

SAMSUNG

SAMSUNG MEDISON
DIAGNOSTIC ULTRASOUND SYSTEM

Version 1.05

RS85

User Manual

English



WARRANTY

Samsung Medison provides the following warranty to the purchaser of this unit. This warranty covers all problems caused by faulty workmanship or faulty material. Samsung Medison will, as sole and exclusive remedy, 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.

Subject to the applicable laws of the relevant territory, Samsung Medison reserves the right to accommodate service requests by

- (1) replacing the product presented for repair with a refurbished product of the same model or
- (2) repairing the product with refurbished parts.

The refurbished products and parts shall be subject to the same inspection, quality control procedures as for new products and parts.

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

SAMSUNG

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PROPRIETARY 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 systems contain Samsung Medison 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 Standards

■ Classifications

- ▶ Type of protection against electrical shock: Class I
- ▶ Degree of protection against electrical shocks (when the patient is in physical contact): Type BF or Defibrillation-proof type CF applied part
- ▶ Degree of protection against the ingress of harmful liquids: General equipment
- ▶ Degree of safety of use in the presence of flammable anesthetic agent mixed with air, oxygen, or nitrous oxide: Not suitable for use near flammable anesthetic agent mixed with air, 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**]
- ▶ Medical Electrical Equipment, Part 1: General Requirements for Basic Safety and Essential Performance [**ANSI/AAMI ES60601-1**]
- ▶ Medical Electrical Equipment, Part 1: General Requirements for Basic Safety and Essential Performance [**CAN/CSA-22.2 No. 60601-1**]
- ▶ 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**]
- ▶ Medical Electrical Equipment, Part 1-6: General Requirements for Basic Safety and Essential Performance – Collateral Standard: Usability [**IEC 60601-1-6**]
- ▶ 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**]
- ▶ Medical Devices – Application of Risk Management to Medical Devices [**ISO 14971**]
- ▶ Biological Evaluation of Medical Devices, Part 1: Evaluation and Testing within a Risk Management Process [**ISO 10993-1**]

■ Declarations



The Nemko-CCL mark with “C” and “US” identifiers indicates that the product is compliant with and certified to the applicable U.S. and Canadian standards.



This mark certifies that the product conforms to applicable EEC standards and has been certified by the European certification agency.



This mark certifies that the product conforms to applicable EEC standards.



The GMP symbol indicates the Good Manufacturing Practice in accordance with the Korean quality management regulations.

⚠️ 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 manual is as follows.

VERSION	DATE	NOTE
v1.05.07-00	2020.03.04	SW Improvement

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.

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.

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∴ Indications for Use

The ultrasound diagnostic system and probes are designed to obtain ultrasound images and analyze body fluid.

The clinical applications include: Fetal/Obstetrics, Abdominal, Gynecology, Pediatric, Small Organ, Neonatal Cephalic, Adult Cephalic, Trans-rectal, Trans-vaginal, Muscular-Skeletal (Conventional, Superficial), Urology, 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 eye.



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 Modes of Operation' and 'Chapter 7. Modes of Operation'.

⚠ 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.

Prolonged use of three-dimensional ultrasound (3D, 4D) by an unqualified individual, such as to produce a commemorative photograph or video of the fetus, may have an adverse effect on the fetus.

Please use the 3D ultrasound diagnostic imaging system for appropriate purposes only, since using it for non-diagnostic purposes such as recording videos of the fetus may adversely affect the fetus.

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: Warnings to prevent a serious accident, or damage to property		Data Input/Output port
	CAUTION: Precautions to prevent a minor accident 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

Symbols	Description	Symbols	Description
	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
	Power on	IPX 1	Dripping-proof device: Protected against vertically falling water drops
	Power off	IPX 7	Immersion-proof device: Protected against the effects of non-continuous immersion in water
	Power on for part of the product	IPX 8	Submersion-proof device: Protected against the effects of continuous immersion in water
	Power off for part of the product		CAUTION: Electrostatic sensitive devices (ESD)
	Alternating current voltage source		Do not sit on the product.
	Direct current voltage source		Do not push the product.
	Dangerous voltage (Indicates dangerous voltages over 1000V AC or 1500V DC)		Do not lean against the product.
	Protective grounding terminal		Be mindful of the space. Do not place a finger, and or any part of your body in the space.
	Equipotential terminal		Do not approach patients with active implanted cardiac devices.

Symbols	Description	Symbols	Description
	Data output port		DANGER: Do not place your fingers, hands, or any parts of your body in the space.
	Data input port		Do not place objects heavier than the weight specified next to the symbol.
	Microphone port		Do not place heavy objects on the monitor while the monitor mount is folded.
	Probe port		Do not push down on the monitor while the monitor mount is folded.
	Federal law restricts this device to sale by or on the order of a physician.		

Symbols

Symbols	Description	Symbols	Description
	The Authorized European Representative's address is provided.		The manufacturer's name and address are provided.

Labels

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

⚡ Electrical Safety

This product is categorized as a Class I device.

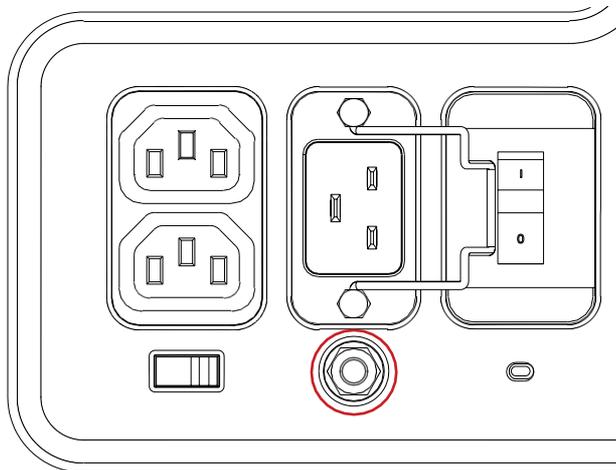


CAUTION:

- ▶ As for US requirement, the LEAKAGE CURRENT might be measured from a center-tapped circuit when the equipment connects in the United States to 240V supply system.
- ▶ To help assure grounding reliability, connect to a “hospital grade” or “hospital only” grounded power outlet.

Prevention of Electric Shock

In a hospital environment, hazardous current can form due to potential differences between exposed conductive parts and connected devices. The solution to the problem is consistent equipotential bonding. Medical equipment is connected with connecting leads made up of sockets which are angled to the equipotential bonding network in medical rooms.



[Figure 1.1 Equipotential Bonding]

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/EN 60601-1. Any person connecting additional equipment to the signal input and output ports of medical electrical equipment must verify that the equipment complies with IEC 60601-1/EN 60601-1.

**WARNING:**

- ▶ Electric shock may result if this system, including all of its externally mounted recording and monitoring devices, is not properly grounded.
- ▶ Never remove the cover from the product. Hazardously high voltage flows through the product. All internal adjustments and replacements must be made by a qualified Samsung Medison Customer Service Department.
- ▶ Always check the product's casing, cables, cords, and plugs for damage before using the product. Disconnect and do not use the power source if the face is cracked, chipped, torn, the housing is damaged, or if the cable is abraded.
- ▶ Always disconnect the system from the wall outlet prior to cleaning it.
- ▶ All patient contact devices, such as probes and ECG leads, must be removed from the patient prior to the application of a high voltage defibrillation pulse.
- ▶ The use of flammable anesthetic gas or oxidizing gases (N₂O) should be avoided. Doing so may cause an explosion.
- ▶ Avoid placing the system where it is likely to be difficult to operate, or disconnect.
- ▶ Do not use HF surgical equipment with the system. Any malfunctions in the HF surgical equipment may result in burns to the patient.
- ▶ 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. This continues to operate when the system is on standby.
- ▶ Do not immerse the cable in liquids. Cables are not waterproof.
- ▶ Make sure that the inside of the system is not exposed to or flooded with liquids. 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 150VA. Only use these outlets 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.
- ▶ Do not connect any peripheral devices not listed in this manual to the auxiliary socket outlets of the system.
- ▶ Do not touch SIP/SOP and the patient simultaneously. There is a risk of electric shock from current leakage.

ECG-Related Information

**WARNING:**

- ▶ This product does not support ECG monitoring. Therefore, it will not recognize incompatible ECG signals.
- ▶ Do not use the ECG electrodes of HF surgical equipment. Any malfunctions in the HF surgical equipment may result in burns to the patient.
- ▶ Do not use ECG electrodes during cardiac pacemaker procedures or other electrical stimulators.
- ▶ Do not use ECG leads and electrodes in an operating room.

ESD

Electrostatic discharge (ESD), commonly referred to as a static shock, is a naturally occurring phenomenon. ESD is most prevalent during conditions of low humidity, which can be caused by heating or air conditioning. The static shock, or ESD, is a discharge of the electrical energy build-up from a charged individual to a lesser or uncharged individual or object. An ESD occurs when an individual with an electrical energy build-up comes in to 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 a patient to an ultrasound system can be significant enough to cause damage to the system or probes.
- ▶ Always perform the pre-ESD preventive procedures before using connectors marked with the ESD warning label.
 - Apply anti-static spray to carpets or linoleum.
 - Use anti-static mats.
 - Ground the product to the patient table or bed.
- ▶ It is highly recommended that the user be given training on ESD-related warning symbols and preventive procedures.

EMI

This product complies with EMI (ElectroMagnetic Interference) standards. However, using the system inside an electromagnetic field can lower the quality of ultrasound images and even damage the product.

If this occurs often, Samsung Medison suggests a review of the environment in which the system is being used, to identify possible sources of radiated 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 the system.

EMC

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

»» ⚠ Guidance and Manufacturer’s Declaration – Electromagnetic Emissions

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an 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 those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
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. Refer to the table below for recommended cable types and lengths:

Cable	Type	Length
VGA	Shielded	Normal
RS232C	Shielded	Normal
USB	Shielded	Normal
LAN (RJ45)	Twisted pair	Any
S-Video	Shielded	Normal
Foot Switch	Shielded	2.99m
B/W Printer	Unshielded Coaxial	Normal
MIC	Unshielded	Any
Printer Remote	Unshielded	Any
Audio R.L	Shielded	Normal
VHS	Shielded	Normal
ECG AUX input	Shielded	< 3m
Parallel	Shielded	Normal

■ 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 emissions 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	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, a relative humidity of at least 30% is recommended.
Electrical fast transient/burst IEC 61000-4-4	±2 kV (for power supply lines) ±1 kV (for input/output lines)	± 2 kV (for power supply lines) ± 1 kV (for input/output lines)	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±0.5 kV, ±1 kV differential mode ±0.5 kV, ±1 kV, ±2 kV common mode	±0.5 kV, ±1 kV differential mode ±0.5 kV, ±1 kV, ±2 kV 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	0% U_t (100% dip in U_t) for 0.5/1 cycles 70% U_t (30% dip in U_t) for 25/30 cycles ^a 0% U_t (100% dip in U_t) for 250/300 cycles ^a	0% U_t (100% dip in U_t) for 0.5/1 cycles 70% U_t (30% dip in U_t) for 25/30 cycles ^a 0% U_t (100% dip in U_t) for 250/300 cycles ^a	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 magnetic field (50/60 Hz) IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical commercial or hospital environment.
NOTE: U_t is the main voltage (AC) prior to the application of the test level.			
^a For example, 10/12 means 10 cycles at 50 Hz or 12 cycles at 60 Hz.			

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
<p>Conducted RF IEC 61000-4-6</p> <p>Radiated RF IEC 61000-4-3</p>	<p>3 Vrms 150 kHz – 80 MHz Outside ISM bands^c</p> <p>6 Vrms 150 kHz – 80 MHz In ISM bands^c</p> <p>3 V/m 80 MHz – 2.7 GHz</p>	<p>3 Vrms</p> <p>6 Vrms</p> <p>3 V/m</p>	<p>Portable and mobile RF communications equipment should not be used closer to any part of the Ultrasound System, including cables, than the recommended separation distance. This is calculated using the equation applicable to the frequency of the transmitter.</p> <p>Recommended Separation Distance</p> <p>$d = 1.2\sqrt{P}$</p> <p>IEC 60601-1-2: 2007</p> <p>$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz</p> <p>$d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz</p> <p>IEC 60601-1-2: 2014</p> <p>$d = 2.0\sqrt{P}$ 80 MHz to 2.7 GHz</p> <p>Where <i>P</i> is the transmitter’s maximum output power rating in watts (W) according to the transmitter’s manufacturer and <i>d</i> is the recommended separation distance in meters (m).</p> <p>Field strengths from fixed RF transmitters^a, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range^b.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE1: At 80 MHz and 800 MHz, the higher frequency range applies.</p> <p>NOTE2: These guidelines may not be applicable in some situations. Electromagnetic propagation is affected by absorption and reflection of structures, objects, and people.</p>			
<p>^aField strengths from fixed transmitters, such as base stations for radio, (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcasts, and TV broadcasts cannot be predicted 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 reorienting or relocating the Ultrasound System or using a shielded location with a higher RF shielding effectiveness and filter attenuation.</p> <p>^bWhen the frequency range exceeds 150 kHz - 80 MHz, the electric field strength should be not higher than 3 V/m.</p> <p>^c The ISM (Industrial, Scientific and Medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.</p>			

▶▶ ⚠ 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. These distances are recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter [W]	Separation Distance in Relation to Frequency of Transmitter [m]				
	IEC 60601-1-2: 2007			IEC 60601-1-2: 2014	
	150 kHz – 80 MHz $d = 1.2\sqrt{P}$	80 MHz – 800 MHz $d = 1.2\sqrt{P}$	800 MHz – 2.5 GHz $d = 2.3\sqrt{P}$	150 kHz – 80 MHz $d = 1.2\sqrt{P}$	80 MHz – 2.7 GHz $d = 2.0\sqrt{P}$
0.01	0.12	0.12	0.23	0.12	0.20
0.1	0.38	0.38	0.73	0.38	0.63
1	1.2	1.2	2.3	1.2	2.0
10	3.8	3.8	7.3	3.8	6.3
100	12	12	23	12	20

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's manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not be applicable in some situations. Electromagnetic propagation is affected by absorption and reflection of structures, objects, and people.

▶▶ ⚠ Guidance and Manufacturer's Declaration – Electromagnetic Immunity

This product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Portable RF communications equipments should be used no closer than 30 cm (12 inches) to any parts of the product. Otherwise, the performance of this equipment could be degraded.

Immunity Test	Band ^a (MHz)	Service ^a	Modulation ^b	IEC 60601 Test Level (V/m)	Compliance Level (V/m)
Proximity fields from RF wireless communications equipment IEC 61000-4-3	380 – 390	TETRA 400	Pulse modulation ^b 18 Hz	27	27
	430 – 470	GMRS 460 FRS 460	FM ^c ±5 kHz deviation 1 kHz sine	28	28
	704 – 787	LTE Band 13, 17	Pulse modulation ^b 217 Hz	9	9
	800 – 960	GSM 800/900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5	Pulse modulation ^b 18 Hz	28	28
	1700 – 1990	GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1, 3, 4, 25 UMTS	Pulse modulation ^b 217 Hz	28	28
	2400 – 2570	Blue Tooth WLAN 802.11 b/g/n RFID 2450 LTE Band 7	Pulse modulation ^b 217 Hz	28	28
	5100 – 5800	WLAN 802.11 a/n	Pulse modulation ^b 217 Hz	9	9

NOTE: If necessary to achieve the IMMUNITY TEST LEVEL, the distance between the transmitting antenna and the ME EQUIPMENT or ME SYSTEM may be reduced to 1m. The 1m test distance is permitted by IEC 61000-4-3.

^a For Some services, only the uplink frequencies are included.

^b The carrier shall be modulated using a 50% duty cycle square wave signal.

^c As an alternative to FM modulation, 50% pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

**WARNING:**

- ▶ Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.
- ▶ Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
- ▶ Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the **ME EQUIPMENT** or **ME SYSTEM**, including cables specified by the manufacturer.
- ▶ Failure to use this equipment in the specified type of shielded location could result in degradation of the performance of this equipment, interference with other equipment or interference with radio services.
- ▶ This equipment has been tested for radiated RF immunity only at selected frequencies, and use nearby of emitters at other frequencies could result in improper operation.



NOTE: The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 Class A). If it is used in a residential environment (for which CISPR 11 Class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.



Electromagnetic Environment – Guidance

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

It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.



CAUTION: If the system is connected to other customer-supplied equipment, such as a local area network (LAN) or a remote printer, Samsung Medison cannot guarantee that the remote equipment will work correctly in the presence of electromagnetic 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 noises in the audio, or both.
<ol style="list-style-type: none"> ESD caused by discharging of electric charge build-up on insulated surfaces or persons. RF energy from RF transmitting equipment such as portable phones, hand-held radios, wireless devices, commercial radio and TV, and so on. Conducted interference on power lines 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 ultrasound systems do not generate interference in excess of the referenced standards.

The 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. After you answer this question, contact your local Samsung Medison customer service representative.

⚠ Mechanical Safety

Moving the Equipment



WARNING: The product weighs more than 100kg. Be extra careful when transporting it. Careless transportation of the product may result in product damage or personal injury.

- ▶ Before transporting the product, check that the wheel brakes are unlocked. Also, make sure to retract the monitor arm completely, so that it is secured in a stationary position.
- ▶ Always use the handles at the back of the console and move the product slowly.

This product is designed to resist shocks. However, excessive shock, for example – if the product falls over, may cause serious damage.

If the system operates abnormally after being repositioned, please contact Samsung Medison customer service department.

⏏ **The Brakes**

You can use the brakes to control the movement of the product. The brakes are mounted on the main body with interlinked on/off buttons. This is how you engage or release the brakes:

To engage the brakes, press the On button with your foot. The Off button will rise. We recommend that you lock the brakes when using the product.

Precautions on Ramps

Always make sure that the control panel is facing the direction of movement.



WARNING: Be aware of the castors, especially when moving the system. Samsung Medison recommends that you exercise caution when moving the product up or down ramps.

When moving the product down a ramp or resting it temporarily on a ramp, the product may tilt over even with the brakes on depending on the direction the product is facing. Do not leave the product on ramps.

Safety Notes



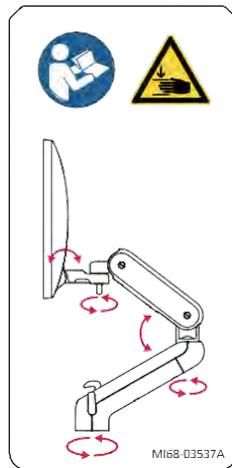
CAUTION:

- ▶ Do not press the control panel excessively.
- ▶ Never attempt to modify the product in any way.
- ▶ Check the operational safety when using the product after a prolonged break in service.
- ▶ Make sure that other objects, such as pieces of metal, do not enter the system.
- ▶ Do not block the ventilation slots.
- ▶ Do not pull on the power cord to unplug it. Doing so can damage the cord and cause short-circuiting and cord snapping. Always unplug 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 service life of the product is approximately 7 years.

For detailed information on cleaning and disinfecting the product, refer to 'Chapter 4. Maintenance'.

ⓘ Monitor Safety Caution

When adjusting the height or position of the monitor, be careful of the space in the middle of the monitor arm. Having your fingers, or other body parts, caught in it may result in injury.



[Figure 1.2 Monitor Safety Caution]

ⓘ Control Panel Caution



CAUTION:

- ▶ Do not press on the control panel with excessive force or lean against it.
- ▶ Do not sit on the control panel or apply too much pressure to it.
- ▶ Do not lift the product grasping the handles on the control panel.

When adjusting the control panel's height or position, be mindful of the space between the panel and the lift. Having your fingers, or other body parts, caught in it may result in injury.



[Figure 1.3 Lift Safety Caution]



Touchscreen Caution



CAUTION: Do not press on the touchscreen with excessive force.

When tilting the touchscreen, be careful not to leave your fingers or hand in the space behind the touchscreen – they may get trapped and hurt.



[Figure 1.4 Touchscreen Safety Caution]

:: Biological Safety

For safety instructions concerning probes and biopsies, refer to 'Chapter 5. Probes'.

**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 Samsung Medison customer service department.
- ▶ Do not use a system that exhibits erratic or inconsistent functioning. Discontinuities in the scanning sequence are indicative of a hardware failure that should be corrected before use.
- ▶ The system limits the maximum contact temperature to 43 degrees Celsius, and the ultrasonic wave output observes American FDA regulations.

ALARA Principle

Guidance for the use of diagnostic ultrasound is defined by the “**As Low As Reasonably Achievable**” (ALARA) principle. The decision as to what is reasonable has been 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 to 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.

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 its applications, have resulted in the need for increased and improved information to guide the user. The output indices are designed to provide that important information.

There are a number of variables, which 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. Exposure time is an especially useful variable, because the user controls it. The ability to limit the index values over time supports the ALARA principle.

»» ⌘ 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 an unscanned mode, like M mode or Doppler, concentrate the 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 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 biological effect is actually occurring, it 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 and can be divided into three categories: direct, indirect, and receiver control.

»» ⌘ Direct Controls

Application selection and the output intensity control directly affect acoustic intensity. There are different ranges of allowable intensity or output depending on your selection. Selecting the correct range of acoustic intensity for the application is one of the first things 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. Samsung Medison systems provide both automatic and user-definable settings.

Output has direct impact on acoustic intensity. Once the application has been established, the output control can be used to increase or decrease the output intensity. 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 scanning 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 is, the higher the number of pulses of energy that will be emitted will be, in the given period of time. Pulse repetition frequency is affected by a number of controls, including 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, or pulse duration is the output pulse duration in pulsed Doppler. 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 higher output intensity to scan at an increased 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 through 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 (Tlb) and cranial bone (Tlc). One of these three thermal indices will be displayed at all times. The thermal index to be displayed is determined by the system preset or user choice, depending upon the application.

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 diagnostic probe application has a default selection. The Tlb or TIs is continuously displayed over its 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 Tlb for a focus at or near a bone. Some factors might create artificially high or low thermal index readings (e.g. presence of fluid or bone, or the flow of blood). A highly attenuating tissue path, for example, may cause the potential for local zone heating to be lower than the thermal index indicates.

The selection of scanned modes or unscanned Operation mode 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 scanning. 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 biological effects 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 potential temperature increase occurring on 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 (Tlb) 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 (Tlc) 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. Tlc is displayed when you select a trans-cranial application.

You can select TI Display in Utility > Setup > Display > 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 manual's Acoustic Output Tables. 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 derated 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 deviation, algorithm accuracy, and measurement deviation. Deviation among probes and systems in particular is an important factor. 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**

Power controls the system 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 total TI is the sum of TIs of the individual modes. 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. Pulse voltage may be automatically adjusted down with 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 automatically changing the frame rate or focal depth. 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. In general, 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 may increase the TI. More time is required for the scanning of 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 the dominant 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. MI will correspond to the peak intensity of the dominant pulse type, which is a color pulse. However, if pulsed Doppler is also enabled, then pulsed Doppler will remain the dominant 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 the dominant 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.

▶▶ ⚠ Doppler, CW, M Mode, and Color Imaging Controls

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 derated 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. Defaults are initialized when you select a probe. Samsung Medison's factory defaults vary according to the probe, application, and mode. Defaults have been chosen below the FDA limits 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. Factory defaults vary with probe, application, and mode. Defaults have been chosen below the FDA limits for intended use.

»» ⌘ **Related Guidance Documents**

For more information about ultrasonic bioeffects and related topics, refer to the following;

- ▶ Medical Ultrasound Safety (AIUM, 2014).
- ▶ 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 (Bioeffect Considerations for the Safety of Diagnostic Ultrasound, *J Ultrasound Med.*, Sept. 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 the 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 Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment (AIUM/NEMA, 2004).

▶▶ ***In Situ*, Derated, 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:

$$In\ Situ = Water [e^{-0.23 a l f}]$$

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

Water = Water Value Intensity

e = 2.7183

a = Attenuation Factor

Tissue a (dB/cm-MHz)

Brain 0.53

Heart 0.66

Kidney 0.79

Liver 0.43

Muscle 0.55

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. An attenuation factor of 0.3 is used for general reporting purposes; therefore, the *In Situ* value is commonly reported using this formula:

$$In\ Situ\ (derated) = Water [e^{-0.069 l f}]$$

Since this value is not the true *in situ* intensity, the term “derated” is used.

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

f_{awf}	ACOUSTIC WORKING FREQUENCY is the frequency of an acoustic signal based on the observation of the output of a hydrophone placed in an acoustic field at the position corresponding to the spatial-peak temporal-peak acoustic pressure. (unit: MHz)
$I_{pa,\alpha}$ at $z_{pii,\alpha}$	The ATTENUATED PULSE-AVERAGE INTENSITY at the depth of maximum ATTENUATED SPATIAL-PEAK TEMPORAL-AVERAGE INTENSITY. (unit: Watts per square centimeter)
$I_{ta}(z)$	The TEMPORAL-AVERAGE INTENSITY at axial distance z . (unit: Milliwatts per square centimeter)
$I_{ta,\alpha}(z)$	The ATTENUATED TEMPORAL-AVERAGE INTENSITY at axial distance z . (unit: Milliwatts per square centimeter)
MI	MECHANICAL INDEX is a displayed parameter representing potential cavitation bioeffects. (unit: N/A)
n_{pps}	The number of acoustic pulses travelling along a particular ULTRASONIC SCAN LINE.
P	OUTPUT POWER is time-average ultrasonic power emitted by an ultrasonic transducer into an approximately free field under specified conditions in a specified medium, preferably water. (unit: mW)
P_{1x1}	Maximum value of the time average acoustic output power emitted from any one-centimetre square region of the active area of the transducer, the one-centimetre square region having 1 cm dimensions in the x- and y-directions.
$P_{r,at}z_{pii}$	The PEAK-RAREFACTIONAL ACOUSTIC PRESSURE at the depth of maximum SPATIAL-PEAK TEMPORAL-AVERAGE INTENSITY. (unit: Megapascals)
$P_{r,\alpha}at z_M$	The ATTENUATED PEAK-RAREFACTIONAL ACOUSTIC PRESSURE associated with the transmit pattern giving rise to the reported value of MI. (unit: Megapascals)
pii	Time integral of the instantaneous intensity at a particular point in an acoustic field integrated over the acoustic pulse waveform. (unit: Watts per square centimeter)

$pii_{\alpha}(Z)$	Value of the pulse-intensity integral after attenuation, at a specified distance from the external transducer aperture. (unit: Watts per square centimeter)
prf	PULSE REPETITION RATE is reciprocal of time interval between equivalent points on successive pulses or tone-bursts. (unit: Hz)
srr	SCAN REPETITION RATE is reciprocal of time interval between identical points on two successive frames, sectors or scans, applying to automatic scanning systems with a periodic scan sequence only. (unit: Pulses per second or Hz)
TIB	BONE THERMAL INDEX is a thermal index for applications such as foetal (second and third trimester), in which the ultrasound beam passes through soft tissue and a focal region is in the immediate vicinity of bone. (unit: N/A)
TIC	CRANIAL BONE THERMAL INDEX is a thermal index for applications, in which the ultrasound beam passes through bone near the beam entrance into the body, such as paediatric and adult cranial or neonatal cephalic applications. (unit: N/A)
TIS	SOFT TISSUE THERMAL INDEX is a thermal index related to soft tissues. (unit: N/A)
$Z_{b,ns}$	DEPTH FOR BONE THERMAL INDEX for non-scanning modes, the distance along the beam axis from the external transducer aperture to the plane where the product of attenuated output power and attenuated spatial-peak temporal-average intensity is a maximum over the distance range equal to, or greater than, the break-point depth, z_{bp} . (unit: cm)
Z_{MI}	Depth on the BEAM-AXIS from the EXTERNAL TRANSDUCER APERTURE to the plane of maximum ATTENUATED PULSE INTENSITY INTEGRAL (pii_{α}). (unit: cm)
$Z_{s,ns}$	DEPTH FOR SOFT-TISSUE THERMAL INDEX for non-scanning modes, the distance along the beam axis from the external transducer aperture to the plane at which the lower value of the attenuated output power and the product of the attenuated spatial-peak temporal-average intensity and 1 cm^2 is maximized over the distance range equal to, or greater than, the break-point depth, z_{bp} . (unit: cm)
$Z_{pii,\alpha}$	Position of maximum ATTENUATED SPATIAL-PEAK TEMPORAL-AVERAGE INTENSITY for NONSCANNING MODE components, determined beyond the BREAK-POINT DEPTH, z_{bp} , on the BEAM-AXIS. (unit: cm)

▶▶ Acoustic Measurement Precision and Uncertainty

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

Quantity	Precision	Total Uncertainty
$p_{ii\alpha}$ (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, derated rarefaction pressure $P_{r,3}$, 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 conducted by the 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 (or 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 non-linear 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.

⚠ Environmental Protection

**CAUTION:**

- ▶ For disposing of the system or accessories that have come to the end of their service lives, contact the vendor or follow appropriate disposal procedures.
- ▶ Waste must be disposed of in compliance with the local regulations.
- ▶ The lithium ion battery used in the product must be replaced by a Samsung Medison service engineer or an authorized dealer.

▶▶ ♻ EU WEEE Directive

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

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.

▶▶ ♻ EU REACH Regulation

For information on Samsung's environmental commitments and product specific regulatory obligations e.g. REACH visit:

[Samsung.com/uk/aboutsamsung/samsungelectronics/corporatecitizenship/data_corner.html](https://www.samsung.com/uk/aboutsamsung/samsungelectronics/corporatecitizenship/data_corner.html)



State of California Proposition 65 Warning (US Only)



WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Chapter 2

Introduction

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 - Console 2-18
 - Peripheral Devices..... 2-20
 - Probes 2-23
 - Accessories 2-24
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:: Specifications

Physical Dimensions	Height: 1,400 mm (with monitor) Width: 557 mm Depth: 985 mm Weight: 131 kg (with monitor) Weight: Approx. 151 kg (with Safe Working Load)
Imaging Modes	2D Mode M Mode Color Doppler Pulsed Wave (PW) Spectral Doppler Continuous Wave (CW) Doppler Tissue Doppler Imaging (TDI) Tissue Doppler Wave (TDW) Power Doppler (PD) S-Flow ElastoScan+ Mode Color M Mode Anatomical Mode 3D Imaging Mode 4D Imaging Mode MV-Flow
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)	Linear Array L3-12A, LA2-9A, LA3-16A, LA3-16AI, LA4-18B, LM4-15B Curved Array CA1-7A, CA2-8A, CF4-9, CA3-10A Endocavity E3-12A, EA2-11B TEE MMPT3-7 3D V5-9, LV3-14A, CV1-8A, EV3-10B Phased Array PA3-8B, PA4-12B, PM1-6A CW CW6.0, DP2B, DP8B
Probe Connections	Five Active Probe Ports (include one CW probe port)
Monitor	Main Monitor 23 inch, 23.8 inch LCD monitor (LED Backlight unit, hereafter referred to as "LCD monitor") Touchscreen Monitor 13.3 inch LCD monitor (LED Backlight unit, hereafter referred to as "LCD monitor")
ECG	USB Type (Defibrillation-proof type CF)
Rear Panel Input/Output Connections	Video Out (VHS, S-VHS) Audio Out Microphone External Trigger Out External monitor HDMI (without Sound) Network USB
Image Storage	Maximum 12,700 frames for Cine memory Maximum 8,192 Lines for Loop memory Image filing system
Application	Obstetrics, Gynecology, Urology, Abdomen, Vascular, Small Part, Pediatric, MSK, Contrast, Cardiac, TCD
Electrical Parameters	100-240 V~, 1000 VA, 50/60 Hz
Measurement Packages	OB, Gynecology, Cardiac, Vascular, Fetal Heart, Urology, Abdomen, Small Parts, Musculoskeletal, TCD, Pediatric Hips, Intraoperative, General

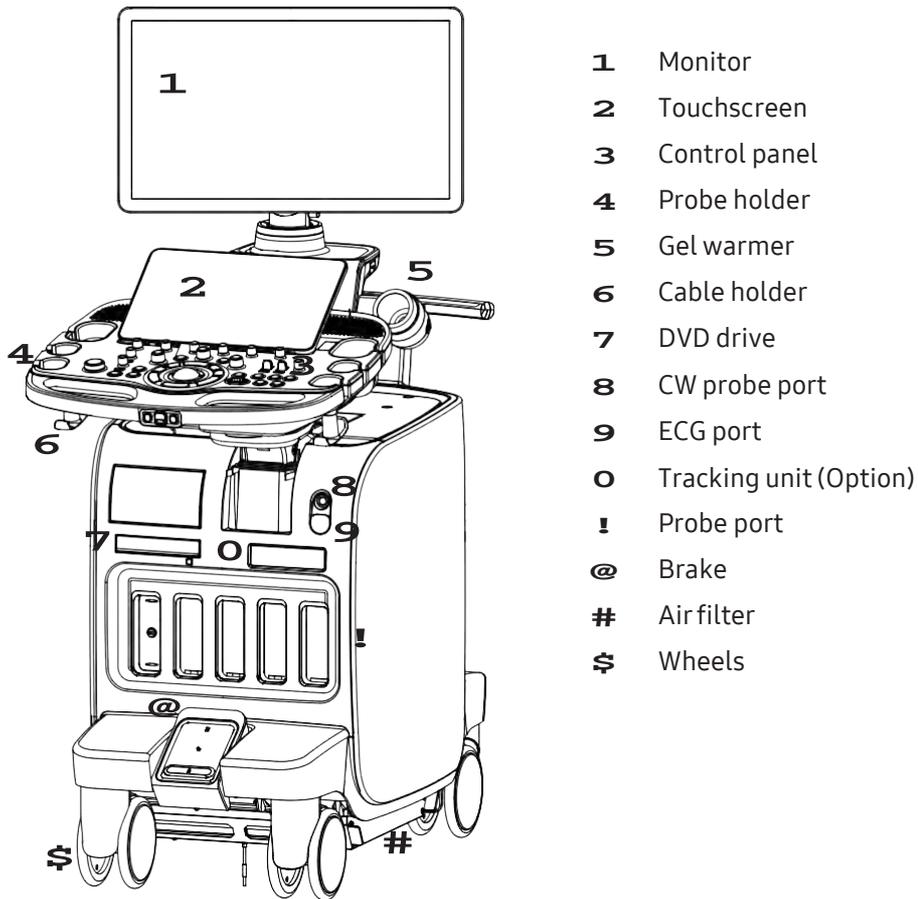
Signal Processing (Pre-processing)	<p>TGC control</p> <p>Mode-independent gain control</p> <p>Acoustic power control (adjustable)</p> <p>Dynamic aperture</p> <p>Dynamic apodization</p> <p>Dynamic range control (adjustable)</p> <p>Image view area control</p> <p>M mode sweep speed control</p>
Signal Processing (Post-processing)	<p>Frame average</p> <p>Edge Enhancement/Blurring</p> <p>Gamma-scale windowing</p> <p>Image orientation (left/right and up/down, rotation)</p> <p>White on black/black on white</p> <p>Zoom</p>
Measurement	<p>Trackball operation of multiple cursors</p> <ul style="list-style-type: none"> ▶ 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	<p>USB Video Printer</p> <p>USB Line Printer</p> <p>USB to RS-232 Serial Cable</p> <p>Foot Switch (IPX8)</p> <p>USB Flash Memory Media</p> <p>USB HDD</p>
User Interface	<p>English, German, French, Spanish, Italian, Russian, Chinese</p>
Pressure Limits	<p>Operating: 700 – 1,060 hPa</p> <p>Storage: 700 – 1,060 hPa</p>
Humidity Limits	<p>Operating: 30 – 75%</p> <p>Storage & Shipping: 20 – 90%</p>
Temperature Limits	<p>Operating: 10 – 35°C</p> <p>Storage & Shipping: -25 – 60°C</p>



CAUTION: If you are using Clear Track/Virtual Track (optional), the operating temperature limit is 10 - 30°C. Refer to the User Manual for Clear Track/Virtual Track supplied with Clear Track/Virtual Track.

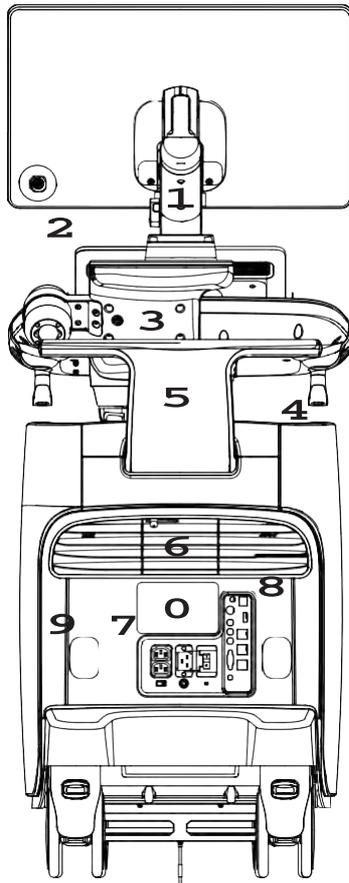
:: Product Configuration

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



- 1** Monitor
- 2** Touchscreen
- 3** Control panel
- 4** Probe holder
- 5** Gel warmer
- 6** Cable holder
- 7** DVD drive
- 8** CW probe port
- 9** ECG port
- 0** Tracking unit (Option)
- !** Probe port
- @** Brake
- #** Air filter
- \$** Wheels

[Figure 2.1 Front of the Product]



- 1** Monitor arm
- 2** USB port
- 3** Lift
- 4** Storage compartments
- 5** Handle
- 6** Ventilation
- 7** Power connection
- 8** Rear panel
- 9** Cable holder
- 0** ID Label

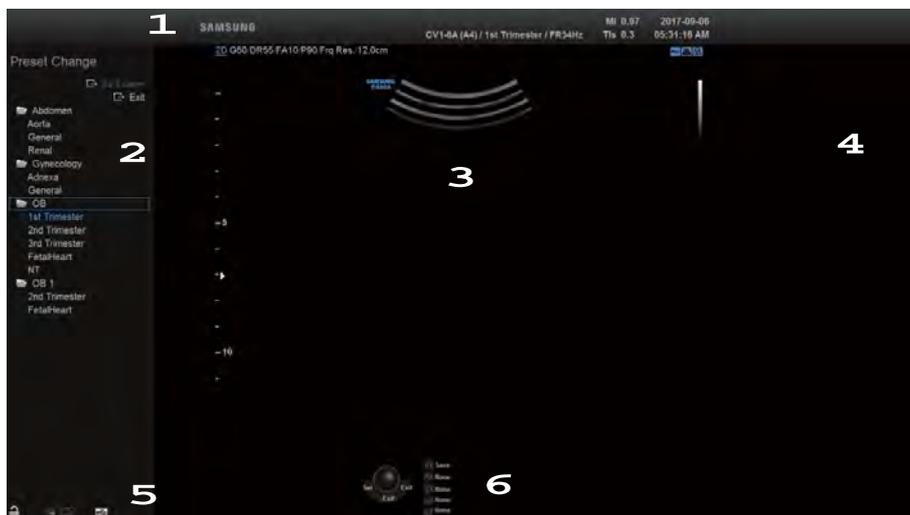
[Figure 2.2 Back of the Product]

Monitor

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

▶▶ Screen Layout

The screen displays ultrasound images, user menus and a variety of other information. As shown in the image below, the screen layout consists of the **1** Title area, **2** Preset Change and EZ-Exam+ area, **3** Image area, **4** Thumbnail area, **5** User Information area, and **6** User-defined Key area.



[Figure 2.3 Monitor Display]

1 Title Area

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

2 Preset Change and EZ-Exam+ Area

Displays Preset Change. You can quickly change the preset of a probe. The EZ-Exam+ menu will also appear if being used.



NOTE: You can set up the EZ-Exam+ menu in EZ-Exam+ Setup. For more information, please refer to 'Chapter 3. Utilities'.

3 Image Area

Displays ultrasound images, TGC, image information, annotation, and measurement information are also displayed.

4 Thumbnail Area

Images saved by selecting **Save** are displayed as thumbnails. If saving Single screens, up to 5 images are shown in a list; for Quad screens, up to 16 images can be displayed. Clicking with the pointer will enlarge the selected thumbnail in the Image area.

5 User Information Area

Information that is useful to the user, such as current system status, image information, selectable items, etc., is displayed.

6 User Key (User Defined Key) Area

The Key settings, including the positions of the **Set** and **Exit** buttons, are displayed. You can change the settings for each button in Utility > Setup > Customize > Button.



NOTE: For information on User Key Setup, please refer to 'Chapter 3. Utilities'.



Tips!

Principles of Operation of the Diagnostic Ultrasound System

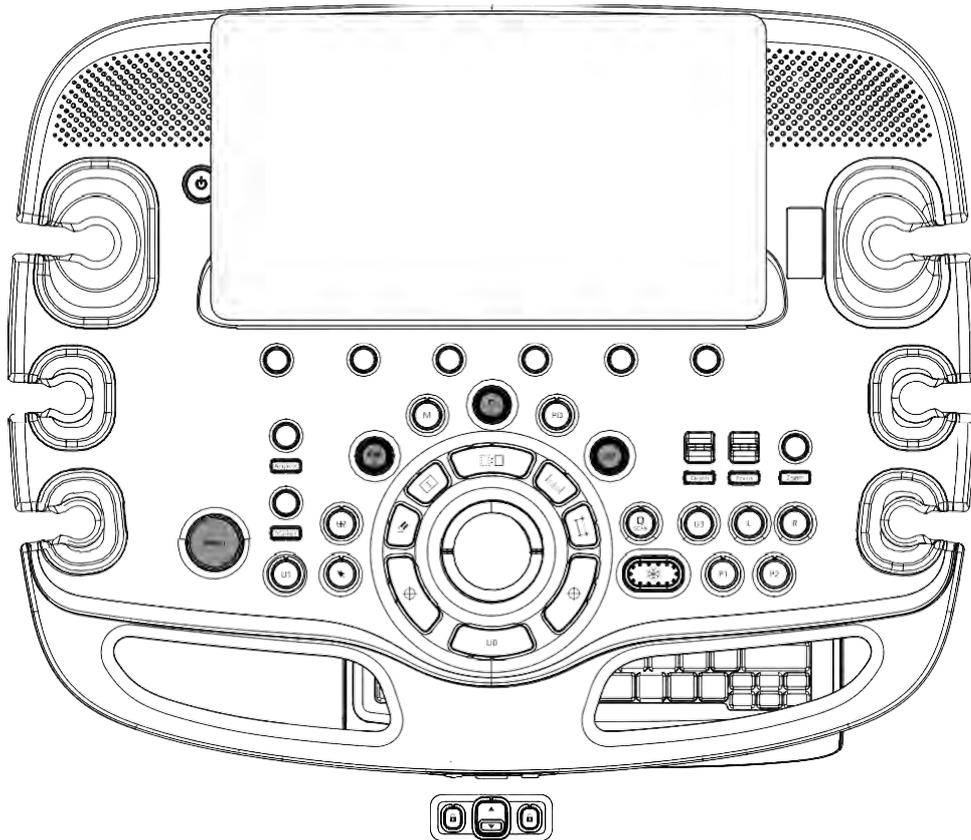
Medical ultrasound images are created by digital memory and computer when they convert the high-frequency wave signals that are transmitted and received by the probe.

As ultrasound waves propagate through the human body, they generate reflected signals whenever they encounter a change in density. For example, reflected signals are generated when signals pass from fatty tissues to muscle tissues. Reflected signals return to the probe where they are converted into electronic signals. The reflected signals are amplified and processed by analog and digital circuits that have filters for various frequencies and response time options. Then they are again converted into high-frequency electronic signals, and saved as a series of digital image signals. The monitor displays the image signals stored in the storage device in real time.

The entire process of transmitting, receiving, and processing signals is controlled by the computer.

Control Panel

The system can be controlled by using the control panel.



[Figure 2.4 Control Panel]

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

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

»» Functions of the Control Panel

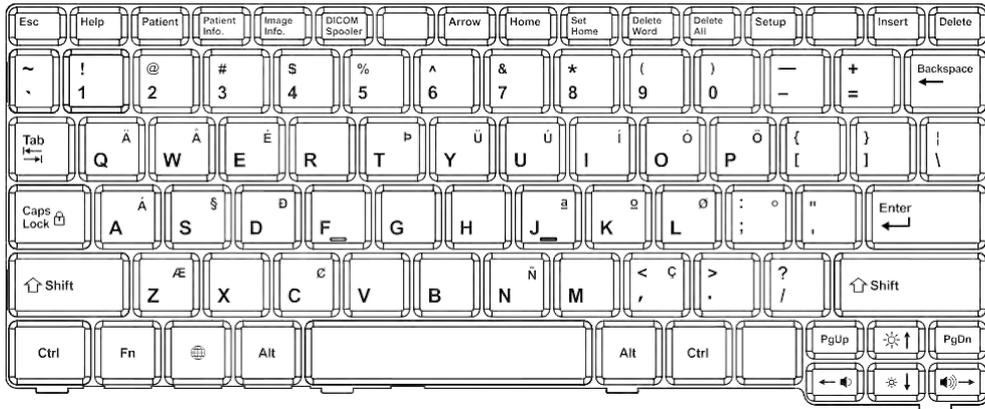
The following are the descriptions and instructions for the controls on the control panel. For more information on controls with multiple functions, see 'Chapter 3. Utilities' onwards in this manual.

 On/Off	Button	Turns the system on/off.
2D	Dial-button	<ul style="list-style-type: none"> ▶ Button: Starts 2D mode. ▶ Dial: Adjusts the 2D gain.
M	Button	Starts or ends M mode.
PD	Button	Starts or ends Power Doppler mode.
PW/Y	Dial-button	<ul style="list-style-type: none"> ▶ Button: Starts or ends PW Spectral Doppler mode. ▶ Dial: Adjusts the PW gain. Also, turning this dial-button when in 3D View rotates the image along the Y-axis.
C/z	Dial-button	<ul style="list-style-type: none"> ▶ Button: Starts or ends Color Doppler mode. ▶ Dial: Adjusts the C gain. Also, turning this dial-button when in 3D View rotates the image along the z-axis.
Angle/X	Dial-button	<ul style="list-style-type: none"> ▶ Button: Adjusts the angle of the sample volume in Spectral Doppler mode. It is also used to adjust the BodyMarker's probe cursor or indicator angle. ▶ Dial: In 3D View, rotates the image along the x-axis.
Marker	Dial-button	Allows the user to type in a BodyMarker on an image. Turn the Marker knob to adjust the probe angle.
Depth	Switch	Adjusts the scanning depth of the image.
Focus	Switch	Changes location and number of focus on the target location you wish to study.
Zoom	Dial-button	Magnifies an image.
Q Scan	Button	Turns the Quick Scan function on. 'Q Scan' will be marked on the top of the image. This function is used in specific study subjects for specific probes.
 Freeze	Button	Pauses/resumes scanning.

U1-4	Button	Stands for 'User Key'. This button allows users to select a function to apply to the button. The function of each button can be assigned via the U Key in Utility > Setup > Customize > Button. The selected settings will be displayed in the User Defined Key area of the monitor.
P1-2	Button	Stands for 'Peripheral Key'. This button allows users to select a function to apply to the button. The function of each button can be assigned via the U Key in Utility > Setup > Customize > Button. The selected settings will be displayed in the User Defined Key area of the monitor.
 Set/Exit	Button	Assigns user-defined functions. The function of each button can be assigned via the U Key in Utility > Setup > Customize > Button. <ul style="list-style-type: none"> ▶ Set: Selects an item or value using the trackball or changes the function of the trackball. ▶ Exit: Exits the function currently being used and returns to the previous state.
Menu	Dial-button	Uses the Ez Exam and Preset Change features.
 Clear	Button	Deletes text, indicators, BodyMarkers, measurement results, etc. displayed on an image.
 Change	Button	Changes the current trackball function.
 Calculator	Button	Starts measurements by application.
 Caliper	Button	Measures distance, circumference, area, and volume.
Trackball	Trackball	Moves the cursor on the screen and scrolls through Cine images.
 Text	Button	Allows the user to enter text on an image.
L	Button	Compares two separate images. The activated image mode is shown on the left.
R	Button	Compares two separate images. The activated image mode is shown on the right.

■ Keyboard (Optional)

This is used to enter text. The keyboard is optional.



[Figure 2.5 Keyboard]

Touchscreen

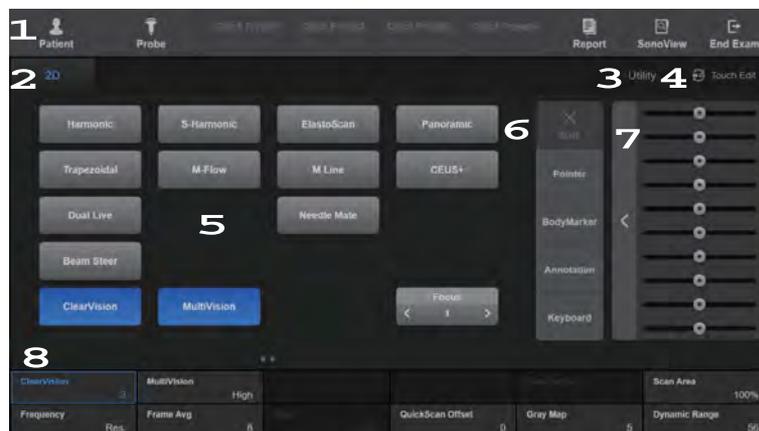
The touchscreen is an operating tool that can be touched by the user to input data. The functions that are available in the current mode are shown in the form of buttons or a dial-button.

Touchscreen Layout



Changing Touchscreen Tabs

You can change tabs on the touchscreen by performing a dragging in a page-turn action.



[Figure 2.6 Touchscreen]

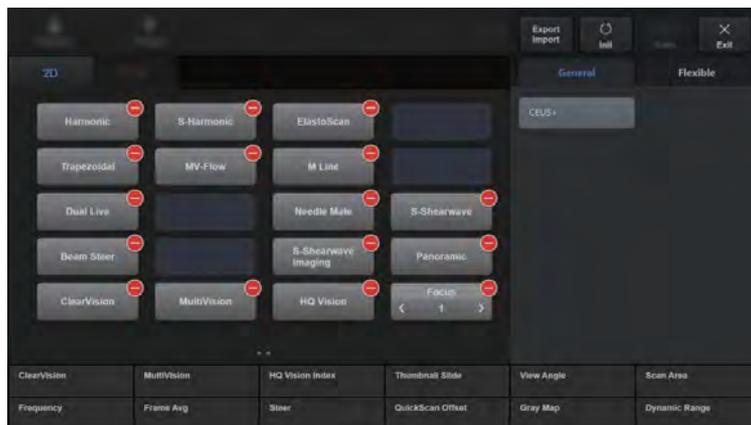
1 Information Area: Shows the title of the touchscreen currently displayed.

Patient	Displays the <i>Patient Information</i> screen, which is used for selecting a patient ID from the list or entering new patient information.
Probe	Displays the <i>Probe Selection</i> screen to select or change the probe and application.
Quick Preset 1–4	Shows the Preset buttons configured at Setup. Up to 4 Preset buttons can be displayed.
Report	Displays the <i>Report</i> screen that shows the measurement results of the current application and other information.
SonoView	Launches SonoView, an image filing program.
End Exam	Finishes the exam of the currently selected patient and resets the related data.



NOTE: For further details about setting up Quick Presets, please refer to 'Utility > Setup > System > Quick Preset' in 'Chapter 3. Utilities'.

- 2 Displays the mode that is currently used.
- 3 The current Operation mode and Utility are displayed in separate tabs and buttons.
- 4 The device enters Customize Mode when the user presses the **Touch Edit** button.



[Figure 2.7 Touchscreen – Touch Edit]

1. Press the – icon at the top of a button to remove that button from the touchscreen.
2. Press an empty slot to add or move a desired function to that button.



NOTE:

- ▶ From the Flexible tab, you can add or move the **WideView**, **Thumbnail Slide**, and **Thumbnail Load** buttons.
- ▶ When the **Thumbnail Slide** button is configured, you can move the saved thumbnails using the knob.

3. **Export/Import:** Configures the Export/Import settings for Touch Customize.
 - ▶ **Init:** Resets the layout to factory default (a Guide Message is provided).
 - ▶ **Save:** Saves the current modification.
 - ▶ **Exit:** Exits Edit Mode (a Guide Message is provided).
4. The optional functions for the **General** Button and **Flexible** Button can be viewed. They are displayed in tabs.

When the General Tab is active: The Delete icon will be displayed on the **General** Button only, and empty slots will be highlighted.

5. Pool Area: Optional buttons are located here. The user can drag desired buttons from this area and drop them into empty slots.
- 5 The menu items that are available in the current input mode are shown as buttons. The menu currently in use is shown in blue.
- 6 These buttons are always displayed on the touchscreen.

Exit	Exits the current screen and returns to the previous state.
-------------	---

The user can assign desired functions to the other four buttons in Utility > Setup > Customize > Touch. Buttons that are in use are shown in blue and buttons that cannot be used are disabled.

Default Arrangement: BodyMarker, Annotation, Screen Keyboard, None

- 7 This is the TGC area. Displays ten sliders for controlling Gain. Moving the slider to the right increases the Gain, which makes the image brighter. TGC stands for Time Gain Compensation.



CAUTION: An excessively large difference between the Gain value settings of adjacent TGC sliders may cause stripes to appear in an image.

- 8 Soft Menu Area: The Soft Menu items that are available in the current input mode are shown. The menus in use are shown with blue borders. Press or rotate the dial-buttons right below each menu.



When there are two Soft Menus on the Touchscreen

When there are two menus available, upper and lower, press the corresponding dial-button to select a desired menu. Alternatively, press a desired menu button on the touchscreen and then use the dial-button.



Adjusting the Control Panel

**CAUTION:**

- ▶ Do not apply excessive force to the control panel.
- ▶ Use the handle at the back of the product when moving it.

■ Moving Left-Right/Forward-Backward

Press and hold one of the two  buttons at the center of the control panel handle, and move carefully left-right/forward-backward to adjust the position. Release the button to fix the control panel in the current position.

■ Moving Up and Down

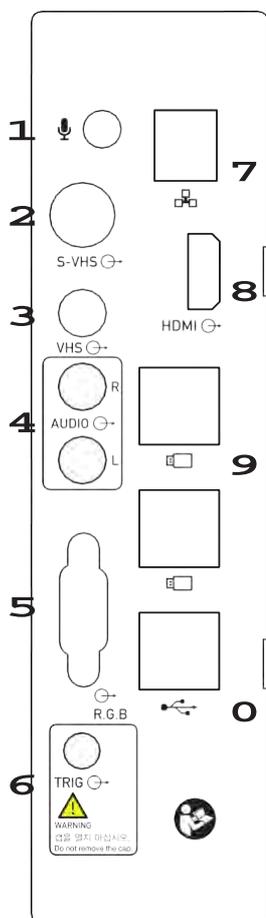
Press the  automatic switch located at the center of the control panel handle to adjust the position vertically.

Console

The console consists of two parts – the inner and outer units. The interior of the console mainly contains devices that produce ultrasound images. On the exterior of the console are various connectors, probe holders, storage compartments, handles, and wheels, etc.

▶▶ Rear Panel

A monitor and other peripheral devices are connected via the rear panel at the back of the system.

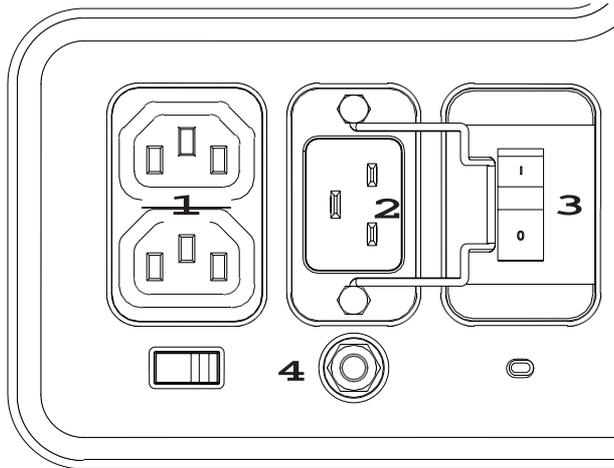


[Figure 2.8 Rear Panel]

- 1** Microphone port (Input): Connects a microphone.
- 2** S-VHS port (Output): Connects the VCR in S-VHS mode.
- 3** VHS port (Output): Connects the VCR in VHS mode.
- 4** Audio port (Output): Used to send audio signals.
- 5** RGB port (Output): Used to output RGB signals.
- 6** Trig port (In/Output): Not used.
- 7** Network port (In/Output): Connects to a network. Via DICOM network, patient information can be transferred to other servers.
- 8** HDMI port (Output): Used to send digital signals to a monitor. Use of a DVI monitor via a DVI adapter or cable is not recommended. (supporting 1920x1080 resolution only)
- 9** Dongle USB port (In/Output): Used to install the optional SW that is intended for use with the Dongle.
- 10** USB port (In/Output): Connects USB peripheral devices.

▶▶ ⚠ Power Connection Part

The power connection part is located at the bottom on the rear panel.



[Figure 2.9 Power Connection Part]

- 1** Power Outlet: Supplies an external peripheral device with power from the product's internal power supply.
- 2** Power Inlet: For the power cable to connect to external power.
- 3** Power switch: Supplies or blocks power to the entire system.
- 4** Equipotential Terminal: This should be connected to the equipotential connection part in the exam room.

▶▶ ⚠ Probe Holders

Probe holders are mounted at the left and right-hand sides of the control panel.

Tips!

Hockey Stick Probe Holder

- ▶ Insert the Hockey stick probe holder into the probe holder to mount.
- ▶ The probe can be mounted onto the 4 probe holders except the 3D probe holder.

Tips!

Vaginal Probe Holder

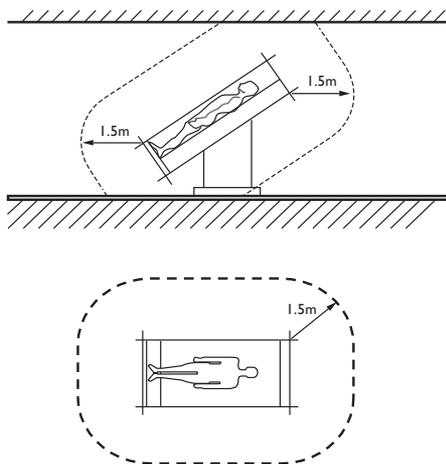
Install this to fix the vaginal probe onto the holder.

Peripheral Devices

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

**CAUTION:**

- ▶ Do not place peripheral devices, not listed in this manual, inside the patient environment. If you place them in the patient environment, it may cause electrical hazard.
- ▶ Do not connect additional external peripheral devices to the auxiliary socket outlet. Doing so may decrease safety level.



[Figure 2.10 Patient Environment]



NOTE: Refer to the User Manual of the peripheral device for its operating information.

■ DVD-Multi

DVD-RW, DVD+RW, DVD-R, DVD+R, CD-R, CD-RW, CD-ROM

■ Solid State Device

SSD 512G



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 during power-on may lead to malfunction of the system and the USB devices.



NOTE:

- ▶ When removing the removable disk, use Utility > Storage manager.
- ▶ USB ports are located both on the console and the rear panel. We recommend that you connect USB storage devices (flash memory media, etc.) to the ports on the console and other USB peripheral devices to the rear panel for convenience.

The following products are recommended:

■ USB Video Printer

- ▶ Black and White: Mitsubishi P-95DE (Japan: Mitsubishi P95D), SONY UP-D897, SONY UP-X898MD, Samsung ML-2955DW, SONY UP-D898MD
- ▶ Color: Mitsubishi CP-30DW, SONY UP-D25MD, Samsung CLP-615ND



CAUTION:

- ▶ Make sure that you check the English OS version first, and then install a compatible printer and driver. Contact Samsung Medison's Customer Service Department to inquire about installing a printer driver.
- ▶ When connecting the printer, ensure that the printer is configured under Microsoft Windows or system setup and has been chosen as the default printer.
- ▶ Please check the port that the printer uses before connecting. Printers should be connected to the printer port while the USB printer should be connected to the USB port.

■ USB to RS-232C Serial Cable

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



NOTE: For more information about the Open Line Transfer, refer to 'Chapter 9. Measurements'.

■ Foot Switch

▶ 3 Pedals HID Type

Assign a function to the foot switch at Setup > Peripherals > Foot Switch. You may select None, Freeze, Update, Record, Print 1, Save, Store Clip, Volume Start, Save+Send to DICOM, and Store Clip+Send to DICOM.

■ WLAN Card

Wireless LAN Card: Netis WF2120 Driver, TP-Link wifi (TP-Link AC1200 T4UH)



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

■ Misc.

Flash Memory Media



NOTE:

- ▶ The system cannot recognize USB 1.1 flash memory. Remove the flash memory from the console and equip again with an appropriate device.
- ▶ Regarding file formats that are not ordinarily saved: Please check first to see if it is possible to save the file format on a desktop PC before trying to save the file on flash memory.
- ▶ Do not use flash memory media which contain anti-virus programs or are defective. Otherwise, the product may fail to work properly.

Probes

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



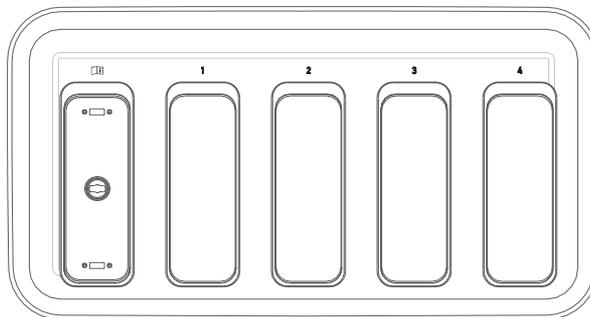
NOTE: For more information on probes, refer to 'Chapter 5. Probes' and the 'Reference Manual'.



Connecting Probes

To ensure the safety of the product and the probe, turn off the power before connecting the probe to, or disconnecting it from, the probe port.

1. Connect probes to the probe ports on the front panel of the console. You can connect up to four probes (five, if including CW). Note that a CW probe must be connected to its own port.
2. To install, turn the connector turning handle clockwise.



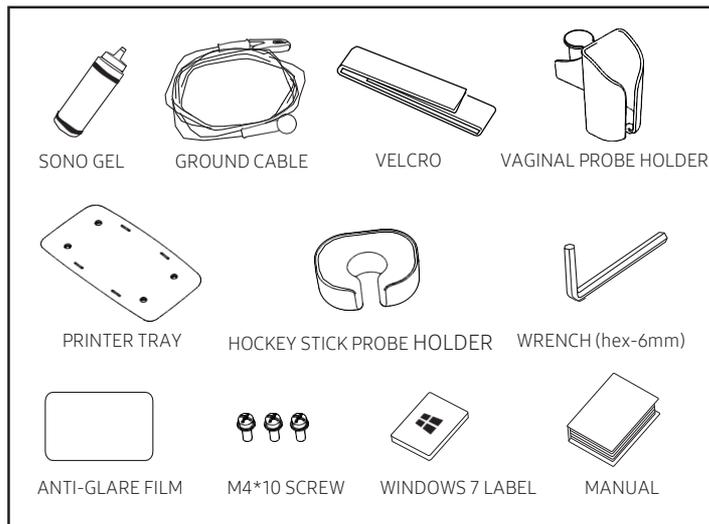
[Figure 2.11 Probe Port]



NOTE: Debris trapped between the probe and the port can cause connection problems. If you experience a connection problem, attempt to remove any debris and try again.

Accessories

An accessory box containing the items below is supplied with the product.



[Figure 2.12 Accessories]



CAUTION: Main cord set, separately certified according to the relevant standards, is to be used when supplied to EU and USA/CAN.



NOTE: Supplied accessories may vary by region.

Optional Functions

This product has the following S/W optional features.

- ▶ SMART 4D
- ▶ RealisticVue
- ▶ Natural Vue
- ▶ XI STIC
- ▶ HDVI
- ▶ ADVR
- ▶ Panoramic
- ▶ Software Trial
- ▶ 2D NT
- ▶ Additional Storage
- ▶ S-Detect for Breast
- ▶ S-Fusion
- ▶ Virtual Track
- ▶ Clear Track
- ▶ Auto IMT+
- ▶ SonoSync™
- ▶ S-Shearwave
- ▶ CEUS+
- ▶ S-Detect for Thyroid
- ▶ MV-Flow
- ▶ S-shearwave Imaging
- ▶ ElastoScan+
- ▶ E-Breast
- ▶ E-Thyroid
- ▶ Cardiac Measurement
- ▶ Strain+
- ▶ Stress Echo
- ▶ Arterial Analysis
- ▶ S-3D Arterial Analysis
- ▶ CrystalVue
- ▶ IOTA-ADNEX

For further information about optional functions, please refer to the relevant chapters in this manual.



NOTE: Software Trial does not refer to a specific feature.



Crystal Clear Cycle™

This collectively refers to CEUS/CEUS+, 5D Follicle, 5D Limb Vol, 5D CNS/5D CNS+, 5D Heart/5D Heart Color, 5D NT, CrystalVue/CrystalVue Flow, RealisticVue, E-Cervix, IOTA-ADNEX, S-Detect for Breast, and S-Detect for Thyroid provided by Samsung Medison.

The features supported by Crystal Clear Cycle™ may vary by country, time, and model.

For the features supported by each model, please refer to the 'Optional Functions' section in 'Chapter 2. Introduction'.

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Setup

The general system settings that directly affect imaging are explained below. The setup may be modified depending on specific needs or preferences.

1. Press the **Utility** button followed by the **Setup** button on the touchscreen.
2. The *Setup* screen will appear on the monitor and touchscreen. Select a tab that contains items you want to set up.

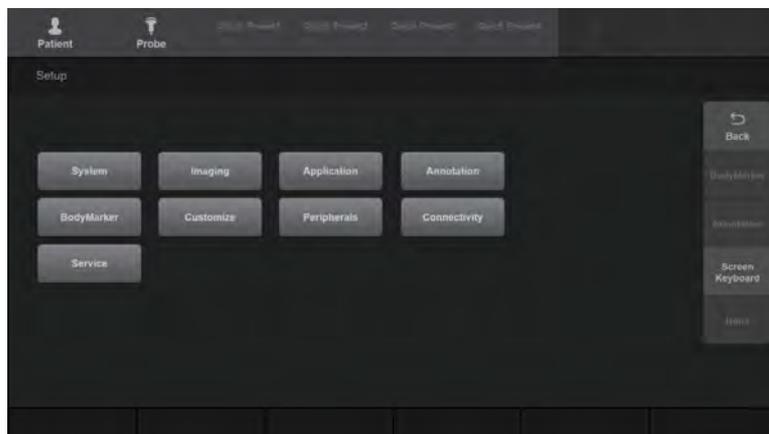
Tips!

How to Select a Tab

The user can select a desired tab in one of the following two ways. Select the way that suits you.

- ▶ Use the trackball and the **Set** button to select a tab on the screen.
- ▶ Press a button on the touchscreen.

3. Set the settings for each item.
4. Press the **Close** button on the screen after setting up to save the settings. Alternatively, press the **Exit** button on the control panel to switch to Scan Mode.
5. Press the **Back** button on the touchscreen to return to the previous screen.

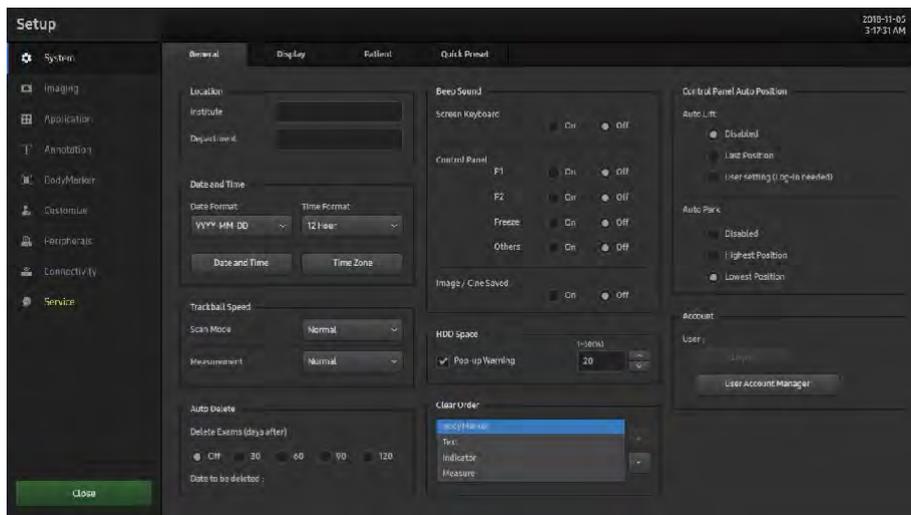


[Figure 3.1 Setup – Touchscreen]

System

General

On the *Setup* screen, select the **General** tab under **System**. You can set general system settings such as title settings.



[Figure 3.2 System – General]

Location

You can set 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: The following special characters cannot be included: #, [, ", :, ;, |, \, or "

Department

Enter details about the hospital/institution. The data entered will be used to identify information during DICOM transfers.

»» ⌘ Date and Time

■ Date Format

Used to set a date display format. Select a desired date format by using a combo button. The date format you selected here will be also applied to various date fields in *Patient Information*.

■ Time Format

Used to set a time display format. Select a desired time format (12 Hour or 24 Hour) by pressing a combo button.



NOTE:

- ▶ You cannot change the date and time when a patient ID is registered. You should finish the current diagnosis first by pressing the **End Exam** button on the touchscreen to change the settings.
- ▶ The year can be set from 2006 to 2027.

■ Date and Time

Set the date and time using the trackball and the **Set** button on the control panel. When properly set, press **Save** to apply the changes. Press the **Cancel** button to cancel the changes.

■ Time Zone

Set the time zone. Select the desired country's time zone by pressing the combo button.

»» ⌘ Trackball Speed

■ Scan Mode

Set the trackball speed for Scan Mode (Slow, Normal, or Fast).

■ Measurement

Set the trackball speed for measurements (Slow, Normal, or Fast). Slower trackball speeds allow more precise measurements.

»» ⌘ **Auto Delete**

■ **Delete Exams (days after)**

You can turn it On or Off, and set the period to 30, 60, 90, or 120 days. When you turn on the system at the specified Auto Delete time, all exams will be deleted. All exams will be deleted after displaying a warning popup message.

■ **Date to be Deleted:**

Displays the date selected for deleting exams.

»» ⌘ **Beep Sound**

The beep sound allows the user to understand that a button or dial-button is in use.

■ **Screen Keyboard**

Turns a sound On or Off using the trackball. When this is set to On, it beeps each time the screen keyboard is used.

■ **Control Panel**

Turns a sound On or Off using the trackball. It will play a sound every time a feature button or dial-button is used.

■ **Image/Cine Saved**

Turns a sound On or Off using the trackball. It will play a sound each time an Image or Cine is saved.

»» ⌘ **HDD Space**

Configure the settings to display a Warning Message when there is not enough storage space available. You can select when to display the popup message, from 1 to 50%. The default setting is On. However, locked exams will not be deleted.

»» ⌘ **Clear Order**

Set the order in which the Delete key on the Control Panel should be applied. The default setting is BodyMarker → Indicator → Text → Caliper.

»» & Control Panel Auto Position

■ Auto Lift

The position for each user or the last position is saved.

- ▶ Disabled: The position saving feature is disabled.
- ▶ Last Position: The last position before the system shut down is saved. When the system restarts, it will move to the last position of the previous task.
- ▶ User Setting (Log-in needed): Logging in to an account will restore the position previously saved by that user. Logging off will save each user's last position before the system shut down.

■ Auto Park

Set the Parking position of the Control Panel when shutting down the system. You may select one from Disabled, Lowest, and Highest.

- ▶ Disabled: The Control Panel positioning feature is disabled.
- ▶ Highest Position: The Control Panel will be positioned at the top of the screen.
- ▶ Lowest Position: The Control Panel will be positioned at the bottom of the screen.

Account

User Account Manager

Register a user ID and Password.

Create

Fill out the User ID, Password, Name, and Authority fields, and then add a new ID. You can set an Authority level (i.e., Admin Level or User Level) for the account.

User Log in

Set the User Log-in function to On or Off. When User Log-in is on, the following can be used:

- ▶ Screen Saver
- ▶ Accessing SonoView/Patient
- ▶ Search window for Patient

When you create a User Level account, you can restrict the following functions:

- ▶ Image Export, Report Export, HL7 Export, Measure Data Save
- ▶ Exam Backup & Restore
- ▶ Delete (Patient, Exam)
- ▶ Connectivity Setup (Network tab, DICOM tab, HL7 Manager)

User Account List

This is the exclusive administrator function that is used to approve and manage accounts. It enables the Account List window.

- ▶ Add: Fill out the User ID, Password, and Name fields. Then, press the **OK** button to create a new ID.
- ▶ Modify: Save the changes.
- ▶ Delete: Delete the selected ID.

Close

Close the settings.

■ Security Setting

You can set the Password Rule, Password Expiry Date, and Number of Login Attempts.

■ Initialize

Resets the user's information.

■ Admin

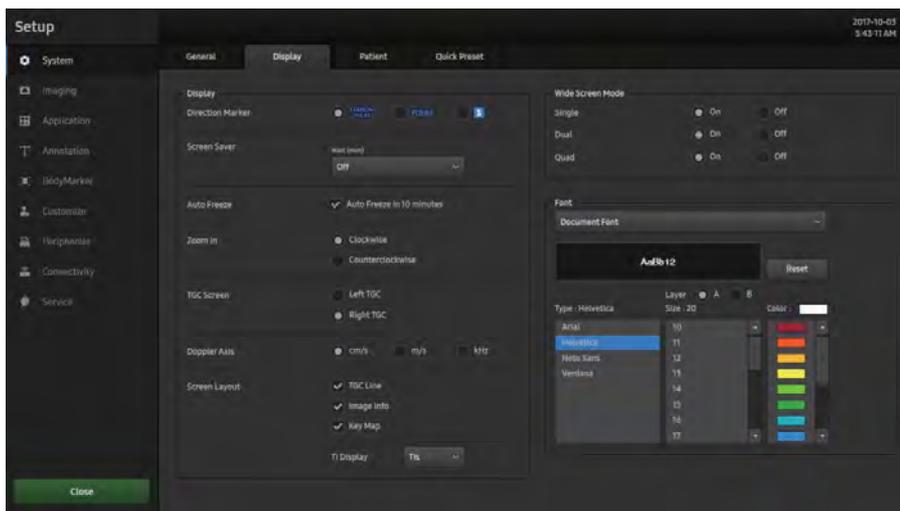
For more information about the Admin account, please contact a service engineer.

**NOTE:**

- ▶ If you have created an Admin Level account, you can add, modify, and delete accounts, and also configure the Security Setting. If you have created a User Level account, you can modify your own account only.
- ▶ Once the User Log-in function is activated, you cannot load other exams without logging in.
- ▶ Your password must be 8-15 characters long and follow the password rules specified in Security Setting.
 - Uppercase letters
 - Numbers
 - Special characters

Display

On the *Setup* screen, select the **Display** tab under **System**. Configure the settings for displaying images.



[Figure 3.3 System – Display]

⏏ ⚠ Display

■ Direction Marker

Set the Direction Marker. Select one from SAMSUNG RS85, RS85, and S.

■ Screen Saver

Select whether to display the screen saver or not. You can select Off and specify when the screensaver should be activated.

■ Auto Freeze

When Auto Freeze in 10 minutes has been selected and the product is left idle for 10 minutes, Scan Mode will freeze automatically.



When the product is left idle for more than one hour, it will exit Scan Mode, regardless of the Auto Freeze setting.



NOTE: In 3D mode, Auto Freeze is activated when the product is not used for 20 minutes.

■ Zoom In

Select the direction in which to rotate the **Zoom** dial to zoom in on an image.

- ▶ Clockwise: Rotating the dial-button clockwise zooms in on an image.
- ▶ Counterclockwise: Rotating the dial-button counter-clockwise zooms in on an image.

■ TGC Screen

Select where to display TGC on the touchscreen.

- ▶ Left TGC: Display TGC on the left side of the touchscreen.
- ▶ Right TGC: Display TGC on the right side of the touchscreen.

■ Doppler Axis

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

- ▶ cm/s: Specify the Doppler axis scale unit as cm/s.
- ▶ m/s: Specify the Doppler axis scale unit as m/s.
- ▶ kHz: Specify the Doppler axis scale unit as kHz.

■ Screen Layout

- ▶ TGC Line: Select whether or not to display the TGC Line. If this feature is disabled, the TGC line will be displayed on the screen for 3 seconds when TGC is configured.
- ▶ Image Info: Show or hide the image information. If the image information obscures the image, you can disable this feature to hide the image information.
- ▶ Key Map: Details of the User Defined Keys, including the positions of the **Set** and **Exit** buttons, are displayed in the User Key area of the monitor screen.

■ TI 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).

»» **Wide Screen Mode**

The Wide Screen setting can be turned On or off by using the trackball in Single, Dual, or Quad Mode. When this is turned off, the screen will be set to 4:3.

»» **Font**

Specify the target for which you want to set the font. Choose from Document Font and Measurement Result Font. The selected font can be previewed.

■ **Reset**

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

	Document Font	Measure Result Font
Font Name	Helvetica	Verdana
Font Size	20	11
Font Color	White	Yellow

■ **Type**

Select the font type to use.

■ **Size**

Select the font size to use.

■ **Color**

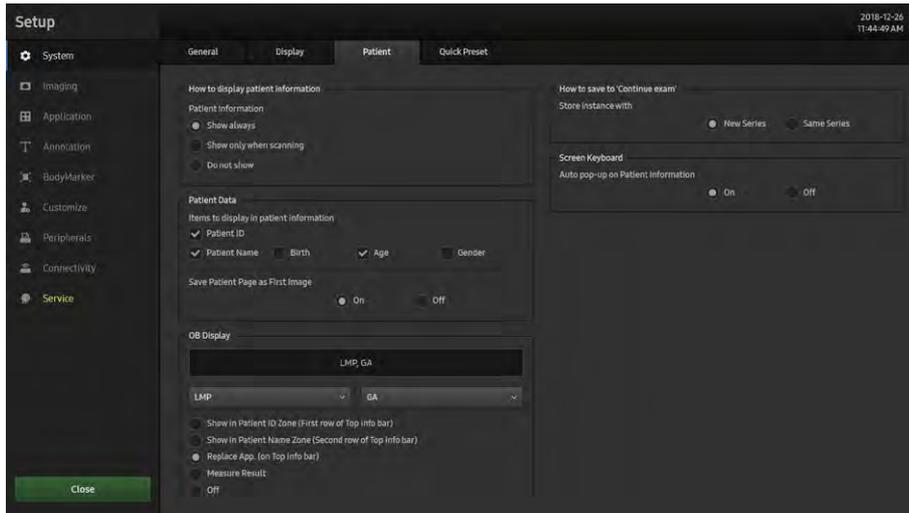
Select the font color to use.



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

Patient

On the *Setup* screen, select the **Patient** tab under **System**. Configure the patient information.



[Figure 3.4 System – Patient]



How to Display Patient Information

■ Patient Information

- ▶ Show always: Always shows the patient's information.
- ▶ Show only when scanning: Only shows the patient's information during scanning. (Not shown while saving, printing, or sending to DICOM.)
- ▶ Do not show: The patient's information is not shown.



Patient Data

■ Items to Display in Patient Information

Select the items that you wish to see on the Patient screen.

■ Save Patient Page as First Image

Turn it On or Off using the trackball. If it is On, the Patient Information Entry screen will be saved when creating an ID.

»» **OB 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.

■ **Show in Patient ID Zone (First row of Top info bar)**

Replace the ID in the title area.

■ **Show in Patient Name Zone (Second row of Top info bar)**

Show the patient name in the title area.

■ **Replace App. (on Top info bar)**

Replace the applications in the title area.

■ **Measure Result**

Display the measurement results when measuring.

■ **Off**

None of the options are displayed on the screen.

»» **How to save to 'Continue exam'**

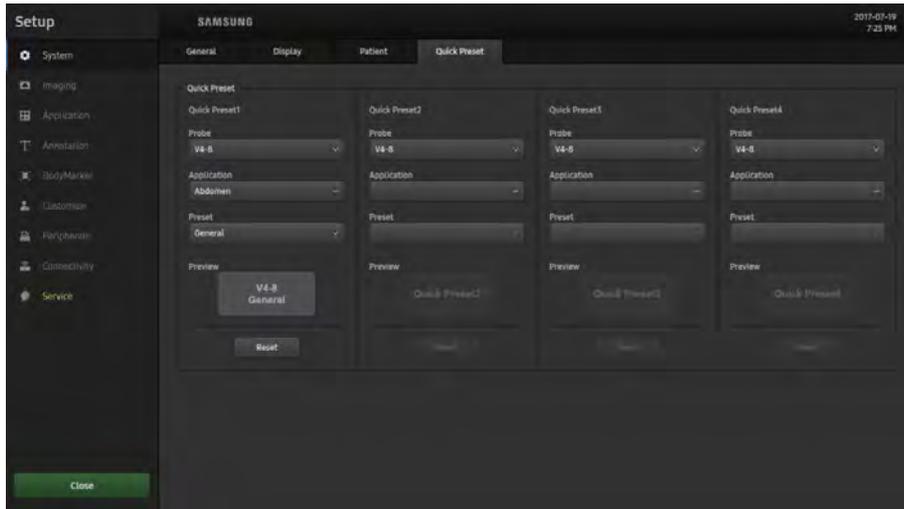
When you want to use Continue Exam, select either a new series (New Series) or the existing series (Same Series) to start with.

»» **Screen Keyboard**

Auto pop-up on Patient Information: Turn the Screen Keyboard On/Off when entering patient information.

Quick Preset

On the *Setup* screen, select the **Quick Preset** tab under **System**. Configure the information related to the Quick Presets.



[Figure 3.5 System – Quick Preset]

» Quick Preset

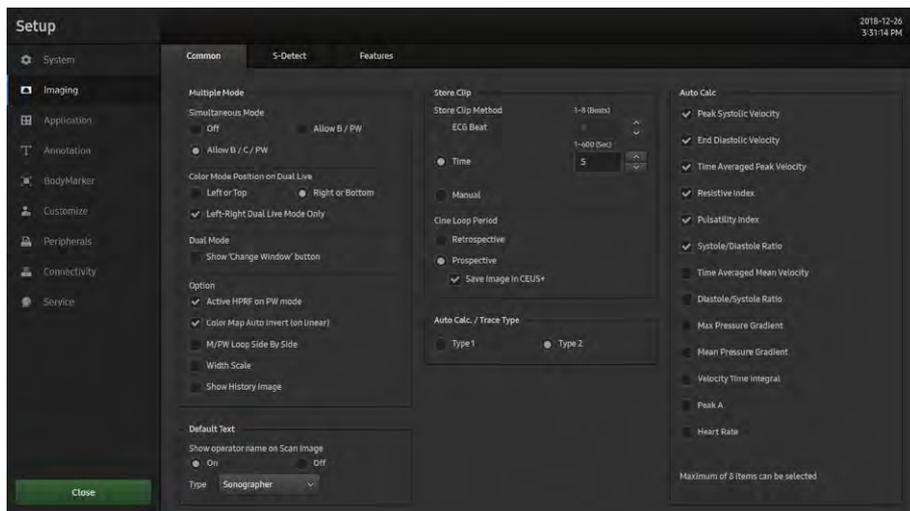
When the user selects Application, Preset, and a Probe connected to the port, the saved Probe and Preset will appear on the touchscreen as buttons.

Up to four Quick Presets can be saved. Clicking the **Reset** button will reset the saved values.

Imaging

Common

On the *Setup* screen, select the **Common** tab under **Imaging**.



[Figure 3.6 Imaging – Common]

Multiple Mode

Simultaneous Mode

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

- ▶ Off: Select this if you do not wish to use Simultaneous Mode.
- ▶ Allow B/PW: Select this option 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.

■ Color Mode Position on Dual Live

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

- ▶ Left or Top: Color Doppler Mode is located in the left or upper part of the screen.
- ▶ Right or Bottom: Color Doppler Mode is located in the right or lower part of the screen.
- ▶ Left-Right Dual Live Mode Only: The **Top-Bottom Dual** button disappears when this checkbox is ticked.

■ Dual Mode

Show 'Change Window' button: Select whether to activate the Change window in Dual Mode.

■ Option

You can select multiple items. Use the trackball and the **Set** button to tick or untick the desired items.

- ▶ Active HPRF on PW Mode: Select whether to enable HPRF (High Pulse Repetition Frequency), which is supported in PW Spectral Doppler Mode. Tick the checkbox to use the HPRF function.
- ▶ Color Map Auto Invert (on linear): Tick this checkbox to highlight the Color Map automatically. 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: If the depth of a 2D image is adjusted, the image size is automatically adjusted to fit the screen size. Please note that this can be used with linear probes only.
- ▶ Show History Image: The previously frozen image is shown upon entering Dual or Quad Mode.



Default Text

■ Show Operator Name on Scan Image

Type: Select Diag. Physician, Ref. Physician, or Sonographer. Turn this option off to hide it from the screen.

»» Store Clip

■ Store Clip

Specify the method and range in which an image is acquired and saved. You can select Time, ECG Beat, or Manual. Note that ECG Beat can be selected only when ECG is on.

- ▶ Time: Specify it as 1–600 seconds.
- ▶ ECG Beat: Specify the heart beat as 1–8 Beats.
- ▶ Manual: Pressing the button on the control panel that has been designated as **Store Clip** automatically starts saving the images; pressing the same button again stops saving.

■ Cine Loop Period

- ▶ Retrospective: When the **Store Clip** button is pressed during scanning, the previous images are saved.
- ▶ Prospective: When the **Store Clip** button is pressed during scanning, the subsequent images are saved.
- ▶ Save Image in CEUS+: You can save images by using CEUS+ Cine Save.



NOTE: The **Store Clip** button can be configured in Utility > Setup > Customize > Button.

»» Auto Calc./Trace Type

Type 1 is a general mode while Type 2 is the bradycardia mode. The Auto Calc. and Auto Trace detection ranges change in PW Mode depending on the setting.



Auto Calc.

Auto Calc. is a Spectral Doppler Mode feature that automatically performs specific calculations based on measured values.

**NOTE:**

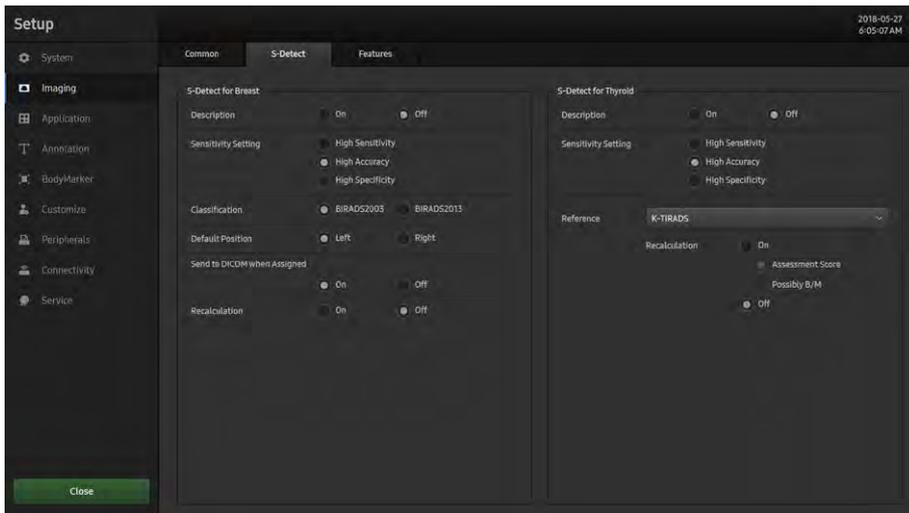
- ▶ The specified items will appear on the screen only when the **Auto Calc.** button on the touchscreen is pressed in Spectral Doppler Mode.
- ▶ Heart Rate has been added; the HR value will be displayed after checking Heart Rate and tracing Auto Calc.

Add and remove automatic calculation items by selecting the corresponding checkboxes. You can select up to eight items.

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

S-Detect

On the *Setup* screen, select the **S-Detect** tab under **Imaging**. Enable or disable the settings for Breast and Thyroid.



[Figure 3.7 Imaging – S-Detect]

» S-Detect for Breast

You can view a demo image by selecting the S-Detect for Breast Demo button in Utility.

■ Description

Determine whether or not to display the desired BI-RADS by selecting On or Off. Turn this option off to hide the call text from the screen.

■ Sensitivity Setting

Select High Sensitivity, High Accuracy, or High Specificity.

■ Classification

Set desired items for either BI-RADS2003 or BI-RADS2013.

■ Default Position

Select a desired item between Left and Right.

■ Send to DICOM When Assigned

Turn this on to send images assigned by S-Detect to DICOM, or off to prevent images from being sent.

■ Recalculation

After modifying results, the user can perform a recalculation. This option can be turned On or Off.

»» S-Detect for Thyroid

You can view a demo image by selecting the S-Detect for Thyroid Demo button in Utility.

■ Description

Determine whether or not to display the desired BI-RADS by selecting On or Off. Turn this option off to hide the call text from the screen.

■ Sensitivity Setting

Select High Sensitivity, High Accuracy, or High Specificity.

■ Reference

Select K-TIRADS, ATA, RUSS or BTA.

- ▶ A sub-function, Recalculation, is enabled only when it is set to K-TIRADS.

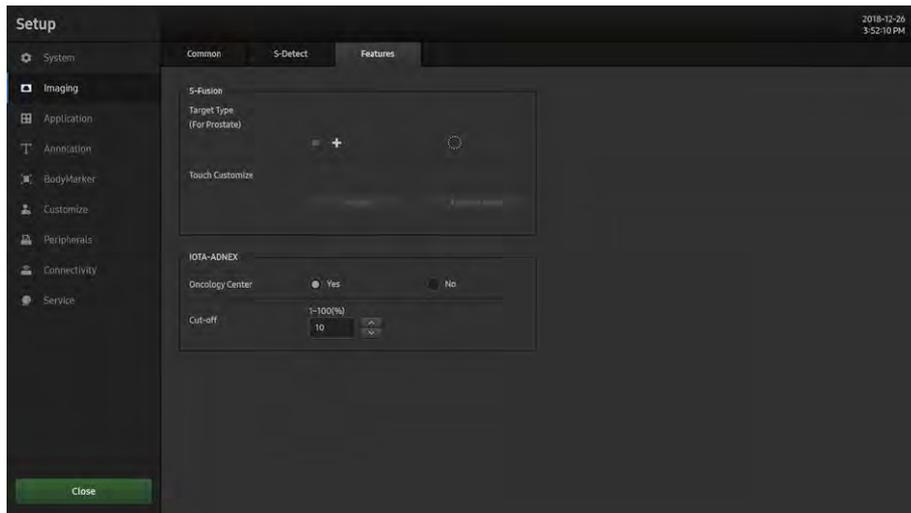
■ Recalculation

It is visible only when Recalculation is turned On for K-TIRADS.

Select Assessment Score or Possibly B/M.

Features

On the *Setup* screen, select the **Features** tab under **Imaging**. You can enable or disable Target Type and Touch Customize individually for S-Fusion.



[Figure 3.8 Features]

▶▶ S-Fusion

■ Target Type (for Prostate)

Specify the shape of the Target Type to use.

■ Touch Customize

This button is used to edit the Navigation Touch Page.

- ▶ When Fusion is selected, you can enter Navigation, and edit the Touch button.
- ▶ When Fusion Freeze is selected, you can edit the Touch button when the image is frozen.



IOTA-ADNEX

■ **Oncology Center**

Decide whether you want to display the Oncology center that you will use.

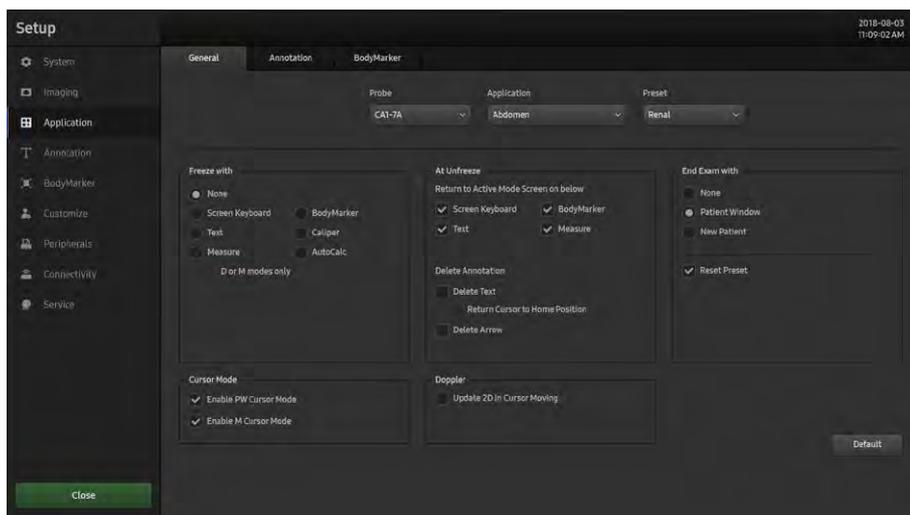
■ **Cut-off**

Set the Cut-off parameters.

Application

General

On the *Setup* screen, select the **General** tab under **Application**.



[Figure 3.9 Application – General]

Select a Probe, Application, or Preset to set, and then configure the required settings. If you select 'All' for Probe, Application, or Preset, each category will be bulk-selected.

Freeze with

Select a function to automatically execute when the **Freeze** button on the control panel is pressed. Select from None, Screen Keyboard, BodyMarker, Text, Caliper, Measure, or Auto Calc.

D or M Modes Only

When 'Freeze with' is set to Measure, Measure Freeze Action will function only in Doppler and M Modes.

»» ⌘ Cursor Mode

In 2D Mode, press the PW button to check the Sample Volume and PW Line without changing the image size. Press the M button to check the M Line.

In PW Cursor Mode, press the PW button again at the user-defined SV position to enter D Only Mode.

In M Cursor Mode, press the M button again at the user-defined M Line position to enter M Mode.

If you select any one of the Cursor modes, the M Line of T/S will not appear in Scan Mode.

■ Enable PW Cursor Mode

When ticked, PW Mode functions in Cursor Mode instead.

■ Enable M Cursor Mode

When ticked, M Mode functions in Cursor Mode instead.

»» ⌘ At Unfreeze

■ Return to Action Mode Screen on Below

Select a function that should end automatically when the **Freeze** button is pressed in **Freeze** state. Select one from Screen Keyboard, BodyMarker, Text, and Measure.

»» ⌘ Delete Annotation

■ Delete Text

If this checkbox is ticked, when the user enters text and clicks the **Freeze** button to return to Scan Mode, all the entered text will be deleted automatically.

- ▶ Return Cursor to Home Position: The text cursor will move automatically to the location set by the user.

■ Delete Arrow

If this checkbox is ticked, when the user enters text and clicks the **Freeze** button to return to Scan Mode, all the indicators will be deleted automatically.

»» Doppler

■ Update 2D in Cursor Moving

If the checkbox is selected, it switches to 2D Only mode when you use the trackball in D Only mode, and then the SV position changes. When you stop using the trackball, it automatically switches back to D Only mode.

»» End Exam with

■ None

Pressing the **End Exam** button on the touchscreen will end the Exam in progress and switch the screen to the *B Mode Scan* screen.

■ Patient Window

Pressing the **End Exam** button on the touchscreen will switch the screen to the *Patient Information* screen.

■ New Patient

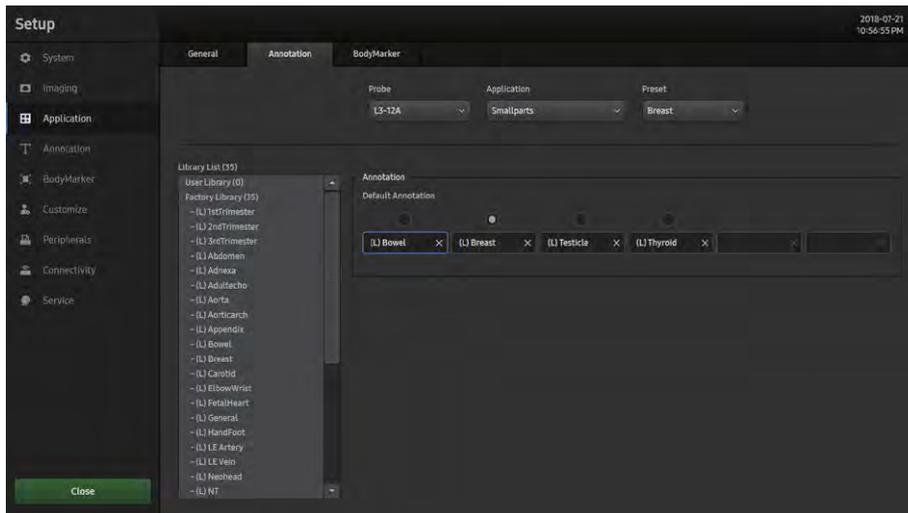
Pressing the **End Exam** button on the touchscreen will switch the screen to the *Patient Information* screen, and automatically generate an ID.

■ Reset Preset

If this checkbox is ticked, the Preset will be reset when the user presses the **End Exam** button.

Annotation

On the *Setup* screen, select the **Annotation** tab under **Application**. Configure information related to image input.



[Figure 3.10 Application – Annotation]

Select a Probe, Application, or Preset to set, and then configure the required settings.

»» 📌 Library List

A Library List is provided. Tick the desired items and click to place them in the preferred areas of the Default Library under Annotation to complete the setup.

»» 📌 Annotation

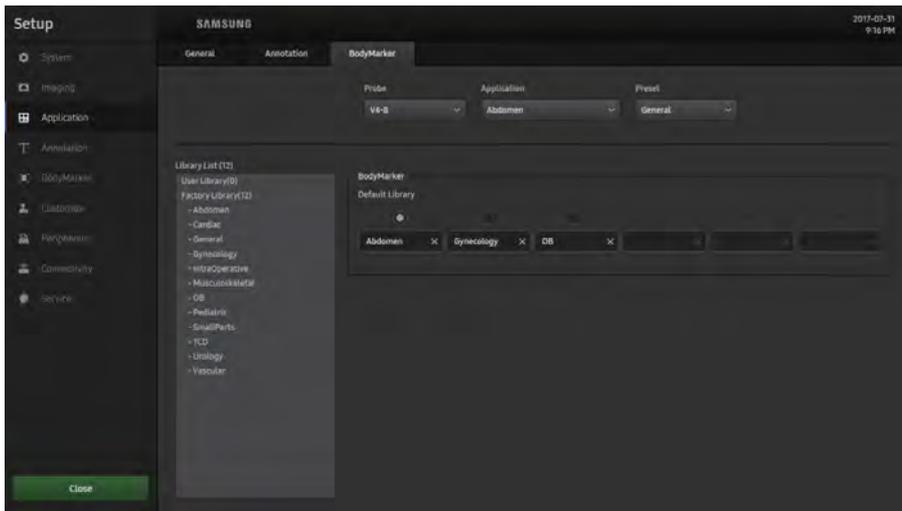
Among the items specified in the Library, specify the Default Library. Only the specified Library will appear on the list.

Select a Library in Setup > Annotation, and map it into Preset.

- ▶ Add: Click Library List and select a Library.
- ▶ Delete: Select 'X' in the Input Box.

BodyMarker

On the *Setup* screen, select the **BodyMarker** tab under **Application**. Configure information related to image input.



[Figure 3.11 Application – BodyMarker]

Select a Probe, Application, or Preset to set, and then configure the required settings.

Library List

A Library List is provided. Tick the desired items and click to place them in the preferred areas of the Default Library under BodyMarker to complete the setup.

BodyMarker

Among the items specified in the Library, specify the Default Library. Only the specified Library will appear on the list.

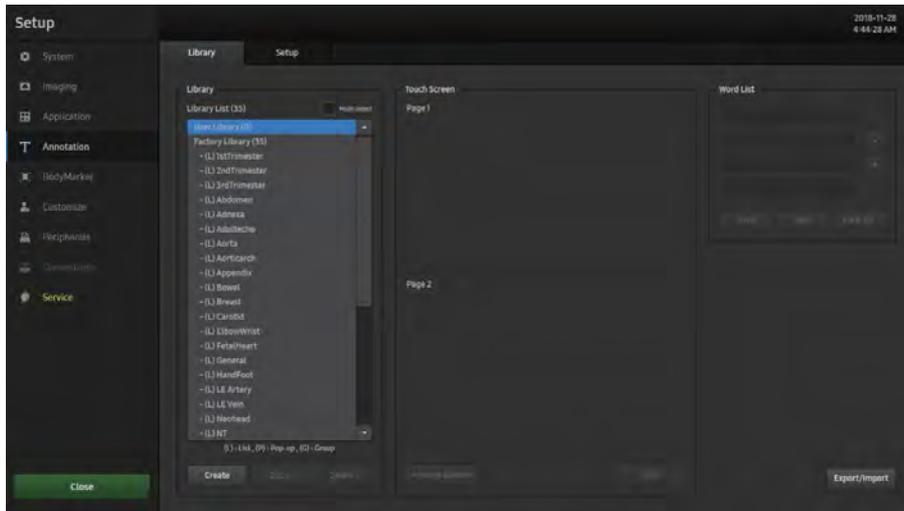
Select a Library in Setup > BodyMarker, and map it into Preset.

- ▶ Add: Click Library List and select a Library.
- ▶ Delete: Select 'X' in the Input Box.

Annotation

Library

On the *Setup* screen, select the **Library** tab under **Annotation**. Select an Annotation to modify, and edit the entire page.



[Figure 3.12 Annotation – Library]

Library

A Library List is provided.

- ▶ Tick Multi Select to select one or more lists.

The users can edit the List in 'User Library' to suit their preferences. Click 'Create' to edit and create a List.

■ Create

Clicking the **Create** button will create a Pop-up window. Enter a name for the Library being created, and select a Type. The created Library will be added to User Library.

Note that Libraries that have the same name and different types will be recognized as separate Libraries, but Libraries that have the same name and same type cannot be saved.

■ Copy

Clicking the **Copy** button will create a Pop-up window. The **Copy** button is enabled only when a Library is selected. It will be named 'Name_copy' according to the name of the copied Library, and its Type cannot be modified. The copied Library will be added to User Library.

Note that Libraries that have the same name and different types will be recognized as separate Libraries, but Libraries that have the same name and same type cannot be saved.

■ Delete

Clicking the **Delete** button will create a pop-up window. Note that it can only be enabled when a Library is selected.

▶▶ Touchscreen

Different information will be displayed depending on the Type selected from the Library.

- ▶ If the Type is List (L), '...' will be displayed, and the number of '...' will change depending on the number of words. When there is only one Word, it will not be displayed.
- ▶ If the Type is Pop-up (P), 'Number of -' will be displayed, and the Icons like '≡' are applied depending on the number of words. When there is only one word, it will not be displayed.
- ▶ If the Type is Group (G), the Group color will be displayed on the bottom right side of the button. Nothing will be displayed for buttons that do not belong to the Group.

It will become visible once the user enters Group Edit Mode via the Library List. The buttons belonging to the relevant Group will be pressed together.

Tips!

Entering Group Edit Mode

Click the **Group** button to enter Group Edit Mode.

- ▶ Selected Group: Pressed
- ▶ Other Groups: Normal state
- ▶ While editing one Group, if the user selects a different Group, the information being edited will be saved, and then the user will be moved to the previous screen.

■ Arrange Buttons

Select this if you need to reposition a Button.

»» **Word List**

Select and edit the text you wish to modify, and then save it by pressing the **Save** button. You can add up to four different entries to one Text button in advance.

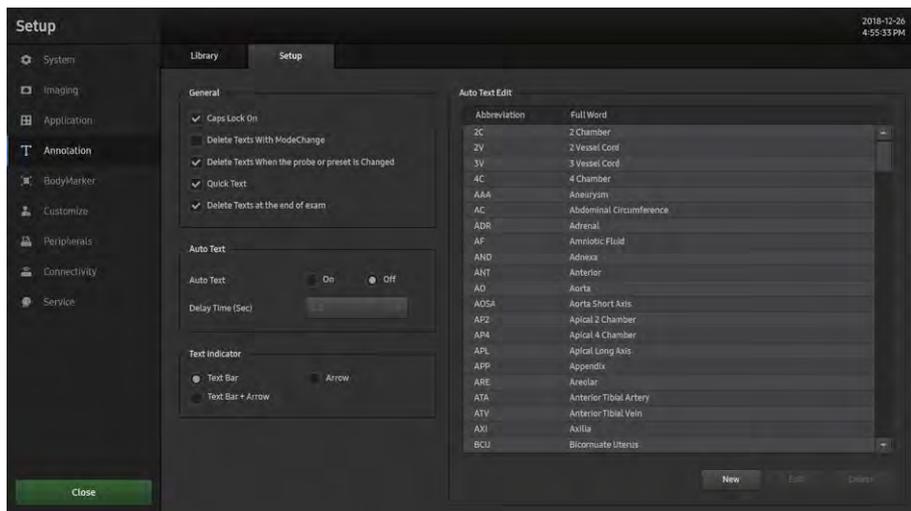
■ **Export/Import**

Share the text saved on the system with another system, or import a text entry from another system. This is only applicable to User Library.

Setup

» **General**

Configure Annotation-related items.



[Figure 3.13 Annotation – Setup]

■ **Caps Lock On**

This means that when text is entered, it is entered in capital letters.

■ **Delete Texts with Mode Changed**

Switching to a different mode will delete the text entered.

■ **Delete Texts when the Probe or Preset is Changed**

Changing the Probe or Preset will delete the text entered.

■ **Quick Text**

This feature immediately switches the system to Text Input Mode when the user presses a character key on the keyboard.

■ **Delete Texts at the end of exam**

Changing the Exam will delete the text entered.

»» & **Auto Text**

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 the user enters 'AC', the system automatically looks up and displays the matching full term, which is 'Abdominal Circumference'.

■ **Auto Text**

Turn this option On or Off.

■ **Delay Time (Sec)**

Specify the time taken by the system to automatically convert an abbreviation into a full word when text is entered.

»» & **Text Indicator**

Select a shape for the cursor that appears on the screen when opening a document.

▶▶ Auto Text Edit

Modify the list of abbreviations stored on the system. Press the button to switch to the *Auto Text Edit* screen. To exit, press the **Close** button.

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!

▶ Creating Abbreviation List

▶ Modifying a word

1. Use the trackball and the **Set** button to select a word to modify from the list. In the Abbreviation and Full Word fields at the bottom of the screen, the abbreviation for the selected word and the corresponding full term are displayed.
2. When you press **Edit**, make a change, and press **OK**, the word will be modified in the Abbreviation and Full Word fields. The abbreviation list is updated in real time.

▶ Adding a word

1. Press the **New** button.
2. Enter the terms you want to add into 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. In the Abbreviation and Full Word fields at the bottom of the screen, the abbreviation for the selected word and the corresponding full term are displayed.
2. Press the **Delete** button and a warning message will appear. To delete the selected word, press **OK**. The word will be deleted from the abbreviation list. Press **Cancel** to cancel the deletion.

BodyMarker

Library

On the *Setup* screen, select the **Library** tab under **BodyMarker**. Select a BodyMarker to modify, and edit the entire page.



[Figure 3.14 BodyMarker – Library]

Library

All Library Lists are provided regardless of the Application or Preset.

- ▶ **Multi Select:** When this is ticked, one or more Lists can be selected.

The user can edit the 'User Library' List to suit their preferences. Click 'Create' to edit and create a List.

▶▶ Touchscreen

This feature displays the selected Library on the Touchscreen.

