

ACUSON Sequoia
Diagnostic Ultrasound System
Instructions for Use



Complies with
IMDA Standards
DA107142



Product Version 2.0**Software Version VA40**

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Chapter 2	Safety and Care Detailed information on the safety and care of the ultrasound system. Includes information on system maintenance.
Chapter 3	Transducer Care and Accessories Detailed information on caring for transducers. Includes procedures for cleaning and disinfecting transducers. Also includes information on compatible transducer accessories.
Chapter 4	System Setup Detailed descriptions for setting up and preparing the system for use. Includes information for transporting the system.
Chapter 5	Beginning a Study Procedures for preventing unauthorized access to the ultrasound system; registering a patient; selecting a transducer, exam, and operating mode; and capturing an image or clip.
Chapter 6	Workflow Protocols Procedures for activating and editing a protocol to guide you through a predefined clinical workflow.
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Chapter 10	Measurements and Calculations Description of the measurement function with procedures for using basic measurement tools for 2D-mode, Doppler, and M-mode. Includes measurement tools for the following exams: ▪ Obstetric
Chapter 11	Cardiac Measurements and Calculations Description of the measurement function with procedures for using measurement tools specific to the cardiac exam.
Chapter 12	Reports Procedures for saving, modifying, and transferring exam-specific reports.
Chapter 13	Printing and Recording Procedures for printing and recording images.
Appendix A	Technical Description Technical description of the ultrasound system. Includes the operating and storage temperatures for the system and transducers.
Appendix B	Icons and Indicators Description of system status indicators, special characters, and the imaging parameters and settings on the image screen.
Appendix C	Cybersecurity Information about ultrasound system security.
Appendix D	Acoustic Output Reference Acoustic output reporting tables.

Note: Not all features and options described in this publication are available to all users. Please check with your Siemens Healthineers representative to determine the current availability of features and options.

About the User and Reference Manuals

The user and reference manuals consist of the following publications.

Publication	Includes
<i>Instructions for Use</i>	▪ Conventions and typographical conventions used in the manuals ▪ Intended audience ▪ Introduction to the ultrasound system ▪ Safety and care information for the ultrasound system and compatible transducers ▪ Procedures for setting up and preparing the system for use ▪ Procedures for registering a patient and activating an operating mode ▪ Procedures for acquiring, optimizing, annotating, measuring, printing, and recording images ▪ Technical description of the ultrasound system ▪ Acoustic output data
<i>Advanced Imaging Manual</i>	This manual is a companion to the Instructions for Use publication and contains additional instructions for use for the safe and proper use of advanced imaging features on the ultrasound system. ▪ Description of the biopsy function ▪ Procedures for specialty imaging ▪ Panoramic imaging ▪ Contrast agent imaging ▪ Comparing images from multiple modalities ▪ 3D and 4D volume imaging ▪ Virtual Touch applications ▪ Procedures for reviewing images and clips ▪ Procedures for the physiologic function ▪ Fusion imaging ▪ Velocity vector imaging
<i>System Reference*</i>	▪ Description of customizable system settings ▪ Description of all measurement labels configurable for the ultrasound system ▪ Information about DICOM connectivity, network capabilities, and external devices ▪ Clinical references ▪ Information regarding the electromagnetic compatibility (EMC) testing of this ultrasound system

*Languages supported by the user interface include a translation of this publication.

Conventions

The user and reference manuals include the following conventions.

Convention	Description
Warnings and Cautions	 WARNING: Warnings are intended to alert you to the importance of following the correct operating procedures where risk of injury to the patient or system user exists.  Caution: Cautions are intended to alert you to the importance of following the correct operating procedures to prevent the risk of damage to the ultrasound system.
Notes and Prerequisites	Prerequisite: Prerequisites contain tasks the user must complete or information the user needs prior to performing a procedure. Note: Notes contain information concerning the proper use of the ultrasound system or correct execution of a procedure.
Cross-references	Examples: See also: For information about cleaning and disinfecting a transducer, refer to Chapter 3 in this manual. See also: For information about customizing the measurement function, refer to Chapter 2 in the System Reference. See also: For additional information about the measurement function, refer to Chapter 10 in the Instructions for Use. See also: For information about exporting and importing images, refer to Chapter B2 in the Advanced Imaging Manual. See also: Alphanumeric Keyboard, page 1-26 See also: Chapter 2, Instructions for Use
Customizable Ultrasound System Settings	Settings for configuring and customizing the ultrasound system are described in the System Reference. When customization is available, the user manual provides a reference to the configuration settings. Example: Use the configuration settings to customize the measurement function.

Typographical Conventions

The following typographical conventions are in descriptions and procedures within your user and reference manuals. Use the conventions to identify the location of a control or selection on the ultrasound system.

Control or Selection	Description
Controls on the Control Panel	Controls located on the control panel are indicated by uppercase boldface type. Examples: ▪ Push DEPTH. ▪ Rotate 2D to adjust the 2D gain. ▪ Press CALIPER to activate the measurement function. ▪ Double-click UPDATE to display the 2D image.
Trackball and Trackball Keys	Right and left trackball keys are located on the control panel. The function assigned to the trackball and trackball keys is indicated by labels on the image screen. Examples: ▪ Adjust the size or position of the field of view and then press a trackball key. ▪ Position the measurement marker and then press a trackball key. ▪ Press the right trackball key.
Selections on the Image Screen	On-screen selections are indicated by boldface type. Roll the trackball to position the pointer on the control or object on the image screen and then press a trackball key. Examples: ▪ Click Correct on the patient registration form. ▪ Double-click a thumbnail. ▪ Select the check box for the required entries and then click Delete.
Controls on the Control Panel for the Touch Screen	Press and rotate controls on the control panel are labeled on the touch screen. The selection assigned to these controls is indicated by boldface type. Examples: ▪ Rotate Tint. ▪ Press Steer.
Selections on the Touch Screen	Touch screen selections are indicated by boldface type. Tap the touch screen to access a selection. Drag an object on the touch screen to reposition the object. Swipe the screen to display a separate page of selections. Examples: ▪ Tap Workflow. ▪ Drag the tail of the arrow on the touch screen to adjust the length.

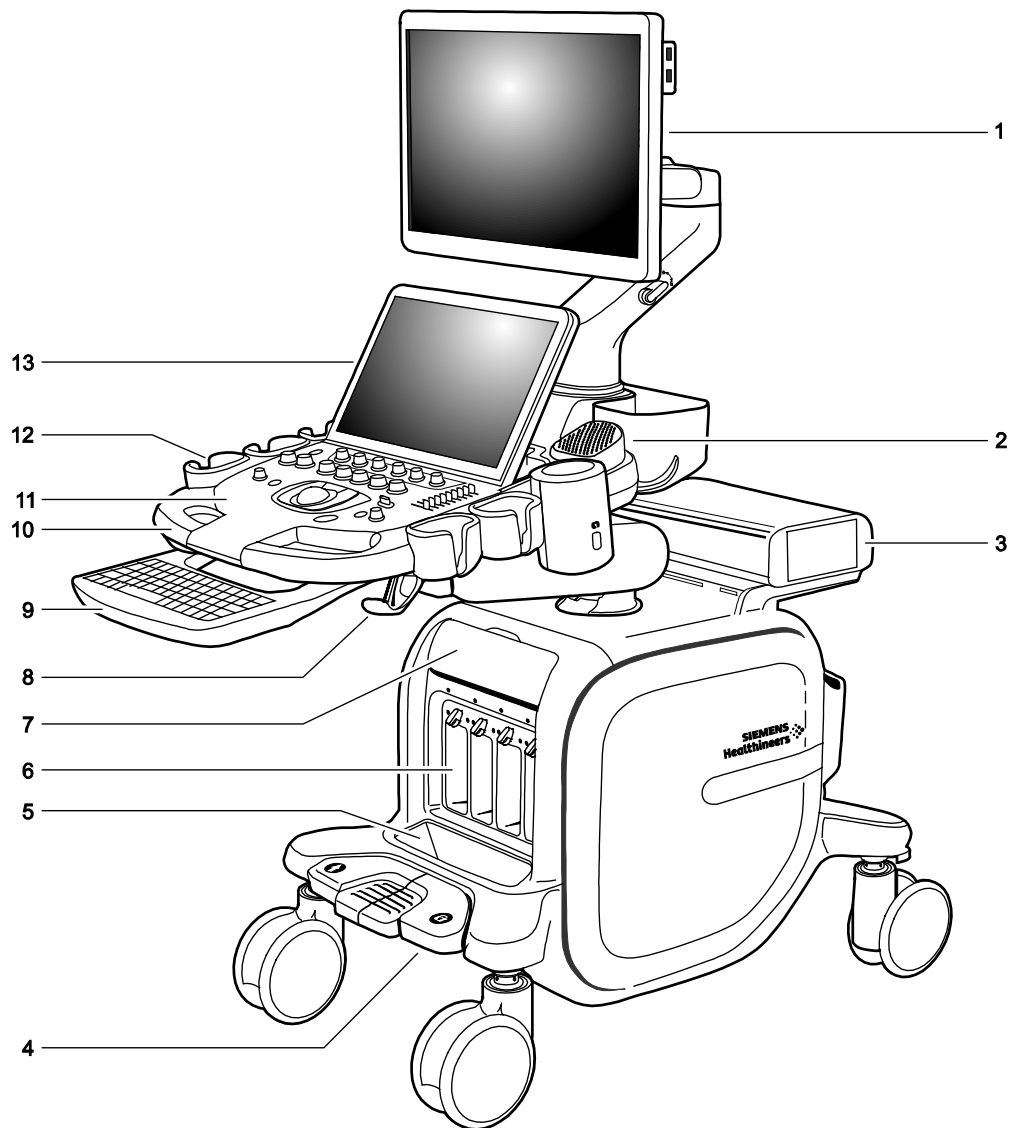
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System Overview

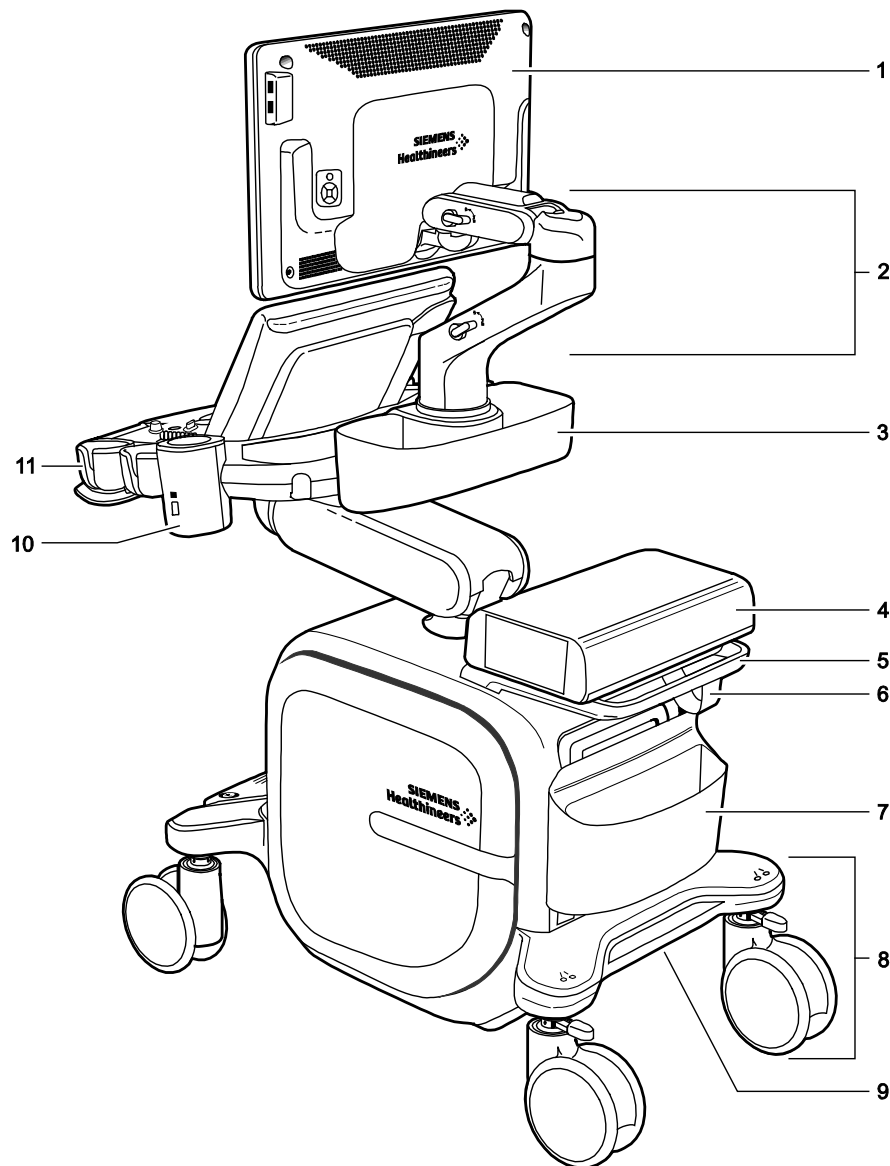
The ACUSON Sequoia ultrasound system is designed for diagnostic use in general imaging, vascular, and cardiac imaging. The system streamlines clinical workflow from patient registration to study archival with software-based applications, transducers, and clinical communication tools.

See also: For a technical description of the ultrasound system, refer to Appendix A in this manual.



Example of the ultrasound system, front view.

- 1 Monitor with USB ports
- 2 Speaker
- 3 Accessories shelf. This example includes the optional printer.
- 4 Lock and swivel lock for the front wheels
- 5 Storage bin for transducer connectors
- 6 Transducer ports for array transducers
- 7 Access door for ports
 - Auxiliary continuous wave Doppler transducer port
 - Auxiliary in/out port for the physiologic function
 - ECG port
- 8 Transducer cable hook
- 9 Keyboard (optional)
- 10 Front handle
- 11 Backlit control panel
- 12 Transducer holder
- 13 Touch screen with USB ports



Example of the ultrasound system, back view.

- 1 Monitor with USB ports
- 2 Adjustable arm for the monitor
- 3 Storage bin
- 4 Accessories shelf
This example includes the optional printer.
- 5 Rear handle for repositioning the ultrasound system
This handle is not intended for moving the system to another location.
- 6 Power cord hook
- 7 Storage bin and access door for connections and indicators
 - Input/output panel
 - Ethernet port
 - Service indicator lights
- 8 Rear swivel wheel with locking lever
- 9 Power panel
- 10 Gel warmer
- 11 Transducer holder

Intended Use

- ⚠ WARNING:** The analysis of results from an ultrasound examination requires that you are trained in the interpretation of diagnostic ultrasound studies and are qualified to make clinical diagnoses.
- ⚠ WARNING:** To avoid the risk of human injury and permanent damage to the ultrasound system, do not use the ultrasound system, transducers, or ultrasound components and accessories during magnetic resonance imaging (MRI) or in an environment with magnetic resonance (MR) equipment.
- ⚠ WARNING:** The ultrasound system is not intended for ophthalmic use.
- ⚠ Caution:** In the United States of America, federal law restricts this device to sale or use by, or on the order of, a physician.
- ⚠ Caution:** Ultrasound is used as an imaging aid, but may have further restrictions specific to in-vitro fertilization (IVF), chorionic villus sampling (CVS), and percutaneous umbilical cord blood sampling (PUBS) procedures. Observe local laws and regulations.

Indications for Use Statement

Product	Indications for Use Statement
ACUSON Sequoia Ultrasound System	The ACUSON Sequoia ultrasound imaging system is intended to provide images of, or signals from, inside the body by an appropriately trained healthcare professional in a clinical setting for the following applications: Fetal, Abdominal, Pediatric, Neonatal Cephalic, Small Parts, OB/GYN (useful for visualization of the ovaries, follicles, uterus and other pelvic structures), Cardiac, Pelvic, Vascular, Adult Cephalic, Musculoskeletal, and Peripheral Vascular applications. The system supports the Ultrasonically-Derived Fat Fraction (UDFF) measurement tool to report an index that can be useful as an aid to a physician managing adult patients with hepatic steatosis. The system also provides the ability to measure anatomical structures for fetal, abdominal, pediatric, small organ, cardiac, transrectal, transvaginal, peripheral vessel, musculoskeletal, and calculation packages that provide information to the clinician that may be used adjunctively with other medical data obtained by a physician for clinical diagnosis purposes.

Operating Modes

- 2D-mode
 - 2D-mode
 - 2D-mode with Harmonics Imaging
 - 2D-mode with Harmonics Imaging for Contrast Agent Imaging
- Color flow Doppler
 - Color (velocity)
 - Power (energy)
- Doppler
 - Pulsed Wave Doppler
 - Pulsed Wave Doppler Tissue Imaging
 - High Pulsed Repetition Frequency Pulsed Wave Doppler
 - Steerable Continuous Wave Doppler for imaging transducers
 - Continuous Wave Doppler for non-imaging transducers
- M-mode
 - M-mode with Harmonics Imaging
 - Anatomical M-mode
- Elastography
 - Strain Imaging
 - Shear Wave Elastography
- 3D/4D Volume Imaging

Combined Modes

- 2D-mode with color
- 2D-mode with Doppler
- 2D-mode with color and Doppler
- 2D-mode with M-mode
- 2D-mode with M-mode and color
- 2D-mode with Elastography

Patient Target Groups

- Adult
- Pediatric
- Fetal

Intended Use Environment

The ultrasound system is a mobile device intended for use in clinical environments.

See also: For information about the environmental requirements, refer to Appendix A in this manual.

Intended Users

User	Interaction with Ultrasound Equipment	Expected Experience and Other Characteristics
Sonographer	- Acquires diagnostic views of anatomy, blood flow, and related pathology - Performs measurements and analysis of the acquired images - Prepares exam data for review and interpretation by a qualified physician	- Ranges from novices (for example, students) to advanced practitioners with certification in multiple subspecialties - Educated in anatomy, physiology, patient care, and identification of pathology in ultrasound images - Many sonographers have a Bachelor's degree; some have advanced degrees in related health care subjects
Physician	- Performs ultrasound exams - Interprets exam data - Writes and assembles exam findings in a report	- Medical doctor - Trained in ultrasound imaging techniques - Skilled in interpreting ultrasound exam data
Radiologist	- Performs ultrasound exams - Performs image-guided access and biopsy procedures - Interprets exam data - Writes and assembles exam findings in a report	- Medical doctor - Expert in diagnostic imaging, including computer tomography, magnetic resonance imaging, X-ray, ultrasound, and nuclear medicine - Advanced training in imaging physics with typically two to six years of post-doctoral training in the field of radiology; some specialize in diagnostic ultrasound
System Administrator and Customer Service Engineer	Configures the ultrasound system for use in a networked environment	- A system administrator is an individual within your organization who is designated to set up system parameters to connect the ultrasound system or workstation to a picture archiving and communication system (PACS). - Customer service engineers are Siemens Healthineers representatives who configure the ultrasound system during initial installation, support troubleshooting activities, and repair the system.

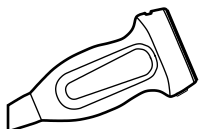
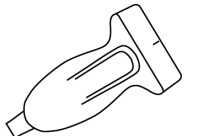
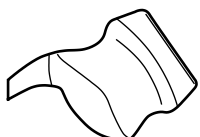
Contraindications

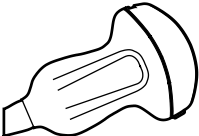
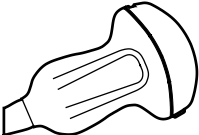
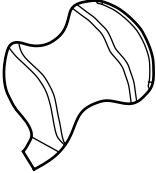
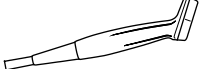
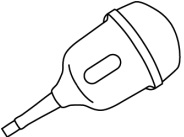
There are no known contraindications for diagnostic ultrasound.

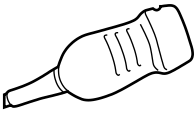
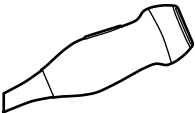
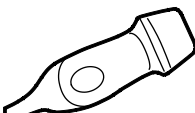
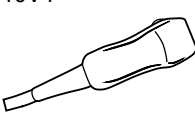
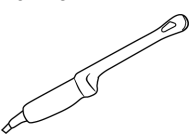
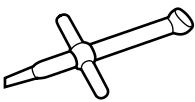
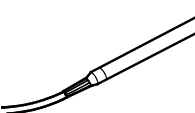
Transducers and Intended Applications

⚠ WARNING: The ultrasound system is not intended to be used with high-frequency surgical equipment. Use of transducers in conjunction with high-frequency surgical equipment may result in an increased risk of harm to the patient in the event of a defect in the high-frequency surgical neutral electrode connection.

Only the following transducers from Siemens Healthineers are compatible with your ultrasound system.

Transducer Name	Modes of Operation ¹	Intended Applications
Curved and Linear Array Transducers		
7L2 	2D, C, D, M	- Abdominal - Peripheral Vessel - Pediatric
10L4 	2D, C, D, M	- Abdominal - Fetal - Musculoskeletal, conventional - Musculoskeletal, superficial - Pediatric - Peripheral Vessel - Small Organ (breast, thyroid, and testicle) - Neonatal Cephalic
14L5 	2D, C, D, M	- Musculoskeletal, conventional - Musculoskeletal, superficial - Pediatric - Peripheral Vessel - Small Organ (breast, thyroid, and testicle)
15L4 	2D, C, D, M	- Small Organ (breast, thyroid, and testicle) - Musculoskeletal, conventional - Musculoskeletal, superficial - Pediatric - Peripheral Vessel
18L6 	2D, C, D, M	- Musculoskeletal, conventional - Musculoskeletal, superficial - Pediatric - Small Organ (breast, thyroid, and testicle)

Transducer Name	Modes of Operation ¹	Intended Applications
Curved and Linear Array Transducers		
DAX 	2D, C, D, M	- Abdominal - Fetal - Pediatric
5C1 	2D, C, D, M	- Abdominal - Fetal - Pediatric
9C2 	2D, C, D, M	- Abdominal - Fetal - Pediatric
9C3 	2D, C, D, M	- Abdominal - Fetal - Pediatric - Musculoskeletal, conventional
11M3 	2D, C, D, M	- Pediatric - Neonatal Cephalic
18H6 	2D, C, D, M	- Musculoskeletal, superficial - Small Organ (breast, thyroid, and testicle) - Pediatric
7VC2 	2D, C, D, M, Volume Imaging	- Abdominal - Fetal - Pediatric

Transducer Name	Modes of Operation ¹	Intended Applications
Phased Array Transducers		
4V1 	2D, C, D, M	- Abdominal - Fetal - Pediatric
5V1 	2D, C, D, M, CW	- Cardiac - Pediatric - Adult Cephalic
8V3 	2D, C, D, M, CW	- Cardiac - Pediatric - Abdominal - Neonatal Cephalic
10V4 	2D, C, D, M, CW	- Cardiac - Neonatal Cephalic - Pediatric
Endocavity Transducers		
9EC4 	2D, C, D, M	- Transrectal - Transvaginal
9VE4 	2D, C, D, M, Volume Imaging	Transvaginal
10EV3 	2D, C, D, M	Transvaginal
Continuous Wave Transducers		
CW2 	CW	- Cardiac - Pediatric
CW5 	CW	Peripheral Vessel

¹Modes of Operation	Includes one or more of the following system operating modes:
2D (brightness mode)	2D-mode, 2D-mode with Harmonics imaging
C (color flow Doppler)	Color (velocity) or Power (energy)
D (Doppler)	Pulsed Wave Doppler, 2D/Doppler, 2D/Doppler with color, 2D/Doppler with power, 2D/Pulsed Wave Doppler Tissue Imaging
M (motion mode)	M-mode, M-mode with Harmonics imaging, 2D/M-mode, 2D/M-mode with color
CW (continuous wave Doppler)	Steerable Continuous Wave Doppler (for phased array transducers), Auxiliary Continuous Wave Doppler (for continuous wave [pencil] transducers)
Volume Imaging	3D volume imaging, 4D volume imaging

Principles of Operation

Diagnostic ultrasound uses high-frequency (above the audible range) sound waves to produce an image of anatomical structures within the body. Electrical pulses vibrate ceramics within a transducer to transmit the sound waves into the body. Sound waves travel through body tissue at approximately 1,540 meters per second and reflect back as echoes to the transducer at each point of change in tissue density, for example, at the border of two organs in the body. These return signals provide information about the acoustic properties of the tissue. The time to receive the echo in microseconds indicates a distance into the body. Structures furthest from the transducer surface require more time to return a signal than structures closer to the transducer surface. The strength and position of each signal indicates a point of varying intensity (brightness). The distances and intensities are processed and displayed on a screen to form a two-dimensional (2D) image.

Clinical Benefits

Ultrasound has a positive impact on the health of an individual as a non-ionizing diagnostic imaging tool. The device provides real-time anatomic and kinetic visualization of internal organs, tissue structures, blood flow, and Doppler-enabled hemodynamics. Ultrasound is the accepted imaging modality for the safe visualization of fetal anatomy and monitoring of fetal development.

The mobility and cost effectiveness of ultrasound increases access to patients in clinical environments. Patient benefits also include a safer examination compared to imaging modalities using ionizing radiation.

Real-time ultrasound imaging provides guidance during interventional procedures, for example, needle biopsies and fluid aspirations; in the absence of ultrasound, these procedures are conducted without visualization or with ionizing radiation.

Image Screen Overview

The image screen displays patient data, including images, imaging parameters and settings, measurements and reports, advanced imaging selections, and configuration settings.

Use the configuration settings to customize the image screen to accommodate your preferences and workflow, including the display of patient information on a saved or printed image or clip.

Note: The system reduces the font size of the imaging parameters to include patient information. For exams with extensive clinical data, for example, obstetric exams, the system includes the data and lists the active modes, but hides mode-specific imaging parameters and settings.

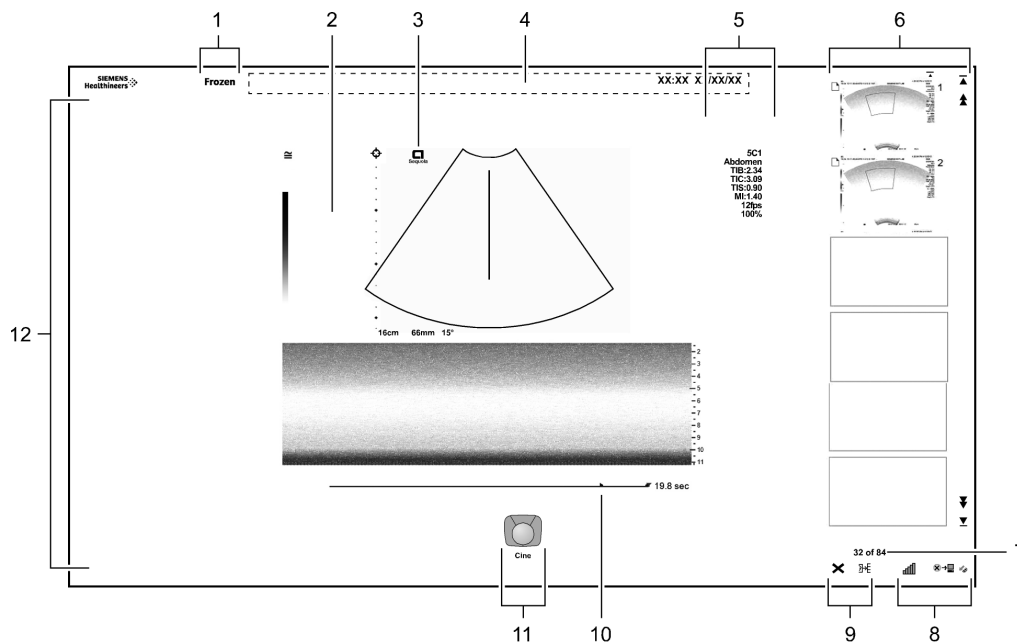
See also: For information about ultrasound system status indicators, refer to Appendix B in this manual.

Screen Saver

The screen saver feature freezes the ultrasound system and replaces the active display with a screen saver after the system has been inactive for a specified number of minutes. A user login is required to exit the screen saver and access the system.

Note: The screen saver feature is not available during the biopsy function.

1 Introduction

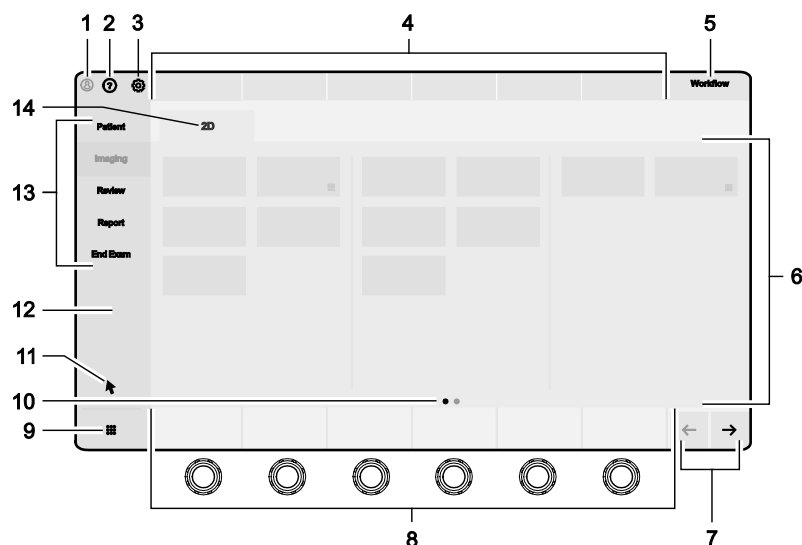


Example of a typical image screen.

- 1 Status of the image
 - **Live** indicates real-time acquisition
 - **Frozen** indicates a frozen image
 - **Review** indicates a previously saved image
- 2 Measured results
 - Displays values for measurements and calculations
- 3 Transducer indicator
- 4 Patient banner
 - Displays patient information, the ultrasound system date and time, and the institution name
- 5 Imaging parameters and settings
 - Displays the active transducer, active exam, and imaging parameters and settings for the active operating mode
 - Displays patient information on a saved or printed image or clip
- 6 Thumbnail panel
 - Displays reference images of previously saved images and clips
- 7 Current thumbnail and total number of thumbnails
- 8 Ultrasound system status
 - Displays network information, for example, the strength of the wireless connection
- 9 Selections for deleting and printing thumbnails
- 10 CINE status indicator
- 11 Trackball status indicator
 - Identifies the function assigned to the trackball keys
- 12 Displays selections available for the active function, for example, for the patient report or Fusion imaging

Touch Screen Overview

The touch screen has selections for use during an exam for each operating mode and during review. Blue indicates the selection is active. A dimmed selection is unavailable.



Example of the touch screen and image optimization controls during 2D imaging.

- 1 Options for logging in to the ultrasound system to restrict access to the ultrasound system
- 2 Information about how to use the ultrasound system
- 3 Selections for configuring the ultrasound system
- 4 Additional selections based on the workflow selection and operating mode
 - During patient registration, includes access to the patient registration form and other patient studies
 - During imaging, includes selections for activating a transducer and selecting an exam
 - During the annotation function, includes selections for body markers, text, and arrows
 - During measurements, includes access to measurement categories
 - During system configuration, includes selections to change the brightness of the control panel, touch screen, or keyboard
- 5 Additional options
 - During imaging, displays workflow selections
 - During measurements and annotations, displays a list of exam packages for selecting additional measurements, calculations, and annotations
- 6 Selections for the operating mode, features, or functions
- 7 Additional pages of selections
- 8 Press and rotate controls on the control panel are labeled on the touch screen
- 9 Additional selections, for example, full-screen format
- 10 Number of pages of selections and the active page. The active page is indicated in white.
- 11 Pointer displays the cursor on the image screen during imaging
- 12 User-defined selections, as specified in the configuration settings
- 13 Main navigation selections
- 14 Operating mode
 - During combined mode imaging, indicates the active operating mode

Main Navigation Selections on the Touch Screen

Selection	Description
Patient	Activates patient registration and displays selections for retrieving patient studies and registering a patient.
Imaging	Activates real-time imaging and displays workflow-specific selections for the operating mode and exam.
Review	Activates review and displays workflow-specific selections.
Report	Activates the patient report and displays report navigation and selections.
End Exam	Displays selections for ending the current exam and patient study.

Additional Selections and Symbols on the Touch Screen

Icon	Description
	Indicates additional options available for the selection.
	A rectangular outline indicates the selection currently assigned to a dual-function control. The selections for the control are displayed on the inside of the rectangular outline. The settings are displayed outside of the rectangular outline.
	Indicates an available port for connecting an array transducer to the ultrasound system.
	Indicates an available port for connecting a continuous wave (pencil) transducer to the ultrasound system.
	Indicates a transducer enabled with gesture detection.
	A triangle indicates a folder of measurement labels during the measurement function.
	A category of measurements during the measurement function.
	A check mark indicates a measured or entered value is assigned to the measurement label. During protocols, indicates a protocol view is saved.
	Indicates guided measurements during the measurement function.

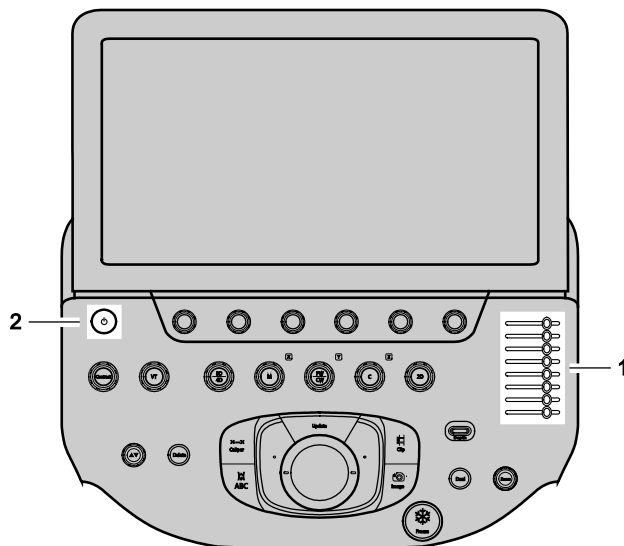
Icon	Description
	Accesses additional selections, for example, full-screen format. Use the configuration settings to add or remove selections from the touch screen.
	Print sends a screenshot of the image screen to the printer.
	DVR Record/Pause records and stores video clips to a digital video recorder.
	DVR Record/Pause temporarily stops recording to a digital video recorder.
	Full Screen activates full-screen display format on the image screen. Full-screen format increases the size of the image to hide the thumbnail panel and patient banner.
	Hide Banner temporarily hides the patient banner on the image screen. The system also hides any patient information in the imaging parameters.
	Lock Screen locks the touch screen and trackball. Pressing the freeze key unlocks the touch screen and trackball.
	Service Image saves a screenshot of the current image screen and touch screen to the service image folder on the ultrasound system. The system also hides any patient information in the imaging parameters.
	Eject USB disconnects all USB-compatible storage devices from the ultrasound system.
	Indicates the virtual keyboard.
---	Reconnect Wi-Fi reconnects the ultrasound system to the wireless network.
---	Film Sheet displays selections to copy images to the film sheet.
---	Network Job Status displays the network job status dialog box.
---	DVR Menu displays selections for the digital video recording device.
---	Send to Store Server sends images and clips to all DICOM storage servers configured for transfer at the end of the exam.
---	Panoramic activates Panoramic imaging. Use the configuration settings to add or remove the selection from the touch screen.
---	Unlock USB accesses the security configuration settings for an encrypted USB storage device connected to the ultrasound system. You must enter the password for the encrypted USB storage device to grant the ultrasound system read-write access to the storage device, for example, to import or export data.
---	Virtual Workstation provides remote access to a configured archival and information system for confirming the status and transfer of patient data, images, and reports.

Controls on the Control Panel

The control panel includes a touch screen, push controls, press controls, and press and rotate controls. The trackball and trackball keys provide access to objects on the image screen.

When the ultrasound system is in use, controls on the control panel are supported by backlighting. Blue lighting indicates the function assigned to the control is active. White lighting indicates the function assigned to the control is available, but not active. No lighting indicates the function assigned to the control is not available for use.

The press and rotate controls on the control panel located directly below the touch screen are always backlit when the ultrasound system is powered on.



Example of the control panel and touch screen on the ultrasound system.

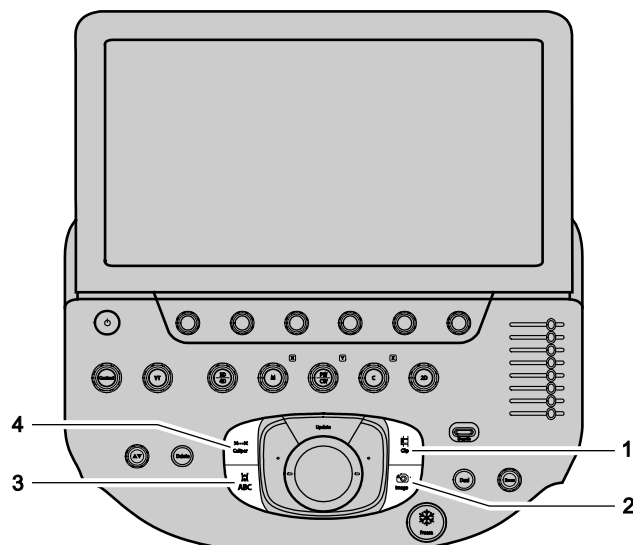
- 1 Controls for adjusting the depth gain compensation
- 2 Partial power on/off switch

Powers on or powers off the ultrasound system

Blue lighting indicates the ultrasound system is powered on, and blinking blue lighting indicates the ultrasound system is plugged in, but not powered on. No lighting indicates the ultrasound system is powered off and not plugged in.

Annotation, Measurement, and Archive Controls

Use the configuration settings to assign the print and store functions to a control on the control panel.

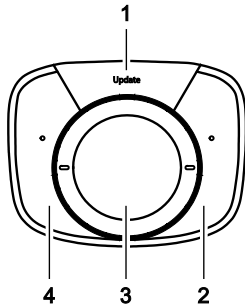


Example of the annotation, measurement, and archive controls.

- 1 **CLIP**
 - Acquires and then saves a clip
 - Ends clip capture while capturing a clip
 - During CINE or system freeze, saves a clip from the current CINE margins
- 2 **IMAGE**
 - Saves a static image
 - During 3D/4D volume review, saves an individual image of a volume
- 3 **ABC**
 - Activates or exits the annotation function
- 4 **CALIPER**
 - Activates or exits the measurement function

Trackball and Trackball Keys

The trackball and trackball keys size and position an object on the image screen, for example, the region of interest, Doppler cursor, and measurement markers.



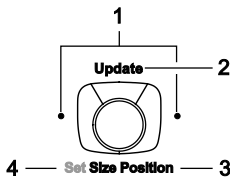
Example of the trackball and trackball keys.

1 UPDATE

- Updates the Doppler spectrum and 2D image
 - Starts, pauses, or continues the acquisition process for the following features: Virtual Touch imaging, Panoramic imaging, Fusion imaging
- 2 Right trackball key activates or confirms a selection depending on the active function
- 3 Trackball sizes and positions an object depending on the active function
- 4 Left trackball key activates or confirms a selection depending on the active function

Trackball Status Indicator

The trackball status indicator on the image screen displays the active functions and available functions for the trackball and trackball keys.

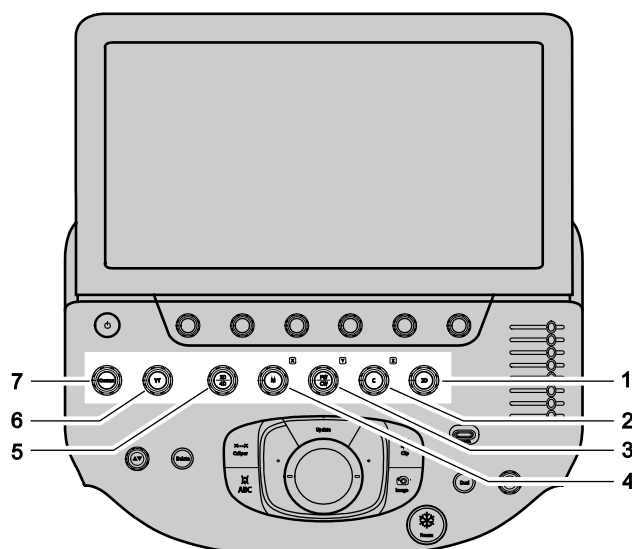


Example of the trackball status indicator on the image screen.

- 1 Dots indicate more than one function is available for the trackball
- 2 Task assigned to **UPDATE**
- 3 Available function for the trackball and trackball keys indicated in white, for example, **Size** or **Position**
- 4 Active function for the trackball indicated in blue, for example, **Set**

Operating Mode Controls

Operating mode controls activate the operating mode and adjust the gain. Press the operating mode control on the control panel to activate the operating mode. Rotate the operating mode control to adjust the gain for the operating mode.



Example of the operating mode controls.

1 **2D**

- Reactivates 2D imaging
- During 2D imaging when an image is zoomed, exits zoom
- During dual imaging, exits dual
- During system freeze, reactivates image acquisition

2 **C**

- Activates or exits color imaging
- Use the touch screen to activate additional Doppler options, for example, color or power
- **Z** rotates a multiplanar reconstruction or volume along the z axis

3 **PW/CW**

- Activates or exits pulsed wave (PW) Doppler or continuous wave (CW) Doppler
- **Y** rotates a multiplanar reconstruction or volume along the y axis

4 **M**

- Activates or exits M-mode imaging
- **X** rotates a multiplanar reconstruction or volume along the x axis

5 **3D/4D**

- Activates the 3D/4D setup step
- During setup of 3D imaging, exits 3D/4D imaging
- Rotate to traverse the slices in the active multiplanar reconstruction
- The functionality of this control is the same for version A or version B of the control.



Example of the 3D/4D control, version A.



Example of the 3D/4D control, version B.

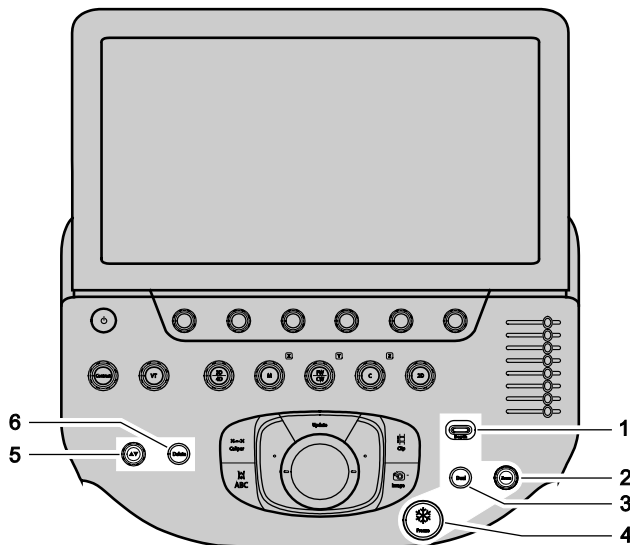
6 **VT**

- Activates or exits Virtual Touch imaging
- Rotate to adjust blending
- Use the touch screen to activate additional features, for example, Virtual Touch shear wave elastography imaging

7 **CONTRAST**

- Activates or exits contrast agent imaging

Image Format Controls



Example of the image format controls.

- 1 **DEPTH**
Adjusts the depth of the image
- 2 **ZOOM**
Zooms an image or magnifies a region of interest
- 3 **DUAL**
Activates dual imaging or selects the left or right side of the image screen
- 4 **FREEZE**
 - Freezes or unfreezes the acquisition of an image, sweep, or spectrum
 - Enables or disables CINE playback
 - During clip capture, ends the capture
 - During 3D imaging, stops the volume acquisition and displays a partial volume
 - During 4D imaging, pauses the volume acquisition for reviewing and editing of volumes in CINE
- 5 **FORWARD/BACKWARD**
 - When the control is rotated, navigates to the previous or next image or page of images on the image screen
 - When the control is rotated during a protocol, navigates to the previous or next protocol view
 - When the control is pressed during a protocol, pauses or resumes the protocol
 - When the control is rotated during the configuration settings, navigates to the previous or next page of configurations on the image screen
 - When the control is rotated in a report, navigates to the previous or next line
- 6 **DELETE**
 - During the measurement function, deletes the measurement in progress in reverse sequence
 - During the annotation function, deletes the annotation in progress in reverse chronological sequence
 - Deletes the selected image in review

Footswitch

Use the footswitch as an alternative to using specific controls on the control panel.

Use the configuration settings to assign functionality to each pedal on the footswitch.

Retractable Keyboard

The retractable keyboard is an ultrasound system option, not a standard feature.

See also: For a description of special characters on the touch screen and retractable keyboards, refer to Appendix B in this manual.

Special Keys on the Retractable Keyboard

Key Name	Description
Blank	Accesses special characters located on the alphanumeric keyboard. This key displays the keyboard language and is blank on English keyboards.
Text Start (Space Bar)	Activates the annotation function. When the annotation function is active, inserts a blank space at the current position of the text cursor.
Alt	Provides access to special characters required for some languages when used in combination with the alphanumeric keys.
Alt Gr	(Available only on non-English keyboards) Accesses special characters located on the alphanumeric keyboard.

Configuring the Ultrasound System

You can customize the ultrasound system to accommodate your workflow and preferences.

During exam and transducer configuration, the ultrasound system displays the default setting in blue.

See also: For detailed information about configuring the ultrasound system, refer to the System Reference.

2 Safety and Care

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Operating Safety and Environment

Do not operate the ultrasound imaging system until you fully understand the safety considerations and procedures presented in this manual.

Siemens Healthineers recommends the use of gloves during the operation, cleaning, and care of the ultrasound system.

See also: For biohazard considerations related to the use of latex products, refer to page 2-13.

Serious Incident Reporting

If you become aware of any (potential) malfunction of our device which has resulted or could result in serious health consequences for the user, patient or any other person please inform us immediately and if legally required, inform the Competent Authority of your country.

System Symbols

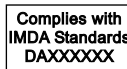
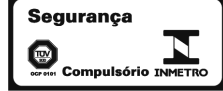
Refer to this table to identify important symbols located on the ultrasound imaging system and transducers.

Symbol	Explanation
	AC (alternating current) voltage source
	Caution: Risk of electric shock. (black and yellow illustration)
	Defibrillation-proof type CF applied part
	Defibrillation-proof type BF applied part
	Type BF applied part
	Consult Instructions for Use
	It is mandatory you refer to the manual. (blue illustration)
	Magnetic resonance (MR) unsafe. Prohibits the use or presence of the medical device in a magnetic resonance imaging (MRI) environment. (black and red illustration)

Symbol	Explanation
	Caution, consult accompanying documents (black illustration)
	General Warning (yellow and black illustration)
	Attention (black illustration)
	Partial power on/off control
	ON position of the mains switch (circuit breaker on the ultrasound system)
	OFF position of the mains switch (circuit breaker on the ultrasound system)
	Equipotential terminal
	Protective earth ground
	Signal input
	Signal output
	USB connection
	Direct current (DC) power input connection
	Indicator light
	Ethernet connection
	Auxiliary continuous wave Doppler transducer port
Aux 1	Auxiliary in/out port
ECG	Electrocardiogram (EKG)
	ECG port
	Electronic array transducer port

Symbol	Explanation
	Unlocked position
	Locked position
	Swivel
	Left-right rotation adjustment
	Height adjustment
	Swivel lock engaged
	Lock engaged
	Wheel lock engaged
	Wheel lock released
	Use only in dry conditions Do not install a wet air filter.
	Location of air filter
PUSH	Releases or engages the locking mechanism when pushed
IPX8	Protected against the effects of continuous immersion in water
R_x ONLY	Caution: In the United States of America, federal law restricts this device to sale or use by, or on the order of, a physician.
	Safe working load "XXX" represents the weight of the system unpacked and ready for operation with documentation devices installed. Additional objects or devices on the system cannot exceed the safe working load.

Symbol	Explanation
	The product must be properly disposed of in accordance with local, state, and regional laws and regulations. Products bearing this symbol are subject to the European Community Directive 2002/96/EC on waste electrical and electronic equipment (WEEE), amended by Directive 2012/19/EU. For collection and disposal of the product, its components, or its accessories, contact your local customer service representative.
	Environmentally friendly use period
	Do not exert excessive force when moving or positioning the ultrasound system. (black and red illustration)
	Do not lean. (black and red illustration)
 XX kg MAX XX lb MAX	Shelf or compartment weight restriction "XX" represents the maximum weight restriction
	The viewing angle of the touch screen is adjustable.
	Pinch hazard
	Identifies the importer of the medical device
	Authorized representative in Switzerland
	European Conformity mark Indicates the manufacturer declares the product complies with the applicable requirements in Regulation (EU) 2017/745 and other applicable European Union harmonization legislation.
	Manufacturer's declaration of product compliance with applicable EEC directives
	UL symbol for listing as recognized components for Canada and United States of America

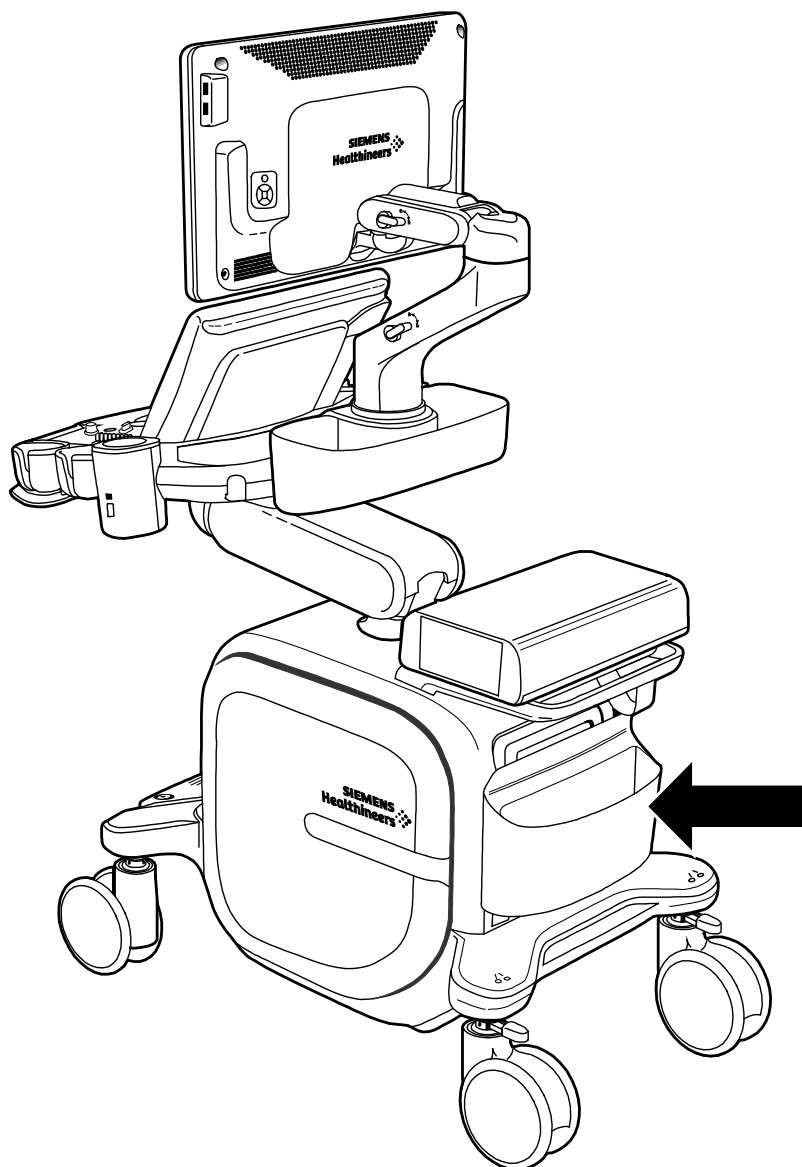
Symbol	Explanation
	UL classified symbol for Canada and United States of America Underwriters Laboratories classification: E466400
	Eurofins MET mark for Canada and United States of America Indicates the product complies with Underwriters Laboratories (UL) and Canadian Standards Association (CSA) safety standards. Includes the following certifications under the mark: E115466 Electrical Safety
	Authorized representative in the European community
	EAC (Eurasian Conformity mark) The Eurasian Conformity mark is a product marking to indicate that the product conforms to all Technical Regulations of the Customs Union assessment procedures.
	Equipment complies with the standard and specifications published by IMDA (Info-communications Media Development Authority of Singapore) "XXXXXX" represents the dealer's license number
	TÜV Rheinland INMETRO Certification Mark (Brazil)
	TÜV SÜD INMETRO Certification Mark (Brazil)
	Agência Nacional de Telecomunicações (ANATEL) certification label in Brazil Includes the certification number
	Product complies with applicable Australian or New Zealand standards for EMC and radio-communications.
	C-Tick Mark Product complies with applicable Australian or New Zealand standards for EMC and radio-communications
	National Communications Commission (NCC) certification of type approval label in Taiwan Includes the approval number
	Technical Conformity Mark for specified radio equipment in Japan

Symbol	Explanation
IC	ISED Canada (IC) Innovation, Science and Economic Development (ISED) certification of radio apparatus in Canada Includes the certification number
FCC ID	Federal Communications Commission (FCC) identifier for certification of radio frequency devices in the United States of America Includes the certification number
CMIIT ID	China Ministry of Industry and Information Technology (CMIIT) identifier for radio type certification in China Includes the certification number
IFETEL	Instituto Federal de Telecomunicaciones (IFT) certification in Mexico Includes the certification number
	DEMKO-Denmark approval mark
	National certification for Korea
	Ukrainian conformity mark
FC	The monitor is compliant with the limits for a Class B digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules in the United States of America.
IVK	(Installierte Volumen Komponente) Identifier of selected system components or parts for product traceability
System IVK	(System Installierte Volumen Komponente) Identifies the system for product traceability
	Barcode with product identification information according to the following barcode specification: GS1 DataMatrix
	Manufacturer
	Date of manufacture Includes the year and month adjacent to the symbol

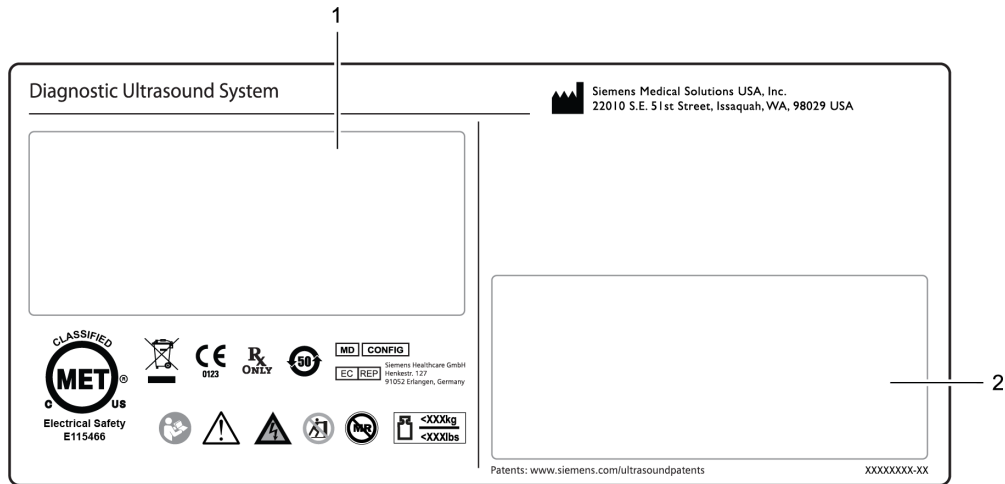
Symbol	Explanation
SN	Identifies the manufacturer's serial number of the medical device Includes the number adjacent to the symbol
REF	Identifies the manufacturer's catalog reference number of the medical device Includes the number adjacent to the symbol
CONFIG	Indicates the device consists of several components that can be assembled by the manufacturer in multiple configurations
COMBI	Indicates the system (a combination of products)
UDI	Indicates the unique device identifier (UDI)
MD	Indicates the equipment is a medical device
GTIN	Global Trade Item Number
Rev REV	Model revision
Serial SERIAL	Serial number
Count COUNT	Quantity of product
SW VERSION	Software version
Model MODEL	Product model number
REF	Device part number
Origin US ORIGIN US	Manufacturer country of origin: United States of America
Origin KR ORIGIN KR	Manufacturer country of origin: Republic of Korea
Origin CN ORIGIN CN	Manufacturer country of origin: China
Origin JP ORIGIN JP	Manufacturer country of origin: Japan

Symbol	Explanation
	Storage temperature range (example)
	Weight and size "XXX" represents the weight of the system packaged for shipping "XX" represents the size of the box in inches
	Do not stack
	Stacking limitation "n" indicates the number of items that can be stacked
	Recycle
	The wood packaging material for shipping the ultrasound system complies with the International Standards for Phytosanitary Measures No. 15. (example)
	Do not expose to direct sunlight
	Storage atmospheric pressure range (example)
	Storage humidity range (example)
	Indicates this side up
	Do not allow to get wet
	Fragile. Handle with care.
	Refer to the operator's manual for information about compatible needle guides.
	Intentional transmitter of non-ionizing radiation

Labels

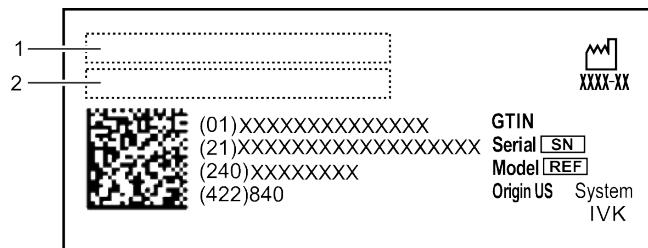


Example of the location of the system label.



Example of ultrasound system label with certification labels.

- 1 Identification label
- 2 Country-specific labels



Example of identification label.

- 1 Product name
- 2 System input power requirement



Example of labels on a transducer.

Biohazard Considerations

- ⚠ **WARNING:** Siemens Healthineers makes every effort to manufacture safe and effective transducers. You must take all necessary precautions to eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials. These precautions should be considered in the use of any application that may indicate the need for such care, and during endocavity or intraoperative scanning; during biopsy or puncture procedures; or when scanning patients with open wounds.
- ⚠ **WARNING:** To eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials, always dispose of hazardous or infectious materials according to local, state, and regional laws and regulations.
- ⚠ **WARNING:** There have been reports of severe allergic reactions to medical devices containing latex (natural rubber). Health care professionals are advised to identify latex-sensitive patients and to be prepared to treat allergic reactions promptly. For additional information in the U.S.A., refer to FDA Medical Alert MDA91-1.
- ⚠ **WARNING:** Ultrasound energy is transmitted more effectively through water than through tissue. When using a standoff device of any kind, for example, a gel pad, the actual mechanical and thermal indices, MI and/or TI, may be higher than indicated in the output display on the system.

The assessment of the biological effects of diagnostic ultrasound on humans is a subject of ongoing scientific research. This system, and all diagnostic ultrasound procedures, should be used for valid reasons, for the shortest possible period of time, and at the lowest mechanical and thermal indices necessary to produce clinically acceptable images.

According to the ALARA (As Low As Reasonably Achievable) principles, acoustic output should be set to the ***lowest level required to satisfactorily perform the examination.***

The ultrasound imaging system complies with the standards of the American Institute of Ultrasound in Medicine (AIUM), the National Electrical Manufacturer's Association (NEMA), the guidelines of the United States Food and Drug Administration (FDA), and the guidelines of the International Electrotechnical Commission (IEC) in terms of safety and acoustic output levels. The ultrasound output levels are stated to permit the user to critically evaluate the system settings in the event of new research findings being announced.

Note on Fetal Examinations

The following recommendation is excerpted from the National Institute of Health in the United States of America. *Consensus Statement on the Use of Ultrasound Imaging During Pregnancy*, Volume 5, No. 1, based on the recommendation issued at the Health Consensus Development Conference, February, 1984:

Ultrasound examination in pregnancy should be performed for a specific medical indication. The data on clinical efficacy and safety do not allow a recommendation for routine scanning at this time.

Ultrasound examination performed solely to satisfy the family's desire to know the fetal sex, to view the fetus, or to obtain a picture of the fetus should be discouraged. In addition, visualization of the fetus solely for educational or commercial demonstrations without medical benefit should not be performed.

In August 1994, the Food and Drug Administration (FDA) notified the medical community and the ultrasound industry regarding its concerns about the misuse of diagnostic ultrasound equipment for non-medical purposes, and to discourage patients from having sonograms for non-medical reasons.

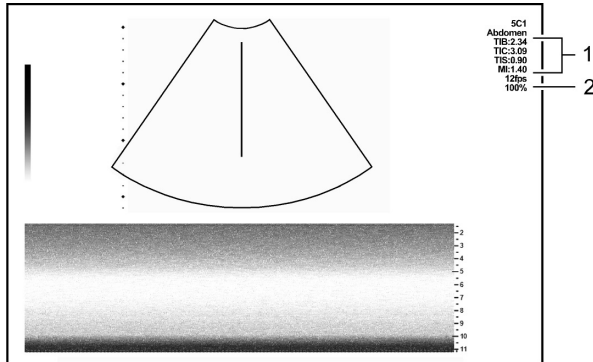
The American Institute of Ultrasound in Medicine (AIUM) has also advocated the responsible use of diagnostic ultrasound for all fetal imaging (August 2005).

Acoustic Output

⚠ WARNING: Ultrasound procedures should be used for valid reasons, for the shortest period of time, and at the lowest mechanical/thermal index setting necessary to produce clinically acceptable images.

Note: For systems distributed in the United States of America, refer to the *Medical Ultrasound Safety* ultrasound education program brochure produced by the AIUM that is shipped with the ultrasound system.

See also: For acoustic output information, refer to Appendix D in this manual.



Example of the mechanical and thermal indices and the transmit power display on the image screen.

- 1 Mechanical and thermal indices
- 2 Transmit power

Transmit Power Control

Adjust the transmit power and the corresponding acoustic pressure delivered through the transducer to the patient by using the designated control on the system. It is the main system function that determines the transmitted intensity of ultrasound for all transducers and imaging modes during real-time imaging, though it is not the only function that affects the mechanical and thermal indices. The range and especially the maximum level of the mechanical and thermal indices differ depending on the transducers. In addition, each diagnostic exam type has a preset value for the transmit power control, which affects the default mechanical and thermal indices.

See also: Imaging Functions that Change Acoustic Output, page 2-18

Note: Maximum transmit acoustic intensity and the mechanical index for each exam type are limited in accordance with the United States Food and Drug Administration's (FDA) recommendations and guidelines. System default transmit intensity and mechanical index values are always below the FDA recommendations for each exam type. In addition to the transmit power control, there are other system controls or functions that could raise acoustic output levels.

To increase the transmit power:

1. Access the next page of touch screen selections, if necessary.
2. During real-time imaging, rotate **Transmit Power** clockwise to increase transmit power.
The system briefly highlights the power value to indicate the change.

To decrease the transmit power:

1. Access the next page of touch screen selections, if necessary.
2. During real-time imaging, rotate **Transmit Power** counterclockwise to decrease transmit power.
The system briefly highlights the power value to indicate the change.

Transmit Power Display

The transmit power range is from 0.2% to 100%. Selecting 100%, in combination with other system controls or functions, generates the maximum acoustic intensity and mechanical index for each transducer, where:

$$I_{SPTA,3} : \leq 720 \text{ mW/cm}^2 \text{ and } MI \leq 1.9$$

Mechanical and Thermal Indices

The ultrasound system incorporates an output display of mechanical and thermal indices to allow you to monitor, and to limit, the amount of ultrasound energy that is transferred to the patient.

The system displays the mechanical and thermal indices during real-time imaging, in all imaging modes.

Indices display in the abbreviated form shown below:

- **MI:** Mechanical Index
- **TIB:** Bone Thermal Index (fetal application)
- **TIS:** Soft Tissue Thermal Index
- **TIC:** Cranial Thermal Index

Imaging Functions that Change Acoustic Output

 **WARNING:** Observe the real-time display of mechanical and thermal indices (MI/TI) at all times.

In addition to the adjustment of the transmit power, adjustment of the following imaging functions and/or controls may affect the acoustic output:

- Power on/off
- Automatic time-out
- Freeze
- Imaging mode
- Transducer and transducer frequency
- Exam type
- Image presets
- Image depth
- Field of view (scan angle); 2D steering angle for linear array transducers
- Frame rate
- Line density
- Focus
- Zoom
- M-mode cursor
- Doppler gate position and size; steering angle for linear array transducers
- Doppler pulsed repetition frequency (PRF)
- Simultaneous/update
- Color PRF
- Color and Power region of interest position and size; steering angle for linear array transducers
- Harmonics
- Compounding
- Gel pad use

Transducer Surface Temperature

The following table provides the maximum surface temperature of the transducers compatible with the ultrasound system.

The maximum surface temperature of the transducers is in accordance with IEC 60601-2-37.

Transducer	Maximum Temperature	
	TMM	Still Air
7L2	39.5°C	41.5°C
10L4	40.6°C	42.2°C
14L5	41.8°C	40.1°C
15L4	40.6°C	45.0°C
18L6	40.9°C	40.3°C
DAX	41.7°C	41.8°C
5C1	41.4°C	42.8°C
9C2	42.0°C	41.0°C
9C3	42.0°C	42.5°C
11M3	40.2°C	40.5°C
18H6	39.1°C	46.6°C
7VC2	39.0°C	44.9°C
4V1	39.3°C	40.1°C
5V1	41.4°C	41.7°C
8V3	40.8°C	40.3°C
10V4	40.9°C	40.0°C
9EC4	42.5°C	38.8°C
9VE4	42.4°C	43.3°C
10EV3	37.5°C	33.8°C
CW2	35.9°C	31.5°C
CW5	34.9°C	40.9°C

TMM = Tissue Mimicking Material

Electrical Safety

-  **WARNING:** To avoid electric shock, use a protective earth connection to connect the ultrasound system to the power supply (supply mains). The protective earth connection ensures additional grounding is provided to reduce the risk of electric shock.
-  **WARNING:** For systems used in the U.S.A.: To ensure grounding reliability, only connect the system to a hospital-grade power outlet (mains outlet).
-  **WARNING:** The power connector (mains plug) for the ultrasound system is a three-prong grounded plug in the U.S.A. and should never be adapted to any two-prong (non-grounded) outlet, either by modifying the plug or by using an adapter. In the U.S.A., proper grounding requires the power connector to be plugged into a hospital-grade power outlet (mains outlet).
-  **WARNING:** To avoid electrical shock, never modify the ultrasound system's power connector (mains plug), as doing so may overload your facility's power circuits. To ensure grounding reliability, connect the system only to an equivalent outlet.
-  **WARNING:** To avoid electrical shock, never use equipment or a mains power cord that shows signs of wear or tampering, or whose ground plug has been bypassed using an adapter.
-  **WARNING:** Equipment connected to the ultrasound system and in the patient zone must be powered from a medically-isolated power source or must be a medically-isolated device. Equipment powered from a non-isolated source can result in chassis leakage currents exceeding safe levels. Chassis leakage current created by an accessory or device connected to a non-isolated outlet may add to the chassis leakage current of the ultrasound system.
-  **WARNING:** Using an extension cord or multi-socket outlet setup to provide power to the ultrasound system or to the system's peripheral devices may compromise the system grounding and cause your system to exceed leakage current limits.
-  **WARNING:** To avoid electrical shock and damage to the ultrasound system, power off and unplug the equipment from the power supply (supply mains) before cleaning and disinfecting the system.
-  **WARNING:** Do not pour any fluid onto the ultrasound system surfaces, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure.

-  **WARNING:** To ensure proper grounding and leakage current levels, it is the policy of Siemens Healthineers to have an authorized Siemens Healthineers representative or Siemens Healthineers-approved third party perform all on-board connections of documentation and storage devices to the ultrasound system.
-  **WARNING:** To maintain the safety and functionality of the ultrasound system, electrical safety tests must be performed as specified by local safety regulations, or as needed.
-  **WARNING:** To prevent excessive leakage current from contacting the patient, do not touch a user-accessible connector on the system while touching or scanning the patient. User-accessible connectors include the ECG connector, a transducer connector, a USB connector, and any other audio, video, or data transmission connectors.
-  **WARNING:** Connecting peripheral devices to accessory outlets on the ultrasound system effectively creates a medical electrical system, resulting in a reduced level of safety.
-  **WARNING:** Do not modify this equipment without authorization from Siemens Healthineers.
-  **Caution:** To avoid the possibility of static shock and damage to the system, avoid the use of aerosol spray cleaners on the monitor screens.
-  **Caution:** Do not use spray cleaners on the ultrasound system, as this may force cleaning fluid into the system and damage electronic components. It is also possible for the solvent fumes to build up and form flammable gases or damage internal components.
-  **Caution:** To maintain the safety and functionality of the ultrasound system, maintenance must be performed every 24 months. Electrical safety tests must also be performed at regular intervals as specified by local safety regulations, or as needed.

Level of Protection against Electrical Shock for Transducers

⚠ WARNING: Only use Type BF transducers with the ultrasound system to maintain a level of protection against electrical shock.

According to IEC 60601-1, the assemblies for the linear, curved, and phased array transducers provide a "Level of Protection Against Electrical Shock" of "Type BF."



Example of the Type BF icon located on the transducer label.

Defibrillators

⚠ WARNING: The ECG function is designed to withstand the effects of defibrillation. However, when possible, disconnect the ECG leads during defibrillation since a malfunction of the safety controls could otherwise result in electrical burns for the patient.

For patient safety, be sure to use defibrillators that do not have grounded patient circuits.



Example of the Type CF icon located on the transducer label.

Implantable Devices

⚠ WARNING: Ultrasound systems, like other medical equipment, use high-frequency electrical signals that can interfere with implantable devices such as pacemakers and implantable cardioverter-defibrillators (ICDs). If the patient has such an implantable device, you should be aware of any interference in its operation and immediately power off the ultrasound system.

Possible Combinations with Other Equipment

 **WARNING:** Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN or IEC standards (for example, EN 60950 or IEC 60950 for data processing equipment and EN 60601-1 or IEC 60601-1 for medical equipment). Anyone who connects additional equipment to any of the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1 or IEC 60601-1. Siemens Healthineers can only guarantee the performance and safety of the devices listed in the *Instructions for Use*. If in doubt, consult the Siemens Healthineers service department or your local Siemens Healthineers representative.

The ultrasound system can support two on-board documentation devices at one time.

On-board peripheral devices must be installed by an authorized Siemens Healthineers representative or by a Siemens Healthineers-approved third party. Devices installed by other people will be at the user's risk and may void the system warranty.

Important Information for Maintaining Data Integrity

 **WARNING:** To prevent the loss of data that results from unplugging the system from the power supply (supply mains) before the system has completed its shutdown sequence, follow the system shutdown instructions in this manual.

 **Caution:** To prevent corruption of data stored on inserted media, do not interrupt the exporting process. Do not delete exported patient data from the local database until the exporting process is complete and the inserted media is determined to be full (or no more exporting is planned for the inserted media).

To ensure data integrity:

- To prevent the loss of data that results from power failures and other system "down" occurrences, you must archive important data, such as patient records, onto external media.
- Loss of data is to be expected and its retrieval is not normally possible under the following conditions: loss of power to the ultrasound system, CPU failure, system lockup, and other similar causes.
- Should an abnormal system shutdown occur, retrieval of data not saved to the ultrasound system or not archived to external media is not normally possible.

An abnormal system shutdown occurs if you do not power off the ultrasound system using the partial power on/off control located on the control panel. Other examples of abnormal system shutdown include: equipment malfunction, loss of power, or pressing and holding the partial power on/off control longer than four seconds.

- Should an abnormal system shutdown occur, the system may initially require additional time to reboot or to respond to user input. This is due to the operating system performing a background scan of the ultrasound system's data storage to detect and segregate any truncated or corrupted files.

Data Compression

 **WARNING:** This product uses JPEG Lossy compression that is irreversible and can result in the loss of image quality. All compressed images contain information about the compression ratio and compression type. This product conforms to the DICOM standard. DICOM conformance statements for ultrasound products are available at www.siemens-healthineers.com/services/it-standards/dicom.

Caring for the Ultrasound System

It is the responsibility of the user to verify that the ultrasound system is safe for diagnostic operation on a daily basis. Each day, prior to using the system, perform each of the steps in the Daily Checklist.

All exterior parts of the ultrasound system, including the control panel, keyboard, transducers, and biopsy devices, should be cleaned and/or disinfected as necessary or between uses. Clean each component to remove any surface particles. Disinfect components to destroy pathogens and other microorganisms.

See also: Cleaning the Air Filter, page 2-33

Daily Checklist

⚠ WARNING: To minimize the risk of cross-contamination and infectious diseases, a sterile, non-pyrogenic transducer sheath must be in place during procedures requiring sterility.

⚠ WARNING: To avoid electrical shock, you must visually inspect a transducer prior to use. Do not use a transducer with cracked, punctured, or discolored casing or a frayed cable.

Discoloration Exception: The use of approved cleaners and disinfectants may cause discoloration of the transducer. You can continue to use a transducer discolored due to the use of approved cleaners and disinfectants only.

See also: For information about approved cleaners and disinfectants for a transducer, refer to Chapter 3 in this manual.

Perform the following each day before using the ultrasound system:

- Visually inspect all transducers. Do not use a transducer with a cracked, punctured, or discolored casing or a frayed cable. You can continue to use a transducer discolored due to the use of approved cleaners and disinfectants only.

Verify the electrical component of the transducer connector is clean and free from gel or particles.

- Visually inspect all power cords. Do not turn on the power if a cord is frayed or split, or shows signs of wear.

If your system's power cord is frayed or split, or shows signs of wear, contact your Siemens Healthineers service representative for power cord replacement.

- Visually inspect the ECG connector and the cable. Do not use the ECG function if the connector or cable is damaged or broken.
- Verify the trackball, DGC slide controls, and other controls on the control panel are clean and free from gel or other contaminants.

Once the system is powered on:

- Visually check the on-screen displays and lighting.
- Verify the screen displays the current date and time.
- Verify the transducer identification and indicated frequency are correct for the active transducer.

Maintenance

 **Caution:** To maintain the safety and functionality of the ultrasound system electrical safety tests must be performed as specified by local safety regulations, or as needed.

Repair

 **WARNING:** Do not modify this equipment without authorization from Siemens Healthineers.

For questions regarding repair or replacement of any equipment parts on your system, contact your Siemens Healthineers service representative.

Siemens Healthineers Authorized Care

Installers and operators must observe any statutory regulations that govern the installation, operation, inspection, and maintenance of this equipment.

To ensure the safety of patients, operators, and third parties, the equipment must be inspected every 24 months, and the replacement of parts is performed as necessary. This maintenance must be performed by a qualified Siemens Healthineers authorized representative. It is important to inspect the equipment more frequently if it is operated under extraordinary conditions.

Perform inspections and maintenance at the prescribed intervals to avoid worn and hazardous parts due to wear. Contact the Siemens Healthineers service department for the required maintenance.

As manufacturers and installers of ultrasound equipment, Siemens Healthineers cannot assume responsibility for the safety properties, reliability, and/or performance of the equipment, if:

- Installations, extensions, readjustments, modifications, additions, or repairs are carried out by persons not specifically authorized by Siemens Healthineers.
- Components that affect the safe operation of the system are replaced by parts not authorized by Siemens Healthineers.
- The electrical installation of the room where the equipment is located does not meet the power and environmental requirements stated in this manual.
- The equipment is not used in accordance with the operating instructions.
- The system is operated by personnel not adequately educated or trained.

Siemens Healthineers suggests that you request any person who performs maintenance, or repairs, to provide you with a certificate showing:

- The nature and extent of the work performed
- Changes in rated performance
- Changes in working ranges
- Date of service
- Name of person or firm performing the service
- Signature of person performing the service

Cleaning and Disinfecting the Ultrasound System

You must take all necessary precautions to eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials. Use universal precautions when cleaning and disinfecting. You should treat all portions of the imaging system that come in contact with human blood or other body fluids as if they were known to be infectious.

All exterior parts of the ultrasound system, including the control panel, keyboard, transducers, and biopsy devices, should be cleaned and/or disinfected as necessary or between uses. Clean each component to remove any surface particles. Disinfect the components to destroy pathogens and other microorganisms.

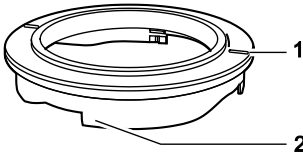
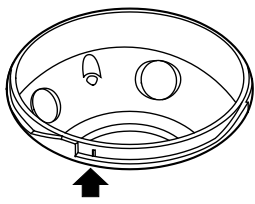
-  **WARNING:** To avoid electric shock and damage to the system, always power off and disconnect the equipment from the AC power source before cleaning and disinfecting.
-  **WARNING:** Disinfectants and cleaning methods listed are recommended by Siemens Healthineers for compatibility with product materials, not for biological effectiveness. Refer to disinfectant label instructions for guidance on disinfection efficacy and appropriate clinical uses.
-  **WARNING:** The use of any disinfectants other than those specified in the instructions for use may damage the ultrasound system and accessory surfaces and, as a result, may create electrical hazards for the patients and/or users.
-  **WARNING:** Contents of some disinfecting agents are known to be health hazards. Their concentration in the air must not exceed an applicable specified limit. Comply with the manufacturer's instructions when using these agents.
-  **Caution:** Do not clean or disinfect the system with chlorinated or aromatic solvents, acidic or basic solutions, isopropyl alcohol or strong cleaners such as ammoniated products, as these can damage the surface of the system. Use the recommended cleaning and disinfecting procedure. Only use approved cleaners and disinfectants on the ultrasound system.
-  **Caution:** Do not use spray cleaners on the ultrasound system as this may force cleaning fluid into the system and damage electronic components. It is also possible for the solvent fumes to build up and form flammable gases or damage internal components.
-  **Caution:** Do not pour any fluid onto the ultrasound system surfaces, including the control panel and touch screen, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure.
-  **Caution:** Prior to cleaning or disinfecting the system, you must disconnect and remove transducers from the ultrasound system. Unintended contact with disinfectants approved only for use with the system can result in damage to the transducers.

Note: Iodine and betadine may discolor the control panel. There is no associated degradation of imaging performance or control panel reliability due to discoloration by iodine or betadine.

System Surfaces

See also: For instructions on removing and attaching the transducers, transducer holders, and gel warmer, refer to Chapter 4 in this manual.

To	Do This
Clean and disinfect the surface of the ultrasound system	 Caution: To avoid the possibility of static shock and damage to the ultrasound system, avoid the use of aerosol spray cleaners on the monitor screen and touch screen. 1. Power off the ultrasound system and then unplug the power cord from the power supply (supply mains). 2. Use a clean gauze pad or lint-free cloth, lightly moistened with a mild detergent, to wipe the surface of the ultrasound system. – Gently wipe the glass surfaces of the touch screen and monitor. – Take particular care to clean the areas near the trackball and the slide controls. Ensure these areas are free of gel and any other visible residue. – Ensure that fluids do not seep into any openings on the ultrasound system, such as the seams on the control panel. 3. After cleaning, use a clean, lint-free cloth to dry the surface. 4. Use an approved disinfectant wipe to disinfect the ultrasound system and accessories, except the transducer ports. 5. After cleaning and disinfecting, reconnect the ultrasound system power cord to the power supply (supply mains).
Clean the array transducer ports on the ultrasound system	 Caution: To avoid damage to the transducer ports, never use gauze pads, lint-free cloths, or solutions to clean the transducer ports. 1. Disconnect transducers from the array transducer ports. 2. Use compressed air to remove particles from the ports. 3. Reconnect the transducer and then rotate the transducer locking lever from the unlocked position to the locked position approximately five times to dislodge any debris.
Clean and disinfect the holders for transducers and coupling gel	1. Remove the holder from the ultrasound system. 2. Clean the holder under running water, using a mild detergent and dry with a lint-free cloth. 3. As required, use an approved disinfectant wipe to disinfect the holder. 4. Reattach the holder to the ultrasound system.

To	Do This
Clean and disinfect the gel warmer	⚠ Caution: To avoid damage to the gel warmer, do not immerse the gel warmer in water or any solution. Note: To facilitate cleaning, remove the cap at the bottom of the gel warmer. Rotate the cap counterclockwise to remove the cap; rotate the cap clockwise to secure the cap. 1. Remove the gel warmer from the ultrasound system. 2. Unplug the power cable from the gel warmer. 3. Clean and disinfect the gel warmer using an approved disinfectant wipe. 4. Reattach the gel warmer to the ultrasound system.
Clean and disinfect the trackball	⚠ Caution: Do not drop or place foreign objects inside the trackball assembly because doing so may affect the trackball operation and damage the ultrasound system.  <i>Example of the trackball ring.</i>  <i>Example of the point of attachment for the trackball ring on the trackball assembly.</i> 1. Raised markings on either side of the ring 2. Tab for inserting into the trackball assembly 1. Rotate the ring around the trackball counterclockwise and then carefully lift up the ring to remove the ring and trackball. 2. Clean the ring and trackball with a cotton swab or lint-free pad moistened with mild detergent solution. 3. Clean the inside of the trackball assembly with a cotton swab or lint-free pad moistened with mild detergent solution. 4. As required, use an approved disinfectant wipe to disinfect the ring, trackball, and trackball assembly. 5. Allow the trackball components to completely dry before reassembly. 6. Reinstall the ring and trackball. a. Place the trackball inside the trackball assembly. b. Place the ring over the trackball, taking care to align the tab with the point of attachment on the trackball assembly. c. Rotate the ring clockwise until the ring snaps into place and the raised markings of the ring are in a horizontal position.

Approved Disinfectant Wipes for the Ultrasound System Surfaces

Use only approved disinfectant wipes on the surfaces of the ultrasound system and accessories, except the transducer ports.

Note: For spray disinfectants, you must apply the disinfectant to a clean, lint-free cloth before wiping the surfaces of the ultrasound system.

	Monitor screen	Touch screen	Trackball assembly	Gel warmer	Array transducer ports	All other ultrasound system surfaces*
Acrylan	✓	✓	✓	✓	NA	✓
ANIOS OXIZYME	✓	✓	✓	✓	NA	✓
ANIOXY-TWIN	✓	✓	✓	✓	NA	✓
ANIOXYDE 1000	✓	✓	✓	✓	NA	✓
ANIOXYDE 1000 LD	✓	✓	✓	✓	NA	✓
antifect N liquid	✓	✓	✓	✓	NA	✓
AZO 70% IPA Wipes & Spray	✓	✓	✓	✓	NA	✓
AzoMax Wipes & Spray	✓	✓	✓	✓	NA	✓
Azo Universal Cleaning and Disinfectant Wipes	✓	✓	✓	✓	NA	✓
Bacillol 30 Tissues & Foam	✓	✓	✓	✓	NA	✓
Bacillol AF	✓	✓	✓	✓	NA	✓
Bacillol Tissues	✓	✓	✓	✓	NA	✓
Bacillol Wipes	✓	✓	✓	✓	NA	✓
CaviCide	✓	✓	✓	✓	NA	✓
CaviCide1	✓	✓	✓	✓	NA	✓
CaviWipes	✓	✓	✓	✓	NA	✓
CaviWipes 1	✓	✓	✓	✓	NA	✓
CaviWipes 2.0	✓	✓	✓	✓	NA	✓
CLEANISEPT WIPES	✓	✓	✓	✓	NA	✓
CLEANISEPT WIPES forte	✓	✓	✓	✓	NA	✓
Clinell Clorox Wipes	NA	✓	✓	✓	NA	✓
Clinell Universal Wipes & Spray	✓	✓	✓	✓	NA	✓
Clorox Healthcare Bleach Germicidal Wipes	NA	✓	✓	✓	NA	✓
Clorox Healthcare Fuzion Cleaner Disinfectant	NA	✓	✓	✓	NA	✓
Clorox Healthcare Bleach Germicidal Wipes	NA	✓	✓	✓	NA	✓
Clorox Healthcare Hydrogen Peroxide Cleaner Disinfectant	✓	✓	✓	✓	NA	✓
Clorox Healthcare VersaSure Cleaner Disinfectant Wipes	NA	✓	✓	✓	NA	✓

	Monitor screen	Touch screen	Trackball assembly	Gel warmer	Array transducer ports	All other ultrasound system surfaces*
Dispatch	NA	✓	✓	✓	NA	✓
Ecolab Quaternary Disinfectant Wipes	✓	✓	✓	✓	NA	✓
ESCULASE	✓	✓	✓	✓	NA	✓
gigasept PAA concentrate	✓	✓	✓	✓	NA	✓
gigasept pearls	✓	✓	✓	✓	NA	✓
HospiCare 3525s Disinfectant Wipes	✓	✓	✓	✓	NA	✓
HospiCare Multi-Surface Wipes 60R	NA	✓	✓	✓	NA	✓
Incidin OxyFoam S	✓	✓	✓	✓	NA	✓
Incidin OxyWipe S	✓	✓	✓	✓	NA	✓
Incidin OxyWipe	✓	✓	✓	✓	NA	✓
INTERCEPT Detergent	✓	✓	✓	✓	NA	✓
Meliseptol Wipes sensitive	✓	✓	✓	✓	NA	✓
Mikrobac Tissues	✓	✓	✓	✓	NA	✓
mikrozid AF wipes & liquid	✓	✓	✓	✓	NA	✓
mikrozid PAA wipes	✓	✓	✓	✓	NA	✓
mikrozid sensitive wipes & liquid	✓	✓	NA	NA	NA	NA
mikrozid universal wipes & liquid	✓	✓	✓	✓	NA	✓
Micro-Kill Bleach Germicidal Bleach Wipes	NA	✓	✓	✓	NA	✓
Oxivir Tb	✓	✓	✓	✓	NA	✓
PDI Easy Screen Cleaning Wipe	✓	✓	NA	NA	NA	NA
PHAGO'SPORE & PHAGO'WIPES SPORE	✓	✓	✓	✓	NA	✓
Protex Disinfectant Spray and Wipes	NA	✓	✓	✓	NA	✓
Protex ULTRA Disinfectant Wipes	NA	✓	✓	✓	NA	✓
RAPICIDE PA	✓	✓	✓	✓	NA	✓
Rely+On PeraSafe	✓	✓	✓	✓	NA	✓
Reynard IPA Surface Disinfection Wipes	✓	✓	✓	✓	NA	✓
Reynard Premier Detergent & Disinfectant Wipes	✓	✓	✓	✓	NA	✓
Sani-Cloth 70% Wipes	✓	✓	✓	✓	NA	✓
Sani-Cloth Active Wipes	✓	✓	✓	✓	NA	✓
Sani-Cloth AF Universal Wipes	✓	✓	✓	✓	NA	✓
Sani-Cloth AF3 Germicidal Wipes	✓	✓	✓	✓	NA	✓
Sani-Cloth Bleach Germicidal Disposable Wipes	NA	✓	✓	✓	NA	✓
Sani-Cloth Chlor Wipes	NA	✓	✓	✓	NA	✓
Sani-Cloth HB Germicidal Wipe	NA	✓	✓	✓	NA	✓
Sani-Cloth Plus Germicidal Disposable Cloth	✓	✓	✓	✓	NA	✓
Sani-Cloth Plus	✓	✓	✓	✓	NA	✓

	Monitor screen	Touch screen	Trackball assembly	Gel warmer	Array transducer ports	All other ultrasound system surfaces*
Septiwipes	✓	✓	✓	✓	NA	✓
SideKick Disinfecting Wipes	✓	✓	✓	✓	NA	✓
SONO Ultrasound Wipes	NA	✓	✓	✓	NA	✓
Super Sani-Cloth Germicidal Disposable Wipe	✓	✓	✓	✓	NA	✓
SURFASAFE Premium	✓	✓	✓	✓	NA	✓
Transeptic	✓	✓	✓	✓	NA	✓
Tristel Duo ULT	✓	✓	✓	✓	NA	✓
Tristel Solo for Ultrasound	✓	✓	✓	✓	NA	✓
trophon Companion Cleaning Wipes	NA	✓	✓	✓	NA	✓
Virex II 256	✓	✓	✓	✓	NA	✓
Wet Wipe Ethanol Disinfection with Detergent	✓	✓	✓	✓	NA	✓
WIP'ANIOS Excel	✓	✓	✓	✓	NA	✓
WipeClean Ethanol Disinfection 80%	✓	✓	✓	✓	NA	✓

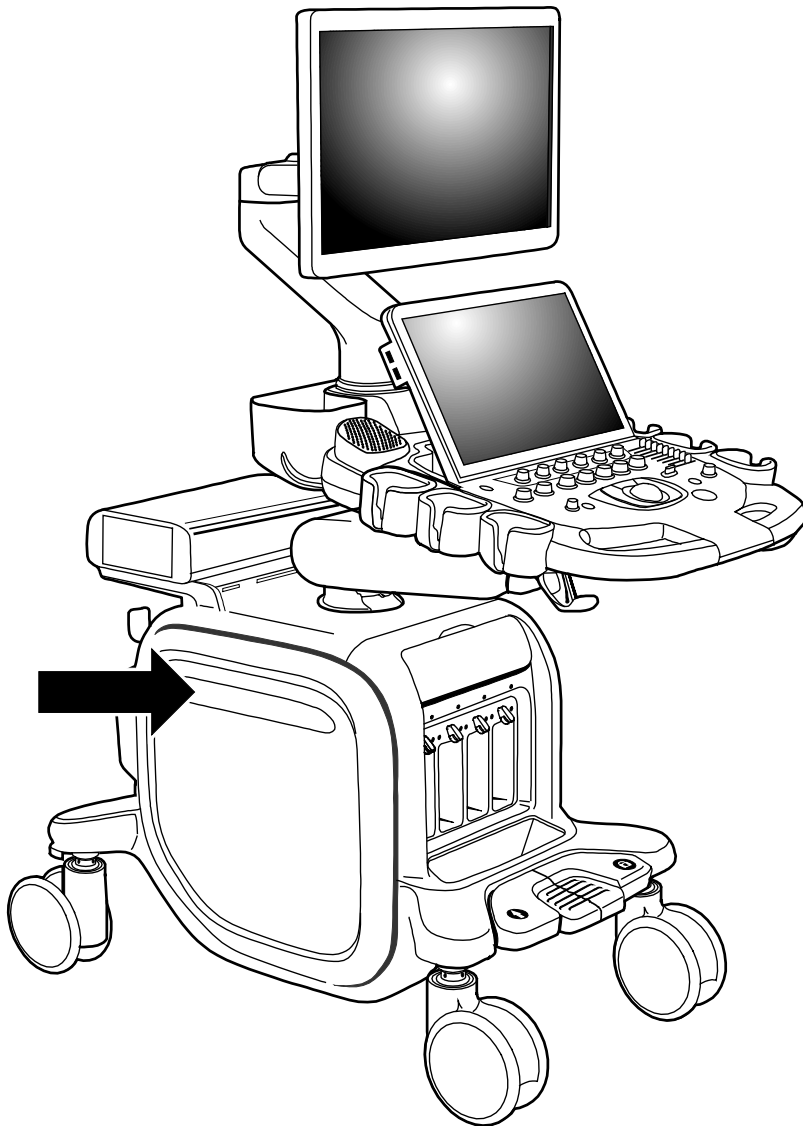
*All other system surfaces include the surfaces not listed in the above table and also include the transducer holders.