- ▶ Set Default: When this is selected, a BodyMarker which will be used by default in the relevant Library is provided.

■ Editing Touchscreen

- 1 BodyMarker list: Its content will change depending on the group selected in 'Group'.
- 2 The Probe currently in use and the list of BodyMarkers in Preset are displayed separately in Page 1 and Page 2.



NOTE: You can save from 1 to 64 BodyMarkers in each list.

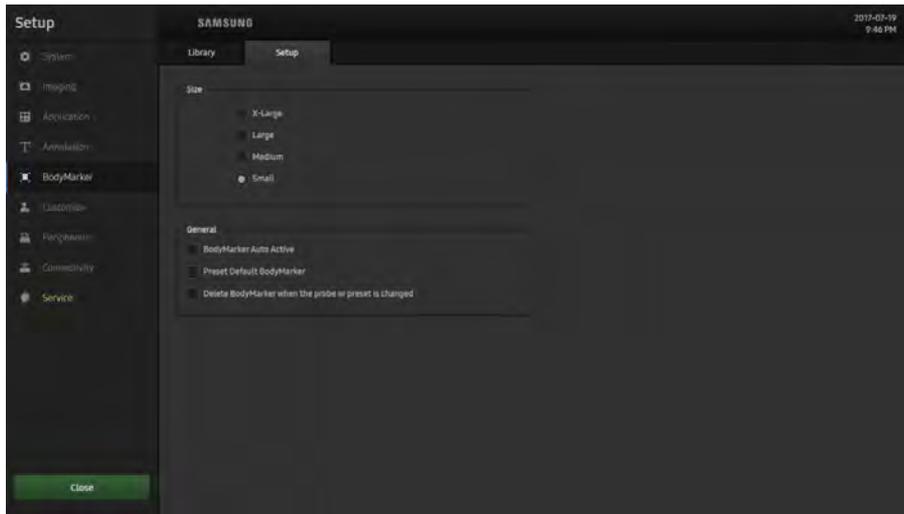
- ▶ Adding a BodyMarker: Select a desired page and position, and click a BodyMarker on the list. The selected BodyMarker is added to the touchscreen page.
- ▶ Removing a BodyMarker: Select a BodyMarker from the list and click the **Delete** button.

▶▶ BodyMarker List

BodyMarkers for each Application are displayed.

Setup

On the *Setup* screen, select the **Setup** tab under **BodyMarker**. Configure BodyMarker-related items.



[Figure 3.15 BodyMarker – Setup]

»» **Size**

Set the BodyMarker size (X-Large, Large, Medium, or Small).

»» **General**

■ **BodyMarker Auto Active**

Select whether or not to activate BodyMarker Mode automatically when the active image area is changed.

■ **Preset Default BodyMarker**

If representative BodyMarkers have been set, pressing the **BodyMarker** button will display the representative BodyMarkers for each preset on the screen.

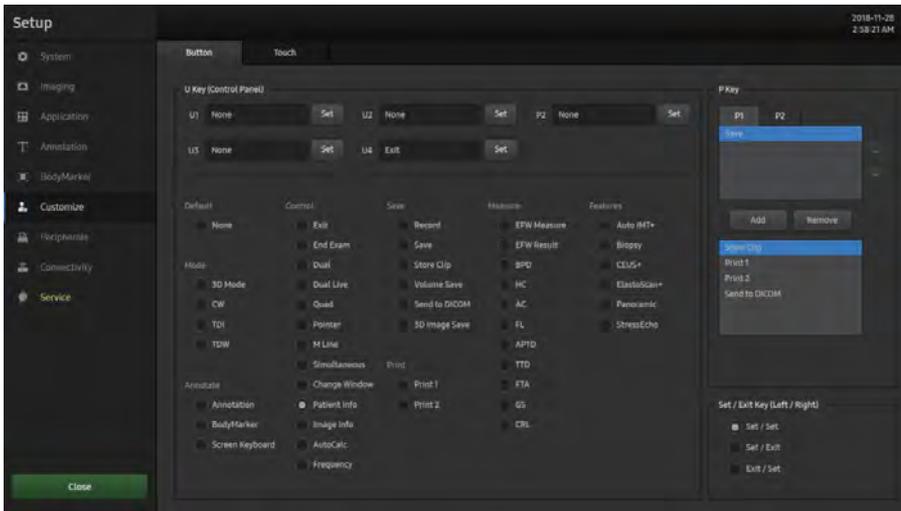
■ **Delete BodyMarker when the Probe or Preset is Changed**

Set whether to maintain the BodyMarker when the Probe, Application or Preset is changed.

Customize

Button

On the *Setup* screen, select the **Buttons** tab under **Customize**. You can set the functions of the keys and buttons on the product.



[Figure 3.16 Customize – Button]

U Key (Control Panel)

Assign functions to the **U1**, **U2**, **U3**, **U4**, and **P2** buttons on the control panel. The functions that can be set are shown below:

Default	None
Mode	3D Mode, CW, TDI, TDW
Annotate	Annotation, BodyMarker, Screen Keyboard
Control	Exit, End Exam, Dual, Dual Live, Quad, Pointer, M Line, Simultaneous, Change Window, Patient Info, Image Info, AutoCalc, Frequency
Save	Record, Save, Store Clip, Volume Save, Send to DICOM, 3D Image Save
Print	Print 1, Print 2
Measure	EFW Measure, EFW Result, BPD, HC, AC, FL, APTD, TTD, FTA, GS, CRL
Features	Auto IMT+, Biopsy, CEUS+, ElastoScan+, Panoramic, Stress Echo

»» ⌘ PKey

Assign functions to the P Key (**P1** and **P2**) buttons on the control panel. Up to three functions can be assigned to the **P1** and **P2** buttons. The available functions include Save, Store Clip, Print1, Print2, and Send to DICOM.

■ Add

Press the **Add** button to add functions.

■ Remove

Press the **Remove** button to delete functions.

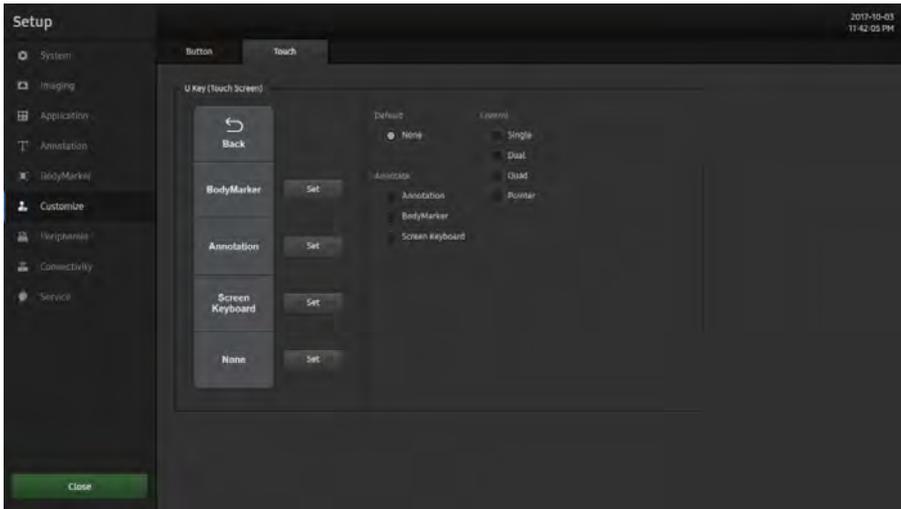
»» ⌘ Set/Exit Key (Left/Right)

Select the functions to assign to the buttons on the left and right sides of the trackball on the control panel.

- ▶ Set/Set: Assign **Set** to the left button and **Set** to the right button.
- ▶ Set/Exit: Assign **Set** to the left button and **Exit** to the right button.
- ▶ Exit/Set: Assign **Exit** to the left button and **Set** to the right button.

Touch

On the *Setup* screen, select the **Touch** tab under **Customize**. Configure the Screen buttons that will be connected to the Touchscreen.



[Figure 3.17 Customize – Touchscreen]

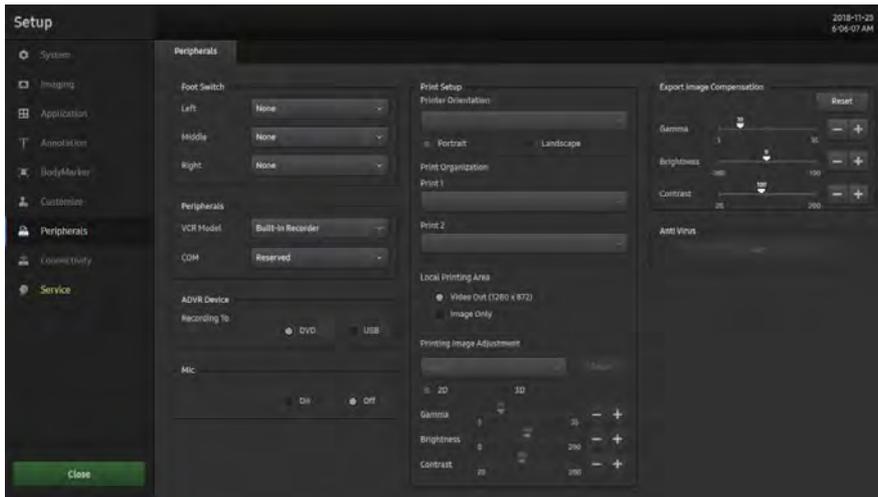
» U Key (Touchscreen)

Assign functions to the four **Screen** buttons, except for the **Back** button on the Touchscreen. The functions that can be set are shown below:

Default	None
Annotate	Annotation, BodyMarker, Screen Keyboard
Control	Single, Dual, Quad, Pointer

Peripherals

On the *Setup* screen, select the **Peripherals** tab under **Peripherals**. You can configure keys, buttons, and the peripheral devices connected to the product.



[Figure 3.18 Peripherals – Peripherals]

» Foot Switch

Set the functions of the left, middle, and right foot switch pedals.

The available functions are as follows:

- ▶ None, Freeze, Update, Record, Print 1, Save, Store Clip, Volume Start, Save+Send to DICOM, Store Clip+Send to DICOM

» Peripherals

■ VCR Model

Set as Built-in Recorder. The user cannot change this setting.

■ COM

Configure a device to connect to a serial port.

- ▶ Reserved: The COM port is not used.
- ▶ Open Line Transfer: To finish connecting the device after selecting this option, you need to restart the system.

»» ⌘ **ADVR Device**

■ **Recording To**

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

»» ⌘ **Mic.**

Turn it On or Off using the trackball. The default setting for mic is Off.

»» ⌘ **Print Setup**

■ **Printer Orientation**

Set the type and page orientation of the Echo printer. Select a printer to use by using the combo button.

- ▶ Portrait: Vertical orientation.
- ▶ Landscape: Horizontal orientation.



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

■ **Print Organization**

Set the types of printers that will be used when the **P1** and **P2** buttons on the control panel are pressed.

■ **Local Printing Area**

Set the area that will be printed.

- ▶ Video Out (1280 x 872): Print only a certain part of the screen (1280 x 872) that contains the image area.
- ▶ Image Only: Print the image area only.

■ Printing Image Adjustment

Adjust the image print quality. Select the type of the printer and image, and adjust Gamma, Brightness, and Contrast.



NOTE: This is only supported by some digital printers.

»» ⌘ Export Image Compensation

When transferring external images, the user can configure the monitor settings according to their environment. You can change the Gamma, Brightness and Contrast settings, and click the **Reset** button to restore the default settings.



Compensation

Adjusting the post curve settings for images enables other monitors to display them as closely as possible to the original images, which is convenient for diagnosis.

»» ⌘ Anti Virus

Pressing this button will start the anti-virus program. However, if no anti-virus program is installed, this button will be disabled.



For information on the installation of anti-virus programs, please contact the Customer Service Department.

Connectivity

Press the **Connectivity** button on the touchscreen. You can manage DICOM operations, DICOM server settings, and network information for the system.

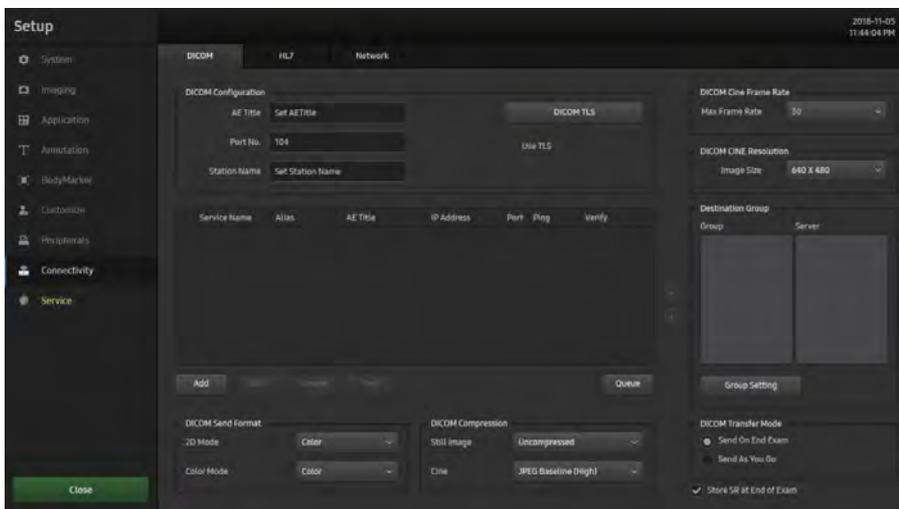
DICOM

On the *Setup* screen, select the **DICOM** tab under **Connectivity**. Configure DICOM (Digital Imaging and Communication in Medicine) operation and DICOM server.



NOTE:

- ▶ You cannot change DICOM settings when a patient ID is registered. You should finish the current diagnosis first by pressing the **End Exam** button on the touchscreen to change the settings.
- ▶ For more information, please refer to the server user's manual, or the DICOM Conformance Statement.



[Figure 3.19 Setup – Connectivity – DICOM]

»» DICOM Configuration

Shows the information about the DICOM server that the system can use. 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. Select the DICOM server you want to use by using the Service Name checkbox.



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). Used for identifying the equipment that uses DICOM on the network.

■ Station Name

Enter the name of the system. Along with AE Title, it is often used to identify the system in the DICOM network.

■ Port No.

Enter the port number for the server being used.

■ DICOM TLS

Select a certificate required for DICOM communication encryption. For encrypted DICOM communication, the device must have a certificate; if it doesn't, you must register a new certificate.

1. Certificate Registration: Register a certificate for the device. Select the Import button.
* Select the user's certificate and private key file. The red marks denote required fields.
2. Certificate Generation: Create your own certificate for the device. Select the Create button. → Enter information. The red marks denote required fields.
3. Certificate Distribution: Copy the certificate for the device to a USB drive. If you have created the certificate for the device yourself, other servers that you will need to access later may need to verify your certificate.
4. Root CA Registration: If you use the DICOM function, you will need to register the certificate with the certification authority, who will verify the certificate for the others whose servers you will need to access. Select the Import button under Trusted Authority Certificates. → Select the Root CA's certificate file.

Tips!

How to Use DICOM TLS

- ▶ To use TLS for the device's SCU role
DICOM Setup → Add (Register a service) → Check 'Use TLS' → Check 'Verify Server Certificate' (optional)
- ▶ To use TLS for the device's SCP role
DICOM Setup → Select 'Use TLS' at the top of the screen → Select 'Verify Client Certificate' (optional)

▶▶ DICOM Send Format

Specify save formats for 2D or color images for the DICOM services. 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, images will be saved in grayscale format.

»» ⌘ DICOM Compression

Select whether or not to compress the images for the DICOM service. Select Uncompressed, JPEG Baseline (High, Mid, Low), or JPEG Lossless, using the combo button. When you select Uncompressed, the images are saved without compression.



NOTE: DICOM Compression settings are applied at the time an image is saved. For example, if it is set to JPEG Baseline (High, Mid, Low) and JPEG Lossless, saving the image will compress it.

»» ⌘ DICOM Cine Frame Rate

Select one from 10, 15, 20, 25, and 30 fps for the frame rate of DICOM Cine.

»» ⌘ DICOM Cine Resolution

When saving DICOM Cine images, select 1280x720, 1024x768, or 640x480 for the Image size under DICOM Cine Resolution.

»» ⌘ Destination Group

Add, modify, or delete groups to which images should be sent when a specific User defined key (User key or Peripheral key), which has been set using the Send to DICOM function, is pressed.

The set Destination Group will be displayed under DICOM Destination on the *Patient Information* screen. Once set, when the relevant user defined key is pressed, images will be sent to the destination group specified under DICOM Destination on the *Patient Information* screen.

Click the **Add Group** or **Edit Group** to open the *DICOM Group* window.

- ▶ Add: Add a Destination Group.
- ▶ Edit: Edit a Destination Group.
- ▶ Delete: Delete a Destination Group added by a user.
- ▶ Press **OK** to finish. Press **Cancel** to cancel.

»» **DICOM Transfer Mode**

Select a transfer method. The selected method applies to all groups.

- ▶ Send On End Exam: Send all saved images when you press the **End Exam** button.
- ▶ Send As You Go: Send an image whenever you press the **Save** button to save it.

■ **Store SR at End of Exam**

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

»» **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. Press **Cancel** to cancel.

■ **Services**

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

■ **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.

■ **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 for 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.

STORAGE Server Information

Select 'STORAGE' for the **Services** item. Configure the Image Storage Service using DICOM.

■ Storage Options

- ▶ Send Cine Loops: Select this checkbox to transfer Cine Loops.
- ▶ Include Pixel Spacing: The area information used in CT or X-ray is also included, in addition to the area information used in ultrasonography. 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: Select this option only if you use a storage service that supports the 3D volume data format used by Samsung Medison.

■ 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 from a PACS device that uses the standard DICOM VOI LUT.

- ▶ **Window Center:** Enter a value for the DICOM Tag (0028, 1050) setting. The setting value indicates the brightness of an image that is displayed by the storage service. Relative to 128, a higher value results in a darker image. 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.

■ Maintain Association

If Transfer Mode is set to 'Send As You Go' in Storage Service, you can configure 'Maintain Association'.

- ▶ If the checkbox is ticked: Even after image transfer has been completed, association is maintained until the exam ends.
- ▶ If the checkbox is not ticked: Association is terminated once the image has been transferred.

PRINT Server Information

Select 'PRINT' for the **Services** item. 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 user's manual, or the DICOM Conformance Statement.

■ Color

Specify whether to use colors. Select either Grayscale or RGB.

■ Format

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

■ Orientation

Specify the paper orientation. Select either Landscape or Portrait.

■ Magnification

Specify the interpolation method that will be used when resizing an image to output. Select one from Replicate, Bilinear, Cubic, and None.

■ Border Density

Specify the border color of the image to be printed. Select either Black or White.

■ Empty Density

Specify the background color of an image to print. Select either 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 one from Paper, Clear Film, Blue Film, Mammo Clear Film, and Mammo Blue Film.

■ Film Size

Specify the paper size. Select one from 8 inch x 10 inch, 8.5 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 24 cm, 24 cm x 30 cm, A4, or A3.

■ Destination

Specify the paper pathway. Select either 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 one from High, Med, and Low.

■ Copies

Enter the number of copies, from 1 to 99.

■ Configuration Info

Specify the unique value for a printer. Please refer to the DICOM Conformance Statement for the printer.

WORKLIST Server Information

Select 'WORKLIST' for the **Services** item. Set the Modality Worklist Service using DICOM.

■ Show Worklist First when the Patient Screen Opens

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

■ Worklist Update Method

Specify the method of updating worklists.

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



To update worklists, set Search Source to **Worklist** in the **Search** tab on the *Patient Information* screen, and then press **Search**.

- ▶ Worklist Page Opens: Update automatically when you open the Worklist tab.
- ▶ On Startup and Every: Update worklists when the system boots up, and then automatically update them at specified intervals.

■ Scheduled Station Name

Set the name of the station you want to retrieve exams from.

- ▶ Any: Retrieve Exams from all Stations.
- ▶ This System: Retrieve exams with the station name that is specified in the DICOM tab only.
- ▶ Another: Retrieve exams from the station entered by the user. Leaving it blank is the same as selecting “Any”.

■ Scheduled Station AE Title

Select the AE title of the exams to retrieve.

- ▶ Any: Retrieve exams with all AE titles.
- ▶ This System: Retrieve exams with the AE title that is specified in the DICOM tab only.
- ▶ Another: Retrieve exams with the AE title entered by the user.



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

■ Study Description Priority

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. If you wish to re-prioritize an item, select the item and change its position by pressing the **Up** and **Dn** buttons.

■ Scheduled Procedure Step Location

Specify the location of the exams you want to retrieve.

- ▶ Any: Retrieve exams from all locations.
- ▶ Location: Retrieve exams from the location entered by the user only.

PPS Server Information

Select 'PPS' (Performed Procedure Step) for the **Services** item. Configure the Modality Performed Procedure Step Service using DICOM. The configuration options are the same as those of the storage server.

■ Always Complete Exams

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

SC Server Information

Select 'SC' (Storage Commitment) for the **Services** item. Configure the Storage Commitment Service using DICOM. The Storage Commitment Service is used after a diagnosis is completed, and all the saved images and reports are sent.

■ Associated Storage Server

Select an Image Storage server to connect.

■ Associated SR Server

Select a Structured Report server to connect.

Storage SR Server Information

Select 'Storage SR (Storage Structured Report)' for the **Services** item. Configure the Report Storage Service using DICOM. The configuration options are the same as those of the storage server.

■ Maintain Association

If Transfer Mode in SR Service is set to 'Send As You Go', you can configure 'Maintain Association'.

- ▶ If the checkbox is ticked: Connection is maintained until the End Exam finishes even after the DICOM Structured Report is sent.
- ▶ If the checkbox is not ticked: Connection ends after DICOM Structured Report is sent.

DICOM QR Server Information

Select 'DICOM QR' for the **Services** item. The settings can be configured the same way as the Storage Server.

»» ⌘ Editing DICOM Information

Select a service on the screen and click **Edit**. The information on the selected service appears. After changing the information, click **Save** to save the changes. Press **Cancel** to cancel.

»» ⌘ Deleting DICOM Services

Select a service and click **Delete** on the screen.

»» ⌘ 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 it is properly connected.

»» ⌘ 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.

- ▶ Job ID: Displays the job ID.
- ▶ Patient ID: Displays the patient ID.
- ▶ Alias: Displays the Alias value set on the *DICOM Configuration* screen.
- ▶ Type: Displays the types of job. 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 measurement data. For MPPS Start, the Instances value is always displayed as 0.
- ▶ Date/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 soon after.
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. This occurs when the network is not connected.
Not Ready	The Ready state is not complete. This is prior to a MPPS (Modality Performed Procedure Step) Start job is completed. It may also indicate that a batch selected storage or print job is not yet 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

The *DICOM Log* window appears.

■ 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

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

■ Log Settings

Specify the log file management method.

- ▶ Delete Archived Log Afterwards: Specify how long to keep the log file. Enter a 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. Enter a number 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.

▶▶ **HL7**

HL7 (Health Level 7) is a set of standards for transfer of information between health information systems that is accredited by the American National Standards Institute (ANSI); it is the most widely used set of standards for health information not only in the United States but across the world.

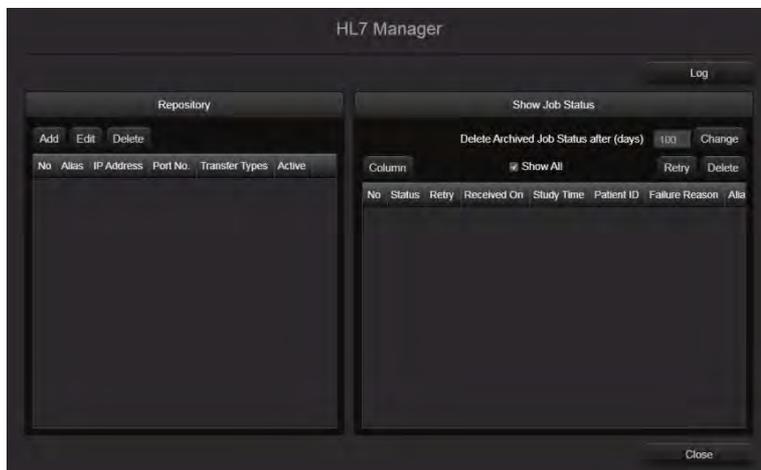
■ **HL7 Manager**

Press the button to open the *HL7 Manager* window. Configure settings for transferring the report information created by this system to the HL7 server (repository).



HL7 Manager

To configure the HL7 server, use Repository. For data transfer and management, use Show Job Status and Log.



[Figure 3.20 HL7 Manager]


Tips!

► **Repository**

Shows the information about the repository server that is being used by the system. To activate or deactivate the use of the server, use the **Active** checkbox.

Add: Add a server. The *Repository Info* window will open. For the information to enter in IP Address and Port No., ask the network administrator of the institution this product is installed at.



- Alias: Enter the name of the server.
- IP Address: Enter the IP address of the server.
- Port No.: Enter the port number of the server.
- Connect Timeout: Enter the TCP/IP connection timeout (in seconds) for transferring data.
- Read Timeout: Enter the TCP/IP connection timeout (in seconds) for receiving server response.

[Figure 3.21 Repository Info]

Edit: Edit the information for the selected server.

Delete: Delete the selected server.

► **Show Job Status**

Review and manage the status of data transfer (jobs). Only jobs that are being transferred or have failed to transfer are displayed. To show all jobs, including the ones that have been successfully transferred, use the **Show All** checkbox.

- Delete Archived Job Status after (days): Enter the retention period for jobs. Press **Change** to set the number of days you entered as the retention period.
- Column: Select the job information to display on the screen.

No: Message Control ID

Status: Transfer status

Retry: Number of transfer attempts

Received On: Transfer start time

Study Instance UID: ID for identifying the study (Unified Identifier)

Study Time: Study start time for this product

Patient ID: Patient ID

Patient Name: Patient name

Failure Reason: Reason for transfer failure

Alias: Server name

IP Address: Server IP

Port No.: Server port No.

Tips!

Transfer Types: Type of transfer

Error Message: Reason for failure that was sent by the server

- Retry: Transfer the selected job again. Note that only jobs that have failed to transfer can be re-transferred.
- Delete: Delete the selected job. Note that jobs that are currently being transferred cannot be deleted.

► Log

Manage all HL7-related logs on this product. You may use the combo box to view logs by date.

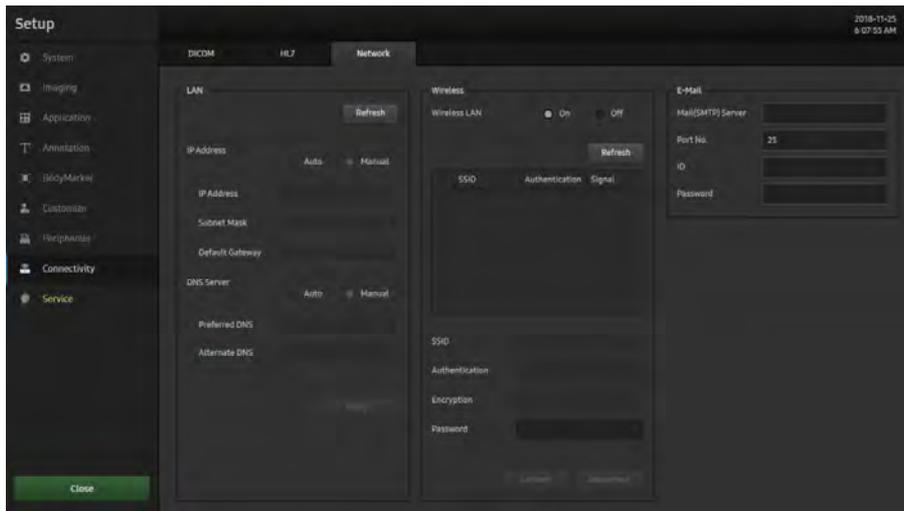
- Delete Archived log Status after (days): Enter the retention period for log file. Press **Change** to set the number of days you entered as the retention period.
- Export: Use the combo box to select the media to save the log file to. Press **Export** to save the log file.



[Figure 3.22 Log]

Network

On the *Setup* screen, select the **Network** tab under **Connectivity**. You can set E-mail, Network Status, etc.



[Figure 3.23 Connectivity – Network]

» LAN

■ Refresh

Update the saved Profile List and display it on the screen.

■ IP Address

A fixed IP address can be entered after selecting a desired method, either Auto or Manual. Specify the IP Address, Subnet Mask, and Default Gateway information.

■ DNS Server

The Preferred DNS and Alternate DNS information can be set after selecting a desired method between Auto and Manual.

- ▶ Apply: Restore the Profile settings to the selected values and then shut down the system.

Wireless

Wireless LAN

Set this to On or Off. Use a USB adapter to connect the system to a wireless network.



NOTE: The *Wireless Network* 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 access authentication method for the wireless network.
- ▶ Encryption: Displays the data encryption method for communicating with the wireless network.
- ▶ Password: Enter the password for the network.

Tips!

How to Connect to a Wireless Network

1. Use the trackball and the **Set** button to press the **Scan** button.
2. Select an available wireless network.
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.

»» ⌘ E-mail

Configure the server to send/receive e-mails using this server.

■ 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

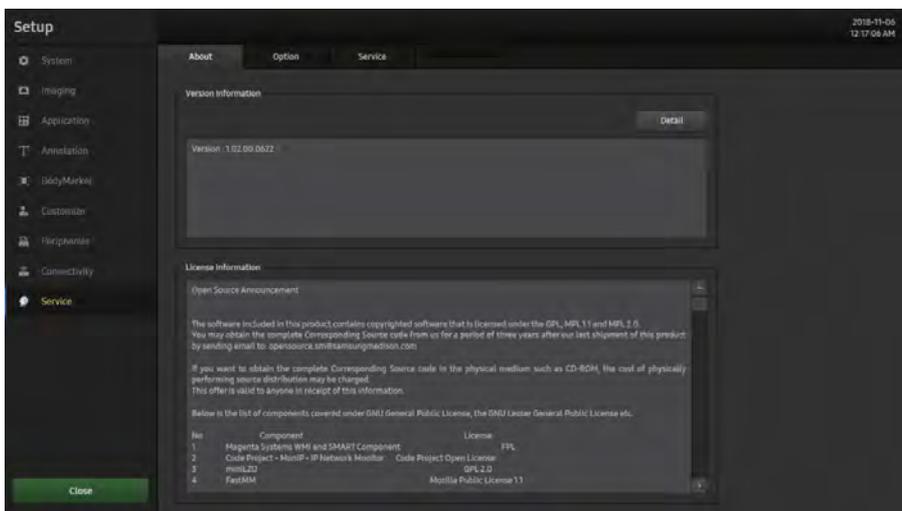
Enter the log-on password for the e-mail server to use.

Service

Press the **Service** button on the touchscreen. The software version of the product will be displayed.

About

On the *Setup* screen, select the **About** tab under **Service**. Press the **Detail** button to view the product's version information in detail.

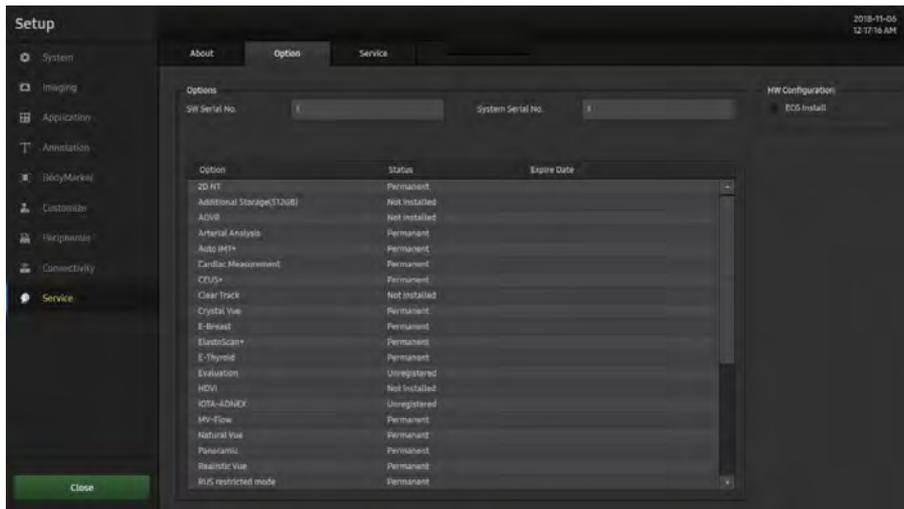


[Figure 3.24 Service – About]

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

Option

On the *Setup* screen, select the **Option** tab under **Service**. Enables or disables optional software or hardware.



[Figure 3.25 Service – Option]

* Actual options may vary.

»» Option

The list of optional software will appear.



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

■ Option

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

■ Status

Show the current status of optional software.

- ▶ Lock_Not Installed: Hardware is not connected.
- ▶ Lock_Unregistered: The software license has not been registered yet.
- ▶ Lock_Installed: Hardware is installed but cannot be used yet.
- ▶ Unlock_Permanent: The hardware or software can be used for an unlimited period.
- ▶ Unlock_Restricted: The hardware or software can be used only for a certain period of time.
- ▶ Lock_Expired: Use of the software is restricted, and it cannot be used because the specified period of use has expired.



Tips!

Software Trial

The following options will be disabled automatically when this option is disabled. You can only disable this option when it is set to be used only for a certain period of time. When the system boots, a warning message will be displayed to inform you of the expiration date.

■ HW Configuration

The list of optional hardware will appear. Currently, only ECG is supported. Select a hardware item to use by ticking the checkbox. Reboot the system to complete the settings.

**CAUTION:**

- ▶ Users should not attempt to perform anything on their own. They must contact the customer service department of Samsung Medison who can perform this service for them.
- ▶ If performed by users, it will not be covered by warranty.

**NOTE:**

- ▶ Performs restoration of saved basic patient information and images, or changes the software.
- ▶ It provides a Built-in Self-test function.

Service

▶▶ RMS Control

RMS stands for Remote Maintenance Service. If you encounter an issue with the product, this feature takes control of the system remotely and collects data to help resolve the issue.

■ Service Application

Pressing the button opens the *Service Application* screen. The *Service Application* screen consists of Log and Service tabs.

Tips!

Using RMS

You cannot use RMS unless you agree to the following, which are specified in the Service tab:

- ▶ The equipment's status is inspected via remote control and the results are used for customer service and error prevention purposes.
- ▶ The product's screen will be shared since the service is provided via remote control.
- ▶ Patient-related information is not transferred outside, including to Samsung Medison.

Tips!

Log

You can view various logs generated by the equipment such as the usage frequency, errors, and system information.

- ▶ Diagnostics: Show an Error Log of any errors that may be found while carrying out the hardware diagnosis.
- ▶ Error: Show information about the error that has occurred in the system. Select an image to view the circumstances when the error occurred.
- ▶ Utilization: You can also view specific usage information such as an Application, Probe, and Preset.

▶▶ RIS Browser

Choose whether to use RIS Browser or not.

⚙️ Measure Setup

Specify various setup options for measurements. The setup may be modified depending on specific needs or preferences.

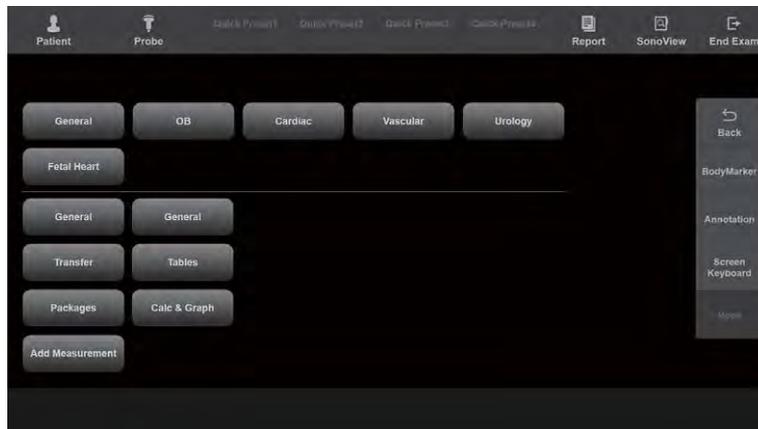
1. Press Utility > Measure Setup on the touchscreen.
2. When the *Measure Setup* screen appears on the monitor, select an item to configure or press a desired setting button on the touchscreen.
3. Set the settings for each item.

Tips!

How to Select a Tab

The user can select a desired tab in one of the following two ways. Select the way that suits you.

- ▶ Use the trackball and the **Set** button to select a tab on the screen.
- ▶ Press a button on the touchscreen.



[Figure 3.26 Measure Setup – Touchscreen]

⏏️ Touch Menu Designer

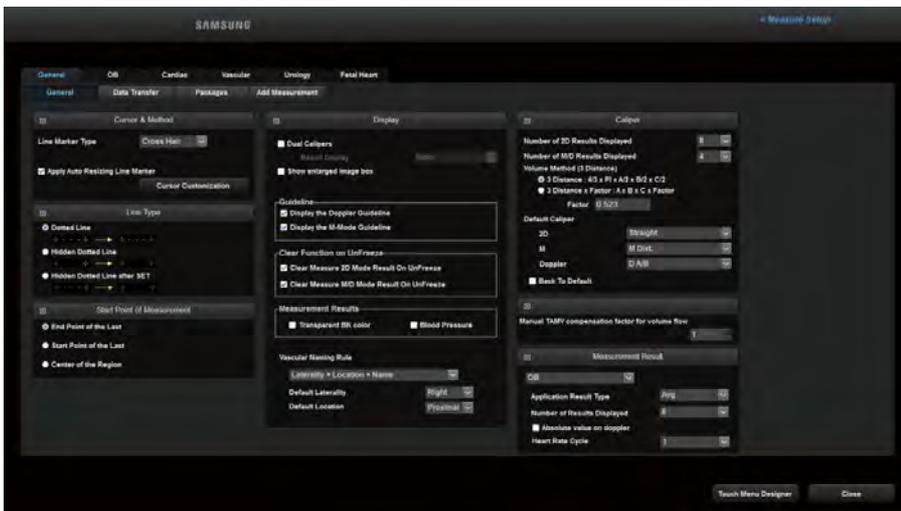
The screen will switch to the *Measure Menu* screen. For more information, please refer to the 'Measure Menu' section of this chapter.

General

Select the **General** tab on the *Measure Setup* screen. Alternatively, press **General** on the touchscreen. You can specify basic items that are used during measurements.

General

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



[Figure 3.27 Measure Setup – General – General]

Cursor & Method

Line Marker Type

Specify the shape of the caliper cursor displayed on the screen. Either Crosshair (+) or Arrowhead can be selected.

Apply Auto Resizing Line Marker

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

»» Cursor Customization

■ Guide

The size of the cursor the user is currently measuring with

■ Large

The size of the cursor the user has measured

■ Small

The size of the cursor among the markers the user has measured that are within 50px of the cursor on the screen

■ Shape

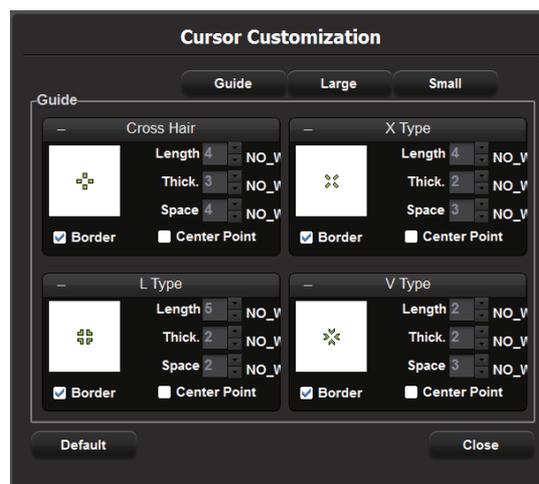
Cross Hair, X Type, L Type, V Type

■ Border

Cursor shadowing feature

■ Center Point

This feature displays a small dot at the exact center of the marker to help the user see the precise point of measurement



[Figure 3.28 Cursor Customization]

»» 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.



Selecting a 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

Set a location indicated by the cursor. 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 during measurement. Select the checkboxes of the items you wish to use.

■ Dual Caliper

When the checkbox is ticked, measurement values will be copied to and displayed in Dual Live Mode, E Dual Mode, or Low MI Dual Live Mode.

- ▶ Result Display: Select one from Both, Right, and Left.

■ Show Enlarged Image Box

At measurement, it displays the 2x magnified images with indication of the current location.

■ Guideline

- ▶ Display the Doppler Guideline: Choose whether or not to display the Cross Line while measuring various items on a spectrum in Freeze state. 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 Freeze state in 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 Results

- ▶ Transparent BK Color: Sets a transparent background.
- ▶ Blood Pressure: If the function is checked, the pressure information of the current position is displayed together when measuring Doppler in a Doppler image.



NOTE: Use the Settings tab of each application to configure the Number of Results Displayed for obstetrics, cardiac, vascular, urology, and fetal heart measurement.

■ Vascular Naming Rule

Depending on the Laterality and Position settings of the Vascular measurement items, a user can choose the naming rule for the measurement group.

However, the system must be restarted after the setting is changed to apply the selected naming rule to the Report Edit Mode.

- ▶ You can select from the following six items:
 - Laterality + Location + Name
 - Laterality + Name + Location
 - Location + Laterality + Name
 - Location + Name + Laterality
 - Name + Location + Laterality
 - Name + Laterality + Location
- ▶ Default Laterality: Select Right, Left, or N/A for the default menu direction of the vessel in the touch measurement menu.
- ▶ Default Location: Select Proximal, Mid, Distal, or N/A for the default position of the vessel in the touch measurement menu.



Caliper

■ Number of 2D Results Displayed

This option determines how many lines of measurement results will be displayed on the 2D Mode screen when basic measurements are taken by pressing the **Caliper** button on the control panel.

■ Number of M Results Displayed

This option determines how many lines of measurement results will be displayed on the M or D mode screen when basic measurements are taken by pressing the **Caliper** button on the control panel.

■ Volume Method (3 Distance)

Enter the formula that will be used to calculate the volume using 3 Distance Vol. Caliper.

- ▶ 3 Distance: The volume is calculated using three diameters in the longitudinal and transverse planes ($4/3 \times \text{PI} \times A/2 \times B/2 \times C/2$).
- ▶ 3 Distance x Factor: The volume is calculated using three diameters in the longitudinal and transversal planes and a factor (F) value entered by the user ($A \times B \times C \times \text{Factor}$).



NOTE:

- ▶ 3 Distances x Factor: A=1st Dia.; B=2nd Dia.; C=3rd Dia.
- ▶ The factor value is set to 0.523 by default. When the value needs to be changed, a value from 0 to 1 ($0 < \text{factor} \leq 1$) is recommended.

■ Default Caliper

Caliper items can be set for 2D, M, and Doppler, respectively.

- ▶ Back to Default: When this is ticked, the system's default setting will be saved.

▶▶ **Manual TAMV Compensation Factor for Volume Flow**

When TAMV is measured using the Manual Trace method, select a compensation factor. Select a compensation factor of 1 when the user draws an expected TAMV line. When a factor below 1 is selected, the TAMV line is drawn considering the compensated factor. Select a compensation factor from 0.10 to 1.00.

▶▶ **Measurement Result**

■ **Application Result Type**

Set a measurement method. Select one from average value (Avg.), last measured value (Last), maximum value (Max), and minimum value (Min).

■ **Number of Results Displayed**

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

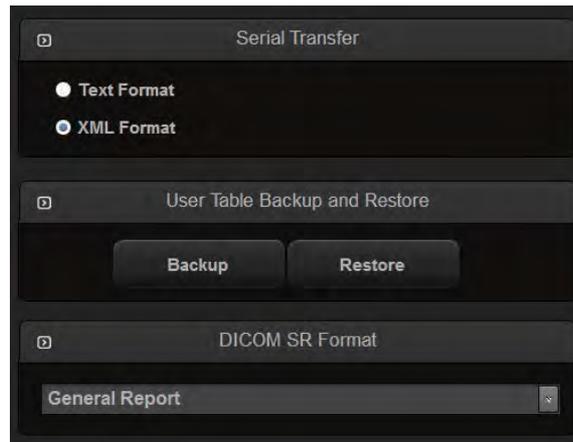
- ▶ Absolute value on doppler: Configure a desired application and then tick the relevant checkbox. The measured Doppler value is displayed as an absolute value in Scan Mode and in the Report.

■ **Heart Rate Cycle**

Specify the number of Heart Rate Cycles.

Data Transfer

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



[Figure 3.29 Measure Setup – General – Data Transfer]

Serial Transfer

Specify the format in which data will be transferred. You can select text format or XML format. This product uses an RS-232C USB serial cable to transfer data. Select the XML format to transfer data with reporting tools such as Astraia, Sonoultra, and ViewPoint.



NOTE: Before configuration, make sure that **COM** is set to 'Open Line Transfer' under the Peripherals tab on the *Setup* screen.

User Table Backup and Restore

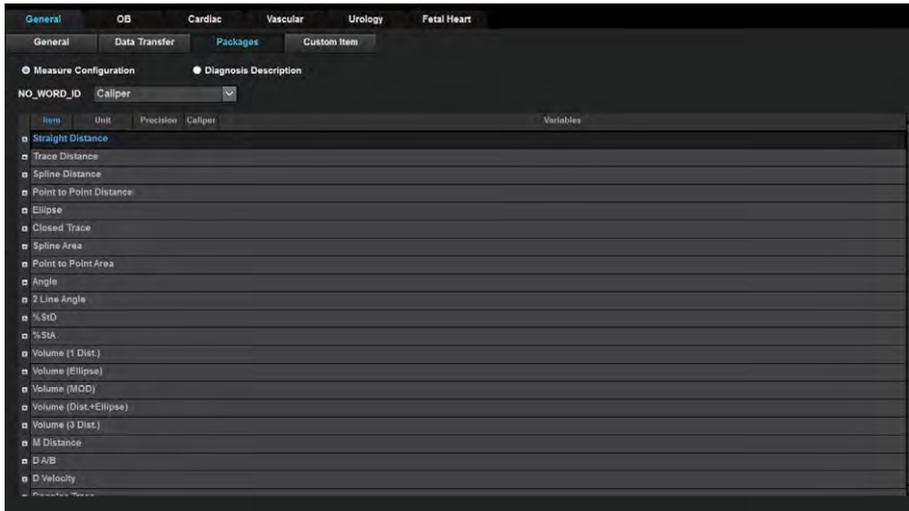
This is used to back up tables created by the user or restore previously backed up tables on the system. Click **Backup** or **Restore** and configure the settings on the screen that appears afterwards.

DICOM SR Format

- ▶ General Report: This is the default data format.
- ▶ ViewPoint: This is the ViewPoint data format.

Packages

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



[Figure 3.30 Measure Setup – General – Packages]

»» ⌘ Measure Configuration

Change the units, decimal places, measurement method, etc. for an item to be measured. The Unit and Precision settings can be configured per Package.

- ▶ Item: Select 'Application' to display an item to measure.
- ▶ Unit: Select the unit by pressing the combo button.
- ▶ Sync: When ticked, the units of any items belonging to the same group that have the same properties as the changed items will be changed.
- ▶ Precision: Set the decimal places to a value from 0 to 3 by pressing the combo button.
- ▶ Caliper: Select measurement methods by using the checkboxes in the *Caliper* window activated on the right side. At least one must be selected.
- ▶ Variables: The user can select whether to apply variables during measurements only or to reports as well, by using the checkboxes in the *Variables* window activated on the right side. At least one must be selected.



NOTE:

- ▶ The 'Cardiac' setting can be used only when the probe preset is Cardiac or Pediatric Cardiology.
- ▶ If 'Application' is set to Cardiac, the 'D Velocity', 'D A/B', 'D Trace' and 'M Distance' items are changed.

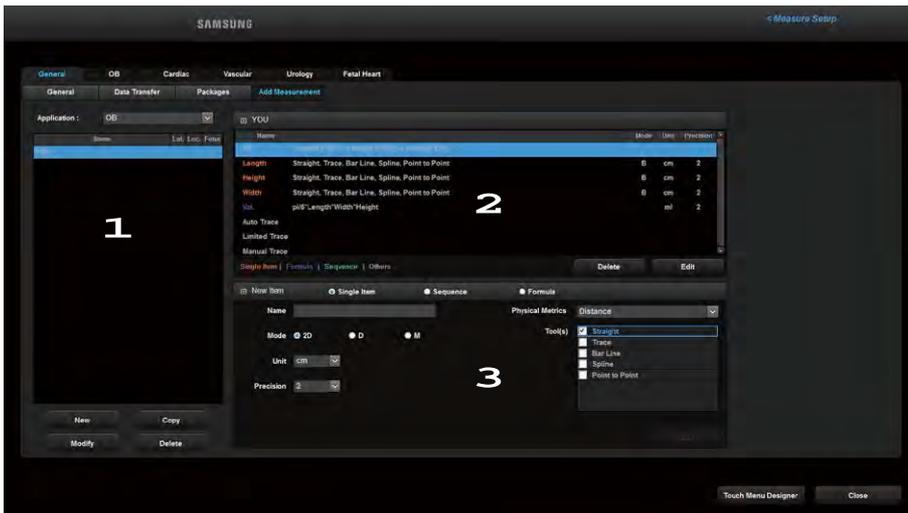
»» ⌘ Operation Description

When an item is selected using the trackball, the *Options* window is activated. Add a Description item to the report, or delete or edit items added by a user.

- ▶ Add: Add a Description item. Up to 12 items may be entered.
- ▶ Edit: Edit a Description item added by the user.
- ▶ Delete: Delete a Description item added by the user.
- ▶ Reset: Resets to default settings.

Add Measurement

Select the **Add Measurement** sub-tab under the **General** tab. The measurement groups and items can be selected and configured as desired.



[Figure 3.31 Measure Setup – General – Add Measurement]

1 Measurement Group Area

New, Copy, Modify, and Delete measurement groups. Options for the measurement group, such as Name, Laterality (Lat.), Location (Loc.), and Multiple Fetuses (M.Preg.), are displayed.

Application

Select an application.

New

Creates a new measurement group. Click **New** on the screen. A maximum of ten measurement groups can be created per application.

- ▶ Group Name: Enter the name of the measurement group.
- ▶ Type: Select the type of measurement group. Once the type of measurement group is selected, the default measurement items for each group will be displayed.
- ▶ Option: Set the options for the measurement group by using the checkboxes. Set the Multiple Fetuses (Multi Pregnancy), Laterality and Laterality N/A prefix, and Location and Location Display options. Available options vary depending on the application.

■ Copy

Copies the selected measurement group. You can set a Group Name and Options for the measurement group to be copied.

■ Modify

Allows the user to modify the Group Name and Options of the selected measurement group.

■ Delete

Delete the selected measurement group.

»»  2 Measurement Item Area

Displays the measurement items for the selected measurement group. The measurement items can be added, deleted, and edited by the user. Information, such as the modes, units, precision settings, and the names of the measurement items are displayed. The absence/existence of a single measurement item (Single Item), sequential measurement item (Sequence), or measurement item requiring a formula is marked in color.

■ Delete

Deletes the selected measurement item. Deleted measurement items will not appear in Patient and Report.

■ Edit

Edits the selected measurement item. This item will remain inactive if the button is clicked; clicking the Cancel or Update button will close the Edit window.

▶▶ 3 New Item/Edit Item Areas

Creates a new measurement item. A maximum of 90 measurement items can be created. Select one of the options: single measurement item (Single Measure), sequential measurement item (Sequence), or measurement item requiring a formula.

■ Single Item

Creates a single measurement item.

- ▶ Name: Enter the name of the measurement item.
- ▶ Mode: Select B, D, or M for the Operation modes.
- ▶ Unit: Select the units for the measurement item.
- ▶ Precision: Set the decimal places to a value from 0 to 3 by pressing the combo button.
- ▶ Physical Matrics: Select Distance, Circumference, Area, Volume, or Angle from the measurement menu.
- ▶ Tool(s): Select a measurement method.

■ Sequence

Creates an item that can be measured continuously.

■ Formula

Creates a measurement item that uses a formula.

- ▶ Name: Enter the name of the measurement item.
- ▶ Formula (=): Enter a formula.

The measurement items that can be added by the user are displayed to the right of the formula. Select a desired measurement item, and click  to display the lower-tier items. To add a measurement item to the formula, select the measurement item and press .

Modify the formula by clicking the **Back** button or the **Delete** button on the bottom right side of the screen, or the screen keyboard on the touchscreen.

- ▶ Unit: Enter the units for the measurement item.
- ▶ Precision: Set the decimal places to a value from 0 to 3 by pressing the combo button.

■ Add

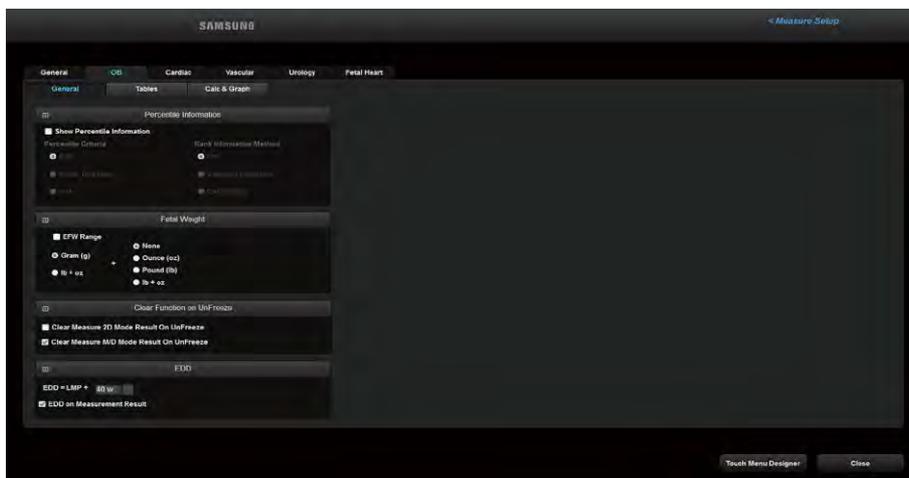
Once the measurement items are configured, press the **Add** button on the monitor screen to add a measurement item.

OB

Select the **OB** tab on the *Measure Setup* screen. Alternatively, press **OB** on the touchscreen. Here you can set items related to obstetrics measurement.

General

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



[Figure 3.32 Measure Setup – OB – General]

▶▶ Percentile Information

■ Show Percentile Information

Select the checkbox if you wish to use percentile information.

■ Percentile Criteria

Select a value that will be used for percentile calculation.

- ▶ EDD: The user can calculate an expected delivery date. Once the expected delivery date is entered, GA (Gestational Age) is automatically calculated and displayed.
- ▶ Estab. Due Date: GA is calculated based on the mother's Estab. Due Date that is entered in the Patient Information. After a percentile value is calculated, it will be displayed on the measurement screen and report.
- ▶ AUA (Average US GA): The GA is calculated using the average values of several ultrasound measurements. After a percentile value is calculated, it will be displayed on the measurement screen and report.

■ 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.

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

»» **Fetal Weight**

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

'lb + oz' displays pounds and ounces at the same time while 'None' indicates that no secondary units are used.

■ **EFW Range**

Select the checkbox to display the margin of error for the fetal weight. The margin of error will be displayed only when the unit is set to 'Gram (g)'.

»» **Clear Function on UnFreeze**

This function is applied to obstetrics only.

■ **Clear Measure 2D Mode Result On UnFreeze**

Tick the checkbox to determine whether or not to delete 2D Mode results when UnFreeze is selected after measurement.

■ **Clear Measure M/D Mode Result On UnFreeze**

Tick the checkbox to delete M or D Mode results when UnFreeze is selected after measurement.

»» **EDD**

■ **EDD on Measurement Result**

Put a check in the checkbox to display the estimated date of delivery. You can set Pregnancy Week. You can select a value from 35 to 45 weeks; the default is 40 weeks (280 days). When changing the Pregnancy Week, EDD is also changed.

Table Settings

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



[Figure 3.33 Measure Setup – OB – Tables]



OB Tables

■ Preset

You can configure the User Preset settings for OB Table. Press  to add or delete presets. The default setting is General.

- ▶ This does not apply to the Probe User Preset settings of the system; you can only configure the settings for MeasSetup Table.

■ Items

This setting is intended for the measurement of the gestational age (GA) and the fetal size (Growth). Select items in the following order: Select items for PI and RI graphs, and the AFI settings for the MCA (Mid Cerebral Artery) and UA (Umbilical Artery) by following the steps shown below.

1. Select measurement items from the list on the left.
2. Select a reference type from the GA table and 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 an EFW measurement method between EFW equation and EFW growth.
2. Select a reference to use 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.

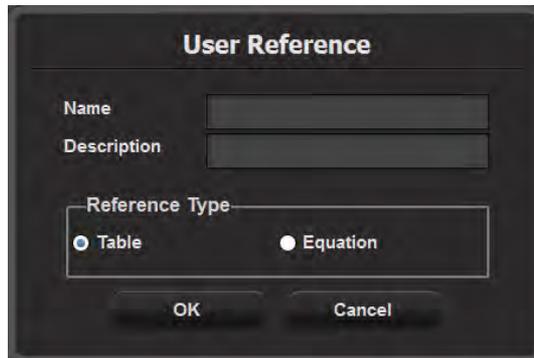
- ▶ Input at least three types of data.
- ▶ If there are no Min and Max values, select Value Only for 'Table Type'.

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: For EFW Equation, only Equation can be set as the reference type, while only Table can be set for EFW Growth.

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

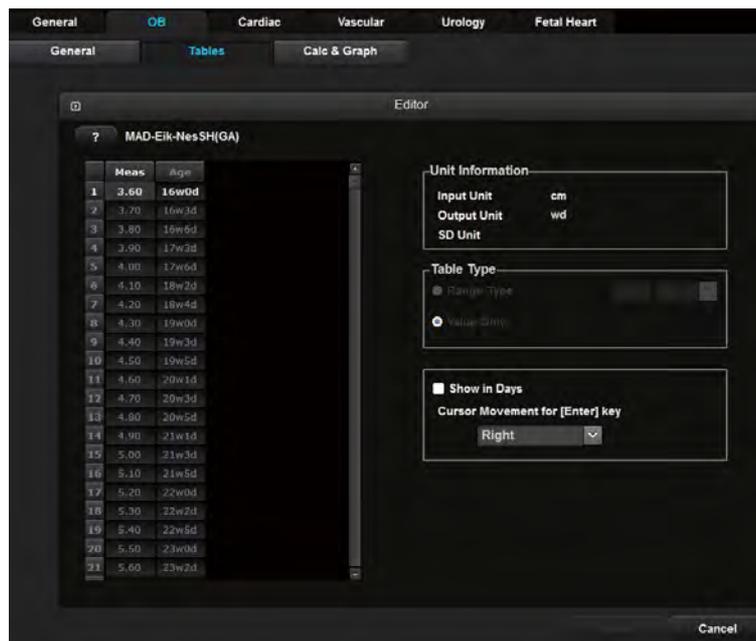


The screenshot shows a dark-themed dialog box titled "User Reference". It features two text input fields labeled "Name" and "Description". Below these is a "Reference Type" section with two radio buttons: "Table" (selected) and "Equation". At the bottom, there are "OK" and "Cancel" buttons.

[Figure 3.34 User Reference]


Tips!
Adding Reference Tables

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



[Figure 3.35 User Table]

► **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 such as Min., Max., and SD.

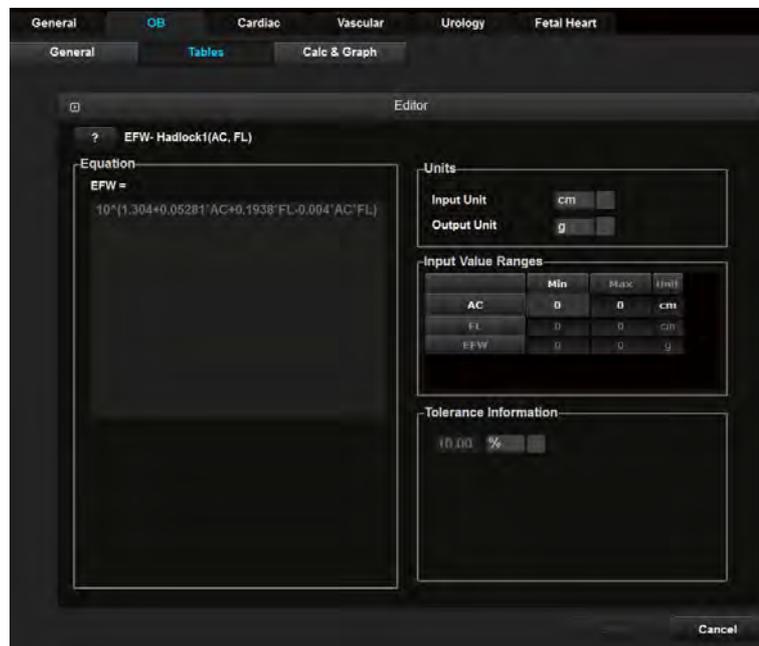
► **Other**

- 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.


Tips!
Adding Reference Equations

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.
- ▶ **Units**
Set the Input and Output units.
- ▶ **Input Value Ranges**
Enter the minimum (Low) and maximum (High) ranges for the selected reference.
- ▶ **Tolerance Information**
Select the tolerance from w or d.



[Figure 3.36 User Equation]

■ View & Modify References

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

■ EFW Sequential Measurement

Arrange the order of EFW measurement items by using the User Keys (U1 to U4). Select a measurement item by using the trackball and the **Set** button, and then change its position in the order by using the arrow buttons.



NOTE:

- ▶ This setting is necessary when 'EFW Measurement' has been assigned to one of the User Keys (U1 to U4) in Setup > Customize > Button. The setting will be applied for EFW measurements via one of the User Keys (U1 to U4).
- ▶ You can also set EFW measure in Touch Menu Designer.

Calc. & Graph

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



[Figure 3.37 Measure Setup – OB – Calc. & Graph]

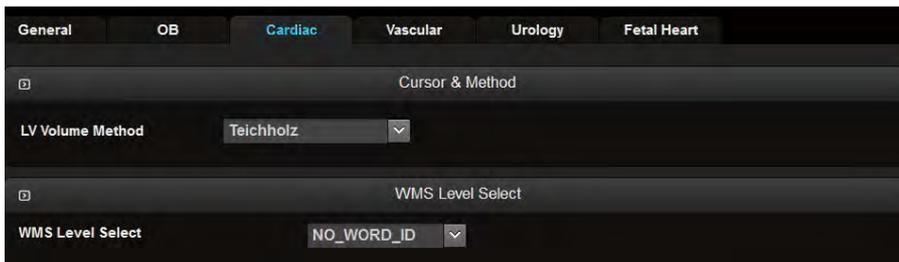


Trend Graph

Specify whether to include a graph for a certain item or ratio in an obstetrics report. Click  to open the *Editor* screen for the relevant graph.

Cardiac

Select the **Cardiac** tab on the *Measure Setup* screen. Alternatively, press **Cardiac** on the touchscreen. You can specify settings for cardiac measurement.



[Figure 3.38 Measure Setup – Cardiac]

▶▶ **Cursor & Method**

■ **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.

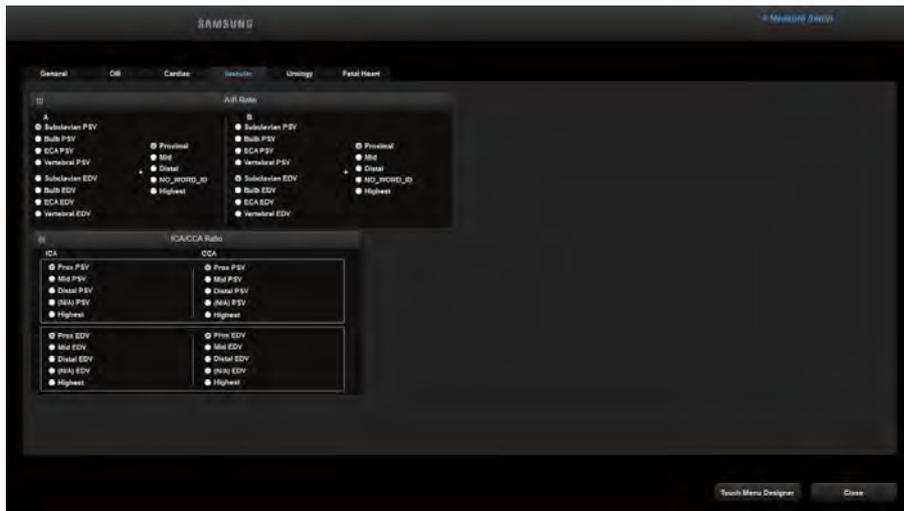
▶▶ **WMS Level Select**

■ **WMS Level Select**

Select one of the following Score menus to use from WMS Level Select: WMS-Level 4, WMS-Level 5, or WMS-Level 7.

Vascular

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



[Figure 3.39 Measure Setup – Vascular]



A/B Ratio

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

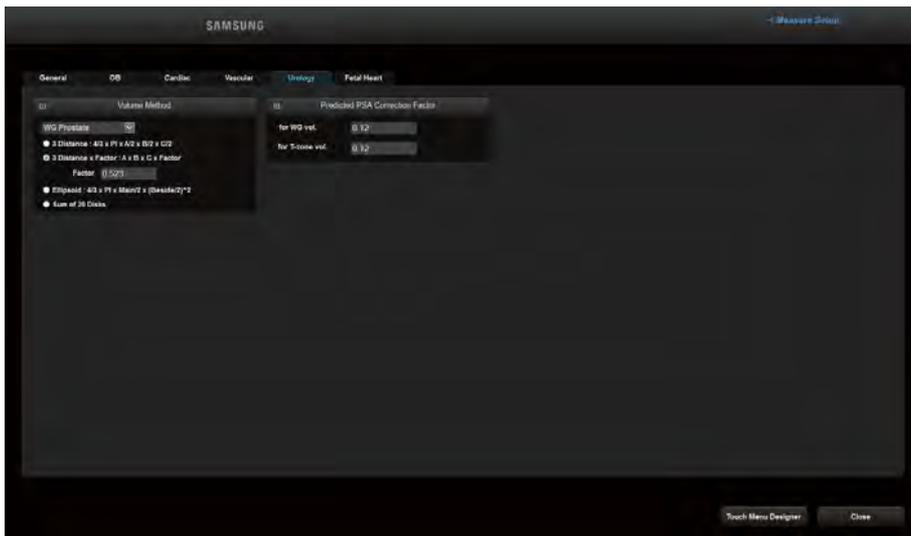


ICA/CCA Ratio

Specify each measurement item that will be used for the ICA and CCA ratios. If **Highest** is selected, the highest result value will be used.

Urology

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



[Figure 3.40 Measure Setup – Urology]

Volume Method

Choose one from WG Prostate, Bladder, T-Zone, Residual Vol., Renal Vol., and Testicle; and apply Volume Method to it. Specify an equation that will be used for volume calculation.

- ▶ 3 Distance: The volume is calculated using three diameters in the longitudinal and transverse planes ($\frac{4}{3} \times \text{PI} \times \frac{A}{2} \times \frac{B}{2} \times \frac{C}{2}$).
- ▶ 3 Distance x Factor: The volume is calculated using three diameters in the longitudinal and transversal planes and a factor (F) value entered by the user ($A \times B \times C \times \text{Factor}$).
- ▶ Ellipsoid: The volume is calculated using the lengths of the Main and Beside axes on the 2D plane ($\frac{4}{3} \times \text{PI} \times \frac{\text{Main}}{2} \times (\frac{\text{Beside}}{2})^2$).
- ▶ Sum of 20 Disks: The volume is calculated by summing the areas on the 20 parallel planes ($\frac{d}{20} \times (A_1 + A_2 + \dots + A_{20})$, d: the sum of the distances between disks).



NOTE:

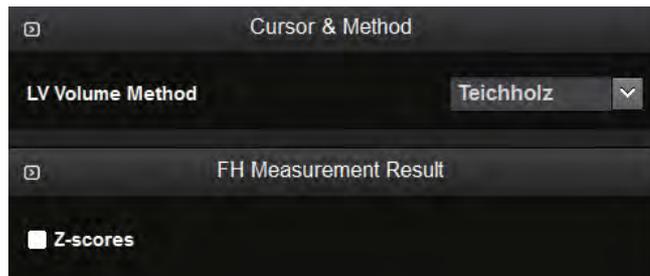
- ▶ 3 Distances x Factor: A = 1st Dia. ; B = 2nd Dia. ; C = 3rd Dia.
- ▶ The Factor value is set to '0.523' by default. When the value needs to be changed, a value from 0 to 1 ($0 < \text{factor} \leq 1$) is recommended.

Predicted PSA Correction Factor

Specify the Predicted PSA correction factor to measure the WG and T-Zone volumes. The default value is 0.12.

Fetal Heart

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



[Figure 3.41 Measure Setup – Fetal Heart]

Cursor & Method

■ 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.



FH Measurement Result

■ Z-Score

Show or hide the Z-Score. The Z-Score is calculated based on BPD, FL, and GA (AUA & LMP) measurements for the 17 indicators of Fetal Echo.

Fetal Echo Z-Score Items	
Aortic Valve	LPA
Pulmonary Valve	RV Diam
Asc. Aorta	LVIDd
Desc. Aorta	RV Inlet
Tricuspid Valve	LV Inlet
Mitral Valve	RV Area
Duct Art	LV Area
MPA Diam	IVC
RPA	

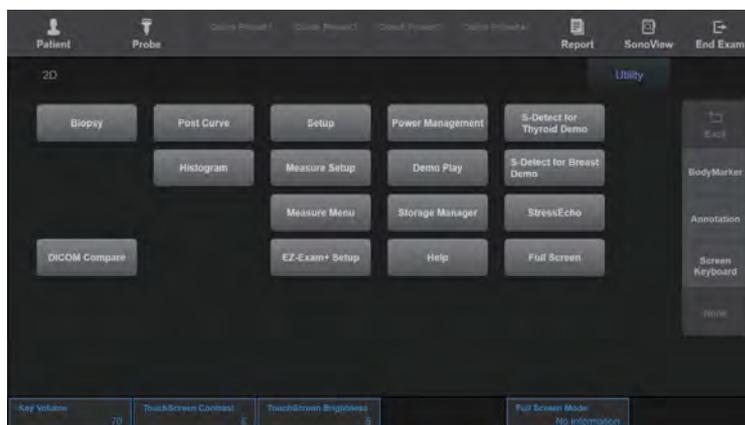
[Table 3.1 Fetal Echo Z-Score Items]

:: Utility

This menu is for system settings and for using ECG, Biopsy, and Histogram.

You can use the Utility menu as follows:

1. Press the **Utility** tab on the touchscreen. The *Utility* screen will open on the touchscreen.
2. Press a button to select the desired item.
3. Close the *Utility* screen and press the **2D** button on the touchscreen to switch to Scan Mode.



[Figure 3.42 Utility – Touchscreen]

■ Key Volume

Set the button sound on the *Utility* screen on the touchscreen.

■ Touchscreen Contrast

Set the contrast for the touchscreen.

■ Touchscreen Brightness

Set the brightness for the touchscreen.

Biopsy

Select **Biopsy** on the *Utility* screen on the touchscreen.



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



[Figure 3.43 Biopsy]

» Editing the Biopsy Guideline



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.

1. Press **Edit**. A warning message appears.
2. Pressing **OK** will open the screen where the guideline can be set.
3. Set the biopsy guideline by using the trackball and the **Set** button.
4. Press **Save** on the touchscreen to save the settings. A confirmation message will appear.
5. Press **Edit** to set the biopsy guideline again.
6. Pressing **OK** will apply the set biopsy guideline. Press **Cancel** to cancel saving.



Support for Multiple Guidelines

When a specific probe is in use, the **User** button will appear on the touchscreen. This allows you to preset two or more biopsy guidelines.

The biopsy settings for the E3-12A probe are configured as shown below:

For detailed specifications, please refer to 'Chapter 5. Probes'.

- ▶ A: BP-KIT-077 (0°), BP-KIT-078 (0°)
- ▶ B: BP-KIT-076 (2°)
- ▶ C: BP-KIT-057 (4.2°)

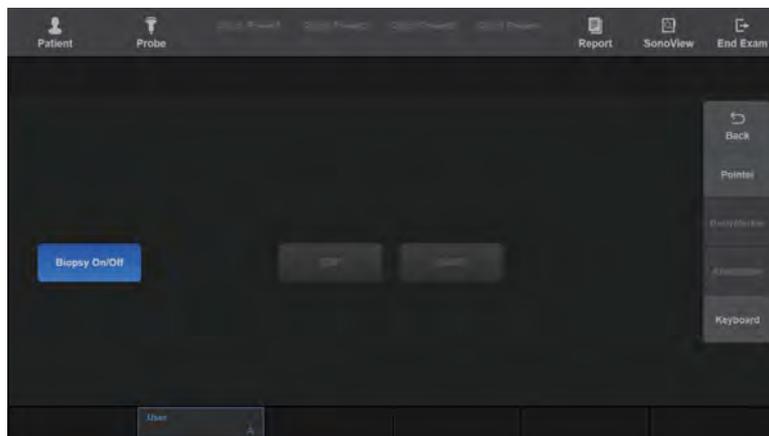


Setting User Guidelines

1. Select the biopsy guideline you need to set using the **User** button on the touchscreen.
2. Press **Edit**. A warning message appears.
3. Press **Save** on the touchscreen to save the settings. A confirmation message will appear.
Press **Edit** to set the biopsy guideline again.
4. Pressing **OK** will apply the set biopsy guideline. Press **Cancel** to cancel saving.

▶▶ **Starting and Finishing a Biopsy**

1. Press the **Biopsy On/Off** button on the touchscreen. A warning message will appear.
2. Press **OK** and the biopsy guideline will appear on the screen.
 - ▶ If the Biopsy Guideline displayed on the screen is incorrect, press **Edit** to set it again.
 - ▶ When using a probe which supports multiple guidelines, you can use the **User** button to choose a preset guideline.
3. Insert a needle along the guideline. And then perform the biopsy as desired.
4. Once completed, press the **Biopsy On/Off** button again. The biopsy is complete.



[Figure 3.44 Biopsy – Touchscreen]

ADVR

Press 2D on the touchscreen or **ADVR** on the *Utility* screen. The touchscreen will switch to the *ADVR* screen.



CAUTION: Check the capacity of the media before recording.

▶▶ **Record**

Records images.

■ **Record**

Press the **1** button to start recording preparations. Recording will automatically begin once ready. The time it takes to begin recording will vary depending on the type of DVD used.

- ▶ DVD: The amount of time required to save a recording will vary depending on the type of media being used.
- ▶ USB: Enter an image file to record and press **OK** to start recording.



CAUTION: Be careful not to disconnect the USB device from the system during recording, as this may cause problems.



[Figure 3.45 ADVR – Record]

■ Record Stop

Press the 2 button to stop recording.

■ Close Session

Press the 3 button to exit the current DVD recording mode. To play back recorded images, you must stop recording and press Close Session to finish the current recording mode.

■ Record Mode

Press the touchscreen or use the dial-button to select Append or Overwrite for the recording method.

- ▶ Append: Records in continuation of the current recording.
- ▶ Overwrite: Overwrites the current recording and starts a new recording.

▶▶ ⌘ Play

For DVD type, follow the instructions below to play back the recorded image.

■ Play

Select a recorded video and press the **4** button to start playback.

■ Pause

Press the **5** button to pause playback.

■ Stop

Press the **6** button to stop playback.

■ Play Menu

Press the **6** button on the screen to exit Play Mode.

■ Rewind

Press the **7** button during playback to rewind.

■ Fast Forward

Press the **8** button during playback to fast forward.

■ Speed

Configures the rewind and fast forward speeds. Press the touchscreen or use the dial-button to select one from x2, x4, x8, x16, and x32.



NOTE:

- ▶ The speed needs to be changed before playback.
- ▶ The playback speed will not change if you try to change it during playback.

■ Menu

When you press **Menu** on the touchscreen during playback, you can view the menu where you can select a track.



NOTE: For USB type files, only the Play, Pause, and Stop functions can be used.

▶▶ ⌘ Eject Tray

For DVD Type, press the button on the touchscreen to eject the media tray.

▶▶ ⌘ Close Tray

For DVD Type, press the button on the touchscreen to close the media tray.

Volume

Used to adjust the volume. Press the touchscreen or use the dial-button and select a value from 0 to 100.



[Figure 3.46 ADVR – Touchscreen]

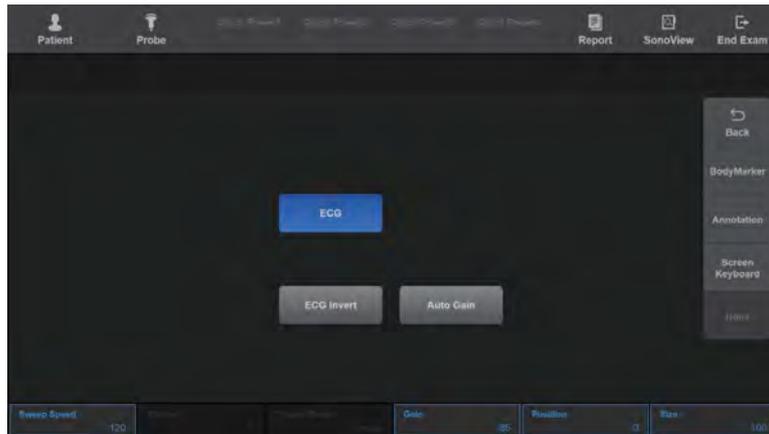


NOTE:

- ▶ For more information on the recommended media, please refer to 'Peripheral Devices' in 'Chapter 2. Introduction'.
- ▶ The following media are only warranted:
Melody+RW, HP+RW, Mitsubishi+RW, Imation+RW, Verbatim+RW
- ▶ Philips+RWMedia recorded via ADVR cannot be backed up or transferred. Furthermore, media backed up or transferred via ADVR cannot be recorded.
- ▶ In Setup > Peripherals > ADVR Device > Recording To, you can select DVD or USB as the Media Type for real-time recording.

ECG

Press **ECG** on the *Utility* screen of the touchscreen. The ECG (echocardiogram) function allows viewing of the cardiac pulsation.



[Figure 3.47 ECG – Touchscreen]



NOTE: It only appears in the menu when the application has been set to Cardiac or Vascular.

In a Multi Image Mode, such as Dual or Quad, the ECG Cine feature can be used for each image.

»» ⌘ Starting and Terminating ECG

Press **ECG** on the touchscreen.

»» ⌘ ECG Settings

■ ECG Invert

Inverts ECG. Turn this On or Off by pressing the touchscreen.

■ Auto Gain

Press **Auto Gain** on the touchscreen to automatically set the gain value of ECG.

■ 2D/Loop

Sets the area for using ECG. Select **2D** or Loop by pressing the touchscreen. You can use ECG in the 2D area when you select **2D**, or in the Loop area of Spectral Doppler Mode when you select Loop.

■ Sweep Speed

Sets the ECG speed. Select 60 Hz, 120 Hz, 180 Hz, 240 Hz, 300 Hz, or 360 Hz by using the dial-button on the touchscreen.

■ Trigger

Sets the trigger interval. Turn it off or select a value from 1 to 5 by using the dial-button on the touchscreen.

■ Trigger Time

Sets the time to initiate a trigger. Select a value from 0 to 1,000 msec using the dial-button on the touchscreen.

■ Gain

Sets the ECG gain value. Select a value from 10 to 100 using the dial-button on the touchscreen.

■ Size

Sets the ECG size. Select a value from 50 to 200 using the dial-button on the touchscreen.

■ Position

Sets the ECG position. Select a value from 0 to 90 by using the dial-button on the touchscreen. The ECG moves toward the top as the value increases.



CAUTION:

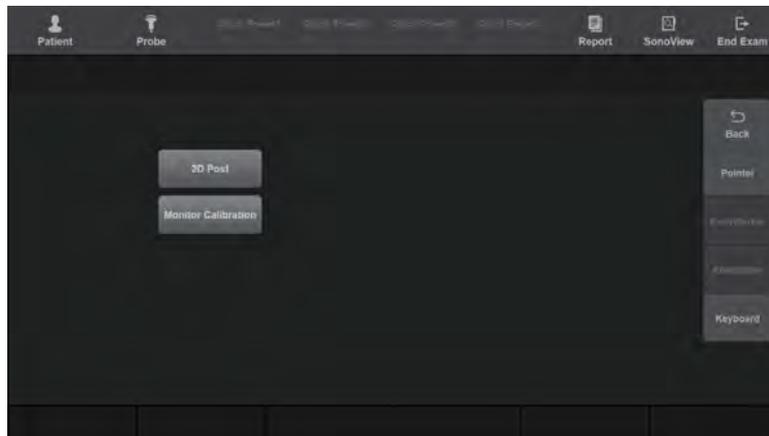
- ▶ If the ECG is less than 30Hz, the Heart Rate (HR) may not be displayed.
- ▶ In CW Mode, when the ECG is active, the error ratio of the Heart Rate (HR) should be within 2%.

DICOM Compare

Press the button on the touchscreen to move to the *Compare* screen. Press the **Select Series** button to open the *Data Manager* window. Select Series by using the checkbox and press **Assign**. The selected items are added. The *Dual* window opens, and images can be compared.

Post Curve

Press **Post Curve** on the *Utility* screen of the touchscreen. The touchscreen switches to Post Curve. Here you can set various post maps and gamma values. Post Curve's tab menu varies by Operation modes.



[Figure 3.48 Post Curve – Touchscreen]

▶▶ 2D Post

Press **2D Post**.

■ Chroma Map

Press **Chroma Map** on the touchscreen to turn it On or Off. When you select On, you can change the colors of images on the screen according to your choice.

Use the [1] dial-button to select one from Type 1 to Type 15 or from User 1 to User 6. When you set User Type to Curve, the **Chroma Map Edit** button will be enabled on the touchscreen.

■ Chroma Map Edit

You can set the Chroma colors of your choice. You can also set the Chroma colors in each Operation mode menu. This is enabled only for the **User** type.

Adjust the color using **Red**, **Green**, and **Blue**. You can select a value from 0 to 255.

When you change the settings, **Chroma Map Save** is enabled. Press **Chroma Map Save** to save the settings.

■ Chroma Map Save

Saves the settings changed in **Chroma Map Edit**.

■ Back

Returns to the previous step in the current menu after the current Post Map settings have been completed.

■ Gamma

Use the dial-button on the touchscreen to set the brightness and contrast (Off, Weak, Medium, or Hard).

- ▶ Off: Gamma Off
- ▶ Weak: Bright contrast
- ▶ Medium: Medium contrast
- ▶ Hard: Dark contrast

■ Post Curve

Adjust the gamma, brightness, and contrast of the screen. You can use the touchscreen dial-button to select a value from nine different Post Curve settings.



[Figure 3.49 2D Post – Touchscreen]

» » & Color Map

Press **Color Map**. However, it is available only when Color Mode is turned On.

■ Tag

Press **Tag** on the touchscreen to turn it On/Off. When turned On, a random color is applied to a certain area (Tag) of an image displayed on the screen.

■ Tag Width

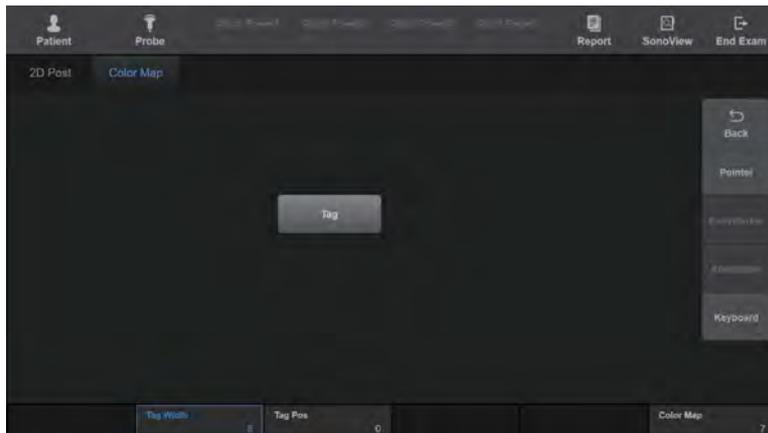
Press the touchscreen or use the dial-button on the control panel to set the Tag range to a value from 8 to 256. The Tag Width affects the Tag Pos.

■ Tag Pos

Press the touchscreen or use the dial-button on the control panel to set the Tag position to a value from 0 to 248. The Tag Pos affects the Tag Width.

■ Color Map

Press the touchscreen or use the dial-button on the control panel to select the Color Map type. The system provides 15 pre-configured types.



[Figure 3.50 Color Map – Touchscreen]

▶▶ ⚠ D Post

Press **D Post**. The editing method is identical to 2D Post.

▶▶ ⚠ Monitor Calibration

Press **Monitor Calibration**.

■ Brightness

Set the brightness of the screen. Press the touchscreen or use the dial-button on the control panel to select a value from 0 to 100.

■ Contrast

Set the contrast of the screen. Press the touchscreen or use the dial-button on the control panel to select a value from 0 to 100.

■ Curve

Specify the focus curve. Press the touchscreen or use the dial-button on the control panel to select one from Type 1 to Type 5, or from User 1 to User 3. You can edit the user type focus curves according to your preferences by using **Edit**.

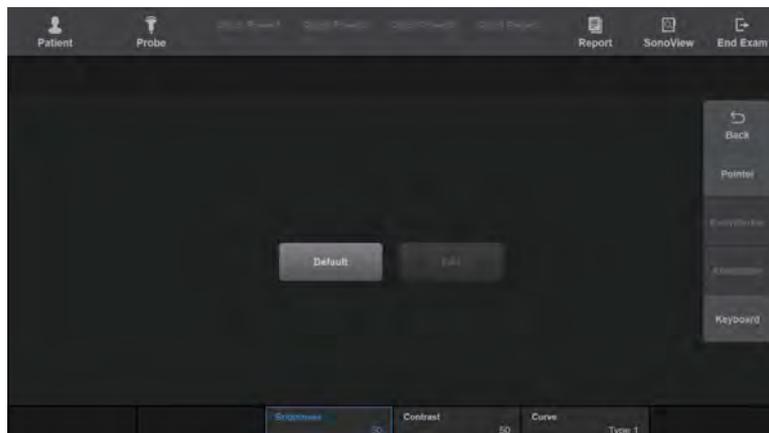
■ Edit

When Curve is set to User, **Edit** is enabled on the touchscreen. Pressing **Edit** on the touchscreen shows the screen and menu for setting a curve.

- ▶ Insert: Insert a point on the Curve. The new point is added in the middle, between the currently selected point and the next point.
- ▶ Delete: Deletes the currently selected point.
- ▶ Save: Save the current Curve.
- ▶ Picker Pos: Selects a point in the curve. Press the touchscreen or use the dial-button on the control panel to select the position of the point.
- ▶ Color: Select **Red**, **Green**, or **Blue** for the color of the point on the curve to suit your preference.

■ Default

Restores it to factory settings.



[Figure 3.51 Monitor Calibration – Touchscreen]

Histogram

Press **Histogram** on the *Utility* screen of the touchscreen. The touchscreen will switch to the Histogram screen. A histogram is a type of graph representing the distribution of echoes.

1. Press **Histogram** on the touchscreen. The touchscreen will switch to the Histogram screen.
2. Specify an area that the histogram is to cover. Use the trackball and the **Set** button to specify area 1, 2, and 3.
3. Histograms 1, 2, and 3 will appear on the screen.



[Figure 3.52 Histogram]

» » **Histogram Settings**

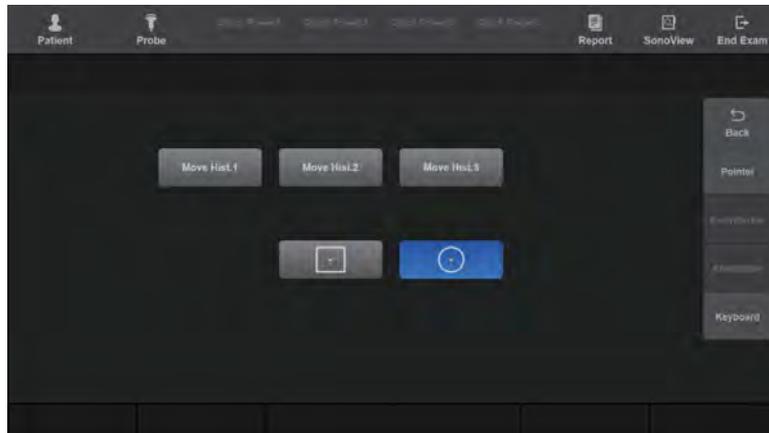
Specify the position or type of a histogram.

■ **Move Hist. 1, 2, 3**

After selecting a histogram to move by pressing its button on the touchscreen, change the position using the trackball and the **Set** button.

■ **Rectangle, Ellipse**

Select Rectangle  or Ellipse  on the touchscreen to specify the shape of the histogram area.



[Figure 3.53 Histogram – Touchscreen]

Measure Menu

Press Measure Menu on the *Utility* screen on the touchscreen. The monitor and touchscreen will both switch to the *Measure Menu* screen.

Set the buttons that will appear on the touchscreen during measurement. The menus for measurement items and results can be configured as desired.



[Figure 3.54 Measure Menu]

▶▶ ⚡ Select Calc. Page

Select a measurement page (package) to set. Alternatively, rotate the [1] Page dial-button on the touchscreen to select a package. The measurement page consists of OB, Gynecology, Cardiac, Vascular, Fetal Heart, Urology, Abdomen, Small Parts, TCD, Pediatric Hip, and MSK.

▶▶ ⚡ Available Menu List

The possible measurement items appear as a menu on the touchscreen. Click '+' to display measurement sub-items. After selecting measurement items from the **Available Menu List** and desired positions, press ⇨ on the screen. The selected items are added to the menu on the right.

»» Touch Menu Design

■ Measurement Package Settings

- ▶ Prev Page: Moves to the previous page.
- ▶ Next page: Moves to the next page.

■ Changing Menu Position

Select a measurement group or item, and change its position using , , , and .

■ New Tab

Creates a new tab.

■ Delete Menu

Deletes the selected measurement item.

■ Rename Tab

Changes the name of the created tab.

■ Laterality

Can be measured on any items that have Laterality and Location data in all pages of Measure Touch Menu Designer.

■ Check the Auto Sequence Items All

Select all items that you want to measure in succession in the current group.

■ Activate Group Menu

When this checkbox is selected, the first group among the groups in the Measure Menu is chosen by default.

■ Group Name

Select an existing item and then its Group Name to rename it.

- ▶ For empty groups: Go to Touch Menu Designer > Group Name, enter a name, and create a new group.

■ Clear All

Delete all the contents of the selected tab.

■ Save this Page

Saves the changes made to the current page.

■ Default Items

Pressing **Default Items** on the screen restores the default settings.

■ Back

Returns to the step that precedes the current menu.

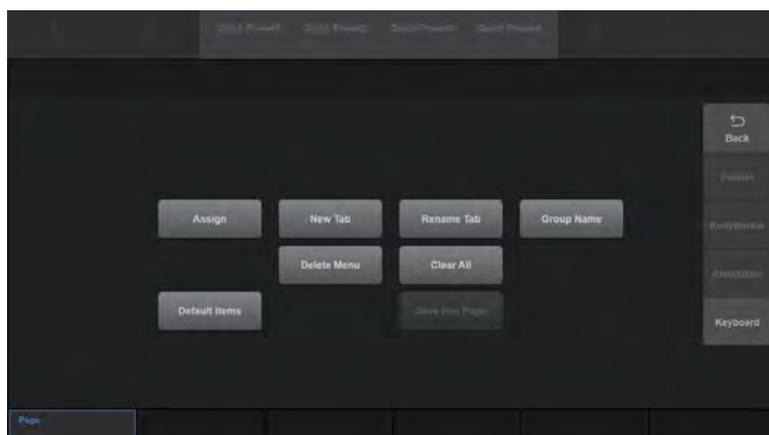
■ Close

Finishes editing. When changes have been made, a message appears, asking whether you want to save them.



NOTE:

- ▶ You cannot place sub-measurement items in Group.
- ▶ For detailed descriptions of measurement items, see 'Chapter 9. Measurements'.
- ▶ Change the units, decimal places, measurement method, etc. by selecting an item to be measured. For more information, please refer to 'Packages' in this chapter.

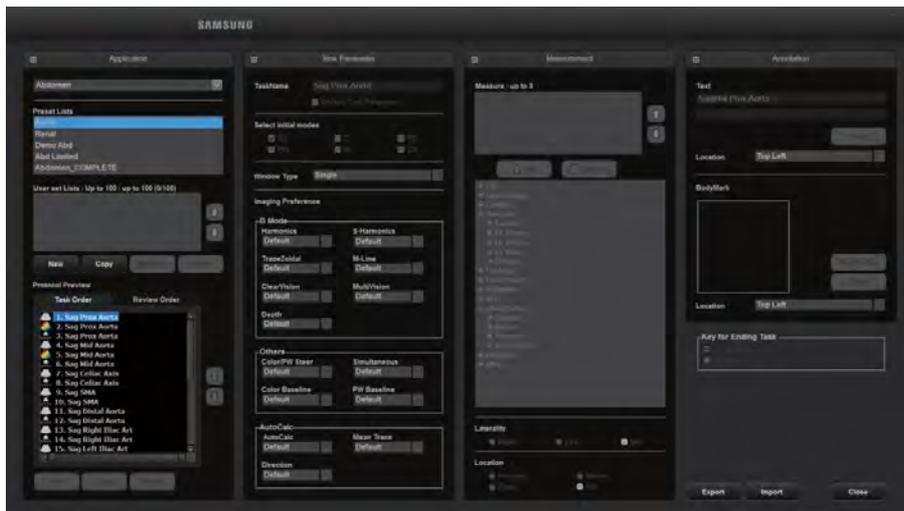


[Figure 3.55 Measure Menu – Touchscreen]

EZ-Exam+ Setup

Press **EZ-Exam+ Setup** on the *Utility* screen on the touchscreen. The *EZ-Exam+ Designer* screen appears on the monitor and touchscreen.

EZ-Exam+ is a macro function that saves your frequently used exams as a protocol and runs them together. This feature streamlines the Operational process.



[Figure 3.56 EZ-Exam+ Setup]



Application

■ Application

A list of available applications is shown. Available only for OB/Gyn, General, Cardiac, Vascular, Urology, Abdomen, SmallParts, and MSK. If previously configured EZ-Exams are available, they will be shown in the Preset Lists when an application is selected.

■ Preset Lists

Displays default EZ-Exams+ supported by the system. You cannot delete or rename any EZ-Exams+ on the Default List. Moreover, you cannot add a new EZ-Exam+ to the Default List.

■ **User Set Lists: Up to 100(0/100)**

The user-defined EZ-Exam+ are displayed. You may rename, delete, or copy the EZ-Exam+ on the User Set Lists, and also add new EZ-Exam+ to them. You can set up to 100 EZ-Exam+ and change their priority by using the Up or Down buttons on the right side of the User Set Lists menu.

■ **Reorder**

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

■ **New**

Click **New** on the monitor or the touchscreen. When the *New Protocol* window appears, enter a name and click **OK**. Press **Cancel** to cancel.

■ **Copy**

Select the EZ-Exam+ you wish to copy and click **Copy** on the monitor or touchscreen. When the *Copy Protocol* window appears, enter a name and click **OK**. Press **Cancel** to cancel.

■ **Rename**

Select the EZ-Exam+ you wish to rename and click **Rename** on the monitor or touchscreen. When the *Rename Protocol* window appears, enter a name and click **OK**. Press **Cancel** to cancel.

■ **Delete**

Select the EZ-Exam+ you wish to delete and click **Delete** on the monitor or touchscreen. When the Warning appears, click **OK**. Press **Cancel** to cancel.

▶▶ **Protocol Preview**

If you select an item from the User Set Lists, the tasks involved in and details of the protocol will be displayed.

■ **Task Order**

This shows the order in which tasks are performed.

■ **Review Order**

Sets the order in which DICOM displays obtained image.

»» ⌘ Task Parameter

Provides a task parameter item belonging to the task selected from the task list. Adds a new group. Enter a name and click **OK**. Press **Cancel** to cancel. Up to 75 groups can be added to Task Group.

■ Default Task Parameter

Use the Task Parameter value used in the previous mode as is.

■ Select Initial Modes

Select the Operation mode to use.

■ Window Type

Specify the layout of Operation mode.



NOTE: You can add groups to an EZ-Exam+ that is already included in the Userset List.

■ Imaging Preference

You can configure relevant settings.

»» ⌘ Measurement

Up to three measurements are supported.

■ Add

This is enabled when one from the following list is selected, and disabled when the number of measurements reaches three.

■ Remove

This is enabled when one of the selected measurements is selected.

■ Laterality, Location

They are enabled for the required measurements only.

Annotation

Two annotations in two lines are supported.

Location

Set this to Top Left, Top Center, Top Right, Middle Left, Middle Right, Bottom Left, Bottom Center, or Bottom Right.

BodyMarker

BodyMarker-related settings can be configured.



[Figure 3.57 EZ-Exam+ Edit BodyMarker]

Edit BodyMarker

This feature is provided in a separate information window, and a BodyMarker List which belongs to the selected Library is provided.

After selecting a desired BodyMarker, specify the probe's angle and position in the Probe Position area, and click **OK**. The information window will close, and the BodyMarker and Probe will be displayed.

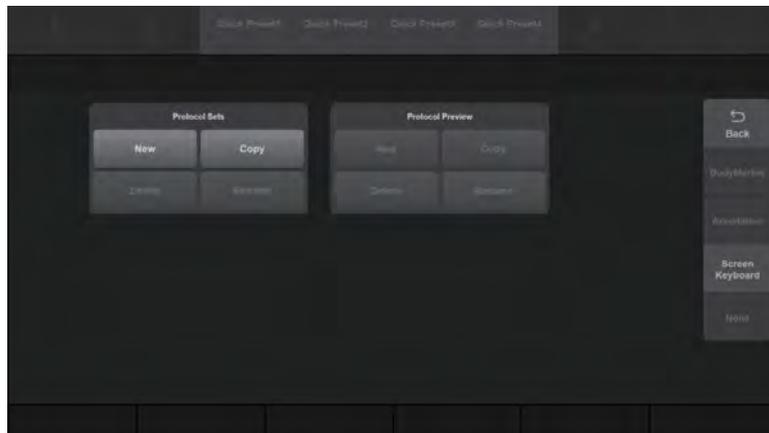
»» ⌘ Key for Ending Task

You can finalize one Task Group and designate a key that can operate the next Task Group. If the P1 or P2 button is set to Save, Store Clip, Print 1, Print 2, or Send to DICOM, the set function is displayed in parentheses.



NOTE: For more information on how to assign functions to the peripheral keys (P1 and P2 buttons) on the control panel, please refer to Utility > Setup > Customize > Button in this chapter.

If no function is configured, None will be displayed and the P key will be inactive in Scan Mode. The P1 and P2 checkboxes cannot be unticked at the same time; at least one must be ticked.



[Figure 3.58 EZ-Exam+ Setup – Touchscreen]

■ Export

Share EZ-Exam+ protocols saved on the system with another system.

1. Press the **Export** button.
2. In the *Drive* window, select the USB device you want to export data to.
3. Press the **Next** button and the Export Complete message will be displayed.
4. Press the **Close** button to complete the setup.



Tips!

EZ-Exam+ PC Tool Installation Method

The PC Tool allows the user to create and edit a Protocol on a PC separate from the System. Protocols created using the PC Tool can also be used on the ultrasound system.

- ▶ Select the “Export EZ-Exam+ Installation” checkbox to download the EZ-Exam+ Installer file to a USB drive.
- ▶ It can be installed on Windows 7, Windows 8, and Windows 10 (32-bit, 64-bit).

■ Import

Import a protocol from another system.

1. Press the **Import** button.
2. In the *Drive* window, select the USB device you want to import data from.
3. Press the **Next** button to move to the Category & Protocol selection screen. To cancel the import, press the **Cancel** button.
4. Place check marks next to the applications you want to import. To select an application's item, place a check mark on the relevant tab.
5. Press the **Close** button to complete the setup.



NOTE: When importing, up to 56 tabs can be included. If there are more than 56 tabs, only 56 tabs will be imported, a warning message will be displayed, and the remaining tabs will not be processed.

Power Management

Press **Power Management** on the *Utility* screen on the touchscreen. The touchscreen will switch to the *Power Management* screen.

»» **TI 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).

■ **Save**

Press the button on the touchscreen to save changes.

■ **Limit MI**

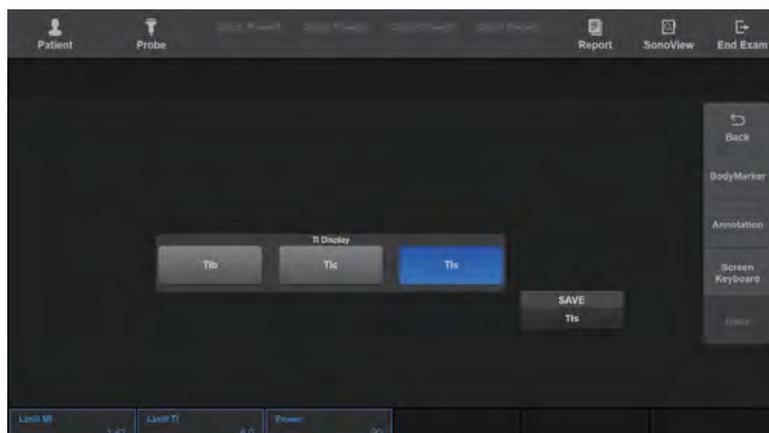
Sets the value of the Mechanical Index. Press the button on the touchscreen or use the Soft Menu dial-button on the control panel to set the value.

■ **Limit TI**

Sets the value of the Thermal Index. Press the button on the touchscreen or use the Soft Menu dial-button on the control panel to set the value.

■ **Power**

Set the ultrasound output intensity. Select a value from 10 to 100 by pressing the button on the touchscreen or using the dial-button.



[Figure 3.59 Power Management]

Storage Manager

Press **Storage Manager** on the *Utility* screen on the touchscreen. 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 the checkbox in front of the drive symbol is ticked.



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

To close Storage Manager, click **Close**, press **Exit** on the touchscreen, or press the **Exit** button on the control panel.

■ Refresh

Updates the display on the touchscreen 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.

Help

Press **Help** on the touchscreen. The help text stored in the system will be displayed on the monitor screen.

Demo Play

A demo video for optional functions has been saved.

Full Screen

In 2D Mode, you can view the Image area in full screen. Press the specified **Set** button or the **Exit** button to exit Full Screen Mode.

⚙️ Stress Echo (Option)

The Stress Echo function is used when added burden is put on the heart via exercise or drugs, in order to observe and diagnose changes in the heart.



NOTE:

- ▶ Stress Echo is an optional feature of this product.
- ▶ You can use it only when the application is cardiac.

The procedure for using Stress Echo is as follows:

- ▶ When setting up and using a new protocol:

Set up a protocol → Register the patient ID → Select and start the protocol → Acquire and specify images → Review the images and make a diagnosis → Create a Stress Echo report.

- ▶ When selecting and using an existing protocol:

Register the patient ID → Select and start the protocol → Acquire and specify images → Review the images and make a diagnosis → Create a Stress Echo report.

This manual provides instructions for using Stress Echo by setting up a new protocol. For instructions on registering a patient ID, please refer to 'Chapter 6. Starting Modes of Operation'. For information on Stress Echo reports, please refer to 'Chapter 9. Measurements'.

Setting up a Protocol

Ensure that there is no patient ID registered, press the **Utility** button on the touchscreen, and then press the **Stress Echo** button. Alternatively, press the **Template Editor** button on the *Protocol Screen*. The *Protocol Template Editor* screen will be displayed. You may edit an existing protocol or set up a new protocol.

■ Creating a New Protocol Template

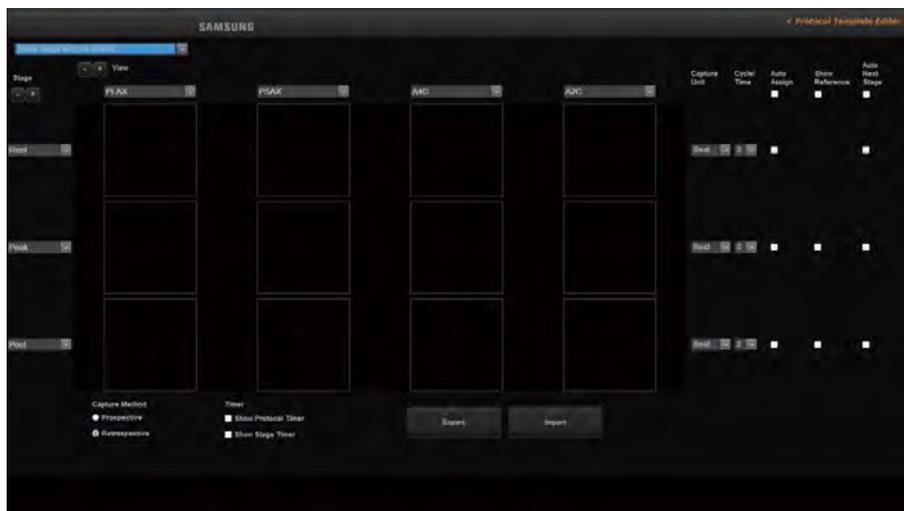
Press the **New Template** button.

■ Editing an Existing Protocol Template

Click the combo button at the top left corner of the screen, and select a protocol from the protocol list.

»» ⌘ The Protocol Template Editor Screen

The *Protocol Template Editor* screen consists of the following items. Use these items to edit a protocol.



[Figure 3.61 Protocol Template Editor]

■ Protocol

When you click the combo button, the default protocols and other existing protocols are listed.

Tips!

Default Protocols

This product offers the following five protocols by default. The default protocols cannot be deleted or transferred to external storage media. Also, you cannot modify one of the default protocols and save it with the same name.

Protocol	View	Stage
Two Stage Exercise Stress	PLAX, PSAX, A4C, A2C	Rest, Peak
Three Stage Bicycle Stress	PLAX, PSAX, A4C, A2C	Rest, Peak, Post
Four Stage Pharmacological Stress (TBD)	PLAX, PSAX, A4C, A2C	Stage 1–4
Diastolic Stress	MV-PW, TDI, LVOT-PW, TR, PSAX-BASE, PSAX-Mid, PSAX-APEX, 4CH, 2CH, MR	Baseline, Legs UP, 25W, 50W, 75W, 100W, 125W, REC2, REC5, REC10
Dobutamine Stress	PLAX, PSAX, 4CH, APLAX, 2CH, MV-PW, TDI, LVOT-PW, TR-CW	Baseline, 5, 10, 20, 30, 40, atropine, recovery

■ Stage

Set the stage. Use this  button to add or delete a stage. To select one of the default stages, use the combo button. To directly enter a stage, use the keyboard.



NOTE: You must create at least two stages, and you can add up to 10 stages.

■ View

Set the view. Use this  button to add or delete a view. To select one of the default views, use the combo button. To directly enter a view, use the keyboard.



NOTE: You must create at least two views, and you can add up to 10 views.

■ Capture Unit

Select a method for image acquisition by pressing the **Save** button on the control panel.

- ▶ Beat: Acquires images by the number of heartbeats.
- ▶ Time: Acquires images by seconds.

■ Cycle/Time

Select the image acquisition interval by pressing the **Save** button on the control panel. The Capture Unit can be set from 1 to 4 for Beats or Time.