✓ = approved

NA = not approved

Cleaning the Air Filter

The ultrasound system has a removable, washable air filter. Check and clean the air filter weekly, or as needed, to maintain proper system cooling.



Example of the location of the air filter.

To remove and clean the air filter:

 **Caution:** Do not scrub, stretch, or bend the filter, or apply heat to the filter, as doing so could damage the filter.

1. Power off the ultrasound system and then unplug the power cord from the power supply (supply mains).
2. Push the air filter tray in to release the locking mechanism and then pull the tray from the system.
3. Rinse the air filter with running water and allow the filter to completely dry.
To hasten drying, you may gently shake the filter, or blot the filter with a clean, lint-free cloth.

 **Caution:** Do not insert the air filter tray into the ultrasound system with a wet filter as this can damage the ultrasound system.

4. Slide the dry air filter tray back into the ultrasound system.
5. Plug the power cord into the power supply (supply mains).

Caring for Documentation and Storage Devices

 **Caution:** Computer viruses on a USB-compatible device can infect the ultrasound system. Check for viruses before connecting the device to the system.

Note: Study data stored directly to a USB device can be lost. Do not use a USB device for permanent data storage.

For information on the care of an optional documentation or storage device, refer to the manufacturer's operating instructions that accompanied the device.

Green Performance Management: Environmental Protection

Siemens Healthineers recognizes its responsibility to minimize the environmental impacts of services, operations, and products. For more information, contact your local Siemens Healthineers representative.

Product Recycling and Disposal

Dispose of this product according to local, state, and regional laws and regulations.

Batteries and electrical and electronic equipment can contain hazardous substances. If released, the hazardous substances can harm people and the environment.

Siemens Healthineers provides disassembly instructions to treatment facilities for the safe and proper removal and recycling of electrical and electronic components in this product. For more information, contact your local Siemens Healthineers representative.

To the extent required by local, state, and regional laws and regulations, Siemens Healthineers has programs for the return of used products. For more information, contact your local Siemens Healthineers representative.

Disposing of the Packaging Materials

Dispose of or recycle the packaging materials according to local, state, and regional laws and regulations.

To the extent required by local, state, and regional laws and regulations, Siemens Healthineers will collect and dispose of packaging materials for this product. For more information, contact your local Siemens Healthineers representative.

Handling and Disposal of Components and Accessories

⚠ WARNING: Observe local, state, and regional laws and regulations for the disposal of the ultrasound system components and accessories.

⚠ WARNING: Bodily fluids on used needles and needle guides can transmit infectious diseases. To eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials, always dispose of the needle and the needle guide according to local, state, and regional laws and regulations.

Component or Accessory	Handling Instructions
Air filter	See also: Cleaning the Air Filter, page 2-33 The air filter is reusable. Replace the air filter if the air filter is damaged in any way. For example, the air filter has a hole or the air filter tray will not fit in the air filter slot.
Bracket for needle guides	The bracket is reusable. Replace the bracket if the bracket is damaged in any way. Refer to the in-box instructions for disposal guidelines for the reusable bracket.
Needle guides	The sterile-packaged needle guide accessories are single-use items. Refer to the in-box instructions for disposal guidelines for the disposable needle guide accessories.
Protective overlay for the control panel	The protective overlay for the control panel is disposable. Replace the protective overlay if the overlay is damaged in any way. For example, if the protective overlay has a hole or does not fit on the control panel, replace the overlay.

Energy Efficient Usage: Energy Conservation

See also: For information on supplying power to the system, refer to Chapter 4 in this manual.

To conserve energy, activate hibernate for the ultrasound system between uses.

When the ultrasound system is not in use, power off the system. Keep the system plugged into the power supply (supply mains). Ensure the circuit breaker (mains switch) on the ultrasound system is in the on position.

For maximum energy conservation when the system is in storage, power off and unplug the system from the power supply (supply mains).

3 Transducer Care and Accessories

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Caring for Transducers

- ⚠ **WARNING:** To minimize the risk of cross-contamination and infectious diseases, clean and high-level disinfect endocavity transducers after each use; clean and sterilize intraoperative transducers after each use.

- ⚠ **WARNING:** To avoid electrical shock, you must visually inspect a transducer prior to use. Do not use a transducer with cracked, punctured, or discolored casing or a frayed cable.

Discoloration Exception: The use of approved cleaners and disinfectants may cause discoloration of the transducer. You can continue to use a transducer discolored due to the use of approved cleaners and disinfectants only.

- ⚠ **WARNING:** Prior to each use, inspect the endocavity or intraoperative transducer for signs of mechanical damage such as cracks, cuts, tears, perforations, or protrusions. Do not use the transducer if the transducer appears damaged in any way. Any damage could cut the patient and compromise the electrical safety of the transducer, causing possible patient or user injury. Contact your local Siemens Healthineers representative.

- ⚠ **WARNING:** During neurosurgical procedures, if a transducer becomes contaminated with tissue or fluids of a patient known to have Creutzfeldt-Jakob disease, the transducer should be destroyed, as it cannot be sterilized.

- ⚠ **WARNING:** When using an endocavity or intraoperative transducer with a CF type applied part, the patient leakage currents may be additive.

- ⚠ **Caution:** Transducers are sensitive instruments – irreparable damage may occur if they are dropped, knocked against other objects, cut, or punctured. Do not attempt to repair or alter any part of a transducer.

- ⚠ **Caution:** To avoid cable damage, do not roll the ultrasound system over transducer cables, and do not wrap the transducer cable around the transducer handle or the transducer connector.

- ⚠ **Caution:** To avoid damage to the transducer, do not use transducer sheaths containing an oil-based coating or petroleum- or mineral oil-based ultrasound coupling agents. Use only a water-based ultrasound coupling agent.

- ⚠ **Caution:** Follow all instructions provided by manufacturers of sterile goods (transducer sheaths) to ensure proper handling, storage, and cycling of all sterile goods.

- ⚠ **Caution:** To avoid damage caused by electrostatic discharge, do not touch the electrical component on the transducer connector.

Take extreme care when handling or storing transducers. They must not be dropped, jarred, or knocked against other objects. Do not allow transducers to come into contact with any sharp-edged or pointed object.

Protective Case

Due to the mechanical sensitivity of transducers, Siemens Healthineers recommends that you always use the transducer case when you ship a transducer or transport it from one place of examination to another. The case is specially designed to protect the sensitive parts of the transducer. Be sure that all parts of the transducer are properly placed inside the case before you close the lid.

Storage

Store transducers in a clean, dry, protected environment. Extreme temperatures or humidity may damage a transducer.

See also: For information on storage temperatures, refer to Appendix A in this manual.

Repair

Siemens Healthineers can only guarantee the safety and performance of transducers serviced by an authorized third-party. Contact your local Siemens Healthineers service representative when your transducer appears to be damaged or malfunctions in any way.

Methods for Cleaning and Disinfecting Transducers

You must observe the required methods for cleaning and disinfecting or cleaning and sterilization before the first use and after each use of a transducer.

Siemens Healthineers defines the methods for cleaning and disinfecting or cleaning and sterilization by classifying the use of the transducer according to the Spaulding Classification scheme observed by the United States Food and Drug Administration (FDA).

Example of Transducers	Use	Minimum Required Method	Classification
- Intraoperative - Laparoscopic	Normally sterile tissue or body space	Cleaning and sterilization	Critical
- Endocavity - Transesophageal	Intact mucous membranes	Cleaning and high-level disinfection	Semi-critical
Non-invasive	Non-intact skin	Cleaning and high-level disinfection	Semi-critical
Non-invasive	Intact skin	Cleaning and low-level disinfection	Non-critical

Important Information

The ultrasound system does not support transducers for the following uses:

- Intraoperative
- Laparoscopic
- Transesophageal

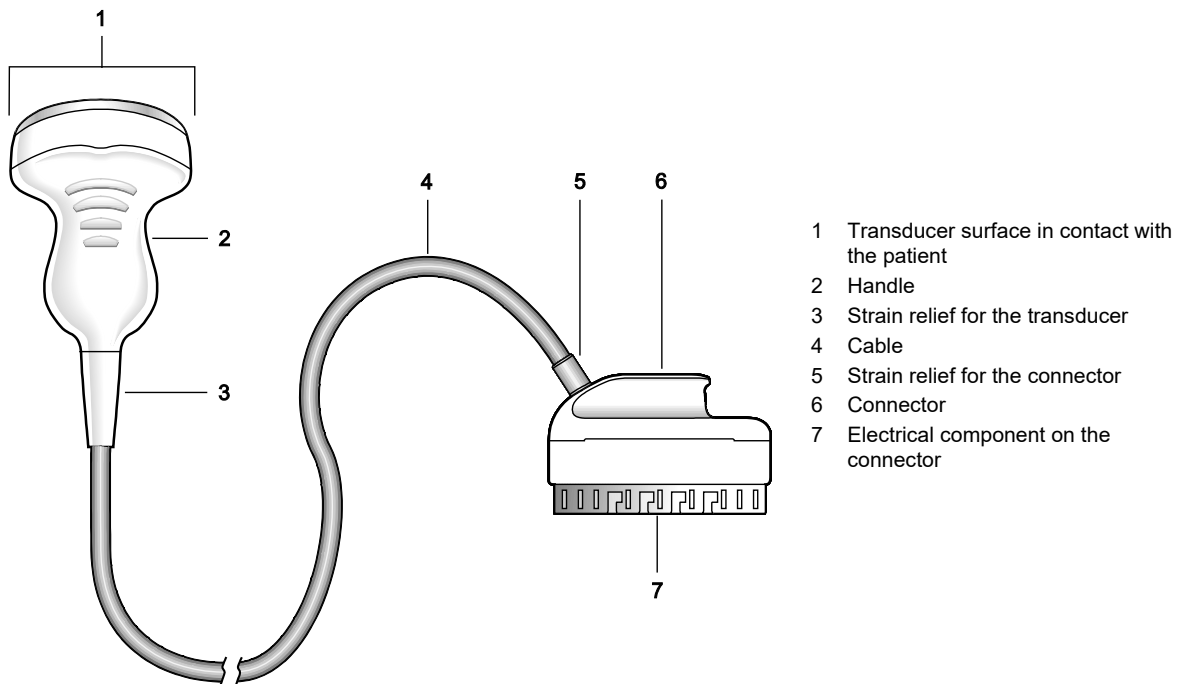
Reprocessing Methods

The transducer cleaning and disinfecting instructions in this chapter were validated for efficacy with the following reprocessing methods:

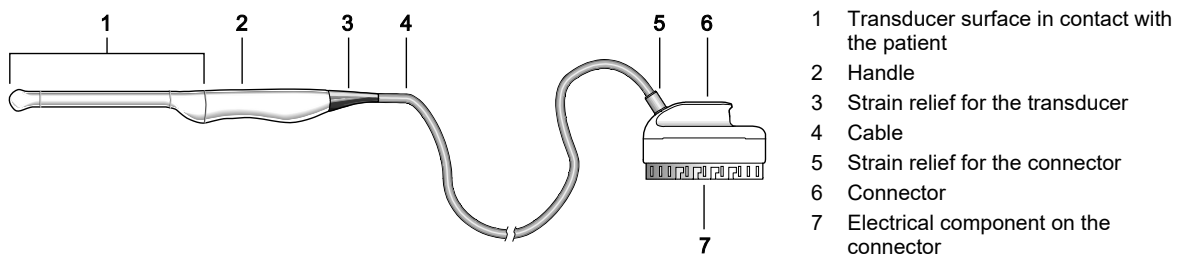
- Cleaning reprocessing methods:
 - Spraying or wiping a transducer
 - Immersing a transducer
- Disinfecting reprocessing methods:
 - Spraying or wiping a transducer
 - Immersing a transducer
 - Use of an automated reprocessing device
- Sterilization reprocessing methods:
 - Use of an automated sterilization system

See also: Contact your customer service representative if you require additional information about reprocessing a transducer.

Examples of Transducer Components



Example of transducer components.



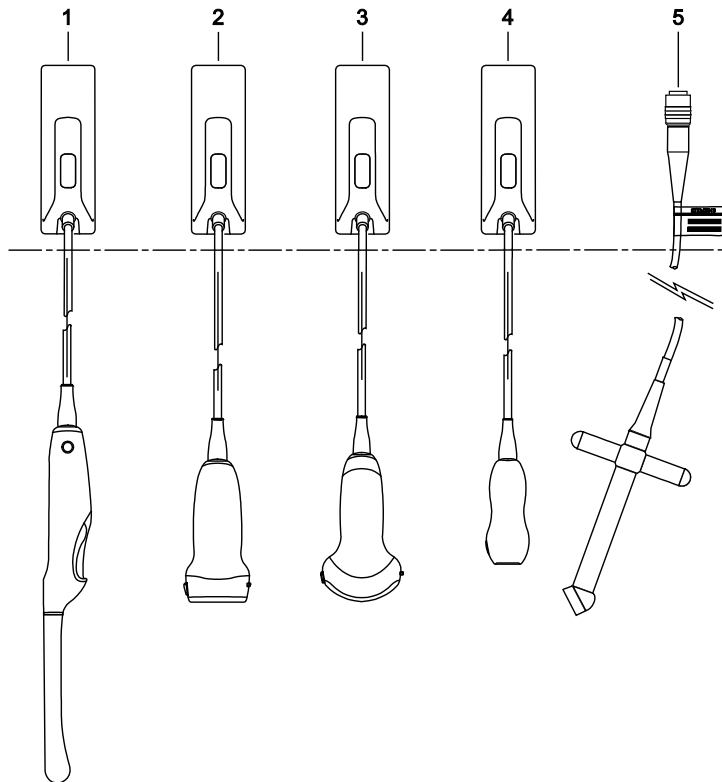
Example of endocavity transducer components.

Immersion Levels

⚠ Caution: To avoid damage to the transducer, observe the immersion levels indicated for each transducer type. Transducers with the protection level IPX8 are indicated by the presence of the "IPX8" symbol on the connector of the transducer.

⚠ Caution: Do not immerse the label located on the cable of the continuous wave transducer.

Note: Transducers meet Ingress Protection level IPX8 of EN 60529 and IEC 60529 to the depth of the immersion line shown in the illustration.



Example of immersion levels.

- 1 Endocavity
- 2 Linear
- 3 Curved
- 4 Phased
- 5 Continuous wave

Cleaning and Disinfecting Transducers

-  **WARNING:** To avoid electrical shock and damage to the system, disconnect the transducer prior to cleaning or disinfecting.
-  **WARNING:** Disinfectants and cleaning methods listed are recommended by Siemens Healthineers for compatibility with product materials, not for biological effectiveness. Refer to disinfectant label instructions for guidance on disinfection efficacy and appropriate clinical uses.
-  **Caution:** Do not sterilize transducers using hot steam, cold gas, or Ethylene Oxide (EO) methods. Before applying any other methods which might be recommended by manufacturers of sterilization equipment, please contact your Siemens Healthineers representative.
-  **Caution:** To avoid damage to the transducer, observe the immersion levels indicated for each transducer type. Do not immerse or allow the connector of a transducer or the strain relief on the connector to become wet.
-  **Caution:** The transducers have been designed and tested to be able to withstand disinfection as recommended by the manufacturer of the disinfectant product. Carefully follow the disinfectant manufacturer's instructions.
-  **Caution:** Do not use abrasive cleaners, organic solvents such as benzene, isopropyl alcohol, or phenol-based substances, cleaners, or disinfectants containing organic solvents to clean or disinfect transducers. These substances can damage the transducers.

Isopropyl Alcohol Exception: Immersing a transducer in isopropyl alcohol can damage the transducer. Only use approved cleaners and disinfectants on the transducer.

You can only use a clean, lint-free gauze pad moistened with isopropyl alcohol to clean the electrical component on the transducer connector.
-  **Caution:** Do not use an abrasive sponge or brush. These materials can damage the transducer.
-  **Caution:** The use of a spray cleaner or disinfectant may force fluid inside the transducer and the ultrasound system. To avoid damage, first remove the transducer from the system and then carefully spray the transducer. Never spray the transducer connector.
-  **Caution:** Prior to cleaning or disinfecting a transducer, you must disconnect and remove the transducer from the ultrasound system. Do not clean or disinfect the transducer on or near the ultrasound system. Unintended contact with approved transducer cleaners and disinfectants can result in severe damage to the ultrasound system components.

Required Task	Location in This Manual
Read and understand the biohazard considerations.	Chapter 2
Perform the steps in the daily checklist, including transducer inspection.	Chapter 2
Read and understand the cleaning and disinfecting information for the ultrasound system.	Chapter 2
Read and understand all transducer-specific warnings and cautions.	page 3-3
Disconnect the transducer.	Chapter 4
Observe the required method of cleaning and disinfecting for the transducer.	page 3-5
Wipe visible soil and contaminants from the transducer immediately after each use.	page 3-9
Clean the transducer.	page 3-10
Disinfect the transducer.	page 3-11
Store the transducer.	page 3-4

Cleaning a Transducer at the Point of Use

Cleaning a transducer immediately after each use prevents soil and contaminants from drying on the surface of the transducer and facilitates cleaning.

To immediately clean a transducer after each use:

1. Disconnect and remove the transducer from the ultrasound system.
2. Remove any transducer accessories from the transducer.
3. Immediately clean the transducer in close proximity to the point of use.
 - a. Moisten a clean gauze pad or lint-free cloth with water or an approved cleaner. Or, use an approved cleaning wipe.
See also: For a list of approved cleaners, refer to page 3-12.
 - b. Carefully wipe the transducer surface intended for contact with the patient. Avoid touching the electrical components on the connector.
4. Perform subsequent cleaning of the transducer according to the next procedure.

Cleaning a Transducer

Cleaning a transducer removes soil and contaminants from the surface of the transducer and prepares the transducer for disinfection.

To clean a transducer:

Prerequisite: The transducer is disconnected and removed from the ultrasound system. Transducer accessories are removed from the transducer, including the transducer sheath.

1. Select an approved cleaner. Follow the cleaner manufacturer's instructions for concentration, temperature, and contact time when cleaning the surface of the transducer.
See also: For a list of approved cleaners, refer to page 3-12.
2. Clean the transducer from the connector to the surface intended for contact with the patient using one of the following cleaning methods. Avoid touching the electrical components on the connector.
 - If immersion is required, keep the transducer connector and the connector strain relief dry while immersing the transducer in an approved cleaner to the level indicated on page 3-7.
 - If wiping is required, carefully wipe the transducer.
 - If spraying is required, do not spray the transducer near the ultrasound system. Never spray the transducer connector.
3. Rinse the transducer according to the cleaner manufacturer's instructions. Keep the electrical components on the connector dry.
Note: If the cleaner manufacturer does not provide rinsing instructions, thoroughly rinse the transducer with deionized water at room temperature.
4. Disinfect the transducer or sterilize the transducer, as required.

To clean the electrical component on the transducer connector:

1. To remove any gel from the electrical component, carefully wipe the electrical component using a lint-free gauze pad moistened with water.
2. To remove any skin oils from the electrical component, carefully wipe the electrical component using a lint-free gauze pad moistened with isopropyl alcohol.
3. Use compressed air to remove particles from the electrical component.

Disinfecting a Transducer

Immediately after cleaning, disinfect a transducer to destroy pathogens and other microorganisms and to prepare the transducer for storage or the next patient exam.

To disinfect a transducer:

Prerequisite: Clean the transducer. Identify the required level of disinfection for the transducer.

1. Select an approved disinfectant for the required level of disinfection. Follow the disinfectant manufacturer's instructions for concentration, temperature, and contact time when disinfecting the surface of the transducer.

See also: For a list of approved disinfectants, refer to page 3-13.

2. Disinfect the transducer from the connector to the surface intended for contact with the patient using one of the following disinfection methods. Avoid touching the electrical components on the connector.
 - If immersion is required, keep the transducer connector and connector strain relief dry while immersing the transducer in an approved disinfectant to the immersion level indicated on page 3-7.
 - If wiping is required, carefully wipe the transducer.
 - If spraying is required, carefully spray the transducer. Do not spray the transducer near the ultrasound system. Never spray the transducer connector.
 - If a reprocessing device is required, use a device compliant with ISO 15883 and follow the reprocessing device manufacturer's instructions.

3. Rinse the transducer according to the disinfectant manufacturer's instructions. Keep the electrical components on the connector dry.

Note: If the disinfectant manufacturer does not provide rinsing instructions, thoroughly rinse the transducer with deionized water at room temperature.

4. Follow the disinfectant manufacturer's instructions for drying the transducer.

Note: If the disinfectant manufacturer does not provide drying instructions, dry the transducer with a clean, lint-free, soft cloth.

5. Store the transducer in a clean, dry, protected environment.

List of Approved Cleaners

See also: For an additional list of approved cleaners, refer to the Cleaners and Disinfectants Addendum.

Note: An approved cleaner may discolor the transducer. There is no associated degradation of imaging performance or transducer reliability.

	Clinell Universal Wipes & Spray	ENZOL	Prolystica 2X Concentrate Enzymatic Presoak and Cleaner	Protex ULTRA Disinfectant Wipes	Transeptic
7L2	✓	✓	✓	✓	✓
10L4	✓	✓	✓	✓	✓
14L5	✓	✓	✓	✓	✓
15L4	✓	✓	✓	✓	✓
18L6	✓	✓	✓	✓	NA
DAX	✓	✓	✓	✓	✓
5C1	✓	✓	✓	✓	✓
9C2	✓	✓	✓	✓	✓
9C3	✓	✓	✓	✓	NA
11M3	✓	NA	NA	✓	NA
18H6	✓	✓	✓	✓	✓
4V1	✓	✓	✓	✓	✓
5V1	✓	✓	✓	✓	✓
8V3	✓	✓	✓	✓	✓
10V4	✓	✓	✓	✓	✓
7VC2	✓	✓	NA	✓	✓
9EC4	✓	✓	✓	✓	✓
9VE4	✓	✓	✓	✓	✓
10EV3	✓	✓	✓	✓	✓
CW2	✓	✓	✓	✓	✓
CW5	✓	✓	✓	✓	✓

✓ = approved

NA = not approved

List of Approved Disinfectants

The Federal Republic of Germany prohibits the use of wipes for disinfection of transesophageal transducers and any transducer used in a semi-critical procedure.

See also: For an additional list of approved disinfectants, refer to the Cleaners and Disinfectants Addendum.

Note: An approved disinfectant may discolor the transducer. There is no associated degradation of imaging performance or transducer reliability.

	CIDEX	CIDEX OPA	gigasept FF (new)	Revital Ox RESERT HLD	Sani-Cloth AF3 Germicidal Disposable Wipes	Sani-Cloth HB Germicidal Disposable Wipe	Super Sani-Cloth Germicidal Disposable Wipe	trophon EPR, NanoNebulant ¹	trophon EPR, Sonex-HL ¹	trophon2, NanoNebulant ¹	trophon2, Sonex-HL ¹
7L2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10L4	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓
14L5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15L4	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA
18L6	✓	✓	NA	✓	✓	✓	NA	NA	NA	NA	NA
DAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5C1	✓	✓	✓	✓	✓	✓	✓	✓ ²	✓ ²	✓ ²	✓ ²
9C2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9C3	✓	✓	NA	✓	✓	✓	NA	NA	NA	NA	NA
11M3	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓
18H6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4V1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5V1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8V3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10V4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7VC2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9EC4	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓
9VE4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10EV3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CW2	✓	✓	✓	NA	✓	✓	✓	NA	NA	NA	NA
CW5	✓	✓	✓	NA	✓	✓	✓	NA	NA	NA	NA

✓ = approved

NA = not approved

¹Indicates a reprocessing device with the approved disinfectant for use. For information about the reprocessing device, refer to the device manufacturer's instructions for use.

²For use only with the following serial numbers of 5C1 transducers: ≥2019XXXX.

Transducer Accessories

⚠ WARNING: Ensure the accessories for a transducer are properly cleaned, disinfected, or sterilized as appropriate before each use to avoid possible patient contamination.

Attachment procedures for the following accessories are presented in this chapter or shipped separately with the device.

Accessory	Curved Array	Linear Array	Phased Array	Endocavity
Disposable transducer sheaths	All	All	All	All
Reusable bracket and disposable needle guides	5C1	7L2	4V1	9EC4
	9C2	10L4	DAX	9VE4
	9C3	14L5		10EV3
		15L4		
		18L6		

See also: For information on using the reusable bracket with a Fusion tracking sensor, refer to Chapter D1 in the Advanced Imaging Manual.

Transducer Sheaths (Transducer Covers)

-  **WARNING:** There have been reports of severe allergic reactions to medical devices containing latex (natural rubber). Health care professionals are advised to identify latex-sensitive patients and to be prepared to treat allergic reactions promptly. For additional information in the U.S.A., refer to FDA Medical Alert MDA91-1.
-  **WARNING:** To minimize the risk of cross-contamination and infectious diseases, a sterile, non-pyrogenic transducer sheath must be in place during procedures requiring sterility.
-  **WARNING:** Only a sterile transducer sheath provides the sterile barrier required for surgical or puncture procedures. To ensure sterility of a procedure, always place a sterile sheath on a transducer, as transducers cannot be sterilized using hot steam, cold gas, or Ethylene Oxide (EO) methods.
-  **WARNING:** After placing the sheath over the transducer, visually inspect the sheath to ensure there are no defects. Do not use the sheath if it has any holes or tears.
-  **Caution:** Siemens Healthineers recommends that you follow all instructions provided by manufacturers of sterile goods (transducer sheaths) to ensure proper handling, storage, and cycling of all sterile goods.

Transducer sheaths are single-use items used to ensure proper acoustic coupling and provide a prophylactic barrier for the intended ultrasound application. Sheaths are available for all transducers. Siemens Healthineers recommends the use of market-cleared transducer sheaths.

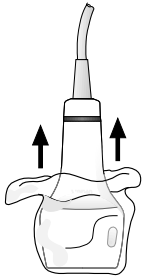
Using a disposable latex transducer sheath on a transducer reduces the possibility of cross-contamination. Always use a protective transducer sheath for endocavity exams, and when scanning an open wound or an area where the skin is not intact.

To place the transducer in a sheath:

Note: For sterile use, follow a sterile technique including use of sterile water and a sterile water-based coupling agent (gel), taking care not to contaminate the sheath.

Before applying any coupling agent (gel) to the sheath, remove any powder in the sheath by rinsing with water.

1. Remove the packaging and unfold the transducer sheath.
2. Apply a water-based coupling agent (gel) to the inside of the sheath and onto the face of the transducer.
3. Hold the transducer by the cable relief and unroll the sheath onto the transducer.
4. Pull the transducer sheath tightly over the face of the transducer to remove wrinkles.
5. Secure the sheath to the transducer housing or cable relief with the adhesive tapes or elastic bands.



Example of placing a sheath over a transducer.

Disposal

While wearing protective gloves, remove the transducer sheath from the transducer. Dispose of the transducer sheath according to local, state, and regional laws and regulations for waste.

Storage

 **WARNING:** Before use, examine sterile goods, such as sheaths, for any material flaws. Some packaging may list an expiration date. Any product showing flaws, or whose expiration date has passed, should not be used.

 **Caution:** Do not store transducer sheaths in direct sunlight, as ultraviolet damage can result.

Latex products have a limited shelf life, and should be stored in a cool, dry, dark place with an ambient temperature between -5°C and +40°C and up to 80% relative humidity at +40°C.

Brackets and Needle Guides

⚠ WARNING: Percutaneous procedures always involve heightened risk to the patient and to the operator handling biopsy needle guides. Clinicians using Siemens Healthineers recommended biopsy devices under ultrasound guidance should be trained and must observe proper needle insertion sequencing with the needle guide in order to avoid undue discomfort and unnecessary risk and injury to the patient.

⚠ WARNING: If a reusable bracket becomes contaminated with tissue or fluids of a patient known to have Creutzfeldt-Jakob disease, then the bracket should be destroyed. Sterilization is not effective against Creutzfeldt-Jakob contamination.

⚠ WARNING: Reusable brackets are packaged non-sterile. Sterilize or high-level disinfect brackets products prior to their first use and after each use.

⚠ WARNING: The disposable needle guides are packaged sterile and are single-use items. Do not use if the packaging indicates signs of tampering or if the expiration date has passed.

Use the reusable bracket to attach needle guides to the transducer.

Refer to the in-box instructions for attachment and care procedures for all needle guide accessories, including information on reprocessing the reusable bracket.

Storage

Always clean and sterilize or high-level disinfect the reusable bracket after each needle puncture or biopsy procedure, before storing the reusable bracket.

4 System Setup

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Initial Setup

 **WARNING:** Do not tip the ultrasound system in any direction more than 10 degrees. This action can cause the system to tip over and create a risk for injury to the user or patient and damage to the system.

 **WARNING:** Do not lean on or apply excessive force to the control panel or monitor. These actions can cause the ultrasound system to tip over and create a risk for injury to the user or patient and damage to the system.

The ultrasound system is initially unpacked and installed by a Siemens Healthineers representative who will verify the operation of the system. Any transducers, documentation and storage devices, accessories, and options delivered with your system are also connected and installed for you.

System Ergonomics

The relationship of repetitive ultrasound scanning with musculoskeletal disorders is indicated in literature for users conducting all types of ultrasound exams. Examples of musculoskeletal disorders include pain and injury to the neck, shoulder, back, wrist, hands, and fingers.

We recommend keeping informed about the trends in literature for continued education regarding scanning techniques, for example, handling a transducer to obtain a quality image and the proper posture to use while scanning a patient.

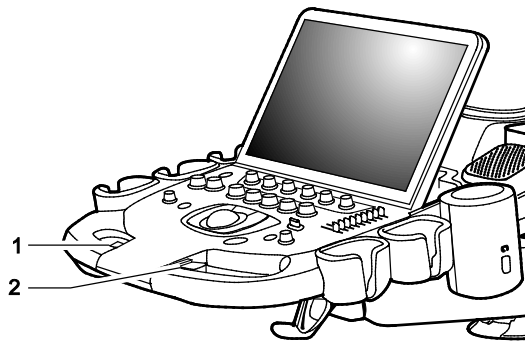
The ultrasound system provides features designed for your ergonomic considerations. You can adjust the height of the control panel to scan from a standing or sitting position and utilize the integrated footrest, adjust the viewing angle of the touch screen and monitor, and reposition the control panel to optimize your scanning environment. For direct access to your frequently-used functions, customize the touch screen buttons. Use the cable hangers to provide support for the transducer cables.

See also: For information about customizing the touch screen, refer to Chapter 1 and Chapter 2 in the System Reference.

See also: Transducer Cable Management, page 4-21

Positioning the Control Panel

⚠ WARNING: Carefully adjust the height of the control panel. A potential pinch point exists below the control panel and the base of the ultrasound system can create a risk for injury to the user.



Example of the adjustment controls for the control panel.

- 1 Rotate adjustment control
- 2 Height adjustment control

To rotate the position of the control panel:

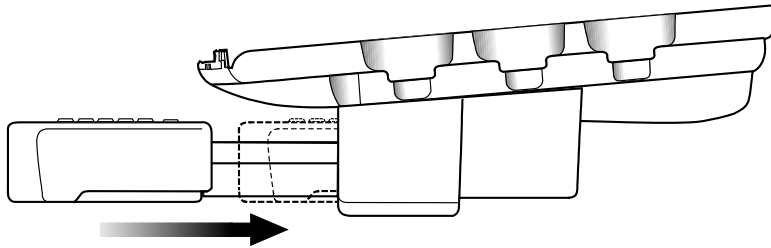
1. Press and hold the rotate adjustment control as you reposition the control panel to the right or to the left.
2. To lock the control panel in the required position, release the control.

To adjust the height of the control panel:

1. Press and hold the height adjustment control and place both hands on the handle to raise or lower the control panel.
2. To lock the control panel in the required position, release the control.

Accessing the Retractable Keyboard

The retractable keyboard is an ultrasound system option, not a standard feature.



Example of the retractable keyboard on the ultrasound system.

To access the keyboard:

- To extend the keyboard, gently pull the keyboard from the ultrasound system.
- To retract the keyboard, gently push the keyboard toward the ultrasound system.

Positioning the Touch Screen

⚠ WARNING: Carefully tilt the touch screen backward. A potential pinch point between the back of the touch screen and the speakers can create a risk for injury to the user.

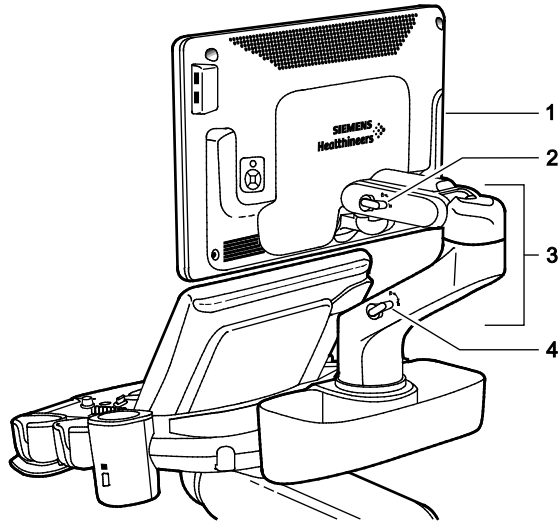
To adjust the viewing angle of the touch screen:

- Gently grasp the top center or the sides of the touch screen and then tilt the touch screen forward or backward.

The touch screen retains the adjusted position.

Positioning the Monitor

⚠ WARNING: Carefully position the monitor to avoid risk for injury to the user. A potential pinch point between the adjustable arm and the touch screen exists when swiveling the adjustable arm to the 180° position. A potential pinch point also exists between the monitor and the adjustable arm when rotating the monitor.



Example of positioning the monitor.

- 1 Monitor handhold
- 2 Lock for securing the top of the adjustable arm in the center position
- 3 Adjustable arm
- 4 Lock for securing the bottom of the adjustable arm in the center position

To reposition the monitor:

1. Rotate the locks into the unlocked position.
2. To adjust the position of the monitor, gently grasp the adjustable arm as you swivel and extend the arm to the left or to the right.
3. To adjust the viewing angle of the monitor, gently grasp the monitor handholds as you tilt the monitor (screen) forward or backward.
4. To position the monitor for transport, rotate the top and bottom adjustable arms to the center position and then rotate the locks into the locked position.

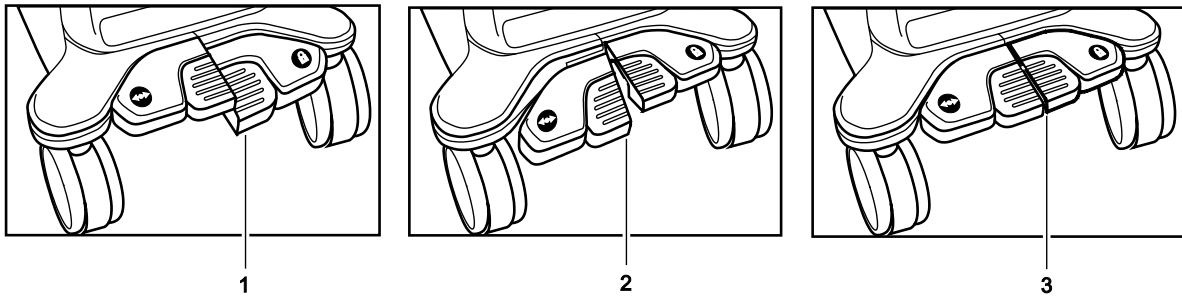
Moving the System

-  **WARNING:** Preparations before moving the ultrasound system are important to minimize potential damage to sensitive components and to avoid safety hazards. Review the moving instructions before moving the system.
-  **WARNING:** Use caution when moving the ultrasound system. Exerting excessive force can cause the system to lose balance, creating a risk for human injury and damage to the system.
-  **WARNING:** Do not park the ultrasound system or leave the system unattended on a slope. Even when the rear wheels are locked, the system may slide down a ramp.
-  **Caution:** Do not lean on the monitor, touch screen, storage bin, or keyboard. Subjecting these components to heavy loads or excessive force can damage the ultrasound system.

The ultrasound system is a mobile unit. Before moving the system to another location, you must prepare for the move by powering off and securing the system.

Securing the Wheels Locks

The ultrasound system has four locking swivel wheels. The front wheels are simultaneously in a locked, locked swivel, or unlocked position. The rear wheels are individually locked or unlocked. Use your foot to unlock and lock the wheel locks on the system.

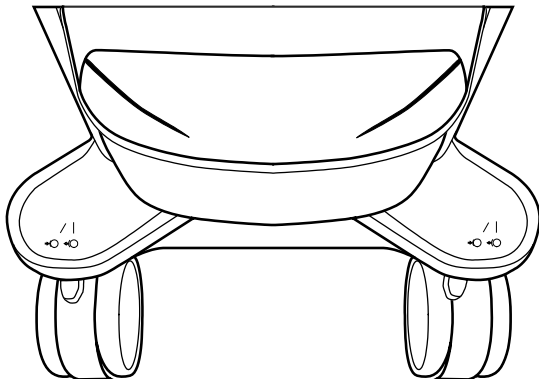


Example of the front wheel locks.

- 1 Locked
- 2 Swivel locked
- 3 Unlocked

To lock the front wheels:

- To prevent the front wheels from rolling, press the wheel lock into the locked position.
- To lock the directional swivel of the front wheels, press the wheel lock in the locked position.
- To roll the front wheels in any direction, raise the wheel lock to the unlocked position.



Example of the rear wheels individually in unlocked and locked positions.

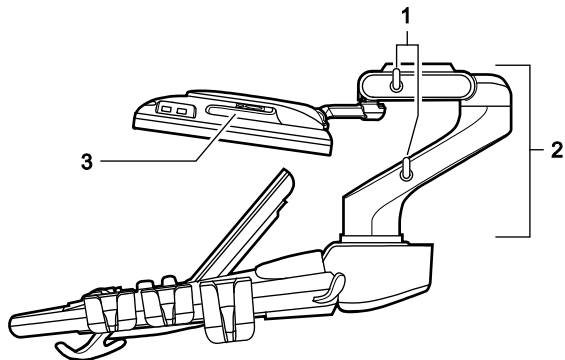
To lock the rear wheels:

- To lock a rear wheel, push the lever to the locked position.
- To unlock a rear wheel, push the lever to the unlocked position.

Securing the Monitor

⚠ WARNING: To avoid damage to the monitor and the potential for personal injury to the user, ensure the monitor does not swivel during transport. Lock the monitor in the transport position before moving the ultrasound system.

Position the monitor into the horizontal position to increase visibility when moving the ultrasound system.



Example of the monitor in locked position for moving the ultrasound system.

- 1 Locks in locked position
- 2 Adjustable arm
- 3 Monitor handhold

To lock the position of the monitor for transport:

1. Rotate the locks on the adjustable arm into the unlocked position.
2. Swivel the adjustable arm to align the monitor to the front, center of the ultrasound system.
3. Rotate the locks into the locked position.
4. Gently grasp the handholds on the monitor and tilt the monitor forward into the horizontal position.

Before the Move

 **Caution:** To prevent damage to the ultrasound system during a move, retract or close any doors and trays on documentation devices or components on the ultrasound system. Ensure components do not protrude from the system.

Always pull on the plug when disconnecting the ultrasound system from the power supply (supply mains) and disconnecting devices from the system. Never pull on cords or cables.

To prepare the ultrasound system for the move:

1. Power off the ultrasound system.
2. Unplug the power cord from the power outlet (mains outlet).
3. Secure the power cord to avoid rolling the system wheels over the cord.
4. Disconnect all devices from the system, including the network cable, off-board peripheral devices, system accessories, and transducers.
5. Place each clean transducer in a protective carrying case for safe transport.
See also: For information on cleaning and disinfecting transducers, refer to Chapter 3 in this manual.
6. Close any doors and trays on documentation devices or components on the ultrasound system and retract the keyboard, if necessary.
7. Ensure the control panel is in the center, locked position.
8. Transport gel and disk media separately.
9. Position and lock the monitor for transport.
10. Swivel lock or unlock the front wheels.
11. Unlock the rear wheels.

During the Move

-  **Caution:** When moving the ultrasound system, protect the system from environmental changes including moisture, winds, dirt and dust, and extreme heat or cold exposure.
-  **Caution:** Avoid moving the ultrasound system on outside surfaces with loose dirt, contaminants, or standing liquids.
-  **Caution:** Care should be taken to minimize shock and vibration of the ultrasound system. Avoid uneven surfaces that contain an abrupt height change or jarring surface irregularities.
-  **Caution:** Do not move the ultrasound system by pushing on the touch screen, monitor, storage bin, or cable hooks. Pushing on these components can cause loss of control and damage the ultrasound system. Use the front handle to move the system.

You can move the ultrasound system from room to room within a facility and reposition the system during an examination. Be careful on inclines and uneven surfaces. The ultrasound system can be moved across pavement and other hardened parking lot surfaces.

Note: You must lock the wheels of the ultrasound system when transporting the system by vehicle. The ultrasound system must be sufficiently anchored to the vehicle floor or walls to avoid shifting or moving during transport.

After the Move

-  **Caution:** Obstructed fans can cause potential ultrasound system overheating, system performance degradation, or failure. Do not allow fabric, such as linens or bedding, or surfaces to impede ventilation around the system. Ensure the system has proper ventilation during operation.
-  **Caution:** Wheel locks are most effective on a level surface. Never park the ultrasound system on an incline greater than five degrees.

To set up the ultrasound system after a move:

1. Position the ultrasound system.
Note: Always position the ultrasound system away from structures, for example, a wall, to provide access to the power panel on the system.
2. Lock the front and rear wheels.
3. Plug the power cord into a hospital-grade or local equivalent power supply (mains outlet).
See also: Plugging in the Ultrasound System, page 4-13
4. Reconnect devices to the system, including the network cable, off-board peripheral devices, system accessories, and transducers.
5. Unlock and position the monitor.
6. Power on the ultrasound system.

Shipping the Ultrasound System

You must prepare the ultrasound system to ship over long distances or transport the system over rough terrain.

To prepare the ultrasound system for shipment:

1. Repack the ultrasound system in the factory packaging and crate.
2. Load the system into a vehicle using a lift gate.
3. Secure the system with cargo straps to prevent lateral movement of the system during transport.
4. Provide shock cushions beneath the system to prevent sudden jarring of the system during transport.

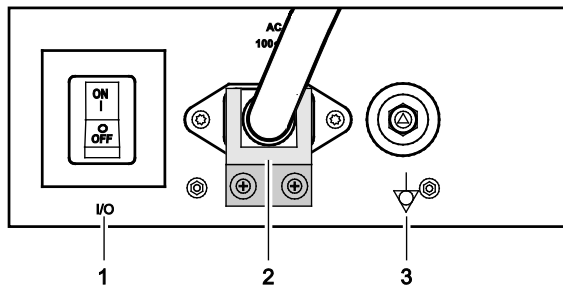
System Startup

⚠ WARNING: Operating the ultrasound system in close proximity to other equipment can cause reciprocal interference. You should observe and ensure normal operation of the ultrasound system and other equipment.

The first step to operating the ultrasound system is to connect the system to a power supply (supply mains).

Accessing the Power Panel

The power panel is located under the ultrasound system and is accessible from the back of the system.



Example of the power panel on the ultrasound system.

- 1 Circuit breaker (mains switch) of the ultrasound system
- 2 Power cord inlet with protective cover for the power cord
- 3 Equipotential terminal

Note: The power cord is attached to the ultrasound system and includes a protective cover for the power cord. If your power cord requires replacement, contact your Siemens Healthineers service representative.

Plugging in the Ultrasound System

⚠ WARNING: Before connecting the ultrasound system to a power supply (supply mains), you must read and understand the Electrical Safety section of Chapter 2 in this manual.

To plug in the ultrasound system:

- 100V~ to 240V~ systems used in the U.S.A.: plug the power cord into a hospital-grade power supply outlet (mains outlet).
- 100V~ to 240V~ systems outside the U.S.A.: plug the power cord into a standard power supply outlet (mains outlet). For example, a "Schuko" outlet (CEE 7/7 standard).

Supplying Power to the Ultrasound System

The ultrasound system is powered on and off using the partial power on/off control located on the control panel.

Illumination of the Control	System Status
Steady blue	Powered on
Flashing blue	Plugged into the power supply (supply mains) and the circuit breaker (mains switch) on the ultrasound system is in the ON position (I)
Off (not lit)	▪ Powered off ▪ Unplugged from a power supply (supply mains) ▪ Circuit breaker (mains switch) on the ultrasound system is in the OFF position (O)

For optimal system performance, power off the ultrasound system every 24 hours.

To power on the ultrasound system:

Prerequisite: Ensure the partial power on/off control is flashing blue.

1. Press the partial power on/off control.
The ultrasound system performs self-diagnostic and calibration tests. The system is ready for use once the tests are successfully complete. If a problem occurs, an error code or message displays on the screen; note the problem and call your Siemens Healthineers service representative.
See also: For information on logging in to the ultrasound system, refer to Chapter 5 in this manual.
2. Visually check the on-screen displays and lighting as indicated in the daily checklist before using the ultrasound system.
See also: For the daily checklist, refer to Chapter 2 in this manual.

To power off the ultrasound system:

1. Press the partial power on/off control.
2. To finish the transfer of images before powering off, tap **Complete Data Transfer**.
3. To restart the system, tap **Restart**.
4. To power off the system, tap **Shut Down**.
5. To cancel the shutdown, tap **Cancel**.
6. To completely disconnect the ultrasound system from the power supply (supply mains), power off the system and then unplug the ultrasound system from the power supply.

Activating Hibernate

Hibernate decreases the time to power on and off the ultrasound system.

When hibernate is activated, the ultrasound system saves and ends the current exam. If transfer of images is in progress, you can choose to delay or continue the transfer before system hibernate. A delayed transfer resumes when the network connection is reestablished.

Note: You can activate hibernate up to 20 times in a 24-hour period.

To activate hibernate:

1. Briefly press the partial power on/off control.
2. To finish the transfer of images before system hibernate, tap **Complete Data Transfer**.
3. Tap **Hibernate**.

Note: Ensure the partial power on/off control is flashing blue.

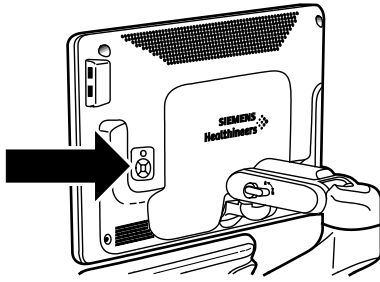
4. Transport the ultrasound system to another location, if necessary.

See also: Moving the System, page 4-7

5. To exit hibernate and power on the ultrasound system, press the partial power on/off control.

Adjusting the Monitor Settings

Use the control panel, not the monitor controls, to optimize the brightness and contrast of images on the image screen.



Example of location of the monitor controls.

To adjust the monitor settings:

1. Press the menu control on the monitor.

MENU



The system displays the menu for approximately 30 seconds. You can press the menu control again to immediately dismiss the menu.

2. To select a menu:

- a. Press the up or down control to select a menu, for example, contrast.



- b. Press the enter control to confirm the menu selection.

ENTER

- c. Press the back control to display the previous menu.

BACK

3. To adjust the selection:

- a. Press the up or down control to select a setting.
- b. Press the enter control to confirm the setting.

4. To exit the menu, press the menu control.

Adjusting the Touch Screen and Control Panel Lighting

You can adjust the brightness of the touch screen, backlighting of the controls on the control panel, and the backlighting of the keys on the retractable keyboard.

To adjust the brightness settings:

1. Tap the configuration button.



2. Tap **Control Panel Settings**.
3. To adjust the brightness of the control panel, rotate the required control.

Selection	Description
Touch Screen	Adjusts the brightness of the touch screen.
Blue Light	Adjusts the brightness of the blue lighting of an active control.
White Light	Adjusts the brightness of the white lighting of an available control.
Keyboard	Adjusts the brightness of the backlighting of the retractable keyboard.

Adjusting the Volume of the Audio

The ultrasound system provides options for audible feedback during acquisition and when using the touch screen.

Use the configuration settings to enable the audible feedback and to adjust the volume of the audible tone.

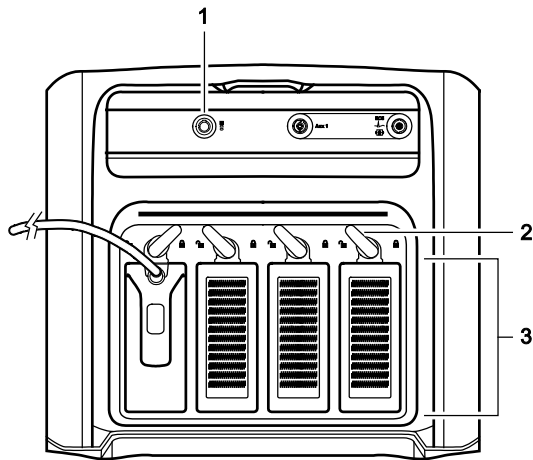
See also: For information on adjusting the Doppler volume, refer to Chapter 8 in this manual.

See also: For information on adjusting the volume during recording, refer to Chapter 13 in this manual.

Connecting and Disconnecting Transducers

⚠ Caution: To avoid damaging the transducer cable, do not pull on the cable to disconnect the transducer. Use the following instructions.

The touch screen displays the names of the transducers connected to the ultrasound system.



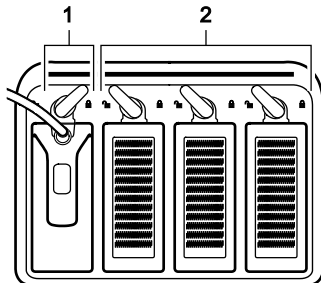
Example of transducer ports.

- 1 Transducer port for continuous wave (pencil) transducers
- 2 Transducer locking lever
- 3 Transducer ports for array transducers

Array Transducers

⚠ Caution: If you encounter resistance when rotating the lever to the locked position, do not force the lever. Carefully follow the instruction to reconnect the transducer to the ultrasound system.

When array transducers are connected or disconnected from the ultrasound system, there may be some resistance due to the shielding material inside the connectors. This is normal for these transducers.



Example of the locked and unlocked positions of the transducer locking lever.

- 1 Locking lever in locked position
- 2 Locking lever in unlocked position

To connect an array transducer:

1. Hold the transducer connector with the cable extending upward from the connector.
2. Insert the transducer connector into the port until you hear an audible click and then rotate the transducer locking lever to the locked position.

Note: If the locking lever is not fully rotated to the locked position, the ultrasound system will not recognize the transducer. Ensure the lever is fully rotated to the locked position.

3. Place the transducer in the transducer holder.

To disconnect an array transducer:

1. Rotate the transducer locking lever to the unlocked position.
2. Firmly grasp the transducer connector and carefully pull the transducer from the transducer port.
3. To keep the transducer on the ultrasound system, place the transducer connector in the storage bin and ensure the transducer is in the transducer holder.

See also: For information on cleaning, disinfecting, and storing transducers, refer to Chapter 3 in this manual.

Continuous Wave Transducers

Use the transducer port for continuous wave (pencil) transducers.

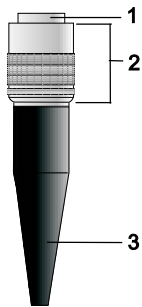
To connect a continuous wave transducer:

1. Align the connector key until the connector fits smoothly into the receptacle.
2. Insert the connector into the continuous wave transducer port until the connector locks in position.

To disconnect a continuous wave transducer:

- Pull on the connector housing ring to disengage the locking mechanism. Continue pulling on the ring to remove the connector from the transducer port.

See also: For information on cleaning, disinfecting, and storing transducers, refer to Chapter 3 in this manual.



Example of a connector on a continuous wave transducer.

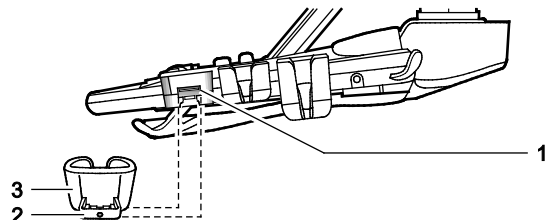
- 1 Connector
- 2 Retractable connector housing
- 3 Transducer cable

Protective Transducer Holders

⚠ Caution: Transducer holders have variable sizes both in depth and diameter. To avoid transducer damage, you must use the holder and insert provided for specialty transducers with small or large diameter handles.

After connecting a transducer to the ultrasound system, place the transducer in the protective holder attached to the control panel. Holders are also available for the coupling agent (gel).

The transducer holders are interchangeable and replaceable.



Example of transducer holders.

- 1 Point of attachment
- 2 Tab
- 3 Holder

To attach a transducer holder:

- Push the tab of the transducer holder into the point of attachment on the control panel until the holder snaps into place.

To remove a transducer holder:

1. Reach under the transducer holder to locate the tab on the holder. The tab extends below the point of attachment on the control panel.
2. Press the tab against the holder as you pull the holder away from the control panel.

Transducer Cable Management

⚠ WARNING: To avoid injury from tripping over a transducer cable, use the cable hangers on the ultrasound system to keep the transducer cable from contact with the floor.

Drape the transducer cable through the cable hangers on the ultrasound system. These hangers provide support for the transducer cables, keep cables off the floor, and help to prevent tangling of the cables when more than one transducer is connected to the system.

Connecting System Accessories

The ultrasound system has connections for system accessories.

Connecting a Footswitch

Attach the footswitch connector to a USB port on the input/output panel located on the back of the system.

Use the configuration settings to assign functions to the footswitch pedals.

Connecting a Smart Card Reader

A smart card reader restricts user access to the ultrasound system by requiring public key infrastructure (PKI) authentication.

Note: For information on the installation and operation of the smart card reader, refer to the manufacturer's operating instructions that accompanied the device.

To prepare the ultrasound system for a smart card reader:

1. Contact your Siemens Healthineers service representative to enable the public key infrastructure (PKI) authentication in the configuration settings of the ultrasound system.
2. Contact an ultrasound system administrator at your facility to connect the ultrasound system to an Active Directory domain controller.

See also: For information on connecting the ultrasound system to a domain controller, refer to Chapter 7 in the System Reference.

To attach the smart card reader to the ultrasound system:

1. Place the smart card reader in an accessible location on the ultrasound system.
2. Connect the USB cable of the card reader to a USB port.

Note: If the card reader is disconnected while the ultrasound system is in use, keep your smart card in the card reader, reconnect the USB cable, and then restart the ultrasound system.

Connecting Physio Cables

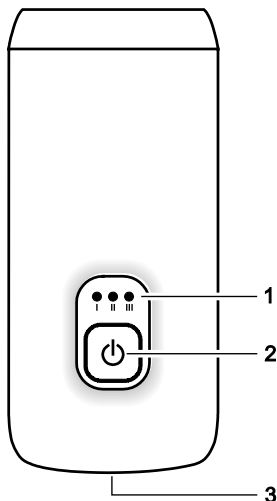
See also: For information on setting up the physiologic feature, refer to Chapter C1 in the Advanced Imaging Manual.

Connecting the Gel Warmer

⚠ Caution: Do not attempt to repair or alter the gel warmer. Contact your local Siemens Healthineers service representative immediately if your gel warmer appears to be damaged or malfunctions in any way.

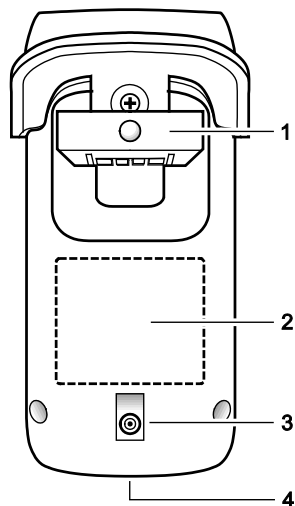
See also: For information on cleaning and disinfecting the gel warmer, refer to Chapter 2 in this manual.

When the ultrasound system and the gel warmer are powered on, the gel warmer continuously heats the bottle of gel inserted into the gel warmer.



Example of the gel warmer, front view.

- 1 Temperature indicator lights
- 2 Power on/off and temperature adjustment control
- 3 Cap for collecting gel spilled from the inverted gel bottle



Example of the gel warmer, back view.

- 1 Tab
- 2 Label
- 3 Power cable connector
- 4 Cap

To attach the gel warmer to the ultrasound system:

1. Remove the transducer holder on the side of the ultrasound system closest to the patient and farthest from the front of the system.
See also: Protective Transducer Holders, page 4-21
2. Attach the gel warmer to the ultrasound system.
 - a. Attach one end of the power cable accompanying the gel warmer to the connector on the back of the gel warmer and then attach the other end of the power cable to the connector on the control panel.
 - b. Push the tab of the gel warmer into the point of attachment on the control panel until the warmer snaps into place.

To use the gel warmer:

1. Press and hold the power on/off control on the front of the gel warmer to power on the gel warmer.

The gel warmer power control illuminates when the gel warmer is powered on.

Note: A flashing light indicates there is a problem with the device. Check the cable connector on the gel warmer and on the ultrasound system. If you continue to experience a problem with the device, contact your Siemens Healthineers service representative.

2. Press the power on/off control to change the temperature setting of the gel warmer.

Selection	Setting	Temperature
I	Lowest	31°C
II	Medium	34°C
III	Highest	37°C

3. Invert the bottle of gel and then insert the bottle into the gel warmer.
4. To power off the gel warmer, press and hold the power on/off control.

Virtual Communication for Remote Assistance

(Available only for ultrasound systems with the service option for remote assistance)

⚠ WARNING: To maintain patient confidentiality, do not use the camera and headset within the patient environment. You must remove the camera from the ultrasound system after the conclusion of a remote service session.

You can use the optional camera and headset from Siemens Healthineers for virtual communication with a Siemens Healthineers service representative.

To begin a remote service session:

Note: If the camera attachment is not installed on the ultrasound system, inform your service representative.

1. Locate the camera and headset for use with the ultrasound system.
2. Initiate the remote assistance session using the phone number provided by your Siemens Healthineers representative.
3. Follow the instructions provided by your service representative to set up the session of virtual communication, including connections of the camera and headset.
The following ports on the ultrasound system are compatible with the camera and headset:
 - All USB ports on the ultrasound system
4. Conclude the remote service session as directed by your representative.
Note: If you do not disconnect from the remote service session, the session ends after 30 minutes of inactivity.
5. Disconnect the camera and headset from the ultrasound system and then store the camera and headset in a location designated by your department.

Connecting the Ultrasound System to a Network

You can connect the ultrasound system to a local area network (LAN) through a wired or a wireless connection. When both wired and wireless connections are configured and available, the ultrasound system assigns priority to the wired connection.

If you are in the process of saving a study to a network location when you disconnect the system from a LAN or change the connection to a LAN, the ultrasound system pauses the process of saving the study and resumes saving the study when you reconnect the system to the LAN.

See also: For information on configuring a wireless network connection, refer to Chapter 5 in the System Reference.

Wired Connection

To connect the ultrasound system to a network through a wired connection:

Prerequisite: The required wired connection on the ultrasound system is configured by your network administrator.

1. Connect the network cable to the Ethernet port located on the back of the ultrasound system below the input/output panel door.
 2. Connect the network cable to the hospital network port.
- The system disconnects from the wireless network, connects to the LAN through the wired connection, and displays an icon indicating a wired connection on the lower right of the image screen.



Example of the icon indicating a wired connection.

Wireless Network Connections

⚠ Caution: Do not connect a wireless adapter or network card to any of the USB ports on the ultrasound system.

⚠ Caution: Use only the wireless configuration described in the System Reference for the ultrasound system.

⚠ Caution: Ultrasound systems operate in the range of radio frequencies (RF) and are susceptible to electromagnetic interference generated by other RF energy sources. To prevent this interference, increase the distance between the ultrasound system and the interfering RF energy source. Other medical devices and systems, including devices and systems in compliance with CISPR emission standards, may cause interference for the wireless connection.

The ultrasound system can send data, such as studies, measurement data, images, and clips, to a network location over a wireless network.

Note: Siemens Healthineers recommends connecting the ultrasound system to wireless networks that use the 5 GHz frequency bandwidth to reduce potential radio interference from devices using the 2.4-GHz frequency.

To connect the ultrasound system to a network through a wireless connection:

Prerequisite: Configure the wireless network connection.

1. Disconnect the network cable from the ultrasound system, if necessary.
The ultrasound system connects to the most recently used wireless network, if the wireless network is secured and detected.
2. To reconnect the ultrasound system to the currently-selected wireless network:
 - a. Tap the additional selections button.



- b. Tap **Reconnect Wi-Fi**.
3. To connect to another detected wireless network:
 - a. Tap the configuration button.



- b. Click **Connectivity & Network**.
 - c. Click **Wireless Network**.
 - d. To enable connections to wireless networks, select the **Enable WiFi** check box, if necessary.
 - e. Click the profile name of a wireless network.
 - f. Click **Connect**.

The ultrasound system connects to the wireless network. An icon indicates the strength of the wireless connection.



Example of the icon indicating the signal strength of a wireless connection.

Note: An "x" on the icon indicates the ultrasound system is not connected to a wireless network.

- g. To view the name of the network and network speed, position the pointer on the icon.
The network speed is in megabits per second (Mbps).

Input/Output Panel Connections

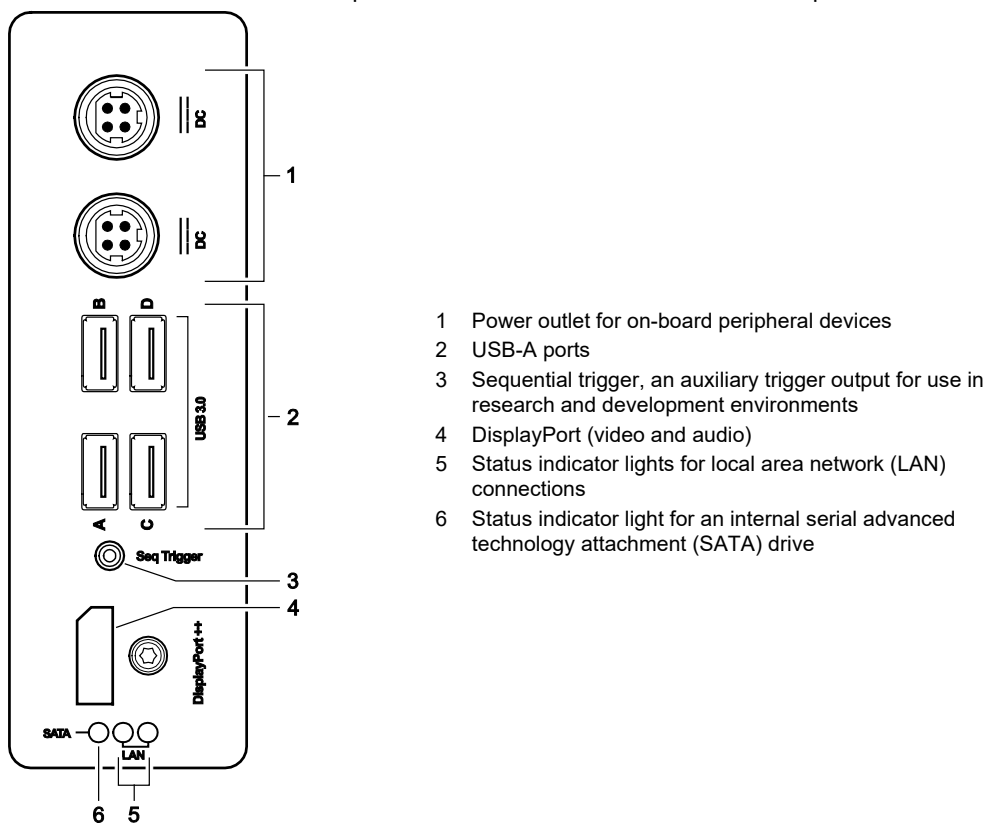
⚠ WARNING: Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN or IEC standards (for example, EN 60950 or IEC 60950 for data processing equipment and EN 60601-1 or IEC 60601-1 for medical equipment). Anyone who connects additional equipment to any of the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1 or IEC 60601-1. Siemens Healthineers can only guarantee the performance and safety of the devices listed in the *Instructions for Use*. If in doubt, consult the Siemens Healthineers service department or your local Siemens Healthineers representative.

See also: For additional information on accessories and options, refer to Appendix A in this manual.

⚠ WARNING: To ensure proper grounding and leakage current levels, it is the policy of Siemens Healthineers to have an authorized Siemens Healthineers representative or approved third party perform all on-board connections of documentation and storage devices to the ultrasound system.

⚠ Caution: To prevent damage to the ultrasound system and peripheral devices, always power off the system before connecting or disconnecting peripheral devices.

The input/output (I/O) panel, an RJ-45 Ethernet (network) port, and lights for service diagnostics are located inside the I/O panel door on the back of the ultrasound system. You can route cables connected to the I/O panel and the Ethernet cable under the I/O panel door.



Example of connections on the input/output panel.

Connecting Peripheral Equipment

⚠ WARNING: Equipment connected to the ultrasound system and in the patient environment must be powered from a medically-isolated power supply (supply mains) or must be a medically-isolated device. Equipment powered from a non-isolated source can result in chassis leakage currents exceeding safe levels. Chassis leakage current created by an accessory or device connected to a non-isolated outlet may add to the chassis leakage current of the ultrasound system.

⚠ WARNING: Non-medical grade report printers cannot be used within a patient environment.

⚠ WARNING: During use of a non-medical grade report printer or when a non-medical grade report printer is connected to the ultrasound system, the ultrasound system cannot in any way be in contact with a patient.

Peripheral devices must be installed on the ultrasound system by an authorized Siemens Healthineers representative or by a Siemens Healthineers approved third party. Any use of other devices with the system will be at the user's risk and may void the system warranty.

To fulfill EN 60601-1 or IEC 60601-1 (Medical Electrical Equipment, Part 1: General Requirements for Basic Safety and Essential Performance) requirements, connection of peripheral equipment to your ultrasound system must adhere to one of the following conditions:

- The peripheral equipment itself is a medical device approved according to EN 60601-1 or IEC 60601-1; or
- Non-medical peripheral equipment approved according to any other EN or IEC standard (EN XXXXX or IEC XXXXX, for example, equipment complying with EN 60950 or IEC 60950) must use the following setup for connection:



Equipotential terminal located on the power panel of the ultrasound system.

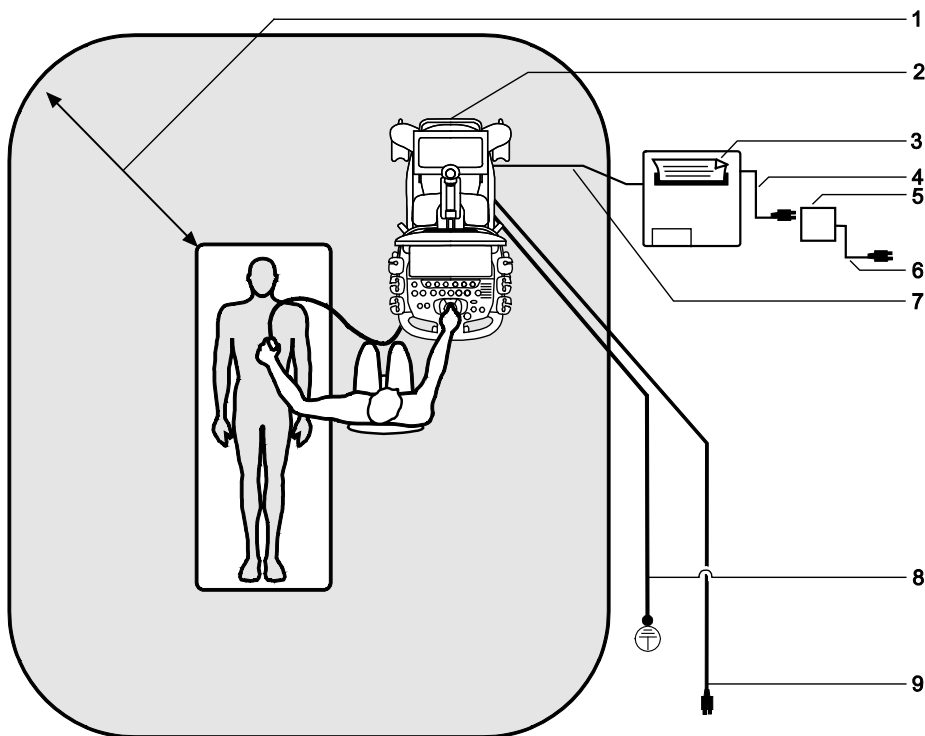
- Connect the ultrasound system to an independent protective ground terminal, with a ground wire connection to the ultrasound system's equipotential terminal. Ensure that the protective ground wire is connected to a qualified protective ground connection independent of the existing system's ground connection (via the power cord).
- The peripheral equipment is located at least 1.5 meters (1.8 meters [6 feet] in Canada and the U.S.A.) outside of the patient environment. A patient environment is defined as the area in which medical examination, monitoring, or treatment of the patient takes place.
- The peripheral equipment is connected to a mains outlet (power outlet) outside the patient environment but still within the same room as the ultrasound system.

For additional information and other possible combinations, refer to the Medical Electrical Equipment Standard EN 60601-1 or IEC 60601-1, Annex I.

Note: The above information is based on current EN 60601-1 or IEC 60601-1 standards. If your country's regulatory standards for medical equipment do not correspond to EN 60601-1 or IEC 60601-1, your local requirements may be different.

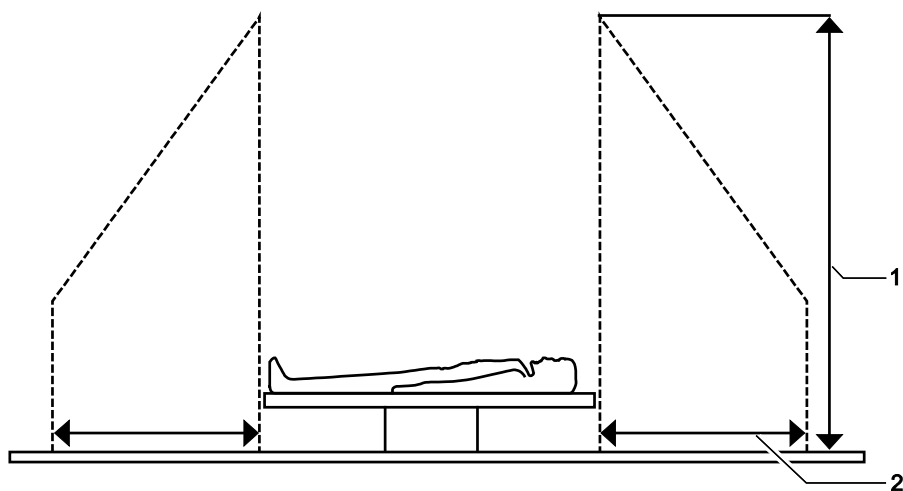
During normal operation, the ultrasound system is designed to display ultrasound images without noise, artifacts, or distortion that cannot be attributed to physiological effects.

Observe the peripheral equipment connections and patient environment shown in the following diagram to support the normal operation of the ultrasound system.



Example of a peripheral equipment connection and patient environment.

1 Patient environment represented by shading, extending exactly 1.5 meters (1.8 meters [6 feet] in Canada and in the U.S.A.) around patient and ultrasound system	5 Medically-approved isolation transformer
2 Ultrasound system	6 Medically-approved isolation transformer power cable
3 Peripheral equipment (EN XXXXX or IEC XXXXX)	7 Printer data cable
4 Peripheral equipment power cable	8 Additional protective ground
	9 Ultrasound system power cord



Example of a peripheral equipment connection and patient environment.

- | |
|---|
| 1 2.5 meters (typical) |
| 2 1.5 meters (1.8 meters [6 feet] in Canada and the U.S.A.) |

On-Board vs. Off-Board Documentation Devices

On-board documentation devices must be installed by authorized Siemens Healthineers representatives.

Off-board documentation devices are user installable.

An off-board documentation device has a data cable connecting it to the ultrasound system but is connected to AC power separate from the ultrasound system. An off-board documentation device is located separately, for example, on a table next to the ultrasound system.

Up to four documentation devices in total may be connected to the ultrasound system. All installed documentation devices may be controlled from the ultrasound system.

The following configurations are supported:

On-board Documentation Devices	Off-board Documentation Devices
2	Up to 2
1	Up to 3
none	Up to 4

See also: For a list of supported on-board documentation devices, refer to Appendix A in this manual.

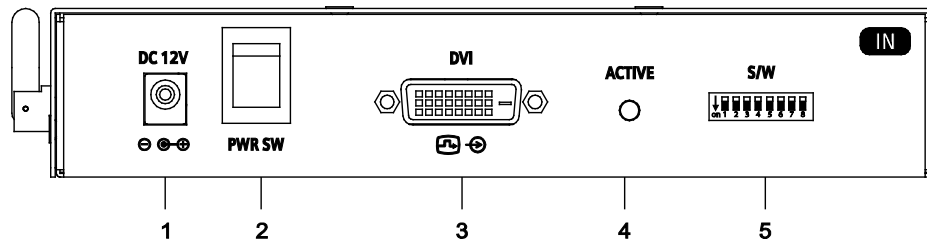
Universal Video Converter

The universal video converter receives digital video signals from the ultrasound system and then converts the digital signals to support secondary viewing devices, for example, an analog monitor or an analog video recording device.

Note: Secondary viewing devices connected to the ultrasound system using the universal video converter are intended for reference only and have not been validated for diagnostic use.

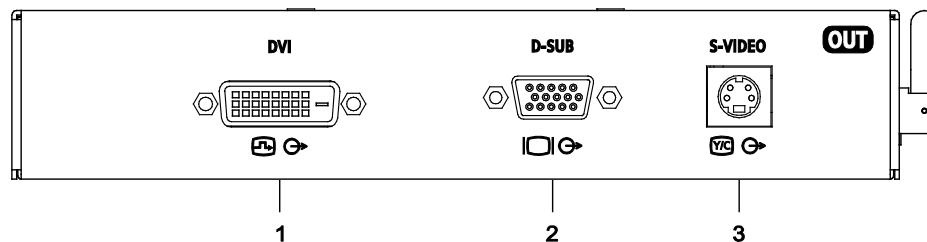
The display of the ultrasound image on the secondary viewing device is determined by the setting of the fifth switch on the universal video converter:

- The off position sends the 1920x1080 full image screen from the ultrasound system to the viewing device.
- The on position sends only an 1024x768 image from the ultrasound system. The image is scaled and cropped for the viewing device.



Example of the input ports and switches on the universal video converter.

- 1 Power cable input
- 2 Power switch
- 3 Digital video interface (DVI) input from the ultrasound system
- 4 Light indicating the universal video converter is active
- 5 Switches for video formats and display settings



Example of the video output ports on the universal video converter.

- 1 Digital video interface (DVI) output
- 2 Video graphics array (S-VGA) output
- 3 S-video output

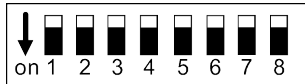
Requires selection of the first video format switch on the universal video converter: PAL or NTSC.

To set up the universal video converter:

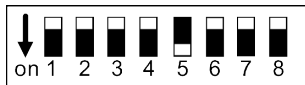
1. Connect the DVI input cable from the ultrasound system to the universal video converter.
2. Connect the power cable to the power cable input on the universal video converter and then plug the AC/DC wall adapter to the power outlet.

Note: Only use the AC/DC wall adapter provided with the universal video converter.

3. Connect the required video cable to a video output port on the universal video converter and then connect the video cable to the secondary viewing device.
4. Power on the ultrasound system, the universal video converter, and the secondary viewing device.
5. Push all switches on the universal video converter upward to the off position.



6. To display the scaled and cropped image on the secondary viewing device, push the fifth switch downward to the on position.



7. To select S-Video output from the universal video converter when a video cable is connected to the S-Video output:
 - For NTSC format, push the first switch upward to the off position.
 - For PAL format, push the first switch downward to the on position.

Installing Software Updates

(Available only when Smart Remote Services is enabled on your ultrasound system)

The remote update handling feature sends software updates to your ultrasound system over a secure network connection. You should install a software update within one week after the update is downloaded. However, you cannot postpone a mandatory security update.

Note: Installing a software update requires a permission level of administrator.

To install or defer software updates:

Prerequisite: Power on the ultrasound system and ensure the system is connected to a wired or wireless network.

1. Click the remote services icon on the lower right of the image screen.



Note: A flashing "!" on the icon indicates the software update is mandatory for the ultrasound system. You cannot postpone a mandatory security update.

2. Click **Description** to view a description of the software update.
3. Select the checkbox to confirm you have read the description.
4. Click **Install**.

The software update description provides the required installation time.

If multiple software updates are ready for installation, the system installs the first update and then prompts you to continue installation of the next update.

5. Click **OK**.

Note: Do not power off the ultrasound system while installation is in progress.

The system may restart multiple times during installation. The system displays a message when installation is complete.

6. To postpone installation of the software update, click **Install Later**.
7. To postpone installation of all software updates, click **Install All Later**.

5 Beginning a Study

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Preventing Unauthorized Access

The security package on the ultrasound system protects patient information from unauthorized access by requiring a user login to access the ultrasound system. It is the responsibility of the ultrasound system administrator at your facility to observe local security policies and implement security settings and policies for the ultrasound system.

You can also restrict user access to the ultrasound system by requiring public key infrastructure (PKI) authentication with a smart card reader.

See also: For information about connecting a smart card reader to the ultrasound system, refer to Chapter 4 in this manual.

You can lock the screen to prevent unauthorized access to patient information. An active screen saver display also locks the screen. A locked screen requires a user login to access the system.

See also: For information about the screen saver, refer to Chapter 1 in this manual.

The ultrasound system administrator also assigns permissions for each user account. Permissions establish data access rights (either no access or full access) that determine whether a user can view studies stored on the system. To understand the permissions assigned to your user account, or if you do not have a user name and case-sensitive password, contact your ultrasound system administrator.

Use the configuration settings to review the permissions for the currently logged-in user account.

Logging In to the Ultrasound System

All users are required to log in to the ultrasound system prior to use.

To	Do This
Log in to the ultrasound system without a smart card	1. Click DomainLogin, if necessary. 2. Enter your user name and password. 3. Click OK.
Log in to the ultrasound system with a smart card	1. Insert your smart card into the smart card reader. 2. Click PKILogin. 3. Enter the personal identification number (PIN) for your smart card. 4. Click OK. 5. Keep your smart card in the card reader during use of the ultrasound system. Note: Removing your smart card from the reader locks the screen to prevent unauthorized access to patient data. To unlock the screen, re-insert your card and continue the exam.
Begin a study without a password	(Available only when enabled in the configuration settings) Prerequisite: Obtain the emergency access user name from your ultrasound system administrator. 1. Click DomainLogin, if required. 2. Enter the emergency access user name. 3. Click OK. The ultrasound system enables limited access to patient data.

To	Do This
Prevent unauthorized access to the ultrasound system	- Click the login button.  - Select Lock System.  The ultrasound system displays the login screen.
Change your password	(Available only when enabled for the currently logged-in user account in the configuration settings) Note: You cannot change the personal identification number (PIN) of your smart card on the ultrasound system. - Click the login button.  - Select Change Password.  - Enter the password information on the change password screen. - Click OK.
Log in as a different user	- For systems with a smart card reader, insert your smart card into the card reader. - Click the login button.  - Select Log in Different User.  - Enter your user name and password. Or, enter the personal identification number (PIN) for your smart card. - Click OK.
Log off the ultrasound system	Note: You can log off the ultrasound system only after an exam is completed. - Click the login button.  - Select Log Off <User Name> (where User Name is your assigned user name).  - For systems with a smart card reader, remove your smart card.

Patient Registration

Use the patient registration form to register a patient or edit information for a previously registered patient.

You can press the key assigned to the print store function to begin a study and then edit the registration information before ending the exam.

Preregistering a Patient

The following information is required for pre-registration: patient's last name, identification number, and date of birth. The ultrasound system displays an asterisk (*) next to incomplete information in the patient registration form.

To preregister a patient:

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. Enter the required patient registration information.
4. Tap **Preregister**.

The patient study is added to the list of scheduled procedures on the worklist server.

Registering a New Patient and Beginning a Study

You can edit patient registration information at any time before ending the patient study.

To begin a study without registering the patient:

- Press the control assigned to the print or store function.
The system saves the registration information as an image.

To register a patient and begin a study:

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. Enter the required patient information.
4. To delete all patient information in the registration form, tap **Clear All**.
5. Tap **Start Study**.
The ultrasound system exits patient registration and activates real-time imaging.
6. Tap the name of the transducer.
7. Tap the name of the exam, if necessary.

Registering a Patient from the Worklist Server

When you select a patient from the worklist server, you can edit the patient registration information and begin the patient study.

Use the configuration settings to assign a default exam, transducer, and exam package to a worklist procedure description.

To register a patient from a worklist server:

Prerequisite: Connect the ultrasound system to a Hospital Information System/Radiology Information System (HIS/RIS) server, configured for Modality Performed Procedure Step (MPPS).

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. Click **Worklist**.
The ultrasound system displays a list of patient studies saved to the worklist server.
4. To select a different worklist server connected to the ultrasound system, select the server name.
5. To refresh the list of patients, click **Refresh**.
6. To search for a patient, enter the search criteria for the patient name, identification number, or accession number.
The system filters the list of patients as you enter the search criteria. The search is not case-sensitive.
7. To search for a patient on a different worklist server, select a predefined search option:
 - **Patient ID** filters studies by the patient identification number.
 - **Last name** filters studies by the patient's last name.
 - **First name** filters studies by the patient's first name.
8. Click the server search icon and then search for a patient.


The system displays the files matching your search criteria.
9. Click the name of the patient.
10. Edit the study information, for example, the name of the exam, if necessary.
11. Tap **Start Study**.
12. To exit without beginning the patient study and search for a different scheduled procedure, tap **Cancel**.

Selecting a Patient from the Local Database

When you select a patient from the local database on the ultrasound system, you can begin a new study for the patient or review or insert images and clips for a stored patient study.

To select a patient from the local database:

Prerequisite: Import the patient study stored on an external storage device to the local database on the ultrasound system.

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. Click **Local Database**.
The system displays a list of patients saved to the local database on the ultrasound system.
4. To search for a patient, enter the search criteria for the patient name, identification number, or accession number.
The system filters the list of patients as you enter the search criteria. The search is not case-sensitive.
5. Click the name of the patient.
6. To begin a new patient study, tap **New Study**.
 - a. Edit the study information, if necessary.
 - b. Tap **Start Study**.
7. To review a patient study, tap **Load to Review**.
8. To exit without selecting the patient study and search for a different patient, tap **Cancel**.

Patient Registration Form Selections

The patient registration form contains general and exam-specific information. The exam information entered in the patient registration form is not copied to a new study for the patient.

Selection	Description
Patient	---
Last Name	Patient's last name. If a last name is not entered, the ultrasound system generates the name Unknown. The patient name (first, middle, and last names combined) is limited to 64 characters.
First Name	Patient's first name.
Middle Name	Patient's middle name.
Patient ID	Identification number for the patient. If an identification number is not entered, the system generates a unique identifier starting with the system date and time. The identification number is limited to 64 characters. If there is not enough space for the entire number to display on the image screen, the number is appended with three dots (...).
Date of Birth	Patient's date of birth. Enter the month, day, and year in the format specified in the configuration settings. If a date of birth is not entered before the end of the study, the ultrasound system generates the date of birth 11/18/1858, but does not display this date on the form.
Age	The system calculates and displays the patient's age based on the patient's date of birth.
Gender	Patient's gender. If no gender is selected, the ultrasound system assigns gender based on the exam: ▪ Female for the obstetric, early obstetric, and gynecological exams ▪ Male is not assigned for any exams ▪ Other for all exams other than obstetric, early obstetric, and gynecological exams

Selection	Description																																						
Height	Patient's height.																																						
Weight	Patient's weight.																																						
BP	Patient's blood pressure, in mmHg.																																						
BSA	(Available only for cardiac exams) The ultrasound system calculates the patient's body surface area (BSA) in m ² based on height and weight entries.																																						
Institution	---																																						
Institution Name	Name of the institution.																																						
Performing Physician	Physician's name.																																						
Referring Physician	Referring physician's name.																																						
Operator	Your initials or other identifying information.																																						
Exam	List of system and user-defined exams.																																						
	<table> <tr> <td>General</td><td>General</td></tr> <tr> <td>Abd-Difficult</td><td>Abdomen, difficult</td></tr> <tr> <td>Abdomen</td><td>Abdomen</td></tr> <tr> <td>Arterial</td><td>Arterial</td></tr> <tr> <td>Breast</td><td>Breast</td></tr> <tr> <td>Cardiac</td><td>Cardiac</td></tr> <tr> <td>Carotid</td><td>Cerebrovascular</td></tr> <tr> <td>Early OB</td><td>Early obstetric</td></tr> <tr> <td>Fetal Echo</td><td>Fetal echo</td></tr> <tr> <td>GYN</td><td>Gynecological</td></tr> <tr> <td>MSK</td><td>Musculoskeletal</td></tr> <tr> <td>Neonatal Head</td><td>Neonatal head</td></tr> <tr> <td>OB</td><td>Obstetric</td></tr> <tr> <td>Prostate</td><td>Prostate</td></tr> <tr> <td>Superficial</td><td>Superficial musculoskeletal</td></tr> <tr> <td>TCI</td><td>Transcranial imaging</td></tr> <tr> <td>Testis</td><td>Testis</td></tr> <tr> <td>Thyroid</td><td>Thyroid</td></tr> <tr> <td>Venous</td><td>Venous</td></tr> </table>	General	General	Abd-Difficult	Abdomen, difficult	Abdomen	Abdomen	Arterial	Arterial	Breast	Breast	Cardiac	Cardiac	Carotid	Cerebrovascular	Early OB	Early obstetric	Fetal Echo	Fetal echo	GYN	Gynecological	MSK	Musculoskeletal	Neonatal Head	Neonatal head	OB	Obstetric	Prostate	Prostate	Superficial	Superficial musculoskeletal	TCI	Transcranial imaging	Testis	Testis	Thyroid	Thyroid	Venous	Venous
General	General																																						
Abd-Difficult	Abdomen, difficult																																						
Abdomen	Abdomen																																						
Arterial	Arterial																																						
Breast	Breast																																						
Cardiac	Cardiac																																						
Carotid	Cerebrovascular																																						
Early OB	Early obstetric																																						
Fetal Echo	Fetal echo																																						
GYN	Gynecological																																						
MSK	Musculoskeletal																																						
Neonatal Head	Neonatal head																																						
OB	Obstetric																																						
Prostate	Prostate																																						
Superficial	Superficial musculoskeletal																																						
TCI	Transcranial imaging																																						
Testis	Testis																																						
Thyroid	Thyroid																																						
Venous	Venous																																						

Selection	Description
Protocol	List of workflow protocols. A protocol is a predefined checklist that guides you through a clinical workflow. ▪ Breast ▪ Cardiac ▪ Cardiac Advanced ▪ Carotid ▪ OB (obstetric) ▪ User-defined protocols The system activates the first view of the protocol when you begin the exam.
Requested Procedure	List of Modality Performed Procedure Step from a Hospital Information System/Radiology Information System server.
Request ID	Identification code for the procedure in the imaging service request. An imaging service request identifies attributes that are common among the requested procedures. Typically generated by a Hospital Information System/Radiology Information System server. The identification number is limited to 16 characters.
Accession No	Identification number indicating the sequence of the current study as related to other studies for this patient. Used for billing purposes. Typically generated by a Hospital Information System/Radiology Information System server. The identification number is limited to 16 characters. An accession number is required for sending data to a Nuance report template.
Comments	Information describing the symptom or particular circumstance that indicates the advisability or necessity of a specific medical procedure.

Patient History

(Available for the following exams: obstetric, early obstetric, fetal echo)

- Modifying the date of the last menstrual period or the date of conception updates the estimated date of delivery and clinical age.
- Modifying the estimated date of delivery updates the clinical age.
- Modifying the clinical age updates the estimated date of delivery.

Selection	Description
History	---
LMP	Date of last menstrual period
DOC	Date of conception
EDD	Estimated date of delivery Calculation of the date is based on entries for last menstrual period or date of conception and/or estimated fetal age.
Clinical Age	Calculation of the estimated fetal age in weeks and days is based on entries for last menstrual period, date of conception, or estimated date of delivery.
No. Fetuses	For multiple fetuses, select the number of fetuses to enable the multiple gestation analysis capability.
Gravida	Patient's history of pregnancies.
Para	Enter the number for each selection.
Aborta	The entries in these fields are transferred to the patient report, but do not display on the image screen.
Ectopics	
OB History	Enter growth data for use in the growth analysis graph (growth curves) on the obstetric report. Includes previous obstetric measurements. See also: For additional information about entering growth data for the obstetric exam, refer to Chapter 10 in this manual.
Interval Growth	Calculation of the growth rate is based on values entered in the obstetric history.

Customizing the Patient Registration Form

You can customize the display of patient information on the patient registration form.

To customize the patient registration form:

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. To show or hide the list of patient studies, click the show hide button.



Note: The ultrasound system hides the list of patient studies during an exam.

4. To sort patient data alphabetically, click the title of the column in the list of patient studies.
5. To show or hide information in the patient registration form, click a selection:
 - **Long Form** displays all information.
 - **Short Form** displays the following patient information: last name, identification number, date of birth, gender, age, and exam.

Editing Patient Registration Information

During a patient study, you can display the patient registration form to edit patient registration information or select a different exam or protocol. You can also select a different transducer and exam at any time.

Use the configuration settings to restrict editing for the following information: patient's last name, identification number, and date of birth.

To edit registration information during an exam:

1. Tap **Patient**.
2. Click **Correct**.
3. Edit the information in the patient registration form.
4. To confirm the edits and continue imaging, tap **OK**.
5. To continue imaging without saving the edits, tap **Cancel**.

Selecting a Different Exam and Transducer

An exam consists of a set of optimized imaging parameters and settings and a compatible transducer.

Use the configuration settings to enable gesture detection for selecting the following transducers:

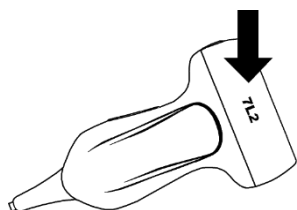
7L2, 10L4, 14L5, 15L4, 18L6, DAX, 5C1, 9C2, 9C3, 7VC2, 5V1, 9EC4, 9VE4, 10EV3

To select a different exam and transducer during an exam:

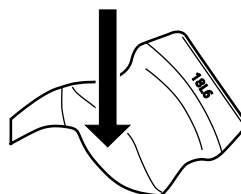
Prerequisite: The transducer is connected to the ultrasound system.

1. Tap the name of the transducer on the touch screen. Or, for transducers with gesture detection enabled, tap the transducer name located on the transducer or double-tap the handle of the transducer.

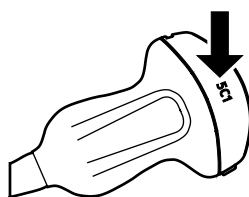
Note: Avoid tapping the surface of the transducer intended for contact with the patient.



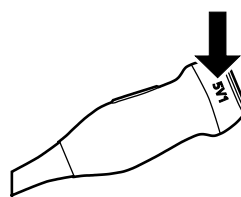
Example of the tap location on a linear array transducer.



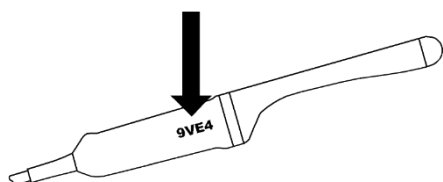
Example of the tap location on the 18L6 transducer.



Example of the tap location on a curved array transducer.



Example of the tap location on a phased array transducer.



Example of the tap location on an endocavity transducer.

2. Tap the name of the exam.

Restarting an Existing Study

You can append an existing study during a limited period of time.

To restart an existing study:

Prerequisite: The patient study is stored on the local database on the ultrasound system.

1. Tap **Patient**.
2. Tap **Patient Registration**, if necessary.
3. Click **Local Database**.
4. Click the name of the patient.
5. Tap **Append Study**.
6. Edit the study information, if necessary.
7. Tap **Start Study**.

The system updates the patient study with images and clips, and updates calculations with additional measurement values.

Selecting an Exam Package

An exam package includes exam-specific measurement labels and annotations. You can select measurement labels and annotations from any exam package without changing the patient exam.

To select an exam package:

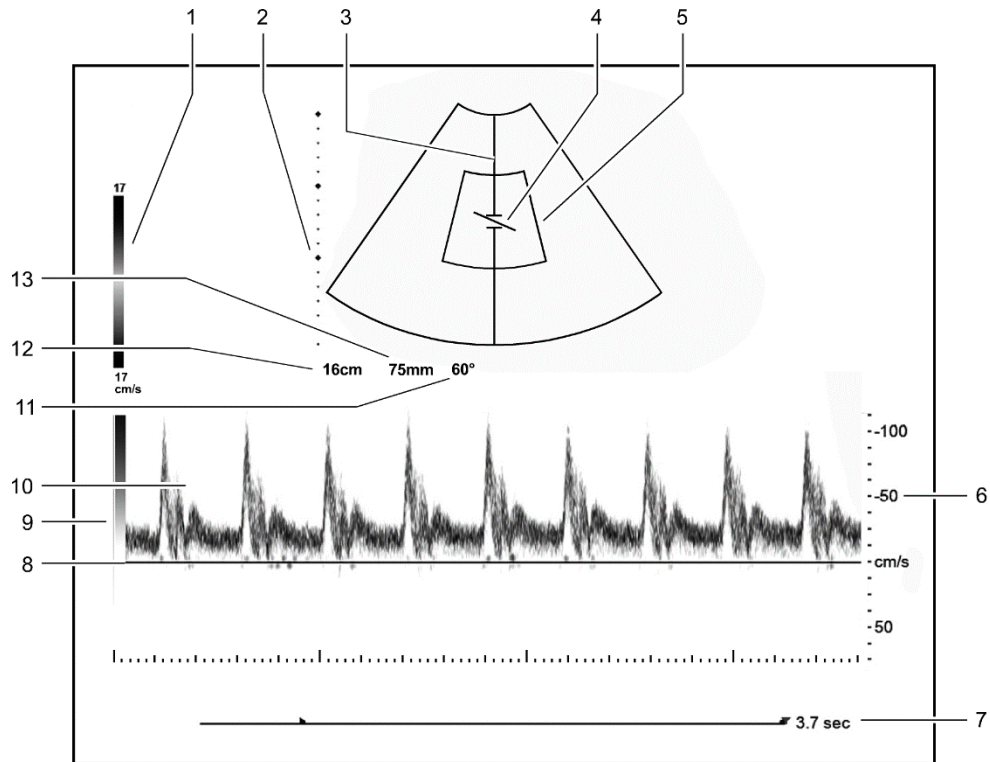
Prerequisite: Activate the measurement function or the annotation function.

1. Tap **Exam Package**.
2. Tap the required selection:

Selection	Description
General	General
Abdomen	Abdomen
Breast	Breast
Cardiac	Cardiac
Carotid	Cerebrovascular
Early OB	Early obstetric
Fetal Echo	Fetal echo
GYN	Gynecological
LEA	Peripheral vascular arterial, lower extremity
LEV	Peripheral vascular venous, lower extremity
MSK	Musculoskeletal
Neo Head	Neonatal head
OB	Obstetric
Ped Hip	Pediatric hip
Pediatric Hip	Pediatric hip
Pediatric Abdomen	Pediatric abdomen
Pelvis	Pelvis
Penile	Penile
Prostate	Prostate
Renal	Renal
TCl	Transcranial imaging
Testis	Testis
Thyroid	Thyroid
UEA	Peripheral vascular arterial, upper extremity
UEV	Peripheral vascular venous, upper extremity

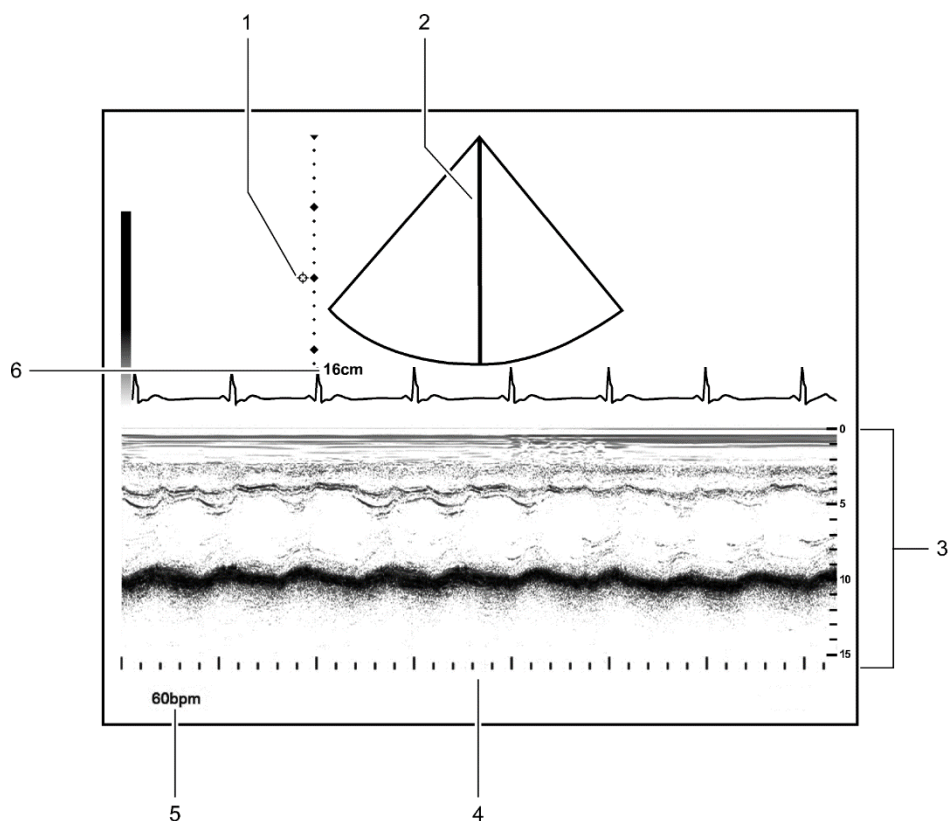
Activating an Operating Mode

You can activate combined mode imaging. To assign priority to an operating mode during combined mode imaging, tap the mode on the touch screen.



Example of 2D-mode with Doppler and color imaging.

1 Color bar	8 Doppler baseline
2 Depth scale	9 Gray bar
3 Doppler cursor	10 Doppler spectrum
4 Doppler gate and Doppler angle indicator	11 Doppler angle
5 Color region of interest	12 2D depth
6 Doppler scale	13 Pulsed wave Doppler gate depth
7 CINE bar and current frame indicator	



Example of 2D-mode with M-mode imaging.

- 1 Focal zone markers
- 2 M-mode cursor
- 3 M-mode sweep with depth scale
- 4 Time scale
- 5 Heart rate
- 6 2D depth

To activate an operating mode:

1. Press the control on the control panel. For example, press **C** to activate color imaging.
Note: If the system is configured to display the Doppler or M-mode cursor before activating the Doppler spectrum or M-mode sweep, adjust the position of the cursor and then press the required control again.
2. To deactivate all operating modes except 2D-mode, press **2D**.
3. To assign priority to an operating mode during combined mode imaging, tap the mode on the touch screen. For example, tap the **Color** tab to assign priority to color imaging during 2D imaging with color.

2D-mode Overview

2D-mode indicates brightness or two-dimensional gray scale imaging. You can display dual 2D-mode images, select transducer-dependent image formats, and adjust imaging parameters and settings for the active image.

To	Do This
Activate dual display format	1. Tap Dual. The system displays one real-time image and one frozen image orienting from the same acquisition in a side-by-side format. 2. To alternate the active image, press UPDATE.
Activate live dual display format	1. Tap Live Dual. The system displays two real-time images from the same acquisition in a side-by-side format. Both images display the active compounding and universal imaging settings. 2. To exit live dual display format, tap Live Dual.

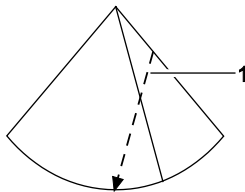
Doppler Overview

Doppler displays a 2D image and a Doppler spectrum. The cursor represents the acoustic line along which the sample volume or the Doppler gate is placed for gathering Doppler information. The system supports both pulsed wave and continuous wave Doppler.

M-mode Overview

M-mode displays a 2D image and an M-mode sweep. The cursor represents the acoustic line along which the M-mode information is gathered.

During cardiac exams, use Anatomical M-mode to view an M-mode sweep based on the patient's anatomy and independent of transducer orientation. You can rotate and reposition the anatomic M-mode cursor to align with the patient's anatomy.



1 Example of the anatomic M-mode cursor.

Color Flow Overview

During Color imaging, the system applies color to indicate velocities of blood flow in a defined region of interest (ROI) within a 2D image.

- Color mode applies color to the velocities and directions of blood flow within the ROI.
- Power mode applies color to the energy measurement generated by the blood flow within the ROI.

Acoustic Streaming with Cysts

 **WARNING:** Acoustic streaming may occur in fluid filled cysts under certain conditions, for example, when it is necessary to repetitively image a fluid filled cyst with long ultrasound pulses. To verify that flow inside of a cyst is actually acoustic streaming, use spectral Doppler with a large gate and low scale and filter settings and move the sample volume around the inside of the cyst.

Acoustic streaming is a well-known physical phenomenon that can occur while imaging fluid filled cysts. Under typical imaging conditions, the color flow and Doppler scale and filter settings are set too high to see the low velocity acoustic streaming, however, physical artifacts may be generated under the following conditions:

- Long ultrasound pulses are repetitively used to image a fluid filled cyst about one centimeter or larger.
- The fluid in the cyst has low viscosity.
- The center of the cyst is located near the elevation focus of the transducer.
- The pulsed repetition frequency (PRF) setting is low. (Acoustic streaming flow is typically visible between one and two centimeters per second.)
- The wall filter setting is low. (Acoustic streaming velocities are usually set by filters.)

You can confirm the flow inside of a cyst is acoustic streaming by using a large gate and low scale and filter settings and then moving the sample volume inside the cyst.

Note: Flow away from the transducer is visible at multiple locations throughout the center of the cyst if it is acoustic streaming. It is more difficult to generate acoustic streaming near the edge of the cyst.

Volume Imaging Overview

See also: For information on volume imaging, refer to Chapter A7 in the Advanced Imaging Manual.

Capturing Images and Clips

When you capture an image or clip, the system saves the data to the ultrasound system and displays a thumbnail of the image or clip in the thumbnail panel. The thumbnail includes an assigned number.

Use the configuration settings to enable the display of patient information on a saved or printed image or clip.

When you select a thumbnail during imaging and review, the system displays a blue border around the image and around the thumbnail.

To	Do This
Capture an image	Press IMAGE. Or, press the control assigned to the store function. The system displays an icon on the image. 
Capture a clip	Press CLIP. Or, press the control assigned to the store function. The system displays an icon on the image. 
Display the image in full-screen format	- Tap the additional selections button.  - Tap Full Screen. The full-screen format increases the size of the image to hide the thumbnail panel and patient banner.
View additional thumbnails	- Click the page down button to view thumbnails not currently visible on the screen.  - Click the down button to display the next thumbnail, one at a time. 
Delete an image	- Select a thumbnail. - Click Delete.  The system displays a red icon on the thumbnail of the image. The thumbnail remains in the thumbnail panel until the images are deleted from the ultrasound system. The ultrasound system deletes the images marked for deletion at the end of the exam.

To	Do This
Show or hide the patient banner	1. Tap the additional selections button.  2. Tap Hide Banner. The system also hides any patient information in the imaging parameters.
Lock the touch screen	1. Tap the additional selections button.  2. Tap Lock Screen. 3. To unlock the screen, press FREEZE.
Adjust the settings for clip capture	1. Tap Clip Length and then select a setting. 2. Tap Capture Type and then select a setting. – Prospective acquires a clip of the newly acquired images – Retrospective acquires a clip of the previously acquired images

Completing a Patient Study

You can end an exam at any time.

Note: Disable the biopsy function prior to ending the exam.

To end the current patient examination:

1. Tap **End Exam**.
2. To end the exam, tap **OK**.
The system deletes all images marked for deletion. If a protocol is in progress when you end the exam and you have not archived the protocol, all skipped views in the protocol and all images marked for deletion are also deleted.
3. To continue the exam, tap **Cancel**.

6 Workflow Protocols

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Overview

A workflow protocol is a pre-defined checklist that guides you through a clinical workflow. The protocol consists of one or more protocol views. For example, a protocol view is an image or clip and can include measurements and annotations. When you activate a protocol, the protocol views display in the thumbnail panel.

Use the configuration settings to configure protocols or create a user-defined protocol.

Activating Protocols

You can activate a protocol from the patient registration form or during imaging.

To activate a protocol:

- To activate a protocol during patient registration, select a protocol from the patient registration form.

The ultrasound system activates the first protocol view when you complete patient registration.

- To activate a protocol during imaging:
 - a. Tap **Workflow**.
 - b. Tap **Protocols** and then tap the required protocol.

To complete a protocol view:

- To complete a view with manual progression, tap the protocol view and then press **IMAGE**.
- To complete a view with automatic progression, press **IMAGE**.

The system displays a check mark on the protocol view.

- To complete a view with a measurement.
 - a. Press **CALIPER**.
The system displays the first measurement marker on the image screen.
 - b. Complete the measurement and then press **IMAGE**.
- To exit the protocol, tap **Exit**.

If there are incomplete protocol views, the system displays a message to complete or skip the views.

Editing Protocol Views

Changes to the protocol view affect only the active protocol.

The name of the protocol view displays on the touch screen and in the thumbnail panel.

To edit a protocol:

1. Activate a protocol.
2. To view additional pages of protocol views, tap the arrows.

To	Do This
Change the progression for the views	▪ Tap Progression. – Automatic activates the next view in the protocol when the current view is complete. – Manual waits for you to select the next view in the protocol. You can capture multiple images for a single view. The ultrasound system inserts additional views after the active view.
Add a view	1. Tap Add View. 2. Enter a name for the view. 3. Tap Save. 4. To exit without saving the new view, tap Cancel.
Delete a completed view	1. Tap the name of the completed view. 2. Tap Delete. The system removes the view with the image and any measurements from the thumbnail panel. The system displays the image during review with a red X. The measurements are not deleted from the report.
Rename a view	1. Tap the name of the view. 2. Tap Rename View. 3. Enter a view name and then tap Save. 4. To exit without renaming the view, tap Cancel.
Change the view sequence	1. Tap Reorder. The system displays a thick border around each view. 2. Click the required view. 3. Click the thick border at the required location. 4. Click Close.
Pause a protocol	1. Tap Pause Protocol. 2. To select a different protocol, tap the name of the protocol. 3. To save an image outside of the protocol, press IMAGE during a paused protocol.
Resume a protocol	▪ Tap the Protocols tab and then tap the name of the protocol.
Assign a protocol view name to the frozen image	1. Freeze the image. 2. Tap Remain Frozen. 3. Tap the name of the required protocol view.

7 CINE

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Overview

CINE continuously stores in a temporary memory buffer recently acquired data in all operating modes.

During CINE playback, the ultrasound system displays a CINE bar below the image, representing the status of the CINE memory. In dual display format, the system displays a CINE bar below each image.

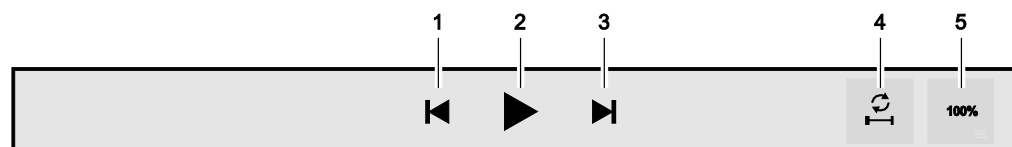


Example of the CINE bar on the image screen.

- 1 Beginning position of the CINE data
Reposition this marker to edit the length of the CINE data.
- 2 Location of the currently displayed CINE data
- 3 Ending position of the CINE data
Reposition this marker to edit the length of the CINE data.
- 4 Frame number of the current frame, in frames or seconds.

CINE Playback Selections

The ultrasound system displays CINE selections on the touch screen.



Example of the CINE selections.

- 1 Repositions the beginning position to the first frame
- 2 Starts or pauses playback
- 3 Repositions the ending position to the last frame
- 4 Aligns playback of multiple images or clips
The selection lists the current setting.
- 5 Adjusts the rate of playback
The selection lists the current setting.



Example of the CINE selections specific to a cardiac exam.

- 1 **Margin** includes selections to adjust the left (beginning) and right (ending) frames of CINE playback and reposition end diastole or end systole
- 2 Repositions the current frame to the end diastolic marker
- 3 Repositions the current frame to the end systolic marker
- 4 **ED/ES Split** activates live dual display format with the end diastolic frame on the left image and the end systolic frame on the right image

Reviewing and Adjusting CINE Playback

You can view data stored in the CINE memory in continuous playback or frame-by-frame review.

To play back CINE data:

- Freeze the image, if necessary.

To	Do This
Reset the CINE memory	Unfreeze the image.
Start continuous playback	Tap the play button. 
Stop continuous playback	Tap the pause button. 
Adjust the rate of CINE playback	Tap the playback rate button and then select a setting. The system displays the playback rate as a percentage.
Display the first frame	Tap the first frame button. 
Display the last frame	Tap the last frame button. 
View the CINE data frame-by-frame	Rotate Cine. Or, roll the trackball.
View a clip during review	Note: You cannot edit the length of the CINE data for a clip in review. - Double-click a thumbnail containing a clip.  <i>Example of an icon identifying a clip.</i> - Press UPDATE, if necessary. Cine indicates the trackball is assigned to viewing a clip frame-by-frame. Pointer indicates the trackball is assigned to the pointer for selecting on-screen objects, including the marker indicating the current position of CINE data.
Reposition the beginning and ending position of playback	- To reposition the beginning marker, rotate Left Margin. - To assign the beginning marker to the current frame, press Left Margin. - To reposition the ending marker, rotate Right Margin. - To assign the ending marker to the current frame, press Right Margin.

To	Do This
Align playback	▪ Tap a synchronize button: – None cancels playback alignment  – Loop Aligned begins and ends simultaneous playback of CINE data  – Same Start begins simultaneous playback of CINE data 
Store the current frame of CINE during an active study	(Available only in full-screen format during playback) ▪ Press the control assigned to the store function.
Store the current frame of CINE during review	(Available only in full-screen format during playback) ▪ Press the control assigned to the store function.
Reposition the beginning and ending markers	(Available only for the cardiac exam) 1. Tap Margin to display the margins for the frame, if necessary. – ED/ES displays selections for assigning the pink end diastolic and end systolic markers. – Frame displays selections for assigning the white beginning and ending markers of CINE playback. 2. To reposition the beginning marker, rotate Left Margin. 3. To assign the beginning marker to the current frame, press Left Margin. 4. To reposition the ending marker, rotate Right Margin. 5. To assign the ending marker to the current frame, press Right Margin.

To	Do This
Reposition the end diastolic and end systolic markers	(Available only for the cardiac exam) 1. Tap Margin to display the margins for end diastole and end systole, if necessary. – ED/ES displays selections for assigning the pink end diastolic and end systolic markers. – Frame displays selections for assigning the white beginning and ending markers of CINE playback. 2. To reposition the pink end diastolic marker, rotate ED. 3. To assign the end diastolic marker to the current frame, press ED. 4. To reposition the current frame to the end diastolic marker, tap the end diastole button. The ultrasound system displays the frame number of the end diastole frame on the image screen. 5. To reposition the pink end systolic marker, rotate ES. 6. To assign the end systolic marker to the current frame, press ES. 7. To reposition the current frame to the end systolic marker, tap the end systole button. The ultrasound system displays the frame number of the end systole frame on the image screen.
Display the end diastolic and end systolic frames in a live dual display format	(Available only for the cardiac exam) ▪ Tap ED/ES Split. The ultrasound system activates live dual display format with the end diastolic frame on the left image and the end systolic frame on the right image. ▪ To alternate the active image, press UPDATE.

8 Image Optimization

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Overview

You can optimize an image using the selections on the control panel and the touch screen. Active imaging parameters and settings are indicated in white on the image screen, and any adjustments to the settings are indicated in green.

See also: For additional information on identifying active imaging parameters and settings or the assignment of the trackball on the image screen, or a description of the control panel, including the touch screen, refer to Chapter 1 in this manual.

The imaging parameters and settings available for optimization depend on the exam type, transducer, and imaging mode. During combined mode imaging, adjustments to the imaging parameters and settings are applied only to the active priority mode.

Use the configuration settings to display or hide imaging parameters and settings on the image screen.

Adjusting the Settings for General Imaging Parameters

The following imaging parameters and settings are available for all operating modes. Any exceptions are noted.

To	Do This
Adjust the imaging parameters and settings for another operating mode during combined mode imaging	▪ Tap the tab for the required mode and then adjust the settings for the imaging parameter. – Color assigns priority to color imaging – 2D assigns priority to 2D-mode imaging – PW assigns priority to pulsed wave Doppler – CW assigns priority to continuous wave Doppler – M Mode assigns priority to M-mode
Adjust the gain (increase or decrease brightness of the displayed image)	▪ Rotate the required mode control on the control panel. For example, to adjust color gain, rotate C. The ultrasound system retains changes to the gain settings when you freeze or unfreeze the image.
Adjust the transmit frequency	(Available settings are transducer, mode, and feature dependent) ▪ Rotate Frequency. – High indicates a high frequency – Mid indicates a mid-level frequency – Low indicates a low frequency – Pen improves penetration – Res improves resolution An H displays before the transmit frequency setting when Harmonic imaging is active.
Adjust the transmit power	▪ Rotate Transmit Power.

To	Do This
Adjust the imaging depth	Push DEPTH. The system displays the depth value on the image screen below the image.
Optimize the uniformity of image brightness in the field of view	Tap Auto TEQ. The system displays an icon on the image screen. 
Adjust the depth gain compensation	Slide the depth gain compensation controls on the control panel. The ultrasound system retains changes to the settings when you freeze and unfreeze the image.
Distinguish the contours of a structure using the UltraArt universal image processing feature	Prerequisite: Activate 2D imaging. During combined mode imaging, tap the 2D tab to access the optimization settings. - Tap the UltraArt button.  The system displays images with different settings on the touch screen and outlines the active setting in blue. - Tap an image to apply the settings. The system closes the display of images after a specified period of time. - To exit, tap the UltraArt button again.
Adjust the overall contrast resolution (dynamic range)	Rotate DR.
Adjust the balance of the line density and the frame rate	(Available only during real-time imaging with Clarify disabled) Rotate Line Density. An increase in the line density enhances the resolution and decreases the frame rate.
Select a processing curve or assign color to velocity or energy information	Rotate Maps. The system assigns echo amplitudes to gray levels in the image and updates the gray bar. During color imaging, selects a processing curve that assigns the velocity range to a range of colors. Darker hues indicate lower velocities. Shades of green indicate variation in the flow. During power imaging, selects a processing curve that assigns flow amplitudes to color levels. A color bar represents signal strength. Brighter colors on the color bar indicate stronger signals.
Change the color tint	Rotate Tint. The system adds color to the gray map and updates the gray bar.

To	Do This
Zoom an image	(Not available during Anatomic M-mode) 1. Rotate ZOOM to adjust the magnification level. The system displays a Z on the image screen below the image. 2. To pan the magnified image: a. Roll the trackball. b. Press a trackball key. 3. To cancel magnification, press ZOOM.
Magnify a high-definition (HD) region of interest	(Not available during Doppler, M-mode, Anatomic M-mode, and Virtual Touch imaging) Prerequisite: The image depth is greater than two centimeters. 1. Press ZOOM. The system displays a zoom box (region of interest) on the image and HD Z below the image. 2. Adjust the size or position of the zoom box. a. Press a trackball key, if necessary. Position indicates the trackball is assigned to repositioning the zoom box. A solid line outlines the zoom box. Size indicates the trackball is assigned to resizing the FOV. A dotted line outlines the zoom box. b. Roll the trackball to adjust the size or position. 3. Press ZOOM. The system acquires a high-definition image indicated within the zoom box at a higher frame rate and updates the depth value on the image screen to indicate the distance from the skin line to the top of the zoom box. 4. To cancel magnification, press ZOOM.
Reverse the horizontal orientation of the image (right-to-left or left-to-right)	▪ Tap L/R Flip. The system reverses the orientation of the image and the transducer orientation indicator.
Reverse the vertical orientation of the image (top-to-bottom or bottom-to-top)	▪ Tap U/D Flip. The system reverses the orientation of the image and the transducer orientation indicator.

Optimizing 2D Images

Prerequisite: Activate 2D imaging. During combined mode imaging, tap the **2D** tab to access the optimization settings.

To	Do This
Resize or reposition of the field of view (FOV)	(Available only for phased and curved array transducers with curved and vector formats) - Press a trackball key, if necessary. Position indicates the trackball is assigned to repositioning the FOV. A dashed line outlines the FOV. Size indicates the trackball is assigned to adjusting the width of the FOV. A dotted line outlines the FOV. Set indicates the trackball is no longer assigned to adjusting the FOV. The system removes the outline from the FOV. - Roll the trackball to adjust the size or position and then press a trackball key.
Reduce or enlarge the size of the 2D image	(Not available during live dual imaging, HD zoom, or anatomical M-mode) Tap Image Size and then select a size setting.
Rotate an image	(Available only for linear array transducers) (Not available during seamless dual imaging) - To rotate the image 90 degrees in a clockwise direction, tap 90°. - To rotate the image 90 degrees in a counterclockwise direction, tap 270°. - To reset to the starting position, tap 0°. Note: Only the active image rotates during dual imaging. Both images rotate during live dual imaging.
Activate a linear or trapezoid image format	(Available only for linear array transducers) Tap Trapezoid.
Adjust the angle of the field of view	(Available only for linear array transducers in a linear format) - To incrementally adjust the angle, rotate Steer. - To adjust the angle left, straight, and right, press Steer. The geometry of the transducer determines the angle of the field of view.
Create a visible smoothing effect	Rotate Persist. A higher setting includes more lines of image data for each image frame.
Enhance contrast resolution with the Harmonics feature	Note: Use harmonic imaging to enhance visualization, improve image contrast and spatial resolution, or to reduce noise. Tap Harmonics. An H displays before the transmit frequency setting when Harmonic imaging is active.
Activate spatial compounding	Note: Use spatial compounding to reduce speckle and enhance tissue differentiation in 2D images. Tap Compounding.

To	Do This
Activate the InFocus feature to continuously adjust the transmit focal zones	1. Tap InFocus. 2. Tap the InFocus button.  The system displays an icon on the image screen.
Adjust the number, position, and spacing of the transmit focal zones	Note: During live dual imaging, changes to focal zones in one image affects the other image the next time the image is activated. 1. Press InFocus. 2. Tap the InFocus edit button.  The system displays an icon on the depth scale to indicate the location of the focal zone.  3. Rotate InFocus to position the focal zone at or below the area of interest.
Adjust the speed of sound	(Exam-dependent) 1. Tap Speed of Sound. 2. Select a setting. A lower setting is for fatty tissue and a higher setting is for less fatty or soft tissue.
Activate Clarify	Note: Use Clarify to decrease image artifacts. 1. Press Clarify. The system displays a region of interest (ROI) on the image. 2. Adjust the size or position of the ROI in linear format. a. Press a trackball key, if necessary. Position indicates the trackball is assigned to repositioning the ROI. A solid line outlines the ROI. Size indicates the trackball is assigned to resizing the ROI. A dotted line outlines the ROI. b. Roll the trackball to adjust the size or position and then press a trackball key. 3. Rotate Clarify to select a setting. Higher settings increase the visualization of micro-vasculature in the image.

Optimizing Color Images

Prerequisite: Activate color. During combined mode imaging, tap the **Color** tab to access the optimization settings.

To	Do This
Select color imaging or power imaging	▪ To select power imaging, tap Power. The system applies color to the energy measurement generated by the blood flow within the region of interest and displays the color bar on the image screen. ▪ To select color imaging, tap Color. The system applies color to the velocities and directions of blood flow within the region of interest and displays the color bar on the image screen.
Resize or reposition the color region of interest (ROI)	1. Press a trackball key, if necessary. – Position indicates the trackball is assigned to repositioning the color ROI. A solid line outlines the color ROI. – Size indicates the trackball is assigned to resizing the color ROI. A dotted line outlines the color ROI. 2. Roll the trackball to adjust the size or position and then press a trackball key.
Adjust the angle of the color region of interest	(Available only for linear array transducers in a linear format) ▪ To incrementally adjust the angle, rotate Steer. ▪ To adjust the angle left, straight, and right, press Steer.
Emphasize the blood flow, the tissue, or both	▪ Tap the required setting. – 2D Only emphasizes the tissue. – Color Only emphasizes the blood flow. – 2D + Color combines the tissue and blood flow.
Optimize hemodynamic flow conditions	▪ Tap a setting. – Low provides maximum sensitivity to low velocity flows by incorporating the lowest possible filter settings and lower pulse repetition frequency. You may experience increased flash (motion artifacts). – General produces an optimal balance between flash suppression and maximum sensitivity by using an adaptive wall filter. – High optimizes the system for the high arterial flow common to pulsatile vessels and stenotic conditions. – (Available only during power imaging) Slow optimizes the visualization of slow blood flow in microvascular structures within the region of interest. – Additional settings are available based on anatomy, for example, kidney or aorta.

To	Do This
Optimize visualization of color frequency for the region of interest	(Available only during color imaging or power imaging) ▪ To enable the feature, press Frequency and then tap Auto. The system adjusts the color frequency for the region of interest, and the imaging parameters and touch screen indicate the feature is on. ▪ Note: When you reposition the region of interest, the system changes the color frequency. ▪ To exit, press Frequency and then tap Manual.
Visualize the direction of blood flow within the region of interest	(Available only during power imaging) ▪ Tap Dir Power. The system displays colors depicting the direction of flow in the region of interest and the color bar. ▪ To exit, tap Dir Power again.
Invert the color scale	▪ Tap Invert. The system reverses the colors depicting forward and reverse flow in the region of interest and the color bar.
Adjust the range of displayed color velocities	▪ Rotate Scale. The system adjusts the scale factor of the pulse repetition frequency.
Extend the range of displayed color velocities in one direction	▪ Rotate Baseline. The system repositions the color baseline and updates the color bar.
Adjust the level of motion or low flow sensitivity	▪ Rotate Filter. A higher wall filter reduces the level of sensitivity.
Adjust the color persistence	▪ Rotate Persist. During color imaging, adjusts the time that the colors corresponding to blood flow velocity remain in the region of interest before decaying or being replaced by another color. During power imaging, adjusts the time that power data is processed in calculating the power amplitude display.
Adjust the color priority level	▪ Rotate Priority. During color imaging, adjusts the amount of color pixel information overlaying the 2D image. During power imaging, adjusts the display of the amount of power information.
Smooth the flow pattern	▪ Rotate Smooth. As the spatial averaging (smoothing) increases, the flow sensitivity increases and spatial resolution decreases.
Activate eSieDoppler during color imaging	See also: For information about activating eSieDoppler during color imaging, refer to page 8-13.

Optimizing the Doppler Spectrum

Prerequisite: Activate Doppler. During combined mode imaging, tap the **PW** or **CW** tab to access the optimization settings.

Use the configuration settings to select a default layout for the 2D image and Doppler spectrum.

To	Do This
Reposition the Doppler cursor and gate on the 2D image	Roll the trackball to adjust the position of the Doppler cursor and gate.
Resize the Doppler gate on the 2D image	Rotate Gate Size.
Correct the flow angle	(Not available for the cardiac exam) Note: The flow angle indicator displays on the Doppler gate. - To incrementally adjust the angle, rotate Angle Correct. - To adjust the angle left, straight, and right, rotate Angle Correct. The system displays the position of the Doppler gate below the image. The system also displays the flow angle below the image.
Adjust the angle of the Doppler cursor	- To incrementally adjust the angle, rotate Steer. - To adjust the angle left, straight, and right, press Steer.
Adjust the Doppler audio volume	(Available only on a frozen image) Note: The touch screen displays a number to indicate the level of the volume. - To increase the volume, tap the plus button.  - To decrease the volume, tap the minus button.  - To mute the volume, tap the volume button.  - To unmute the volume, tap the mute button. 

To	Do This
Adjust the scrolling speed of the Doppler spectrum	Rotate Sweep Speed. The system displays time markers on the touch screen.
Pause the Doppler spectrum and refresh the 2D image	- Press UPDATE. - To pause the 2D image and acquire the spectrum, press UPDATE again.
Change the format of the 2D image and Doppler spectrum	- To display the Doppler spectrum and hide the 2D image, tap the trace button.  - To display the 2D image and hide the Doppler spectrum, tap the 2D button.  - To display both the 2D image and the Doppler spectrum - Tap the split screen button.  - Tap the button for the required format.  - To simultaneously acquire both the 2D image and the Doppler spectrum, tap Live/Live.
Invert the Doppler spectrum and left/right speaker output	Tap Invert. The system reverses the vertical orientation of the Doppler spectrum and the Doppler audio on the baseline. Negative values display above the baseline. The system displays the term inverted below the baseline.
Distinguish the contours of a structure using edge enhancement	Tap Edge and then select a setting.
Reject low frequency settings	Note: This selection can reject signals generally caused by tissue clutter. Rotate Filter.
Adjust the display of blood flow velocity	Rotate Baseline.

To	Do This
Adjust the scale factor of pulse repetition frequency (PRF)	Note: Adjusting the PRF may improve velocity range sensitivity or control aliasing. ▪ Rotate Scale.
Activate high pulse repetition frequency	▪ Tap HPRF.
Apply colors to the Doppler shift information of moving tissue with the region of interest	(Available only for the cardiac and fetal echo exams) ▪ Tap DTI and then select a setting.
Activate the auto statistics feature to trace the maximum velocity on a Doppler spectrum	(Compatible only with pulsatile flow) Note: During live imaging, the system uses three consecutive heart beats. On a frozen image, the system uses the last measured heart beat. 1. Tap Auto Trace and then tap the method for analyzing the Doppler spectrum. – Above Baseline determines statistics for Doppler data above the baseline. – Below Baseline determines statistics for Doppler data below the baseline. – Above and Below determines statistics for Doppler data above and below the baseline. The system positions the peak systole at the maximum velocity of the Doppler spectrum and the end diastole at the end of the heart cycle. 2. Position and anchor the ending measurement marker. 3. To remove the statistics from the screen, tap Auto Trace again. Use the configuration settings to show or hide the values in the measured results. 4. To assign a measurement label, press CALIPER and then select a label.

To	Do This
Activate eSieDoppler during color imaging	(Not available during power imaging) 1. Tap Auto Doppler, if necessary. An icon displays on the image screen when the feature is active.  A blue icon indicates the feature is active. A white icon indicates the feature is suspended during user adjustments to the ROI or Doppler steering angle. 2. Confirm placement of the color region of interest (ROI), Doppler gate, color flow angle, and steering angle of the Doppler cursor as you scan. 3. Manually reposition the color region of interest, Doppler gate, and Doppler steering angle, if necessary. The system suspends the feature during manual adjustment. 4. To reactivate the feature, press FREEZE to reactivate imaging. Or, press Auto Doppler. 5. To exit the feature, tap Auto Doppler. The system removes the icon from the image screen.

Optimizing M-mode Sweeps

Prerequisite: Activate M-mode. During combined mode imaging, tap the **M mode** tab to access the optimization settings.

The system gathers M-mode information from the acoustic line represented by the position of the M-mode cursor.

Use the configuration settings to select a default layout for the 2D image and M-mode sweep.

To	Do This
Resize or reposition of the M-mode cursor	- Press a trackball key, if necessary. Position indicates the trackball is assigned to repositioning the cursor. The cursor is a solid line. Size indicates the trackball is assigned to resizing the cursor. The cursor is a dotted line. - Roll the trackball to adjust the size or position and then press a trackball key.
Change the format of the 2D image and M-mode sweep	- To display the M-mode sweep and hide the 2D image, tap the trace button.  - To display the 2D image and hide the M-mode sweep, tap the 2D button.  - To display both the 2D image and the M-mode sweep. - Tap the split screen button.  - Tap the button for the required format. 
Pause the M-mode sweep and refresh the 2D image	- Press UPDATE. - To pause the 2D image and acquire the sweep, press UPDATE again.
Adjust the angle of the M-mode cursor	(Available only for linear array transducers) Rotate Steer.
Adjust the scrolling speed of the M-mode sweep	Rotate Sweep Speed. Time markers do not scroll with the M-mode sweep.

To	Do This
Distinguish the contours of a structure using edge enhancement	▪ Tap Edge and then select a setting.
View the M-mode sweep based on patient anatomy and independent of the transducer orientation	(Available only during the cardiac exam) 1. Rotate Angle. The system activates anatomical M-mode. The anatomical M-mode cursor displays as a dashed line with an arrow pointing in the direction of the deeper part of the image. 2. To reposition the anatomical M-mode cursor along with the M-mode cursor, roll the trackball. 3. To exit anatomical M-mode, tap Reset. 4. To exit anatomical M-mode, press 2D.

Creating User-Defined Exams

You can create a user-defined exam to capture the optimized configuration of imaging parameters and settings for the active transducer.

Use the configuration settings to assign an exam package to a user-defined exam.

To create or edit a user-defined exam:

1. During imaging, adjust the imaging parameters and settings required for the user-defined exam.
2. Tap the name of the transducer.
3. Tap **Add / Edit Exam**.
The ultrasound system displays the name of the active exam.
4. To create a new exam, enter a name and then tap **Save**.
If you do not enter a new name and save the existing exam, the ultrasound system adds an asterisk to the existing name.
5. To overwrite an existing user-defined exam, tap **Save**.
The ultrasound system saves the imaging parameters and settings for the active transducer only.
6. To delete the selected user-defined exam, click **Delete**.
7. To exit without saving the user-defined exam, tap **Cancel**.

9 Annotations

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Annotating with Text

During imaging or review, you can annotate an image by using the keyboard to enter text or by selecting predefined text. Each exam package has predefined text for anatomical structures, imaging views, and body positions.

Use the configuration settings to customize text.

Note: To position the text at a location other than the default location, use the directional arrow keys on the keyboard to position the cursor and then use the keyboard to enter the text.

To activate the text function:

1. Press **ABC**.
2. Tap the **Text** tab, if necessary.

To	Do This
Define the default position for text on the image screen	1. Position the cursor on the image screen. 2. Tap Set Home.
Position the cursor at the default position	▪ Tap Home.
Insert predefined anatomical text or modifier text on an image	1. Position the cursor on the image screen. 2. Tap the predefined text.
Insert custom text on an image	1. Position the cursor on the image screen. 2. Tap the keyboard icon. 3. Tap Text for regular text. Or, tap Title for bold text. 4. Enter the text. The system displays a predefined label matching the first characters you enter, if specified in the configuration settings. 5. To accept the suggested text, tap Tab or press a trackball key. 6. To continue entering text instead of accepting the suggested text, enter the required characters.
Insert or remove characters in text	1. Position the cursor between the characters. 2. Use the keyboard to insert or delete characters.

To	Do This
Reposition text on an image	1. Position the cursor on the text and then press a trackball key. 2. Roll the trackball to the new location and then press a trackball key to confirm the position.
Delete one word of text on an image	1. Position the cursor on the text and then press a trackball key. 2. Press DELETE.
Delete a line of text on an image	1. Position the cursor on the line and then press a trackball key. 2. Tap DELETE repeatedly.
Temporarily hide annotations	▪ Tap the show hide button.  Note: The button color is blue when text is hidden. ▪ To redisplay hidden text, tap the show hide button again.
Remove all text, arrows, and body markers from an image	▪ Tap Clear Screen.
Select the next custom text annotation	▪ Tap Select Line.
Overwrite existing annotations with a temporary label	(Available only during review) 1. Position the cursor before the first character of the first word to overwrite. 2. Tap the overwrite button.  3. Use the keyboard to insert or delete characters. Note: To fully overwrite existing text, the temporary label must be the same length or longer than the original text. 4. Press a trackball key to confirm the text.
Exit the annotation function	▪ Press ABC.

Annotating with Directional Arrows

You can annotate an image with arrows during imaging or review.

To activate the arrow function:

1. Press **ABC**.
2. Tap the **Arrow** tab.

To	Do This
Insert and position a new arrow on an image	1. Roll the trackball to position the arrow and then press a trackball key. 2. To adjust the length of the arrow, drag the tail of the arrow on the touch screen. 3. To change the direction indicated by the arrow tip, drag the tail in the required direction on the touch screen. 4. Press ABC to confirm the size, position, and direction of the arrow.
Insert an additional arrow	▪ Press UPDATE .
Select the last arrow	▪ Tap Previous Arrow .
Cycle through the arrows	▪ Tap Previous Arrow repeatedly.
Delete an arrow	1. Tap Previous Arrow to select the required arrow. 2. Press DELETE.
Remove all text, arrows, and body markers from the image	▪ Tap Clear Screen .
Exit the arrow annotation function	▪ Press ABC .

Annotating with Body Markers

Body markers are on-screen anatomical graphics that indicate the anatomy under evaluation and the orientation of the transducer. You can annotate an image with a body marker during imaging or review.

Use the configuration settings to customize body markers for each exam package.

To activate the body marker function:

1. Press **ABC**.
2. Tap the **Body Marker** tab.

To	Do This
Select a body marker	▪ Tap the required body marker. The system places the body marker on the image with the transducer marker selected for repositioning.
Reposition a body marker	1. Tap Trackball to select Body Marker. 2. Roll the trackball to reposition the body marker. 3. To confirm the position, tap Trackball again.
Display the transducer marker	▪ Tap Transducer Marker. – On inserts a transducer marker. – Off removes the transducer marker.
Reposition a transducer marker	▪ Tap the required transducer marker on the touch screen and then slide your finger to the new location. The system updates the location of the transducer marker on the image screen.
Change the orientation of a transducer marker	▪ Tap the blue dot on the touch screen and then slide your finger around the circle to the required location. The system updates the orientation of the transducer marker on the image screen.
Delete the body marker	1. Select the required body marker. 2. Press DELETE.
Remove all text, arrows, and body markers from the image screen	▪ Tap Clear Screen.
Exit the body marker function	▪ Press ABC.

10 Measurements and Calculations

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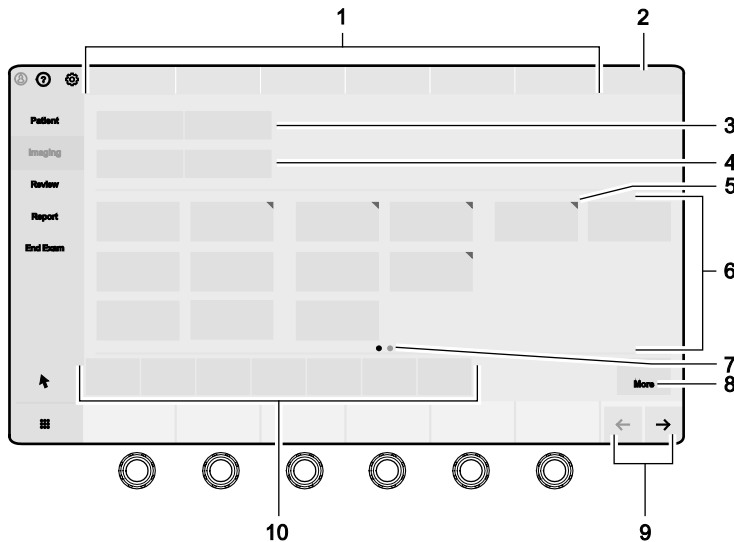
Overview

The measurement function provides measurement tools, measurement labels, and calculations based on the active operating mode. You can use labels from any exam package during the measurement function without changing the patient exam. The ultrasound system displays the measured value in the measured results.

A folder of measurement labels includes system-defined sequences of individual measurements. The system advances to the next measurement label after you complete a measurement, or you can manually select a label in any sequence.

When you change the calibration of an image, for example the image depth, the ultrasound system removes the measurement markers and measured results from the image screen.

Use the configuration settings to customize the measurement function.



Example of the touch screen during the measurement function.

- 1 Categories of measurement labels based on exam
Custom indicates user-defined measurement labels.
- 2 Exam package, for example, abdomen
- 3 Measurement label modifiers, for example, left or right
- 4 Sub-categories of measurement labels, for example, liver transplant
- 5 A triangle indicates a folder of measurement labels
 A check mark indicates a measured value is assigned to the label.
- 6 Measurement labels for the selected exam package
 A check mark indicates a measured value is assigned to the label.
- 7 Indicator for each page of measurement labels
 - A white dot indicates the active page.
 - A gray dot indicates additional pages of measurement labels.
- 8 **More** indicates additional measurement tools are available
- 9 Accesses additional pages of measurement labels
- 10 Measurement tools
 - Blue indicates the active measurement tool.
 - White indicates the available measurement tools.

Activating the Measurement Function

The measurement function is available during a patient exam or with saved images. The ultrasound system stops CINE playback when you activate the measurement function.

Use the configuration settings to configure the ultrasound system to activate the measurement function when you freeze the image.

To activate the measurement function during a patient exam:

Prerequisite: During Doppler or M-mode, freeze the image.

1. Press **CALIPER**, if necessary.
2. To exit the measurement function, press **CALIPER**.

To activate the measurement function with saved images:

Prerequisite: Save the images in an ultrasound format, not screen capture format.

1. Tap **Review**.
2. Select the image in the thumbnail panel.
3. Press **CALIPER**.
4. To exit the measurement function, press **CALIPER**.

Positioning and Anchoring Measurement Markers

A measurement marker and a unique identifying number indicate the beginning and ending points of a measurement.

The ultrasound system removes measurement markers and measured results when you enter any of the following functions: patient browser, patient registration, system configuration, review, patient report, and help. To prevent the loss of a measurement in progress, ensure all measurement markers are anchored and the measurement is labeled before accessing another screen.



Example of a measurement marker.

To position and anchor a measurement marker:

1. Activate the measurement function.
2. To position a measurement marker, roll the trackball.
The system displays the markers available for positioning and the corresponding measured result in blue on the image screen. The system changes the size of the markers according to the distance between the pair of markers.
3. To anchor a marker, press a trackball key.
The system displays a measured value in the measured results and activates the next marker.
4. To complete a measurement, position the last marker and then press a trackball key. Or, position the last marker and then press **ABC** to access the annotations feature.
The system displays the completed markers and the corresponding measured result in yellow on the image screen.

Note: For all exam packages except for the cardiac exam, you can also complete a measurement by pressing the control assigned to the following functions: print, image store, clip store.

Positioning and Anchoring Markers in Dual Format

You can perform a measurement across the boundaries of dual or seamless dual images even if there is a gap between the images, but not if one of the images is zoomed. The measured values are estimates.

Performing a Measurement

You must assign a label to the measured value to include the value in a patient report.

Labeling Measurements

You can assign a measurement label to a measurement after completing the measurement. You can also assign a measurement label to the most recent unlabeled, completed measurement.

Modifier labels are available where appropriate to indicate the view of the anatomy, for example, right or left.

To measure then label:

Prerequisite: A measurement label has not been selected.

1. Activate the measurement function.
2. Tap the required measurement tool.
3. Position and anchor the beginning and ending measurement markers.
4. Tap a modifier for the measurement label, if necessary.
5. Tap the required measurement label.

The ultrasound system activates the measurement tool for the selected label if the label does not support the active tool.

6. To select a measurement label from a different exam:
 - a. Tap **Exam Package** and then tap the required exam.
 - b. Tap the required measurement label.

To label then measure:

1. Activate the measurement function.
2. Tap the required measurement label.

The system activates the measurement tool for the selected measurement label.
3. Tap a modifier for the measurement label, if necessary.
4. To select a measurement label from a different exam:
 - a. Tap **Exam Package** and then tap the required exam.
 - b. Tap the required measurement label.
5. To activate a different measurement tool, tap the required measurement tool.
6. Position and anchor the beginning and ending measurement markers.

Editing or Deleting a Measurement

Note: You cannot edit measured results acquired with the following tools: Doppler heart cycle tool or Doppler trace tool.

To	Do This
Edit the active measurement	1. Press UPDATE to cycle through the markers. 2. Reposition and then anchor the marker.
Delete a segment of a traced circumference	1. Rotate Undo counterclockwise to remove a segment of the trace. 2. To restore the deleted segment, rotate Undo clockwise. 3. Roll the trackball to continue tracing the circumference and then anchor the marker.
Edit a segment of a traced circumference	1. Roll the trackball to position the blue arrow on the image. The system highlights a segment in blue. – For smaller adjustments, position the arrow on or near the segment and then press a trackball key. – For larger adjustments, position the arrow away from the segment and then press a trackball key. 2. To continue to adjust the selected segment, roll the trackball. 3. To adjust another segment, press a trackball key. 4. Press UPDATE to complete the edit.
Edit a completed measurement	1. Tap Last Caliper to cycle through the completed measurements. 2. Reposition and then anchor the measurement marker. The system updates the measured value in the measured results and in the report.
Delete a completed measurement	1. Tap Last Caliper to cycle through the completed measurements. 2. Press DELETE. The measurement is removed from the image screen, but remains in the patient report.
Remove all measurements from the image screen	▪ Tap Clear Screen. The system also removes annotations from the image screen.

Viewing Measured Results

The ultrasound system displays measured and calculated values in the measured results on the image screen. The ultrasound system also displays an indicator when the length of the displayed value exceeds the field size for the precision specified in the configuration settings. The full value is used in a calculation.

When the denominator is zero in a ratio, the ultrasound system displays a blank value for the calculation and does not copy the value to the report.

During an obstetric exam, the ultrasound system also displays measured and calculated values on the touch screen.

Use the configuration settings to configure the display of fetal data in the measured results.

To change the location of measured results:

1. Position the cursor on the measured results.
The system displays the measured results with a green border.
2. Roll the trackball to reposition the measured results and then press a trackball key.

Measured Result Units

Units	Description
cm	centimeters
cm ²	centimeters squared
cm ³	centimeters cubed
cm/s	centimeters per second
kPa	kilopascal
mm	millimeters
mm/s	millimeters per second
°	degrees
m/s	meters per second
kHz	kilohertz
bpm	beats per minute
sec	second
s	second
l/min	liters per minute
%	percentage

Measuring with 2D-mode Basic Measurement Tools

See also: To edit a measurement, including a segment of a traced circumference, refer to page 10-7.

To	Do This
Measure a distance	1. Tap Distance.  2. Position and then anchor the beginning and ending markers.
Measure a depth	(Available only for non-Cardiac exams) Note: You cannot assign a label to a measured result for depth. 1. Tap Depth.  2. Position and then anchor a marker. The system indicates the distance from the skin line.
Measure the circumference and area of a structure using an ellipse	1. Tap Ellipse.  2. Position and then anchor the first marker. The system displays an ellipse. 3. Position and then anchor the major axis. 4. Position and then anchor the other axis.
Measure the circumference and area of a manually traced structure	Note: Tolerances of circumference measurements cannot be guaranteed when using the manual tool because the accuracy of tracing a circumference is largely dependent on the user's incremental movements using the trackball. 1. Tap 2D Trace.  2. Position and then anchor the first marker. 3. Roll the trackball to trace the structure and then anchor the next marker. The ultrasound system closes the trace between the two endpoints and indicates the major and minor axis.
Measure the diameter of a manually traced structure	1. Tap Open Trace.  2. Position and then anchor the first marker. 3. Roll the trackball to trace the structure and then anchor the marker.

To	Do This
Measure an acute angle	1. Tap More, if necessary. 2. Tap Angle.  3. Position and then anchor the end point of the first independent line. 4. Roll the trackball to extend the length of the line and then anchor the line. 5. Position and then anchor the end point of the second independent line. A dashed line indicates the measured angle. 6. Roll the trackball to extend the length of the line and then anchor the line.
Measure the circumference and area of a system-traced structure	(Available only for non-cardiac exams) 1. Tap More, if necessary. 2. Tap eSieCalcs.  3. Position and then anchor the first marker. 4. Roll the trackball to encompass the structure of interest within the rectangle and then press SELECT. The system traces the structure. 5. To confirm the traced circumference, press SELECT.

Measured Results of 2D-mode Basic Measurement Tools

Measured Results	Abbreviation
Distance, major diameter	D
Depth	Depth
Circumference	C
Area	A
Axis length	D1, D2
Angle	Angle

Measuring with Doppler Basic Measurement Tools

Changes to the Doppler gate and the transmit frequency update the labeled measurements and the corresponding calculations displayed in the measured results.

See also: To edit a measurement, including a segment of a traced circumference, refer to page 10-7.

To	Do This
Measure a velocity	1. Tap Velocity.  2. Position and then anchor the marker on the Doppler waveform.
Measure a heart rate	1. Tap More, if necessary. 2. Tap Heart Rate.  3. Position and then anchor the first marker at the beginning of the cardiac cycle. 4. Position and then anchor the next marker at the end of the required number of cardiac cycles. Note: You can manually enter a heart rate value in the patient report.
Manually trace the heart cycle	1. Tap D-Trace.  2. Position and then anchor the first marker both horizontally and vertically. 3. Position and then anchor the next marker to manually draw a trace of the waveform. The system displays markers on the traced waveform to indicate peak systole and end diastole. 4. Position and then anchor the marker to indicate peak systole and end diastole.
Measure the resistive index	1. Tap RI-S/D.  2. Position and then anchor the first marker to indicate peak systole. 3. Position and then anchor the next marker to indicate end diastole.
Measure the change in distance over time	1. Tap Acceleration.  2. Position and then anchor the beginning and ending markers. A dotted line indicates the slope.

To	Do This
Measure time	1. Tap Time.  2. Position and then anchor the beginning and ending markers. The blue mark on each marker is a guide for positioning the marker on the waveform.
Measure the heart cycle	1. Tap Heart Cycle.  2. Position and then anchor the first marker (delimiter). 3. Position the second marker to the right of the first marker. The system draws the maximum trace between the delimiters and places markers on peak systole. 4. Anchor the second marker. 5. Position and then anchor the marker to indicate end diastole.

Measured Results of Doppler Measurement Tools

Measured Results	Abbreviation
Velocity	Vel
Velocity input values	V1, V2
Peak pressure gradient	Peak Grad
Mean pressure gradient	Mean Grad
Heart Rate	HR
Time or acceleration time	Time
Peak systolic velocity	PS
End diastolic velocity	ED
Velocity time integral	VTI
Maximum velocity	Vmax
Mean velocity	Vmean
Time averaged mean velocity	TAMn
Time averaged maximum velocity	TAMx
Pulsatility index calculation	PI
Minimum Diastole	MD
Resistive index calculation	RI
Peak systolic velocity to end systolic velocity calculation	S/D
Positive slope value	Acceleration
(Available only for Transcranial Imaging (TCI) measurement labels)	Mean TCD
Mean Flow Velocity: (Peak Systolic Velocity + (End Diastolic Velocity x 2))/3	

Measuring with M-mode Basic Measurement Tools

To	Do This
Measure a distance	1. Tap M-Distance.  2. Position and then anchor the beginning and ending markers.
Measure a change in distance over time	1. Tap M-Slope.  2. Position and then anchor the beginning and ending markers. Asterisks in the measured results indicate a slope value greater than 999 millimeters.
Measure a heart rate	1. Tap M-Heart Rate.  2. Position and then anchor the first marker at the beginning of the cardiac cycle. 3. Position and then anchor the next marker at the end of the required number of cardiac cycles. Note: You can manually enter a heart rate value in the patient report.
Measure a time interval	1. Tap Time.  2. Position and then anchor the beginning and ending markers.

Measured Results of M-mode Measurement Tools

Measured Results	Abbreviation
Distance	D
Heart Rate	HR
Time	Time
Slope	Slope

Measuring with Compound Measurement Tools

Use the compound measurement tools when the measurement sequence requires more than one imaging mode or tool. Compound measurements require multiple measurements on one image or involve measurements on multiple images.

Compound measurements can be done in any sequence. You can also temporarily stop compound measurements and perform measurements unrelated to the compound measurement.

You must complete the compound measurement before selecting another compound measurement tool.

See also: To edit a measurement, including a segment of a traced circumference, refer to page 10-7.

To	Do This
Measure area stenosis	1. Tap %Stenosis-A.  2. Position and then anchor the beginning and ending markers. 3. To complete the measurement, position and then anchor the second set of measurement markers.
Measure distance stenosis	1. Tap %Stenosis-D.  2. Position and then anchor the beginning and ending markers. 3. To complete the measurement, position and then anchor the second set of measurement markers.
Measure a volume	1. Tap More, if necessary. 2. Tap Volume.  3. Measure the volume using the measurements specified in the configuration settings, for example, three distance measurements. 4. To complete the measurement, anchor the last marker.

To	Do This
Measure volume flow	(Not available during review) 1. Tap a measurement label. 2. Tap More, if necessary. 3. Tap Vol Flow.  4. Position and then anchor the beginning and ending markers on the 2D image. 5. Position and then anchor a marker on the waveform. 6. Position the second marker to the right of the first marker. The system traces the waveform between the two markers. 7. Anchor the marker.

Measured Results of Compound Tools

Measured Results	Abbreviation
%Stenosis	%Stenosis
Input distance values	D, D1, D2, D3
Input ellipse axis values	D1, D2
Input area values	A1, A2
Volume	Vol
Volume Flow	Vol Flow
Cross-Sectional Area	A
Time Averaged Mean Velocity	TAMn

Calculations

Calculations use formulas requiring specific measurements. The ultrasound system performs a calculation after you complete the required measurements.

See also: For information on calculation formulas, refer to Appendix C in the System Reference.

Calculating Ratios

The ultrasound system displays the calculation with the first measurement listed first and the second measurement listed second. For example, the system displays the distance ratio as D1/D2.

To determine a ratio:

1. Tap **More**, if necessary.
2. Tap the required measurement tool.
 - **Area Ratio** calculates the ratio of two area measurements

 - **Distance Ratio** calculates the ratio of two distance measurements

 - **Velocity Ratio** calculates the ratio of two velocities on a Doppler waveform

3. Position and then anchor the beginning and ending markers.

Measured Results of Calculations and Ratios

Measured Results	Abbreviation
Distance input values	D1, D2
Distance ratio calculation	Distance Ratio
Area input values	A1, A2
Area ratio calculation	Area Ratio
Velocity input values	V1, V2
Velocity ratio calculation	Velocity Ratio

Measuring with Exam-specific Tools

The measurement function includes exam-specific measurement tools, for example, during the obstetric exam.

Performing Obstetric Measurements

The obstetric and early obstetric exams include measurement labels and calculation labels for 2D-mode, M-mode, and Doppler.

Calculation labels are not included on the touch screen. The ultrasound system performs the calculations when you make the required measurements. Calculation results are included on the image screen and in the patient report.

See also: For a list of measurement and calculation labels, refer to Chapter 3 in the System Reference.

Prerequisite: Select an obstetric exam or an obstetric exam package and then activate the measurement function.

To	Do This
Determine an amniotic fluid index (AFI)	(Available only for a 2D-mode image) 1. Tap AFI. The ultrasound system activates the measurement label for the first quadrant: AFI - Q1. 2. Position and anchor the beginning and ending measurement markers for each quadrant. The system activates the next quadrant and displays the distance for each measured quadrant. When the four measurements are complete, the system calculates the AFI.
Measure the fetal heart rate	(Available only for an M-mode sweep or Doppler waveform) 1. Tap Fetal HR. 2. Position and anchor the first marker at the beginning of the cardiac cycle. 3. Position and anchor the second marker at the ending of the second cardiac cycle.
Obtain measurements for the obstetric ratios	▪ Measure the fetal structures required for the ratio. Use the configuration settings to customize the display of obstetric ratios in the report.
Add a fetus	1. Tap Add Fetus. 2. Select the number of fetuses and then click OK.
Measure multiple fetuses	Prerequisite: Enter the number of fetuses on the patient registration form. ▪ Tap the required fetus identifier, for example, Fetus B, and then perform the measurement.

Calculated Results of Obstetric Tools

Results	Abbreviation
Last menstrual period	LMP
Date of conception	DOC
Estimated date of delivery	EDD
Estimated fetal weight	EFW
Standard deviation	SD

Measured Result Units

Units	Description
w, d	Weeks, days
g	Grams
lb, oz	Pounds, ounces
%	Growth percentile

Measuring Fetal Structures with the eSie OB Feature

The eSie OB measurement feature detects and measures the following fetal structures:

- Biparietal Diameter
- Head Circumference
- Abdominal Circumference
 - Anterior Posterior Abdominal Diameter
 - Transabdominal Diameter
- Femur Length
- Crown Rump Length
- Humerus Length
- Occipital Frontal Diameter

Use the configuration settings to select the outer-to-outer measurement method for biparietal diameter or to create user-defined fetal measurement labels.

To measure fetal structures:

Prerequisite: During an obstetric exam, acquire and then freeze a 2D image.

1. Activate the measurement function.
2. Tap **eSie OB**, if necessary.
3. Tap the required measurement label.
The system places the measurement markers on the image.
4. Reposition the beginning and ending measurement markers, if necessary.
The system displays the values in measured results.
5. To manually perform a measurement:
 - a. Tap **eSie OB** to exit the feature.
 - b. Perform the measurement.

Performing Pediatric Hip Measurements

(Available only for a 2D-mode image)

Prerequisite: Knowledge of the Graf technique for evaluation of the pediatric hip, including the classification zones for the hip from dislocated to normal.

The measurement function provides a tool to measure the angles of the left and right pediatric hip and tools to determine the stressed and flexed percentages of femoral head coverage.

Use the configuration settings to select the default angles for measurement.

- An alpha angle only requires a reference line and one intersecting line.
- Alpha and beta angles require a reference line and two intersecting lines.

You can view the Graf Sonometer, a graph of the measured angles, in the patient report. The system provides a Sonometer for alpha only angles and for alpha and beta angles.

See also: For a list of measurement labels, refer to Appendix C in the System Reference.

To determine a hip angle:

Prerequisite: Activate the measurement function and then select the **Ped Hip** exam package.

1. Tap **Left** for the left hip or **Right** for the right hip.
2. Tap **Hip Angle**.

A baseline for use as a reference line displays on the image screen. The mark on the baseline indicates the pivot point.

3. Position the baseline.
 - a. Position the baseline along the straight section of the ilium with the arrow pointing toward the femoral head.
 - b. To adjust the angle of the baseline in fine increments, rotate **Rotate**.
 - c. To rotate the baseline in 90° increments, press **Rotate**.
 - d. Anchor the line.
4. Position the intersecting line to measure the alpha angle.
 - a. Position the alpha line at the bony rim of the acetabulum.
 - b. Position the alpha line along the lower limb of the ilium and intersect the baseline.
 - c. To adjust the alpha line in fine increments, rotate **Rotate**.
 - d. Anchor the line.

5. Position the intersecting line to measure the beta angle.

Note: The intersecting line to measure the beta angle is available only when you have enabled alpha and beta angle measurements in your configuration settings.

- a. Position the beta line at the bony rim of the acetabulum.
- b. Position the beta line along the labrum and intersect the baseline.
- c. To adjust the beta line in fine increments, rotate **Rotate**.
- d. Anchor the line.

To determine a stressed or flexed percentage of femoral head coverage:

Prerequisite: Activate the measurement function and then select the **Ped Hip** exam package.

1. Tap **Left** for the left hip or **Right** for the right hip.
2. Tap **Stressed %FHC** or **Flexed %FHC**.
A baseline for use as a reference line displays on the image screen. The mark on the line indicates the pivot point.
3. Position the baseline.
 - a. Position the baseline along the straight section of the ilium with the arrow pointing toward the femoral head.
 - b. To adjust the angle of the baseline in fine increments, rotate **Rotate**.
 - c. To rotate the baseline in 90° increments, press **Rotate**.
 - d. Anchor the line.
4. Roll the trackball to position the circle for determining the femoral head diameter.
5. Rotate **Size** to adjust the size of the circle and then anchor the circle.

Calculated Results of Pediatric Hip Tools

Results	Abbreviation
Alpha angle	α
Beta angle	β
Hip	Hip
Left	Lt
Right	Rt
Percentage of femoral head coverage	%FHC
Stressed	Stressed
Flexed	Flexed

Measuring Carotid Intima-Media Thickness with the Auto IMT Feature

(Not available during real-time imaging)

Auto IMT detects and measures the carotid intima-media thickness on a user-defined region of interest.

Use the configuration settings to show or hide the values in the measured results.

See also: For a list of measurement and calculation labels, refer to Appendix C in the System Reference.

To determine a carotid intima-media thickness:

Prerequisite: Activate the measurement function and then select the **Carotid** exam package.

1. Tap **Right** for the right vessel or **Left** for the left vessel.
2. Tap an IMT label, for example, **Prox CCA IMT**.
The region of interest (ROI) displays on the 2D image. The dashed reference line is 1 cm from the ROI.
3. To preview temporary values for different locations of the vessel:
 - a. Position the ROI over the posterior wall of the common carotid artery and then press **UPDATE**.
The system traces the vessel and displays measured values for the selected region of interest.
 - b. To exit the preview, roll the trackball.
4. Define the region of interest.
 - a. Position the ROI over the posterior wall of the common carotid artery and then press a trackball key.
The system traces the vessel and displays two lines for measuring thickness of the vessel with the active line in blue.
 - b. To edit the lines for measuring thickness of the vessel:
 - i. Roll the trackball to position the cursor near the active line in blue.
 - ii. Press a trackball key to adjust the contour of the line.
 - iii. Continue editing the line, as necessary.
5. To complete the measurement, press **UPDATE**.

Calculated Results of Auto IMT Tools

Results	Abbreviation
Mean intima-media thickness	Mean
Maximum intima-media thickness	Max
Minimum intima-media thickness	Min
Intima-media thickness of the distal wall 10 mm proximal to the common carotid artery-carotid sinus junction	C10
The value is derived from the position of the region of interest as recommended by the Japanese Society of Ultrasound Medicine.	

11 Cardiac Measurements and Calculations

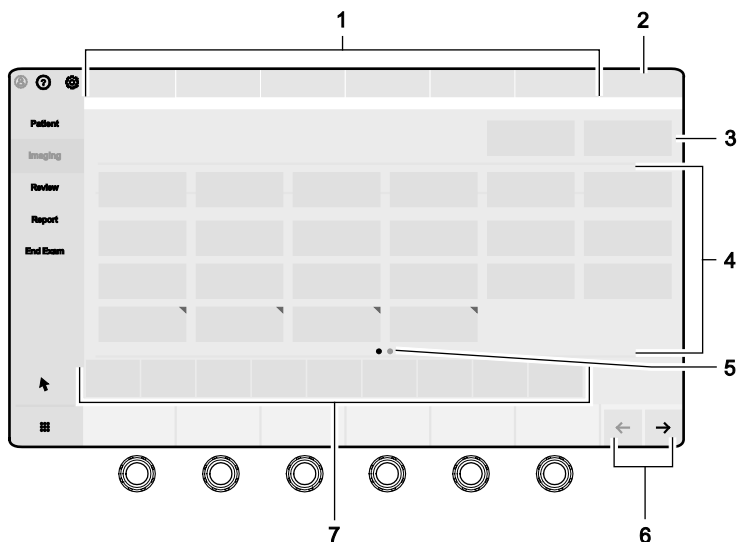
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Overview

The measurement function provides measurement tools, measurement labels, guided measurements, and calculations specific to the cardiac exam. You can perform cardiac measurements by selecting the cardiac study during patient registration or an exam, or by selecting the cardiac exam package during the measurement function.

Guided measurements are system-defined sequences of individual measurements. The system advances to the next measurement label after you complete a measurement, or you can manually select a label in any sequence.

See also: For additional information about the measurement function, refer to Chapter 10 in this manual.



Example of the touch screen during the measurement function.

- 1 Operating mode and category of measurement based on anatomy and physiology; for example, left ventricular diastology
- 2 Exam package for example, cardiac
- 3 Measurement labels; for example, heart rate
- 4 Categories of measurements based on view of the anatomy; for example, apical or subcostal view.
 - A triangle indicates a folder of measurement labels; for example, left ventricular diastolic series.
 - An arrow displayed with a folder of measurement labels indicates guided measurements.
 - Measurement labels; for example, left ventricular outflow tract diameter, systole
 - A check mark indicates a measured value is assigned to the label.
- 5 Indicator for each page of measurement labels
 - A white dot indicates the active page.
 - A gray dot indicates additional pages of measurement labels.
- 6 Accesses additional pages of measurement labels
- 7 Measurement tools
 - Blue indicates the active measurement tool.
 - White indicates the available measurement tools.

Measured Results

The ultrasound system displays measured and calculated values in the measured results on the image screen. You cannot reposition measured results during a cardiac study.

Measured Result Units

Units	Description
cm	centimeters
cm ²	centimeters squared
cm ³	centimeters cubed
cm/s	centimeters per second
cm/m ²	centimeters per meters squared
kPa	kilopascal
mm	millimeters
mm/s	millimeters per second
α, β	Alpha, Beta
°	degrees
ml	milliliters
ml/m ²	milliliters per meters squared
m/s	meters per second
m/s ²	meters per second squared
ms	milliseconds
kHz	kilohertz
bpm	beats per minute
sec	second
s	second
l/min	liters per minute
l/min/m ²	liters per minute per meters squared
l/m ²	liters per meters squared
%	percentage
mmHg	millimeters of mercury

Selecting Cardiac Measurement Labels

The system activates a measurement tool and displays the first measurement marker when you select a measurement label.

To select a cardiac measurement label:

Prerequisite: Select the cardiac study or the cardiac exam package.

1. Activate the measurement function.
The ultrasound system activates a measurement tool for the active operating mode.
2. Select the required measurement category:

Selection	Description
RV	Right ventricle
AoV	Aortic valve
MV	Mitral valve
TV	Tricuspid valve
PV	Pulmonary valve
LV	Left ventricle
RV Diastology	(Available only during Doppler) Right ventricle diastology
LV Diastology	(Available only during Doppler) Left ventricle diastology
Pericardial Effusion	Pericardial Effusion
LA	(Available only during 2D-mode) Left atrium
RA	(Available only during 2D-mode) Right atrium
Veins	Veins

Selection	Description
Ao/LA	(Available only during M-mode) Aorta/left atrium
LV/RV	(Available only during M-mode) Left ventricle/right ventricle
IVC	Inferior vena cava
Arteries	Arteries
Shunts	Shunts

3. Select the view of the anatomy, if necessary, and then select the measurement label.
Measurement labels from any exam package are available if you select the measurement label before completing the measurement.
4. To hide the calculation values in the measured results, tap **Hide Results**.
5. To show the calculation values in the measured results, tap **Show Results**.

Measuring with 2D-mode Measurement Tools

See also: For information about how to edit a measurement, including a segment of a traced circumference, refer to Chapter 10 in this manual.

To	Do This
Enter a heart rate value	(Available only for the following measurements as default: AoV , MV , PV , TV , LV , and RV) 1. Tap a folder for a measurement label. 2. Tap HR Edit. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Enter an aliasing velocity value	(Available only for the following measurements: AoV , MV , PV , and TV) 1. Tap a folder for a measurement label. 2. Tap the label; for example, AR Aliasing Velocity. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Enter a right atrial pressure value	(Available only for the following measurements: TV) 1. Tap a folder for a measurement label. 2. Tap RA Pressure. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Measure a distance	1. Tap Distance.  2. Position and then anchor the beginning and ending markers.

To	Do This
Measure the circumference and area of a structure using an ellipse	1. Tap Ellipse.  2. Position and then anchor the first marker. The system displays an ellipse. 3. Position and then anchor the major axis. 4. Position and then anchor the other axis. 5. Adjust the position of the ellipse, if necessary, and then anchor the ellipse.
Measure the circumference and area of a manually traced structure	1. Tap 2D Trace.  2. Position and then anchor the first marker. 3. Roll the trackball to trace the structure and then anchor the next marker. Note: Tolerances of circumference measurements cannot be guaranteed when using the manual tool because the accuracy of tracing a circumference is largely dependent on the user's incremental movements using the trackball.
Measure an acute angle	1. Tap Angle.  2. Position and then anchor the beginning and ending markers for the reference line. 3. Position and then anchor the beginning and ending markers for the intersecting line to create an angle.
Measure the circumference and area of a structure with three or more points indicated by markers	1. Tap Spline.  2. Position and then anchor three or more points on the traced structure. 3. Press UPDATE and then press a trackball key to complete the measurement. The system also indicates the major and minor axis.

To	Do This
Make a left ventricular function assessment	Note: This series measurement does not separately measure diastole and systole. Use measurement labels to specify diastole and systole measurements. 1. Activate the measurement function. 2. Tap LV Series.  3. Position and then anchor the first marker on the anterior interventricular septum. 4. Position and then anchor the next marker on the posterior interventricular septum. 5. Position and then anchor the next marker on the endocardium of the left ventricular free wall. 6. Position and then anchor the next marker on the posterior left ventricular free wall.
Determine an end diastolic volume or end systolic volume using Simpson's method of disks	1. Activate the measurement function. 2. Tap Vol MOD Spline.  3. Position and then anchor the first marker in the basal septal segment. 4. Position and then anchor the last marker in the basal lateral segment. The system indicates the long axis and disks of the traced contour and highlights a segment in blue. 5. Position and then anchor the additional markers following the contours of the endocardium. 6. To edit the contour: a. Roll the trackball to select the segment or long axis and then press a trackball key. ▪ For smaller adjustments, position the arrow on or near the blue segment and then press a trackball key. ▪ For larger adjustments, position the arrow away from the blue segment and then press a trackball key. ▪ To rotate the long axis, position the arrow within the contour and then press a trackball key. b. To continue to adjust the selected segment, roll the trackball. 7. Press UPDATE to complete the measurement.

Measured Results of 2D-mode Measurement Tools

Measured Results	Abbreviation
Distance	D
Axis length	D1, D2
Circumference	C
Area	A
Interventricular septum	IVS
Left ventricle internal dimension	LVID
Left ventricle posterior wall thickness	LVPW
Alpha angle	α
Beta angle	β
Volume	Vol

Measuring with Doppler Measurement Tools

Changes to the Doppler gate and the transmit frequency update the labeled measurements and the corresponding calculations displayed in the measured results.

To	Do This
Enter a heart rate value	(Available only for the following measurements as default: AoV, MV, PV, TV, LV, and RV) 1. Tap a folder for a measurement label. 2. Tap HR Edit. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Enter an aliasing velocity value	(Available only for the following measurements: AoV, MV, PV, and TV) 1. Tap a folder for a measurement label. 2. Tap the label; for example, AR Aliasing Velocity. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Enter a right atrial pressure value	(Available only for the following measurements: TV) 1. Tap a folder for a measurement label. 2. Tap RA Pressure. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Measure a velocity	1. Tap Velocity.  2. Position and then anchor the marker on the Doppler waveform.
Measure a heart rate	1. Tap Heart Rate.  2. Position and then anchor the first marker at the beginning of the cardiac cycle. 3. Position and then anchor the next marker at the end of the required number of cardiac cycles. Note: You can manually enter a heart rate value in the patient report.

To	Do This
Measure the peak systole, end diastole, and resistive index	1. Tap D-Trace.  2. Position and then anchor the first marker both horizontally and vertically. 3. Roll the trackball to manually draw a trace of the waveform. A marker displays on the traced waveform to indicate peak systole. 4. Anchor the marker. 5. Anchor the marker for end diastole.
Measure the change in velocity over time	1. Tap Acceleration.  2. Position and then anchor the beginning and ending markers. A dotted line indicates the slope.
Measure a time interval	1. Tap Time.  2. Position and then anchor the beginning and ending markers.
Measure the velocity below a trace of the waveform	1. Tap VTI.  2. Position and then anchor the first marker both horizontally and vertically. 3. Roll the trackball to manually draw a trace of the waveform. A marker displays on the traced waveform to indicate maximum velocity. 4. Anchor the marker.

To	Do This
Measure the velocity below a trace of the waveform	(Not available during review) 1. Tap Auto VTI.  2. Position and then anchor the first marker. 3. Position the second marker to the right of the first marker. The system traces the waveform between the two markers and indicates maximum velocity. 4. Anchor the marker.
Determine a valve area by defining the time needed for the peak transvalvular gradient to fall to its half value	1. Tap PHT.  2. Position and then anchor the first marker on the waveform at peak velocity. 3. Position and then anchor the next marker on the deceleration of the mitral valve. The position of the marker on the line indicates the location of the measurement.

Measured Results of Doppler Measurement Tools

Measured Results	Abbreviation
Velocity	Vel
Minimum velocity	Vmin
Maximum velocity	Vmax
Peak gradient	Peak Grad
Mean gradient	Mean Grad
Heart Rate	HR
Time	Time
Acceleration rate	Acceleration
Acceleration Time	AT
Pressure Half Time	PHT
Slope	Slope
Velocity time integral	VTI
Deceleration Time	DT

Measuring with M-mode Measurement Tools

To	Do This
Enter a heart rate value	1. Tap a folder for a measurement label. 2. Tap HR Edit. 3. Enter a value and then tap Save. 4. To exit without saving a value, tap Cancel.
Measure a vertical distance	1. Tap M-Distance.  2. Position and then anchor the beginning and ending markers.
Measure a change in distance over time	1. Tap M-Slope.  2. Position and then anchor the beginning and ending markers.
Measure a heart rate	1. Tap M-Heart Rate.  2. Position and then anchor the first marker at the beginning of the cardiac cycle. 3. Position and then anchor the next marker at the end of the required number of cardiac cycles. Note: You can manually enter a heart rate value in the patient report.

To	Do This
Measure a time interval	1. Tap Time.  2. Position and then anchor the beginning and ending markers.
Make a left ventricular function assessment	Note: This series measurement does not separately measure diastole and systole. Use measurement labels to specify diastole and systole measurements. 1. Freeze the waveform. 2. Activate the measurement function. 3. Tap LV Series.  4. Position and then anchor the first marker on the anterior interventricular septum. 5. Position and then anchor the next marker on the posterior interventricular septum. 6. Position and then anchor the next marker on the endocardium of the left ventricular posterior wall. 7. Position and then anchor the next marker on the posterior left ventricular posterior wall.

Measured Results of M-mode Measurement Tools

Measured Results	Abbreviation
Distance	D
Heart Rate	HR
Slope	Slope
Time	Time
Interventricular septum	IVS
Left ventricle internal dimension	LVID
Left ventricle posterior wall thickness	LVPW

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Overview

A patient report includes patient information and organizes measurements, calculations, images, and comments into sections by exam.

The ultrasound system copies the most recent information from patient registration to the patient report, including the patient history for each patient study. The patient banner displays patient information on each page of the patient report.

Measured results are added to a section of the report when the first labeled measurement is completed.

Use the configuration settings to configure the patient report.

See also: For information about printing a report, refer to Chapter 13 in this manual.

Modifying the Report

Editable values are displayed in a text box in the patient report. You cannot edit a calculation value.

Images marked for deletion during imaging or review are not removed from the patient report.

To modify the patient report:

- Tap **Report** and click the name of the required section of the report, if necessary.

To	Do This
Edit a measured value	1. Tap Edit Report. 2. To change a measured value, enter the numerical value in the text box. The system places an asterisk next to the edited value and updates calculated values based on the measurement value. 3. To delete a measured value, delete the numerical value in the text box.
Enter an assessment	(Available for the following exams: abdomen, carotid, obstetric, early obstetric, fetal echo, gynecology, pediatric hip) 1. Select an option from the drop-down list. 2. Enter comments.
Edit a ratio	▪ Select a different value for calculating the ratio from the drop-down list.
Insert comments	1. Click Summary Comments. 2. Position the cursor in the text box and enter the information. 3. To insert predefined text, click Load Comments. a. To insert comments defined for the current exam, click the comment. b. To insert comments defined for a different exam, select the exam from the drop-down list and then click the comment. 4. Click OK.
Show or hide a section of the report	1. To view a section of the report, click the section name on the left side of the image screen. 2. To expand a section of the report, click the plus button next to the name of the section.  3. To hide a section of the report, click the minus button next to the name of the section.  The printed report does not include hidden sections of the report. 4. To view all sections of the report, click Expand All. 5. To hide all sections of the report, click Collapse All. 6. To view the next or previous line of the report, rotate FORWARD/BACKWARD.

To	Do This
Reorganize the measured results displayed in the report	1. Click a measured result heading from the drop-down list to view the available options. 2. To hide a column of measured results, click the blank selection in the drop-down list. 3. To show different measured results in the selected column, click another option from the drop-down list.
Copy images, protocol views, and clips to the patient report	1. Click Images. 2. Click the image on the thumbnail panel. The protocol view name displays in the image section of the report, but not in the printed report. 3. To change the display format of the images, click the required format from the drop-down list, for example, 2x2. 4. To rearrange an image in the report, click the image and then click the new location. 5. To delete an image from the report, click the image and then click Delete.  Images deleted from the report are not deleted from the exam.
Select the method for displaying a measurement value	1. Click Edit Report. 2. Select the type of measured value to include as the value for the measurement label. – Last uses the most recent measurement value. – Avg uses the average of all measurement values. – Min uses the minimum value. – Max uses the maximum value. Depending on the number of measurements completed for the label, you can select the first through the fifth measurement to include as the value for the measurement label. The system updates the measurement values and corresponding calculations in the report.
Create a single report for multiple exams	▪ Complete all exams and then tap End Exam.
Create a separate report for each exam	▪ Tap End Exam after each exam.