■ Auto Assign

Once images are captured, they are automatically assigned to each stage and view.

■ Show Reference

Displays reference image in dual mode when a stage image is acquired. This can only be used if the 'Auto Assign' checkbox is ticked.

With this feature enabled, the first stage is automatically set as the reference image.

Select the checkbox for each stage to acquire images using the same settings as the reference image.

■ Auto Next Stage

When an image is assigned to the last view of the current stage, the system automatically proceeds to the next stage.

■ Capture Method

Select the video acquisition range for images by pressing the **Save** button on the control panel.

- ▶ Prospective: Stores images that take place after the button is pressed.
- ▶ Retrospective: Stores images that took place before the button was pressed.

■ Timer

Set the onscreen timer display settings.

- ▶ Show Protocol Timer: Displays the protocol's time record (T1) on the screen.
- ▶ Show Stage Timer: Displays the current stage's time record (T2) on the screen.

■ Export

Pressing the **Export** button on the touchscreen opens the *Protocol Export* window. You can export and save protocols to external storage media.

■ Import

Pressing the **Import** button on the touchscreen opens the *Protocol Import* window. You can import protocols from external storage media.

■ New Template

Pressing the **New Template** button on the touchscreen creates a new protocol.

■ Save

Pressing the **Save** button on the touchscreen saves the newly set up protocol. This cannot be used when a default protocol has been changed.

■ Save As

Pressing the **Save As** button on the touchscreen saves the set protocol with a different name.

■ Delete

Pressing the **Delete** button on the touchscreen deletes the current protocol and opens a new protocol template. This cannot be used when a default protocol is selected.

■ Exit

Pressing the **Exit** button on the touchscreen exits the *Protocol Template Editor* screen.

Starting a Protocol and Capturing Images

After registering a patient ID, press the **Stress Echo** button on the touchscreen. The *Protocol Screen* will be displayed. Select a protocol to start a test, and examine the captured Stress Echo images.

■ Selecting a Protocol

Click the combo button at top of the screen, and select a protocol from the protocol list. Click the **Exit** button on the screen to exit the Protocol Selection screen.

■ Starting a Protocol

Press **Begin Protocol**. The screen will switch to Operation mode. Once a protocol begins, the **End Protocol** button will be activated.

■ Capturing Stress Echo Images

Press the **Save** button on the control panel to capture images for each view and stage. A matrix of captured Stress Echo images is displayed on the left-hand side of the screen.



[Figure 3.62 Matrix]

- ▶ While acquiring images, if you wish to return to the *Protocol Screen*, press the **Stress Echo** button on the touchscreen.
- ▶ To change a stage and acquire images, use one of the following methods:
 1. Press the **Pointer** button on the control panel. Use the pointer to select the next stage.
 2. Press **Next Stage** on the *Protocol Screen*.

■ Ending a protocol

Press **End Protocol**.

Tips!

Auto Assign and Auto Next Stage

If either **Auto Assign** or **Auto Next Stage** is enabled, images will be automatically assigned when you acquire Stress Echo images. The matrix will be displayed as shown below:



[Figure 3.63 Matrix – Auto Assign, Auto Next Stage]

Tips!

Show Reference

If **Show Reference** has been selected in the *Protocol Template Editor* screen, then the *Protocol Screen* scan is performed alongside the reference image. Show Reference is a feature that sets the first stage as the reference image and compares subsequent scans under identical conditions. This can only be enabled if the **Auto Assign** checkbox is ticked. Enabling this feature activates Dual mode. The reference image is shown on the left. The current image is shown on the right-hand side of the screen and can be acquired under the same conditions as the reference image.

Applied reference image conditions are as follows:

- Image Depth
- Width
- Dynamic Range
- 2D Mode (Harmonic, etc.), Color Mode
- SRF Index
- Post-Processing (Gray map)
- Gain (2D, C)
- Read Zoom

► Note on Using Show Reference

Remember the following while using the **Show Reference** feature:

- Press the **Caliper** or **Calculator** button on the control panel to switch to Single mode. Once the concerned feature has been used, the system returns to Dual mode.
- Pressing the **Freeze** button activates Single mode. Pressing the **Save** button saves the image and returns the system to Dual mode.

»» Protocol Screen

The *Protocol Screen* consists of the following items:

- 1 Protocol: Click the combo button, and the protocol list will be displayed. Select the protocol that you want to use.



NOTE: Once a protocol has started, you cannot change it.

- 2 Stage: Click the combo button to display the stage list. Select a stage to use. The thumbnail list shows the images stored on the selected stage.



Tips!

The stage that is currently acquiring images is displayed with a green outline in the stage area.

- 3 Stress Echo Image Area: Displays Stress Echo images by aligning them with the View of the horizontal axis and the Stage of the vertical axis. When you select a Stress Echo image, an orange outline is displayed and double-clicking it enlarges the image. Double-clicking the enlarged image restores it to its original size.
- 4 Thumbnail List: Displays the acquired Stress Echo images by stage. When searching thumbnails, you can increase/decrease the number of thumbnails in the list by rotating the **Nobs** button to the right. Images that have already been assigned to the Stress Echo Image Area are not displayed in the Thumbnail List.
- 5 Icon List: The functions that can be used on the *Protocol Screen* are displayed as icons.
- 6 Stress Echo Information Area: Displays the Stress Echo settings information.

■ Begin Protocol/End Protocol

Begin or end a protocol.



NOTE: A protocol cannot be resumed once it has been ended.

■ Pause Protocol/Resume Protocol

Pause or resume a protocol.

■ Review

Switch to the Stress Echo Review screen.

■ Assign

When this is set to On, the stage selected in **Stage** is outlined in yellow. The Stress Echo images in the thumbnail list are assigned as appropriate to each view and stage. This cannot be used after the protocol has ended.

■ Change View

This will not be displayed if **Auto Assign** or **Auto Next Stage** has not been enabled.

■ Next Stage

The stage will change to the next one. The stage that is currently being acquired is displayed with a green outline in the Stage area on the left hand side of the screen.

■ Thumb Scroll

This will only be displayed if there are four or more acquired images. It changes the page of the thumbnail list.

Icon List



[Figure 3.64 Icon List]

- 1 Assign:** Click the icon to turn it on or off. When this is set to On, the stage selected in **Stage** is outlined in yellow. The Stress Echo images in the thumbnail list are assigned as appropriate to each view and stage. This cannot be used after the protocol has ended.
- 2 Release:** Click the icon to turn it on or off. When this is set to On, the images selected in the Stress Echo image area are returned to the Thumbnail list. This cannot be used after the protocol has ended.
- 3 Select All:** Selects all images in the Stress Echo image area.
- 4 Unselect All:** Deselects all the selected images.
- 5 Template Editor:** Switches to the Protocol Template Editor screen.
- 6 Exit:** Exits the Protocol screen.

Reviewing an Image

Select a Stress Echo image on the *Protocol Screen*, and press **Review**. The *Stress Echo Review* screen will appear. Here you can review the selected image, and perform measurements and other tasks.



Stress Echo Review Screen

- 1** Stress Echo Image Area: The images you selected on the *Protocol Screen* will be displayed. You can review up to four Stress Echo images on one screen. At the top of each image, the stage and view names, as well as the Protocol Timer (T1) and Stage Timer (T2), are displayed. You can review up to four Stress Echo images on one screen.
- 2** Image Information Area: The probe type, application, frame rate, depth, frequency, T1, image saving time, and matrix are displayed.
- 3** WMS Diagram Area: WMS Diagram is displayed. WMS stands for Wall Motion Scoring. At the top of each diagram is a combo button for selecting a stage. At the bottom of each diagram, the WMSI value, and the value selected on the score menu, are displayed.

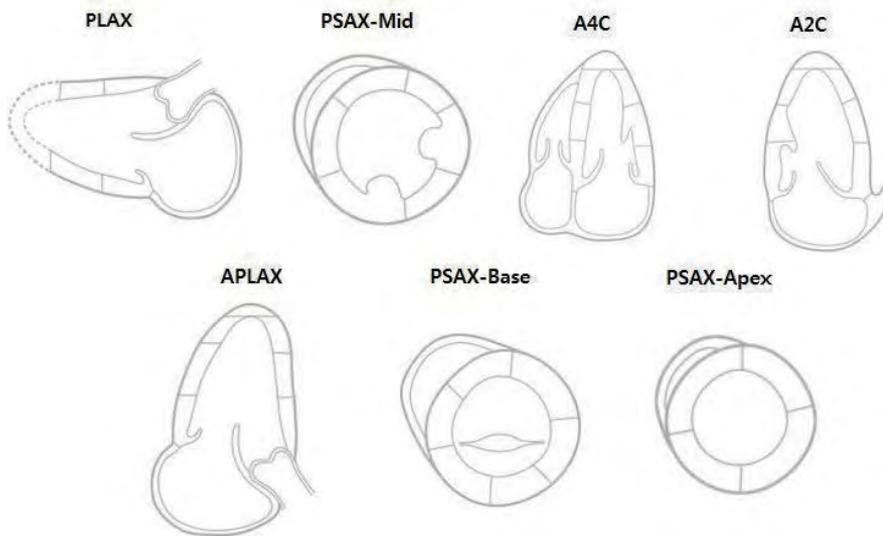


NOTE: You can perform measurements using the **Caliper** and **Calculator** buttons. Pressing the **Calculator** button displays the heart measurement menu, and the current stage is displayed in the menu subject line.

WMS

WMS Diagram is displayed. Each diagram is divided into segments marked with area numbers from 1 to 16. Enter WMS information after selecting a stage.

1. PLAX: Parasternal Long Axis
2. PSAX-Mid
3. A4C: Apical Four Chamber
4. A2C: Apical Two Chamber
5. APLAX
6. PSAX-Base
7. PSAX-Apex



[Figure 3.65 WMS Diagram]

Left Ventricular Segment	Area Number
Basal Anterior Septum	1
Basal Anterior	2
Basal Lateral	3
Basal Posterior	4
Basal Inferior	5
Basal Septum	6
Mid Anterior Septum	7
Mid Anterior	8
Mid Lateral	9
Mid Posterior	10
Mid Inferior	11
Mid Septum	12
Apical Septum	13
Apical Anterior	14
Apical Lateral	15
Apical Inferior	16

[Table 3.2 Segments and Area Numbers]

■ Entering WMS

1. Select a segment that you want to enter a WMS into by using the trackball and the **Set** button. The Score menu will appear.
2. Select a value from the menu. The segment color will change and the WMS will be displayed.

Or

1. Select a desired value on the Score menu at the bottom of the screen.
2. Place the pointer in the segment that you want to enter a value in, and press the **Set** button. The segment color will change and the WMS will be displayed.

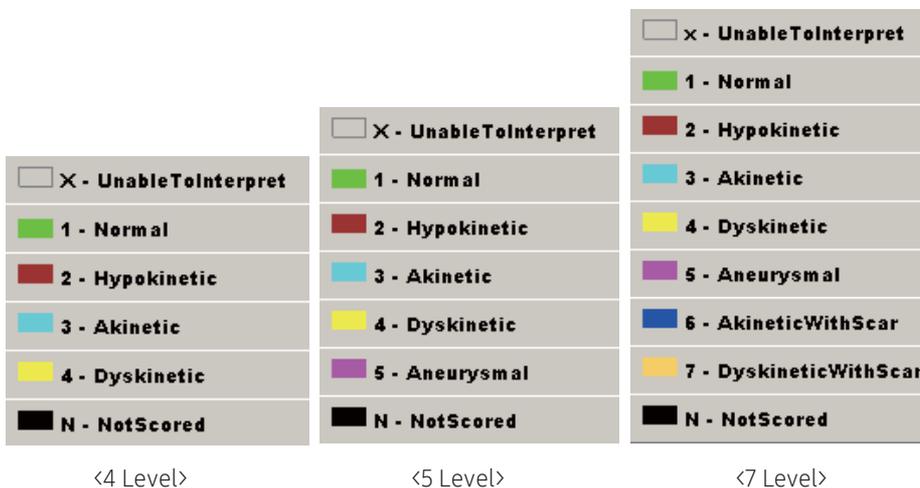


When a WMS is entered into a segment, the same score is applied to all segments that have the same area number.



Score Menu

This product supports three score menus. You can select which score menus that you wish to use in Utility > Measure Setup > Cardiac > WMS Level Select.



[Figure 3.66 Score Menu]

■ Deleting a WMS

To delete an entered value, click 'N-NotScored' on the Score menu, and then click the segment that you want to delete the value for. The color of the selected segment will be reset.



Press **Delete WMS** on the touchscreen to delete all WMS data entered in the current stage.

■ WMSI

This is the average of all the WMS data entered in the current stage. WMSI stands for Wall Motion Scoring Index.

■ Delete WMS

Delete all WMS data entered in the current stage.

■ Run/Stop

You can play or stop playing all Cine images shown in the Stress Echo Image Area simultaneously.

■ Stage Scroll

Changes the stage. This will only be displayed if two or more stages are being used.

■ Strain+

You can use the Strain+ Image function. This is displayed only when the conditions for using the Strain+ Image function are met.

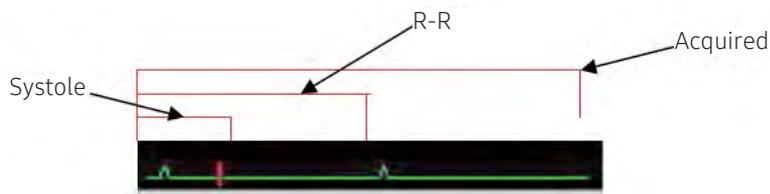
■ Selection Mode

Set up the display method for selecting the image to display on the screen by using a matrix. Select Manual, 1x2, 2x1, 2x2, 1x4, or 4x1. The selected stage and view will be shown in the image information area.

- ▶ mXn: When you select an image from the matrix, m stages under the selected image and n views to the left of the selected image will be selected. The selected images will be displayed on screen automatically.
- ▶ Manual: Manually select images to display on the screen from the matrix. Selected images will be marked with yellow numbers; pressing **Review** will display the images on screen in the order of the numbers.

■ Change Play

Set the Cine image playback method to Acquired, R-R, or Systole Only.



[Figure 3.67 Playback Method]

■ Change Sync

Select Short, Long, or End to End as the synchronization method for Cine images.

- ▶ Short: The shortest image of the four Cine images is played.
- ▶ Long: The longest image of the four Cine images is played.
- ▶ End to End: The four Cine images are played by synchronizing the beginning and the end.

■ Protocol Screen

The Stress Echo Review screen will close and the Protocol screen will open.



NOTE: For information about Stress Echo reports, please refer to 'Chapter 9. Measurements'.



- ▶ Pressing the **Report** button after finishing WMSI generation in the Stress Echo Review screen opens the Stress Echo Report.
- ▶ The Stress Echo Report cannot be edited.

:: Strain+ Image (Option)

Strain+ Image visualizes the movement of the myocardial muscle to help to diagnose myocardial infarction or disease.



NOTE: The Strain+ Image function can only be used when the following conditions are met:

- ▶ Application: Cardiac
- ▶ Operation mode: 2D (Freeze state)
- ▶ ECG: On; two or more ECG trigger points; ECG HR: 30~240 Range

■ Selecting Images

Select an image to analyze, using the trackball and the control panel's **Set** button.

Tips!

Select an image by referring to the following:

- ▶ Select an image that shows the entire wall of the heart.
- ▶ There should be an R-Peak before/after the selected image, and there should be more than 70 Cine frames between the previous R-Peak and the final image.



-----R-----Selected image----- R ----- R -----

[Figure 3.68 R-Peak]

■ Quantification

You can select Strain+ or Auto EF.



NOTE: If the image was not properly selected, it will not switch to the *Quantification* screen.

Strain+

Press the **Strain+** button on the touchscreen. You will be moved to the *Strain* screen.

Strain+ is executed in the following order:

Select an image → Set up the contour line → Calculate Strain+ data → Analyze the result

»» Select Images

Select the image and chamber information. The *Strain* screen consists of the following items:

- 1 Thumbnail List: Saved images will be displayed as thumbnails.
- 2 Image Area: The images selected from the Thumbnail list are displayed.
- 3 Operation Guide: Instructions for using the Strain function are displayed on the screen. Click **Show/Hide** to show or hide the operation guide.

■ Selecting Images

You need to select three images. Use the trackball and the **Set** button on the control panel to double-click the image you wish to use. Alternatively, select an image and then click the pointer on the desired location in the image area.



NOTE: If one or more conditions for using the Strain+ Image function (Cardiac, 2D Mode, ECG On) are not met, the missing criteria will be displayed in red at the top left corner of the image.

■ Selecting Cine Position

Set up the Cine for each image displayed in the image area.

■ Selecting Chamber Information

Use the combo box buttons at the top left corner of each image. Set to 2ch, 3ch, 4ch, Apex short, Mid short, or Basal short.



NOTE:

- ▶ To use Multi-Analysis, you must select 2ch, 3ch, or 4ch.
- ▶ If saved Strain data exists, it will be set up automatically.

■ Moving to the Next Step

Press the **Next** button on the touchscreen.



NOTE: If chamber information has not been selected (Not Assigned), pressing the **Next** button will not take you to the next step.

■ Ending Strain+

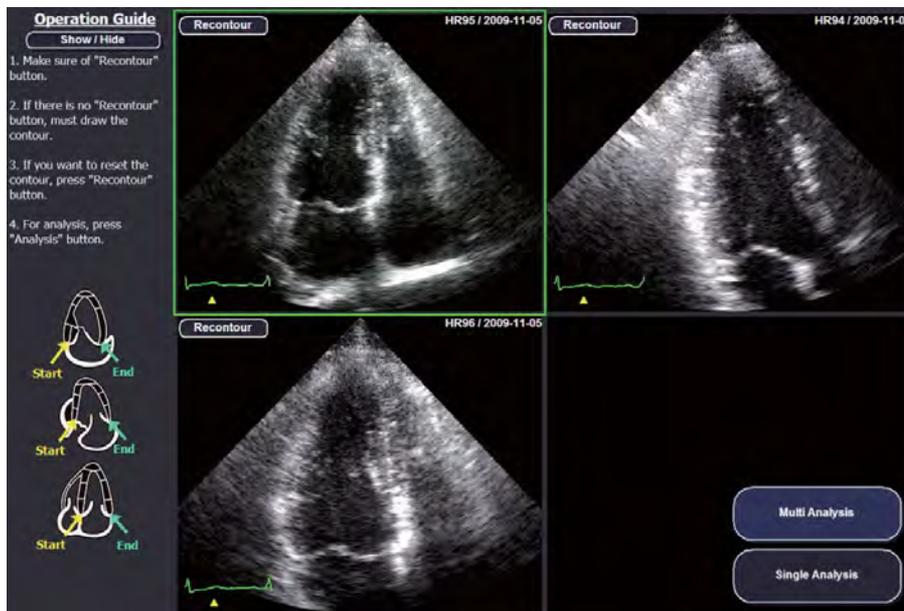
Press the **Close** button on the touchscreen.

» ⌘ Contour Line Setup and Calculations

Press the **Next** button on the *Strain+* screen. The screen will switch to the *Contour Setup* screen.

In the Contour Setup screen, a contour line will be drawn on the image, and the calculations based on it will be carried out. When an image is selected, it will be surrounded by a green border if the image contains Strain data, or by a gray border if it does not.

The Operation Guide will be displayed on the left-hand side of the screen. Click **Show/Hide** to show or hide the operation guide.

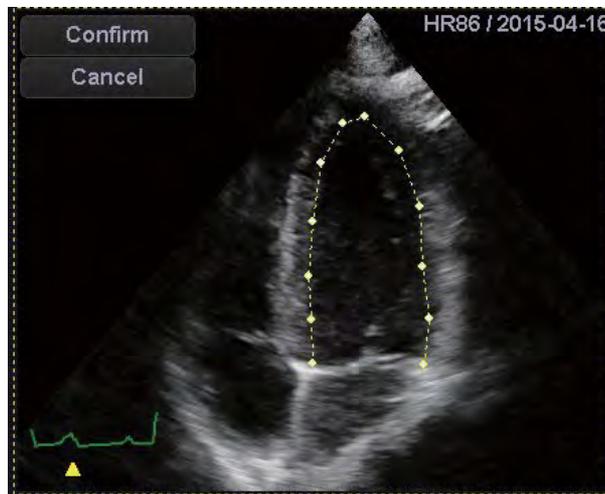


[Figure 3.69 Contour Setup Screen]

■ Step 1: Draw and Generate an Endocardial Contour Line

Use the **Draw contour** or **Recontour** button in the top-left corner of each image. The image will be surrounded by a yellow dotted border while a contour line is being drawn.

- ▶ **Draw Contour:** This will be displayed on images that do not contain Strain data. Click this button, and then use the trackball and the **Set** button on the control panel to specify the point at which to draw a contour line.
- ▶ **Recontour:** This will be displayed on images that contain Strain data. To redraw the contour line, click this button, and then use the trackball and the **Set** button on the control panel to specify the point at which to draw the contour line.
- ▶ While the user is drawing the contour, two buttons, **Confirm** and **Cancel**, will be enabled in the top-left corner of each image.
- ▶ After specifying the points of the Endocardial contours, press **Confirm** to generate a contour.

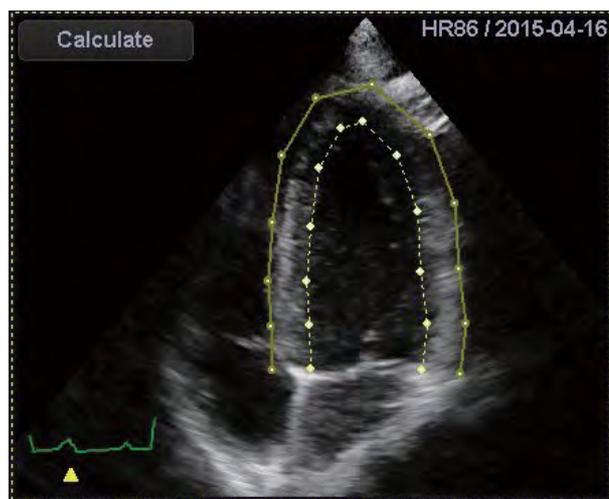


NOTE:

- ▶ You must specify five or more points to generate the Endocardial contour. If fewer than five points have been specified, pressing **Confirm** will display the message 'Abnormal Contour!' and the contour line will be deleted.
- ▶ The method of drawing contour lines differs based on the selected chamber information.

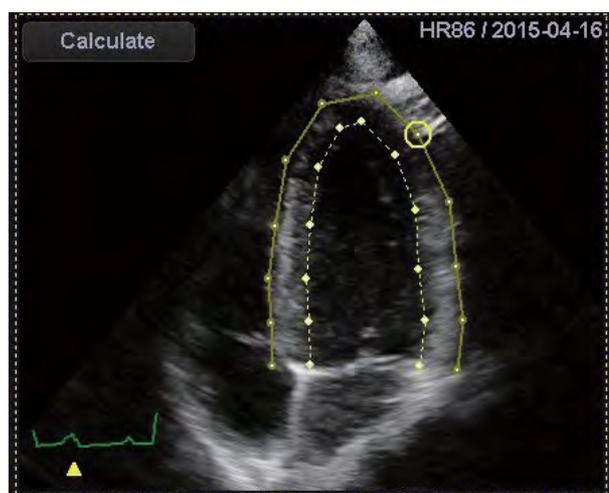
■ Step 2: Generate or Cancel an Epicardial Contour Line

The Endocardial contour will be created, and the Epicardial line will be displayed 10 mm outside the generated contour line. Press **Cancel** to cancel and redraw the contour.



■ Step 3: Modify an Epicardial Contour Line

Bring the cursor near the point of the Epicardial contour you want to correct. The point will then be surrounded by a yellow border. Press the **Set** button on the control panel, and then use the trackball to reposition the point. Press **Set** again to update the Epicardial contour line with the changed point.



■ **Step 4: Calculating Strain+ Data**

Click **Calculate** displayed on the image. Once the calculations are complete, the image will be surrounded by a green border.

■ **Modifying a Contour**

Bring the cursor near the point you want to correct, and the point will be surrounded by yellow borders. Press the **Set** button on the control panel, and then use the trackball to reposition the point. Press **Set** again to update the contour line with the changed point.

■ **Calculating Strain+ Data**

Click **Calculate** displayed on the image. Once the calculations are complete, the image will be surrounded by a green border.

Strain+ Result

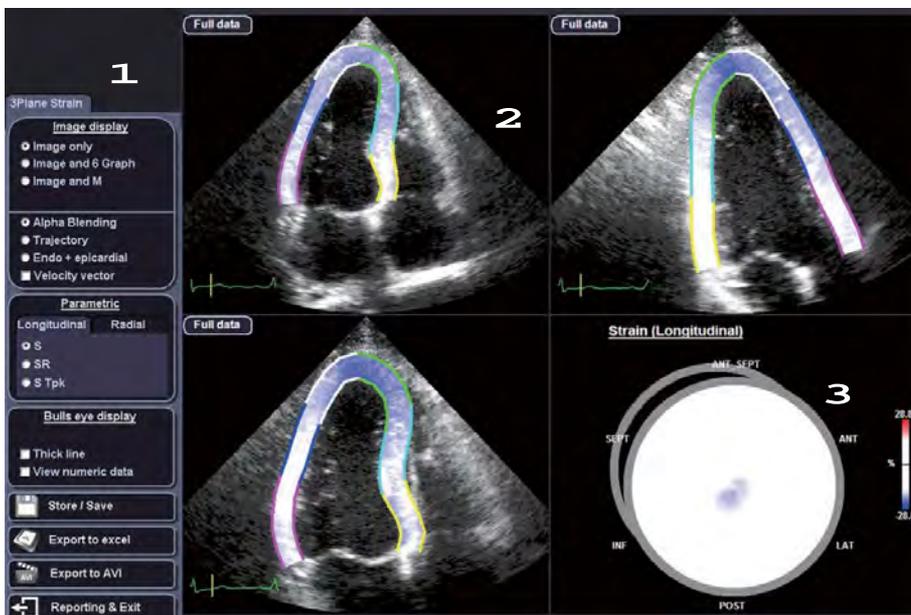
Click **Multi Analysis** or **Single Analysis** on the screen.



NOTE: If the image is 2ch, 3ch, or 4ch, the **Multi Analysis** button will be activated. Otherwise, only **Single Analysis** may be used.

The Strain+ Result screen is composed as follows:

- 1 Menu: Items, including the on-screen data display method and data saving items, are displayed. For Multi Analysis, the Ejection Fraction values of 2ch and 4ch are also displayed.
- 2 Image Area: An image with a contour line is displayed.
- 3 Bull's Eye: Information for various slices of the heart (2ch, 3ch, 4ch) is displayed simultaneously. For Single Analysis, only the information for the selected image is displayed.



[Figure 3.70 Strain+ Result Screen]

■ Run/Stop

Pause or resume the playback of the image.

Tips!

When Stopped

When Stopped, the numeric value will be automatically displayed at the Bull's eye. The numeric value is the strain data digitized into a number based on the color bar. You may select one of the following to review the strain data:

- ▶ Current: The strain data for the current position of the bar is displayed.
- ▶ R-R Interval: The strain data for the R-R interval is displayed.
- ▶ Selected Interval: The strain data for the interval you have selected is displayed.

■ Position

Specify the image range to play.

■ Image Display

Select how to display the image.

- ▶ Image only: Display image only.
- ▶ Image and 6 Graph: Display the image and the segmental graph.
- ▶ Image and M: Display the image and the M Mode.
- ▶ Image and Graph: Display the image and the graph.

Tips!

Image Only

When 'Image only' is selected, pressing the **Full** button at the top left corner of each image will display all graphs and the M Mode. Changing the range in M Mode will display it in a pink broken line.

To return to 'Image only', press the **3 Plane** button.

Tips!

Image Panning

You can use the trackball to pan the image. Click on the left/right side of the image to pan the image to the left/right. This is useful when the image is obscured by a graph, etc.

Note that this cannot be used if 'Image only' is selected.

- ▶ Alpha blend: Displays the movement of the outline.
- ▶ Trajectory: Samples and displays a number of Speckles.
- ▶ Endo + epicardial: Expresses the vector direction, velocity, strain, and movement position of both the endocardium and the epicardium.
- ▶ Velocity vector: Displays the speed on the image.

■ Parametric

Select either the **Longitudinal** or the **Radial** tab to configure the settings.

- ▶ S: Denotes Strain.
- ▶ SR: Denotes Strain Rate.
- ▶ S Tpk: Denotes Strain Time to Peak.

■ Bull's Eye Display

Select how to display the Bull's eye.

- ▶ Thick Line: Select the checkbox to display the border of each segment with a thick line.
- ▶ View Numeric Data: If the checkbox is selected, numerical data will be displayed at the Bull's eye. When stopped, the numerical data will be always displayed.

■ Store/Save

Press this button to open the *Store/Save* window. Save the selected data to the system's hard disk.

- ▶ Strain: Saves Strain data only.
- ▶ Screen Capture and AVI: Saves the result along with a captured screen as an AVI file.
- ▶ Strain Data + Screen Capture and AVI: Saves Strain data, the captured screen, and an AVI file.
- ▶ Cancel: Cancels saving.

■ Export to Excel

Save the result and the representative image as an Excel file. This is only available if a USB flash memory drive is connected.

■ Export to AVI

Save the result as an AVI file. This is only available if a USB flash memory drive is connected.

■ Reporting & Exit

The *Confirmation* window will open. To exit without saving the measurements, press **Close**. To save the measurements and exit, press **Close & Confirm**. To return to the Strain+ Result screen, press **Cancel**.



After finishing reporting in the *Strain+* Analysis screen, press the **Report** button on the control panel to open the Strain Report.

- ▶ The Strain report cannot be edited.

Auto EF

Press the **Quantification** button on the touchscreen, and then press the **Auto EF** button.



NOTE: The Auto EF function can only be used when the following conditions are met.

- ▶ Operation mode: 2D (Freeze state)
- ▶ Screen Mode: Single Mode

The Auto EF function is not an auto-complete option; the user needs to specify points and draw a contour line.



[Figure 3.71 Contour Setup Screen]

▶▶ ⌘ Contour Line Setup and Calculations

■ Drawing Contour Lines

Use the trackball and the **Set** button on the control panel to specify points. To cancel the last specified point, specify a different position near to the last point.

■ Calculating Auto EF Data

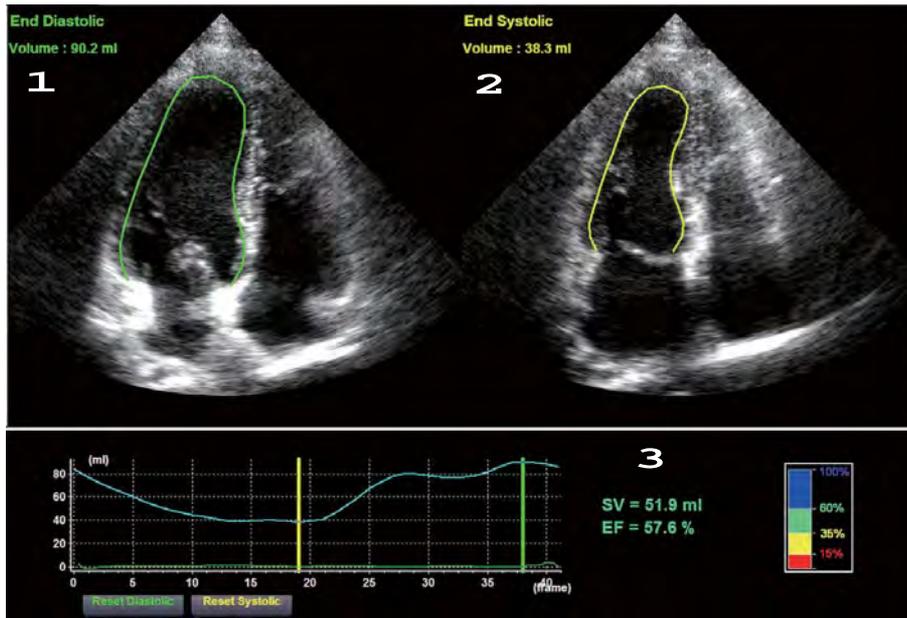
Press **Calculation**. The screen will switch to the result screen.

■ Exit

Press **Close** on the touchscreen.



Auto EF Result



[Figure 3.72 Auto EF Result Screen]

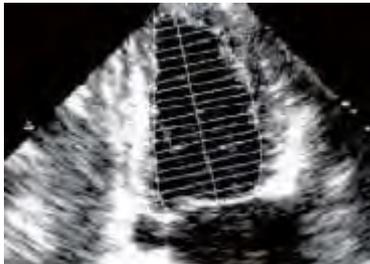
The *Auto EF Results* screen consists of the following items:

- 1 End Diastolic: The related information will be displayed in green.
- 2 End Systolic: The related information will be displayed in yellow.
- 3 Calculation Result: The Stroke Volume (SV) and Ejection Fraction (EF) will be displayed.

If the position of the Cine frame is changed, the calculation results will be changed accordingly. To reposition the frame, set it by using either ED or ES. To reset the position of the changed frame, use **Reset Systolic** or **Reset Diastolic** on the screen.

**NOTE:**

- ▶ Based on the Endocardial contour set by the user, it traces the Endocardial among other images in the Beat to find the borders of the Endocardial.
- ▶ It uses the calculated borders of the Endocardials from all images of heart intervals to measure the volume using Simpson's rule.
- ▶ Among all volumes of the heart intervals, use the smallest value (ES: End Systolic) and the biggest value (ED: End Diastolic) to calculate the Stroke Volume (SV) and the Ejection Fraction (EF).
- ▶ The user checks ED and ES.

Simpson's Rule

Find the position of the Apex, followed by the length component of the longest axis. Based on this information, measure the volume assuming that there are multiple disks.

Stroke Volume

$$SV = EDV - ESV$$

EF (Ejection Fraction)

$$EF(\%) = SV / EDV * 100$$

(Terms)

EDV: End-Diastolic Volume

ESV: End-Systolic Volume

Chapter 4

Maintenance

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 - Cleaning and Disinfection 4-4
 - Electrical Safety Check 4-9
 - Accuracy Check 4-9

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:: Operating 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.

- ▶ For the system to function correctly, the temperature should be maintained from 10 to 35° and humidity from 30% to 75%.
- ▶ Avoid places with excessive moisture.
- ▶ Avoid direct exposure to sunlight.
- ▶ Avoid severe fluctuation of temperature.
- ▶ Avoid installing the product near a heating appliance.
- ▶ Avoid dusty and/or poorly ventilated locations.
- ▶ Avoid locations that are subject to vibration.
- ▶ Avoid locations where chemical substances or harmful gases are present.
- ▶ Avoid using this product close to or on top of another device as it may cause malfunctions.
- ▶ Do not block the vents on the system, peripheral devices, and accessories.
- ▶ When the product's internal temperature is higher than usual, the following message appears on the monitor. When you see this message, please contact the Customer Service Department.



CAUTION:

- ▶ The system will shut down due to the product's high temperature.
- ▶ The system will shut down in five seconds due to the product's high temperature.
- ▶ The product's temperature is rising.

⚡ Product Maintenance

Cleaning and Disinfection

Using an inappropriate cleaner or disinfectant may damage the product. Please read the following carefully.

Clean and disinfect the product every day or after each test.

**WARNING:**

- ▶ Turn off the system and disconnect the power cord from the wall outlet before cleaning and disinfecting the system. Otherwise, there is a risk of electric shock or fire.
- ▶ Do not clean the electrical contacts or connectors.
- ▶ Always wear a protective face guard and gloves when cleaning and disinfecting the product.
- ▶ Clean and disinfect the product every day or after each test.



NOTE: To learn how to clean and disinfect probes, please refer to 'Probes'.

⏪ ⚠ Cleaning

**CAUTION:**

- ▶ When you use a detergent, comply with the recommendations of the detergent manufacturer.
- ▶ Do not spray detergent directly onto the product's exterior. Doing so may discolor or crack the surface.
- ▶ When using a spray-on product, do not spray it directly onto the product to prevent liquid from entering the product.
- ▶ Do not use chemicals such as wax, benzene, alcohol, paint thinner, insecticide, air freshener, or lubricant.
- ▶ Do not use any liquid containing glycol components such as Propylene glycol, Butylene glycol, or Polyethylene glycol, etc. including cosmetics on the external surface of the product. Doing so may discolor or crack the external surface of the product.
- ▶ Do not use glass cleaners or products containing bleach.
- ▶ Make sure that liquids or other objects do not enter the inside of the product.

Component	Cycle	Cleaning Method
Console	Every day or after each test	Wipe it using a soft cloth, lightly dampened with a pH neutral soap solution or clean water.
Monitor		Wipe the surface carefully with a soft, dry cloth. (Touchscreen: If applicable to the product)
Touchscreen		
Trackball	Every month	Remove the trackball rim by turning it counterclockwise, wipe it using a soft cloth, and then assemble in reverse order of disassembly.
Air Filters		Identify the location of the filter in the product, separate it from the product, and then remove dust using a brush or a vacuum cleaner. Slide the filter back into the product.
Probe holders	Every day or after each test	Probe holders can be removed depending on the product. Wipe them with a soft cloth lightly dampened with a cleaning solution (IPA 75%).
Peripheral Devices	Clean peripheral devices according to the manufacturer's instructions.	



NOTE:

- ▶ Since a pH neutral soap solution does not contain strong chemical ingredients, it will not irritate the skin.
- ▶ The solution must not contain any fragrances, oil, or alcohol.



CAUTION:

- ▶ Make sure that the touchscreen is not contaminated by an electrically conductive substance.
- ▶ Contamination of the LCD screen by ultrasound gel or other substances may degrade the sensitivity of the touchscreen and cause malfunctions. This phenomenon is caused by the contact between the capacitive touchscreen and the conductive substance. If you find foreign substances on the screen, clean it with a dry cloth, and then restart the system.

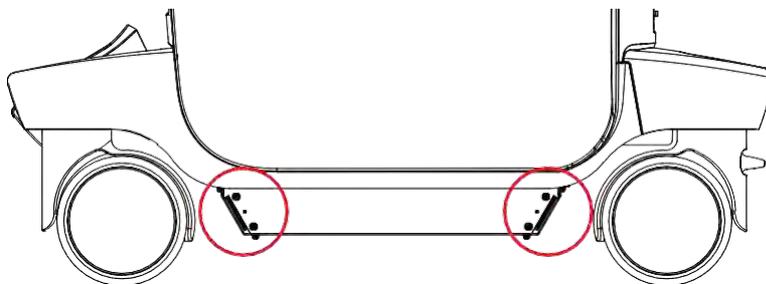
■ Cleaning Air Filters

The air filters minimize the intake of dust. When the air filter is clogged with dust, it may cause the product to overheat and generate noise; it may also reduce the reliability and the system performance.

Clean the filter once a month to maintain the system in optimal condition.



CAUTION: Be sure to lock the brakes on the front wheels before cleaning the air filters to avoid injury by any unexpected movement of the product.



[Figure 4.1 Removing the Air Filters]



NOTE: Allow the wet filter to dry thoroughly before reinstalling it. A wet filter can cause the system to malfunction.

Disinfection

In general, an ultrasound system has an irregular surface, and disinfection of the entire surface of the product is not recommended. Therefore, users should comply with the following disinfection steps:

**CAUTION:**

- ▶ When you use a disinfectant, comply with the recommendations of the disinfectant manufacturer.
- ▶ Use only the disinfectants recommended in the product user manual to disinfect the system's surfaces.

A disinfectant qualified by the FDA 510 (k) process is recommended.

1. Turn off the system and disconnect the power cord from the wall outlet.
2. Dilute the disinfectant solution to the strength specified on the instruction label.
3. Wipe the system's surfaces with the disinfectant solution, following the disinfectant's instructions.
4. Air dry or towel dry with a soft cloth according to the instructions on the disinfectant label.

■ Disinfectants for System Surfaces

The following disinfectants can be used to disinfect all surfaces of the system (including probe holders) except for the monitor and touchscreen.

Product Name	Manufacturer	Type
Sani-Cloth Bleach Germicidal Disposable Wipe	PDI	Wipe
Tristel Duo ULT	Tristel Solutions Limited	Foaming soap
Sporox II	Sultan Healthcare	Liquid
Rely+On™ Perasafe	DU PONT	Powder
Anioxyde 1000	Anios	Liquid
MetriCide OPA Plus	Metrex	Liquid



CAUTION:

- ▶ Using an inappropriate disinfection procedure may damage the system. Make sure that you check the disinfectant's expiry date.
- ▶ Mix the disinfectant solution to the strength specified on the instruction label, by following the disinfectant manufacturer's instructions.

■ Disinfectants for Monitor Surface

The following disinfectants can be used to disinfect the monitor and touchscreen.

Product Name	Manufacturer	Type
Sani-Cloth Bleach	PDI	Wipe
Sporox	DSHealthcare Inc.	Liquid
Anioxyde 1000	Laboratoires Anios	Liquid
Metricide-OPA Plus	Metrex	Liquid
Cidex Plus	Advanced Sterilization Products	Liquid
Cleanisept Wipes	Dr. Schumacher GmbH	Wipe



CAUTION: When using a disinfectant, wipe it carefully with a soft cloth.

Electrical Safety Check



NOTE: Users may request safety inspections as required, but only trained persons are allowed to perform the safety inspection.

The product's maintenance status may affect the electrical safety of the product. The product should be in an electrically safe work condition at all times for user safety.

Accuracy Check



NOTE: In case of doubt in the measurements, please contact your local Samsung Medison Service Department for an accuracy test.

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.

The equations and table related to measurement accuracy are included in 'Chapter 9. Measurements' in this manual.

:: 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.

User Setting Backup

Always keep a backup copy of all information related to the user settings in case of data loss. Users should not attempt to back up user settings on their own. Staff at Samsung Medison's Customer Service Department should perform backup upon client's request.

Patient Information Backup

The SonoView program can be used to back up patients' basic information and scanned images. You can save the back up manually. Back ups can only be saved externally, either to CDs or DVDs. For a more detailed description, see 'Chapter 6. Starting Modes of Operation'. If the system needs to be reinstalled due to a defect in the product, staff at Samsung Medison's Customer Service Department will restore the saved basic patient information and images.

Software

The software may be changed to improve the product's performance. Users should not attempt to modify the software by themselves; they must consult staff at Customer Service Department and ask them to guide them through the modification process.



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

If errors occur in the operating system (Windows), or you desire to upgrade the operating system, please follow the instructions of 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.

Cybersecurity

Threats against cybersecurity have intensified gradually in recent years.

Threats manifest in a variety of forms, including a system breakdown caused by virus infections or a leak of patient data stored on the system, and unfortunately, no security measure can prevent such threats 100%. Therefore, please comply with the following to prepare for cyber threats.

- ▶ Do not connect the product to an unsecured public wired or wireless network, and under no circumstances do you connect to the Internet via this product.
- ▶ Place this product in an area where it cannot be operated or tampered with physically by non-designated persons, and shut off power when it is not in use.
- ▶ Only external devices (e.g., USB drive) that have been scanned for viruses and malwares should be connected to the product.
- ▶ If you suspect that the product is infected, stop using it immediately, shut off power, and make sure that you contact the Security Manager (Technical Support).
- ▶ If a new security patch has been released, adjust the schedule with the Service Team to apply the patch promptly.
- ▶ Samsung Medison provides remediation support for known cybersecurity vulnerabilities of its products until the end of their lifecycle.

Chapter **5**

Probes

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Probe

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 the maximum contact temperature to 43°C, and the ultrasonic waves output (AP&I) observes American FDA regulations. The power protection fuse protects the product from over-current. 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 use a preset that is best suited to the particular organ being scanned.

Thermal Index (TI) Table

Thermal Index (TI) is displayed in the Title area of the screen, and represents the probability of temperature rise in a particular area of the body. There are body organ (TIs), bone (Tlb), and cranial bone thermal (Tlc) indexes, depending on the body part. This product is configured to automatically display a thermal index according to the selected probe and application.

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

Probe	Application	Preset	Thermal Index
L3-12A	Small Parts	Bowel, Breast, Breast1, Testicle, Thyroid	TIs
	Abdomen	General, Pediatric ABD, Superficial	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Pediatric Hip, Penetration	TIs
LA2-9A	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	Abdomen	General, Pediatric ABD	TIs
	MSK	General, Pediatric Hip	TIs

Probe	Application	Preset	Thermal Index
LA3-16A	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration	TIs
LA3-16AI	MSK	General, Superficial	TIs
	Intraoperative	General	TIs
LA4-18B	Small Parts	Breast, Testicle, Thyroid	TIs
	Vascular	Superficial, Carotid	TIs
	MSK	General, Superficial	TIs
LM4-15B	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Abdomen	General, Pediartic ABD, Superficial	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Penetration	TIs
		Pediartic Hips	TIs
CA1-7A	Abdomen	Aorta, General, General1, Renal, Penetration, Urology	TIs
	Pediatric	Pediatric ABD	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester, Fetal Heart, NT	TIb
	Gynecology	General, Adnexa, Penetration, Uterus	TIs
	Vascular	Venous	TIs
	MSK	Spine	TIb
CA2-8A	Abdomen	Aorta, General, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester, Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
CF4-9	Pediatric	Abdomen, NeoHead, Bowel	TIs
	Vascular	Arterial, Carotid, Venous	TIs

Probe	Application	Preset	Thermal Index
E3-12A	OB	1st Trimester	TIs
	Gynecology	General, Adnexa	TIs
	Urology	Prostate	TIs
CA3-10A	Abdomen	Aorta, Bowel, General, Renal	TIs
	Pediatric	Pediatric ABD, Pediatric Hip, Neonatal, Pediatric Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, Fetal Heart, NT	TIb
	Gynecology	General, Adnexa	TIs
	Vascular	Arterial, Venous	TIs
	MSK	Hip	TIs
Spine		TIb	
V5-9	OB	1st Trimester	TIs
	Gynecology	General, Adnexa	TIs
	Urology	Prostate	TIs
LV3-14A	Small Parts	Bowel, Breast, Testicle, Thyroid	TIs
	Vascular	Arterial, Carotid, Venous	TIs
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist	TIs
CV1-8A	Abdomen	Aorta, General, Renal	TIs
	OB	1st Trimester	TIs
		2nd Trimester, 3rd Trimester, Fetal Heart, NT	TIb
	OB1	2nd Trimester, Fetal Heart	TIb
	Gynecology	General, Adnexa	TIs
PA3-8B	Abdomen	Aorta, General, Renal	TIs
	Pediatric	Abdomen, NeoHead	TIs
	Cardiac	Aortic Arch, Adult Echo, Ped Echo	TIs
PA4-12B	Pediatric	Abdomen, NeoHead	TIs
	Cardiac	Aortic Arch, Ped Echo	TIs

Probe	Application	Preset	Thermal Index
PM1-6A	Abdomen	Aorta, General, Renal	TIs
	Cardiac	Aortic Arch, Adult Echo, Adult Echo1, Adult Echo2, Ped Echo	TIs
	TCD	General	TIs
CW6.0	Cardiac	Ped Echo	TIs
	Vascular	Arterial, Venous	TIs
DP2B	Cardiac	Adult Echo	TIs
MMPT3-7	Cardiac	Adult Echo	TIs
EV3-10B	OB	1st Trimester	TIs
	Gynecology	General, Adnexa	TIs
	Urology	Prostate	TIs
DP8B	Cardiac	Ped Echo	TIs
	Vascular	Arterial, Venous	TIs
EA2-11B	OB	1st Trimester	TIs
	Gynecology	General, Adnexa	TIs
	Urology	Prostate	TIs

**NOTE:**

- ▶ Other than the system-optimized presets, users may configure the usersets to meet their needs.
- ▶ For information on selection and settings of probes, refer to 'Chapter 6. Starting Modes of Operation'.
- ▶ The default thermal index may vary, corresponding to the presets.
- ▶ You can change the thermal index in Utility > Setup > System > Display > TI Display.
- ▶ Intraoperative is not supported in Canada.

■ Function List

The functions available in this product for various probes and applications are as follows:

Probe	Application	Har	S-Har.	Multi Vision	Clear Vision	Q Scan	ECG	Elasto Scan+	S-Shearwave
L3-12A	Small Parts	0	0	0	0	0	0	0 (Only Breast, Breast1)	X
	Abdomen	0	0	0	0	0	0	X	X
	Vascular	0	0	0	0	0	0	X	X
	MSK	0	0	0	0	0	0	0	X
LA2-9A	Small Parts	X	X	0	0	0	0	0 (Only Breast)	X
	Vascular	X	X	0	0	0	0	X	X
	Abdomen	X	X	0	0	0	0	X	X
	MSK	X	X	0	0	0	0	X	X
LA3-16A	Small Parts	0	0	0	0	0	0	0 (Only Breast)	X
	Vascular	0	0	0	0	0	0	X	X
	MSK	0	0	0	0	0	0	X	X
LA3-16AI	MSK	0	0	0	0	0	0	X	X
	Intraoperative	0	0	0	0	0	0	X	X
LA4-18B	Small Parts	0	0	0	0	0	0	0 (Only Breast)	X
	Vascular	0	0	0	0	0	0	X	X
	MSK	0	0	0	0	0	0	X	X
LM4-15B	Small Parts	0	0	0	0	0	0	0 (Only Breast)	X
	Abdomen	0	0	0	0	0	0	X	X
	Vascular	0	0	0	0	0	0	X	X
	MSK	0	0	0	0	0	0	X	X

Probe	Application	Har	S-Har.	Multi Vision	Clear Vision	Q Scan	ECG	Elasto Scan+	S-Shearwave
CA1-7A	Abdomen	0	0	0	0	0	X	X	0
	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	X	X
	Pediatric	0	0	0	0	0	X	X	X
	Vascular	0	0	0	0	0	X	X	X
	MSK	0	0	0	0	0	X	X	X
CA2-8A	Abdomen	0	0	0	0	0	X	X	X
	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	X	X
CF4-9	Pediatric	X	0	0	0	0	X	X	X
	Vascular	X	0	0	0	0	0	X	X
E3-12A	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	0	X
	Urology	0	0	0	0	0	X	0	X
CA3-10A	Abdomen	0	0	0	0	0	X	X	X
	Pediatric	0	0	0	0	0	X	X	X
	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	X	X
	Vascular	0	0	0	0	0	X	X	X
	MSK	0	0	0	0	0	X	X	X
V5-9	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	0	X
	Urology	0	0	0	0	0	X	0	X
LV3-14A	Small Parts	0	0	0	0	0	0	X	X
	Vascular	0	0	0	0	0	0	X	X
	MSK	0	0	0	0	0	0	X	X

Probe	Application	Har	S-Har.	Multi Vision	Clear Vision	Q Scan	ECG	Elasto Scan+	S-Shearwave
CV1-8A	Abdomen	0	0	0	0	0	X	X	X
	OB	0	0	0	0	0	X	X	X
	OB1	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	X	X
PA3-8B	Abdomen	0	0	X	0	0	X	X	X
	Pediatric	0	0	X	0	0	X	X	X
	Cardiac	0	0	X	0	0	0	X	X
PA4-12B	Pediatric	0	0	X	0	0	X	X	X
	Cardiac	0	0	X	0	0	0	X	X
PM1-6A	Abdomen	0	0	X	0	0	X	X	X
	Cardiac	0	0	X	0	0	0	X	X
	TCD	0	0	X	0	0	X	X	X
CW6.0	Cardiac	X	X	X	X	X	0	X	X
	Vascular	X	X	X	X	X	0	X	X
DP2B	Cardiac	X	X	X	X	X	0	X	X
MMPT3-7	Cardiac	0	0	X	0	0	0	X	X
EV3-10B	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	0	X
	Urology	0	0	0	0	0	X	0	X
DP8B	Cardiac	X	X	X	X	X	0	X	X
	Vascular	X	X	X	X	X	0	X	X
EA2-11B	OB	0	0	0	0	0	X	X	X
	Gynecology	0	0	0	0	0	X	0	X
	Urology	0	0	0	0	0	X	0	X

Probe	Application	Biopsy	CM	TDI	PD	S-Flow	TDW	CW	Wide View
L3-12A	Small Parts	0	X	X	0	0	X	X	0
	Abdomen	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
LA2-9A	Small Parts	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	Abdomen	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
LA3-16A	Small Parts	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
LA3-16AI	MSK	X	X	X	0	0	X	X	0
	Intraoperative	X	X	X	0	0	X	X	0
LA4-18B	Small Parts	0	X	X	0	0	X	X	X
	Vascular	0	X	X	0	0	X	X	X
	MSK	0	X	X	0	0	X	X	X
LM4-15B	Small Parts	0	X	X	0	0	X	X	0
	Abdomen	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0

Probe	Application	Biopsy	CM	TDI	PD	S-Flow	TDW	CW	Wide View
CA1-7A	Abdomen	0	X	X	0	0	X	X	0
	OB	0	X (Except Fetal Heart)	X	0 (Except Fetal Heart)	0	X	X	0
	Gynecology	0	X	X	0	0	X	X	0
	Pediatric	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
CA2-8A	Abdomen	0	X	X	0	0	X	X	0
	OB	0	X (Except Fetal Heart)	X	0 (Except Fetal Heart)	0	X	X	0
	Gynecology	0	X	X	0	0	X	X	0
CF4-9	Pediatric	0	X	X	0	0	X	X	X
	Vascular	0	X	X	0	0	X	X	X
E3-12A	OB	0	X	X	0	0	X	X	X
	Gynecology	0	X	X	0	0	X	X	X
	Urology	0	X	X	0	0	X	X	X
CA3-10A	Abdomen	0	X	X	0	0	X	X	0
	Pediatric	0	X	X	0	0	X	X	0
	OB	0	0	X	X	0	X	X	0
	Gynecology	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
V5-9	OB	0	X	X	0	0	X	X	X
	Gynecology	0	X	X	0	0	X	X	X
	Urology	0	X	X	0	0	X	X	X

Probe	Application	Biopsy	CM	TDI	PD	S-Flow	TDW	CW	Wide View
LV3-14A	Small Parts	0	X	X	0	0	X	X	0
	Vascular	0	X	X	0	0	X	X	0
	MSK	0	X	X	0	0	X	X	0
CV1-8A	Abdomen	0	X	X	0	0	X	X	X
	OB	0	X (Except Fetal Heart)	X	0 (Except Fetal Heart)	0	X	X	X
	OB1	0	X (Except Fetal Heart)	X	0 (Except Fetal Heart)	0	X	X	X
	Gynecology	0	X	X	0	0	X	X	X
PA3-8B	Abdomen	X	X	X	0	0	X	0	X
	Pediatric	X	X	X	0	0	X	0	X
	Cardiac	X	0	0	X	X	0	0	X
PA4-12B	Pediatric	0 (Only Abdomen)	X	X	0	0	X	0	X
	Cardiac	X	0	0	X	X	0	0	X
PM1-6A	Abdomen	X	X	X	0	0	X	0	X
	Cardiac	X	0	0	X	X	0	0	X
	TCD	X	X	X	0	0	X	0	X
CW6.0	Cardiac	X	X	X	X	X	X	0	X
	Vascular	X	X	X	X	X	X	0	X
DP2B	Cardiac	X	X	X	X	X	X	0	X
MMPT3-7	Cardiac	X	0	0	X	X	0	0	X
EV3-10B	OB	0	X	X	0	0	X	X	0
	Gynecology	0	X	X	0	0	X	X	0
	Urology	0	X	X	0	0	X	X	0

Probe	Application	Biopsy	CM	TDI	PD	S-Flow	TDW	CW	Wide View
DP8B	Cardiac	X	X	X	X	X	X	O	X
	Vascular	X	X	X	X	X	X	O	X
EA2-11B	OB	O	X	X	O	O	X	X	O
	Gynecology	O	X	X	O	O	X	X	O
	Urology	O	X	X	O	O	X	X	O



NOTE: The significance of each symbol is as follows:

- ▶ Har: Harmonic Imaging
- ▶ S-Har.: S-Harmonic
- ▶ 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
- ▶ Wide View: WideView MultiVision

Using Ultrasound Gel

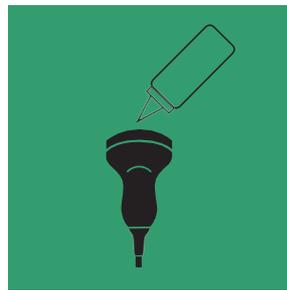
For successful acoustic signal transmission, please only use the ultrasound gels approved by Samsung Medison.

**WARNING:**

- ▶ The use of inappropriate ultrasound gels could result in damage to the probe. Using damaged probes may result in electric shocks and other hazards to the patients and/or users.
- ▶ Do not use ultrasound gels that contain any of the following agents:
 - Oils such as mineral oil, cooking oil, gasoline, solvents, rust inhibitors, lanolin, paraffin-based grease, ester, and excessive silicon-based release agents
 - Alcohols such as acetone, methanol, plasticizer (dioctylphtalate), and denatured alcohol
 - Glacial acetic acid and iodine
 - All lotions or gels that contain aromatic substances

**CAUTION:**

- ▶ When applying the ultrasound gel to the probe, make sure that the tip of the ultrasound gel injection nozzle does not touch the surface of the probe lens.
- ▶ The injection nozzle may cause damage to the probe lens.





Gel Warmer

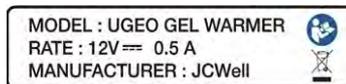
The Gel Warmer keeps the ultrasound gel warm. Warming up ultrasound gel takes approximately 5 minutes. There is an optional holder on the left side of the control panel in which you may place the gel warmer.

**WARNING:**

- ▶ Always turn the Gel Warmer off when it is not in use.
- ▶ Do not put your hands inside the Gel Warmer, as it may burn your skin.

**CAUTION:**

- ▶ Do not use the Gel Warmer for purposes other than to control the temperature of ultrasound gel.
- ▶ Make sure that no items such as the probe slip into the Gel Warmer.
- ▶ Do not touch the power terminal of the Gel Warmer while you are examining a patient. There is a risk of electric shock from leakage current.
- ▶ Do not apply excessive force to the Gel Warmer, or you may damage its support parts.



[Figure 5.1 Gel Warmer Label – Examples]

Using Sheaths

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

Samsung Medison does not supply sheaths, so you should purchase appropriate supplies from your regular supplier.

**WARNING:**

- ▶ For more information about sheaths, please contact the manufacturer.
- ▶ Always keep sheaths in a sterile state.
- ▶ Sheaths are disposable. Do not reuse them.
- ▶ Make sure to clean and disinfect the probe after every use.
- ▶ Check the exterior of the Sheath before use. If a sheath is split or contaminated, do not use it.
- ▶ In neurosurgical applications, a disinfected probe must be used with sterile gel and a sterile pyrogen-free sheath.
- ▶ No neurosurgical treatments or examinations should be carried out on a patient with Creutzfeldt-Jakob disease. If a probe has been used on such a patient, it cannot be sterilized by any method whatsoever.
- ▶ 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.

▶▶ Using Sheath

1. Remove the sheath from the packaging, and fill it with ultrasound gel. Be sure to put on sterilized surgical gloves.
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

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.



CAUTION:

- ▶ The user is responsible for cleaning, disinfecting, and sterilizing probes.
- ▶ Probes are not sterilized at the time of shipment.
- ▶ Do not apply mechanical shock to the probe.
- ▶ In case a probe is bumped against the ground or a hard surface, disconnect the probe immediately from the console of the ultrasound system. If damaged, the electrical insulation may cause an electrical shock.
- ▶ 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, or hydrogen peroxide.
- ▶ Do not expose the probe to temperatures of 50°C or higher.
- ▶ 3D and 4D probes may make a slight noise if they are used for a long time or if a certain mode is in use.
- ▶ Probes should be cleaned and disinfected prior to replacement or disposal.
- ▶ Always inspect the lenses, cables, and connectors after using probes. If damaged, stop using them immediately.

▶▶ Using and Infection Control of the Probe

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. Consequently, the safety instructions must be followed carefully in order to minimize the risk of infection among patients.

**WARNING:**

No neurosurgical treatments or examinations should be carried out on a patient with Creutzfeldt-Jakob disease. If the probe has been used on such a patient, it cannot be sterilized by any method whatsoever.

If the probe or product is contaminated, dispose of it according to the local biohazardous waste disposal procedures.



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 cleaning solution and sheaths.

⚠ Risk of Electric Shock

The probe uses electrical energy. If it touches conductive materials, there are risks of electric shocks to the patient or the user.



WARNING:

- ▶ Have the system regularly inspected for electrical leakage by Samsung Medison's Customer Service Department.
- ▶ Do not immerse the probe in liquid.
- ▶ Do not touch the probe connectors or the connection pins on the product. 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 system limits patient contact temperature to 43°C, and the ultrasound power output (AP&I) is in compliance with US FDA standards.

Cleaning and Disinfecting the Probe

All probes must be cleaned and disinfected after each use. Cleaning is an important procedure that must be carried out before disinfecting the probe. For information on cleaning and disinfecting the probe, please refer to the appropriate chapter. Using an inappropriate disinfectant may damage the probe.



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 degradation after cleaning and disinfecting the probe.
- ▶ Using an inappropriate cleaning or sterilizing agent may damage the probe.

▶▶ Information on Detergent, Disinfectant, and Ultrasound Gel

■ Classification of Disinfectants

To maintain the performance of ultrasound probes, proper maintenance is required.

As ultrasound probes are classified into critical, semi-critical or non-critical devices based on the standards of FDA guidance* and the Hygiene Requirements for the Reprocessing of Medical Devices from Germany guideline of Robert Koch Institute(RKI), proper cleaning and disinfection or sterilization methods for that classification should be used.

Classification Criteria	Contact Area	Application Probe	Level Selection
Non-critical device	Intact skin	Convex, Linear array, and sector transducers	Low level disinfectant
Semi-critical device	Mucous membrane and damaged skin	Endocavity	High level disinfectant
Critical device	Blood, sterile tissue, etc.	Intraoperative, TEE	High level disinfectant or sterilization

* Guidance for Industry and FDA Staff - Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers - Appendix D

* It is recommended that only high level disinfectants are used for Endocavity probes.

An appropriate detergent, disinfectant or ultrasound gel should be selected based on the following tables.

Please check which detergent, disinfectant, and ultrasound gels are appropriate by visiting the Samsung Medison website and referring to the User Guides.

All probes have been tested in accordance with IPX 7 Criteria.

- ▶ User Guides: A booklet is provided upon purchasing the product.
- ▶ Website: <http://www.samsunghealthcare.com>

The following is information about the manufacturers (or Distributors) of detergents, disinfectants, and ultrasound gels.

Product	Manufacturer
Alkazyme	Alkapharm UK Ltd.
Anioxyde 1000	Laboratoires Anios
Aquasonics 100	Parker laboratories, Inc.
Asepti-Wipes	Ecolab
Asepti-Wipes II	Ecolab
Bleach 5.25%	-
CaviWipes	Metrex
Cidex	Advanced Sterilization Products
Cidex 2%	Advanced Sterilization Products
Cidex OPA	Advanced Sterilization Products
Cidex Plus	Advanced Sterilization Products
Cidezyme	Johnson & Johnson
Cleanisept Wipes	Dr. Schumacher GmbH
Clear Image	NEXT Medical Products
Enzol	Johnson & Johnson
Ethanol 75%	-
GE Ultrasound Contact Gel	GE Accessories
Gigasept	Schulke & Mayr GmbH
Gigasept AF	Schulke & Mayr GmbH
Gigasept FF	Schulke & Mayr GmbH
Hibitane	Regent Medical

Product	Manufacturer
Incidin Foam	Ecolab
Isopropyl alcohol (70%)	-
Isopropyl alcohol (80%)	-
Kendall	Tyco/Healthcare
Klenzyme	Steris
McKesson	McKesson Medical-Surgical Inc.
Metricide 14	Metrex
Metricide 28	Metrex
Metricide 30	Metrex
Metricide OPA Plus	Metrex
Metricide	Metrex
MetriWipes	Metrex
Metrizyme	Metrex
Milton	Procter & Gamble
Natural Image	Sonotech Inc.
Nuclear	Alkapharm
Omnicide - FG2	Coventry Chemicals Limited
Omnicide 14NS	Coventry Chemicals Limited
Omnicide (28)	Coventry Chemicals Limited
PeraSafe	ANTEC International Limited
Salvanios pH 7	Laboratoires Anios
Salvanios pH 10	Laboratoires Anios
Sani-Cloth Active	PDI
Sani-Cloth AF Germicidal	PDI
Sani-Cloth AF3 Germicidal	PDI
Sani-Cloth Bleach Germicidal	PDI
Sani-Cloth Germicidal	PDI
Sani-Cloth HB	PDI

Product	Manufacturer
Sani-Cloth Plus	PDI
Scan	Parker laboratories, Inc.
Sekusept Extra	Ecolab
Sekusept Plus	Ecolab
Septiwipes	Dr. Schumacher GmbH
Sonogel	Sonogel Vertriebs GmbH
Sporox	DSHealthcare Inc.
Sporox II	DSHealthcare Inc.
Steranios 2%	Laboratoires Anios
Ster-Bac Blu	Ecolab
Super Sani-cloth	PDI
Surfaces Hautes	Laboratoires Anios
Transeptic spray	Parker laboratories, Inc.
Tristel Duo	Tristel Solutions Limited
Tristel Sporicidal Wipe	Tristel Solutions Limited
Trophon	Nanosonics Limited
T-Spray	Pharmaceutical Innovations, Inc.
T-Spray II	Pharmaceutical Innovations, Inc.
Virkon	DuPont
Wavelength	National Therapy Products Inc.
Wavicide-01	National Therapy Products Inc.

»» Cleaning the Probe

The probe must be cleaned and disinfected after each use. Cleaning is an important procedure that must be carried out before disinfecting the probe.

**CAUTION:**

- ▶ Do not use brushes 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 the biopsy adapter or needle guide. Collect the reusable parts, reusable biopsy adapter, or needle guide that need to be disinfected or sterilized, and discard the disposable parts in the clinical waste bin (For more information on cleaning and disinfection/sterilization of the reusable parts, please refer to the relevant chapters).
3. Remove and dispose of the medical sheaths in the clinical waste bin properly (Medical sheaths are disposables).
4. Use a soft cloth or appropriate cleaning sheet lightly dampened with clean water or a cleaner to remove any foreign substances left on the probe, the edges, corners, and curved parts of the probe, and cables.
5. Rinse them with water thoroughly to remove any loose particles and residues (up to the waterproofed point).
6. Wipe with a clean, dry, soft cloth.
7. If still wet, wipe with a clean water-dampened cloth, and again with a clean, dry, soft cloth.
8. Dispose of the used cloth in the clinical waste bin.

»» ⚠ Disinfecting Probes

The probe must be cleaned and disinfected after each use. Disinfection of the probe is an important step that must be carried out.



CAUTION: Disinfect to reduce pathogens to the level of 10^{-6} .

■ Disinfecting the Probe with a Fluid Disinfectant

Using an inappropriate disinfectant may damage the probe.



WARNING:

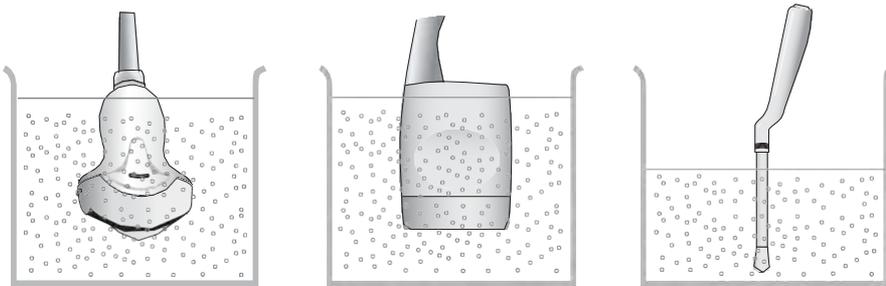
- ▶ Always use a protective face mask and gloves when disinfecting the probes.
- ▶ Inspect the housing, strain relief, lens and seal for damage, and check for any functional degradation after disinfecting the probe.
- ▶ Never use disinfectants after the expiration date.
- ▶ The type of tissue the probe will contact during use dictates the level of disinfection required for a probe. Ensure that the solution strength and duration of contact are appropriate for disinfection.



CAUTION:

- ▶ Failing to use a recommended disinfectant or follow the recommended disinfection method may damage and/or discolor the probe. This could also void the product warranty.
- ▶ Do not immerse non-sterilizable probes in disinfectant for one hour or longer.
- ▶ Only use liquid solutions to sterilize probes. Do not sterilize by autoclaving or using EtO gas.

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.



[Figure 5.2 Disinfecting a Probe]

4. Follow the instructions on the disinfectant to complete the immersion procedure for the probe and never leave the transducer immersed in the disinfectant solution for longer than the maximum immersion duration. Rinse the probe with clean water.
5. Air dry the probe and store it properly (e.g. in a sterile bag) to prevent any further contamination.

■ Disinfecting the Probe with a Disinfection Wipe

Using an inappropriate disinfection wipe may damage the probe.



WARNING:

- ▶ Always use a protective face mask and gloves when disinfecting the probes.
- ▶ Inspect the housing, strain relief, lens and seal for damage, and check for any functional degradation after disinfecting the probe.
- ▶ Never use disinfection wipes that have gone beyond their expiration date.
- ▶ Ensure that the contact duration is appropriate for disinfection.



CAUTION: Using a non-recommended disinfection wipe or not following the recommended disinfection method can damage and/or discolor the probe. This could also void the product warranty.

1. For more information on the correct use, storage, and disposal of the holder, please refer to the user instructions for the disinfection wipe.
2. Dependant on the types of wipe, apply the active disinfectant to a dry wipe or use a ready-to-use wet wipe containing disinfectant.
3. Use the disinfection wipe to apply the active disinfectant all over the surface of the probe and ensure all areas are covered.
4. Discard the used disinfectant wipes as clinical waste. Do not re-use the disinfectant wipes.
5. Air-dry the probe for the amount of time specified in the user instructions for the disinfectant wipes and store the probe properly (e.g., in a sterile bag) to prevent any further contamination.

■ Disinfecting the Probe with the Disinfection System

Using a combination of a non-approved probe/disinfection system may damage the probe.

**WARNING:**

- ▶ Always use a protective face mask and gloves when disinfecting the probes.
- ▶ Inspect the housing, strain relief, lens and seal for damage, and check for any functional degradation after disinfecting the probe.
- ▶ Ensure that the cycle duration is appropriate for the desired disinfection level.



CAUTION: Using a combination of a non-approved probe or disinfection system, or not following the recommended disinfection method can damage the probe. This could also void the product warranty.

1. For more information on the correct use, storage, and disposal of waste materials, please refer to the user instructions for disinfection devices.
2. Place the probe head, a part of the cable and possible marker in the disinfection device, following the user instructions of the disinfection device.
3. Start the desired disinfection process and wait for the cycle to complete.
4. After the cycle is complete, remove the probe and the marker from the disinfection device and store them properly (e.g., in a sterile bag) to prevent any further contamination.
5. Record the disinfection data for traceability according to local regulations.

MPTEE Probe (Option)

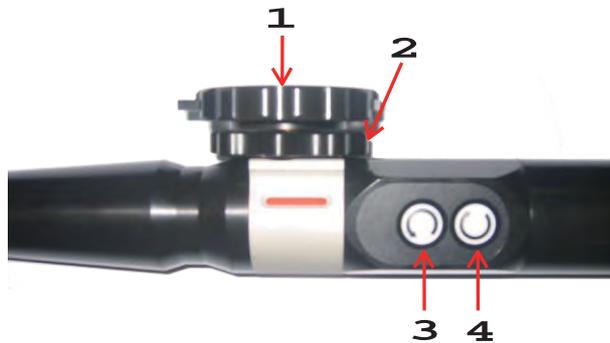
The Multi-Planar Transesophageal Echocardiography (MPTEE) probe is used by inserting it inside the body.



CAUTION: The user is responsible for the correct configuration and use. Please make sure to read the User Manual thoroughly.



How to Use MMPT3-7 Probe



[Figure 5.3 MMPT3-7 Probe Dial]

■ Lens Angle Adjustment

The lens angle can be adjusted to from 0° to 180° by using buttons 3 and 4. Button 3 rotates the lens angle counterclockwise. Button 4 rotates the lens angle clockwise.

■ Scan Head Tilting

Use dials 1 and 2. Rotate dial 1 clockwise to tilt the lens forward. Rotate the dial counterclockwise to tilt the lens backward. Rotate dial 2 clockwise to tilt the lens sideways.



[Figure 5.4 Scan Head Tilting]

■ Locked Mode

Makes the lens movement less natural than when left open, preventing movement of the lens and head during use. If a red marker is shown when you rotate MMPT3-7's silver handle, the probe is locked.



[Figure 5.5 Lock State]



Precautions for Using the Probe



DANGER: Do not use the product in a temperature outside the range of 25°C or lower and 42°C or higher. It may cause damage to the human body.



WARNING:

- ▶ Inspect the MPTEE probe for any sharp areas or rough surfaces.
- ▶ Do not transport the product while the MPTEE probe is placed in the probe holder. The probe is not secured, and it may fall.
- ▶ To protect the patient and the probe, keep the probe in Unlocked state when inserting the probe.
- ▶ The image obtained with the TEE probe may differ from the image displayed on screen. It is necessary to perform an inspection in advance to reduce the risk of difference in images.
- ▶ Familiarize yourself with the use and safety instructions for the TEE probe completely before using it.
- ▶ Only use the probe as an internal insertion probe.
- ▶ Do not apply excessive force when inserting or operating the transesophageal probe.

■ Temperature Change Warning Message

- ▶ When the temperature of the MPTEE probe exceeds 41°C, the following warnings are displayed:

Temperature Range	Warning Message
41.0°C ≤ TEE Temperature < 42.0°C	Estimated surface temperature of xx.x°C.
42.0°C ≤ TEE Temperature < 42.5°C	Estimated surface temperature of xx.x°C. Please reduce the power value.
42.5°C ≤ TEE Temperature < 43.0°C	Estimated surface temperature of xx.x°C. Please reduce the power value. Near the thermal limit of 43.0°C.
TEE Temperature = 43.0°C	Surface Temperature Reached: Currently 43.0°C. The power value has been automatically reduced.
43.0°C < TEE Temperature ≤ 50.0°C	Scan head temperature critical. The system has stopped transmitting and returned to the Probe Selection dialog. When you reselect the probe, please reduce the power value if necessary.
50.0°C < TEE Temperature or TEE Temperature < 5.0°C	Error condition detected. The System has stopped transmit and returned to the Probe Selection Dialog. Please contact a Service Representative.

- ▶ For the MPTEE probe, the following warnings are displayed, depending on the status of the circuit:
 - Short circuit or open circuit: Error condition detected. The System has stopped transmit and returned to the Probe Selection Dialog. Please contact a Service Representative.



CAUTION: The probe is intended to be inserted into the human body; always keep it clean. Never place the probe on the floor.



NOTE:

- ▶ When the probe is not in use, place it in the probe holder located on the left side of the console. The probe holder on the right side is not suitable for the MPTEE probe.
- ▶ We recommend that you use pyrogen-free sheaths.

»» ⚠ Maintenance

Proper cleaning and disinfection prevent infectious diseases. The user must clean and disinfect the probe by using an effective method, such as the one contained in this user manual.



CAUTION: Do not allow the handle or the probe connector to come in contact with cleansing agent or disinfectant. Clean the handle and the cable with a moist cloth; disinfect only the area between, and including, the scan head at the end of the probe and the area marked as 100cm.

■ Cleaning



CAUTION: Never clean the probe with methanol or ethanol. Doing so may cause serious problems with the product.

1. Remove the parts that do not need to be cleaned, and clean the scan head and the cable with a gauze soaked in non-irritant cleansing solution. Mix non-irritating cleaning agent in lukewarm water to create the cleansing solution; the recommended water temperature is 26°C or lower.
2. Rinse the product with lukewarm water until the cleansing solution is completely eliminated.
3. Either air-dry or use a soft cloth to remove moisture.

Cleaner	Supplier	Active Ingredient	Concentration
Cidezyme/Enzol	ASP J&J	Proteolytic enzymes	<5%
EMpower	Metrex	Proteolytic enzymes	<2%
Hycolin	Coventry Chemicals	Alkyldimethylbenzylammonium chloride	1-10%
		Tetrasodium EDTA	1-10%
		Alcohol ethoxylate	1-10%
Metrizyme	Metrex	Proteolytic enzymes	<2%
Prolystica 2x conc. Enzymatic Presoak & cleaner	Steris	Ethanollamine	1-5%
		Protease	0.1-1%
		Ethoxylated alcohol	1-5%
		Polyalkylene glycol	1-5%
		Glycerine	1-5%

Cleaner	Supplier	Active Ingredient	Concentration
T-spray	Pharmaceutical Innovations Inc.	N-alkyl-(C12-18)-n-N-dimethyl-N-Benzyl-ammonium-chloride; Alkyl-dimethyl-ethyl-benzyl-ammonium-chloride	
T-spray 2	Pharmaceutical Innovations Inc.	Alkyl-dimethyl-benzyl-ammonium-chloride; Octyl-decyl-dimethyl-ammonium-chloride; Dioctyl-dimethyl-ammonium-chloride; Didecyl-dimethyl-ammonium-chloride	

■ Disinfection

When necessary, disinfect the MPTEE probe with a liquid disinfectant. Cidex, Cidex-OPA, Metricide, Omnicide, and Giasept solutions are suitable for disinfecting the MPTEE probe. For the preparation methods and required immersion periods of the different disinfectant solutions, refer to the instructions provided by the manufacturers.



WARNING: Do not use ethanol, iodine, steam, heat, or ethylene oxide to disinfect the product.



CAUTION:

- ▶ Do not leave the probe in disinfectant solution for more than one hour.
- ▶ The probe must be rinsed immediately after disinfection.

1. Immerse the clean and dry surface of the probe in the disinfectant solution. Immerse only the portion of the probe between the scan head at the end of the probe and the area marked as 100cm.
2. Rinse away the disinfectant with water, and dry the probe completely before storage.

Disinfectance	Supplier	Active Ingredient	Concentration
Cidex ADS	ASP J&J	Gluteraldehyde	2.55%
Cidex Plus	ASP J&J	Gluteraldehyde	3.40%
Cidex OPA	ASP J&J	Ortho-phthalaldehyde	0.55%
Gigasept AF	Schulke und Mayr	Didcyldimethylammoniumchloride Glycine, aminoalkyl derivs Tridecylpolyethylenglycoether N-(3-Aminopropyl)-N-dodecylpropane-1, 3-diamine	15% 6.9% 15-30% <5%
Gigasept FF	Schulke und Mayr	Formaldehyde Dimethoxytetrahydrofurane Succindialdehyde	4.5% 3.2% 4.5%
Korsolex extra	Bode Chemie	Gluteraldehyde	5-10%
Metricide	Metrex	Gluteraldehyde	2.60%
Metricide 28	Metrex	Gluteraldehyde	2.50%
Metricide Plus 30	Metrex	Gluteraldehyde	3.40%
Metricide OPA Plus	Metrex	Ortho-phthalaldehyde	0.60%
Omnicyde 14 N.S.	Coventry Chemicals	Gluteraldehyde	2.60%
Omnicide 28	Coventry Chemicals	Gluteraldehyde	2.50%
Perasafe	Dupont	Sodium Perborate	40-60%
Sekusept Aktiv	Ecolab	Sodium Perborate monohydrate Critic Acid Fatty alcohol ethoxylate	30-50% 15-20% <5%
Steranios 2%, 2% N.G., 2% E.C.S.	Anios	Gluteraldehyde	2.00%
TD100 & TD5	CS Medical	Gluteraldehyde	2.65%
Totacide 28	Coventry Chemicals	Gluteraldehyde	2.00%
Virkon	Dupont	Potassium peroxymonosulphate	<50%

:: 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.

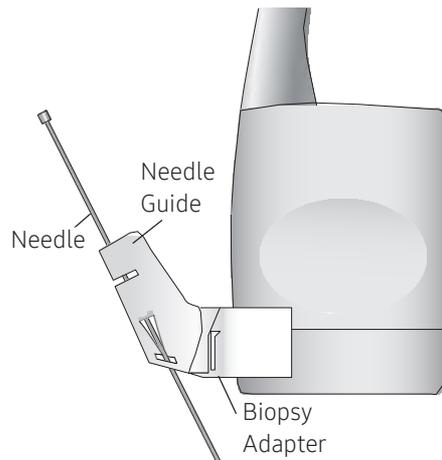
The ultrasound system shows the needle, which penetrates through the skin surface and veins, along with the examination location, minimizing the risk to the patient.

**CAUTION:**

- ▶ Ultrasonographic studies using a biopsy kit must be conducted by a physician or qualified, experienced healthcare professional. Make sure that you comply with the preventive safety measures and sterilization procedures for all environments.
- ▶ Do not use the biopsy kit for ultrasonographic studies for other purposes such as human anatomical dissection.
- ▶ The user will be responsible for using the biopsy kit for ultrasonographic studies.
- ▶ Please make sure to read the User Manual thoroughly.

Biopsy Kit Components

The biopsy kit consists of the adapter, needle guide and needle. The components vary depending on the probe type.



[Figure 5.6 Biopsy Kit Components]

- ▶ **Adapter:** Secures the needle guide to the probe tightly.
- ▶ **Needle Guide:** Guides the angle (direction) of the needle so that it may reach the biopsy target accurately. It also secures the needle so that the needle does not waver.
- ▶ **Needle:** This is the needle that is inserted into the patient's body. The biopsy kit supplied by Samsung Medison does not contain a needle.
- ▶ **Sheath:** Prevents the probe and adapter from getting soiled by any unwanted substances during the examination (blood and other bodily fluids).
- ▶ **Ultrasound 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 needles approved for use in your country.
- ▶ Verify the condition of the biopsy needle before use. Do not use a bent biopsy needle.
- ▶ The needle and guide must be sterilized before use.
- ▶ 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.



CAUTION: For more information about conducting ultrasonographic studies using the biopsy kit, contact the biopsy kit manufacturer.

▶▶ Before Using Biopsy Kit

Check all the components of the biopsy kit. Ensure that the biopsy kit you are using is compatible with the probe, system, and system software.

**WARNING:**

- ▶ Biopsy kits not supplied by Samsung Medison may not be compatible with the probe. Use Samsung Medison-approved biopsy kits only. Improper installation may adversely affect the patient.
- ▶ Be sure to read the instructions for installing a sheath, and the alignment of the needle guide thoroughly before using the biopsy kit.
- ▶ Always ensure that the probe and the needle guide are secured on both the left and the right sides.

»» ⌘ Biopsy Procedure

The system generates a needle guideline through the displayed real-time ultrasound images to indicate the anticipated path of the needle. Use this guideline to ensure that the needle or other instrument follows 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. Perform the puncture by sliding the needle through the groove in the guide until the needle intercepts the target.

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. Dispose of the components that are not designed for reuse.

**CAUTION:**

- ▶ Dispose of non-reusable components according to infectious waste regulations.
- ▶ Sterilize reusable components before disposing of them.

▶▶ ⚠ 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 an accurate path while verifying the alignment of needle guide, stop using the product and contact Samsung Medison Customer Support Department.

Reverberation or other tissue artifacts may produce false needle images on the screen. Ensure that the needle path is along the guideline and that you are not using a false needle image to locate the needle.



WARNING:

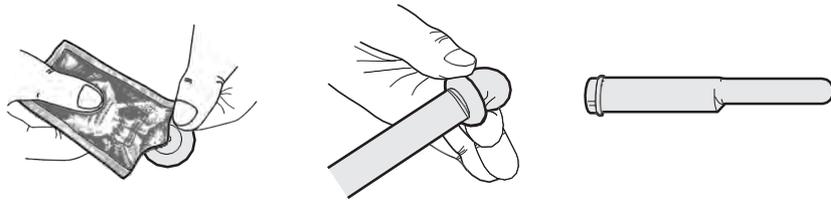
- ▶ The needle used for this alignment verification must not be used for the actual procedure. Always use a new, sterile needle for each biopsy procedure.
- ▶ To assist in accurate projection of the needle, use a straight, new needle for each alignment procedure.
- ▶ The needle guideline only displays the projected path of the needle. Since the default line may be different from the actual line, the actual location of the needle must be checked by monitoring the echo from the needle.

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 it is, then 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.

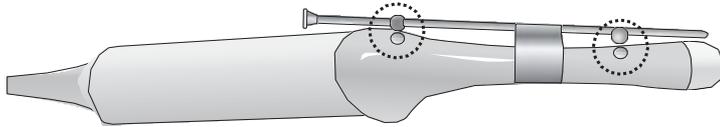
Assembling the Biopsy Kit

▶▶ ⚠ Stainless Steel Biopsy Kit

1. Place a sheath up to the top of the probe's handle.



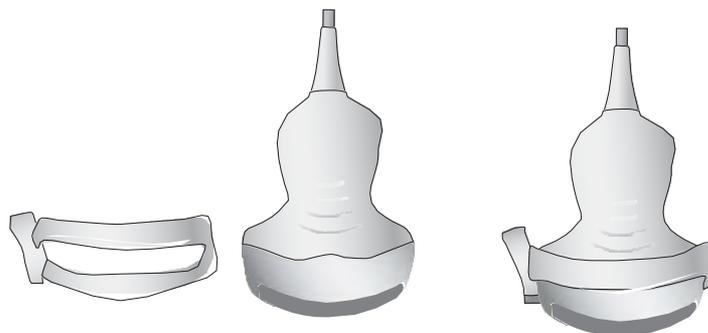
2. Mount the adapter onto the probe. If the surface of probe is fluted, mount the adapter in accordance with it.



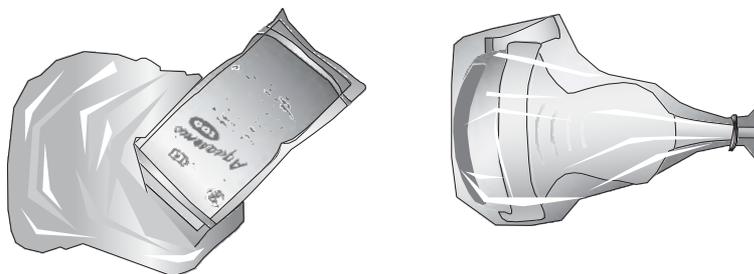
3. Insert the needle into the needle guide and start the exam.

▶▶ Plastic Biopsy Kit

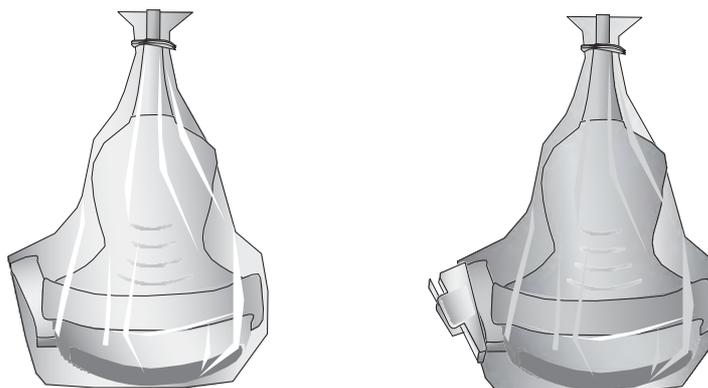
1. Mount the adaptor on the probe.



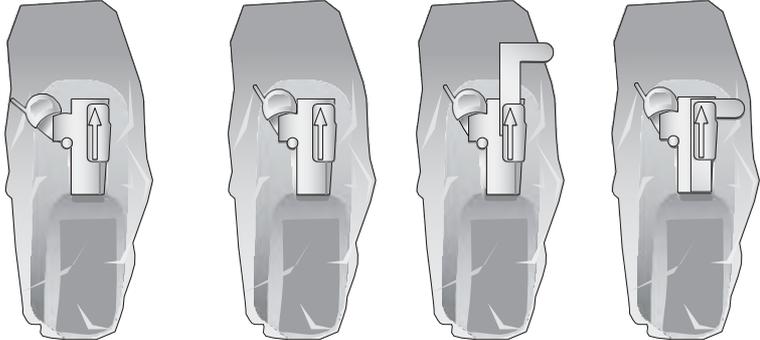
2. Cover the adaptor and probe completely with the sheath.



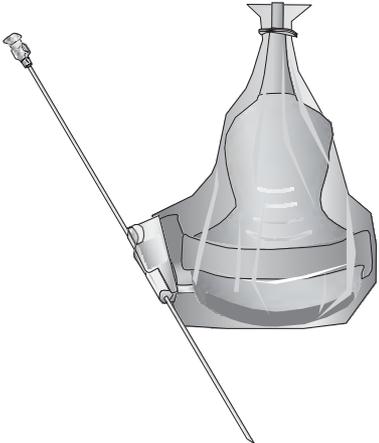
3. Install the needle guide onto the adaptor.



4. Install the Needle Guide Clip if it is included in the components.



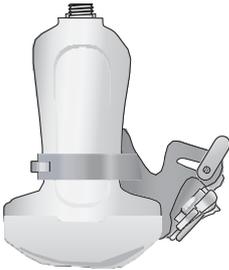
5. Insert the needle into the needle guide and start the exam.



Tips!

Using Multi Angle

Use the angle adjuster.



►► Biopsy Specifications

Probe	Biopsy					
	Model Name	Components	Adapter Material	Reusable/ Disposable	Needle Gauge	Multi Angle
L3-12A	BP-KIT-053 [BP-KIT-053-NG]	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 20, 22G	0.591, 0.984, 1.575 (in)
		Needle Guide		Disposable		
LA2-9A	BP-KIT-043	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	4, 5.5, 7 (cm)
		Needle Guide		Disposable		
LA3-16A	BP-KIT-055 [BP-KIT-055-NG] BP-KIT-068 [BP-KIT-068-NG]	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 20, 22G	0.591, 0.984, 1.575 (in)
		Needle Guide		Disposable		
LM4-15B	BP-KIT-075	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23, 8.5FR	1.5, 2.5, 3.5 (cm)
		Needle Guide		Disposable		
CA1-7A	BP-KIT-058 [BP-KIT-058-NG]	Biopsy Adapter	Acetal Copolymer	Reusable	14, 16, 18, 20, 22, 25G	1.969, 3.937, 5.906, 7.874 (in)
		Needle Guide		Disposable		
CA2-8A	BP-KIT-054	Biopsy Adapter	Acetal Copolymer	Reusable	16, 18, 22, 25G	2.362, 3.150, 3.937 (in)
		Needle Guide		Disposable		
E3-12A	BP-KIT-057	Needle Guide	ABS	Disposable	16–18G	Single Angle (4.2°)
	BP-KIT-076	Needle Guide	Polycarbonate	Disposable	16G	2°
	BP-KIT-077	Needle Guide	ABS	Disposable	16, 18, 20–22G	0°
	BP-KIT-078	Needle Guide	Stainless	Reusable	16–18G	0°
CA3-10A	BP-KIT-071	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23, 8.5FR	3.5, 6.5, 8.5, 12 (cm)
		Needle Guide		Disposable		
V5-9 EV3-10B	BP-KIT-060	Needle Guide	ABS	Disposable	16–18G	Single Angle (1.8°)
	BP-KIT-029	Needle Guide	Stainless	Reusable	18G	NA
LV3-14A	BP-KIT-030	Biopsy Adapter	Stainless	Reusable	14, 18, 21G	Single Angle (2 cm)

Probe	Biopsy					
	Model Name	Components	Adapter Material	Reusable/ Disposable	Needle Gauge	Multi Angle
CV1-8A	BP-KIT-059 [BP-KIT-059-NG]	Biopsy Adapter	Acetal Copolymer	Reusable	14, 16, 18, 20, 22, 25G	1.969, 3.937 (in)
		Needle Guide		Disposable		
LA4-18B	BP-KIT-069	Biopsy Adapter	Acetal Copolymer	Reusable	14–23G (Except 19G)	1.5, 2.5, 4 (cm)
		Needle Guide		Disposable		
PA4-12B	BP-KIT-067	Biopsy Adapter	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	1.5, 2, 3, 4 (cm)
		Needle Guide		Disposable		
EA2-11B	BP-KIT-065	Needle Guide	Stainless	Reusable	16–18	2°
	BP-KIT-066		ABS	Disposable		
CF4-9	BP-KIT-083 [BP-KIT-083-NG]	Bracket	Acetal Copolymer	Reusable	14, 15, 16, 17, 18, 20, 21, 22, 23G, 8.5FR	3, 6.5, 10 (cm)

Cleaning and Disinfecting the Biopsy Kit

Reusable Biopsy adapters must be cleaned and disinfected after each use. Disposable biopsy adapters and disposable biopsy kit parts must be disposed of as medical waste after each use. Cleaning is an important procedure that must be carried out before disinfecting or sterilizing reusable biopsy adapters.

Read the biopsy kit user manual carefully before cleaning and disinfecting.



WARNING: Always use protective eyewear and gloves when cleaning and disinfecting biopsy kit.



CAUTION: Disinfect to reduce pathogens to the level of 10^{-6} .

» » Cleaning Biopsy Kit

1. After use, the biopsy kit is removed from the probe.
2. Disassemble the biopsy kit into its component parts and discard the disposable parts in the clinical waste bin.
3. Rinse with water to remove excess dust from the device.
4. Prepare an enzymatic solution (e.g. Enzol), following the manufacturer's instructions for proper dilution and immersion duration. Immerse the parts in the detergent and allow soaking for the prescribed time.
5. Brush the parts thoroughly using a soft bristle brush. Clean the lumen using an appropriate sized brush. If any visible parts remain, continue brushing until clean.
6. Rinse the device thoroughly with water and dry the components carefully. Dispose of the used drying cloths appropriately according to the local medical waste regulations.

»» ⌘ Disinfecting Biopsy Kit

Refer to the user instructions of the disinfectant for details of proper storage, use, and disposal of the disinfectant.



CAUTION:

- ▶ Always refer to the biopsy kit user manual for the latest information on the supported methods and disinfectants.
- ▶ A stainless steel biopsy adapter is reusable; a plastic biopsy adapter may be reusable. A plastic biopsy needle guide is in general disposable.
- ▶ Plastic biopsy kits can only be disinfected by using a chemically compatible cold-disinfectant, either manually or with a medical washer-disinfector. Do not use an autoclave, gas or radiation.

1. Re-assemble the reusable parts of the biopsy adapter, if applicable.
2. Disinfect the biopsy adapter for the duration and at the temperature as specified in the user instructions for the adapter.
3. After disinfection, follow the proper post-disinfection procedure for the disinfection method used. (Please refer to the user manuals for the disinfectant, disinfecting equipment, etc.)
4. Inspect the components for damage such as cracks, rust, or breakage; and if damage is found, stop using the device and contact the Samsung Medison Customer Support Department.
5. Properly pack the disinfected adapter and label it according to the local regulations.

»» ⌘ Sterilizing Stainless Steel Biopsy Kit

1. Re-assemble the reusable parts of the stainless steel biopsy adapter, if applicable.
2. Sterilize the stainless steel adapter by using steam (autoclave) or gas (Ethylene Oxide).
3. After sterilization, follow the proper post-sterilization procedure for the sterilization method used. (Please refer to the instructions for the sterilization equipment.)
4. Inspect the components for damage such as cracks, rust, or breakage; and if damage is found, stop using the device and contact the Samsung Medison Customer Support Department.
5. Properly pack the sterilized adapter and label it according to the local regulations.

Starting Modes of Operation

&/? <i>System Power</i>	6-3
Powering On	6-3
Powering Off.....	6-4
&/? <i>Probes & Applications</i>	6-5
Selecting Probes and Applications	6-6
Managing Presets	6-6
&/? <i>Patient Information</i>	6-9
Patient Information Entry	6-11
Changing Measurements	6-29
Worklist Search.....	6-33
Searching for Patient Information	6-35
DICOM Q/R.....	6-42

System Power

Boot up the system for use.



CAUTION:

- ▶ Installation and initial operation of the product must be performed by trained professionals only.
- ▶ To avoid pressing buttons on the control panel or to make sure none of the buttons are being pressed while the system is booting, connect the probe and all the peripheral devices to be used before powering up the system.
- ▶ Make sure to connect the probes and peripheral devices that will be used before powering on the system. If you attempt to connect them during system use, it may lead to patient injury or irreparable damage to the console.



NOTE: Please check all product-related preventive safety measures before use.

Powering On

Press the **On/Off** button when the power is off. Booting begins, and the product logo appears on the screen. When booting is completed, the 2D mode screen appears in End Exam status.



CAUTION: Before starting the diagnosis, you must register the patient information.



NOTE:

- ▶ The product should turn on about 10 seconds after the power switch at the back of the product is turned On.
- ▶ While booting is in progress, do not press the buttons on the control panel, and make sure that the buttons are not being pressed. It may cause the system to malfunction.
- ▶ If you turn on the power after turning it off suddenly, the system may turn on and off momentarily. This is one of the characteristics of the Intel PC main board, not a system error.

Powering Off

Press the **On/Off** button while using the system to initiate shutdown. To **Shut Down** the system, press Shut Down on the screen; to cancel, press **Cancel**.



CAUTION:

- ▶ When the system is not turned off, holding down the **On/Off** button for five seconds or longer forces the product to power off.
- ▶ If the ultrasound system is unplugged while working or turned off by forcibly shutting down, the files may get corrupted and it may result in data loss.
- ▶ To ensure that the product is safely cut off from electrical power, set the power switch at the rear of the product to Off position after using the product.
- ▶ Press the **On/Off** button twice to turn off the system. *Select Next Operation* window appears when you press the **On/Off** button once. The system will turn off if you press it again.



NOTE: Once turned off, please wait at least 15 seconds before turning it back on.

⚡ Probes & Applications

Before scanning, select a probe, an application, and a preset.

Press the **Probe** button on the touchscreen to display the *Probe Selection* screen. On this screen, you can select or change the probe, application, and preset.

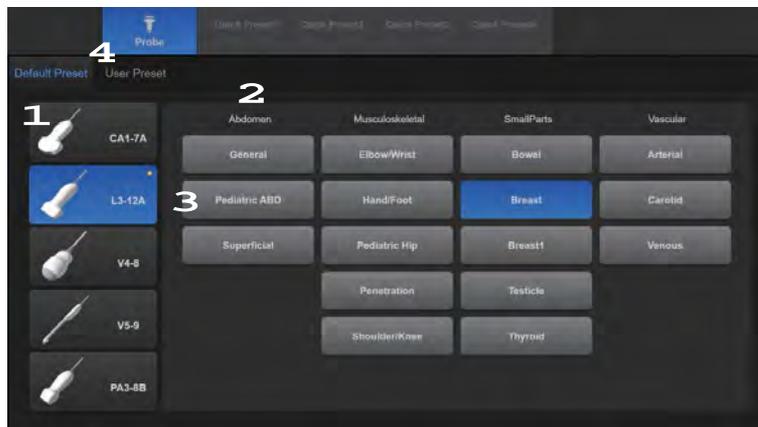
Press the **Probe** button once more or press the **Exit** button on the control panel to close the *Probe* screen without applying the changes.



CAUTION: Refer to 'Chapter 5. Probes' for more information on probes, applications, and presets that are supported by the product.

»» ⌘ Probe Selection Screen

The *Probe Selection* screen consists of the following:



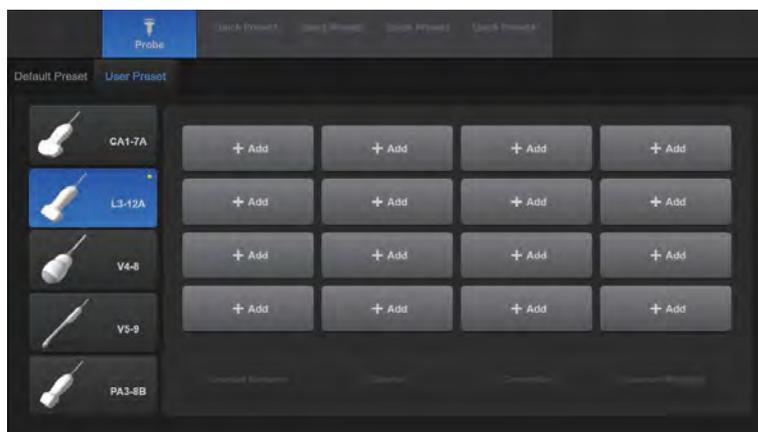
[Figure 6.1 Probe Selection – Touchscreen]

- ▶ Probe List (1): Displays a list of probes currently connected to the system.
- ▶ Application List: Displays the applications (2) that are supported by the probe you have selected as well as the presets (3) for the applications.
- ▶ Preset Tab (4): You may select presets by using this tab. It offers Default Presets, which are provided by the system by default, and User Presets, which the user may configure as desired.

Selecting Probes and Applications

Make selections in the following order: Probe → Application → Preset. The Probe Selection screen shows the currently selected probe and preset in blue. When you press the preset, the system automatically applies the settings and then switches to Operation mode. The selected probe and preset are shown in the Title area of the monitor.

Managing Presets



[Figure 6.2 User Preset – Touchscreen]

▶▶ **Adding a Preset**

Add the application and the preset you are currently using as a User Preset.

1. Press the **User Preset** tab on the touchscreen to switch to the *User Preset* screen.
2. Press **+Add**. The *Named* window will open on the monitor screen.
3. Enter a name for the *User Preset* and press **OK**. To cancel, press **Cancel**.
4. The User Preset is added to the *User Preset* screen.

»» ⌘ **Renaming a Preset**

Only User Presets may be renamed. Note that a User Preset cannot be renamed while it is in use.

1. In the *User Preset* screen, press **Rename** on the touchscreen.
2. Select the preset you wish to rename from the User Preset List. The *Rename Preset* window will open on the monitor screen.
3. Enter a name for the preset and press **OK**. To cancel, press **Cancel**.

»» ⌘ **Deleting a Preset**

Only User Presets may be deleted.

1. In the *User Preset* screen, press **Delete** on the touchscreen.
2. Select the preset you wish to delete from the User Preset List. A confirmation message will be displayed.
3. To delete, press **OK**. To cancel, press **Cancel**.

»» ⌘ **Overwriting a Preset**

You may save the current probe settings to the selected User Preset.

1. In the *User Preset* screen, press **Overwrite** on the touchscreen.
2. Select a preset from the User Preset List. A confirmation message will be displayed.
3. To overwrite the preset, press **OK**. The 'Save Success' message will be displayed on the monitor screen when saving is completed. To cancel, press **Cancel**.

Exporting/Importing a Preset

Save a User Preset to an external storage device, or copy a saved User Preset to the system.



NOTE: This feature is only available when a flash memory drive is plugged into the USB port.

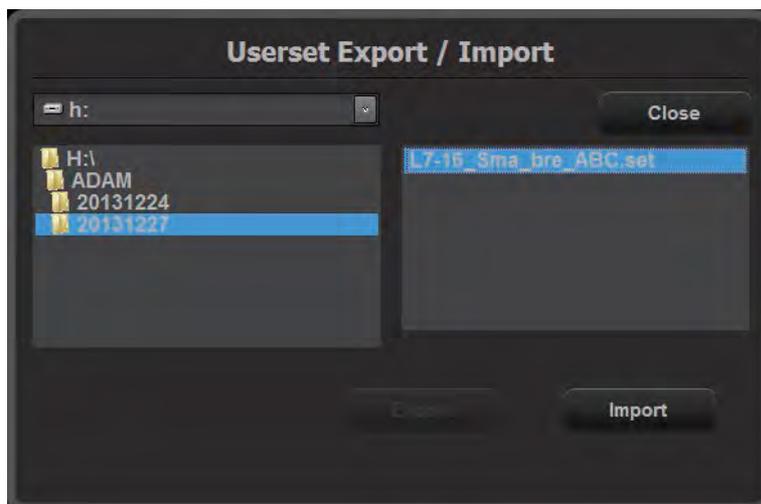
Exporting a Preset

Only the User Preset you are currently using can be exported.

1. In the *User Preset* screen, press **Userset Manager** on the touchscreen.
2. Press the User Preset that you wish to save. The *Userset Export/Import* window will open on the monitor screen.
3. To save to a USB flash drive, press **Export**. To close the screen, press **Close**.

Importing a Preset

1. In the *User Presets* screen, press **Userset Manager** on the touchscreen.
2. Select the preset you wish to save from the touchscreen. The *Userset Export/Import* window will open on the monitor screen.
3. To import the User Preset that is saved on a USB flash drive onto the system, press **Import**. To close the screen, press **Close**.



[Figure 6.3 Userset Export/Import]

⦿ Patient Information

Press the **Patient** button on the touchscreen to display the *Patient Information* screen. Here, you can enter, search, edit, and generally manage the patient information.



NOTE: The ID and name fields are required.

Once you have finished entering the patient information, press the **OK** button on the monitor or press the **OK** button the touchscreen to exit. Press **Cancel** to cancel. Alternatively, you can press the **Patient** button on the touchscreen once more or press the **Exit** button on the control panel.

»» ⌘ Patient Information Screen

Use the trackball and the **Set** button to select the desired entry field. Press the touchscreen button if you wish to enter information by using the touchscreen.

Press **OK** on the screen to save and finish entering. To cancel, press the **Cancel** or press the **Cancel** on the touchscreen. If you click **Register** on the screen when there is no exam, an exam will start and the *Patient Information* window will not close.

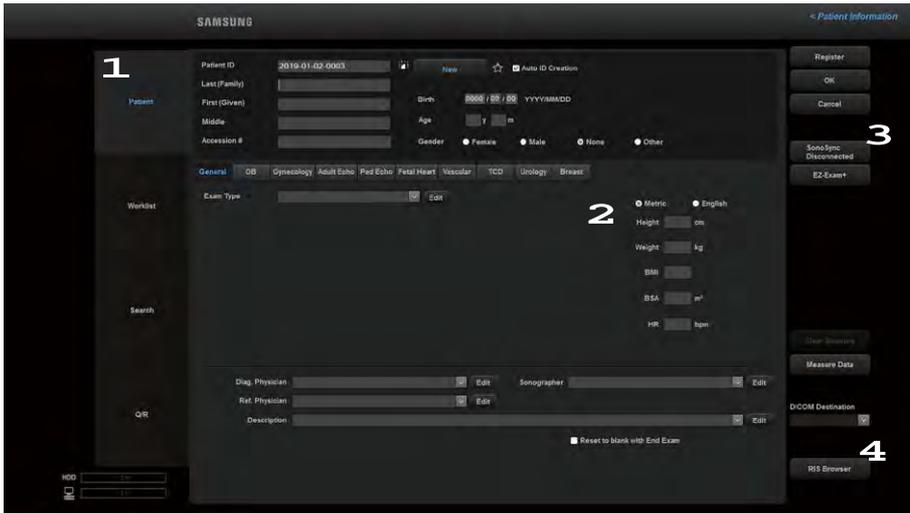
The *Patient Information* screen consists of two sections.

- 1 Page Tab: Pages related to patient information entry are shown as tabs.
- 2 Information: You may enter or manage patient information on this screen.
- 3 List of Functions: The functions that may be used in each page tab are displayed here as buttons.
- 4 DICOM Destination: When the User key or P1 and P2 keys are set to Send to DICOM, an image is sent to the DICOM Destination selected on the Patient tab.