Obstetrical Report

The obstetrical report includes selections for maternal and fetal assessments, fetal growth charts (growth curves), images, and comments. When multiple fetuses are present, completed measurements, images, and assessments are available for each fetus.

To include the standard deviation of each measurement, the clinical age, last menstrual period, date of conception, or estimated date of delivery must be entered in the patient registration form. If this information is absent, the system displays only the gestational age.

Use the configuration settings to customize the display of obstetric ratios, standard deviations, and gestational age on the report.

Modifying the Obstetrical Report

- Modifying the date of the last menstrual period or the date of conception updates the estimated date of delivery and clinical age.
- Modifying the estimated date of delivery updates the clinical age.
- Modifying the clinical age updates the estimated date of delivery.

The system displays the following indicators for out-of-range values in the patient report:

- **OOB** indicates the values are outside the valid range.
- OB ratios:
 - *** indicates the clinical age is outside the valid range for the OB ratio. The asterisks display on the low and high values of the range.
 - An OB ratio value within brackets (< >) indicates the clinical age is in the valid range, but the OB ratio value is outside the normal range.

To modify the report:

1. Tap **Report**.
2. Click **Edit Report**.

To	Do This
Select another reference for a measurement label	1. Click Fetal Biometry. 2. Select another author from the drop-down list. Note: When multiple fetuses are present, the author applies to all fetuses.
Modify the estimated date of delivery or last menstrual period	▪ Click Patient History and then enter a new date.
Select a different reference for calculating gestational age	1. Click Collapse All. 2. Click Fetus Information. 3. Select another author from the drop-down list. Note: When multiple fetuses are present, the author applies to all fetuses.
Assess fetal structures	1. Click Fetal Assessment. 2. Select a description from a drop-down list or enter text to describe structural observations.
Assess maternal structures	1. Click Maternal Assessment. 2. Select a description from a drop-down list or enter text to describe structural observations.

To	Do This
Enter a biophysical profile for a fetus	(Not available for the early obstetric exam) 1. Click Biophysical Profile. 2. Enter a value for each selection. The ultrasound system totals the values to calculate a score for the biophysical profile.
Review fetal growth curves	1. Click Fetal Growth Charts. 2. To edit the reference author, select an author from the drop-down list. 3. To select another fetal measurement label, select the label from the drop-down list. 4. To change the display layout, select the layout from the drop-down list, for example, 1x1.
Copy fetal images and clips to the patient report	1. Click Fetus, if necessary. 2. To specify a specific fetus, click the corresponding identifier, for example, Fetus B. 3. Click Fetus Images. 4. Click the image on the thumbnail panel.
Compare measured values for multiple fetuses	▪ Click Fetus Side-by-Side.

Fetal Growth Charts

You can view fetal growth charts (growth analysis graphs) to evaluate predicted fetal growth patterns for a measurement, ratio, or calculation.

A fetal growth chart includes measured or calculated values within the limits for the selected author. Each growth chart includes the following information:

- Measured results on the vertical axis
- Clinical age on the horizontal axis
- Author of the predicted fetal growth pattern with color indicators:
 - Red indicates the upper limit
 - Green indicates the mean
 - Blue indicates the lower limit
- Icons of different shapes and colors represent multiple fetuses on a fetal growth chart. A legend indicates the icon associated with each fetus.
- Growth data from prior exams, if entered as growth data, for the following parameters: BPD, AC, FL, HC, HL

Note: The references for growth curves typically use 5 or 10 percent for the lower limit and 90 or 95 percent for the upper limit.

The publication for growth curves by Chitty uses both two and three standard deviations for the graphical representation of data. These standard deviations correspond to the 3rd and 97th percentiles and the 10th and 90th percentiles.

The ultrasound system generates the growth curves using the published standard deviations. Measurement values depicted in the growth curve are mathematically correct, but do not directly map to the clinical publication. For consistency with other fetal biometric calculations, the system plots fetal growth and calculates a growth percentile using the 5th and 95th percentiles with a ± 1.5 standard deviation. The 3rd and 97th percentiles are included in the author's publication.

See also: Publications are listed in Appendix F of the System Reference.

The JSUM reference uses 5 percent and 95 percent for the lower and upper limits, respectively, for the middle cerebral artery and umbilical artery growth curves. The JSUM, Tokyo, and Osaka references use a standard deviation of 1.5 from the mean for the lower and upper limits for all other growth curves.

Note: The ultrasound system plots fetal growth and calculates a growth percentile for a measured or calculated value only when the values are within the growth curve limits and the gestational age is within the range of the selected author.

Use the configuration settings to create user-defined growth curves.

To view a fetal growth chart:

1. Tap **Report**.
2. Click **Fetal Growth Charts**.
3. To view a growth chart for another measurement, ratio, or calculation, select an option from the measurement list.
4. To select a growth chart for another reference author, select an option from the author list.
5. To change the layout for the fetal growth charts:
 - Select **1x1** to display a single graph in the report.
 - Select **2x2** to display four graphs in the report.

Entering Growth Data

You can enter growth data and estimated fetal weight parameters. The ultrasound system incorporates growth data into the fetal growth chart on the obstetrical report.

You can also select interval growth to include growth percentiles for the following parameters in the obstetrical report: BPD, AC, and FL. The ultrasound system uses growth data from the current exam and the selected prior exam to calculate the interval growth rate for the selected author. When a prior exam is not selected in obstetric history, the system uses the most recent exam.

Use the patient browser to import measured results from prior exams.

The system retains growth data entered in the patient history until the end of the exam.

To enter growth data:

Note: The system does not check growth data entered in the patient history for accuracy or internal consistency.

1. To enter data for a new patient, register the patient and select an obstetric study.
2. To enter data for a registered patient, tap **Report**.
3. Click **OB History**.
4. Enter the required information.
The ultrasound system copies the exam date to the obstetric history for each fetus.
5. To include the data in obstetric trending, select **Trend**.
6. To select a previous exam for calculating interval growth rate percentages, select **Interval Growth**.
7. Click **OK**.
8. To exit without saving the changes, click **Cancel**.

Pediatric Hip Report

Prerequisite: Knowledge of the Graf technique for evaluation of the pediatric hip, including the classification zones for the hip from dislocated to normal.

The pediatric hip report includes an assessment for the left and right hips and the Graf Sonometer. The Sonometer is a depiction of the measured angle or angles in a graph.

Use the configuration settings to customize the display of information to include in the report.

To assess the left or right hip:

1. Tap **Report**.
2. Click **Ped Hip**.
3. Click **Right Hip Description** or **Left Hip Description**.
4. Select an assessment from each drop-down list, for example, you can select a descriptive option for the osseous profile, osseous acetabulum, cartilaginous acetabulum, or anatomical classification (type).

To view the measured angle in a graph:

1. Tap **Report**.
2. Click **Ped Hip**.
3. Click **Right Hip Sonometer** or **Left Hip Sonometer**.
The system displays a Sonometer according to your configuration settings for alpha only angles or for beta and alpha angles.

Saving Report Data

You can save report data as an image or transfer report data from the ultrasound system.

To save the patient report:

1. Tap **Report**.
2. To save the patient report, click **Store Report**.
You can continue the patient exam while the ultrasound system saves the report.
3. To save only the displayed section of the patient report, press **IMAGE**.

Transferring Report Data

You can transfer report data to an external location during an exam or at the end of an exam, as specified in the configuration settings. The images, growth charts, and obstetrical growth history are not included in the exported patient report.

Report data includes the following file formats:

- .xml
- DICOM Structured Report
- Nuance PowerScribe 360
- .pdf

To transfer data to a connected USB device:

1. Connect a USB-compatible storage device to the ultrasound system.
2. Tap **Report**.
3. Tap **Export to PDF**.
4. Enter a filename and then click **OK**.
5. Tap the additional selections button.



6. Tap **Eject USB** and remove the USB-compatible storage device.

To transfer data during an exam:

(Not available for the cardiac exam)

1. Tap **Report**.
2. Click **Transfer Report**.

Nuance Data Transfers

 **WARNING:** If the Nuance data transfer feature is enabled, the ultrasound system transfers measured results from the patient report to the configured destination device when you end an exam. If measured results are deleted from the patient report on the ultrasound system after the measurements are successfully transferred, the measurements are not deleted on the destination device.

If the transfer fails (for example, the ultrasound system is not connected to the network), the system resends the data until the transfer is successful or you delete the transfer from the status queue.

To view the status of Nuance data transfers:

Prerequisite: Enter an accession number for the patient study in the patient registration form.

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Click **Transfer** and then click **Nuance Data Transfer Status**.
4. To cancel a data transfer, select the data transfer and then click **Delete**.
5. Click **Close**.

To troubleshoot the Nuance data transfers:

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Click **Transfer** and then click **Nuance Data Transfer Status**.
4. To troubleshoot a data transfer listed in the status:
 - a. Review the cause for the data transfer failure listed in the **Job Status** column.

Cause	Recommended Action
The Nuance server did not recognize the site, user, name, or password entered in the configuration settings.	Verify the configuration settings are correct and update the information, if necessary.
The ultrasound system could not connect to the Nuance server.	Ensure the ultrasound system is connected to the network.
The Nuance server did not recognize the accession number.	▪ Verify the accession number on the ultrasound system matches the accession number on the report template. ▪ Refresh the worklist server to ensure the most recent information was transferred to the ultrasound system and to the computer where the Nuance software is installed.

- b. Select the data transfer and then click **Retry**.
5. To troubleshoot a data transfer not listed in the status, verify the Nuance server accepted the transferred data.
 - a. The following log file lists the measured results not transferred because corresponding custom fields are not configured on the Nuance server:
c:\syngo\log\NuanceExportMissingCustomFields.txt
 Contact your service representative for the ultrasound system for assistance accessing the log file. Contact the administrator responsible for the Nuance software for assistance configuring custom fields.
Note: The log file is overwritten after each data transfer.
 - b. If the data was accepted by the Nuance server, compare the measured results sent by the ultrasound system to the measurements displayed in the template. The template may use different labels than the ultrasound system patient report.

13 Printing and Recording

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Printing Images

You can print an image during an active study or during review of an active exam or previous exam.

Use the configuration settings to reassign controls on the control panel to the print function and configure the print destination.

To	Do This
Print an image during an active study	Press the control assigned to the print function. The system sends a request to the printer and saves the image to the local database.
Print an image from a clip	- Rotate Cine to display the required frame in the clip. - Press the control assigned to the print function.
Print an image during review	Press the control assigned to the print function. The system sends a request to the printer and saves the image to the local database.
Copy images to the film sheet during review	- Select the required images. - Tap Copy to Film.  - Select a printer and then click Continue, if necessary. During review of an active study, the system prints the image at the end of the exam. During review of a stored study, the system prints the image when you exit review.
Print an image from a study stored on the local database	- Tap Patient. - Tap Patient Browser. - Select an image from the local database. - Click Patient and then click Copy to Film.  - Select a printer and then click Continue, if necessary. - Click Patient and then click Expose Film Task. 

To	Do This
View the status of a print job	1. Tap the additional selections button.  2. Tap Film Sheet. 3. Click Film Task Status and then select the required printer.  4. Tap Exit.

Printing the Report

You can print the entire contents of the patient report or print a screenshot of a section of the report.

To print the patient report:

Prerequisite: The ultrasound system is connected to a supported printer.

1. Tap **Report**.
2. To print the entire report, click **Print Report**.
3. To print a screenshot of the report, select the required section and then press the control assigned to the print function.
4. To exit the preview of the report, click **Report**.

Customizing Print Settings

Use the film sheet to save images for subsequent printing.

To customize print settings:

1. Tap the additional selections button.



2. Tap **Film Sheet**.
3. Select the required saved image or print job and then select an option.

To	Do This
View the next or previous page of images within the selected print job folder	To access the next page, click the upper right of the icon; to access the previous page, click the lower right of the icon. 
Change the layout of the film sheet	Click Layout and then select an option. The size of an image decreases when additional images are included on the page. Note: If you apply a layout to part of a print job folder, the system places the reformatted images on the last film sheet at the end of the print job, resulting in a new sequence of images.
Remove images from the print queue on the film sheet	Click Delete.
Change the printer destination	1. Click Camera. 2. Select the required printer from the drop-down list. 3. Select a film size from the drop-down list.
Hide or show the overlays	Prerequisite: Images are stored as ultrasound images with overlays. Examples of overlays include date, patient name, and transmit frequency. 1. Click Images. 2. Select Customized Text.  3. To hide text, select No Text.  4. To show hidden text, select All Text. 

To	Do This
Hide or show graphics	Prerequisite: Images are stored as ultrasound images with overlays. Examples of graphics include annotations, measurement markers, the region of interest, and the color bar velocity. 1. Click Images. 2. To hide graphics, select Hide Graphics.  3. To show graphics, select Show Graphics. 
Select the display format of the image	▪ Click Images. – Fit to Segment displays the image as large as possible without clipping the image.  – Original Image displays an image in the original aspect ratio.  Note: This format may cause errors during printing. – Clip Document displays a rectangular image.  Note: This format may cause errors during printing.

Recording a Patient Study

You can record a patient study for later playback. When you start and then stop recording, the ultrasound system saves a title on the recording media. Each time you pause and then resume recording during a session, the ultrasound system saves a chapter on the recording media. A title can consist of multiple chapters. The ultrasound system assigns a title using the patient's last name and the exam type.

The ultrasound system displays the following information on the touch screen.

- **Video Destination** displays the location for recording the patient study.
- **Available Space** indicates a status of the space available on the recording media.
- **Video Timer** indicates the time elapsed since the start of the recording.

To record a patient study:

Prerequisite: Connect and power on the recording device before powering on the ultrasound system and insert formatted media into the recording device. Refer to the manufacturer's instructions for information about formatting new media.

1. Tap the additional selections button.



2. Tap **DVR Menu**.

To	Do This
Begin recording a patient study	▪ Tap Start .
Temporarily stop recording	▪ Tap Pause .
Continue recording after pausing	▪ Tap Resume .
End recording	▪ Tap Stop .
Select the destination for recording the patient study	1. Tap Change Destination. The ultrasound system activates the configuration settings. 2. Select the destination from the list. – Network File Share sends the recording to a network location from the drop-down list. – USB Storage sends the recording to a location from an external storage device. 3. To exit the configuration settings and record the study, tap Imaging and then tap Start.
Remove the recording selections from the touch screen	▪ Tap Exit .

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Standard Features

The ultrasound system includes the language-specific user interface and power cord required for your region.

Cybersecurity

- Your ultrasound system includes a security package to protect patient confidentiality and system security.

See also: For information about cybersecurity, refer to Appendix C in this manual.

Data Storage Encryption

 **Caution:** Data storage encryption on your ultrasound system requires a USB storage device with the recovery key for recovering encrypted data in the event of a system failure. The ultrasound system administrator must keep the recovery key in a secure location.

- Patient data encryption software protects patient health information and system settings stored on the ultrasound system by preventing unauthorized access
- Includes a USB storage device with the recovery key for recovering encrypted data

System Operating Software

- Windows-based operating software
- Multi-language capability
- User-modifiable configuration settings, including libraries of annotations and body markers
- User-defined exam, transducer, and image parameter settings
- Supports DICOM file format
- Supports PC file format
- Compatible with remote update handling for remote application support and remote troubleshooting
- Supports self-installable software updates from an online portal

Operating Modes

- 2D-mode
 - 2D-mode
 - 2D-mode with Harmonics Imaging
 - 2D-mode with Harmonics Imaging for Contrast Agent Imaging
- Color flow Doppler
 - Color (velocity)
 - Power (energy)
- Doppler
 - Pulsed Wave Doppler
 - Pulsed Wave Doppler Tissue Imaging
 - High Pulsed Repetition Frequency Pulsed Wave Doppler
 - Steerable Continuous Wave Doppler for imaging transducers
 - Continuous Wave Doppler for non-imaging transducers
- M-mode
 - M-mode with Harmonics Imaging
 - Anatomical M-mode
- Elastography
 - Strain Imaging
 - Shear Wave Elastography
- 3D/4D Volume Imaging

See also: For information on 3D and 4D volume imaging, refer to page A-10 in this chapter.

Combined Modes

- 2D-mode with color
- 2D-mode with Doppler
- 2D-mode with color and Doppler
- 2D-mode with M-mode
- 2D-mode with M-mode and color
- 2D-mode with Elastography

Formats

- Single, dual, live dual, and seamless dual image display format
- Display formats for M-mode and Doppler
 - Full screen
 - Side by side
 - 1/2 2D with 1/2 trace
 - 1/3 2D with 2/3 trace
 - 2/3 2D with 1/3 trace
- Virtual format imaging: linear, steered, or trapezoidal format
- Curved-sector, linear, and phased-sector data acquisition and display formats
- Image display formats during review: 1x1, 2x2, 3x3, and 4x4

2D-mode Features

- Adjustable size and position of field of view
- Magnification in frozen, CINE, or real-time imaging
- CINE capture: up to 300 seconds
- Acquired 2D-mode frame rates, depending on the transducer and imaging depth: up to 250 fps (frames per second)
- Fundamental and harmonic transmit frequencies, transducer dependent
- User-selectable transmit frequencies: up to 14.0 MHz
- Multi-line signal parallel processing
- Linear array transducer beam steering
- 2D/Doppler refresh, update, and triplex functions
- Gain in one decibel increments: -20 dB to 20 dB
- Dynamic range in one decibel increments: 10 dB to 80 dB
- 2D-mode with Harmonics imaging
- InFocus dynamic transmit focusing
- Doppler grayscale and colorization (tint) maps
- Persistence levels: up to 4
- Speed of sound, exam-dependent: up to 4
- Line density: up to 3
- UltraArt universal image processing: Off, 1 to 3
- Clarify: up to 5
- Maps: up to 9
- Tints: up to 15

Color Features

- Gain in 0.5 decibel increments: -20 dB to 20 dB
- User-adjustable color region of interest (ROI), size, and position
- Independent controls for color gain, pulse repetition frequencies, invert, baseline, line density, persistence, priority, filter, and smoothing
- User-selectable transmit frequencies: up to 5
- Color On/Off invert and baseline shift functions
- User-selectable color flow states: low, general, high, and anatomy specific, for example, kidney or aorta
- Color-adaptive wall filter
- Pulse repetition frequency range: 200 Hz to 10,000 Hz
- Color velocity maps, exam-dependent: up to 10
 - Includes a velocity variance map
- Color AutoHz imaging
 - Compatible transducers: 5C1
Supported studies: Abdomen, Abdomen-Difficult
 - Compatible transducers: 10L4
Supported studies: Arterial, Venous

Power Features

- Power gain in 0.5 decibel increments: -20 dB to 20 dB
- Independent controls for power gain, pulse repetition frequencies, invert, baseline, line density, persistence, priority, filter, and smoothing
- User-selectable transmit frequencies: up to 5
- User-selectable power flow states: low, general, high, slow, and anatomy specific, for example, kidney or aorta
 - Slow setting:
 - Compatible transducers: 5C1
Supported studies: Abdomen, Abdomen-Difficult, General
 - Compatible transducers: 9C2
Supported studies: Abdomen, General
 - Compatible transducers: 7VC2
Supported studies: Abdomen
 - Compatible transducers: 15L4
Supported studies: Breast, Carotid, Musculoskeletal, Testis, Thyroid, General
 - Compatible transducers: 18L6
Supported studies: Thyroid, General
 - Compatible transducers: 10EV3
Supported studies: Gynecology, General
- User-selectable Power map selections: up to 5
- Persistence levels: up to 4
- Power smoothing levels: up to 4
- Pulse repetition frequency range: 200 Hz to 10,000 Hz
- Adaptive wall filter

Pulsed Wave Doppler Features

- Fast Fourier Transformation (FFT) processing: up to 256 points
- FFT speed: up to 2,880 FFTs per second
- User-selectable transmit frequencies per transducer: up to 3
- Simultaneous 2D-mode and Doppler display and 2D/Doppler with color (Triplex)
- User-selectable 2D/Doppler refresh
- User-adjustable Doppler scale and baseline position controls
- User-adjustable Doppler UltraArt universal image processing and edge controls
- Angle correction in one-degree increments: 0° to 89°
- Transmit frequencies: 1.25 MHz to 10 MHz
- Pulse repetition frequencies (PRF) and high-pulse repetition frequency (PRF) Doppler: 100 Hz to 35,714 Hz
- Wall filter selections: 1 Hz to 4,375 Hz
- Adjustable Doppler gate size: 0.5 mm to 30 mm
- Doppler signal processing enables calculation of waveform statistics during real-time imaging
- Derived waveform Doppler trace function analyzes real-time or frozen Doppler spectrum for maximum velocity information. Waveform may be set to trace above baseline, below baseline, or both.
- Doppler CINE control feature: stores up to 30 seconds of Doppler data
- Sweep speed selections: up to 12
- Gain in one decibel increments: -30 dB to 30 dB
- Dynamic range in five decibel increments: 10 dB to 80 dB
- Doppler gain, scale, baseline, spectral invert, sweep speed, wall filter, edge, UltraArt universal image processing, grayscale map, colorization (tint) map, flow angle correction, and dynamic range adjustment on real-time or frozen images
- Adjustable audio volume with different levels and a mute control: up to 21 levels
- Optimization of scale, baseline, gain and/or dynamic range selected manually or upon entering freeze
- Pulsed wave Doppler tissue imaging available for all cardiac and fetal echo exams on vector and curved array transducers

Continuous Wave Doppler Features

- Fast Fourier Transformation (FFT) processing: up to 256 points
- FFT speed: up to 2,880 FFTs per second
- User-selectable transmit frequencies per transducer: up to 2
- Simultaneous 2D-mode and Doppler display
- User-selectable Doppler update mode
- User-adjustable Doppler scale and baseline position controls
- User-adjustable Doppler UltraArt universal image processing and edge controls
- Angle correction in one-degree increments: 0° to 89°
- Flow angle correction on real time or frozen images, with velocity readout update
- Transmit frequencies: 1.8 MHz to 5.0 MHz
- Pulse repetition frequencies (PRF): 2,000 Hz to 50,000 Hz
- Wall filter selections: 40 Hz to 1,000 Hz
- Doppler CINE control feature: up to 30 seconds of Doppler data can be stored
- Sweep speed selections: up to 12
- Gain in one decibel increments: -30 dB to 30 dB
- Dynamic range in five decibel increments: 10 dB to 80 dB
- Doppler gain, scale, baseline, spectral invert, sweep speed, wall filter, edge, UltraArt universal image processing, grayscale map, colorization (tint) map, flow angle correction, and dynamic range adjustment on real time or frozen images
- Adjustable audio volume with different levels and a mute control: up to 21 levels
- Automatic optimization of scale, baseline, gain and/or dynamic range selected manually or upon entering freeze

M-Mode Features

- Independent controls for M-mode gain and sweep speed
- Dynamic range display in one decibel increments: 10 dB to 80 dB
- Gain in one decibel increments: -20 dB to 20 dB
- Sweep speed selections: 8 mm/s to 200 mm/s
- User-selectable transmit frequencies: up to 15.0 MHz
- User-selectable edge enhancement selections: up to 4
- Maps: up to 9
- Tints: up to 15
- Anatomical M-mode for the cardiac exam supports visualization of an M-mode sweep by rotating the M-mode cursor off axis

Imaging Features

3D Volume Imaging

- Acquires three-dimensional volumes of image data for assessing structures
- Available in combination with 2D-mode or 2D-mode with color

Note: 2D-mode with color is only available for the following transducers: 7VC2
- Requires the compatible transducers: 7VC2
Supported studies: Abdomen, Obstetric, General
- Requires the compatible transducers: 9VE4
Supported studies: Gynecology, General
- Sweep quality selections: up to 3
- Sweep angle selections:
 - 7VC2: 20° to 85° in increments of 5°
 - 9VE4: 20° to 145° in increments of 10°, 145° maximum
- Rendering methods: surface, vascular, skeletal, light source

4D Volume Imaging

- Acquires and enables simultaneous viewing of three-dimensional images in real-time for assessing motion
- Available in combination with 2D-mode
- Requires the compatible transducers: 7VC2
Supported studies: Abdomen, Obstetric, General
- Requires the compatible transducers: 9VE4
Supported studies: Gynecology, General
- Sweep quality selections: up to 3
- Sweep angle selections:
 - 7VC2: 20° to 85° in increments of 5°
 - 9VE4: 20° to 80° in increments of 10°
- Rendering methods: surface, vascular, skeletal, light source

Harmonics

- Available for all imaging transducers
- Harmonic transmit frequencies per transducer: up to 4

Compounding

- 2D image optimization technique for enhanced viewing of tissue differences by detection of subtle lesions and enhanced tissue differentiation

Biopsy

- Available for transducers compatible with needle guide attachments

See also: For information on transducer accessories, refer to Chapter 3 in this manual.

Tissue Equalization (TEQ) Technology

- Optimizes the overall field of view (FOV) image brightness uniformity by changing the depth gain compensation and overall gain
- Supports 2D-mode and Pulsed Wave Doppler
- Auto Tissue Equalization Optimization continuously applies the TEQ technology to a 2D-mode image

UltraArt Universal Image Processing

- Reduces speckle and enhances contrast to provide a realistic tissue presentation and patient-specific processing that adapts to differences in tissue

Clarify Technology

- Available in combination with 2D-mode, the 2D-mode image in Doppler, compounding, and harmonics
- Clarify can decrease artifacts in the 2D-mode image, resulting in an improved view of anatomical structures. Decreased artifacts can enhance definition of both tissue and vessel walls by increasing contrast resolution and improving boundary detection. Clarify uses flow information to eliminate noise and reverberation from vessels.

Speed of Sound

- Optimizes the 2D image by adjusting the speed of sound
- Available speed of sound values are dependent on the active exam

Panoramic Imaging

- Panoramic images may be created up to 60 cm in length and up to 360° when the depth is less than the radius of the target area being scanned
- CINE display of frame-by-frame review of individual data frames within the panoramic image
- On-screen reference and speed indicators enhance imaging technique
- Reverse during acquisition
- Zoom and pan capabilities
- Compatible with UltraArt universal image processing
- Color Panoramic imaging is a combination of real-time panorama imaging and real-time power mode acquisition. All power information is preserved during image acquisition, and the peak of the signal is saved for the color panoramic image.

Modality Compare

- Displays images from a previous exam side-by-side with images from the current exam
- Supported modalities for previous exams
 - Mammography
 - Computed tomography
 - Magnetic resonance imaging
 - Ultrasound

Clips

- Prospective capture of motion image data
- Retrospective capture of motion image data
- Acoustic Rate Capture
- Variable clip length (1 to 300 seconds)
- Clip formats
 - Compressed JPEG Lossy
 - Uncompressed Clips
 - AVI and JPEG
 - DICOM
- Supports storing of individual images within clips

Protocols

A protocol is a predefined checklist that guides you through a clinical workflow.

- Define protocol views that include an image or clip with measurements and annotations
- Change the sequence of views during a protocol
- Pause and resume a protocol
- Activate a clinical application program during a protocol
- Create new protocols or modify existing protocols
- Import or export protocols using a USB storage device

DICOM

- DICOM 3.0 standard

Virtual Workstation

- Provides remote access to your facility's archival and information system using a virtual workstation on the ultrasound system
- Includes connection options for a web browser connection or a remote desktop session

Measurements, Calculations, and Reports

The measurement function is available during a patient exam or with stored images. Each measurement label supports up to 25 measurements. The ultrasound system copies only the five most recently labeled measurements to the report.

General Functions

- 2D-mode and M-mode have unlimited sets of measurement markers per image for distance measurements
- Doppler has unlimited sets of measurement markers per image for velocity measurements
- Label then measure or measure then label workflow for individual labels
- Customizable measurement packages: up to 30
- Customizable reports

See also: For additional information about general measurements and calculations, refer to the measurement chapters in this manual.

General 2D-mode Measurements and Calculations

- Distance
- Depth
- Angle
- Circumference
- Area
- Volume
- Stenosis
- Volume flow
- Ratio calculations

General M-mode Measurements and Calculations

- Distance
- Depth
- Heart rate
- Slope
- Time

General Doppler Measurements and Calculations

- Measurements on a frozen or CINE image including velocity
- Heart rate
- Heart cycle
- Systolic/diastolic ratio
- Resistive index
- Pulsatility index
- Time averaged velocity
 - Time averaged mean velocity
 - Time averaged maximum velocity
- Acceleration
- Time
- Doppler statistics (system-generated waveform trace) for real-time and CINE display of Doppler spectral measurements and calculations, including PS, ED, S/D, PI, RI, TAMx, TAMn
- Ratio calculations (two velocity measurements)

Exam-specific Measurements and Calculations

The measurement function is arranged by exam type and is available for use with all exam types. All exam types support the following measurement and report features.

- All general measurements and calculations
- Exam-specific patient report (editable)

See also: For information about exam-specific measurements and calculations, refer to the measurement chapters in this manual.

eSieCalcs Software

- Provides area, volume, and maximum diameter measurements using a border detection algorithm on a user-defined region of interest
- Can be used wherever manual trace is available

Wireless Data Transfer

- Enable wireless capabilities on the ultrasound system

Storage and Archiving

The ultrasound system supports data storage and review of completed ultrasound studies, including static images, dynamic clips, measurements, calculations, and reports.

Mobility

- Hibernate decreases the time to power on and off the ultrasound system. The system is ready for use in approximately 30 seconds.
- Compact and lightweight industrial design
- Steering handle for portability and maneuvering
- Rear handle for repositioning the ultrasound system
- Four locking swivel wheels
- Transducer holders and cable management
- Tilt-down monitor
- Locking arm for monitor
- Locking control panel

Maximum Physical Dimensions

Width:	60 cm
Height:	120 cm to 175 cm
Depth:	94 cm to 108 cm Minimum depth for storage: 108 cm
Weight:	125 kg (276 lb.) Not to exceed 155 kg (341 lb.) The weight of the system is based on the system unpacked and ready for connecting transducers and using in a patient examination. The weight includes documentation devices, such as printers, installed on the system.

User-Accessible Connections

- USB ports on the right side of the monitor for importing and exporting protocols and exams, archiving, and serviceability (quantity 2)
- USB ports on the left side of touch screen for importing and exporting protocols and exams, archiving, and serviceability (quantity 2)
- USB ports on the input/output panel for peripheral devices (quantity 4)
- DC power sockets on the input/output panel for on-board peripherals (quantity 2)
- DC power sockets on each side the control panel for the gel warmer (quantity 2)

See also: Input and Output Signals for Audio, Video, and Data Transmission Connections, page A-37

Operator Control Panel

- Backlit controls and keys
- Control panel adjustment for standing and sitting positions
 - Left/right swivel: $\pm 90^\circ$
 - Range of height: 74 cm to 97 cm
- Control panel text available in: English, German, French, Spanish, Italian
- Control panel layout supports ambidextrous operation
- Touch screen
 - 39.624 cm (15.6 inch) diagonal widescreen
 - Full high-definition video
 - Variable tilt angle: 30° to 50°
 - Touch screen for use with gloved hands

Monitor

- Full high-definition video display
 - 21.5-inch to 22-inch diagonal
 - 16:9 widescreen format
 - 1920×1080 resolution
 - 1024×768 image screen capture for images and reports
- Organic light-emitting diode (OLED) technology
 - High contrast ratio
 - Uniformity across a range of environmental lighting and viewing angles
 - Reduced glare in all working environments
- Adjustable position
 - Height: 139 cm to 173 cm
 - Tilt: $+90^\circ$ forward and -15° backward
 - Swivel: $\pm 45^\circ$ left and right
 - Lateral adjustment using the adjustable arms: $\pm 360^\circ$ around the system
- Transport position
 - Monitor folded down
 - Locks secure the top and bottom adjustable arms in the center position

Transducer Technology and Design Attributes

- Multi-D array transducer technology
- Lightweight, ergonomic transducer design
- Touch screen and gesture transducer selection
- Four array transducer ports
- One auxiliary continuous wave transducer port
- Compact-pinless connectors
- Storage bin for transducer connectors
- Transducer holders for all transducer designs and gel bottle storage
- Gel warmer
- Virtual format imaging
- User-adjustable display depth: transducer dependent (0.5 cm to 55 cm)

Transducer	Maximum Display Depth (cm)
7L2	20
10L4	14
14L5	8
15L4	8
18L6	8
DAX	55
5C1	40
9C2	30
9C3	30
11M3	14
18H6	6
7VC2	30
4V1	30
5V1	30
8V3	24
10V4	14
9EC4	14
9VE4	16
10EV3	16
CW2	N/A
CW5	N/A

▪ Range of operating frequencies

Transducer	2D-mode	Doppler
7L2	2.2 MHz - 7.5 MHz	2.65 MHz - 5.0 MHz
10L4	3.5 MHz - 8.5 MHz	4.0 MHz - 7.3 MHz
14L5	5.5 MHz - 11.5 MHz	5.3 MHz - 7.3 MHz
15L4	5.0 MHz - 13.0 MHz	4.5 MHz - 8.0 MHz
18L6	5.0 MHz - 13.35 MHz	5.3 MHz - 10.0 MHz
DAX	1.1 MHz - 3.0 MHz	1.25 MHz - 2.2 MHz
5C1	1.4 MHz - 4.5 MHz	1.4 MHz - 4.0 MHz
9C2	2.0 MHz - 7.0 MHz	2.5 MHz - 4.5 MHz
9C3	2.1 MHz - 7.5 MHz	2.8 MHz - 4.4 MHz
11M3	3.1 MHz - 8.5 MHz	3.1 MHz - 5.5 MHz
18H6	7.0 MHz - 12.0 MHz	7.3 MHz - 11.0 MHz
7VC2	2.1 MHz - 5.4 MHz	2.5 MHz - 4.0 MHz
4V1	1.5 MHz - 4.3 MHz	1.8 MHz - 3.3 MHz
5V1	1.33 MHz - 3.7 MHz	1.5 MHz - 3.5 MHz
8V3	2.3 MHz - 8.0 MHz	2.5 MHz - 6.5 MHz
10V4	4.0 MHz - 8.7 MHz	4.0 MHz - 7.3 MHz
9EC4	3.5 MHz - 7.5 MHz	3.5 MHz - 6.0 MHz
9VE4	3.3 MHz - 8.3 MHz	3.5 MHz - 5 MHz
10EV3	3.0 MHz - 8.3 MHz	4.0 MHz - 6.0 MHz
CW2	---	2.0 MHz
CW5	---	5.0 MHz

- 2D-mode includes fundamental and harmonic imaging, without contrast
- Doppler includes pulsed wave, pulsed wave Doppler tissue imaging, continuous wave, and color imaging

Accessories and Options

⚠ WARNING: Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN or IEC standards (for example, EN 60950 or IEC 60950 for data processing equipment and EN 60601-1 or IEC 60601-1 for medical equipment). Anyone who connects additional equipment to any of the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1 or IEC 60601-1. Siemens Healthineers can only guarantee the performance and safety of the devices listed in the *Instructions for Use*. If in doubt, consult the Siemens Healthineers service department or your local Siemens Healthineers representative.

⚠ WARNING: You must only use the transducers, accessories, cables, and replacement parts for internal components specified by Siemens Healthineers to reduce the risk of increased RF (radio frequency) emissions or decreased immunity of the ultrasound system.

The Siemens Healthineers-authorized accessories and options for your ultrasound system are listed in this chapter. The available options depend on the licenses purchased for your ultrasound system.

For information about the combinations of options available for purchase, contact your Siemens Healthineers representative.

Note: To ensure compliance with the Medical Device Regulations, use only the devices listed in this chapter with your ultrasound system.

Language-Specific Operating System

Includes the operating and general imaging system software and system user and reference manuals.

- English Language Operating System
- International English Language Operating System
- German Language Operating System
- French Language Operating System
- Spanish Language Operating System
- Italian Language Operating System

Cardiac Imaging Option

- Cardiac imaging
- Pulsed Wave DTI (Doppler tissue imaging) capability
- Cardiac measurements and reports

Fusion Imaging Option

- Fusion imaging aligns reference data with a real-time ultrasound image for diagnosis and interventional procedures
- Supported reference data: computed tomography, magnetic resonance imaging
- Compatible transducers: 4V1, 5C1, DAX
Supported studies: Abdomen, General
- Compatible transducers: 10L4
Supported studies: Musculoskeletal, General
- Fusion supports the following components
 - Ascension Technologies Corporation driveBAY 2 electromagnetic tracking system
 - Ascension Technologies Corporation Mid-range Transmitter (for the driveBAY 2)
 - GCX pole to support mid-range transmitter
 - CIVCO General Purpose 8 mm sensors

Note: For information on the installation, care, and operation of hardware components, refer to the manufacturer's operating instructions that accompanied the device.

Fusion Imaging Accessories

- CIVCO eTrax Needle Sensor Starter Kit
- Transducer-specific tracking brackets with needle guides

Virtual Touch Strain Imaging Option

- Provides a qualitative representation of relative tissue stiffness for the region of interest
- Strain Ratio provides a quantifiable method to compare the relative stiffness of tissue within two user-selectable regions of interest
- Compatible transducers: 9EC4
Supported studies: Prostate
- Compatible transducers: 10L4, 14L5, 15L4, 18L6
Supported studies: Breast, Thyroid, General

Virtual Touch Point Shear Wave Elastography Option

- Measures tissue shear velocity (V_s) and elasticity (E) for a selected region of interest using acoustic radiation force impulse (ARFI) technology of diagnostic ultrasound to induce tissue displacement.
- Provides measurement labels for sites, lesions, and liver segments
- Compatible transducers: 4V1, 5C1, 9C2, DAX
Supported studies: Abdomen, General
- Compatible transducers: 10L4
Supported studies: Abdomen

Virtual Touch Auto pSWE Option

(Requires the Virtual Touch Point Shear Wave Elastography option)

- Simultaneously acquires a series of multiple point shear wave elastography (pSWE) measurements within individual regions of interest
- Measurements per label: up to 15
- Compatible transducers: 9C2, DAX
Supported studies: Abdomen, General

Virtual Touch UDF (Ultrasound-Derived Fat Fraction) Option

(Requires the Virtual Touch Auto pSWE option)

- Measures tissue in a selected region of interest and calculates the ultrasound-derived fat fraction (UDFF) index for assessing fatty liver disease
- Measurements per label: up to 20
- Compatible transducers: 9C2, DAX
Supported studies: Abdomen, General

Virtual Touch Shear Wave Elastography Option

- Uses acoustic radiation force impulse (ARFI) technology of diagnostic ultrasound to induce tissue displacement
- Qualitatively depicts shear velocity or shear elasticity for a selected region of interest on a 2D image
- Provides quantitative measurements of shear velocity (Vs) and elasticity (E) for selected points within the region of interest
- Compatible transducers: 5C1, 9C2, DAX
Supported studies: Abdomen, General
- Compatible transducers: 10L4
Supported studies: Breast, Thyroid, General, MSK
- Compatible transducers: 15L4, 18L6
Supported studies: Breast, Thyroid, General

Contrast Agent Imaging Option

Note: At the time of publication, the United States Food and Drug Administration has cleared ultrasound contrast agents only for use in left ventricular opacification to improve the delineation of the left ventricular endocardial border, liver for lesion characterization in adult and pediatric patients, and vesicoureteral reflux (VUR) in pediatric patients. Check the current regulation for the country where you are using this ultrasound system for contrast agent clearance.

- Supports the following contrast agent destruction techniques:
 - Burst
 - Flash Sequencing
- Real time, low Mechanical Index technique for contrast agent imaging
- Compatible transducers: 7L2, 10L4, 14L5, 15L4, 18L6, DAX, 5C1, 9C2, 9C3, 18H6, 7VC2, 11M3, 4V1, 5V1, 8V3, 10V4, 9EC4, 9VE4, 10EV3
- VueBox Support
 - Requires clips acquired during contrast agent imaging and stored in DICOM format
 - Enables compatibility with the VueBox software application from Bracco. The software is used to perform qualitative and quantitative analysis of linear data. For information regarding the software application, refer to the manufacturer's instructions.
 - Compatible transducers: 7L2, 10L4, 14L5, 15L4, 18L6, DAX, 5C1, 9C2, 9C3, 18H6, 7VC2, 11M3, 4V1, 5V1, 8V3, 10V4, 9EC4, 9VE4, 10EV3

eSie OB Measurements Option

- Provides system-generated measurements of crown rump length, biparietal diameter, head circumference, abdominal circumference, femur length, humerus length, and occipital frontal diameter
- Supports biparietal diameter outer-to-outer or outer-to-inner measurements

syngo Velocity Vector Imaging Option

- Tracks and estimates tissue velocity and other motion and deformation parameters at selected points on a user-defined outline of a structure
- Assists analysis of rotation, displacement, and radial strain of the left ventricle
- Assists evaluation of fetal or adult cardiac contraction by analyzing the systolic and diastolic ventricular strain and rotation

Auto IMT

- Detects and measures the carotid intima-media thickness on a user-defined region of interest
- Measures the maximum intima-media thickness and average intima-media thickness of the carotid artery

eSieDoppler

The eSieDoppler feature uses Doppler signals detected from within the color region of interest (ROI) to identify the vessel with the most prominent flow and provide system-generated Doppler steering and angle corrections.

- During 2D-mode with color, the system repositions and steers the color region of interest (ROI) in the center of the detected vessel.
- During 2D-mode with color and pulsed wave Doppler, the system repositions and steers the color region of interest (ROI) and repositions and adjusts the angle of the Doppler gate in the center of the detected vessel and performs angle correction for the flow in that vessel.
- Available during color Doppler, during pulsed wave Doppler, and during color Doppler in combination with pulsed wave Doppler
- Compatible transducers: 10L4
Supported studies: Arterial, Carotid

Retractable Keyboard Option

- Language-specific alphanumeric keyboard available in: English, German, French, Spanish, Italian, Danish, Finnish and Swedish, Norwegian

Footswitch Option

- Configurable three-pedal footswitch
- Attaches to a USB port on the ultrasound system

Smart Card Reader Option

- Attaches to a USB port on the ultrasound system
- Requires connecting the ultrasound system to a Microsoft Active Directory domain controller
- The ultrasound system supports the following smart card readers:
 - HID OMNIKEY 3021 USB Reader*
 - HID OMNIKEY 3121 USB Desktop Reader*
 - Identiv SCR3310v2.0 USB Smart Card Reader*
 - Gemalto IDBridge CT30 Smart Card Reader*

*Not available from Siemens Healthineers.

Printer Option

- Black and white printer assembly, UP-D711MD, Sony
- Print media, UP-D711MD thermal printer paper

Off-board Documentation Devices

- Black and white printer, UP-X898MD, Sony
- Color printer, UP-D25MD, Sony

Blu-ray/DVD/CD Combination Drive Option

 **Caution:** Use only disc media brands qualified by Siemens Healthineers. You may have problems storing data to or retrieving data from disc media not qualified by Siemens Healthineers.

- Recordable disc drive for storage, review, and archival of patient and image data
- Compatible only with Blu-ray disc (BD) or medical-grade digital video disc (DVD) media
- Disc media
 - The combination drive supports the following media: BD-R, BD-RW, DVD-R, DVD-RW
 - The following media brands are recommended for use with the combination drive: Panasonic, TDK, Maxell, Verbatim M Disc

Protective Overlay

- Protective overlay for avoiding possible contamination
- Includes protective overlays for the control panel, the rotary controls, and the touch screen

Universal Video Converter Option

Converts digital video signals from the ultrasound system to analog video signals to support an external display device. Includes the following cables:

- Universal AC/DC power adapter and cable
- DisplayPort-to-DVI video cable

Physio Module Option

- Includes the ECG function, which contains the ECG cable and leads
 - ECG leads, standard U.S.A.
 - ECG leads, standard European

Virtual Communication for eSieLink Remote Assistance

- Enables virtual communication for remote assistance with a Siemens Healthineers representative
- Requires using the phone number provided by your Siemens Healthineers representative to initiate remote assistance. The representative guides you through the setup of each communication session.
- Includes a headset, camera, and camera attachment

Transducer Options

Refer to the following table to identify transducers compatible with your ultrasound system.

Options	Description
Transducers, Curved Array	▪ 5C1 ▪ DAX ▪ 9C2 ▪ 9C3 ▪ 11M3 ▪ 7VC2
Transducers, Linear Array	▪ 7L2 ▪ 10L4 ▪ 14L5 ▪ 15L4 ▪ 18L6 ▪ 18H6
Transducers, Phased Array	▪ 4V1 ▪ 5V1 ▪ 8V3 ▪ 10V4
Transducers, Endocavity	▪ 9EC4 ▪ 9VE4 ▪ 10EV3
Transducers, Continuous Wave (CW)	▪ CW2 ▪ CW5

Options	Description
Transducer Accessories (Reusable bracket and disposable needle guides)	▪ Verza Guidance System – Biopsy and Fusion needle guide set, 4V1 – Biopsy and Fusion needle guide set, 7L2 – Biopsy and Fusion needle guide set, 10L4 – Biopsy and Fusion needle guide set, 15L4 – Biopsy and Fusion needle guide set, 5C1 – Biopsy and Fusion needle guide set, 9C2 – Biopsy and Fusion needle guide set, DAX – Biopsy needle guide set, 14L5 ▪ In-plane ultrasound needle guide, Ultra-Pro II – Fusion needle guide set, 4V1 – Biopsy needle guide set, 18L6 – Biopsy needle guide set, 9C3 ▪ Reusable endocavity needle guide, 9EC4 ▪ Disposable endocavity needle guide, 9EC4 ▪ Disposable endocavity needle guide, 9VE4 ▪ Disposable endocavity needle guide, 10EV3

Disposables and Consumables

- Needle guides
- ECG electrode patches
- Ultrasound coupling agent (gel)
- Transducer sheaths (transducer covers)
- Cleaning and disinfecting products, including solutions, wipes, and gauze pads
- Removable media, for example, disc media and USB storage devices
- Printer paper
- Shipping containers
- Packing materials
- Protective overlay for the control panel

User-Accessible Cables

Cable Type	Shielded	Length (m)	Ferrite
AC mains input (system power)	No	4.5 m	No
USB (8 each)	Yes	2.0 m	No
DisplayPort	Yes	1.0 m	Yes
Footswitch, Kinesis	Yes	2.8 m	No
Footswitch, Whanam FSU3000S	Yes	≤ 3.0 m	No
Gel warmer	No	≤ 0.3 m	No
Black and white printer (DC type)			
Power cable (DC input)	Yes	≤ 0.7 m	No
USB cable	Yes	≤ 0.6 m	No
Black and white printer (AC type)			
Power cable (AC input)	No	≤ 2.75 m	No
USB cable	Yes	≤ 2.0 m	No
Color printer (AC type)			
Power cable (AC input)	No	≤ 2.75 m	No
USB cable	Yes	≤ 2.0 m	No
Blu-Ray/DVD/CD combination drive			
Power cable (DC input)	No	≤ 0.7 m	No
USB 3.0 cable	Yes	≤ 1.1 m	No
Fusion tracking system			
Power cable	Yes	≤ 0.6 m	No
USB cable	Yes	≤ 0.8 m	No
Transmitter cable	No	≤ 3.4 m	No
Transducer sensor cable	No	2.6 m	No
Needle tracking sensor cable	No	2.6 m	No
ECG cable	Yes	≤ 4.15 m	No

Cable Type	Shielded	Length (m)	Ferrite
Transducer cables			
7L2	Yes	≤ 2.2 m	Yes
10L4	Yes	≤ 2.3 m	Yes
14L5	Yes	≤ 2.3 m	Yes
15L4	Yes	≤ 2.1 m	Yes
18L6	Yes	≤ 2.3 m	Yes
DAX	Yes	≤ 2.9 m	Yes
5C1	Yes	≤ 2.3 m	Yes
9C2	Yes	≤ 2.2 m	Yes
9C3	Yes	≤ 2.3 m	Yes
11M3	Yes	≤ 2.2 m	Yes
18H6	Yes	≤ 2.0 m	No
7VC2	Yes	≤ 2.2 m	Yes
4V1	Yes	≤ 2.3 m	Yes
5V1	Yes	≤ 2.2 m	Yes
8V3	Yes	≤ 2.3 m	Yes
10V4	Yes	≤ 2.0 m	No
9EC4	Yes	≤ 2.2 m	Yes
9VE4	Yes	≤ 2.5 m	No
10EV3	Yes	≤ 2.15 m	Yes
CW2	Yes	≤ 2.3 m	Yes
CW5	Yes	≤ 2.2 m	Yes
Universal video converter			
Universal AC/DC power adapter and cable	No	≤ 1.75 m	No
DisplayPort-to-DVI video cable	Yes	≤ 1.0 m	Yes

Measurement Range and Accuracy

The following tables describe the variability in accuracy for clinical measurements.

Clinical Measurements: Range and Accuracy

The ultrasound system utilizes the selected speed of sound for all measurements. When the speed of sound is adjusted or an image preset is used with a different speed of sound, the anatomy measured at a different speed of sound produces different measured results. However, the following ranges and accuracy apply to all speeds of sound.

Direct Measurement	Range	Accuracy
Distance	0 cm – 40 cm	3% of the distance or 1.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Does not apply to trace tool.
Distance using extended field of view	0 cm – 27.5 cm	Linear transducer: 5% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Curved transducer: 8% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound.
Trace Distance	0 cm – 139 cm	5% of the distance or 6 mm; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Trace Circumference	0 cm – 139 cm	5% of the circumference or 6 mm; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Trace Area	0 cm ² – 1170 cm ²	6% of the area or 1.5 cm ² ; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Time	0 sec – 9.0 sec	Less than ±1% of the sweep speed or ±10 msec, whichever is greater.
Velocity	1 cm/sec – 2000 cm/sec	10% of the velocity or 5 cm/s; whichever is greater using a calibrated flow phantom.

2D-Mode Measurements

2D-mode Measurements	Range or Formula	Minimum Value	Maximum Value
Distance	0 cm – 40 cm	D-Tol(D)	D + Tol(D)
Distance Ratio	D1/D2	(D1-Tol(D1))/(D2+Tol(D2))	(D1+Tol(D1))/(D2-Tol(D2))
Mean Distance	(D1+D2+D3)/3	(D1-Tol(D1)+D2-Tol(D2)+D3-Tol(D3))/3	(D1+Tol(D1)+D2+Tol(D2)+D3+Tol(D3))/3
Ellipse Circumference	$\pi\{1/2[D1^2+D2^2]\}^{1/2}$	$\pi\{1/2[(D1-Tol(D1))^2+(D2-Tol(D2))^2]\}^{1/2}$	$\pi\{1/2[(D1+Tol(D1))^2+(D2+Tol(D2))^2]\}^{1/2}$
Ellipse Area	$\pi(D1)(D2)/4$	$\pi(D1-Tol(D1))(D2-Tol(D2))/4$	$\pi(D1+Tol(D1))(D2+Tol(D2))/4$
Trace Area	0 cm ² – 1170 cm ²	A-Tol(A)	A+Tol(A)
% Stenosis by Area	100(A1-A2)/A1	100(A1-Tol(A1)-A2-Tol(A2))/(A1+Tol(A1))	100(A1+Tol(A1)-A2+Tol(A2))/(A1-Tol(A1))
% Stenosis by Diam.	100(D1-D2)/D1	100(D1-Tol(D1)-D2-Tol(D2))/(D1+Tol(D1))	100(D1+Tol(D1)-D2+Tol(D2))/(D1-Tol(D1))
Amniotic Fluid Index	AFI=D1+D2+D3+D4	D1-Tol(D1)+D2-Tol(D2)+D3-Tol(D3)+D4-Tol(D4)	D1+Tol(D1)+D2+Tol(D2)+D3+Tol(D3)+D4+Tol(D4)
Strain Ratio	M _{ROI1} /M _{ROI2}	---	---

Legend

Abbreviation	Definition
D	Distance
Tol	Tolerance
A	Area
AFI	Amniotic Fluid Index
MROI	Mean strain in a region of interest

Doppler Measurements

Doppler Measurements	Range or Formula	Minimum Value	Maximum Value
Velocity	1 cm/sec – 2000 cm/sec	$V - \text{Tol}(V)$	$V + \text{Tol}(V)$
Time @ Slow Sweep	0 sec – 9.0 sec	$T - \text{Tol}(T) @ \text{Slow Sweep}$	$T + \text{Tol}(T) @ \text{Slow Sweep}$
Time @ Med Sweep	0 sec – 4.5 sec	$T - \text{Tol}(T) @ \text{Med Sweep}$	$T + \text{Tol}(T) @ \text{Med Sweep}$
Time @ Fast Sweep	0 sec – 2.2 sec	$T - \text{Tol}(T) @ \text{Fast Sweep}$	$T + \text{Tol}(T) @ \text{Fast Sweep}$
Time Averaged Maximum Velocity; TAMx	$(MxVel_1 + MxVel_2 + \dots + MxVel_N) / N$	$(MxVel_1 - \text{Tol}(MxVel_1) + MxVel_2 - \text{Tol}(MxVel_2) + \dots + MxVel_N - \text{Tol}(MxVel_N)) / N$	$(MxVel_1 + \text{Tol}(MxVel_1) + MxVel_2 + \text{Tol}(MxVel_2) + \dots + MxVel_N + \text{Tol}(MxVel_N)) / N$
Time Averaged Mean Velocity; TAMn	$(MnVel_1 + MnVel_2 + \dots + MnVel_N) / N$	$(MnVel_1 - \text{Tol}(MnVel_1) + MnVel_2 - \text{Tol}(MnVel_2) + \dots + MnVel_N - \text{Tol}(MnVel_N)) / N$	$(MnVel_1 + \text{Tol}(MnVel_1) + MnVel_2 + \text{Tol}(MnVel_2) + \dots + MnVel_N + \text{Tol}(MnVel_N)) / N$
Time Averaged Mode Velocity; TAMd	$(MdVel_1 + MdVel_2 + \dots + MdVel_N) / N$	$(MdVel_1 - \text{Tol}(MdVel_1) + MdVel_2 - \text{Tol}(MdVel_2) + \dots + MdVel_N - \text{Tol}(MdVel_N)) / N$	$(MdVel_1 + \text{Tol}(MdVel_1) + MdVel_2 + \text{Tol}(MdVel_2) + \dots + MdVel_N + \text{Tol}(MdVel_N)) / N$
Resistivity Index	$(PS - ED) / PS$	$(PS - \text{Tol}(PS) - ED - \text{Tol}(ED)) / (PS + \text{Tol}(PS))$	$(PS + \text{Tol}(PS) - ED + \text{Tol}(ED)) / (PS - \text{Tol}(PS))$
Pulsatility Index	$(PS - MD) / TAMx$	$(PS - \text{Tol}(PS) - MD - \text{Tol}(MD)) / (TAMx + \text{Tol}(TAMx))$	$(PS + \text{Tol}(PS) - MD + \text{Tol}(MD)) / (TAMx - \text{Tol}(TAMx))$
Slope (Acceleration)	$(V1 - V2) / T$	$(V1 - \text{Tol}(V1) - V2 - \text{Tol}(V2)) / (T + \text{Tol}(T))$	$(V1 + \text{Tol}(V1) - V2 + \text{Tol}(V2)) / (T - \text{Tol}(T))$
Systolic/Diastolic Ratio	S/D	$(PS - \text{Tol}(PS)) / (ED + \text{Tol}(ED))$	$(PS + \text{Tol}(PS)) / (ED - \text{Tol}(ED))$

Legend

Abbreviation	Definition
V	Velocity
sec	Seconds
Tol	Tolerance
T	Time
Slow Sweep	Slow sweep
Med Sweep	Medium sweep
Fast Sweep	Fast sweep
MxVel	Maximum velocity
N	Number of velocities averaged
MnVel	Mean velocity
MdVel	Mode velocity
PS	Peak systolic velocity
ED	End diastolic velocity
MD	Minimum diastole
TAV	Time averaged velocity
S/D	Peak systolic velocity to end diastolic velocity calculation

M-Mode Measurements

M-Mode Measurements	Range or Formula	Minimum Value	Maximum Value
Distance	0 cm – 40 cm	D-Tol(D)	D+Tol(D)
Time @ Slow Sweep	0 sec – 9.0 sec	T-Tol(T) @ Slow Sweep	T+Tol(T) @ Slow Sweep
Time @ Med Sweep	0 sec – 4.5 sec	T-Tol(T) @ Med Sweep	T+Tol(T) @ Med Sweep
Time @ Fast Sweep	0 sec – 2.2 sec	T-Tol(T) @ Fast Sweep	T+Tol(T) @ Fast Sweep
Heart Rate	60 bpm – 240 bpm	N/Time for N beats - N/(Time for N beats+Tol(T)) N = 1, 2, 3, 4, or 5	N/Time for N beats - N/(Time for N beats-Tol(T)) N = 1, 2, 3, 4, or 5

Legend

Abbreviation	Definition
D	Distance
Tol	Tolerance
T	Time
Slow Sweep	Slow sweep
Med Sweep	Medium sweep
Fast Sweep	Fast sweep
N/Time for N beats	Number of heart beats/number of heart beats per minute
N = 1, 2, 3, 4, or 5	Number of heart beats = 1, 2, 3, 4, or 5

Virtual Touch Clinical Measurements: Range and Accuracy

Data was measured using customized elasticity phantoms produced by CIRS, Inc., Norfolk, Virginia. The phantoms ranged in Elasticity (Young's Modulus) from 3 kPa to 148 kPa and were certified by the phantom manufacturer according to methods described in "Characterization of Viscoelastic Materials Using Group Shear Wave Speeds"¹ and "Ultrasonic Shear Wave Elasticity Imaging Sequencing and Data Processing Using a Verasonics Research Scanner"². The phantom certification includes a nominal shear wave speed and a 95% Confidence Interval of this shear wave speed.

¹Rouze NC, Deng Y, Trutna CA, et al. "Characterization of Viscoelastic Materials Using Group Shear Wave Speeds." *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* 65(5):780–794, 2018.

²Deng Y, Rouze NC, Palmeri ML, Nightingale KR. "Ultrasonic Shear Wave Elasticity Imaging Sequencing and Data Processing Using a Verasonics Research Scanner." *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* 64(1):164–176, 2017.

Point Shear Wave Elastography (pSWE)

Transducer	Direct Measurement	Range	Tolerance Symbol	Tolerance Function or Value (Accuracy)
4V1	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±10% over the depth range of 2.0 - 8.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±20% over the depth range of 2.0 - 8.0 cm
5C1	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±10% over the depth range of 2.0 - 8.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±20% over the depth range of 2.0 - 8.0 cm
9C2	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±10% over the depth range of 1.5 - 7.5 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±20% over the depth range of 1.5 - 7.5 cm
DAX	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±10% over the depth range of 3.0 - 12.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±20% over the depth range of 3.0 - 12.0 cm
10L4	Shear Wave Velocity	1.0 m/s to 7.0 m/s	Tol(Vs)	±20% over the depth range of 1.0 - 4.5 cm
	Elasticity (Young's Modulus)	3.0 kPa to 148.0 kPa	Tol(E)	±40% over the depth range of 1.0 - 4.5 cm

Ultrasound-Derived Fat Fraction (UDFF)

UDFF (Ultrasound Derived Fat Fraction) delivers a similar clinical utility to MRI-PDFF (Magnetic Resonance Imaging Proton Density Fat Fraction) for determining hepatic steatosis. Both methods classify hepatic steatosis as an index value greater than 5%.

Transducer	Direct Measurement	Tolerance Function or Value (Accuracy)
DAX	Ultrasonically-derived fat fraction (UDFF) index	±20% of the nominal value over the depth range of 4.3 cm to 8.0 cm
9C2	Ultrasonically-derived fat fraction (UDFF) index	±20% of the nominal value over the depth range of 2.3 cm to 7.7 cm

Shear Wave Elastography (SWE)

Transducer	Direct Measurement	Range	Tolerance Symbol	Tolerance Function or Value (Accuracy)
5C1	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±15% over the depth range of 2.0 - 8.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±30% over the depth range of 2.0 - 8.0 cm
9C2	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±20% over the depth range of 1.0 - 6.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±40% over the depth range of 1.0 - 6.0 cm
DAX	Shear Wave Velocity	1.0 m/s to 5.0 m/s	Tol(Vs)	±20% over the depth range of 3.0 - 12.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 75.0 kPa	Tol(E)	±40% over the depth range of 3.0 - 12.0 cm
10L4	Shear Wave Velocity	1.0 m/s to 7.0 m/s	Tol(Vs)	±20% over the depth range of 0.3 - 4.5 cm
	Elasticity (Young's Modulus)	3.0 kPa to 148.0 kPa	Tol(E)	±40% over the depth range of 0.3 - 4.5 cm
15L4	Shear Wave Velocity	1.0 m/s to 7.0 m/s	Tol(Vs)	±20% over the depth range of 0.5 - 3.5 cm
	Elasticity (Young's Modulus)	3.0 kPa to 148.0 kPa	Tol(E)	±40% over the depth range of 0.5 - 3.5 cm
18L6	Shear Wave Velocity	1.0 m/s to 7.0 m/s	Tol(Vs)	±20% over the depth range of 0.3 - 3.0 cm
	Elasticity (Young's Modulus)	3.0 kPa to 148.0 kPa	Tol(E)	±40% over the depth range of 0.3 - 3.0 cm

System Requirements

Power Supply Requirements

Mains Voltage:	100V~ to 240V~
Maximum Current:	5.4 to 13.0 amps
Frequency:	50 to 60 Hz

Possible Combinations with Other Equipment

⚠ WARNING: Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN or IEC standards (for example, EN 60950 or IEC 60950 for data processing equipment and EN 60601-1 or IEC 60601-1 for medical equipment). Anyone who connects additional equipment to any of the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1 or IEC 60601-1. Siemens Healthineers can only guarantee the performance and safety of the devices listed in the *Instructions for Use*. If in doubt, consult the Siemens Healthineers service department or your local Siemens Healthineers representative.

Only the peripheral devices listed in this chapter are approved for use with the ultrasound system. Any use of other devices with the system will be at the user's risk and may void the system warranty.

On-board peripheral devices must be installed by an authorized Siemens Healthineers representative or approved third party. Check with your sales representative.

Leakage Currents

⚠ WARNING: Connecting peripheral products and accessories from non-isolated sources may result in chassis leakage current exceeding safe levels.

Input and Output Signals for Audio, Video, and Data Transmission Connections

Port	Location	Example of Connection	Signal
RJ-45	On rear panel	Ethernet RJ45, 10BaseT/100BaseT/1000BaseT	Bi-directional
USB-A (four ports)	Input/output panel	Printer, Fusion electronics unit, footswitch, Blu-ray/DVD/CD combination drive	Bi-directional
DisplayPort	Input/output panel	External monitor	Input
USB-A (two ports)	Left side of the touch screen	USB storage device, headset and camera for virtual communication with a Siemens Healthineers service representative	Bi-directional
USB-A (two ports)	Right side of the monitor	USB storage device, headset and camera for virtual communication with a Siemens Healthineers service representative	Bi-directional
ECG connector	Physio panel	ECG leads	Input
Aux connector	Physio panel	ECG external DC input	Bi-directional

Wireless Network Connections

The ultrasound system supports the following options for connection to wireless networks.

Network standard:	▪ 802.11a ▪ 802.11b ▪ 802.11ac ▪ 802.11g ▪ 802.11n
Frequency bandwidth:	▪ 2.4 GHz ▪ 5 GHz
Authentication:	▪ WPA ▪ WPA2 ▪ WPA PSK ▪ WPA2 PSK ▪ Open
Encryption:	▪ None ▪ TKIP ▪ AES
Extensible Authentication Protocol (EAP):	▪ PEAPv0 (PEAP-MSHCAPv2) ▪ TLS

Environmental Requirements

Electromagnetic Compatibility (EMC) Note: Operating the ultrasound imaging system in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations, as well as portable and mobile RF (radiated frequency) may lead to temporary degradation or interference visible on the monitor screen. A lightening of image background may be noticed while visualizing hypoechoic structures, or color spectral interference, or jitter, or horizontal lines in the image screen may occur. However, the device has been designed and tested to withstand such interference and will not be permanently damaged. Wait until the interference disappears or restart the ultrasound system.

Ultrasound System

	During Operation	During Storage or Transportation
Atmospheric pressure:	700 hPa to 1060 hPa	500 hPa to 1060 hPa
Relative humidity:	20% to 80%, non-condensing	10% to 95%, non-condensing
Temperature:	---	---
System without a printer	+10°C to +40°C	-20°C to +60°C
System with a printer	+10°C to +35°C	-10°C to +60°C

Note: Print media, for example, printer paper, is excluded from the environmental requirements. Refer to the ranges included on the manufacturer's label.

Transducers

	During Operation	During Storage or Transportation
Atmospheric pressure:	---	---
All transducers, except 7VC2, 9VE4	700 hPa to 1060 hPa	500 hPa to 1060 hPa
7VC2, 9VE4	700 hPa to 1060 hPa	700 hPa to 1060 hPa
Relative humidity:	---	---
All transducers, except 7VC2, 9VE4	10% to 80%, non-condensing	10% to 95%, non-condensing
7VC2, 9VE4	10% to 80%, non-condensing	10% to 90%, non-condensing
Temperature:	---	---
All transducers, except 7VC2, 9VE4	+10°C to +40°C	-10°C to +50°C
7VC2, 9VE4	+20°C to +40°C	-5°C to +50°C

Note: Needle guides are excluded from the environmental requirements. Refer to the ranges included on the manufacturer's label.

Protective Measures

Explosion protection: This product is not designed for operation in areas subject to explosion hazards.

System Classifications

- Type of protection against electrical shock:
Class I, external powered
- Degree of protection against electrical shock:
 - Type BF applied part for endocavity, linear, curved, and phased array transducers
 - Type B applied part for Fusion transducer sensors and needle tracking sensors
 - Type BF defibrillation-proof applied part for ECG connections on the physio module
 - Type CF defibrillation-proof applied part for ECG connections on the physio module
- Degree of protection against harmful ingress of water:
Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide:
Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
- Mode of operation:
Continuous operation
- Ingress protection levels:
 - Transducers: IPX8
 - Footswitch: IPX8

Standards Compliance

The diagnostic ultrasound system is in compliance with the following standards, including all applicable amendments at the time of product release.

Quality Standards

- FDA QSR 21 CFR Part 820
- EN ISO 13485 and ISO 13485
- ISO 9001

Design Standards

- ANSI/AAMI ES 60601-1
- CAN/CSA-C22.2 No. 60601-1
- EN 60601-1 and IEC 60601-1
- EN 60601-1-2 and IEC 60601-1-2 (Class A)
- EN 60601-1-6 and IEC 60601-1-6
- EN 60601-2-18 and IEC 60601-2-18
- EN 60601-2-37 and IEC 60601-2-37
- EN 62304 and IEC 62304
- EN 62366-1 and IEC 62366-1
- EN ISO 14971 and ISO 14971

Acoustic Output Standards

- IEC 62359, Test Methods for the Determination of Thermal and Mechanical Indices Related to Medical Diagnostic Ultrasonic Fields
- AIUM/NEMA UD-2, Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment
- AIUM/NEMA UD-3, Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment

Radio and Telecommunications Standards

- CFR 47 FCC Part 15.247
- CFR 47 FCC Part 15.107
- CFR 47 FCC Part 15.109
- ETSI EN 300 328
- ETSI EN 301 489-1
- ETSI EN 301 489-17
- ETSI EN 301 893

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Overview

Refer to this appendix to identify icons and imaging parameters located on the ultrasound image screen, including how to access special characters on the retractable keyboard.

See also: For additional information about the image screen or touch screen, refer to Chapter 1 in this manual.

See also: For information about on-screen indicators specific to a feature, refer to the chapter supporting the feature.

System Status Indicators

The following icons are located on the lower right of the image screen.

Network Connection Icons

Prerequisite: Connect the ultrasound system to a wired or wireless network.

Icon	Description
	Indicates the ultrasound system is connected to a local area network (LAN) through a wired connection.
	Indicates the ultrasound system is connected to a wireless network. The shading in the bars indicates the strength of the wireless connection, for example, if all bars are shaded, the connection is strong. See also: For additional information on wired and wireless connections, refer to Chapter 4 in this manual.
	Indicates the ultrasound system is not connected to a wireless network.

Remote Service Icons

(Available only when Smart Remote Services is enabled on your ultrasound system)

Prerequisite: Connect the ultrasound system to a wired or wireless network.

Note: You can click the remote service icon in the lower right of the image screen to access the configuration settings for remote services.

Icon	Description
	Indicates the ultrasound system is connected to the remote services. To disconnect from remote services, click the icon and then disable remote services.

Remote Update Handling Icons

(Available only when Smart Remote Services is enabled on your ultrasound system)

Prerequisite: Connect the ultrasound system to a wired or wireless network.

Icon	Description
	Indicates a software update is available for installation on your ultrasound system. See also: For additional information on installing software updates, refer to Chapter 4 in this manual.

Recording Icons

Prerequisite: Connect and power on the recording device.

Icon	Description
	Indicates the device is recording.

Data Storage Space Indicators

Icon	Description
	Indicates storage space for security log files on the ultrasound system. A yellow icon indicates low storage space. A red icon indicates the storage is full and the ultrasound system will be locked from further access. See also: For information about user privileges to bypass a blocked system, refer to Chapter 7 in the System Reference.

Special Keyboard Characters

The system supports special characters for some languages through the use of a combination of keys on the retractable keyboard.

To access special characters on the retractable keyboard:

- Press and hold the **Alt** key and then press one of the following keys on the keyboard:

Spanish		German		French	
Key	Character	Key	Character	Key	Character
1	í	p	Ä	n	Ç
/	¿	-	ä	j	ç
l	Ñ	0 (zero)	ö	z	à
9	ñ	[	Ü	x	è
a	á	=	ü	s	é
s	é	'	ß	b	ù
d	í				
f	ó				
g	ú				

Italian		Scandinavian		Other	
Key	Character	Key	Character	Key	Character
z	à	m	Æ	u	Œ
x	è	k	æ	8	œ
s	é	. (period)	Ø	q	α
c	ì	;	ø	w	β
v	ò	,	Å	e	μ
b	ù	l	å	r	θ

Examples of Imaging Parameters and Settings

The image screen displays mode-dependent imaging parameters and settings.

Use the configuration settings to enable or disable the display of the mode-specific imaging parameters and settings.

Patient Information

Use the configuration settings to enable the display of patient information on a saved or printed image or clip. You can include the following patient information in the imaging parameters section on the image screen:

- Name of the institution
- Patient's last name and first name or last name only
- Identification number for the patient
- Date and time of the exam
- Operator
- Date of birth

If the patient information exceeds the available space, the system displays an ellipsis (...).

General Settings

Example	Description
DAX	Transducer name
Abdomen	Exam type
TIB:0.36	Bone tissue thermal index
TIC:2.03	Cranium bone thermal index
TIS:0.36	Soft tissue thermal index
MI:1.21	Mechanical index
8fps	Frame rate in frames per second (FPS)
12vps	(Available only during volume imaging) Frame rate of the acquisition in volumes per second (vps)
100%	Transmit power, a percentage of the maximum acoustic intensity and mechanical index for the active transducer

2D-mode Settings

Example	Description
2D	Operating mode
High	Transmit frequency
0dB/DR50	Gain and dynamic range
c=1540	Speed of sound in use Available speed of sound values are dependent on the active exam.
LD 1	Line density
UA 2	UltraArt universal image processing
MapE/T1	Map and tint
P3	Persistence
Clarify 1	(Available only during Clarify) Clarify Level

Color Settings

Example	Description
C	Operating mode
High	Transmit frequency
0dB/High	Gain and flow state
P3/LD1	Persistence and line density
PRF 1984	Pulse repetition frequency (PRF)
MapF/F2	Map and filter
S2/Pr2	Smoothing and priority
Color only	Color display

Doppler Settings

Example	Description
D	Operating mode
PW	Doppler modes ▪ PW indicates pulsed wave ▪ CW indicates continuous wave ▪ DTI indicates pulsed wave Doppler tissue imaging
High	Transmit frequency
0dB/DR55	Gain and dynamic range
MapD/T1	Map and tint
GS3.0	Size of the Doppler gate
PRF0	Pulse repetition frequency (PRF)
F 200	Filter

M-mode Settings

Example	Description
M	Operating mode
29 dB / DR 75	Gain and dynamic range
MapE/T1	Map and tint
E1	Edge enhancement

Volume Imaging Settings

Example	Description
3D	3D volume imaging mode
4D	4D volume imaging mode
0dB/DR65	Gain and dynamic range
Q Mid	Volume sweep quality
V 80°	Volume sweep angle
Th15	Threshold
Op60	Opacity
S1	Smoothing
Br6	Brightness
Con65	Contrast
MPR:	Multiplanar reconstruction
MapC	Map
T5	Tint
2D + Color	Color display
Vol:	Volume
T3	Tint
2D + Color	Color display

Clinical Data

Examples marked with an asterisk (*) require a fetal selection in the patient registration form.

Example	Description
Clinical Data	Name of the section in the imaging parameters
LMP or DOC	Last menstrual period or the date of conception followed by a date
Age (EDD)	Expected date of delivery followed by a date
(date)	Date of last menstrual period or date of conception
(weeks, days)*	Clinical age
(date)*	Expected delivery date
(grams, ±grams)*	Estimated fetal weight

Contrast Settings

Example	Description
Contrast	Imaging feature
Low	Transmit frequency
0 dB/DR50	Gain and dynamic range
LD 1	Line density
UA OFF	UltraArt universal image processing
MapF/T0	Map and tint
P3	Persistence or peak hold
Contrast Only	Contrast display

Strain Settings

Example	Description
Strain	Imaging feature
Color 0	Color
Map 0	Map index

Virtual Touch Shear Wave Elastography Settings

Example	Description
SWE	Imaging feature
Velocity	Shear wave parameter
Transp: 80%	Transparency

Virtual Touch Point Shear Wave Elastography Settings

Example	Description
pSWE	Imaging feature

Appendix C Cybersecurity

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Overview

At the time of publication, the following information and recommendations provide measures for helping secure the operating environment of the ultrasound system and prevent unauthorized access.

Ultrasound System Security

The ultrasound system protects against security threats without disrupting the workflow or performance of the ultrasound system.

Anti-Virus Protection

The ultrasound system uses Whitelisting software as an anti-virus solution. The anti-virus protection is preinstalled and activated on the ultrasound system before shipment. Whitelisting provides the following protection against security threats and vulnerabilities.

- Prevents execution of unauthorized software, scripts, and dynamic-link libraries (DLLs)
- Runs only trusted applications on the ultrasound system
- Accepts ultrasound system product updates through an authorized process
- Protects against threats from networks and infected USB storage devices

See also: Preventing, Detecting, and Removing Malware, page C-6

Firewall Policy

The ultrasound system is configured to use the operating system firewall as an added layer of protection.

Use the configuration settings to open or close communication through a port on the ultrasound system.

See also: For information on configuring the ports, refer to the security checklist in Chapter 1 in the System Reference.

Protecting Patient Confidentiality

The ultrasound system integrates security capabilities and security controls for assuring confidentiality of patient health information before, during, and after an exam.

Patient data on the ultrasound system includes specific private, patient-identifying information, for example, patient demographics, biometric data, and information used for diagnosis, including text comments entered on images captured on the system and in patient reports.

- The image screen displays the patient data.
- Users can generate a hardcopy and electronic copy of images and reports.
- Users can also retrieve patient data from or save to removable media or a device on the network.

The ultrasound system can temporarily maintain the privacy of patient data in volatile memory until the system is powered off. Patient data can be persistently stored on local media and imported or exported through wired or wireless networks or through connected storage devices. The ultrasound system maintains the privacy of patient data during power service interruptions.

- You can protect patient confidentiality by using the security capabilities described in this appendix.
- Additionally, you can purchase a license for your service representative to encrypt data storage on the ultrasound system.

Security Responsibilities and Guidance

According to international standards for medical devices, the security of a medical device is the responsibility of the medical device manufacturer and your hospital, clinic, or facility as the delivery organization for healthcare.

- The ultrasound system has an underlying operating system. The operating system may be vulnerable to typical attacks, such as malware or denial-of-service.
- The following responsibilities of the medical device manufacturer prevent installation of unapproved software on the ultrasound system.
 - At the time of shipment to your hospital, clinic, or facility, the ultrasound system is current with applicable security patches for software from Siemens Healthineers.
 - Security updates are offered for the ultrasound system to address critical vulnerabilities.

Use the configuration settings on the ultrasound system to view the Windows hotfixes installed on the system.

See also: For additional information, refer to the security checklist in Chapter 1 in the System Reference.

 - At the time of initial installation of the ultrasound system in your hospital, clinic, or facility, your service representative will confirm the integrity of the ultrasound system is the same as documented prior to shipment from the medical device manufacturer.
- Unintended consequences of data loss, misuse, or corruption not under the control of the ultrasound system, for example, after electronic communication from the ultrasound system to an information network or to storage devices are the responsibility of your hospital, clinic, or facility.

Recommendations for Your Hospital, Clinic, or Facility

- Apply appropriate administrative and physical safeguards to ensure the physical and electronic security of the network in your hospital, clinic, or facility, and with all medical devices on the network.
- Restrict access to medical devices by authorized users.
- Apply a firewall between the network of your hospital, clinic, or facility and external networks. Optionally, connect a hardware firewall between the network of your hospital, clinic, or facility and the ultrasound system.
- Monitor security incidents on your network.
- Prevent access of medical devices to the internet.
- Read the topics on the following pages of this appendix for an overview of the security capabilities of the ultrasound system. Each topic contains additional recommended actions for your hospital, clinic, or facility.

Preventing, Detecting, and Removing Malware

The ultrasound system supports an anti-malware protection mechanism for the prevention of malware.

- The ultrasound system incorporates McAfee Application Control software; only software signed by the medical device manufacturer is executable.
- Anti-malware settings are not user configurable.
- Detection of malware is not incorporated into the user interface.
- The ultrasound system captures security-related activities in a security log file.
- Ultrasound systems connected to Smart Remote Services receive security updates when they become available.
- Self-installable software updates are available from an online portal.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
▪ Ensure all removable storage media is free of malware. ▪ Report any malware intrusion of the ultrasound system to the network administrator at your hospital, clinic, or facility and your service representative. ▪ Schedule periodic maintenance with your service representative. ▪ Perform software updates when they become available.	Refer to the policies of your hospital, clinic, or facility.

Hardening the Ultrasound System

Basic protection ensures the ultrasound system is not compromised while maintaining the intended use of the ultrasound system.

- Each ultrasound system includes a BIOS password.
 - UEFI (Unified Extended Firmware Interface) provides secure system startup.
 - The default password can be changed after system installation.
- A software-based firewall is configured with restrictions and activated.
- The ultrasound system is implemented with file-level access controls.
- All user accounts not required for the intended use of the ultrasound system are disabled or deleted.
- Shared resources not required for the intended use of the medical device are disabled.
- Unnecessary network ports are closed (disabled).
- Unnecessary services are disabled.
- Unauthorized software or hardware cannot be installed on the ultrasound system without tools.
- Components on the ultrasound system are sustainable within their life cycle according to internal quality systems and external regulations for medical device manufacturers.
- The ultrasound system provides anti-virus protection.

See also: Anti-Virus Protection, page C-3
- In the event of a malfunction, the ultrasound system cannot be powered on, and users cannot access the secured desktop.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
▪ Install the ultrasound system in a secure physical location. ▪ Install the ultrasound system behind a firewall in your hospital, clinic, or facility. ▪ Store removable media in a secure location.	Refer to the policies of your hospital, clinic, or facility.
(Available only for the ultrasound system administrator) Configure the firewall settings and data export capabilities, including DICOM devices and shared network locations.	Chapter 1, System Reference Chapter 6, System Reference
(Available only for the ultrasound system administrator) Enable the Federal Information Processing Standard (FIPS) in the configuration settings for the ultrasound system.	Chapter 7, System Reference
Configure rigorous password requirements.	Chapter 7, System Reference

Managing User Accounts and Configuring Roles

The security package on the ultrasound system provides configuration settings for managing user accounts and establishing data access permissions and functional privileges. Users have access to patient data and functions only as necessary to perform the tasks required by your hospital, clinic, or facility.

- A user login is required to access the ultrasound system.
- The ultrasound system authenticates each user with a unique user name and password.

Note: Ultrasound systems connected to a smart card reader require an Active Directory domain controller for public key infrastructure (PKI) authentication.
- Only personnel assigned to an Administrator account can define (add, edit, or delete) user groups and user roles. The groups and roles limit access to patient data.
- Administrator privileges are not required to operate the ultrasound system.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
Assign an authorized user to an Administrator account for setting up and modifying security features on the ultrasound system.	Chapter 7, System Reference
(Available only for the ultrasound system administrator) ▪ Configure user accounts to restrict user access to the ultrasound system by requiring unique user names and passwords. ▪ Configure user accounts with a domain controller to restrict access to the ultrasound system by requiring unique user names and passwords or public key infrastructure (PKI) authentication.	Chapter 4, Instructions for Use Chapter 7, System Reference
Configure rigorous password requirements. ▪ Require complex passwords. ▪ Establish periodic expirations of the passwords. ▪ Establish the quantity of unsuccessful login attempts prior to locking out a user.	Chapter 7, System Reference Refer to the policies of your hospital, clinic, or facility.
Maintain user accounts for only those who need access to the ultrasound system. Remove authorization for users who no longer require access to the ultrasound system.	Refer to the policies of your hospital, clinic, or facility.
Ensure users do not share user names and passwords.	Refer to the policies of your hospital, clinic, or facility.
▪ Control user names and accounts centrally in your hospital, clinic, or facility, but not on the ultrasound system. ▪ Discuss the use of Lightweight Directory Access Protocol (LDAP) with your service representative for a centralized location to store user names and passwords.	Refer to the policies of your hospital, clinic, or facility.

Accessing the Ultrasound System for Emergency Use

Users can perform an emergency exam on the ultrasound system with an emergency login account. Access to all aspects of the system other than the functions required to perform the exam are restricted; for example, an emergency account does not have access to any other patient data on the ultrasound system.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
(Available only for the ultrasound system administrator) - Define and configure an emergency account and define access rights for an emergency user. - Track the use of the emergency user account with the audit trail logs.	Chapter 7, System Reference
- Maintain control of the emergency user account and monitor usage of the account. - Inform authorized users about the policies for utilizing an emergency user account.	Refer to the policies of your hospital, clinic, or facility.

Preventing Physical Access

The ultrasound system includes an automatic screen lock feature to prevent physical access by unauthorized users when the system is left idle for a period of time.

You also cannot remove device components, other than removable media, from the ultrasound system without specific tools. This design prevents physical access by unauthorized users.

Your hospital, clinic, or facility can provide additional safeguards against physical access by unauthorized users.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
- Install the ultrasound system in a secure location. - Store removable media in a secure location.	Refer to the policies of your hospital, clinic, or facility.
Position the ultrasound system to prevent the viewing of patient data by unauthorized users.	Chapter 4, Instructions for Use
Configure the length of time the ultrasound system is inactive before activating the screen saver on the image screen.	Chapter 1, System Reference
- Manually lock the image screen to restrict physical access to the ultrasound system. A locked screen requires a user name and password to access the system. - Train authorized personnel in your hospital, clinic, or facility to use the lock screen feature when the ultrasound system is powered on and unattended.	Chapter 5, Instructions for Use

Removing or Hiding Patient-Identifying Information

The ultrasound system is designed with features to hide patient-identifying information.

Media containing patient data is under the control of your hospital, clinic, or facility.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
- Temporarily hide patient-identifying information on the image screen during a study. - Temporarily hide a list of patient studies.	Chapter 5, Instructions for Use
Remove (anonymize) patient-identifying information from a study, as required, before exporting patient data.	Chapter B2, Advanced Imaging Manual

Assuring Integrity and Confidentiality during Data Transmission

The ultrasound system is designed to ensure the integrity and confidentiality of transmitted patient data.

- Supports encryption of patient data sent in a secure DICOM transmission
 - Supports DICOM transfer from and communication with only trusted and defined sources
 - Authenticates communication nodes. Node authentication uses Secure DICOM to assure both the sender and the receiver of data are known to each other and are authorized to receive transferred information.
- Media containing patient data is under the control of your hospital, clinic, or facility.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
- Send and receive patient data using secure DICOM transmission. - Configure trusted sources with certificates. Communication to a PACS device can use TLS (Transport Layer Security) certificates.	Chapter 6, System Reference
- Ensure the network used to transfer patient data is not accessible by non-authorized persons. - Do not send patient data over an insecure network or to an insecure network device.	Refer to the policies of your hospital, clinic, or facility.

Backing Up Data and Disaster Recovery

The ultrasound system provides capabilities to recover system data and patient data. The ultrasound system is not intended as a storage device for patient data.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
Minimize the amount of patient data stored on the ultrasound system. ▪ Archive patient data to a remote DICOM archive or PACS device following acquisition of the data. ▪ Back up locally saved patient data to a DICOM archive or PACS device.	Chapter B2, Advanced Imaging Manual
Back up and store the settings of the ultrasound system on external media. Your ultrasound system administrator can subsequently restore the saved system settings.	Backing up and restoring settings is available in the service section of the configuration settings on the ultrasound system.
(Available only for the ultrasound system administrator) ▪ Archive audit logs to an external device or server. ▪ Back up and delete audit logs on a routine basis.	Chapter 7, System Reference
Remove all patient data prior to decommissioning a medical device.	Refer to the policies of your hospital, clinic, or facility.

Configuring Audit Controls and Managing Log Files

The security features of the ultrasound system provide a reliable audit of activity on the system by user, date, and time. The system generates an audit log and encrypts the information in the audit log.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
(Available only for the ultrasound system administrator) Configure audit controls and specify the user activities to track in an audit log.	Chapter 7, System Reference
(Available only for the ultrasound system administrator) Manage the log files on the ultrasound system. Archive and delete the log files on a regular basis.	Chapter 7, System Reference
(Available only for the ultrasound system administrator) Archive the audit logs to a removable storage device or to a device on the network; for example, a server.	Chapter 7, System Reference
Routinely review the audit logs according to the policies of your hospital, clinic, or facility.	Refer to the policies of your hospital, clinic, or facility.

Third-Party Components

The ultrasound system is maintainable and supported during the estimated life of the product. A list of open-source third-party applications is available in the configuration settings.

See also: For information about open source software included on the ultrasound system, refer to the security checklist in Chapter 1 in the System Reference.

Security Product Updates

Smart Remote Services can monitor the vulnerability of the ultrasound system and offer product updates of relevant operating system and product security patches.

Smart Remote Services encrypts all communication to and from the ultrasound system and provides the following services for your system through a virtual private network.

- Monitoring the ultrasound system by periodically collecting system properties
- Retrieving log files
- Enabling remote sessions for troubleshooting
- Auditing and documenting all changes to critical system files

Self-installable software updates are available from an online portal.

Recommended Actions for Your Hospital, Clinic, or Facility

Recommendations	Location of Additional Information
▪ Immediately contact your service representative if you detect any vulnerability with the ultrasound system. ▪ Accept remote product updates.	Contact your service representative for additional information about the remote connectivity capability.

Appendix D Acoustic Output Reference

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Display Resolution and Measurement Accuracy

When a transducer is capable of exceeding a mechanical index (MI) of 0.01 or thermal index (TI) of 0.1, the ultrasound imaging system displays indices starting from 0.01 (MI) or 0.1 (TI) in increments of 0.01 (MI) or 0.1 (TI) for all displayed values.

A number of factors contribute to the estimation error for the displayed index. Variation among transducers and systems, approximation for real-time index calculations, and measurement errors contribute to the index display error. The measurement uncertainty for acoustic pressure, power, and center frequency is within 12%, 12%, and 7% respectively. The total estimated display accuracy is $\pm 15\%$ for MI and $\pm 30\%$ for TI. Definitions for these parameters can be found in the AIUM/NEMA document entitled *Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment* (also known as the Output Display Standard).

Track 3, FDA 510(k) and IEC 60601-2-37 Acoustic Output Reporting

Data presented in Track 3 and IEC 60601-2-37 format represents the average MI/TI values of each transducer model measured under worst-case acoustic output conditions. The on-screen MI/TI values are based on measurements on one transducer rounded up to the nearest display increment. It is possible that the values displayed on screen may exceed the MI/TI values presented in the Track 3 and IEC 60601-2-37 format.

Summary Table for Acoustic Output

An "X" indicates that either the MI index or TI indices is greater than 1.0 for each transducer/mode. A Track 3 and IEC 60601-2-37 format acoustic output table is supplied for each transducer/mode combination marked with an "X."

Transducer Model	Operating Mode										
	B-mode (2D)	2D with Color	PW Doppler	2D with PW Doppler	2D with Color and PW Doppler	2D with M-mode	M-mode with Color	CW Doppler	2D with CW Doppler	Elasticity	Contrast
7L2	X	X	X	X	X	X					X
10L4	X	X	X	X	X	X	X			X	X
14L5	X	X	X	X	X	X	X				X
15L4	X	X	X	X	X	X	X			X	X
18L6	X	X	X	X	X	X	X			X	X
DAX	X	X	X	X	X	X	X			X	X
5C1	X	X	X	X	X	X	X			X	X
9C2	X	X	X	X	X	X	X			X	X
9C3	X	X	X	X	X	X	X				X
11M3	X	X	X	X	X	X	X				X
18H6	X	X	X	X	X	X	X				X
7VC2	X	X	X	X	X	X	X				X
4V1	X	X	X	X	X	X	X			X	X
5V1	X	X	X	X	X	X	X	X	X		X
8V3	X	X	X	X	X	X	X	X	X		X
10V4	X	X	X	X	X	X	X	X	X		X
9EC4	X	X	X	X	X	X	X				X
9VE4	X	X	X	X	X	X	X				X
10EV3	X	X	X	X	X	X					X
CW2								X			
CW5								X			

The following rules apply to the summary table:

B-mode (2D)	No other mode active. Only MI (when larger than 1.0) is reported for this mode.
M-mode	May include simultaneous B-mode.
PW Doppler / CW Doppler	In duplex modes, the largest displayed TIS (scanned or non-scanned) is reported if it is larger than 1.0.
Color Flow or Power	Includes simultaneous color flow M-mode, B-mode, and Doppler. In combined modes, the largest displayed TIS (scanned or non-scanned) is reported if it is larger than 1.0.
Combined modes	The output is reported as a separate mode if the largest formulation of TIS, TIB, or TIC (if an intended use) is greater than the corresponding value reported for all constituent modes.
Other	The output is reported as a separate mode if the largest formulation of TIS, TIB, or TIC (if an intended use) is greater than the corresponding value reported for all constituent modes. TIC is reported if the transducer is intended for transcranial or neonatal cephalic use.

Definitions

Symbol		Definition		Units
FDA	IEC	FDA	IEC	
MI	MI	Mechanical Index	Same as FDA	n/a
TIS	TIS	Soft Tissue Thermal Index	Same as FDA	n/a
TIB	TIB	Bone Thermal Index	Same as FDA	n/a
TIC	TIC	Cranial Thermal Index	Same as FDA	n/a
$p_{r,3}$	$p_{r,\alpha}$ at z_{MI}	Derated peak rarefactional pressure associated with the transmit pattern giving rise to the value reported under MI	Same as FDA	MPa
W_o	P	Ultrasonic power, except for TIS_{scan} in which case it is the ultrasonic power passing through a one centimeter window	Output power	mW
---	P_{1x1}	---	Bounded output power	mW
Z_1	z_s	Axial distance corresponding to the location of $\max[\min(W_{.3}(z), I_{TA.3}(z) \times 1 \text{ cm}^2)]$, where $z \geq Z_{bp}$	Depth for TIS	cm
Z_{sp}	z_b	Axial distance at which TIB is a global maximum (i.e., $Z_{sp} = Z_{B.3}$)	Depth for TIB	cm
---	z_{MI}	---	Depth for mechanical index	cm
$z@PII_{.3max}$	$z_{piI,\alpha}$	Axial distance corresponding to the maximum of the derated spatial-peak pulse intensity integral (megapascals)	Depth at the point where the free-field, attenuated pulse intensity integral is a maximum	cm
f_c	f_{awf}	Center frequency	Acoustic working frequency	MHz
PRF	prr	Pulse repetition frequency	Pulse repetition rate	Hz
---	srr	---	Scan repetition rate	Hz
---	n_{pps}	---	Number of pulses per ultrasonic scan line	---
$I_{PA.3@PII.3max}$	$I_{pa,\alpha}$ at $z_{piI,\alpha}$	Derated pulse-average intensity at the maximum of the derated spatial-peak pulse intensity integral	Same as FDA	W/cm ²
---	$I_{spta,\alpha}$ at $z_{piI,\alpha}$ or $z_{sII,\alpha}$	---	Attenuated spatial-peak temporal-average intensity at depth for peak attenuated pulse intensity integral	mW/cm ²
---	I_{spta} at z_{piI} or z_{sII}	---	Spatial-peak temporal-average intensity at depth for peak pulse intensity integral	mW/cm ²
$p_{r@PII_{max}}$	p_r at z_{piI}	Peak rarefactional pressure at the point where the free-field, spatial-peak pulse intensity integral is a maximum	Same as FDA	MPa

Note: Pulse-average intensity (I_{pa}) is the ratio of the pulse-intensity integral (I_{pi}) to the pulse duration (t_d).

Legend

English	Translations for languages other than English
Acoustic Output Reporting Table – Track 3, FDA 510(k) and IEC 60601-2-37	n/a
(Per transducer/mode that exceeds MI or TI value of 1.0)	n/a
Transducer Model	n/a
Operating Mode	n/a
Acoustic Parameters	n/a
Index label	n/a
At surface	n/a
Below surface	n/a
Units	n/a
Maximum Index Value	n/a
Index Component Value	n/a
Other Information	n/a
Operating Control Conditions	n/a
Frequency	n/a
Focus	n/a
Line Density	n/a
Gate Size	n/a
Scale	n/a
H Low (Harmonics low frequency)	n/a
H Mid (Harmonics mid-level frequency)	n/a
H High (Harmonics high frequency)	n/a
Low (low frequency)	n/a
Mid (mid-level frequency)	n/a
High (high frequency)	n/a
Pen (penetration)	n/a
Res (resolution)	n/a
# No data is provided for this operation condition.	n/a

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	1.40		1.40		2.12
Index Component Value				1.40	1.40	1.40	1.40	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.84					
	P	(mW)		114.13		114.13		127.50
	$P_{1\times1}$	(mW)		74.66		74.66		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.80					
	$z_{pii,\alpha}$	(cm)	2.80					
	f_{awf}	(MHz)	4.02	3.94		3.94		3.99
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	92.46					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	447.00					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	74.06					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	115.71					
	p_r at z_{pii}	(MPa)	4.08					
Operating Control Conditions	Frequency	---	H High	H High		H High		H High
	Focus	(cm)	3.00	4.50		4.50		11.00
	Line Density	---	1	2		2		2
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	1.62		1.62		1.32
Index Component Value				1.40	1.40	1.40	1.40	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.83					
	P	(mW)		103.12		103.12		20.35
	$P_{1\times1}$	(mW)		73.49		73.49		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.30					
	$z_{pII,\alpha}$	(cm)	2.30					
	f_{awf}	(MHz)	4.62	4.00		4.00		3.92
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	13.93					
	n_{pps}	---	17					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	333.36					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	49.20					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	94.74					
	p_r at z_{pII}	(MPa)	3.92					
Operating Control Conditions	Frequency	---	High	Mid		Mid		Mid
	Focus	(cm)	3.31	14.00		14.00		0.50
	Line Density	---	1	1		1		1
	Scale	---	661	833		833		2778
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.52	1.22		3.35		2.29
Index Component Value				1.22	1.15	1.24	3.35	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.76					
	P	(mW)		110.10		102.24		109.97
	$P_{1\times1}$	(mW)		77.39		79.56		
	z_s	(cm)			1.80			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	3.30	3.31		3.29		3.31
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	167.11					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	375.78					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	500.56					
	p_r at z_{pii}	(MPa)	2.18					
Operating Control Conditions	Frequency	---	Low	Low		Low		Low
	Focus	(cm)	0.50	7.96		5.50		7.80
	Gate Size	(cm)	0.05	0.35		0.05		0.35
	Scale	---	500	7576		10417		7813
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.65		3.17		4.11
Index Component Value				1.56	1.25	1.56	3.08	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.11					
	P	(mW)		111.04		111.04		40.58
	P_{1x1}	(mW)		82.08		82.08		
	z_s	(cm)			1.90			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	3.30	4.00		4.00		3.92
Other Information	p_{rr}	(Hz)	79.87					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	42.01					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	447.18					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	606.60					
	p_r at z_{pii}	(MPa)	1.26					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	1.00	14.00		14.00		0.50
	Gate Size	(cm)	0.05	0.50		0.50		0.50
	Scale	---	6250	4808		4808		4167
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.66		3.15		4.43
Index Component Value				1.53	1.23	1.53	3.03	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.16					
	P	(mW)		109.08		109.08		44.15
	$P_{1\times1}$	(mW)		80.58		80.58		
	z_s	(cm)			1.90			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	3.30	4.00		4.00		3.92
Other Information	p_{rr}	(Hz)	76.52					
	s_{rr}	(Hz)	#					
	n_{pps}	---	113					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	46.74					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	452.58					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	611.57					
	p_r at z_{pii}	(MPa)	1.32					
	Operating Control Conditions	Frequency	---	Low	Mid		Mid	
Focus		(cm)	1.00	14.01		14.01		0.50
Gate Size		(cm)	0.05	0.35		0.35		0.05
Scale		---	3788	1603		1603		19231
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	1.71		1.99		2.35
Index Component Value				0.26	0.17	0.34	0.93	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.84					
	P	(mW)		10.76		21.47		17.18
	$P_{1\times1}$	(mW)		10.13		17.63		
	z_s	(cm)			1.30			
	z_b	(cm)					2.80	
	z_{MI}	(cm)	2.80					
	$z_{pii,\alpha}$	(cm)	2.80					
	f_{awf}	(MHz)	4.02	5.37		4.02		4.37
Other Information	p_{rr}	(Hz)	60.39					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	447.00					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	174.54					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	386.84					
	p_r at z_{pii}	(MPa)	4.08					
Operating Control Conditions	Frequency	---	H High	Mid		H High		Low
	Focus	(cm)	3.00	5.50		3.30		7.99
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7L2**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.22		1.22		1.85
Index Component Value				0.65	0.65	0.65	0.65	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.46					
	P	(mW)		58.52		58.52		61.48
	$P_{1\times1}$	(mW)		41.91		41.91		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.70					
	$z_{pii,\alpha}$	(cm)	2.10					
	f_{awf}	(MHz)	3.19	3.23		3.23		3.23
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	2.00					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	200.80					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	15.10					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	24.00					
	p_r at z_{pii}	(MPa)	2.59					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	13.00	3.00		3.00		3.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	1.40		1.40		1.56
Index Component Value				1.40	1.40	1.40	1.40	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.58					
	P	(mW)		92.26		92.26		130.85
	$P_{1\times1}$	(mW)		66.37		66.37		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.00					
	$z_{pii,\alpha}$	(cm)	3.00					
	f_{awf}	(MHz)	3.97	4.42		4.42		4.83
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	18.60					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	400.97					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	8.89					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	19.92					
	p_r at z_{pii}	(MPa)	3.75					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H High
	Focus	(cm)	3.00	4.00		4.00		5.00
	Line Density	---	1	2		2		2
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.73		1.73		2.02
Index Component Value				1.56	1.56	1.56	1.56	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.81					
	P	(mW)		61.87		61.87		7.73
	$P_{1\times1}$	(mW)		61.25		61.25		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.60					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	6.73	5.34		5.34		4.62
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	21.85					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	87.76					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	21.35					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	93.18					
	p_r at z_{pii}	(MPa)	1.57					
	Operating Control Conditions	Frequency	---	Res	Mid		Mid	
Focus		(cm)	2.38	2.31		2.31		1.00
Line Density		---	1	1		1		1
Scale		---	381	1116		1116		3497
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.07	1.85		2.48		2.01
Index Component Value				1.85	1.00	1.48	2.48	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.46					
	P	(mW)		102.38		85.55		113.06
	$P_{1\times1}$	(mW)		73.13		77.50		
	z_s	(cm)			2.60			
	z_b	(cm)					3.20	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	5.24	5.31		4.00		5.30
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	229.70					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	307.48					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	425.78					
	p_r at z_{pii}	(MPa)	2.52					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Mid
	Focus	(cm)	0.50	6.40		7.12		13.92
	Gate Size	(cm)	0.05	0.10		0.15		0.15
	Scale	---	500	3205		8621		4902
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.82		2.47		1.96
Index Component Value				1.78	0.93	0.79	2.07	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.71					
	P	(mW)		98.46		41.60		108.11
	$P_{1\times1}$	(mW)		70.33		41.60		
	z_s	(cm)			2.70			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	3.90					
	$z_{pii,\alpha}$	(cm)	3.90					
	f_{awf}	(MHz)	5.30	5.31		3.99		5.30
Other Information	p_{rr}	(Hz)	80.17					
	s_{rr}	(Hz)	#					
	n_{pps}	---	113					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	23.44					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	579.54					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	3178.17					
	p_r at z_{pii}	(MPa)	1.48					
	Operating Control Conditions	Frequency	---	Mid	Mid		Low	
Focus		(cm)	4.84	6.47		1.72		13.95
Gate Size		(cm)	0.20	0.10		0.10		0.10
Scale		---	1984	4808		12500		4902
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.76		2.55		2.70
Index Component Value				1.57	0.78	0.91	2.18	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.94					
	P	(mW)		74.40		47.77		20.14
	P_{1x1}	(mW)		62.12		47.71		
	z_s	(cm)			2.40			
	z_b	(cm)					2.40	
	z_{MI}	(cm)	3.00					
	$z_{pII,\alpha}$	(cm)	3.00					
	f_{awf}	(MHz)	5.26	5.31		4.00		4.00
Other Information	p_{rr}	(Hz)	83.33					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	39.71					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	496.69					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	1692.62					
	p_r at z_{pII}	(MPa)	1.65					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Low
	Focus	(cm)	3.28	5.17		1.98		0.44
	Gate Size	(cm)	0.10	0.05		0.10		0.40
	Scale	---	2500	16667		15625		13158
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	1.44		1.64		1.56
Index Component Value				0.27	0.18	0.26	0.53	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.58					
	P	(mW)		15.49		13.69		13.69
	$P_{1 \times 1}$	(mW)		12.66		12.18		
	z_s	(cm)			2.00			
	z_b	(cm)					3.00	
	z_{MI}	(cm)	3.00					
	$z_{pII,\alpha}$	(cm)	3.00					
	f_{awf}	(MHz)	3.97	4.42		4.54		4.54
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	401.88					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ Or $z_{sII,\alpha}$	(mW/cm ²)	159.15					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	358.17					
	p_r at z_{pII}	(MPa)	3.75					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H High
	Focus	(cm)	3.00	4.14		3.14		3.14
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.27	1.92		2.39		2.70
Index Component Value				1.79	1.04	1.19	2.23	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.89					
	P	(mW)		74.43		47.25		44.78
	$P_{1 \times 1}$	(mW)		71.57		47.25		
	z_s	(cm)			1.60			
	z_b	(cm)					1.00	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	6.75	5.25		5.31		5.34
Other Information	p_{rr}	(Hz)	79.69					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	91.40					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	43.57					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	55.21					
	p_r at z_{pii}	(MPa)	1.56					
Operating Control Conditions	Frequency	---	Res	Mid		Mid		Mid
	Focus	(cm)	2.05	6.99		3.01		1.03
	Scale	---	1116	7576		8929		16667
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	1.27		1.27		1.66
Index Component Value				1.08	1.08	1.08	1.08	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.99					
	P	(mW)		73.81		73.81		76.41
	$P_{1\times1}$	(mW)		45.63		45.63		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.30					
	$z_{pii,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	5.00	4.99		4.99		4.99
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	0.63					
	n_{pps}	---	4					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	509.37					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	260.14					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	380.11					
	p_r at z_{pii}	(MPa)	3.62					
Operating Control Conditions	Frequency	---	5	5		5		5
	Focus	(cm)	1.69	3.17		3.17		3.88
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10L4**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	1.48		1.48		1.33
Index Component Value				0.75	0.75	0.75	0.75	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.81					
	P	(mW)		46.18		46.18		26.29
	$P_{1\times1}$	(mW)		29.09		29.09		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.00					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	4.61	5.43		5.43		4.61
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	58.28					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	500.32					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	85.38					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	129.06					
	p_r at z_{pii}	(MPa)	3.87					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Low
	Focus	(cm)	2.00	3.00		3.00		2.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	0.87		0.87		1.22
Index Component Value				0.87	0.87	0.87	0.87	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.88					
	P	(mW)		41.18		41.18		59.14
	$P_{1\times1}$	(mW)		26.46		26.46		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	7.21	6.89		6.89		6.89
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	39.06					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	1052.67					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	18.69					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	27.82					
	p_r at z_{pii}	(MPa)	4.98					
Operating Control Conditions	Frequency	---	Low	H High		H High		H High
	Focus	(cm)	1.00	3.50		3.50		3.50
	Line Density	---	1	2		2		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	1.03		1.03		1.39
Index Component Value				0.75	0.75	0.75	0.75	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.39					
	P	(mW)		25.03		25.03		29.58
	$P_{1\times1}$	(mW)		25.03		25.03		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.70					
	$z_{pII,\alpha}$	(cm)	0.70					
	f_{awf}	(MHz)	6.31	6.31		6.31		6.31
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	9.48					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	267.97					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	27.03					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	37.11					
	p_r at z_{pII}	(MPa)	2.65					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	1.74	1.51		1.51		1.75
	Line Density	---	1	1		1		1
	Scale	---	319	4808		4808		2976
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.10	1.34		2.01		1.45
Index Component Value				1.34	0.90	1.28	2.01	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.55					
	P	(mW)		49.61		41.74		49.63
	$P_{1\times1}$	(mW)		38.53		36.91		
	z_s	(cm)			1.30			
	z_b	(cm)					1.10	
	z_{MI}	(cm)	0.60					
	$z_{pii,\alpha}$	(cm)	0.60					
	f_{awf}	(MHz)	5.36	7.28		7.28		7.28
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	290.33					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	426.66					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	532.61					
	p_r at z_{pii}	(MPa)	2.85					
	Operating Control Conditions	Frequency	---	Low	Mid		Mid	
Focus		(cm)	0.70	7.73		7.95		7.74
Gate Size		(cm)	0.05	0.40		0.10		0.40
Scale		---	500	8065		4032		8065
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.41	1.35		2.12		1.46
Index Component Value				1.35	0.86	1.28	2.10	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.93					
	P	(mW)		45.41		41.43		45.41
	$P_{1\times1}$	(mW)		38.84		36.96		
	z_s	(cm)			1.20			
	z_b	(cm)					1.10	
	z_{MI}	(cm)	1.90					
	$z_{pII,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	5.34	7.29		7.29		7.29
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	37.81					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	449.27					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	904.91					
	p_r at z_{pII}	(MPa)	1.32					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	2.01	6.50		7.57		6.50
	Gate Size	(cm)	0.10	0.50		0.25		0.50
	Scale	---	2500	4464		8333		8929
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.43	1.28		1.63		1.41
Index Component Value				1.17	0.78	1.06	1.59	
Acoustic Parameters	IEC	Units						
	$p_{r,a}$ at z_{MI}	(MPa)	0.93					
	P	(mW)		40.85		32.01		36.89
	$P_{1\times1}$	(mW)		33.69		30.45		
	z_s	(cm)			1.20			
	z_b	(cm)					1.00	
	z_{MI}	(cm)	1.00					
	$z_{pii,a}$	(cm)	1.00					
	f_{awf}	(MHz)	7.27	7.29		7.29		7.29
Other Information	p_{rr}	(Hz)	81.17					
	s_{rr}	(Hz)	#					
	n_{pps}	---	108					
	$I_{pa,a}$ at $z_{pii,a}$	(W/cm ²)	31.55					
	$I_{spta,a}$ at $z_{pii,a}$ Or $z_{sii,a}$	(mW/cm ²)	343.06					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	615.84					
	p_r at z_{pii}	(MPa)	1.22					
	Operating Control Conditions	Frequency	---	Mid	Mid		Mid	
Focus		(cm)	5.04	6.84		5.00		5.78
Gate Size		(cm)	0.10	0.25		0.65		0.65
Scale		---	5682	17857		2174		2404
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	0.87		1.10		1.07
Index Component Value				0.14	0.09	0.13	0.37	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.88					
	P	(mW)		4.32		4.08		2.77
	$P_{1\times1}$	(mW)		4.29		4.03		
	z_s	(cm)			0.90			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	7.21	6.79		6.89		7.07
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	1052.67					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	149.38					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	245.65					
	p_r at z_{pii}	(MPa)	4.98					
Operating Control Conditions	Frequency	---	Low	H High		H High		H High
	Focus	(cm)	1.00	1.50		1.51		1.01
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	1.16		1.88		1.52
Index Component Value				1.12	0.71	1.02	1.82	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.46					
	P	(mW)		32.05		33.97		35.48
	$P_{1 \times 1}$	(mW)		32.05		33.97		
	z_s	(cm)			0.90			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	0.70					
	$z_{pii,\alpha}$	(cm)	0.70					
	f_{awf}	(MHz)	7.43	7.35		6.28		6.28
Other Information	p_{rr}	(Hz)	79.69					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	283.33					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	110.49					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	157.74					
	p_r at z_{pii}	(MPa)	2.76					
Operating Control Conditions	Frequency	---	Res	Res		Mid		Mid
	Focus	(cm)	1.53	7.54		7.54		7.54
	Scale	---	1116	8065		3472		8065
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **14L5**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	0.90		0.90		1.03
Index Component Value				0.43	0.43	0.43	0.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.43					
	P	(mW)		17.82		17.82		21.12
	$P_{1 \times 1}$	(mW)		13.19		13.19		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{p1i,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	7.41	6.89		6.89		6.89
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	40.58					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{p1i,\alpha}$	(W/cm ²)	637.73					
	$I_{spta,\alpha}$ at $z_{p1i,\alpha}$ or $z_{s1i,\alpha}$	(mW/cm ²)	26.77					
	I_{spta} at z_{p1i} or z_{s1i}	(mW/cm ²)	42.25					
	p_r at z_{p1i}	(MPa)	4.42					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	1.00	2.25		2.25		5.25
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.19	0.43		0.43		0.78
Index Component Value				0.43	0.43	0.43	0.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.17					
	P	(mW)		20.78		20.78		42.96
	P_{1x1}	(mW)		13.14		13.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	7.12	6.80		6.80		6.80
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	38.11					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	515.58					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	6.64					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	9.88					
	p_r at z_{pii}	(MPa)	3.61					
Operating Control Conditions	Frequency	---	Low	Low		Low		Low
	Focus	(cm)	1.00	5.25		5.25		3.50
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.19	0.72		0.72		0.80
Index Component Value				0.71	0.71	0.71	0.71	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.24					
	P	(mW)		23.45		23.45		62.25
	$P_{1\times1}$	(mW)		18.79		18.79		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.50					
	$z_{pII,\alpha}$	(cm)	0.80					
	f_{awf}	(MHz)	6.00	7.98		7.98		5.97
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	16.32					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	161.80					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	31.89					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	44.36					
	p_r at z_{pII}	(MPa)	2.21					
Operating Control Conditions	Frequency	---	Mid	High		High		Mid
	Focus	(cm)	1.03	2.73		2.73		2.49
	Line Density	---	1	2		2		2
	Scale	---	313	1042		1042		7353
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.79	0.80		1.38		1.22
Index Component Value				0.80	0.47	0.44	1.38	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.94					
	P	(mW)		28.42		20.58		16.84
	$P_{1\times1}$	(mW)		21.15		20.58		
	z_s	(cm)			1.50			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	6.01	7.98		4.51		6.00
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	195.72					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	252.95					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	345.99					
	p_r at z_{pii}	(MPa)	2.07					
	Operating Control Conditions	Frequency	---	Low	High		Pen	
Focus		(cm)	1.50	6.01		2.94		0.45
Gate Size		(cm)	0.05	0.15		0.40		0.40
Scale		---	400	13889		14706		8929
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.16	0.82		1.35		1.21
Index Component Value				0.82	0.48	0.58	1.34	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.89					
	P	(mW)		28.95		20.14		16.22
	P_{1x1}	(mW)		21.54		20.14		
	z_s	(cm)			1.50			
	z_b	(cm)					0.70	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	0.60					
	f_{awf}	(MHz)	6.08	7.98		6.00		6.00
Other Information	p_{rr}	(Hz)	79.37					
	s_{rr}	(Hz)	#					
	n_{pps}	---	38					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	118.70					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	223.00					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	286.85					
	p_r at z_{pii}	(MPa)	1.86					
Operating Control Conditions	Frequency	---	Low	High		Low		Low
	Focus	(cm)	0.80	5.95		1.19		0.45
	Gate Size	(cm)	0.05	0.35		0.40		0.35
	Scale	---	992	9615		22727		12500
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.13	0.74		1.23		1.22
Index Component Value				0.57	0.33	0.45	1.21	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.51					
	P	(mW)		19.93		15.88		15.88
	$P_{1\times1}$	(mW)		14.89		15.88		
	z_s	(cm)			1.50			
	z_b	(cm)					0.50	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	0.50					
	f_{awf}	(MHz)	4.50	7.98		6.00		6.00
Other Information	p_{rr}	(Hz)	78.58					
	s_{rr}	(Hz)	#					
	n_{pps}	---	38					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	8.82					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	121.68					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	142.28					
	p_r at z_{pii}	(MPa)	0.56					
	Operating Control Conditions	Frequency	---	Pen	High		Low	
Focus		(cm)	0.50	6.00		0.45		0.45
Gate Size		(cm)	0.35	0.15		0.40		0.40
Scale		---	992	15625		2717		2717
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.12	0.35		0.48		0.74
Index Component Value				0.08	0.06	0.08	0.21	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.99					
	P	(mW)		3.06		3.06		1.52
	$P_{1\times1}$	(mW)		3.03		3.03		
	z_s	(cm)			0.90			
	z_b	(cm)					1.70	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	0.80					
	f_{awf}	(MHz)	7.06	5.43		5.43		7.14
Other Information	p_{rr}	(Hz)	61.12					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	437.41					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	51.60					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	72.75					
	p_r at z_{pii}	(MPa)	3.40					
Operating Control Conditions	Frequency	---	Low	H Low		H Low		Low
	Focus	(cm)	0.84	2.50		2.50		2.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.02	0.77		1.05		0.96
Index Component Value				0.73	0.50	0.42	0.99	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.61					
	P	(mW)		19.14		14.67		14.82
	$P_{1\times1}$	(mW)		19.14		14.67		
	z_s	(cm)			0.70			
	z_b	(cm)					0.60	
	z_{MI}	(cm)	0.60					
	$z_{pii,\alpha}$	(cm)	0.70					
	f_{awf}	(MHz)	4.58	8.05		6.08		6.08
Other Information	p_{rr}	(Hz)	82.67					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	87.79					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	84.45					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	117.12					
	p_r at z_{pii}	(MPa)	1.46					
Operating Control Conditions	Frequency	---	Low	High		Mid		Mid
	Focus	(cm)	1.23	4.12		0.83		0.70
	Scale	---	1157	7143		11905		13889
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.26	0.42		0.42		0.49
Index Component Value				0.35	0.35	0.35	0.35	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.83					
	P	(mW)		19.93		19.93		19.93
	$P_{1\times1}$	(mW)		14.78		14.78		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	0.80					
	f_{awf}	(MHz)	5.01	5.02		5.02		5.02
Other Information	p_{rr}	(Hz)	0.16					
	s_{rr}	(Hz)	#					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	465.15					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	42.47					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	56.01					
	p_r at z_{pii}	(MPa)	3.25					
Operating Control Conditions	Frequency	---	5	5		5		5
	Focus	(cm)	1.25	3.30		3.30		3.30
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **15L4**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.19	0.43		0.43		0.71
Index Component Value				0.43	0.43	0.43	0.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.17					
	P	(mW)		20.78		20.78		39.10
	$P_{1\times1}$	(mW)		13.14		13.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	7.12	6.80		6.80		6.80
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	100.00					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	515.58					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	17.43					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	25.92					
	p_r at z_{pii}	(MPa)	3.61					
Operating Control Conditions	Frequency	---	Low	Low		Low		Low
	Focus	(cm)	1.00	5.25		5.25		3.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	0.83		0.83		1.05
Index Component Value				0.83	0.83	0.83	0.83	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.36					
	P	(mW)		40.03		40.03		72.27
	$P_{1\times1}$	(mW)		24.90		24.90		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	6.55	7.02		7.02		6.14
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	24.51					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	590.10					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	9.28					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	12.35					
	p_r at z_{pii}	(MPa)	3.89					
Operating Control Conditions	Frequency	---	H High	H High		H High		H High
	Focus	(cm)	1.00	1.50		1.50		3.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	0.97		0.97		1.22
Index Component Value				0.84	0.84	0.84	0.84	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.48					
	P	(mW)		35.95		35.95		59.52
	$P_{1\times1}$	(mW)		27.93		27.93		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	1.20					
	f_{awf}	(MHz)	6.28	6.28		6.28		6.28
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	10.51					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	370.66					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	47.82					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	79.27					
	p_r at z_{pii}	(MPa)	3.08					
	Operating Control Conditions	Frequency	---	Mid	Mid		Mid	
Focus		(cm)	2.47	2.39		2.39		2.39
Line Density		---	3	3		3		2
Scale		---	326	1667		1667		3906
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.44	1.52		2.02		2.24
Index Component Value				1.52	0.87	1.27	2.02	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.02					
	P	(mW)		43.71		36.14		18.10
	P_{1x1}	(mW)		43.71		36.14		
	z_s	(cm)			1.10			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	1.00					
	$z_{pII,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	5.39	7.32		7.35		7.30
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	208					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	42.47					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	384.99					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	569.25					
	p_r at z_{pII}	(MPa)	1.23					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	1.31	3.61		2.35		0.26
	Gate Size	(cm)	0.05	0.05		0.05		0.10
	Scale	---	2083	500		1786		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	1.42		1.85		2.24
Index Component Value				1.41	0.81	1.16	1.83	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.18					
	P	(mW)		40.43		33.26		17.91
	$P_{1\times 1}$	(mW)		40.43		33.26		
	z_s	(cm)			1.10			
	z_b	(cm)					1.70	
	z_{MI}	(cm)	1.10					
	$z_{pii,\alpha}$	(cm)	1.10					
	f_{awf}	(MHz)	7.30	7.31		7.34		7.30
Other Information	p_{rr}	(Hz)	80.54					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	60.79					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	443.16					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	771.52					
	p_r at z_{pii}	(MPa)	1.56					
	Operating Control Conditions	Frequency	---	Mid	Mid		Mid	
Focus		(cm)	1.30	3.64		2.32		0.28
Gate Size		(cm)	0.10	0.05		0.05		0.15
Scale		---	1953	7143		3333		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.44		1.94		2.18
Index Component Value				1.38	0.79	1.14	1.88	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.16					
	P	(mW)		39.67		32.49		16.94
	P_{1x1}	(mW)		39.67		32.49		
	z_s	(cm)			1.10			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	1.10					
	$z_{pii,\alpha}$	(cm)	1.10					
	f_{awf}	(MHz)	5.33	7.31		7.35		7.30
Other Information	p_{rr}	(Hz)	79.31					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	59.58					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	438.39					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	647.03					
	p_r at z_{pii}	(MPa)	1.37					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	1.33	3.60		2.31		0.26
	Gate Size	(cm)	0.10	0.05		0.05		0.10
	Scale	---	1953	14706		15625		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	0.86		1.35		1.07
Index Component Value				0.22	0.15	0.34	0.86	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.33					
	P	(mW)		7.83		12.86		13.51
	$P_{1\times1}$	(mW)		6.86		10.54		
	z_s	(cm)			1.10			
	z_b	(cm)					1.50	
	z_{MI}	(cm)	1.70					
	$z_{pil,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	5.98	6.75		6.82		6.14
Other Information	p_{rr}	(Hz)	61.27					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pil,\alpha}$	(W/cm ²)	718.42					
	$I_{spta,\alpha}$ at $z_{pil,\alpha}$ or $z_{sil,\alpha}$	(mW/cm ²)	214.30					
	I_{spta} at z_{pil} or z_{sil}	(mW/cm ²)	432.39					
	p_r at z_{pil}	(MPa)	4.73					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H High
	Focus	(cm)	1.69	1.51		1.67		3.01
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.39	1.12		1.54		1.62
Index Component Value				1.05	0.65	0.54	1.13	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.61					
	P	(mW)		34.95		17.83		15.02
	$P_{1\times1}$	(mW)		34.95		17.83		
	z_s	(cm)			1.10			
	z_b	(cm)					1.30	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	6.31	6.30		6.34		6.31
Other Information	p_{rr}	(Hz)	46.50					
	s_{rr}	(Hz)	#					
	n_{pps}	---	26					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	119.68					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	87.32					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	138.07					
	p_r at z_{pii}	(MPa)	1.90					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	1.15	7.41		2.97		0.79
	Scale	---	1302	5556		11364		22727
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.29	0.65		0.65		0.89
Index Component Value				0.20	0.20	0.20	0.20	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.67					
	P	(mW)		9.60		9.60		12.93
	$P_{1\times1}$	(mW)		7.89		7.89		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	0.80					
	f_{awf}	(MHz)	5.31	5.31		5.31		5.31
Other Information	p_{rr}	(Hz)	0.30					
	s_{rr}	(Hz)	#					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	112.44					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	11.39					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	17.27					
	p_r at z_{pii}	(MPa)	1.87					
Operating Control Conditions	Frequency	---	5.3	5.3		5.3		5.3
	Focus	(cm)	0.52	1.87		1.87		1.87
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18L6**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	0.89		0.89		0.99
Index Component Value				0.78	0.78	0.78	0.78	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.35					
	P	(mW)		33.81		33.81		33.53
	$P_{1\times1}$	(mW)		24.14		24.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	5.56	6.82		6.82		6.82
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	8.68					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	637.78					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	10.14					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	14.98					
	p_r at z_{pii}	(MPa)	4.06					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	1.00	0.50		0.50		0.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.84		1.84		4.24
Index Component Value				1.84	1.84	1.84	1.84	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.78					
	P	(mW)		317.89		317.89		654.67
	$P_{1\times1}$	(mW)		183.40		183.40		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	6.30					
	$z_{pii,\alpha}$	(cm)	6.30					
	f_{awf}	(MHz)	1.66	2.10		2.10		1.58
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	7.85					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	192.26					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	12.01					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	18.10					
	p_r at z_{pii}	(MPa)	2.54					
Operating Control Conditions	Frequency	---	H Mid	Low		Low		Pen
	Focus	(cm)	6.00	6.00		6.00		12.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.48	1.97		1.97		4.56
Index Component Value				1.43	1.43	1.43	1.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.69					
	P	(mW)		167.50		167.50		353.37
	$P_{1\times1}$	(mW)		138.53		138.53		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.10					
	$z_{pII,\alpha}$	(cm)	3.10					
	f_{awf}	(MHz)	1.50	2.17		2.17		1.50
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	9.80					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	117.92					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	65.13					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	89.65					
	p_r at z_{pII}	(MPa)	1.98					
Operating Control Conditions	Frequency	---	Pen	Res		Res		Pen
	Focus	(cm)	3.01	3.00		3.00		4.24
	Line Density	---	1	1		1		1
	Scale	---	198	8065		8065		5435
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.33	1.60		4.86		4.64
Index Component Value				1.27	1.60	1.27	4.86	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.62					
	P	(mW)		65.66		407.85		541.74
	$P_{1\times1}$	(mW)		178.56		178.56		
	z_s	(cm)			4.20			
	z_b	(cm)					4.20	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	1.48	1.50		1.50		1.28
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	63.50					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	319.52					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	392.03					
	p_r at z_{pii}	(MPa)	1.48					
	Operating Control Conditions	Frequency	---	Low	Low		Low	
Focus		(cm)	1.50	16.00		16.00		24.00
Gate Size		(cm)	0.10	0.50		0.50		1.00
Scale		---	500	4032		4032		2778
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.54		5.33		4.73
Index Component Value				1.27	1.49	0.55	5.20	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.57					
	P	(mW)		418.82		470.62		470.62
	$P_{1\times1}$	(mW)		177.72		90.50		
	z_s	(cm)			4.30			
	z_b	(cm)					9.90	
	z_{MI}	(cm)	2.70					
	$z_{pii,\alpha}$	(cm)	4.50					
	f_{awf}	(MHz)	1.52	1.50		1.28		1.28
Other Information	p_{rr}	(Hz)	79.87					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	8.25					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ OR $z_{sii,\alpha}$	(mW/cm ²)	195.64					
	I_{spta} at z_{pii} OR z_{sii}	(mW/cm ²)	313.47					
	p_r at z_{pii}	(MPa)	0.63					
Operating Control Conditions	Frequency	---	Low	Low		Pen		Pen
	Focus	(cm)	39.95	18.00		18.00		18.00
	Gate Size	(cm)	0.10	0.80		0.65		0.65
	Scale	---	1786	3571		3623		3623
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.47	1.81		5.36		4.69
Index Component Value				1.12	1.51	0.42	4.93	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.89					
	P	(mW)		346.25		347.59		450.15
	$P_{1\times1}$	(mW)		157.22		69.52		
	z_s	(cm)			4.10			
	z_b	(cm)					9.00	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	1.48	1.50		1.28		1.28
Other Information	p_{rr}	(Hz)	43.63					
	s_{rr}	(Hz)	#					
	n_{pps}	---	206					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	18.02					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	407.52					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	499.99					
	p_r at z_{pii}	(MPa)	0.83					
	Operating Control Conditions	Frequency	---	Low	Low		Pen	
Focus		(cm)	1.50	14.00		14.00		20.00
Gate Size		(cm)	0.10	0.65		0.65		0.65
Scale		---	2083	4386		4464		3289
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.80		4.89		3.50
Index Component Value				0.66	0.63	1.19	4.76	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.78					
	P	(mW)		27.27		363.06		363.06
	$P_{1\times1}$	(mW)		67.54		156.05		
	z_s	(cm)			3.30			
	z_b	(cm)					4.30	
	z_{MI}	(cm)	6.30					
	$z_{pii,\alpha}$	(cm)	6.30					
	f_{awf}	(MHz)	1.66	2.04		1.60		1.60
Other Information	p_{rr}	(Hz)	59.38					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	192.26					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	300.47					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	622.86					
	p_r at z_{pii}	(MPa)	2.54					
Operating Control Conditions	Frequency	---	H Mid	Low		H Mid		H Mid
	Focus	(cm)	6.00	7.76		10.32		10.32
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.48	1.72		5.20		3.74
Index Component Value				1.36	1.65	1.04	4.28	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.69					
	P	(mW)		387.61		305.48		373.33
	$P_{1 \times 1}$	(mW)		160.48		145.71		
	z_s	(cm)			4.30			
	z_b	(cm)					8.70	
	z_{MI}	(cm)	3.10					
	$z_{pii,\alpha}$	(cm)	3.10					
	f_{awf}	(MHz)	1.50	1.77		1.50		1.50
Other Information	p_{rr}	(Hz)	71.43					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	117.92					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	270.79					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	373.33					
	p_r at z_{pii}	(MPa)	1.98					
Operating Control Conditions	Frequency	---	Pen	Mid		Pen		Pen
	Focus	(cm)	3.01	20.00		12.00		16.50
	Scale	---	977	2809		3968		3125
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	1.07		1.07		3.36
Index Component Value				0.68	0.68	0.68	0.68	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.96					
	P	(mW)		115.69		115.69		329.22
	$P_{1 \times 1}$	(mW)		64.60		64.60		
	z_s	(cm)		#				
	z_b	(cm)					#	
	z_{MI}	(cm)	4.20					
	$z_{pii,\alpha}$	(cm)	4.20					
	f_{awf}	(MHz)	2.20	2.20		2.20		1.59
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	0.26					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	253.49					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	145.79					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	310.17					
	p_r at z_{pii}	(MPa)	2.64					
Operating Control Conditions	Frequency	---	2.2	2.2		2.2		1.6
	Focus	(cm)	3.96	6.50		6.50		11.85
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **DAX**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.41	1.50		1.50		4.07
Index Component Value				0.68	0.68	0.68	0.68	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.78					
	P	(mW)		201.96		201.96		456.59
	$P_{1\times1}$	(mW)		86.68		86.68		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	6.30					
	$z_{pii,\alpha}$	(cm)	6.30					
	f_{awf}	(MHz)	1.66	1.66		1.66		1.66
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	1.00					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	192.26					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	2.91					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	4.38					
	p_r at z_{pii}	(MPa)	2.54					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	6.00	8.00		8.00		12.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.61		1.61		4.35
Index Component Value				1.61	1.61	1.61	1.61	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.73					
	P	(mW)		392.74		392.74		438.93
	P_{1x1}	(mW)		150.82		150.82		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.50					
	$z_{pii,\alpha}$	(cm)	3.50					
	f_{awf}	(MHz)	1.64	2.25		2.25		1.99
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	80.13					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	106.73					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	283.37					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	407.11					
	p_r at z_{pii}	(MPa)	2.10					
Operating Control Conditions	Frequency	---	H Low	H High		H High		Low
	Focus	(cm)	18.00	8.00		8.00		10.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.22	2.18		2.18		4.96
Index Component Value				2.08	2.08	2.08	2.08	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.46					
	P	(mW)		204.23		204.23		485.33
	$P_{1\times1}$	(mW)		136.69		136.69		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.10					
	$z_{pii,\alpha}$	(cm)	3.10					
	f_{awf}	(MHz)	1.44	3.19		3.19		2.49
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	21.19					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	76.09					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	309.11					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	408.00					
	p_r at z_{pii}	(MPa)	1.45					
	Operating Control Conditions	Frequency	---	Pen	High		High	
Focus		(cm)	15.01	10.45		10.45		12.41
Line Density		---	2	1		1		3
Scale		---	1016	340		340		392
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	1.91		4.37		3.82
Index Component Value				1.91	1.80	0.55	4.37	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.69					
	P	(mW)		253.70		393.46		253.11
	$P_{1\times1}$	(mW)		120.81		72.86		
	z_s	(cm)			3.50			
	z_b	(cm)					4.00	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	1.55	3.32		1.59		3.32
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	19.53					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	93.50					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	114.63					
	p_r at z_{pii}	(MPa)	0.83					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Mid
	Focus	(cm)	1.00	15.00		15.38		15.00
	Gate Size	(cm)	0.05	0.80		0.05		0.80
	Scale	---	500	2336		3571		2525
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.91		4.45		4.50
Index Component Value				1.89	1.78	0.56	4.42	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.80					
	P	(mW)		250.78		447.61		360.46
	$P_{1\times1}$	(mW)		119.42		73.65		
	z_s	(cm)			3.50			
	z_b	(cm)					4.20	
	z_{MI}	(cm)	3.90					
	$z_{pii,\alpha}$	(cm)	3.90					
	f_{awf}	(MHz)	1.60	3.32		1.60		1.60
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	26.69					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	376.45					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	586.97					
	p_r at z_{pii}	(MPa)	0.99					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	4.08	14.99		25.17		20.98
Gate Size		(cm)	0.20	0.40		0.05		0.05
Scale		---	3906	1984		2000		1953
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	2.17		4.93		4.47
Index Component Value				1.13	1.12	0.57	4.17	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.69					
	P	(mW)		138.26		130.90		208.09
	$P_{1\times1}$	(mW)		72.89		75.89		
	z_s	(cm)			2.90			
	z_b	(cm)					2.30	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	1.55	3.26		1.57		1.55
Other Information	p_{rr}	(Hz)	46.09					
	s_{rr}	(Hz)	#					
	n_{pps}	---	129					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	19.53					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	277.97					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	340.77					
	p_r at z_{pii}	(MPa)	0.83					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Low
	Focus	(cm)	0.99	9.51		1.53		1.00
	Gate Size	(cm)	0.05	0.05		0.05		0.10
	Scale	---	1953	3333		2315		19231
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	1.90		2.98		3.31
Index Component Value				0.63	0.97	0.41	2.59	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.56					
	P	(mW)		151.59		129.60		156.69
	$P_{1\times1}$	(mW)		61.58		56.68		
	z_s	(cm)			3.20			
	z_b	(cm)					3.00	
	z_{MI}	(cm)	4.80					
	$z_{pii,\alpha}$	(cm)	4.80					
	f_{awf}	(MHz)	1.66	2.15		1.51		1.52
Other Information	p_{rr}	(Hz)	60.24					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	113.91					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	207.12					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	358.35					
	p_r at z_{pii}	(MPa)	2.05					
Operating Control Conditions	Frequency	---	H Low	H High		H Pen		H Pen
	Focus	(cm)	5.82	9.00		12.00		26.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	2.60		4.91		5.05
Index Component Value				2.57	2.05	2.10	4.62	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.15					
	P	(mW)		207.60		270.56		270.56
	$P_{1\times1}$	(mW)		173.00		180.37		
	z_s	(cm)			1.90			
	z_b	(cm)					4.20	
	z_{MI}	(cm)	3.60					
	$z_{pii,\alpha}$	(cm)	3.60					
	f_{awf}	(MHz)	2.50	3.11		2.45		2.45
Other Information	p_{rr}	(Hz)	74.38					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	290.20					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	396.51					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	737.77					
	p_r at z_{pii}	(MPa)	2.94					
Operating Control Conditions	Frequency	---	Mid	High		Mid		Mid
	Focus	(cm)	5.04	8.02		21.59		21.59
	Scale	---	1042	1524		1563		1563
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.40	2.22		2.22		3.64
Index Component Value				2.08	2.08	2.08	2.08	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.52					
	P	(mW)		182.58		182.58		182.58
	$P_{1\times1}$	(mW)		132.30		132.30		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.20					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	3.25	3.30		3.30		3.30
Other Information	p_{rr}	(Hz)	0.53					
	s_{rr}	(Hz)	#					
	n_{pps}	---	4					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	254.72					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	99.67					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	152.52					
	p_r at z_{pii}	(MPa)	2.23					
Operating Control Conditions	Frequency	---	3.31	3.31		3.31		3.31
	Focus	(cm)	2.00	3.86		3.86		3.86
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5C1**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.41	1.59		1.59		4.57
Index Component Value				1.17	1.17	1.17	1.17	
Acoustic Parameters	IEC	Units						
	$p_{r,a}$ at z_{MI}	(MPa)	2.10					
	P	(mW)		280.40		280.40		322.09
	$P_{1 \times 1}$	(mW)		111.42		111.42		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	4.20					
	$z_{pii,a}$	(cm)	4.20					
	f_{awf}	(MHz)	2.22	2.21		2.21		2.00
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	26.47					
	n_{pps}	---	3					
	$I_{pa,a}$ at $z_{pii,a}$	(W/cm ²)	184.15					
	$I_{spta,a}$ at $z_{pii,a}$ Or $z_{sii,a}$	(mW/cm ²)	218.52					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	376.01					
	p_r at z_{pii}	(MPa)	2.71					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		High
	Focus	(cm)	18.00	10.00		10.00		10.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	1.97		1.97		4.04
Index Component Value				1.97	1.97	1.97	1.97	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.29					
	P	(mW)		137.02		137.02		389.50
	P_{1x1}	(mW)		99.78		99.78		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.20					
	$z_{pII,\alpha}$	(cm)	2.20					
	f_{awf}	(MHz)	2.92	4.15		4.15		2.87
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	14.60					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	283.00					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	5.04					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	8.59					
	p_r at z_{pII}	(MPa)	2.76					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		H Mid
	Focus	(cm)	2.00	4.00		4.00		8.00
	Line Density	---	1	3		3		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	2.15		2.15		3.65
Index Component Value				2.05	2.05	2.05	2.05	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.41					
	P	(mW)		101.86		101.86		291.84
	$P_{1\times1}$	(mW)		96.71		96.71		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	3.40	4.46		4.46		3.37
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	11.43					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	154.37					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ OR $z_{sii,\alpha}$	(mW/cm ²)	67.80					
	I_{spta} at z_{pii} OR z_{sii}	(mW/cm ²)	85.71					
	p_r at z_{pii}	(MPa)	2.14					
Operating Control Conditions	Frequency	---	Mid	High		High		Mid
	Focus	(cm)	0.60	1.70		1.70		8.10
	Line Density	---	1	3		3		2
	Scale	---	355	947		947		714
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	2.45		4.13		3.69
Index Component Value				1.78	2.45	1.00	4.13	
Acoustic Parameters	IEC	Units						
	$p_{r,a}$ at z_{MI}	(MPa)	2.32					
	P	(mW)		272.47		181.56		259.10
	$P_{1\times1}$	(mW)		110.15		84.14		
	z_s	(cm)			2.50			
	z_b	(cm)					2.50	
	z_{MI}	(cm)	0.80					
	$z_{pii,a}$	(cm)	2.00					
	f_{awf}	(MHz)	2.51	3.40		2.50		2.50
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,a}$ at $z_{pii,a}$	(W/cm ²)	118.27					
	$I_{spta,a}$ at $z_{pii,a}$ Or $z_{sii,a}$	(mW/cm ²)	349.97					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	501.98					
	p_r at z_{pii}	(MPa)	1.93					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	1.00	14.00		7.56		23.64
Gate Size		(cm)	0.10	0.05		0.25		1.00
Scale		---	500	17857		3906		500
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.40	2.42		4.90		3.78
Index Component Value				1.70	2.34	1.28	4.83	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.74					
	P	(mW)		260.02		234.68		263.78
	$P_{1\times1}$	(mW)		105.12		106.17		
	z_s	(cm)			2.50			
	z_b	(cm)					2.60	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	4.48	3.40		2.53		2.50
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	13.03					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ OR $z_{sii,\alpha}$	(mW/cm ²)	349.43					
	I_{spta} at z_{pii} OR z_{sii}	(mW/cm ²)	522.38					
	p_r at z_{pii}	(MPa)	0.76					
Operating Control Conditions	Frequency	---	High	Mid		Low		Low
	Focus	(cm)	0.96	13.98		7.99		29.68
	Gate Size	(cm)	0.35	0.05		0.05		0.40
	Scale	---	1953	19231		14706		6579
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	2.37		4.02		3.83
Index Component Value				1.58	2.17	0.92	3.78	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.11					
	P	(mW)		240.82		165.44		244.84
	$P_{1\times1}$	(mW)		97.35		76.67		
	z_s	(cm)			2.50			
	z_b	(cm)					3.50	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	2.51	3.40		2.52		2.50
Other Information	p_{rr}	(Hz)	81.26					
	s_{rr}	(Hz)	#					
	n_{pps}	---	113					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	25.82					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	350.85					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	501.83					
	p_r at z_{pii}	(MPa)	1.02					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	0.99	14.01		7.37		24.47
Gate Size		(cm)	0.10	0.15		0.20		0.20
Scale		---	3968	3788		2841		2717
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	2.09		2.95		4.02
Index Component Value				0.64	0.46	0.80	1.89	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.57					
	P	(mW)		46.05		75.44		13.07
	$P_{1\times1}$	(mW)		39.66		58.28		
	z_s	(cm)			2.00			
	z_b	(cm)					2.70	
	z_{MI}	(cm)	3.60					
	$z_{pii,\alpha}$	(cm)	3.60					
	f_{awf}	(MHz)	2.98	3.38		2.87		2.89
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	150.83					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	43.00					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	87.45					
	p_r at z_{pii}	(MPa)	2.25					
Operating Control Conditions	Frequency	---	Low	H High		H Mid		H Mid
	Focus	(cm)	14.00	4.50		8.00		0.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	2.04		4.08		3.54
Index Component Value				1.84	1.71	1.62	3.21	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.41					
	P	(mW)		169.14		149.02		183.25
	$P_{1\times1}$	(mW)		114.77		101.12		
	z_s	(cm)			2.00			
	z_b	(cm)					2.90	
	z_{MI}	(cm)	0.50					
	$z_{pII,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	3.40	3.37		3.37		3.37
Other Information	p_{rr}	(Hz)	51.31					
	s_{rr}	(Hz)	#					
	n_{pps}	---	26					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	154.37					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	217.39					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	274.84					
	p_r at z_{pII}	(MPa)	2.14					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	0.60	8.02		8.00		8.24
	Scale	---	1437	7143		6579		1429
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.55	1.22		1.22		2.93
Index Component Value				0.91	0.91	0.91	0.91	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.45					
	P	(mW)		108.66		108.66		168.12
	$P_{1\times1}$	(mW)		76.46		76.46		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.40					
	$z_{pii,\alpha}$	(cm)	3.40					
	f_{awf}	(MHz)	2.50	2.50		2.50		2.50
Other Information	p_{rr}	(Hz)	0.72					
	s_{rr}	(Hz)	#					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	417.02					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sil,\alpha}$	(mW/cm ²)	287.91					
	I_{spta} at z_{pii} or z_{sil}	(mW/cm ²)	639.75					
	p_r at z_{pii}	(MPa)	3.29					
Operating Control Conditions	Frequency	---	2.5	2.5		2.5		2.5
	Focus	(cm)	4.30	4.80		4.80		7.75
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C2**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	2.00		2.00		2.95
Index Component Value				2.00	2.00	2.00	2.00	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.41					
	P	(mW)		183.30		183.30		194.44
	$P_{1\times1}$	(mW)		130.99		130.99		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.80					
	$z_{pii,\alpha}$	(cm)	3.80					
	f_{awf}	(MHz)	3.21	3.21		3.21		3.21
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	8.19					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	379.30					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	9.34					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	16.54					
	p_r at z_{pii}	(MPa)	3.59					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	4.00	6.00		6.00		10.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.20	1.14		1.14		1.81
Index Component Value				1.14	1.14	1.14	1.14	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.27					
	P	(mW)		118.45		118.45		170.52
	$P_{1\times1}$	(mW)		63.94		63.94		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.00					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	3.56	3.74		3.74		3.74
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	13.03					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	192.96					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	2.89					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	6.48					
	p_r at z_{pii}	(MPa)	2.90					
Operating Control Conditions	Frequency	---	H High	Low		Low		Low
	Focus	(cm)	2.00	2.00		2.00		2.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	1.47		1.47		2.44
Index Component Value				1.35	1.35	1.35	1.35	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.30					
	P	(mW)		148.92		148.92		278.34
	$P_{1\times1}$	(mW)		66.11		66.11		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	4.20					
	$z_{pii,\alpha}$	(cm)	4.20					
	f_{awf}	(MHz)	2.84	4.27		4.27		3.59
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	4.18					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	380.51					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	32.92					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	76.61					
	p_r at z_{pii}	(MPa)	3.39					
	Operating Control Conditions	Frequency	---	Pen	Res		Res	
Focus		(cm)	4.01	4.01		4.01		6.99
Line Density		---	3	1		1		3
Scale		---	217	340		340		751
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.26	1.12		3.01		2.70
Index Component Value				1.12	1.10	1.22	3.01	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.38					
	P	(mW)		222.23		85.34		222.23
	$P_{1\times1}$	(mW)		65.85		71.11		
	z_s	(cm)			5.00			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	1.00					
	$z_{pII,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.60	3.58		3.60		3.58
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	168.16					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	368.66					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	522.22					
	p_r at z_{pII}	(MPa)	2.28					
Operating Control Conditions	Frequency	---	High	High		High		High
	Focus	(cm)	1.00	29.98		1.00		29.98
	Gate Size	(cm)	0.05	0.05		0.30		0.05
	Scale	---	500	2404		4167		2404
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.18	1.16		3.40		2.36
Index Component Value				1.04	1.14	0.91	3.34	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.54					
	P	(mW)		175.95		85.74		175.95
	$P_{1\times1}$	(mW)		62.56		60.17		
	z_s	(cm)			3.90			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.60	3.50		3.17		3.50
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	63.25					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	411.07					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	582.30					
	p_r at z_{pii}	(MPa)	1.50					
Operating Control Conditions	Frequency	---	High	High		Mid		High
	Focus	(cm)	1.00	10.00		2.00		10.00
	Gate Size	(cm)	0.05	0.40		0.30		0.40
	Scale	---	1953	2083		1953		2083
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	1.09		3.18		2.47
Index Component Value				0.88	0.86	0.81	2.67	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.05					
	P	(mW)		173.16		66.54		173.16
	$P_{1\times1}$	(mW)		51.31		46.70		
	z_s	(cm)			5.00			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	4.30					
	$z_{pii,\alpha}$	(cm)	4.30					
	f_{awf}	(MHz)	3.55	3.58		3.62		3.58
Other Information	p_{rr}	(Hz)	43.40					
	s_{rr}	(Hz)	#					
	n_{pps}	---	129					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	54.69					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	323.72					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	1029.96					
	p_r at z_{pii}	(MPa)	1.78					
Operating Control Conditions	Frequency	---	High	High		High		High
	Focus	(cm)	4.00	29.92		2.00		29.92
	Gate Size	(cm)	0.05	0.10		0.15		0.10
	Scale	---	1953	1202		3125		1202
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.20	1.26		1.55		1.70
Index Component Value				0.20	0.13	0.30	0.82	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.27					
	P	(mW)		11.67		21.67		22.05
	$P_{1 \times 1}$	(mW)		8.24		17.69		
	z_s	(cm)			2.20			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	2.00					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	3.56	5.13		3.56		3.56
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	192.96					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	128.90					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	210.72					
	p_r at z_{pii}	(MPa)	2.90					
Operating Control Conditions	Frequency	---	H High	Mid		H High		H High
	Focus	(cm)	2.00	4.00		2.00		2.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.39	1.54		2.92		2.23
Index Component Value				1.50	1.35	1.51	2.88	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.63					
	P	(mW)		130.79		130.78		141.52
	$P_{1 \times 1}$	(mW)		74.21		74.20		
	z_s	(cm)			2.30			
	z_b	(cm)					3.10	
	z_{MI}	(cm)	3.40					
	$z_{pii,\alpha}$	(cm)	3.40					
	f_{awf}	(MHz)	3.55	4.26		4.27		4.27
Other Information	p_{rr}	(Hz)	79.37					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	342.96					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	371.91					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	873.85					
	p_r at z_{pii}	(MPa)	3.97					
Operating Control Conditions	Frequency	---	Mid	Res		Res		Res
	Focus	(cm)	3.01	3.07		3.01		4.01
	Scale	---	1111	3906		3906		3906
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9C3**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.20	1.08		1.08		1.72
Index Component Value				0.72	0.72	0.72	0.72	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.27					
	P	(mW)		75.90		75.90		123.30
	$P_{1\times1}$	(mW)		42.16		42.16		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.00					
	$z_{pii,\alpha}$	(cm)	2.00					
	f_{awf}	(MHz)	3.56	3.56		3.56		3.34
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	3.64					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	192.96					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	2.33					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	5.24					
	p_r at z_{pii}	(MPa)	2.90					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	2.00	2.00		2.00		6.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.21	1.88		1.88		2.39
Index Component Value				1.88	1.88	1.88	1.88	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.26					
	P	(mW)		109.18		109.18		105.46
	$P_{1\times1}$	(mW)		85.66		85.66		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	3.51	4.61		4.61		3.50
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	16.58					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	299.85					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	21.98					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	28.79					
	p_r at z_{pii}	(MPa)	2.75					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H Low
	Focus	(cm)	2.00	3.00		3.00		8.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	2.06		2.06		2.55
Index Component Value				1.77	1.77	1.77	1.77	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.61					
	P	(mW)		74.72		74.72		53.92
	$P_{1\times 1}$	(mW)		70.09		70.09		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.80					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	4.00	5.31		5.31		3.98
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	13.54					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	433.67					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	110.41					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	158.45					
	p_r at z_{pii}	(MPa)	3.23					
	Operating Control Conditions	Frequency	---	Mid	High		High	
Focus		(cm)	2.30	3.80		3.80		3.80
Line Density		---	1	1		1		1
Scale		---	208	725		725		6250
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.07	2.04		2.57		3.00
Index Component Value				2.04	1.40	1.81	2.57	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.49					
	P	(mW)		78.15		69.36		78.15
	$P_{1\times1}$	(mW)		78.15		69.36		
	z_s	(cm)			1.00			
	z_b	(cm)					1.50	
	z_{MI}	(cm)	1.40					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	5.46	5.48		5.47		5.48
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	361.87					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	428.29					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	723.48					
	p_r at z_{pii}	(MPa)	3.12					
Operating Control Conditions	Frequency	---	High	High		High		High
	Focus	(cm)	1.51	10.99		13.98		10.99
	Gate Size	(cm)	0.05	0.05		0.05		0.05
	Scale	---	500	2033		4902		2033
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	2.02		2.50		2.98
Index Component Value				1.88	1.29	1.69	2.39	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.06					
	P	(mW)		72.16		64.73		70.57
	$P_{1\times1}$	(mW)		72.16		64.73		
	z_s	(cm)			1.00			
	z_b	(cm)					1.50	
	z_{MI}	(cm)	1.80					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	3.20	5.46		5.49		5.49
Other Information	p_{rr}	(Hz)	79.82					
	s_{rr}	(Hz)	#					
	n_{pps}	---	82					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	42.73					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	342.96					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	522.83					
	p_r at z_{pii}	(MPa)	1.26					
	Operating Control Conditions	Frequency	---	Low	High		High	
Focus		(cm)	7.00	10.98		12.84		13.13
Gate Size		(cm)	0.05	0.05		0.25		0.05
Scale		---	2155	3049		5208		5208
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.27	2.04		2.78		2.95
Index Component Value				1.76	1.21	1.76	2.50	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.95					
	P	(mW)		67.76		67.76		67.62
	P_{1x1}	(mW)		67.76		67.76		
	z_s	(cm)			1.00			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	1.70					
	$z_{pII,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	3.20	5.46		5.46		5.44
Other Information	p_{rr}	(Hz)	44.71					
	s_{rr}	(Hz)	#					
	n_{pps}	---	172					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	34.59					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ OR $z_{sII,\alpha}$	(mW/cm ²)	327.10					
	I_{spta} at z_{pII} OR z_{sII}	(mW/cm ²)	478.54					
	p_r at z_{pII}	(MPa)	1.10					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	5.50	10.95		10.95		11.15
	Gate Size	(cm)	0.05	0.10		0.10		0.10
	Scale	---	2083	2717		2717		2841
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.21	1.87		2.23		2.47
Index Component Value				0.31	0.24	0.28	0.66	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.58					
	P	(mW)		16.33		13.24		17.00
	$P_{1\times1}$	(mW)		14.70		13.24		
	z_s	(cm)			1.20			
	z_b	(cm)					2.20	
	z_{MI}	(cm)	1.30					
	$z_{pII,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.50	4.42		4.50		3.51
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	75.11					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ Or $z_{sII,\alpha}$	(mW/cm ²)	56.43					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	82.48					
	p_r at z_{pII}	(MPa)	1.72					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H Low
	Focus	(cm)	12.16	3.15		2.46		6.15
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.21	2.35		2.98		3.12
Index Component Value				2.27	1.52	2.18	2.70	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.18					
	P	(mW)		90.65		87.13		87.13
	$P_{1\times1}$	(mW)		90.65		87.13		
	z_s	(cm)			1.10			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	1.60					
	$z_{pii,\alpha}$	(cm)	1.60					
	f_{awf}	(MHz)	3.24	5.25		5.25		5.25
Other Information	p_{rr}	(Hz)	82.67					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	228.41					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	267.67					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	394.55					
	p_r at z_{pii}	(MPa)	2.46					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	2.48	10.09		9.77		9.77
	Scale	---	1157	5435		5435		5435
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **11M3**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.21	1.14		1.14		1.82
Index Component Value				0.73	0.73	0.73	0.73	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.26					
	P	(mW)		55.60		55.60		55.62
	$P_{1 \times 1}$	(mW)		43.44		43.44		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	3.51	3.51		3.51		3.51
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	7.81					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	299.85					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	16.50					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	21.61					
	p_r at z_{pii}	(MPa)	2.75					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	2.00	4.00		4.00		4.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.74	0.78		0.78		0.60
Index Component Value				0.54	0.54	0.54	0.54	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.13					
	P	(mW)		14.37		14.37		14.40
	$P_{1 \times 1}$	(mW)		10.25		10.25		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	0.95					
	$z_{pii,\alpha}$	(cm)	0.95					
	f_{awf}	(MHz)	8.20	10.99		10.99		10.99
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	46.50					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	186.65					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	10.18					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	16.90					
	p_r at z_{pii}	(MPa)	2.65					
Operating Control Conditions	Frequency	---	H High	High		High		High
	Focus	(cm)	1.00	4.00		4.00		2.50
	Line Density	---	1	2		2		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.74	1.06		1.06		0.92
Index Component Value				0.90	0.90	0.90	0.90	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.99					
	P	(mW)		21.50		21.50		25.17
	$P_{1\times 1}$	(mW)		19.95		19.95		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	8.25	9.44		9.44		8.23
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	7.07					
	n_{pps}	---	25					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	227.72					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	24.49					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	41.71					
	p_r at z_{pii}	(MPa)	2.50					
	Operating Control Conditions	Frequency	---	Mid	High		High	
Focus		(cm)	1.50	1.49		1.49		5.53
Line Density		---	1	3		3		3
Scale		---	208	2525		2525		1250
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.56	1.60		1.35		1.56
Index Component Value				1.60	0.86	0.94	1.35	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.54					
	P	(mW)		33.62		27.01		11.58
	$P_{1\times1}$	(mW)		33.62		27.01		
	z_s	(cm)			0.90			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	0.75					
	$z_{pii,\alpha}$	(cm)	0.75					
	f_{awf}	(MHz)	7.45	10.02		7.34		7.45
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	102.76					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	136.32					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	210.30					
	p_r at z_{pii}	(MPa)	1.77					
Operating Control Conditions	Frequency	---	Mid	High		Mid		Mid
	Focus	(cm)	0.76	4.07		2.72		0.28
	Gate Size	(cm)	0.05	0.50		1.00		0.35
	Scale	---	500	4167		3125		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.74	1.56		1.31		1.51
Index Component Value				1.53	0.82	0.88	1.28	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.47					
	P	(mW)		32.15		25.13		10.97
	$P_{1\times1}$	(mW)		32.15		25.13		
	z_s	(cm)			0.90			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	7.44	10.02		7.34		7.45
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	108.36					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	429.75					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	682.34					
	p_r at z_{pii}	(MPa)	1.85					
Operating Control Conditions	Frequency	---	Mid	High		Mid		Mid
	Focus	(cm)	1.00	4.00		2.72		0.28
	Gate Size	(cm)	0.05	0.50		1.00		0.35
	Scale	---	1953	6250		3125		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.73	1.50		1.24		1.47
Index Component Value				1.38	0.74	0.76	1.11	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.46					
	P	(mW)		28.98		21.77		10.07
	P_{1x1}	(mW)		28.98		21.77		
	z_s	(cm)			0.90			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	7.44	10.02		7.34		7.45
Other Information	p_{rr}	(Hz)	44.39					
	s_{rr}	(Hz)	#					
	n_{pps}	---	129					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	107.02					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	409.87					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	650.77					
	p_r at z_{pii}	(MPa)	1.84					
Operating Control Conditions	Frequency	---	Mid	High		Mid		Mid
	Focus	(cm)	1.00	4.08		2.71		0.28
	Gate Size	(cm)	0.05	0.50		0.50		0.35
	Scale	---	1953	4167		3125		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.74	0.78		0.78		0.57
Index Component Value				0.08	0.04	0.08	0.05	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.13					
	P	(mW)		1.70		1.70		1.70
	$P_{1\times1}$	(mW)		1.57		1.57		
	z_s	(cm)			1.10			
	z_b	(cm)					1.10	
	z_{MI}	(cm)	0.95					
	$z_{pii,\alpha}$	(cm)	0.95					
	f_{awf}	(MHz)	8.20	10.99		10.99		10.99
Other Information	p_{rr}	(Hz)	60.98					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	186.65					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	49.74					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	85.75					
	p_r at z_{pii}	(MPa)	2.65					
Operating Control Conditions	Frequency	---	H High	High		High		High
	Focus	(cm)	1.00	4.91		4.91		4.91
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.74	1.29		1.26		1.17
Index Component Value				1.27	0.64	0.55	1.25	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.58					
	P	(mW)		24.17		14.18		27.69
	$P_{1\times1}$	(mW)		24.17		14.18		
	z_s	(cm)			0.90			
	z_b	(cm)					1.05	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	8.26	11.00		8.19		8.23
Other Information	p_{rr}	(Hz)	40.06					
	s_{rr}	(Hz)	#					
	n_{pps}	---	25					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	134.91					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	47.10					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	77.57					
	p_r at z_{pii}	(MPa)	1.94					
Operating Control Conditions	Frequency	---	Mid	Res		Mid		Mid
	Focus	(cm)	1.12	5.64		2.18		5.64
	Scale	---	1042	10000		7353		10417
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **18H6**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.12	0.82		0.82		0.91
Index Component Value				0.55	0.55	0.55	0.55	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.29					
	P	(mW)		18.79		18.79		30.89
	$P_{1\times1}$	(mW)		13.44		13.44		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.00					
	f_{awf}	(MHz)	8.56	8.56		8.56		8.56
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	9.06					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	478.05					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	6.88					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	10.68					
	p_r at z_{pii}	(MPa)	4.42					
Operating Control Conditions	Frequency	---	High	High		High		High
	Focus	(cm)	1.00	2.50		2.50		4.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	0.59		0.59		1.84
Index Component Value				0.59	0.59	0.59	0.59	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.26					
	P	(mW)		122.02		122.02		216.80
	$P_{1\times1}$	(mW)		43.46		43.46		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.70					
	$z_{pii,\alpha}$	(cm)	3.70					
	f_{awf}	(MHz)	2.81	2.84		2.84		2.84
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	24.67					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	206.21					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	19.89					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	36.74					
	p_r at z_{pii}	(MPa)	2.88					
Operating Control Conditions	Frequency	---	H High	Low		Low		Low
	Focus	(cm)	6.00	6.00		6.00		6.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.25	0.77		0.77		3.11
Index Component Value				0.63	0.63	0.63	0.63	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.33					
	P	(mW)		37.61		37.61		142.16
	$P_{1\times1}$	(mW)		33.29		33.29		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.00					
	$z_{pii,\alpha}$	(cm)	3.00					
	f_{awf}	(MHz)	2.57	3.97		3.97		3.07
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	8.60					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	78.42					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	54.46					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	92.55					
	p_r at z_{pii}	(MPa)	1.77					
	Operating Control Conditions	Frequency	---	Low	High		High	
Focus		(cm)	3.99	3.14		3.14		4.46
Line Density		---	3	3		3		3
Scale		---	260	411		411		641
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.17	0.89		2.86		1.69
Index Component Value				0.61	0.89	0.64	2.86	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.32					
	P	(mW)		121.87		62.34		126.64
	P_{1x1}	(mW)		41.55		53.13		
	z_s	(cm)			3.30			
	z_b	(cm)					2.40	
	z_{MI}	(cm)	0.80					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.93	3.10		2.51		2.52
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	173.14					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	230.36					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	336.62					
	p_r at z_{pii}	(MPa)	2.21					
Operating Control Conditions	Frequency	---	High	Mid		Low		Low
	Focus	(cm)	1.00	29.85		2.16		25.99
	Gate Size	(cm)	0.05	0.30		0.40		0.05
	Scale	---	500	1179		1008		3125
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.33	0.87		2.73		1.67
Index Component Value				0.57	0.83	0.47	2.61	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.97					
	P	(mW)		109.77		65.15		110.73
	$P_{1\times1}$	(mW)		38.38		38.63		
	z_s	(cm)			3.10			
	z_b	(cm)					3.60	
	z_{MI}	(cm)	2.80					
	$z_{pii,\alpha}$	(cm)	2.80					
	f_{awf}	(MHz)	2.55	3.10		2.57		2.52
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	79					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	34.19					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	425.11					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	728.39					
	p_r at z_{pii}	(MPa)	1.25					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	3.40	26.67		4.38		28.04
Gate Size		(cm)	0.15	0.25		0.15		0.25
Scale		---	8333	6250		3333		6757
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.40	0.80		2.37		1.66
Index Component Value				0.44	0.61	0.37	2.22	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.05					
	P	(mW)		83.86		47.48		88.78
	P_{1x1}	(mW)		29.91		30.83		
	z_s	(cm)			3.30			
	z_b	(cm)					3.00	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	2.57	3.10		2.51		2.52
Other Information	p_{rr}	(Hz)	52.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	113					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	42.78					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	389.14					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	680.92					
	p_r at z_{pii}	(MPa)	1.36					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Low
	Focus	(cm)	3.49	28.15		3.56		29.75
	Gate Size	(cm)	0.05	0.50		0.40		0.50
	Scale	---	1953	2475		1953		2358
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	0.60		1.64		1.65
Index Component Value				0.31	0.26	0.40	1.56	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.84					
	P	(mW)		29.75		38.34		10.62
	$P_{1 \times 1}$	(mW)		23.32		31.43		
	z_s	(cm)			2.20			
	z_b	(cm)					3.30	
	z_{MI}	(cm)	1.70					
	$z_{pII,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	4.24	2.83		2.64		2.86
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	323.41					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ Or $z_{sII,\alpha}$	(mW/cm ²)	68.75					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	111.13					
	p_r at z_{pII}	(MPa)	3.54					
Operating Control Conditions	Frequency	---	Mid	H High		H Mid		Low
	Focus	(cm)	2.00	4.99		4.01		1.85
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	0.83		2.70		1.64
Index Component Value				0.61	0.78	0.59	2.59	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.16					
	P	(mW)		98.53		70.58		33.79
	$P_{1 \times 1}$	(mW)		41.99		48.12		
	z_s	(cm)			2.90			
	z_b	(cm)					3.40	
	z_{MI}	(cm)	3.00					
	$z_{pii,\alpha}$	(cm)	3.00					
	f_{awf}	(MHz)	2.57	3.03		2.59		3.07
Other Information	p_{rr}	(Hz)	74.38					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	257.96					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	382.15					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	668.27					
	p_r at z_{pii}	(MPa)	2.73					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Mid
	Focus	(cm)	4.01	28.52		5.07		4.58
	Scale	---	1042	1613		1563		893
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **7VC2**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	0.58		0.58		1.77
Index Component Value				0.58	0.58	0.58	0.58	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.20					
	P	(mW)		113.67		113.67		208.09
	$P_{1 \times 1}$	(mW)		43.94		43.94		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.50					
	$z_{pii,\alpha}$	(cm)	3.50					
	f_{awf}	(MHz)	2.79	2.78		2.78		2.77
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	7.96					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	319.13					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	7.83					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	16.16					
	p_r at z_{pii}	(MPa)	2.94					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	4.00	6.00		6.00		8.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.52	0.75		0.75		2.10
Index Component Value				0.75	0.75	0.75	0.75	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.20					
	P	(mW)		85.93		85.93		184.43
	$P_{1 \times 1}$	(mW)		39.13		39.13		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.90					
	$z_{pii,\alpha}$	(cm)	3.90					
	f_{awf}	(MHz)	2.10	4.03		4.03		2.07
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	19.13					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	151.13					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	4.66					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	8.29					
	p_r at z_{pii}	(MPa)	2.94					
Operating Control Conditions	Frequency	---	H High	High		High		H High
	Focus	(cm)	4.00	2.00		2.00		24.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	1.05		1.05		2.32
Index Component Value				0.97	0.97	0.97	0.97	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.09					
	P	(mW)		83.41		83.41		196.22
	$P_{1\times1}$	(mW)		61.70		61.70		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	4.80					
	$z_{pii,\alpha}$	(cm)	4.80					
	f_{awf}	(MHz)	2.56	3.29		3.29		2.57
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	18.39					
	n_{pps}	---	9					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	217.89					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	35.78					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	60.77					
	p_r at z_{pii}	(MPa)	3.18					
	Operating Control Conditions	Frequency	---	Mid	Res		Res	
Focus		(cm)	5.02	0.68		0.68		27.19
Line Density		---	3	1		1		1
Scale		---	211	679		679		839
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	1.04		3.62		1.78
Index Component Value				0.87	1.04	0.57	3.62	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.58					
	P	(mW)		116.09		113.52		107.00
	P_{1x1}	(mW)		56.51		64.36		
	z_s	(cm)			2.40			
	z_b	(cm)					3.20	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	3.29	3.22		1.86		3.10
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	70.51					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	167.25					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	245.97					
	p_r at z_{pii}	(MPa)	1.52					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Mid
	Focus	(cm)	1.00	29.95		3.02		5.99
	Gate Size	(cm)	0.05	0.10		0.10		0.05
	Scale	---	500	2427		880		10000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	1.04		3.83		1.88
Index Component Value				0.83	1.00	0.47	3.79	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.12					
	P	(mW)		111.55		98.80		69.76
	$P_{1\times1}$	(mW)		54.30		54.78		
	z_s	(cm)			2.40			
	z_b	(cm)					3.50	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	3.32	3.21		1.81		3.11
Other Information	p_{rr}	(Hz)	79.87					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	47.44					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	538.21					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	842.44					
	p_r at z_{pii}	(MPa)	1.36					
	Operating Control Conditions	Frequency	---	Mid	Mid		Low	
Focus		(cm)	2.02	29.95		3.45		5.99
Gate Size		(cm)	0.10	0.10		0.40		0.05
Scale		---	4167	2427		4167		2500
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.49	1.01		3.35		1.99
Index Component Value				0.85	0.74	0.46	3.26	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.08					
	P	(mW)		72.35		96.48		56.50
	P_{1x1}	(mW)		53.59		52.02		
	z_s	(cm)			1.90			
	z_b	(cm)					4.00	
	z_{MI}	(cm)	1.80					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	3.28	3.34		1.86		3.10
Other Information	p_{rr}	(Hz)	77.64					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	38.52					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	485.48					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	746.72					
	p_r at z_{pii}	(MPa)	1.33					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Mid
	Focus	(cm)	2.01	2.20		4.02		16.01
	Gate Size	(cm)	0.10	0.10		0.10		0.05
	Scale	---	4167	4167		5952		2155
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.40	0.98		2.01		2.05
Index Component Value				0.57	0.92	0.57	1.96	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.82					
	P	(mW)		43.02		162.68		104.88
	$P_{1\times1}$	(mW)		57.83		57.86		
	z_s	(cm)		3.90				
	z_b	(cm)					5.00	
	z_{MI}	(cm)	6.70					
	$z_{pii,\alpha}$	(cm)	6.70					
	f_{awf}	(MHz)	1.69	2.07		2.08		2.07
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	154.31					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	263.66					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	584.72					
	p_r at z_{pii}	(MPa)	2.65					
Operating Control Conditions	Frequency	---	H Low	H High		H High		H High
	Focus	(cm)	8.00	12.00		11.14		28.06
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.44	1.17		4.93		2.32
Index Component Value				0.66	1.13	0.57	4.69	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.26					
	P	(mW)		44.47		152.07		171.97
	$P_{1\times1}$	(mW)		45.00		58.88		
	z_s	(cm)			3.10			
	z_b	(cm)					2.70	
	z_{MI}	(cm)	3.50					
	$z_{pii,\alpha}$	(cm)	3.50					
	f_{awf}	(MHz)	2.60	3.10		2.04		2.57
Other Information	p_{rr}	(Hz)	79.69					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	182.34					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	331.55					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	620.76					
	p_r at z_{pii}	(MPa)	3.09					
Operating Control Conditions	Frequency	---	Mid	Res		Pen		Mid
	Focus	(cm)	3.51	6.01		2.41		28.45
	Scale	---	1116	1894		4630		1250
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **Elasticity**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.37	0.79		0.79		1.68
Index Component Value				0.69	0.69	0.69	0.69	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.24					
	P	(mW)		85.38		85.38		85.38
	$P_{1\times 1}$	(mW)		54.89		54.89		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.30					
	$z_{pii,\alpha}$	(cm)	2.30					
	f_{awf}	(MHz)	2.67	2.66		2.66		2.66
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	0.42					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	187.24					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	157.61					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	240.60					
	p_r at z_{pii}	(MPa)	2.84					
Operating Control Conditions	Frequency	---	2.67	2.67		2.67		2.67
	Focus	(cm)	2.96	4.48		4.48		4.48
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **4V1**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	0.68		0.68		1.97
Acoustic Parameters	Index Component Value			0.27	0.27	0.27	0.27	
	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.00					
	P	(mW)		61.21		61.21		102.29
	$P_{1\times 1}$	(mW)		24.83		24.83		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	5.50					
	$z_{pii,\alpha}$	(cm)	5.50					
	f_{awf}	(MHz)	2.10	2.29		2.29		2.07
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	4.65					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	154.86					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	6.01					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	11.54					
	p_r at z_{pii}	(MPa)	2.99					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Low
	Focus	(cm)	6.00	4.00		4.00		24.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	1.69		1.69		3.29
Index Component Value				1.69	1.69	1.69	1.69	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.79					
	P	(mW)		236.22		236.22		229.00
	$P_{1\times1}$	(mW)		130.65		130.65		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	4.00					
	$z_{pii,\alpha}$	(cm)	4.00					
	f_{awf}	(MHz)	1.88	2.72		2.72		1.89
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	12.63					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	104.12					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	43.16					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	67.62					
	p_r at z_{pii}	(MPa)	2.18					
Operating Control Conditions	Frequency	---	H High	Mid		Mid		H High
	Focus	(cm)	20.00	12.00		12.00		12.00
	Line Density	---	2	1		1		2
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	2.01		2.01		4.30
Index Component Value				1.77	1.77	1.77	1.77	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.89					
	P	(mW)		243.38		243.38		153.65
	$P_{1\times1}$	(mW)		122.66		122.66		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	3.60					
	$z_{p1i,\alpha}$	(cm)	3.60					
	f_{awf}	(MHz)	2.01	3.03		3.03		2.01
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	24.03					
	n_{pps}	---	9					
	$I_{pa,\alpha}$ at $z_{p1i,\alpha}$	(W/cm ²)	131.09					
	$I_{spta,\alpha}$ at $z_{p1i,\alpha}$ or $z_{s1i,\alpha}$	(mW/cm ²)	55.57					
	I_{spta} at z_{p1i} or z_{s1i}	(mW/cm ²)	99.24					
	p_r at z_{p1i}	(MPa)	2.43					
Operating Control Conditions	Frequency	---	Pen	Res		Res		Pen
	Focus	(cm)	3.50	2.06		2.06		4.06
	Line Density	---	3	3		3		3
	Scale	---	5682	781		781		3676
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	3.08		4.71		5.01
Index Component Value				3.08	2.79	1.59	4.71	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.09					
	P	(mW)		271.87		222.10		271.87
	$P_{1\times1}$	(mW)		186.10		183.47		
	z_s	(cm)			2.00			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	0.90					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	2.50	3.48		1.82		3.48
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	31.35					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	91.21					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	124.44					
	p_r at z_{pii}	(MPa)	1.00					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	1.00	1.01		1.01		1.01
Gate Size		(cm)	0.10	1.50		1.50		1.50
Scale		---	2000	15625		15625		15625
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	2.52		3.84		4.63
Index Component Value				2.30	2.08	1.22	3.62	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.55					
	P	(mW)		203.36		170.34		203.36
	$P_{1\times1}$	(mW)		139.20		140.73		
	z_s	(cm)			2.00			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	3.10					
	$z_{pii,\alpha}$	(cm)	3.10					
	f_{awf}	(MHz)	1.82	3.48		1.82		3.48
Other Information	p_{rr}	(Hz)	79.37					
	s_{rr}	(Hz)	#					
	n_{pps}	---	24					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	95.22					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	366.88					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	549.95					
	p_r at z_{pii}	(MPa)	1.81					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Mid
	Focus	(cm)	3.00	1.00		1.00		1.00
	Gate Size	(cm)	0.10	1.50		1.50		1.50
	Scale	---	2500	15625		15625		15625
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.33	1.82		3.48		4.21
Index Component Value				1.17	1.10	1.15	3.00	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.92					
	P	(mW)		139.84		188.79		188.79
	$P_{1\times1}$	(mW)		98.43		132.32		
	z_s	(cm)			2.40			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	3.70					
	$z_{pii,\alpha}$	(cm)	3.70					
	f_{awf}	(MHz)	1.83	2.49		1.82		1.82
Other Information	p_{rr}	(Hz)	80.23					
	s_{rr}	(Hz)	#					
	n_{pps}	---	62					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	31.83					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	357.99					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	575.31					
	p_r at z_{pii}	(MPa)	1.16					
	Operating Control Conditions	Frequency	---	Low	Low		Low	
Focus		(cm)	4.00	11.99		16.00		16.00
Gate Size		(cm)	0.20	0.10		1.50		1.50
Scale		---	6579	5319		3846		3846
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.43	1.07		1.92		3.58
Index Component Value				0.24	0.43	0.24	1.27	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.84					
	P	(mW)		68.81		68.81		68.81
	$P_{1\times1}$	(mW)		27.48		27.48		
	z_s	(cm)			2.70			
	z_b	(cm)					3.30	
	z_{MI}	(cm)	4.20					
	$z_{pii,\alpha}$	(cm)	4.20					
	f_{awf}	(MHz)	1.66	1.84		1.84		1.84
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	136.23					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	239.66					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	389.52					
	p_r at z_{pii}	(MPa)	2.23					
Operating Control Conditions	Frequency	---	H Mid	H Mid		H Mid		H Mid
	Focus	(cm)	5.00	12.01		12.01		12.01
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.27	1.85		4.24		4.01
Index Component Value				1.11	1.52	1.03	3.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.79					
	P	(mW)		229.74		262.56		229.74
	$P_{1\times1}$	(mW)		93.69		107.07		
	z_s	(cm)			3.40			
	z_b	(cm)					3.80	
	z_{MI}	(cm)	2.00					
	$z_{pii,\alpha}$	(cm)	2.40					
	f_{awf}	(MHz)	1.99	2.49		2.03		2.49
Other Information	p_{rr}	(Hz)	50.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	18					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	95.45					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	120.01					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	166.73					
	p_r at z_{pii}	(MPa)	1.94					
Operating Control Conditions	Frequency	---	Pen	Mid		Pen		Mid
	Focus	(cm)	2.00	12.02		12.00		12.02
	Scale	---	1012	4310		3425		4310
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.16	1.53		5.00		4.44
Index Component Value				1.53	1.47	1.53	5.00	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.21					
	P	(mW)		213.41		213.41		213.41
	$P_{1\times1}$	(mW)		177.84		177.84		
	z_s	(cm)			1.80			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	1.81	1.81		1.81		1.81
Other Information	p_{rr}	(Hz)	59.81					
	s_{rr}	(Hz)	#					
	n_{pps}	---	30400					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.37					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	366.97					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	459.48					
	p_r at z_{pii}	(MPa)	0.12					
Operating Control Conditions	Frequency	---	Low	Low		Low		Low
	Focus	(cm)	1.00	1.00		1.00		1.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **2D with CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	1.46		4.20		4.50
Index Component Value				1.22	1.17	1.22	3.96	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.13					
	P	(mW)		169.66		169.66		169.66
	$P_{1\times1}$	(mW)		141.38		141.38		
	z_s	(cm)			1.80			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	3.20					
	$z_{pii,\alpha}$	(cm)	3.20					
	f_{awf}	(MHz)	1.81	1.81		1.81		1.81
Other Information	p_{rr}	(Hz)	78.64					
	s_{rr}	(Hz)	#					
	n_{pps}	---	17280					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.58					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	434.81					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	648.43					
	p_r at z_{pii}	(MPa)	0.16					
Operating Control Conditions	Frequency	---	Low	Low		Low		Low
	Focus	(cm)	3.99	0.99		0.99		0.99
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **5V1**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.29	1.46		1.46		3.83
Index Component Value				1.46	1.46	1.46	1.46	
Acoustic Parameters	IEC	Units						
	$p_{r,a}$ at z_{MI}	(MPa)	1.88					
	P	(mW)		258.80		258.80		266.00
	$P_{1 \times 1}$	(mW)		143.14		143.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	5.90					
	$z_{pii,a}$	(cm)	5.90					
	f_{awf}	(MHz)	2.15	2.15		2.15		2.15
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	18.87					
	n_{pps}	---	3					
	$I_{pa,a}$ at $z_{pii,a}$	(W/cm ²)	123.94					
	$I_{spta,a}$ at $z_{pii,a}$ Or $z_{sii,a}$	(mW/cm ²)	69.64					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	114.75					
	p_r at z_{pii}	(MPa)	2.75					
Operating Control Conditions	Frequency	---	Pen	Pen		Pen		Pen
	Focus	(cm)	12.00	10.00		10.00		10.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	1.20		1.20		2.20
Index Component Value				1.20	1.20	1.20	1.20	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.95					
	P	(mW)		104.61		104.61		130.82
	P_{1x1}	(mW)		62.14		62.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	4.05	4.05		4.05		2.90
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	34.23					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	373.99					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	6.09					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	10.96					
	p_r at z_{pii}	(MPa)	4.33					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Low
	Focus	(cm)	3.00	3.00		3.00		8.00
	Line Density	---	1	1		1		2
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	1.58		1.58		2.34
Index Component Value				1.47	1.47	1.47	1.47	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.69					
	P	(mW)		84.76		84.76		132.14
	P_{1x1}	(mW)		64.30		64.30		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.50					
	$z_{pii,\alpha}$	(cm)	2.50					
	f_{awf}	(MHz)	3.47	4.79		4.79		3.46
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	14.85					
	n_{pps}	---	9					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	245.67					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	19.33					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	31.20					
	p_r at z_{pii}	(MPa)	3.63					
Operating Control Conditions	Frequency	---	Mid	High		High		Mid
	Focus	(cm)	2.49	1.40		1.40		15.06
	Line Density	---	1	3		3		3
	Scale	---	274	391		391		4167
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.41	1.93		3.61		2.98
Index Component Value				1.93	1.52	1.33	3.61	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.62					
	P	(mW)		138.05		105.64		138.05
	$P_{1\times1}$	(mW)		116.81		79.23		
	z_s	(cm)			1.70			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	3.45	3.47		3.52		3.51
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	17.92					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	46.25					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	71.03					
	p_r at z_{pii}	(MPa)	0.93					
	Operating Control Conditions	Frequency	---	Mid	Mid		Mid	
Focus		(cm)	1.00	1.00		1.50		1.00
Gate Size		(cm)	0.05	1.25		0.10		1.25
Scale		---	500	17857		19231		17857
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	1.88		3.59		2.58
Index Component Value				1.81	1.42	0.78	3.43	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.40					
	P	(mW)		128.04		86.85		115.50
	$P_{1\times1}$	(mW)		108.34		65.14		
	z_s	(cm)			1.70			
	z_b	(cm)					1.80	
	z_{MI}	(cm)	2.10					
	$z_{pII,\alpha}$	(cm)	2.10					
	f_{awf}	(MHz)	3.52	3.51		2.50		2.50
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	71.01					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	506.81					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	843.91					
	p_r at z_{pII}	(MPa)	1.80					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Low
	Focus	(cm)	2.00	1.01		1.41		1.01
	Gate Size	(cm)	0.10	1.25		1.25		1.25
	Scale	---	1953	17857		15625		16667
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	1.80		3.32		2.55
Index Component Value				1.59	1.25	0.63	2.95	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.90					
	P	(mW)		113.72		71.71		106.02
	$P_{1\times1}$	(mW)		96.22		52.59		
	z_s	(cm)			1.70			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	3.90					
	$z_{pii,\alpha}$	(cm)	3.90					
	f_{awf}	(MHz)	3.52	3.47		2.50		2.50
Other Information	p_{rr}	(Hz)	73.70					
	s_{rr}	(Hz)	#					
	n_{pps}	---	80					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	50.22					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	540.22					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	1432.02					
	p_r at z_{pii}	(MPa)	1.45					
	Operating Control Conditions	Frequency	---	Mid	Mid		Low	
Focus		(cm)	4.00	1.00		1.51		1.00
Gate Size		(cm)	0.15	1.25		1.25		1.25
Scale		---	1953	17857		12500		16667
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	1.13		2.09		2.15
Index Component Value				0.68	0.84	0.75	2.04	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.95					
	P	(mW)		53.75		111.56		56.05
	$P_{1\times1}$	(mW)		47.89		57.52		
	z_s	(cm)			2.20			
	z_b	(cm)					3.30	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	4.05	2.97		2.73		2.97
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	373.99					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	97.58					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	234.00					
	p_r at z_{pii}	(MPa)	4.33					
Operating Control Conditions	Frequency	---	Mid	Low		H High		Low
	Focus	(cm)	3.00	22.83		8.00		22.83
# No data is provided for this operation condition.								