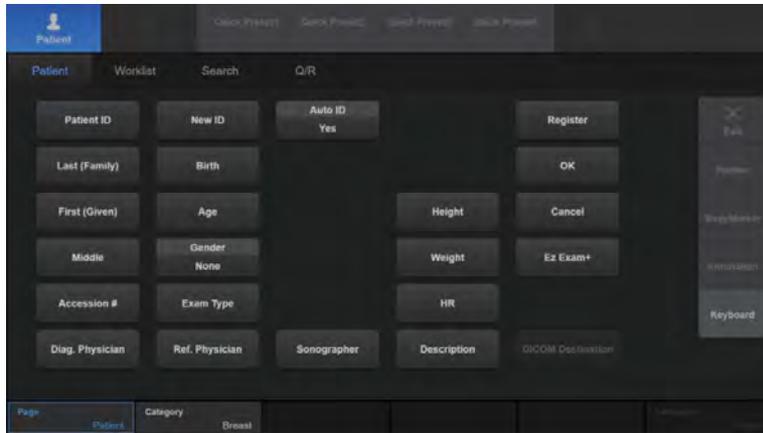


NOTE:

- ▶ You cannot change DICOM Destination when a patient ID is registered. To change the DICOM Destination, you should finish the current diagnosis by pressing the **End Exam** button on the touchscreen.
- ▶ For more information on adding, deleting, or modifying DICOM Destination, please refer to 'Chapter 3. Utilities', 'DICOM Setup'.



[Figure 6.4 Patient Information]



[Figure 6.5 Patient Information – Touchscreen]

Patient Information Entry

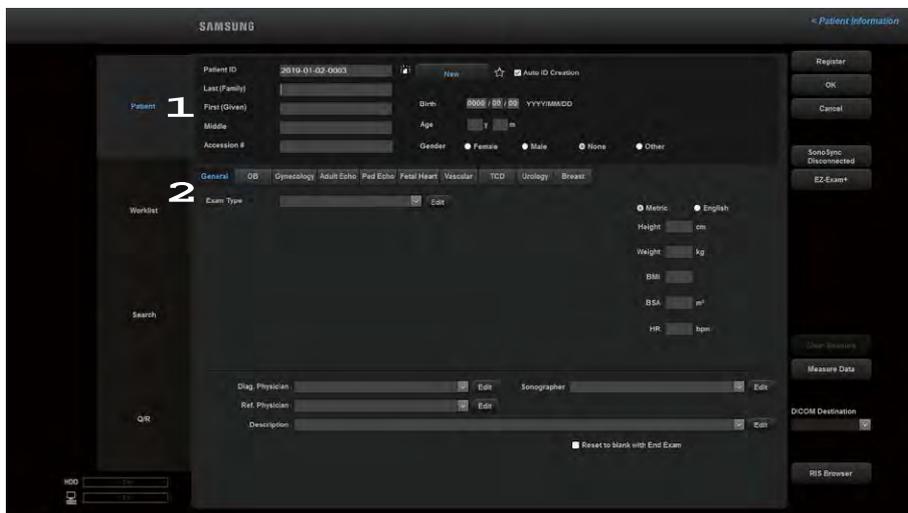
From the *Patient Information* screen, press the **Patient** tab. Alternatively, use the touchscreen's **Page** dial-button to select **Patient**.

Enter patient information on the *Study Information* and *Measure Data* screens.

» Study Information

The *Study Information* consists of the following:

- 1 Basic Patient Information: Enter or edit ID, name, age, gender, and other types of basic patient information.
- 2 Application Information: Add or edit required information for individual applications. To select an application, select the corresponding tab or use the touchscreen's **Category** dial-button.



[Figure 6.6 Patient Information]

■ SonoSync™

SonoSync™ is a real-time image-sharing solution that can be used on computers, smartphones, etc. by doctors or between doctors and sonographers to provide or receive a patient care guide and training. In addition, the voice chat and real-time marking functions are provided to ensure better communication, while the MultiVue function is also included to allow monitoring of multiple ultrasound images on a single screen.

* SonoSync™ is a function used for sharing images, not for making diagnoses.



NOTE: SonoSync™ is an optional feature of this product. Some functions, options or probes may not be used in certain countries.

- ▶ Streaming On/Off: Turn the SonoSync function On or Off.
- ▶ Server IP (or Domain): Enter the IP address/domain of the shared server.
- ▶ Server Port: Enter the port number of the shared server.
- ▶ Streaming Quality: Select a streaming quality.
- ▶ Streaming Area: Select a streaming area.
- ▶ Sound: Select a speaker and adjust the volume.
- ▶ MIC: Select a microphone.
- ▶ System Info.: The system information is displayed.
- ▶ User Name: Select one of the following as the username: Diag. Physician, Ref. Physician, or Operator (Sonographer).

■ EZ-Exam+

EZ-Exam+ is a macro function that saves your frequently used exams as a protocol and runs them together. EZ-Exam+ provides a basic protocol list for the user, based on the application list.

Press EZ-Exam+, select an application and a protocol, and then press **OK**. Start an exam, and it will automatically run in the EZ-Exam+ area on the left.

To end EZ-Exam+, click **Off** from EZ-Exam+ on the patient information screen. You may **Exit** by changing the EZ-Exam+ area to Preset Change, or by pressing the **End Exam** button.



NOTE:

- ▶ For more information on EZ-Exam+, refer to 'Chapter 3. Utilities'.
- ▶ EZ-Exam+ is not available in Auto IMT+, ElastoScan+, Panoramic, CEUS+, Post Curve, or Exam Restart (Review Exam) modes.

■ Clear Measurements

Clears all measured values previously entered.

■ Measure Data

Change the entered measurement data. The screen will switch to the *Measure Data* screen.



NOTE: Appears only when a patient ID has been selected.

■ DICOM Destination

When an exam ends, the saved images are sent to the DICOM server. Select a DICOM destination, and then press **Set**. You can choose a directory where the images should be saved, and also rename the group.

■ RIS Browser

Moves you to a web browser.



CAUTION:

- ▶ Please contact a service engineer for more information about the RIS Browser or URL settings.
- ▶ Samsung Medison shall not be responsible for any damage to the product if you have used RIS Browser for anything other than its intended purposes (e.g., accessing inappropriate websites).

» » Basic Patient Information Entry

■ ID

Enter a patient ID.

- ▶ Manual Entry: Enter in the ID field manually.
- ▶ Automatic Entry: Select **Auto ID Creation**, and press **New**. The icon will change to .

If you enter an ID that is identical to an existing ID, the icon next to the ID entry field will change to .

To set as a Favorite, press ★. To remove from Favorites, press the button once more so that ☆ is displayed.

■ Name

Enter the name of the patient. The name you enter will apply to the Title area and the Report.

- ▶ Last (Family): Enter the patient's last name.
- ▶ First (Given): Enter the patient's first name.
- ▶ Middle: Enter the patient's middle names if they have any.

■ Accession

When viewing the worklist for a patient via the DICOM server, this information is automatically displayed in the appropriate fields.

■ Representation

Specify how the names of Asian patients, including Korean, Chinese and Japanese are displayed.

- ▶ Roman: Type in Roman letters.
- ▶ Ideographic: Type in ideographic letters.
- ▶ Phonetic: Type in phonetic letters.



NOTE:

- ▶ This button appears on the screen only in a product that supports Asian patient names.
- ▶ For information on specifying the order or way in which names are displayed, refer to 'Screen Display Settings' in 'Chapter 3. Utilities'.

■ Birth

Enter the date, month, and year of birth for the patient using YYYY (year)/MM (month)/DD (date) format.

■ Age

Enter the patient's age in "yy-mm" format. When a birth date is specified in the **Birth** field, this information is automatically calculated and displayed.

■ Gender

Select the patient's gender.

»» General

Enter additional information. Information entered in **General** is applied to all application information entry screens.

■ Exam Type

Enter the type of the study performed. Use the **Edit** button to add, edit, or delete an Exam Type.

■ Metric/English

Allows you to select the unit. When the unit is changed, the entered number is automatically recalculated and displayed in the new unit of measurement.

- ▶ Select Metric to use centimeters (cm) for the height and kilograms (kg) for the weight.
- ▶ Select English to use feet (ft) and inches (in) for the height and pounds (lb) and ounces (oz) for the weight.

■ Height

Enter the patient's height.

■ Weight

Enter the patient's weight.

■ BMI

When the height and weight figures are entered, the patient's BMI (Body Mass Index) is automatically calculated and entered.

■ BSA

When the height and weight are entered, the BSA (Body Surface Area) is automatically calculated and displayed.

■ HR

Enter a heart rate.

■ Diag. Physician

Enter the name of the physician who diagnosed the patient. When there is more than one physician involved, you can use the combo button to make a selection. Use the **Edit** button to add, edit, or delete a Diag. Physician.

**Tips!**

Typing in Japanese or Chinese

You can enter Japanese or Chinese characters in the Diag. Physician, Ref. Physician, Sonographer, Description, and Indication fields.

■ Ref. Physician

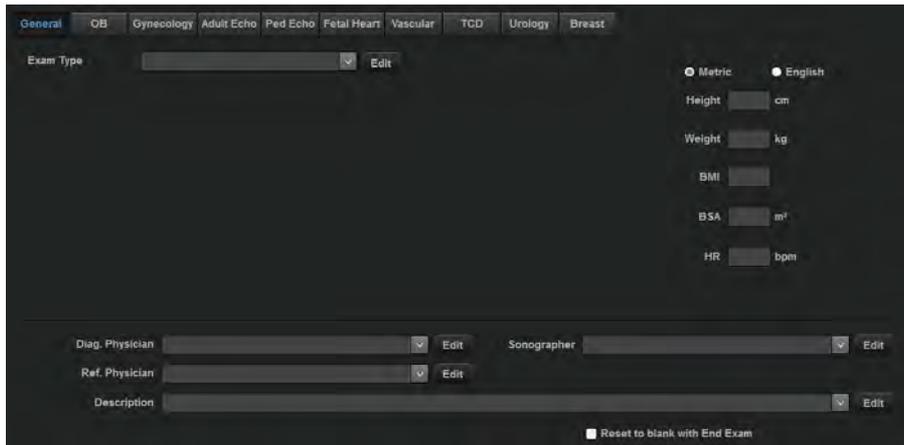
Enter the name of the referring physician. When there is more than one sonographer involved, you can use the combo button to make a selection. Use the **Edit** button to add, edit, or delete a Ref. Physician.

■ Sonographer

Enter the name of the sonographer who scanned the patient. When there is more than one sonographer involved, you can use the combo button to make a selection. Use the **Edit** button to add, edit, or delete a sonographer.

■ Description

Enter a description of the diagnosis. If a description is entered, it can be searched for and viewed under Description in SonoView. Use the **Edit** button to add, edit, or delete a Description.



The screenshot shows the 'General' tab of the SonoView interface. At the top, there are several tabs: General (selected), OB, Gynecology, Adult Echo, Ped Echo, Fetal Heart, Vascular, TGD, Urology, and Breast. Below the tabs, there is an 'Exam Type' dropdown menu with an 'Edit' button. To the right, there are radio buttons for 'Metric' (selected) and 'English'. Below these are input fields for 'Height' (cm), 'Weight' (kg), 'BMI', 'BSA' (m²), and 'HR' (bpm). At the bottom, there are three rows of input fields: 'Diag. Physician' with an 'Edit' button, 'Ref. Physician' with an 'Edit' button, and 'Description' with an 'Edit' button. A checkbox labeled 'Reset to blank with End Exam' is located at the bottom right of the form.

[Figure 6.7 General Information]

When the checkbox for “Return to blank with End Exam” is selected, the details saved in Dig. Physician, Ref. Physician, Sonographer, and Description are reset.

OB

Enter the obstetrical information.

■ LMP (Last Menstrual Period)

Indicates the patient's last menstrual period. Once the details have been entered in the correct format, the EDD (LMP) and GA (LMP) are automatically calculated and displayed.

- ▶ When "Display Calculated DOO (LMP)" is selected, DOO (LMP) is displayed on the screen.
- ▶ When "Display Calculated DOC (LMP)" is selected, DOC (LMP) is displayed on the screen.

■ Estab. Due Date (Established Due Date)

Enter EDD in the specified format. Once the details have been entered in the correct format, the GA (Estab.) is automatically calculated and displayed.

- ▶ When "Display Calculated LMP (Estab.)" is selected, LMP (Estab.) is displayed on the screen.
- ▶ When "Display LMP for Reference (write only)" is selected, you can enter LMP yourself.

■ GA (Gestational Age)

Indicates the gestational age of a patient. Once the details have been entered in the correct format, the EDD (GA) is automatically calculated and displayed.

- ▶ When "Display Calculated LMP (GA)" is selected, LMP (GA) is displayed on the screen.

■ DOC (Date of Conception)

Indicates the patient's date of conception. Once the details are entered in the correct format, EDD (DOC) and GA (DOC) are automatically calculated and displayed.

- ▶ When "Display Calculated LMP (DOC)" is selected, LMP (DOC) is displayed on the screen.

■ DOO (Date of Ovulation)

Indicates the date of expected ovulation. Once the details are entered in the correct format, EDD (DOO) and GA (DOO) are automatically calculated and displayed.

Tips!

Calculating LMP and EDD (LMP) with Ovul. Date

The following formulae are used:

- ▶ $LMP = \text{Ovul. Date} - 14$
- ▶ $EDD = (280 - 14) + \text{Ovul. Date}$

Tips!

Calculating EDD (LMP)/EDD (GA)

EDD can be calculated by entering LMP or GA.

- ▶ When LMP is entered: GA (LMP) and EDD (LMP) are automatically calculated and displayed on the screen.
- ▶ When GA is entered: LMP (GA) and EDD (GA) are automatically calculated and displayed on the screen.

Tips!

When EDD (LMP) is entered, EDD (LMP) changes to EDD. And LMP (EDD) and GA (EDD) are automatically calculated and displayed on the screen.



NOTE: Values that have been calculated and entered cannot be changed.

■ Number of Fetuses

Enter the number of fetuses. Up to four may be entered.

■ Day of Cycle

Enter a menstrual period in number of days (dd).

■ Ectopic

Enter the number of ectopic pregnancies.

■ Gravida

Enter the number of pregnancies.

■ **Aborta**

Enter the number of miscarriages.

■ **Para**

Enter the number of deliveries.

■ **New of Pregnancy**

Deletes the patient’s existing OB information.

[Figure 6.8 OB Information]



Gynecology

Enter the gynecological information.



NOTE:

- ▶ In the GYN information input screen, even if the Ovul. Date is entered, LMP and EDD will not be calculated automatically.
- ▶ For other gynecological information, refer to the OB section.

The screenshot shows a software interface for entering gynecological information. At the top, there are tabs for different medical specialties: General, OB, Gynecology (selected), Adult Echo, Ped Echo, Fetal Heart, Vascular, TCD, Urology, and Breast. Below the tabs, the 'Exam Type' is selected from a dropdown menu, with an 'Edit' button next to it. On the right side, there are radio buttons for 'Metric' (selected) and 'English'. The main area contains several input fields: 'LMP' (Last Menstrual Period) with a date format of '0000 / 00 / 00', 'Ovul. Date' (Ovulation Date) with a date format of '0000 / 00 / 00', 'Day of Cycle', 'Ectopic', 'Gravida', 'Aborta', and 'Para'. On the right side, there are input fields for 'Height' (cm), 'Weight' (kg), 'BMI', 'BSA' (m²), 'HR' (bpm), and 'Serum CA-125' (U/ml). At the bottom, there are dropdown menus for 'Diag. Physician', 'Ref. Physician', and 'Description', each with an 'Edit' button. A 'Sonographer' dropdown menu is also present. A checkbox at the bottom right is labeled 'Reset to blank with End Exam'.

[Figure 6.9 Gynecology Information]

▶▶ **Adult Echo**

Enter cardiologic information.

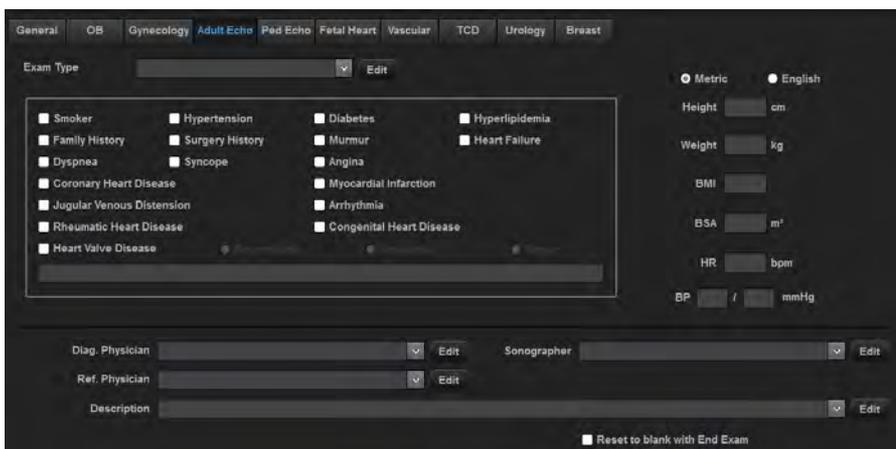
■ **BP**

Enter systolic/diastolic pressure (blood pressure).

■ **Additional Information**

Select the applicable checkboxes.

Smoker	Hypertension
Diabetes	Hyperlipidemia
Family History	Surgery History
Murmur	Heart Failure
Coronary Heart Disease	Angina
Myocardial Infarction	Jugular Venous Distension
Dyspnea	Syncope
Arrhythmia	Rheumatic Heart Disease
Congenital Heart Disease	Heart Valve Disease



[Figure 6.10 Adult Echo Information]

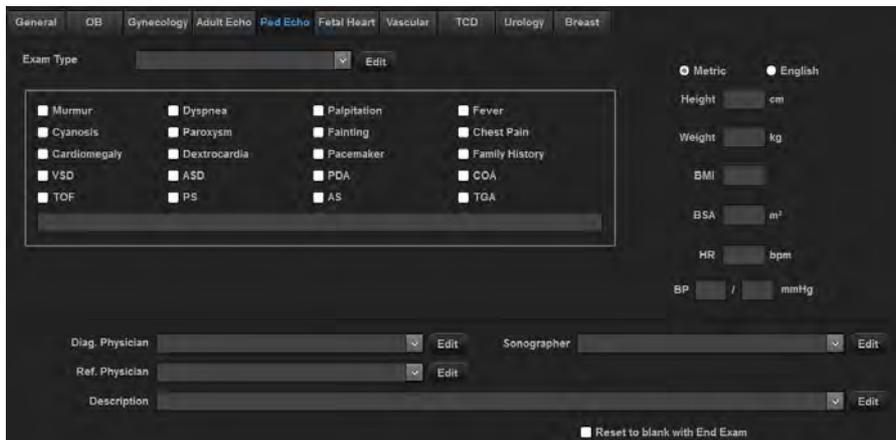
» **Ped Echo**

Enter pediatric cardiac information.

■ **Additional Information**

Select the applicable checkboxes.

Murmur	Dyspnea
Palpitation	Fever
Cyanosis	Paroxysm
Fainting	Chest Pain
Cardiomegaly	Dextrocardia
Pacemaker	Family History
VSD (Ventricular Septal Defect)	ASD (Atrial Septal Defect)
PDA (Patent Ductus Arteriosus)	COA (Coarctation of the Aorta)
TOF (Tetralogy of Fallot)	PS (Pulmonic Stenosis)
AS (Aortic Stenosis)	TGA (Transposition of the Great Arteries)



[Figure 6.11 Pediatric Echo Information]

» » Fetal Heart

Enter additional information about the fetal heart. Entry is identical to the relevant information in the obstetrical section.

[Figure 6.12 Fetal Heart Information]

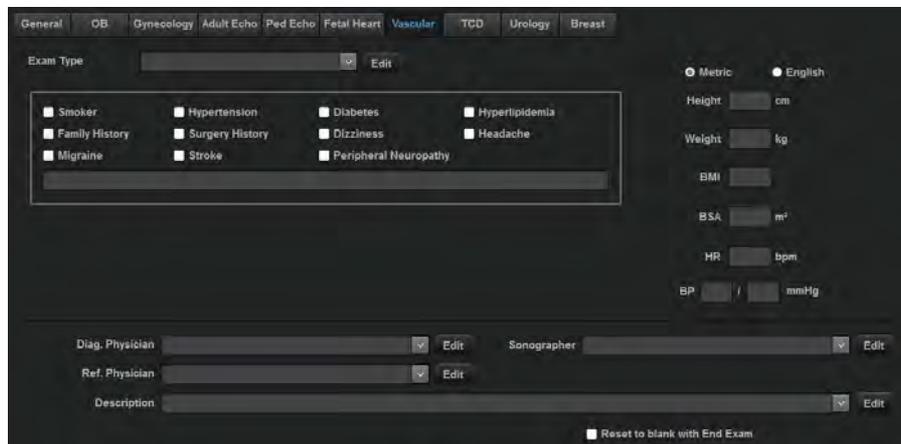
»» **Vascular**

Enter vascular information.

■ **Additional Information**

Select the applicable checkboxes.

Smoker	Hypertension
Diabetes	Hyperlipidemia
Family History	Surgery History
Dizziness	Headache
Migraine	Stroke
Peripheral Neuropathy	



[Figure 6.13 Vascular Information]

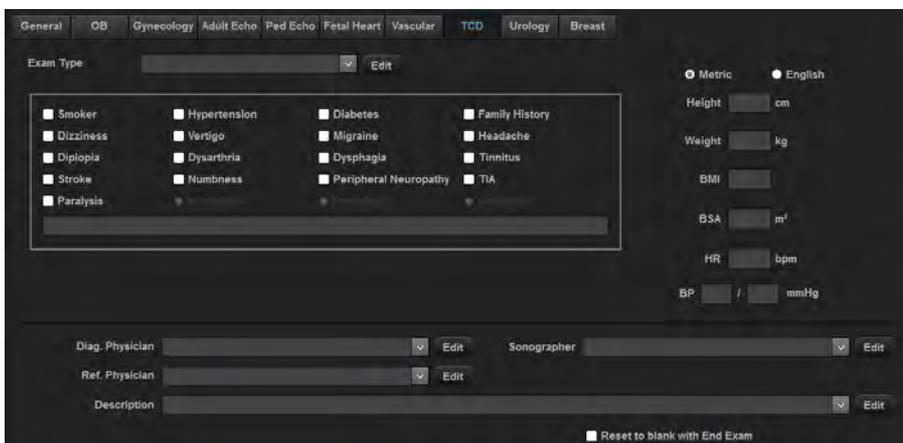
» **TCD**

Enter additional information for Transcranial Doppler (TCD).

■ **Additional Information**

Select the applicable checkboxes.

Smoker	Hypertension
Diabetes	Family History
Dizziness	Vertigo
Migraine	Headache
Diplopia	Dysarthria
Dysphagia	Tinnitus
Stroke	Peripheral Neuropathy
TIA	Numbness
Paralysis	



[Figure 6.14 TCD Information]

» Urology

Enter urological information.

■ PSA

Enter the Prostate Specific Antigen (PSA) value.

The screenshot shows a software interface for entering patient information. At the top, there is a navigation bar with tabs for 'General', 'OB', 'Gynecology', 'Adult Echo', 'Ped Echo', 'Fetal Heart', 'Vascular', 'TCD', 'Urology', and 'Breast'. The 'Urology' tab is selected. Below the navigation bar, there is a section for 'Exam Type' with a dropdown menu and an 'Edit' button. To the right of this section, there are two radio buttons for 'Metric' and 'English'. Below these are several input fields with units: 'Height' (cm), 'Weight' (kg), 'BMI', 'BSA' (m²), 'HR' (bpm), and 'PSA' (ng/ml). At the bottom of the form, there are three rows of input fields with 'Edit' buttons: 'Diag. Physician', 'Ref. Physician', and 'Description'. A checkbox labeled 'Reset to blank with End Exam' is located at the bottom right of the form.

[Figure 6.15 Urology Information]

» **Breast**

Enter the breast-related information.

■ **Breast Feeding Experience**

Enter the patient’s breastfeeding experience.

■ **HRT Start Year**

Enter the year when the patient started Hormone Replacement Therapy (HRT).

Among Breast Biopsy, Breast Surgery, Palpable Mass, Nipple Discharge, and Pain, the relevant item is displayed on the Left/Right side.

■ **Cancer History**

Enter the patient’s medical history.

■ **Mammogram Date**

Enter the mammogram date.

■ **Family History of Breast Cancer**

Enter the age at which the patient’s family member was diagnosed with breast cancer.



[Figure 6.16 Breast Information]

Changing Measurements

From the *Study Information* screen, press the **Measure Data** button.



NOTE: Appears only when a patient ID has been selected.



Insert Measure Data Screen

Click the **Insert** tab on the screen. You can enter the existing obstetrical measurements.



[Figure 6.17 Insert Measure Data]

■ Exam. Date

Enter the measurement date.

■ Fetus

If there are multiple fetuses, identify each one. Up to four fetuses (A, B, C, D) can be specified.

■ Exam No.

Up to eight exam numbers can be entered for each date. The Exam number is displayed at the bottom of the screen.

■ **New Data**

Cancel all measurement data entered for all exams and enter new measurement data.

■ **Clear**

Cancel entering the measurement data.

■ **Insert**

Complete entering the measurement data.

■ **Page Browse**

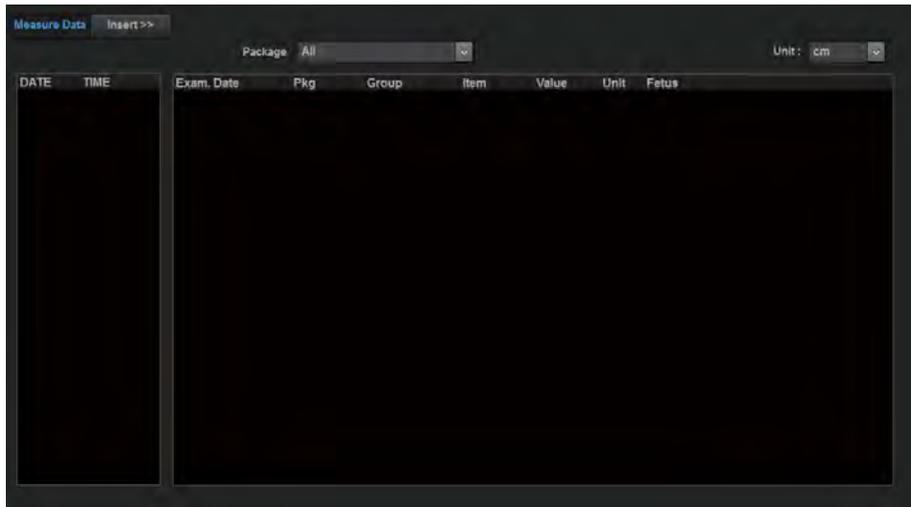
Use the >> or << button.

■ **Study Information**

Loads application-specific *Patient Information* screen.

»» View Measure Data Screen

Click the **View** tab on the screen. You can view the measurements on the screen, or save them as an Excel file. The * symbol next to Date indicates that the data is the current measurement data.



[Figure 6.18 View Measure Data]

■ Package

Select a measurement package to display on the screen.

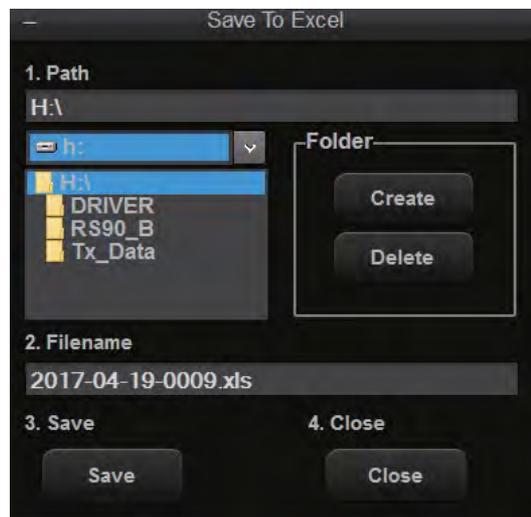
■ Refresh

Update the measurement data. Newly calculated measurements, or the measurements entered, are added.

■ Save

The *Save To Excel* window appears, allowing you to save information on the screen in an Excel file.

1. Designate the path.
 - ▶ To create a folder, select **Create**.
 - ▶ To delete a folder, select **Delete**.
2. Enter the file name. By default, the Excel file name is set to the measurement ID.
3. Select **Save** to finish. Press **Close** to cancel.



[Figure 6.19 Save to Excel]

Worklist Search

On the *Patient Information* screen, select the **Worklist** tab. Alternatively, use the touchscreen's **Page** dial-button to select **Worklist**. Perform a search by connecting to the DICOM Modality Worklist server in the hospital network.

■ Worklist Server

Use the tab to select the Worklist Server to search.



NOTE: A Worklist search is available only when DICOM is enabled. The Worklist Server can be specified at Utility > Setup > Connectivity > DICOM. Refer to the 'Setting DICOM' section of 'Chapter 3. Utilities'.



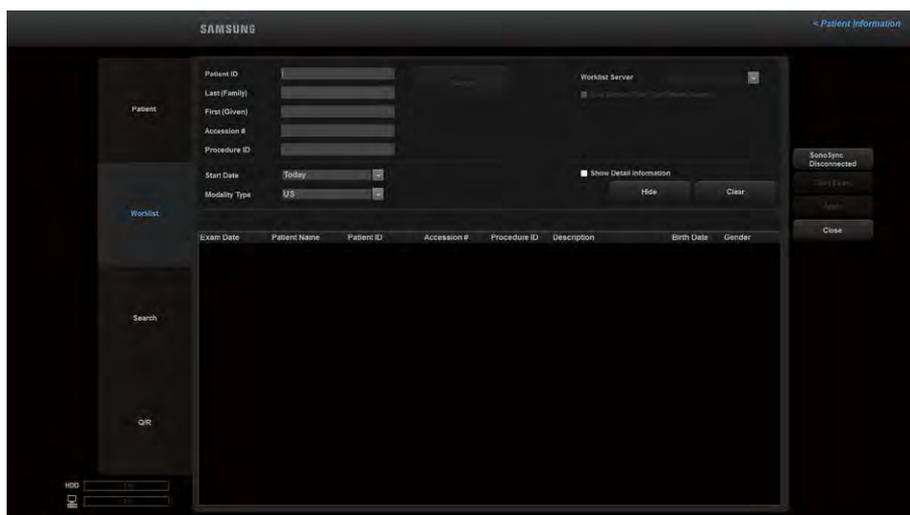
NOTE: Use the **Hide** or **Show** button to hide or show the Worklist search results. The default is **Hide**.

1. You can enter a Patient ID, Last (Family) Name, First (Given) Name, Accession #, Procedure ID, Start Date, or Modality Type as a search condition. When you click Search, the list of patients who match the search criteria will be displayed.



Clicking items such as Date/Time or Patient Name sorts entries into alphabetical or numerical order for the selected criteria.

2. Select a patient list and press on the **Apply** button. This applies the selected patient information to the system. Pressing on the **Start Exam** button applies the patient information to the system and switches the system to Scan Mode.



[Figure 6.20 Worklist]

■ Use Server Filter for Patient Search

When the checkbox is selected, filtered data with the patient-related search criteria is transferred at request of a worklist. When it is not selected, data that does not reflect the patient-related search criteria is transferred.

■ Use Specific Character Set (008, 0005)

Decide whether you will use the current character set as a query condition when you search for a worklist.

■ Show Detail Information

When this checkbox is selected, the **Worklist Information** of the chosen data is displayed.

Searching for Patient Information

On the *Patient Information* screen, select the **Search** tab. Alternatively, use the touchscreen's **Page** dial-button to select **Search**. Search through the patient information stored in the system.



[Figure 6.21 Search]

1. In **Search By**, select a search condition.
Select **Patient ID** to search using a **Patient ID** or **Patient Name** to search using a patient name.
2. Select a drive under **Drive**. Information about the selected drive is shown under **Current Information**.
3. After entering the required ID or name in the search box, click **Search**. The list of patients who match the search criteria will be displayed.

To select multiple Exam Lists at once, select multiple patient lists using the trackball while pressing the Shift key. (However, the Screen Keyboard is not supported.)

Tips!

- ▶ Search results will be more accurate when you enter additional information such as Favorite or not (i.e., ★ or ☆), Exam Date, Period, Type, Category, etc.
- ▶ Selecting Type will display the matching Operation mode images from the exams you have searched in the thumbnail list at the bottom of the screen.

»» Exam List

Displays a list of exams returned from **Search**. In addition to patient ID, name, age, and gender, the exam list contains the following information:

- ▶ Exam Date: Exam date
- ▶ Images: Number of images on record
- ▶ Measurements: Measurement status
- ▶ SR: Structured Report status
- ▶ SE: Stress Echo exam status
- ▶ SC: The transfer status of the exam (Storage Commit)
- ▶ Q: Strain Test
- ▶ Lock Status: Lock status
- ▶ Favorite: Whether it is set as a Favorite or not
- ▶ Description: Notes related to diagnosis



When you press one of the fields, such as Patient ID and Name, the data is sorted by the alphabetic or numeric order of the selected field.

■ Delete Patient List

This feature allows the user to delete data containing patient information only without exam information. However, this feature is enabled only when the Drive is HDD.

»» Viewing Exam

Select an exam by using the trackball and the **Set** button, and press **SonoView** in the list of functions. Switch to the *SonoView* screen.



NOTE: For instructions on using SonoView, refer to 'Chapter 10. Image Managements'.

»» ⌘ Deleting Exam

Use the trackball and the **Set** button to select an exam, and then press **Delete** in the list of functions. All images included in the exam will be deleted. Note that the exam that is currently in session and any locked exams cannot be deleted.

Select either to delete only the image or to delete only the exam. An exam without Measurement Data will not be displayed on the screen if only the image is deleted.



NOTE: Once deleted, exams cannot be recovered.

»» ⌘ Sending Exams via DICOM

You can send selected exams via the DICOM network.



NOTE: Before using this feature, make sure that DICOM is properly configured. For instructions on configuring DICOM, refer to 'Chapter 3. Utilities'.

Perform the following steps to send the selected exam via DICOM:

1. Select an exam, and click **Send** in the list of functions. The *DICOM Storage* window will open.
2. Select the alias you wish to transmit. You can select images under Stored Images and reports under Storage SR. You can select multiple servers at the same time by selecting the Multi-Select checkbox.
3. Click **Transfer**. The transfer will be started and its progress (%) will be displayed. Click **Close** to cancel. Click **Test**, before sending the exam, to check the DICOM's connection with the server.
4. When you select the 'Close the window on successful send' checkbox, specify whether you want to close the window automatically after the transfer.

▶▶ Printing Exams via DICOM



NOTE: Before using this feature, make sure that DICOM is properly configured. For instructions on configuring DICOM, refer to the Set DICOM section of 'Chapter 3. Utilities'.

Perform the following steps to print the selected exam via DICOM:

1. Select an exam, and click **Print** in the list of functions. The *DICOM Printer* window will open.
2. You can select multiple servers at the same time by selecting the Multi-Select checkbox.
3. Click **Transfer**. The transfer will be started and its progress (%) will be displayed. Click **Close** to cancel. Click **Test**, before sending the exam, to check the DICOM's connection with the server.
4. When you select the 'Close the window on successful send' checkbox, specify whether you want to close the window automatically after the transfer.

»» Exam Export

Perform the following steps to export the selected exam to an external storage device:

1. Select an exam, and click **Export** in the list of functions. The *Image Export* window will open.
2. In **Drive**, select the device on which the exam will be saved. You can select CD-ROM, or flash memory.
3. In **File Name**, enter the file name. The same file name is given to all images of an exam. When an exam contains multiple images, a serial number is automatically added to the end of the file name.
4. In **File Format**, select the format in which the files will be saved. You can select BMP, JPEG, TIFF, or DICOM.
5. In **Export Option**, select the options to apply to the files. You can select multiple options.
 - ▶ 3D Volume Data: Export the 3D volume data together with the image.
 - ▶ 2D Cine: Export the stored Cine images after converting them to video files (AVI files).
 - ▶ 3D and Live Cine: Export 3D Cine and Live Cine images after converting them to video files (AVI files).
 - ▶ Hide Patient Information: Export images from which the patient ID and name have been deleted.
 - ▶ Multi Folder: Create a folder using the date the image was created, and then save images by date.
6. In **Directories**, select the location in which the exam will be saved. To create a new directory, click  and enter the name. To delete a directory, select it and click . In **Files**, the files currently saved in the selected directory are displayed.

7. Click **Export** to begin exporting. Click **Close** to cancel.



[Figure 6.22 Image Export]

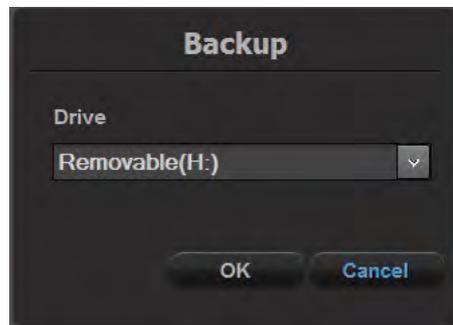
»» ⌘ Exam Backup

You can backup the selected exams on an external storage device.



NOTE: USB devices with anti-virus software installed are not supported.

1. Insert a storage medium for backups. CD-ROM or flash memory can be used.
2. Select exam(s) and then press **Backup** in the list of functions.
3. A *Confirmation* window will appear asking whether to continue the backup. Click **Yes** to continue. Click **No** to cancel.
4. The *Backup* window will appear. Under **Drive**, select the media where the selected exams will be saved.
5. Click **OK** to start the backup. Click **Cancel** to cancel.



[Figure 6.23 Exam Backup]

»» ⌘ Executing Exam

Select an exam, and click **Review Exam** in the list of functions. The selected exam will be displayed on the screen, and the system will switch to Scan Mode. In the User Information area, the first Exam Reviewed date for the exam will be displayed.

»» ⌘ Restarting an Exam

Select an exam, and click **Continue Exam** in the list of functions. You can update the current scan for exams that have been conducted in the last 24 hours, which is convenient.



NOTE: Only exams from the last 24 hours are displayed in the list of functions.

DICOM Q/R

»» Source

■ Server

One or more servers should be registered in the DICOM Q/R settings.



NOTE: Before using this feature, make sure that DICOM Q/R is properly configured. To configure DICOM Q/R, please refer to 'Chapter 3. Utilities', 'Set DICOM'. There is no limit on the number of registered DICOM Q/R servers.

■ Drive

ODD or USB Memory

■ Drive Import

The *Import Explorer* window is available. This is disabled when the Source is Server, and enabled when it is Drive.

»» Run DICOM Q/R

Retrieve an image from the selected server or drive in the following order:

1. After entering the ID in the *Patient* window, register or start an exam. Go to the DICOM Q/R tab.
2. Select the server or drive you want to use from 'Source'. The study for the Patient ID will be automatically searched.
3. Click the **Search** button to select the drive. Clicking the **Drive Import** button opens the *Drive Import* window. You can import or delete images in the *Drive Import* window. Note that the **Search** button will be activated only if the Patient ID has been registered when selecting a server.
 - ▶ Search by entering Patient ID, Accession #, or Last (Family).
 - ▶ Alternatively, search by selecting the modality you wish to find. You may select MR, CT, Mammo, US, DR, or PET for the modality.
 - ▶ You may search by designating a period. Select Period. Select Today, 1Week, 1Month, 3Months, 6Months, 1Year, or Exam Date. Select Exam Date to view a calendar from which you can select a date. After setting the date, press **OK** or press **Cancel** to cancel.
4. Click the **Search** button to search.
5. Patient ID, Patient Name, Modality, Exam Date, Description, and Series Count will appear on the Study List search result.
6. Up to three studies can be selected from the Study List. Selecting more than three studies will deselect the initially selected study.
7. Select a study on the Study List to search series. Modality, Exam Date, Description, Series #, Image Count, and Status will appear on the Series List search result.
8. After searching the series, select the Series you wish to retrieve. You may select or deselect up to 10 series by using **Select All**. Click **Retrieve**. If more than 10 series are selected, the first series will be deselected.

» Data Manager

1. Click **Retrieve** to display the *Retrieved Data* window.
2. Select the Data Manager tab under Retrieved Data.
3. In the *Data Manager* window, select the series by using the checkbox. Click **Assign** to add the selected item.

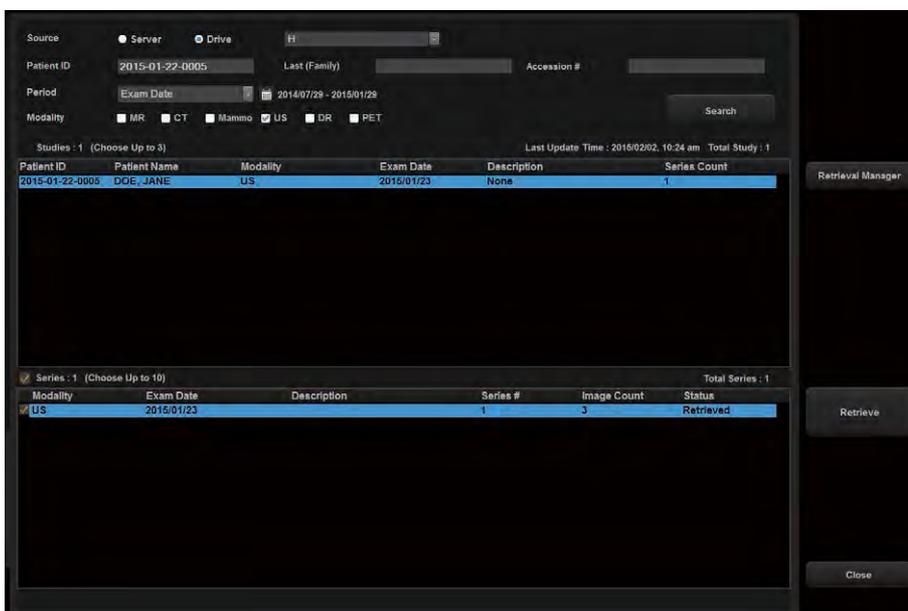


NOTE: If you have not started the diagnosis, select the series on the *Data Manager* window by using the checkbox and click **Delete** to delete. However, an exam locked by using the checkbox cannot be deleted.

4. Select the **Patient ID** tab to return to the *Retrieved Data* window.
5. Select an image to display it in the *Preview* window.
6. Click **Compare** to open the *Dual* window, in which two images can be compared. The thumbnail changes to Series/US and the series appears.
7. Click **Close** on the screen.



NOTE: For more information, please refer to 'Chapter 3. Utilities', 'DICOM Compare'.



[Figure 6.24 DICOM Q/R]

Chapter 7

Modes of Operation

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∴ Information

Types of Modes

This product supports a variety of Operation modes including Basic Mode, Combined Mode, Multi-Image Mode, and 3D/4D Mode.

- ▶ **Basic Mode:** Consists of different modes, each of which has a specific usage and function. By default, 2D Mode is applied together with another mode.
- ▶ **Combined Mode:** Applies two or three Basic Modes for a single image at the same time. By default, 2D Mode is applied together with another mode; the image is studied on a single screen.
- ▶ **Multi-Image Mode:** The screen is divided into two (dual) or four (quad) sub screens, each of which is used to view an image. Since each sub screen can display a different image, it can be a very useful feature, allowing multilateral views of an organ.
- ▶ **3D/4D Mode:** Provides 3D stereographic images.

The types of Operation modes that are available with the product are shown below:

Mode	Type
Basic Mode	2D Mode Color Doppler Mode Power Doppler Mode M Mode PW Spectral Doppler Mode CW Spectral Doppler Mode TDI (Tissue Doppler Imaging) Mode TDW (Tissue Doppler Wave) Mode ElastoScan+ Mode
Combined Mode	2D/C/PW Mode 2D/PD/PW Mode 2D/C/M Mode 2D/TDI/TDW Mode Dual Live Mode
Multi-Image Mode	Dual Mode Quad Mode
3D/4D Mode	3D Mode 4D Mode (Optional)



NOTE: The functionalities for each mode may be restricted by the selected probe.

Basic Operating Instructions

The items that are commonly used in each Operation mode are shown below:

»» ⌘ Using the Control Panel

The items that can be used in each Operation mode are provided as menu items. You can change the image format or optimize an image to facilitate your diagnosis.

■ Gain

Use the dial-button on the control panel. The **Gain** button is displayed differently depending on the Operation modes, but it is usually in the form of a dial-button used to select a Operation mode.

Adjust the brightness of an image. Rotate the dial-button clockwise to increase the gain.

■ Focus

Use the **Focus** switch on the control panel to adjust the position of the focus.

Move the **Focus** switch up to move the focus up; move it down to move the focus down.

■ Depth

Use the **Depth** switch on the control panel to adjust the image scanning depth.

Move the **Depth** switch up to move the depth up; move it down to move the depth down.

The allowable range for adjustment varies depending on the probe type.

■ Zoom

Use the **Zoom** dial-button on the control panel.

Magnify an image. An image can be magnified by either Read Zoom or Write Zoom.

- ▶ Read Zoom: Read Zoom is used for magnifying images that are stored on the hard disk.
 1. Rotate the **Zoom** dial-button on the control panel left or right.
 2. Use the trackball to reposition the Zoom Box. The position of the Zoom Box on the image is shown in the Zoom Navigation Box, which is displayed on the left side of the screen.
 3. Study the magnified image. Rotate the dial-button clockwise to magnify the image.
- ▶ Write Zoom: This function allows you to magnify and scan an image in real time.
 1. Press the **Zoom** dial-button on the control panel. The Write Zoom Box is displayed on the screen.
 2. Use the **Change** button to move and resize the Zoom box.
 3. When you press the **Set** button, it changes to Write Zoom.

To exit Zoom Mode, either press the **Zoom** dial-button once more or press the **Exit** button on the control panel. If you are using Write Zoom, Zoom Mode automatically exits when you change **Depth**.

■ Q Scan

Use the **Q Scan** button on the control panel. The 'Q Scan' mark  will be displayed at the top of the image. Q scan stands for Quick Scan.

In 2D Mode, Gain and TGC are automatically adjusted in order to optimize the brightness and contrast of the image. In PW Spectral Doppler Mode, the Scale and Baseline are adjusted in order to optimize the state of the spectrum.

To exit Q Scan, press the **Exit** button on the control panel.



NOTE: The Q Scan function is only available with certain probes and applications.

■ QuickScan Offset

When running Q Scan, press the buttons on the touchscreen or use the dial-button to adjust the value from -10 to +10.

▶▶ Using Touchscreen Menus

The items that can be used in each Operation mode are provided as touchscreen menu items. You can change the image format or optimize an image to facilitate your diagnosis.

1. The menu for the Operation modes currently being used is displayed on the touchscreen.
In a combined mode that uses two or more Operation modes, you may press the relevant tab on the touchscreen to change the Operation mode.



Changing Touchscreen Tabs

You can change tabs on the touchscreen by performing a dragging in a page-turn action.

2. Press the touchscreen button to turn the function On or Off. To use soft menu, either press the touchscreen button or use the soft menu dial-button on the control panel to select a value.

■ TGC (Time Gain Compensation)

Use the TGC sliders on the touchscreen.

In general, ultrasound penetration gets weaker with depth. TGC can be used to compensate for this effect.

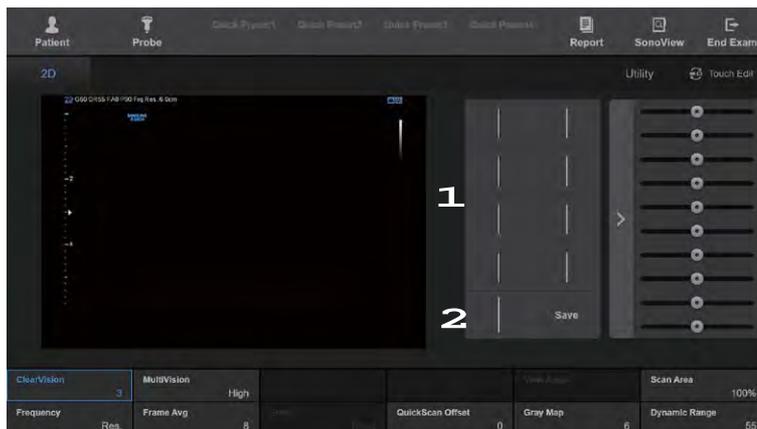
The product provides 10 TGC sliders for varying depths, allowing you to adjust the Gain by area. Among the 10 sliders, the topmost slider represents the shallowest area, with the lower sliders representing increasingly deep areas.

Move the slider to the right to increase the Gain and make the image brighter.



User TGC

Press < on the touchscreen to display the User TGC. You may select a TGC or set up a new one. The screen for User TGC consists of the following elements.



[Figure 7.1 TGC – Touchscreen]

- 1 User TGC: Press the button to switch to the corresponding TGC.
- 2 Align Center Button: Press the button to automatically align the TGC at the center of the slider.
- ▶ **Setting Up a User TGC**
 - 1. Use the TGC sliders to adjust the Gain, and the press **Save** on the touchscreen.
 - 2. Select the User TGC button you wish to save to. User TGC setup is now complete.



CAUTION: An excessively large difference between the Gain settings of adjacent TGC sliders may cause stripes to appear in an image.

:: Basic Mode

2D Mode

This basic mode, also referred to as B Mode (Brightness mode), provides scan planes of organs. This is used to display two-dimensional anatomy images in the direction of scanning in real time.

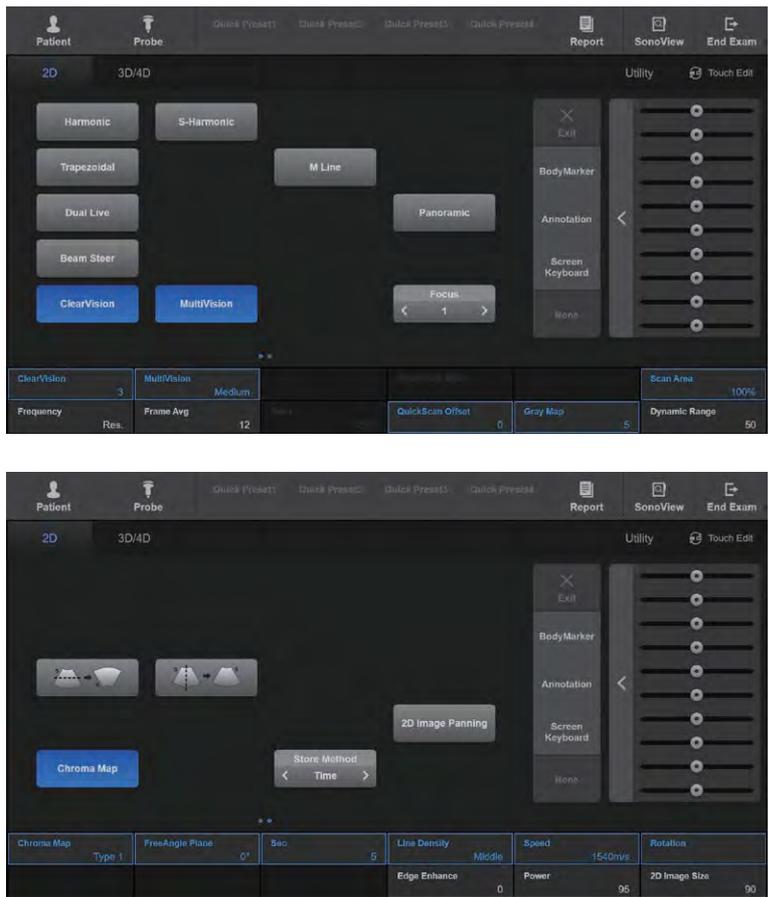
»» ⌘ Entering 2D Mode

Press the **2D** dial-button on the control panel. If you press the **2D** dial-button in other Operation modes, it will switch to the basic 2D Mode.



NOTE: Because 2D Mode is applied by default for all Operation modes, it cannot be terminated.

» 2D Mode Menu



[Figure 7.2 2D Mode – Touchscreen]

■ Harmonic

Press **Harmonic** on the touchscreen to select On or Off; the 'Har' mark  will be displayed in the image information.

This product provides an OHI (Optimal Harmonic Imaging) function, which optimizes images using high frequencies.

■ S-Harmonic

Pressing **S-Harmonic** on the touchscreen to select On or Off; the 'S-Har' mark  will be displayed in the image information.

Press the **S-Harmonic** button on the touchscreen and press the button on the touchscreen or use the dial-button to adjust the S-Harmonic Index. S-Harmonic inverts the pulses to sharpen the displayed image.



NOTE:

- ▶ The Harmonic and S-Harmonic function are only available with specific probes.
- ▶ S-Harmonic function may show lines in the near field of certain probes when non-Scan Mode is used. This is due to the technical features that improve the sensitivity and resolution of the ultrasound images and does not cause any problems in Scan Mode.

■ Trapezoidal

Press **Trapezoidal** on the touchscreen to select On or Off.

Change the rectangular frame provided by a Linear Probe to a trapezoidal shape. Doing so provides a wider view of an image.

The Trapezoid function may not be available for some depths.



NOTE: The Trapezoidal item appears in the menu only when a Linear Probe is used.

■ Dual Live

Press **Dual Live** on the touchscreen to select On or Off.

The 2D image and the Color Doppler image for the scanned area can be displayed simultaneously in real time.

■ Panoramic

The touchscreen switches to the *Panoramic Ready* screen. For more information, refer to 'Panoramic' in this chapter.



NOTE:

- ▶ Panoramic is an optional feature of this product.
- ▶ The Panoramic function is only available in 2D mode with Linear and Convex probes.

■ CEUS+

The touchscreen switches to the *Contrast Agent* screen. For more information, refer to 'CEUS+ Mode' in this chapter.



NOTE: The CEUS+ feature is available for certain probes only.

■ MultiVision

Press **MultiVision** on the touchscreen to select On or Off; the 'Spatial Compound' mark  will be displayed in the image information. MultiVision is using Multi-beam improves image quality.

When 'On' is selected, the **MultiVision** is enabled in the soft menu. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a setting value from Low, Medium, and High.



NOTE: It can only be used with certain probes. For more information, please refer to 'Probe List' in 'Chapter 5. Probes'.

■ ClearVision

Press **ClearVision** on the touchscreen to select On or Off; the 'ClearVision' mark  will be displayed in the image information. ClearVision removes noise from the image and enhances outlines to help show the image more clearly.

When 'On' is selected, the **ClearVision Index** is enabled in the soft menu. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a setting from 1 to 5.

■ HQ Vision

Press **HQ Vision** on the touchscreen to select On or Off; the 'HQ Vision' mark  will be displayed in the image information. HQ Vision improves the definition and quality of images. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select the Index.



NOTE:

- ▶ The probes, applications, and presets available in HQ Vision are as follows:

Probe	Application	Preset
LA2-9A	Small Parts	Breast, Thyroid
	MSK	General
CA1-7A	Abdomen	General
LA4-18B	MSK	General, Superficial
LM4-15B	MSK	Elbow & Wrist, Hand & Foot, Shoulder & Knee
L3-12A	MSK	Elbow & Wrist, Hand & Foot, Shoulder & Knee

- ▶ HQ Vision cannot be used for S-Harmonic (which can be used for MSK applications), NeedleMate, or CEUS+ in 2D Mode.
- ▶ HQ Vision is available in C Mode, Combined Mode, and Write Zoom Mode.

■ Frequency

Select the frequency of the probe. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select among Res, Pen, and Gen. The selected frequency is displayed in the Image Area on the monitor.

- ▶ Res (Resolution): High frequency
- ▶ Gen (General): General frequency
- ▶ Pen (Penetration): Low frequency

■ Dynamic Range

Dynamic Range adjusts contrast by changing the ratio of the minimum and maximum values of input signals. Selecting a higher Dynamic Range will display a smoother image.

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select an index from 25 to 75.

■ **Frame Avg**

When an image is updated, the present image and the previous image are averaged. When you keep scanning the same area continuously, speckles may appear on the updated image. Frame Avg is used to minimize these speckles. Frame Avg stands for Frame Average.

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0 to 15.

■ **Speed**

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 1410 to 1600 m/s.

■ **Gray Map**

Change the 2D Post Curve. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 1 to 13.

■ **2D NT**

You can use the ROI box to measure the NT more easily.

Press the **2D NT** button on the touchscreen to select On or Off.

Press the Switch button to adjust the size of the ROI box, and then use the trackball to move the ROI box.

At a desired position, press the **Set** button on the control panel to display the measurement value on the left side of the screen.

If you want to measure a different location after an initial measurement, press the **Set** button on the control panel to finish the current measurement and then press the **Set** button again.

Press the **Reset** button on the touchscreen to remeasure the NT.

Press the **Exit** button on the touchscreen or press it on the control panel, or press the **2D** button on the control panel to exit 2D NT.

**NOTE:**

- ▶ 2D NT is enabled under the following conditions:
 - 2D Freeze Mode
 - Measurement item: OB
- ▶ While conducting 2D NT, changing the image, such as by using Zoom, is not possible.
- ▶ The 2D NT measurements will be saved and printed out in a report.



CAUTION: The measurement value may have a margin of error of $\pm 5\%$.

■ M Line

An M Line appears on the image. The M Line indicates where the observed image is located in the 2D image when M or PW Mode is used together with 2D Mode.

Press **M Line** on the touchscreen to select On or Off.

**M Line and Sample Volume**

When M Line is in use, a sample volume is displayed together with the M Line. The angle and depth information for the sample volume is displayed on the screen.

■ U/D Flip

Press the up and down flip icon on the touchscreen. Each press of the button flips the image vertically.

■ L/R Flip

Press the left and right flip icon on the touchscreen. Pressing this button flips the image horizontally (Left/Right Flip). The Direction Marker at the top of the image indicates the current orientation of the image.

■ Change Window

The active image is changed each time the touchscreen button is pressed. The image that is currently being scanned is displayed with a blue outline at the top of the image.



NOTE:

- ▶ This is displayed on the touchscreen only in Dual Mode.
- ▶ Enable or disable Change Window in Setup > Imaging > Common. For more information, refer to 'Setup' in 'Chapter 3. Utilities'.

■ Top-Bottom Dual

Press the button on the touchscreen to change the left-right layout in Dual Mode to up-down.

■ Angle

Press the button on the touchscreen or use the soft menu dial-button on the control panel to adjust the angle of the image. The button is enabled in the soft menu only when the Scan Area is smaller than 100%.



NOTE: Angle is only available with certain probes.

■ Scan Area

Select the width (%) of the image. Increasing the image width reduces the frame rate. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 40 to 100.



NOTE: View Area varies depending on the preset.

■ 2D Image Size

Select the size of the 2D image. Press button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 50 to 100.

■ Store Method

Select the method for saving the Cine image when you use the **Store Clip** function. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select among Time, Manual, and ECG Beat.

- ▶ Time: Save the images that are shown during the specified time frame. The Sec button will be enabled in the soft menu. Press the button on the touchscreen or use the soft menu dial-button on the control panel to specify the duration (in seconds).
- ▶ Manual: The images are saved from the time when the **Store Clip** button is pressed first until the button is pressed again.
- ▶ ECG Beat: Specify the heart beat as 1 - 8 beats.



Store Clip button

Refers to a User Key in the control panel (P1-2, U1-4) to which Store Clip functionality has been assigned. The current settings are displayed in User Key area at the bottom of the monitor screen. You can change the setting for each button in Setup > Customize > Button.

■ Line Density

Select the density of the scan line. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select among Low, Middle, and High. Selecting High increases the number of scan lines, resulting in higher image resolution at the expense of frame rate.

■ Chroma Map

Change the color of the image. Press the button on the touchscreen to select On or Off. When 'On' is selected, **Chroma Map**, which allows image color setting, is enabled. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from Type 1 to 15, or from User1 to 3.



NOTE: User types can be changed in Utility > Post Curve > 2D Post > Chroma Map. For more information, please refer to 'Post Curve' in 'Chapter 3. Utilities'.

■ Free Angle Plane

Adjusts the ScanHead of the 3D probe to the desired angle by using the dial-button.

■ Edge Enhance

Display the outline of tissues or an organ more clearly. Selecting a higher setting will allow the outline to be displayed more clearly.

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from -3 to 3.

■ Power

Select the power of the ultrasound output. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 10 to 100.

■ 2D Image Panning

Press the button on the touchscreen to select On or Off. When 'On' is selected, you may reposition the 2D image by using the trackball.

■ Rotation

Press the button on the touchscreen or use the soft menu dial-button on the control panel to rotate the 2D image.

■ NeedleMate

Press the button on the touchscreen to select On or Off. NeedleMate helps you see the biopsy needle on an ultrasound image more clearly.



NOTE: NeedleMate only appears in the menu when a Linear Probe is used.

When turned On, **Needle Direction**, **Needle Angle**, and **Needle Enhance** are displayed on the touchscreen.

■ Needle Direction

Sets the orientation direction of the biopsy needle for images. Press the button on the touchscreen to select Left or Right.

■ Needle Angle

Sets the orientation angle of the biopsy needle for images. Press the button on the touchscreen to select Shallow, Medium, or Steep.

■ Needle Enhance

Sets the strength and thickness of the biopsy needle. Press the button on the touchscreen to select 1, 2, 3, or 4.

Enhance Level	Feature
1	Needle thickness is thin and needle enhancement is normal.
2	Needle thickness is thin and needle enhancement is high.
3	Needle thickness is thick and needle enhancement is normal.
4	Needle thickness is thick and needle enhancement is high.

■ Beam Steer

To enhance the needle imaging, press the button on the touchscreen to adjust the angle of the ultrasonic beam in 2D Mode.

■ Beam Steer Index

Press the button on the touchscreen to select Right, Right2, Left, or Left2.

CEUS+

This mode is used for imaging the contrasting effect within blood vessels by infusing an ultrasound contrast agent.



NOTE: CEUS+ is an optional feature of this product.

Press **CEUS+** on the touchscreen to select On or Off. When 'On' is selected, the touchscreen is switched to the *CEUS+* screen.



CEUS+ Mode

- ▶ CEUS stands for Contrast Enhanced Ultrasound, and aids the diagnosis by enhancing the contrast on the ultrasound image.
- ▶ When entering CEUS+ mode, Dual mode is displayed by default.
- ▶ Functions such as Harmonic and PPI are not available.

■ Agent Type

- ▶ V-type: A contrast agent used in a low MI environment (approximately below 0.1)
- ▶ Z-type: A contrast agent used in a medium MI environment (approximately above 0.1)

■ Priority

Select a CEUS+ type. Press the button on the touchscreen to select either Contrast or 2D.

- ▶ Contrast: It displays contrast-applied images.
- ▶ 2D: It displays CEUS+ 2D images.

■ Auto Gain

Press **Auto Gain** on the touchscreen to select On or Off. When 'On' is selected, the brightness of an image will be adjusted automatically.

■ VesselMax

Press the **VesselMax** on the touchscreen to select On or Off; the 'VesselMax' mark  will be displayed in the image information.

- ▶ VesselMax shows the shape of vessel more clearly by accumulating the images obtained by using contrast media.
- ▶ When 'On' is selected, the **VesselMax Frame** is enabled in the soft menu. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value among Full, 0.3, 0.6, 0.9, 1.2, 1.5, 1.8, 2.1, 2.4, and 2.7 sec.

■ FlowMax

Press **FlowMax** on the touchscreen to select On or Off. The 'FlowMax' mark  will be displayed in the image information.

- ▶ FlowMax increases the contrast of the images obtained by using contrast media.
- ▶ When 'On' is selected, the **FlowMax** is enabled in the soft menu.

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 1 to 7.

■ Ref. Pointer

This option displays the Ref. Pointer on an image. Press **Ref. Pointer** on the touchscreen to select On or Off. The **Ref. Pointer** in CEUS+ Mode is used to indicate the same location on the Agent and Tissue images in Dual Live Mode.

■ Review Pointer

Displays a Review Pointer over an image. Press the **Freeze** button and then the **Review Pointer** button on the touchscreen to select On or Off.

■ Dual Live

Press **Dual Live** on the touchscreen to select On or Off. When 'On' is selected, Dual Live mode is activated to display both Contrast and 2D images side-by-side. When 'Off' is selected, Single mode is activated.

■ Timer1/Timer2

Press the **Timer1** or **Timer2** button on the touchscreen to start the timer. When re-pressing the button, the timer stops and the time is reset. If you don't press the button again, the timer will keep running even when the CEUS+ On/Off state is changed.

■ Flash

Press the button on the touchscreen to select On or Off. For the defined frames in **Flash Frame**, brighter images are produced.

■ Flash Frame

Define the number of frames to run the Flash function. Use the soft menu dial-button on the control panel to choose a setting from 3 to 100 frames.

■ Frame Avg

Frame Avg averages the present image and the previous image when an image is updated. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0 to 15.

■ MI Control

It defines the amount of sound pressure (Mechanical Index) of the ultrasound beam. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0.02 to 1.00.

■ Sensitivity

It defines the sensitivity of the contrast agent. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select SPD, GEN, PEN1, or PEN2.

Tips!

Sensitivity

Each value is characterized as below:

- ▶ Frame Rate: $SPD > GEN = PEN1 = PEN2$
- ▶ Sensitivity: $SPD < GEN < PEN1 \leq PEN2$
- ▶ Artifact: $SPD > PEN1 > PEN2 > GEN$

■ **Reject Level**

This function reduces noises or echoes from an image in order to make the image clearer. Press the button on the touchscreen or use the dial-button to select a value from 0 to 64.

■ **Scan Area**

This sets the horizontal area (%) of an image. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 40 to 100.

■ **Frame Limit**

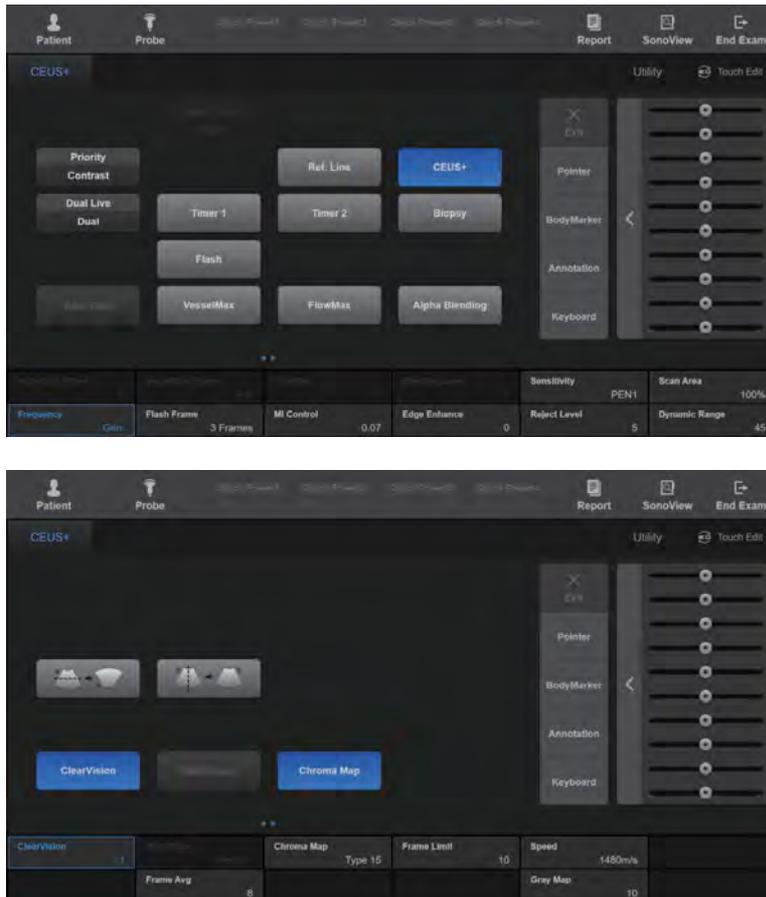
Select the total frame rate. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 2 to the maximum frame rate for the current Scan Mode.

■ **Speed**

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a play speed from 1420 to 1600 m/s.

■ Alpha Blending

This feature enables you to superimpose an Agent image over a Tissue image in Dual Live Mode. Press the button on the touchscreen to select On or Off. When 'On' is selected, the **Blending Level** button is enabled in the soft menu. You can adjust the blending ratio.



[Figure 7.3 CEUS+ – Touchscreen]

■ TIC

Pressing the **Freeze** button on the control panel in CEUS+ mode will display TIC. TIC, which stands for Time Intensity Curve, is a curve that represents the change of the average intensity over time in the ROI.

1. Press the button on the touchscreen to select the shape of the ROI. You can select Rectangle, Ellipse or Polygon.
2. Use the **Set** button and the trackball on the control panel to define the ROI.
3. The TIC of the ROI and the Parameter information about the Agent image currently shown on the screen are displayed.

▶ TIC Parameter

No.	Parameter	Full Name
1	PI	Peak Intensity
2	RT	Rise Time
3	MTT	Mean Transit Time
4	AUC	Area Under the Curve
5	iAUC	Wash in Area Under the Curve
6	oAUC	Wash out Area Under the Curve
7	TTP	Time To Peak
8	FT	Fall Time
9	WiR	Wash in Rate (maximum slope)
10	WoR	Wash out Rate (minimum slope)
11	Mean Int.	Mean Intensity
12	STD.	Standard deviation



NOTE:

- ▶ TIC Parameter analysis results should be used as reference data, not to make a conclusive diagnosis.
- ▶ The final diagnosis must be made by conducting a comprehensive assessment of all clinical data, including results obtained by means of other examinations.



Add ROI

To set up an additional ROI, repeat the processes described in steps 1 and 2. The **ROI** button will be enabled on the touchscreen to let you select the ROI.

■ Delete All

Delete all ROIs.

■ Delete ROI

Press the button to delete the selected ROI. Use the soft menu dial-button to select the ROIs to be deleted.

■ Curve Fit

The TIC value can fit into five types of curve. Some parameters are not displayed, depending on the choice.

- ▶ Wash-In Curve Fitting: Shows the TIC as an increasing curve.
- ▶ Wash-Out Curve Fitting: Shows the TIC as a decreasing curve.
- ▶ Wash-In/Out Curve Fitting: Shows the TIC as a curve that shows both increase and decrease.
- ▶ Sigmoid: Shows the TIC in an S-shaped curve.
- ▶ Polynomial: Shows the TIC using a polynomial curve fitting.

■ Degree

Enabled when the curve fit is polynomial; you can select a value from 1 to 10 to adjust it.

■ Edge Enhance

Allows you to view more accurate images of organ or tissue boundaries. A higher value provides more accurate images of boundaries. Press the button on the touchscreen or use the dial-button to select a value from -3 to +3.

■ Chroma Map

Press the button on the touchscreen to select On or Off. When 'On' is selected, Chroma Map, which allows image color setting, is enabled. Press the button on the touchscreen or use the dial-button to select a value from Type 1 to 15 or from User 1 to 6.



NOTE: User types can be changed from Utility > Post Curve > 2D Post > Chroma Map. For details, please refer to 'Post Curve' in 'Chapter 3. Utilities'.

■ **Copy ROI**

Press the button to copy the selected ROI. Use the soft menu dial-button to select the ROI you wish to copy. After copying the ROI, use the control panel's **Set** button and the trackball to specify its position.

■ **First Pos**

After specifying the position of the first frame by rotating the dial-button or using the Trackball, press the dial-button to save it.

■ **Last Pos**

After specifying the position of the last frame by rotating the dial-button or using the Trackball, press the dial-button to save it.

■ **Speed**

Rotate the dial-button to adjust the auto playback speed.

■ **Cine Play**

Play Cine images.

■ **Save to File**

TIC of all ROIs is saved in csv file.

Panoramic

Panoramic Imaging is the function that acquires images over a wider range by using continuous ultrasonographic images. Up to 1,000 frames can be used.



NOTE:

- ▶ Panoramic is an optional feature of this product.
- ▶ The Panoramic function is only available in 2D Mode with Linear and Convex probes.

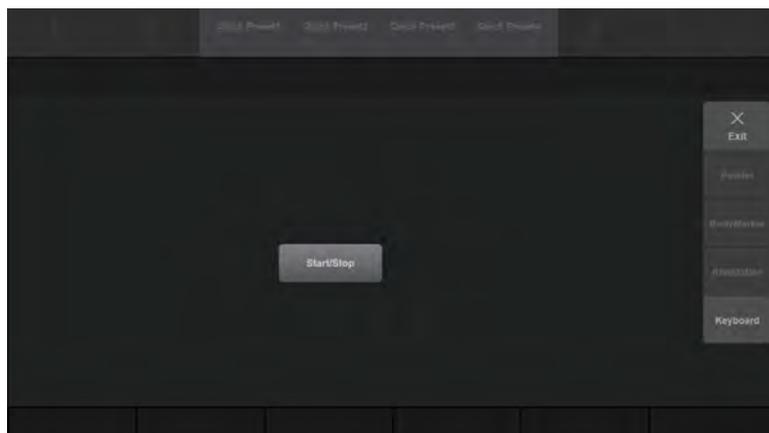
■ Acquiring a Panoramic Image

1. Press **Panoramic** on the touchscreen. The touchscreen will switch to the *Panoramic Ready* screen.
2. Press **Start/Stop** on the touchscreen or the **Set** button on the control panel. The system will start acquiring a panoramic image.
3. Press the **Start/Stop** or **Set** button to stop acquiring the panoramic image. The touchscreen will switch to the *Panoramic Review* screen.

Tips!

Things to Remember when Acquiring a Panoramic Image

- ▶ When scanning a curved surface, ensure that the scan surface and the contact surface of the probe are always at right angles.
- ▶ Moving in the opposite direction while acquiring an image erases the previously saved frames and saves new frames.
- ▶ The image quality may deteriorate if the contact surface of the probe loses contact with the scan surface.
- ▶ If the scan speed is fast or the angle of the contact surface of the probe changes, artifacts may occur.



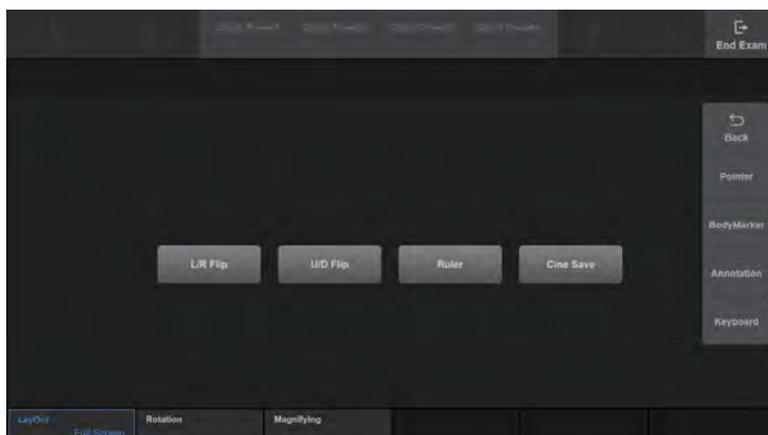
[Figure 7.4 Panoramic Ready – Touchscreen]

■ Reviewing a Panoramic Image



NOTE:

- ▶ The only buttons that you can use on the control panel are, the **Caliper** and the **Mode** buttons.
- ▶ **L/R Flip**, **U/D Flip**, and **Magnifying** are available only when the **Layout** is set to Full Screen.



[Figure 7.5 Panoramic Review – Touchscreen]

- ▶ **L/R Flip**: Flip the panoramic image horizontally.
- ▶ **U/D Flip**: Flip the panoramic image vertically.
- ▶ **Ruler**: Press the button to select On or Off. When 'On' is selected, a ruler will be displayed in the Panoramic image.
- ▶ **Cine Save**: Save Cine images.
- ▶ **Layout**: Specify how the panoramic image will be displayed on the screen.
 - Full Screen: Display the panoramic image in full screen mode.
 - Left/Right: Display the 2D and panoramic images on the left and right of the screen, respectively.
 - Top/Down: Display the 2D and panoramic images at the top and bottom of the screen, respectively.
- ▶ **Rotation**: Rotate the panoramic image.
- ▶ **Magnifying**: Magnify the panoramic image.
- ▶ **Back**: Return to the *Panoramic Readyscreen*.
- ▶ **Exit**: Exit Panoramic Imaging.

S-Detect for Breast (Lite)

S-Detect for Breast is the function to help ultrasound breast exams. It includes functionalities for selecting a lesion, dividing the area of a lesion, describing the characteristics of a lesion, and recommending the benignity and malignity of a lesion, which assist in the diagnosis process.

**NOTE:**

- ▶ S-Detect for Breast is an optional feature of this product.
- ▶ S-Detect for Breast is not supported in Canada.
- ▶ In the USA, this function is provided as S-Detect for Breast Lite.

**S-Detect for Breast Lite**

S-Detect for Breast Lite is the function to help ultrasound breast exams. It includes functionalities for selecting a lesion, dividing the area of a lesion, describing the characteristics of a lesion.

**CAUTION:**

- ▶ For the S-Detect for Breast Lite
Lexicon Classification is supported by an automatic recommendation feature for the Shape and Orientation items ONLY, which can also be directly entered by the user. The other items under Lexicon Classification and the Assessment Category Score must be entered by users.
- ▶ The Auto determination is only available for Shape and Orientation.

▶▶ Run S-Detect for Breast (Lite)

Acquire an image in the 2D Mode and press the **Freeze** button on the control panel. Press **S-Detect** on the touchscreen to start S-Detect for breast.

■ S-Detect for Breast Execution Conditions

To run S-Detect for Breast, the following conditions need to be met.

- ▶ Preset: Breast
- ▶ Operation mode: 2D (Freeze state)
- ▶ Image Mode: Single Mode
- ▶ Patient information has been entered



You cannot run S-Detect for Breast in the following circumstances.

- ▶ Zoom is currently on
- ▶ You have panned the image (2D Image Panning)
- ▶ In Trapezoidal, and Biopsy Beam Steer status

» **S-Detect for Breast (Lite) Screen**

The *S-Detect for Breast* screen consists of the following four sections.



[Figure 7.6 S-Detect for Breast]

1 Ultrasound Image Area

Shows the study image that has been acquired in 2D Mode.

2 Location Information Area

Provides information about the location of the study site and the size of the lesion. The user can manually enter Position and Left/Right before or after taking measurements; Depth, Height, Width, and Area are automatically calculated when the contour of the lesion is extracted.

- ▶ Position: Drag the point at the center of the coordinates with the mouse to specify the location on the breast from which the study image has been acquired. You can rotate the angle of the C/P to adjust the probe angle.
- ▶ Left/Right: Specify either the left or right breast.
- ▶ Distance: The distance from the center of the breast.
- ▶ Angle: Clockwise angle from the center of the breast.
- ▶ Depth: Depth from the skin surface to the location of the lesion.
- ▶ Width: The horizontal length of the lesion.
- ▶ Height: The vertical length of the lesion.
- ▶ Area: The area of the lesion.
- ▶ Marker Gap: Each user can adjust and set the unit of the marker gap such as 1 – 5 cm.

3 BI-RADS Lexicon Classification Area

Provide the BI-RADS Lexicon Classification for the lesion that has been finally selected by the user. The auto determination result is displayed in blue, whereas other items are marked 'Unselected' in white. If the user modifies the classification results, text will appear in yellow with an asterisk (*).

4 BI-RADS Assessment Category Score

S-Detect for Breast recommends the benignity or malignancy of the lesion selected by the user; the user makes a final decision on the BI-RADS Assessment Category Score.

Using the final BI-RADS Assessment Category Score, S-Detect for Breast shows the assessment description.



Call Text

You can hide the call text to protect the patient. Select Setup > Imaging > S-Detect. For more information, please refer to 'S-Detect' in 'Chapter 3. Utilities'.

»» ⌘ Measure S-Detect for Breast (Lite)

Use Target Point to specify suspected lesions. Use the control panel's trackball and **Set** button.

■ Initialize

Resets all results and allows the user to re-specify the Target Point.

■ Target Point

Analyze the area of the suspected lesion based on the point specified by the user.

■ Target Area

Analyzes the area of the suspected lesion based on the area specified by the user.

■ Manual Contour

Analyze the area of the suspected lesion by arbitrarily selecting a point.

■ **Hide Contour**

Press the **Hide Contour** button on the touchscreen to turn On or Off. When turned 'On', the contour of lesion is not displayed on the screen.

■ **Point Edit Contour**

Modify the area of the suspected lesion based on the point specified by the user.

■ **Line Edit Contour**

Modify the area of the suspected lesion based on the line specified by the user.

■ **Distance**

Show the length of a specific area that is included in the study image.

■ **Annotation**

Enter text in the study image.

■ **Report**

The *Report* screen will appear.



NOTE: Length and annotation may be used before and after extracting the contour of the lesion.



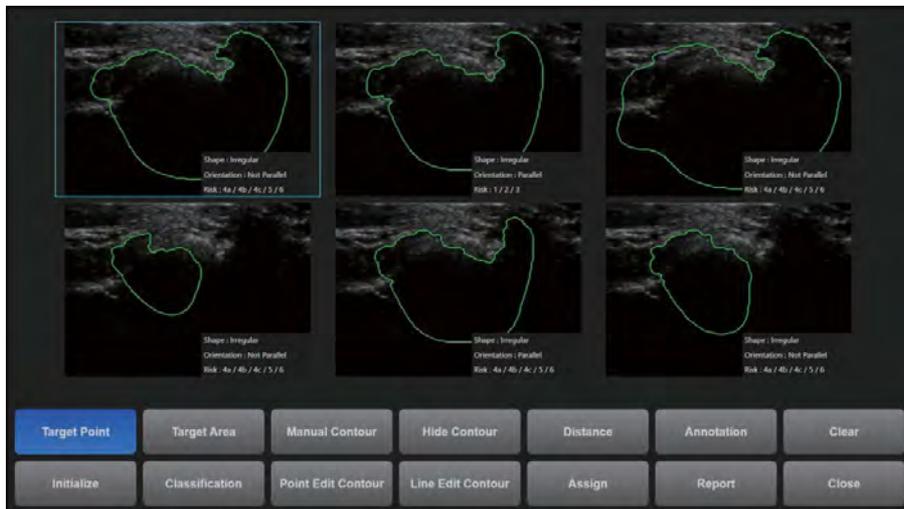
Analyze S-Detect for Breast

■ Extracting the Area of the Lesion

The contour of the area of the suspected lesion is extracted, and up to 6 candidates are shown on the touchscreen. Each image shows the Shape, Orientation, and Risk of the lesion. The user may select one of the candidates as the final area of the lesion.



NOTE: The area of the lesion is extracted differently depending on the Target Point or Target Area entered by the user; in some circumstances, no area of lesion may be extracted.



[Figure 7.7 S-Detect for Breast – Extracting the Area of a Suspected Lesion]

■ **Classification (BI-RADS Lexicon Classification)**

The area of the lesion selected by the user is analyzed, and then the analysis items are displayed. BI-RADS2003 and BI-RADS2013 are available, and each item has the following categories.

Lexicon Classification		Description	Note
BI-RADS2003	Shape	Oval, Round, Irregular	
	Orientation	Parallel, Not Parallel	
	Margin	Circumscribed, Indistinct, Angular, Microlobulated, Spiculated	Recommended Functions Excluded for S-Detect for Breast Lite
	Lesion Boundary	Abrupt Interface, Echogenic Halo	
	Posterior Feature	No Posterior Findings, Enhancement, Shadowing, Combined Pattern	
	Echo Pattern	Anechoic, Hyperechoic, Complex Echogenicity, Hypoechoic, Isoechoic	
	Calcifications	Macrocalcifications, Micro. Outside of a mass, Micro. In a mass	Recommendation functionality is not included
	Surrounding Tissue	Duct Changes, Cooper Ligament Chg, Edema, Architectural Distortion, Skin Thickening, Skin Retraction	
	Vascularity	Unselected, None, In Lesion, Adjacent To Lesion, Diffuse Vascularity	
	Special Case	Clustered Microcysts, Complicated Cysts, Mass in or on Skin, Foreign Body, Intrama. Lymph Nodes, Axillary Lymph Nodes	

Lexicon Classification		Description	Note
BI-RADS2013	Shape	Oval, Round, Irregular	
	Orientation	Parallel, Not Parallel	
	Margin	Circumscribed, Not Circumscribed, Indistinct, Angular, Microlobulated, Spiculated	Recommended Functions Excluded for S-Detect for Breast Lite
	Posterior Features	No Posterior Findings, Enhancement, Shadowing, Combined Pattern	
	Echo Pattern	Anechoic, Hyperechoic, Complex Cystic And Solid, Hypoechoic, Isoechoic, Heterogeneous	
	Calcifications	In a mass, Outside of a mass, Intraductal	Recommendation functionality is not included
	Associated Features	Architectural Distortion, Duct Changes, Skin Thickening, Skin Retraction, Edema, Vascularity, Absent, Internal Vascularity, Vessels In Rim, Elasticity Assessment, Soft, Intermediate, Hard	
	Special Cases	Clustered Microcysts, Complicated Cyst, Mass In Or On Skin, Foreign Body + Implants, Intrama. Lymph Nodes, Axillary Lymph Nodes, Simple Cyst, Vascular Abnormalities, AVMs, Mondor Disease, Post-surg. Fluid Coll., Fat Necrosis	

■ **BI-RADS Assessment Category Score**

Recommends the benignity or malignancy of the area of the lesion selected by the user.

▶ BI-RADS2003

BI-RADS Assessment Category Score	Description	
0	Analysis not possible (Incomplete)	
1	Negative	Possibility of Benignancy
2	Benign	
3	Probably benign	
4a	Low suspicion for malignancy	Possibility of Malignancy
4b	Intermediate suspicion of malignancy	
4c	Moderate concern, but not classic for malignancy	
5	Highly suggestive of malignancy	
6	Known biopsy-prove malignancy	

▶ BI-RADS2013

BI-RADS Assessment Category Score	Description	
0	Incomplete	
1	Negative	Possibility of Benignancy
2	Benign	
3	Probably benign	
4a	Low suspicion for malignancy	Possibility of Malignancy
4b	Moderate suspicion for malignancy	
4c	High suspicion for malignancy	
5	Highly suggestive of malignancy	
6	Known biopsy-proven malignancy	

**NOTE:**

- ▶ Classification items and BI-RADS Score functionality may be applied differently in certain regions.
- ▶ In the USA, Lexicon Classification is supported by an automatic recommendation feature for the Shape and Orientation items, which can also be directly entered by the user. The other items under Lexicon Classification and the Assessment Category Score must be entered by users only.
- ▶ In the United States, Canada, and China, the recommendation feature for the benignity or malignancy of a lesion is not supported.

**Tips!****Editing BI-RADS Lexicon Classification and BI-RADS Assessment Category Score**

The user may manually edit the BI-RADS Lexicon Classification items and the BI-RADS Assessment Category Score.

▶ Editing BI-RADS Lexicon Classification

Select the title of each item on the monitor screen. Or press **Classification** on the touchscreen to select a Classification item.

▶ Editing BI-RADS Assessment Category Score

The BI-RADS Assessment Category Score at the bottom of the monitor is changed. When the Category Score is changed, the assessment description also changes accordingly.

■ Recalculation

If the user edits the result of the BI-RADS Lexicon Classification, then the probability of tumor being malignant or benign is re-calculated. This feature can be enabled in Setup > Imaging > S-Detect.



NOTE: Recalculation is not supported in the United States, Canada, and China.

»» S-Detect for Breast Sensitivity Settings

This allows users to adjust the sensitivity and specificity levels for lesion analysis. It can be selected in Setup > Imaging > S-Detect > Sensitivity Setting.

- ▶ High Sensitivity: Increases the chance of detecting malignancy as its sensitivity is higher than that of the default mode (High Accuracy).
- ▶ High Accuracy: This is the default mode. It can distinguish between benignity and malignancy more accurately than the High Sensitivity and High Specificity modes.
- ▶ High Specificity: Increases the chance of detecting benignity as its specificity is higher than that of the default mode (High Accuracy).



NOTE: The Sensitivity Setting is not supported in the United States, Canada, and China.

»» Print S-Detect for Breast Report

Once the area of the lesion selected by the user has been analyzed, press **Assign** on the touchscreen; the result of the analysis is printed as a patient report.

The S-Detect for Breast analysis result is categorized as an S-Detect for Breast Report, which is a separate category in the report; the information included in the report is as follows.

Press the **Exit** button to return to the S-Detect for Breast screen.

- ▶ Patient information: The patient information entered by the user when the study began
- ▶ Location information: Position, Distance, Angle, Depth, Height, Width, Area
- ▶ BI-RADS Lexicon Version Information
- ▶ BI-RADS Lexicon Classification
- ▶ BI-RADS Score
- ▶ S-Detect for Breast screen image



NOTE:

- ▶ When printing a report, the *S-Detect for Breast* screen image is automatically printed. Once the area of the lesion selected by the user has been analyzed, press **Assign** on the touchscreen to print up to 10 reports (5 on the left and 5 on the right).
- ▶ Use the **Insert Images** button on the *Report* screen to attach the image. You may include the location information (Left/Right) and description for each image.



[Figure 7.8 S-Detect for Breast Report]

» Exit S-Detect for Breast

Press the **Close** button on the touchscreen to exit S-Detect for Breast. You may also exit S-Detect for Breast by ending Freeze or by pressing the Operation mode buttons on the control panel.

S-Detect for Thyroid

**NOTE:**

- ▶ S-Detect for Thyroid is an optional feature of this product.
- ▶ S-Detect for Thyroid is not supported in Canada.

S-Detect for Thyroid is the function to help ultrasound thyroid exams. It can select a lesion, divide the contour of a lesion, describe the characteristics of a lesion, and recommend the benignity and malignancy of a lesion to assist the diagnosis process.



CAUTION: In the USA, Canada, and China, a recommendation as to whether the result is benign or malignant is not applied.

▶▶ S-Detect for Thyroid Execution

Acquire an image in 2D mode and press the **Freeze** button on the control panel. Press **S-Detect** on the touchscreen to start S-Detect for Thyroid.

■ S-Detect for Thyroid Execution Conditions

To run S-Detect for Thyroid, the following conditions need to be met:

- ▶ Preset: Thyroid
- ▶ Operation mode: 2D (Freeze state)
- ▶ Image Mode: Single Mode
- ▶ Patient information has been entered



S-Detect for Thyroid cannot run in the following cases.

- ▶ Zoom is currently on
- ▶ You have panned the image (2D Image Panning)
- ▶ The system is set to Trapezoidal, or Biopsy Beam Steer.

» S-Detect for Thyroid Screen

The *S-Detect for Thyroid* screen consists of the following four areas.



[Figure 7.9 S-Detect for Thyroid]

1 Ultrasound Image Area

Shows the study image that has been acquired in 2D Mode.

2 Location Information Area

This displays information about the location of the test area and lesion size. The user can manually enter the Position before or after taking measurements; Depth, Height, Width, and Area are automatically calculated when the contour of the lesion is extracted.

- ▶ Position: Position the cursor by using the trackball and select the location of the lesion using BodyMarker.
- ▶ Depth: Depth from the skin surface to the location of the lesion.
- ▶ Height: The vertical length of the lesion.
- ▶ Width: The horizontal length of the lesion.
- ▶ Area: The area of the lesion.

3 TI-RADS Lexicon Classification Area

Provides the TI-RADS Lexicon Classification for the lesion that has been selected by the user. The auto determination result is displayed in blue, whereas other items are marked 'Unselected' in white. If the user modifies the classification results, text will appear in yellow with an asterisk (*).

4 TI-RADS Assessment Category Score

S-Detect for Thyroid suggests the benignity or malignity of the lesion selected by the user; the user makes a final decision on the TI-RADS Assessment Category Score.

Based on the determined TI-RADS Assessment Category Score, S-Detect for Thyroid provides the call text.



Call text

You can hide the call text to protect the patient. Select Setup > Imaging > S-Detect > Description. For more information, please refer to 'S-Detect' in 'Chapter 3. Utilities'.



NOTE: Regardless of the settings, the call text for the TI-RADS Assessment Category Score is not displayed in the USA.

Measure S-Detect for Thyroid

Use either Target Area (default) or Target Point to define the area of the suspected lesion. Use the trackball and **Set** button on the control panel.

■ Initialize

You can re-specify the Target Area or Target Point.

■ Target Point

Analyzes the lesion based on the point in the area of the suspected lesion specified by the user.

■ Target Area

Analyzes the suspected lesion based on the area specified by the user. When a Target Area is selected, a guide image which tells you how to designate an area will appear.

Users can use the trackball to adjust the guide line to meet the lesion border and click **Set** to insert the vertex of a rectangle. (Figure A)

When you move the trackball, a rectangle will appear and you can select **Set** to complete the selection after adjusting the two sides of the rectangle to overlap the boundary of suspected lesion. (Figure B)

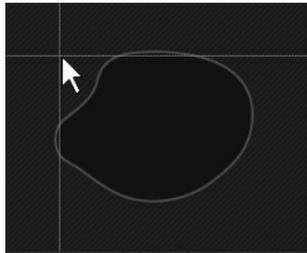


Figure A

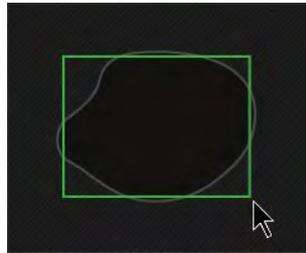


Figure B

■ Manual Contour

Users can manually draw the boundary of the suspected lesion to analyze the area. Users can select **Set** in the control panel and use the trackball to draw the boundary. Then choose **Set** again to finish drawing the boundary.

■ Hide Contour

Press the **Hide Contour** button on the touchscreen to turn it On or Off. The boundary of the lesion is displayed on the screen when it is On, and the boundary is not displayed on the screen when it is Off.

■ Point Edit Contour

Expands or shrinks the area of the lesion based on the point specified by the user.

■ Line Edit Contour

Expands or shrinks the area of the lesion based on the line specified by the user.

■ **Distance**

Show the length of a specific area that is included in the study image.

■ **Annotation**

Enter text in the study image.

■ **Report**

The *Report* screen will appear.



NOTE: Length and annotations may be used before and after extracting the contour of the lesion.

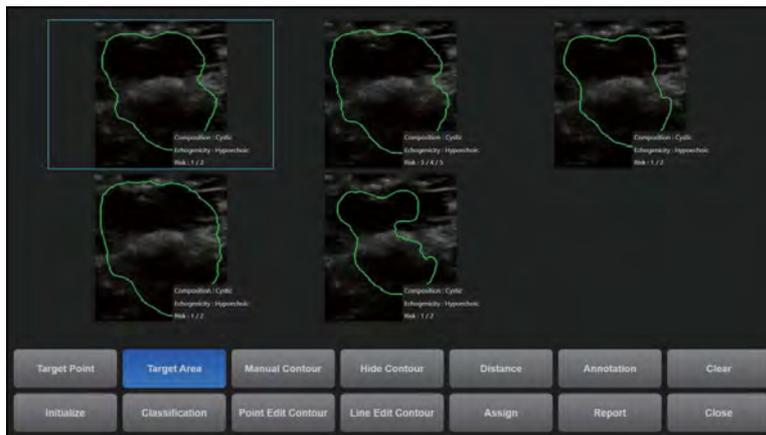
▶▶ **Analyze S-Detect for Thyroid**

■ **Extracting the Area of the Lesion**

The contour of the area of the suspected lesion is extracted, and up to 6 candidates are shown on the touchscreen. Each image shows the Composition, Echogenicity, and Risk of the lesion. The user may select one of the candidates as the final area of the lesion.



NOTE: The area of the lesion is extracted differently depending on the Target Point or Target Area entered by the user; in some circumstances, no area of lesion may be extracted.



[Figure 7.10 S-Detect for Thyroid – Extract Suspected Area of Lesion]

■ Lexicon Classification

The area of the lesion selected by the user is analyzed, and then the analysis results are displayed. The items are categorized as follows:

► TI-RADS Lexicon Classification

Lexicon Classification	Description	Note
Composition	Solid, Partially cystic (Predominantly Solid, Predominantly cystic), Cystic	Recommended Functions Supported (Not supported in the USA)
Echogenicity	Hyper/Isoechoic, Hypoechoic (Marked Hypoechoic)	
Orientation	Parallel, Non-Parallel	
Margin	Well-defined smooth, Microlobulated/ Spiculated, Ill-defined	
Spongiform	Appearance, Nonappearance	
Shape	Ovoid to round, Irregular	
Calcifications	Calcifications (Microcalcifications, Macrocalcifications), No calcifications	
Elasticity	Unselected, Stiff, Soft	Recommended Functions Excluded (Not supported in the USA)
Central Vascularity	Unselected, Appearance, Nonappearance	

► BTA Lexicon Classification

Lexicon Classification	Description	Note
Nodule Composition	Solid, Partially cystic (Mixed solid/cystic, Micro-cystic/spongiform), Cystic	Recommended Functions Supported
Echogenicity	Hyper/Iso-echoic (Hyper-echoic, Iso-echoic), Hypo-echoic (Markedly hypo-echoic)	
Taller than Wide	AP > TR, AP ≤ TR	
Margin	Well defined, Irreg./Lobulated/Spiculated (Irregular/Lobulated, Spiculated)	
Calcifications	Calcifications (Micro-calcification, Macro-calcification, Rim/Egg shell), None	
Colour flow	Unselected, Central, Peripheral, Mixed, None	Recommended Functions Excluded
Cystic Component	Unselected, Ring down sign–colloid, No Ring down sign	
Halo	Unselected, Absent, Interrupted, Regular/continuous	
Extent	Unselected, Retrosternal extension/tracheal deviation, None	
Lymphadenopathy	Unselected, Suspected malignancy, None	

■ **TI-RADS Assessment Category Score**

Suggests the benignity or malignity of the area of the lesion selected by the user. Four scores K-TIRADS, RUSS, ATA, and BTA are supported. When the user selects a TI-RADS Assessment Category Score, call text is provided accordingly.

TI-RADS Assessment Category Score		Description	
K-TIRADS	1	No nodules	N/A
	2	Benign	Possibility of Benignancy
	3	Low suspicion	Possibility of Malignancy
	4	Intermediate suspicion	
	5	High suspicion	
RUSS	1	Negative	N/A
	2	Constantly benign	Possibility of Benignancy
	3	Probably benign	
	4a	Mildly suspicious	Possibility of Malignancy
	4b	Highly suspicious	
	5	Highly suspicious	
ATA	1	Benign	Possibility of Benignancy
	2	Very low suspicion	
	3	Low suspicion	Possibility of Malignancy
	4	Intermediate suspicion	
	5	High suspicion	
BTA	1	Normal	Possibility of Benignancy
	2	Benign	
	3	Indeterminate/Equivocal	Possibility of Malignancy
	4	Suspicious	
	5	Malignant	

**NOTE:**

- ▶ Classification items and the TI-RADS Score may be applied differently in certain regions.
- ▶ In the United States and Canada, the automatic suggestion feature of the Lexicon Classification is not supported. Users must enter content in the Lexicon Classification.
In the USA and Canada, Elasticity and Central vascularity of the Lexicon Classification are not displayed.
- ▶ Only the K-TIRADS Assessment Category Score is supported in the United States and Canada.
- ▶ In the United States and China, the Assessment Category Score must be manually entered by users.
- ▶ BTA is not supported in China.

**Editing the TI-RADS Lexicon Classification and TI-RADS Assessment Category Score**

The user may manually edit the Classification items and the TI-RADS Assessment Category Score.

- ▶ Edit the TI-RADS Lexicon Classification
Select a title for each item on the monitor screen. Or press **Classification** on the touchscreen and select Classification for the item.
- ▶ Edit the TI-RADS Assessment Category Score
The TI-RADS Assessment Category Score at the bottom of the monitor will be changed. When the Category Score is changed, the determination also changes accordingly.

■ Recalculation

The user can have the TI-RADS Assessment Category Score and the probability of being malignant or benign re-calculated after they edit the result of the TI-RADS Lexicon Classification. To enable this function, select Setup > Imaging > S-Detect. This setting only applies for K-TIRADS.

K-TIRADS Assessment Category		US Features
1	No nodules	Spongiform, Pure cyst
2	Benign	Solid hyper/Isoechoic or partially cystic + No 3 suspicious features
3	Low suspicion	1. Solid hypoechoic + No 3 suspicious features 2. Solid hyper/Isoechoic or partially cystic + Any 3 suspicious features
4	Intermediate suspicion	Solid hypoechoic + Any of 3 suspicious features
5	High suspicion	Spongiform, Pure cyst

3 suspicious features: Nonparall, Microlobulated/Spiculated, and Microcalcification.



NOTE: Recalculation is not supported in the USA, Canada, and China.

»» S-Detect for Thyroid Sensitivity Settings

Users can adjust the sensitivity and specificity levels for lesion analysis. It can be selected in Setup > Imaging > S-Detect > Sensitivity Setting.

- ▶ High Sensitivity: Increases the chance of detecting malignancy as its sensitivity is higher than that of the default mode (High Accuracy).
- ▶ High Accuracy: This is the default mode. It can distinguish between benignity and malignancy more accurately than the High Sensitivity and High Specificity modes.
- ▶ High Specificity: Increases the chance of detecting benignity as its specificity is higher than that of the default mode (High Accuracy).



NOTE: The Sensitivity Setting is not supported in the United States, Canada, and China.

»» Print S-Detect for Thyroid Report

Once the area of the lesion selected by the user has been analyzed, press **Assign** on the touchscreen. The analysis result is printed out in the patient report.

The S-Detect for Thyroid analysis result is categorized as an S-Detect for Thyroid Report, which is a separate category in the report; the information included in the report is as follows:

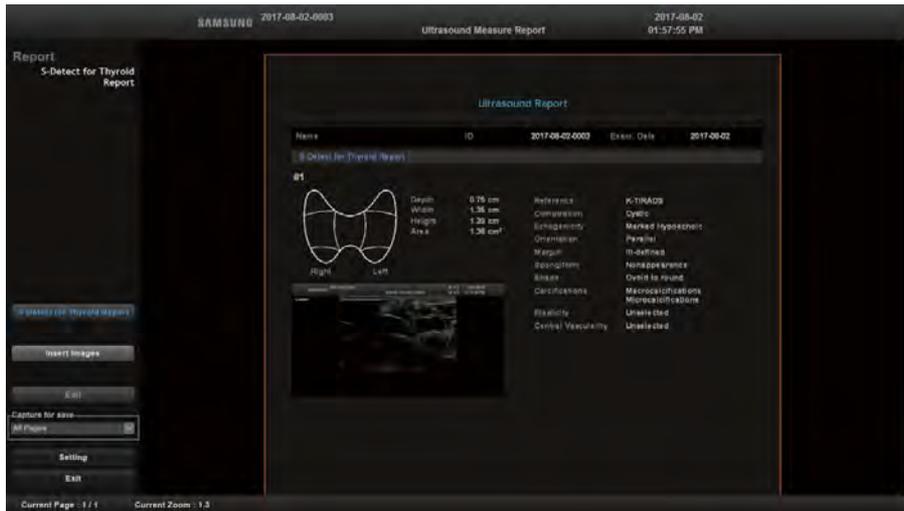
Press the **Exit** button to return to the S-Detect for Thyroid screen.

- ▶ Patient information: The patient information entered by the user when the study began
- ▶ Location information: Position, Depth, Height, Width, Area
- ▶ TI-RADS Score Reference information
- ▶ TI-RADS Lexicon Classification
- ▶ TI-RADS Score
- ▶ S-Detect for Thyroid screen image



NOTE:

- ▶ When printing a report, the S-Detect for Thyroid screen image is automatically printed. Once the area of the lesion selected by the user has been analyzed, press **Assign** on the touchscreen to print up to 30 copies of the report.
- ▶ Attach the image saved during the study by using the **Insert Images** button on the *Report* screen. In each image, you can enter the location information (Left/Right) and its description.



[Figure 7.11 S-Detect for Thyroid Report]

» Exit S-Detect for Thyroid

Press the **Close** button on the touchscreen to exit S-Detect for Thyroid. You may also exit S-Detect for Thyroid by ending Freeze or by pressing the Operation mode buttons on the control panel.

Arterial Analysis

Arterial Analysis provides the user with vessel stiffness information which shows how hard the vessel is. It also provides the user with a tool to easily measure and collect information regarding the diameter of the vessel and the thickness of the vessel wall. This option is helpful in research and follow-up studies related to vessel hardening.



NOTE: Arterial Analysis is an optional feature of this product.

▶▶ Run Arterial Analysis

Acquire an image in the 2D mode and press the **Freeze** button on the control panel. Press **Arterial Analysis** on the touchscreen to run Arterial Analysis.

■ Prerequisites for Arterial Analysis

To run Arterial Analysis, the following conditions need to be met:

Probe	Application	Preset
Linear	Vascular	Arterial, Carotid, Venous

- ▶ Operation mode: 2D (Freeze state)
- ▶ Image Mode: Single Mode
- ▶ Patient information has been entered
- ▶ Cine Stop
- ▶ ECG: Trigger Off

▶▶ ⌘ **Start Arterial Analysis**

1. After checking the probe, application and preset settings, start the vessel scan.
2. Press **Freeze** to obtain the desired image.
3. Press **Arterial Analysis** on the touchscreen.
4. Use the trackball and the **Set** button to draw the area of vessels to analyze, and then press **Start Analysis**.
5. Once the measurement position has been selected, the graph will be displayed. If tracking is not successful, draw the vessel wall again and press **Start Analysis**.

■ **Cine Frame**

Press the button on the touchscreen or use the soft menu dial-button on the control panel to rotate the frame.

■ **Start**

Press the **Start** button on the touchscreen to begin moving forward to the next frame consecutively.

■ **Stop**

While playing, press the **Stop** button on the touchscreen to stop playback.

■ **Speed**

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a play speed from 50 to 150. Changes can be made in increments/decrements of 50.

▶▶ ⌘ **Measure Arterial Analysis**

■ **Location**

Click the combo box to set the location appropriate for the vessel location. When Measure Table opens, the location will be shown in the upper left.

■ Drawing Type

Examine the image and select Line, Box, or Circle depending on the shape of vessel. If the image is in the long axis view, select Line or Box. If it is in the short axis view, select Circle. When you have selected the line type, use the trackball and the **Set** button to draw the Near Wall. Double press the **Set** button to finish selecting the near area. Follow the same procedure to select the Far Wall.

■ Recontr.

Select this to adjust the vessel wall again.

■ Parametric Image

- ▶ Image Only: Only images in the 2D mode will appear.
- ▶ Trajectory: The vessel wall will be shown as a dotted line.
- ▶ Endo+ Epicardial: The vessel wall will be shown as a solid line.
- ▶ Velocity Vector: The vessel wall will be shown as a dotted line, and the end will be connected to the moved vector and displayed.
- ▶ Alpha Blend: Superimposes a parametric image over a 2D image.
- ▶ Angle: Shows the changed angle when the drawing type is Circle.

■ Graph

- ▶ Direction: Select either “Radial”, “Longitudinal”, or “Area”, depending on the vessel direction.
- ▶ Parameter Type: Select Displacement, Strain, Strain rate, or Velocity.
- ▶ 6 Segment: A single frame will be shown in 6 divided segments.
- ▶ Select Range Pos.: You can select a range with the bar and the area will be shown in the graph screen.



NOTE:

For the short axis view, the value for the longitudinal direction cannot be calculated, and therefore cannot be confirmed. “0” will appear in the measure table.

For the long axis view, the value for the circumferential direction cannot be calculated, and therefore cannot be confirmed. “0” will appear in the measure table.

■ Vertical Bar

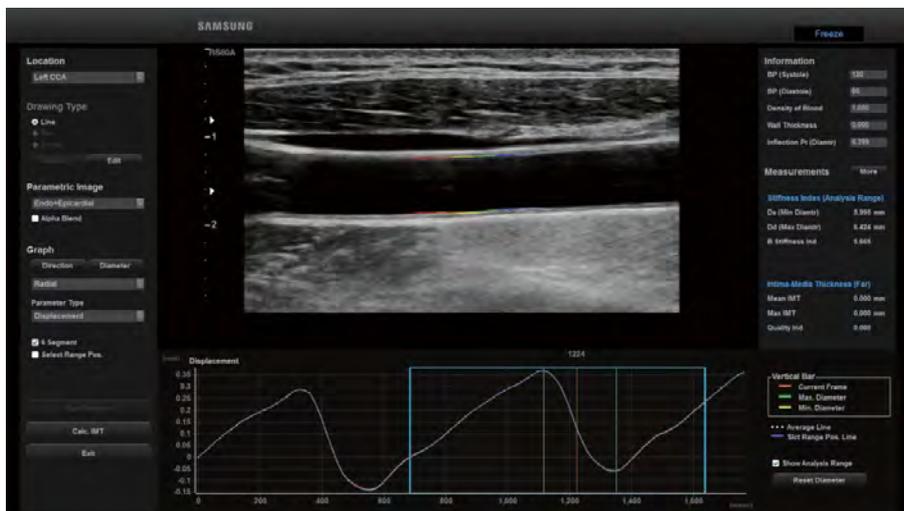
A vertical line will appear. Use the trackball and the **Set** button to change the position.

■ Reset Diameter

Resets the vertical bar location to Max. Diameter or Min. Diameter within the range.

■ Show Analysis Range

Uses the checkbox to show the Analysis Range.



[Figure 7.12 Arterial Analysis]

▶▶ **Calc. IMT**

Press **Calc. IMT** on the screen. The IMT of the current frame will be measured automatically. You can check the IMT measurement in the Measure Table.

■ **Define Intima**

Re-defines the Far Intima Line. When you press **Define Intima** on the screen, the far intima line will be deleted.

■ **Define Media**

Re-defines the Far Media Line. When you press **Define Media** on the screen, the far media line will be deleted.

■ **Edit Intima**

Modifies the Far Intima Line. When you press **Edit Intima** on the screen, the far intima line will appear in yellow, and you can edit it.

■ **Edit Media**

Modifies the Far Media Line. When you press **Edit Media** on the screen, the far media line will appear in yellow, and you can edit it.

■ **Save**

Press the **Save** button on the screen. The measurement of the edited line will be calculated and applied to the table below.

■ **Cancel**

Press the **Cancel** button on the screen. All modifications will be reset.



[Figure 7.13 Calc. IMT]

▶▶ **Arterial Analysis Information**

The *Information* window appears in the upper right of the screen.

■ **BP (Systolic)/BP (Diastole)**

If the BP value has been entered in the patient information, it will appear automatically. If not, you can enter it manually.

■ **Density of Blood**

The default value is 1.05. Users can change it.

■ **Wall Thickness**

Select Box or Line for the drawing type to run Start Analysis. When Calc. IMT is running, the wall thickness is calculated and entered automatically. If Circle is selected, the value can be manually entered by the user.

Tips!

When you press **Start Analysis**, the value of B Stiffness Index will be automatically calculated. If the value of BP (Systole, Diastole) or density of blood is entered or modified, the value of Pulse wave velocity(β) is automatically calculated. This value change can be found in the measure table.

■ Inflection Pt (Diamtr)

You can refer to the diameter line to adjust the position of Min. Diameter, Max. Diameter and Inflection Point. Then the measurement of the Inflection Pt length will appear.

■ Augmentation Index Type

You can assess the pattern of the graph to select cAI or pAI.

- ▶ **cAI:** Three vertical lines will appear. You can use the trackball and the **Set** button to change their positions. You can refer to the diameter line to adjust the position of Inflection Point, Min. Diameter and Max. Diameter.
- ▶ **pAI:** Three vertical lines will appear. You can use the trackball and the **Set** button to change their positions. You can refer to the diameter graph to adjust the position of AI Early Systolic Pressure and AI Late Systolic Pressure.



CAUTION: The range of measurement error is $\pm 5\%$.



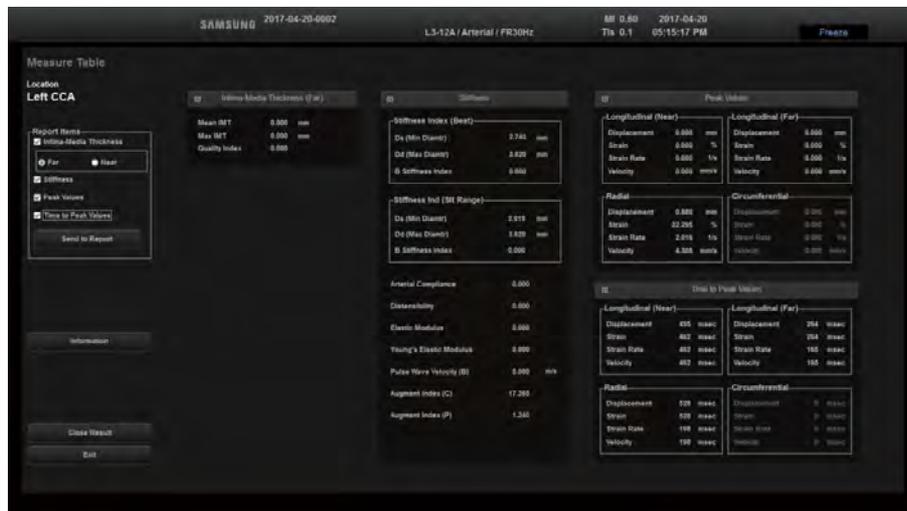
[Figure 7.14 Information]

» **Measure Table**

When you press **More** on the screen, the *Measure Table* window appears. The measurements of the items such as Intima-Media Thickness (Far), Intima-Media Thickness (Near), Stiffness, Peak Values and Time to Peak Values will appear. When you press **Close** on the screen, the screen returns to the *Arterial Analysis* window.

■ **Report Items**

Use checkboxes to select items to be included in the report. When you press the **Send to Report** button, the selected measurement items will be added to the report screen. However, the **Send to Report** button will remain disabled if no items are selected.



[Figure 7.15 Measure Table]

Print Arterial Analysis Reports

Press the **Send to Report** button and the text 'Send Complete' will appear. Press the **Report** button on the touchscreen to print the report.

Based on items selected by using checkboxes to be printed on the report, the following items will be included in the report:

- ▶ Patient information: The patient information entered by the user when the study began
- ▶ Direction: Rt, Lt
- ▶ Art. Analysis-Stiffness (CCA)
- ▶ Art. Analysis-IMT Near (CCA)
- ▶ Art. Analysis-IMT Far (CCA)
- ▶ Art. Analysis-Peak (CCA)
- ▶ Art. Analysis-Time to Peak (CCA)

The screenshot shows a mobile application interface for an Ultrasound Measure Report. The report is titled 'Ultrasound Report' and is dated 2017-08-31. The report content is as follows:

Name	ID	2017-08-31-0002	Exam Date	2017-08-31
[Carotid]				
[Art. Analysis - Stiffness (CCA)]	Rt	Lt		None
[Dist] Min. Diameter		22.40	mm	
[Dist] Max. Diameter		23.47	mm	
[Dist] B Stiffness Index		0.00		
[Analysis Range] Min. Diameter		22.41	mm	
[Analysis Range] Max. Diameter		23.47	mm	
[Analysis Range] B Stiffness Index		0.00		
Arterial Compliance		0.00	mm/MPa	
Distensibility		0.00	1/MPa	
Diastolic Measure		0.00	MPa	
Pulse Wave Velocity (B)		0.00	m/s	
Augment Index (C)		64.98	%	
Augment Index (P)		46.52	%	
[Art. Analysis - IMT Far (CCA)]	Rt	Lt		None
Mean		0.55	mm	
Max		0.58	mm	
Quality Index		0.19		
[Art. Analysis - Peak (CCA)]	Rt	Lt		None
[Radial] Displacement		1.07	mm	
[Radial] Strain		6.93	%	
[Radial] Strain Rate		0.19	1/s	
[Radial] Velocity		2.77	m/s	
[Art. Analysis - Time to Peak (CCA)]	Rt	Lt		None
[Radial] Displacement		1064	ms	
[Radial] Strain		1984	ms	

[Figure 7.16 Arterial Analysis Report]

The equations used for Arterial Analysis measurement are as follows:

	Index	Definition	Formula	Ref	Unit
1	Stiffness Index	The ratio of the natural logarithm of SBP/DBP to the relative change in diameter	$\ln\left(\frac{\text{Systole.BloodPressure}}{\text{Diastole.BloodPressure}}\right) \times \left(\frac{\text{Min.Diameter}}{\Delta D}\right)$	[1, 3]	Non-Dimensional
2	Arterial Compliance	The absolute change in vessel area for a given change in pressure	$\pi \times \left(\frac{\text{Max.Diameter}^2 - \text{Min.Diameter}^2}{4 \times \Delta P}\right)$	[6, 9]	mm/kPa
3	Distensibility	The relative change in vessel diameter for a given change in pressure	$\frac{\Delta D}{\Delta P} \times \frac{1}{\text{Min.Diameter}}$	[3, 8]	kPa ⁻¹
4	Elastic Modulus (Peterson)	The pressure change required for (theoretical) 100% stretch from resting diameter (inverse of distensibility)	$\frac{\Delta P}{\Delta D} \times \text{Min.Diameter}^2$	[1, 8]	kPa
5	Pulse Wave Velocity (Beta)	Speed with which the pulse wave travels along a length of artery	$\sqrt{\frac{\text{StiffnessIndex} \times \text{Diastole.BloodPressure}}{2 \times \text{BloodDensity}}}$ <small>* BloodDensity: 1.050 g/cm³ = 1050 kg/m³</small>	[2, 7]	m/s
6	Augmentation Index (Central)	A measure of wave reflection and arterial stiffness (defined for a central pressure (diameter) waveform)	$\frac{\text{Max.Diameter} - \text{InflectionPoint.Diameter}}{\Delta D} \times 100$	[4, 5]	%
7	Augmentation Index (Peripheral)	A measure of wave reflection and arterial stiffness (defined for a peripheral pressure (diameter) waveform)	$\frac{\text{LateSystolicPressure.Diameter} - \text{Min.Diameter}}{\text{EarlySystolicPressure.Diameter} - \text{Min.Diameter}} \times 100$	[4, 5]	%

**NOTE:**

- ▶ $\Delta D = \text{Max. Diameter} - \text{Min. Diameter}$
- ▶ $\Delta P = \text{Systole.BloodPressure} - \text{Diastole.BloodPressure}$

* Blood pressures are converted from **mmHg** to **kPa** (**1 mmHg = 0.13332239 kPa**)

1. Liao, Duanping, et al. "Arterial stiffness and the development of hypertension the ARIC study." *Hypertension* 34.2 (1999): 201-206.
2. Harada, Akimitsu, et al. "On-line noninvasive one-point measurements of pulse wave velocity." *Heart and vessels* 17.2 (2002): 61-68.
3. Oliver, James J., and David J. Webb. "Noninvasive assessment of arterial stiffness and risk of atherosclerotic events." *Arteriosclerosis, Thrombosis, and Vascular Biology* 23.4 (2003): 554-566.
4. Munir, Shahzad, et al. "Peripheral augmentation index defines the relationship between central and peripheral pulse pressure." *Hypertension* 51.1 (2008): 112-118.
5. Sugawara, Motoaki, et al. "Relationship between the pressure and diameter of the carotid artery in humans." *Heart and vessels* 15.1 (2000): 49-51.
6. Natale, Francesco, et al. "Visceral adiposity and arterial stiffness: echocardiographic epicardial fat thickness reflects, better than waist circumference, carotid arterial stiffness in a large population of hypertensives." *European Heart Journal-Cardiovascular Imaging* (2009).
7. Simova I, Katova T, Kostova V, Hristova K, Dimitrov N. Reproducibility of Arterial Stiffness Indices in Different Vascular Territories and between Different Observers: Reproducibility of Arterial Stiffness Indices. *Echocardiography*. 2011 Apr;28(4):448–56.
8. O'Rourke MF, Staessen JA, Vlachopoulos C, Duprez D, Plante G e. E. Clinical applications of arterial stiffness; definitions and reference values. *American Journal of Hypertension*. 2002 May 1;15(5):426–44.
9. Laurent S, Cockcroft J, Van Bortel L, Boutouyrie P, Giannattasio C, Hayoz D, et al. Expert consensus document on arterial stiffness: methodological issues and clinical applications. *European Heart Journal*. 2006 Sep 25;27(21):2588–605.

▶▶ Finish Arterial Analysis

You can press **Exit** on the screen to finish the Arterial Analysis.

S-3D Arterial Analysis

S-3D Arterial Analysis can analyze the 3D blood vessel and plaque and help you detect cardiovascular conditions at an early stage.



NOTE: S-3D Arterial Analysis is an optional feature of this product.



Start S-3D Arterial Analysis

■ Execution Conditions

To run S-3D Arterial Analysis, the following conditions need to be met:

Probe	Application	Preset
LV3-14A	Vascular	Carotid

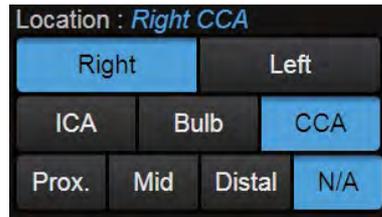
■ Performing a Scan

1. Select 3D mode.
2. Select the tab for S-3D Arterial Analysis.
3. Adjust the quality and angle with the touch panel.
4. Set the ROI box.
5. Press the **Freeze** button.

» » Analyze S-3D Arterial Analysis

■ Selecting Vessel Position

You can select a precise position on the vessel you're currently analyzing.



■ Set Area to Analyze

In the bottom thumbnail, use the icon in the bottom of the green box to set the area to analyze. Blue bars will show the start and end point of the area to analyze.



■ Adjust Images

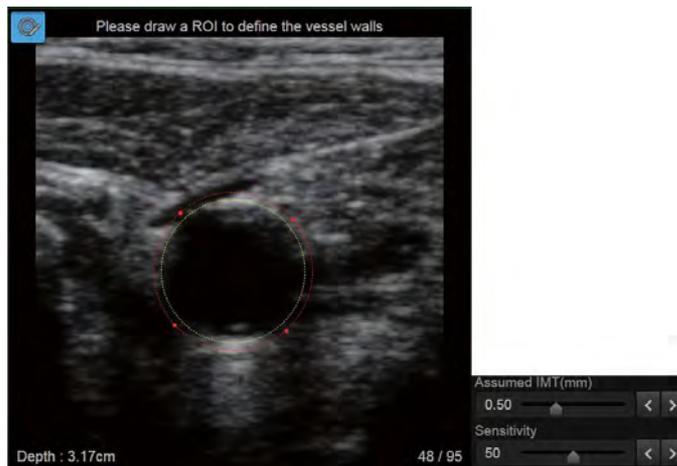
The following four items can be used to adjust images. Users can control the slider manually or select the arrow buttons to control it. The adjusted images will affect the analysis results.



- ▶ Filter: Controls how much noise is removed.
- ▶ Threshold: Controls how much weak signals are removed.
- ▶ Gain: Controls the signal strength.
- ▶ Contrast: Controls the image contrast.

■ Set Seed ROI

For analysis, the user can set the Seed ROI on the vessel wall. Move the trackball to position it on the starting point of the Seed ROI and click it. After adjusting the ROI, click it again to set the Seed ROI. The ROI will be automatically adjusted to the vessel. Then use Assumed IMT, Sensitivity, or Edit to adjust it to fit the ROI. Select the **Clear** button at the bottom of the image to delete the ROI.



■ Start Analysis

To start the analysis, set the Seed ROI and select the **Analysis** button at the bottom of the image.

■ Graph

Two components of the analysis results are shown in graphs. Use the upper right button in the graph to select each component.

1. Area Stenosis: ratio of area stenosis
2. Minimum Lumen Diameter: minimum diameter of Residual Lumen



■ 3D Modeling

For analysis results, 3 different 3D Modeling options are offered. The 3D screen shows the current slice position with a green box and offers Rotate and Zoom In/Out functions.

1. 3D Vessel: Shows extracted vessels and current slice in 3D.
2. Plaque Vessel: Shows plaque, using a color scale, in accordance with plaque height in 3D vessel model.
3. Plaque Map: Shows plaque, using a color scale, in accordance with plaque height in spread 3D vessel model.

■ Reset Analysis

Select the **Recontour** button at the bottom of the image to reset the analysis.

S-Shearwave Imaging

It provides the user with images showing tissue elasticity.



NOTE: S-Shearwave Imaging is an optional feature of this product.

▶▶ Start and finish S-Shearwave Imaging

Press **S-Shearwave Imaging** on the touchscreen. Press it again to end S-Shearwave Imaging.

▶▶ Run S-Shearwave Imaging

■ Prerequisites to Run S-Shearwave Imaging

S-Shearwave Imaging can be operated under the following conditions:

Probe	CA1-7A	LA2-9A
Application	Abdomen (General, General1, Penetration, Renal, Aorta)	Small Parts (Breast, Thyroid) MSK (General, Pediatric Hip)
Operation mode	2D Mode (Freeze state)	



Recommendations for Running S-Shearwave Imaging

Since the image quality deteriorates if the contact surface of the probe loses contact with the scan surface, the contact surfaces of the probe must adhere to the object being measured completely.

»» ⌘ Measure S-Shearwave Imaging

1. After checking the probe and the application, start a scan.
2. When you get the desired image, press the **S-Shearwave Imaging** on the touchscreen.
3. Use the trackball to move to a desired ROI measurement position.

Tips!

How to Obtain More Accurate Images with S-Shearwave Imaging (Using CA1-7A Probe)

- ▶ Scan the space between two ribs. (The right lobe of liver is recommended.)
- ▶ Ask patients to breathe steadily and stably before holding their breath. (Avoid deep breathing.)
- ▶ Position the ROI Box on top of the suspected lesion without obscuring vessels.
- ▶ The ROI must be positioned at least 1.5 cm below the liver capsule.

»» ⌘ Measure S-Shearwave Imaging Elasticity

1. Press the **Freeze** button on the control panel, and then the **Elasticity Measure** button on the touchscreen.
2. Use the trackball to move to a desired ROI measurement position within the Elasticity Image ROI.
3. Pressing the **Set** button will display elasticity statistics within the Measure ROI and save the value.
4. A maximum of four Sites can be specified, and a maximum of ten Measure ROIs can be specified per Site.

»» ⌘ Measure S-Shearwave Imaging Elasticity Ratio

1. Press the **Freeze** button on the control panel, and then the **Elasticity Ratio Measure** button on the touchscreen.
2. Use the trackball to move to a desired ROI measurement position within the Elasticity Image ROI.
3. Pressing the **Set** button will display elasticity statistics within the Measure ROI.
4. When two Measure ROIs are specified, it will display the elasticity ratio and save the value.
5. A maximum of four Sites can be specified, and a maximum of ten Measure ROIs can be specified per Site.

Tips!

Using Elasticity (Ratio) Measure, you can measure the elasticity value in both Single and Dual Live RMI modes where elastograms are provided.

■ RMI

An RMI image, which indicates the reliability of the measured Shearwave elasticity image, will appear. The darker the color, the higher the reliability. Displays the color map in a color that is different from the color map in the Shearwave elasticity image.

■ Dual Live

If you enable RMI in S-Shearwave Imaging Dual Live, you can view both an RMI image and a shearwave elastogram at the same time.

■ Unit

Press the button on the touchscreen or use the soft menu dial-button on the control panel to change the unit of an elasticity value.

- ▶ kPa: Based on Young's Modulus
- ▶ m/s: The Shearwave speed is displayed in 'm/s'.

■ Elasticity Range

Select the color of the elastogram. Press the button on the touchscreen or use the soft menu dial-button on the control panel to change the Color Map range. If you change the Color Map, the color bar will also change accordingly.

■ Smooth

It softens elasticity images.

■ Clear All Result

Clears the results of all Sites.

■ Clear Site Result

Clears the results of the selected Sites.

■ HQ Mode

With High Quality Mode, it displays high-resolution images.

S-Shearwave

It provides the user with tissue stiffness information.



NOTE: S-Shearwave is an optional feature of this product.



Start and Finish S-Shearwave

Press **S-Shearwave** on the touchscreen. Press again to end S-Shearwave.



Run S-Shearwave

■ Prerequisites to Run S-Shearwave

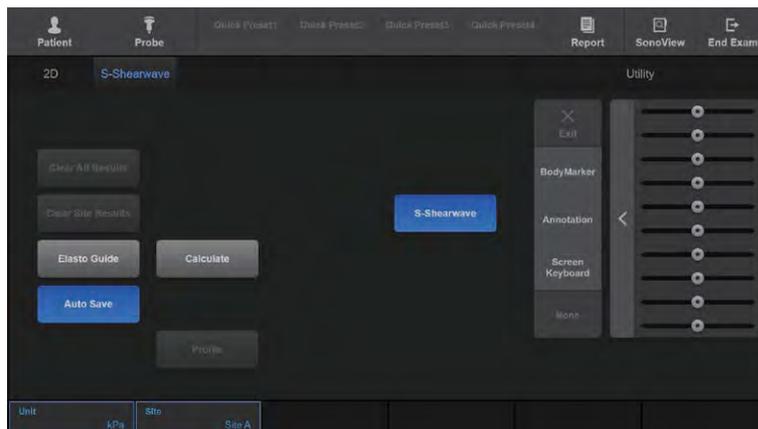
To run S-Shearwave, the following conditions need to be met:

- ▶ Probe: CA1-7A
- ▶ Application: Abdomen (Aorta, General, General1, Penetration and Renal are recommended)
- ▶ Operation mode: 2D Mode
- ▶ Image Mode: Single Mode
- ▶ Probe: LA2-9A
- ▶ Application: Small Parts (Breast)
- ▶ Operation mode: 2D Mode
- ▶ Image Mode: Single Mode

Tips!

Recommendations to Run S-Shearwave

- ▶ View Depth must be within 8 cm.
- ▶ The bottommost depth of the ROI box must be from 2 cm to -1 cm from the View Depth. (e.g., The bottommost depth of the ROI box must be from 2 to 7 cm, whereas View Depth is 8 cm.)
- ▶ Since the image quality may deteriorate if the contact surface of the probe loses contact with the scan surface, the probe must adhere to the object being measured.



[Figure 7.17 S-Shearwave – Touchscreen]

▶▶ **Measure S-Shearwave**

1. After checking the probe and the application, start a scan.
2. When you get the desired image, press **S-Shearwave** on the touchscreen.
3. Press **Elasto Guide** on the touchscreen to display an elasticity image.
4. Use the trackball and the **Set** button to move to the position to measure the ROI.
5. A total of four Sites can be specified.

■ **Clear All Results**

Clears the results of all Sites.

■ **Clear Site Results**

Clears the results of the selected sites.

Tips!

How to Obtain More Accurate S-Shearwave Images

- ▶ Scan the space between two ribs (right lobe of liver is recommended).
- ▶ Ask patients to breathe steadily and stably before holding their breath. (Avoid deep or shallow breaths.)
- ▶ Position the ROI Box on the suspected lesion, but not on vessels.

Print S-Shearwave Report

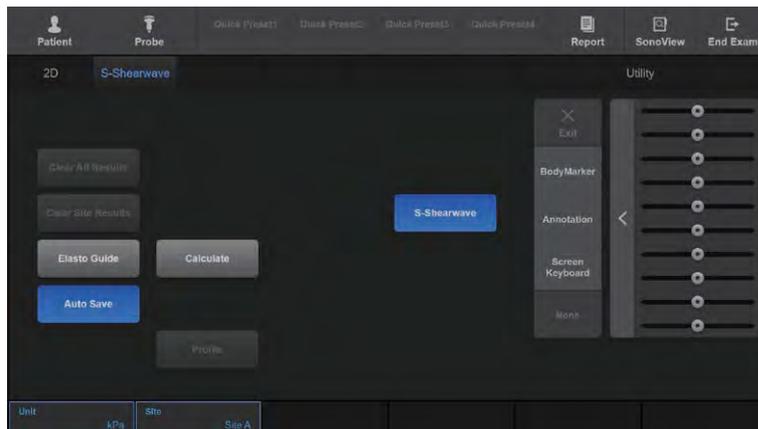
Press the **Send to Report** button and the text 'Send Complete' will appear. Press the **Report** button on the touchscreen to print the report. The report includes the following information:

- ▶ [Stiffness (kPa), Stiffness (m/s), Depth (cm), RMI] x 20 (max)
- ▶ 2 Median (kPa, m/s)
- ▶ 2 IQR/Median (each calculated in kpa and m/s)



- ▶ When scanning the intercostal view of liver, the ROI box must be positioned on the lesion to measure the stiffness.
- ▶ Ask patients to hold their breath and wait until the result is displayed.
- ▶ To obtain a stable measurement, position the ROI on the same location and repeat the measurements.

- ▶ Press **Calculate** on the touchscreen or use the **Set** button on the control panel to start measurement. You can select either m/s or kPa to change the unit of elasticity by pressing the touchscreen button or using the soft menu dial-button on the control panel.
 - kPa: Based on Young's Modulus.
 - m/s: Shearwave speed is shown in 'm/s'.



[How to Position Region of Interest (ROI)]

- 1** ROI must be at least 1.5 cm below the liver capsule.
 - There must be no vessels between liver capsule and ROI.
 - Only the same type of tissues must be included in the ROI.
- 2** The depth of ROI must be 6 cm or less.
 - If the depth is more than 6 cm, the result may not be reliable.
- 3** It is recommended that ROI is positioned near the center line.
 - As the ROI is positioned farther away from the center line, the result may not be reliable.
- 4** No vessels should be placed within the spaces (1cm x 1cm) on both sides of the ROI.
 - It is recommended that these spaces only include the same type of tissues as those in ROI.

Tips!

Incorrect Examples of Region of Interest (ROI)



[ROI is Near the Surface of Liver Capsule]



[Image in B Mode is Too Dark]



[ROI is Too Far Away From the Center Line]

[Calculate S-Shearwave]

1. Press **Calculate** on the touchscreen or use the **Set** button on the control panel to start measurement. You can select either m/s or kPa to change the unit of elasticity by pressing the touchscreen button or using the soft menu dial-button on the control panel.
2. The calculating progress bar is displayed on the lower left of the monitor screen and the message, "Please wait for next calculation", appears when the calculation is finished.

[S-Shearwave Image Screen Result]

1. The calculation results appear in RMI on the lower part of the monitor.
 - kPa (or m/s): Young's Module (Speed)
 - RMI (Reliable Measurement Index): Reliable Measurement Index (RMI) shows how reliable the measurement is and it is more reliable if the value gets closer to the maximum value of 1. (If RMI is 0.4 or higher, it is considered as very reliable.)
 - It is recommended that this process is repeated more than 10 times by pressing the **Freeze** button on the control panel. (The accumulated number of measurement results must be less than 20.)
2. You can use the **Auto Save** button on the touchscreen to save the image results automatically (Auto Save can be used only if patient information has already been entered.)

- 3 Users can view the measured results in the Stiffness Results Table.
- Stiffness Results displays up to 20 values of Stiffness, Depth, and RMI.
 - In the bottom table, Median and IQR/Med. values are displayed.

A	B	C	D
No.	Stiffness (kPa)	Depth (cm)	RMI
1	3.4	3.4	0.9
2	3.0	3.4	0.9
3	3.7	3.4	1.0
4	2.9	3.6	0.9
5	3.9	3.7	1.0

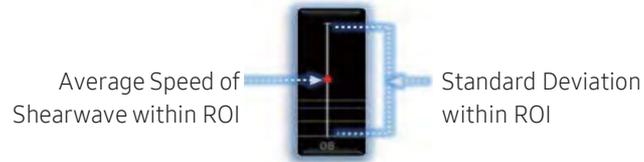
Median	IQR/Med.
3.4kPa	25.0%

[Stiffness Results]

1. Press the **Profile** button on the touchscreen to view the statistics of several measurement results. However, you can only see the statistics of measurement results by pressing the **Profile** button only if patient information already has been entered.

[Graph Result]

- ▶ Up to 20 results can be displayed.



The lines for Med., 25%ile, and 75%ile will appear. If there is only one measurement result, the position of the lines for Med., 25%ile, and 75%ile will be identical. If the measured value is 0, then the result will not be displayed on the screen and will not be added to S-Shearwave Profile.

- ▶ Median value represents the stiffness of each measurement.
- ▶ IQR (Interquartile Range): 75percentile – 25percentile
- ▶ IQR/Med. < 30%: allowed value, IQR/Med. > 30%: unreliable result



NOTE: The result can be trusted only when the value from dividing Interquartile Range by Median (IQR/Med.) is less than 30%.

[Graph Modification]

[Monitor Screen]

- 1 The data a in the image above has RMI of less than 0.4; thus it is not reliable and we can remove the value. The data b is too far away from the Median value; thus not reliable. Uncheck the outliers such as a and b to make sure the IQR/Med is less than 30%.
- 2 The measurement is considered successful if there are 5 or more checked boxes, but you can follow the below steps if it is insufficient.
 - Perform the measurement according to the guideline.
 - Take a measurement on a different location.

**NOTE:**

- ▶ If the S-Shearwave measurement is not displayed, the “Detection Failed, Please Retry...” message will be displayed on the monitor screen.
- ▶ The accumulated number of measurement results must be less than 20.
- ▶ If the measured value is 0, the result will not be displayed on the screen and will not be added to Edit Data.
- ▶ Reliable Measurement Index (RMI) is a measured reliability and has a higher reliability as it approaches 1.

2. When you press **OK** after deselecting the checkbox, the deselected data values will be deleted. If you press **Close**, no selection will be applied, and the value will remain the same.
 - ▶ Click the **Auto Profile** button and uncheck all unreliable data to set the IQR/Med value to 30% or lower.
 - ▶ Click the **Semi-Auto Profile** button and uncheck unreliable data piece by piece, starting with the most unreliable data, and set the IQR/Med value close to 30% or lower.
 - ▶ Click the **Check All** button to check all data.



NOTE: Press End Exam to run the Clear All data function.



[Figure 7.18 S-Shearwave Profile]

3. When you press **Close**, the screen will return to the window where you can set the ROI for measuring the elasticity.


Tips!
S-Shearwave Velocity/Stiffness Measurements

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Velocity	m/s	S-Shearwave ROI	±15% for the CA1-7A probe over the range of depths (from 1 cm to 7 cm) using phantoms	SD less than 5% for multiple repeated measurements over the range of depths (from 1 cm to 7 cm) using phantoms
Stiffness	kPa	S-Shearwave ROI	±30% for the CA1-7A probe over the range of depths (from 1 cm to 7 cm) using phantoms	SD less than 10% for multiple repeated measurements over the range of depths (from 1 cm to 7 cm) using phantoms

The formula for Stiffness: $E = 3 \times \rho \times c^2$

Where E = Young's modulus of tissue

ρ = density of tissue (assumed to be 1 g/cc)

c = shear wave speed in m/s



NOTE: The conversion from shear wave speed (m/s) to Young's modulus is done under the assumption that the underlying material in which the shear wave propagates is linear, isotropic, incompressible, and homogenous.

S-Fusion

Based on the 3 dimensional CT, PET-CT, and MRI images acquired previously, the sensors installed in the probe will be used to adjust with the real-time ultrasound wave. The position of the probe will be tracked to display the real-time ultrasound image of the same plane and the registered 3-dimensional image.



NOTE: S-Fusion is an optional feature of this product.



WARNING:

- ▶ Patients with cardiac auxiliary devices such as a pacemaker or defibrillator should not approach this device.
- ▶ The registered 3D Data do not contain real-time images and therefore should be used only as a reference for a surgical procedure.

⚠ Caution

Familiarize yourself with the instructions shown below before using the navigation system:

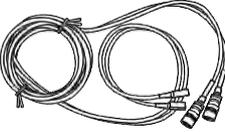


WARNING:

- ▶ Do not operate the Field Generator within 200mm of a cardiac pacemaker. The magnetic field generated by the Field Generator may interfere with the operation of the pacemaker. This may result in injury.
- ▶ Do not allow sensors to be exposed to powerful magnetic fields such as an MRI machine. Doing so may magnetize the sensors. Using magnetized sensors may result in inaccurate information or an injury.
- ▶ To avoid magnetic distortion, no magnetic element should exist within 300mm of the Field Generator and its surrounding area.
- ▶ If the patient is using an iron-framed bed, install the Field Generator above the bed and it must be positioned at least 20cm away from the bed.

» » **Install Navigation System**

The components of the navigation system are as follows:

Components		Description
	Field Generator	Generates an electromagnetic field to find the location of sensor.
	Probe Sensors (2EA)	Detects the strength and orientation of the generated electro-magnetic field, and relays the information to the tracking unit.
	Tracking Bracket	Allows mounting of Probe Sensors on the probe.
	Tracking Unit	<p>Calculates the position and orientation of the probe and the biopsy needle based on the data from the sensors. It also displays this information on the monitor. Connect the cable of the transmitter to the port on the right. Connect the two sensors from the probe to the first and second ports on the left. However, if Needle Tracking is used, connect the Needle Tracking sensor to the third port.</p> <p>The external marker sensor is connected to the fourth port.</p>
	External Marker	Compensates the movement of the patient by placing it on the patient and through a function that finds out the patient's position. Also, when there are CT data containing markers, it can automatically register them. An external marker that can be used for this product is OmniTRAX of CIVCO.

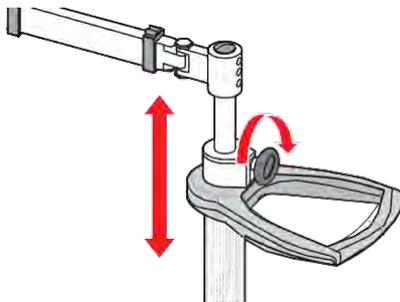
■ **Stand**

Use the Stand to mount the Field Generator and store various supplies.

▶▶ Installation Procedure for Navigation System

■ Adjusting the position of the Field Generator Mount

1. Rotate the Height Adjustment Lever clockwise to release the lock.
2. Lift or lower the Height Adjustment Pipe to a desired height, and rotate the lever to lock the Pipe in place.

**CAUTION:**

- ▶ When adjusting the height, be careful not to place your hand, foot, or any other body part on the moving area.
- ▶ After adjusting the height, make sure that the Height Adjustment Lever is securely locked.

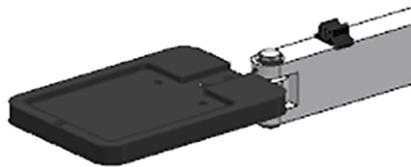
**NOTE:** Adjusting the height is easier if you engage the Brakes first.

■ Mounting the Field Generator

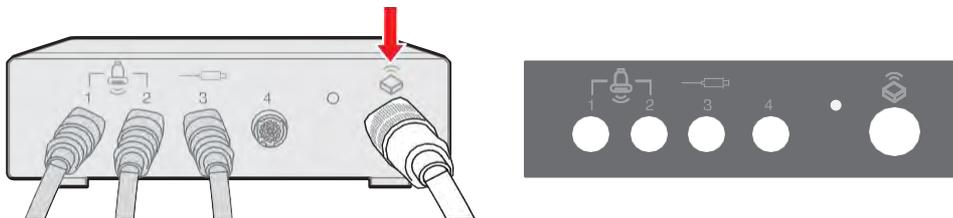


CAUTION: Before mounting the Field Generator, turn off the power of the ultrasound system you want to connect it to.

1. Place the Field Generator on the Mount by aligning it properly.
2. Make sure that the Field Generator is aligned with the Mount correctly, and then use the screws to secure the Field Generator to the Mount.

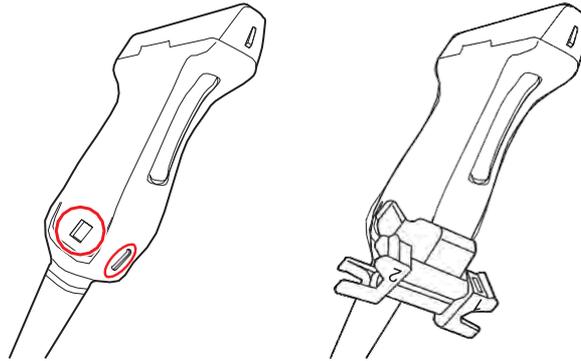


3. Connect the Field Generator cable to the Tracking Unit's Field Generator port.

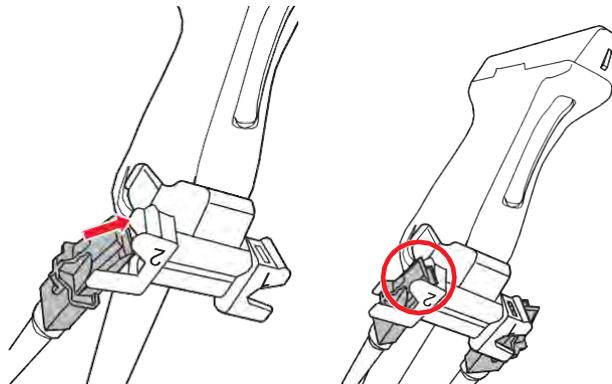


■ Connecting the Probe Sensors

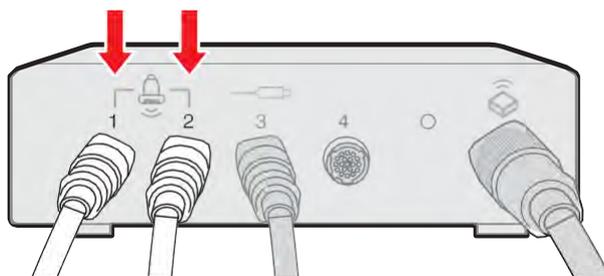
1. Mount the Tracking Bracket into the groove on the surface of the probe.



2. Mount the end of the Probe Sensor (2EA) into the Tracking Bracket.



3. Connect the Probe Sensors' cables to Ports 1 and 2 of the Tracking Unit. Connect the needle tracking sensor to port 3 of the tracking unit, and connect the external marker sensor to port 4.



4. When using Clear Track/Virtual Track, connect the needle tracking sensor to port 3 of the tracking unit.
5. The external marker sensor is connected to Port 4 in the tracking unit. When the external sensor is connected, S-Fusion registration works together with the position of external marker sensor, and uniform registration results are provided in accordance with the external marker sensor position.

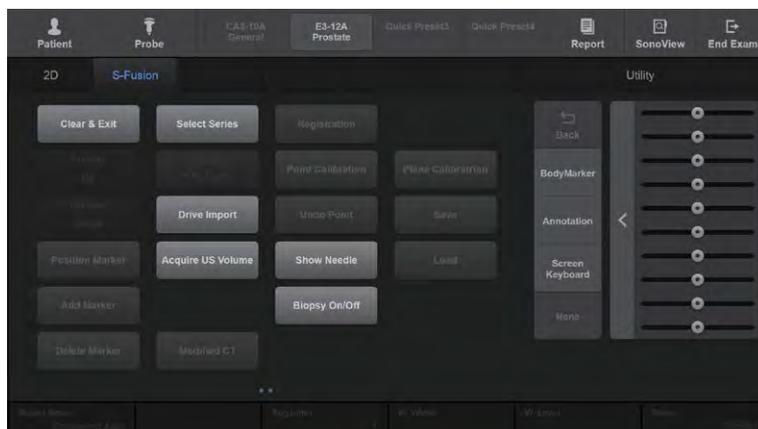
▶▶ **Start and Finish S-Fusion**

Press **S-Fusion** on the touchscreen. Press the **Clear & Exit** button to delete all registered data. The connection with the sensors will be terminated and S-Fusion will end.

Tips!

S-Fusion Execution Conditions

- ▶ Probe: CA1-7A, L3-12A, LA4-18B, CA3-10A, E3-12A (Prostate Preset)
- ▶ Available Operation modes: 2D, C, PD, CEUS+
- ▶ Connection to the navigation system is established.
- ▶ Option: Unlocked state
- ▶ When the patient information is entered, DICOM Data are loaded. However, without entering the patient information, the US Volume Data can be obtained or registered.



[Figure 7.19 S-Fusion – Touchscreen]



Run S-Fusion

1. Open the *Patient* window to go to the DICOM Q/R tab. Select the DICOM Q/R server to retrieve the desired data or retrieve the saved 3D DICOM data from an external device (CD, DVD, or USB drive).
2. When the *Retrieved Data* window opens, select data and press **Assign**.



NOTE: For more information on using DICOM Q/R, please refer to 'Chapter 6. Starting Modes of Operation', 'DICOM Q/R'.

3. Press **S-Fusion** on the touchscreen to start S-Fusion.
4. When you press **Select Series** on the touchscreen, the data will be loaded. The patient ID must be entered.

■ Select Series

If there are retrieved data, the **Select Series** button will be activated. You can select up to six series. New data will be loaded only when the selected data is different from the previously loaded data, and the previous data will be deleted. If the same data is selected, no data will be loaded and the previous data will remain.



Select Series

- ▶ Select each series on the touchscreen to modify it at any time.
- ▶ If you enter into the tracking mode by registering in only one series, the rest of the data will be registered and can be tracked.
- ▶ All series data share the registration by modality.
(With E3-12A Prostate Fusion, only MR Series can be selected.)
- ▶ If you register in only one modality, the registration will be automatically calculated and applied in other modalities; however, you can modify the registration in each modality by running the Modify Registration.

■ Drive Import

This is used when importing data via storage devices (CD, DVD, and USB).

■ Priority

Determines whether to focus on real-time ultrasound image (2D), CT, PET-CT or MRI for operation.

■ Show Needle

Connect the needle tracking sensor to the third port of the tracking unit. You can use the **Show Needle** button on the touchscreen to display or hide the position and orientation of the probe and needle on the image. The S-Fusion function provides Clear Track and Virtual Track. The selected Needle Tracking Device is displayed at the top left corner of the monitor screen.

■ Biopsy On/Off

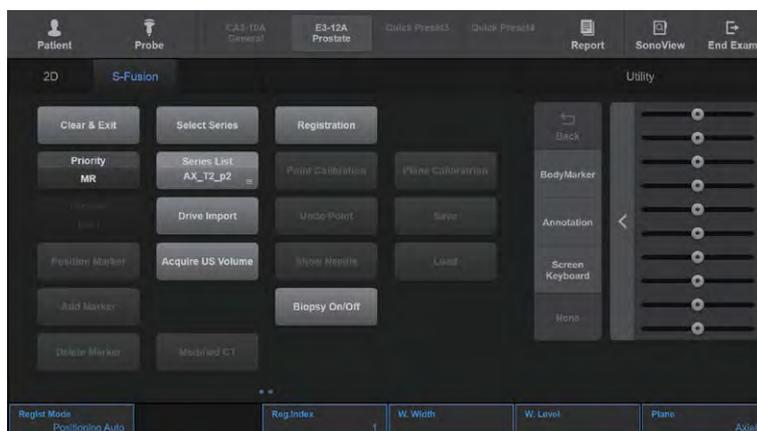
The Biopsy Guideline appears on US images.

■ Plane

Select Axial, Sagittal, or Coronal as the 2D plane to show in the 3D Volume of MRI, CT, and PET-CT. (With E3-12A Prostate Fusion, only the axial cross-section can be displayed.)

■ Orientation Marker

Corresponding orientation text will appear in the upper and right corner of the Volume image. After using Registration function of S-Fusion, the orientation text will no longer appear.

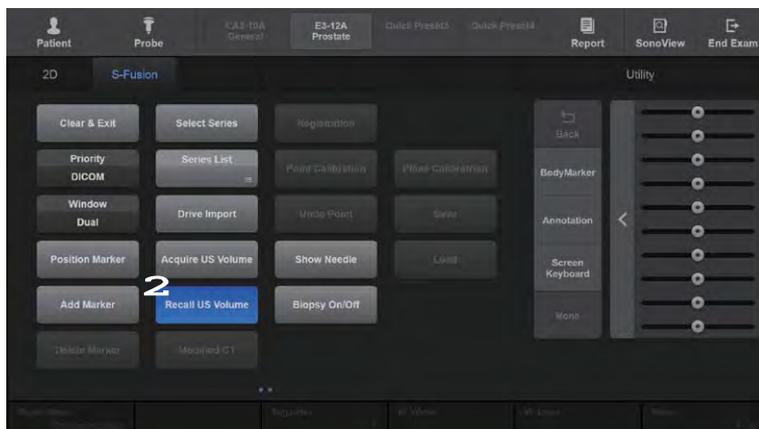
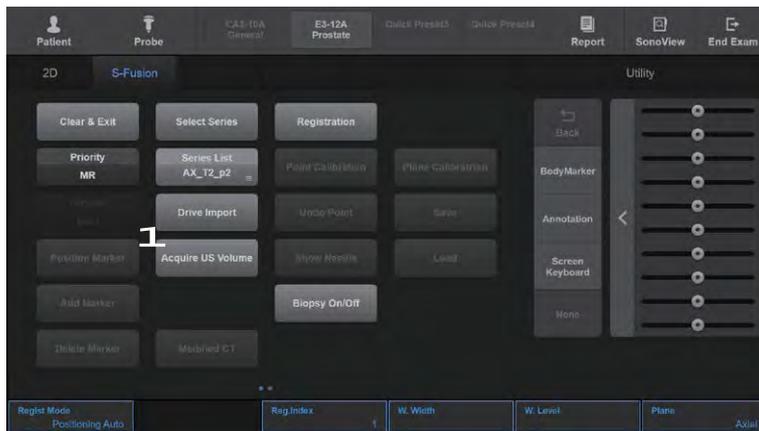


[Figure 7.20 Run S-Fusion – Touchscreen]

■ **Acquire US Volume**

- 1 Acquire US Volume: Move the probe to obtain an ultrasound image as 3D Volume Data.
- 2 Recall US Volume: You can press **Acquire US Volume** to load the acquired 3D Volume Data and enable this button.

Press **Acquire US Volume** to use the Freehand 3D by Sensor function. Press the **Set** button on the control panel to re-configure the volume data from the sensors.



[Figure 7.21 US Volume – Touchscreen]



- ▶ If you press **Select Series** or **Acquire US Volume**, it will be automatically switched to Dual mode.
- ▶ E3-12A Prostate Fusion does not support the Acquire US Volume feature.

▶▶ Registration

1. Work on aligning the orientation prior to the registration. Position the probe in the sagittal direction and adjust the orientation lock by using the **Set** button. However, if the patient is lying face up while **Correct Probe Angle** on the touchscreen is on, the yaw and pitch of the probe are corrected accordingly.
2. Press the **Registration** button on the touchscreen to start registration.



NOTE: For E3-12A Prostate Fusion, please check the Registration Mode in Prostate Fusion Registration.

■ Registration Mode (Regist Mode)

- ▶ **Manual:** Sets the 3D volume data from either CT, PET-CT or MRI as a reference plane. Choose a Position (Supine/Prone) according to the patient's posture. Bring the reference plane to the real-time ultrasound image and set the point lock on the desired area. Set the point lock on the same location and area of the reference plane of CT, PET-CT or MRI.
- ▶ **Sweeping Auto:** Use the Freehand by 3D function to tilt and acquire ultrasound images including the diaphragm. Then, find the common features of the two images and register them. To increase the accuracy after completing the registration, you may proceed to Calibration (Point/Plane) and register real-time ultrasound, CT, PET-CT, and MRI images again.
- ▶ **Positioning Auto:** Place the probe on the anticardium in the sagittal direction and press the **Registration** button. Find common positions in two images and register them. To increase the accuracy after completing the registration, you may proceed to Calibration (Point/Plane) and register real-time ultrasound, CT, PET-CT, and MRI images again.
- ▶ **External Marker:** Only CT data can be registered. You can register only if there are DICOM volume data containing CT taken by placing markers in advance. Use specific points of the DICOM volume markers and specific points of markers placed on the patient to register. When sensors are connected to markers, the active patient tracking is automatically executed to reflect the patient's position in real-time. To increase the accuracy after completing the registration, you may proceed to Calibration (Point/Plane) and register ultrasound, CT, and MRI images again.

- ▶ Respiration Auto: Only CT data can be registered.
 1. With the same breathing conditions as in the CT scan, use the Freehand by 3D function to tilt and acquire the ultrasound images to include the diaphragm.
 2. For the second image, in a breathing state favorable for ultrasound scanning, use the Freehand by 3D function to tilt and acquire the ultrasound images to include the diaphragm.
 3. By using the acquired 3D US Volume, the registration results between calibrated breathing CT and CT prior to calibration are provided.
 4. By using **Modified CT**, select a CT image before and after calibration, to calibrate and observe it with the real-time ultrasound.
 5. To increase the accuracy after completing the registration, you may proceed to Modify Registration to register images again by setting landmarks on each real-time ultrasound and CT image.

**NOTE:**

- ▶ S-Fusion can be used for all applications that support the CA1-7A, L3-12A, and LA4-18B probes. All 5 registration types can be used for CA1-7A abdomen, but only Manual and External Marker can be used for L3-12A and LA4-18B Abdomen.
- ▶ E3-12A Prostate only provides the Positioning Auto Registration methods.
- ▶ The Respiration Auto function is for Portal Phase CT, and reliability of the image may become low if it is a partial image of a Liver CT.

3. When the registration is completed and the image appears, press Registration to cancel the previous registration and run the registration again.

■ W. Width

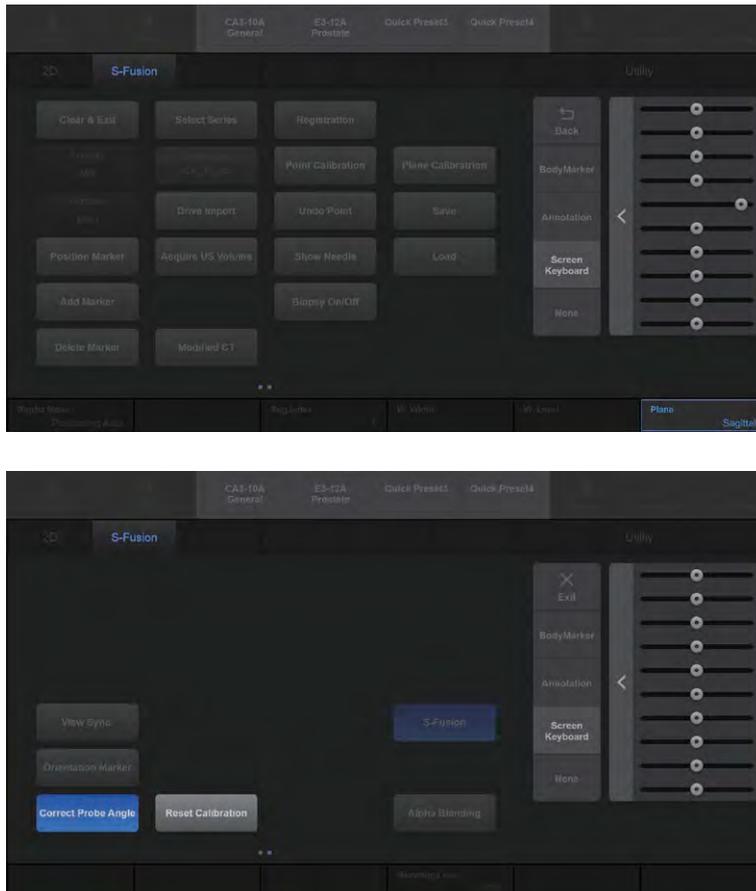
Adjust the Window Setting of MRI, CT and PET-CT to control the contrast.

■ W. Level

Adjust the Window Level of MRI, CT and PET-CT to control the brightness.

■ Correct Probe Angle

You can press **Correct Probe Angle** on the touchscreen to turn it On or Off. When it is 'On', it adjusts the tilting of the probe for a patient who is lying down. (Not supported by E3-12A Prostate Fusion.)



[Figure 7.22 Registration – Touchscreen]

»» ⌘ Registration Tracking

■ Window

Select Dual or Single for the layout to show the fusion image.

■ Registration

- ▶ Point Calibration: You can modify the information for registration. When registration is complete, you can select the same landmark from two modalities to modify registration.
- ▶ Plane Calibration: You can modify the information for registration. Using the trackball, change the angle to **Angle/X**.
- ▶ Undo Point: Returns to the previous registration. If there is no previous registration, the button will be disabled.
- ▶ Save: Stores the results of the most recent registration to a selected Reg.Index.
- ▶ Overwrite: Saves a new registration result to the Reg.Index over the existing saved registration.
- ▶ Load: Opens saved registration results in a selected Reg.Index.

■ Position Marker

Press **Position Marker** on the touchscreen to turn the marker On or Off. This marker is to flag the location of a lesion or suspected abnormality, and up to 10 markers can be created. If this is turned off, it can be turned On by using Marker Draw.

■ Delete Marker

Press **Delete Marker** on the touchscreen to delete the previous position marker.

■ Add Marker

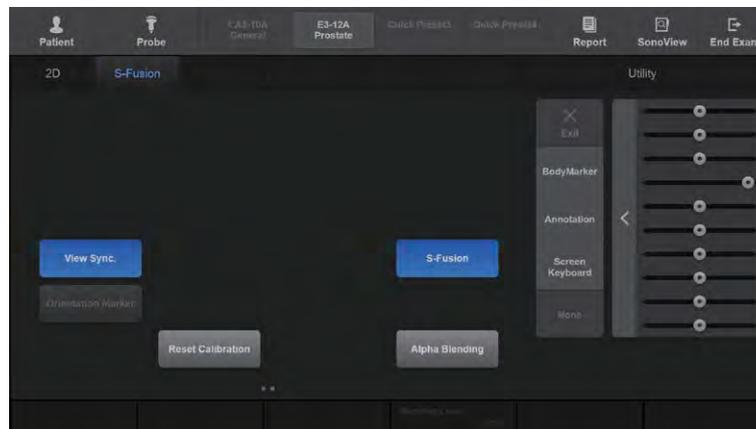
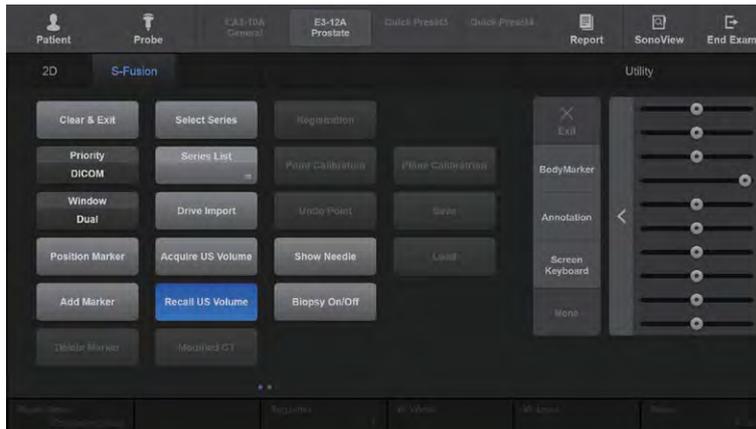
Press **Add Marker** on the touchscreen to add a new position marker.

■ View Sync.

Press **View Sync.** on the touchscreen to synchronize the real-time ultrasound images with those of CT, PET-CT or MRI. Register by loading DICOM data, or press **Acquire US Volume** to run.

■ Alpha Blending

Press **Alpha Blending** on the touchscreen to turn this function On or Off. The real-time ultrasound image will be superimposed over CT, PET-CT or MRI images. When turned On, **Blending Level** will be enabled in the soft menu.



[Figure 7.23 Registration Tracking – Touchscreen]

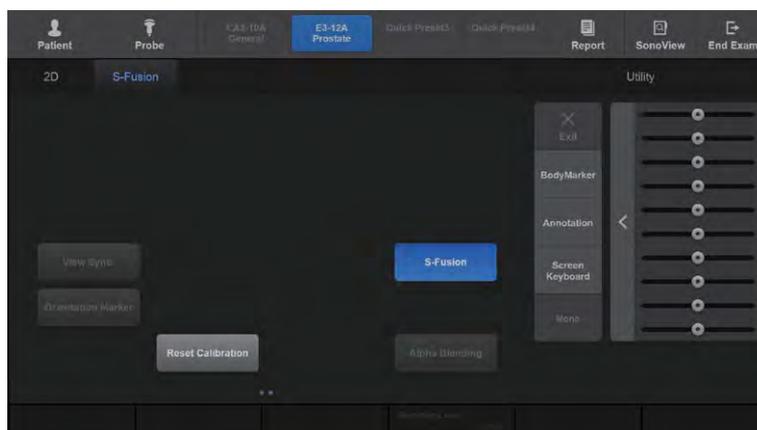
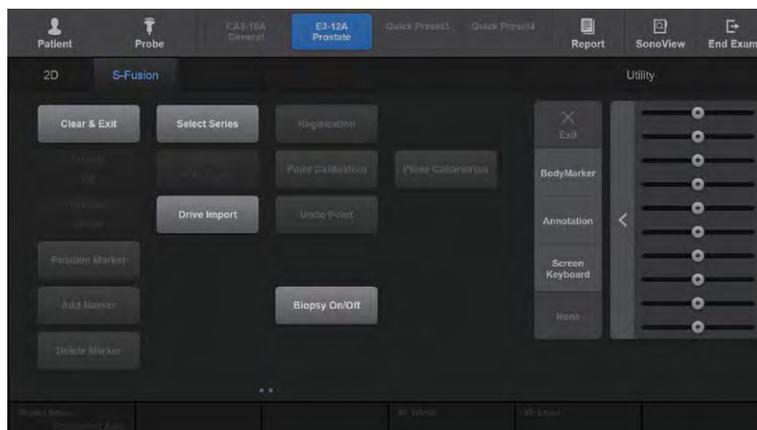


Prostate Fusion

Tips!

Prerequisites to Run Prostate Fusion

- ▶ Probe: E3-12A
- ▶ Preset: Prostate
- ▶ Available Operation modes: 2D, C, PD
- ▶ The navigation system should be connected.
- ▶ Option: Unlocked state



[Figure 7.24 S-Fusion – Touchscreen]

■ Prostate Segmentation

Tapping **Segmentation + Registration** on the touchscreen automatically starts an Auto Segmentation and opens the Segmentation tab.

Press the **Exit** button to delete segmented data.

The segmented results can be modified by moving the trackball.

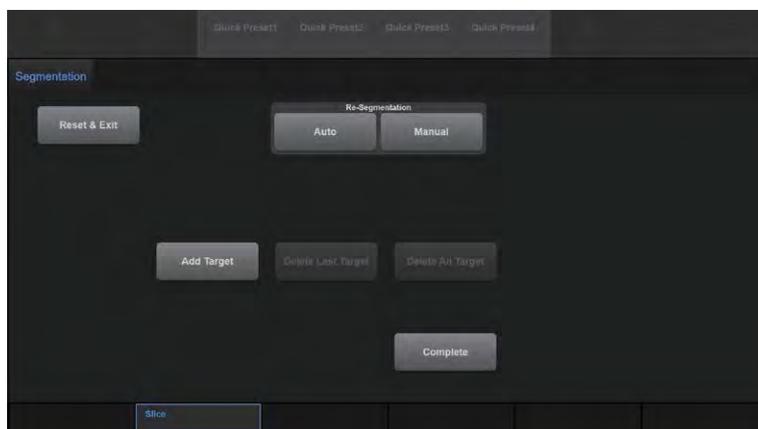


NOTE:

- ▶ When Prostate Segmentation is selected, accuracy is guaranteed for MR T2 images only.
- ▶ CT, PET-CT images cannot be used in Prostate Fusion.

■ Hide Target

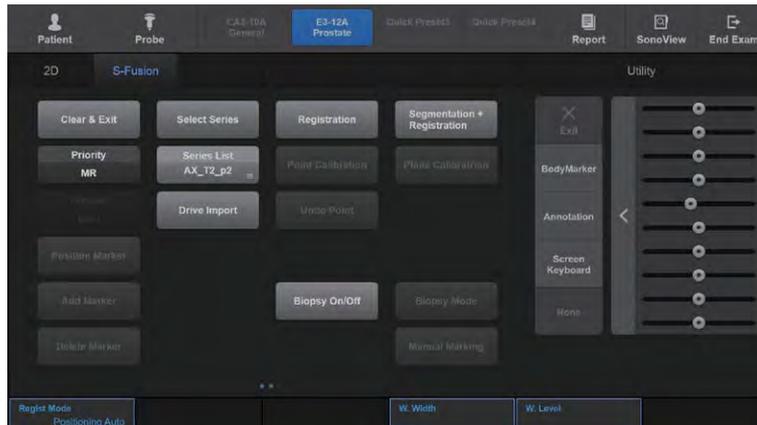
Select the target on which the biopsy will be performed. A different colored color map will be applied to each target. You can decide to show or hide each target in S-Fusion.



[Figure 7.25 Segmentation – Touchscreen]

- 1 Retrieve Auto Segmentation results again, or perform another Segmentation manually.
- 2 Specify or delete a Biopsy Target.
- 3 Use the trackball and knob to view and modify the Segmentation results.
- 4 Press the **Complete** button to save the current segmentation result, and automatically return to the S-Fusion tab while the middle axial cross-section of the segmented prostate is displayed to start the Registration process.

■ Prostate Fusion Registration



[Figure 7.26 Prostate Fusion Registration – Touchscreen]

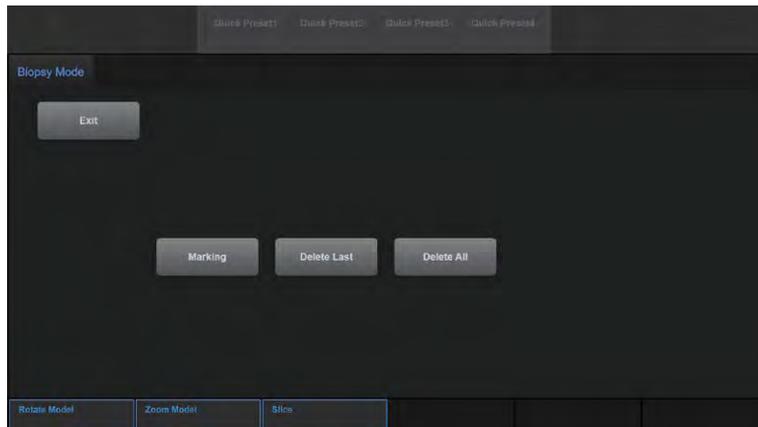
- 1 The user can configure precisely the currently displayed MR using trackball.
- 2 After placing probe to display same slices with MR AXIAL slices, complete registration using **Set** button.

■ Marking

- ▶ Auto Marking: Automatically saves the biopsy position.
- ▶ Manual Marking: Manually saves the biopsy position.

■ 3D Model Biopsy Guide

The user can start this by pressing the **Biopsy Mode** under **S-Fusion** on the touchscreen (The Prostate Segmentation and Registration processes must be completed first).



[Figure 7.27 Biopsy Mode – Touchscreen]

1. The **Exit** to return to the existing S-Fusion tab.
2. Record or delete the current Biopsy Point.
3. Record a Biopsy Point using the **Set** button in **S-Fusion** under **Biopsy Mode**.

■ Rotate Model/Zoom Model/Slice

These buttons are used to rotate a 3D model to the left/right and zoom in/out on a 3D model, respectively. The user can zoom in/out on a 3D model 40 times using the touch panel. You can move the displayed slice (axial cross-section) using the Slice button.

Clear Track/Virtual Track

Clear Track/Virtual Track functionality displays the position and direction of the probe and the needle on the ultrasound image when conducting a biopsy. It helps you insert the needle in the position and direction that you want, as well as helping to prevent damaging an organ that is not the target of the biopsy.

**NOTE:**

- ▶ Clear Track/Virtual Track is an optional feature of this product.
- ▶ Clear Track/Virtual Track is categorized as Type B Applied Part device.

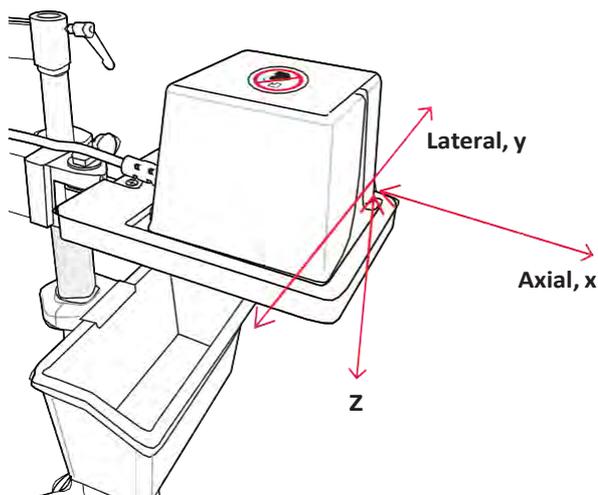
**Caution**

Familiarize yourself with the instructions shown below before using Clear Track/Virtual Track.



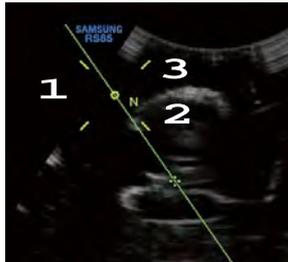
WARNING: If the Field Generator overheats, a warning message will be displayed on the monitor screen. Press **OK** to exit the screen and stop using Clear Track. Once the heat has sufficiently dissipated, you may resume Clear Track or Virtual Track.

- ▶ Refer to the 'Installation Guide' (supplied separately) for its components, installation, safety, and other detailed information.
- ▶ Optimal sensor sensitivity results when the direction of emission from the Field Generator is perpendicular to the orientation of the probe.
- ▶ To obtain the most reliable information, make sure that the needle is positioned within the radius (x axis) of 20 to 50 cm and within a vertical and horizontal distance (y and z axes) of ± 28 cm from the emitter of the Field Generator. Make sure that the needle is positioned at the center of the space described above so that the Sensor Status remains green. If the needle is positioned outside this space, it is more likely that the distance between the needle and lesion is over 4–5 mm.

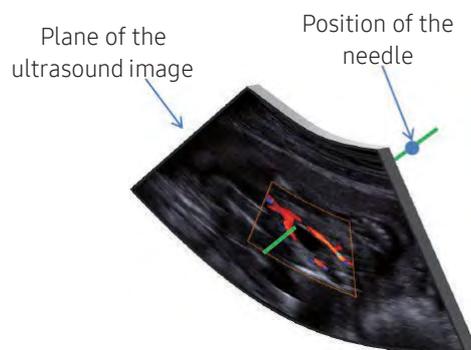


- ▶ Even when the distance between the probe and the Field Generator is maintained properly, the environment, the movement of the sensor and the probe, and other external influences may cause the color of the icon or the number of bars to change. Normally, it will return to green quickly. If it continues to be red, the system may be under the influence of a strong external magnetic field, or the sensor may be malfunctioning; you must stop using the system.
- ▶ When the external marker sensor is connected, the position and sensitivity of the probe sensor and needle tracking sensor work with those of the external marker sensor. According to the position change of the external marker sensor, the needle position is shown.
- ▶ If this persists and you have confirmed that there is no environmental influence, stop using the product and contact the Customer Support Department or your local vendor.

Icon	Preset
Numbers	1, 2: Sensitivity between the probe and the Field Generator N: Sensitivity between the Needle Sensor and the Field Generator
Green	Normal sensitivity: The needle is in a sufficiently close proximity to the Field Generator.
Red	When sensitivity is low: Change the field generator, patient position and posture to reach the normal sensitivity level.
Bars	Signal strength. More bars represent a stronger signal.


Tips!


- 1 Angle between the probe and the progress of the needle: A larger circle represents a larger angle.



- 2 Needle position: The current position of the needle is indicated by the letter 'N'.
- 3 Proximity of the Target to the needle tip: Four directions are displayed; the proximity is shown using colors and crosshair sizes. The closer the target and the needle tip are, the smaller the crosshair.
 - 0-3mm: Blue
 - ~5cm: Yellow
 - Farther than 5cm: Red


Tips!
Mode Controls

While Needle Visualization is active, the use of the following modes and functions are restricted.

- ▶ Operations that change the screen layout in 2D Mode: Dual, Quad, and 2D/C Live
- ▶ Modes other than 2D: PW, CW, and M mode
- ▶ Other functions that use 2D Mode: ElastoScan+, Panoramic

However, operations that change the properties of an image are allowed.

▶▶ Virtual Track

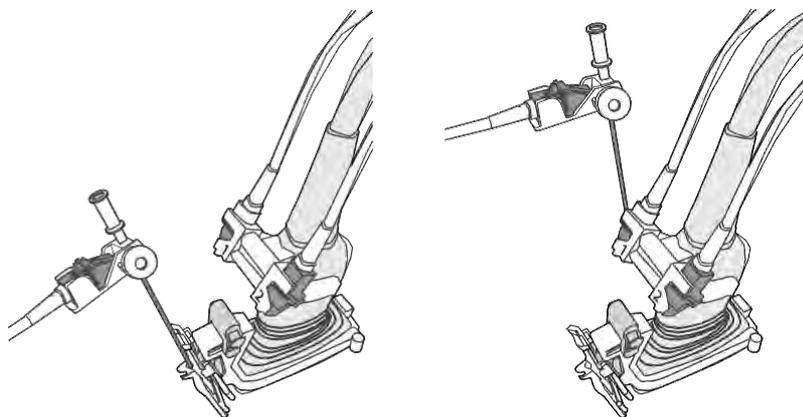
■ Sensor Position

1. Touch the touchscreen and swipe the screen to move to the next page.
2. Enter the length from the end of the needle to the sensor attached to the needle by pressing **Sensor Position** or by rotating the dial-button. The length can be selected in the range from 3 to 15 cm. The selected length is maintained until it is changed and is displayed at the top left corner of the monitor screen.



NOTE: Please enter an accurate length because the tracking will not be conducted successfully if the entered value is different from the actual length.

The direction of the sensor attached to the needle is as shown in the figure below when using Virtual Track. If it is not used as shown in the figure below, the actual needle position will not match with the guideline. Therefore, the probe sensor on the tracking unit port 1 should be on the opposite side of the needle tracking sensor on the port 3.



NOTE: When using Virtual Track, the guide line on the screen only displays an expected route. Always check the actual needle on an image.

**CAUTION:**

- ▶ Since the sensor is located away from the tip of the needle, the system cannot detect a bent needle tip. If the needle is bent, the estimated route of the needle and the location of the needle tip will be different from the actual route of the needle and the location of the needle tip. Therefore, the needle must be inspected prior to use.
- ▶ Make sure that the needle tracking sensor is not placed between the field generator and tracking bracket.



NOTE: Please contact the Samsung Medison's Customer Service Department for calibration that is required for an accurate and safe use of Clear Track or Virtual Track.

IOTA-ADNEX

The IOTA-ADNEX feature provides statistical data according to the ADNEX Risk Model during ultrasound examination of ovaries, assisting in diagnosing ovarian lesions. It enters patient information, ultrasound images, and measurements, and provides statistical information.

**NOTE:**

- ▶ IOTA-ADNEX is an optional feature of this product.
- ▶ IOTA-ADNEX can be launched in 2D mode only.
- ▶ This feature has been verified by the IOTA group. This is a risk calculation feature that provides statistical data (not a diagnostic feature).

▶▶ Running IOTA-ADNEX

In 2D mode, press **IOTA-ADNEX** on the touchscreen to start IOTA-ADNEX.

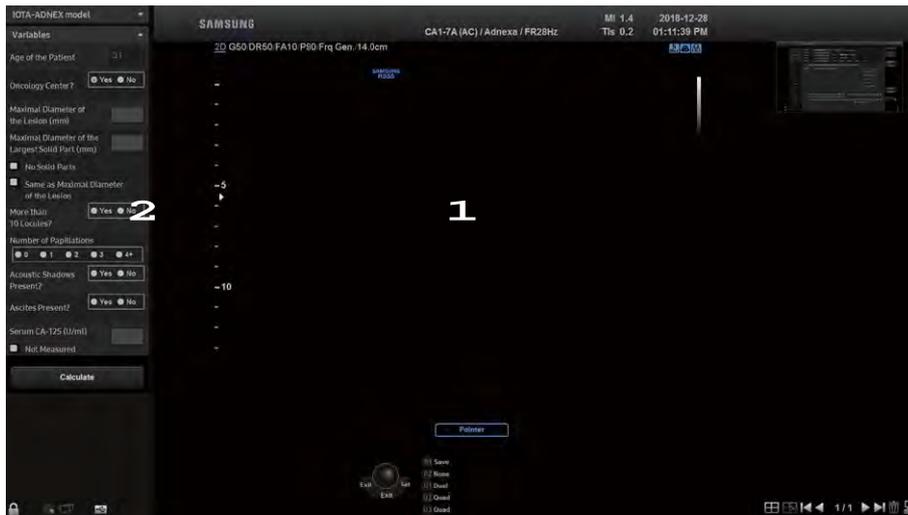
■ Prerequisites for IOTA-ADNEX

To run IOTA-ADNEX, the following conditions need to be met:

- ▶ Probe: CA1-7A, CA2-8A, CA3-10A, CV1-8A, E3-12A, EA2-11B, V5-9, EV3-10B
- ▶ Application: Gynecology (General, Adnexa)
- ▶ Operation mode: 2D
- ▶ Image Mode: Single Mode
- ▶ Patient information has been entered

▶▶ IOTA-ADNEX Screen

The IOTA-ADNEX screen is composed as follows:



[Figure 7.28 IOTA-ADNEX]

1 Ultrasound image area

Shows the study image that has been acquired in 2D Mode.

2 Variables area

Allows the user to enter information about the patient and lesion.

- ▶ Age of the Patient (years): Displays the age of the patient entered in the Patient Information. If there is no registered patient information, you are moved to the Patient Information screen. Only a value between 14 and 100 is displayed; a message window opens if the age falls outside this range.
- ▶ Oncology Center: Displays the Oncology Center type set in Option. The user can edit this information on the IOTA-ADNEX screen.

Tips!

You can specify the Oncology Center and cutoff value in Utility > Setup > Imaging > Features.

- ▶ Maximal Diameter of the Lesion (mm): When you select Maximal Diameter of Lesion, the screen freezes and the status changes to Caliper. If the user uses the Caliper to measure the diameter of the lesion, the greatest value is displayed by comparing each measurement with the previous ones. Only values from 8 to 400 are displayed. It can be directly entered from the IOTA-ADNEX screen instead of measuring it manually from the user. Press the **Data Clear** button on the touchscreen to clear the Diameter value.

- ▶ Maximal Diameter of the Largest Solid Part (mm): When the Maximal Diameter of the Largest Solid Part is selected, the screen becomes frozen and goes into Caliper status. If the user uses the Caliper to measure diameter of the solid part, the greatest value is displayed by comparing each measurement with the previous ones. Only the values smaller than the ones entered in the Maximal Diameter of the Lesion are displayed. It can be directly entered from IOTA-ADNEX screen instead of measuring it manually from the user. Press the **Data Clear** button on the touchscreen to clear the Diameter value.
 - No Solid Parts: Place a check mark if no solid parts exist. Then, '0' is displayed.
 - Same as Maximal Diameter of the Lesion: Place a check mark if the solid parts have the same size as the lesion. The value entered in the Maximal Diameter of the Lesion field is displayed.
- ▶ More than 10 Locules: Specify whether there are 10 or more locules.
- ▶ Number of Papillations: Select 0, 1, 2, 3, or 4+ for the number of papillations.
- ▶ Acoustic Shadows Present: Specify whether there is an acoustic shadow (Yes) or not (No).
- ▶ Ascites Present: Specify whether there is ascites (Yes) or not (No).
- ▶ Serum CA-125(U/ml): Displays the Serum CA-125 information in Patient Information, if any. Only a value from 0 to 30000 is displayed. You can edit this in Patient mode and also on the IOTA-ADNEX screen.



When the input value is 0, specify whether the value has been measured by the user or not in the pop-up window. If you select Yes, then 0 is displayed as the value; if you select No, then Not measured is displayed.

- ▶ Calculate: Show IOTA-ADNEX results.

▶▶ IOTA-ADNEX Results and Report

Show IOTA-ADNEX results. You can press **Back** on the touchscreen to change the variables.

■ Chance of Benign

Displays the probability of benignity.

■ Risk of Malignancy

Displays the probability of malignancy.

■ Risk of Borderline/Stage I/Stage II-IV/Metastatic

Among the four stages of malignancy, the probabilities of Borderline, Stage I, Stage II-IV, and Metastatic are displayed.



[Figure 7.29 IOTA-ADNEX]

■ Report

Once the lesion selected by the user is analyzed, press Assign. Then, the analysis result is displayed as a patient report. The report includes the following information: Pressing **Print** opens the Print Preview window. Pressing **Print** again prints the report.

- ▶ Patient information: The patient's information entered by the user upon starting the exam
- ▶ Risk results: Chance of Benign, Risk of Malignancy, Risk of Borderline/Stage I/Stage II-IV/Metastatic
- ▶ Risk results in graph: Baseline Risks, Patient Risks, Risk of Borderline/Stage I/Stage II-IV/Metastatic



[Figure 7.30 IOTA-ADNEX Report]

» ⌘ Finishing IOTA-ADNEX

Press **Exit** button on the touchscreen to finish IOTA-ADNEX.

M Mode

The M Mode is used to specify an observation area in a 2D image with the M Line, and display changes over time.

This mode is appropriate for the observation of organs with a lot of movement, such as cardiac valves. The 2D Mode image is also shown, enabling the marking and adjustment of the observation area within the entire image.

▶▶ ⌘ **Entering & Exiting M Mode**

Press the **M** button on the control panel. If you press this button again, M mode will be terminated and the mode will switch to 2D.

▶▶ ⌘ **M Mode Screen**

■ **M Line**

The M Line indicates the relative position of the M Mode image in the 2D image. Move the M Line to change the site of study. Use the trackball in the control panel to move the M Line left or right.

▶▶ ⌘ **M Mode Menu**

■ **Sweep Speed**

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a speed from 60 to 360Hz. You may make changes in increments of 60Hz.

■ **Negative**

Inverts the colors in an M image. Press the button on the touchscreen to select On or Off.

■ **Display Size**

Select the size of the M image. Press the button on the touchscreen button or use the soft menu dial-button on the control panel to select a size from 30 to 70%.

■ **M Edge Enhance**

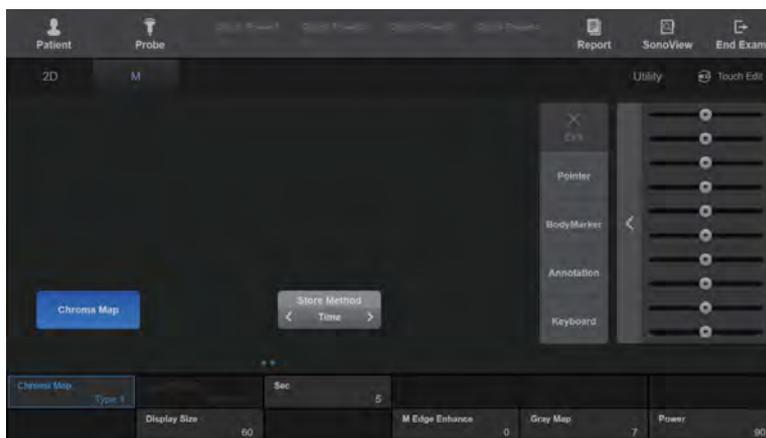
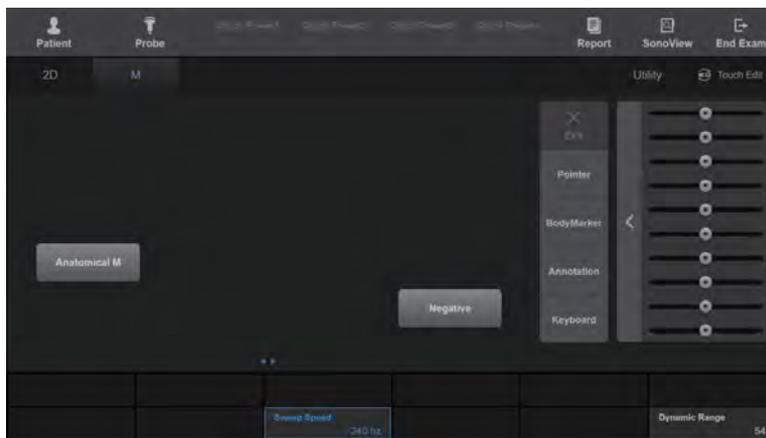
Select the Edge Enhancement value for the M image. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from -3 to 3. The higher the number, the clearer the edge of the M image becomes.

■ FreeAngle M

Use this function to freely define the M Line and study the image. Press the button on the touchscreen button to select On or Off. When 'On' is selected, you can use the trackball and **Set, Change** buttons on the control panel to define the length, position, and angle of the M Line.



NOTE: Only available with a Phased Array probe or Cardiac application.



[Figure 7.31 M Mode – Touchscreen]



NOTE: For more information on other touchscreen items, refer to the '2D Mode' section.

Color Doppler Mode

This mode displays the colored blood flow pattern of the ROI (Region of Interest) within the 2D image. It is appropriate for examining the presence of blood flow, its average speed, and its direction. The 2D Mode image is also shown, allowing the marking and adjustment of the ROI within the entire image.

»» ⌘ Entering & Exiting C Mode

Press the **C/Z** button on the control panel. Press this button again to exit Color Doppler Mode and enter 2D Mode.

»» ⌘ C Mode Screen

■ ROI Box

ROI stands for Region of Interest. The ROI Box outlines the area of the 2D image where color (blood flow) information is displayed in Color Doppler Mode.

You can adjust the position and size of the ROI box by using the **Change** button. Each time the **Change** button is pressed, the current status of the ROI Box is shown in the bottom center of the screen.

- ▶ ROI Position: In this state, the position of the ROI Box can be changed. Use the trackball to move and reposition the ROI Box.
- ▶ ROI Size: In this state, the size of the ROI Box can be changed. Use the trackball to move and resize the ROI Box.

■ Color Bar

In Color Doppler mode, the color bar indicates the direction and speed of blood flow. Based on the baseline at the middle, red indicates the direction and speed of blood flow toward the probe. By contrast, the blue color indicates the direction and speed of blood flow away from the probe.

»» C Mode Menu

■ Color Invert

Pressing the touchscreen button inverts the color bar; inverting the color bar also inverts the color displayed in the image.

■ Multi Freq

Select the frequency of the probe. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select between Pen and Gen.

■ Filter

Filter out the low-frequency Doppler signals generated by the movement of blood vessel walls. Adjust the Cutoff Frequency to remove Doppler signals that fall below it from the screen. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0 to 3.

■ Scale

Set the pulse repetition frequency (PRF). Press the button on the touchscreen or use the soft menu dial-button on the control panel. The PRF is displayed on the color bar. Increasing the PRF increases the velocity range of displayed blood flow, while decreasing the PRF decreases the velocity range of displayed blood flow.

■ Baseline

Adjust the baseline of the color bar. Press the button on the touchscreen or use the soft menu dial-button on the control panel. Rotate the dial-button clockwise to raise the baseline.

■ Balance

Adjust the range of a color image by comparing the gray levels of 2D images with the Doppler signal values of color images. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 1 to 31. When the Balance value increases, the color image also appears in the part where the gray level of a 2D image is high (the bright part), increasing the range of the color image.

■ Display Mode

Select the display mode for the Color Doppler Mode. Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select Color + BW or BW Only.

■ Color Mode

Sets details of the color display. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select Velocity or Vel + Var. Vel stands for Velocity, and Var stands for Variance.



NOTE: Color Mode can only be used when the cardiac application is selected in a certain probe.

■ Sensitivity

Select the sensitivity of the color image. Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select a value from 8 to 31. When this value increases, the sensitivity of a color image improves but the frame rate is reduced.

■ Smooth

Displays a smooth color image. Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select a value from 1 to 8.

■ Alpha Blending

Superimposes a color image over a 2D image in the color image area. Press the button on the touchscreen to select On or Off. When 'On' is selected, the **Blending Level** button is enabled in soft menu.

■ Blending Level

Specify the blending ratio between the 2D image and the color image. Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select a value from 1 to 26. The lower the number, the higher the ratio of the 2D image to the color image becomes.

■ Density

Select the density of the scan line. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select among Low, Middle1, Middle2, and High. Selecting High increases the number of scan lines, resulting in higher image resolution at the expense of frame rate.

■ Steer

Minimizes the loss of color information by adjusting the angle of ultrasound beam. Press the button on the touchscreen or use the dial-button to select Left, Right, or None.



NOTE: The Steer button is only enabled when a linear probe is used.

■ Frame Avg

Frame Avg averages the present image and the previous image when an image is updated. Press the button on the touchscreen button or use the soft menu dial-button on the control panel to select a value from 0 to 9.

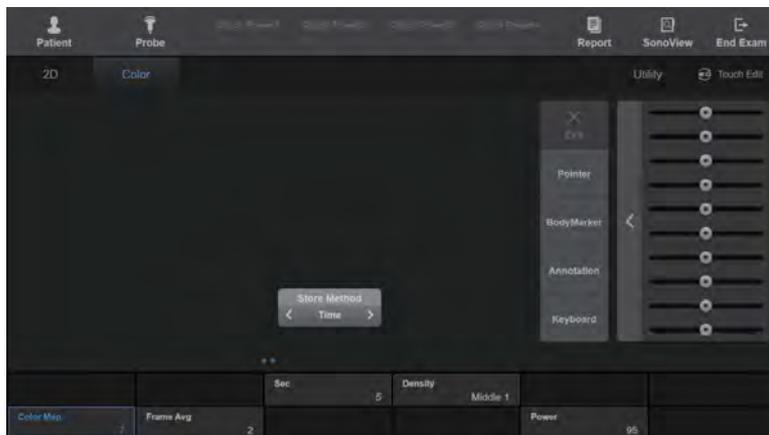
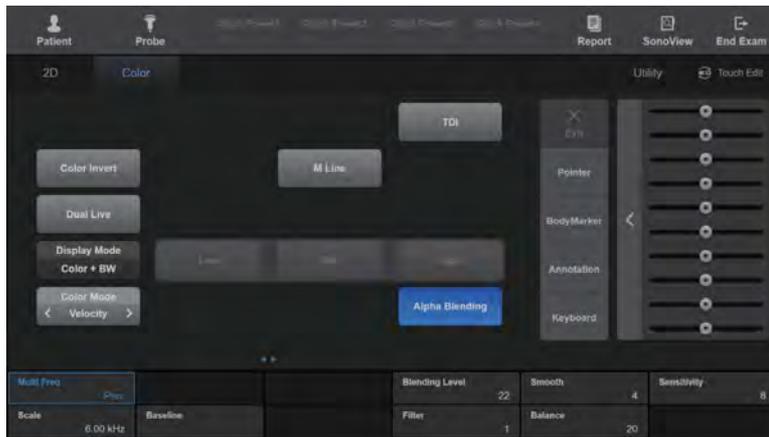
■ TDI

Switches to TDI Mode. TDI stands for Tissue Doppler Imaging.



NOTE:

- ▶ This can only be used when the cardiac application is selected in Phased Array Probe.
- ▶ For more information on TDI, refer to 'TDI Mode'.



[Figure 7.32 Color Doppler Mode – Touchscreen]



NOTE: For more information on other touchscreen items, refer to the '2D Mode' section.

Power Doppler Mode

This mode displays the intensity of blood flow using color within the ROI in the 2D image. It is suitable for studying the presence and amount of blood flow. The 2D Mode image is also shown, allowing the marking and adjustment of the ROI within the entire image.

▶▶ Entering & Exiting PD Mode

Press the **PD** button on the control panel. Press the button again to exit PD Mode and enter 2D Mode.

▶▶ PD Mode Screen

■ Color Bar

The color bar displayed varies depending on the Power Doppler mode display method selected in PD mode.

- ▶ PD Mode: The color bar indicates the presence of blood flow and its amount. The top of the color bar is the brightest section, where the amount of blood flow is at its highest.
- ▶ S-Flow Mode: The color bar indicates the strength and direction of blood flow. Based on the Baseline at the middle, red indicates the strength and direction of blood flow toward the probe. By contrast, the blue color indicates the strength and direction of blood flow away from the probe.

■ ROI Box

The ROI (Region of Interest) outlines the area of the 2D image where color (blood flow) information is displayed in Power Doppler Mode.



PD Mode Menu

■ Color Invert

Pressing the touchscreen button inverts the color bar; inverting the color bar also inverts the color displayed in the image.



NOTE: The Color Invert function only appears on the touchscreen when PD Mode is set to S-flow Mode.

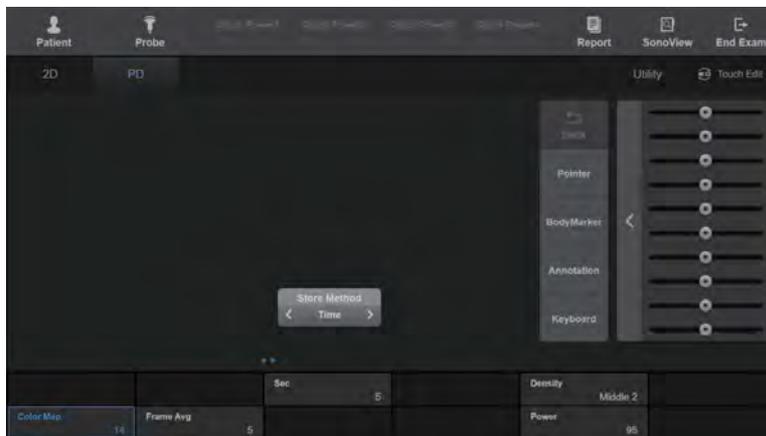
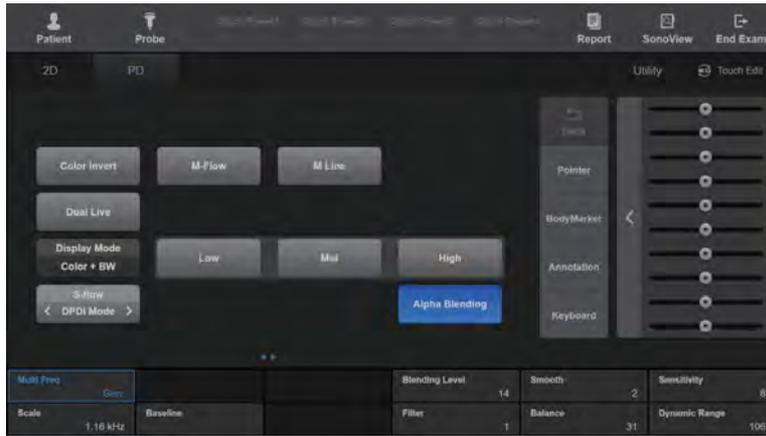
■ S-flow Mode

Displays information on the intensity and direction of blood flow. Press the button on the touchscreen to select PD Mode or DPDI Mode.

- ▶ DPDI Mode: When DPDI Mode is selected, the PRF value is displayed on the color bar.

■ Dynamic Range

Dynamic Range adjusts contrast by changing the ratio of the minimum and maximum values of input signals. Selecting a higher Dynamic Range will display a smoother image. Press the button on the touchscreen button or use the soft menu dial-button on the control panel to select an index from 50 to 200.



[Figure 7.33 Power Doppler Mode – Touchscreen]



NOTE: For more information on other touchscreen items, refer to '2D Mode' and 'Color Doppler Mode' sections.

PW Spectral Doppler Mode

PW stands for Pulse Wave. This mode displays the blood flow speed at a specific blood vessel location within a specific time frame. Distance (depth) information can also be obtained by transmitting pulses over particular time frames.

This mode is useful for measuring low-speed blood flow, such as in the abdomen and peripheral vessels. The 2D Mode image is also shown, allowing the marking and adjustment of the observation area within the entire image.

▶▶ ⌘ Entering & Exiting PW Spectral Doppler Mode

Press the **PW/Y** dial-button in the control panel. To obtain a spectral Doppler image, press the **Set** button on the control panel or the **PW/Y** dial-button.



NOTE:

- ▶ The Doppler image can only be obtained in the D Only or Simultaneous states.
- ▶ When the M Line is enabled, you can instantly get a Spectral Doppler image in PW Mode.

▶▶ ⌘ PW Spectral Doppler Mode Screen

■ Sample Volume

The Doppler spectrum is displayed when the Sample Volume is located above the blood flow on the 2D image. The size and depth of the Sample Volume is displayed in **mm** units. Its position is moved with the trackball and displayed in the **xx.xx@yy.yy mm** format; this indicates that a Sample Volume that is 'xx.xx mm' in size is located at a depth of 'yy.yy mm'.

For example, 2.00@16.70 mm means a 2.00 mm sample volume at 16.70 mm in depth.

- ▶ Moving Sample Volume: Use the trackball on the control panel.
- ▶ Resizing Sample Volume
 - On the control panel: Press the **Change** button on the control panel, and then use the trackball to adjust the size. Press the **Change** button once more to return to Adjust Position state.
 - On the touchscreen: Press the **SV Size** button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0.5 to 20.
- ▶ Adjusting Sample Volume Angle: Rotate the **Angle** dial-button on the control panel to select an angle from -70 to 70 degrees. Press the **Angle** dial-button to select among -60, 0, and 60 degrees.

■ Adjusting Doppler Baseline

Adjust by rotating the **Baseline** dial-button on the touchscreen.

■ HPRF Function



NOTE:

- ▶ Enable or disable HPRF in Setup > Imaging > Common > Option.
- ▶ HPRF cannot be enabled if twice the value of PRF is higher than 23KHz.

Measure the blood flow above the speed limit at a specific depth. The scale is increased; this can be used in PW Spectral Doppler mode. HPRF stands for High PRF.

- ▶ **Activating HPRF:** Increasing the scale at a specific depth to a certain point automatically activates HPRF. The Phantom Gate will appear on the D Line at a position higher than the Sample Volume. Once HPRF starts, the PRF does not increase even if you increase the scale value.
- ▶ **Finishing HPRF:** While HPRF is in use, decrease the scale value in one step to finish HPRF. Here, the PRF value becomes the maximum value in the current PW Spectral Doppler Mode.
- ▶ **Moving Sample Volume:** To move the Sample Volume position in the D Only state, the system calculates the PRF values and the Phantom Gate position, and updates them on the Spectral Doppler image. HPRF is terminated when it can no longer be activated. When Sample Volume is moved in the 2D Only state, the PRF values don't change.



CAUTION:

- ▶ While in a zoomed in state, the Phantom Gate position can move outside the 2D image area.
- ▶ Make sure that the Sample Volume and Phantom Gate are not placed together in the measuring area. If more than two Sample Volumes are located in the vessels, all Doppler components will appear in the spectrum, causing noise.

▶▶ PW Spectral Doppler Mode Menu

■ Simultaneous

Press the button on the touchscreen to select On or Off.

If the Simultaneous option is turned On, you can view real-time 2D and Spectral Doppler images at the same time. If the option is not turned On, however, you will only be able to view the image in one of these modes. The Simultaneous function decreases Doppler PRF, thus decreasing the measurable speed range.



NOTE: It appears in the PW menu only when the Setup > Imaging > Common > Multiple Mode > Simultaneous Mode setting is set to Allow.

■ Doppler Invert

Press **Doppler Invert** on the touchscreen. Pressing the button inverts + and –, which indicate the velocity of the spectrum.

■ Steer Invert

Press **Steer Invert** on the touchscreen. Pressing the button inverts the angle of the Sample Volume.



NOTE: Steer Invert is only enabled when using a linear probe.

■ Steer

Press **Steer** on the touchscreen. You can select one from Left 3, 2, 1, None, Right 1, 2, and 3. Every time you press the button, it changes in the direction specified in Sample Volume.

■ Fine Tune Steer

This is controlled using the **Fine Tune Steer Knob** button. You can set different angles for the Color Box and SV Line.

■ Sweep Speed

Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select a speed from 60 to 720Hz. You may make changes in increments of 60Hz.

■ Dynamic Range

Dynamic Range adjusts contrast by changing the ratio of the minimum and maximum values of input signals. Selecting a higher Dynamic Range will display a smoother image. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select an index from 1 to 4.

■ Sound

Adjust the Doppler sound volume. Press the touchscreen button or use the soft menu dial-button on the control panel to select a value from 0 to 100.

■ Auto Calc.

Press the button on the touchscreen to select On or Off. If the function is turned on, Doppler Trace is performed and its results are displayed. Up to 8 calculations can be selected in Setup > Imaging > Common > Auto Calc. If this function is turned on, the **Mean Trace** button is enabled.

For information on settings for the items to calculate, refer to Measure Setup in 'Chapter 3. Utilities'.



CAUTION: The measurements carried out by Auto Trace under Measure and Real Time Automatic Doppler Trace (Automatic Calculator) may be different from each other. This is because the algorithms for these two methods are different. It is recommended that you use Auto Trace under Measure for more accurate measurement.



Things to Consider for Real Time Automatic Doppler Trace

1. Aliasing occurs because the PRF is too low in comparison to the image speed, or the spectrum is clustered around the baseline because the PRF is too high.
2. Peak is indistinctive or intermittent such as in spectral waveforms for veins.
3. Meaningful spectrum distinction becomes difficult because the Doppler Gain is set too high or too low.
4. An index is displayed during the transition time after the Sample Volume is moved with the Trackball.
5. The major spectral signals are cut off because the Doppler Wall Filter is set too high.
6. Peak Trace is interrupted due to abnormal Doppler noise or artifacts, and the heart rate is above approximately 140 bpm.

If any of the above apply, Real Time Automatic Doppler Trace may not produce an accurate trace or results. In addition, during Auto Calculation, results will not be displayed if the Freeze function is run against inaccurate values.

■ Auto Calc. Direction

Select the part of the spectrum to calculate with Auto Calc. Select from All, Up, and Down by pressing the touchscreen button or using the soft menu dial-button on the control panel.

■ Mean Trace

Press the touchscreen button to select On or Off. Mean Trace for the spectrum will run.

■ Sensitivity

Select the Max/Mean Trace sensitivity for the PW Spectral Doppler imaging. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 1 to 5.

■ Spectrum Ehn.

Select the brightness and sensitivity of the Spectral Doppler image. Press the button on the touchscreen or use the dial-button to select a value from 1 to 4. Spectrum Ehn stands for Spectrum Enhancement.

■ Spectrum Type

Select the type of spectrum. Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select from Type 1 to 3.

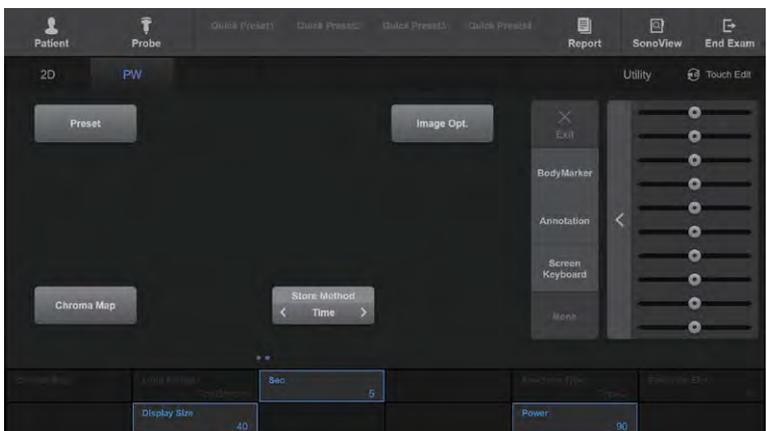
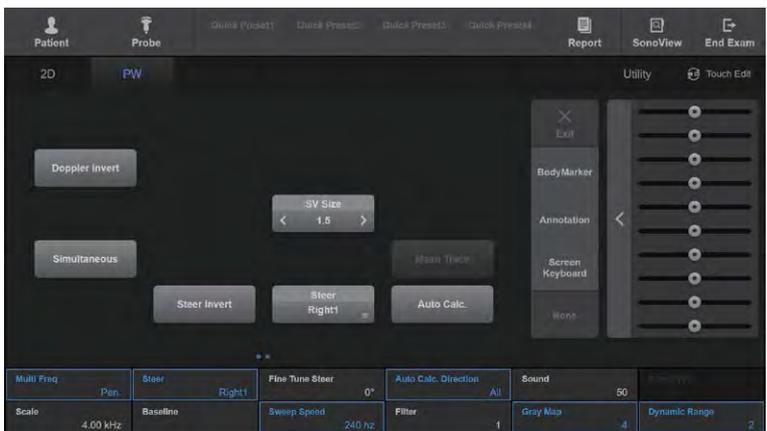
■ TDW

Switches to TDW Mode. TDW stands for Tissue Doppler Wave.



NOTE:

- ▶ This can only be used when the cardiac application is selected in Phased Array Probe.
- ▶ For more information on TDW, refer to TDW Mode.



[Figure 7.34 PW Spectral Doppler Mode – Touchscreen]



NOTE: For more information on other touchscreen items, refer to '2D Mode' and 'Color Doppler Mode' sections.

CW Spectral Doppler Mode

CW stands for Continuous Wave. This mode displays the blood flow speed and direction at a specific blood vessel location within a specific time frame. Unlike PW Spectral Doppler Mode, it does not provide Sample Volume.



NOTE: CW Spectral Doppler Mode is only available with a Phased Array probe or a Static CW probe.

■ Steered CW Spectral Doppler Mode

This mode can only be used if the Phased Array probe is used. The 2D Mode image is also shown, allowing the marking and adjusting of an observation area within the entire image.

■ Static CW Spectral Doppler Mode

This mode is only available with a Static CW Probe. The 2D image is not displayed.



Entering & Exiting CW Spectral Doppler Mode

Press the **CW** button on the control panel. Press the button again to enter 2D Mode.



CW Button

Refers to a User Key in the control panel (**P1-2, U1-4**) to which CW functionality has been assigned. The current settings are displayed in the User Key area at the bottom of the monitor screen. You can change the setting for each button in Utility > Setup > Customize > Button.

▶▶ CW Spectral Doppler Mode Menu



[Figure 7.35 CW Spectral Doppler Mode – Touchscreen]



NOTE: For more information on other touchscreen items, please refer to the 'PW Spectral Doppler Mode' section.

TDI Mode

TDI stands for Tissue Doppler Imaging. It visualizes the movement of rapidly moving tissues such as the heart. TDI Mode is available in Color Doppler Mode. In Color Doppler Mode, TDI shows cardiac tissue information using color.



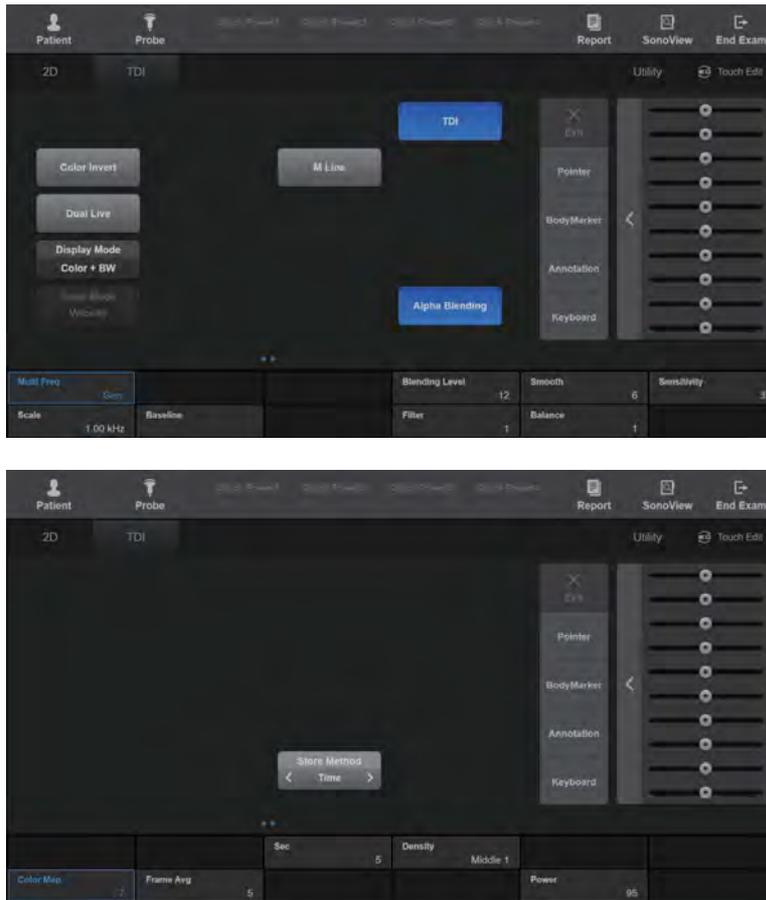
NOTE: This can only be used when the cardiac application is selected in Phased Array Probe.



Entering and Exiting TDI Mode

In **C Mode**, press the **TDI** button on the touchscreen. Press it again to exit TDI Mode and enter **C Mode**.

» » ⌘ TDI Mode Menu



[Figure 7.36 TDI Mode – Touchscreen]



NOTE: For more information on other touchscreen items, refer to the 'Color Doppler Mode' section.

TDW Mode

TDW stands for Tissue Doppler Wave. It visualizes the movement of rapidly moving tissues such as the heart. TDW Mode is available in PW Spectral Doppler Mode. When it is used in Spectral Doppler Mode along with Color Doppler or Power Doppler Mode, changes in cardiac tissues over time can be observed.



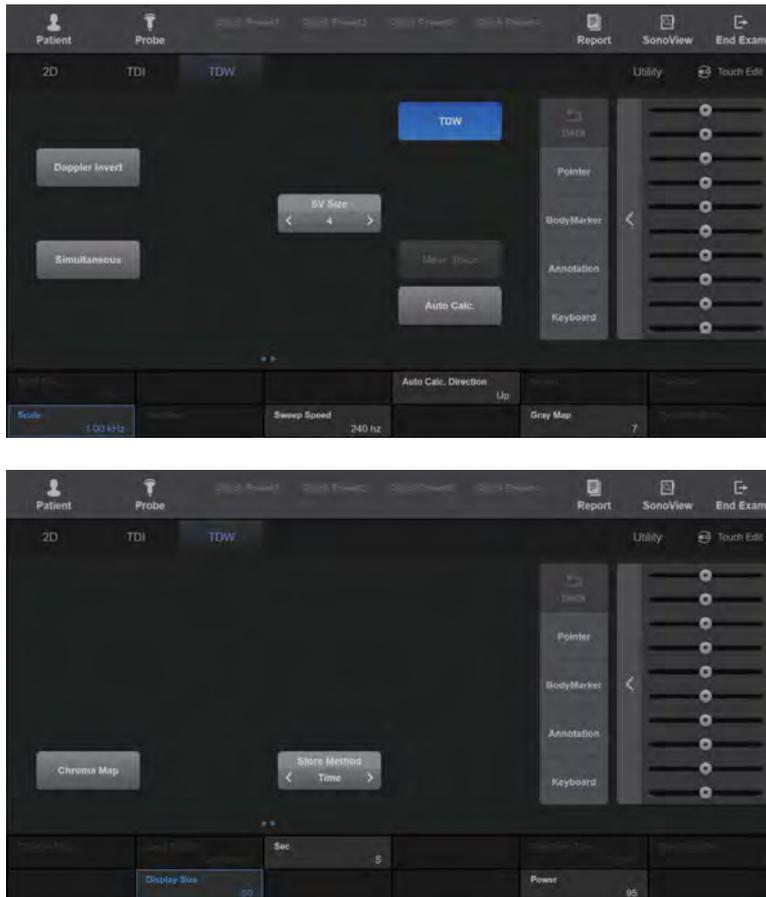
NOTE: This can only be used when the cardiac application is selected in Phased Array Probe.



Entering & Exiting TDW Mode

In TDI Mode, press the **PW/Y** dial-button on the control panel. You may also press the **TDW** button on the touchscreen in PW Spectral Mode. Press the **PW/Y** dial-button again to switch to TDI Mode, or press the **TDW** button again to switch to PW Mode.

» »  TDW Mode Menu



[Figure 7.37 TDW Mode – Touchscreen]



NOTE: For more information on other touchscreen items, please refer to the 'PW Spectral Doppler Mode' section.