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.45	1.37		2.40		2.30
Index Component Value				1.29	1.11	1.18	2.25	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.65					
	P	(mW)		61.84		87.46		114.62
	$P_{1\times1}$	(mW)		55.10		51.54		
	z_s	(cm)			2.20			
	z_b	(cm)					3.10	
	z_{MI}	(cm)	3.30					
	$z_{pii,\alpha}$	(cm)	3.30					
	f_{awf}	(MHz)	3.47	4.93		4.82		3.46
Other Information	p_{rr}	(Hz)	51.91					
	s_{rr}	(Hz)	#					
	n_{pps}	---	26					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	305.33					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	448.86					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	1043.01					
	p_r at z_{pii}	(MPa)	3.89					
Operating Control Conditions	Frequency	---	Mid	High		High		Mid
	Focus	(cm)	3.61	4.73		3.25		15.17
	Scale	---	1453	4902		1276		2551
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.09	1.30		3.72		2.17
Index Component Value				1.30	0.89	1.03	3.72	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.18					
	P	(mW)		74.82		87.24		88.05
	$P_{1\times1}$	(mW)		74.82		87.24		
	z_s	(cm)			1.50			
	z_b	(cm)					1.70	
	z_{MI}	(cm)	1.10					
	$z_{pii,\alpha}$	(cm)	1.50					
	f_{awf}	(MHz)	3.64	3.64		2.49		2.49
Other Information	p_{rr}	(Hz)	59.81					
	s_{rr}	(Hz)	#					
	n_{pps}	---	60800					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.23					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sil,\alpha}$	(mW/cm ²)	231.26					
	I_{spta} at z_{pii} or z_{sil}	(mW/cm ²)	336.90					
	p_r at z_{pii}	(MPa)	0.10					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Low
	Focus	(cm)	1.03	1.01		1.37		1.01
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **2D with CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.40	1.21		2.85		2.09
Index Component Value				1.03	0.71	0.63	2.63	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.14					
	P	(mW)		59.37		52.88		41.32
	$P_{1\times1}$	(mW)		59.37		52.88		
	z_s	(cm)			1.50			
	z_b	(cm)					2.20	
	z_{MI}	(cm)	2.20					
	$z_{pii,\alpha}$	(cm)	2.20					
	f_{awf}	(MHz)	2.49	3.64		2.49		2.49
Other Information	p_{rr}	(Hz)	78.59					
	s_{rr}	(Hz)	#					
	n_{pps}	---	23750					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.59					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	439.42					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	640.81					
	p_r at z_{pii}	(MPa)	0.17					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Low
	Focus	(cm)	2.01	1.01		2.01		8.01
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **8V3**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.46	1.25		1.25		2.19
Index Component Value				0.70	0.70	0.70	0.70	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.49					
	P	(mW)		65.90		65.90		129.79
	$P_{1\times1}$	(mW)		48.84		48.84		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	3.01	3.01		3.01		3.01
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	16.14					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	224.95					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	3.33					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	5.61					
	p_r at z_{pii}	(MPa)	3.33					
Operating Control Conditions	Frequency	---	High	High		High		Low
	Focus	(cm)	3.00	1.50		1.50		9.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.82	1.48		1.48		1.71
Index Component Value				1.48	1.48	1.48	1.48	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.85					
	P	(mW)		52.74		52.74		68.34
	$P_{1\times1}$	(mW)		40.69		40.69		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.20					
	$z_{pii,\alpha}$	(cm)	2.20					
	f_{awf}	(MHz)	5.10	7.62		7.62		6.08
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	16.67					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	86.51					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	29.60					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	57.07					
	p_r at z_{pii}	(MPa)	2.69					
Operating Control Conditions	Frequency	---	H Low	High		High		Low
	Focus	(cm)	10.50	8.00		8.00		8.00
	Line Density	---	1	2		2		2
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.20	1.65		1.65		1.84
Index Component Value				0.92	0.92	0.92	0.92	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.66					
	P	(mW)		36.66		36.66		39.32
	$P_{1\times1}$	(mW)		34.03		34.03		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.90					
	$z_{pII,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	4.88	5.65		5.65		4.90
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	34.90					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	332.33					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	50.17					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	152.48					
	p_r at z_{pII}	(MPa)	3.60					
Operating Control Conditions	Frequency	---	Mid	High		High		Mid
	Focus	(cm)	1.99	1.50		1.50		5.00
	Line Density	---	2	1		1		1
	Scale	---	8065	3571		3571		2500
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	2.10		2.90		2.91
Index Component Value				2.10	1.09	1.95	2.90	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.70					
	P	(mW)		60.68		82.11		89.70
	$P_{1\times1}$	(mW)		60.68		82.11		
	z_s	(cm)			1.30			
	z_b	(cm)					1.30	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	4.02	7.28		5.00		5.00
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	47.20					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	115.63					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	148.44					
	p_r at z_{pii}	(MPa)	1.16					
	Operating Control Conditions	Frequency	---	Low	High		Mid	
Focus		(cm)	0.50	13.68		1.00		0.82
Gate Size		(cm)	0.10	0.10		0.25		1.25
Scale		---	500	5000		12500		19231
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.15	1.73		2.44		2.25
Index Component Value				1.09	0.59	1.48	2.19	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.61					
	P	(mW)		31.21		62.14		63.53
	P_{1x1}	(mW)		31.21		62.14		
	z_s	(cm)			1.20			
	z_b	(cm)					1.30	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	5.01	7.31		5.00		5.00
Other Information	p_{rr}	(Hz)	79.87					
	s_{rr}	(Hz)	#					
	n_{pps}	---	119					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	15.31					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	360.64					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	865.40					
	p_r at z_{pii}	(MPa)	0.89					
Operating Control Conditions	Frequency	---	Mid	High		Mid		Mid
	Focus	(cm)	2.00	5.00		1.00		1.00
	Gate Size	(cm)	0.20	0.40		0.20		0.40
	Scale	---	2500	2841		4167		4167
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	1.85		2.55		2.34
Index Component Value				1.34	0.86	1.42	2.14	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.72					
	P	(mW)		56.33		59.83		60.59
	$P_{1\times1}$	(mW)		56.33		59.83		
	z_s	(cm)			1.30			
	z_b	(cm)					1.30	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	5.01	5.00		5.00		5.00
Other Information	p_{rr}	(Hz)	76.69					
	s_{rr}	(Hz)	#					
	n_{pps}	---	124					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	21.26					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	366.23					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	878.80					
	p_r at z_{pii}	(MPa)	1.05					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	2.01	0.99		0.99		0.99
	Gate Size	(cm)	0.15	0.40		0.30		0.40
	Scale	---	4167	25000		25000		25000
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.37	1.46		1.68		1.68
Index Component Value				0.30	0.15	0.14	0.32	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.80					
	P	(mW)		7.85		5.87		5.87
	$P_{1\times1}$	(mW)		7.70		4.71		
	z_s	(cm)			1.30			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	1.00					
	$z_{pii,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	4.18	8.12		6.04		6.04
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	58.34					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	29.05					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	42.28					
	p_r at z_{pii}	(MPa)	1.50					
Operating Control Conditions	Frequency	---	H Mid	High		Low		Low
	Focus	(cm)	1.00	1.00		2.00		2.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	1.39		1.91		1.83
Index Component Value				1.16	0.84	0.78	1.59	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.97					
	P	(mW)		55.32		50.73		60.22
	$P_{1\times1}$	(mW)		42.35		39.46		
	z_s	(cm)			1.50			
	z_b	(cm)					3.40	
	z_{MI}	(cm)	2.40					
	$z_{pii,\alpha}$	(cm)	2.40					
	f_{awf}	(MHz)	4.90	5.76		4.15		4.95
Other Information	p_{rr}	(Hz)	45.09					
	s_{rr}	(Hz)	#					
	n_{pps}	---	26					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	423.68					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	394.70					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	887.90					
	p_r at z_{pii}	(MPa)	4.46					
Operating Control Conditions	Frequency	---	Mid	High		Low		Mid
	Focus	(cm)	2.50	8.02		4.22		8.00
	Scale	---	1263	5682		3906		4717
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.11	1.44		1.68		2.31
Index Component Value				1.44	1.02	1.20	1.68	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.21					
	P	(mW)		60.84		63.13		63.13
	$P_{1\times1}$	(mW)		60.84		63.13		
	z_s	(cm)			1.00			
	z_b	(cm)					1.50	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.50					
	f_{awf}	(MHz)	4.00	4.99		4.00		4.00
Other Information	p_{rr}	(Hz)	59.88					
	s_{rr}	(Hz)	#					
	n_{pps}	---	66800					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.17					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	169.24					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	258.52					
	p_r at z_{pii}	(MPa)	0.09					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Low
	Focus	(cm)	0.50	0.50		0.56		0.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **2D with CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.09	1.39		2.29		1.92
Index Component Value				0.61	0.43	0.59	1.49	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.10					
	P	(mW)		25.65		24.64		24.88
	$P_{1\times1}$	(mW)		25.65		24.64		
	z_s	(cm)			1.00			
	z_b	(cm)					1.00	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	4.99	4.99		4.99		4.99
Other Information	p_{rr}	(Hz)	78.78					
	s_{rr}	(Hz)	#					
	n_{pps}	---	47500					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.38					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	285.38					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	569.14					
	p_r at z_{pii}	(MPa)	0.15					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	1.99	4.99		0.99		0.99
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10V4**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.18	1.26		1.26		1.60
Index Component Value				0.51	0.51	0.51	0.51	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.84					
	P	(mW)		30.37		30.37		30.37
	$P_{1\times1}$	(mW)		23.43		23.43		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	5.73	4.56		4.56		4.56
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	2.00					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	343.84					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ OR $z_{sii,\alpha}$	(mW/cm ²)	5.04					
	I_{spta} at z_{pii} OR z_{sii}	(mW/cm ²)	10.27					
	p_r at z_{pii}	(MPa)	5.03					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	3.00	7.00		7.00		7.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	0.51		0.51		0.88
Index Component Value				0.51	0.51	0.51	0.51	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.79					
	P	(mW)		30.22		30.22		54.69
	$P_{1\times1}$	(mW)		22.89		22.89		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.30					
	$z_{pii,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	4.45	4.70		4.70		4.53
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	62.85					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	300.57					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	16.49					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	26.27					
	p_r at z_{pii}	(MPa)	3.26					
Operating Control Conditions	Frequency	---	Low	H High		H High		H High
	Focus	(cm)	1.00	9.50		9.50		3.00
	Line Density	---	1	1		1		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.95	0.64		0.64		0.93
Index Component Value				0.58	0.58	0.58	0.58	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.82					
	P	(mW)		26.61		26.61		54.52
	$P_{1\times1}$	(mW)		24.14		24.14		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.60					
	$z_{p1i,\alpha}$	(cm)	1.60					
	f_{awf}	(MHz)	3.66	5.08		5.08		4.06
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	8.51					
	n_{pps}	---	17					
	$I_{pa,\alpha}$ at $z_{p1i,\alpha}$	(W/cm ²)	192.94					
	$I_{spta,\alpha}$ at $z_{p1i,\alpha}$ or $z_{s1i,\alpha}$	(mW/cm ²)	40.47					
	I_{spta} at z_{p1i} or z_{s1i}	(mW/cm ²)	60.52					
	p_r at z_{p1i}	(MPa)	2.17					
Operating Control Conditions	Frequency	---	Pen	High		High		Mid
	Focus	(cm)	3.01	2.00		2.00		5.00
	Line Density	---	1	1		1		3
	Scale	---	272	651		651		833
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.09	0.50		1.57		0.97
Index Component Value				0.50	0.36	0.40	1.57	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.19					
	P	(mW)		17.91		20.67		16.25
	$P_{1\times1}$	(mW)		17.91		20.67		
	z_s	(cm)			0.80			
	z_b	(cm)					1.60	
	z_{MI}	(cm)	1.40					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	4.07	5.91		4.07		5.98
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	237.83					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	450.20					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	666.85					
	p_r at z_{pii}	(MPa)	2.67					
	Operating Control Conditions	Frequency	---	Mid	High		Mid	
Focus		(cm)	1.50	5.00		3.00		1.02
Gate Size		(cm)	0.05	0.05		0.05		0.10
Scale		---	500	3968		3968		3968
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	0.51		1.54		0.93
Index Component Value				0.47	0.34	0.39	1.51	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.31					
	P	(mW)		16.21		20.18		14.73
	P_{1x1}	(mW)		16.21		20.18		
	z_s	(cm)			0.80			
	z_b	(cm)					1.70	
	z_{MI}	(cm)	1.80					
	$z_{pII,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	4.02	6.06		4.02		5.98
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	77.86					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ OR $z_{sII,\alpha}$	(mW/cm ²)	459.37					
	I_{spta} at z_{pII} OR z_{sII}	(mW/cm ²)	767.97					
	p_r at z_{pII}	(MPa)	1.64					
Operating Control Conditions	Frequency	---	Mid	High		Mid		High
	Focus	(cm)	3.00	5.04		3.00		0.98
	Gate Size	(cm)	0.05	0.05		0.05		0.15
	Scale	---	1953	11364		1953		12500
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.31	0.54		1.35		0.99
Index Component Value				0.22	0.17	0.29	1.21	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.54					
	P	(mW)		11.59		14.89		14.23
	$P_{1\times1}$	(mW)		11.59		14.89		
	z_s	(cm)			1.00			
	z_b	(cm)					1.40	
	z_{MI}	(cm)	1.60					
	$z_{pii,\alpha}$	(cm)	1.60					
	f_{awf}	(MHz)	3.52	4.02		4.07		4.07
Other Information	p_{rr}	(Hz)	86.81					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	10.61					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	348.21					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	516.36					
	p_r at z_{pii}	(MPa)	0.65					
	Operating Control Conditions	Frequency	---	Low	Mid		Mid	
Focus		(cm)	2.00	5.01		2.00		1.00
Gate Size		(cm)	0.40	0.65		0.35		0.35
Scale		---	1953	10417		1953		1953
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.35	0.52		0.83		0.85
Index Component Value				0.28	0.19	0.34	0.79	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.89					
	P	(mW)		12.70		17.49		5.15
	$P_{1\times1}$	(mW)		12.30		17.49		
	z_s	(cm)			1.30			
	z_b	(cm)					2.30	
	z_{MI}	(cm)	1.60					
	$z_{pii,\alpha}$	(cm)	1.60					
	f_{awf}	(MHz)	4.60	4.70		4.13		4.60
Other Information	p_{rr}	(Hz)	60.39					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	499.63					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	232.64					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	386.48					
	p_r at z_{pii}	(MPa)	3.72					
Operating Control Conditions	Frequency	---	H High	H High		H Low		H High
	Focus	(cm)	1.50	4.00		3.00		1.52
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.30	0.29		1.06		0.53
Index Component Value				0.11	0.09	0.16	0.68	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.14					
	P	(mW)		4.67		6.67		8.04
	$P_{1\times1}$	(mW)		4.67		6.67		
	z_s	(cm)			0.70			
	z_b	(cm)					0.70	
	z_{MI}	(cm)	1.40					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.66	5.08		5.08		5.08
Other Information	p_{rr}	(Hz)	78.32					
	s_{rr}	(Hz)	#					
	n_{pps}	---	13					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	235.24					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	263.16					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	388.58					
	p_r at z_{pii}	(MPa)	2.31					
Operating Control Conditions	Frequency	---	Pen	High		High		High
	Focus	(cm)	2.00	5.01		2.00		2.00
	Scale	---	1096	9615		10417		8333
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9EC4**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.37	0.22		0.22		0.49
Index Component Value				0.14	0.14	0.14	0.14	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.96					
	P	(mW)		7.13		7.13		16.97
	$P_{1\times1}$	(mW)		6.32		6.32		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.70					
	$z_{pii,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	4.70	4.60		4.60		4.53
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	2.00					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	270.90					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	21.81					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	35.20					
	p_r at z_{pii}	(MPa)	3.74					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	9.50	1.50		1.50		3.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	0.45		0.45		0.65
Index Component Value				0.45	0.45	0.45	0.45	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.63					
	P	(mW)		22.71		22.71		37.00
	$P_{1\times1}$	(mW)		19.76		19.76		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.80					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	3.87	4.79		4.79		4.12
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	15.69					
	n_{pps}	---	2					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	470.01					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	13.70					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	19.24					
	p_r at z_{pii}	(MPa)	3.23					
Operating Control Conditions	Frequency	---	H Mid	Low		Low		H High
	Focus	(cm)	2.00	4.50		4.50		6.50
	Line Density	---	2	2		2		1
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.37	0.50		0.50		0.74
Index Component Value				0.42	0.42	0.42	0.42	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.18					
	P	(mW)		25.30		25.30		17.44
	$P_{1\times1}$	(mW)		20.79		20.79		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.30					
	$z_{pII,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	4.28	4.28		4.28		3.62
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	12.35					
	n_{pps}	---	17					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	51.29					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	83.08					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	127.29					
	p_r at z_{pII}	(MPa)	1.40					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Low
	Focus	(cm)	3.00	3.50		3.50		1.50
	Line Density	---	1	2		2		1
	Scale	---	226	226		226		272
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.22	0.62		1.49		0.82
Index Component Value				0.62	0.41	0.31	1.49	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.56					
	P	(mW)		28.49		18.39		31.37
	$P_{1\times1}$	(mW)		28.49		18.39		
	z_s	(cm)			1.30			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	0.90					
	f_{awf}	(MHz)	4.37	4.53		3.52		3.51
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	166.30					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	278.54					
	I_{spta} at z_{pii} Or z_{sii}	(mW/cm ²)	365.27					
	p_r at z_{pii}	(MPa)	2.35					
	Operating Control Conditions	Frequency	---	Mid	Mid		Low	
Focus		(cm)	0.50	3.01		0.50		12.00
Gate Size		(cm)	0.05	0.05		0.50		0.05
Scale		---	500	2016		665		658
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	0.56		1.41		0.84
Index Component Value				0.49	0.34	0.29	1.38	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.74					
	P	(mW)		23.59		17.57		18.61
	P_{1x1}	(mW)		22.96		17.57		
	z_s	(cm)			1.30			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	1.10					
	$z_{pii,\alpha}$	(cm)	1.10					
	f_{awf}	(MHz)	4.42	4.52		3.52		3.52
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	111.07					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ OR $z_{sii,\alpha}$	(mW/cm ²)	554.72					
	I_{spta} at z_{pii} OR z_{sii}	(mW/cm ²)	776.01					
	p_r at z_{pii}	(MPa)	2.06					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Low
	Focus	(cm)	0.99	3.49		0.48		0.50
	Gate Size	(cm)	0.05	0.10		0.25		0.05
	Scale	---	1953	3333		1953		17857
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.32	0.52		1.25		0.84
Index Component Value				0.27	0.18	0.27	1.21	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.18					
	P	(mW)		12.87		16.07		17.79
	$P_{1\times1}$	(mW)		12.52		16.07		
	z_s	(cm)			1.30			
	z_b	(cm)					0.90	
	z_{MI}	(cm)	1.40					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.62	4.50		3.52		3.52
Other Information	p_{rr}	(Hz)	86.81					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	54.16					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	376.29					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	533.83					
	p_r at z_{pii}	(MPa)	1.41					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	1.51	3.48		0.42		0.50
Gate Size		(cm)	0.05	0.35		0.25		0.05
Scale		---	1953	1953		7143		17857
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.34	0.43		0.79		0.67
Index Component Value				0.12	0.07	0.15	0.57	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.63					
	P	(mW)		4.99		8.66		11.86
	$P_{1\times1}$	(mW)		4.99		8.66		
	z_s	(cm)			1.30			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	1.80					
	$z_{pii,\alpha}$	(cm)	1.80					
	f_{awf}	(MHz)	3.87	4.87		3.73		4.12
Other Information	p_{rr}	(Hz)	60.10					
	s_{rr}	(Hz)	#					
	n_{pps}	---	20					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	470.01					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	219.92					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	360.52					
	p_r at z_{pii}	(MPa)	3.23					
Operating Control Conditions	Frequency	---	H Mid	Low		H Low		H High
	Focus	(cm)	2.00	2.49		2.51		6.49
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **M-mode with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.42	0.40		1.32		1.06
Index Component Value				0.26	0.21	0.24	1.00	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.47					
	P	(mW)		12.65		13.78		15.38
	$P_{1\times1}$	(mW)		12.65		13.78		
	z_s	(cm)			0.80			
	z_b	(cm)					1.10	
	z_{MI}	(cm)	1.30					
	$z_{pii,\alpha}$	(cm)	1.30					
	f_{awf}	(MHz)	4.29	4.33		3.65		3.64
Other Information	p_{rr}	(Hz)	62.00					
	s_{rr}	(Hz)	#					
	n_{pps}	---	17					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	307.87					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	282.01					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	418.51					
	p_r at z_{pii}	(MPa)	2.90					
Operating Control Conditions	Frequency	---	Mid	Mid		Low		Low
	Focus	(cm)	2.01	6.50		3.23		0.92
	Scale	---	1116	7813		6757		7353
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **9VE4**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.43	0.41		0.41		0.59
Index Component Value				0.20	0.20	0.20	0.20	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.75					
	P	(mW)		13.37		13.37		18.40
	$P_{1 \times 1}$	(mW)		11.18		11.18		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.10					
	$z_{pii,\alpha}$	(cm)	1.10					
	f_{awf}	(MHz)	3.72	3.73		3.73		3.73
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	6.24					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	308.99					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sil,\alpha}$	(mW/cm ²)	6.63					
	I_{spta} at z_{pii} or z_{sil}	(mW/cm ²)	9.26					
	p_r at z_{pii}	(MPa)	3.11					
Operating Control Conditions	Frequency	---	Low	High		High		High
	Focus	(cm)	1.00	6.50		6.50		6.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **2D-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.01		1.01		1.63
Index Component Value				1.01	1.01	1.01	1.01	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.05					
	P	(mW)		70.46		70.46		74.96
	P_{1x1}	(mW)		54.25		54.25		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	4.88	3.91		3.91		3.62
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	18.60					
	n_{pps}	---	1					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm²)	608.77					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm²)	6.49					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm²)	10.89					
	p_r at z_{pii}	(MPa)	4.07					
Operating Control Conditions	Frequency	---	Low	H High		H High		H Mid
	Focus	(cm)	2.00	4.00		4.00		10.00
	Line Density	---	1	3		3		3
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **2D with Color**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.36	1.15		1.15		1.68
Index Component Value				1.14	1.14	1.14	1.14	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.69					
	P	(mW)		48.61		48.61		52.41
	$P_{1\times1}$	(mW)		48.61		48.61		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.60					
	$z_{pII,\alpha}$	(cm)	1.60					
	f_{awf}	(MHz)	3.94	4.92		4.92		4.00
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	12.40					
	n_{pps}	---	11					
	$I_{pa,\alpha}$ at $z_{pII,\alpha}$	(W/cm ²)	456.00					
	$I_{spta,\alpha}$ at $z_{pII,\alpha}$ or $z_{sII,\alpha}$	(mW/cm ²)	193.14					
	I_{spta} at z_{pII} or z_{sII}	(mW/cm ²)	289.53					
	p_r at z_{pII}	(MPa)	3.35					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Low
	Focus	(cm)	3.00	15.60		15.60		15.85
	Line Density	---	1	1		1		3
	Scale	---	208	260		260		208
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.29	1.20		2.34		1.93
Index Component Value				1.20	0.83	1.00	2.34	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.57					
	P	(mW)		51.25		52.72		54.25
	$P_{1\times1}$	(mW)		51.25		52.72		
	z_s	(cm)			1.10			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.96	4.92		4.00		4.00
Other Information	p_{rr}	(Hz)	60.61					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	275.30					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	450.26					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	662.96					
	p_r at z_{pii}	(MPa)	2.48					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	1.00	15.98		8.70		9.30
Gate Size		(cm)	0.05	0.05		0.05		0.05
Scale		---	500	5952		13889		13158
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **2D with PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	1.19		2.37		1.92
Index Component Value				1.17	0.81	1.00	2.35	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.53					
	P	(mW)		50.01		52.57		52.08
	P_{1x1}	(mW)		50.01		52.57		
	z_s	(cm)			1.10			
	z_b	(cm)					2.00	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.96	4.92		4.00		4.00
Other Information	p_{rr}	(Hz)	80.13					
	s_{rr}	(Hz)	#					
	n_{pps}	---	74					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	92.34					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	447.75					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	677.43					
	p_r at z_{pii}	(MPa)	1.64					
Operating Control Conditions	Frequency	---	Low	Mid		Low		Low
	Focus	(cm)	1.00	15.98		8.70		8.61
	Gate Size	(cm)	0.05	0.05		0.10		0.10
	Scale	---	1953	20833		13889		14706
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **2D with Color and PW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.43	1.16		2.21		1.88
Index Component Value				1.01	0.70	0.70	1.93	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	1.50					
	P	(mW)		43.34		36.70		46.65
	$P_{1\times 1}$	(mW)		43.34		36.70		
	z_s	(cm)			1.10			
	z_b	(cm)					1.90	
	z_{MI}	(cm)	0.50					
	$z_{pii,\alpha}$	(cm)	1.40					
	f_{awf}	(MHz)	3.96	4.92		4.01		4.00
Other Information	p_{rr}	(Hz)	45.82					
	s_{rr}	(Hz)	#					
	n_{pps}	---	129					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	88.28					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ or $z_{sii,\alpha}$	(mW/cm ²)	426.72					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	645.40					
	p_r at z_{pii}	(MPa)	1.61					
	Operating Control Conditions	Frequency	---	Low	Mid		Low	
Focus		(cm)	1.01	15.98		6.59		8.98
Gate Size		(cm)	0.05	0.05		0.05		0.05
Scale		---	1953	3472		2500		13889
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **2D with M-mode**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	0.93		1.62		1.66
Index Component Value				0.47	0.46	0.62	1.52	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	3.05					
	P	(mW)		37.63		56.30		46.03
	$P_{1\times1}$	(mW)		24.80		37.11		
	z_s	(cm)			1.60			
	z_b	(cm)					1.70	
	z_{MI}	(cm)	1.90					
	$z_{pii,\alpha}$	(cm)	1.90					
	f_{awf}	(MHz)	4.88	3.94		3.50		3.50
Other Information	p_{rr}	(Hz)	60.68					
	s_{rr}	(Hz)	#					
	n_{pps}	---	10					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	608.77					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	121.19					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	233.31					
	p_r at z_{pii}	(MPa)	4.07					
Operating Control Conditions	Frequency	---	Low	H High		H Mid		H Mid
	Focus	(cm)	2.00	15.50		15.50		15.50
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **10EV3**Operating mode: **Contrast**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			1.38	0.94		0.94		1.59
Index Component Value				0.55	0.55	0.55	0.55	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	2.46					
	P	(mW)		42.99		42.99		72.44
	$P_{1\times1}$	(mW)		33.37		33.37		
	z_s	(cm)			#			
	z_b	(cm)					#	
	z_{MI}	(cm)	1.70					
	$z_{pii,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	3.18	3.48		3.48		3.62
Other Information	p_{rr}	(Hz)	#					
	s_{rr}	(Hz)	6.28					
	n_{pps}	---	3					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	244.51					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	8.22					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	10.94					
	p_r at z_{pii}	(MPa)	2.92					
Operating Control Conditions	Frequency	---	Low	Mid		Mid		Mid
	Focus	(cm)	2.00	4.00		4.00		10.00
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **CW2**Operating mode: **CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.08	0.96		4.02		3.57
Index Component Value				0.96	0.89	0.96	4.02	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.11					
	P	(mW)		139.53		139.53		139.53
	$P_{1\times1}$	(mW)		101.11		101.11		
	z_s	(cm)			2.90			
	z_b	(cm)					1.60	
	z_{MI}	(cm)	2.90					
	$z_{pii,\alpha}$	(cm)	2.90					
	f_{awf}	(MHz)	1.99	1.99		1.99		1.99
Other Information	p_{rr}	(Hz)	59.88					
	s_{rr}	(Hz)	#					
	n_{pps}	---	33400					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.41					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	34.48					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	52.31					
	p_r at z_{pii}	(MPa)	0.14					
Operating Control Conditions	Frequency	---	Pen	Pen		Pen		Pen
	Focus	(cm)	6.10	6.10		6.10		6.10
#	No data is provided for this operation condition.							

Acoustic Output Reporting Table — Track 3, FDA 510(k) and IEC 60601-2-37

(Per transducer/mode that exceeds MI or TI value of 1.0)

Transducer model: **CW5**Operating mode: **CW Doppler**

Index Label			MI	TIS		TIB		TIC
				At surface	Below surface	At surface	Below surface	
Maximum Index Value			0.04	0.65		1.49		0.97
Index Component Value				0.65	0.49	0.65	1.49	
Acoustic Parameters	IEC	Units						
	$p_{r,\alpha}$ at z_{MI}	(MPa)	0.10					
	P	(mW)		30.90		30.90		30.90
	$P_{1\times1}$	(mW)		27.35		27.35		
	z_s	(cm)			1.20			
	z_b	(cm)					1.30	
	z_{MI}	(cm)	1.70					
	$z_{pii,\alpha}$	(cm)	1.70					
	f_{awf}	(MHz)	4.99	4.99		4.99		4.99
Other Information	p_{rr}	(Hz)	59.88					
	s_{rr}	(Hz)	#					
	n_{pps}	---	83500					
	$I_{pa,\alpha}$ at $z_{pii,\alpha}$	(W/cm ²)	0.31					
	$I_{spta,\alpha}$ at $z_{pii,\alpha}$ Or $z_{sii,\alpha}$	(mW/cm ²)	311.45					
	I_{spta} at z_{pii} or z_{sii}	(mW/cm ²)	559.02					
	p_r at z_{pii}	(MPa)	0.13					
Operating Control Conditions	Frequency	---	Mid	Mid		Mid		Mid
	Focus	(cm)	9.05	9.05		9.05		9.05
#	No data is provided for this operation condition.							

ACUSON Sequoia
Diagnostic Ultrasound System
Advanced Imaging Manual

US

Complies with
IMDA Standards
DA107142

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Product Version 2.0**Software Version VA40**

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Chapter A5	Strain Imaging Procedures for displaying the relative stiffness of tissue as an elastogram during real-time 2D-mode imaging. Includes procedures for performing a measurement with the shadow function and for determining a strain ratio.
Chapter A6	Virtual Touch Applications Procedures and descriptions for using acoustic radiation force impulse (ARFI) technology to obtain qualitative visualizations or quantitative measurements of tissue stiffness. Includes descriptions for the following applications: ▪ Point Shear Wave Elastography (pSWE) – Virtual Touch Auto pSWE – Virtual Touch UDFF ▪ Shear Wave Elastography (SWE)
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Chapter D1	Fusion Imaging Explanation of Fusion imaging for viewing real-time ultrasound images aligned with reference data acquired using another imaging modality. Includes procedures for setting up the tracking system for detecting the location and orientation of a transducer and needle used during Fusion imaging. Also includes information for cleaning, disinfecting, and care of the tracking system.
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About the User and Reference Manuals

The user and reference manuals consist of the following publications.

Publication	Includes
<i>Instructions for Use</i>	▪ Conventions and typographical conventions used in the manuals ▪ Intended audience ▪ Introduction to the ultrasound system ▪ Safety and care information for the ultrasound system and compatible transducers ▪ Procedures for setting up and preparing the system for use ▪ Procedures for registering a patient and activating an operating mode ▪ Procedures for acquiring, optimizing, annotating, measuring, printing, and recording images ▪ Technical description of the ultrasound system ▪ Acoustic output data
<i>Advanced Imaging Manual</i>	This manual is a companion to the Instructions for Use publication and contains additional instructions for use for the safe and proper use of advanced imaging features on the ultrasound system. ▪ Description of the biopsy function ▪ Procedures for specialty imaging ▪ Panoramic imaging ▪ Contrast agent imaging ▪ Comparing images from multiple modalities ▪ 3D and 4D volume imaging ▪ Virtual Touch applications ▪ Procedures for reviewing images and clips ▪ Procedures for the physiologic function ▪ Fusion imaging ▪ Velocity vector imaging
<i>System Reference*</i>	▪ Description of customizable system settings ▪ Description of all measurement labels configurable for the ultrasound system ▪ Information about DICOM connectivity, network capabilities, and external devices ▪ Clinical references ▪ Information regarding the electromagnetic compatibility (EMC) testing of this ultrasound system

*Languages supported by the user interface include a translation of this publication.

Conventions

The user and reference manuals include the following conventions.

Convention	Description
Warnings and Cautions	 WARNING: Warnings are intended to alert you to the importance of following the correct operating procedures where risk of injury to the patient or system user exists.  Caution: Cautions are intended to alert you to the importance of following the correct operating procedures to prevent the risk of damage to the ultrasound system.
Notes and Prerequisites	Prerequisite: Prerequisites contain tasks the user must complete or information the user needs prior to performing a procedure. Note: Notes contain information concerning the proper use of the ultrasound system or correct execution of a procedure.
Cross-references	Examples: See also: For information about cleaning and disinfecting a transducer, refer to Chapter 3 in this manual. See also: For information about customizing the measurement function, refer to Chapter 2 in the System Reference. See also: For additional information about the measurement function, refer to Chapter 10 in the Instructions for Use. See also: For information about exporting and importing images, refer to Chapter B2 in the Advanced Imaging Manual. See also: Alphanumeric Keyboard, page 1-26 See also: Chapter 2, Instructions for Use
Customizable Ultrasound System Settings	Settings for configuring and customizing the ultrasound system are described in the System Reference. When customization is available, the user manual provides a reference to the configuration settings. Example: Use the configuration settings to customize the measurement function.

Typographical Conventions

The following typographical conventions are in descriptions and procedures within your user and reference manuals. Use the conventions to identify the location of a control or selection on the ultrasound system.

Control or Selection	Description
Controls on the Control Panel	Controls located on the control panel are indicated by uppercase boldface type. Examples: ▪ Push DEPTH. ▪ Rotate 2D to adjust the 2D gain. ▪ Press CALIPER to activate the measurement function. ▪ Double-click UPDATE to display the 2D image.
Trackball and Trackball Keys	Right and left trackball keys are located on the control panel. The function assigned to the trackball and trackball keys is indicated by labels on the image screen. Examples: ▪ Adjust the size or position of the field of view and then press a trackball key. ▪ Position the measurement marker and then press a trackball key. ▪ Press the right trackball key.
Selections on the Image Screen	On-screen selections are indicated by boldface type. Roll the trackball to position the pointer on the control or object on the image screen and then press a trackball key. Examples: ▪ Click Correct on the patient registration form. ▪ Double-click a thumbnail. ▪ Select the check box for the required entries and then click Delete.
Controls on the Control Panel for the Touch Screen	Press and rotate controls on the control panel are labeled on the touch screen. The selection assigned to these controls is indicated by boldface type. Examples: ▪ Rotate Tint. ▪ Press Steer.
Selections on the Touch Screen	Touch screen selections are indicated by boldface type. Tap the touch screen to access a selection. Drag an object on the touch screen to reposition the object. Swipe the screen to display a separate page of selections. Examples: ▪ Tap Workflow. ▪ Drag the tail of the arrow on the touch screen to adjust the length.

A1 Biopsy and Puncture Procedures

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Overview

Refer to the in-box instructions for attachment and care procedures for all needle guide accessories, including information on reprocessing the reusable bracket.

⚠ WARNING: Percutaneous procedures always involve heightened risk to the patient and to the operator handling biopsy needle guides. Clinicians using Siemens Healthineers recommended biopsy devices under ultrasound guidance should be trained and must observe proper needle insertion sequencing with the needle guide in order to avoid undue discomfort and unnecessary risk and injury to the patient.

⚠ WARNING: The ultrasound system displays guidelines on the image to indicate an anticipated needle path. The guidelines do not account for a bent or deflected needle and are not intended as an absolute reference. It is the user's responsibility to verify correct positioning of the needle during a biopsy or puncture procedure.

⚠ WARNING: To reduce the risk of injury to the patient, conduct a biopsy procedure during real-time imaging. When an image is frozen, the correct positioning of the needle cannot be assured.

⚠ WARNING: The ultrasound system displays a warning message if the image refresh rate is too low to support visualization of the needle. This is a temporary condition. Pause the procedure until the system resumes real-time imaging. If the image refresh rate remains too low for visualization of the needle, discontinue the procedure.

The frame rate is too low to support visualization of the needle.

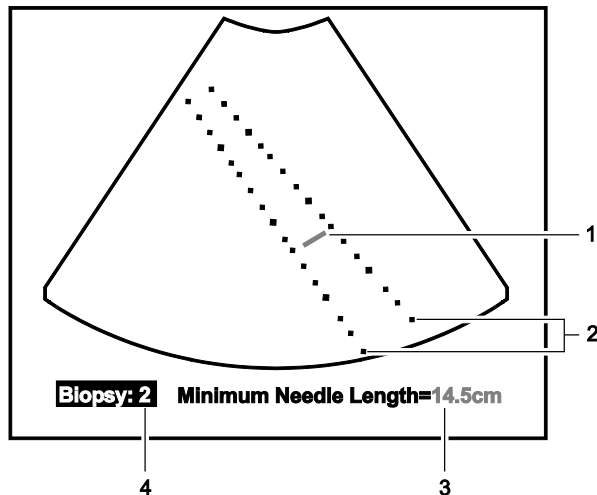
Adjust the imaging parameters to increase the frame rate or discontinue the procedure.

⚠ Caution: Visually inspect the biopsy device before use. Do not attach a damaged biopsy device to a transducer.

The biopsy function is available for transducers compatible with needle guide attachments. The ultrasound system displays guidelines on the image to indicate an anticipated needle path. You must verify the angle of the needle guide on the biopsy device matches the angle selection on the image screen before performing any procedure.

You can also use the biopsy function to estimate the minimum length of a needle required for the intended procedure.

Note: The minimum needle length is dependent on the biopsy device attached to the transducer and the position of the target area of interest. The minimum needle length is the distance from the exit point on the needle guide attached to the transducer to the target area of interest. The target of interest is selectable using a positionable marker within the guidelines on the image screen.



Example of the on-screen guidelines with a proposed minimum needle length.

- 1 Needle length marker
Identifies the target area of interest within the guidelines
- 2 Guidelines
Displays an anticipated needle path on the image
- 3 Minimum needle length
Displays the proposed minimum length of the needle in centimeters (cm)
- 4 Angle selection
Displays the angle selected on the touch screen

Activating the Biopsy (Puncture) Guideline Function

You can activate the biopsy function during real-time imaging in the following modes:

- 2D-mode with full field of view
- 2D-mode with color
- 2D-mode with contrast
- Fusion imaging

While using the biopsy function, you can activate another compatible mode or freeze the image. The color of the guidelines changes from green to yellow when you freeze the image.

If you request an action not allowed during the biopsy function or attempt to activate the biopsy function from an incompatible mode, the system displays a message indicating the action is not allowed.

To activate the biopsy function:

Prerequisite: Refer to the needle guide manufacturer's instructions for attachment and care procedures for all needle guide accessories.

Note: Before performing any patient procedure using a needle guide, you must verify the needle path.

1. Tap **Biopsy**.
The ultrasound system may display a message indicating the image format is incompatible and requires a format change.
2. To accept any required format changes, click **OK**. To cancel activation of the biopsy function, click **Cancel**.
3. To specify the angle of the needle path, tap the required angle setting.
4. Confirm the target area of interest is within the guidelines.
The system displays the following message as a precaution:
Verify the angle selected on the needle guide attached to the transducer matches the selection on the touch screen.
5. Verify the angle locked on the needle guide attached to the transducer matches the selection on the touch screen and then tap **OK**.
6. To determine the minimum length of the needle required for the intended procedure:
 - a. Tap **Minimum Needle Length**, if necessary.
 - b. Roll the trackball to position the needle length marker at the target area of interest.
The system displays the proposed minimum length of the needle on the image screen.
7. To exit the biopsy function and remove the guidelines from the image:
 - a. Tap **Biopsy**.
 - b. Tap **Off**.

Note: Disconnecting the active transducer from the ultrasound system exits the biopsy function.

Verifying the Needle Path Before a Procedure

⚠ WARNING: Do not use a needle guide if the path of the needle is not accurately indicated by the guidelines on the image. The path of the needle must display within the guideline. Contact your Siemens Healthineers service representative if the needle path is not accurately indicated.

Before performing any patient procedure using a needle guide, you must verify that the path of the needle is accurately indicated by the guidelines on the image.

The needle guide is ready for patient use ***only after the path of the needle has been verified.***

Checklist of items required for needle path verification:

- Transducer with attached needle guide
- Water-based coupling agent (gel)
- Sterile transducer sheath
- New, straight, biopsy needle
- Sterilized container of sterilized and degassed water

To verify the path of the needle:

1. Attach the needle guide to the transducer.
See also: For attachment and care procedures for all needle guide accessories, refer to the needle guide manufacturer's instructions.
2. Connect the transducer to the system and activate the transducer, if necessary.
3. Activate the biopsy function and then confirm the angle on the image screen matches the angle locked on the needle guide attached to the transducer.
See also: Activating the Biopsy (Puncture) Guideline Function, page A1-5
4. Immerse the head of the transducer into the degassed water and insert the needle into the needle guide.
5. Verify the path of the needle displays according to the guidelines on the image.
After verification, the needle guide is ready for use.

A2 Panoramic Imaging

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Overview

 **WARNING:** To avoid technique-related artifacts and measurement inaccuracies, read this entire chapter before using the Panoramic imaging feature.

Panoramic imaging acquires two-dimensional ultrasound images with a composite, extended field of view for the following use:

- Imaging any structure where a field of view larger than standard real-time imaging is required; for example, large organs, masses, and long lengths of a vessel
- Depicting anatomic relationships over a larger area than provided by standard 2D-mode imaging

Color Panoramic imaging acquires a panoramic image with color for the following use:

- Showing the presence of blood flow and 2D anatomy in exams; for example, for obstetric exams or for abdominal vascularity to characterize aortic abdominal aneurysms
- Depicting vascular studies with vein mapping or grafts

All color data is preserved during image acquisition and the peak of the signal is saved for the color panoramic image.

All system-supported curved array or linear array transducers are compatible with Panoramic imaging.

- Linear (preferred)
- Curved (not intended for performing tightly curved scans)
- Phased array (not intended for performing tightly curved scans)

Acquiring a Panoramic Image

You can activate Panoramic imaging during 2D-mode, 2D-mode with power, or 2D-mode with color.

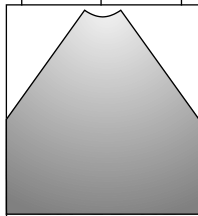
Image creation begins with a standard field of view and extends the view during steady, forward motion scanning. When the memory buffer is full, the ultrasound system stops acquisition and freezes the image.

You can confine the created image within a single scan plane; for example, a transverse scan of the abdomen, or not confine the image to a single plane, for example, when following the path of a tortuous vessel.

To acquire a panoramic image:

1. Optimize the 2D image.
2. To select Color Panoramic imaging, activate color imaging.
3. Tap **Workflow**.
4. Tap **Panoramic**.

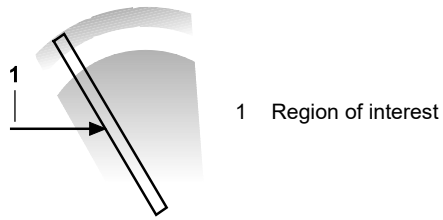
The system displays a bounding box on the 2D image. This indicates the section of the image used to create the panoramic image.



5. To fill the bounding box with the image, decrease the image depth to increase the image size, if necessary.

6. Press **UPDATE**.

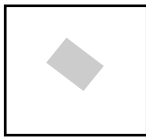
The system builds the panoramic image as you move the transducer and indicates the status of the scan with a region of interest.



7. Slowly and steadily scan in the required direction.

Note: As you scan, ensure the system displays the anatomy and structures as contiguous on the image screen.

The reference indicator provides a "snapshot" of the entire panoramic image. Data displays in the reference indicator only during acquisition.



8. To erase a section of the panoramic image within the region of interest, reverse the direction of scanning.
9. To continue image acquisition, resume a forward scanning motion.
10. To suspend or resume image acquisition, press **UPDATE**.
11. To stop image acquisition before the buffer is full, press **FREEZE**.

To	Do this
Review panoramic images during CINE	Prerequisite: The CINE memory capacity is sufficient to display a large panoramic image. 1. Rotate Cine. The system displays a thumbnail of the selected frame from the panoramic image on the right side of the image screen with a standard 2D-mode frame on the left side. 2. To review all available 2D-mode CINE frames, rotate Cine. 3. To redisplay the panoramic image in the size and rotation selected prior to entering CINE, tap Redisplay.
Rotate a panoramic image	(Not available when Best Fit is selected) ▪ Roll the trackball to adjust the image and then press a trackball key.

To	Do this
Resize the panoramic image after acquisition	1. To adjust the magnification of the image, rotate ZOOM. 2. To scale the image to fit the image area, tap Best Fit. 3. To scale the image to the previous size and rotation, tap Restore.
Display a flexible ruler	▪ Tap Flex Ruler. A flexible ruler displays along the skin line and lateral margins of the acquired image in 1 cm increments with a larger marker every 5 cm. The ruler includes markers for the contours of the image and the depth direction.
Display or remove power data in the real-time image	(Available only during Color Panoramic imaging) ▪ Tap All Power.
Activate or exit continuous capture of power data in the panoramic image	(Available only during Color Panoramic imaging) 1. Place the transducer on the required location and do not move the transducer. 2. Tap Color Capture. After the color data is captured, you can begin moving the transducer.
Display or remove color data in the panoramic image	(Available only during Color Panoramic imaging) ▪ Tap Flow. When you pause and then continue image acquisition, the captured data will still contain color data.
Adjust the selection of the color region of interest in the panoramic image	(Available only during Color Panoramic imaging) 1. To maximize the selection area and display 100% of the region of interest, tap Acquisition Fraction. 2. To minimize the selection area and display 30% of the region of interest, tap Acquisition Fraction again.

12. To exit, tap **Exit**.

Avoiding Artifacts During Acquisition

Artifact	Technique Tips
- Contour of the skin line has a "waving flag" appearance with folds - Jagged, broken skin line - Abrupt changes in boundaries or boundaries are not aligned - A structure visible in the real-time image abruptly disappears at the composite boundary	The transducer has moved off plane or off the required path. Stop your forward scanning motion and correct your orientation in the real-time 2D image before continuing acquisition of the composite image. To confine the image to a single plane or correctly follow a vessel, observe the trailing edge of the real-time image area, located in the region of interest. Use the remainder of the real-time image as a guide to correct the rotation of the transducer while scanning in a forward motion.
Shadowing and bending	Balance the gain throughout the image to avoid a bending artifact. Low gain in the far field decreases the amount of data needed to ensure a geometrically correct composite image. Keep the transducer perpendicular and in full contact with the skin surface to avoid excessive bending and ensure a constant elevation position. A forward scanning motion avoids an image-compounding effect, which appears as a brighter, distorted section of the composite image. Scanning over a long length of superficial bone, occupying the full width of a single frame, creates shadowing. There is not enough data in the lower half of the image, causing excessive bending of the composite image. Scan a flat or gently curved surface for optimal results.
Swirl (image overlaps in depth)	Avoid performing a tightly curved scan (for example, transverse slice through the calf) may cause a swirl compounding artifact where the image overlaps in depth. Set the depth as shallow as possible. The depth should be less than the radius of the target being scanned. This leaves a blank "hole" in the image. If the depth is too deep, the bottom of the image appears swirled. Do not measure an image with a swirl at the bottom. Optimal Good Bad  Large Hole "Hole" Swirl Artifact <i>Example of curved panoramic images.</i>

Measuring a Panoramic Image

 **WARNING:** To ensure accuracy, measurements should only be made on panoramic images acquired in a single scan plane.

Note: You cannot activate the measurement function with the **FREEZE** key during Panoramic imaging.

You can make general 2D measurements on a frozen, full-sized, or best fit panoramic image. If the structure requiring measurement is contained within the boundary of a single, standard 2D frame, make the measurement on the corresponding frame retrieved from CINE and not on the panoramic image.

You can make angle, linear, elliptical, auto trace, and trace 2D-mode measurements on a frozen, full-sized or best fit, composite image.

Technique Tips During Measurements

Avoid measurements on the following composite images.

- Images not following a single plane, for example, when tracking a tortuous vessel. An out-of-plane image depicts the contour pattern of the skin line and the appearance of internal structures.
- Images with a swirl artifact at the bottom
- Across a large shadow in a panoramic image
- Across gaps in an image, for example, gaps encountered with a tightly curved scan
- Across a disrupted area of the image, indicated by a jagged flexible ruler along the skin line

A3 Contrast Agent Imaging

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Configuring the Flash Sequence	5
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Overview

 **WARNING:** Carefully follow the contrast agent manufacturer's instructions for use, including indications and contraindications, when administering ultrasound contrast agents.

 **WARNING:** Cardiac rhythm disturbances during perfusion studies using gas ultrasound contrast agents have been observed in the diagnostic range of the Mechanical Index (MI) values. For details, refer to the specific package insert for the contrast agent being used.

Contrast agent imaging is a harmonic imaging feature intended to maximize the display of the contrast signal from the ultrasound contrast agent while minimizing the signal from tissue.

Contrast agent imaging provides preconfigured settings for filters, overall gain, and other parameters coordinated with patented data sequencing techniques for optimal viewing of contrast agent.

During contrast agent imaging, the system displays the mechanical index (MI) and the thermal indices (TI) in the imaging parameters.

To activate contrast agent imaging:

Prerequisite: Activate a compatible operating mode: 2D-mode, 2D-mode with color, 2D-mode with power.

1. Press **CONTRAST**.
The system activates a dual display format.
2. To exit, press **CONTRAST**.

Using Contrast Agent Imaging

Prerequisite: Activate contrast agent imaging.

To	Do This
Enhance areas of low contrast agent concentration	▪ Tap Peak Hold to enable maximum intensity projection.
Adjust transmit power	▪ Rotate Transmit Power.
Adjust the frame rate	▪ Rotate Frame Rate.
Identify the ultrasound contrast agent	▪ Tap Agent Type and then select a setting. – Low MI to optimize the settings for low-range MI contrast agents. – Mid MI to optimize the settings for mid-range MI contrast agents.
Start the timer	(Available only during real-time imaging) 1. Tap Timer. The system displays the elapsed time on the image screen. 2. To stop the timer, tap Timer again.
Display the recorded time during CINE	▪ Activate the control assigned to CINE. The system displays the recorded time in 1/100 seconds above the timer.
Specify a clip length	▪ Tap Clip Length and then select the duration for the clip capture, in seconds. Use the configuration settings to add an additional clip length setting for contrast agent imaging.
Emphasize the contrast agent, the tissue, or both	1. Tap the required setting for the left image of a dual display format. – Contrast Only to emphasize the contrast agent. – 2D Only to emphasize the tissue. – 2D + Contrast to combine of the contrast agent and tissue. 2. To display the left image in full-screen format, tap Live Dual. 3. To redisplay the image in dual format, tap Live Dual again.

Techniques for Contrast Agent Destruction

You can use a high mechanical index technique to destroy the contrast agent microbubbles and then observe reperfusion of the bubbles into the anatomy.

Contrast agent imaging includes the following techniques for contrast agent destruction:

- Burst is a high mechanical index technique for rapid destruction of contrast agent microbubbles for observation of the time required for reperfusion of the contrast agent.
- Flash sequencing is a high mechanical index non-imaging mode technique for rapid destruction of contrast agent and observation of the reperfusion of the contrast agent into the anatomy.

To use the Burst destruction technique:

1. Tap **Burst**.
2. To stop the burst process, tap **Burst** again.

To use the Flash Sequence technique:

1. Configure the Flash Sequence, if necessary.
2. Tap **Flash Sequence**.
The system activates the continuous burst of the contrast agent destruction and reperfusion sequences.

Configuring the Flash Sequence

You can configure the flash sequence using selections on the touch screen.

To configure the Flash Sequence:

1. Tap **Configure Flash Sequence**.
2. Select the first step of the sequence.
 - a. Tap **Burst Time**.
 - b. Tap the duration, in seconds, for destruction of the contrast agent.
3. Select the second step of the sequence; tap an option.
 - **Peak Hold** starts maximum intensity projection when Burst is complete.
 - **Live Imaging** resumes real-time imaging when Burst is complete.
4. Tap **Imaging Duration** and then select the length of acquisition in seconds.
5. Select the third step of the sequence; tap an option.
 - **Stay Live** continues real-time imaging when acquisition is complete.
 - **Auto Freeze** freezes the image when acquisition is complete.
6. To capture the flash sequence as a clip, tap **Flash Sequence Clip Capture**.
7. When configuration is complete, tap **Exit**.

Basic Measurements

You can perform all basic measurements during contrast agent imaging on either image in a dual screen layout or simultaneously on both images using the shadow function.

See also: For information on measurements and calculations, refer to Chapter 10 in the Instructions for Use.

To perform a measurement using the shadow function:

1. Activate the measurement function.
2. Tap the required measurement tool.
3. Tap **Shadow**, if necessary.
4. Measure the area of interest on either image.
The ultrasound system duplicates and displays the measurement on the other image.
5. To exit the shadow function, tap **Shadow**.

A4 Modality Compare

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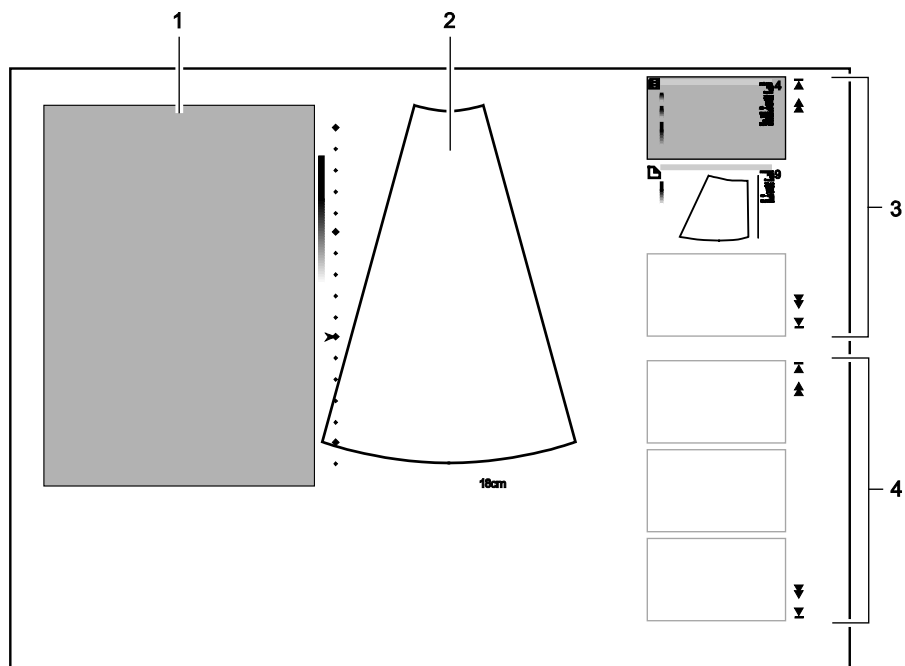
Overview

Note: Reference images displayed on the ultrasound system are informational only and not intended for diagnosis.

The modality compare feature displays images or clips from multiple exams and the following imaging modalities.

- Mammography
- Computed tomography
- Magnetic resonance
- Ultrasound

You can view the reference data in a side-by-side format with ultrasound images from the current exam during real-time imaging or review.



Example of the components of the image screen for the modality compare feature.

- 1 Reference data
- 2 Ultrasound image
- 3 Thumbnail panel with reference images from modality compare
- 4 Thumbnail panel with ultrasound images for the active exam

To activate modality compare:

1. Tap **Workflow**.
2. Tap **Modality Compare**.
3. To exit modality compare, tap **Exit**.

Comparing Images and Clips

During modality compare, the ultrasound system displays the reference image and the ultrasound image in a side-by-side format.

The patient name, patient ID, date of birth, and gender for the reference data must match the entries on the patient registration form for the current exam. These entries are case sensitive.

See also: For information about correcting patient information, refer to Chapter 5 in the Instructions for Use.

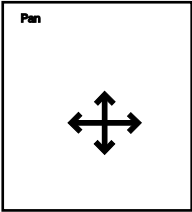
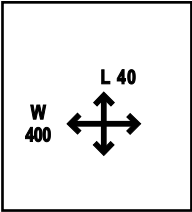
To review images and clips:

Prerequisite: Import the required reference data to the ultrasound system before you load the reference data to an exam.

See also: For information about importing reference data, refer to Chapter B2 in this manual.

1. Tap **Workflow**.
2. Tap **Modality Compare**.
The system displays a list of studies stored in the local database on the ultrasound system for the registered patient.
 - **Studies** lists the patient studies for the current patient.
 - **Images** lists the images for the selected study.
3. Click the required study.
4. To display a preview of a reference image, position the pointer on the required thumbnail.
5. Select the reference images.
 - To select one or multiple images, click the thumbnail.
 - To select all of the displayed thumbnails, click **Select All**.
 - To cancel the selection of thumbnails, click **Select None**.

6. Click **OK**.

To	Do this
Select the next or previous reference image	▪ Rotate Image .
Display the next or previous frame of the reference clip	▪ Rotate Frame .
Magnify the reference image	▪ Rotate Zoom .
Adjust the position of the reference image	▪ Tap the pan control and then drag your finger horizontally. 
Adjust the contrast and brightness of the reference image	(Available only for static, gray scale images, excluding ultrasound images) 1. Tap the window and level control.  – To adjust the brightness, drag your finger up or down. – To adjust the contrast, drag your finger left or right. 2. To apply the changes to all static images, tap Apply to All. 3. To restore the previous window and level settings, tap Reset to Default.

To	Do this
Select additional reference images during imaging	1. Tap Select Images. 2. Click the study and then select the reference images. 3. Click OK. 4. To cancel the selection of images, click Cancel.
Remove a reference image from the thumbnail panel	▪ Select the thumbnail and then tap Remove Image.
Compare modality images with stored images	1. Tap Review. 2. Tap Compare. 3. Select the images for comparison: a. Click the reference image in the thumbnail panel and then click the required location on the review screen. b. Click the ultrasound image in the thumbnail panel and then click the required location on the review screen.

A5 Strain Imaging

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Overview

Strain imaging is a qualitative visualization method used to display the relative stiffness of tissue as an elastogram during real-time 2D-mode imaging.

The ultrasound system displays two images on the image screen in live dual format.

Activating Strain Imaging

To activate Strain imaging:

1. Press **VT**.
2. Tap **Strain**.

The ultrasound system displays two images on the screen in a live, dual format. The left image is a 2D-mode image with a region of interest (ROI). The right image is a 2D image with a corresponding ROI showing the elastogram.

A gray overlay box indicates too little or too much axial motion or excessive lateral motion.

The system also displays a real-time quality factor (**QF**) score. A value greater than 60 indicates minimal global motion artifact. A value less than 50 indicates a less than optimal result; perform another acquisition.

3. To regenerate the elastogram, use cycles of gentle up and down compression while avoiding lateral and vertical movement of the transducer.
Note: The natural compressions generated by a patient's respirations may be sufficient to generate the elastogram.
4. To increase the size of the live dual format on the screen, rotate **Zoom**.
As you enlarge the image, the system crops the edges of the image while maintaining the aspect ratio.
5. To view a full screen Strain image, tap **Live Dual**.
6. To apply a gray scale map, rotate **Map Index**.
 - **0** applies the standard map. This is the natural result of the strain estimation from the echo signal without compensation for pre-compression (stress) or non-uniform stress applied by the user.
 - **1** applies a normalized map. This compensates for the potential that non-uniform stress is applied with the transducer during scanning.
 - **2** applies an inverted map.

The system displays an elasticity imaging bar above the gray bar for the active map. The elasticity imaging bar represents the range of gray shades available for depicting the stiffness of the tissue from **SF** (soft) to **HD** (hard).
7. To apply a color map, rotate **Color**.
8. To exit, press **2D**.

Basic Measurements

You can perform all basic measurements including the area ratio and distance ratio during Strain imaging on either image in a dual screen layout.

To calculate the ratio of two area measurements:

- Tap **EI/B Ratio – A.**



To calculate the ratio of two distance measurements:

- Tap **EI/B Ratio – D.**



See also: For additional information about the measurement function, refer to Chapter 10 in the Instructions for Use.

Shadow Function

When the shadow function is active, the system duplicates and displays the measurement on the other image.

To perform a measurement using the shadow function:

1. Activate the measurement function.
2. Tap **Shadow**.
3. Measure a distance, trace, or ellipse on either image.
4. To exit the shadow function, tap **Shadow**.

Strain Ratio

Strain imaging provides a compound measurement tool to compare the relative stiffness of tissue within two regions of interest, for example, compare the average strain of a lesion and the average strain of the surrounding tissue.

- A strain ratio of 1 indicates the stiffness of the tissue in both regions of interest is equal.
- A strain ratio greater than 1 indicates the tissue in the first region of interest (for example, a lesion) is softer than the tissue in the second region of interest (for example, the surrounding tissue).
- A strain ratio less than 1 indicates the tissue in the first region of interest is harder than the tissue in the second region of interest.

When interpreting the results of strain ratio calculations, consider the type of tissue within each region of interest. For example, results will be different depending on whether you selected the lesion or the surrounding tissue as the first region of interest.

You can label strain ratio measurements with any labels available with exams that support Strain imaging.

To determine the strain ratio:

Prerequisite: Select a linear transducer, activate Strain imaging, and select a map index of 0 or 1.

Note: The system calculates the strain ratio using only the region of interest displayed within the elastogram. If the strain ratio ROI extends beyond the elastogram, expand the elastogram. To expand the elastogram, press a trackball key to select **Size**, and then roll the trackball to adjust the size of the elastogram, and then press a trackball key again.

1. Freeze the image, if necessary.
2. Activate the measurement function.
3. Tap **Strain Ratio**.
4. Position and then anchor the first marker of the ellipse tool.
Note: During a breast exam, place the first ellipse marker in fatty tissue and the second ellipse marker within a suspected lesion.
5. Position and then anchor the axis endpoint (major axis).
6. Position and then anchor the second axis to complete the first region of interest.
7. Repeat steps 4 through 6 for the second region of interest.
 The system displays the strain ratio and the average strain (%) for both regions of interest in the measured results.
8. To exit strain ratio, exit the measurement function.

Patents

Patent numbers in the United States of America for the Strain imaging feature include:

- 6,270,459

A6 Virtual Touch Applications

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Acoustic Radiation Force Impulse Technology

⚠ WARNING: To prevent the possibility of inadvertently heating tissue, avoid repeated image acquisitions near the interface of bone and tissue within a short period of time.

⚠ WARNING: Measurement values for shear wave velocity, elasticity, and other image display settings are relative indexes intended only for the purpose of comparison with other measurements performed using the ACUSON Sequoia ultrasound system. Absolute values for shear wave velocity and elasticity measurements may vary among different manufacturers due to multiple system-dependent factors, including shear wave frequency, excitation beam (push beam) frequency, shear wave detection techniques, and shear wave velocity and elasticity estimation methods.

The system displays the following message on the screen during Point Shear Wave Elastography (pSWE) or Shear Wave Elastography (SWE) and in the report if shear wave speed measurements are saved to the report:

Shear wave speed and elasticity values may vary among manufacturers!

The following features use acoustic radiation force impulse (ARFI) technology to obtain qualitative visualizations or quantitative measurements of tissue stiffness:

- Point Shear Wave Elastography (pSWE)
 - Virtual Touch Auto pSWE
 - Virtual Touch UDFF (ultrasound-derived fat fraction)
- Shear Wave Elastography (SWE)

ARFI technology uses a time-controlled sequence of "push pulses" from the transducer, rather than manual compression or palpation cycles, to induce a small displacement of tissue. The image qualitatively depicts the relative stiffness of tissue within a selected region of interest (ROI) compared to surrounding tissue. The system can also provide a quantitative measurement of shear velocity (Vs) and elasticity (E) at a specific anatomical location.

During acquisition, ARFI technology combines a period of pulse sequences with a temporary freeze period of no transmit power. A timer indicates the remaining time in seconds until the transducer is available for imaging. This duration is typically a few seconds depending on the transducer and imaging conditions. The cooling timer prevents possible heating of the transducer surface from the momentary shear wave generation pulses.

Cooling 5

Example of timer.

The system uses an optimization algorithm to ensure acceptable levels for the $I_{SPTA,3}$, the Mechanical Index (MI), and the Thermal Index (TI) during use. When imaging is activated, you cannot adjust imaging parameters that affect the transmit power output until the acquisition is complete.

Point Shear Wave Elastography (pSWE)

Use Point Shear Wave Elastography (pSWE) to measure tissue for a selected region of interest (ROI) as shear velocity (Vs) and Young's Modulus of Elasticity (E).

Note: Because shear waves do not propagate through fluid, do not use pSWE to measure fluids.

Note: The ultrasound system automatically assigns a label to each acquisition. You can change this label if necessary.

To activate Point Shear Wave Elastography (pSWE):

1. Press **VT** during 2D imaging.
2. Tap **pSWE**, if necessary.



The system displays a ROI box on the image.

3. To reposition the ROI, roll the trackball.
The software restricts the depth of the ROI box.

Note: You cannot adjust the size of the ROI box.

4. To begin acquisition, press **UPDATE**.
An audible tone indicates when pSWE measurement acquisition ends.

When acquisition is complete, the system automatically freezes, selects the active label, and displays the tissue shear velocity (Vs), elasticity (E), and the depth of the ROI in the measured results.

The 2D image represents the last frame prior to the pSWE acquisition.

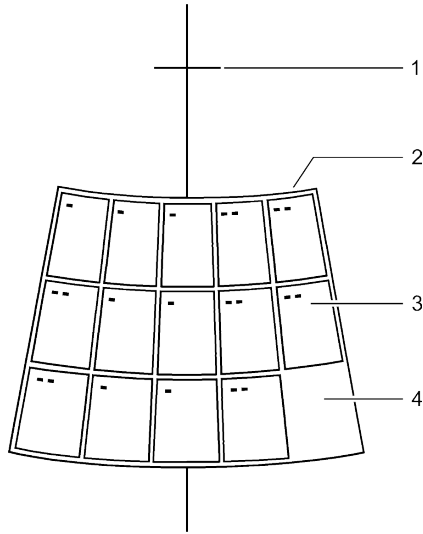
During system freeze, a cooling timer indicates the remaining time (in seconds) until the transducer is available for image acquisition.

Note: If the system displays the measurement values as **X.XX** m/s, the confidence interval threshold for measurement quality was not reached. Repeat the acquisition until the system displays a numerical value instead of **X.XX** m/s.

5. Press **IMAGE** to save the measurements.
The saved measurements display on the left panel of the image screen.
6. To reactivate pSWE after the automatic freeze period ends:
 - a. Press **FREEZE** to unfreeze the image.
 - b. Adjust the ROI position, if necessary.
 - c. Press **UPDATE** to begin acquisition.
7. To exit, press **2D**.

Virtual Touch Auto pSWE

Virtual Touch Auto pSWE simultaneously acquires a series of multiple point shear wave elastography measurements within individual regions of interest.



Example of the region of interest after Auto pSWE acquisition.

- 1 Marker
The marker is for placement at the liver capsule.
- 2 Region of interest (ROI)
- 3 Individual region of interest with an indicator of relative shear wave speed
- 4 Absence of an individual region of interest

Each individual region of interest represents a single pSWE measurement and includes an indicator representing the relative stiffness for the region's measurement. The absence of an individual region of interest indicates the confidence interval threshold for measurement quality was not reached for the individual region.

Indicator	Relative Shear Wave Speed
-	0 kPa to 5 kPa
--	5 kPa to 9 kPa
---	9 kPa to 13 kPa
----	≥13 kPa

To activate Auto pSWE:

Prerequisite: Knowledge of pSWE imaging for evaluation of tissue stiffness.

1. Press **VT** during 2D imaging and then tap **pSWE**, if necessary.
The system displays a ROI box on the image.

2. Tap **Auto pSWE**.

3. To reposition the marker and the ROI, roll the trackball.

4. Press **UPDATE** to begin acquisition.

An audible tone indicates when measurement acquisition ends.

When acquisition is complete, the ultrasound system freezes the image and displays the following values for the active measurement label in the measured results:

- Tissue shear velocity (Vs) median
- Elasticity (E) median
- Depth of the ROI

The cooling timer indicates the remaining time in seconds until the transducer is available for the next image acquisition.

5. Press **IMAGE** to save the measurements.

The saved measurements display on the left panel of the image screen.

6. To reactivate Auto pSWE after the automatic freeze period ends, unfreeze the image and repeat steps 3 and 4.

7. To exit, press **2D**.

Virtual Touch UDFF

Ultrasound-derived fat fraction (UDFF) measures tissue in a selected region of interest and calculates the UDFF index for assessing fatty liver disease.

To obtain the ultrasound-derived fat fraction:

Prerequisite: Knowledge of pSWE imaging for evaluation of tissue stiffness.

1. Press **VT** during 2D imaging and then tap **pSWE**, if necessary.
The system displays a single ROI box on the image.
2. To view multiple regions of interest, tap **Auto pSWE**.
3. Tap **UDFF**.
4. To reposition the marker and the ROI, roll the trackball.
5. Press **UPDATE** to begin acquisition.

An audible tone indicates when measurement acquisition ends.

When acquisition is complete, the ultrasound system freezes the image and displays the following values for the active measurement label in the measured results:

- Tissue shear velocity (Vs) median (requires an image with multiple regions of interest)
 - Elasticity (E) median (requires an image with multiple regions of interest)
 - Percentage of ultrasound-derived fat fraction (UDFF)
 - Depth of the ROI
6. Press **IMAGE** to save the measurements.
 7. To obtain another UDFF measurement after the automatic freeze period ends, unfreeze the image and repeat steps 4 through 6.
 8. To exit, press **2D**.

Measurement Labels

See also: For information on the measurement function, refer to Chapter 10 in the Instructions for Use.

Point Shear Wave Elastography (pSWE) provides a set of shear velocity and elasticity measurement labels for abdomen exams:

- Up to ten sites for generic locations
- Up to ten masses
- Up to nine liver segments based on the Couinaud segmentation system

Note: You can make as many measurements as required, however the ultrasound system can only save up to 20 measurements. When you make the twenty-first measurement, the ultrasound system displays a message.

Maximum valid measurements made.

If you click **OK**, the ultrasound system deletes the earliest measurement and saves the latest measurement; the first measurement is replaced with the twenty-first measurement.

To change the assigned measurement label:

1. Tap **Site**, **Liver Segment**, or **Mass**.
2. Tap the required label from the list.
3. To save the updated label to the patient report, press a trackball key. Or, press the control assigned to the store function.

Measurement Data

When you have made Point Shear Wave Elastography (pSWE) measurements, the abdomen patient report lists measurements for each liver assessment measurement label. The abdomen report also includes an assessment section with specific selections for the liver.

The left panel on the image screen lists completed measurements and statistics for each measurement label and includes overall statistics for the measured anatomy.

Measurement Data	Description
Vs (m/s)	Shear velocity
E (kPa)	Elasticity
Depth (cm)	Depth of the region of interest
D(cm)	
UDFF (%)	(Available only for ultrasound-derived fat fraction) Ultrasound-derived fat fraction index for the region of interest Note: The UDFF index does not display in the left panel.
Median	Median calculation for all measurements associated with the assigned label
Mean	Mean calculation for all measurements associated with the assigned label
Std Dev	Standard deviation calculation for all measurements associated with the assigned label
IQR	Interquartile range (the distance between the 75th percentile and the 25th percentile) for all measurements associated with the assigned label
IQR/Median	Ratio of the interquartile range to the median calculation for all measurements associated with the assigned label
Overall Statistics	The overall statistics display in the report as indicated and also in the left panel.
Median	Median calculation for all measurements included in the report
Mean	Mean calculation for all measurements included in the report
Std Dev	Standard deviation calculation for all measurements included in the report
IQR	Interquartile range calculation for all measurements included in the report
IQR/Median	Ratio of the interquartile range to the median calculation for all measurements included in the report

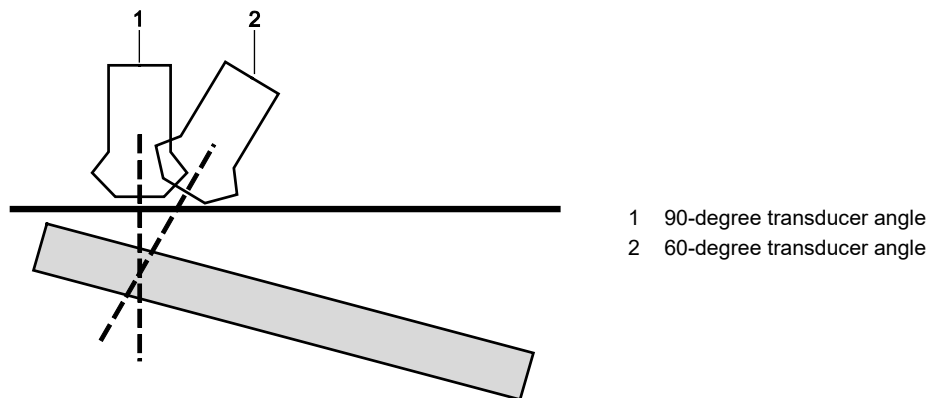
Viewing the Left Panel

To	Click this icon
Collapse a category of measurements and values in the left panel	▼
Expand a category of measurements and values in the left panel	▶
Hide the left panel	<
	Note: When you activate a full screen format, the system hides the left panel.
Show the left panel	>

Scanning Techniques to Mitigate Technical Limitations

- When frequent "X.XX" results are encountered in focal lesions, evaluate the elevated shear wave velocities in the periphery of the lesion.
- To obtain reproducible results in the liver with pSWE, take measurements in the right lobe of the liver using an intercostal scanning approach. Advise the patient to breathe normally and to momentarily stop breathing and then take measurements. Avoid taking measurements during deep inspiration and breath hold as the literature cites that this action increases central venous pressure. Elevated central venous pressure can artificially elevate shear wave velocity and elasticity measurements.
- In general, use a transducer angle of 90 degrees to the skin surface for the highest measurement accuracy.

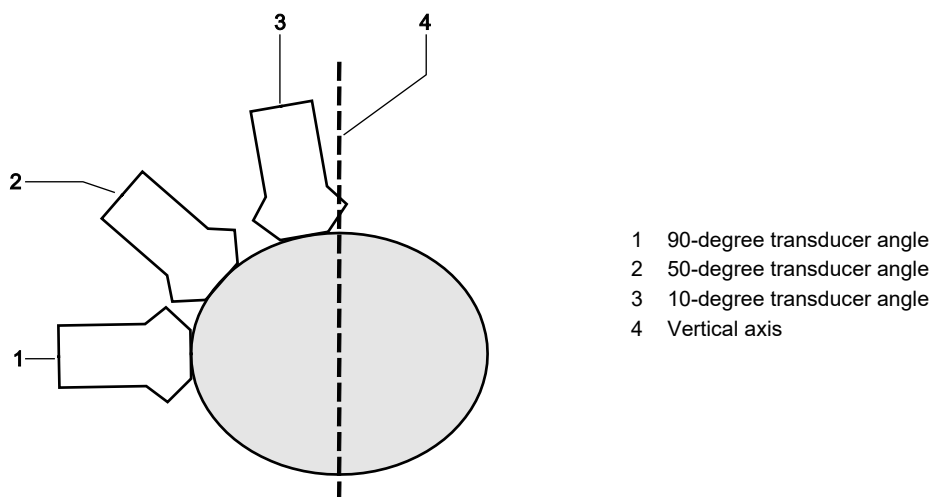
An out-of-plane transducer angle less than 50 degrees to the skin surface can result in artificially low shear wave velocities and elasticity values due to loss of transducer contact with the flat scanning surface.



Transducer angle on a flat surface.

- Maintain adequate contact and be aware of the effects of the transducer angle relative to the contact surface.

When the transducer surface is in continuous contact with the skin surface and follows the contour of the curved surface, shear wave velocity and elasticity measurements are accurate and stable.



Transducer angle on a curved surface.

Shear Wave Velocity and Elasticity Measurements in Liver Assessment

pSWE can provide a reliable measure of shear wave velocity and elasticity in the liver when proper technique is used.

The following factors can result in abnormally high values in the liver:

- Excessive transducer pressure on the liver, such as in subcostal scanning where transducer pressure is used to displace intervening bowel gas
- Elevated central venous pressure due to heart failure or valsalva maneuvers (including deep inspiration and breath hold)
- Significant portal hypertension
- Poor contact with the skin surface or oblique transducer angles relative to the liver
- Elevated aminotransferase levels
- Food intake less than 2 to 3 hours prior to examination
- Liver location (liver segment measured)
- Liver fibrosis

The following techniques should be used during liver assessment to ensure measurements are reliable:

- Measurements are most reliable at least 1 cm to 2 cm deep to the liver capsule using the intercostal scanning approach along a mid-axial line in liver segments 5 and/or 8.
- The patient should breathe normally with measurements taken after the patient is asked to momentarily suspend respiration.
- Multiple measurements in the same location should be taken to ensure measurement repeatability with the median shear wave velocity and elasticity value representing the most reliable single measure when there are measurement outliers.
- An IQR/median shear wave velocity ratio less than 0.15 and an IQR/median shear wave elasticity ratio less than 0.3 is indicative of reliable liver assessment with pSWE. A higher ratio indicates significant variability in the measurements, decreasing the reliability of measurement results.

Ultrasound-Derived Fat Fraction Measurements in Liver Assessment

The following techniques should be used for measurements of the liver with UDFF quantification:

- Place the patient in either a supine position or an approximate 30° left lateral decubitus position.
- Position the transducer at an intercostal space wide enough to accommodate the transducer and at the correct level for scanning the upper-right liver lobe (segment 5 or segment 8).
- Position the transducer face with the long axis of the transducer parallel to the intercostal space. Check for correct positioning by inspecting the image for shadowing at the image edges.
- Position the transducer face in contact with the skin and parallel to the liver capsule. Avoid tilting the transducer so the acoustic waves travel perpendicular to the liver capsule.
- The patient should breathe normally with measurements taken after the patient is asked to momentarily suspend respiration.
- Perform multiple measurements in the same location to ensure measurement repeatability with the median UDFF value representing the most reliable single measures when there are measurement outliers.
- Maintain the UDFF measurement region of interest (ROI) between 3 cm and 7 cm depth whenever possible to minimize the effect of depth on measurements.
- Place the marker at the liver capsule to ensure the region of interest is 1.5 cm to 2.0 cm below the liver capsule.

Shear Wave Elastography (SWE)

Observe the following precautions when using this feature.

- Using the appropriate amount of scanning pressure is an important factor in achieving reliable and repeatable results with SWE. Minimal to mild compression is recommended for optimal results. Excessive pressure on the body with the transducer may artificially elevate shear wave velocities and result in unreliable measurements.
- Shear wave imaging may have limitations in adequately visualizing regions of very high stiffness, for example, in certain breast cancers.
 - Use the **Quality** image display setting to verify that the shear wave velocity and elasticity image represents adequate shear wave formation. Shear wave velocity and elasticity measurements should be made only in regions with high shear wave quality, represented in green when the **Quality** image display setting is selected.
 - Use the **Displacement** image display setting to verify consistency of soft and stiff regions between the shear wave **Velocity** or **Elasticity** image display setting and the **Displacement** image display setting.
 - Regions of high shear wave velocity or elasticity should be consistent with regions of low shear wave displacement. Regions of low shear wave velocity or elasticity should be consistent with regions of high shear wave displacement.
- In lesions where multiple or extensive areas of low shear wave quality are encountered, shear wave velocity and elasticity estimates in the lesion should be interpreted with caution.

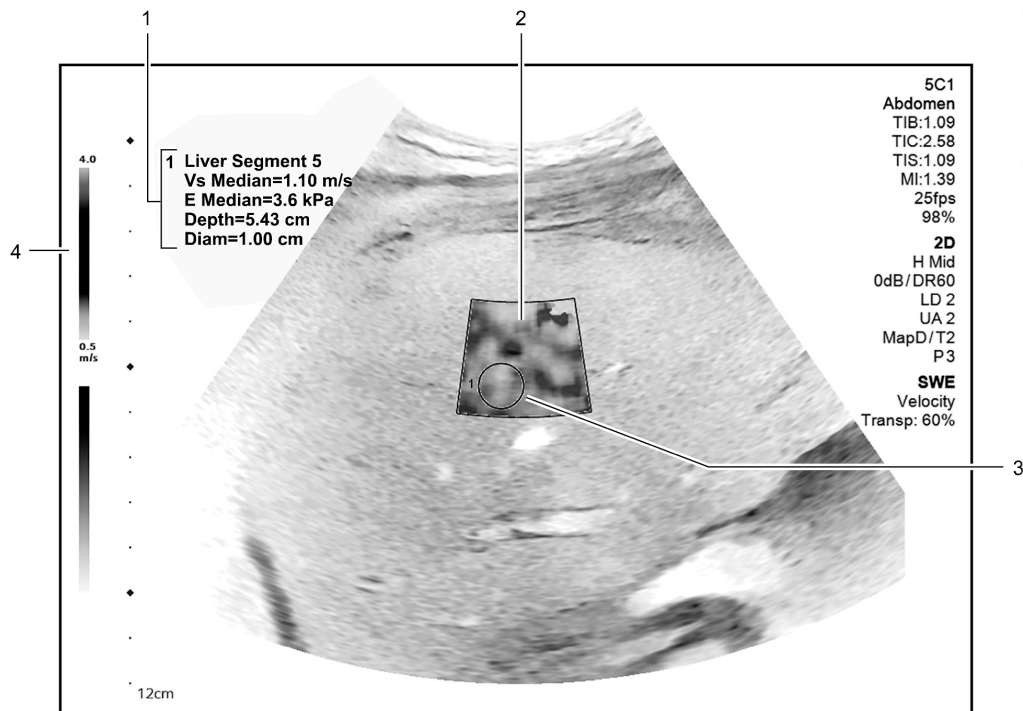
Shear Wave Elastography (SWE) qualitatively depicts tissue stiffness for a selected region of interest (ROI) and provides a quantitative measurement of shear wave velocity (V_s) and elasticity (E) for any point within the ROI. You can adjust the size and depth of the ROI where shear wave information will be acquired.

- The maximum depth is dependent on the transducer.
- In a full-screen format, the system displays the shear velocity or elasticity data as a transparent color overlay on the 2D image.
- In a dual-screen format, the system displays the 2D image on the left side and the ROI with the shear velocity or elasticity data on the right side.

In either full-screen or dual-screen format, you can apply one of the following image display settings to the shear wave data: **Velocity** or **Elasticity**, **Quality**, or **Displacement**. Each of these settings provides additional context for evaluating and interpreting the shear wave velocity and elasticity and measured results.

Note: If the shear wave velocity and elasticity within the region of interest is not detectable (for example, a fluid-filled cyst) or the shear wave velocity and elasticity is non-determinant, the shear wave velocity or elasticity image display setting displays only the 2D-mode data in that area (no color is displayed).

Basic measurements, including area ratio and distance ratio, are also available. You can perform all basic measurements, such as distance, ellipse, and trace, on either side of a dual display format.



Example of SWE screen without the measurement data shown in the left panel.