ElastoScan+ Mode

The elasticity of ROI in a 2D image is shown in color. The 2D Mode image is also shown, so that you can mark and adjust the position of the ROI within the scanned image.



NOTE:

- ▶ ElastoScan+ Mode is an optional feature of this product.
- ▶ The probes, applications, and presets that support ElastoScan+ are as follows:

Probe	Application	Preset
L3-12A	Small Parts	Breast, Breast1
	MSK	Shoulder/Knee, Hand/Foot, Elbow/Wrist, Pediatric Hip, Penetration
LA3-16A	Small Parts	Breast
E3-12A	Urology	Prostate
	Gynecology	General, Adnexa
LA4-18B	Small Parts	Breast
	MSK	General, Superficial
LM4-15B	Small Parts	Breast
LA2-9A	Small Parts	Breast
V5-9	Urology	Prostate
	Gynecology	General, Adnexa
EV3-10B	Urology	Prostate
	Gynecology	General, Adnexa
EA2-11B	Urology	Prostate
	Gynecology	General, Adnexa

- ▶ In E Mode, the following features are not available: Angle, View Area, ECG, Histogram.

Tips!

ElastoScan+

An elastogram is elasticity imaging of an object, based on continuous ultrasound images. The technique that obtains the elasticity of an object and converts it to images is called ElastoScan+. ElastoScan+ visualizes the presence of a solid mass or stiffness in tissue.

It is already well known that lesions such as tumors are different from healthy tissue in terms of their stiffness. Up until now, palpation has been used for examination, but this method has certain depth limitations.

■ E Dual Mode

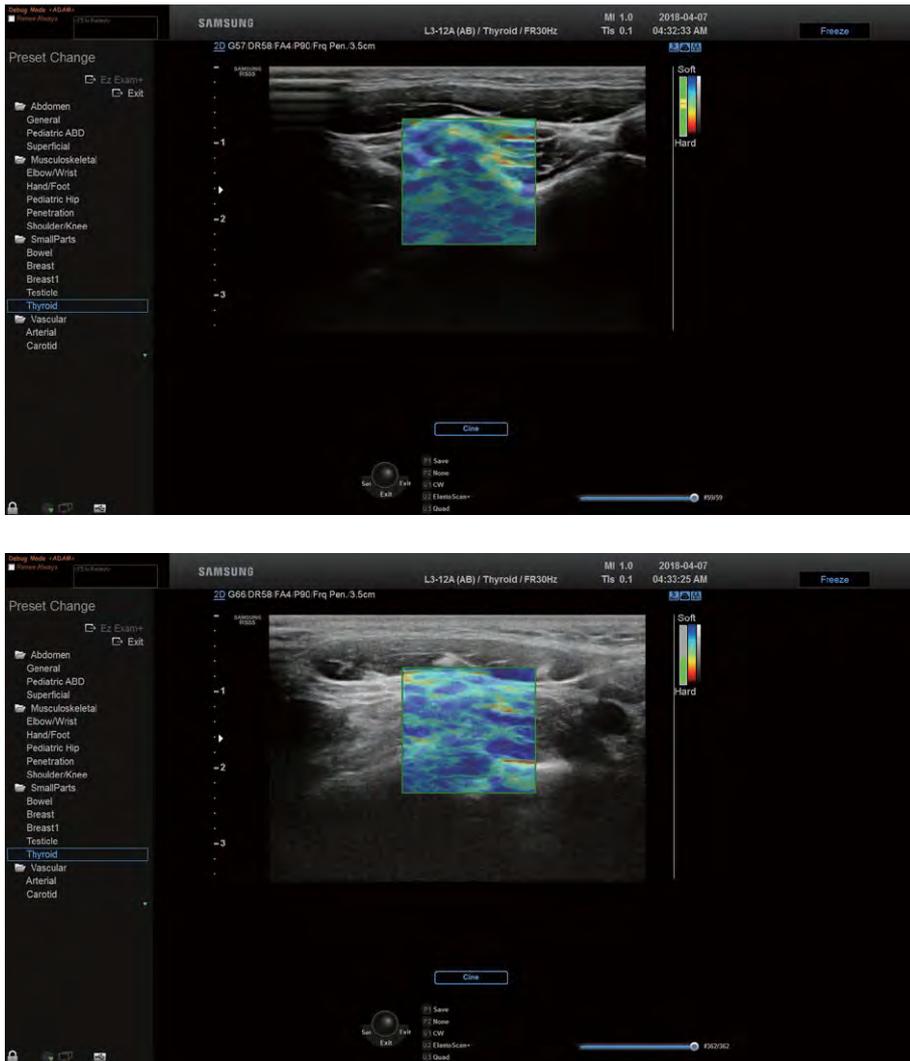
In this mode, the elastogram and the 2D image are displayed together on the screen. Press **Single/Dual** on the touchscreen to select either Single or Dual Mode. To facilitate comparative observation, the 2D image is shown on the left and an E image is shown on the right.



[Figure 7.38 E Dual Mode]

■ E Single Mode

In this mode, the E image is displayed alone on the screen. Press **Single/Dual** on the touchscreen to select either Single or Dual Mode.



[Figure 7.39 E Single Mode]

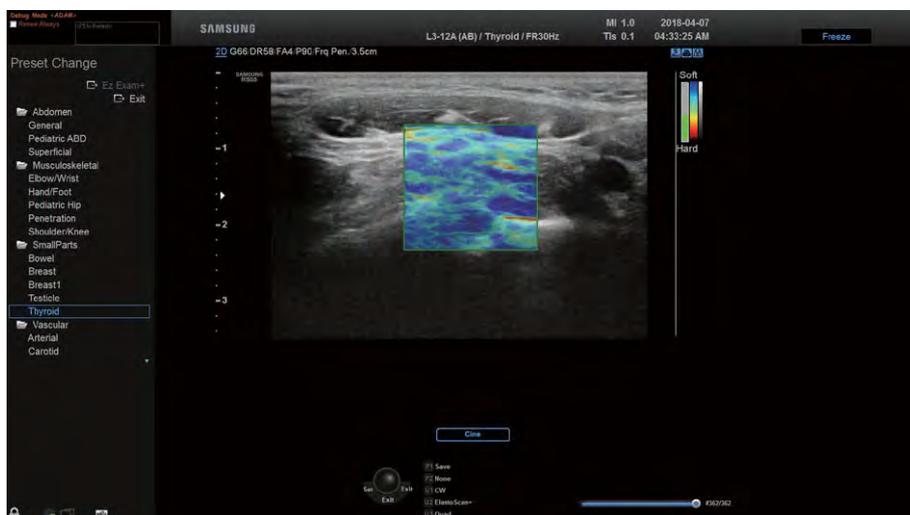
■ ROI Mode

ROI stands for Region of Interest. In E Mode, the ROI Box represents the area where elasticity information is processed and shown. Press **ROI Mode** on the touchscreen to turn ROI Mode On or Off.

To acquire a good elasticity image, it is important that only the effective tissues are included in the ROI by avoiding ineffective components such as bone and air. If a ratio of the effective image is insufficient, no elasticity image can be displayed even when tissues are placed under pressure. For breast, it is ideal to set the area as wide as possible in the lateral direction, and to include the subcutaneous layer and muscle in the axial direction, to obtain a good-quality elasticity image. However, be flexible to adjust to suit the real-life situation.

You can adjust the position and size of the ROI Box by using the **Change** button on the control panel. Each time the **Change** button is pressed, the current status of the ROI Box is shown in User Information area of the screen, including:

- ▶ E ROI Pos.: In this state, the position of the ROI Box can be changed. Use the trackball to reposition the ROI Box.
- ▶ E ROI Size: In this state, the size of the ROI Box can be changed. Use the trackball to resize the ROI Box, and press the **Change** button to apply the new size.



[Figure 7.40 ROI Mode]



NOTE: ROI Mode is available in E Single Mode as well as in E Dual Mode.

»» ⌘ Entering and Exiting E Mode

In 2D Mode, press **ElastoScan+** on the touchscreen. Press the button again to switch to 2D Mode.

»» ⌘ E Mode Screen

■ Color Bar

In E Mode, the color bar indicates the stiffness of the tissue. Regardless of the color, the lower section of the bar indicates that the target area is stiffer than the surrounding tissues, and the upper section indicates that the target area is less stiff than the surrounding tissues.



■ Compression Guide Bar

The strength and status of compression are shown in the numbers and colors of blocks from Steps 0 to 7. All blocks are empty at Step 0, which appears when the probe is almost stationary, the ROI is insufficient, or matching between images is poor. Step 1 and Step 2 (in gray) mean inadequate compression, and from Step 3 to Step 7 (in blue or green) mean adequate compression. The number of blocks filled represents the number of the step. It is not displayed on the screen when the application is set to Thyroid.



■ Motion Tracking Bar

Shows the movement of the probe in the appropriate color. Displays the movement during approximately 4 seconds. The red color indicates an active movement, while the green color indicates a dull movement. This will only be displayed if the application is set to Thyroid.



▶▶ **Performing a Scan**

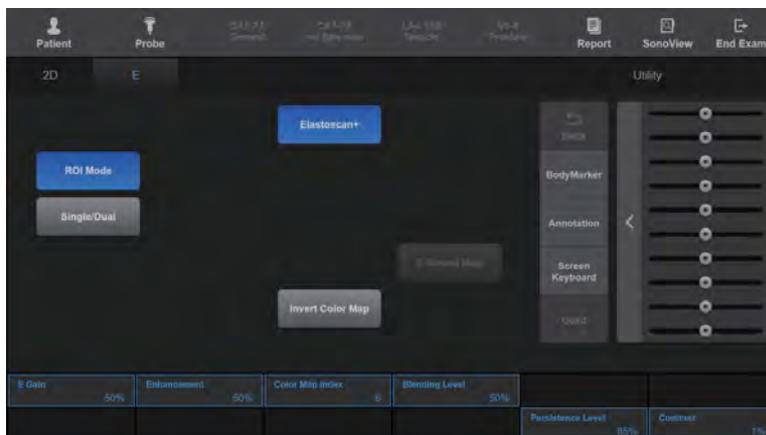
When using E mode, place a probe onto the surface of an area to observe and position the ROI appropriately on a lesion to observe it. Then use the probe to compress the lesion periodically. When the compression guide is supported, refer to this guide to adjust the size of the compression. If the region being examined is quite deep, the ideal procedure is to increase the compression.



Precautions for Scanning

- ▶ To closely observe the location of the lesion, minimize the movement of tissues.
- ▶ A breast is a complex organ which consists of lactiferous ducts, lactiferous glands, fatty tissue, fibrous tissue, and chest muscles. Moving a probe along vertically causes unintended movements of the tissues.
- ▶ The prostate and the thyroid consist of tissues that are simpler than those of a breast and there are relatively fewer unintended movements.

▶▶ **E Mode Menu**



[Figure 7.41 E Mode – Touchscreen]

■ **Invert Color Map**

Pressing the touchscreen button inverts the color bar; inverting the color bar also inverts the color displayed on the image.

■ Alpha Blending

Alpha Blending blends 2D and E images so that they appear to overlap with each other. Press the button on the touchscreen to select On or Off. When 'On' is selected, the **Blending Level** button is enabled in the soft menu, which allows you to adjust the blending ratio.

Press the button on the touchscreen button or using the soft menu dial-button on the control panel to select from 0 to 100%.

v3.0 and above support this only when it is 'On' and the button will not appear on the screen. When loading data from previous versions, the button will appear on the screen.

■ E Gain

Adjust the brightness of E image from 1 to 100%.

■ Contrast

Adjust the contrast for an E image from 1 to 100%.

■ Enhancement

Adjusts the enhancement of the image. Press the button on the touchscreen or use the dial-button to select a value from 0 to 100%. A higher value provides more clearly defined boundaries, at the expense of increased noise.

■ Color Map Index

Select the color of the elastogram. Press the button on the touchscreen or use the dial-button to select from types 1 to 5. If you change the Color Map, the color bar will also change accordingly.

■ Blending Level

Select the ratio of Alpha Blending. Press the button on the touchscreen or use the dial-button to select a value from 0 to 100%. Setting the value to 0% shows an E image only and setting it to 100% shows a 2D image only.

■ Persistence Level

Specify the speed of change between frames. Press the button on the the touchscreen or use the dial-button to select from 0 to 100%. Selecting a higher value increases the rate of frame change.

»» E-Strain

This function assists with the examination of breast lesions. It calculates the strain ratio between the area of the suspected lesion (ROI) and normal breast fat and displays the results.



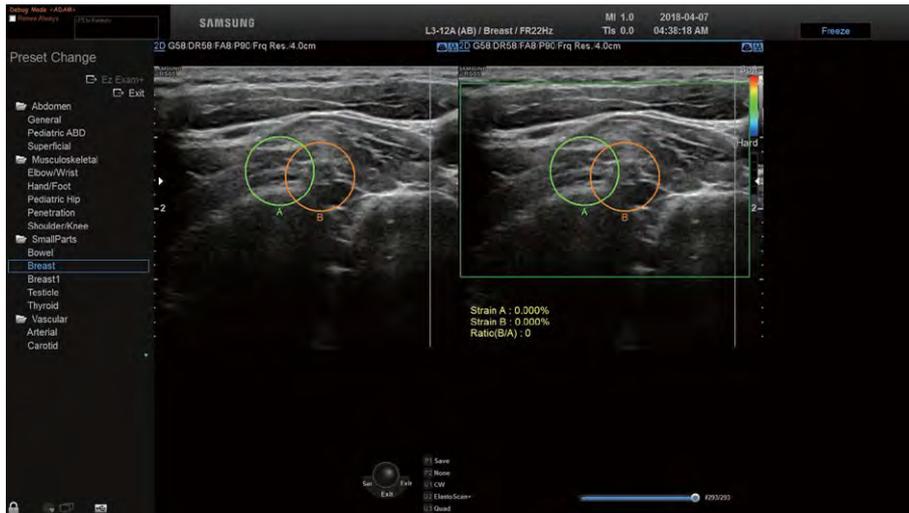
NOTE:

- ▶ The **E-Strain** button is only activated on the touchscreen when the following conditions are satisfied:
 - Application: Breast, Urology
 - Freeze state
- ▶ E-Strain is not supported in the United States.

1. Press the **Freeze** button on the control panel and then press the **E-Strain** button.
 2. Specify the position and size of the ROI in the area of the suspected lesion.
 - ▶ Make sure that breast fat is visible at the same level as, or above, the ROI.
 - ▶ Adjust the size of the ROI by using the trackball and the **Change** button.
 3. Press the **Set** button. The calculation is automatically performed and the results will be displayed on the screen.
 - ▶ Strain A: Mean strain value inside the ROI
(Supported in countries except the USA and Canada)
 - ▶ Strain B: Mean strain value of areas considered normal outside the ROI
(Supported in countries except the USA. and Canada)
- ▶ Ratio (B/A): Ratio of Strain values (Target Strain/Ref. Strain)
(Supported in countries except Europe, China and Japan.)



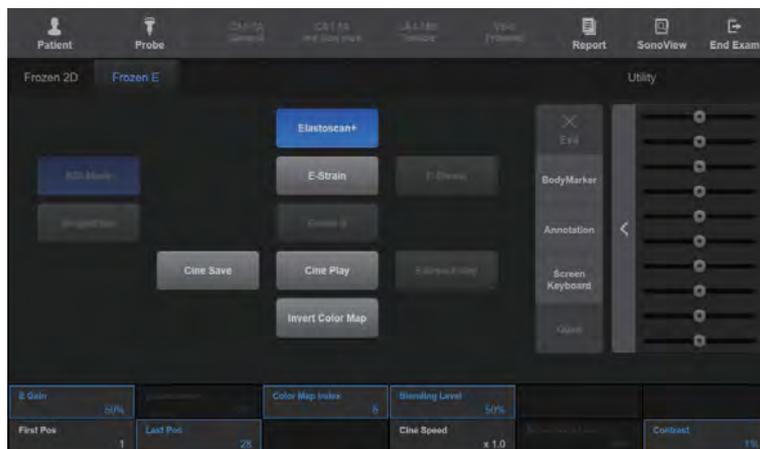
CAUTION: The range of measurement error is $\pm 15\%$ using phantom.



[Figure 7.42 E-Strain Monitor Screen]

4. To adjust the A Strain area and B Strain area again, use the following functions in the touchscreen.

- ▶ Delete A: Delete the A Strain area and set the ROI again. (However, the button will not be enabled when the B Strain is set.)
- ▶ Delete B: Delete the B Strain area and set the ROI again.



[Figure 7.43 E-Strain – Touchscreen]

»» E-Breast

This function assists with examination of breast lesions. It calculates the strain ratio between the area of the suspected lesion (ROI) and normal breast fat and displays the results.

**NOTE:**

- ▶ E-Breast is an optional feature of this product.
- ▶ The E-Breast button is only activated on the touchscreen when the following conditions are satisfied:
 - Application: Breast
 - Freeze state

■ E-Breast

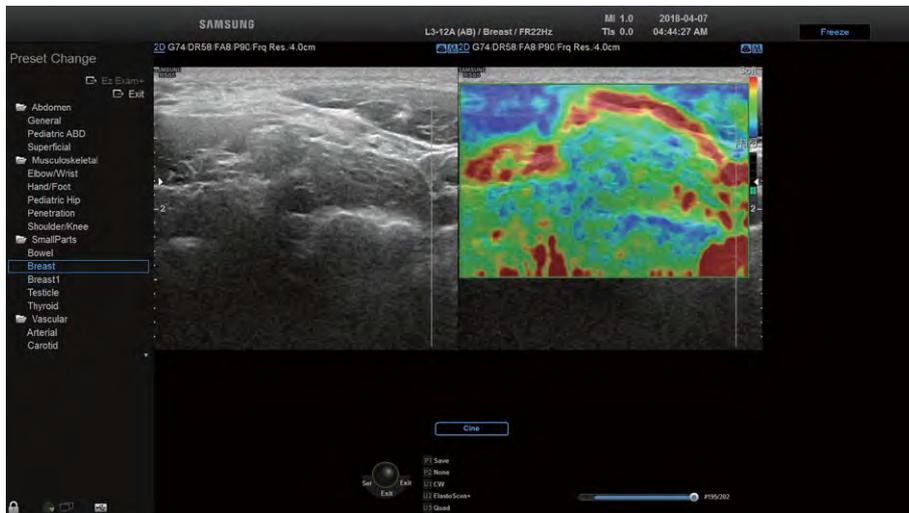
1. Press the **Freeze** button and then press the **E-Breast** button on the control panel.
2. Set the location and size of the ROI in the suspicious area of lesion.
 - ▶ Check that you can see the breast fat at the same level or above of the ROI.
 - ▶ Adjust the size of the ROI by using the trackball and the **Change** button.
3. Press the **Set** button. The calculation is automatically performed and the results will be displayed on the screen.
 - ▶ Target Strain: the average strain value of the area inside the ROI (Supported in countries except the USA and Canada.)
 - ▶ Ref. Strain: the average strain value of the area outside the ROI that is considered normal (Supported in countries except the USA and Canada.)
 - ▶ Strain Ratio: the strain ratio value (target strain/reference strain)

■ E-Breast Map

Obtain the average, maximum, and minimum values for Strain in the Reference Area of the frame, and show them in the elastogram display area. The average Strain within the frame is represented by the center (green) of the color bar, with the elastogram showing Hard Areas (red), Normal Areas (green), and Soft Areas (blue).



CAUTION: The range of measurement error is $\pm 15\%$ using phantom.



[Figure 7.44 E-Breast]

▶▶ E-Thyroid

This is the function for thyroid lesion exam. The ROI is used to show the contrast of an elastogram.



NOTE:

- ▶ The button is only activated on the touchscreen when the following conditions are satisfied:
 - Application: Thyroid
 - Freeze state
- ▶ The ROI mode and **Alpha Blending** feature must be turned On.

■ E-Thyroid

1. Press the **Freeze** button and then press the **E-Thyroid** button on the control panel.
2. Set the location and size of the ROI in the suspicious area of lesion.
Adjust the size of the ROI by using the trackball and the **Change** button.
3. Press the **Set** button. The ROI will be changed into an editable octangle shape and automatically calculate the ECI (Elasticity Contrast Index) and display the results on the screen.



Optimization of the ROI

To closely observe the location of the lesion, you can change the shape of the ROI to fit the size of the location of the lesion.

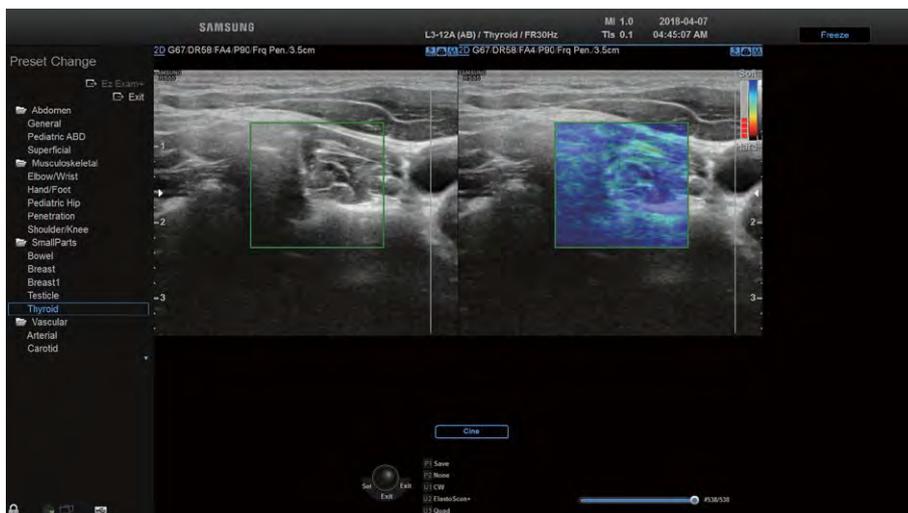
- ▶ When the cursor is hovering over the each point of the octagon, the color of corresponding point will be changed to yellow and editable.
- ▶ Use the trackball to move the position of the point and press the **Set** button to specify its position. The change is updated in real time and displayed on the screen. The system will automatically calculate the ECI and display the results on the screen whenever the position of the point is adjusted.

■ E-Thyroid Reset

When you press this button on the touchscreen, the measured E-Thyroid results will be reset.



CAUTION: The range of measurement error is $\pm 15\%$ using phantom.



[Figure 7.45 E-Thyroid]

MV-Flow Mode

This mode displays the intensity of blood flow in color within the ROI in the image. It is appropriate for examining the presence of microcirculatory blood flow and volume of slow blood flow.



NOTE:

- ▶ MV-Flow is an optional feature of this product.
- ▶ The probes, applications, and presets that support the MV-Flow feature are as follows:

Probe	Application	Preset
L3-12A	Small Parts	Breast, Breast1, Thyroid
	MSK	Sholder/Knee
LA4-18B	MSK	General
CA1-7A	Abdomen	General, General1
CA3-10A	Pediatric	Pediatric ABD

Press the **MV-Flow** on the touchscreen to select On or Off. When 'On' is selected, the touchscreen will switch to the MV-Flow screen.



MV-Flow Mode

- ▶ When entering MV-Flow Mode, Single Mode is displayed by default.
- ▶ MultiVision, S-Harmonic, and QuickScan are not available as 2D Mode features.

■ Tissue Suppression

Helps to reduce signals from tissues and with observing micro-blood vessels. Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0 to 5. The greater the number, the lesser the signals from tissues, which facilitates the micro-blood vessels observation.

■ Flow Mode

Select Power or Color on the touchscreen.

- ▶ Power: It displays information on the intensity of blood flow. The color bar indicates the presence of blood flow and its amount. The top of the color bar is the brightest section, where the intensity of blood flow is at its highest.
- ▶ Color: Displays information on the intensity and direction of blood flow. The color bar indicates the strength and direction of blood flow. Based on the Baseline at the middle, red indicates the strength and direction of blood flow toward the probe. By contrast, the blue color indicates the strength and direction of blood flow away from the probe.

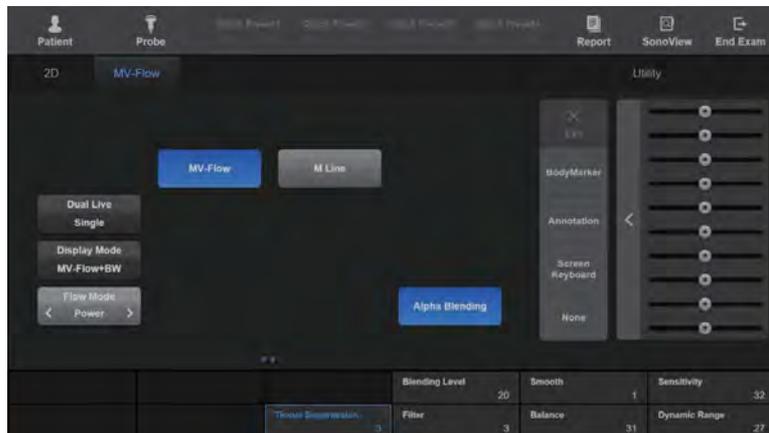


NOTE: Color Mode is available only with Linear probes.

■ Filter

Filters out low-frequency Doppler signals produced by tissue movement. Adjust the Cutoff Frequency to remove doppler signals whose frequency is lower than the cutoff frequency.

Press the button on the touchscreen or use the soft menu dial-button on the control panel to select a value from 0 to 5.

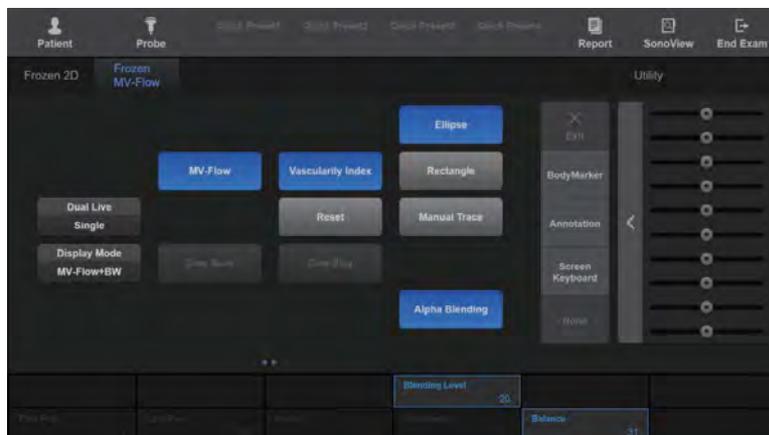


[Figure 7.46 MV-Flow – Touchscreen]

■ Vascularity Index (VI)

Provides the amount of displayed blood flow acquired by MV-Flow image. Displays the number of pixels, area, and ratio measurements within the Vascularity Index (VI) ROI. Available VI ROI Types include Ellipse, Rectangle, and Manual Trace.

- ▶ Pixels
 - Power: Number of the pixels within the VI ROI showing blood flow in MV-Flow image (having an intensity ≥ 26)
 - ROI: Total number of the pixels within the VI ROI
- ▶ Area (Unit: cm^2)
 - Power: Size of the power pixel area within the VI ROI
 - ROI: Size of the VI ROI area
- ▶ Ratio: Ratio of the power pixels over the total VI ROI pixels



[Figure 7.47 Frozen MV-Flow – Touchscreen]



NOTE: For more information on other touchscreen items, please refer to the '2D Mode', 'Color Doppler Mode', and 'Power Doppler Mode' sections.



WARNING: This feature is not intended for the diagnosis or evaluation of the progression of disease. This feature is intended to provide relative values in response to changes in ultrasound image acquisition method. The vascularity index does not provide an absolute measurement of vascularity within a given ROI.



CAUTION:

- ▶ Pixels with at least 26 of brightness on the MV-Flow™ images are included only.
- ▶ Values of Gain, Tissue suppression, Filter, Sensitivity, DR, and FA affect VI.
 - Alpha Blending and Balance do not affect the VI value.

∴ Combined Mode

In Combined Mode, three different modes are shown combined, including the default 2D Mode. Note that in Dual Live Mode, only two modes - 2D and Color Doppler - are shown combined.

2D/C/PW Mode

Color Doppler Mode and PW Spectral Doppler Mode are displayed simultaneously.

In Color Doppler Mode, press the **PW/Y** dial-button on the control panel. Or, in PW Spectral Doppler Mode, press the **C/Z** dial-button on the control panel.

2D/PD/PW Mode

Power Doppler Mode and PW Spectral Doppler Mode are displayed simultaneously.

In Power Doppler Mode, press the **PW/Y** dial-button on the control panel. Or, in PW Spectral Doppler Mode, press the **PD** button on the control panel.

2D/C/CW Mode

Color Doppler Mode and CW Spectral Doppler Mode are displayed simultaneously. This mode is available only with certain probes.

In Color Doppler Mode, press the **CW** button on the control panel. Or, in CW Spectral Doppler Mode, press the **C/Z** dial-button on the control panel.

2D/PD/CW Mode

Power Doppler Mode and CW Spectral Doppler Mode are displayed simultaneously. This mode is available only with certain probes.

In Power Doppler Mode, press the **CW** button on the control panel. Or, in CW Spectral Doppler Mode, press the **PD** button on the control panel.

2D/C/M Mode

Color Doppler Mode and M Mode are displayed simultaneously.

In Color Doppler Mode, press the **M** button on the control panel. Or, in M Mode, press the **C/Z** dial-button on the control panel (only available with certain probes and applications).

Dual Live Mode

This mode provides 2D Mode and Color Doppler Mode simultaneously. In 2D Mode or C Mode, press **Dual Live** on the touchscreen.

2D/TDI/TDW Mode

TDI Mode and TDW Mode are displayed simultaneously. In PD Mode or Color Doppler Mode, press **TDI** on the touchscreen, and then press the **PW/Y** dial-button.



NOTE: This can only be used when the cardiac application is selected in Phased Array Probe.

▶▶ Changing Combined Mode Format

■ Changing the Active Image Mode

Press the **Set** button on the control panel. The currently active image mode, such as 'D Only' or '2D Only', is displayed above the on-screen menu.

In Combined Mode, more than two image modes are used at the same time. The image mode currently in use is called the 'Active Image Mode'. For example, if Sample Volume is moved with the trackball in 2D/C/PW Mode, PW Spectral Doppler Mode becomes the current active image mode.

Because the menu and button options vary depending on the active image mode, you can use the **Set** button to change the active image mode.

Note that the active image mode cannot be changed with the **Set** button when the Freeze function is in effect.

■ Changing the Menu

Change only the touchscreen menu without changing the active image mode. The control panel buttons will correspond to the active image mode.

For example, when the touchscreen menu for 2D mode is displayed on the screen in 2D/C/PW mode, you can select another mode from the touchscreen menu to switch to that mode.



NOTE: For information on optimizing an image in Combined Mode, please refer to 'Basic Mode'.

⌘ Multi-Image Mode

The product supports Dual Mode and Quad Mode.

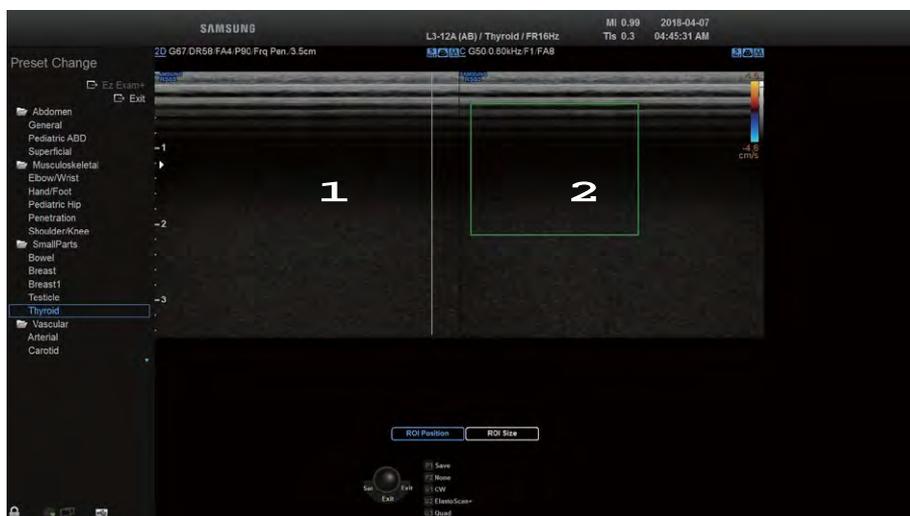
In Multi-Image Mode, an image can be displayed in different combined modes. Button operations in an active area are the same as in Combined Mode.

Dual Mode

Press the **Dual** button on the touchscreen. Alternatively, press the **L** or **R** button on the control panel.

You can compare two different images at the same time. Each time you press the **Dual** button, one of the two images is selected. The current active image mode is indicated by a blue line at the top. The buttons and menu operate according to the image mode that is currently in use.

To exit Dual Mode, press the **2D** dial-button.



[Figure 7.48 Dual Mode]

■ Dual Mode Screen

Press the **Dual** button on the touchscreen to display the current Cine image and the most recent Cine image in the order of **1** → **2**.

Quad Mode

Press the **Quad** button set as the U Key on the touchscreen. Alternatively, press and hold the **L** or **R** button on the control panel.

You can compare four different images at the same time. Each time you press the **Quad** button, one of the four images is selected. The current active image mode is indicated by a blue line at the top. The buttons and menu operate according to the image mode that is currently in use.

To exit Quad Mode, press the **2D** dial-button.



[Figure 7.49 Quad Mode]

■ Quad Mode

Press the **Quad** button on the touchscreen to display the current Cine image and the three most recent Cine images in the order of **1** → **2** → **3** → **4**.



NOTE: For information on optimizing an image in Multi-image mode, please refer to 'Basic Mode'.

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⦿ 3D/4D Mode

Displays the observation area as a 3D image. This product provides 3D Mode and 4D Mode (optional).



NOTE:

- ▶ Standard probes cannot be used for 3D/4D Modes.
- ▶ This User Manual was created using the Smart 4D as reference.
- ▶ For information on Operation modes other than the 3D/4D Modes, please refer to 'Chapter 7. Modes of Operation'.

3D Mode

The product provides 3D mode and XI STIC.



[Figure 8.1 3D Mode]

■ 3D

In this mode, you can acquire 3D images using a 3D probe.

■ XI STIC

In this mode, fetal cardiac cycle and STIC volume data can be obtained with 3D probes. For more information, please refer to 'XI STIC' in this chapter.



NOTE: XI STIC is an optional feature of this product.



Color 3D Mode

3D Mode can be used in combination with Color Doppler or Power Doppler Mode.

- ▶ 3D/C Mode: In Color Doppler Mode, press **3D** on the touchscreen. A 3D image of the observation area is displayed, along with a color representation of the velocity and direction of blood flow.
- ▶ 3D/PD Mode: In Power Doppler Mode, press **3D** on the touchscreen. A 3D image of the observation area is displayed, along with a color representation of the presence and/or amount of blood flow.

▶▶ Entering and Exiting 3D/4D Mode

Press **3D** on the touchscreen. When on, the *3D Stand Byscreen* will be displayed on the touchscreen. Press the button again to exit 3D/4D Mode.

▶▶ 3D/4D Mode Screen

■ ROI Box

In 3D/4D Mode, the ROI Box is also called the Volume Box, which represents the area to be converted into a 3D/4D image.

You can adjust the position and size of the ROI Box by using the **Change** (endre) button on the control panel. Each time the **Change** (endre) button is pressed, the current status of the ROI Box is shown at the bottom center of the screen, including:

- ▶ ROI Position: In this state, the position of the ROI Box can be changed. Use the trackball to move the ROI Box.
- ▶ ROI Size: In this state, the size of the ROI Box can be changed. Use the trackball to resize the ROI Box, and press the **Change** (endre) button to apply the new size.

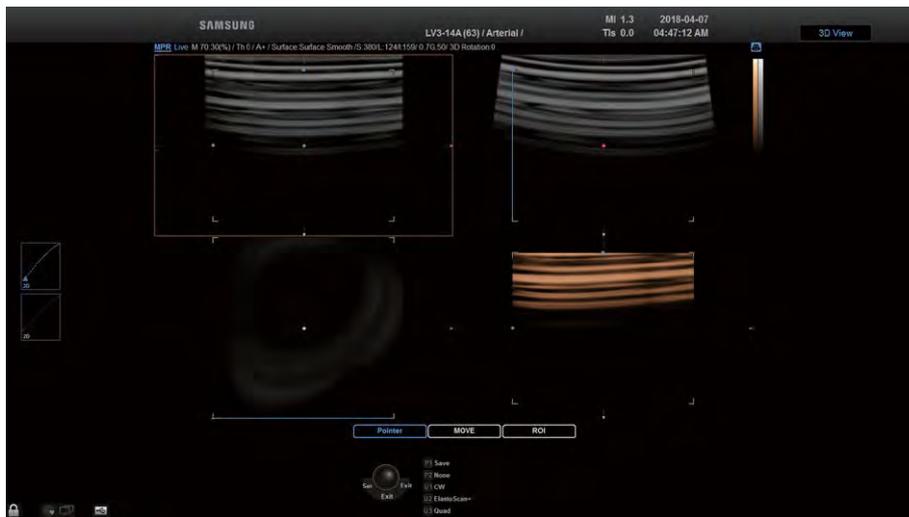
4D Mode

Use a 3D probe to obtain 3D images in real time. This is also called Live 3D Mode.



NOTE:

- ▶ 4D Mode is an optional feature of this product.
- ▶ 4D Mode is only available when 3D probes are used.



[Figure 8.2 4D Mode]

Images can be obtained in the same way as standard 3D images.



4D Mode Screen

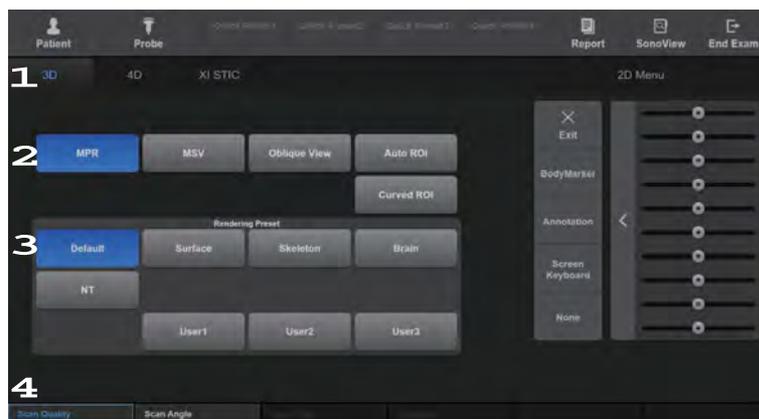
The current mode in the Image Information area will be shown as 'Live' to indicate 4D. Press the **Freeze** button on the control panel to switch to the *4D Cine* screen.



NOTE: In 4D, only MPR, MSV, and Oblique View Modes are available. For more information, see 3D View-MPR and 3D XI.

:: 3D Stand By

This screen is displayed on the touchscreen when you start 3D/4D Mode. Select from various parameters to configure the acquisition method of 3D images.



[Figure 8.3 3D Stand By – Touchscreen]

» 3D Stand By Menu

■ 1 Menu Tab

Press the touchscreen tab to select the 3D/4D Mode you wish to use. Tabs displayed on the touchscreen differ depending on the probe you are using and whether Color 3D Mode is enabled.

■ 2 View Mode

Select a view mode to use after 3D images are acquired.

- ▶ MPR: The standard view mode for 3D image review.
- ▶ MSV, Oblique View: View modes for reviewing 3D XI images. Select either **MSV** or **Oblique View**. For more information, please refer to '3D XI'.



NOTE: MSV and Oblique View are view modes for 3D XI.

- ▶ Auto ROI: Press **Auto ROI** on the touchscreen to select On or Off. When 'On' is selected, the ROI Box will be automatically placed in the area that will be converted to a 3D image.



NOTE: Auto ROI is available only in the OB application.



Tips!

Things to Remember when Using Auto ROI

- ▶ Only images of the fetal body can be acquired.
 - ▶ If Auto ROI is turned On, the position or size of the ROI Box cannot be changed.
 - ▶ Auto ROI is affected by the brightness or contrast of 2D images.
 - ▶ It is not available in Color 3D Mode.
- ▶ Curved ROI: Press **Curved ROI** on the touchscreen to select On or Off. When 'On' is selected, you can manipulate a Curved ROI line to select the rendered area.



NOTE:

- ▶ It cannot be used when OH (Orientation Help) is on.
- ▶ It is supported when the Render Direction is 'C+'.
- ▶ It is supported in **Dual** and **Quad** modes.



[Figure 8.4 Curved ROI]

■ 3 Rendering Preset

Press the button on the touchscreen to select a preset for the 3D image. For more information, please refer to 'Preset' in '3D View-MPR Mode'.

■ 4 Soft Menu

Press the button on the touchscreen or use the Soft Menu dial-button on the control panel to select a value.

- ▶ **Scan Quality:** Select the quality of the 3D image from Low, Medium, Medium2, High, and Extreme. Increasing the quality of the image (i.e. closer to Extreme) results in lower scan speed.



NOTE: Scan Quality is not available in the XI STIC menu tab.

- ▶ **Scan Angle:** Set the scan angle. The available scan angle range varies depending on the probe being used.



NOTE: In XI STIC, set the scan angle from 15° to 60°.

- ▶ **Scan Time:** Set the image acquisition time. Select a value from 7 s to 15 s by pressing the touchscreen or using the dial-button. The button is enabled in XI STIC only.



NOTE: For more information, please refer to 'XI STIC'.

- ▶ **Trimester:** Set the pregnancy trimester. Select from 1st, 2nd, and 3rd by pressing the touchscreen or using the dial-button. The button is enabled in XI STIC only.



NOTE: For more information, please refer to 'XI STIC'.

Acquiring 3D/4D Images

1. Specify the location and size of the ROI Box as desired.
2. Configure various settings in the 3D Stand By screen on the touchscreen.
Select a menu tab, and then configure in the order of View Mode → Rendering Preset → Soft Menu.
3. Press the **Freeze** or **Set** button on the control panel. Acquisition of the 3D image will begin. If you wish to cancel the acquisition of 3D image in progress, press the **Exit** button.
4. Once 3D image acquisition is complete, the View Mode screen will be shown (if configured to do so).
If a horizontally flipped 3D image is obtained, the image will also be shown horizontally flipped in View Mode.
5. Optimize the image for diagnosis. To obtain another 3D image, press **3D** on the touchscreen.

Tips!

How to Improve 3D Image Quality

- ▶ Consider the direction, size and section of the viewpoint as well as the visibility of an object.
- ▶ Before acquiring 3D images, adjust the contrast in 2D Mode.
- ▶ The bigger the ROI box, the slower the rendering speed. Therefore, set an appropriate ROI box size.
- ▶ To see the 3D image of a fetus in frontal view, position the fetal head in the direction of the Direction Mark, putting it in the coronal plane. Then scan the fetus from back to abdomen.
- ▶ The 3D image of a fetal face can be more easily located in the coronal plane than in the Sagittal plane.
- ▶ To determine the surface contour, subjects such as amniotic fluid that do not generate echoes should be insulated with hypo-echoic textures.
- ▶ Once 3D image acquisition is complete, you can adjust the low-threshold level to clean up the image. The general rule is not to adjust the High Threshold; set it to the maximum value of 255.

Tips!

Adjusting 2D Images in 3D/4D Modes

- ▶ Press the **2D Menu** tab on the touchscreen to optimize a 2D image before acquiring the corresponding 3D image.
- ▶ Once the 2D image is optimized, press **3D Menu** on the touchscreen to return to 3D Stand By Mode.



NOTE: For information on Operation modes other than the 3D/4D Modes, please refer to 'Chapter 7. Modes of Operation'.

:: 3D View – MPR

This view mode is enabled upon the acquisition of images when **MPR** is selected in *3D Stand By Mode*. Alternatively, press **MPR** in the View Mode tab on the touchscreen. You can optimize 3D images, perform diagnosis, and take measurements.

The '3D View' indicator appears in the upper right corner of the monitor screen, and 3D image information is displayed as **MPR**.

Basic Operating Instructions

■ Zooming In to/Out of Images

Rotate the **Zoom** dial-button on the control panel to zoom in or out of an image. The current zoom factor is displayed on the left side of the screen.

■ Niche Zoom

Use the **Zoom** dial-button on the control panel. Press the dial-button to switch to Niche Zoom. Rotate the dial-button to zoom in or out VCT images. The current zoom factor is displayed on the left side of the screen.



NOTE: This option is available with VCT.

■ Rotating an Image

- ▶ X-axis Rotation: Use the **Angle/X** dial-button on the control panel.
- ▶ Y-axis Rotation: Use the **PW/Y** dial-button on the control panel.
- ▶ Z-axis Rotation: Use the **C/Z** dial-button on the control panel.

■ Calculations by Application

Press the **Calculator** button on the control panel. Measurements are taken in the same manner as the measurements taken in each application, which is described in 'Chapter 9. Measurements'.



NOTE:

- ▶ Measurements can be taken only for images in MPR, MSV or Oblique View.
- ▶ In MSV, measurements can be taken only when the Display Format is 1x1, 2x1, or 2x2. For more information, please refer to 'MSV' in this chapter.
- ▶ In Oblique View, measurements can be taken only when the Display Format is 2x1.
- ▶ Only the **SonoView**, **Patient**, and **Report** buttons are available during measurement.

■ Basic Measurement

Press the **Caliper** button on the control panel. For more information, refer to 'Basic Measurements' in 'Chapter 9. Measurements'.

■ Annotation

Press **Annotation** on the touchscreen.

- ▶ Entering Text: Press **Keyboard** or **Annotation** on the touchscreen. Text entry mode will be activated. For more information, refer to 'Entering Text' in 'Chapter10. Image Management'.
- ▶ Entering Indicators: Press the button for setting up Indicators. For more information, refer to 'Entering Indicators' in 'Chapter10. Image Management'.



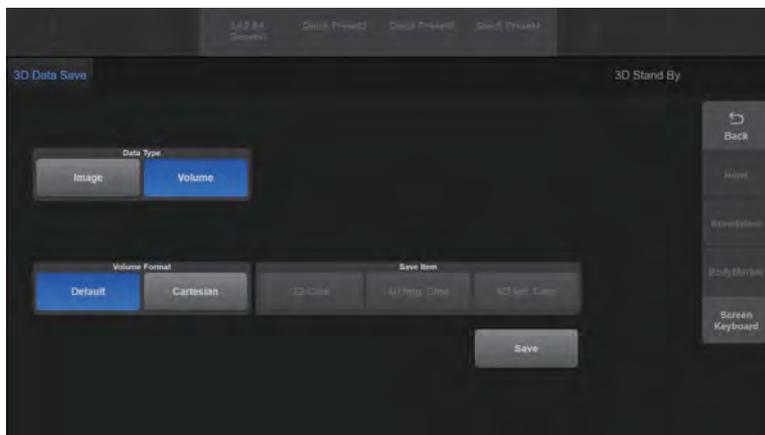
NOTE: While entering an annotation, measurement functions such as **Calculator** and **Caliper** cannot be used.

■ Saving Images



NOTE: If volume data contains both 4D and 3D Cine images, choose either 4D or 3D for saving.

1. Press the **Save** button on the control panel. The *3D Data Save* screen will be displayed on the touchscreen.
2. Specify settings such as Data Type, Save Item, and Volume Format.
3. To finish saving the image, press **Save** on the touchscreen. To cancel saving, press **Back** on the touchscreen or press **Exit** button on the control panel.



[Figure 8.5 3D Data Save]

Tips!

Volume Data

1. If volume data contains a Cine image, the Cine image will be saved with it.
2. If images are saved with volume data, they can be converted to new 3D rendered images with SonoView.

■ Printing Images

Press the **Print** button on the control panel.

Tips!

Print Button

Refers to a User Key in the control panel (**P1-2**, **U1-4**) to which Print functionality has been assigned. The current settings are displayed in the User Key area at the bottom of the monitor screen. You can change the setting for each button in Utility > Setup > Customize > U Key.



3D View Screen



[Figure 8.6 3D View]

- 1 In MPR Mode, the current mode, Mix, Threshold Low, Render Direction, Render Modes 1 and 2, and 3D Rotation are displayed in the 3D image information.

3D Image Information: The 3D mode currently being used and the image information are displayed on the monitor screen. Turn the information display On or Off by pressing the User Key on the control panel that corresponds to **Image Info**.



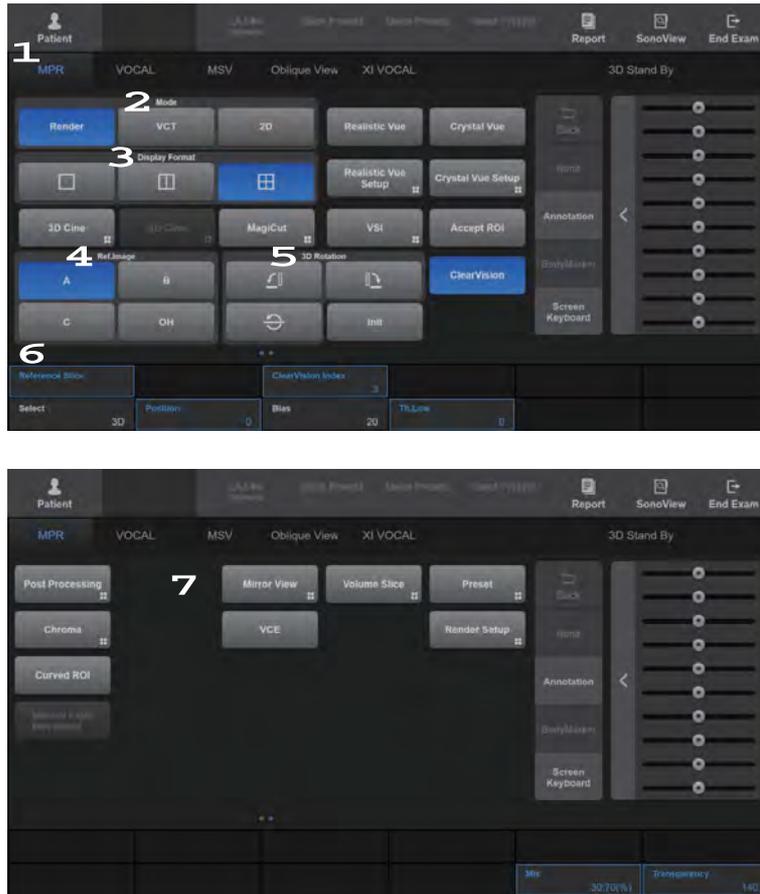
NOTE: To assign an **Image Info**. button function, go to Utility > Setup > Customize > U Key. For more information, please refer to 'Chapter 3. Utilities'.

- 2 A Plane: Image of the axial section.
- 3 B Plane: Image of the sagittal section.
- 4 C Plane: Image of the coronal section.
- 5 3D Image

- 6 Trackball status indication: The current state of the trackball is displayed at the bottom of the monitor screen. You can select Pointer, Move, or ROI for trackball. Press the **Change** button on the control panel to change the trackball state. The trackball state changes sequentially each time the button is pressed.
- ▶ Move: Use the trackball to move the 3D image. The acquired 3D image moves as you move the trackball.
 - ▶ ROI: Use the trackball to resize the ROI box. The ROI box on the 3D image is resized as you move the trackball.
 - ▶ Pointer: Re-adjusts the position of ROI Box. Pressing the **Pointer** button on the touchscreen switches to Pointer state. You can rotate the ROI Box around the image axis by using the pointer while pressing the **Set** button. Press the **Change** button again to switch to another state.

» 3D View Menu

Only those buttons that are available in the current mode are enabled.



[Figure 8.7 3D View Menu]

■ 1 View Mode Tab

Press the touchscreen tab to select which menu to use. The displayed menu will differ depending on which tab is selected.

■ 2 Mode

Select the method for displaying the 3D image by pressing the button on the touchscreen.

- ▶ Render: Shows images in the Axial, Sagittal and Coronal planes, along with the 3D image.
- ▶ VCT: Shows the images for Axial, Sagittal, and Coronal planes and their actual combination. Each plane is distinguished by different colored borders. VCT stands for Volume CT.
- ▶ 2D: The Axial, Sagittal, and Coronal plane images are displayed on the screen along with OH (Orientation Help). OH represents the currently selected plane's location on the volume data.



Press **Single** button on the touchscreen for a more detailed view.

■ 3 Display Format

Select the display format by pressing the button on the touchscreen.

- ▶ Single: Displays the 3D image in full screen mode.
- ▶ Dual: One 2D image is displayed together with a 3D image.
- ▶ Quad: Both 2D and 3D images are displayed.



NOTE: In 2D or VCT Modes, only Single or Quad Format can be used.

■ 4 Ref. Image

Press the corresponding button on the touchscreen to select a reference image from among A, B, and C. The selected image will be highlighted with orange borders.

- ▶ A: Axial Section
- ▶ B: Sagittal Section
- ▶ C: Coronal Section
- ▶ OH: Press this button on the touchscreen to select On or Off. When 'On' is selected, a 3D image will be displayed along with the OH. OH stands for Orientation Help.



NOTE: Available in **Render** and **2D**.

■ 5 3D Rotation

Select -90° , 90° , or 180° by pressing the button on the touchscreen. Rotation is based on the current 3D image orientation.



NOTE: This option may be used in **Render**.

■ 6 Soft Menu

Press the button on the touchscreen or use the Soft Menu dial-button on the control panel to set up.

- ▶ Reference Slice: It moves the Reference Slice to left and right in parallel.
- ▶ Select: Select either 2D or 3D for Post Curve.



NOTE: In **Mirror View**, Select is only enabled in Color 3D Mode.

- ▶ **Position:** Select the position of the Post Curve you have selected in **Select** from 0 to 100.
- ▶ **Bias:** Select the bias of the Post Curve you have selected in **Select** from -100 to 100.



Initializing Post Curve

Double-clicking the Post Curve on the left side of the screen with the trackball when the trackball is in Pointer mode will only initialize the Post Curve you have selected in **Select**.

- ▶ **Th.Low:** Select the lowest threshold from 0 to 254.



NOTE: This option may be used in **Render**.



Threshold

You may adjust Threshold to filter out unnecessary data from an image. A higher threshold tends to enhance cystic elements, while a lower threshold tends to enhance bony elements.

■ 7 3D Utility Menu

This menu appears on the second page of the touchscreen. Scroll the touchscreen from right to left to flip to the second page.



NOTE:

- ▶ The following 3D Utility Menu items are enabled in MPR Mode: VCE, RealisticVue, Volume Slice, Chroma, ROI Curved, MagiCut, Mirror View, Render Setup, 3D Cine, 4D Cine, Preset, Post Processing, Move Light, VSI.
- ▶ For more information on 3D Utility, refer to the '3D Utility Menu'.

■ Accept ROI

Press the button on the touchscreen to select On or Off. When 'On' is selected, ROI will not be displayed.



NOTE: Available in **Render** and **Mirror View**.

■ ClearVision

You can obtain a clearer image by eliminating noise and enhancing boundaries. Five predefined indices are provided. If set to 'On' **ClearVision Index** is enabled on the touchscreen.



NOTE: For more information on ClearVision and ClearVision Index, please refer to the 2D Mode menu of this chapter.

■ Init

Resets the location information of the 3D image.

■ Mix

Configure the mix of Render Modes 1 and 2. Select from 0:100 to 100:0 (%). For more information on Render Modes, refer to 'Render Setup' in '3D Utility Menu'.



NOTE: This option may be used in **Render**.

■ Transparency

Select the transparency of the 3D image. Select from 20 to 250. The lowest value (20) is for complete transparency, and the highest value (250) is for complete opacity.



NOTE: This option may be used in **Render**.

▶▶ HDVI

Filters 3D images to express outlines more vividly and improve image quality. Five predefined indexes are available.



NOTE: HDVI is an optional feature of this product.

▶▶ HDVI Index

Press **HDVI Index** on the touchscreen. Select an index from 1 to 5 by pressing the button on the touchscreen or using the dial-button.

▶▶ HDVI Type

Press the touchscreen button or use the dial-button to select the part to measure from the available options of Face, Brain, Early OB, Heart, Spine, Gyn, Breast, Thyroid, Carotid, Abdomen, and Kidney, and adjust the image.



NOTE: The ClearVision and HDVI options are enabled in MPR, MSV, or Oblique View mode. For more information on 3D Utility, see the '3D Utility Menu'.

▶▶ 4D View Screen

Obtain images the same way you obtain a standard 3D image. 'Live' will be shown in the current mode in the image information to indicate 4D.

Press the **Freeze** button on the control panel to switch to the *4D Cine* screen.

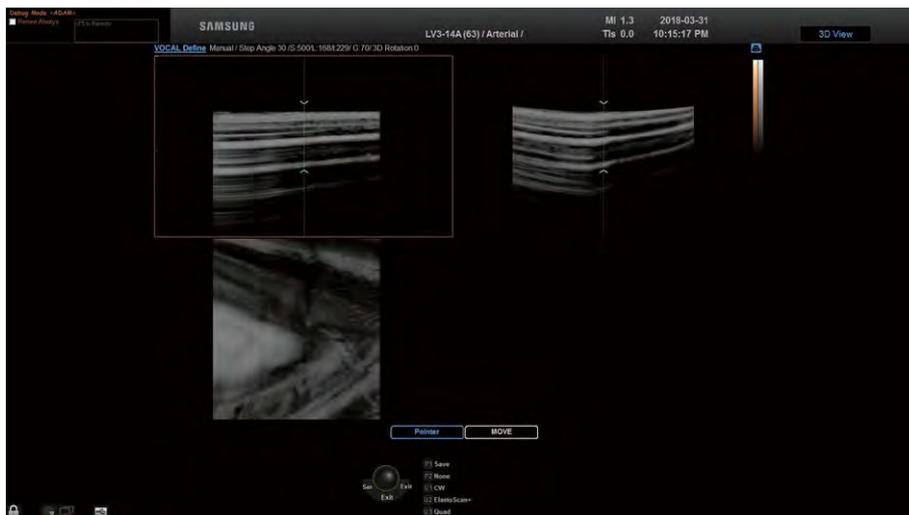


NOTE: In 4D, only MPR, MSV, and Oblique View modes are available. For more information, see 3D View-MPR and 3D XI.

∴ VOCAL

Measure the volume of tissues within the human body. VOCAL is an abbreviation for Virtual Organ Computer Aided anaLysis.

VOCAL is performed in the following order: VOCAL Define → VOCAL Edit → VOCAL



[Figure 8.8 VOCAL]

VOCAL Define

Configure the settings required for performing VOCAL. Information on the current mode, contour type, Step Angle, and 3D Rotation Angle are displayed in the 3D image information area.

```
VOCAL Define Manual / Step Angle 30 /S:500/L:202/I:165/ 1.5G:50/ 3D Rotation:0
```

[Figure 8.9 VOCAL Define Image Information]

» » Contour Type

Select a contour type. A contour line is automatically created for all types except **Manual**.

■ Solid

Used for object data with many echoes.

■ General

Draw a contour line for a general object. This is faster than other automatic contour types, but less accurate.

■ Prostate

Used for prostate data.

■ Cystic

Used for object data with fewer echoes.

■ Sphere

After creating a spherical object, edit its contour to make it into the desired shape.

■ Manual

Create the desired shape of an object manually.

»» ⌘ **Ref. Image**

Press the corresponding button on the touchscreen to select a reference image from among A, B, and C. The selected image will be highlighted with orange borders.

»» ⌘ **Step Angle**

Select the angle of rotation. Select from **12**, **18** or **30** by pressing the corresponding button on the touchscreen.

»» ⌘ **Pole Point Move Using Trackball**

Set the range to perform VOCAL in a reference image. In the reference image, Pole 1 indicates the position of the upper arrow and Pole 2 indicates the position of the lower arrow.

Tips!

Designating Poles 1 and 2

Designate the position of the Pole Points by performing one of the following three actions.

- ▶ Press the **Pole 1** or **Pole 2** button on the touchscreen, and then use the trackball on the control panel.
- ▶ Press the **None** button on the touchscreen, and then use the touchscreen or the Soft Menu dial-button on the control panel.
- ▶ Press the **None** button on the touchscreen, move the trackball to Pole 1 or 2, press the **Set** button to specify the position, and then drag the trackball.

»» ⌘ **Init**

When you press the touchscreen, the position information of the 3D image is initialized.

▶▶ **Start**

Press the touchscreen to begin creation of VOCAL data.

Tips!

When the Contour Type is Set to Manual

1. Press **Start** on the touchscreen.
2. Press the **Set** button over an image, and then move the trackball to draw the contour line.
3. Press the **Set** button to confirm the selection.
4. Select the next task in **Image Position** on the touchscreen.
 - ▶ Press **Next** to move to the next frame.
 - ▶ Press **Previous** to move to the previous frame.
5. Press **Done** on the touchscreen. VOCAL will start. If you wish to cancel and then set a new Contour, press **New Contour**.

If you press **Done** without contouring, VOCAL is performed over a sphere.



[Figure 8.10 VOCAL Define – Touchscreen]

VOCAL Edit

Once VOCAL data is created, volume information will be displayed on the screen. In VOCAL Edit Mode, you can modify or redraw the existing contour lines.

Information on the current mode, Shell Mode, the current frame number : the total number of frames is displayed in the 3D image information area.

VOCAL Edit Off / (1:6) /S:500/L:202/I:165/ 1.5G:50/ 3D Rotation:0

[Figure 8.11 VOCAL Edit Image Information]

»» ⌘ Shell Mode

Set the external surface (shell) of an object based on its contour line.

■ Off

Disable Shell Mode. The generated contour will overlap the shell.

■ Inside

The shell is drawn inside the contour generated by the Shell Thick. specified.

■ Outside

The shell is drawn outside the contour generated by the Shell Thick. specified.

■ Symmetric

Half the shell is drawn inside the contour and the other half of the shell is drawn outside the contour, with each drawn at half of the Shell Thick. specified.

»» ⌘ Shell Thick.

Specify the thickness of the shell. Select a value from 1 to 20mm by pressing the button on the touchscreen or using the dial-button. This option appears on the touchscreen only when Shell Mode is used.

»» ⌘ Image Position

Review the contour lines for each frame. Use **Previous** and **Next** buttons to move through frames.

»» Multi Edit

Edit multiple contour lines at once. Press the button on the touchscreen to turn Multi Edit On or Off. When this feature is turned On, up to 6 contour lines will be displayed on the screen. If there are 6 or more lines, you can use the **MEV Page** dial-button to navigate between pages. MEV is an abbreviation for Multi Edit View.

Use the **Pole 1** and **Pole 2** buttons to edit contour lines. You can also use the trackball and the **Set** button on the control panel to edit contour lines. Once editing is complete, press **Multi Edit** again to turn it off.

»» Clear Contour

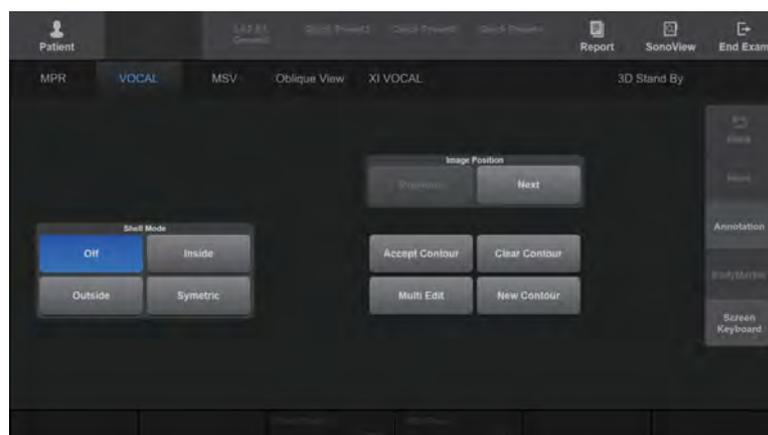
When you press this button on the touchscreen, the VOCAL data are deleted, the settings are maintained, and the system returns to the VOCAL Define step.

»» New Contour

When you press this button on the touchscreen, the VOCAL data and the settings are all deleted and it returns to the initial setting stage of VOCAL Define.

»» Accept Contour

Press the button on the touchscreen to apply changes. The screen will switch to the VOCAL data review screen.



[Figure 8.12 VOCAL Edit – Touchscreen]

VOCAL

Optimizes VOCAL data for review. Information on the current mode and display format is shown in the 3D image information area.

VOCAL ROI 3D /S:500/L:202/I:165/ 1.5G:50/ 3D Rotation:0

[Figure 8.13 VOCAL Image Information]

Mode

Specify how VOCAL data are presented.

■ ROI 3D

Shows images in the Axial, Sagittal and Coronal planes, together with VOCAL data.

■ Fixed 3D

Shows images in the Axial, Sagittal and Coronal planes, together with 3D images for VOCAL data.

■ VCT

Shows actual combinations of images in the Axial, Sagittal and Coronal planes and VOCAL data.

Display Format

Press the button on the touchscreen to select **Single** or **Quad**. When **Single** is selected, VOCAL data is displayed in full screen; if **Quad** is selected, the Axial, Sagittal, and Coronal plane images, and the VOCAL data, are displayed.

Ref. Image

Press the corresponding button on the touchscreen to select a reference image from among A, B, and C. The selected image will be highlighted with orange borders.

»» **VOCAL Edit**

Return to the VOCAL Edit stage.

»» **Init**

Resets the location information of the 3D image.

»» **Histogram**

A shell histogram is calculated and displayed on the screen.

This represents the gray value distribution within the 2D and Power Doppler images of an object for which VOCAL has been performed. It also displays the Mean Gray (MG), Vascularization Index (VI), Flow Index (FI) and Vascularization Flow Index (VFI).



NOTE: Histogram is available only for 2D and Power Doppler 3D images.



Formula for Shell Histogram:

- ▶ MG: The average value of gray voxel brightness (gray)
 $MG = \frac{\text{The sum of brightness (gray)}}{\text{The total number of voxels}}$
- ▶ VI: The ratio of color voxels over all voxels within the shell
 $VI = \frac{\text{The number of color voxels}}{\text{The total number of voxels}}$
- ▶ FI: The average value of brightness (color) for color voxels within the shell
 $FI = \frac{\text{The sum of brightness (color)}}{\text{The total number of color voxels}}$
- ▶ VFI: The average value of brightness (color) for all voxels within the shell
 $VFI = \frac{\text{The sum of brightness (color)}}{\text{The total number of voxels}}$

»» **Niche**

Select from Type 1 to Type 8 by pressing the corresponding button on the touchscreen or using the dial-button.



NOTE: This option is available with VCT.

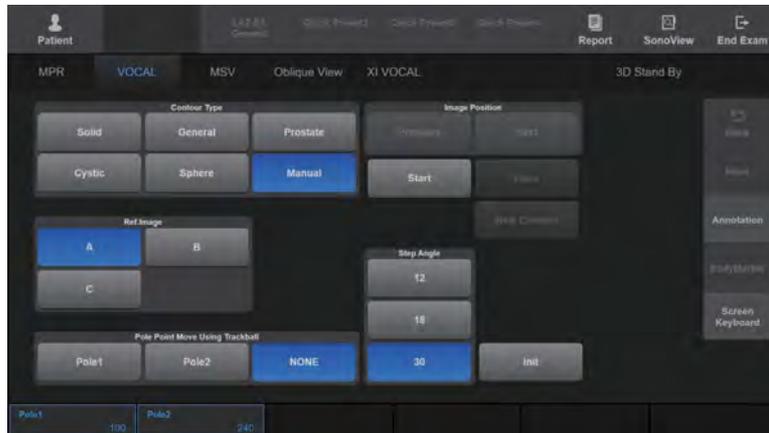
Mode

Specify how the surface of the VOCAL data is represented. Select Surface or Wireframe by pressing the corresponding button on the touchscreen or by using the dial-button.

- ▶ Surface: VOCAL data are represented using the method of expressing the exterior of images by curves.
- ▶ Wireframe: VOCAL data are represented by dots and lines.



NOTE: This option is available with ROI 3D.



[Figure 8.14 VOCAL – Touchscreen]



NOTE:

- ▶ For more information on other touchscreen items, refer to '3D View-MPR'.
- ▶ The following 3D Utility Menu items are enabled in VOCAL Mode: Render Setup, 3D Cine, and Chroma.
- ▶ For more information on 3D Utility, refer to the '3D Utility Menu'.

:: 3D XI

This view mode is enabled if 3D image acquisition is completed when **MSV** or **Oblique View** is selected in *3D Stand By*. '3D XI' is displayed in the upper right-hand corner of the monitor screen.

An image can be viewed in multiple slices.



NOTE: 3D XI is only available when 3D probes are used.

MSV

An image can be viewed in multiple slices. MSV is an abbreviation for Multi-Slice View.



NOTE: Only when the Display Format is 1x1, 2x1, or 2x2, measurement functions such as **Calculator** and **Caliper** can be used.



[Figure 8.15 Multi Slice View]

» **MSV Screen**

The images sliced at the thickness set in **Slice Thick.** are displayed on the screen. 'Slice number/the total number of slices' is shown at the bottom of each slice image. The currently selected slice image is indicated with an orange outline.

The image information displays the current mode, Ref. Image, Slice Thick., and 3D Rotation Angle. The *3D XI-MSV* screen is displayed on the touchscreen.

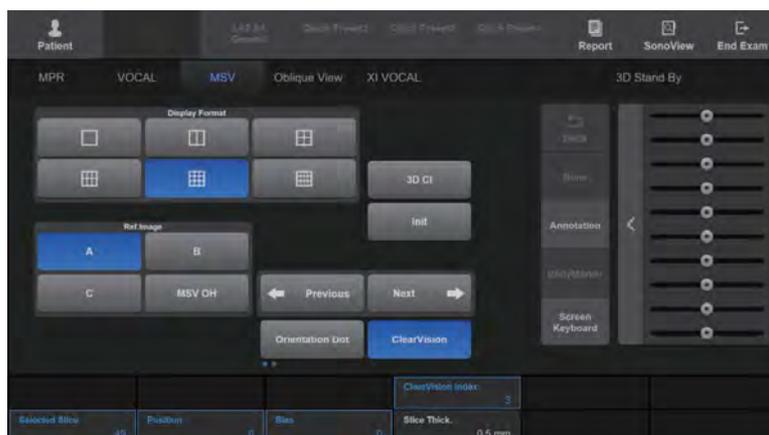
■ **Rotating an Image**

Rotating the reference plane affects all planes.

- ▶ **X-axis Rotation:** Use the **Angle/X** dial-button on the control panel. When the trackball is in Pointer mode, move the trackball near to the X axis of the image. If the shape of the pointer changes after it has moved, press the **Set** button and move the trackball.
- ▶ **Y-axis Rotation:** Use the **PW/Y** dial-button on the control panel. When the trackball is in Pointer mode, move the trackball near to the Y axis of the image. If the shape of the pointer changes after it has moved, press the **Set** button and move the trackball.
- ▶ **Z-axis Rotation:** Use the **C/Z** dial-button on the control panel. When the trackball is in Pointer mode, move the trackball near to the Z axis of the image. If the shape of the pointer changes after it has moved, press the **Set** button and move the trackball.

■ **Moving an Image**

Set the trackball in Move Mode, and then move it up/down/left/right. The image will move along the X and Y axes.



[Figure 8.16 Multi Slice View – Touchscreen]

»» ⌘ **Display Format**

Set the layout of slice images. Select from 1x1, 2x1, 2x2, 3x2, 3x3 or 4x3 by pressing the corresponding button on the touchscreen. The number of slices that can be displayed simultaneously on the screen varies based on this setting.

»» ⌘ **Ref. Image**

Press the corresponding button on the touchscreen to select a reference image from among A, B, and C.

■ **MSV OH**

Press this button on the touchscreen to turn this feature On or Off. If this function is turned On, the A, B and C planes of the selected slice image will be displayed on the screen. The selected slice and reference images will be highlighted with orange borders.

»» ⌘ **Previous/Next**

Change the page on the screen. This option is available when the total number of slice images exceeds what is specified in **Display Format**. Select a page by pressing the **Previous** and **Next** buttons on the touchscreen.

»» ⌘ **Selected Slice**

Select a slice image to observe. Select a slice by pressing the button on the touchscreen or using the dial-button. The selected slice will be highlighted with orange borders.

»» ⌘ **Position**

Set the position of the post curve. Select a value from 0 to 100 by pressing the button on the touchscreen or using the dial-button.

»» ⌘ **Bias**

Set the bias of the post curve. Select a value from -100 to 100 by pressing the button on the touchscreen or using the dial-button.



Slice Thick.

Set the cut depth of images. Select a value from 0.5 to 10.0mm by pressing the corresponding button on the touchscreen or using the dial-button. Depending on your selection, the number of slices and pages will vary.



NOTE: The Slice Thick. measurement represents the slice width in volume data, rather than the actual anatomical position.



Slice Thick. Type

Select the distance between Slice Thick. Select either 0.5mm or 1.0mm by pressing the touchscreen button or using the dial-button.



Ruler

Set the position of the ruler. Select from None, Right, Left, Top, Bottom and All by pressing the corresponding button on the touchscreen or using the dial-button.



NOTE:

- ▶ For more information on other touchscreen items, refer to '3D View-MPR'.
- ▶ The following 3D Utility Menu items are enabled in MSV Mode: Orientation Dot, 3D CI, Chroma, 4D Cine, Volume CT, Post Processing, Auto Contrast, Negative, and Preset.
- ▶ For more information, refer to the '3D Utility Menu'.

Oblique View

After drawing a straight or curved line on the selected image in MPR Mode, you can observe the related oblique image. Instructions are as follows:

1. Select **Display Format** and then specify the number of oblique images for observation.
2. Select the **Oblique Cut Type**.
3. Draw a straight or curved line on a reference image by using the trackball and the **Set** button. An oblique image will appear with the start (S) and end (E) points shown.

If Cut Type is set to Line and the trackball is in Move state, you can reposition the line.

4. Optimize the image for observation by using other buttons on the touchscreen.



NOTE: When Display Format is 2x1, measurement functions such as **Calculator** and **Caliper** can be used.



[Figure 8.17 Oblique View]

»» ⌘ Oblique View Screen

The reference image selected in MPR Mode is displayed on the screen. The reference image is highlighted with an orange outline, and always located at the upper left-hand corner of the screen.

When more than one line is used for observation, each line is indicated by a different color and number.

The image information displays the current mode, Ref.Image, Oblique Cut Type, and Plumb Size (or Slice Thick.). The *3D XI-Oblique View* screen is displayed on the touchscreen.

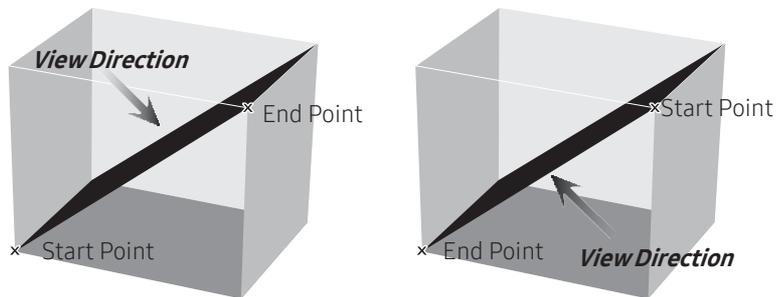


NOTE: When **OVIX** is used, the image information also displays OVIX Line Offset, Mix, Threshold Low, and Render Mode 1, 2.



Direction of View of Oblique Image

The observer is positioned perpendicular to the plane that slices the reference image. Refer to View Direction, shown below.



»» ⌘ Display Format

Select the layout. Press the button on the touchscreen to select 2x1, 3x2, or 3x3. Depending on this setting, the number of oblique images and the Oblique Cut Type will vary.

▶▶ Oblique Cut Type

Press the button on the touchscreen to specify how images are cut.

■ Line

The oblique image of a straight line can be observed.

■ Contour

The oblique image of a curved line or contour line can be observed.



Multi Line & Multi Contour

If **Display Format** is set to 3x2 or 3x3, enable **Auto Increment** to draw more than one line.

■ Parallel

The oblique image of a straight line and its parallel lines can be studied. If a straight line is drawn, its parallel lines are automatically shown on the screen.



NOTE: This cannot be used when **Display Format** is 2x1.

■ Plumb

The oblique image of a straight line and its perpendicular lines can be studied. If a straight line is drawn, its perpendicular lines are automatically shown on the screen.



NOTE: This cannot be used when **Display Format** is 2x1.

»» ⌘ Image Rotation

Specify the direction of an oblique image. Select 90, 180, or -90 by pressing the button on the touchscreen. Select the oblique image that you wish to change the direction of from **Select Slice**.

»» ⌘ Clear Line

Delete the Oblique image.

»» ⌘ Selected Slice

Select a line by pressing the button on the touchscreen or using the dial-button. The oblique image of the selected line is indicated by a blue outline.



NOTE: This cannot be used when **Display Format** is 2x1.

»» ⌘ Plumb Size

Adjust the length of the perpendicular lines by pressing the button on the touchscreen or using the dial-button. You can adjust the length in 1mm increments, based on the centermost line; the current length is displayed in the Image Information.



NOTE: This is used only when **Oblique Cut Type** is set to Plumb.

»» ⌘ Slice Thick.

Adjust the interval between the perpendicular lines by pressing the button on the touchscreen or using the dial-button. You can adjust the interval in 1mm increments, based on the centermost line; the current length is displayed in the Image Information.



NOTE: This is used only when the **Oblique Cut Type** is set to Parallel.

▶▶ Rotate Line

Rotate a straight line by pressing the button on the touchscreen or using the dial-button. When the line is rotated, the oblique image is also changed accordingly.



NOTE: This cannot be used when:

- ▶ **Oblique Cut Type** is set to Contour; or
- ▶ **Oblique Cut Type** is set to Line and **Selected Slice** is set to Select All.

▶▶ OVIX

OVIX is the abbreviation for Oblique View eXtended which sets the cross-sectional thickness of an oblique image and shows the image in 3D.

Press the corresponding button on the touchscreen to turn it On or Off. When this is On, an OVIX Line appears on the reference image, which indicates the cross-sectional thickness of the oblique image of the reference image. The OVIX Post Curve is also displayed at the left-hand side of the monitor screen.

The thickness of the OVIX Line can be adjusted by using **OVIX Thick**. To change the 3D image settings, select and adjust **Render Setup** or OVIX Post Curve in the 3D Utility Menu.



NOTE: This cannot be used when **Oblique Cut Type** is Contour.

▶▶ OVIX Thick.

Adjust the thickness of OVIX by pressing the button on the touchscreen or using the dial-button. The 3D image for the set thickness appears.

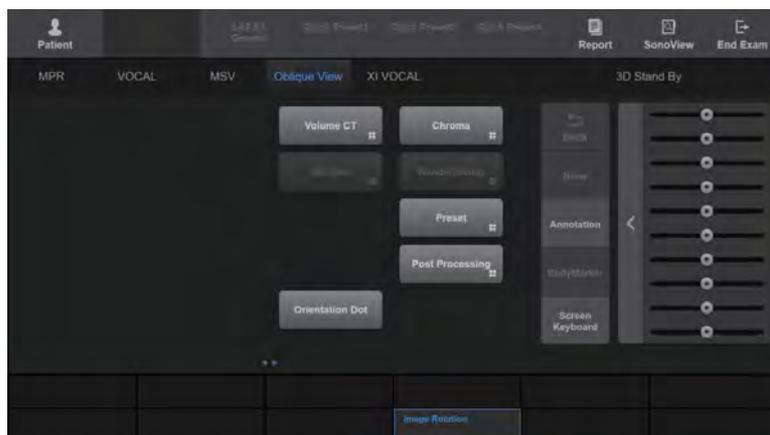
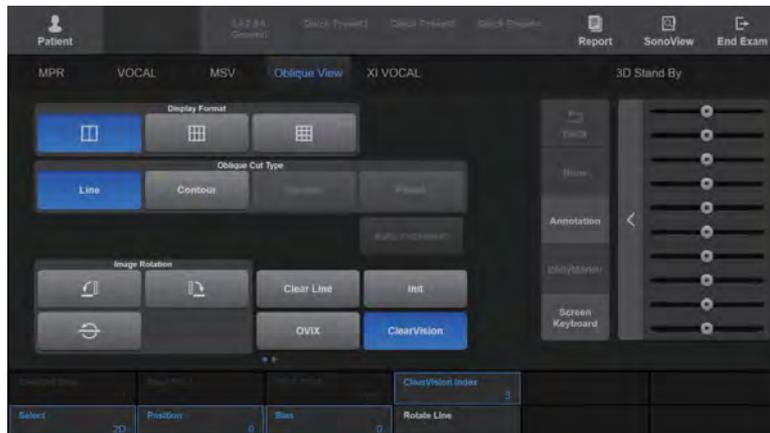
»» **Init**

Deletes the Oblique image and initializes the location information for the Ref. Image at the same time.



NOTE:

- ▶ For more information on other touchscreen items, refer to '3D View-MPR'.
- ▶ The following 3D utility menu items are enabled in Oblique View Mode: Render Setup, Chroma, Orientation Dot, 4D Cine, Volume CT, Post Processing, and Preset.
- ▶ For more information on 3D Utility, refer to the '3D Utility Menu'.



[Figure 8.18 Oblique View – Touchscreen]

:: XI VOCAL

Measure the volume of tissues in 3D XI Mode.



NOTE: XI VOCAL is one of the functions in 3D XI.



[Figure 8.19 XI VOCAL]

Tips!

VOCAL vs XI VOCAL

The following formulae are used:

- ▶ VOCAL: Measures the volume of an object in a standard 3D image by using rotational slices.
- ▶ XI VOCAL: Measures the volume of an object in the selected reference image in MSV Mode. Uses parallel slices. It calculates the volume of an object by cutting it into multiple slices.

XI VOCAL is performed in the following order: XI VOCAL Define → XI VOCAL Edit → XI VOCAL

XI VOCAL Define

Specify how slice and contour lines are retrieved.

The reference image and slice line will be displayed on the left-hand side of the screen. The start point (S) and end point (E) of the slice line are displayed on the right-hand side of the screen. In the 3D Image Information, the current mode, Ref. Image, Contour Type, # of Slices (number of images), and 3D Rotation Angle are displayed. The *3D XI-XI VOCAL* screen is displayed on the touchscreen.



[Figure 8.20 XI VOCAL Define]

»» Contour Type

Select a contour type. A contour line is automatically created for all types except **Manual**.

■ Solid

Used for object data with many echoes.

■ Cystic

Used for object data with fewer echoes.

■ General

Draw a contour line for a general object. This is faster than other automatic contour types, but less accurate.

■ Manual

The shape of the object is created manually by the user. The contour line is configured in the *XI VOCAL Edits* screen.

»» Ref. Image

Press the button on the touchscreen to select a reference image from among A, B, and C. The selected image will be highlighted with orange borders.

■ Ref. Contour

Press the button on the touchscreen to select On or Off. When 'On' is selected, a contour line can be drawn on the reference image using the trackball and the **Set** button.

»» Slice Direction

Set the direction of a slice line. Select from Vertical or Horizontal by pressing the corresponding button on the touchscreen. Changing the direction of the slice line also changes the slice image displayed on the screen.

»» ⌘ **Init**

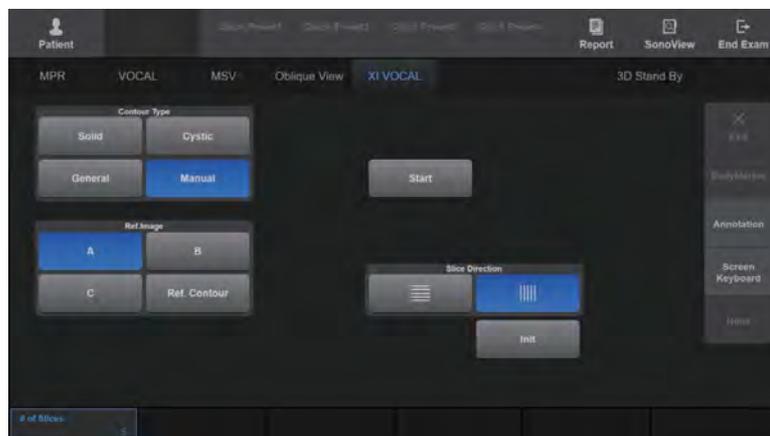
Resets the location information of the 3D image.

»» ⌘ **Start**

The system will switch to the *XI VOCAL Edit* screen.

»» ⌘ **# of Slices**

Specify the number of slice images. Select a value from 5, 10, 15 and 20 by pressing the corresponding button on the touchscreen or using the dial-button. Depending on the selected number of images, the interval between slices will vary.



[Figure 8.21 XI VOCAL Define – Touchscreen]

XI VOCAL Edit

Specify the contour extraction range or run XI VOCAL.

Based on the slice lines, slice images and pole points will be displayed on the screen. A pole point is a reference point against which an object contour is extracted. Two pole points appear in each slice image.

The selected slice image is highlighted with orange borders. The image number/the total number of slice images' is shown at the bottom of each image. The current mode is displayed in the 3D Image Information.



Reference Image and Slice Line

Always displayed at the lower right-hand corner of the *XI VOCAL Edit* screen. They can be useful when the position of a slice image needs to be considered.



[Figure 8.22 XI VOCAL Edit]

»» ⌘ Ref. Page

Change the page by pressing the corresponding button on the touchscreen or using the dial-button.

»» ⌘ New Contour

Delete the current data and return to the *XI VOCAL Define* stage.

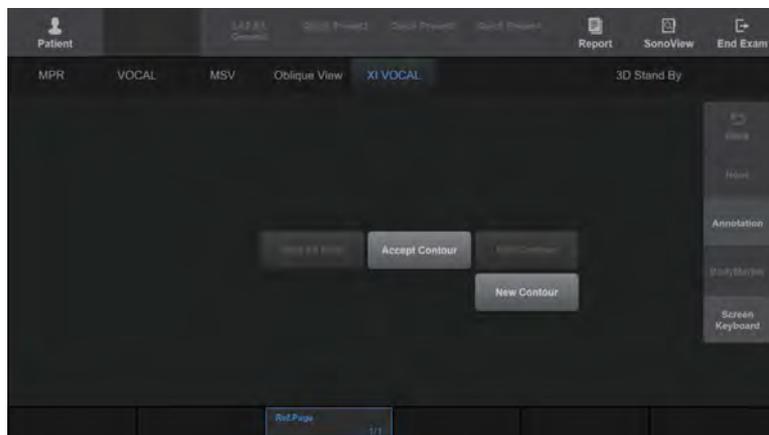
»» ⌘ Accept Contour

Apply the changes and perform XI VOCAL. The screen will change to the *XI VOCAL* screen.

Tips!

When the Contour Type is Set to Manual

Use the **Set** button and trackball to draw a contour line before pressing **Accept Contour**. If you press **Accept Contour** without drawing a contour line first, a general type contour line will be extracted.



[Figure 8.23 XI VOCAL Edit – Touchscreen]

XI VOCAL

Optimize XI VOCAL data for review.

Slice images with their contour lines shown and 3D reference images are displayed. The 3D reference image is highlighted with orange borders, and the calculated volume is shown at the bottom of the image. The current mode is displayed in the 3D Image Information.

Tips!

3D Reference Image

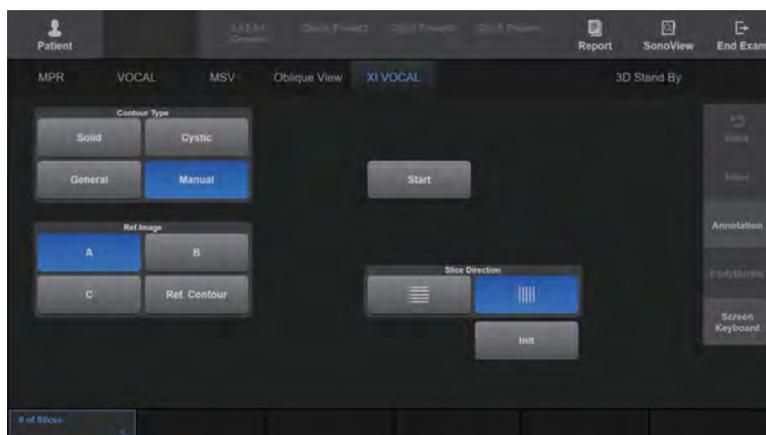
Use XI VOCAL to display an object for which the volume has been obtained in 3D. You can use the **Zoom** switch and **Angle/X, PW/Y, C/Z** dial-buttons on the control panel to zoom or rotate the object for observation.

View All Slice

Press the button on the touchscreen to select On or Off. When 'On' is selected, all XI VOCAL data – including the reference image, slice line and slice image - will be displayed on the screen simultaneously.

Edit Contour

Return to the *XI VOCAL Edit* screen. You can edit the contour line by using the trackball and the **Set** button.



[Figure 8.24 XI VOCAL – Touchscreen]

XI STIC

This option can be used to obtain the fetal cardiac cycle with volume data on fetal cardiac area, and to recompile the volume data for display. STIC is an abbreviation for Spatio-Temporal Image Correlation.

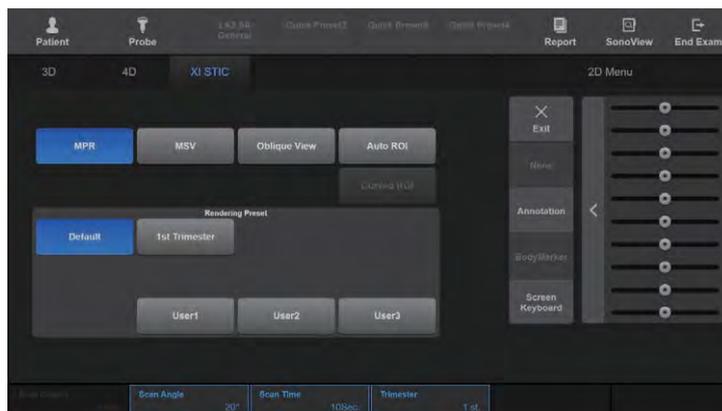


NOTE:

- ▶ XI STIC is an optional feature of this product.
- ▶ XI STIC is only available when 3D probes are used.
- ▶ XI STIC only appears when Application is set to **OB**.
- ▶ When you enter 3D Stand By in Fetal Echo Application, the system will automatically switch to STIC.



[Figure 8.25 XI STIC]



[Figure 8.26 XI STIC – Touchscreen]

▶▶ Acquiring XI STIC Image



NOTE:

- ▶ When a heart rate cannot be calculated because motion artifacting is severe or a cardiac cycle is not present, the system returns to the initial XI STIC screen.
- ▶ In Color STIC, the cardiac cycle can only be measured when the frame rate is 20 or above.

1. Select the **XI STIC** tab in the *3D Stand By* screen on the touchscreen.
2. Set the various parameters as you would for acquisition of standard 3D images.
3. Press the **Freeze** or **Set** button on the control panel. The system will start acquiring 3D images.
4. When image acquisition is complete, XI STIC is displayed on the monitor screen, and the *XI STIC Confirm* screen appears on the touchscreen. Check that the fetal cardiac cycle has been calculated.
5. Press **Yes** on the touchscreen to continue. Press **No** to cancel and acquire images again.
6. Optimize the acquired images as needed for diagnosis.



How to Improve STIC Volume Data

- ▶ Scan Angle: Specify a small scan angle for small fetal hearts.
- ▶ Scan Position: Adjust the scan position so that the center of the scan angle and the fetal heart are aligned properly.
- ▶ ROI Box: Adjust the size of the volume box so that it nearly fits the size of the fetal heart.

▶▶ Scan Angle

Set the scan angle. Select an angle from 15° to 60° by pressing the corresponding button on the touchscreen or using the dial-button.

▶▶ Scan Time

Set the image acquisition time. Select a value from 7s to 15s by pressing the corresponding button on the touchscreen or using the dial-button.

▶▶ Trimester

Set the pregnancy trimester. Select from 1st, 2nd and 3rd by clicking the corresponding button or using the dial-button on the touchscreen.

Tips!

Trimester

When the 1st, 2nd, or 3rd trimester is set, the recommended scan time and STIC angle are automatically set as shown in the following table:

Trimester	1st	2nd	3rd
Scan Time	10 seconds	12 seconds	15 seconds
STIC Angle	20°	25°	30°

If a scan time and STIC angle other than those in the above table are set, the trimester is then displayed as user set.



NOTE: For information on how to use, please refer to '3D Stand By'.

▶▶ Reviewing XI STIC Image

XI STIC images are played as Volume Cine. XI STIC information, including Img. Angle, Vol. Angle, Scan Time, HR, and Volume Pos., is shown on the left side of the screen.



NOTE: The only available modes with Volume Cine are MPR, MSV and Oblique View.

Press the **Freeze** button on the control panel to stop Volume Cine playback.

▶▶ **Speed (%)**

Set the playback speed for XI STIC images. Select a speed from 25% to 400% by pressing the corresponding button on the touchscreen or using the dial-button. This rate is based on the fetal heart rate (100%).

▶▶ **Volume Pos.**

Select an index by pressing the corresponding button on the touchscreen or using the dial-button.

**NOTE:**

- ▶ Only available in Freeze state.
- ▶ For information on other usage, please refer to '3D View-MPR' and '3D XI'.

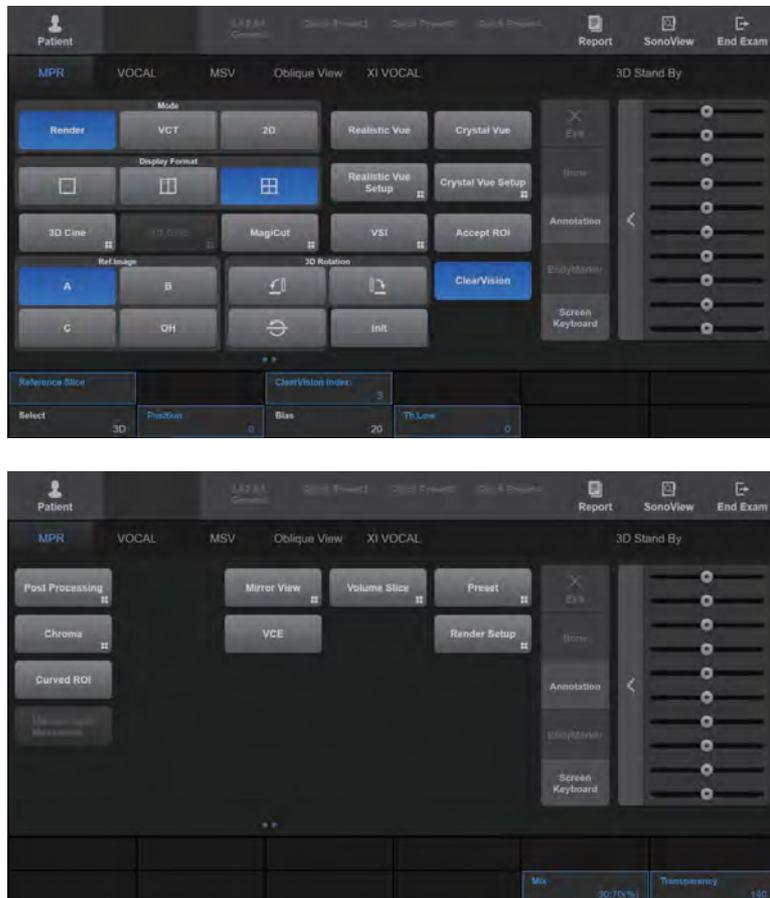
:: 3D Utility Menu

This menu is always displayed on the second page of the touchscreen in View Mode. Only the buttons that are available in the current mode are enabled.

Scroll the touchscreen to the right or left to flip the page. Press **Exit** on the touchscreen to exit the menu currently in use.



NOTE: This content describes the functions that are commonly available in all modes. Therefore, you need to refer to the section on each individual mode for information on OVIX, Auto Increment, and other mode-specific functions.



[Figure 8.27 3D Utility Menu – Touchscreen]

VCE

Press the touchscreen to turn it On or Off. When turned On, the contrast of a 3D image will be enhanced. VCE stands for Volume Contrast Enhancement.



NOTE: Available only in the **Render** Mode of MPR.

RealisticVue

Semi-translucent rendering is used for a realistic display of fetal images.

Press the **RealisticVue** button, and Clear SFVI, HDVI, and VC will be all turned On.



NOTE: RealisticVue is an optional feature of this product.

■ Clear SFVI

Press this button on the touchscreen to turn this feature On or Off. Turning this on reduces noise. SFVI stands for Smart Filter Volume Imaging.

■ VC

Press the touchscreen button to turn it On or Off. When turned On, use the dial-button to select a value from 1 to 8. VC stands for Volume Compound.

■ Light Direction

Use the touchscreen or the trackball to reposition the direction of the light that is applied to volume.



NOTE: You need to press the **Move Light** button to enter trackball mode.

■ **Set Color**

Use the dial-button to select the Set Color applied to RealisticVue. You can choose from values 1-8.



NOTE: You can set color by using the Hue, Saturation, and Lightness dial-buttons.

■ **Move Light**

Apply the user-defined Light direction to the image.



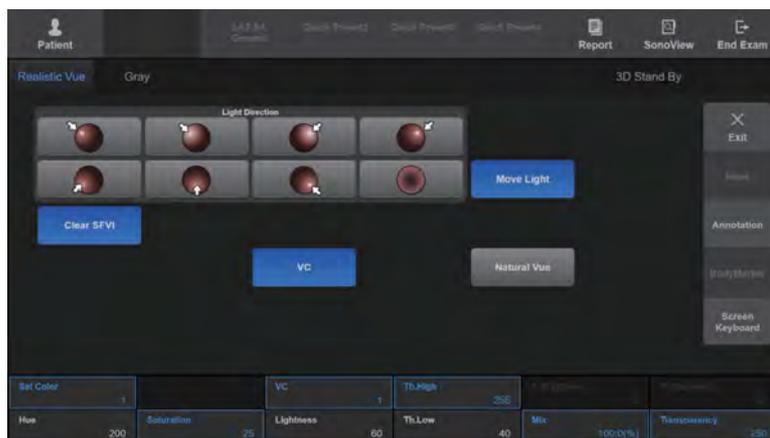
NOTE: It is only enabled in the 3D Utility Menu when RealisticVue is 'On'.

■ **Natural Vue**

This feature shows the reflected light on the object surface by the light source to improve realism and representation of shape. Press the button on the touchscreen to select On or Off.



NOTE: N.Brightness, N.Sharpness dial-buttons can be used to change the color setting.



[Figure 8.28 RealisticVue]

CrystalVue

It renders the context information about the user-defined area.

**NOTE:**

- ▶ CrystalVue is an optional feature of this product.
- ▶ Available in MPR Mode only.
- ▶ This feature is enabled in Gray Mode under Render Setup (Render Mode1: Surface, Render Mode2: Surface Smooth), (Render Mode1: Surface, Render Mode2: VSI).
This feature is enabled in Inversion Mode under Render Setup (Render Mode1: Surface, Render Mode2: Surface Smooth), (Render Mode1: Surface, Render Mode2: VSI).
- ▶ RealisticVue Setup can be executed in CrystalVue.

■ Context

Renders the volume data of the selected context for regions such as heart, spine, ventricle, umbilical cord, liver, long bone, and follicle.

■ ROI Contour

The context information is displayed as rendered images for the user-defined areas only; for other areas, only the surface information is displayed.

■ ROI Circle

The user selects a circular area for which to show the context information. The context information is displayed as rendered images for the user-defined circular area only; for other areas, only the surface information is displayed.

■ Complexity

Assign a Complexity Value from 0 to 600 by pressing the touchscreen or using the dial-button. If the Complexity Value is 0, only the surface information is displayed; for higher Complexity Values, however, the context information is shown as rendered images.

■ Strength

Assign a Strength Value from 0 to 100 by pressing the touchscreen or using the dial-button. At higher Strength Values, the context information becomes clearly visible and turns opaque. At higher Strength Values, the image has a wider range of complexity.

■ CrystalVue Transparency

Select a value from 20 to 250 by pressing the button on the touchscreen or using the dial-button. The lowest value (20) is for complete transparency, and the highest value (250) is for complete opacity.

■ Presets

The saved Complexity, Strength, and CrystalVue Transparency values are displayed. User1 to User5 are available, and they can be renamed by the user. Pressing any of these buttons will enable its function, while adjusting the Complexity, Strength, and CrystalVue Transparency values will disable it.

■ ROI Circle Size

In the Mode, select ROI Circle to adjust the size of the circular area where the context information is to be presented. Press the button on the touchscreen or use the dial-button to select Small, Medium, or Large.



[Figure 8.29 CrystalVue Setup – Touchscreen]

Volume Slice

Volume data can be viewed in multiple slices. The *Volume Slice* screen will be displayed on the touchscreen.



NOTE: If **Volume Slice** is pressed in modes other than **Render**, Volume Slice will start after the system switches to **Render** Mode. Therefore, Volume Slice images are displayed with the settings available in **Render** Mode.



MSV vs. Volume Slice

MSV displays a 3D image as 2D images by separating it into multiple slices. Volume Slice, on the other hand, displays 3D images. Furthermore, Volume Slice allows you to adjust the settings for each slice image independently.

■ Volume Slice Screen

Nine images are displayed on the monitor screen. In the center line are the 2D, 3D, and OH reference images. Volume Slice images, which are generated based on the reference images, are displayed in the remaining lines.

On the 3D reference image and the Volume Slice images, the ROI position and the slice numbers are displayed. On the 2D reference image, the ROI Box and the slice line are displayed.



[Figure 8.30 Volume Slice]

 Tips!**Slice Number**

Because 3 images are divided before and after a reference image, respectively, the Slice number is shown as a number from -3 and 3.

■ Ref. Image

Press the button on the touchscreen to select a reference image from A, B, and C. The selected image will be displayed in the 2D image.

- ▶ A: Axial Section
- ▶ B: Sagittal Section
- ▶ C: Coronal Section

■ 3D Rotation

Select the direction of Volume Slice. Press the button on the touchscreen to select -90, 90, or 180.

■ Slice Thick.

Select the interval between slice lines. Select by pressing the button on the touchscreen or using the dial-button. The Volume Slice images are updated accordingly.

■ Selected Slice

Select a Slice Line. Press the button on the the touchscreen or use the dial-button to select -3 or 3. The selected slice line also appears in the 2D Reference Image. In addition, the Volume Slice image for the selected slice line is indicated by an orange contour.



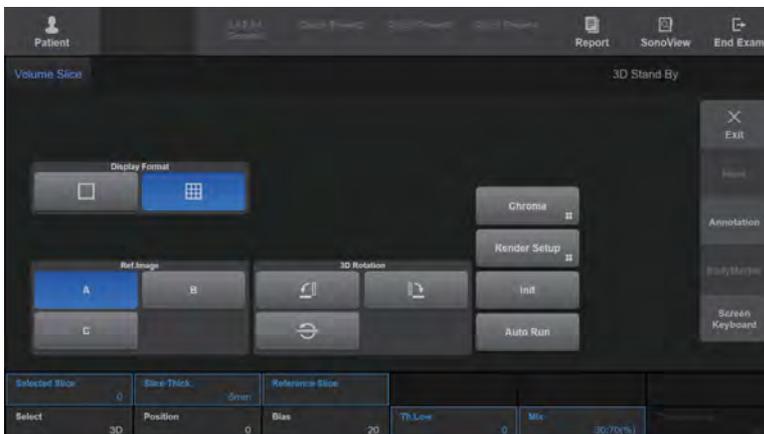
NOTE: For more information on other menu items, refer to the menu in '3D Mode' section.



Performing Volume Slice Again

To perform Volume Slice again based on a certain Volume Slice image:

1. While the trackball is in Pointer Mode, use the trackball and the **Set** button to select a Volume Slice image.
2. Double-click the selected Volume Slice image, and Volume Slice will be performed again based on that image. The result will be applied to the reference image.



[Figure 8.31 Volume Slice – Touchscreen]

Chroma

The *Chroma Map* screen will be displayed on the touchscreen. Set the color of 2D and 3D images by pressing the corresponding button on the touchscreen.



[Figure 8.32 Chroma Map – Touchscreen]

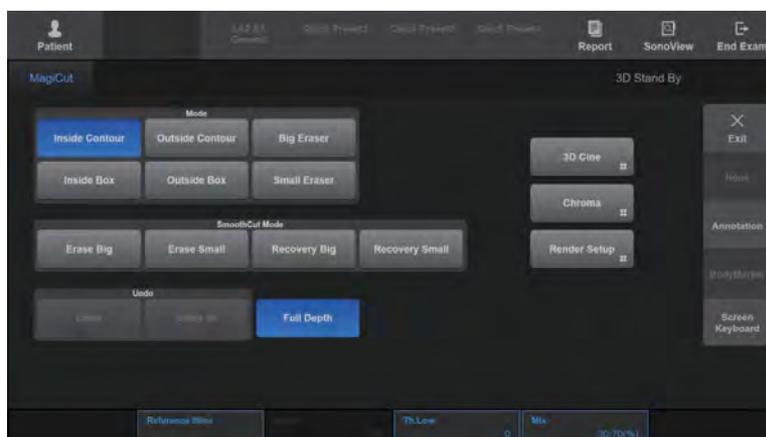
MagiCut

The *MagiCut* screen is displayed on the touchscreen. You can cut away the parts that are not relevant to diagnosis from 3D images. Select the area to cut using the trackball and the **Set** button.



NOTE:

- ▶ Only available in MPR Mode.
- ▶ If MagiCut is enabled, **Accept ROI** is turned On automatically.
- ▶ After MagiCut is enabled, if the system is switched to a mode other than MPR Mode, MagiCut is disabled.



[Figure 8.33 MagiCut]

■ Mode

Set how parts are cut by pressing the corresponding button on the touchscreen.

- ▶ Inside Contour: Cuts the inside of the selected area.
- ▶ Outside Contour: Cuts the outside of the selected area.
- ▶ Inside Box: Cuts the inside of the box.
- ▶ Outside Box: Cuts the outside of the box.
- ▶ Small Eraser: Cuts the selected contour line.
- ▶ Big Eraser: Cuts the selected contour line (thicker than Small Eraser).

■ Full Depth

Press the touchscreen to turn it On or Off. When turned On, the entire area will be cut. If it is turned Off, **Depth** will appear on the touchscreen.

■ Depth

Set the cut depth. Select a value from 1 to 100 by pressing the button on the touchscreen or using the dial-button.

■ Undo

Cancels the previous task(s).

- ▶ Undo: Cancels the last task.
- ▶ Undo All: Cancels all tasks that have been done so far.

■ SmoothCut Mode

- ▶ Erase Small: Enables to use the trackball to rub out the portion you wish to erase.
- ▶ Erase Big: Erases larger area.
- ▶ Recovery Small: Restores the volume image for the desired portion.
- ▶ Recovery Big: Restores the image in a larger area.

■ Mix

Set a combination of Render Modes 1 and 2. Select a value from 0:100(%) and 100:0(%) by pressing the corresponding button on the touchscreen or using the dial-button.

■ Th.Low

Set the minimum range of the threshold. Select a value from 0 to 254 by pressing the button on the touchscreen or using the dial-button.

Mirror View

3D images can be viewed in multiple directions. The *Mirror View* screen will be displayed on the touchscreen.