- 1 Measured results for shear wave velocity or elasticity
 - If you perform a measurement within the ROI that exceeds the current maximum velocity setting, the measured results display **HIGH** for the shear velocity value.
 - If you perform a measurement within the ROI that is lower than the current minimum velocity setting, the measured results display **LOW**.
 - The measured results display **NA** if the measurement marker is activated prior to SWE acquisition.
 - The measured results display **X.XX m/s** and **XX.X kPa** if the shear wave was not detected within the ROI or if you perform a measurement outside of the ROI.
- 2 SWE region of interest
- 3 Measurement marker with unique identifier

Each measurement displays the corresponding identifier in the measured results.
- 4 Color bar depicts the range of values displayed in the region of interest for the selected image display setting: velocity or elasticity, quality, or displacement. During dual imaging, a color bar displays for each image.

Use the configuration settings to display shear wave measurements as velocity (m/s) or elasticity (kPa) units in the patient report.

To activate Shear Wave Elastography (SWE):

1. Press **VT** during 2D-mode.
2. Tap **SWE**.



The system activates a dual display format and displays a ROI.

3. To activate a full-screen format, tap **Live Dual**.
4. To adjust the size or position of the ROI prior to acquisition:
 - a. Press a trackball key.
 - b. Roll the trackball to reposition or resize the ROI.

Note: You cannot adjust the ROI during acquisition.
5. Press **UPDATE** to begin acquisition.
 The system acquires a single image frame and then freezes the image. During system freeze, a cooling timer indicates the remaining time (in seconds) until the transducer is available for image acquisition.
6. To change the image display setting, tap a setting.
 - **Velocity** or **Elasticity** depicts the range of shear wave velocity or elasticity values from minimum to maximum. Shear wave velocity is slower in soft tissue and faster in stiff tissue. Elasticity is higher in soft tissue and lower in stiff tissue. The color bar displays the minimum and maximum range of the shear wave velocity or elasticity image.
 - **Quality** depicts the combination of shear wave displacement magnitude and the signal-to-noise level from low (**LO**) to high (**HI**). A low displacement magnitude and high noise level are depicted as low quality. A high displacement magnitude and low noise level are depicted as high quality.
 - **Displacement** indicates the magnitude of the shear wave displacement of tissue from low (**LO**) to high (**HI**). Displacement is higher in soft tissue and lower in stiff tissue.
 - **Displacement 1** depicts the relative differences of shear wave magnitude in shades of blue.
 - **Displacement 2** depicts the relative differences of shear wave magnitude in grayscale.
7. Press **IMAGE** to save the measurements.
 The saved measurements display on the left panel of the image screen.
8. To reactivate SWE after the freeze period ends:
 - a. Unfreeze.
 - b. Adjust the ROI size and position, if necessary.
 - c. Press **UPDATE** to begin acquisition.
9. To exit, press **2D**.

Measurements

See also: For information on the measurement function, refer to Chapter 10 in the Instructions for Use.

You can measure the shear wave velocity or elasticity anywhere within the region of interest (ROI). You can perform multiple measurements on a single acquisition. Shear Wave Elastography (SWE) supports both measure-then-label and label-then-measure methods.

To measure shear wave velocity or elasticity:

1. Adjust the range of velocities or elasticity displayed in the ROI.
 - To change the maximum velocity, rotate **Max Velocity**.
 - To change the minimum velocity, rotate **Min Velocity**.
 - To change the maximum elasticity, rotate **Max Elasticity**.
 - To change the minimum elasticity, rotate **Min Elasticity**.
2. Press **CALIPER**.

Note: The system activates the shear velocity measurement tool during SWE.

The system updates the shear wave velocities or elasticities in the ROI and the color bar to depict the velocities within the selected range. The selected maximum and minimum velocity or elasticity values display above and below the color bar.

Note: Adjusting the range of velocities or elasticities removes all completed measurements from the screen.
3. To resize the diameter of the ROI, rotate **ROI Diameter**.

Note: The following ROI diameters in mm are available: 3, 5, 10, 15, 20.
4. Position the marker and then press a trackball key.

The system displays the measured results in meters per second (m/s) for shear velocity and in kiloPascals (kPa) for elasticity.

Note: If you perform a measurement within the ROI that exceeds the current maximum velocity or elasticity setting, the measured results display **HIGH** for the shear velocity and elasticity value. If you perform a measurement within the ROI that is lower than the current minimum velocity and elasticity setting, the measured results display **LOW**. The measured results display **X.XX** in m/s and **XX.X** in kPa if the shear wave was not detected within the ROI or if you perform a measurement outside of the ROI.
5. To select the last caliper, press **Last Caliper**.
6. To activate the shadow function in a dual-screen format:
 - a. Tap **Shadow**.
 - b. Perform a measurement on either image.
 - c. To exit the shadow function, tap **Shadow**.
7. To clear the screen, press **Clear Screen**.

To change the assigned measurement label:

1. Tap the measurement category, for example, **Mass** or **Site**.
2. Tap the required label from the list.
3. To save the measurement to the patient report, press a trackball key.

Measurement Data

When you have made SWE measurements, the patient report lists measurements for each measurement label.

The left panel on the image screen lists completed measurements and statistics for each measurement label and includes overall statistics for the measured anatomy.

Measurement Data	Description
Median (m/s)	Median shear velocity within the measurement marker
Mean (m/s)	Mean shear velocity within the measurement marker
Max (m/s)	Maximum shear velocity within the measurement marker
Median (kPa)	Median shear elasticity within the measurement marker
Mean (kPa)	Mean shear elasticity within the measurement marker
Max (kPa)	Maximum shear elasticity within the measurement marker
Depth (cm)	Depth
D(cm)	Depth of the region of interest
Diam (cm)	Diameter of the measurement marker
Mean	Mean calculation for all measurements associated with the assigned label
Std Dev	Standard deviation calculation for all measurements associated with the assigned label
Median	Median calculation for all measurements associated with the assigned label
IQR	Interquartile range (the distance between the 75th percentile and the 25th percentile) for all measurements associated with the assigned label
IQR/Median	Ratio of the interquartile range to the median calculation for all measurements associated with the assigned label
Overall Statistics	The overall statistics display in the report as indicated and also in the left panel.
Mean	Mean calculation for all measurements included in the report
Std Dev	Standard deviation calculation for all measurements included in the report
Median	Median calculation for all measurements included in the report
IQR	Interquartile range calculation for all measurements included in the report
IQR/Median	Ratio of the interquartile range to the median calculation for all measurements included in the report

Viewing the Left Panel

To	Click this icon
Collapse a category of measurements and values in the left panel	▼
Expand a category of measurements and values in the left panel	▶
Hide the left panel	⏏ Note: When you activate a full screen format, the system hides the left panel.
Show the left panel	⏏

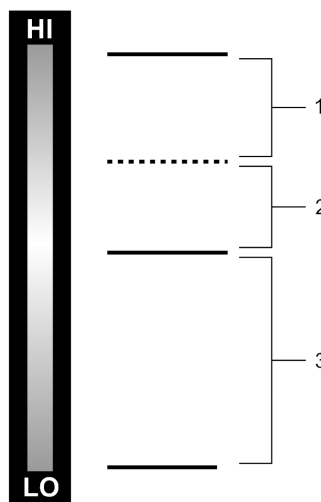
Technique Hints

SWE provides a two-dimensional display (map) of shear wave velocity or elasticity, quality, and displacement information. Each of these maps represents a parameter of the system-generated shear waves to assist in the interpretation of SWE images.

- Use the Quality map to confirm that shear wave generation was adequate and identify regions of the shear wave image where shear wave velocity or elasticity estimations may be incorrect due to poor shear wave signal quality. For example, in some exceptionally stiff breast cancers, it can be difficult to adequately visualize and measure shear wave velocities because of high tissue attenuation. Shear wave velocity or elasticity measurements are reliable in locations of high signal quality and these locations are represented in green; measurements are unreliable in locations of low signal quality and these locations are represented in yellow/orange. When the shear wave quality is orange/red, shear wave velocities cannot be estimated and the Velocity or Elasticity, and Displacement maps display only 2D-mode information.

The following illustration depicts the use of color to represent shear wave quality. The color indications in the Quality map help identify locations in the Velocity and Elasticity maps where shear wave velocity and elasticity estimations are reliable, may be unreliable, or could not be estimated. The values in the left column indicate the quality index calculated by the system software. Index values of 0 and 1.0 represent the minimum and maximum quality. When the quality index is too low, the system displays only 2D-mode information.

⚠ Caution: In lesions where multiple or extensive areas of low shear wave quality are encountered, shear wave velocity or elasticity estimates in the lesion should be interpreted with caution.



Example of the color bar for the Quality map.

- 1 Reliable shear wave velocity or elasticity estimate (green to yellow-green)
- 2 Shear wave velocity or elasticity estimate may be unreliable (yellow-green to yellow-orange)
- 3 Shear wave velocity or elasticity estimate not possible (yellow-orange to red)

- Use the Displacement map to improve visualization of structural boundaries where large differences in shear wave amplitude can occur. The Displacement map indicates the relative differences of shear wave magnitude in the image. These differences are represented in grayscale or in shades of blue. The lightest shade represents the highest relative displacement magnitude.

Shear wave displacement is typically lower in very stiff tissue compared to softer tissues. You can correlate the Displacement map to the Quality map to understand if poor shear wave quality may be related to low shear wave displacement. In general, high shear wave velocity and elasticity are correlated with low shear wave displacement. In regions depicting low shear wave velocity and elasticity and low shear wave displacement, shear wave velocity and elasticity measurements may be unreliable.

A7 Volume Imaging

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Overview

Prerequisite: To avoid technique-related artifacts, you must be thoroughly familiar with the techniques of 3D and 4D imaging. Read this entire chapter before performing 3D or 4D imaging.

Volume imaging is a collection of sequential, parallel 2D-mode images also referred to as a volumetric data set. You can acquire the data in a single acquisition (3D) or a continuous acquisition (4D). The volumetric data set creates a volume rendering and multiplanar reconstructions.

Multiplanar reconstructions are two-dimensional image planes of the volume for simultaneous visualization of orthogonal scan planes and include imaging planes not obtainable by adjusting the transducer position during 2D-mode imaging, for example, the coronal plane. A multiplanar reconstruction is also referred to as a plane or an arbitrary slice of the volume.

Volume imaging includes settings and tools for defining the multiplanar reconstructions and volume, including shaping the volume, highlighting surface features, and repositioning planes and volumes for visualization of otherwise occluded anatomical structures. The multislice function also provides simultaneous review of the anatomy of interest in parallel slices.

You can activate 3D or 4D imaging only with compatible transducers and studies.

See also: For a list of compatible transducers and supporting studies, refer to Appendix A in the Instructions for Use.

Workflow

The clinical workflow for 3D/4D imaging includes setup, acquisition, and post-acquisition steps.

Step 1: Setting Up for Acquisition

- Optimize the image while scanning during 2D-mode or 2D-mode with color.
 - Select an image preset.
 - Adjust the imaging parameters for the transducer and exam.
- Select the image optimization settings for 3D volume acquisition.
- Define the volume and planes.
 - Size and position the region of interest and volume of interest to acquire large or small areas within the 2D field of view and volume rendering.
 - Change the curvature of the cut plane.
 - Adjust the orientation of the volume and multiplanar reconstructions.

Note: The area of interest in 3D/4D setup matches the orientation of the 2D-mode image.
- Select the image quality and adjust the sweep angle.

Step 2: Acquiring and Viewing the Volume

- During 4D imaging, the ultrasound system processes the imaging data and simultaneously displays the volume and multiplanar reconstructions in real-time.
 - Optimize 4D images, for example, resize the volume of interest, shape the face of the volume by changing the curvature of the cut plane, and adjust imaging parameters to emphasize volume data.
 - Temporarily pause 4D acquisition to review the volume in CINE playback.
- During 3D imaging, the transducer performs a single sweep and then the ultrasound system processes the imaging data and displays the volume and the multiplanar reconstructions.

Note: You cannot pause or optimize the image during 3D acquisition.
- Store volumes and clips or print images.

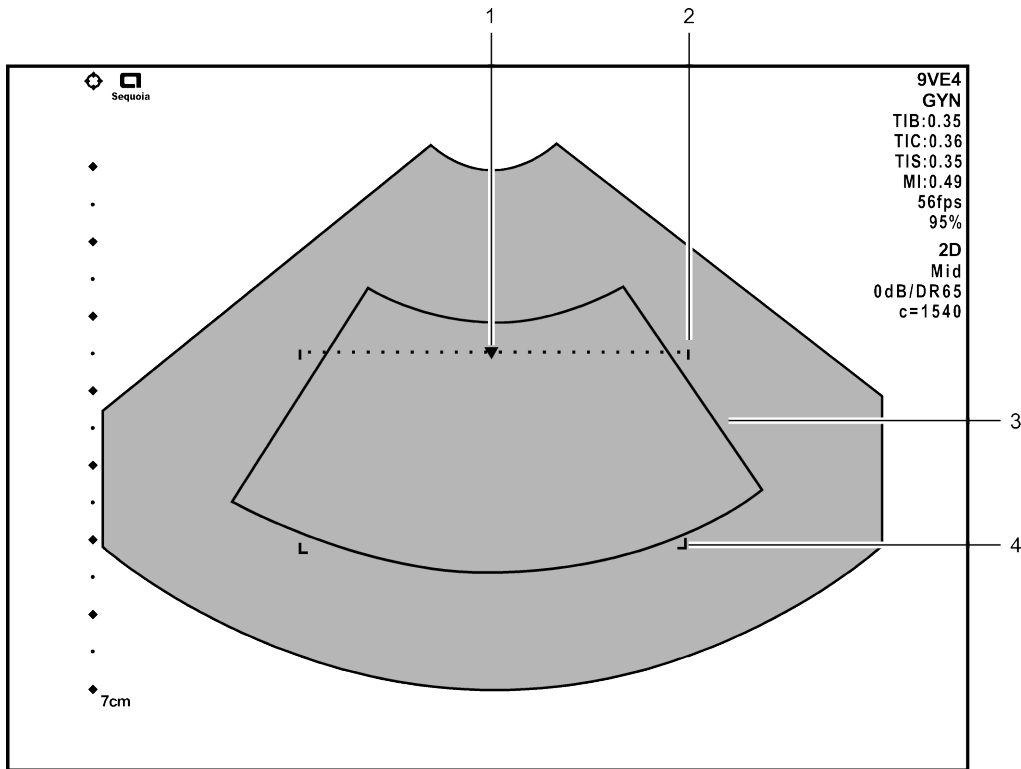
Step 3: Reviewing and Storing Volumes

- Review the volume in CINE playback.
- View and define anatomical structures in the multiplanar reconstructions and volume.
- Measure structures in the multiplanar reconstructions.
- Annotate multiplanar reconstructions or volumes.
- Store volumes and clips or print images.

Setting Up for Volume Acquisition

Prepare for volume acquisition by scanning and optimizing the real-time 2D image. You can select an image preset and adjust the imaging parameters for the transducer and exam.

Note: You can magnify (zoom) and pan an image during the 3D/4D setup step. If 2D-mode with HD zoom is enabled, the ultrasound system exits zoom when volume imaging mode is activated.



Example of a 3D/4D imaging setup screen.

- 1 Cut plane defines the face of the volume from the view indicated by a blue line spanning the region of interest.
Position the anchor point to adjust the curve of the cut plane to exclude extraneous anatomy and include relevant anatomy in the acquired volume.
- 2 Blue markers on the cut plane indicate the borders of the volume of interest.
- 3 Region of interest (ROI)
A blue outline indicates the region of interest.
- 4 Volume of interest (VOI)
The distance between the top and bottom blue markers indicate the depth of the volume of interest within the region of interest.

To set up for acquisition of 3D/4D volumes:

Prerequisite: Connect a 3D/4D transducer, select a study, and then activate 2D-mode imaging.

See also: For a list of compatible transducers and supported studies, refer to Appendix A in the Instructions for Use.

1. Optimize the 2D-mode image.
See also: For information about optimizing 2D-mode images, refer to Chapter 8 in the Instructions for Use.
2. To activate color imaging with a compatible transducer, press **C**, tap **Color**, and then optimize the color imaging parameters.
See also: For information about optimizing color images, refer to Chapter 8 in the Instructions for Use.
3. Press **3D/4D**.
 The touch screen displays the **3D/4D Setup** tab.
4. To adjust the rendering method, tap a selection:
 - **Surface** enhances visualization of the volume with a surface of varying opacity.
 - **Vascular** enhances visualization of the volume with the minimum intensity projection, for example, for viewing vascular structures.
 - **Skeletal** enhances visualization of the volume with the maximum intensity projection, for example, for viewing skeletal structures.
 - **LightSource** enhances visualization of the volume with translucent lighting.
5. Define the area of interest for acquiring the volume.
 - a. Press a trackball key, if necessary.
 - **Position** indicates the trackball is assigned to repositioning the area of interest. A solid blue outline indicates the ROI. Blue markers indicate the VOI.
 - **Size** indicates the trackball is assigned to resizing the area of interest. A dotted blue outline represents the ROI. Blue markers indicate the VOI.
 - **Curve** indicates the trackball is assigned to adjusting the curve of the cut plane to exclude extraneous anatomy. A blue line spanning the top of the area of interest indicates the curve of the cut plane. A dotted blue line indicates the anchor point of the curve is active.
 - b. Roll the trackball to adjust the position or size of the ROI and VOI or adjust the curve of the cut plane and then press a trackball key.
6. To change the resolution of the image, rotate **Quality**.
 - **Low** generates a low-resolution image with the fastest sweep speed.
 - **Mid** generates an optimized image with a moderate sweep speed.
 - **High** generates a high-resolution image with the slowest sweep speed.
7. To adjust the range of acquisition or sweep angle in degrees, if necessary, rotate **Angle**.
 The angle of the sweep indicates the elevation of the anatomical structure and corresponds to plane B.

Acquiring Volumes

Each 3D/4D acquisition produces a volume rendering and multiplanar reconstructions.

3D Acquisition

During 3D acquisition, you scan while the ultrasound system acquires volume data. When the acquisition is complete, the ultrasound system processes the volume data and displays a volume and multiplanar reconstructions.

To acquire a 3D volume:

Prerequisite: Set up for acquisition of a 3D volume.

1. Tap **3D**.
2. Press **UPDATE** to start 3D acquisition.
The touch screen displays: **Acquisition in progress...**
The ultrasound system acquires and then displays the volume and multiplanar reconstructions on the image screen and the **3D** tab on the touch screen.
3. To cancel imaging and set up for volume acquisition, press **UPDATE**.
4. To stop imaging and display a partial volume, press **FREEZE**.
Note: Pressing **FREEZE** again discards the partial volume and restarts the setup step for volume acquisition.
5. To activate 4D imaging, tap **4D**.
Note: A sweep angle setting of greater than 80° changes to the setting of 80° when activating 4D imaging.
6. To exit 3D/4D imaging, press **2D**. Or, press **3D/4D**.

4D Acquisition

During 4D acquisition, the ultrasound system processes the volume data and displays a volume rendering, providing a real-time view of the three-dimensional image as you scan.

You can adjust settings during 4D acquisition to enhance visualization of anatomy within the volume of interest. You can also temporarily pause volume acquisition to play back and review CINE data at any time during 4D acquisition.

Use the configuration settings to activate CINE when you freeze the image.

To acquire a 4D volume:

Prerequisite: Set up for acquisition of a 4D volume.

1. Tap **4D**.
2. Press **UPDATE** to start 4D acquisition.
The ultrasound system continuously acquires and displays the volume and multiplanar reconstructions on the image screen.
3. Review and optimize the volume during acquisition.

Note: The following tasks are described on the page indicated within this chapter.

To	Page
Adjust the resolution and sweep speed	A7-6
Adjust the range of acquisition or sweep angle	A7-6
Change the rendering method	A7-6
Readjust the imaging area of the volume data	A7-6
Change the image orientation to visualize anatomical structures within the volume	A7-12
Change the layout of the image screen	A7-15
Magnify an area of interest	A7-16
Adjust the imaging parameters	A7-17
Step through the volume	A7-27

4. To activate 3D imaging, tap **3D**.
5. To exit 4D imaging and display the 3D/4D imaging setup screen and the **3D/4D Setup** tab, press **UPDATE**.
6. To complete or temporarily pause 4D imaging and access CINE playback, press **FREEZE**.
Note: Pressing **FREEZE** again exits CINE playback and resumes 4D acquisition.
7. To exit 3D/4D imaging, press **2D**.

Reviewing a Volume in CINE Playback

You can review a volume in CINE playback from a paused or completed 4D acquisition, or a retrieved stored volume.

See also: For additional information on CINE, refer to Chapter 7 in the Instructions for Use.

To redefine the beginning or ending position of CINE playback:

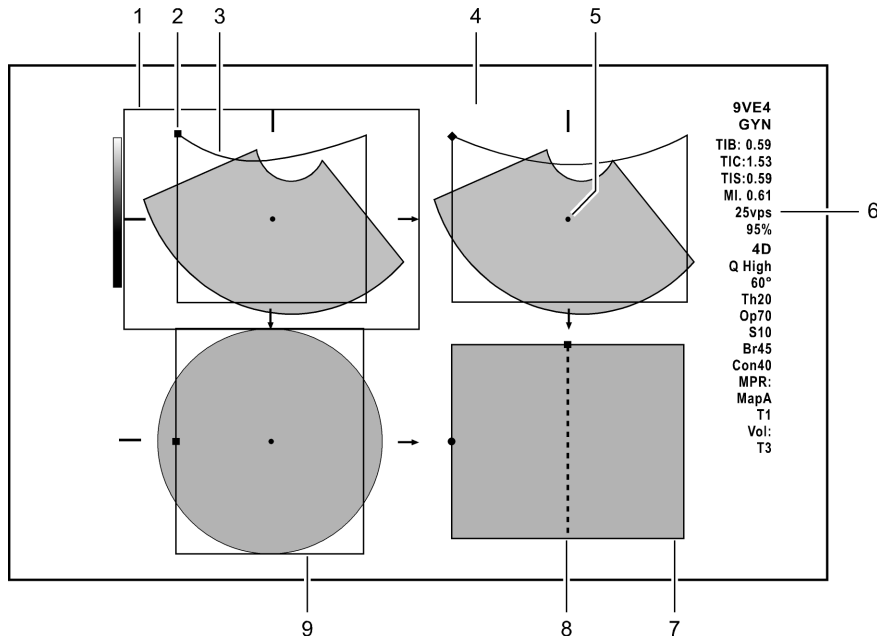
(Available only on a frozen 4D volume)

1. Press a trackball key, if necessary.
 - **Cine** indicates the trackball is assigned to viewing the CINE data frame by frame.
 - **Margins** indicates the trackball is assigned repositioning the beginning and ending for playback.
2. Roll the trackball to select the CINE frame.
3. Tap a selection.
 - **Left Margin** identifies the beginning position of the CINE data.
 - **Right Margin** identifies the ending position of the CINE data.
4. Press a trackball key to confirm the position.
5. Repeat steps 2 through 4 to define the other position.

Visualizing Anatomical Structures

You can define the multiplanar reconstructions (MPRs) and volume to enhance the visualization of anatomical structures, for example, you can change the surface of the volume, rotate planes and volumes, remove data obscuring anatomical structures, and reshape the face of the volume.

A dot on each orthogonal plane identifies the point of intersection of the multiplanar reconstructions. In the following 4:1 layout, the two-dimensional slices of the volume represented in planes A, B, and C align to the center point of the volume.

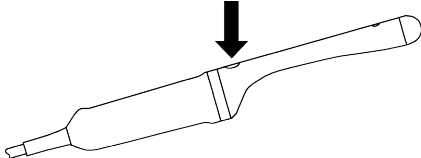
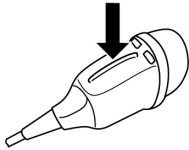


Example of the 4D post-acquisition screen.

- 1 Active plane
A white outline surrounds the active multiplanar reconstruction.
- 2 Plane A is the acquisition plane and the sagittal view
- 3 Cut plane
The cut plane represents the view planes of the volume rendering.
- 4 Plane B is the elevation plane and the transverse view.
- 5 Intersection point
A dot on each orthogonal plane identifies the point of intersection of the multiplanar reconstructions.
In the 4:1 layout, the two-dimensional slices of the volume represented in planes A, B, and C align to the center point of the volume.
- 6 Acquisition rate in volume per second (**vps**)
- 7 Volume rendering (**VR**) or volume
- 8 Slice position
A yellow dotted line on the volume rendering represents the position of the slice in the active plane. The dotted line is not present in 1:1 layout.
- 9 Plane C is the coronal view.

Orientation Markers Legend

The orientation of the volume of interest and the following orientation markers on the multiplanar reconstructions provide information about the view direction and the relative position of the volume to the acquisition plane:

Marker	Description	View Direction
■	Indicates the starting position of the acquisition. The position of the square marker on the image aligns to the orientation marker on the transducer.	Up/Down Down/Up Front/Back Back/Front
 Example of the orientation marker on the 9VE4 transducer.		
 Example of the orientation marker on the 7VC2 transducer.		
●	Indicates the end of the elevational sweep.	Up/Down Down/Up Left/Right Right/Left
◆	Indicates the near field of the acquisition.	Front/Back Back/Front Left/Right Right/Left

Rotation Indicators Legend

During rotation of multiplanar reconstructions, lines display in two planes indicating the axis of rotation and the view direction is indicated by an arrowhead. The third plane shows an intersection point. Rotation around the intersection point is indicated by a circle around the intersection point.



Example of the intersection point during rotation.

Active MPR	Axis and Color
Plane A	A red line represents the X axis. A blue line represents the Y axis. A green line represents the Z axis.
Plane B	A green line represents the X axis. A blue line represents the Y axis. A red line represents the Z axis.
Plane C	A red line represents the X axis. A green line represents the Y axis. A blue line represents the Z axis.

Positioning and Resizing the Volume

You can reposition and resize the volume of interest.

To	Do This
Reposition or resize the volume of interest	- Press a trackball key, if necessary. Position indicates the trackball is assigned to repositioning the volume of interest. Size indicates the trackball is assigned to resizing the volume of interest. Note: You cannot resize the volume in the 1:1 layout. - Roll the trackball to adjust the size or position and then press a trackball key.
Change the direction of the volume by 180 degrees	Tap Flip.
Synchronize the volume with the active plane	Tap Sync. Note: During 4D acquisition, the volume synchronizes with plane A.
Change the view direction of the volume	- Tap a selection: Up/Down displays the top of the volume Down/Up displays the bottom of the volume Front/Back displays the front of the volume Back/Front displays the back of the volume Left/Right displays the left side of the volume Right/Left displays the right side of the volume
Invert the dark and bright areas of the 2D-mode data in the volume to enhance the visualization of internal surfaces	Tap Inversion. When inversion is enabled, the ultrasound system displays hyperechoic areas as dark and hypoechoic areas as bright, for example, for visualization of cystic areas within a volume.

Showing or Hiding the Volume of Interest

(Available only during 3D/4D setup and volume review)

3D Acquisition

- Show the volume of interest: Acquire only the anatomy within the region of interest (ROI) and volume of interest (VOI) with lines identifying the boundaries of the region of interest, volume of interest, and cut plane.
- Hide the volume of interest: Acquire the full field of view for the volume.

3D Acquisition Review

- Show the volume of interest: Show the lines identifying the boundaries of the volume of interest and cut plane.
- Hide the volume of interest: Hide the lines identifying the boundaries of the volume of interest and cut plane.

To show or hide the volume of interest:

- Tap **VOI**.

Rotating the Volume and Multiplanar Reconstructions

Rotation of the volume enables visualization of an anatomical structure from any angle. The volume rotates independently of the multiplanar reconstructions.

During rotation of a multiplanar reconstruction, the rotation of the three orthogonal planes is synchronized along the axis of the active plane. You can synchronize the position of the volume to the position of any multiplanar reconstruction.

To	Do This
Freely rotate a plane or volume	▪ Select a plane or the volume and then rotate a control: – X rotates along the x axis – Y rotates along the y axis – Z rotates along the z axis
Rotate the volume to the home position	▪ Tap 0°. Note: The home position is a factory-defined setting for the active exam when the volume is in an up or down view direction. In other view directions, the home position synchronizes to the multiplanar reconstructions.
Rotate the volume 90 degrees in a clockwise direction from the home position	▪ Tap 90°.
Rotate the volume 180 degrees from the home position	▪ Tap 180°.
Rotate the volume 90 degrees in a counter-clockwise direction from the home position	▪ Tap 270°.

Changing the Image Screen Layout

You can change the layout of the image screen.

Use the configuration settings to specify the initial display layout for the multiplanar reconstructions and volumes during and after volume acquisition.

To	Do This
Display planes A, B, and C and the volume	Tap the 4:1 layout icon. 
Display plane A on the left and the volume on the right	Tap the 2:1 layout icon. 
Display planes A and B and the volume	Tap the 3:1 layout icon. 
Display the volume in the center of the image screen	Tap the 1:1 layout icon. 
Change the image in the 1:1 layout	- Tap a selection: – A displays plane A. – B displays plane B. – C displays plane C. – VR displays the volume.

Magnifying or Panning an Area of Interest

You can magnify or pan an area of interest in the volume and multiplanar reconstructions during 3D/4D setup, 4D acquisition, or review.

The planes and volume rendering synchronize at the same magnification.

To magnify an area of interest:

1. Rotate **ZOOM** to adjust the magnification level.
The system displays a **Z** on the image screen below the image.
2. To cancel magnification, press **ZOOM**.

To pan the volume or a multiplanar reconstruction:

1. Press a trackball key, if necessary.
 - **Pan** indicates the trackball is assigned to repositioning the image.
 - **Set** indicates the trackball is assigned to anchoring the position of the image.
2. Roll the trackball to reposition the image and then press a trackball key.

Adjusting Imaging Parameters

You can adjust the imaging parameters to optimize the volume, for example, to create a soft, sculptured appearance for highlighting surface features.

To adjust imaging parameters:

1. To optimize multiplanar reconstructions, tap **MPR** and then adjust the imaging parameters.
2. To optimize the volume, tap **VR** and then adjust the imaging parameters.
3. To optimize MPRs or volumes during color imaging, tap a selection to emphasize the blood flow, tissue, or both, and then adjust the imaging parameters.
 - **2D + Color** combines the tissue and blood flow.
 - **2D Only** emphasizes the tissue.
 - **Color Only** emphasizes the blood flow.

Note: Imaging selections available for optimization are indicated on the touch screen in color; dimmed selections are unavailable.

To	Do This
Adjust the overall contrast resolution (dynamic range)	(Available only for multiplanar reconstructions) ▪ Rotate DR.
Select a processing curve for assigning echo amplitudes to gray levels in the image	(Available only for multiplanar reconstructions) ▪ Rotate Map.
Add color to the gray map	Note: Adjust the tint separately for multiplanar reconstructions and for the volume. ▪ Rotate Tint.
Adjust the threshold of the opacity curve	(Available only for volumes) ▪ Rotate Threshold. The ultrasound system removes 2D-mode data from the volume with values lower than the selected threshold.
Change the percentage of opacity to smooth image contours	(Available only for volumes) ▪ Rotate Opacity.
Adjust the smoothness of the surface	(Available only for volumes) ▪ Rotate Smooth.
Adjust the percentage of brightness of 2D-mode data	(Available only for volumes) ▪ Rotate Brightness.
Adjust the percentage of contrast	(Available only for volumes) ▪ Rotate Contrast.

To	Do This
Enhance structures and lighting in the volume	Note: When FlexPlane is active, selections are only available for thickness settings greater than zero. ▪ To enhance visualization of the volume with a surface of varying opacity, tap Surface. ▪ To enhance visualization of the volume with the maximum intensity projection, for example, for viewing skeletal structures, tap Skeletal. ▪ To enhance visualization of the volume with the minimum intensity projection, for example, for viewing vascular structures, tap Vascular. ▪ To enhance visualization of the volume with translucent lighting, tap LightSource.
Apply a hue to the volume	▪ Rotate Tint.
Change the resolution of the multiplanar reconstructions and the volume	▪ Rotate Quality.
Adjust the range of the acquired elevation in the multiplanar reconstructions and the volume	▪ Rotate Angle.
Select a processing curve for assigning velocity ranges to color ranges in the multiplanar reconstructions and volume	▪ Rotate Color Maps.
Adjust the threshold of the opacity curve during color imaging	▪ Rotate C. Threshold. The ultrasound system removes color data from the volume with values lower than the selected threshold.
Change the percentage of opacity to smooth image contours during color imaging	▪ Rotate C. Opacity.
Adjust the amount of color pixel information overlaying the 2D image	▪ Rotate Priority.

Repositioning the Light Around the Volume

(Available only for the light source rendering method or selection)

You can rotate the light 360° around the volume to illuminate surfaces and enhance shadows.



Example of the light direction icon repositioned by rolling the trackball.

To activate and reposition the direction of the light around the volume:

1. Tap **LightSource**.
An icon indicates the feature is active. A gray arrow indicates the light is off.
2. Tap **Light**. Or, activate the 1:1 image screen layout.
An orange arrow displays on the icon for repositioning the direction of light around the volume.
3. Drag the arrow to reposition the direction of the light.
 - **Direction** indicates the trackball is assigned to repositioning the direction of the light.
 - **Set** anchors the position of the light.
4. To deactivate the light:
 - Tap **Light**.
 - Activate an image screen layout: **2:1**, **3:1**, **4:1**.
 - Press **FREEZE**.

Restoring Original Acquisition Settings

You can restore the original acquisition settings and factory-default settings of the volume and multiplanar reconstructions.

To restore the settings:

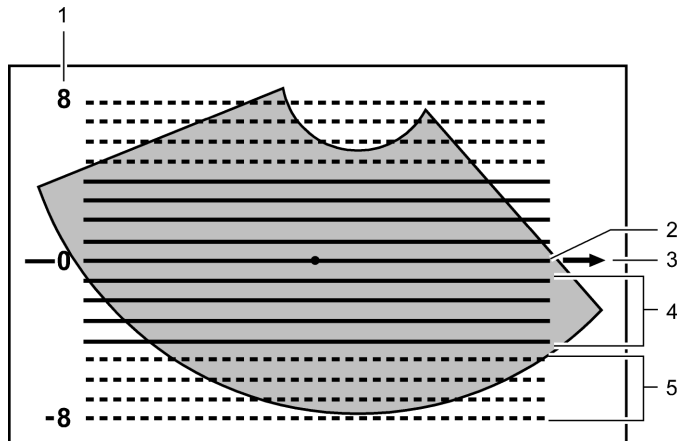
- To restore the position, rotation, and slice to the factory-default settings, tap **Reset Orientation**.
- To straighten the curve of the cut plane, tap **Reset Curve**.
- To reset all imaging parameters, the rendering method, orientation, layout, and curve to the acquisition setup settings, tap **Reset All**.

Displaying Parallel Slices with Multislice

The multislice function enables simultaneous review of anatomy of interest in multiple parallel slices of a multiplanar reconstruction.

You can view slices of a 3D volume or freeze and then view a 4D volume CINE sequence with the multislice function.

The point of intersection is the location of the central slice and is relative to the active multiplanar reconstruction. Parallel slices displaying in the multislice layout are planes in front of and behind the central slice.



Example of the reference MPR with lines representing the slices available for viewing.

- 1 Numbers on the lines correspond to the numbers on the slices shown in the layout.
- 2 A yellow line indicates the position of the active slice.
In this example, the active slice is labeled with a zero to indicate the relationship of the other slices available for viewing.
- 3 View direction
- 4 White lines indicate the slices shown in the selected layout.
- 5 Dotted lines indicate slices not currently shown in the selected layout.
To view additional slices, adjust the range or change the layout.

To activate Multislice:

- Tap the **Multislice** tab.

To	Do This
Change the reference plane	▪ Tap a selection: – A displays plane A. – B displays plane B. – C displays plane C.
Change the number of slices displayed on the image screen	▪ Tap a selection: – 4:4 layout displays a reference MPR and 15 parallel slices.  – 3:3 layout displays a reference MPR and eight parallel slices.  – 2:2 layout displays a reference MPR and three parallel slices.  – 2:1 layout displays a reference MPR and the selected slice.  – 1:1 layout displays the selected slice in full-screen layout. 
View the multiple slice layout or the full-screen layout	▪ Double-click a slice.
Add or remove a pair of slices on either side of the central slice	▪ Rotate Slices.
Adjust the distance between slices for visualizing anatomy	▪ Rotate Distance.
Reposition the slice in the reference image	▪ Rotate Position of Slices.
View a range of parallel slices within the volume	▪ Rotate Range Position.
Traverse the slices in the active multiplanar reconstruction	▪ Rotate 3D/4D.

To	Do This
Select a slice	1. Tap the pointer on the touch screen to display the cursor. 2. Roll the trackball to select a slice and then press a trackball key. – Pointer indicates the trackball is assigned to selecting a slice.
Reposition a slice	1. Press a trackball key, if necessary. – Position indicates the trackball is assigned to repositioning the range of slices to visualize the target anatomy. 2. Roll the trackball to reposition a slice and then press a trackball key.
Rotate the slices	▪ Rotate a control: – X rotates along the x axis. – Y rotates along the y axis. – Z rotates along the z axis.

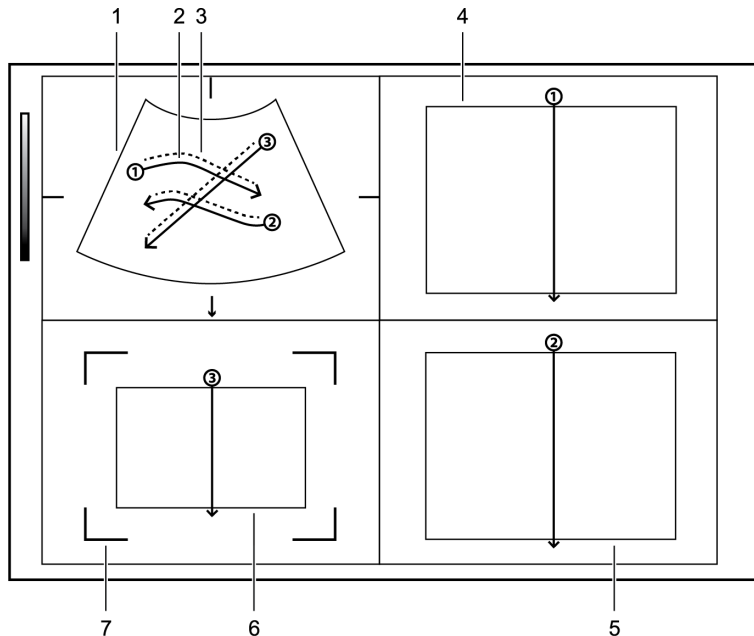
Creating Slice Images with FlexPlane

(Available only on a frozen 3D volume or during volume review)

Use the FlexPlane function to create slices of a reference image for review of anatomy.

You can draw up to three orthogonal or nonorthogonal slices using a line, trace, or spline on the reference image. As you draw on the reference image, an image extends in the active slice.

You can change the thickness of the slice to emphasize internal structures and tissue.



Example of the FlexPlane image screen in 4:1 layout. The initial view is a 2:1 layout with the reference image on the left and the slice on the right.

- 1 Reference image
- 2 Solid line is the position of the slice
The color of the line corresponds to the slice.
 - A number identifies the beginning of the line and the corresponding slice.
 - The arrow identifies ending of the line and the view direction.
 - The arrow identifies the view direction of the line.
- 3 Dotted line is the thickness indicator
The color of the line corresponds to the slice.
 - The distance between the dotted line and the solid line indicates the thickness of the slice.
 - The thickness is zero when a dotted line is not shown.
- 4 **Slice 1**
The color magenta identifies the position of the first slice.
- 5 **Slice 2**
The color green identifies the position of the second slice.
- 6 **Slice 3**
The color blue identifies the position of the third slice.
- 7 Active slice
Markers identify the active slice, and the color of the markers correspond to the slice.

To activate FlexPlane:

1. Select the reference image.
 - a. Tap the **3D** tab.
 - b. Select a multiplanar reconstruction.
 - To select plane A, tap **A**.
 - To select plane B, tap **B**.
 - To select plane C, tap **C**.
2. Tap the **FlexPlane** tab.

To	Do This
Select or add a slice	▪ Tap a selection. – Slice 1 corresponds to the first plane in the reference image. – Slice 2 corresponds to the second plane in the reference image. – Slice 3 corresponds to the third plane in the reference image.
Drawing a straight line	1. Tap Line. 2. Roll the trackball to position the marker and then press a trackball key to anchor the beginning point of the line. 3. Roll the trackball to the ending point of the line and then press a trackball key.
Trace a structure	1. Tap Trace. 2. Roll the trackball to position the marker and then press a trackball key to anchor the beginning point of the trace. 3. Roll the trackball to trace the structure and then press a trackball key to anchor the ending point of the trace.
Draw a line with curved segments	1. Tap Spline. 2. Roll the trackball to position the marker and then press a trackball key to anchor the beginning point of the spline. 3. Roll the trackball to trace the structure and then press a trackball key to place an inflection point. 4. Double-click a trackball key to anchor the ending point of the spline.
Delete a segment of a spline or trace	▪ Tap Undo.
Redraw a slice	▪ Tap Redraw. The ultrasound system removes the solid and dashed lines for the selected slice from the reference image and deletes the selected slice.

To	Do This
Reposition the line or image	1. Press a trackball key, if necessary. – Line indicates the trackball is assigned to adjust the position of the line on the reference image and selected slice. – Image indicates the trackball is assigned to adjust the position of the reference image and selected slice. 2. Roll the trackball.
Show or hide all lines on a slice	▪ Tap Hide Line.
Rotate the line clockwise or counterclockwise on the selected slice	▪ To rotate a slice in increments of 1 degree, slowly rotate Rotate Line. ▪ To rotate a slice in increments of 5 or 45 degrees, rotate Rotate Line.
Rotate the selected slice	▪ To rotate a slice in increments of 1 degree, slowly rotate Rotate Slice. ▪ To rotate a slice in increments of 5 or 45 degrees, rotate Rotate Slice. ▪ To rotate a slice 90 degrees in a clockwise position from the home position, tap 90°. ▪ To rotate a slice 180 degrees from the home position, tap 180°. ▪ To rotate a slice 90 degrees in a counter-clockwise direction from the home position, tap 270°. ▪ To reset the original position, tap 0°.
Change the thickness of the slices	▪ Rotate Thickness to select a setting: – Off indicates a thickness of zero. – Thickness settings are in 0.5 mm increments and range from 0.5 mm to 20 mm.
View the opposite side of a slice	(Available only for thickness settings greater than zero) ▪ Tap Flip Line. The system repositions the dotted line to the opposite side of the solid line.

To	Do This
Restore the acquired position of the reference image	▪ Tap Reset Orientation. Note: Zoomed slices, rotated slices, and rotated lines are not restored to their original orientation.
Remove all lines from the reference image and delete all slices	▪ Tap Clear All.
Change the image screen layout	Note: You cannot change the image screen layout when drawing is in progress. ▪ Tap a selection: – 4:1 layout displays a reference image and three slices.  – 2:1 layout displays a reference image and the selected slice.  – 1:1 layout displays the selected slice in full-screen layout.  Note: You can select 1:1 layout after the line is complete.
Adjust the brightness	▪ Rotate Brightness.
Adjust the contrast	▪ Rotate Contrast.
Adjust the tint	▪ Rotate Tint.
Select a processing curve for assigning echo amplitudes to gray levels	▪ Rotate Map.

Removing Data from a Volume

Remove data to enable visualization of anatomical structures within a volume. Rotation of the volume and planes can help you visualize an anatomical structure and determine the position of the shapes to draw and remove from the volume.

Shaping a Volume with Cut Plane

The cut plane function enables visualization of anatomy of interest within a volume, for example, a lesion that is visible in a multiplanar reconstruction, but is not visible on the surface of the volume.

You can define a cut plane on either the acquisition plane or the volume rendering. Locate the anatomy of interest by traversing the multiplanar reconstructions (MPRs) along the orthogonal axis through the volume. Traversing the MPR is also called stepping through the volume.

To traverse the slices in a multiplanar reconstruction:

- Rotate **3D/4D**.

Drawing Shapes to Remove Data from the Volume

You can remove data obscuring the anatomical structures in a volume.

Use the following editing tools to remove data from a multiplanar reconstruction or a volume:

- **Line** removes large portions of the perimeter of a multiplanar reconstruction or volume, for example, to remove reverberation from the image. The tool removes data from sides of the image relative to the drawn segment.
- **Open Spline** removes shaped objects along the perimeter of a multiplanar reconstruction or the face of the volume, for example, to remove data occluding the view.
- **Closed Spline** removes entire objects within the multiplanar reconstruction or volume.

A blue line indicates the drawing of a shape is in progress. A yellow line indicates the drawn shape is complete, and the data is ready for removal. A cursor in the shape of a scissor identifies the area of the volume to remove.



Example of the cursor for removing data from the volume.

Upon completion of an edit, the ultrasound system removes the clipped region from the volume and the removed area is dimmed on the multiplanar renderings.

To remove data from the volume:

1. Tap the **Editing** tab.
2. Tap the **Volume Editing** tab.

To	Do This
Remove data using the line tool	1. Tap Line. 2. Position the cursor and then press a trackball key to anchor the beginning point of the line. 3. Position the cursor and then press a trackball key to anchor the ending point of the line. The beginning and ending points extend to the edges of the box. 4. Position the cursor over the area to remove and then press a trackball key.
Remove data using the open spline tool	1. Tap Open Spline. 2. Position the cursor and then press a trackball key to anchor the beginning point of the spline. 3. Roll the trackball to trace the structure and then press a trackball key to place an inflection point. 4. Press UPDATE to close the spline. Or, double-click a trackball key. The beginning and ending points extend to the edges of the box. 5. Position the cursor over the area to remove and then press a trackball key.
Remove data using the closed spline tool	1. Tap Closed Spline. 2. Position the cursor and then press a trackball key to anchor the beginning point of the spline. 3. Roll the trackball to trace the structure and then press a trackball key to place an inflection point. 4. Press UPDATE to close the spline. Or, double-click a trackball key. The trace closes by extending a line from the ending marker to the beginning marker. 5. Position the cursor over the area to remove and then press a trackball key.
Undo the most recent edit	▪ Tap Undo Last .
Redo the most recent edit	▪ Tap Redo Last .
Remove all edits	▪ Tap Undo All .

Animating a Volume

You can define the range, direction, and speed of animation to view the volume.

To animate the volume:

1. Rotate the volume and then zoom the image, if necessary.
See also: For information about rotating and positioning the volume, refer to page A7-14.
2. Tap the **Editing** tab.
3. Tap the **Animation** tab.

To	Do This
Establish the beginning and ending of the animation	1. Press a trackball key, if necessary. – First indicates the trackball is assigned to repositioning the volume to the beginning position of the animation. – Last indicates the trackball is assigned to repositioning the volume to the ending position of the animation. 2. Roll the trackball to reposition the volume and then press a trackball key to anchor the position.
Select the direction of animation	▪ To animate the volume repeatedly from the beginning-to-ending position, tap the begin-to-end icon.  ▪ To animate the volume from the beginning-to-ending position and then ending-to-beginning position, tap the back-and-forth icon. 
Change the speed of animation	▪ Rotate the Speed control to select a setting: – Slow indicates a slower animation speed. – Medium indicates a moderate animation speed. – Fast indicates a faster animation speed.
Play or pause the animation	▪ To play the animation, tap the play icon.  ▪ To pause the animation, tap the pause icon. 
Stop the animation and view the original orientation of the volume	▪ Tap Reset Orientation. Note: Magnification of the image is retained if zoom is enabled.

Storing and Printing Images

You can convert a volume to a DICOM multi-frame clip and store clips of the currently displayed volume.

Images are captured and stored as single-frame images or within the series object containing the volume. Series objects are accessible from the patient browser.

You can print individual images of a multiplanar reconstruction or a volume. A volume is a sequence of multiple-frame images and cannot be printed as a range of images.

Use the patient browser to transfer volumes and their representative images to external storage devices.

See also: For additional information on capturing images and clips, refer to Chapter 5 in the Instructions for Use.

See also: For information on recording a patient study, refer to Chapter 13 in the Instructions for Use.

To store a volume as a clip:

(Available only for 4D volumes)

1. Press **CLIP**. Or, press the control assigned to the clip store function.

The system displays an icon on the image.



2. To specify a duration of a recorded clip, tap **Clip Length** and then select a setting, for example, five seconds.
3. To change the direction for capturing data, tap **Capture Type** and then select a setting, for example, prospective for newly acquired images.

Use the configuration settings to define additional clip capture settings for 4D volumes.

To store or print an image:

Note: The volume is not stored when you store or print an image. To review the volume at a later time, you must store the volume.

Prerequisite: A printer is connected to the ultrasound system.

- To save an individual image, press **IMAGE**. Or, press the control assigned to the store function.

The system displays an icon on the image.



- To send a screenshot of the image to the printer, tap the print icon. Or, press the control assigned to the print function.



Example of the print icon.

Exporting a Volume as an Image

See also: For information about exporting and importing patient data, refer to Chapter B2 in this manual.

Retrieving Stored Volumes

You can select a patient study from the local database for review of multiplanar reconstructions and volume renderings.

See also: For information on loading a patient study for review, refer to Chapter 5 in the Instructions for Use.

Exporting and Importing Acoustic Data

Use the DICOM configuration settings for exporting and importing acoustic data with images or clips.

Performing a Measurement

You can perform a 2D-mode measurement on an individual multiplanar reconstruction or a slice while an acquisition is frozen, after acquisition is complete or during review. You cannot perform a measurement on a volume.

See also: For information on performing a measurement, refer to Chapter 10 in the Instructions for Use.

Creating a User-Defined Exam

You can create a user-defined exam to capture the optimized 3D and 4D imaging settings.

See also: For information on creating or editing a user-defined exam, refer to Chapter 8 in the Instructions for Use.

B1 Review

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Overview

Use the review function to view and evaluate images from the current exam or previous exams. Images printed, but not stored, during a patient study are also available during review.

See also: For information on reviewing volumes, refer to Chapter A7 in this manual.

See also: For information on playing back CINE data and clips during review, refer to Chapter 7 in the Instructions for Use.

Activating Review

When you activate review, the ultrasound system displays thumbnails of images saved with the study. You can insert images during review of an active study or append a stored study.

To review an active study:

1. Tap **Review**. Or, double-click a thumbnail.
2. To exit review, press **2D**.

To review a stored study:

Prerequisite: Import the patient study stored from an external storage device to the local database on the ultrasound system.

1. Tap **Patient**.
2. Tap **Patient Registration** and then click **Local Database**.
3. Click the stored patient study.
4. To review a stored patient study, tap **Load to Review**.
5. To review a stored patient study and insert images:
 - a. Tap **Append Study**.
 - b. Tap **Start Study**.
6. To exit review, press **2D**.

Reviewing Images

You can view archived reports and insert measurements and annotations on an image during review.

To review images:

1. Activate review.
2. To select images for review:
 - To select a single image, tap **Single Select** and then select the required image.
 - To select multiple images, tap **Multiple Select** and then select each required image.
 - To select all images, tap **Select All**.
 - To cancel the current selection of images, tap **Select None**.

To	Do This
Display an image in full-screen format	▪ Double-click a thumbnail.
Print an image	1. Select the image and then press the control assigned to the print function. 2. To send the image to the film sheet, select the image and then tap Copy to Film.
Store a copy of the currently displayed image as a DICOM image	(Available only in full-screen format during review of an active study) ▪ Press the key assigned to the store function.
Select the previous or next thumbnail	▪ Rotate Page.
Select the display format	▪ Tap a selection, for example, 4:1.
Show or hide a protocol view name	▪ Tap Protocol Text. – On displays the protocol view name on the image – Off hides the protocol view name on the image
Sort protocol images	▪ Tap Sort By. – Time displays the images in the sequence captured during the protocol. – View displays images in the sequence specified in the configuration settings.
Mark or unmark images for attention	▪ Select an image and then tap Flag. The system displays the following icon on the image.
	

To	Do This
Mark or unmark images for deletion	1. Select the images. 2. To mark images for deletion, tap Delete Image(s). Or, press DELETE. The system displays the following red icon on the image and removes the images from the exam when you exit review.  3. To unmark images for deletion, tap Delete Image(s).
Save a screen capture of the currently displayed images (secondary DICOM clip capture)	(Available only during review of an active study) ▪ Press the key assigned to the store function.
Magnify an image	▪ Select the required image and then rotate ZOOM.

Comparing Images

You can compare ultrasound images for the active exam and images and clips from a stored exam.

To compare images and clips:

1. Activate review.
2. Tap **Multiple Select** and then select images for comparison.
3. Tap **Compare**.

The ultrasound system displays the images on a single page in the sequence the images were selected.

To	Do This
Insert an image for comparison	▪ Click a thumbnail and then click a location on the review screen.
Hide an image currently selected for comparison	1. Click the image. 2. Tap Remove .
Exit the compare function	▪ Tap Compare .

B2 Export and Import

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Overview

You can access and import patient data stored in DICOM format. You can also export images in DICOM or personal computer (PC) format. The system stores images in the following PC format files.

Type	Format
Images	JPEG
Panoramic Images	Composite, single-frame JPEG
Clips	AVI

Use the configuration settings to configure selections for exporting patient data. For example, you can export patient data during an exam or at the end of the exam, and select the destination device.

See also: For information about exporting images and clips from *syngo* Velocity Vector Imaging, refer to Chapter D2 in this manual.

See also: For information about importing and exporting workflow protocols, refer to Chapter 1 in the System Reference.

Exporting Patient Data

You can export patient data for the active exam to a configured picture archiving and communication system (PACS) device.

To export patient data for the active exam to a PACS:

Prerequisite: A PACS device is configured for the transfer of patient data at the end of the exam.

1. Tap the additional selections button.



2. Tap **Send to Store Server**.

To view the status of a patient data transfer:

1. Tap the additional selections button.



2. Tap **Network Job Status**.
3. To restart a transfer, select the job and then click **Restart**.
4. To stop a transfer, select the job and then click **Stop**.
5. To delete a transfer, select the job and then click **Delete**.
6. To exit the dialog box, click **Close**.

Exporting Patient Data from the Patient Browser

Additional options are available in the patient browser to export patient data.

To export patient data:

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Click **Local Database** and then select the required patient data.
4. Click **Transfer** and then select an option:

To	Do This
Send the patient data to a PACS	1. Click Send to. 2. Select the destination and then click Send.
Archive the patient data in DICOM format	Prerequisite: Configure the destination as an archive device for the patient data. 1. Click Archive to. 2. Select the destination and then click Archive.
Export the patient data in DICOM format to an external storage device	Prerequisite: The destination for the patient data supports DICOM format. 1. Click Export to. 2. Select the destination and then click Export. The system exports the patient data in DICOM portable media format and includes an image viewer.
Export images and clips in PC format to an external storage device	Prerequisite: Connect an external storage device to the ultrasound system. ▪ Select an option: – Export to DVD in PC format sends images and clips to an external storage device connected to the ultrasound system. – Export to USB in PC format sends images and clips to a USB device connected to the ultrasound system. Patient data and DICOM information are not transferred with the images and clips.
Eject the inserted USB storage device	1. Tap the additional selections button. 2. Tap Eject USB.

Removing Patient-Identifying Information

You can remove patient-identifying information from a completed patient study located in the local database on the ultrasound system. The ultrasound system removes the information from the DICOM header.

Exams without patient-identifying information are deleted from the ultrasound system according to the automatic disk management settings specified in the configuration settings.

You can also temporarily remove patient-identifying information during a study by hiding the patient banner located on the image screen.

To remove patient-identifying information from an exam:

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Select the required patient data from the local database.
4. Click **Patient** and then click **De-identify**.
The system prompts you for a substitute name.
5. Enter a name and then click **OK**.
The system copies the study to a new patient folder labeled with the name you entered and replaces the date of exam with the date when the patient-identifying information was removed from the file. The **Patient ID** updates to **Anonymous**.

Note: All patient-identifying information is removed from the exam, for example, images of the patient registration form and patient report. The new patient folder contains only images and clips from the exam.

Editing and Sending MPPS Data

You can edit the Modality Performed Procedure Step (MPPS) data, for example, descriptions, action codes, and billing information. For the currently registered patient, you can also discontinue or complete the patient study.

When you send edited data, discontinue the examination, or complete the examination, the ultrasound system sends the updated edits and status to the connected Hospital Information System/Radiology Information System (HIS/RIS) worklist server.

To edit MPPS data:

Prerequisite: Connect a worklist server configured for Modality Performed Procedure Step (MPPS) to the ultrasound system.

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Select the required patient data.
4. Click **Patient** and then click **Show MPPS**.
5. Edit the information.
6. To discontinue the examination, click **Discontinued**.
7. To complete the examination, click **Completed**.
8. Click **Save**.
9. To exit without making any changes, click **Cancel**.

Importing Patient Data

You can import patient data to the local database on the ultrasound system.

To import patient data from an external storage device:

Prerequisite: Connect an external storage device to the ultrasound system.

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Select the required patient data from the external storage device.
4. Click **Transfer** and then click **Import**.
The ultrasound system imports the data to the local database on the ultrasound system.

To import patient data from a network location:

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Click **Transfer** and then click **Import from Off-line**.
4. Select the location from the **Path** drop-down list.
5. Select one or more files and then click **OK**.
The ultrasound system imports the data to the local database on the ultrasound system.

Confirming Transfer of Patient Data using a Virtual Workstation

(Requires a wireless network connection)

You can remotely access your facility's archival and information system from a virtual workstation on the ultrasound system.

Use the configuration settings to configure a virtual workstation on the ultrasound system.

To access the virtual workstation:

Prerequisite: A user account on your facility's archival and information system.

1. Tap the additional selections button.



2. Tap **Virtual Workstation**.
3. If more than one virtual workstation is configured, select a virtual workstation and then click **OK**. To cancel the connection, click **Cancel**.
4. Log in to your user account for the archival and information system and then confirm the status and transfer of patient data, images, and reports.
For instructions on using your archival and information system, refer to the system manufacturer's instructions.
5. To disconnect from a web browser, log off the archival and information system and then close the web browser.
6. To disconnect from a remote desktop, sign out of your Windows user account.

C1 Physiologic Function

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Overview

-  **WARNING:** Use the ECG trace for timing purposes only. It is not intended for diagnostic use or patient monitoring.
-  **WARNING:** Do not use the ECG function in conjunction with electrosurgery or diathermy equipment.
-  **WARNING:** To reduce the risk of electric shock and burns, use only the cable and patient leads supplied for use with the physiologic module. Use of other cables and patient leads could defeat the current-limiting and electrical safety features of the physiologic module.
-  **Caution:** To avoid possible damage to the cables used with the physio panel, do not pull on the cable when disconnecting the connector from the system. Always grasp the connector housing.

Electromagnetic Compatibility (EMC) Note: Operating the ultrasound imaging system in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations, as well as portable and mobile RF (radiated frequency) may lead to temporary degradation or interference visible on the monitor screen. However, the device has been designed and tested to withstand such interference and will not be permanently damaged. Wait until the interference disappears or restart the ultrasound system.

Note: If the physio module detects abnormal input due to electrical interference, the module is designed to shut down to prevent the incorrect display of the physio signals on the image screen. If the physio module shuts down, you must restart the ultrasound system to reset the physio module.

Note: The ECG leads are defibrillation proof. However, in the event of defibrillation while using the ECG function, the ECG inputs may become saturated (overloaded). An ECG pattern may not be visible for up to 30 seconds. After 30 seconds, the ECG trace displays on the screen.

The physiologic module provides the following channels for monitoring signals:

- Electrocardiogram (ECG) displays a trace on the image screen from a three-lead ECG cable attached to the patient.
- A transthoracic impedance respirometer (TIR) provides respiratory monitoring through the ECG leads attached to the patient. The ultrasound system obtains a respiration signal by tracking changes in the patient's chest impedance data and then calculates the breathing rate.
- Auxiliary input (AUX) optionally provides monitoring for signals delivered from external equipment, for example, amplified ECG signals, a digital trigger, or other physiological inputs from external medical devices. Auxiliary input provides an analog output which is selectable from the three analog input channels.

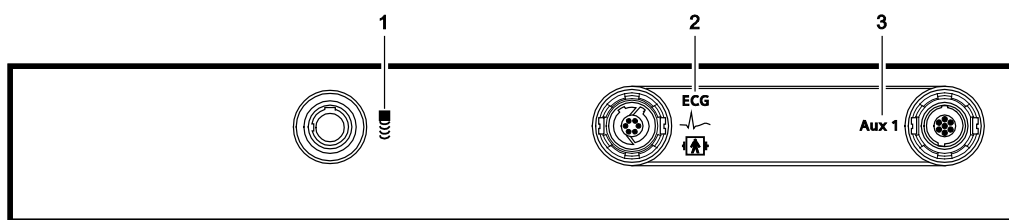
Each channel provides a continuous stream of signals to the ultrasound system. The ultrasound system uses these signals to derive the R-wave trigger output. You can monitor a patient's respiration relative to their cardiac function, and these waveforms are visible during 2D-mode, M-mode, color Doppler, pulsed wave Doppler, and continuous wave Doppler.

The electrical activity controlling the heart muscle is detected by placing ECG electrode patches in specific locations on the patient and amplifying the electrical signals that produce the ECG trace display on the ultrasound system monitor.

Activating Physio on the Ultrasound System

The ultrasound system has two versions of physio modules.

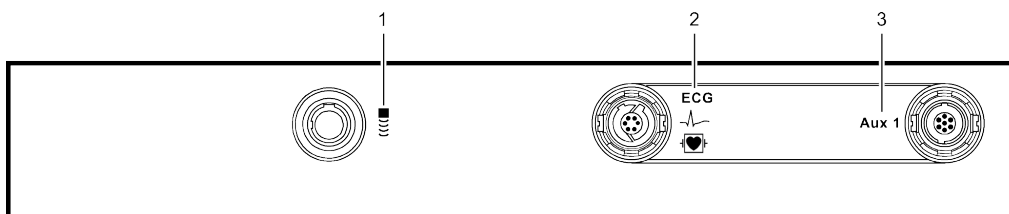
Physio modules marked with a Type BF symbol on the panel provide protection from defibrillator voltages for components in contact with the body (for example, ECG leads).



Example of the physio panel, defibrillation-proof Type BF device.

- 1 Auxiliary continuous wave Doppler transducer port
- 2 ECG port
- 3 Auxiliary In/Out port

Physio modules marked with a Type CF symbol on the panel provide protection from defibrillator voltages for components in contact with the heart.



Example of the physio panel, defibrillation-proof Type CF device.

- 1 Auxiliary continuous wave Doppler transducer port
- 2 ECG port
- 3 Auxiliary In/Out port

See also: For information about patient safety and the user of defibrillators, refer to Chapter 2 in the Instructions for Use.

To activate the physiologic function:

1. Tap **Workflow**.
2. Tap **Physio**.
3. To exit, disconnect the leads from the patient and then disconnect the ECG cable.

Connecting Leads to the Patient

In keeping with existing international standards, the ECG leads for systems that operate at 115V (for example, North and South America) are red, white, and black. The leads are labeled RA (right arm), LA (left arm), and LL (left leg). Leads for systems that operate at 230V (for example, Europe) are green, red, and yellow. The leads are labeled R (right arm), L (left arm), and F (left leg).

Patient Location	100V	115V	230V
Left leg	Green	Red	Green
Right arm	Red	White	Red
Left arm	Yellow	Black	Yellow

Note: Attach the patient electrodes in the 3-lead configuration for Leads I, II, III, using the right arm (RA), left arm (LA), and left leg (LL) attachment for optimal monitoring of the ECG and Transthoracic Impedance Respirometer (TIR) trace. Use the RA-LA electrodes in either polarity for TIR monitoring.

Activating an ECG or Auxiliary ECG Trace

Note: The ultrasound system uses the electrodes placed on the patient's body to detect impedance change and display the respiratory waveform.

Note: Allow a few seconds for the ultrasound system to average several heart beats and display the normalized ECG trace. If the ultrasound system displays a message indicating the lead is off, the ECG cable may be loose, incorrectly positioned, or has lost contact with the patient electrode. To restore the signal for auxiliary ECG trace, check the placement of the leads and reconnect the auxiliary ECG device cable to the output connector on the auxiliary input/output cable.

See also: Adjusting the ECG, Auxiliary ECG, or Respiration Trace, page C1-7

To activate an ECG trace:

1. Connect the ECG cable to the ECG port on the physio panel.
2. Attach the ECG electrode patches to the patient.
3. Connect each lead to the appropriate patch.
4. Activate **Physio**, if necessary.
5. Tap **ECG**.
6. Tap **ECG Trace**.
7. Adjust the ECG trace, if necessary.
Note: The system cannot display a trace unless all three leads are connected to the patient.
8. To exit, disconnect the leads from the patient and then disconnect the ECG cable.

To activate an auxiliary ECG trace:

1. Activate the auxiliary ECG device, including the attachment of ECG electrode patches to the patient and the connection of leads to the patches, according to the manufacturer's instructions.
2. Connect the auxiliary input/output cable to the auxiliary port on the physio panel.
 - To activate the auxiliary in (Aux In) ECG trace, connect the input connector on the auxiliary input/output cable to an auxiliary ECG device.
 - To activate the auxiliary out (Aux Out) ECG trace, connect the output connector on the auxiliary input/output cable to an external device (for example, a monitor).
3. Activate **Physio**, if necessary.
4. Tap **AUX**.
5. Tap **AUX Trace**.
6. Adjust the auxiliary ECG trace, if necessary.
7. To exit, disconnect the leads from the patient and then disconnect the ECG cable.

Adjusting the ECG, Auxiliary ECG, or Respiration Trace

The ultrasound system displays the trace for each signal in a different color and position. For example, an ECG trace displays in teal, an auxiliary trace displays in orange, and a respiratory trace displays in green.

To	Do This
Select a trace	▪ To display a trace from a 3-lead ECG cable inserted in the ECG port, tap ECG. ▪ To display a trace from an auxiliary ECG device, for example, a stress treadmill, tap Aux. ▪ To display respiratory function changes, tap Resp.
Select the trace to use as the R-wave trigger	(ECG traces only) ▪ Tap Set QRS. Note: If only one ECG trace is enabled, the system selects the enabled ECG trace as the R-wave trigger. The system recognizes R-waves if they are inverted.
Position the selected trace up or down on the screen	▪ Rotate Position.
Adjust the scrolling speed of the trace	▪ Rotate Sweep Speed. Note: During Doppler, the trace has the same scrolling speed as the Doppler spectrum.
Display or hide the trace on an image	▪ Tap ECG Trace.
Display or hide the auxiliary trace on an image	▪ Tap Aux Trace.
Display or hide the R-wave markers on the trace	(ECG traces only) 1. Select a trace with an R-wave trigger. 2. Tap R-wave Marker.
Adjust the wave amplitude of the trace	▪ Rotate Size.

To	Do This
Select a different lead for monitoring the ECG trace	1. Tap ECG. 2. Tap ECG Trace, if necessary. 3. Tap a different lead: Lead I, Lead II, or Lead III.
Select a lead for monitoring the patient's breathing rate	1. Tap Resp. 2. Tap Resp Trace, if necessary. 3. Tap a different lead: Lead I, Lead II, or Lead III.
Invert the polarity of the ECG trace during imaging	Note: You can invert the polarity of the ECG trace on the ultrasound system during image acquisition only if the signal from the auxiliary ECG device is inverted. You cannot change the polarity of an inverted trace during review. ▪ Tap Invert.
Invert the respiration trace during imaging	▪ Tap Invert. The default respiration trace ascends during inhalation and descends during exhalation. When inverted, the respiration trace ascends during exhalation and descends during inhalation.

Troubleshooting Guide

Symptom	Possible Cause	Recommended Action
- An ECG trace is not present or displays as a flat line - The ultrasound system displays a "Lead Off" message on the image screen	- The ECG cable is loose or not properly attached to the ultrasound system. - The ECG cable has lost contact with the patient electrode. - All three leads are not connected to the patient. - Leads are poorly connected to the cable. - Leads are poorly connected to the patient.	- Check all cable and lead connections. - Reposition or replace the leads or cable.
	Leads are incorrectly placed on the patient.	Remove the ECG patch, clean the skin, and attach a new ECG patch to the patient.
The R-wave markers are not visible on an ECG trace. Or, the R-wave markers identify peaks that are not R-waves.	The ECG trace of interest is not selected as the QRS source.	Select the ECG trace of interest.
	The R-wave marker is not activated.	Confirm the R-wave marker is enabled.
	The ultrasound system may not be able to detect the R-waves because the signal quality is insufficient.	- See the "ECG trace is noisy, ragged, or erratic" instructions included in this table. - Reposition or replace the leads or cable. - Select a different lead.
	Too much movement by the patient.	Recheck the trace of interest for the R-wave markers at least 30 seconds after the patient's movements have relaxed.
An ECG trace is noisy, ragged, or erratic	A lead or leads may be detecting muscle movement.	Inspect the ECG patch placement and reposition the lead(s) on the patient as necessary.
	The conductive gel pad of an ECG patch has evaporated (dried out).	Replace the ECG patch with a new one (check the expiration date of the new patch).
An ECG trace is inverted during imaging	- The ECG leads were placed on the patient incorrectly. - The signal from the auxiliary ECG device is inverted.	See also: Adjusting the ECG, Auxiliary ECG, or Respiration Trace, page C1-7
Asterisks (***) are displayed instead of the heart rate	The ultrasound system may not be able to detect the R-waves because the signal quality is insufficient.	- Wait for the signal to stabilize. - Reposition or replace the leads or cable.

Configuring Physio Settings

You can configure the physio settings using selections on the touch screen.

To modify configuration settings for the physiologic function:

1. Activate the physiologic function.
2. To assign the default lead, tap **Lead I**, **Lead II**, or **Lead III**.
3. To assign the auxiliary input type, tap **ECG** or **General**.
4. To assign the auxiliary output type, tap **ECG**, **Resp**, **Aux Input**, or **R-wave**.

D1 Fusion Imaging

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Overview

- ⚠ WARNING:** This feature uses reference data collected using other imaging modalities. Variability in system performance, operator technique, patient characteristics, patient movement, and other factors may affect image alignment and sensor tracking data. At all times, the clinician is advised to carefully review the on-screen data and confirm the information presented with clinical judgment.
- ⚠ WARNING:** The tracking system generates magnetic fields that can interfere with implantable devices such as pacemakers and implantable cardioverter-defibrillators (ICDs). If the patient has such an implantable device, you should be aware of any interference in its operation and immediately power off the ultrasound system.
- ⚠ WARNING:** Percutaneous procedures always involve heightened risk to the patient and to the operator. Clinicians using biopsy or ablation devices under ultrasound guidance should be trained and must observe proper procedures when attaching tracking sensors to the transducer or the needle to avoid inaccurate tracking or alignment.

Fusion imaging enables viewing of a real-time ultrasound image aligned with reference data acquired using another imaging modality, such as computed tomography (CT) or magnetic resonance imaging (MRI). You can use the overlaid image for visualization during diagnostic ultrasound exams, ultrasound-guided ablation procedures, and ultrasound-guided biopsy procedures.

The ultrasound system displays the following overlay graphics in Fusion:

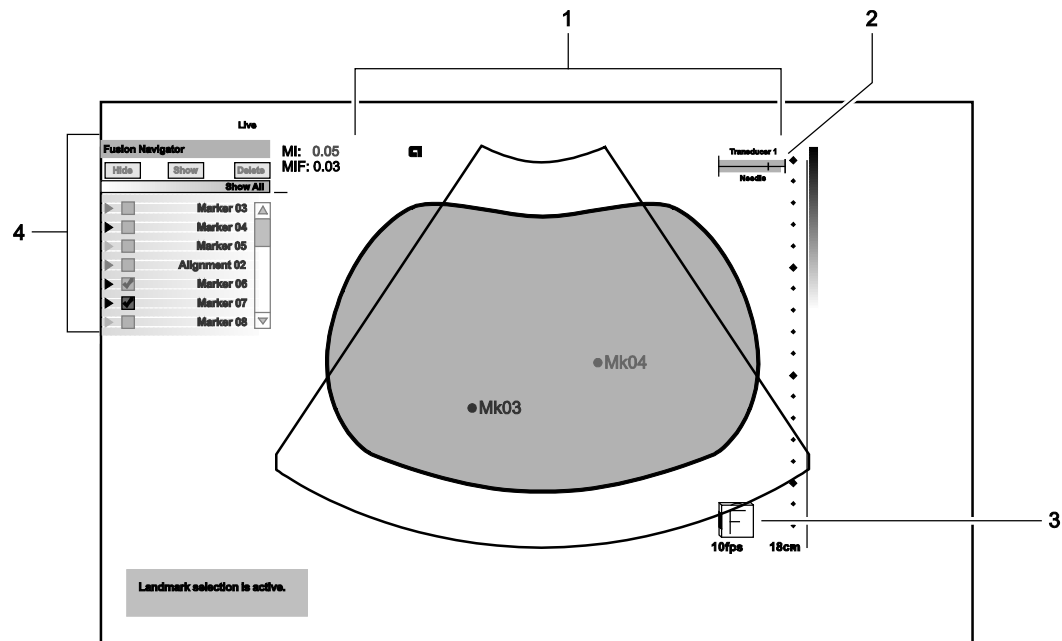
- Depth scale and depth value
- Focal zone markers
- Gray bar
- Color bar
- Orientation markers

The values for these parameters update to current values during real-time ultrasound imaging.

The Fusion feature requires the following tracking system equipment.

Equipment	Description
Electronics unit	Provides connections to the transmitter, the transducer sensors, and the needle sensor.
Transmitter	Connected to the electronics unit. Generates a magnetic field for determining the location of the transducer or needle.
Transducer sensor	Attached to the transducer and the electronics unit. Provides location and orientation information to the tracking system.
Needle tracking sensor	Inserted into the needle and attached to the electronics unit. Provides location and orientation information to the tracking system.

Note: Refer to the manufacturer's operating instructions that accompanied each device.



Example of Fusion screen during real-time imaging.

- 1 Overlaid image
- 2 Tracking quality indicator
- 3 Orientation indicator
- 4 Navigator

Terminology Used in This Chapter

Term	Definition
overlaid image	An overlay of reference data on a real-time ultrasound image.
electronics unit	Component of the tracking system that provides connections to the transmitter, the transducer sensors, and the needle sensor.
fuse	To align reference data with the same anatomy or area of interest in a real-time ultrasound image.
image	In this chapter, the term <i>image</i> refers to an ultrasound image, reference data, or an overlaid image. When a function applies only to specific type(s) of images, the images types are explicitly named.
landmark	A marker on a displayed image used to indicate a point of interest on the patient anatomy.
level	The midpoint of the range of values displayed in the reference data. Adjusting the window and level settings for reference data is similar to adjusting contrast in an ultrasound image.
multiplanar reconstruction (MPR)	A rendered view of a single plane (axial, sagittal, or coronal) of a volume.
Navigator	A list of all planning data and alignments.
needle path	A guideline drawn on the reference data for use during an interventional procedure.
planning data	Landmarks, segmentations, and needle paths created for use as references during an interventional procedure.
reference data	A previously acquired data set, for example computed tomography (CT) or magnetic resonance imaging (MRI), saved in DICOM format.
segmentation	The process of identifying the anatomy of interest (foreground) on the reference data. - Line segmentation identifies the foreground using a line drawn through the anatomy of interest. - Seed segmentation identifies the foreground (for example, a lesion) and background (for example, surrounding tissue) using landmarks (seed points).
tracking system	The Fusion hardware and software that detects the location and orientation of the transducer and needle.
window	The range of values displayed in the reference data. Adjusting the window and level settings for reference data is similar to adjusting brightness in an ultrasound image.

Activating Fusion

Prerequisite: Ensure the transducer and transducer sensor are connected to the corresponding port before activating Fusion.

The tracking system must be powered on and a transmitter and at least one transducer sensor must be connected to the electronics unit before you activate Fusion.

See also: Setting up the Tracking System for Fusion Imaging, page D1-24

To activate Fusion:

Prerequisite: Register the patient through the patient browser and then select a compatible transducer and exam type before activating Fusion.

1. Tap **Imaging**, if necessary.
2. Tap **Workflow**.
3. Tap **Fusion**.

The ultrasound system displays a message while the tracking system initializes and then activates real-time imaging and displays selections for Fusion.

4. To exit, tap **Exit**.

Note: The ultrasound system retains all saved planning data and alignments until you end the exam or register a new patient.

Quality Indicators

After the tracking system is initialized, the ultrasound system displays graphical tracking quality indicators for the transducer sensor and the needle tracking sensor. The indicator displays a green bar across the width of the indicator when tracking quality is high.

If the tracking indicator displays a yellow bar, move the transmitter closer to the patient.

If the transducer or needle tracking quality is poor, the system displays a message:

Poor tracking quality is detected.

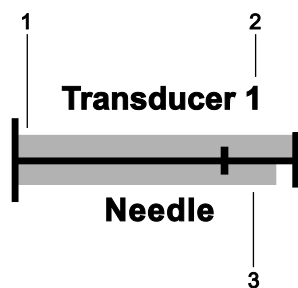
To improve the tracking quality, move the transducer sensor or the needle tracking sensor closer to the tracker.

The system displays a message if the transducer or needle is not detected (disconnected):

Sensor 1 Unplugged

Needle Unplugged

To resolve this issue, reconnect the transducer or the needle.



Example of the tracking quality indicators.

- 1 Tracking quality indicator for the transducer sensor
- 2 The port number on the tracking system for the active transducer sensor
- 3 Tracking quality indicator for the needle sensor

Loading the Reference Data

You must import reference data to the ultrasound system before you load reference data to an exam.

The patient name, patient ID, date of birth, and gender on the patient registration form should match the corresponding information for the reference data. If the system is unable to match the patient data with the reference data, an error is displayed. You can click **Cancel** to correct the error or click **OK** to ignore the error and continue loading the reference data.

Note: Your reference data must include no less than three images and no more than 500 images, and contain a computed tomography (CT) or magnetic resonance imaging (MRI) image.

To load reference data:

1. Activate Fusion before loading a series:
 - a. Tap **Imaging**.
 - b. Tap **Workflow**.
 - c. Tap **Fusion**.
2. Access the patient browser:
 - a. Tap **Patient**.
 - b. Tap **Patient Browser**.
3. Double-click the required series to load the reference data.
 When the data has loaded, the system closes the patient browser and displays the reference data on the image screen.

 If the system is unable to match the patient's name with the name on the reference data, the ultrasound system displays a message. Confirm the identity of the patient and then try again or click **OK** to ignore the message and continue loading the reference data.

See also: For information about importing patient data, refer to Chapter B2 in this manual.

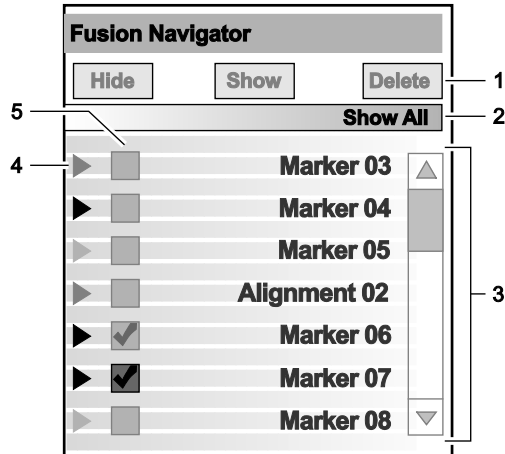
Tools for Primary Functions

Function	Description
Real-time imaging	Use the Scan tools to acquire images, optimize images, make measurements, or perform interventional procedures. See also: Real-time Imaging, page D1-13
Planning data	Use the Plan tools to identify the anatomy of interest and draw planned needle paths for an interventional procedure. See also: Planning Data, page D1-16
Image alignment	Use the Fuse tools to initialize and adjust the alignment of the ultrasound image and reference data. See also: Image Alignment, page D1-19

Fusion Navigator

The Navigator lists all planning data and alignments created for the displayed image. Planning data includes landmarks, segmentations, and needle paths. Each time you create planning data, the system displays a unique marker on the image and updates the Navigator with a corresponding entry. The color of the on-screen marker matches the color of the entry marker in the Navigator.

Note: Alignments do not display a corresponding on-screen marker.



Example of Fusion Navigator.

- 1 Controls to display, hide, or delete planning data or alignments on the image
- 2 Control to limit the list of entries displayed in the Navigator
- 3 List of entries
- 4 Entry marker
- 5 Check boxes to select the entries to hide, display, or delete

Fusion Navigator Controls

Type of Planning Data	Example of Navigator Label
Landmark	Marker 01
Pair of corresponding points (identified using the point alignment method)	Pair Markers 03
Needle path guideline	Needle Path 01
Segmentation (outline of an area of interest)	Segmentation 04
Alignment	Alignment 02

Adjusting Data Displayed in the Navigator

To	Do this
Rename an entry in the Navigator	1. Double-click the entry text in the list. 2. Enter the new name in the text box and then press Enter. Note: If the new name exceeds the available space, the system displays an ellipsis (...) at the end of the name.
Permanently remove planning data or alignments from the image	▪ Select the check box for the required entries and then click Delete. The system removes the markers for the selected entries from the image and removes the corresponding entries from the Navigator.
Temporarily hide selected planning data on the image	▪ Select the check boxes for the required entries and then click Hide. The system hides the markers on the image for the selected entries.
Redisplay hidden planning data	▪ Select the check boxes for the required entries and then click Show.
Limit the list of entries displayed in the Navigator	1. Click Fusion Navigator List. 2. Select the items to display in the Navigator. – Show All displays all entries for planning data and alignments. – Show Segmentation displays only the entries for outlines created using line segmentation or seed segmentation. – Show Needle Path displays only the entries for planned needle paths. – Show Marker displays only the entries for landmarks. – Show Point Correspondence displays only the entries for pairs of alignment markers. (Available only when point alignment is activated.) – Show Alignment displays only the entries for saved alignments. 3. To redisplay all entries in the Navigator, click Show All.

Adjusting Data Displayed in an Image

To	Do this
Change the display format	(Available only when an overlaid image is displayed.) 1. Tap Layout. 2. Tap the required display format. – 1:1 displays the overlaid image in a full screen format. – 2:1 displays the reference data on the left side of the screen and the ultrasound image on the right side of the screen. – 1:3 displays the overlaid image on the left side of the screen. The right side of the screen displays multiplanar reconstructions (MPRs) and a volume rendering. – 4:1 displays the sagittal MPR in the upper left quadrant, the coronal MPR in the upper right quadrant, the axial/transversal MPR in the lower left quadrant, and a volume rendering in the lower right quadrant. This layout does not support biopsy. Note: 1:1, 2:1, and 1:3 are available only during scanning. 4:1 is available only during planning.
Position a landmark	(Not available during system freeze or image alignment) Note: Load the reference data before positioning landmarks. If you position landmarks on the ultrasound image before you load the reference data, the system deletes the landmarks when the reference data is loaded. 1. Tap Landmark. 2. Click the required location for the landmark and then press a trackball key. The system displays a marker and a unique label on the image and updates the Navigator with a corresponding entry.
Display or hide all planning data	(Available only when reference data is displayed) ▪ Tap Structures.
Adjust the size or position of the field of view (FOV)	1. Tap 2D FOV. 2. Tap Size or Position. 3. Roll the trackball to adjust the size or position of the field of view and then press a trackball key.
Activate color and adjust the size or position of the color region of interest (C ROI)	1. Tap C and then select the color region of interest. 2. Tap Size or Position. 3. Roll the trackball to adjust the size or position the color region of interest and then press a trackball key.
Deactivate color imaging	▪ Press 2D.

To	Do this
Change the image orientation	1. To change the direction of the image horizontally (right-to-left or left-to-right), tap L/R Flip. 2. To change the direction of the image vertically (top-to-bottom or bottom-to-top), tap U/D Flip. 3. To reset the image orientation, tap Reset Orientation.
Zoom an overlaid image	▪ Press and then rotate ZOOM.
Pan an overlaid image	1. Tap Pan. 2. Click the overlaid image. 3. Roll the trackball to reposition the image. 4. Click the overlaid image to anchor the position of the image. 5. To restore the previous position of the overlaid image, tap Reset Pan.
Apply predefined optimization settings to the displayed reference data	(Available only during planning) Note: If the volume quadrant is selected, the system applies the setting to the volume data. If an MPR quadrant is selected, the system applies the setting to all MPRs. ▪ Press Preset. Note: CTA is a computed tomography angiogram. T1 and T2 are types of MRI scans.
Adjust the range of values or the midpoint of values displayed in the reference data	(Available only during planning) The system displays a control on the touch screen for adjusting window and level settings. Note: If the volume quadrant is selected, the system applies the setting to the volume data. If an MPR quadrant is selected, the system applies the setting to all MPRs. 1. To adjust the window setting, slide your finger horizontally on the control. 2. To adjust the level setting, slide your finger vertically on the control.
Adjust the opacity of the displayed reference data	(Available only when an overlaid image is displayed) ▪ Rotate Transparency. The following transparency settings are available: – 0% transparency indicates the reference data is not visible. Less than 50% transparency indicates more of the ultrasound image and less of the reference data is visible. – 50% transparency indicates both the ultrasound image and the reference data are equally visible. – More than 50% transparency indicates more of the reference data and less of ultrasound image is visible. – 100% transparency indicates the reference data is fully visible and the ultrasound image is less visible.

Performing Measurements

(Available only for 2D images during real-time imaging or planning)

Note: The measurement units configuration setting does not apply to Fusion. The ultrasound system always displays measured results in millimeters (mm) when Fusion is activated.

See also: For information on performing measurements, refer to Chapter 10 in the Instructions for Use.

Real-time Imaging

Use the Scan tools to perform real-time imaging before you load the reference data. After the reference data has been aligned with the ultrasound image, you can capture additional images and clips of the overlaid image. You can also use the overlaid image, including any planning data, as a reference during an interventional procedure.

To acquire real-time images when Fusion is activated:

- Press **IMAGE**.

If you have not loaded reference data, the system displays a real-time ultrasound image in full-screen display format. If reference data has been fused with the ultrasound image, the system displays the overlaid image.

Supported Imaging Functionality

During real-time imaging, Fusion supports 2D imaging features, including CINE and the following imaging functionality:

- Tissue Equalization (TEQ)
- Harmonics imaging
- Color Imaging
- Biopsy
- Contrast Agent Imaging

See also: For information on imaging functions, refer to Chapter 8 in the Instructions for Use.

Interventional Procedures

⚠ WARNING: Percutaneous procedures always involve heightened risk to the patient and to the operator handling biopsy needle guides. Clinicians using Siemens Healthineers recommended biopsy devices under ultrasound guidance should be trained and must observe proper needle insertion sequencing with the needle guide in order to avoid undue discomfort and unnecessary risk and injury to the patient.

You can perform interventional procedures, including ultrasound-guided ablation and biopsy procedures, using the overlaid image as a reference. Biopsy controls are available only when **Scan** is activated.

You can also create planning data such as landmarks, segmentations, and planned needle paths before performing an interventional procedure.

To track the position of the needle:

Prerequisite: Connect a needle-tracking sensor to port 4 on the tracking system and then connect a transducer sensor to the port associated with the active transducer.

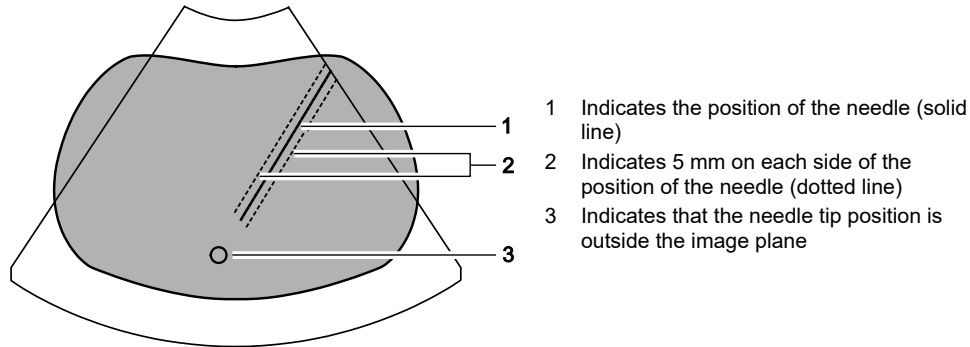
See also: Attaching the Sensors to the Electronics Unit, page D1-26

1. Tap **Scan** to display the overlaid image.
2. To view the reference image on the left side of the screen and the ultrasound image on the right side of the screen, select the required display format: **1:1**, **2:1**, or **1:3**.
3. Tap **Track Needle**.