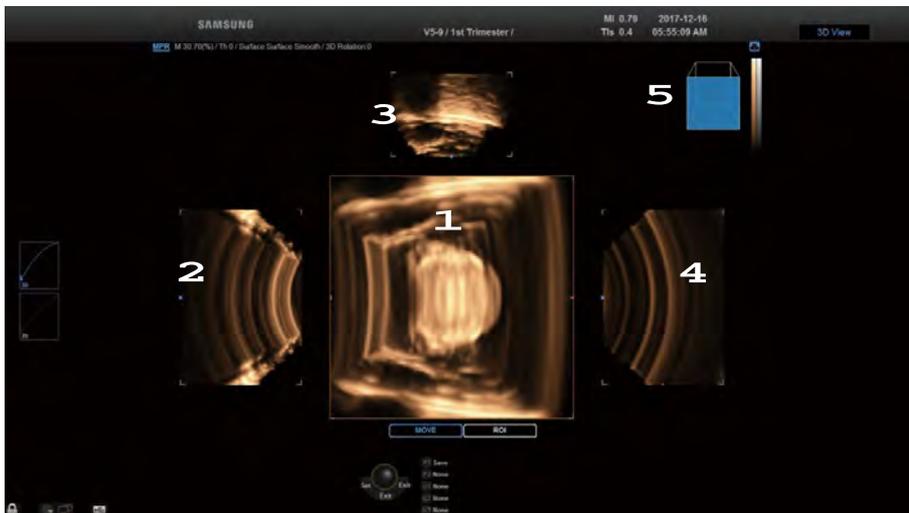


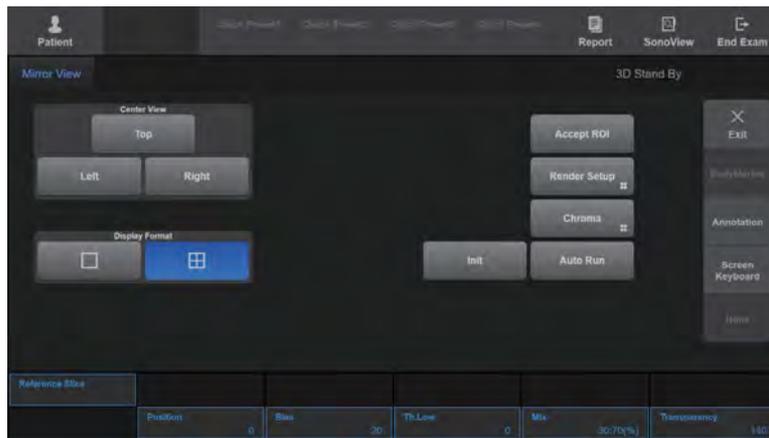
NOTE: If **Mirror View** is pressed in modes other than **Render**, Mirror View will start after the system switches to **Render Mode**. Therefore, Mirror View images are displayed with the settings available in **Render Mode**.

■ Mirror View Screen

The front, top, left and right images of a 3D image are displayed on the screen. In addition, a reference image is shown in the upper right-hand corner of the screen, indicating the direction of images.

- 1 A reference image for Mirror View
- 2 The reference image viewed from the left
- 3 The reference image viewed from the top
- 4 The reference image viewed from the right
- 5 A reference image indicating the direction of each image





[Figure 8.34 Mirror View]

■ Trackball Status Indication

The current state of the trackball is displayed at the bottom of the monitor screen. You can select Pointer, Move, or ROI for trackball. Press the **Change** button on the control panel to change the trackball state. The trackball state changes sequentially each time the button is pressed.

- ▶ Move: Use the trackball to move the 3D image. The acquired 3D image moves as you move the trackball.
- ▶ ROI: Use the trackball to resize the ROI box. The ROI box on the 3D image is resized as you move the trackball.
- ▶ Pointer: Re-adjusts the position of the ROI Box. Pressing the **Pointer** button on the control panel switches to Pointer state. You can resize an image or the ROI Box in this state. Press the **Change** button again to switch to another state.

■ Center View

Select an image by pressing the corresponding button on the touchscreen. The selected image will be displayed as the front image. Select **Top**, **Left**, or **Right**.

■ Display Format

When you press this button on the touchscreen, the front image is displayed in full screen.



NOTE: 'Center View' cannot be changed when Display Format is Single.

■ Position

Set the position of the post curve. Select a value from 0 to 100 by pressing the button on the touchscreen or using the dial-button.

■ Bias

Set the bias of the post curve. Select a value from -100 to 100 by pressing the button on the touchscreen or using the dial-button.



Initializing Post Curve

If you double-click the Post Curve on the left-hand side of the screen with the trackball while the trackball is in Pointer Mode, the Post Curve will be initialized.

■ Transparency

Set the transparency of a 3D image. Select a value from 20 to 250 by pressing the button on the touchscreen or using the dial-button.

The lowest value (20) is for complete transparency, and the highest value (250) is for complete opacity.

■ Mix

Set a combination of Render Modes 1 and 2. Select a value from 0:100(%) to 100:0(%) by pressing the corresponding button on the touchscreen or using the dial-button.

■ Th.Low

Set the minimum range of the threshold. Select a value from 0 to 254 by pressing the button on the touchscreen or using the dial-button.

When you press this button on the touchscreen, the front image is displayed in full screen.

■ Init

Resets the positional information of the image.



NOTE: To initialize the settings except the location information, press **Preset** and then press **Default**.

■ Auto Run

Press this button on the touchscreen to select On or Off. When 'On' is selected, the image rotates 360° around the Y-axis. You can also turn the image around the desired rotational axis, either X, Y, or Z.



NOTE: Auto Run is supported only for **Mirror View** and **Volume Slice**.



Tips!

Performing Mirror View Again

To perform Mirror View again based on a certain Mirror View image:

1. While the trackball is in Pointer mode, use the trackball and the **Set** button to select a Mirror View image.
2. Double-click the selected Mirror View image. Mirror View will be performed again based on the selected image. The selected image will be displayed at the Front.

Render Setup



NOTE: In Oblique View Mode, this option is available only when **OVIX** is on.

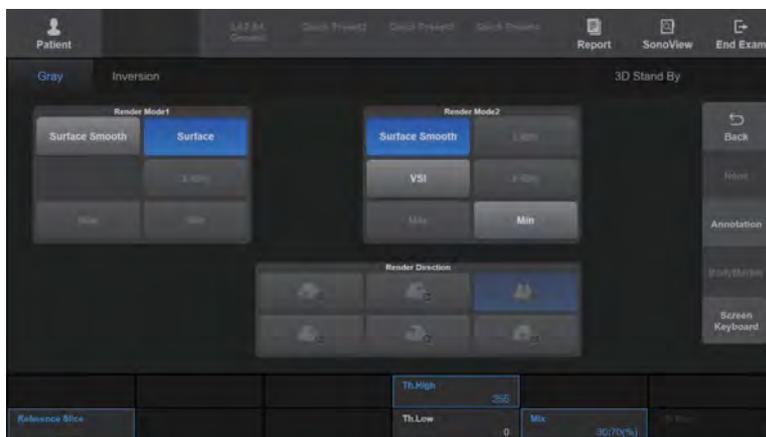
The *Rendering Setup* screen will be displayed on the touchscreen. Specify the image rendering method.

After selecting the rendering mode tab on the touchscreen, specify the required settings including Render Direction and Render Mode. The specified settings will be displayed in the image information area.

This product provides four Render Modes – Gray, Color, See Thru, and Inversion.



NOTE: The **Color** and **See Thru.** tabs are available with color 3D images only.



[Figure 8.35 Render Setup – Touchscreen]

▶▶ Gray

Specify how volume data acquired with the Gray method should be rendered into 3D images.

■ Render Direction

Set the rendering direction by pressing the corresponding button on the touchscreen. '+' indicates the facing direction and '-' indicates the opposite of the facing direction.

■ Render Mode 1, 2

Sets Render Modes 1 and 2 by pressing the corresponding buttons on the touchscreen.

- ▶ Surface: Represents 3D images in the Ray-Casting method, which shows the shell of an image with curved surfaces.
- ▶ Surface Smooth: Provides 3D images that are smoother than **Surface**.
- ▶ Max: Expresses the 3D image with maximum intensity; useful for studying the skeletal parts of the human body.
- ▶ Min: Renders 3D images with minimum intensity. Useful for observing the vessels or hollow parts in a human body.
- ▶ Light: Represents the depth of 3D images in terms of brightness.
- ▶ X-Ray: Represents 3D images in terms of average intensity. Provides images that are similar to X-ray images.
- ▶ VSI (Volume Shading Imaging): This displays a realistic image by using depth and intensity information. When Surface or Surface Smooth is enabled in Render Mode 1, VSI is enabled in Render Mode 2.



NOTE: For more information on other menu items, refer to 'Render Setup'.

■ Mix

Set a combination of Render Mode 1 and 2. Select a value from 0 to 100 by pressing the corresponding button on the touchscreen or using the dial-button.

■ Th.High

Set the maximum range of the threshold. Select a value from 1 to 255 by pressing the button on the touchscreen or using the dial-button.

■ Th.Low

Set the minimum range of the threshold. Select a value from 0 to 254 by pressing the button on the touchscreen or using the dial-button.



Threshold

You may adjust Threshold to filter out unnecessary data from an image. A higher threshold tends to enhance cystic elements, while a lower threshold tends to enhance bony elements.

■ Th.Power

Specify the Threshold for color. Select a value from 0 to 255 by pressing the corresponding button on the touchscreen or using the dial-button. As this value increases, more color is removed from an image.

▶▶ Color

Specify how the volume data acquired with the Angio/CFM method are rendered into 3D images. For information on each setting item, refer to 'Gray'.

»» ⌘ See Thru

Set the method for rendering the data from Gray+Angio, Gray+CFM combinations as a 3D image. Settings other than Render Mode 1 and 2 are configured in the same way as Gray Render Mode.

■ Transparent-Transparent

Adjust the transparencies of both Gray and Color data, so that the Color data inside the Gray data may be studied. The parts that are obscured by the Gray data are displayed slightly darker.

■ Transparent-Surface

Adjust the transparency of Gray data, so that the Color data inside the Gray data may be studied. The parts that are obscured by the Gray data are displayed slightly darker.

■ Max-Transparent

Set Gray data to 'Max', and Color data to 'Transp', to study Color data. The parts that are obscured by the Gray data are displayed slightly lighter.

■ Max-Surface

Set Gray data to 'Max', and Color data to 'Surface', to study Color data. The parts that are obscured by the Gray data are displayed slightly lighter.

■ Balance3D

This is enabled only for color 3D images. Select a value from 0 to 102 by pressing the button or using the dial-button on the touchscreen.

The range of a color image is only adjusted at the gray levels lower than the selected value for Balance3D. However, on the A, B, or C planes, color does not disappear entirely, but is displayed faintly in the area where the gray level is high.

»» ⌘ Inversion

Inverts the image when the volume data obtained using the Gray method is rendered as a 3D image. Other settings are configured in the same way as in Gray Render Mode.

RealisticVue

This semi-transparent rendering method is useful in identifying morphological abnormalities in fetuses. When you press the **RealisticVue** button, Clear SFVI, HDVI, and VC are turned On.



NOTE: RealisticVue is an optional feature of this product.

■ Clear SFVI

Press this button on the touchscreen to turn this feature On or Off. It reduces noise when turned On. SFVI stands for Smart Filter Volume Imaging.

■ VC

Press the VC button to turn it On or Off. If it is turned On, use the dial-button to select a value from 1 to 5. VC stands for Volume Compound.

■ Light Direction

Use the touchscreen or the trackball to reposition the direction of the light that is applied to the volume.



NOTE: You need to press the **Move Light** button to enter Trackball Mode.

■ Set Color

Use the dial-button to set the Set Color that will be applied to RealisticVue to a value from 1 to 5.



NOTE: You can set the color by using the **Hue**, **Saturation**, and **Lightness** dial-buttons.

3D Cine

Review the 3D image temporarily saved on the system. The *3D Cine Define* screen will be displayed on the touchscreen.



3D Cine Define

Specify the settings needed for creation of a Cine image.

■ Rotate Angle

Press the button on the touchscreen to select the total angle to rotate the image. Select 30°, 45°, 60°, 90°, 180°, or 360°.

■ Step Angle

Press the button on the touchscreen to select the per-step angle to rotate the image. You may select 1°, 3°, 5°, or 15°.



Tips!

The Difference Between Rotate Angle and Step Angle

The Cine image rotates through the angle selected as the 'Rotate Angle'. This rotation consists of multiple steps, each of which is the angle selected as the 'Step Angle'. For example, if you set the 'Rotate Angle' to 360°, and the 'Step Angle' to 15°, the 3D Cine rotates through 360°, which consists of 25 steps of 15° incremental rotations.

■ Rotate Axis

Press the button on the touchscreen to set the rotational axis.

■ Generate Cine

Cine images are generated by applying the current settings. Once the images are generated, the touchscreen switches to *3D Cine Review*.

■ Review Cine

Review Cine images generated previously. The touchscreen switches to *3D Cine Review*.

■ Start Angle

Press the button on the touchscreen or use the dial-button to set the start angle of a Cine image. If you configure **Start Angle**, the settings for **Rotate Angle** are cleared.

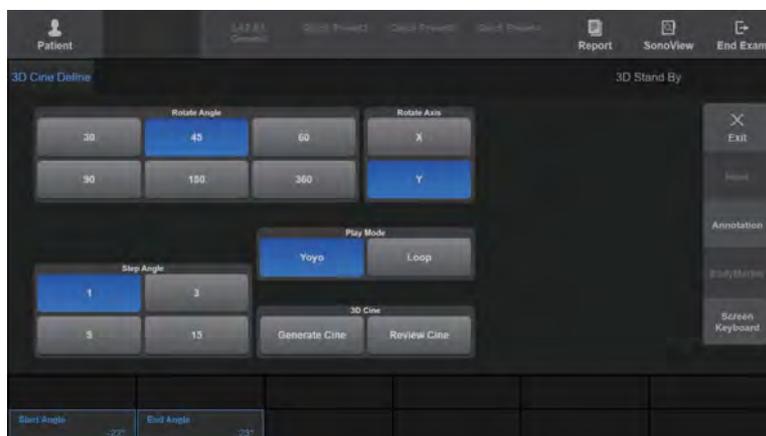
■ End Angle

Press the button on the touchscreen or use the dial-button to set the end angle of a Cine image. If you configure **End Angle**, the settings for **Rotate Angle** are cleared.

■ Play Mode

Select the play mode for Cine images. Press the button on the touchscreen or use the dial-button to select from Loop or Yoyo.

- ▶ Loop: Repeats playback in one direction.
- ▶ Yoyo: Plays until the end in one direction, and then plays in the reverse direction.



[Figure 8.36 3D Cine Define – Touchscreen]

▶▶ 3D Cine Review

Specify the settings needed for review of a Cine image. The Cine Bar is shown on the screen. 'The current Cine frame number/the total number of Cine frames' is displayed on the Cine Bar.



[Figure 8.37 3D Cine Review]

■ Play Mode

Select the play mode for Cine images. Select from Loop or Yoyo by pressing the corresponding button on the touchscreen.

- ▶ Loop: Repeats playback in one direction.
- ▶ Yoyo: Plays until the end in one direction, and then plays in the reverse direction.

■ Cine Play

Press this button on the touchscreen to turn this feature On or Off. Cine images are played when this is On. When turned Off, **Cine Frame** will appear on the touchscreen.

■ New Cine

Clears the current Cine image and creates a new one. The system switches to the *3D Cine Definescreen*.

■ Cine Speed

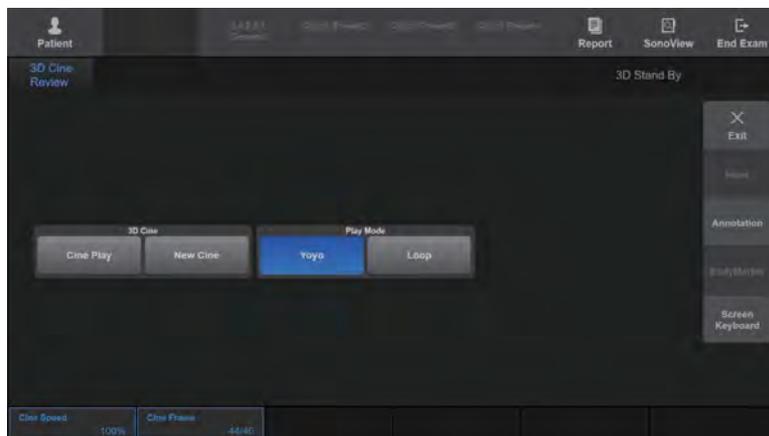
Set the playback speed for a Cine image by pressing the corresponding button on the touchscreen or using the dial-button. Select 25%, 50%, 100%, 200%, 300%, or 400%.

■ Cine Frame

Select the Cine frame to review. To do this, press the corresponding button on the touchscreen or use the dial-button. You can also move the trackball to the left or right to select.



NOTE: This option is available when **Play** is turned off. 'The current Cine frame number/the total number of Cine frames' is displayed.



[Figure 8.38 3D Cine Review – Touchscreen]

4D Cine

Review the 4D image temporarily saved on the system. The *4D Cine* screen will be displayed on the touchscreen.



NOTE: You can also press the **Freeze** button in 4D Mode to execute 4D Cine.

The Cine Bar is shown on the screen. The Cine Bar includes 'The current Cine frame number/the total number of Cine frames'.

■ Display Format

Select the display format by pressing the button on the touchscreen.

- ▶ Single: Displays the 3D image in full screen mode.
- ▶ Dual: One 2D image is displayed together with a 3D image
- ▶ Quad: Both 2D and 3D images are displayed.

■ Play Mode

Select the play mode for Cine images. Select from Loop or Yoyo by pressing the corresponding button on the touchscreen or using the dial-button.

- ▶ Loop: Repeats playback in one direction.
- ▶ Yoyo: Plays until the end in one direction, and then plays in the reverse direction.

■ Cine Type

Select the Cine image type by pressing the corresponding button on the touchscreen.

- ▶ Volume: This button appears when Cine images are played. The **MPR**, **MSV**, or **Oblique** buttons are enabled, depending on the state before the 4D Cine was started. Cine images can be played by changing the Display Format, etc. The **Volume Pos.** button appears on the touchscreen.
- ▶ Image: This is the general Cine playing method. The **Image Pos.** button is displayed on the touchscreen.

■ Cine Play

Press this button on the touchscreen to turn this feature On or Off. Cine images are played when this is On.

■ **Cine Speed**

Select the playback speed for Cine images. Select a speed from 25% to 400% by pressing the corresponding button on the touchscreen or using the dial-button.

■ **Image Pos.**

Select the Cine image to review. 'The current Cine frame number/the total number of Cine frames' is displayed.



NOTE: This can be used when **Cine Type** is Image.

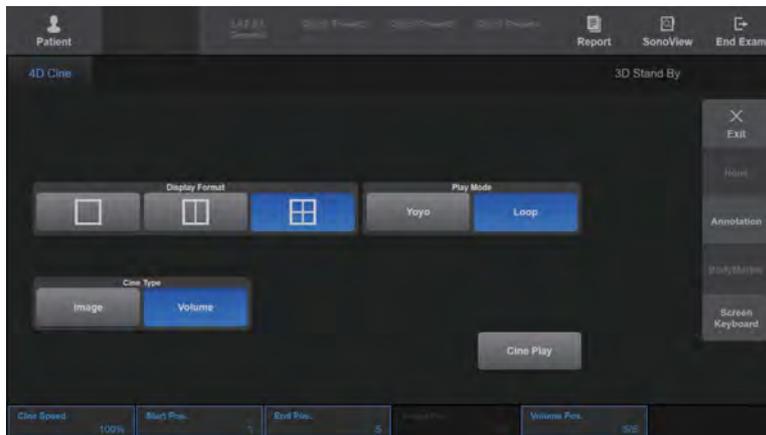
■ **Volume Pos.**

Select the volume data to review. 'The number of the current volume data/total number of volume data' is displayed.



NOTE:

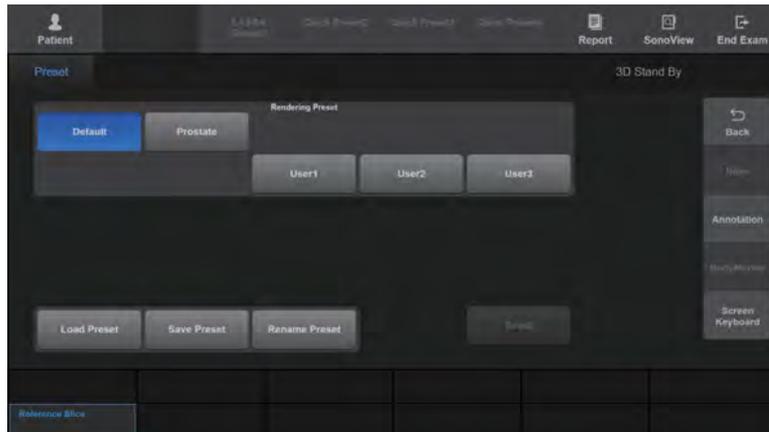
- ▶ This can be used when **Cine Type** is Volume.
- ▶ This cannot be used while Cine images are being played.



[Figure 8.39 4D Cine – Touchscreen]

Preset

The *Preset* screen appears on the touchscreen. This is used to select or edit a 3D Mode preset.



[Figure 8.40 Preset – Touchscreen]

■ Default

Use the default setting (General Preset) for the probe.

■ Load Preset

Loads the selected preset and exits from the *Preset* screen.

■ Save Preset

Save the content of the current Preset and exit the *Preset* screen.

■ Rename

Change the name of the selected Rendering Preset. When you press this button on the touchscreen, the *Name* screen appears. After changing the name, press **OK** to save the new name. Press **Cancel** to cancel the change.

■ Reset

This button is only enabled when a Userset is selected. Press the button on the touchscreen to restore the Preset to the initial system settings and then exit the Preset screen. Location information is not restored, however.

VSI (Volume Shading Imaging)

This displays a realistic image by using depth and intensity information.

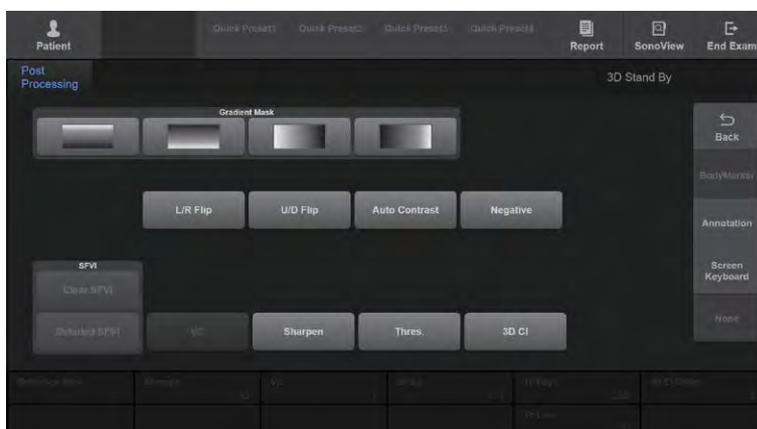


NOTE:

- ▶ Available only in **Render** mode of MPR.
- ▶ VSI is enabled in Render Mode 2 when Surface or Surface Smooth is enabled in Render Mode 1.

Post Processing

The *Post Processing* screen is displayed on the touchscreen.



[Figure 8.41 Post Processing – Touchscreen]

■ Gradient Mask

Adjust the brightness of a specific area in an image. Make a selection by pressing the corresponding button on the touchscreen.

■ Flip Image

Inverts the position of an image.



NOTE: This option is only available in **MSV** Mode. It may not be used when **OH** is on, however.

Press the image on the touchscreen and flip the image left and right or up and down.

■ Clear SFVI

Press this button on the touchscreen to turn this feature On or Off. Turning this on reduces noise. SFVI stands for Smart Filter Volume Imaging.

■ Detailed SFVI

Press this button on the touchscreen to turn this feature On or Off. Select a value from 0 to 100 by using the Strength dial-button on the touchscreen if it is turned On.

■ VC

Press the **VC** button to turn it On or Off. When turned On, use the dial-button to select a value from 1 to 5. VC stands for Volume Compound.

■ Negative

Press this button on the touchscreen to turn this feature On or Off. When turned On, the brightness of an image will be inverted.

■ Auto Contrast

Press this button on the touchscreen to turn this feature On or Off. When turned On, the contrast of an image will be adjusted automatically.

■ Thres.

Press this button on the touchscreen to turn this feature On or Off. When turned On, the **Th.Low** or **Th.High** dial-buttons can be used to adjust the threshold.

■ Sharpen

Press this button on the touchscreen to turn this feature On or Off. When turned On, the boundary of an image will become sharper. Select a value from 100 to 400 by using the **Sharp** dial-button.

■ 3D CI

Press this button on the touchscreen to turn this feature On or Off. 3D CI is an abbreviation for 3D Compound Imaging. When turned On, images are compounded to reduce noise and enhance image quality. Use the **3D CI Offset** dial-button to select a value from 1 to 10 as the distance between images used for 3D CI.

Orientation Dot

Press the corresponding button on the touchscreen to turn the Orientation Dot On or Off. When this is On, a dot appears at the center of the reference image.



NOTE: Only available in MSV and Oblique View Modes.

3D CI

Press this button on the touchscreen to turn this feature On or Off. 3D CI is an abbreviation for 3D Compound Imaging. When turned On, images are compounded to reduce noise and enhance image quality. Use the **3D CI Offset** dial-button to select a value from 1 to 10 as the distance between images used for 3D CI.



NOTE:

- ▶ When 3D CI is on in Post Processing in the 3D Utility Menu, the **3D CI Offset** dial-button is created, which can then be used to adjust the distance between images.
- ▶ Only available in MSV and Oblique View Modes.

Volume CT

A 3D image is divided into Axial, Sagittal and Coronal images and then recompiled for display. In this way, information on slice images can be obtained. The current mode and the display format are shown in the image information area.

**NOTE:**

- ▶ Only available in MSV and Oblique View Modes.
- ▶ Measurement functions, such as **Calculator** or **Caliper**, cannot be used.

■ Display Format

Specify how Volume CT images are presented. Select from Cube or Cross by pressing the corresponding button on the touchscreen. Depending on this setting, the touchscreen menu will vary.

▶▶ Cube Volume CT

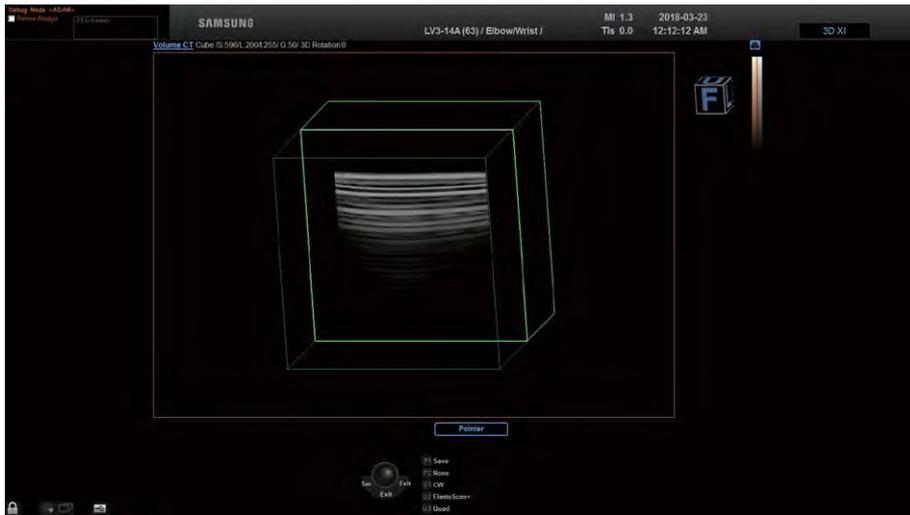
Shows the external slice image of the cube.

■ View Direction

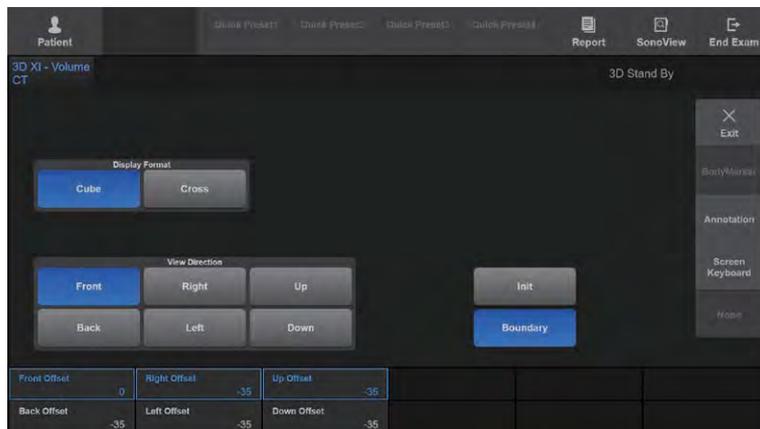
Set the view direction for the external slice of a cube. Select from Front, Back, Left, Right, Up or Down by pressing the corresponding button on the touchscreen.

■ **Offset**

Adjust the position of the external slice by pressing the button on the touchscreen or using the dial-button.



[Figure 8.42 Cube Volume CT]



[Figure 8.43 Cube Volume CT – Touchscreen]

▶▶ **Cross Volume CT**

The internal cross-sectional images where the Coronal, Sagittal, and Axial Planes intersect are shown.

- ▶ A Plane Offset: Adjust the position of the Front Surface. It is indicated by a blue outline on the screen.
- ▶ B Plane Offset: Adjust the position of the Left Surface. It is indicated by a red outline on the screen.
- ▶ C Plane Offset: Adjust the position of the Top Surface. It is indicated by a yellow outline on the screen.

■ **Init**

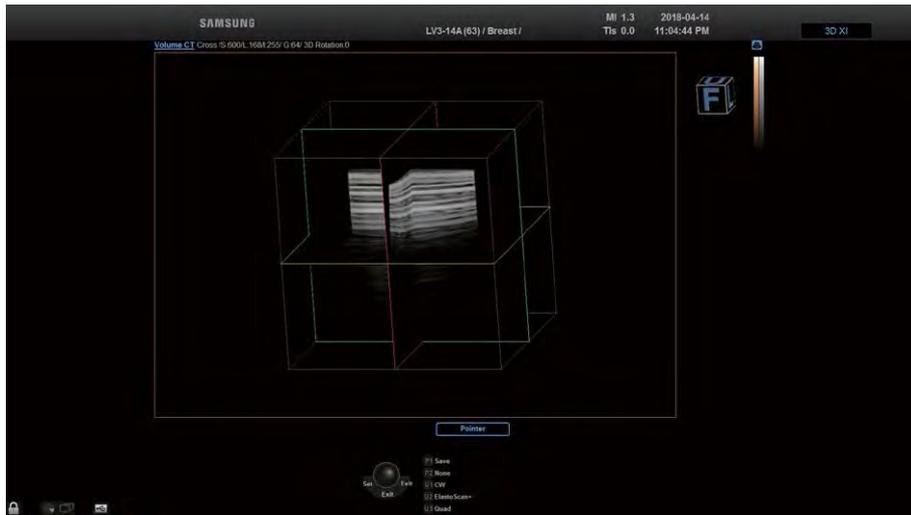
Resets the positional information of the image.



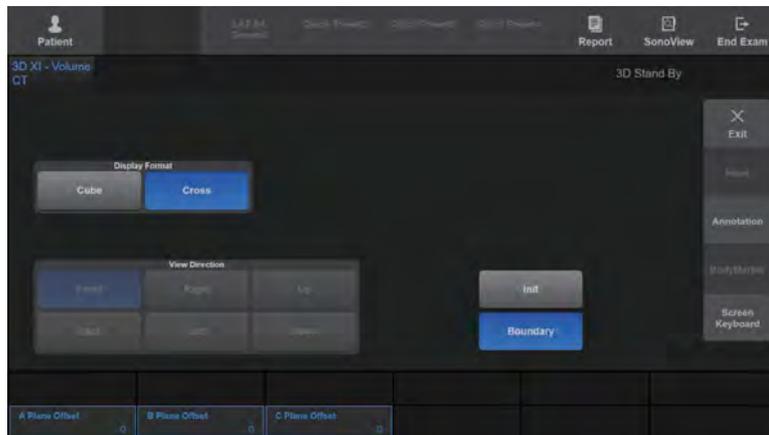
NOTE: To initialize the settings except the location information, press **Preset** and then press **Default**.

■ **Boundary**

Press the touchscreen button to turn this function On or Off. Turning this function on will display a cubic (regular hexahedral) boundary, which represents the outer perimeter of the whole volume data.



[Figure 8.44 Cross Volume CT]



[Figure 8.45 Cross Volume CT – Touchscreen]

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∴ Measurement Accuracy

Measurement values can vary, depending on the nature of the ultrasound, the body's response to ultrasound, the measurement tools, algorithms, product settings, probe type and user operation.

Before using this product, make sure to read and understand the following information regarding the causes of measurement errors, and measurement optimization.

Causes of Measurement Errors

»» ⌘ Image Resolution

The resolution of ultrasound images may be limited by the available space.

- ▶ Errors due to signal range may be minimized by adjusting the focus settings. Optimizing focus settings increases the resolution of the measurement area.
- ▶ In general, lateral resolution is lower than axial resolution. Therefore, measurements should be performed along the axis of the ultrasound beam to obtain accurate values.
- ▶ Gain has a direct impact on resolution. Gain can be adjusted by using the **Gain** button for each mode.
- ▶ In general, increasing the frequency of the ultrasound enhances resolution.

»» ⌘ Pixel Size

- ▶ Ultrasound images in the product consist of pixels.
- ▶ Since a single pixel represents the basic unit of an image, a measurement error may result in the displacement of approximately ± 1 pixel when compared to the original image size.
- ▶ However, this error becomes significant only when a narrow area in an image is measured.

»» ⚠ **Ultrasound Velocity**

- ▶ The velocity of the ultrasound used during measurement is usually 1,540 m/s on average.
- ▶ The velocity of the ultrasound may vary depending on the cell type.
- ▶ The possible range of error is from approximately 2 to 5%, depending on the structure of the cells (about 2% for typical cells and about 5% for fatty cells).

»» ⚠ **Doppler Signal Adjustment**

- ▶ During velocity measurement, an error may occur depending on the cosine angle between the blood flow and the ultrasound beam.
- ▶ For Doppler velocity measurements, the most accurate results can be ensured when the ultrasound beam is aligned in parallel with the blood flow.
- ▶ If that is not possible, the angle between them should be adjusted by using the **Angle** options.

»» ⚠ **Aliasing**

- ▶ PW Spectral Doppler Mode uses a signal sampling technique to calculate the frequency (or velocity) spectrum.
- ▶ Adjust the baseline or the velocity scale to minimize aliasing. A lower frequency probe can also be used to reduce aliasing.

»» ⚠ **Calculation Equation**

- ▶ Some of the calculation equations used for clinical purposes originate from hypotheses and approximation.
- ▶ All calculation equations are based on medical reports and articles.

»» ⚠ **Human Error**

- ▶ Human error may occur due to inappropriate use or lack of experience.
- ▶ This can be minimized through compliance with and thorough understanding of the manuals.

Optimization of Measurement Accuracy

»» ⌘ **2D Mode**

- ▶ Resolution is in proportion to the frequency of the probe.
- ▶ Penetration is in inverse proportion to the frequency of the probe.
- ▶ The highest resolution can be obtained at the focus of the probe, where the ultrasound beam is narrowest.
- ▶ The most accurate measurements can be obtained at the focus depth. The accuracy decreases as the distance from the focus increases, widening the beam width.
- ▶ Using the zoom function, or minimizing the depth display, makes distance or area measurements more accurate.

»» ⌘ **M Mode**

- ▶ The accuracy of time measurements can be increased when the sweep velocity and the display format are set to high values.
- ▶ The accuracy of distance measurements can be increased when the display format is set to higher values.

»» ⌘ **Doppler Mode**

- ▶ It is recommended to use lower frequency ultrasound for measurement of faster blood flows.
- ▶ The size of the sample volume is limited by the axial direction of the ultrasound.
- ▶ Using lower frequency ultrasound increases penetration.
- ▶ The accuracy of time measurements can be increased when the sweep velocity is increased.
- ▶ The accuracy of velocity measurements can be increased when the vertical scale is set to lower values.
- ▶ It is most important to use an optimal Doppler angle to enhance the accuracy of velocity measurements.

▶▶ ⚠ **Color/Power Doppler Mode**

- ▶ A protocol is not specified for images in Color Doppler Mode or Power Doppler Mode. Therefore, the same limitations imposed when measurements are taken in B/W images apply to the accuracy of the measurements taken in these modes.
- ▶ It is not recommended to use images in Color/Power Doppler Mode for measurement of accurate blood flow velocity.
- ▶ The amount of blood (Color flow) is calculated based on the average velocity rather than the peak velocity.
- ▶ In all applications, the amount of blood flow is measured in PW Spectral Doppler Mode.

▶▶ ⚠ **Cursor Position**

- ▶ All measurements are affected by input data.
- ▶ Adjust the images on the screen so that they are displayed at maximum granularity.
- ▶ Use the front edge or boundary point of a probe to make the start and end points of a measurement object more distinct.
- ▶ Make sure that the probe direction is always aligned during measurement.

Measurement Accuracy Table

The following tables show the accuracy of the measurements possible when using The Product. Ensure that the results of measurement accuracy checks are kept within the ranges specified in the table. Except for certain applications or probes, the following accuracy ranges should be maintained for measurement of a straight distance.



NOTE: In case of doubt in the measurements, please contact your local Samsung Medison Service Department for an accuracy test.

2D Mode

Measurements	Accuracy (Whichever is greater)	Test Methodology	Accuracy Based on	Range
Axial Distance	$< \pm 4\%$ or 1 mm	Phantom	Acquisition	Full Screen
Lateral Distance	$< \pm 4\%$ or 2 mm	Phantom	Acquisition	Full Screen
Area	$< \pm 8\%$ or 4 mm ²	Measurement	Equation	Full Screen
Volume	$< \pm 12\%$ or 8 mm ³	Measurement	Equation	Full Screen
Angle	$< \pm 4\%$ or 1°	Measurement	Equation	Full Screen

M Mode

Measurements	Accuracy (Whichever is greater)	Test Methodology	Accuracy Based on	Range
Time	$< \pm 5\%$ or 1 ms	Signal Generator	Acquisition	0.01 – 11.3 sec
Slope	$< \pm 8\%$ or 4 mm/ms	Measurement	Equation	Full Screen

▶▶ PW/CW Spectral Doppler Mode

Doppler Measurement	Accuracy (Whichever is greater)	Test Methodology	Accuracy Based on	Range
Velocity	$< \pm 15\%$	Phantom	Acquisition	PW: 0.1 cm/s – 8.8 m/s CW: 1 cm/s – 19.3 m/s
Time	$< \pm 5\%$	Signal Generator	Acquisition	10 ms – 9.44 s
Heart Rate	$< \pm 5\%$ or 1 bpm	Measurement	Equation	1 – 43,200 bpm



Accuracy of ± 1 least significant displayed digit (e.g. XX.X will be ± 0.1 mm, XX% will be $\pm 1\%$)

∴ Basic Measurements

Press the **Caliper** button on the control panel.



NOTE: This performs a simple measurement, such as distance and area, regardless of applications. For information on measurements for each application, please refer to 'Measurements by Application' in this chapter.

The available measurement methods vary depending on the current Operation mode. Please see the following table:

Measurement	Operation Modes	Measurement Methods
Distance Measurement	2D, M, D	Straight Trace PtoP Spline %StD 3 Point 2 Line
	M	M Dist.
	D	D Velocity D Time D A/B Manual Limited Auto PtoP Spline
Circumference and Area Measurement	2D, M, D	Ellipse Trace Spline PtoP %StA
Volume Measurement	2D, M, D	3 Distance MOD 1 Distance Ellipse Dist. + Ellipse

[Table 9.1 Basic Measurements by Operation Modes]

» » Basic Measurement Operations

The following is the information on common button operations for basic measurements:

■ Changing/Selecting Measurement Method

Select a measurement method on the touchscreen. The menu items that can be selected on the touchscreen vary according to Operation modes. The selected measurement method is displayed in the user information area.

■ Adjusting Font Size

Adjust the font size by pressing **Font Size** on the touchscreen or rotating the dial-button. Select a font size for the measurement results, from 10 to 30, using the dial-button.

■ Canceling Measurement Results

- ▶ Undo: Press **Undo** on the touchscreen. Doing this discards the immediately preceding readings and allows you to take the measurement again.



NOTE: Undo can be used only for **3 Distance Vol.** and **Dis.+ Ellipse Vol.** among the volume measurement items.

- ▶ Delete: When you press **Delete** on the touchscreen or rotate the dial-button, part of the curve being traced is deleted.



NOTE: The back trace function can be used only for **Trace Dist.**, **Trace Area**, and **MOD Vol.** among the distance measurement items.

■ Setting the Display Position of the Measurement Results

Press the **Result Action** button on the touchscreen or use the dial- button to select.

- ▶ Move: Change the display position of the measurement results using the trackball and then press the **Set** button.
- ▶ Reset: When you press the dial-button, the display position of the measurement results is reset.



NOTE: When there are multiple pages of measurement results, you can find the desired result using **Move**.

■ Delete Measurement Results

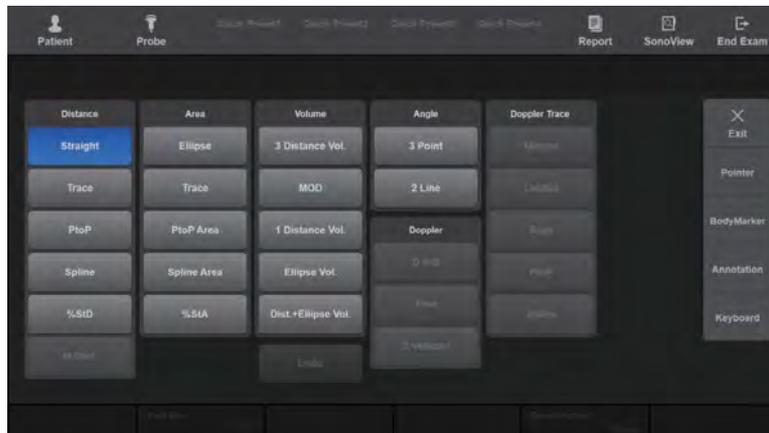
Press the **Clear** button on the control panel.

■ Print Measurement Results

On the control panel, press the User Key (U1-4) that has been designated as **Print**.

■ Exiting Basic Measurements

Press the **Caliper** button again on the control panel. Or press the **Exit** button.



[Figure 9.1 Caliper]

Distance Measurements

Distance

■ Straight (Dist.)

A basic measurement that is available in all Operation modes. You can specify two points in a 2D image and measure the straight distance between them.

1. Press **Straight** on the touchscreen.
2. Use the trackball and the **Set** button on the control panel to specify both end points of the measurement area:

Use the trackball to place the cursor at the desired position and press the **Set** button.

Tips!

Repositioning Point

Instead of pressing the **Set** button to confirm the point position, you can press the **Change** button to reset it.

3. Specify both end points and then the distance between them will be measured.
4. When the measurement is finished, the result is shown on the screen.

■ Trace (Dist.)

A basic measurement that is available in all Operation modes. You can specify a point in a 2D image and trace a curve from that point to measure the distance between them.

1. Press **Trace** on the touchscreen.
2. Use the trackball and the **Set** button on the control panel to specify the start point of the measurement area:

Use the trackball to place the cursor at the desired position and press the **Set** button.

3. Use the trackball to draw the desired curve and then press the **Set** button to set the end point.

Tips!

Editing Curves

Moving the trackball in the opposite direction, before designating the end point by pressing the **Set** button, deletes the trace line. Also, rotating the touchscreen's **Delete** button partially deletes the contour being traced.

4. Specify both end points and then the length of the curve will be automatically measured.

■ PtoP (Dist.)

This is a basic measurement that is available in all Operation modes. Designate the position of the points on the 2D image and the cumulative measurement of the line formed from the points will be determined. Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

■ Spline (Dist.)

This is a basic measurement that is available in all Operation modes. Designate the position of the points on the 2D image and the cumulative measurement of the curve formed from the points will be determined. Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

■ %StD

StD stands for Stenosis Distance, which is a basic measurement available in all Operation modes. In a 2D image, the diameter of a vessel is measured and the stenosis ratio calculated.

1. Press **%StD** on the touchscreen.
2. Measure the total diameter of a vessel using the Straight measurement method.
3. When a new cursor appears, measure the inner wall diameter of the vessel under stenosis.
4. Calculate %StD with the following equation:

$$\%StD = (\text{Outer Distance} - \text{Inner Distance}) / \text{Outer Distance} \times 100$$

■ M Dist.

This is a basic measurement that is available in M Mode only. You can specify two points in an M image and measure the distance, elapsed time and velocity between them.

1. Press **M Dist.** on the touchscreen.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in 'Straight'.
3. When the measurement is finished, the result is shown on the screen.

» » Angle

■ 3 Point (Angle)

This is a basic measurement that is available in all Operation modes. Place three points on a 2D image and measure the angle formed by the points.

1. Press **3 Point** on the touchscreen.
2. Specify three points.
3. The angle formed by the three points will be calculated and displayed on the screen.

■ 2 Line (Angle)

This is a basic measurement that is available in all Operation modes. Specify two straight lines on a 2D image to measure the angle between the two lines.

1. Press **2 Line** on the touchscreen.
2. Draw two straight lines. Refer to 'Straight' for instructions on how to draw a straight line.
3. The angle between two lines will be calculated and displayed on the screen.

When two angles are calculated, the smaller angle is displayed.

» » Doppler

■ D Velocity

This is a basic measurement that is only available in Spectral Doppler mode. Specify two points on a Spectral Doppler image and measure the velocity at each point to calculate the ratio of velocity between the two points.

1. Press **D Velocity** on the touchscreen.
2. Specify two points for which to measure velocity.

Use the trackball to place the cursor at the desired position, and then press the **Set** button.

3. When the measurement is finished, its result is shown on the screen.

- ▶ V1: Velocity at Point 1
- ▶ V2: Velocity at Point 2
- ▶ PGmax: Max Pressure Gradient
- ▶ V1/V2: The Ratio of Velocity

■ Time

This is a basic measurement that is only available in Spectral Doppler mode. Specify two bars on a Spectral Doppler image to calculate the time between the bars.

1. Press **Time** on the touchscreen.
2. Set two bars on the spectrum with the trackball and the **Set** button.
3. When the measurement is finished, its result is shown on the screen.

■ D A/B

This is a basic measurement that is only available in Spectral Doppler mode. Specify two points on a Spectral Doppler image and measure the velocity at each point to calculate the velocity gradient, time gradient, and acceleration.



NOTE: In a Spectral Doppler image, the X- and Y-axes represent time and velocity, respectively.

1. Press **D A/B** on the touchscreen.
2. Specify two points and measure the length of the straight line between the points. Measurement is taken in the same way as 'Straight'.
3. When the measurement is finished, its result is shown on the screen.
 - ▶ V1: Velocity at Point 1
 - ▶ V2: Velocity at Point 2
 - ▶ PGmax: Max Pressure Gradient
 - ▶ V2-V1: Change in Velocity
 - ▶ Time: Change in Time
 - ▶ RI: Resistivity Index
 - ▶ S/D: Systolic to Diastolic Ratio
 - ▶ Acc: Acceleration

The equations used for D A/B measurement are as follows:

$$\text{▶ } RI = \frac{V_1 - V_2}{V_1}$$

$$\text{▶ } dV = V_2 - V_1$$

$$\text{▶ } Acceleration = \frac{(V_2 - V_1)}{(T_2 - T_1)} = \frac{dV}{dT}$$

▶▶ Doppler Trace

■ Manual (Trace)

This is a basic measurement that is available in Spectral Doppler Mode only. You can specify a point in a Spectral Doppler image and trace a curve from that point to calculate the velocity, integral value and average velocity of blood flow.

1. Press **Manual** on the touchscreen.
2. Trace a curve. The method for measuring a curve is the same as in 'Trace (Dist.)'.
3. When the measurement is finished, the result is shown on the screen.
 - ▶ PSV: Peak Systolic Velocity
 - ▶ EDV: End Diastolic Velocity
 - ▶ PI: Pulsatility Index
 - ▶ RI: Resistivity Index
 - ▶ S/D: Ratio of PSV to EDV
 - ▶ Vmax: Maximum Velocity
 - ▶ Vmean: Mean Velocity
 - ▶ PGmax: Maximum Pressure Gradient
 - ▶ PGmean: Mean Pressure Gradient
 - ▶ VTI: Velocity Time Integral
 - ▶ PHT: Pressure Half Time
 - ▶ Acc: Acceleration
 - ▶ AccT: Acceleration Time
 - ▶ Dec: Deceleration
 - ▶ DecT: Deceleration Time

The equations used for Manual Trace measurement are as follows:

$$\text{▶ } V_{mean} = \frac{VTI}{\text{Duration of flow}}$$

$$\text{▶ } RI = \frac{PSV - EDV}{PSV}$$

$$\text{▶ } PI = \frac{PSV - EDV}{V_{mean}}$$

$$\text{▶ } S/D = \frac{PSV}{EDV}$$

■ Limited (Trace)

This is a basic measurement that is only available in Spectral Doppler mode. You can specify a point in a Spectral Doppler image and trace a curve from that point to calculate the velocity, integral value, and average velocity of blood flow.

1. Press **Limited** on the touchscreen.
2. Trace the curve. Measurement is taken in the same way as 'Trace (Dist.)'.
3. When the measurement is finished, its result is shown on the screen.
 - ▶ PSV: Peak Systolic Velocity
 - ▶ EDV: End Diastolic Velocity
 - ▶ PI: Pulsatility Index
 - ▶ RI: Resistivity Index
 - ▶ S/D: Ratio of PSV to EDV
 - ▶ Vmax: Max Velocity
 - ▶ Vmean: Mean Velocity
 - ▶ PGmax: Max Pressure Gradient
 - ▶ PGmean: Mean Pressure Gradient
 - ▶ VTI: Velocity Time Integral
 - ▶ PHT: Pressure Half Time
 - ▶ Acc: Acceleration
 - ▶ AccT: Acceleration Time
 - ▶ Dec: Deceleration
 - ▶ DecT: Deceleration Time

The equations used for Limited Trace measurements are as follows:

$$\text{▶ } V_{mean} = \frac{VTI}{\text{Duration of flow}}$$

$$\text{▶ } RI = \frac{PSV - EDV}{PSV}$$

$$\text{▶ } PI = \frac{PSV - EDV}{V_{mean}}$$

$$\text{▶ } S/D = \frac{PSV}{EDV}$$

■ Auto (Trace)

This is a basic measurement that is only available in Spectral Doppler Mode. A Spectrum is traced automatically.

1. Press **Auto** on the touchscreen.
2. When the measurement is finished, its result will be shown on the screen.



NOTE: For more information on Auto, please refer to 'Common Measurement Methods' in this chapter.

■ PtoP (Trace)

This is a basic measurement that is only available in Spectral Doppler mode. Designate the position of the points on the spectrum and trace the line formed from the points to calculate the velocity, integral value, and average velocity of blood flow.

Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

■ Spline (Trace)

This is a basic measurement that is only available in Spectral Doppler mode. Designate the position of the points on the spectrum and trace the curve formed from the points to calculate the velocity, integral value, and average velocity of blood flow.

Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

Circumference and Area Measurement

» » Area

■ Ellipse (Area)

A basic measurement that is available in all Operation modes. You can measure the circumference and area of a circular (elliptical) object in a 2D image.

1. Press **Ellipse** on the touchscreen.
2. Use the trackball and the **Set** button on the control panel to specify the diameter (axis) of the measurement area.

Use the trackball to place the cursor at the desired position and press the **Set** button.



Repositioning Point

You can press the **Change** button to free the cursor for repositioning. Press the **Set** button to confirm the new point position.

3. Specify the size of the circle (ellipse).
Adjust the size using the trackball, and press the **Set** button.
4. When the measurement is finished, the result is shown on the screen.

The following equation is used for the measurement of ellipses:

$$\blacktriangleright \text{Circ} = 2\pi \cdot \sqrt{\frac{1}{2} \cdot \left\{ \left(\frac{A}{2} \right)^2 + \left(\frac{B}{2} \right)^2 \right\}}, \text{ (A: Long axis, B: Short axis)}$$

$$\blacktriangleright \text{Area} = \pi \times a \times b, \text{ (a, b: Axis)}$$

■ PtoP (Area)

This is a basic measurement that is available in all Operation modes. Designate the position of the points on the 2D image and the cumulative measurement of circumference and area formed from the points will be determined. Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

■ Spline (Area)

This is a basic measurement that is available in all Operation modes. Designate the position of the points on the 2D image and the cumulative measurement of circumference and area formed from the points will be determined. Designate the last point and double-click the **Set** button to finish taking the measurements. Up to 8 measurements can be compared at the same time.

■ Trace (Area)

A basic measurement that is available in all Operation modes. You can measure the circumference and area of an irregular object in a 2D image.

1. Press **Trace** on the touchscreen.
2. Use the trackball and the **Set** button on the control panel to specify the start point for tracing over the contours of the measurement area.

Use the trackball to place the cursor at the desired position and press the **Set** button.
3. Trace the curve so that the measurement cursor returns to the start point, and then press the **Set** button.



NOTE: Trace lines must be closed. If you press the **Set** button before tracing is complete, tracing may be done over a straight line between the current point and the start point, resulting in a significant error.

4. When the measurement is finished, the result is shown on the screen.

The equations used for Trace measurement are as follows:

$$\blacktriangleright \text{Circ} = \text{sum} \sqrt{\{X(n) - X(n-1)\}^2 + \{Y(n) - Y(n-1)\}^2}, \quad (N = 1, 2, \dots \text{ last point})$$

$$\blacktriangleright \text{Area} = \text{sum} \left[\sqrt{X(n-1) \times Y(n) - X(n) \times Y(n-1)} \right], \quad (N = 1, 2, \dots \text{ last point})$$

■ %StA

StA stands for Stenosis Area, which is a basic measurement available in all Operation modes. In a 2D image, the area of a vessel is measured and the stenosis ratio (%) calculated.

1. Press **%StA** on the touchscreen.
2. Measure the area of the vessel's outer wall using the Area Measurement method.
3. When the second cursor appears, measure the area of the vessel's inner wall under stenosis.
4. Calculate %StA with the following equation:

$$\text{\%StA} = (\text{Outer Area} - \text{Inner Area}) / \text{Outer Area} \times 100$$

Volume Measurement



Volume Measurement in Dual Mode

Dual mode is convenient when measuring volume, as it displays two images on one screen.

Volume

3 Distance (Vol.)

A basic measurement that is available in all Operation modes. You can measure the volume of an object in a 2D image by using 3 straight lines.

1. Press **3 Distance** on the touchscreen.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in 'Straight'.
3. Measure the length of the remaining two straight lines as above.
4. When the measurement is finished, the result is shown on the screen. The volume of the object, along with the length of each straight line, are calculated.

Pressing the touchscreen's **Undo** button while measurement is in progress discards the readings taken up to that point and starts taking readings again from the current step.

The equations used for 3 Distance Measurement are as follows:

$$\blacktriangleright Vol = \frac{4}{3}\pi \cdot \frac{D_1}{2} \cdot \frac{D_2}{2} \cdot \frac{D_3}{2}, \text{ (D: distance)}$$

■ MOD

A basic measurement that is available in all Operation modes. In a 2D image, the area of an irregular object and the length of its long axis are obtained to calculate its volume. MOD is an abbreviation for Method of Disk.

1. Press **MOD** on the touchscreen.
2. Draw a contour to measure. The way it is measured is the same as in 'Trace (Area)'.
3. Measure the length of the long axis. The way it is measured is the same as in 'Straight'.
4. When the measurement is finished, the result is shown on the screen.

Tips!

Editing Curves

Before specifying the end point by pressing the **Set** button, you can delete part of the curve being traced by rotating the **Delete** dial-button on the touchscreen.

■ 1 Distance (Vol.)

A basic measurement that is available in all Operation modes. You can measure the volume of an object in a 2D image by using only one straight line.

1. Press **1 Distance** on the touchscreen.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in 'Straight'.
3. When the measurement is finished, the result is shown on the screen. The volume of the object along with the length of the straight line are calculated.

The equations used for 1 Distance Measurement are as follows:

$$\blacktriangleright Vol = \frac{4}{3}\pi \cdot \left(\frac{D}{2}\right)^3, \text{ (D: distance)}$$

■ Ellipse (Vol.)

A basic measurement that is available in all Operation modes. In a 2D image, the volume of a conical object is measured using an ellipse.

1. Press **Ellipse** on the touchscreen.
2. Specify the size of the circle (ellipse). The way it is measured is the same as in 'Ellipse (Area)'.
3. When the measurement is finished, the result is shown on the screen.

The following equation is used for Ellipse measurement:

$$\blacktriangleright Vol. = \frac{4}{3} \pi \cdot \frac{Long}{2} \cdot \frac{Short}{2} \cdot \frac{Short}{2}$$

■ Dist.+Ellipse (Vol.)

A basic measurement that is available in all Operation modes. You can measure the volume of an object in a 2D image by using one straight line and one circle (ellipse).

1. Press **Dist. + Ellipse** on the touchscreen.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in 'Straight'.
3. Specify the size of the circle (ellipse). The way it is measured is the same as in 'Ellipse (Area)'.
4. When the measurement is finished, the result is shown on the screen.
 - ▶ D: The length of a straight line
 - ▶ Area: The area of a circle
 - ▶ Long: The length of the long axis in an ellipse
 - ▶ Vol.: Volume
 - ▶ Short: The length of the short axis in an ellipse

Press the **Undo** button on the touchscreen to cancel the current measurement and take it again.

The equations used for 'Dist. + Ellipse (Vol.)' measurement are as follows:

$$\blacktriangleright Vol = \frac{\pi}{6} \times a \times b \times d \quad (a: \text{Short axis}, b: \text{Long axis}, d: \text{Distance})$$

⌘ Measurements by Application

Press the **Calculator** button on the control panel.

Things to Note

⏪ ⌘ Before Starting Measurement

■ Register Patient

Make sure that the currently registered patient information is correct. If the patient has not been registered, press the **Patient** button on the touchscreen to register the patient.

To enter or change patient information by application, use the *Study Information* screen.

For information on the Patient Information menu and how to enter the information, refer to 'Patient Information' in 'Chapter 6. Starting Modes of Operation'.

■ Check Probe, Application & Preset

- ▶ Check the probe name and application that are displayed in the title area. Press the **Probe** button on the touchscreen to use another probe or application.
- ▶ Check the preset settings on the *Probe Selection* screen.

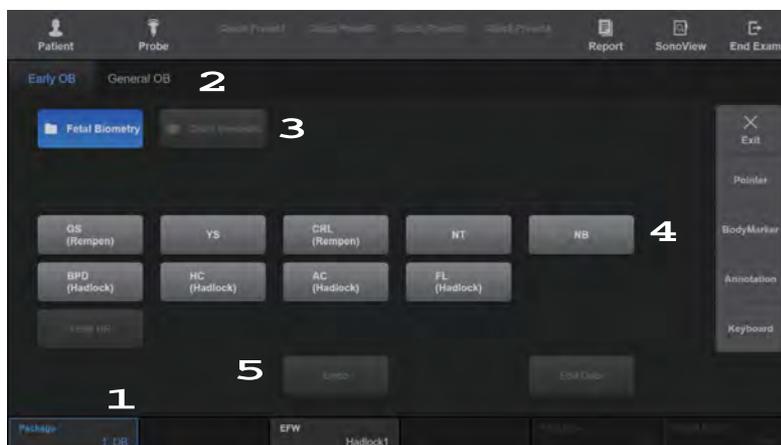
■ Measurement Menu Settings

Set the related menus for convenient measurement. Refer to the 'Setting Measurements' section in 'Chapter 3. Utilities' for additional information.

» **Measurement Menu Touchscreen**

Measurement menu options for each operation item are shown on the touchscreen. The measurement menu touchscreen is made up of four sections as shown below:

- 1** Application: Displays the application currently being measured.
- 2** Measurement Menu Tab: Displays the measurement menu that can be used in the current application.
- 3** Measurement Group: Displays the measurement group that can be used in the current measurement menu.
- 4** Measurement item: Displays the measurement item that can be used in the current measurement group. Measurement starts when button is pressed. Items whose measurements are complete will be V-marked.
- 5** Common Control Menu: Displays functions that can be used regardless of measurement menu.



[Figure 9.2 Measurement Menu – Touchscreen]

»» ⌘ Measurement Operations

The following gives information on the common button operations for measurements:

■ Change Measurement Method

Press the **Change** button on the control panel. If the current measurement item can be measured in more than one way, the measurement method can be changed according to your preferences. The current measurement method is displayed in the user information area. Once measurement has started, the method cannot be changed.

■ Measurement Unit Change

Change the measurement unit by selecting a desired unit from Utility > Measure Setup > General > Packages > Measure Configuration > Unit on the touchscreen.

■ Delete Trace Line

Delete a trace line by moving the trackball in the opposite direction. The trace line can only be erased when measuring Doppler spectrum using Manual Trace.

■ Delete Measurement Result

Press the **Clear** button on the control panel.



NOTE: The measurement results are deleted from the screen but are still shown on the report for the corresponding application.

■ Print Measurement Result

On the control panel, press the User Key (U1-4) that has been designated as Print.

■ Exit Measurement

Press the **Calculator** button again on the control panel. Or press the **Exit** button.

■ End Operational

Press the **End Exam** button on the touchscreen. The diagnosis for the current patient ends, and all measurement results are saved.

■ Package

Press the **Package** button on the touchscreen or rotate the dial-button to select a measurement package.

■ Laterality

Press the **Laterality** button on the touchscreen or rotate the dial-button to select the direction of the object to measure (left (Lt), right (Rt), or N/A). This is displayed on the touchscreen only for specific packages.

■ Location

Press the **Location** button on the touchscreen, or rotate the dial-button to select the direction of the object to measure (Proximal, Mid, Distal, or N/A). This is displayed on the touchscreen only for specific packages.

■ Trace Direction

Press the **Trace Direction** button on the touchscreen or rotate the dial-button to set the trace direction of the Doppler spectrum. This is enabled only after Auto or Limited Trace is carried out in Spectral Doppler Mode.

- ▶ Up: Only the + part of the Doppler waveform is traced.
- ▶ Down: Only the – part of the Doppler waveform is traced.
- ▶ All: All parts of the Doppler waveform are traced.

■ Sensitivity

Press the **Sensitivity** button on the touchscreen or rotate the dial-button to set the threshold. This is enabled only after Auto or Limited Trace is carried out in Spectral Doppler Mode. Adjusting the Sensitivity facilitates Doppler spectrum analysis.

■ Font Size

Press the **Font Size** button on the touchscreen or use the dial-button to set the font size of the measurement result.

■ HR Cycle

Press the **HR Cycle** button on the touchscreen or rotate the dial-button to set the heart rate (HR) cycle. This is enabled only when 'HR' is selected for the measurement item.

■ Result Action

Press the **Result Action** button on the touchscreen or rotate the dial-button to set the position of the measurement result.

- ▶ **Move:** Change the display position of the measurement results. Change the position with the trackball and then press the **Set** button.
- ▶ **Reset:** Resets the location where measurement results are displayed.



When there are multiple pages of measurement results, you can find the desired result using **Move**.

■ Undo

Press the **Undo** button on the touchscreen to cancel the last measurement.

■ Edit Data

Pressing **Edit Data** on the touchscreen switches to the *Report Edit* screen.

■ Toggle Enlarged View

It magnifies the area where the cursor is located by 2x and displays the magnified image in the user information section. It is available in Color Doppler, 2D/C or 2D/C/M mode, and the **Toggle Enlarged View** button appears on the touchscreen. Press the button to select from 2D/C, 2D/C/M, 2D or Color Doppler image.



NOTE: It will be displayed on the touchscreen when you select the Show enlarged image box in Utility > Measure Setup > General > General > Display. For more information, refer to 'Measure Setup' in 'Chapter 3. Utilities'.

Common Measurement Methods

This section provides information on the common measurement methods used for applications.

▶▶ Measurements in Spectral Doppler Mode

In general, if you trace a Doppler spectrum, you can obtain results for various measurement items automatically. There are 3 ways to trace a Doppler spectrum. This product also allows you to select a specific item under the Measurement menu and take measurements individually, without tracing a Doppler spectrum.

■ Auto Trace

A spectrum is traced automatically. It is enabled in the Measurement menu in Spectral Doppler Mode.

1. Press **Auto Trace** in the Measurement menu.
2. The system traces a spectrum automatically.
3. When the trace is complete, the measurement results are displayed on the screen.


Tips!
Things to Consider for Doppler Spectrum Auto Trace

The state of a Doppler spectrum may affect measurement results. Please see the following:

► Causes for Trace Failure

- If the Gain is changed for a Doppler image in the Freeze state, Contour Trace and Peak Trace will not work.
- If there is little or no noise in an image without a spectrum, Contour Trace will not work.
- If there is severe noise in an image, Contour Trace will not work.
- If the Clutter filter is set too high, Auto Trace or Limited Trace may not work.

► Causes for Inaccurate Peak Trace

- If PRF (Pulse Repetition Frequency) is lower than the velocity of the observation area, aliasing may occur. If the original signals are separated from aliasing, a trace can be done but the peak measurement may not be accurate.
- If the peak of a spectral waveform is not clear or occurs intermittently, a trace can be done but the peak measurement may not be accurate.
- If the Doppler Gain is set too high or low, it becomes difficult to distinguish spectrums. This may result in measurement error(s).
- If the Wall Filter is set too high, only part of the spectrum is displayed. In this case, a trace can be done but the peak measurement may not be accurate.
- If abnormal noise or artifact occurs, a trace can be done but the peak measurement may not be accurate.

► Misc.

- Use of the CW Probe may result in measurement error(s).
- Limited Trace is supported only for two-peak spectrums such as Mitral Valve Inflow and Tricuspid Valve Inflow, in the cardiology application.

■ Limited Trace

If you specify a measurement range, a spectrum is traced automatically. It is enabled in the menu in Spectral Doppler Mode.

1. Press **Limited Trace** in the Measurement menu. A bar appears allowing you to specify a measurement area.
2. Specify the measurement range.
Place the bar at a desired position with the trackball, and press the **Set** button.
3. The system traces spectrums within the specified range automatically.
4. When the trace is complete, the measurement results are displayed on the screen.

■ Manual Trace

A spectrum can be traced manually. This is enabled in the menu in Spectral Doppler Mode.

1. Press **Manual Trace** in the Measurement menu. A measurement cursor appears over a spectrum.
2. Trace the spectrum. The measuring method is the same as in 'D Trace'.
3. When the trace is complete, the measurement results are displayed on the screen.

■ Itemized Measurement

In the Measurement menu, select an individual item and take a measurement.

1. Press the **Calculator** button on the control panel after obtaining a desired image.
2. Select a desired item in the Measurement menu. The '+' cursor appears over a spectral waveform.
3. Position the '+' cursor and press the **Set** button.
4. The measurement results for the selected item are displayed on the screen.

Item	Type	Units	Equation
PSV (Peak Systolic Velocity)	Velocity	cm/s or m/s	-
EDV (End Diastolic Velocity)	Velocity	cm/s or m/s	-
PSV, EDV	Velocity	cm/s or m/s	
TAPV (Time Average Peak Velocity)	Velocity	cm/s or m/s	-
PGmean (Mean Pressure Gradient)	Measurement	mmHg	-
PGmax (Maximum Pressure Gradient)	Measurement	mmHg	$4 \times \text{PSV}^2$
S/D (Ratio of PSV to EDV)	Measurement	Ratio	PSV/EDV
D/S (Ratio of EDV to PSV)	Measurement	Ratio	EDV/PSV
RI (Resistivity Index)	Measurement	Ratio	$(\text{PSV} - \text{EDV})/\text{PSV}$
PI (Pulsatility Index)	Measurement	Ratio	$(\text{PSV} - \text{EDV})/\text{TAPV}$

Tips!

Taking Measurements via AutoCalc.

- ▶ You can use **AutoCalc.** to take measurements on predetermined item(s).
- ▶ Refer to the AutoCalc. section of 'Chapter 3. Utilities' for more information on measurement item selection.

▶▶ Volume Flow Measurement

Select **Volume Flow** in the **Measurement** menu.

Volume Flow allows you to measure and calculate an area or distance. For information on distance or area measurements, please refer to 'Basic Measurements'. The TAMV(L) (Time Avg. Mean Velocity) value is automatically measured.

■ **Vesl. Area (Vessel Area)**

Measure the area of a blood vessel and calculate TAMV(L) and Volume Flow.

▶ $VolumeFlow(A) = Area \times TAMV \times 60$

■ **Vesl. Dist. (Vessel Distance)**

Measure the width of a blood vessel and calculate TAMV(L) and Volume Flow.

▶ $VolumeFlow(D) = \frac{\pi \times d^2}{4} \times TAMV \times 60$

» » Stenosis Measurement

You can measure the stenosis of each blood vessel system by measuring and calculating an area or distance.

■ %StA

Measure the area of the inner and outer walls of a blood vessel. (StA stands for Stenosis Area.)

1. Select the **%StA** menu and the first cursor will appear in 2D Mode.
2. Measure the area of the vessel's outer wall using the Circ/Area measurement method.
3. When the second cursor appears, measure the area of the vessel's inner wall under stenosis.

$$\%StA = (\text{Outer Area} - \text{Inner Area}) / \text{Outer Area} \times 100$$

■ %StD

Measure the diameter of a blood vessel. (StD stands for Stenosis Distance).

1. Select the **%StD** menu and the first cursor will appear in 2D Mode.
2. Measure the total diameter of a vessel, using the Distance measurement method.
3. When a new cursor appears, measure the diameter of the vessel's inner wall under stenosis.

$$\%StD = (\text{Outer Distance} - \text{Inner Distance}) / \text{Outer Distance} \times 10$$

» » Heart Rate Measurement

■ HR (Heart Rate)

You can calculate heart rates for a certain period of time.

1. Select **HR** in the Measurement menu. A bar appears allowing you to specify a measurement area.
2. Specify the measurement range.
Place the bar at a desired position with the trackball, and press the **Set** button.
3. The system automatically measures the heart rate within the measurement range.

OB Measurements



NOTE:

- ▶ Ductus Venosus, Fetal HR can only be measured in Doppler Mode.
- ▶ For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.
- ▶ For references on measurement items, see the 'Reference Manual Part 1'.



Before Taking OB Measurements

■ OB Basic Information

Enter the information required for OB diagnosis in the *Patient Information* window. The basic OB information includes LMP (Last Menstrual Period) and Gestations.

Once LMP is entered, EDD (Estimated Delivery Date) and GA (Gestational Age) are calculated automatically. LMP is required for the calculation of values such as EDD and SD in obstetrics measurements.

- ▶ $EDD (LMP) = LMP + 280 \text{ days}$
- ▶ $GA (LMP) = \text{Current System Date} - LMP$

When you input ovulation date, the system calculates LMP, GA (LMP), and EDD (LMP) automatically.

- ▶ $LMP = \text{Ovul. Date} - 14$

When you enter the GA, the LMP (GA) and EDD (GA) will be entered automatically.

When you enter the EDD, the LMP (EDD) and GA (EDD) will be entered automatically.

Regardless of LMP, enter the EDD, after consulting a physician, into Estab. Due Date.

A maximum of four fetuses can be entered in the Number of Fetuses menu. The default value is '1'. In the case of twins, enter '2', etc.

Tips!

- ▶ If a valid date is not entered in the basic obstetrics information, it will return to the previous state before entering.
- ▶ End the exam by pressing **End Exam**, and the patient information screen will switch to LMP, GA (LMP), and EDD (LMP) as a default.

For further information about patient information menus and how to input patient information, refer to 'Entering Patient Data' in Chapter 6 'Starting Modes of Operation'.

■ OB Measurement Menu Settings

Set up the GA Equation, GA Table and OB measurement menus that are used in obstetrics measurements. The user can manually write, back up or restore GA Tables. For more information on the GA Equation and Table, refer to the Reference Manual.



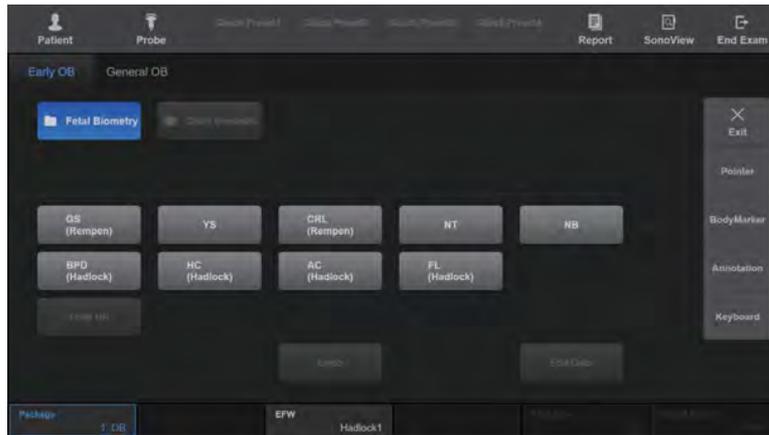
NOTE:

- ▶ For your convenience, you may want to assign obstetrics measurement functions to the **U2** and **U3** buttons on the control panel. They can be assigned in Utility > Setup > Customize > Button > U Key.
- ▶ When multiple fetuses are involved, they are distinguished as Fetus A, Fetus B, Fetus C, and Fetus D in the Measurement menu. To measure different fetuses, use the **Change** button on the control panel or the **Select Fetus** dial-button on the touchscreen. Separate reports are provided for each fetus.

Please refer to the 'Measurement Settings' section in 'Chapter 3. Utilities' of this manual for additional information.

»» Early OB Measurement Menu

When the measurements for the selected items have been completed, the measurements and gestational age are displayed on the screen. The measurement method for each item is the same as for a basic measurement. Measured items are automatically recorded in a report.



[Figure 9.3 Early OB Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Fetal Biometry	GS	All	Distance Measurement	cm, mm
	YS	All	Distance Measurement	cm, mm
	CRL	All	Distance Measurement	cm, mm
	NT	All	Distance Measurement	mm
	NB	All	Distance Measurement	cm, mm
	BPD	All	Distance Measurement	cm, mm
	FL	All	Distance Measurement	cm, mm
	AC	All	Circumference or Automatic Calculation	cm, mm
	Fetal HR	M, PW	Heart Rate	bpm
	EFW	All		
	HC	All	Circumference or Automatic Calculation	cm, mm
Duct Venous	All	PW	Velocity Measurement	cm/s, m/s
	S	PW	Velocity Measurement	cm/s, m/s
	D	PW	Velocity Measurement	cm/s, m/s
	a	PW	Velocity Measurement	cm/s, m/s
	Fetal HR	M, PW	Heart Rate	bpm

» » Automatic calculation

Some items in the Measurement menu are automatically calculated based on the measurements of other items.

■ HC

This is automatically calculated using the following formula, provided there are measured BPD and OFD values.

$$HC = \pi \times \sqrt{(BPD^2 + OFD^2)} / 2$$

Exception: when you use Merz reference, $HC = 2.325 \times \sqrt{BPD^2 + OFD^2}$

■ AC

This is automatically calculated using the following formula, provided there are measured APD and TAD values.

$$AC = \pi \times \sqrt{(APD^2 + TAD^2)} / 2$$

Exception: when you use Merz reference, $AC = \pi \times (APD + TAD) / 2$

■ FTA

This is automatically calculated using the following formula, provided there are measured APD and TAD values.

$$FTA = \pi \times (APD \times TAD) / 4$$

■ MAD

This is automatically calculated using the following formula, provided there are measured APD and TAD values.

$$MAD = (APD + TAD) / 2$$

■ ThC

This is automatically calculated using the following formula, provided there are measured APTD and TTD values.

$$ThC = \pi \times \sqrt{(APTD^2 + TTD^2)} / 2$$

■ APTD x TTD

This is automatically calculated, provided there are measured APTD and TTD values.



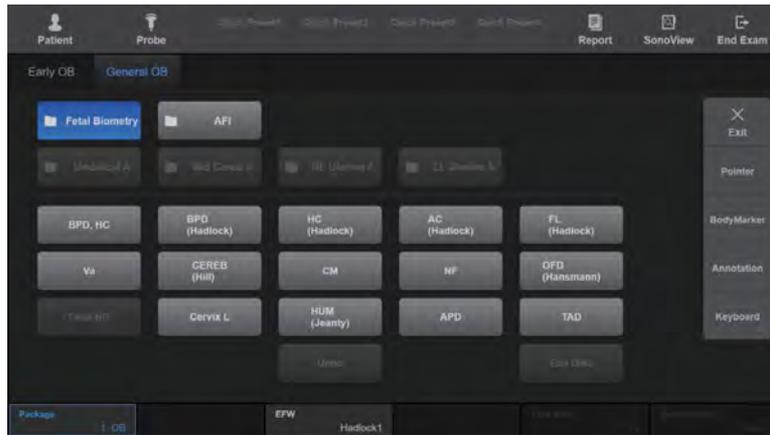
For reference, the Osaka University/Tokyo University methods are mainly used in Asia, the Merz method in Europe, and the Shepard/Hadlock methods on the American continent.



NOTE: The TAMV(L) measurement menu can be added in Utility > Measure Menu. For more information on adding measurement menus, refer to 'Chapter 3. Utilities'.

»» **General OB Measurement Menu**

When the measurements for the selected items have been completed, the measurements and gestational age are displayed on the screen. The measurement method for each item is the same as for a basic measurement. Measured items are automatically recorded in a report.



[Figure 9.4 General OB Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Fetal Biometry	BPD	All	Distance Measurement	cm, mm
	HC	All	Circumference or Automatic Calculation	cm, mm
	AC	All	Circumference or Automatic Calculation	cm, mm
	FL	All	Distance Measurement	cm, mm
	Va	All	Distance Measurement	cm, mm
	CEREB	All	Distance Measurement	cm, mm
	CM	All	Distance Measurement	cm, mm
	NF	All	Distance Measurement	cm, mm
	OFD	All	Distance Measurement	cm, mm
	Fetal HR	M, PW	Heart Rate	bpm
	Cervix L	All	Distance Measurement	cm, mm
	HUM	All	Distance Measurement	cm, mm
	APD	All	Distance Measurement	cm, mm
TAD	All	Distance Measurement	cm, mm	

Measurement Menu	Item	Mode	Method	Units
AFI	All	All	Distance Measurement	cm, mm
	Q1	All	Distance Measurement	cm, mm
	Q2	All	Distance Measurement	cm, mm
	Q3	All	Distance Measurement	cm, mm
	Q4	All	Distance Measurement	cm, mm
	MVP	All	Circumference Measurement	cm, mm
Rt. Uterine A Lt. Uterine A Mid Cereb Artery Umbilical Artery	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist	All	Distance Measurement	cm, mm

»» ⌘ **AFI (Amniotic Fluid Index)**

Measure the amniotic fluid index. Measurements are performed by dividing the pregnant woman's abdomen into four parts. The distance between the fetus and the farthest point of each area is measured. To obtain a specific image from each quadrant plane, press the **Freeze** button to go to the Operation mode. After obtaining the image, press the **Freeze** button again to return to the measurement mode.

»» ⌘ **Calculating Estimated Fetal Weight (EFW)**

When measurements for the following items are complete, the system uses the results to automatically calculate the estimated fetal weight. For an equation for calculating fetal weight, please refer to 'Estimated Fetal Weight Formula' in the Reference Manual Part 1.

- ▶ BPD and AC
- ▶ BPD, FL and FTA
- ▶ BPD, APTD, TTD and FL
- ▶ BPD, APTD, TTD and SL
- ▶ BPD and TTD
- ▶ AC and FL
- ▶ BPD, AC and FL
- ▶ HC, AC and FL
- ▶ BPD, HC, AC and FL
- ▶ AC

▶▶ Continuous Measurement/Review for EFW Calculation

You can measure OB item(s) continuously for EFW calculation.

Tips!

Before Starting Measurement:

1. It will be convenient to set the function of the **U2** and **U3** buttons on the control panel to the two obstetrics measurement items you want to use for continuous EFW measurement. Set their functions in Utility > Setup > Customize > Button > U Key. For more information, refer to the 'User Defined Key' section of 'Chapter 3. Utilities'.
2. Check EFW Reference. You can select or change it from Utility > Measure Setup > OB > Tables.



NOTE: This function is not available in 3D Mode.

■ Measurement Methods

1. Press the control panel's button that has been assigned to the EFW Measure function. The OB menu and measurement items are displayed on the screen.
2. Measure the items for EFW calculation, using the trackball and the **Set** button.
3. Press the **Freeze** button to finish the first measurement.
4. Press the **Freeze** button to measure the next items.
5. Once all the measurements have been taken, EFW is displayed on the screen.

EFW measurements and their sequences are as follows:

Reference	Measure Item (by Order)
Campbell	AC
Hadlock	BPD→AC
Hadlock1	AC→FL
Hadlock2	BPD→AC→FL
Hadlock3	AC→FL→HC
Hadlock4	BPD, HC→AC→FL
Hansmann	BPD→TTD
Merz	BPD→AC
Osaka	BPD→FTA→FL

Reference	Measure Item (by Order)
Shepard	BPD→AC
Shinozuka1	BPD→AC→FL
Shinozuka2	BPD→APTD, TTD→SL
Shinozuka3	BPD→APTD, TTD→FL
JSUM	BPD→AC→FL
Tokyo	BPD→APTD→TTD→FL
Ferrero	AC→FL
Higginbottom	AC
Thurnau	BPD→AC
Warsof	BPD→AC
Weiner1	AC→HC
Weiner2	AC→FL→HC
Woo	BPD→AC→FL


Tips!

Changing Measurement Sequence

To change the measurement sequence, go to Utility > Measure Setup > OB > Tables > EFW Sequential Measurement. You can use the EFW dial-button on the touchscreen to change the EFW Reference.

■ Review the Results of EFW Calculation

1. Press the control panel's button that has been assigned to the EFW Measure function. Measured items of EFW Calculation and the results are displayed on the screen.
2. To remove the results, press the **Clear** button on the control panel.



NOTE: The TAMV(L) measurement menu can be added in Utility > Measure Menu. For more information on adding measurement menus, refer to 'Chapter 3. Utilities.'

Gynecology Measurements



NOTE:

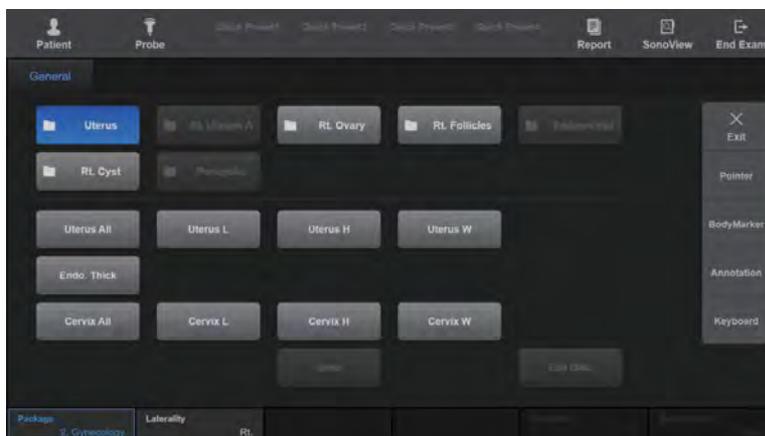
- ▶ For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.
- ▶ For references on measurement items, see the 'Reference Manual Part 2'.

▶▶ Before Taking GYN Measurements

Enter the information required for GYN diagnosis in the *Patient Information* window. Basic Information for gynecology includes Gravida, Para, Aborta, Ovul.Date, Day of Cycle, and Ectopic.

▶▶ Measurement Menu

The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



[Figure 9.5 GYN Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Uterus	Uterus All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
	Endo. Thick	All	Distance Measurement	cm, mm
	Cervix L	All	Distance Measurement	cm, mm
	Cervix H	All	Distance Measurement	cm, mm
	Cervix W	All	Distance Measurement	cm, mm
Cervix Vol.	All	Calculation after Distance Measurement	ml	
Uterine A Endometrial Pericystic	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s

Measurement Menu	Item	Mode	Method	Units
Ovary	Ovary All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
	Ovarian A Auto Trace	PW	Doppler Spectrum Trace	
	Ovarian A Limited Trace	PW	Doppler Spectrum Trace	
	Ovarian A Manual Trace	PW	Doppler Spectrum Trace	
	Ovarian A PSV	PW	Velocity Measurement	cm/s, m/s
	Ovarian A EDV	PW	Velocity Measurement	cm/s, m/s
	Ovarian A PSV, EDV	All	Velocity Measurement	cm/s or m/s
Follicles Cyst	1-20	All	Volume Calculated after Distance Measurement	cm, mm, ml

Most of the gynecology measurements are distance measurements and volume measurements, based on the distance measurement results. If multiple images, such as long axis images and transverse axis images are needed, press the **Freeze** button to switch to Scan Mode and obtain images from another perspective.

Cardiac Measurements

The measurement method for each item is the same as for a basic measurement. Measured items are automatically recorded in a report.

**NOTE:**

- ▶ Cardiac measurement is an optional item.
- ▶ For information on basic measurement methods, refer to 'Basic Measurements' and 'Common Measurement Methods' in this chapter.
- ▶ For references on measurement items, see the Reference Manual Part 2.

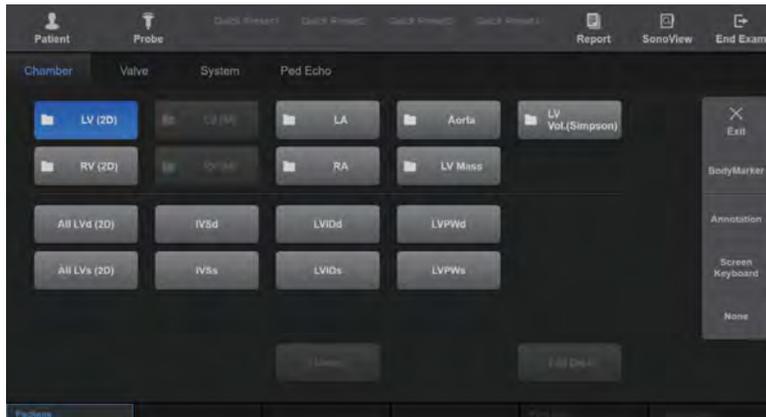
■ Dist. 20

Traces the cardiac circumference and then draws the cardiac axis. The system automatically draws 20 straight lines perpendicular to the axis and calculates its volume.

**Tips!**

- ▶ In Dual 2D Mode, two images can be viewed simultaneously.
- ▶ C Mode is mainly used for measuring reverse cardiac blood flow.
- ▶ As **PISA-Radius** or **PISA-Alias Vel.** measurements require Velocity values, so you have to select the color display for Velocity or Vel + Var in C Mode. For more information, refer to the 'Color Doppler Mode' section in 'Chapter 7. Modes of Operation'.
- ▶ **MPA Diam**, **RPA Diam**, and **LPA Diam** are measured under Aortic Valve Level in Parasternal Short Axis.
- ▶ For **RVAWd**, **RVIDd**, **RVAWs**, and **RVIDs**, see the **LV** measurement method.

▶▶ Adult Echo – Chamber Measurement Menu



[Figure 9.6 Adult Echo – Chamber Measurement Menu]

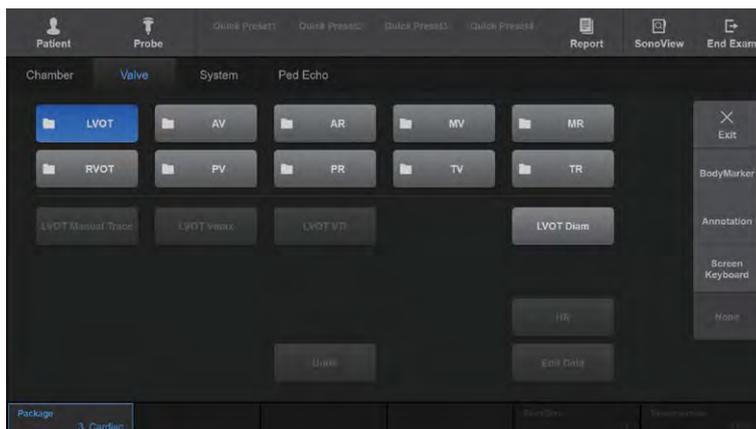
Measurement Menu	Item	Mode	Method	Units
LV (2D)	All LVd (2D)	All	Continuous Measurement	
	IVSd	All	Distance Measurement	cm, mm
	LVIDd	All	Distance Measurement	cm, mm
	LVPWd	All	Distance Measurement	cm, mm
	All LVs (2D)	All	Continuous Measurement	
	IVSs	All	Distance Measurement	cm, mm
	LVIDs	All	Distance Measurement	cm, mm
	LVPWs	All	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Units
LV (M)	All LV (M)	M	Continuous Measurement	
	IVSd	M	Distance Measurement	cm, mm
	LVIDd	M	Distance Measurement	cm, mm
	LVPWd	M	Distance Measurement	cm, mm
	IVSs	M	Distance Measurement	cm, mm
	LVIDs	M	Distance Measurement	cm, mm
	LVPWs	M	Distance Measurement	cm, mm
	LVET	M	Time Measurement	ms
	LVPEP	M	Time Measurement	ms
	MAPSE	M	Distance Measurement	cm, mm
LV Vol. (Simpson)	LVEDV A4C	All	Dist 20	ml
	LVESV A4C	All	Dist 20	ml
	LVEDV A2C	All	Dist 20	ml
	LVESV A2C	All	Dist 20	ml
	LVEDV A4C AL	All	Dist 20	ml
	LVESV A4C AL	All	Dist 20	ml
	LVEDV A2C AL	All	Dist 20	ml
	LVESV A2C AL	All	Dist 20	ml
LV Mass	All	All	Continuous Measurement	
	LVA _d SAX PM Epi	All	Area Measurement	cm ² , mm ²
	LVA _d SAX PM	All	Area Measurement	cm ² , mm ²
	LVL _d Apical	All	Distance Measurement	cm, mm
	LV TE a	All	Distance Measurement	cm, mm
	LV TE d	All	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Units
LA	All	All	Calculation after distance measurement	ml
	LA Major	All	Distance Measurement	cm, mm
	LA Minor	All	Distance Measurement	cm, mm
	LA Diam (2D)	All	Distance Measurement	cm, mm
	LA/Ao (2D)	All	Distance Measurement	cm, mm
	LA/Ao (M)	M	Distance Measurement	cm, mm
	LA Diam (M)	M	Distance Measurement	cm, mm
	LAEDV A4C	All	Area Measurement	cm ² , mm ²
	LAESV A4C	All	Area Measurement	cm ² , mm ²
	LAEDV A2C	All	Area Measurement	cm ² , mm ²
	LAESV A2C	All	Area Measurement	cm ² , mm ²
RV (2D)	RVAWd	All	Distance Measurement	cm, mm
	RVIDd	All	Distance Measurement	cm, mm
	RVAd	All	Area Measurement	cm ² , mm ²
	RVAWs	All	Distance Measurement	cm, mm
	RVIDs	All	Distance Measurement	cm, mm
	RVAs	All	Area Measurement	cm ² , mm ²
	RV Major	All	Distance Measurement	cm, mm
	RV Minor	All	Distance Measurement	cm, mm
RV (M)	All	All	Continuous Measurement	
	RVAWd	M	Distance Measurement	cm, mm
	RVIDd	M	Distance Measurement	cm, mm
	RVAWs	M	Distance Measurement	cm, mm
	RVIDs	M	Distance Measurement	cm, mm
	RVPEP	M	Time Measurement	ms
	RVET	M	Time Measurement	ms
	TAPSE	M	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Units
RA	RA Major	All	Distance Measurement	cm, mm
	RA Minor	All	Distance Measurement	cm, mm
	RAAd	All	Area Measurement	cm ² , mm ²
	RAAs	All	Area Measurement	cm ² , mm ²
	RAEDV	All	Dist 20	ml
	RAESV	All	Dist 20	ml
Aorta	Ao Diam (2D)	All	Distance Measurement	cm, mm
	Ao Diam (M)	M	Distance Measurement	cm, mm
	Asc Ao Diam	All	Distance Measurement	cm, mm
	Desc Ao Diam	All	Distance Measurement	cm, mm
	Ao Arch Diam	All	Distance Measurement	cm, mm
	Ao Isth Diam	All	Distance Measurement	cm, mm
	Ao ST Junct Diam	All	Distance Measurement	cm, mm
	Ao Sinus Diam	All	Distance Measurement	cm, mm

Adult Echo – Valve Measurement Menu



[Figure 9.7 Adult Echo – Valve Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
LVOT	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	VTI	PW	Doppler Spectrum Trace	cm, mm
	Diam	All	Distance Measurement	cm, mm
	HR	M, PW	Heart Rate	bpm

Measurement Menu	Item	Mode	Method	Units
AV	Cusp	All	Distance Measurement	cm, mm
	Cusp (M)	M	Distance Measurement	cm, mm
	Diam	All	Distance Measurement	cm, mm
	AVA Planimetry	All	Area Measurement	cm ² , mm ²
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	PHT	PW	Time Measurement	ms
	VTI	PW	Doppler Spectrum Trace	cm, mm
	AccT/ET	All	Continuous Measurement	
	AccT	PW	Time Measurement	ms
	ET	PW	Time Measurement	ms
	DecT	PW	Time Measurement	ms
	R-R Interval	M, PW	Heart Rate	bpm
	AR	VCW	All	Distance Measurement
PISA Rad		C	PISA-Radius	cm, mm
Alias Vel.		C	Velocity Measurement	cm/s, m/s
Manual Trace		PW	Doppler Spectrum Trace	
Vmax		PW	Velocity Measurement	cm/s, m/s
ed Vmax		PW	Velocity Measurement	cm/s, m/s
PHT		PW	Time Measurement	ms
VTI		PW	Doppler Spectrum Trace	cm, mm
AccT		PW	Time Measurement	ms
DecT		PW	Time Measurement	ms
HR		M, PW	Heart Rate	bpm

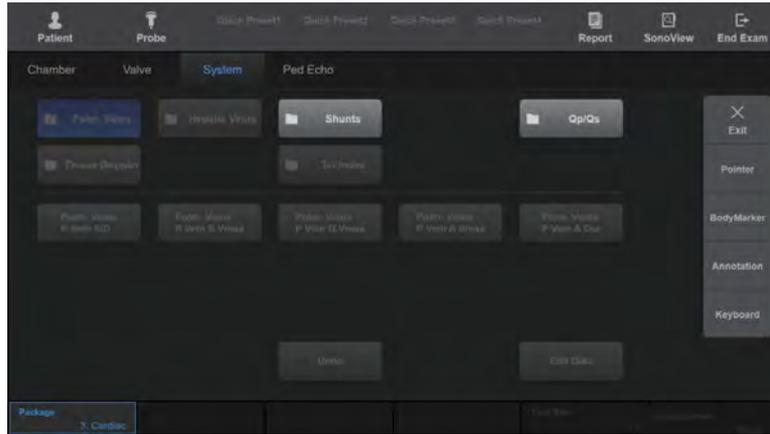
Measurement Menu	Item	Mode	Method	Units
MV	All MV (M)	M	Distance Measurement	cm, mm
	Vp	M	Distance Measurement	cm, mm
	Diam 1	All	Distance Measurement	cm, mm
	Diam 2	All	Distance Measurement	cm, mm
	MVA Planimetry	All	Area Measurement	cm ² , mm ²
	Manual Trace	PW	Doppler Spectrum Trace	
	E-DT-A	PW	Time-Speed-Time Measurement	ms and m/s
	E/A	PW	Velocity Measurement	cm/s, m/s
	Vmax	PW	Velocity Measurement	cm/s, m/s
	PHT	PW	Time Measurement	ms
	AccT	PW	Time Measurement	ms
	DecT	PW	Time Measurement	ms
	A Dur.	PW	Time Measurement	ms
	ET	PW	Time Measurement	ms
	R-R Interval	M, PW	Heart Rate	bpm
MR	VCW	PW	Distance Measurement	cm, mm
	PISA Rad	C	PISA-Radius	cm, mm
	Alias Vel.	C	Velocity Measurement	cm/s, m/s
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	VTI	PW	Doppler Spectrum Trace	cm, mm
	dp/dt	PW	Calculation after Time Measurement	mmHg/s
	HR	M, PW	Heart Rate	bpm

Measurement Menu	Item	Mode	Method	Units
RVOT	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	VTI	PW	Doppler Spectrum Trace	cm, mm
	Diam	All	Distance Measurement	cm, mm
	HR	M, PW	Heart Rate	bpm
PV	Ann Diam	All	Distance Measurement	cm, mm
	PVA Planimetry	All	Area Measurement	cm ² , mm ²
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	PHT	PW	Time Measurement	ms
	VTI	PW	Doppler Spectrum Trace	cm, mm
	AccT/ET	All	Continuous measurement	
	AccT	PW	Time Measurement	ms
	ET	PW	Time Measurement	ms
	DecT	PW	Time Measurement	ms
	Q to PV Close	PW	Time Measurement	ms
	R-R Interval	M, PW	Heart Rate	bpm
PR	VCW	PW	Distance Measurement	cm, mm
	PISA Rad	C	PISA-Radius	cm, mm
	Alias Vel.	C	Velocity	cm/s, m/s
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	MPA Vmax	PW	Velocity Measurement	cm/s, m/s
	PHT	PW	Time Measurement	ms
	VTI	PW	Doppler Spectrum Trace	cm, mm
	AccT	PW	Time Measurement	ms
	DecT	PW	Time Measurement	ms
	HR	M, PW	Heart Rate	bpm

Measurement Menu	Item	Mode	Method	Units
TV	Ann Diam	All	Distance Measurement	cm, mm
	Diam 1	All	Distance Measurement	cm, mm
	Diam 2	All	Distance Measurement	cm, mm
	TVA Planimetry	All	Area Measurement	cm ² , mm ²
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	E/A	PW	Velocity Measurement	cm/s, m/s
	PHT	PW	Time Measurement	ms
	VTI	PW	Doppler Spectrum Trace	cm, mm
	AccT	PW	Time Measurement	ms
	DecT	PW	Time Measurement	ms
	A Dur.	PW	Time Measurement	ms
	Q to TV Open	PW	Time Measurement	ms
	R-R Interval	M, PW	Heart Rate	bpm
TR	VCW	PW	Distance Measurement	cm, mm
	PISA Rad	C	PISA-Radius	cm, mm
	Alias Vel.	C	Velocity Measurement	cm/s, m/s
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	VTI	PW	Doppler Spectrum Trace	cm, mm
	dp/dt	PW	Calculation after Time Measurement	mmHg/s
	RAP	PW	RAP	mmHg
	HR	M, PW	Heart Rate	bpm



Adult Echo – System Measurement Menu



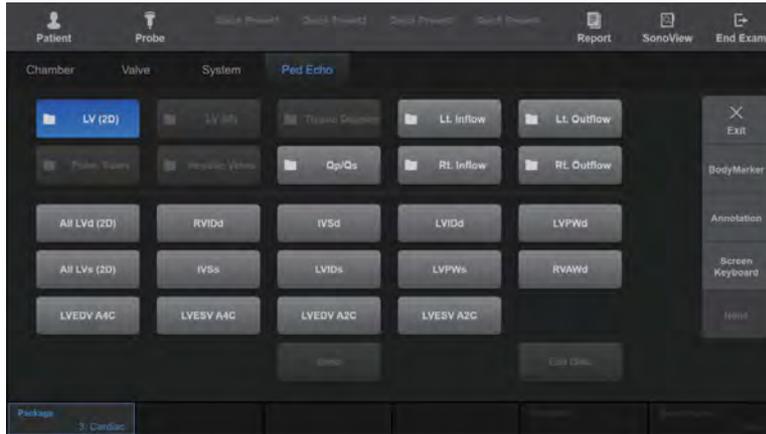
[Figure 9.8 Adult Echo – System Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Pulm. Veins Hepatic Veins	S/D	PW	Continuous Measurement	
	S Vmax	PW	Velocity Measurement	cm/s, m/s
	D Vmax	PW	Velocity Measurement	cm/s, m/s
	A Vmax	PW	Velocity Measurement	cm/s, m/s
	A Dur	PW	Time Measurement	ms

Measurement Menu	Item	Mode	Method	Units
Shunts	MPA Diam	All	Distance Measurement	cm, mm
	LPA Diam	All	Distance Measurement	cm, mm
	RPA Diam	All	Distance Measurement	cm, mm
	PEd	All	Distance Measurement	cm, mm
	PEs	All	Distance Measurement	cm, mm
	SVC S/D	PW	Continuous measurement	
	SVC S Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC D Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC A Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC A Dur	PW	Time Measurement	ms
	IVC S/D	PW	Continuous Measurement	
	IVC S Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC D Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC A Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC A Dur	PW	Time Measurement	ms
	IVC Diam, Exp(M)	M	Distance Measurement	cm, mm
	IVC Diam, Insp(M)	M	Distance Measurement	cm, mm
	SVC Diam, Exp(M)	M	Distance Measurement	cm, mm
	SVC Diam, Insp(M)	M	Distance Measurement	cm, mm
Qp/Qs	Systemic VTI	PW	Doppler Spectrum Trace	cm, mm
	Plumonic VTI	PW	Doppler Spectrum Trace	cm, mm

Measurement Menu	Item	Mode	Method	Units
Tissue Doppler	All LV TDI	PW	Continuous measurement	
	LV Peak E'	PW	Velocity Measurement	cm/s, m/s
	LV Peak A'	PW	Velocity Measurement	cm/s, m/s
	LV Peak S'	PW	Velocity Measurement	cm/s, m/s
	LV AccT	PW	Time Measurement	ms
	LV DecT	PW	Time Measurement	ms
	All RV TDI	PW	Continuous Measurement	
	RV Peak E'	PW	Velocity Measurement	cm/s, m/s
	RV Peak A'	PW	Velocity Measurement	cm/s, m/s
	RV Peak S'	PW	Velocity Measurement	cm/s, m/s
	RV AccT	PW	Time Measurement	ms
	RV DecT	PW	Time Measurement	ms
Tei Index	All LV	PW	Continuous Measurement	
	LV ET	PW	Time Measurement	ms
	LV IVCT	PW	Time Measurement	ms
	LV IVRT	PW	Time Measurement	ms
	All RV	PW	Continuous Measurement	
	RV ET	PW	Time Measurement	ms
	RV IVCT	PW	Time Measurement	ms
	RV IVRT	PW	Time Measurement	ms

» Ped. Echo Measurement Menu



[Figure 9.9 Ped. Echo Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
LV (2D)	All LVd (2D)	All	Continuous Measurement	
	RVIDd	All	Distance Measurement	cm, mm
	IVSd	All	Distance Measurement	cm, mm
	LVIDd	All	Distance Measurement	cm, mm
	LVPWd	All	Distance Measurement	cm, mm
	All LVs (2D)	All	Continuous Measurement	
	IVSs	All	Distance Measurement	cm, mm
	LVIDs	All	Distance Measurement	cm, mm
	LVPWs	All	Distance Measurement	cm, mm
	RVAWd	All	Distance Measurement	cm, mm
	LVEDV A4C	All	Dist 20	ml
	LVESV A4C	All	Dist 20	ml
	LVEDV A2C	All	Dist 20	ml
LVESV A2C	All	Dist 20	ml	

Measurement Menu	Item	Mode	Method	Units
LV (M)	All LV (M)	M	Continuous Measurement	
	RVIDd	M	Distance Measurement	cm, mm
	IVSd	M	Distance Measurement	cm, mm
	LVIDd	M	Distance Measurement	cm, mm
	LVPWd	M	Distance Measurement	cm, mm
	IVSs	M	Distance Measurement	cm, mm
	LVIDs	M	Distance Measurement	cm, mm
	LVPWs	M	Distance Measurement	cm, mm
	RVAWd	M	Distance Measurement	cm, mm
Tissue Doppler	All LV TDI	PW	Continuous Measurement	
	LV Peak E'	PW	Velocity Measurement	cm/s, m/s
	LV Peak A'	PW	Velocity Measurement	cm/s, m/s
	LV Peak S'	PW	Velocity Measurement	cm/s, m/s
	All RV TDI	PW	Continuous Measurement	
	RV Peak E'	PW	Velocity Measurement	cm/s, m/s
	RV Peak A'	PW	Velocity Measurement	cm/s, m/s
	RV Peak S'	PW	Velocity Measurement	cm/s, m/s
Lt. Inflow	LA Diam (2D)	All	Distance Measurement	cm, mm
	MV Diam 1	All	Distance Measurement	cm, mm
	MV E-DT-A	PW	Continuous Measurement	
	MV Dect	PW	Time Measurement	ms
	MR Vmax	PW	Velocity Measurement	cm/s, m/s
	MR dp/dt	PW	Calculation after Time Measurement	mmHg/s

Measurement Menu	Item	Mode	Method	Units
Lt. Outflow	LVOT Diam	All	Distance Measurement	cm, mm
	Ao Sinus Diam	All	Distance Measurement	cm, mm
	Ao Diam (2D)	All	Distance Measurement	cm, mm
	Ao ST Junct Diam	All	Distance Measurement	cm, mm
	Asc Ao Diam	All	Distance Measurement	cm, mm
	Ao Arch Diam	All	Distance Measurement	cm, mm
	Ao Isth Diam	All	Distance Measurement	cm, mm
	Desc Ao Diam	All	Distance Measurement	cm, mm
	AV Vmax	PW	Velocity Measurement	cm/s, m/s
	AR DecT	PW	Time Measurement	ms
	AR ed Vmax	PW	Velocity Measurement	cm/s, m/s
	AR PHT	PW	PHT	ms
Pulm. Veins Hepatic Veins	S/D	PW	Continuous Measurement	
	S Vmax	PW	Velocity Measurement	cm/s, m/s
	D Vmax	PW	Velocity Measurement	cm/s, m/s
	A Vmax	PW	Velocity Measurement	cm/s, m/s
	A Dur	PW	Time Measurement	ms

Measurement Menu	Item	Mode	Method	Units
Qp/Qs	Systemic VTI	PW	Doppler Spectrum Trace	cm, mm
	Pulmonic VTI	PW	Doppler Spectrum Trace	cm, mm
	LVOT Diam	All	Distance Measurement	cm, mm
	RVOT Diam	All	Distance Measurement	cm, mm
	SVC S/D	PW	Continuous Measurement	
	SVC S Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC D Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC A Vmax	PW	Velocity Measurement	cm/s, m/s
	SVC A Dur	PW	Time Measurement	ms
	IVC S/D	PW	Continuous Measurement	
	IVC S Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC D Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC A Vmax	PW	Velocity Measurement	cm/s, m/s
	IVC A Dur	PW	Time Measurement	ms
Rt. Inflow	RA Major	All	Distance Measurement	cm, mm
	TV Diam 1	All	Distance Measurement	cm, mm
	TR Vmax	PW	Velocity Measurement	cm/s, m/s
	RAP	PW	RAP	mmHg
	TV E/A	PW	Continuous Measurement	
Rt. Outflow	RVOT Diam	All	Distance Measurement	cm, mm
	PV Ann Diam	All	Distance Measurement	cm, mm
	PV AccT	PW	Time Measurement	ms
	PR DecT	PW	Time Measurement	ms
	PR Vmax	PW	Velocity Measurement	cm/s, m/s
	MR dp/dt	PW	Calculation after Time Measurement	mmHg/s

Vascular Measurements

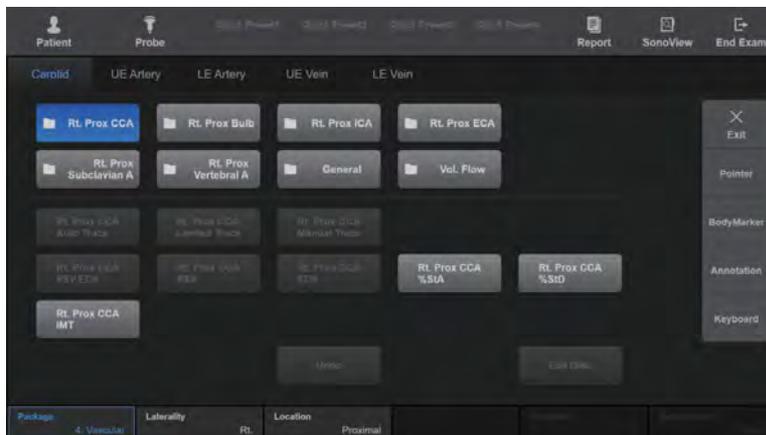
The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



NOTE:

- ▶ For information on basic measurement methods, see ‘Basic Measurements’ and ‘Common Measurement Methods’.
- ▶ For reference values for measurement items, see the Reference Manual Part 2.
- ▶ If there are measured values for the vascular system measurement only, an orange dot is displayed in the measurement menu on the touchscreen.

Carotid Measurement Menu



[Figure 9.10 Carotid Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
CCA Bulb ECA ICA	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Area Measurement	%
	%StD	All	Distance Measurement	%
	IMT	All	Distance Measurement	cm, mm
SubciavianA Vertebral A	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Area Measurement	%
	%StD	All	Distance Measurement	%
General	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Area Measurement	%
	%StD	All	Distance Measurement	%

Measurement Menu	Item	Mode	Method	Units
Vol. Flow	Vol. Flow(Auto)	PW	Automatic calculation	ml/m
	Vol. Flow(D)	PW	Automatic calculation	ml/m
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s
	Vesl. Dist.	All	Distance Measurement	cm, mm
	HR	M, PW	Heart Rate	bpm



- ▶ IMT can be measured three times consecutively.
- ▶ When IMT is measured more than twice, the average is displayed on the monitor.

»» ⌘ Auto IMT+ (Optional)

This function allows you to take IMT measurements easily and quickly.



NOTE:

- ▶ Auto IMT+ is an optional feature of this product.
- ▶ Auto IMT+ can be used only under the following conditions.
 - Probe: Linear Probe, Micro Convex Probe
 - Application: Vascular
 - Operation modes: 2D, C or PD Mode

Auto IMT+ Measurement

1. After checking the probe, application and preset settings, perform the carotid scan.
2. If the desired images are obtained, press **Freeze**. Use the trackball to select an image for IMT measurement.
3. Press **Auto IMT** on the touchscreen. *Auto IMT+* screen will appear.

If scanning is performed when the center of the vessel is aligned with the center of the image area, IMT measurement starts automatically.

4. Use the trackball and the **Set** button to set a location for IMT measurement.

Tips!

Operation #1, #2

If Operation #1, #2 in the user information area is followed, IMT measurements can be taken more easily.

- ▶ Select a point between Near and Far.
 - ▶ If the vessel image quality is poor, select an area that is close to the Intima to be measured.
 - ▶ If a detailed area has to be selected, use the Range Bar.
 - ▶ Press the Space Bar on the keyboard to turn the Intima and Adventitia Marker on/off.
5. Once the measurement position has been selected, the measurement result will be displayed in a table.

Auto IMT+ Screen



[Figure 9.11 Auto IMT+]

■ Risk Color Bar

It is shown in colors based on the IMT thickness. If the thickness is ≤ 0.5 mm, the entire bar is shown in green. If the thickness is ≥ 1.1 mm, the entire bar is shown in red. For a thickness between these values, it is shown in the corresponding color.

■ Ruler and Range Bar

Use the trackball and **Set** button to specify the location and range at which IMT will be measured.

- ▶ Ruler: The grid unit is 10mm. This option is used when a vessel is lying laterally. At the measurement location, press the **Set** button to take IMT measurements at 10mm intervals.
- ▶ Range Bar: This option is used when a vessel is not lying laterally, or the length of a specific segment needs measuring. Press and hold the **Set** button at the start point, and then drag the trackball to specify the end point.

■ Intima and Adventitia Pair

- ▶ Between the Near and Far zones, the one with the higher QI is automatically selected as a measurement value and is represented by the appropriate color of the Risk Color Bar.
- ▶ A pair with a lower QI is represented by dark blue.
- ▶ Press the **Change** button on the control panel to move the Near and Far zones that are automatically selected with QI. The measurement value and color presentation are also changed. However, if QI is 0, it will not be changed.

■ Measurement Result Table

- ▶ Max: The maximum thickness of the Intima/Adventitia pair.
- ▶ Mean: The average thickness of the Intima/Adventitia pair.
- ▶ SD: Standard Deviation
- ▶ QI: The distance ratio of the measured point in a distance, for Quality Index measurement.
- ▶ Points: The total number of the measured Intima/Adventitia pairs.

Auto IMT+ Measurements Analysis

1. Press **Analysis** on the touchscreen. The *Analysis* screen appears.
2. Select the desired analysis among **Framingham/CHD**, **Risk Factor**, **Normal IMT**, and **User Graph** using the trackball and the **Set** button.

A bar corresponding to the measurement result is displayed on each graph. However, no bar is displayed if the measurement result is smaller than Framingham/CHD or the Risk Factor.



User Graph

You can use **User Graph** to adjust the graph and analyze the measurement results as you want.

3. To finish analysis, press **Analysis** again on the touchscreen.

The following materials were referred to when analyzing the measurements of Auto IMT+.

■ Framingham/CHD

Correlation between the Framingham Risk Score and Intima Media Thickness: the Paroi Arterielle et Risque Cardio-vasculaire (PARC) Study.

Pierre-Jean Touboul, Eric Vicaut, Julien Labreuche, Jean-Pierre Belliard, Serge Cohen, Serge Kownator, Jean-Jacques Portal, Isabelle Pithois-Merli, Pierre Amarenco. On behalf of PARC Study participating physicians.

■ Risk Factor

Mannheim Carotid Intima-Media Thickness Consensus (2004–2006)

P.J. Touboul, M.G. Hennerici, S. Meairs, H. Adams, P. Amarenco, N. Borstein, L. Csiba, M. Desvarieux, S. Ebrahim, M. Fatar, R. Hernandez Hernandez, M. Jaff, S. Kownator, P. Prati, T. Rundek, M. Sitzer, U. Schiminke, J.C. Tardif, A. Taylor, E. Vicaut, K.S. Woo, F. Zannad, M. Zureik.

■ Normal IMT

Simon, J. Garipey, G. Chironi, J.L. Megnien, J. Levenson: Intima-media thickness: a new tool for diagnosis and treatment of cardiovascular risk. Journal of Hypertension 20:159-169, 2002



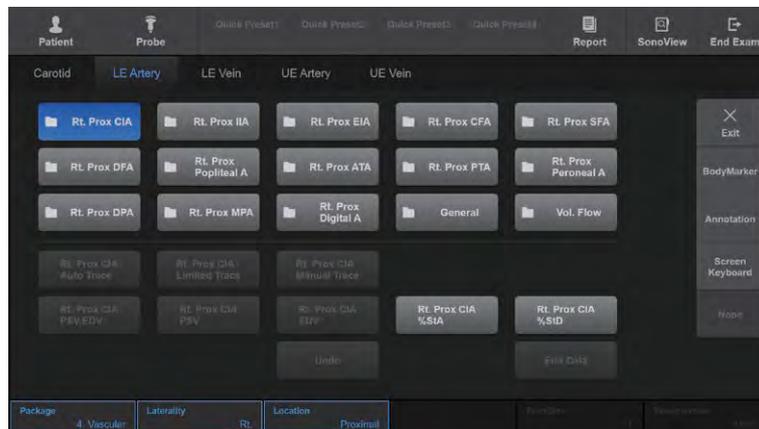
[Figure 9.12 Analysis]

Saving Auto IMT+ Measurement Values

1. Select the direction of the measurement site by pressing **Direction** on the touchscreen or using the dial-button.
2. Select the position of the measurement site by pressing **Position** on the touchscreen or using the dial-button.
3. Select the name corresponding to the measurement site by pressing it on the touchscreen. When you press this, the measurement values are saved and the Auto IMT+ Measurement Mode finishes. The details are displayed on the screen.



LE Artery Measurement Menu



[Figure 9.13 LE Artery Measurement Menu]

Measurement Menu	Item	Mode	Method	Units	
CIA IIA EIA CFA SFA DFA Popliteal A ATA PTA Peroneal A DPA Metatarsal A Digital A	Auto Trace	PW	Doppler Spectrum Trace		
	Limited Trace	PW	Doppler Spectrum Trace		
	Manual Trace	PW	Doppler Spectrum Trace		
	PSV	PW	Velocity Measurement	cm/s, m/s	
	EDV	PW	Velocity Measurement	cm/s, m/s	
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s	
	%StA	All	Area Measurement	%	
	%StD	All	Distance Measurement	%	
	General	Auto Trace	PW	Doppler Spectrum Trace	
		Limited Trace	PW	Doppler Spectrum Trace	
Manual Trace		PW	Doppler Spectrum Trace		
PSV		PW	Velocity Measurement	cm/s, m/s	
EDV		PW	Velocity Measurement	cm/s, m/s	
PSV, EDV		PW	Velocity Measurement	cm/s or m/s	
%StA		All	Area Measurement	%	
%StD		All	Distance Measurement	%	
Vol. Flow	Vol. Flow(Auto)	PW	Automatic calculation	ml/m	
	Vol. Flow(D)	PW	Automatic calculation	ml/m	
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s	
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s	
	Vesl. Dist.	All	Distance Measurement	cm, mm	

» »  **LE Vein Measurement Menu**



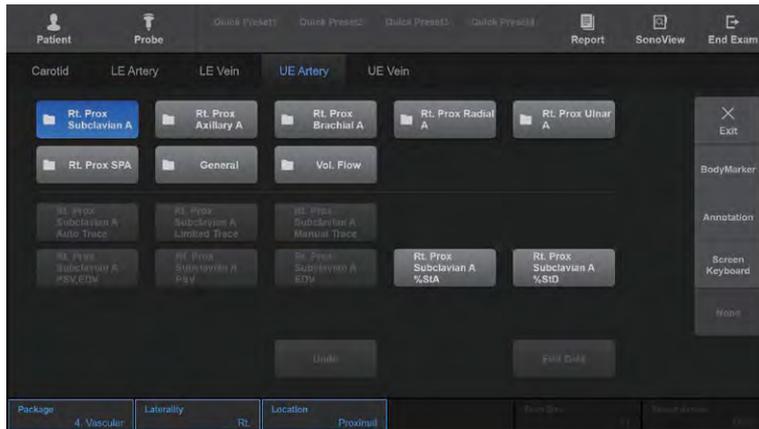
[Figure 9.14 LE Vein Measurement Menu]

Measurement Menu	Item	Mode	Method	Units	
CIV IIV EIV CFV PFV SFV GSV Popliteal V LSV ATV PTV Peroneal V MPV	Auto Trace	PW	Doppler Spectrum Trace		
	Limited Trace	PW	Doppler Spectrum Trace		
	Manual Trace	PW	Doppler Spectrum Trace		
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s	
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s	
	Vmax	PW	Velocity Measurement	cm/s, m/s	
	Duration Time	PW	Time Measurement	ms	
	Vesl. Dist.	All	Distance Measurement	cm, mm	
	General	Auto Trace	PW	Doppler Spectrum Trace	
		Limited Trace	PW	Doppler Spectrum Trace	
Manual Trace		PW	Doppler Spectrum Trace		
Vmax		PW	Velocity Measurement	cm/s, m/s	
Duration Time		PW	Time Measurement	ms	
Vesl. Dist.		All	Distance Measurement	cm, mm	

Measurement Menu	Item	Mode	Method	Units
Vol. Flow	Vol. Flow(Auto)	PW	Automatic Calculation	ml/m
	Vol. Flow(D)	PW	Automatic Calculation	ml/m
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s
	Vesl. Dist.	All	Distance Measurement	cm, mm



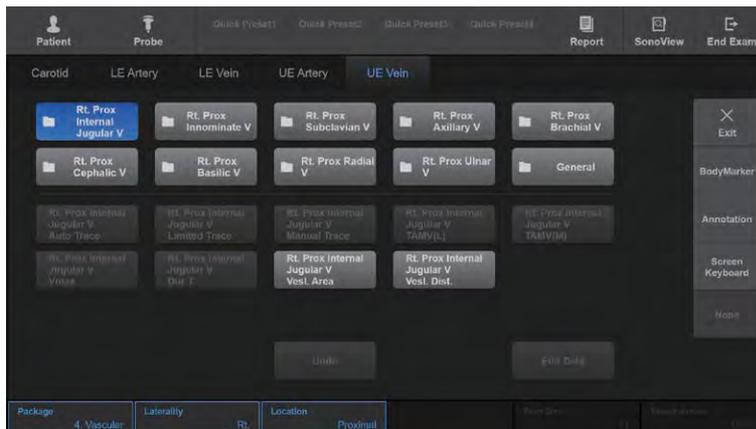
UE Artery Measurement Menu



[Figure 9.15 UE Artery Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Subclavian A Axillary A Brachial A Radial A Ulnar A SPA General	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Area Measurement	%
	%StD	All	Distance Measurement	%
	Vesl. Dist	All	Distance Measurement	cm, mm
Vol. Flow	Volume Flow(Auto)	PW	Automatic calculation	ml/m
	Volume Flow(D)	PW	Automatic calculation	ml/m
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s
	Vesl. Dist.	All	Distance Measurement	cm, mm

UE Vein Measurement Menu



[Figure 9.16 UE Vein Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Internal Jugular V Innominate V Subclavian V Axillary V Brachial V Cephalic Basilic V Radial V Ulnar V	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s
	Vmax	PW	Velocity Measurement	cm/s, m/s
	Dur T	PW	Time Measurement	ms
	Vesl. Dist.	All	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Units
General	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s, m/s
	TAMV(M)	PW	Doppler Spectrum Trace	cm/s, m/s
	Vmax	PW	Velocity Measurement	cm/s, m/s
	Duration Time	PW	Time Measurement	ms
	Vol. Flow(Auto)	PW	Automatic Calculation	ml/m
	Vol. Flow(D)	PW	Automatic Calculation	ml/m
	Vesl. Dist.	All	Distance Measurement	cm, mm



You can add the TAMV(L) measurement menu at Utility > Measure Menu. For more information on adding measurement menus, refer to 'Chapter 3. Utilities'.

Urology Measurements

The measurement method for each item is the same as for a basic measurement. Measured items are automatically recorded in a report.



NOTE:

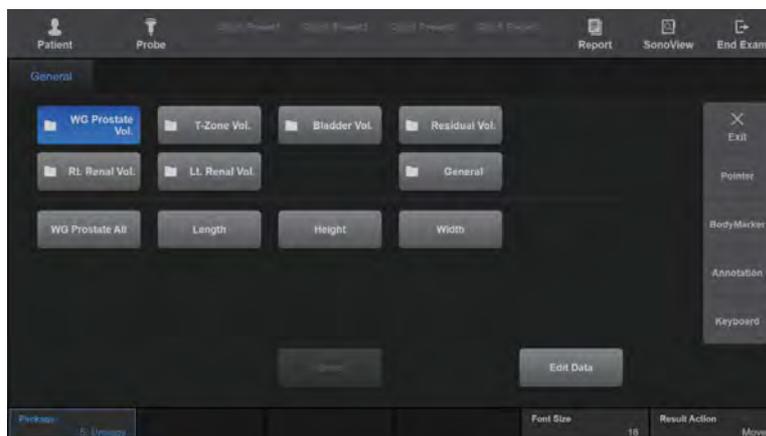
- ▶ The measurement method for each menu differs by the Volume Method specified in Utility > Measure Setup > Urology. When the Volume measurement method is changed, the menu on the touchscreen is automatically changed as well.
- ▶ For information on basic measurement methods, refer to 'Basic Measurements' and 'Common Measurement Methods' in this chapter.
- ▶ For references on measurement items, see the Reference Manual Part 2.

⏪ ⚠ Before Taking Urology Measurements

Set the related menus for convenient measurement.

You can select the volume method for measurement. There are four types of volume method. The factor value can be set manually for the formulae that need it.

For more information on the measurement menus and settings, please refer to the 'Measure Setup' section in 'Chapter 3. Utilities'.



[Figure 9.17 Urology Measurement Menu]

»» Measurement Menu Using the 3 Distance Method

Calculate a volume by measuring three distances.

Measurement Menu	Item	Mode	Method	Unit
WG Prostate Vol. T-Zone Vol. Bladder Vol.	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Residual Vol.	Pre All	All	Calculation after Distance Measurement	ml
	Pre L	All	Distance Measurement	cm, mm
	Pre H	All	Distance Measurement	cm, mm
	Pre W	All	Distance Measurement	cm, mm
	Post All	All	Calculation after Distance Measurement	ml
	Post L	All	Distance Measurement	cm, mm
	Post H	All	Distance Measurement	cm, mm
	Post W	All	Distance Measurement	cm, mm
Rt./Lt. Renal Vol.	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
	Renal Pelvis	All	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Unit
General	Auto Trace	PW	Doppler Spectrum Trace	cm, mm
	Limited Trace	PW	Doppler Spectrum Trace	cm, mm
	Manual Trace	PW	Doppler Spectrum Trace	cm, mm
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm

The measurement for Transitional Zone Prostate Volume, Bladder Volume, Left Renal Volume, Right Renal Volume are the same as for Prostate Volume.

▶▶ Measurement Menu using the 3 Distance x Factor Method

Calculate volume using the Factor value. The measurement method is the same as in the '3 Distance' Method.

Volume (ml) = Factor x Distance1 x Distance2 x Distance3

▶▶ Measurement Menu Using the Ellipsoid Method

Calculate a volume by using the Main Diameter and Beside Diameter values.

Measurement Menu	Item	Mode	Method	Unit
WG Prostate Vol. T-Zone Vol. Bladder Vol.	All	All	Calculation after Distance Measurement	ml
Residual Vol.	Pre Vol.	All	Calculation after Distance Measurement	ml
	Post Vol.	All	Calculation after Distance Measurement	ml
Rt./Lt. Renal Vol.	All	All	Calculation after Distance Measurement	ml
	Renal Pelvis	All	Distance Measurement	cm, mm
General	Auto Trace	PW	Doppler Spectrum Trace	cm, mm
	Limited Trace	PW	Doppler Spectrum Trace	cm, mm
	Manual Trace	PW	Doppler Spectrum Trace	cm, mm
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm

▶▶ Measurement Menu Using the Sum of 20 Disks Method

After measuring the circumference of a prostate, use the Trackball and the **Set** button to calculate the volume by measuring the axis of the prostate.

Measurement Menu	Item	Mode	Method	Unit
WG Prostate Vol. T-Zone Vol. Bladder Vol.	Vol.	All	Calculation after Distance Measurement	ml
Residual Vol.	Pre Vol.	All	Calculation after Distance Measurement	ml
	Post Vol.	All	Calculation after Distance Measurement	ml
Rt./Lt. Renal Vol.	Renal Pelvis	All	Distance Measurement	cm, mm
	Vol.	All	Calculation after Distance Measurement	ml
General	Auto Trace	PW	Doppler Spectrum Trace	cm, mm
	Limited Trace	PW	Doppler Spectrum Trace	cm, mm
	Manual Trace	PW	Doppler Spectrum Trace	cm, mm
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm

Fetal Heart Measurements

The measurement method for each item is the same as for basic measurements. In addition, measurement items are similar to those for cardiac measurement. Measured items are automatically recorded in a report.

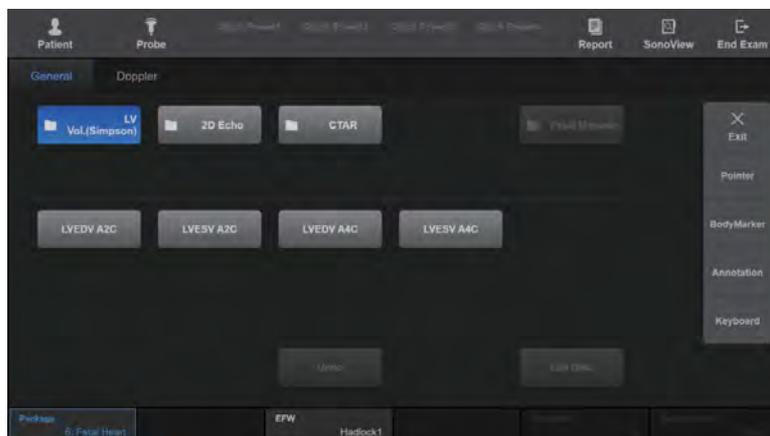


NOTE:

- ▶ For information on basic measurement methods, see ‘Basic Measurements’ and ‘Common Measurement Methods’.
- ▶ For references on measurement items, see the ‘Reference Manual Part 2’.



Fetal Heart – General Measurement Menu



[Figure 9.18 Fetal Heart – General Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
LV Vol. (Simpson)	LVEDV A2C	All	Dist 20	ml
	LVESV A2C	All	Dist 20	ml
	LVEDV A4C	All	Dist 20	ml
	LVESV A4C	All	Dist 20	ml

Measurement Menu	Item	Mode	Method	Units
2D Echo	Asc Ao	All	Distance Measurement	cm, mm
	MPA Diam	All	Distance Measurement	cm, mm
	Duct Art	All	Distance Measurement	cm, mm
	LA Diam	All	Distance Measurement	cm, mm
	RA Diam	All	Distance Measurement	cm, mm
	IVS	All	Distance Measurement	cm, mm
	LVIDd	All	Distance Measurement	cm, mm
	LVIDs	All	Distance Measurement	cm, mm
	LVPW	All	Distance Measurement	cm, mm
	HrtC	All	Distance Measurement	cm, mm
CTAR	CTAR All (D)	All	Continuous Measurement	%
	ThD ap	All	Distance Measurement	cm, mm
	ThD trans	All	Distance Measurement	cm, mm
	HrtD ap	All	Distance Measurement	cm, mm
	HrtD trans	All	Distance Measurement	cm, mm
	ThA	All	Area Measurement	cm ² , mm ²
	HrtA	All	Area Measurement	cm ² , mm ²
Fetal M mode	Fetal M mode (All)	M	Continuous Measurement	cm, mm
	IVSd	M	Distance Measurement	cm, mm
	LVIDd	M	Distance Measurement	cm, mm
	LVPWd	M	Distance Measurement	cm, mm
	IVSs	M	Distance Measurement	cm, mm
	LVPWs	M	Distance Measurement	cm, mm
	RVDd	M	Distance Measurement	cm, mm

■ CTAR (Cardio-Thorax Area Ratio)

This measurement is for comparing the sizes of the fetus chest and heart. The comparison is made by obtaining the ThD ap, ThD trans, HrtD ap, and HrtD trans values.

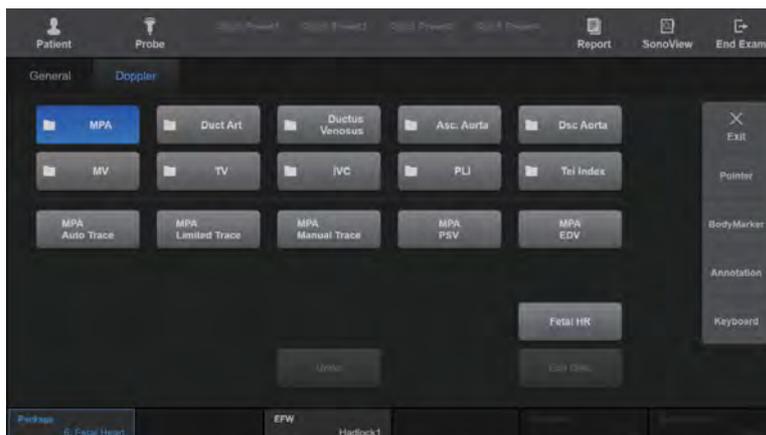
$$\blacktriangleright CTAR = \frac{HrtD\ ap \times HrtD\ trans}{ThD\ ap \times ThD\ trans} \times 100$$



Calculate CTAR(C) using the following equation:

$$CTAR(C) = HrtC / ThC \times 100$$

» Fetal Heart – Doppler Measurement Menu



[Figure 9.19 Fetal Heart – Doppler Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
MPA Duct Art Asc Aorta Dsc Aorta	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	Fetal HR	M, PW	Heart Rate	bpm
Duct Venosus PLI IVC	All	PW	Velocity Measurement	cm/s, m/s
	S Vmax	PW	Velocity Measurement	cm/s, m/s
	D Vmax	PW	Velocity Measurement	cm/s, m/s
	A Vmax	PW	Velocity Measurement	cm/s, m/s
	Fetal HR	M, PW	Heart Rate	bpm

Measurement Menu	Item	Mode	Method	Units
MV TV	E/A	PW	Velocity Measurement	%
	E	PW	Velocity Measurement	cm/s, m/s
	A	PW	Velocity Measurement	cm/s, m/s
	MR Vmax	PW	Velocity Measurement	cm/s, m/s
	Fetal HR	M, PW	Heart Rate	bpm
Tei Index	All	PW	Calculation after Continuous Measurement	
	IVCT	PW	Time Measurement	ms
	ET	PW	Time Measurement	ms
	IVRT	PW	Time Measurement	ms

Abdomen Measurements

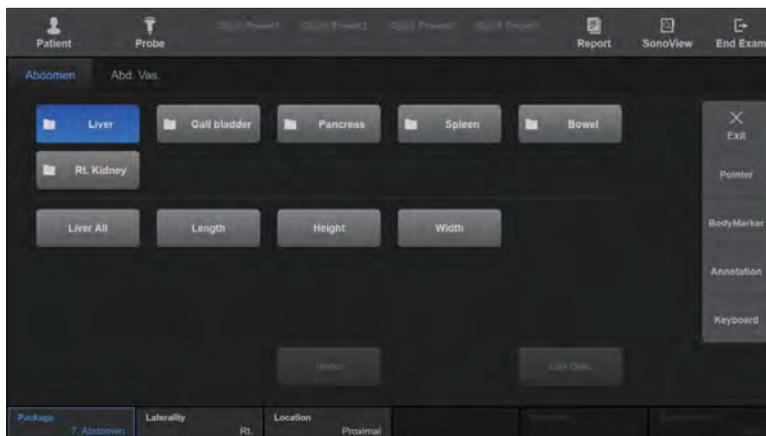
The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



NOTE:

- ▶ It is convenient to calculate each measurement value on the Spectral Doppler image.
- ▶ For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.

▶▶ Abdomen Measurement Menu

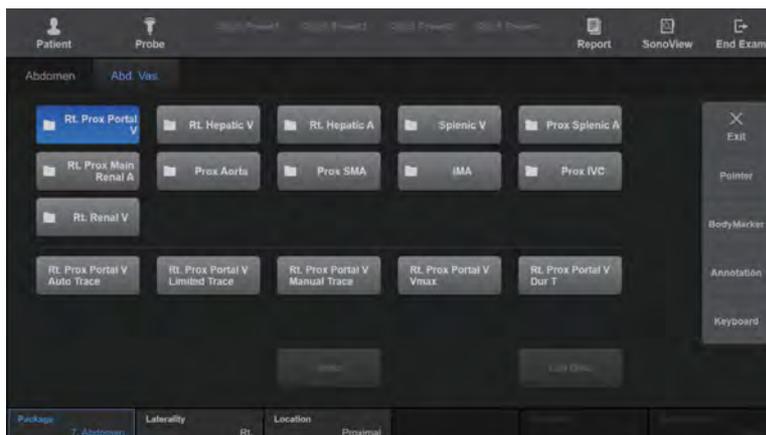


[Figure 9.20 Abdomen Calculations Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Liver	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm

Measurement Menu	Item	Mode	Method	Units
Gallbladder	CBD	All	Distance Measurement	cm, mm
	GB Wall	All	Distance Measurement	cm, mm
	GB All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Pancreas	Head	All	Distance Measurement	cm, mm
	Body	All	Distance Measurement	cm, mm
	Tail	All	Distance Measurement	cm, mm
	Duct	All	Distance Measurement	cm, mm
Spleen	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Bowel	Stomach Wall	All	Distance Measurement	cm, mm
	Small Bowel Wall	All	Distance Measurement	cm, mm
	Large Bowel Wall	All	Distance Measurement	cm, mm

Abd. Vascular Measurement Menu



[Figure 9.21 Abd. Vascular Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Portal V Hepatic V Splenic V Renal V IVC	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	Vmax	PW	Velocity Measurement	cm/s, m/s
	Dur T	PW	Time Measurement	ms
Hepatic A Splenic A Main Renal A Aorta SMA IMA	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s

Small Parts Measurements

The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.

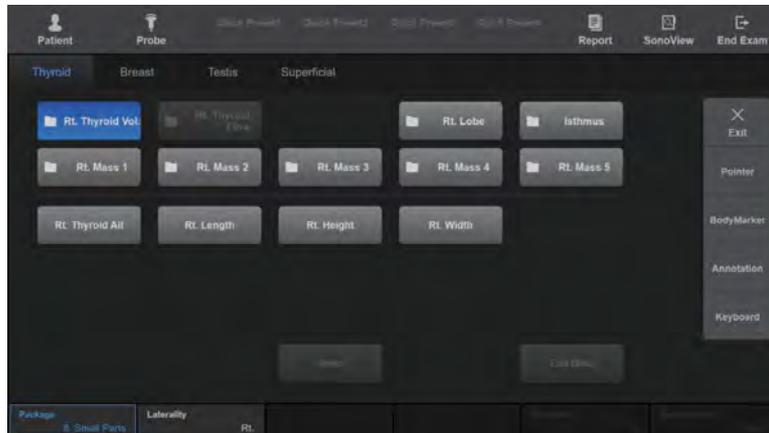


NOTE:

- ▶ It is convenient to calculate each measurement value on the Spectral Doppler image.
- ▶ For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.



Thyroid Measurement Menu

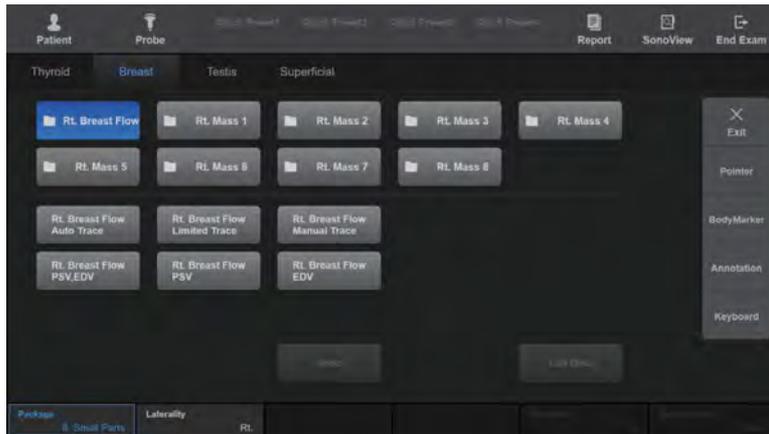


[Figure 9.22 Thyroid Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Mass 1-5 Thyroid Vol.	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Thyroid Flow	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s



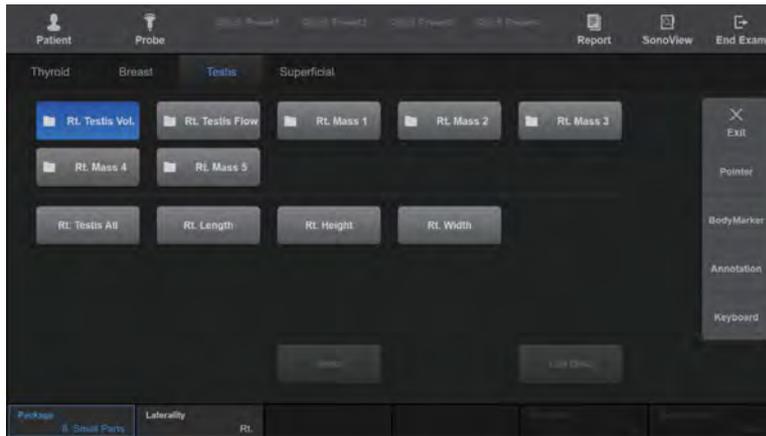
Breast Measurement Menu



[Figure 9.23 Breast Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Mass 1-10	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	D	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Breast Flow	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm
	Vel. A	PW	Velocity Measurement	cm/s, m/s
	Vel. B	PW	Velocity Measurement	cm/s, m/s

▶▶ Testicle Measurement Menu



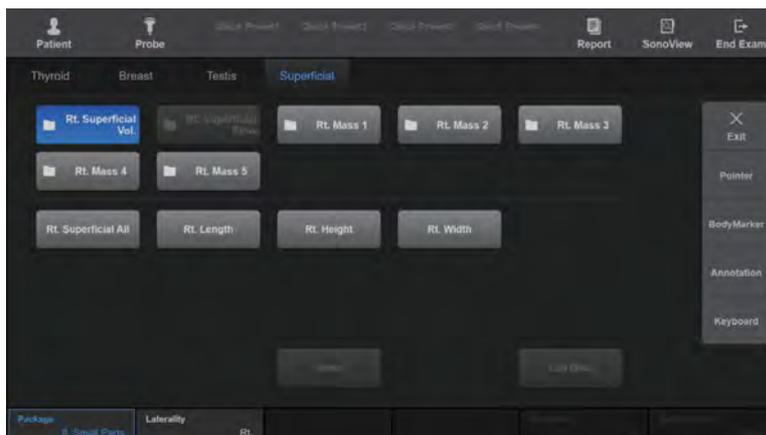
[Figure 9.24 Testicle Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Mass 1-5 Testis Vol.	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Testis Flow	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm
	Vel. A	PW	Velocity Measurement	cm/s, m/s
	Vel. B	PW	Velocity Measurement	cm/s, m/s



NOTE: The measurement methods for Testicle volume vary according to the Volume Method set in Utility > Measure Setup > Urology. If you change the volume measurement method, the touchscreen menu will automatically change as well.

» » Superficial Measurement Menu



[Figure 9.25 Superficial Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Mass 1-5 Superficial Vol.	All	All	Calculation after Distance Measurement	ml
	L	All	Distance Measurement	cm, mm
	H	All	Distance Measurement	cm, mm
	W	All	Distance Measurement	cm, mm
Superficial Flow	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
	Vesl. Dist.	All	Distance Measurement	cm, mm
	Vel. A	PW	Velocity Measurement	cm/s, m/s
Vel. B	PW	Velocity Measurement	cm/s, m/s	

TCD Measurements



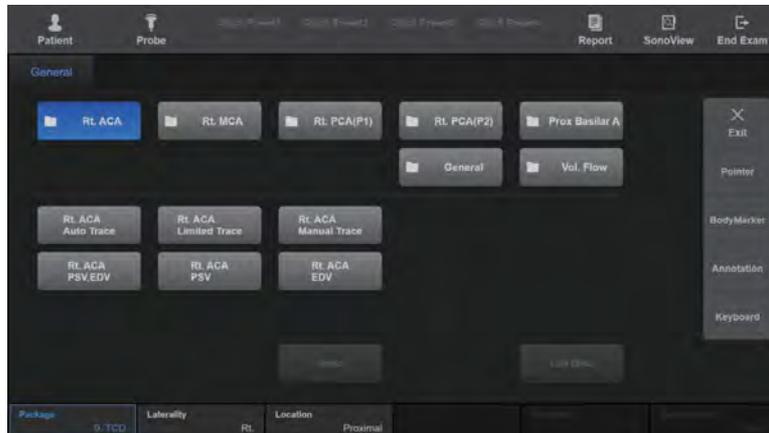
NOTE:

- ▶ It is convenient to calculate each measurement value on the Spectral Doppler image.
- ▶ For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'



General Measurement Menu

The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



[Figure 9.26 TCD Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
ACA MCA PCA(P1) PCA(P2) Basilar A	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
General	Auto Trace	PW	Doppler Spectrum Trace	
	Limited Trace	PW	Doppler Spectrum Trace	
	Manual Trace	PW	Doppler Spectrum Trace	
	PSV	PW	Velocity Measurement	cm/s, m/s
	EDV	PW	Velocity Measurement	cm/s, m/s
	PSV, EDV	PW	Velocity Measurement	cm/s or m/s
	%StA	All	Calculation after Area Measurement	%
	%StD	All	Calculation after Distance Measurement	%
Vol. Flow	Vol. Flow(Auto)	PW	Automatic calculation	ml/m
	Vol. Flow(D)	PW	Automatic calculation	ml/m
	TAMV(L)	PW	Doppler Spectrum Trace	cm/s or m/s
	Vesl. Dist.	All	Distance Measurement	cm, mm

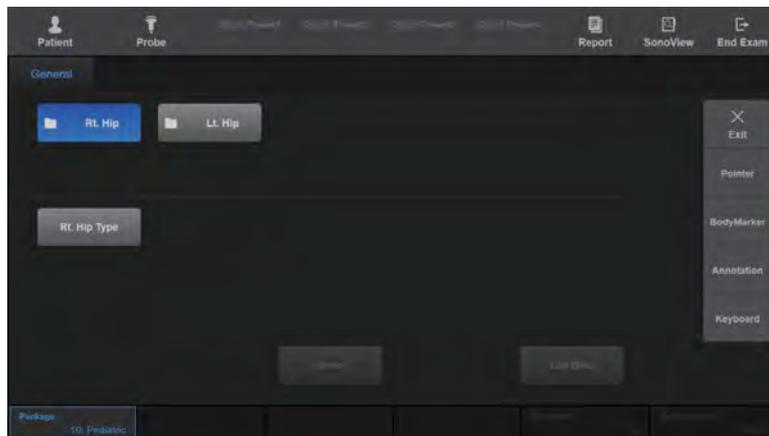
Pediatric Hips Measurements

»» Pediatric Hips Measurement Menu

The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



NOTE: For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.



[Figure 9.27 Pediatric Hip Measurement Menu]

Measurement Menu	Item	Mode	Method	Units
Hip Angle	Hip Angle	All	Calculation of angle after measurement of three straight lines	
Coverage of Femoral head	Rt. coverage Lt. coverage	All	Calculation after Distance Measurement	%

▶▶ Measurement Methods

1. Specify the first straight line by using the trackball and the **Set** button.

Use the trackball to place the cursor at the desired position and press the **Set** button.



Repositioning Point

Instead of pressing the **Set** button to confirm the point position, you can press the **Change** button to reset it.

2. Repeat the process above to specify two more straight lines.
3. The angle between them will be calculated automatically.
 - ▶ α : The angle made by the first and second straight line.
 - ▶ β : The angle made by the first and third straight line.
4. When the measurement is finished, the result is shown on the screen.

See the table below for Hip Joint Type information:

Type	α	β
1a	$60 \leq \alpha < 90$	$0 < \beta < 55$
1b	$60 \leq \alpha < 90$	$55 \leq \beta < 180$
2a/b	$50 \leq \alpha < 60$	$0 < \beta < 180$
2c	$43 \leq \alpha < 50$	$77 \leq \beta < 180$
d	$43 \leq \alpha < 50$	$0 < \beta < 77$
3/4	$0 < \alpha < 43$	

[Table 9.2 Hip Joint Type Table]



Coverage of Femoral Head Measurement Method

1. Specify the first straight line by using the trackball and the **Set** button.

Use the trackball to place the cursor at the major axis of the desired femur head, and then press the **Set** button.



Repositioning Point

Before pressing the **Set** button to confirm the position, you can press the **Change** button to reset the position of the point. You can move the report page using the scroll bar at the right of the screen.

2. Measure the major axis, while measuring the length to the short length 'd' cursor. If the position is opposite, use **Change** to change the position.

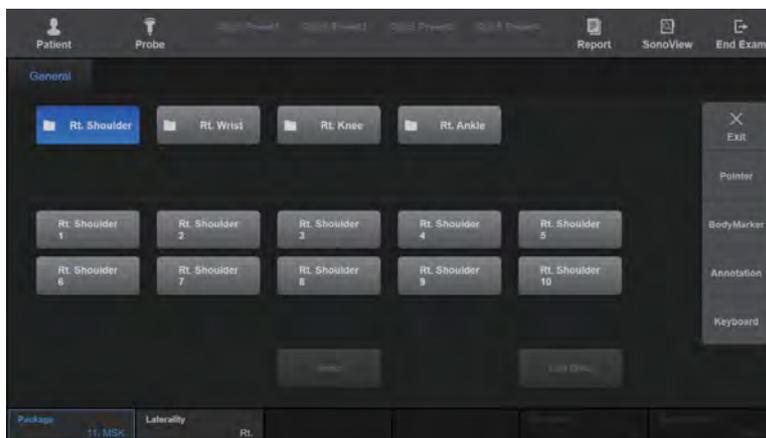
Musculoskeletal Measurements

» » Measurement Menu

The measurement method for each item is the same as for basic measurements. Measured items are automatically recorded in a report.



NOTE: For information on basic measurement methods, see 'Basic Measurements' and 'Common Measurement Methods'.



[Figure 9.28 Musculoskeletal Measurement Menu]

Measurement Menu	Item	Method	Units
Shoulder Wrist Knee Ankle	1-10	Distance Measurement	cm, mm

⦿ Reports

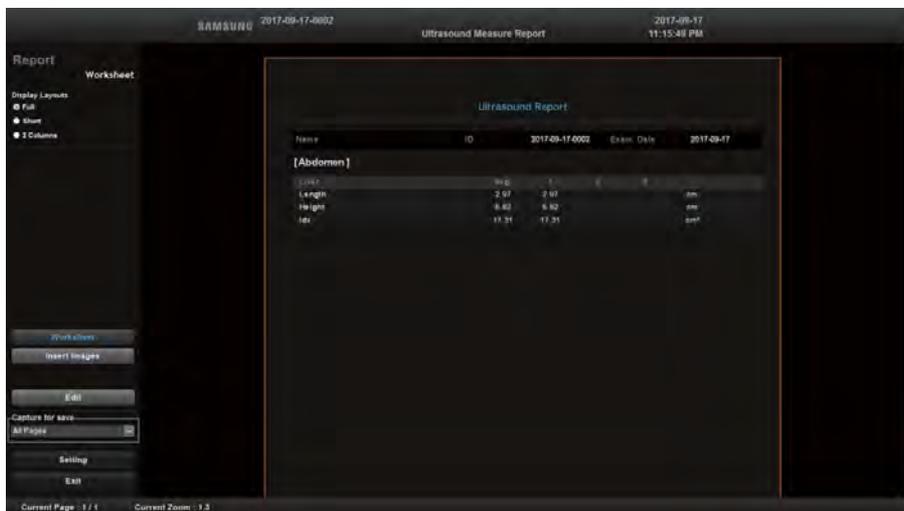
Press **Report** button on the touchscreen.

Measurement results will be organized by application, and will be displayed on the screen.

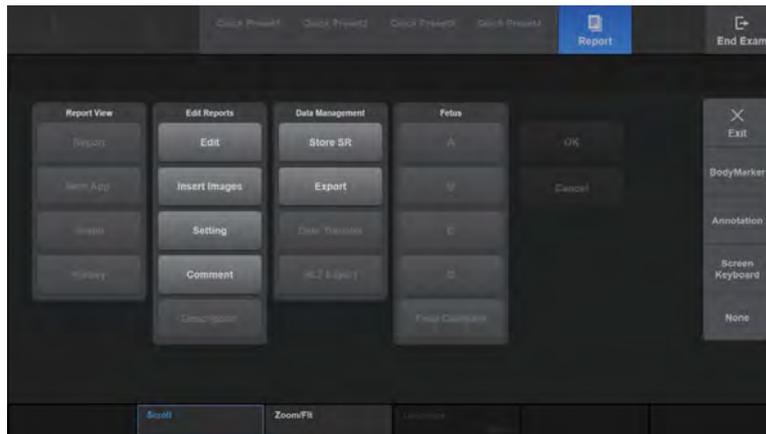


NOTE: Only the reports of the applications that have measurement results are shown.

Report View



[Figure 9.29 Report Screen]



[Figure 9.30 Report – Touchscreen]

■ Display Layouts

Select the basic form of the report.

- ▶ Full: All measurement values are shown.
- ▶ Short: Only the final results (Avg, Min, Max, Last, GA, Pctl) of the measurement values are shown.
- ▶ 2 Columns: Measurements are shown in two columns.

■ Capture for Save

- ▶ Current Page: Save the entire report page shown in the screen.
- ▶ All Pages: Save the entire report page.
- ▶ Snapshot: Capture and save the enlarged report image on the screen.

■ Scroll

Rotate the **Scroll** dial-button on the touchscreen to move the Report page up or down. The position of the current page will be displayed next to 'Current Page' at the bottom of the screen.

Tips!

Moving the Report Page

You can move the report page using the scroll bar at the right of the screen.

■ Zoom/Fit

- ▶ Zoom: Zoom in or out on the report page by pressing the **Zoom/Fit** button on the touchscreen or rotating the dial-button. The zoom ratio will be displayed in 'Current Zoom' at the bottom of the screen.
- ▶ Fit: Select a display method for the Report page. Press the **Zoom/Fit** button to select one of the following three options. The selected method will be displayed next to 'Current Zoom' at the bottom of the screen.
 - Fit Width: The screen is adjusted in line with the width of the report.
 - Fit Height: The screen is adjusted in line with the height of the report.
 - Fit Dual Page: Two pages of the report are displayed on one screen.

■ Fetus

Measurements can be saved for up to four fetuses (i.e., Fetus A, Fetus B, Fetus C, and Fetus D), and the button is enabled only when there are measurements for multiple fetuses. Pressing one of the buttons saved for fetuses (i.e., **A**, **B**, **C**, or **D**) will open the Report screen for the selected fetus. **Fetus Compare** will open the Report screen where measurements of all fetuses are compared.

»» ⌘ Report

Press **Report** on the touchscreen to switch to the *Report* screen.

»» ⌘ Next App.

You may press **Next App.** on the touchscreen to edit the measurement value for another application. Note that this function is available only when there are more than two operation items which have measurement results.

Graph



NOTE: The graph function can be used only with OB reports.

Pressing **Graph** on the touchscreen switches to the *Graph* screen. You can review the graph and history. The list of graphs appears on the left side of the screen.

- ▶ Patient: View patient information, fetus information, and comments.
- ▶ Measure: View measurement data.
- ▶ Trend: Select the graph to review. Select a desired graph, or select all graphs.



NOTE:

- ▶ To display a graph, the LMP or Estab. Due Date should be entered under Patient Information, and the GA table and Fetal Growth table should be enabled.
- ▶ The graph will be created based on the LMP entered in the patient ID.

■ Select a Graph

Select a graph from the list. The graph will be shown on the screen. Use the **Page** dial-button to select a graph. The current graph being selected is shown in yellow in the report page list. You can also use the trackball and the **Set** button to check a checkbox from the list. Click **Select All** in the list to select all the graphs.

■ Insert a Graph

You can use the Insert button to add a selected graph to the report. The button status changes depending on the graph items selected. Each button status performs a different operation as described below:

- ▶ Check item to insert: Check an item in the OB Trend graph to display in the report. When one or more items are checked, the button will change to **Insert graph into report**.
- ▶ Insert graph into report: Insert the Trend graph of the checked items into the report.
- ▶ Update graph in report: Update the current Trend graph of the checked items in the report.
- ▶ Clear graph in report: Clear the inserted graph in the report.

■ Graph Layout

When you tick the **2x2** checkbox on the list, four images will be displayed for each graph. If you select a graph to insert and press the **Insert Graph(2x2) in Report** button on the touchscreen, 2x2 images will be added to the report.

■ Pctl. Criteria (Percentile Criteria)

Select from LMP, EstabDD and AUA, GA View.

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

■ History

The current and past measurements for a fetus are displayed in a concise format.

■ Print Checked Graph

Set the graph layout when you wish to print the reports.



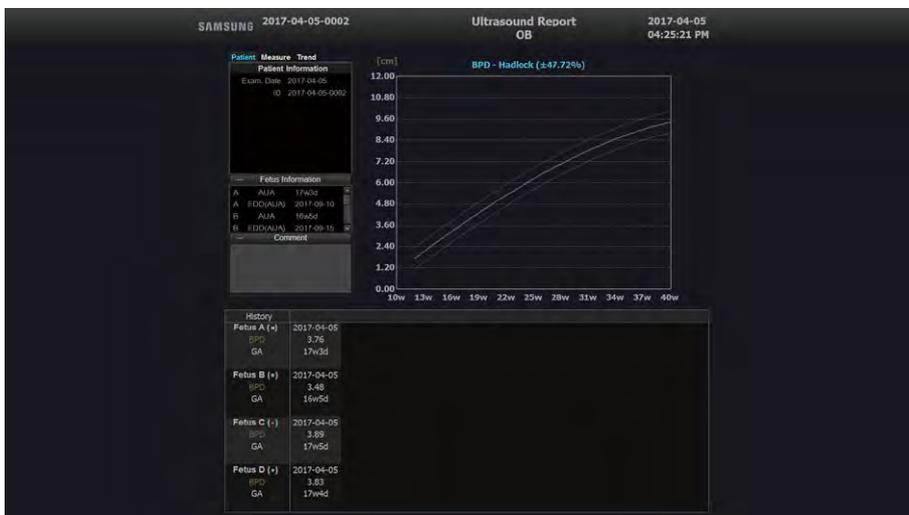
NOTE: Only the graphs selected from the list will be printed.

- ▶ Print Current Graph: Only the selected graph is printed.
- ▶ Print Checked Graph (1 x 1): The selected graph is printed in a 1 x 1 format.
- ▶ Print Checked Graph (3 x 2): The selected graph is printed in a 3 x 2 format.
- ▶ Print Screenshot1: Capture the screen to print the graph.
- ▶ Print Screenshot2: Capture the graph only to save or print.



Tips!

Different color or shape will be used for multiple fetuses to display the measurement.



[Figure 9.31 Graph]



History

Press **History** on the touchscreen. The past and present measurement values of the fetus are displayed in a table format.



NOTE: The history function can only be used with OB reports.

The screenshot shows the 'OB History' report in the Samsung ultrasound software. The report title is 'Ultrasound Report'. The patient information is as follows:

Name	ID	Exam. Date	
	08-29-2017-0003	2017-08-31	
Gender	Female		
Diag. Physician	TEST	Sonographer	TEST

		2017.08.28	2017.08.31
BPD (cm)	A	4.68 20w6d	4.53 20w6d
HC (cm)	A	17.24 19w5d	18.98 21w1d

The interface also includes a sidebar with buttons for 'Worksheet', 'Insert Image', 'Edit', 'Capture for save', 'All Pages', 'Setting', and 'EXIT'. At the bottom, it shows 'Current Page - 1 / 1' and 'Current Zoom - 1.7'.

[Figure 9.32 History]


Tips!
Standard Deviation & Percentile

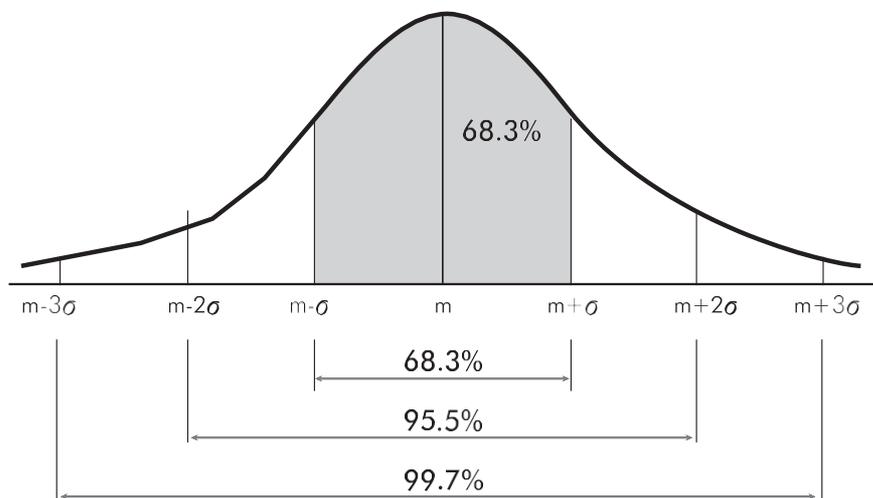
Among the OB information, the Growth table and the typical fetal distribution, for the same number of weeks, are used to determine the following information:

- ▶ The normal distribution curve.
- ▶ The measurements for an actual fetus or a position in EFW distribution.
- ▶ Whether a distribution point is within the normal range.

The number of weeks referenced for the Growth table can be set to LMP, Estab. Due Date, or Average US GA, under **Pctl. Criteria**. The typical setting is LMP.

When the LMP is not known or uncertain, or when the difference between the LMP and the Average US GA is substantial, care must be taken, as selecting different **Pctl. Criteria** can result in a significant difference.

The distribution of the number of weeks in the Growth table for the selected reference is a normal distribution. It is laterally symmetrical around 50% (the average), and it shows the distance from the average as a deviation. The deviation can be represented by Standard Deviation (SD) or Percentile.



[Figure 9.33 The Distribution of the Growth Table for the Selected Number of Weeks (m : Average, σ : Standard Deviation)]

Tips!

When represented by SD, a point near the average indicates a value closer to ± 0 SD and a point away from the average indicates a value closer to the maximum or minimum value. The greater part of the range falls within ± 3 SD, and ± 1 SD, representing 68.3% of the entire range. Thus it can be seen that most fetal measurements are tightly clustered around the average value.

The Percentile represents a point in distribution from 0 to 100 inclusive. Therefore, the average point is represented as 50 Percentile.

As shown in the figure, the average point corresponds to 0 SD (that is, 50 Percentile). If a point is in the range from -1 SD to +1 SD, it falls within 68.3% of the entire range. This means that the point falls within the range from 16 to 84.

Further, if a point is in the range from -2 SD to +2 SD, it falls within 95.5% of the entire range. Thus, the point falls in the range from 3 to 97.

The SD and Percentile are interchangeable. Percentile can be used when a fetal measurement ranking is desired, and SD can be used when the distance between actual fetal measurements and the average measurement is sought.

While the range of Growth table references that are primarily used with OB measurement data varies depending on the user, the typical range accepted by most users is as below:

► **When references are created based on SD:**

- -2.0 SD – +2.0 SD (when converted to Percentile: 2.28 – 97.72 Percentile)
- -1.5 SD – +1.5 SD (when converted to Percentile: 6.68 – 93.32 Percentile)
- -1.0 SD – +1.0 SD (when converted to Percentile: 15.87 – 84.13 Percentile)

► **When references are created based on Percentile:**

- 2.5 – 97.5 Percentile (when converted to SD: -1.96 SD – 1.96 SD)
- 5.0 – 95.0 Percentile (when converted to SD: -1.645 SD – 1.645 SD)
- 10.0 – 90.0 Percentile (when converted to SD: -1.288 SD – 1.288 SD)

Editing Reports

» » Edit

Pressing **Edit** on the touchscreen switches to the *Report Edits* screen. Edit the measurement results or change how to display the measured values.

Change the measured values using the trackball and the **Set** button. The changed values are shown in [].

To finish editing after saving the changes, press **OK** on the touchscreen or click **OK** in the monitor screen. If you wish to end the edit screen without saving changes, press **Cancel**. Press **Next App** on the touchscreen to edit reports for other operation items.

■ Item Selection Mode

- ▶ Basic: Displays only measured and calculated items. You may select items to include in the final report by using checkboxes.
- ▶ Brief: Displays all of the items in a group containing measured items on the screen.
- ▶ Detailed: Displays all items on the screen.

■ Page

Move between report pages by turning the **Page** dial-button on the touchscreen. The current page being reviewed is shown in yellow in the report pages list.

■ Measurement Display Method

The product allows you to measure one measurement item several times. However, only the last three measurement results are saved in a report.

When taking measurements for the same item more than once, measurements can be displayed in four ways. On the *Edit Report* screen, you can specify or change the measurement display method.

- ▶ Avg: Obtain the average of the measurements and display it on the screen.
- ▶ Last: Display the last measurement on the screen.
- ▶ Max: Display the largest value of the measurements on the screen.
- ▶ Min: Display the smallest value of the measurements on the screen.

 Tips!**Report Doppler Result Method**

If you change the **Avg. Type** setting to Avg for measurement items, the average of the calculated values will be displayed as the final value. Alternatively, the final value is displayed using the Slot Index for the values of items whose type is set to Last, Max, and Min. However, this is only available when you measure Doppler items.

- ▶ Selectable value with each item method
Calculations are performed using the values that can be selected for each item method.
- ▶ Selected values by one item method
Calculations are performed using the value selected for one item method.

■ Delete of Measurements

In the Report Edit screen, you can delete measurement values by pressing the **Delete Cell**, **Delete Column**, and **Delete Row** buttons on the touchscreen.

- ▶ Delete Cell: Delete the value in the selected cell.
- ▶ Delete Column: Delete the values in the selected column.
- ▶ Delete Row: Delete the values in the selected row.
- ▶ Cancel: Exit the screen without deleting the measurement values.

■ Composite GA

Select the method to use for calculating Average GA. Use the combo box to select AUA or CUA (Hadlock1 - Hadlock15).

- ▶ If AUA is selected: You can choose which items to include when you calculate the Average GA. Check the checkboxes displayed next to each calculation item you want to include.
- ▶ If CUA is selected: You may select from Hadlock1 to Hadlock15, and only the calculation items that apply to the selected reference will be included in the Average GA calculation.



CUA: References and Formulas

Reference: Hadlock, F.P., Deter,R.L., Harrist,R.B., Park,S.K.,” Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters”, Radiology Vol. 152 No. 2, 1984, pages 497-501.

$$\text{Hadlock1(BPD)} = 9.54 + 1.482 \times \text{BPD} + 0.1676 \times \text{BPD}^2$$

$$\text{Hadlock2(HC)} = 8.96 + 0.540 \times \text{HC} + 0.0003 \times \text{HC}^3$$

$$\text{Hadlock3(AC)} = 8.14 + 0.753 \times \text{AC} + 0.0036 \times \text{AC}^2$$

$$\text{Hadlock4(FL)} = 10.35 + 2.460 \times \text{FL} + 0.170 \times \text{FL}^2$$

$$\text{Hadlock5(BPD, HC)} = 10.32 + 0.009 \times \text{HC}^2 + 1.3200 \times \text{BPD} + 0.00012 \times \text{HC}^3$$

$$\text{Hadlock6(BPD, AC)} = 9.57 + 0.524 \times \text{AC} + 0.1220 \times \text{BPD}^2$$

$$\text{Hadlock7(BPD, FL)} = 10.50 + 0.197 \times \text{BPD} \cdot \text{FL} + 0.9500 \times \text{FL} + 0.7300 \times \text{BPD}$$

$$\text{Hadlock8(HC, AC)} = 10.31 + 0.012 \times \text{HC}^2 + 0.3850 \times \text{AC}$$

$$\text{Hadlock9(HC, FL)} = 11.19 + 0.070 \cdot \text{HC} \cdot \text{FL} + 0.2630 \times \text{HC}$$

$$\text{Hadlock10(AC, FL)} = 10.47 + 0.442 \times \text{AC} + 0.3140 \times \text{FL}^2 - 0.0121 \cdot \text{FL}^3$$

$$\text{Hadlock11(BPD, HC, AC)} = 10.58 + 0.005 \times \text{HC}^2 + 0.3635 \times \text{AC} + 0.02864 \cdot \text{BPD} \cdot \text{AC}$$

$$\text{Hadlock12(BPD, HC, FL)} = 11.38 + 0.070 \cdot \text{HC} \cdot \text{FL} + 0.9800 \cdot \text{BPD}$$

$$\text{Hadlock13(BPD, AC, FL)} = 10.61 + 0.175 \cdot \text{BPD} \cdot \text{FL} + 0.2970 \times \text{AC} + 0.7100 \times \text{FL}$$

$$\text{Hadlock14(HC, AC, FL)} = 10.33 + 0.031 \cdot \text{HC} \cdot \text{FL} + 0.3610 \times \text{HC} + 0.0298 \cdot \text{AC} \cdot \text{FL}$$

$$\text{Hadlock15(BPD, HC, AC, FL)} = 10.85 + 0.060 \cdot \text{HC} \cdot \text{FL} + 0.6700 \times \text{BPD} + 0.1680 \times \text{AC}$$



[Figure 9.34 Edit Report]



Select **Fetal Compare** when measuring the EFW for multiple fetuses to view AUA, EDD (AUA), EFW, and EFW Discordance items.

»» **Insert Images**

Attach the image saved in Exam. When you press **Insert Images** on the screen, the *Images* window will appear.



[Figure 9.35 Insert Image]

1. Select an image from the image list. The selected image is shown in View.
2. Enter a description in Description (optional). The entered description will be attached to the report along with the image.
3. Press **Add** to save the image to Selected Images.
 - ▶ To modify the saved image, select the image in Selected Images and press **Modify**.
 - ▶ To delete the saved image, select the image in Selected Images and press **Remove**. The image will be displayed again on the Image List.
4. To complete attaching, press **OK**. The selected image will be attached to the report screen.

▶▶ Setting

Press **Setting** on the touchscreen or on the screen. You may change various settings to configure the report.



[Figure 9.36 Setting]

■ Report

▶ Header 1, 2

Set the content to be displayed in the header of the report.

▶ Footer

Set the content to be displayed in the footer of the report.

▶ Patient Info.

Select the page range for the patient information.

- All pages: The patient information is displayed on every page.
- Only 1st Page: The patient information is displayed only on the first page.

▶ Title

Ultrasound Report: This is the default title to be displayed on the reports. This can be edited by the user.

▶ Logo

Checking the checkbox adds a logo to the top of the report.

- Change Logo: Press the button to open the *Logo* screen. Select the logo file to use from a USB device or CD-ROM.



NOTE:

- ▶ Only JPEG or BMP file types can be used.
- ▶ The file does not appear in the list if the file name is in a language that is not supported by this product.

▶ Show Date in Footer

Check this box to add the date of printing to the report.

▶ Video Out Mode

Check this box to select the report screen size 1024x768.

▶ Font Size

Select the font size for the report.

▶ Signature

Select the number of signature fields required at the bottom of the report (0-2).

■ **Save**

▶ Capture for Save

- Current Page: Save the entire report page shown in the screen.
- All Pages: Save the entire report page.
- Snapshot: Capture and save the enlarged report image on the screen.

▶ Color

- Same as preview: Save the colors exactly as they are shown in the Preview.
- Black and White: This is the system's default setting; prints black text on a white background.

■ Display

▶ Black Theme

The default setting for the system; sets the report background color to black.

▶ White Theme

Set the background color of the report to white.

■ Print

▶ Range

– Current Page: Only the current page is printed.

– All Page: This is the system's default setting; all pages are printed.

▶ Color

– Same as Preview: The report is printed in the same colors as shown in the preview.

– Black and White: This is the system's default setting; prints black text on a white background.

▶ Report for Echo Paper

Set the preview of the report in print format; the date and time are printed together at the lower right.



NOTE: A warning message will appear if the printer and the report settings do not match.



Comment

Press **Comment** on the touchscreen. A screen in which you can enter opinions appears.

To finish editing after saving the changes, press **OK** on the touchscreen or click **OK** on the monitor screen. If you wish to end the edit screen without saving changes, press **Cancel**.

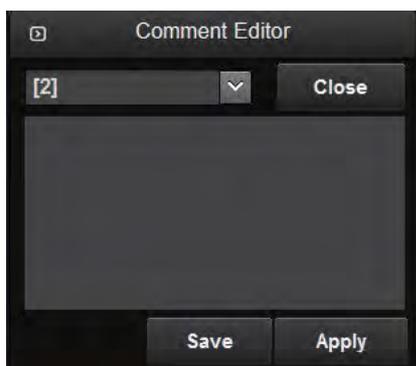


[Figure 9.37 Comment]

■ Comment Editor

Click **Comment Editor** on the screen. Enter your comment for each Application, and press the **Apply** or **Save**. Press **Close** to exit.

- ▶ Apply: Your comment will be applied to the report.
- ▶ Save: You can save comments. Up to 20 comments can be saved.



[Figure 9.38 Comment Editor]

▶▶ Description

Press the **Description** button on the touch panel. This is enabled only when an OB, Fetal Heart, GYN, Carotid or Urology measurement value is available. You can select Empty, Normal, Abnormal, Not seen, or Seen. The item will be deleted if Empty is selected. For Placenta Previa, however, you need to select either Yes or No. If you select one of the group selection items in the combo box, it will be applied to all items.



NOTE: You can add a Description, or delete or edit items that have been added by a user. You can do this in Measure Setup > General > Packages. For more information, please refer to 'Packages' in 'Chapter 3. Utilities'.

Data Management

»» ⌘ Store SR

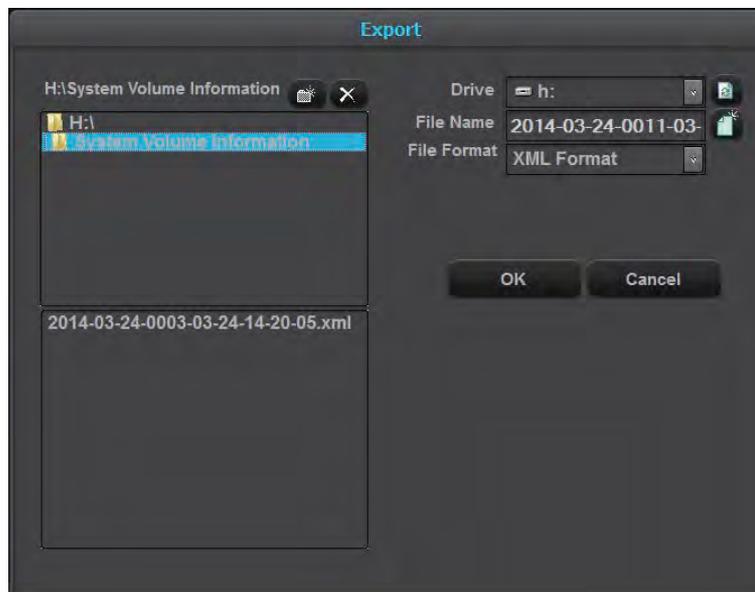
Becomes active when DICOM option is turned On.

Pressing **Store SR** on the touchscreen saves the SR file containing the measurements.

»» ⌘ Export

Press **Export** on the touchscreen. The *Export* window appears, allowing you to save the report in external storage media.

When the *Export* window appears, specify the directory, drive, file name, and file format. Click **OK** on the screen to save the report. Click **Cancel** to cancel.



[Figure 9.39 Export]

»» Data Transfer

Press **Data Transfer** on the touchscreen. A report can be sent using the RS232C cable connected to the system.

To use this button,

1. Connect the RS232C cable to the console.
2. Select Open Line Transfer from the Utility > Peripherals > Peripherals > COM menu.



NOTE: Select the Utility > Measure Setup > General > Data Transfer > Serial Transfer menu to set the type of data to transfer. For more information, refer to 'Chapter 3. Utilities'.



Printing Reports

On the control panel, press the User Key (U1-4) that has been designated as **Print**. The report will be printed on the connected printer.



NOTE: The printer to be used for printing measurement reports can be set in Utility > Setup > Peripherals > Peripherals. For more information, refer to 'Peripherals' in 'Chapter 3. Utilities'.

»» HL7 Export

Press the button to open the *HL7 Manager* window. Configure settings for transferring the report information created by this system to the HL7 server (repository).



NOTE: The printer to be used for printing measurement reports can be set in Utility > Setup > Peripherals > Peripherals. For details, please refer to 'Peripherals' in 'Chapter 3. Utilities'.

Closing Reports

Press **Exit** on the touchscreen, or press the **Exit** button on the control panel.

Image Managements

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⌘ Cine/Loop

Images are automatically saved in the memory during scanning. The saved images can be useful when a patient is diagnosed and reviewed.

The saved images can be in Cine or Loop, depending on the Operation modes.

- ▶ Cine: Images that are saved in all modes other than M Mode and Spectral Mode.
- ▶ Loop: Images that are saved in M Mode and Spectral Mode.



[Figure 10.1 Cine/Loop]



NOTE: The following functions are not supported in Cine images: Probe Change, Application Change, and Preset Change.



Starting and Finishing Image Review

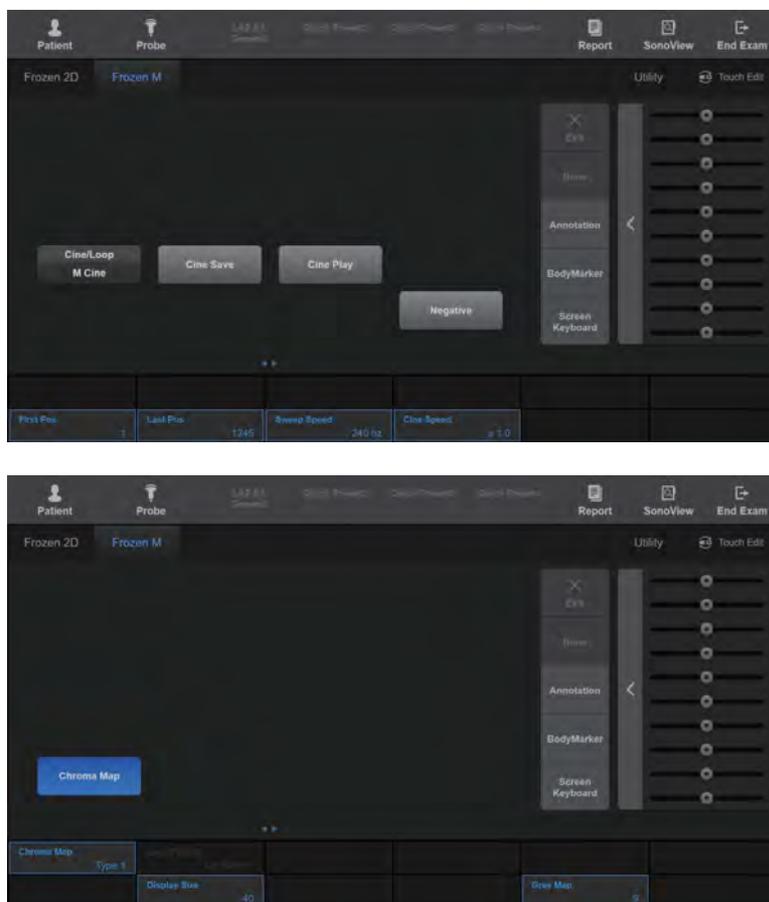
During scanning, press the **Freeze** button on the control panel. This stops the scan and switches the unit to the image review mode screen. Press the **Freeze** button again to return to the scan mode.

▶▶ How to Review Images

Move the cursor to the Cine or Loop bar in the user information area to review an image. You can search through saved images in chronological order by moving the cursor with the trackball. The total number of saved images and the number of the current image being reviewed are shown next to the bar.

■ Select Cine/Loop

Select an image to play by pressing **Cine/Loop** on the touchscreen. This option only appears when both **Cine** and **Loop** are available, such as in M Mode or Spectral Doppler Mode. Select **Cine** or **Loop** by pressing the button on the touchscreen or by pressing the **Change** button on the control panel. The touchscreen menu is changed when images are reviewed.



[Figure 10.2 Reviewing Images – Touchscreen]

■ First Pos

Use the dial-button to set the first frame of the Cine or Loop image to be saved. Use the dial-button or the trackball to set the position of the first frame, and then press the dial-button to save the setting.

■ Last Pos

Use the dial-button to set the last frame of the Cine or Loop image to be saved. Use the dial-button or the trackball to set the position of the last frame, and then press the dial-button to save the setting.

■ Cine Speed

Set by pressing the button on the touchscreen or using the dial-button. You can adjust the automatic playback speed for Cine or Loop by rotating the dial-button. The allowable range for adjustment is from x0.5 to x2.0 in increments/decrements of 0.5.

■ Cine Save

- ▶ In Live Mode: Press the **Save** button on the control panel. Depending on the current setting for the **Save** button, either Still Save or Cine Save will be performed.
- ▶ Freeze State: Press the **Cine Save** button on the touchscreen. You can save the specified image area by pressing the dial-button.

The saved image appears in the thumbnail list on the screen, and can be reloaded or replayed in scan mode or SonoView. You can select Cine or Loop.



NOTE: Assign a function to the **Save** button by going to Utility > Setup > Customize > U Key. For more information, please refer to 'Chapter 3. Utilities'.

■ Cine Play

Press the **Play** button on the touchscreen. You can stop or resume playback of an image by pressing the same button.



Image Preview in Multi-Image Mode

Only the images in an active area can be reviewed. To review images in another area, change the active area by using the **Dual** or **Quad** button on the touchscreen. Alternatively, after pressing **Pointer** on the control panel, place the cursor in the area to activate, and then press the **Set** button on the control panel.


Tips!

Multi-Image Mode Screen Layout

In Multi-Image Mode, recent Cine images are displayed on the screen by default.

► Dual Mode

Press the **Dual** button on the touchscreen to display the current Cine image and the most recent Cine image in the order of **1 → 2**.



[Figure 10.3 Dual Mode]

► Quad Mode

Press the **Quad** button on the touchscreen to display the current Cine image and the three most recent Cine images in the order of **1 → 2 → 3 → 4**.



[Figure 10.4 Quad Mode]

⌘ Annotation

Enter text, an indicator or a BodyMarker on an image. This function can be useful when the diagnosis area is differentiated or displayed.



[Figure 10.5 Annotation]

⌘ Starting Annotation

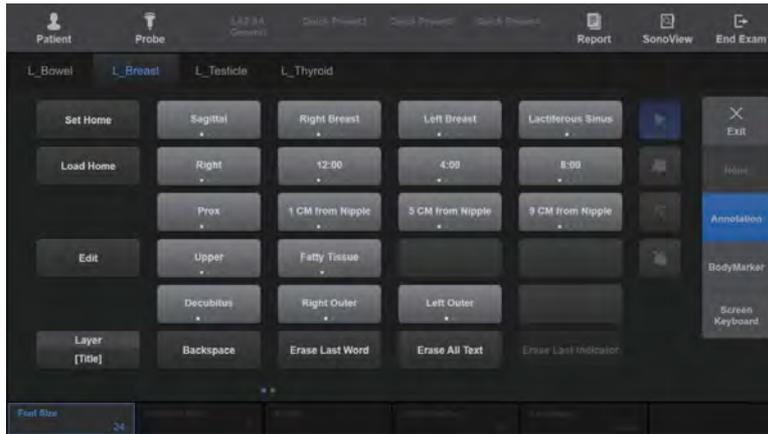
Press the **Annotation** button on the touchscreen. The *Annotation* screen will be displayed on the touchscreen.

⌘ Deleting an Annotation

Press the **Clear** button on the control panel. All inserted text, indicators, and BodyMarkers are erased from the screen.

» » Ending Annotation

Press the **Exit** button on the control panel or press **Exit** on the touchscreen.



[Figure 10.6 Annotation – Touchscreen]

Typing Text

Press the **Annotation** button on the touchscreen and enter text by using one of the following methods:

- ▶ Press the keyboard button on the touchscreen, and then use the onscreen keyboard.
- ▶ Use the pre-entered text shown on the touchscreen. Up to four different preset text entries can be added for one text button, and the text changes whenever the text button is pressed.

You can move the cursor by using the trackball or the arrow keys on the keyboard.

■ Set Home

Place the cursor over the desired location and press to decide the location for the cursor.

■ Load Home

Brings the cursor to its home position.

■ Application

Change the application. The text list changes depending on the application.

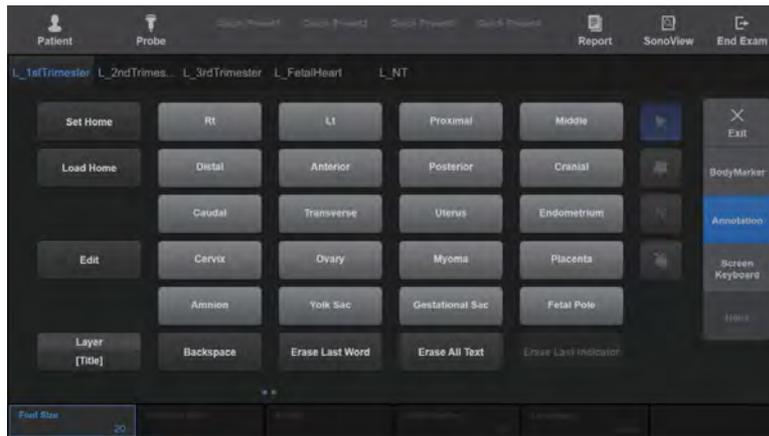
■ Edit

Pressing the **Edit** button will open the Library screen under Annotation. From the Library List, select Factory Library to edit the entire page. To edit another page, change the current page by using **Page**.



Editing Text Page

To edit the entire page, go to Utility > Setup > Annotate > Library > Word List. For more information, please refer to 'Chapter 3. Utilities'.



[Figure 10.7 Edit Text Mode – Touchscreen]

■ Layer

Enter or edit text on two layers. Press the button on the touchscreen to select the input method to use.

- ▶ Layer [Text]: Displays the text entered into the Title layer and Text layer.
- ▶ Layer [Title]: Displays the text entered into the Title layer only.

■ BackSpace

Erases the last character entered.

■ Erase Last Word

The last entered text is erased.

■ Erase All Text

Erase all entered text in the selected layer.



Erase All Text vs Clear button

Erase All Text only erases text. Press the **Clear** button to delete all entered annotations, including Indicators, BodyMarkers, etc.

■ Font Size

Select the font size to use. Select a value from 10 to 30 by pressing the desired button on the touchscreen, or by using the dial-button at the bottom of the touchscreen monitor.

■ Language

Press the appropriate button on the touchscreen or use the dial-button. Select the language to use for entering text.

- ▶ Alpha: Enter in English
- ▶ Japanese: Enter in Japanese
- ▶ Chinese: Enter in Chinese

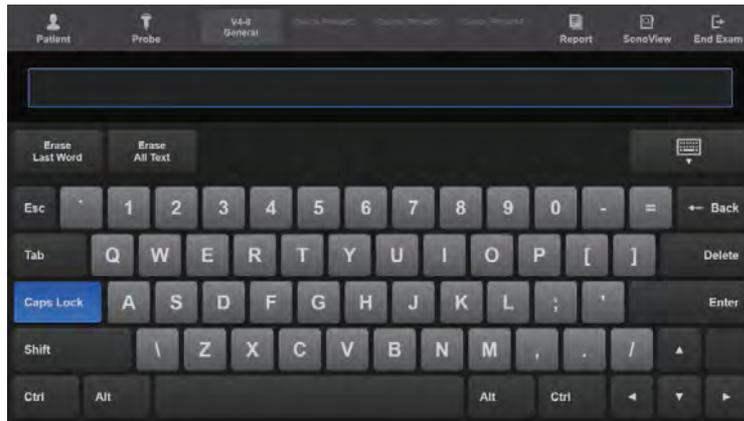


NOTE: This button only appears on the screen if the product supports Asian patient names.

■ Screen Keyboard

The Screen Keyboard will be displayed on the touchscreen.

- ▶ Erase Last Word: Delete the last word.
- ▶ Erase All Text: Delete all text.



[Figure 10.8 Screen Keyboard]

Entering Indicator

This function can be useful when the diagnosis area is differentiated or displayed. Up to 50 indicators can be entered.

1. Press **Annotation** on the touchscreen.
2. Press the **Change** button on the control panel.
3. Move the Indicator to the desired position by using the trackball.
4. Use the touchscreen to adjust the angle and the size of the Indicator.
5. Press the **Set** button on the control panel to enter indicators on the screen.

■ Indicator Size

Adjust the size of the Indicator. Press the button on the touchscreen or use the dial-button to select a value from 1 to 3.

■ Angle

Rotate the Indicator.

■ Angle Degree

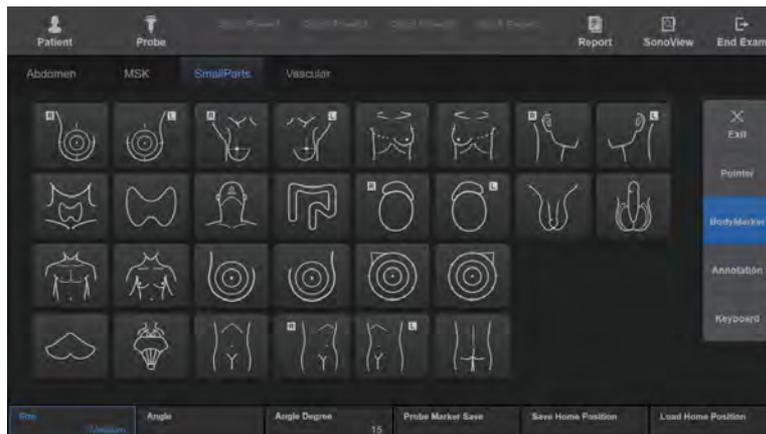
Adjust the rotational angle of the Indicator. Press the button on the touchscreen or use the dial-button to select an angle from 15 to 45 degrees.

■ Erase Last Indicator

Erase the Indicator that was entered last.

Entering BodyMarker

Press **BodyMarker** on the touchscreen. The *BodyMarker* window appears on the touchscreen.



[Figure 10.9 BodyMarker Mode – Touchscreen]

1. A list of BodyMarkers will appear on the touchscreen menu.
 - ▶ The BodyMarker list that appears on the touchscreen will vary depending on the selected application.
 - ▶ Up to 32 BodyMarkers can be displayed on the screen simultaneously. If more than 32 BodyMarkers are provided, you may press the **Page** button on the touchscreen or use the dial-button to move between pages.
2. Press the button for the desired BodyMarker. The BodyMarker will appear in the image.

To resize the BodyMarker, either press the **Size** button on the touchscreen, or use the dial-button.

Tips!

BodyMarker Setting

To change BodyMarker settings, go to Utility > Setup > BodyMarker. For a more detailed description, refer to 'Chapter 3. Utilities'.

3. Select the position and the shape of the probe cursor.
 - ▶ Positioning the Probe Cursor: Use the trackball.
 - ▶ Rotating the probe cursor: Use **Angle** on the touchscreen. Press the button on the touchscreen or use the dial-button to select among 15, 30, and 45 degrees (not for use with the **+** shaped probe cursors).

- Once you have finished, press the **Set** or **Exit** button on the control panel.

Tips!

Repositioning a BodyMarker

- Press the **Change** button on the control panel.
- Move the BodyMarker to a desired position by using the trackball.
- Press the **Change** button on the control panel again to confirm the new position.

- To save the position, type, and angle of the probe set by the user in BodyMarker, press the **Probe Marker Save** on the touchscreen. The position, type and angle of the probe currently set will be saved in the BodyMarker on the touchscreen.

- To save a BodyMarker by setting the position of a specific Mode or Preset, press the **Save Home Position** button on the touchscreen. To import the preset Home Position, press the **Load Home Position** button.

► Probe Marker Save

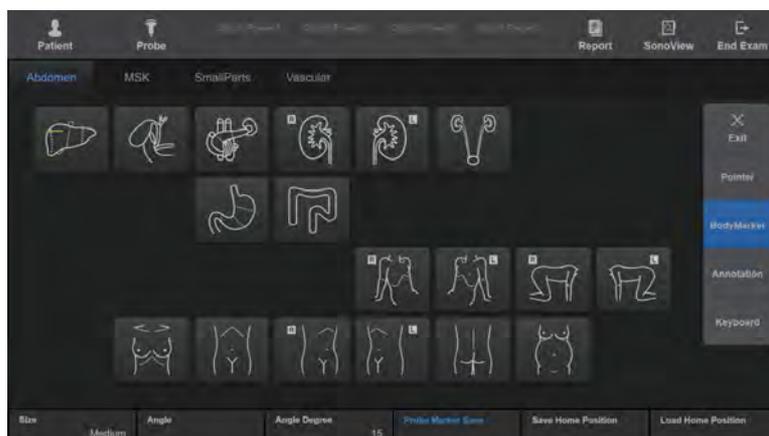
The user can set and save the Angle and Position values for the BodyMarker.

► Save Home Position

The user can save the position of a specific Mode or Preset.

► Load Home Position

The user can save the position of a specific Mode or Preset.



[Figure 10.10 Probe Marker Save]

:: Saving, Playing and Transferring Images

Saving Images

If the patient's information is not entered, the Patient Information screen will appear. The saved images are displayed in the thumbnail area.



WARNING: You must always enter the patient ID, because all images are saved according to patient ID. Failure to enter a patient ID may result in a loss of and/or critical errors in previously saved images.

» » Saving Still Images

Press the **Freeze** button and then press the **Save** button on the control panel. The saved images can then be edited and managed with SonoView.

» » Saving Multi Frame Images

Press the User Key (U1-4, P1-2) that has been defined as Store Clip to save.



NOTE: In Dual/Quad Mode, only Cine in the active area is saved.

Depending on the current state (frozen or live), multi-frame images can be saved in two ways:

■ Freeze State

Either press the User Key on the control panel that corresponds to **Store Clip**, or select **Cine Save** on the touchscreen.

To specify the range of images to save, use the touchscreen's **First Pos** and **Last Pos** dial-buttons, or use the trackball to specify the range.

■ Live Mode

Press the User Key on the control panel that corresponds to **Store Clip**.



Store Clip Settings

To configure the Store Clip method, use Utility > Setup > Imaging > Common > Store Clip Method. For more information, please refer to 'Chapter 3. Utilities'.



Save, Store Clip Button Settings

To assign **Save** and **Store Clip** button functions, use Utility > Setup > Customize > U Key. For more information, please refer to 'Chapter 3. Utilities'.

Playing Images

The saved images can be played in SonoView or in a Operation mode.

▶▶ Playing Images in SonoView



NOTE: Refer to the SonoView section in this chapter.

▶▶ Playing Images in Operation Modes

Use the **Pointer** button on the control panel. Note that this function is available only when there are images saved in the thumbnail list.

1. Press the **Pointer** button and the cursor will appear on the screen.
2. Select an image from the thumbnail area to play on the screen. The selected image is played in the image area.

In Multi Mode, you can specify a location and play an image. 3D View is loaded for 3D images.

Transferring Images

This product allows you to transfer images to PACS systems that support DICOM. You can transfer all saved images automatically, or select a desired image and transfer it manually. For information on the DICOM server settings and DICOM operations, please refer to 'DICOM' in 'Chapter 3. Utilities'.

»» Transferring Images in Operation Modes

You can transfer images automatically. Images are transferred using the Storage Server's transmission method.



DICOM Settings

To configure the DICOM server, go to Utility > Setup > Connectivity > DICOM. For a more detailed description, refer to 'Chapter 3. Utilities'.

»» Transferring Images from SonoView

You can transfer images manually. The following two methods are available:

■ Sending Exam

Send all images for an exam.

1. Press the **Exam Search**  icon at the bottom of the *SonoView* screen. The screen will switch to the *Patient Information* screen.
2. Search for, and then select, an Exam.
3. Press the **Send** button on the right side of the screen. All images from an exam will be sent.

■ Sending Selected Images

Select a desired image from among the images for an exam and send it out.

1. View an exam in the *SonoView* screen.
2. Select an image.
3. Click the **DICOM Storage**  icon at the bottom of the screen. The selected images will be sent.

:: Printing and Recording Images

Printing Images

On the control panel, press the User Key that corresponds to **Print**. The image will be printed on the echo printer.

For information on how to set up a printer, please refer to 'Chapter 3. Utilities'.

Recording Images

Select **ADVR** on the touchscreen. The touchscreen will switch to the *ADVR* screen.



NOTE:

- ▶ ADVR is an optional feature of this product.
- ▶ It is not available in 3D/4D mode.

For more information, please refer to 'Chapter 3. Utilities'.



CAUTION: Check the capacity of the media before recording.

⌘ SonoView

This is the system's integrated image management program. It provides image saving/filing, preview, delete, and other PC-compatible export features.

The image file types used in this product follow the international standard DICOM (Digital Imaging and Communication in Medicine). As a result, the PACS (Picture Archiving Communication System) can be implemented in the RS85 without any additional costs, and it's easy to exchange image files with other hospitals or pieces of equipment.

This product supports the Bitmap file format (.bmp), which is most commonly used on standard PCs, ensuring easier exchange of image data.

▶▶ ⌘ Starting SonoView

Press the **SonoView** button on the touchscreen. The screen will switch to the *SonoView* screen.

If there are saved images available for the current exam, the information and saved images for the exam appear when SonoView starts.



WARNING:

- ▶ Make sure to register a patient before saving images or using SonoView.
- ▶ All diagnosis information in the product is saved and managed for each patient ID. As a result, saving images without entering a patient ID may result in a loss of and/or critical errors in previously saved images.

Exam Mode

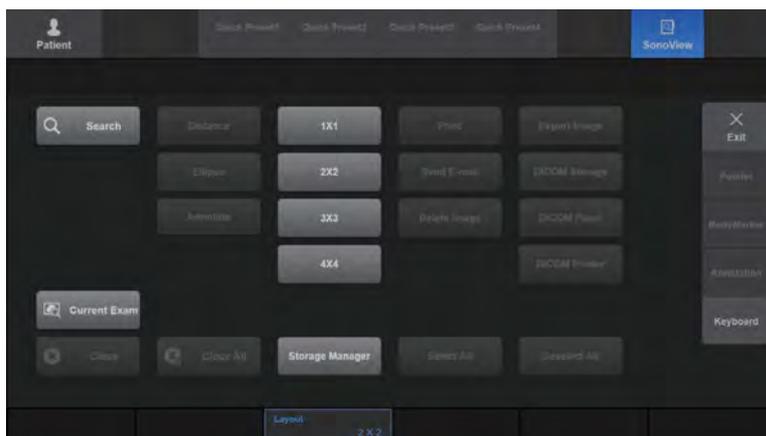
Press the **Exam** tab in the top left corner of the screen. In Exam mode, you may study the exam that is currently in session, or an exam that has previously been saved. The image that is selected on the screen will be highlighted with blue borders.

▶▶ **Exam Mode Screen**

Exams for each patient ID are displayed by date in a tree on the left side of the screen. The numbers in parentheses represent the numbers of the saved images. To show or hide exams, use the trackball and the **Set** button to select a desired ID.



[Figure 10.11 Exam Mode]



[Figure 10.12 Exam Mode – Touchscreen]

»» ⌘ Selecting Exam

Use the trackball and the **Set** button to select an exam from the list on the left side of the screen. The selected exam is shown in blue in the list, and the selected image is displayed on the screen.

■ Reviewing the Current Exam

Click **Current Exam**. The current exam and its images are displayed on the screen. This button is only enabled when the patient ID is registered. You can delete images for the current exam.

■ Reviewing Exams Performed within the Last 24 Hours

Click **Continue Exam**. The exams and their images for the last 24 hours are displayed. The first performance date of the exam appears in the feedback area.

You can place measurements, annotations, and BodyMarkers on the loaded exam screen. In addition, you can update the exam with new image scans.

■ Reviewing Exams Performed Prior to the Last 24 Hours

Click **Review Exam**. The exams that were performed prior to the last 24 hours, and their images, are displayed. The first performance date of the exam appears in the feedback area.

You can place measurements, annotations, and BodyMarkers on the loaded exam screen. However, you cannot update the exam with new image scans.

»» ⌘ Image Scroll

Display the image from the next or the previous page on the screen. Press the **Image Scroll** button on the touchscreen, or use the dial-button. Rotate the dial-button to the left to display the image from the previous page on the screen; rotate the dial-button to the right to display the image from the next page on the screen.

However, this button may not be used when the number of exams saved is lower than the number of images that appear on a single page under the current layout.

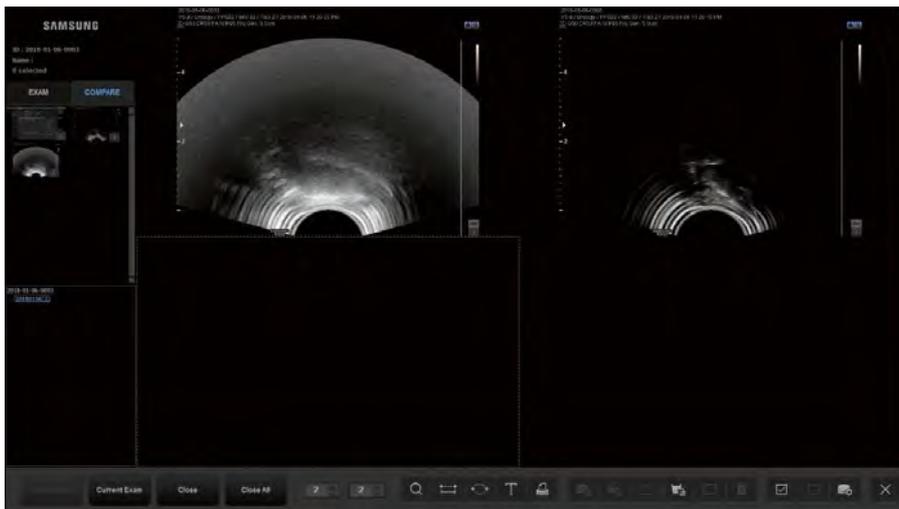
»» ⌘ Closing Exam Review

Click **Close** on the touchscreen. To close all exams in the list, click the **Close All** button.

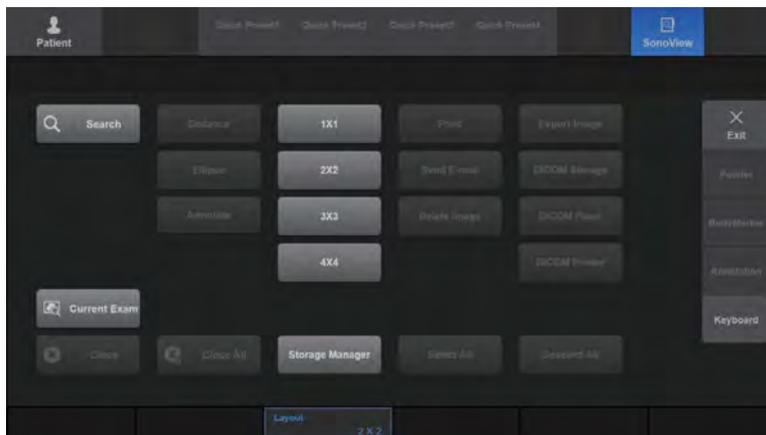
Compare Mode

Press the **Compare** tab in the top left corner of the screen. In Compare mode, you may select the images you wish to compare from the thumbnails and study them.

The image that is selected on the screen will be highlighted with blue borders.



[Figure 10.13 Compare Mode]



[Figure 10.14 Compare Mode – Touchscreen]

»» ⌘ **Compare Mode Screen**

As in Exam Mode, exams for each ID appear on the screen. In addition, images for the selected exam are displayed in a thumbnail format.

»» ⌘ **Searching Exam**

As in Exam Mode, click the **Exam Search**  icon.

»» ⌘ **Select an Image**

Use the trackball and the **Set** button to select images in the Thumbnail list. The selected image is highlighted in blue in the list. Specify the position for the image on the screen, and the selected image will then be displayed.



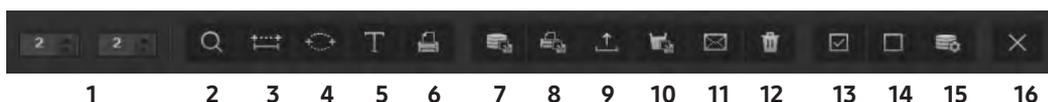
NOTE: Only scan data can be retrieved into the image area.

»» ⌘ **Thumb Scroll**

The image of the previous or next page is displayed on the thumbnail list. To do this, use the **Thumb Scroll** dial-button on the touchscreen. Rotating the dial-button to the left displays the previous page's images in the thumbnail list. Rotating it to the right displays the next page's images in the thumbnail list.

Exam Tool

Press the icon on the screen, or press the appropriate touchscreen button. When the cursor is hovering over an icon, the name of the icon is displayed.



1: Layout	9: Export Image
2: Search	10: DICOM Flush
3: Distance	11: Send E-mail
4: Ellipse	12: Delete Image
5: Annotate	13: Select All
6: Print	14: Deselect All
7: DICOM Storage	15: Storage Manager
8: DICOM Printer	16: Exit

[Figure 10.15 Exam Tools]

▶▶ Layouts

Adjust the number of images that can be displayed on the screen. Press the touchscreen button that represents the screen layout, or use either the **Layout** button or the dial-button. Up to 16 images (4 x 4) can be compared.

The numbers shown in the layout section indicate the number of columns and rows of images to be displayed on the screen. You can change the numbers shown in the layout section to configure various layouts.

▶▶ Displaying in Full Screen

Place the cursor on an image and press the **Set** button twice, and then the image will be displayed in full screen.

▶▶ Selecting Multiple Images

Use the trackball and **Set** button to select images. The selected image is highlighted in blue.

»» ⌘ Selecting All Images

Press the **Select All**  icon on the screen. All images saved in the current Exam will be selected and highlighted in blue.

»» ⌘ Deselecting All Images

Press the **Deselect All**  icon on the screen. All selected images will be deselected, and the blue highlight will disappear.

»» ⌘ Menu

Press the  button located at the lower left corner of an image, or press **Menu** on the touchscreen, and the post-processing menu will appear on the monitor screen's left side. Use the menu to adjust the image for diagnosis. The image is not saved with the post-processing effects.



NOTE: The menu can only be used in a layout of 2x2 or lower.



[Figure 10.16 Post Processing Menu]

▶▶ Reviewing 3D Images

- ▶ If the saved image is 3D, the 3D Indicator  appears at the bottom of the image. Click **3D** and the *3D View* screen will appear, allowing you to review the image.
- ▶ If the saved image is S-3D Arterial Analysis,  appears at the bottom of the image. Press  to execute S-3D Arterial Analysis.
- ▶ If the saved image is Auto IMT+, selecting  will execute Auto IMT+.

▶▶ Reviewing Cine

If the saved image is Cine, the playback and search scroll bar appears at the bottom of the image. You can play, pause, stop or search forward/backward with the scroll bar.



[Figure 10.17 Cine Scroll Bar]



NOTE: Cine images cannot be played in any layout with an image grid greater than 2x2.

▶▶ Searching Exam

Click the **Exam Search**  icon on the screen. *Patient Information's Search* tab screen is shown. Search the information stored in the system for patient information.

For more information, refer to 'Chapter 6. Starting Modes of Operation'.

▶▶ Distance

Click the **Distance Caliper**  icon on the screen. You can measure the distance between two points on an image. Measurement results are not saved.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Measure the desired distance. Measurement-taking methods are identical to those described in 'Chapter 9. Measurements'.
3. Press the **Exit** button on the control panel, and then click the **Distance Caliper** icon again to finish measurement.

»» ⌘ Measurement of Circumference and Area

Click the **Ellipse Caliper**  icon on the screen. You can measure the circumference and area of the desired area in an image. Measurement results are not saved.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Measure the circumference and area of the desired area. For measurement instructions, refer to the 'Basic Measurements' section in 'Chapter 9. Measurements'.
3. Press the **Exit** button on the control panel and then click **Ellipse Caliper** icon again to finish measurement.

»» ⌘ Typing Text

Click the **Text Annotation**  icon on the screen. You can enter text into an image.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Position the cursor on the desired area and enter text.
 - ▶ Font Color: Change the font color.
 - ▶ Font Size: Change the font size.
 - ▶ Language: Select a language.

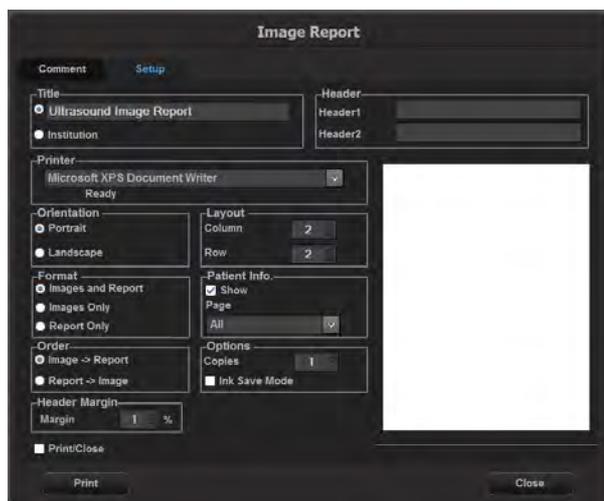


NOTE: This button only appears on the screen if the product supports Asian patient names.

3. Press the **Set** button to confirm the text.
4. Press the **Exit** button on the control panel and then click the **Text Annotation** icon again to finish measurement.

▶▶ Printing Image

1. Click the **Print Image**  icon on the screen. The *Image Report* window will appear.
2. Open the **Setup** and **Comment** tabs and configure the options.
To delete any entries made in the **Comment** tab, click **Clear**.
3. Press the **Print** button to print the image. Click **Close** to cancel.

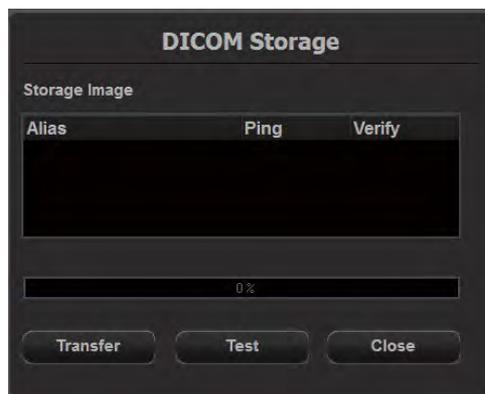


[Figure 10.18 Image Report]

»» ⌘ Transferring Images via DICOM

Transfer the selected image and measurement data via DICOM. The icon is only enabled when an image is selected. The icon is disabled in a system where DICOM is not enabled.

1. After selecting an image, click the **Send Image to DICOM Storage**  icon on the screen. The *DICOM Storage* window will appear.
2. Click the **Transfer** button to transfer the selected image to the DICOM server. Click **Close** to cancel.



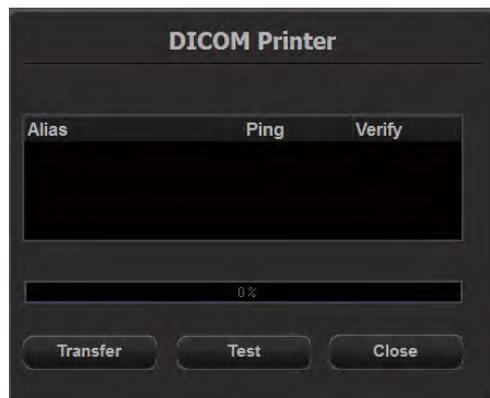
[Figure 10.19 DICOM Storage]

3. After sending it manually from SonoView, or entering SonoView, close it to check if the image has been sent to DICOM.
 - ▶ Use the icon at the bottom right of the image  to view.
 - ▶ Icon shown if sent to DICOM: 
 - ▶ Icon shown if not sent to DICOM: 

▶▶ Printing via DICOM

You can print the selected images via DICOM. The icon is only enabled when an image is selected. The icon is disabled in a system where DICOM is not enabled.

1. After selecting an image, click the **Send Image to DICOM Print**  icon on the screen. The *DICOM Printer* window will be displayed.
2. Click the **Transfer** button to transfer the selected image to the DICOM server and print it. Click **Close** to cancel.



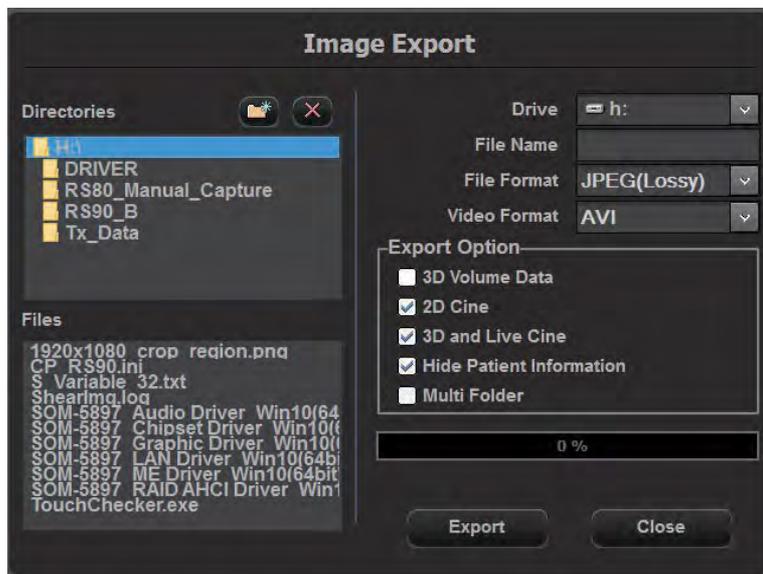
[Figure 10.20 DICOM Printer]

» » & Transferring Images



NOTE: Image transfer will not be performed if there are spaces in the file or directory name.

1. Click the **Export Image**  icon on the screen. The *Image Export* window will be displayed.
2. Specify the various parameters, such as directory, drive, filename and file format.
3. Click the **Export** button to start a transfer. Click **Close** to cancel.



[Figure 10.21 Image Export]

» » & DICOM Flush

Click the **DICOM Flush**  icon. This transfers all images that have been stored locally up to that point to the DICOM Storage server.

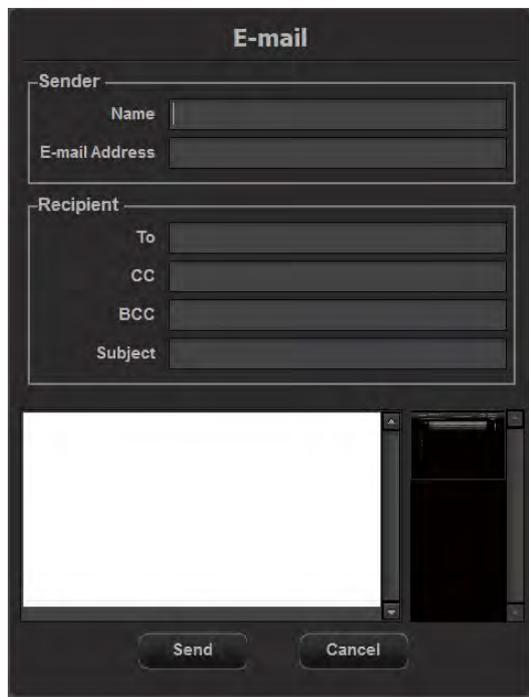
▶▶ Sending in E-mail

1. Click the **Send E-mail**  icon. The *E-mail* window will appear.
2. Specify the various parameters, such as sender and recipient.
3. Check the images that you want to attach from the thumbnail list, and then enter the body text.
4. Click the **Send** button to transfer the selected image. Click **Cancel** to cancel.



NOTE: If you cannot send e-mails even when you know that the mail server is working properly, please check the following:

- ▶ LAN cable connection
- ▶ Email settings in Utility > Setup > Connectivity > Network.
- ▶ Whether ICMP (ping) is Open for the mail server: If ICMP (ping) is set to Close, e-mail will not work normally.



The screenshot shows a dark-themed window titled "E-mail". It has several input fields: "Sender" with sub-fields for "Name" and "E-mail Address"; "Recipient" with sub-fields for "To", "CC", "BCC", and "Subject"; and a large white text area for the body. At the bottom, there are two buttons: "Send" and "Cancel".

[Figure 10.22 E-mail]

»» ⌘ **Deleting Images**

Click the **Delete Image**  icon. Press **OK** to delete the selected image. Please note that images for the current patient under diagnosis cannot be deleted.

»» ⌘ **Storage Manager**

Click the **Storage Manager**  icon. The *Storage Manager* window will appear. For more information about Storage Manager, refer to 'Chapter 3. Utilities'.

»» ⌘ **Closing SonoView**

Press the **Exit**  icon on the screen. Alternatively, you may press the **SonoView** button on the touchscreen or press the **Exit** button on the control panel to exit SonoView.