The system displays the tracked needle on the ultrasound image.

- Red indicates the part of the needle on the right side or above the ultrasound image plane, depending on the orientation of the transducer.
- Blue indicates the part of the needle on the left side or below the ultrasound image plane, depending on the orientation of the transducer.
- A green circle indicates the needle is more than 5° outside the imaging plane.
 - The needle tip points to the location identified by the green circle.
 - The circle decreases in size as the needle tip nears the image plane.

4. To enable or disable tracking of the needle tip (green circle), tap **Needle Tip Graphics**.



Example of the Fusion screen with needle tracking.

The system displays a graphical indicator of the tracking quality for the transducer sensor and the needle tracking sensor.

See also: Quality Indicators, page D1-7

5. To view the entire needle path in selected display formats, use the pan function.

Using the Biopsy Function

During the biopsy function, the system displays the following message as a precaution:

Verify the angle selected on the needle guide attached to the transducer matches the selection on the touch screen.

To verify the angle selected on the needle guide:

1. Verify the angle locked on the needle guide attached to the transducer matches the selection on the touch screen.
2. Tap **OK**.

See also: For more information about the biopsy (puncture) guideline function, refer to Chapter A1 in this manual.

Planning Data

You can create landmarks and segmentations on the reference data to identify areas of interest. You can also draw planned needle paths for use during an interventional procedure.

An on-screen indicator identifies the orientation of the patient. The system displays the orientation indicator whenever reference data is displayed.

Label	Description
A	Anterior
P	Posterior
R	Right
L	Left
H	Head
F	Feet



Example of the on-screen orientation indicator.

The patient name, patient ID, date of birth, and gender on the patient registration form should match the corresponding information for the reference data. If the system is unable to match the patient data with the reference data, an error is displayed. You can click **Cancel** to correct the error or click **OK** to ignore the error and continue loading the reference data.

To create planning data on the reference data:

1. Load the reference data, if necessary.
2. Adjust the display to optimize positioning of planning data.

To	Do this
Change the display format	▪ To select a full-screen format, tap Layout and then tap 1:1. ▪ To select a 4:1 quadrant display format, rotate Quadrant.
Display or hide a volume rendering (VR)	(Available only for a 4:1 display format) ▪ Tap VR.
Change the active view	▪ To select the coronal, sagittal, or axial view, rotate Quadrant.
Pan a multiplanar reconstruction (MPR)	1. Tap Pan. 2. Click the required MPR. 3. Roll the trackball to reposition the image. 4. Click the MPR to anchor the position of the image. 5. To restore the previous position of the MPR, tap Reset Display.
Pan the volume	1. Tap Pan and then drag the volume to the required location. 2. To restore the previous position of the volume, tap Reset Display.
Cycle through the slices of an MPR	1. Press Coronal, Sagittal, or Axial to select the required view. 2. To restore the previous display, tap Reset Display.
Change the active plane view	1. Select the required view. 2. Drag the blue, green, or red axis to change the active plane view.

3. Identify an area of interest.

To	Do this
Identify an area of interest by drawing a line	1. Tap Line Segmentation. 2. Click the image to position the starting and ending points of a line across the area of interest. The system outlines the area identified by the line segmentation and updates the Navigator with a corresponding entry.
Identify an area of interest by positioning seeds	1. Tap Seed Segmentation. 2. Select a Seed Size setting. – Small displays small seeds. – Medium displays medium seeds. – Large displays large seeds. 3. To position the foreground seeds, tap Seed Foreground, drag the seed and outline the area of interest, and then click Set. The system displays the foreground seed in green. 4. To position the background seeds, tap Seed Background, drag the seed and outline the area of interest, and then click Set. The system displays the background seeds in red. 5. Press UPDATE to create the segmentation. 6. To remove foreground or background seeds, tap Clear Foreground Seeds or Clear Background Seeds. The system outlines the area identified by the foreground and background seeds and updates the Navigator with a corresponding entry.

4. Draw a planned needle path.

- a. Tap **Needle Path**.
- b. Click the starting point of the needle path on a multiplanar reconstruction.
- c. Click the ending point of the needle path on a multiplanar reconstruction.
Note: You can position the starting and ending points of the needle path on different multiplanar reconstructions.

The system displays the image in pink to mark the planned needle path and updates the Navigator with a corresponding entry.

Image Alignment

Fusion provides tools to align the reference data and an ultrasound image. An on-screen indicator identifies the orientation of the reference data during alignment.

See also: Planning Data, page D1-16

To initialize the alignment of reference data with an ultrasound image:

1. Tap **Fuse**.
 - If the reference data has not been previously aligned with the ultrasound image, the system displays the reference image and the ultrasound image in a split-screen format. Proceed to step 3.
 - If the reference data has been previously aligned with the ultrasound image, the system displays the overlaid image. Proceed to step 2 to reinitialize the alignment or follow the procedures for performing fine adjustments.
2. Tap **Reset Alignment**.
3. Tap **Supine** or **Prone**.
4. Rotate **Orientation** to select **Coronal**, **Sagittal**, or **Axial**.
5. To drag and drop the image, tap **Manual**, press **X**, **Y**, or **Z** to select the coronal, sagittal, or axial view, respectively, and then press the right trackball button.
 Or, tap **Point** to set a point first on the ultrasound image, scroll the reference image to select the second point, and then press **Initialize**.

Adjusting the Image Alignment

You can use the alignment tools in any combination to perform fine adjustments of the image alignment with the reference data.

To	Do this
Acquire an ultrasound clip and automatically align the ultrasound image with the reference data	(Available only for CT reference data) Note: The system does not support automatic alignment with contrast agent imaging. 1. Tap Auto. 2. Press UPDATE to begin acquiring a clip and then press UPDATE again to end the acquisition. The system acquires a clip length of 20 seconds and then aligns the reference data with the ultrasound data in the acquired clip. 3. To save the current alignment, tap Save Alignment.
Manually align the ultrasound image with the reference data	1. Tap Manual. 2. Tap Move, Z, or Y and then press the right trackball button. The system changes the pointer: – Move positions the reference data in the plane of the ultrasound image.  – Z rotates the reference data in the plane of the ultrasound image.  – Y rotates the reference data around the vertical axis of the ultrasound image.  3. Click the overlaid image and then roll the trackball to position the reference data in the required location on the ultrasound image. 4. Click the overlaid image to anchor the position of the reference data. 5. To save the current alignment, tap Save Alignment.

To	Do this
Align the ultrasound image and the reference data using corresponding points	1. Tap Point. The system displays the reference data and ultrasound image in a side-by-side format. When you position the pointer on the reference data, the system displays a bullseye (target) marker at the corresponding position on the ultrasound image.  <i>Bullseye marker.</i> 2. Click a location on the ultrasound image. The system displays an aqua marker on the ultrasound image, calculates the optimal alignment of the two points, and updates the Navigator with a corresponding entry. Note: The entry markers in the Navigator for pairs of corresponding points are always green. 3. Click a location on the reference data. The system displays a green marker on the reference data. When you position the pointer on the ultrasound image, the system displays a bullseye marker at the corresponding position on the reference data. 4. Repeat steps 2 and 3 to position additional pairs of corresponding points on the reference data and the ultrasound image. The system recalculates the optimal alignment of all corresponding pairs each time you position a pair of corresponding points. Note: The system removes corresponding points from the image and the Navigator when you exit point alignment. 5. To recalculate the optimal alignment, press UPDATE. 6. To save the current alignment, tap Save Alignment. 7. To cancel the alignment setting changes, tap Reset Alignment.
Cancel the most recent adjustment made to the alignment	▪ Tap Undo. You can cancel all adjustments performed in reverse sequence.
Display a previously saved alignment	▪ Select the required alignment in the Navigator and then tap Show. The system restores the positions of the reference data and ultrasound image when the selected alignment was saved.

Troubleshooting

Symptom	Possible Cause	Recommend Action
System indicates poor transducer tracking quality	The tracking sensor is not properly attached to the transducer.	Verify that the sensor has been attached to the transducer as described in the manufacturer's instructions.
	The magnetic field (transmitter) is causing interference with the electronics unit.	Verify that the transmitter is at least 24 inches (61 cm) from the electronics unit.
	Metal objects or electromagnetic field emissions near the tracking field are causing magnetic field distortion.	Remove potential sources of magnetic field distortion or reposition the tracking system or patient.
System indicates that the transducer sensor is unplugged	The transducer sensor is not connected to the electronics unit or is connected to the wrong port on the electronics unit.	Verify that the transducer sensor is connected to the correct port on the electronics unit. See also: Attaching the Sensors to the Electronics Unit, page D1-26
System indicates that needle sensor is unplugged	The needle sensor is not connected to the electronics unit or is connected to the wrong port on the electronics unit.	Verify that the needle sensor is connected to port 4 on the electronics unit.
No data is displayed	Transmitter or sensor is disconnected or the connection is faulty.	Verify that the transmitter and sensor cables are securely connected to the electronics unit.
Data is too noisy (for example, random changes in the position and orientation of the tracking data)	Excessive electrical noise from other electrical and magnetic devices is interfering with the tracking system.	- Power off the electrical equipment operating near the electronics unit to determine the source of the noise. - Remove the equipment (source of the noise) from the area. - If the equipment is critical, increase the distance between the equipment and the sensor, or decrease the distance between the sensor and the transmitter.
	Power line frequency is set incorrectly.	Verify that the correct power line frequency (50 Hz or 60 Hz) is configured as specified in the Service configuration settings.

Symptom	Possible Cause	Recommend Action
Poor data accuracy (for example, the tracking system does not accurately depict the position and orientation of the transducer)	Metal near the tracking system is causing magnetic distortion.	Remove or reduce the amount of metal near the tracking system, including areas around the transmitter and the area between the sensor and the transmitter.
System indicates inability to initialize alignment or perform sweep acquisition	The tracking sensor is too far from the transducer.	Verify that the sensor has been attached to the transducer as described in the manufacturer's instructions.
System is unable to load reference data and displays a message: The patient identifying information is not an exact match. Confirm the identity of the patient. Press OK to continue loading the patient data or press Cancel.	▪ A variation in the patient's name, for example, "Joe" instead of "Joseph." ▪ The accession numbers do not match from one facility to another. ▪ The study identification numbers do not match from one facility to another. ▪ A spelling mistake was made during patient data entry.	Confirm the identity of the patient and click Cancel to correct the error or click OK to ignore the error and continue loading the reference data.

Setting up the Tracking System for Fusion Imaging

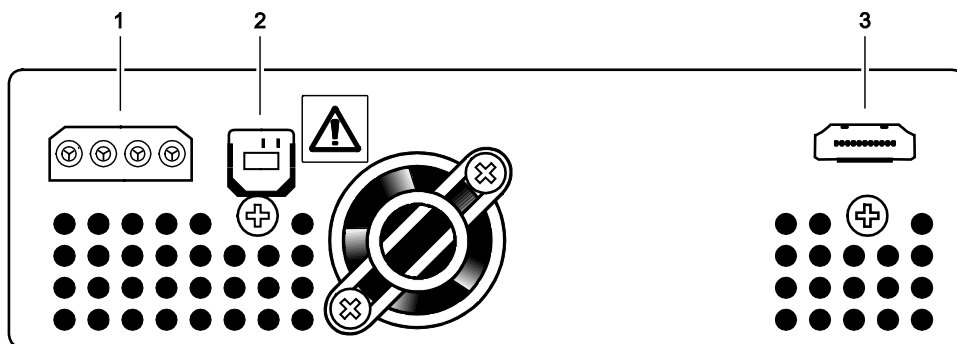
The tracking system consists of the following components:

- electronics unit
- transmitter
- transducer sensors
- needle tracking sensor

Note: Refer to the manufacturer's operating instructions that accompanied each device.

Connecting the Electronics Unit to the Ultrasound System

Note: The electronics unit must be installed by an authorized Siemens Healthineers representative or by a Siemens Healthineers-approved third party.

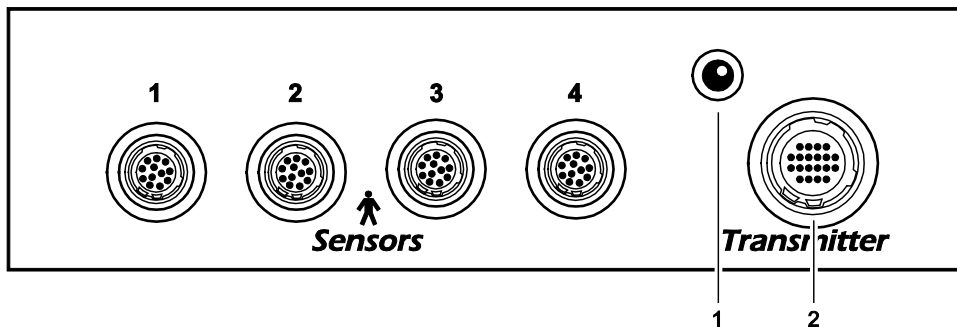


Example of the electronics unit, back view.

- 1 Power cord connection
- 2 USB connection from ultrasound system
- 3 RS-232 connection (not used)

Connecting the Transmitter

Connect the transmitter cable to the connector on the front of the electronics unit.



Example of the electronics unit for the tracking system, front view.

- 1 Status indicator
- 2 Connection for the transmitter

Repositioning the Transmitter

Note: If you reposition the transmitter, ensure that the transmitter is at least 24 inches (61 cm) from the electronics unit.

When the mid-range transmitter is mounted on a rolling stand, it is designed to be mobile. When the transmitter is in use, be sure to engage the brakes located on two of the wheels. You can also adjust the height of the transmitter by repositioning the arm on the rolling stand.

To adjust the position of the transmitter on the transmitter stand:

1. Support the arm with one hand and rotate the knob counterclockwise.
2. Slowly move the arm up or down the pole to the required position.
3. Continue to support the arm and rotate the knob clockwise to secure the arm.

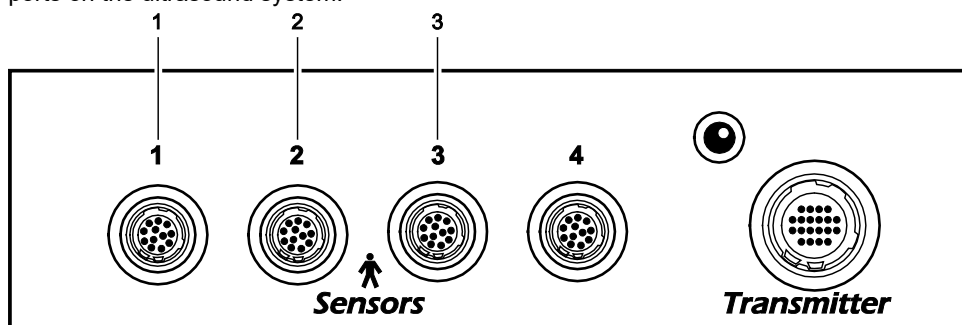
To use the brakes on the rolling stand:

- To engage the brakes, push down the brake lever on each wheel.
- To release the brakes, push up on the brake lever on each wheel.

Attaching the Sensors to the Electronics Unit

Attaching the Transducer Sensors

Attach the connector for each transducer sensor to port 1, 2, or 3 on the electronics unit until you hear an audible click. The ports on the electronics unit correspond to specific transducer ports on the ultrasound system.



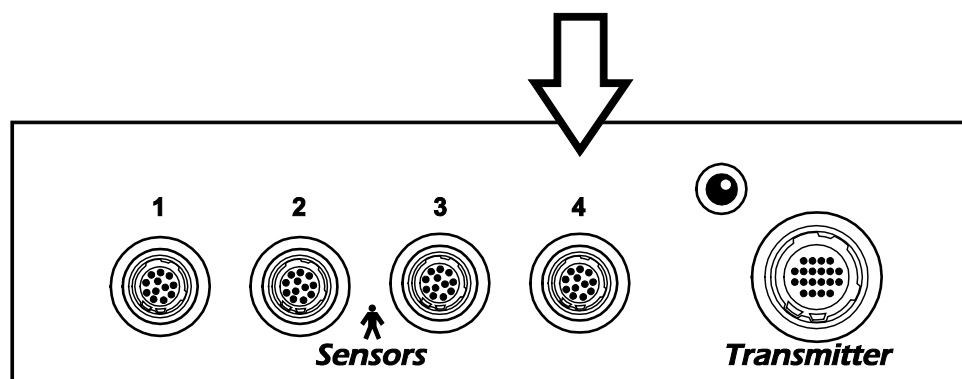
Example of ports on the electronics unit

- 1 Port 1 corresponds to a transducer connected to the first transducer port from the left on the ultrasound system
- 2 Port 2 corresponds to a transducer connected to the second transducer port from the left on the ultrasound system
- 3 Port 3 corresponds to a transducer connected to the third transducer port from the left on the ultrasound system

Note: The fourth transducer port from the left on the ultrasound system is not intended for use with a transducer sensor.

Attaching the Needle Tracking Sensor

Attach the connector for the needle tracking sensor to port 4 on the electronics unit until you hear an audible click.



Attaching Sensors to the Transducer or Needle

Refer to the manufacturer's instructions included with the device.

Troubleshooting the Tracking System

An LED on the front panel of the electronics unit provides status information for troubleshooting the tracking system. The LED slowly blinks green when the tracking system is fully functional and the transmitter is not activated. The LED displays solid green when the tracking system is fully functional and the transmitter is activated.

Symptom	Possible Cause	Recommend Action
Front panel LED is not illuminated	No power.	- Check the power cord connection to the electronics unit and to the power source (outlet). - Cycle power to the electronics unit.
Front panel LED blinks red and yellow	A valid transmitter is not connected to the electronics unit or is not connected properly.	- Attach a transmitter to the electronics unit. - Check the connection from the transmitter to the electronics unit.
Front panel LED slowly blinks green and orange	The tracking system has not fully initialized.	Wait a few minutes for the tracking system to complete its initialization process. The LED will then slowly blink green.
The tracking system is unable to communicate using the USB connection	USB cable is not properly connected.	- Disconnect and reconnect the USB cable to the electronics unit. - Cycle power to the electronics unit.

Maintenance, Cleaning, and Care for Fusion Imaging

Daily Checklist

Note: In addition to the daily checklist for Fusion, you must also perform each of the steps in the Daily Checklist for the ultrasound system.

See also: For information on caring for the ultrasound system, refer to Chapter 2 in the Instructions for Use manual.

Perform the following steps before each use of Fusion:

- Visually inspect the cables for the transmitter and sensors. Do not use a cable with nicks or cuts in the insulation.
- Inspect both the connectors and connections. Do not use a cable with bent or damaged pins.
- Inspect the transmitter. Do not use a transmitter with cracks or exterior damage. If the interior of the transmitter is exposed in any way, the component should be replaced after proper disposal.

Cleaning and Disinfecting the Tracking System Equipment

 **WARNING:** To avoid electrical shock and damage to the ultrasound system, power off and unplug the equipment from the AC power outlet before cleaning and disinfecting.

Follow this procedure to clean the tracking system equipment (electronics unit, transmitter, and cables).

To clean the tracking system equipment:

 **WARNING:** If the equipment comes in contact with biological fluid or tissue, follow your organization's procedures for proper cleaning and disinfection. Do not subject the electronics units or transmitters to autoclaving or gamma radiation. Do not immerse the electronics unit, transmitter, or cables in liquids.

- Wipe the equipment with a cloth dampened with a cleaning solution such as a mild soap and water or a similar solution.

Cleaning and Disinfecting the Sensors

Refer to the manufacturer's instructions included with the device.

D2 *syngo* Velocity Vector Imaging

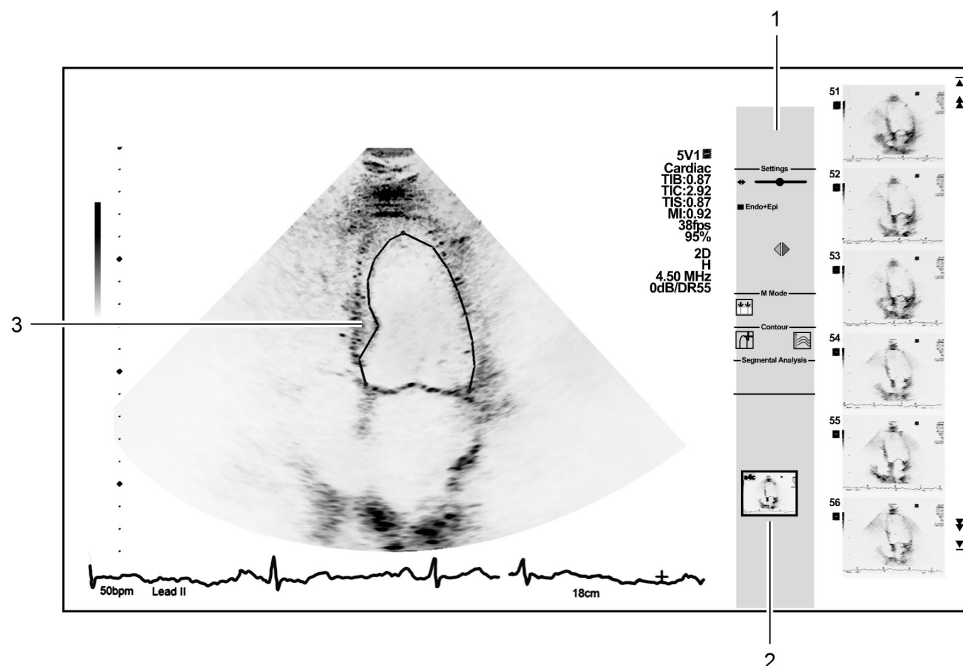
Overview.....	3
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Overview

⚠ WARNING: *syngo* Velocity Vector Imaging technology (*syngo* VVI) utilizes ultrasound data collected prior to analysis. The quality of the data collected and used as input could have an effect on the output of this program. Variability in ultrasound system performance, operator technique, patient characteristics, and other factors may affect the output. At all times, the clinician is advised to carefully review the output and confirm the information presented with clinical judgment and any other relevant sources of data.

syngo VVI is a clinical software program used to visualize, measure, and assess myocardial motion and mechanics using acquired 2D clips. The program tracks and estimates tissue velocity and other motion and deformation parameters at selected points on a user-defined outline (contour) of a structure.

This program illustrates tissue velocity by generating velocity vectors (arrows) on the contour. These velocity vectors are the source of the derived quantitative data, such as velocity and strain rate. You can use this program to analyze rotation, displacement, and radial strain of the left ventricle, right ventricle, and left atrium in fetal and adult studies.



Example of an anatomy boundary definition on the Contour screen.

- 1 Selections for displaying and editing the contour
- 2 Thumbnail of a clip selected for analysis
- 3 Contour

Selecting a Clip for Analysis

Note: You can activate *syngo* VVI only if you select a valid clip. Clips selected for analysis should not exceed 10 heart cycles or 10 seconds.

You can activate this program using a 2D-mode clip that contains at least five frames of 2D-mode data. If the clip contains more than 700 frames, the program loads the first 700 frames acquired.

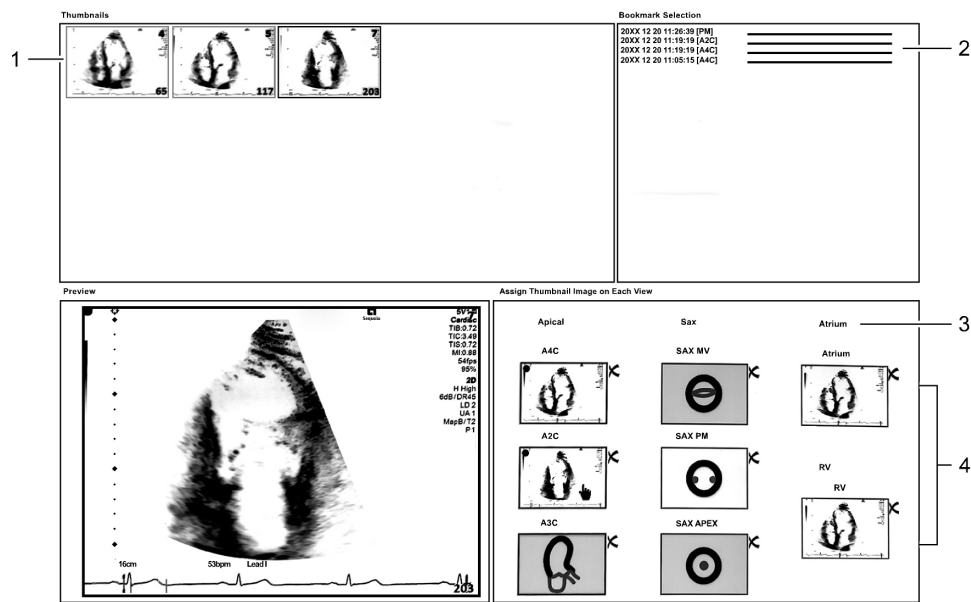
This program also supports the following functionality:

- Playing back and editing clips using the control panel
- Capturing static images

You cannot load 2D color clips, secondary capture images or clips, M-mode or Doppler images, static captures, 2D color dual, 2D live dual clips, 2D dual updated dual clips, DICOM Grayscale Standard Display Function (GSDF) clips, Contrast dual clips, and Virtual Touch updated dual clips.

If you load clips with annotations, you can view the annotations, but you cannot activate the annotation feature.

Analyzing a View



Example of the syngo VVI screen with multiple clips selected.

- 1 Thumbnails of clips selected during review
- 2 Bookmarks for accessing previously analyzed views
- 3 View selection labels
 - **Apical**
 - **SAX** (short axis)
 - **Atrium**
 - **RV** (right ventricle)
- 4 Thumbnails of images within the selected view, for example, A4Ch

To analyze a view:

1. Tap **Review** and then select a 2D-mode clip.
2. To select multiple clips, tap **Multiple Select** and then select the required 2D-mode clips.
Note: You can select multiple images for analysis, but you can only process one view at a time.
3. Tap **syngo VVI**.
Note: You can activate the program only if you select a valid clip.
See also: For information about supported clips, refer to page D2-4.
4. Click an image in the upper left thumbnails box and then select the corresponding view (Apical, SAX, Atrium, or RV) in the **Assign Thumbnail Image on Each View** box.
Note: You can select only one thumbnail for each view. If you add a new thumbnail, it replaces the existing thumbnail.
5. Repeat step 4 for each additional image for analysis.
Note: Each additional image must be within the same view.
6. To process a clip, select an image in the required view in the **Assign Thumbnail Image on Each View** box and then click the gray arrow on the lower right of the screen.



7. To load a previously analyzed view from a bookmark:
 - a. Select the required bookmark from the list on the upper right of the *syngo* VVI screen.
 - b. Click the gray arrow on the lower right of the screen.



8. To delete an image, click the **X** on the upper right of the image in the **Assign Thumbnail Image on Each View** box.
9. To exit the program, tap **Exit**.

Analyzing a Different Clip in the Same View

Note: To analyze a different clip within the same view, you must have previously selected multiple clips for analysis. The selected clip displays as a thumbnail in the **Assign Thumbnail Image on Each View** box. You can select only one thumbnail for each view. If you add a new thumbnail, it replaces the existing thumbnail.

To process a trace for a different clip in the same view:

1. Select a clip in the active view in the **Assign Thumbnail Image on Each View** box.
2. Click the gray arrow on the lower right of the screen.

Analyzing a Clip in a Different View

Note: To analyze a clip in a different view, you must exit *syngo* VVI, select an image in the required view, and then restart the program.

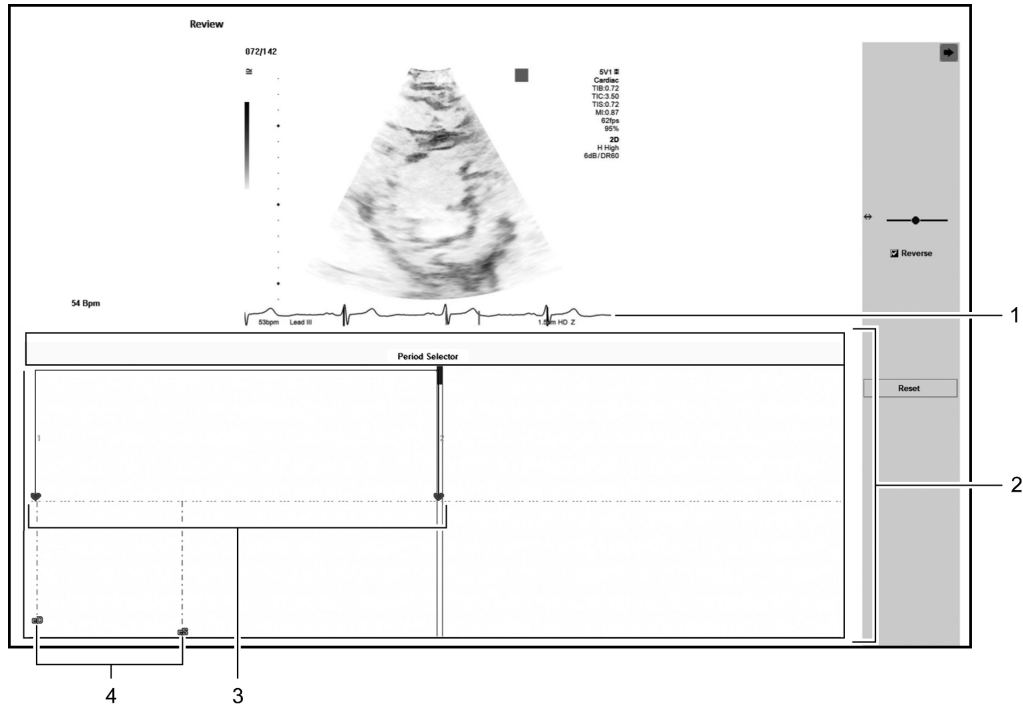
To begin processing a trace from a different view:

1. To exit the program, tap **Exit**.
2. Select a 2D-mode clip.
3. To select multiple clips from the review page, tap **Multiple Select** and then select the required 2D-mode clips.
4. Tap **syngo VVI**.
5. Click a clip in the upper left thumbnails box and then select the corresponding view (Apical, SAX, Atrium, or RV) in the **Assign Thumbnail Image on Each View** box.
6. To begin processing a clip, select a clip in the required view in the **Assign Thumbnail Image on Each View** box, and then click the gray arrow on the lower right of the screen.

Setting Up a Clip for Processing

If you load a clip with an ECG trace and two R-waves per heart cycle, *syngo* VVI defines the trace and performs the analysis.

If you load a clip without an ECG trace or without at least two R-waves per heart cycle, the program displays a message indicating you must edit the clip margins, set R-wave markers, and adjust the end diastole and end systole frames.



Example of the Setup screen.

- 1 ECG trace
- 2 Period Selector and display
- 3 Current frame marker and R-wave markers
- 4 End diastole and end systole markers

Displaying M-mode Data

You can define an M-mode background for display behind each curve plot. The user-created drawing for the M-mode background can include multiple segments. An M-mode background provides additional timing information.

To display M-mode data by drawing a freeform M-mode trace:

1. Click the sequence/M-mode selection button.



2. To outline a trace:

- a. Position the cursor on the 2D image.
The system displays the pencil icon.



- b. Press the left trackball key at the beginning of the trace and at each interim point to anchor each segment of the freeform trace.
- c. To end the trace, press the right-trackball key.

Note: You can draw as many lines as required to define the timing landmarks.

Note: It is not always necessary to draw lines. You can also use the CINE controls to locate ECG R-waves and place markers as required.

3. Use the CINE controls to adjust the M-mode marker position corresponding to 2D-mode.
4. To add an R-wave marker, click the required location in the upper half of the M-mode display. Or, right-click the required location and then click **Set RWave**.

Note: ED-ES (end diastole-end systole) lines display in the lower half of the M line when you identify one complete cycle through the placement of R-waves.

5. To delete an R-wave marker:
 - a. Position the cursor over a marker.
The system displays a double-line arrow.
 - b. Right-click the R-wave marker.
6. To reposition the markers for valve timing events:
 - a. Position the cursor over a marker.
The system displays a double-line arrow.
 - b. Drag the marker to the required location.
 - c. Press the trackball key to confirm the new location.
7. To reverse the grayscale of the M-mode sweep, for example, from black-on-white to white-on-black, click **Reverse**.
8. To reverse all changes, click **Reset**.
9. To display the previous window, click the gray arrow on the upper right of the screen.



To display or hide M-mode in the background on the Analysis screen:

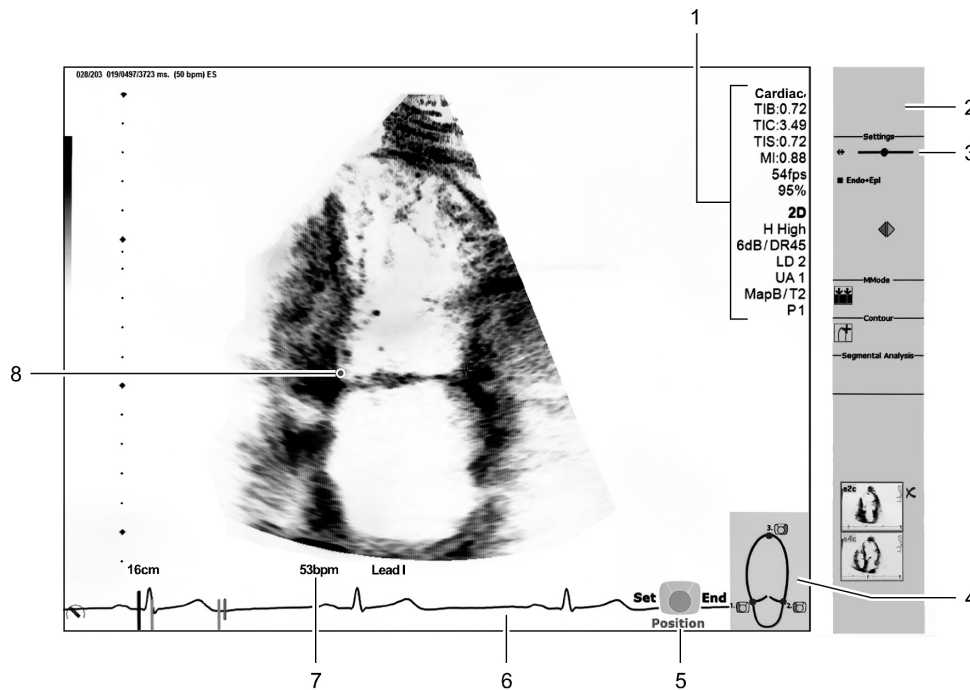
(Available only when M-mode is used to define timing events)

- Click the M-mode background button.



Drawing and Modifying a Contour

The program displays the Contour screen if you load a clip with an ECG trace and R-wave information. Use the Contour screen to draw or edit an outline of the structure for analysis. You can display the Contour screen to modify or redraw the contour.



Example of the Contour screen.

- 1 Imaging parameters and settings for the displayed clip transferred from the echo image
- 2 Selections for displaying and editing the contour
- 3 Gamma slider
- 4 Placement guide for positioning the trace markers
- 5 Controls for repositioning the trace markers
- 6 ECG trace
- 7 Heart rate
- 8 First marker indicated by a red dot

To create a trace:

Note: You can select a different image from the view on the lower right of the image screen.

1. Position the cursor over the required anatomy on the image.
The cursor displays as a +.

2. To create a trace using the placement guide:

See also: For an example of the placement guide, refer to page D2-11.

- a. Press the left trackball key to anchor the first marker.

A red dot displays at the selected point.

Target	Anchor location of first marker
Left ventricle	Base of the interventricular septum and mitral annulus
Left atrium	Mitral annulus near the interatrial septum
Right ventricle	Tricuspid valve annulus near the lateral wall

- b. Follow the placement guide on the screen to place subsequent markers.
 - c. Press the left trackball key to anchor each marker.
 - d. To anchor the final marker and complete the trace, press the right trackball key.
3. To manually create a trace:
 - a. Position the cursor over the next position for each segment of the trace, following a clockwise pattern.
 - b. Press the left trackball key to anchor each marker.
Note: Anchor 7 to 11 markers for apical traces. Anchor at least one marker to each wall segment. For short axis traces, do not anchor the final marker at or beyond the position of the first marker.
 - c. To anchor the final marker and complete the trace, press the right trackball key.
4. To reposition a marker, adjust the large red markers and then adjust the subsequent smaller blue markers.
5. To change the brightness and contrast of the image:
 - a. Drag the Gamma slider to the right or left to adjust the gamma image setting.



- b. To restore the original brightness and contrast setting, click the restore gamma setting button.



6. To reverse the horizontal orientation of the image:

Note: You cannot reverse the orientation of an image after you draw a contour or after selecting the image for analysis.

- a. Delete the contour or delete the image from the history file, if necessary.
- b. Click the pictures mirroring button.



7. To create a single endocardial trace, clear the **Endo+Epi** check box.

8. To create a simultaneous endocardial and epicardial trace:

- a. Select the **Endo+Epi** check box.
- b. Click the green arrows on the right of the image to increase or decrease the distance between the endocardial and epicardial traces.



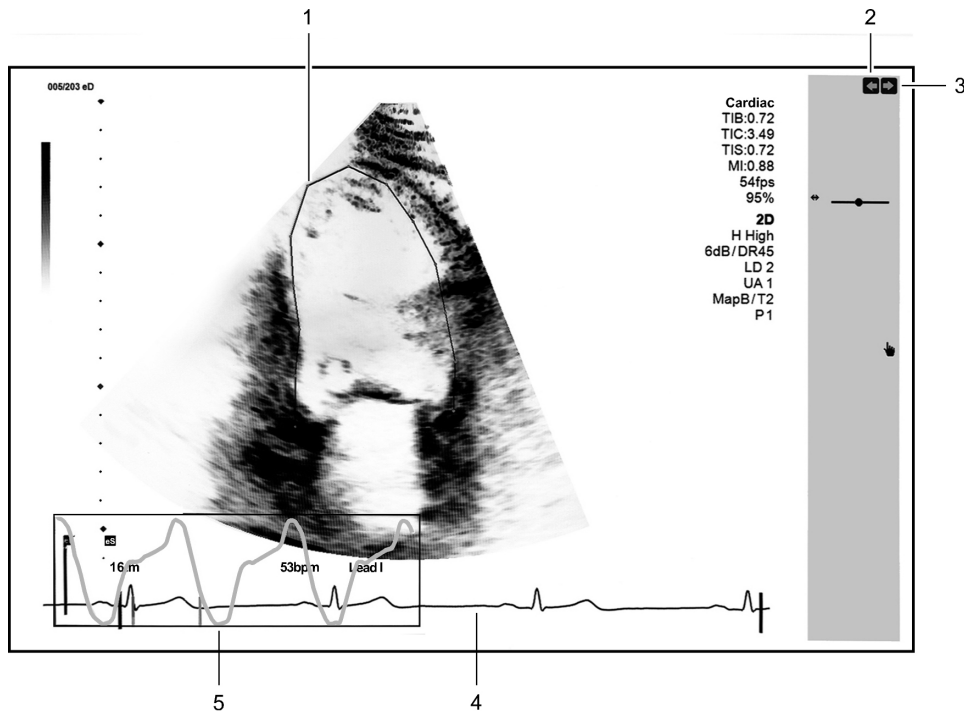
9. To process the trace, double-click the trace. Or, click the start analysis button.



A white calculating box displays in the lower portion of the control pane.

Modifying a Contour

The system displays the contour for review and modification of the trace.



Example of a contour.

- 1 Drag the marker (red dot) to reposition the marker and modify the contour.
- 2 Click the arrow to reject (delete) changes to the traced contour and start again.
- 3 Click the arrow to accept changes to the traced contour.
- 4 ECG trace
- 5 Time volume curve

To modify a contour:

1. Use the CINE controls to review the trace.
2. To reposition a marker (red dot):
 - a. Position the cursor over a marker.
The cursor displays as a double-line arrow.
 - b. Drag the marker to the required location and then press the trackball key to confirm the new location.
3. To accept the changes to the contour and view analysis results, click the accept changes arrow.



4. To reject the changes to the contour, click the reject changes arrow.

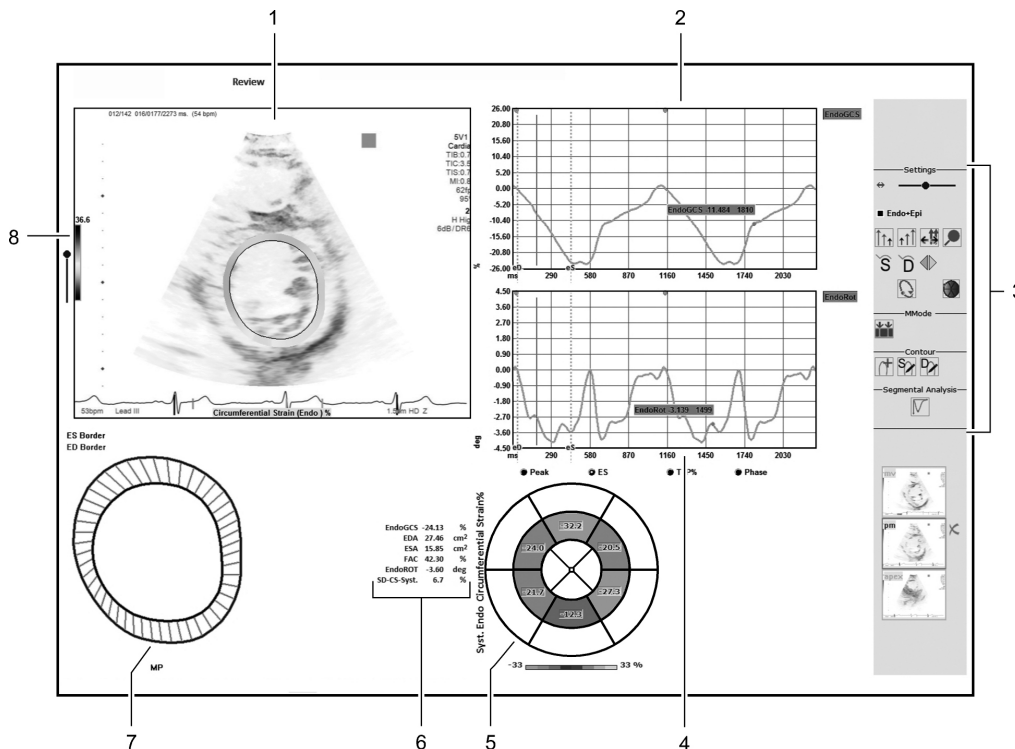


Processing a Contour and Viewing Results

When you process a contour, the program illustrates tissue velocity using velocity vectors (arrows). For each clip frame, the vector length illustrates the magnitude of velocity (speed), and the vector arrowheads illustrate the direction of motion.

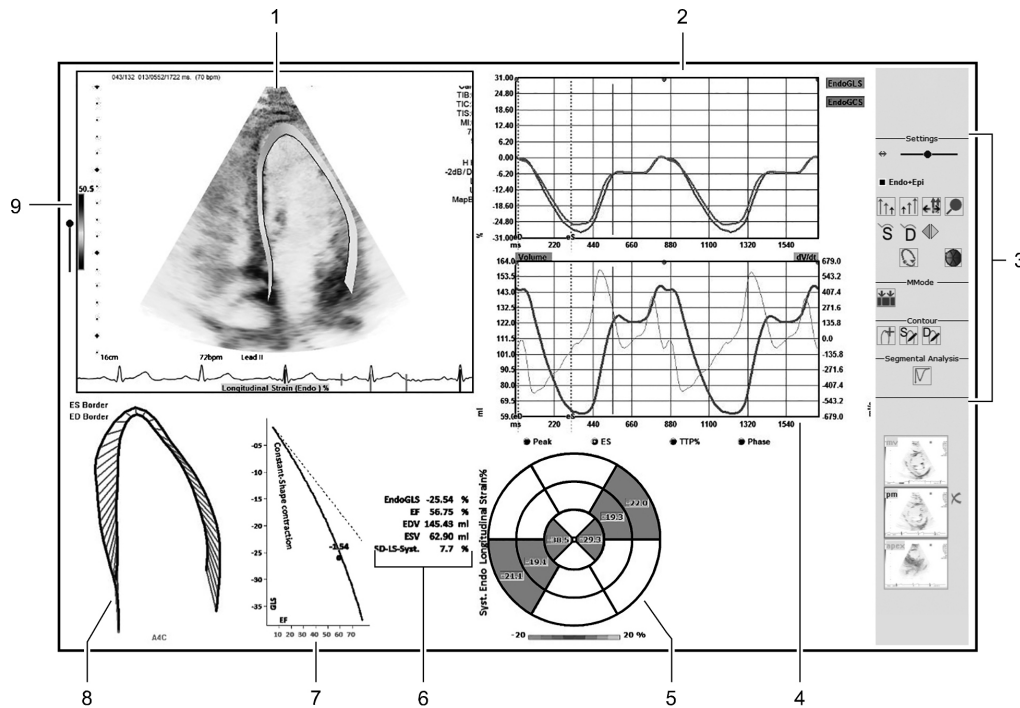
Quantitative data derived from the velocity vectors are depicted as curve plots, parametric M-mode graphs, and parametric segmental diagrams. The specific results displayed depend on the view used to draw the contour, for example, apical view, short axis view, atrium view, or right ventricle view, and the selected parameter, for example, velocity, displacement, strain, or strain rate.

See also: For information about the selections for viewing analysis results, refer to page D2-19.



Example of the Analysis screen with clips displayed in SAX view.

- 1 2D clip with contour
 - 2 Global circumferential strain in the endocardial layer
 - 3 Selections for viewing analysis results
 - 4 Rotation of endocardial layer
 - 5 Systolic endocardial circumferential strain
 - 6 Analysis results for the displayed clip
 - 7 End-systolic border and end-diastolic border
 - 8 Color bar for the selected parameter
- The system assigns a unique color bar to each parameter.



Example of the Analysis screen with clips displayed in Apical view.

- 1 2D clip with contour
 - 2 Global longitudinal and circumferential strain in the endocardial layer
 - 3 Selections for viewing analysis results
 - 4 Rotation of endocardial layer
 - 5 Systolic endocardial longitudinal strain
 - 6 Analysis results for the selected clip
 - 7 Graph displaying the relationship between the left ventricle ejection fraction and left ventricle global longitudinal strain
 - 8 End-systolic border and end-diastolic border
 - 9 Color bar for the selected parameter
- The system assigns a unique color bar to each parameter.

Viewing Results in a Bullseye Plot

(Available only for left ventricle images, not available for right ventricle or atrium images)

The bullseye plots support a 16-segment model. You can display summarized results of all analyzed views in the following segmental display formats (bullseye plots):

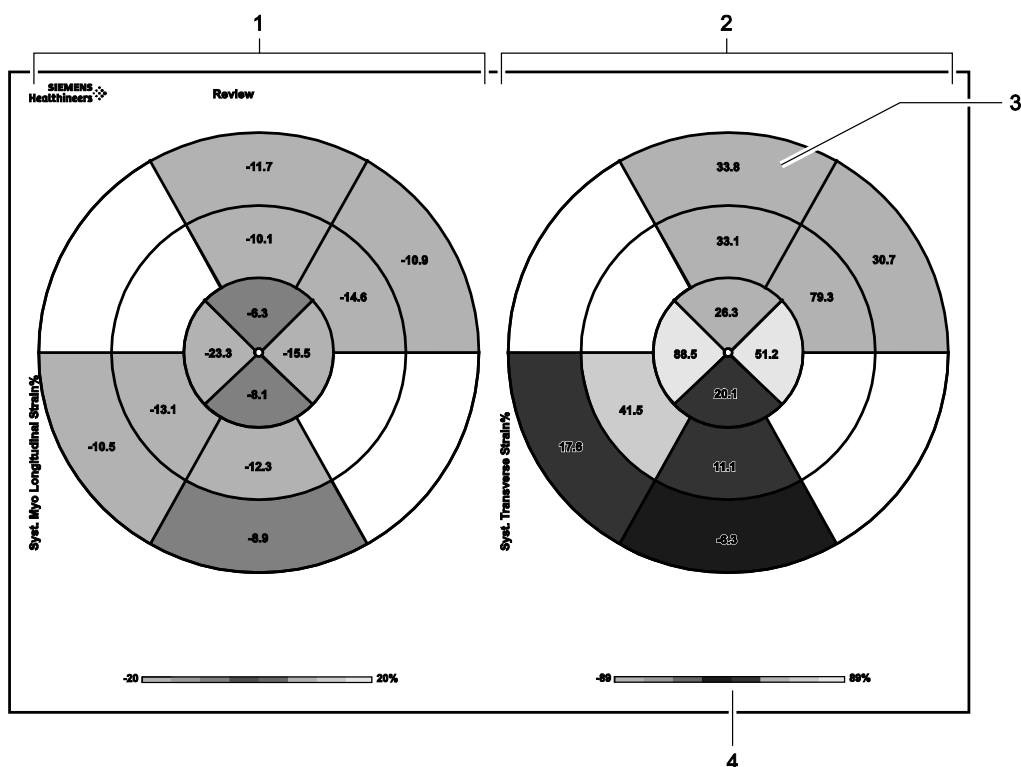
- **Overall Peak or Systolic Peak**

Note: The program displays overall peak results for the strain and displacement parameters and the systolic peak for the strain rate and velocity parameters.

- **Time to Peak**

The bullseye plots contain results from all clips analyzed in the current analysis group (apical or short axis). The Analysis step displays results only for a particular image. When you perform an analysis for one view of a patient study, the program adds the information to the bullseye plots. When you review an existing study, you must load at least one previously analyzed clip to update the bullseye plot.

Note: If you deactivate a segment in the Analysis step, the results for that segment are not included in the bullseye results and overall average.



Example of bullseye plots and data.

- 1 Bullseye plot
- 2 Bullseye plot for strain results
(Available only when the **Endo+Epi** selection is enabled.)
- 3 Numerical result for the segment of the selected parameter
- 4 Color bar for the selected parameter; a unique color bar is assigned to each parameter

Analysis Page: Contour

Editing and Deleting a Trace

You can edit systole and diastole frames for a processed trace (contour) after you have completed creating the trace. After editing the trace on end systolic frames for the left ventricle or right ventricle and end diastolic frames for the left atrium, perform the analysis again.

To edit the currently displayed trace:

1. To modify the end systole border, click the end systolic border correction button.



2. To modify the end diastole border, click the end diastolic border correction button.



3. Position the cursor over a marker and then press the left trackball key to select the marker. The cursor shape changes to a four-pointed arrow.

- To move a marker, drag the marker to the new location and then press the left trackball key to anchor the marker.
- To delete a marker, position the cursor over the marker and then press the right trackball key.

4. To process the modified trace, double-click the trace. Or, click the start analysis button.



5. To view analysis results, click the accept changes arrow.



6. To delete the currently displayed trace and start a new trace, click the new trace button.



To add endocardial and epicardial borders:

1. Select the **Endo+Epi** check box.
2. Click the green arrows on the right of the image to increase or decrease the distance between the endocardial and epicardial traces.



3. To process the modified trace, double-click the trace. Or, click the start analysis button.



4. To view analysis results, click the accept changes arrow.



Analysis Page: Settings

To	Do This
Change the brightness and contrast of the image	- Drag the gamma slider to the right or left to adjust the gamma image setting.  - To restore the original brightness and contrast setting, click the restore gamma setting button. 
Adjust the distance between the endocardial and epicardial traces	- Select the Endo+Epi check box. - Click the green arrows on the right of the image to increase or decrease the distance between the endocardial and epicardial traces. 
Activate or deactivate the zoom function	Note: When you use the zoom function, the system displays the image in a 2D full-screen. Click the zoom in/out button. 
Advance to the end systole	Click the go to end systole button. 
Advance to the end diastole	Click the go to end diastole button. 
Reverse the orientation of the image	Click the pictures mirroring button. 
Invert color parametric	Click the switch parametric over B-mode button. 
Set the position between the anterior and anteroseptal segment	(Available only in SAX view) Click the position between anterior and anteroseptal segment button. 

To	Do This
Display controls to toggle the contour, vector, orbit line and 2D of the trace	Click the toggle button. 
Change the size of the vector	Prerequisite: Display vectors before using these controls. - To decrease the height of the vector, click the decrease vector size button.  - To increase the height of the vector, click the increase vector size button.  - To reset the vector to its original size, click the reset vector size button. 

Analysis Page: Display Buttons

Note: The display buttons are available only when the toggle button is selected.

To view the display controls:

- Click the toggle button.



To	Do This
Display a color overlay with vector maps for regional strain	Click the arrows with color button.
Display vector maps for regional strain	Click the arrows button.
Display a color overlay with the contour	Click the borders with color button.
Display the contour only	Click the borders button.
Display orbit lines	Click the trajectories button.
Display segmentation deformation	(Available only when the epicardial border is displayed) Click the segmental deformation button.
Hide all overlays	Click the no overlay button.

Analysis Page

M-Mode

To	Do This
Select M-mode	Click the sequence/M-mode selection button. 
Display or hide M-mode in the background	(Available only when M-mode is used to define timing events) Click the M-mode background button.  See also: For information about M-mode, refer to page D2-9.

Contour

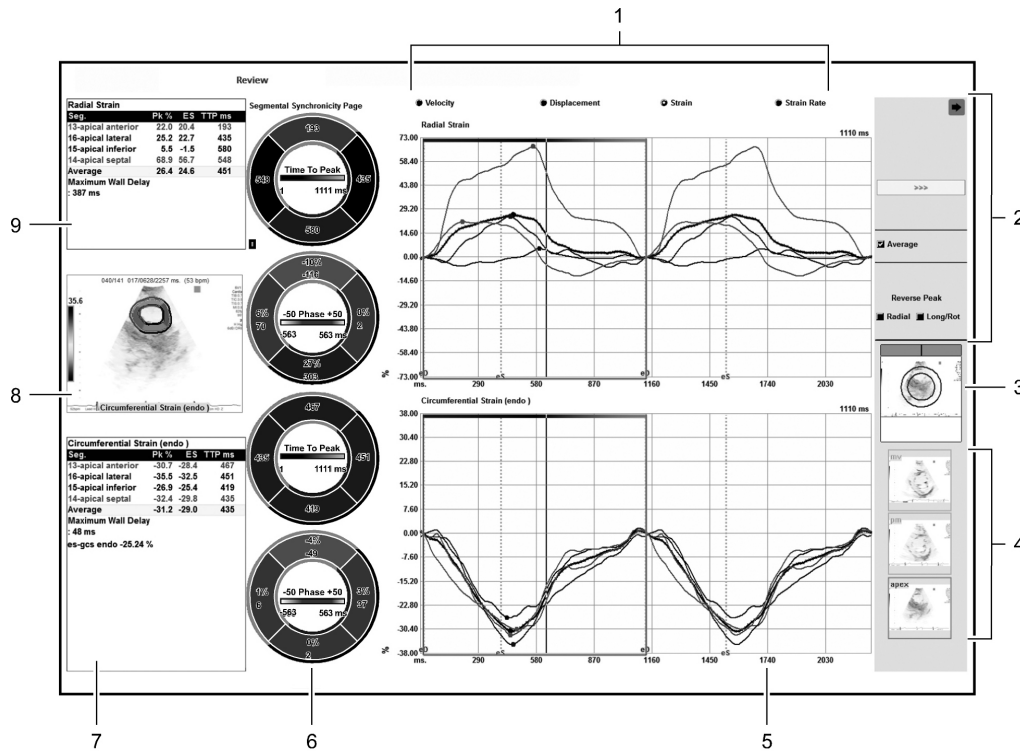
To	Do This
Begin a new trace	Click the new trace button. 
Correct the end systole border	Click the end systolic border correction button. 
Correct the end diastole border	Click the end diastolic border correction button. 

Segmental Analysis

To	Do This
Begin segmental analysis	Click the segmental analysis button. 

Segmental Analysis Results

The **Segmental Synchronicity Page** displays peak and timing information, for example, time-to-peak values related to velocity, displacement, strain, and strain rate.



Example of the Segmental Synchronicity Page.

- 1 Display controls for velocity, displacement, strain, and strain rate
Strain is selected in this example.
- 2 Display and editing selections
- 3 Layer selection area
- 4 Clips available for analysis or clips previously analyzed
- 5 Circumferential strain information
- 6 Time to peak and phase information
- 7 Summary of circumferential or longitudinal strain data
- 8 Contour
- 9 Summary of radial or transverse strain data

Viewing Segmental Analysis Results

Use segmental analysis to view segmental curves and analysis results for segments of the contour. The program displays the clip with the contour, segment diagrams with time-to-peak and phase results, and curve plots for the selected segments. For apical views, the segmental analysis includes a rocking value to indicate motion of the apex.

- To activate or deactivate segments on the segment model, click the required segment on the segment model.

The curve plots display results only for the activated segments on the segment model.

- To display results for a selected location on the curve plot, position the pointer on the required data point on the curve.

The program displays the numerical results, segment name and number, and time for the selected location.

- To display or hide the average curve on the curve plots, click **Average**.

The average curve depicts the average of the analysis results for the currently displayed curves.

- To display the radial results:

- For minimum radial results, click **Reverse Peak Radial** to select **On**.
- For maximum radial results, click **Reverse Peak Radial** to select **Off**.

- To display the longitudinal/rotational results:

- For minimum longitudinal/rotational results, select the **Reverse Peak - Long/Rot** check box.
- For maximum longitudinal/rotational results, clear the **Reverse Peak - Long/Rot** check box.

Analysis Display Information

Control	Description
Reverse Peak	For all parameters except strain longitudinal, strain circumferential, strain rate longitudinal, and strain rate circumferential, identifies the lowest point, the point that is 75% of the lowest point, or the point that is 50% of the lowest point, as determined by the "Time To" selection. For parameters strain longitudinal, strain circumferential, strain rate longitudinal, and strain rate circumferential, identifies the highest point, the point that is 75% of the highest point, or the point that is 50% of the highest point, as determined by the "Time To" selection.
	Moves from beat to beat in a continuous cycle when clicked. Disabled if only one beat is captured.
Velocity	Computes and displays values for the selected parameter. ▪ Longitudinal Velocity in Apical view ▪ Rotation Velocity is the rotation rate in SAX view. Counterclockwise rotation is positive. ▪ Long/Rot is the longitudinal velocity/rotation velocity rate in SAX view. Counterclockwise rotation is positive. ▪ Radial Velocity: – Transverse Velocity in Apical view – Radial Velocity in SAX view
Displacement	Computes and displays values for the selected parameter. ▪ Longitudinal Displacement in Apical view ▪ Rotation Displacement in SAX view ▪ Long/Rot is the longitudinal velocity/rotation rate in Apical view. Counterclockwise rotation is positive in SAX view. ▪ Radial Displacement requires an endocardial and epicardial trace. – Transverse Displacement in Apical view

Control	Description
Strain	Computes and displays values for the selected parameter. ▪ Longitudinal Strain in long axis and generic curve Apical view ▪ Long/Rot is the longitudinal/rotation rate in SAX view. Counterclockwise rotation is positive. ▪ Circumferential Strain in SAX view ▪ Radial Strain requires an endocardial and epicardial trace. – Transverse Strain in Apical view – Radial Strain in SAX view
Strain Rate	Computes and displays values for the selected parameter. ▪ Longitudinal Strain Rate in Apical view ▪ Long/Rot is the longitudinal velocity/rotation rate in SAX view. Counterclockwise rotation is positive. ▪ Circumferential Strain Rate in SAX view ▪ Radial Strain Rate requires an endocardial and epicardial trace. – Transverse Strain Rate in Apical view – Radial Strain Rate in SAX view

Saving Analysis Results to a Report

You can export analysis results to the patient report.

See also: For information about reports, refer to Chapter 12 in the Instructions for Use.

To save data to a report:

- Tap **Save to Report**.

To	Do This
View the summary for a specific parameter	(Available only on the Segmental screen) ▪ Click a format to display the required results. – Velocity – Displacement – Strain – Strain rate
View the summary for a different layer of the heart wall	▪ In the layer selection area, click the required layer. – Endo displays the endocardial layer. – Myo displays the myocardial layer. – Epi displays the epicardial layer.
Display results for the next heart cycle in a clip with multiple beats	▪ Click the next heart cycle button. 

Viewing Analysis Results

The specific results displayed on the Analysis screen and exported to the worksheets and report depend on the view used to draw the contour for Apical view or SAX view and the selected parameter, for example, velocity, displacement, strain, or strain rate.

Results by Parameter

The Summary screen and worksheets display radial and longitudinal or circumferential results for each heart wall segment for the selected parameter: velocity, displacement, strain, and strain rate.

The Summary screen also displays the following summary results for the selected parameter:

- Average of all heart wall segments
- Standard deviation
- Maximum opposing wall delay in Apical view
- Maximum wall delay in SAX view

Exporting Images, Clips, and Data

You can export data in ASCII format (TXT file) to an external USB-compatible storage device or a network location for use outside the program.

You can also export images and clips to an external USB-compatible storage device or a network location. Exported image files contain the displayed window without the on-screen selections. Exported clip files contain the clip in motion, as displayed within the clip window.

After analysis, the export function is available on all windows except the M-mode, R-waves, Crop window.

To export data in ASCII format (TXT file):

1. Position the cursor over the graph and then press the right trackball key to confirm your selection.
2. Tap **Export Data**.
3. Select the available media.

The program displays a confirmation message when the export function is complete.

See also: For descriptions of exported data files, refer to Appendix E in the System Reference.

To export an image:

Note: You can export an image as a bitmap file.

1. Select the required clip.
2. To change the clip frame, use the CINE controls.
3. Tap **Export Image**.
4. Select the available media.

The program displays a confirmation message when the export function is complete.

To export a clip:

Note: You can export a clip as a video clip. You cannot export a clip as a DICOM clip.

1. Select the required clip.
2. Tap **Export Clip**.
3. Select the available media.

The program displays a confirmation message when the export function is complete.

ACUSON Sequoia
Diagnostic Ultrasound System
System Reference



Complies with
IMDA Standards
DA107142



Product Version 2.0**Software Version VA40**

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Chapter 2	Workflow Configuration Settings Instructions for customizing the image presets, worklist procedures, annotations, and the measurement function for your hospital, clinic, or facility. Includes procedures for sharing the preferences within an organization.
Chapter 3	Obstetric Measurement Configuration Instructions for customizing the measurement function for the obstetric exams.
Chapter 4	Reserved for Future Use
Chapter 5	Network Configuration Instructions for configuring network connections.
Chapter 6	DICOM Configuration Instructions for configuring DICOM (Digital Imaging and Communications in Medicine) profiles. Includes a procedure for importing certificates for secure connections.
Chapter 7	Security Configuration Information for the ultrasound system administrator. Includes procedures for creating user accounts and configuring the security log file.

Appendix A	EMC Publication Electromagnetic Emissions and Immunity: Guidance and Manufacturer's Declaration Information regarding the electromagnetic compatibility (EMC) testing of this ultrasound system.
Appendix B	Patient Browser Selections Description of the selections in the patient browser.
Appendix C	Measurement and Calculation Labels (Applies to all exams except cardiac, obstetric, and fetal echo) List of the measurement and calculation labels.
Appendix D	Cardiac Measurement and Calculation Labels List of the measurement and calculation labels for the cardiac exam. Includes a description of labels for the following features: ▪ <i>syngo</i> Velocity Vector Imaging
Appendix E	OB and Fetal Echo Measurement and Calculation Labels List of the measurement and calculation labels for the obstetric and fetal echo exams.
Appendix F	Bibliography A list of clinical references.

Note: Not all features and options described in this publication are available to all users. Please check with your Siemens Healthineers representative to determine the current availability of features and options.

About the User and Reference Manuals

The user and reference manuals consist of the following publications.

Publication	Includes
<i>Instructions for Use</i>	▪ Conventions and typographical conventions used in the manuals ▪ Intended audience ▪ Introduction to the ultrasound system ▪ Safety and care information for the ultrasound system and compatible transducers ▪ Procedures for setting up and preparing the system for use ▪ Procedures for registering a patient and activating an operating mode ▪ Procedures for acquiring, optimizing, annotating, measuring, printing, and recording images ▪ Technical description of the ultrasound system ▪ Acoustic output data
<i>Advanced Imaging Manual</i>	This manual is a companion to the Instructions for Use publication and contains additional instructions for use for the safe and proper use of advanced imaging features on the ultrasound system. ▪ Description of the biopsy function ▪ Procedures for specialty imaging ▪ Panoramic imaging ▪ Contrast agent imaging ▪ Comparing images from multiple modalities ▪ 3D and 4D volume imaging ▪ Virtual Touch applications ▪ Procedures for reviewing images and clips ▪ Procedures for the physiologic function ▪ Fusion imaging ▪ Velocity vector imaging
<i>System Reference*</i>	▪ Description of customizable system settings ▪ Description of all measurement labels configurable for the ultrasound system ▪ Information about DICOM connectivity, network capabilities, and external devices ▪ Clinical references ▪ Information regarding the electromagnetic compatibility (EMC) testing of this ultrasound system

*Languages supported by the user interface include a translation of this publication.

Conventions

The user and reference manuals include the following conventions.

Convention	Description
Warnings and Cautions	 WARNING: Warnings are intended to alert you to the importance of following the correct operating procedures where risk of injury to the patient or system user exists.  Caution: Cautions are intended to alert you to the importance of following the correct operating procedures to prevent the risk of damage to the ultrasound system.
Notes and Prerequisites	Prerequisite: Prerequisites contain tasks the user must complete or information the user needs prior to performing a procedure. Note: Notes contain information concerning the proper use of the ultrasound system or correct execution of a procedure.
Cross-references	Examples: See also: For information about cleaning and disinfecting a transducer, refer to Chapter 3 in this manual. See also: For information about customizing the measurement function, refer to Chapter 2 in the System Reference. See also: For additional information about the measurement function, refer to Chapter 10 in the Instructions for Use. See also: For information about exporting and importing images, refer to Chapter B2 in the Advanced Imaging Manual. See also: Alphanumeric Keyboard, page 1-26 See also: Chapter 2, Instructions for Use
Customizable Ultrasound System Settings	Settings for configuring and customizing the ultrasound system are described in the System Reference. When customization is available, the user manual provides a reference to the configuration settings. Example: Use the configuration settings to customize the measurement function.

Typographical Conventions

The following typographical conventions are in descriptions and procedures within your user and reference manuals. Use the conventions to identify the location of a control or selection on the ultrasound system.

Control or Selection	Description
Controls on the Control Panel	Controls located on the control panel are indicated by uppercase boldface type. Examples: ▪ Push DEPTH. ▪ Rotate 2D to adjust the 2D gain. ▪ Press CALIPER to activate the measurement function. ▪ Double-click UPDATE to display the 2D image.
Trackball and Trackball Keys	Right and left trackball keys are located on the control panel. The function assigned to the trackball and trackball keys is indicated by labels on the image screen. Examples: ▪ Adjust the size or position of the field of view and then press a trackball key. ▪ Position the measurement marker and then press a trackball key. ▪ Press the right trackball key.
Selections on the Image Screen	On-screen selections are indicated by boldface type. Roll the trackball to position the pointer on the control or object on the image screen and then press a trackball key. Examples: ▪ Click Correct on the patient registration form. ▪ Double-click a thumbnail. ▪ Select the check box for the required entries and then click Delete.
Controls on the Control Panel for the Touch Screen	Press and rotate controls on the control panel are labeled on the touch screen. The selection assigned to these controls is indicated by boldface type. Examples: ▪ Rotate Tint. ▪ Press Steer.
Selections on the Touch Screen	Touch screen selections are indicated by boldface type. Tap the touch screen to access a selection. Drag an object on the touch screen to reposition the object. Swipe the screen to display a separate page of selections. Examples: ▪ Tap Workflow. ▪ Drag the tail of the arrow on the touch screen to adjust the length.

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Overview

You can use the configuration settings to modify factory (default) settings or customize the current settings.

The configuration settings are organized into categories, for example, ultrasound system settings, imaging settings, and networking settings.

Note: Some changes may not take effect until you restart the ultrasound system. The system displays a message to remind you to restart the system.

To access the configuration settings:

1. Tap the configuration button.



2. Click the name of the category on the left side of the image screen.
The settings display on the right side of the image screen.
3. Modify the settings.
4. To save your changes, click the name of another category. Or, exit the configuration settings.
5. To restore the factory settings, click **Restore Defaults**.

Note: Restoring default factory settings deletes your changes.

Navigation Buttons

Selection	Definition
▼	Contracts the selections in the list.
▶	Expands the selections in the list.
⌂	Repositions the item to the top of the list.
▲	Repositions the item up one position in the list.
▼	Repositions the item down one position in the list.
⌂	Repositions the item to the bottom of the list.
▲	Repositions the item up one position in the list.
▼	Repositions the item down one position in the list.
>	Moves the item one position to the right.
<	Moves the item one position to the left.
+	Adds the item to the touch screen layout.
x	Removes the item from the touch screen layout.

Configuration Categories

Category	Description
System Settings	---
General	Predefines ultrasound system settings.
Display	Predefines touch screen and image screen settings.
Patient	Predefines patient information settings.
Workflow Enhancement	See also: For information about configuring image presets and worklist procedures, refer to Chapter 2 in this manual.
Imaging Settings	---
General	Predefines settings by exam type, including freeze behavior, dual display format, and settings specific to M-mode, Doppler, or color imaging.
Capture Settings	Predefines capture settings for the exam.
Imaging Mode	Predefines general imaging settings.
Image Parameter Display	Predefines the display of imaging parameters and settings. Provides selections to enable the display of patient information on a saved or printed image or clip.
Measurement & Report	See also: For information on measurement and report configuration settings, refer to Chapters 2 and 3 in this manual.
Annotations	See also: For information about configuring body markers and text labels, refer to Chapter 2 in this manual.
Features	---
Protocols	Predefines settings for user-defined workflow protocols.
Connectivity & Network	See also: For information on network configuration settings, refer to Chapter 5 in this manual. See also: For information on DICOM configuration settings, refer to Chapter 6 in this manual.
Peripheral Devices	---
Foot Switch	Predefines settings for the footswitch.
DVR	Predefines settings for a DVR recording device connected to the ultrasound system.
Print / Store	Predefines settings for printing and storage devices connected to the ultrasound system.
Local Printer	Predefines settings for printing devices connected to the ultrasound system.
System Management	---
System Information	Accesses password-protected service procedures and the remote assistance function. Predefines user account access and passwords.
Security	▪ Indicates enabled or disabled security features on the ultrasound system. ▪ Provides selections for configuring security settings.
Service	Provides remote access for authorized Siemens Healthineers service representatives to troubleshoot and maintain the ultrasound system.

System Settings

General

Selection	Description
Regional Settings (Restart Required)	Identifies system settings for your region. Note: Changes to the regional settings require a system restart.
Language	Provides language options for the ultrasound system user interface screens. ▪ English ▪ German ▪ French ▪ Italian ▪ Spanish
Keyboard	Provides language characters for the touch screen keyboard.
Date Format	Specifies the date display format.
Time Format	Specifies the time display format.
Date	Specifies the current date.
Time	Specifies the current time.
Time Zone	Specifies the time zone for your region.
Units	---
Height and Weight	Specifies the type of measurement units for height and weight. ▪ Metric (cm / kg) displays height and weight in metric units. ▪ English (ft. in / lb. oz) displays height and weight in the non-metric measurement system using feet, inches, pounds, and ounces.
Institution Information	---
Institution Name	Predefines the name of the healthcare institution.
Physician or Operator	Predefines the names of physicians and operators for use during patient registration. ▪ Performing Physicians ▪ Operators ▪ Referring Physicians
Add	Adds a physician's or operator's name.
Delete	Removes the selected physician's or operator's name from the list.

Selection	Description
Audio	---
Confirmation Beep	---
Store Image and Clip	When enabled, provides audible feedback when an image or clip is stored.
Volume	Specifies the volume for the audible tone. ▪ High ▪ Medium ▪ Low
Gesture Detecting Transducer	---
Gesture Settings	Provides options for activating a transducer with gesture detection capabilities.
Enable Gesture Detecting	When enabled, activates gesture detection capability for the selected transducer.

Display

Selection	Description
Touch Screen User Defined Buttons	Adds or removes touch screen buttons for direct access to frequently-used functions. ▪ None indicates no user-defined button on the touch screen. ▪ Print sends a screenshot of the image screen to the printer.  ▪ DVR Record/Pause records and stores video clips to a digital video recorder. Or, temporarily stops recording to a digital video recorder.  The system also displays a timer with the button. ▪ Full Screen activates full-screen display format on the image screen. Full screen format increases the size of the image to hide the thumbnail panel and patient banner.  ▪ Hide Banner temporarily hides the patient banner on the image screen.  ▪ Lock Screen locks the touch screen and trackball. Pressing the freeze key unlocks the touch screen and trackball.  ▪ Panoramic activates Panoramic imaging. ▪ DVR Menu displays selections for the digital video recording device. ▪ Service Image saves a screenshot of the current image screen and touch screen to the service image folder on the ultrasound system.  ▪ Eject USB disconnects the USB-compatible storage devices from the ultrasound system.  ▪ Film Sheet displays selections to copy images to the film sheet. ▪ Network Job Status displays the network job status dialog box. ▪ Send to Store Server sends images and clips to all DICOM storage servers configured for transfer at the end of the exam.
Monitor Screen Saver	---
Wait Time (1 ~ 120)	Specifies the number of minutes before activating the screen saver.

Patient Banner

Selection	Description
Patient Banner	Provides a preview of the current selections in the patient banner.
Rows	Predefines the layout of the selected item. ▪ Row 1 repositions the selected item to the first row in the patient banner. ▪ Row 2 repositions the selected item to the second row in the patient banner.
Position	Repositions the selected item horizontally in the patient banner.
Width	Edits the width of the selected item.
Prefix	Inserts text at the beginning of the selected item's name.
Properties	Predefines the patient information to include in the patient banner. When selected, the items are added to the patient banner. You can configure the layout of the banner.
Accession No	Displays the patient's accession number.
Age	Displays the patient's age.
BP [mmHg]	Displays the patient's blood pressure in mmHg.
BSA [m²]	Displays the patient's body mass index in meters squared.
Date	Displays the date of the patient study.
Date of Birth	Displays the patient's date of birth.
Date + Time (short)	Displays the date and time of the exam.
LMP	Displays the patient's last menstrual period.
EDD	Displays the patient's estimated date of delivery.
Fetal Age	Displays the age of the fetus.
First Name Last Name	Displays the patient's first and last name.
First Name Middle Name Last Name	Displays the patient's first, middle, and last name.
First Name	Displays the patient's first name.
Height	Displays the patient's height.
Institution Name	Displays the institution name.
Last Name, First Name	Specifies the format for the patient's last and first name.
Last Name, First Name Middle Name	Specifies the format for the patient's last, first, and middle name.
Last Name	Displays the patient's last name.
Middle Name	Displays the patient's middle name.

Selection	Description
No. Fetuses	Displays the number of fetuses.
Operator	Displays the initials or other identifying information of the person performing the patient study.
Patient ID	Displays the patient's identification number.
Performing Physician	Displays the performing physician's name.
Referring Physician	Displays the referring physician's name.
Request ID	Displays the request identification number.
Sex	Displays the patient's gender.
Study	Displays the type of patient study.
Time	Displays the time of the patient study.
Weight	Displays the patient's weight.

Workflow Enhancement

See also: For information on configuration settings for workflow enhancement, refer to Chapter 2 in this manual.

Imaging Settings

General

Selection	Description
Dual	Provides dual display options for images and annotations.
Enable Seamless Dual	When enabled, displays the image in a dual display format.
Show Image Text	Displays or hides the imaging parameters in a dual display format.

Capture Settings

Selection	Description
Exam Presets	Displays a list of exams.
Default Capture Settings	Provides options for capturing clips for the selected exam.
Clip Capture	Specifies the direction for capturing data. ▪ Prospective saves newly acquired images. ▪ Retrospective saves previously acquired images.
Clip Length	Provides measurement options for the duration of a recorded clip.
Time	Defines the length of the clip to capture. ▪ Seconds displays a list of predefined clip lengths. ▪ Custom (1 ~ 300) defines a clip length in seconds.
Beats	Defines the length of the clip to capture. ▪ Beats displays a list of predefined heart cycles. ▪ Custom (1 ~ 300) defines a clip length in heart beats. ▪ First R-Wave Offset indicates the user-defined number of frames to capture before the first R-wave. ▪ Last R-Wave Offset indicates the user-defined number of frames to capture after the last R-wave.
Enable Compression	When enabled, the ultrasound system compresses the clip at the time of capture. Note: Compression reduces image quality, and the original quality of the images in the clip cannot be restored. The quality factor is stored in the DICOM tag of the clip. Quality factor is the degree of loss during compression, where 2 is the lowest compression with the highest quality image and 255 is the highest compression with the lowest quality image. When this option is disabled, clips include lossless images with a quality factor of 0.
Compression Level	Specifies the level of clip compression. ▪ Low provides the lowest level of compression while retaining a high-quality image, for example, to a quality factor of 10. ▪ Medium provides a moderate level of compression while reducing the image quality, for example, to a quality factor of 25. ▪ High provides the greatest compression with the greatest loss of image quality, for example, to a quality factor of 35.

Selection	Description
Capture Definition	Provides options for decreasing the file size of a clip.
Limit Clip Capture Rate to 30Hz	When enabled, limits the clip capture frequency to 30 Hz. Note: Limiting the frequency stores files at a lower frame rate and creates a smaller file size. When this option is disabled, the ultrasound system captures and stores files at a higher frame rate.
Contrast Capture Settings	Provides options for capturing clips during contrast agent imaging for the selected exam.
Clip Capture	Specifies the direction for capturing data during contrast agent imaging. Note: Only newly acquired images are captured during contrast agent imaging.
Clip Length	Provides measurement options for the duration of a recorded clip during contrast agent imaging.
Time	Defines the length of the clip to capture during contrast agent imaging. ▪ Seconds displays a list of predefined clip lengths. ▪ Custom (1 ~ 300) defines a clip length in seconds.
Beats	Defines the length of the clip to capture during contrast agent imaging. ▪ Beats displays a list of predefined heart cycles. ▪ Custom (1 ~ 300) defines a clip length in heart beats. ▪ First R-Wave Offset indicates the user-defined number of frames to capture before the first R-wave. ▪ Last R-Wave Offset indicates the user-defined number of frames to capture after the last R-wave.
Enable Compression	When enabled, the ultrasound system compresses the clip at the time of capture. Note: Compression reduces image quality, and the original quality of the images in the clip cannot be restored. The quality factor is stored in the DICOM tag of the clip. Quality factor is the degree of loss during compression, where 2 is the lowest compression with the highest quality image and 255 is the highest compression with the lowest quality image. When this option is disabled, clips include lossless images with a quality factor of 0.
Compression Level	Specifies the level of clip compression. ▪ Low provides the lowest level of compression while retaining a high-quality image, for example, to a quality factor of 10. ▪ Medium provides a moderate level of compression while reducing the image quality, for example, to a quality factor of 25. ▪ High provides the greatest compression with the greatest loss of image quality, for example, to a quality factor of 35.
4D Capture Settings	Provides options for capturing clips during 4D imaging for the selected exam. Note: The 4D and default capture settings are identical with the following exceptions: The maximum clip length for 4D volumes is 10 seconds.

Imaging Mode

Selection	Description
Exam Presets	Displays a list of exams.
Imaging Cursor Workflow	Provides options for cursor workflow for Doppler and M-mode for the selected exam.
Enable Cursor Mode	When enabled, activates cursor mode for both Doppler and M-mode.
Doppler and M Mode	Specifies imaging settings for 2D and Doppler for the selected exam.
Enable Automatic Color Invert	When enabled, activates color inversion with PW Gate Steering.
Doppler Mode	Specifies imaging settings for Doppler for the selected exam.
Display Format	Specifies the display format for 2D and Doppler. ▪ 1/2 2D, 1/2 Trace ▪ 1/3 2D, 2/3 Trace ▪ 2/3 2D, 1/3 Trace ▪ Side by Side
M Mode	Provides options for imaging settings during M-mode for the selected exam.
Display Format	Specifies the display format for 2D/M-mode images. ▪ 1/2 2D, 1/2 Trace ▪ 1/3 2D, 2/3 Trace ▪ 2/3 2D, 1/3 Trace ▪ Side by Side
Freeze Behavior	Provides options during system freeze for the selected exam.
Default Menu on Touch Screen	Assigns the system response to the freeze function during imaging. ▪ Measurement Menu activates the measurement function. ▪ Mode Menu activates CINE. ▪ Text Menu activates text annotations. ▪ Body Marker Menu activates body markers.
In Review	Assigns the system response to the freeze function during review. ▪ Play/Pause CINE assigns the play/pause clip playback function to the freeze control during review. ▪ Exit Review assigns the exit function to the freeze control during review.

Selection	Description
Doppler Auto TEQ	Provides options for using TEQ technology for Doppler for the selected exam.
Parameters	Optimizes the selected parameters when using TEQ technology for Doppler. ▪ Gain optimizes TEQ gain offset for the current imaging mode. ▪ Dynamic Range adjusts the dynamic range. ▪ Scale/Baseline adjusts the scale factor of the Pulsed Repetition Frequency (PRF) and the position of the spectral or color baseline.
Mode	Specifies settings for TEQ. ▪ Off deactivates TEQ when you freeze the image. ▪ Entering Freeze optimizes the overall image brightness uniformity and reactivates real-time imaging (from a frozen image) when you freeze the image.
Doppler Auto TEQ Target Spectral Intensity	Provides options for auto TEQ technology for the selected exam. ▪ PW selects pulsed wave and pulsed wave DTI intensity for gain. – Low – Medium – High ▪ CW selects continuous wave intensity for gain. – Low – Medium – High Note: The selected intensity applies to the gain when the gain is optimized using TEQ technology for Doppler.

Image Parameter Display

Selection	Description
Patient Information	When enabled, the patient information selections display in the imaging parameters.
Institution Name	Displays the institution name.
Last Name, First Name	Displays the patient's last and first name.
Last Name	Displays only the patient's last name.
Date of Birth	Displays the patient's date of birth.
Patient ID	Displays the patient's identification number.
Date + Time (short)	Displays the date and time of the exam.
Operator	Displays the initials or other identifying information of the person performing the patient study.
Imaging Mode	Description
Transducer	Displays the selected transducer.
Exam	Displays the selected exam.
Thermal Index - Bone (TIB)	Displays the bone tissue thermal index.
Thermal Index - Cranium (TIC)	Displays the cranial bone thermal index.
Thermal Index - Soft Tissue (TIS)	Displays the soft tissue thermal Index.
Mechanical Index (MI)	Displays the mechanical index during real-time imaging.
Frame Rate	When enabled, displays the frame rate.
Transmit Power	When enabled, displays the transmit power.
2D	Lists the imaging parameters and settings for 2D-mode.
3D/4D	Lists the imaging parameters and settings for 3D/4D imaging.
C	Lists the imaging parameters and settings for color imaging.
D	Lists the imaging parameters and settings for Doppler.
M	Lists the imaging parameters and settings for M-mode.
Contrast	Lists the imaging parameters and settings for contrast.
Strain	Lists the imaging parameters and settings for strain imaging.
pSWE	Lists the imaging parameters and settings for Point Shear Wave Elastography (pSWE).
SWE	Lists the imaging parameters and settings for Shear Wave Elastography (SWE).

Measurement & Report

See also: For information on measurement and report configuration settings, refer to Chapter 2 in this manual.

See also: For information on obstetric measurement and report configuration settings, refer to Chapter 3 in this manual.

Annotations

See also: For information on customizing body markers and text labels, refer to Chapter 2 in this manual.

Features

Protocols

Selection	Description
Protocols and View	Displays a list of the workflow protocols and associated views.
(List of protocol categories)	Displays a list of categories of protocols. ▪ All lists user-defined and system provided protocols. ▪ Factory Default lists system provided protocols. ▪ User Defined lists protocols created by the user.
(List of protocols)	Displays a list of the protocols and views based on the selected protocol category.
Multiple Select	When enabled, you can select multiple views to copy or delete from a protocol category.
View Details	Lists information about the view, for example, the view name and mode selection.
Add Protocol	Inserts a blank protocol in the list.
Add View	Inserts a blank view in the list. ▪ View lists selections for creating a new view for the protocol. ▪ Body Markers & Text lists selections for adding body markers and text to the new view for the protocol. ▪ Measurements list selections for adding measurements to the new view for the protocol.
Select All Views	Selects all the views for the protocols and applies the edits to all the views.
Replace Text	Predefines text for the selected view.
Copy	Duplicates the selected protocol or view, assigns a name that includes the copied protocol or view name with a numeric extension, and adds the new protocol or view to the list.
Delete	Deletes the selected protocol or view.
Import	Displays a dialog box to copy a protocol from an external storage device.
Export	Displays a dialog box to copy a protocol from the ultrasound system to an external storage device.

Protocol Selections

Selection	Description
Protocol Name	Displays the name of the selected protocol.
Progression	Predefines the next view in the protocol. ▪ Automatic activates the next view in the protocol when the current view is complete. ▪ Manual waits for the user to select the next view in the protocol when the current view is complete.
Append Paused Images	Predefines images in the protocol. ▪ Within the Protocol inserts a newly-saved image at the current location in the list of protocol views when a protocol is paused. ▪ At the End of the Protocol inserts a newly-saved image at the end of the list of protocol views when a protocol is paused.
End Protocol	Predefines the ending for the protocol. ▪ Automatically end when all views completed ends the protocol when the last view is complete.
At Exit Protocol	Predefines the next step after the protocol is complete. ▪ Remain in acquisition continues acquisition when the last view of the protocol is complete. ▪ Enter Report displays the patient report when the last view of the protocol is complete. ▪ Enter Review activates review when the last view of the protocol is complete.
Export Order	Predefines the sequence of protocol views exported from the ultrasound system.

View Selections

Selection	Description
View	Provides options for the selected view.
View Name	Name of the selected view.
Mode Selection	Lists available imaging modes for the selected view.
Color	Predefines the next step after the protocol is complete. ▪ Velocity selects color mode. ▪ Power selects power mode.
Color Steer	Predefines the color region of interest. ▪ None hides the color region of interest. ▪ Steers the color region of interest to a right angle.  ▪ Steers the color region of interest to the center position.  ▪ Steers the color region of interest to a left angle. 
Save Image With and Without Color	When enabled, saves an image with color and an image without color for a selected view with color mode or power mode. The system stores the images when the mode is activated and when an image is printed or stored.
Auto Trace	Predefines auto trace. ▪ On enables auto trace. ▪ Off disables auto trace.
Timer	Predefines the timer. ▪ None hides the timer when the selected view is activated, if the timer was not started on the previous view. ▪ Start starts the timer when the selected view is activated. ▪ Stop stops the timer when the selected view is activated.

Selection	Description
Body Markers & Text	Provides options for body markers and annotations for the selected view.
Annotation	Displays annotations for the selected view.
(Annotation text)	Defines the default text annotation for the protocol view.
X	Defines the default horizontal position on the image screen for the annotation.
Y	Defines the default vertical position on the image screen for the annotation.
Reset Position	Repositions text to the home position on the image screen.
Apply to all views	Predefines the location of all annotations for all views.
Body Marker	Predefines the body marker for the selected view.
Exam	Lists available exams and displays the associated body markers.
Transducer Marker	Predefines the transducer marker. ▪ On enables a transducer marker for the body marker. ▪ Off disables a transducer marker for the body marker.
Orientation	Predefines the angle of the transducer marker on the body marker.
Delete Body Marker	Removes the selected body marker from the list.
Measurements	Provides options for measurements for the selected view.
Number of Measurement Labels	Predefines the quantity of measurement labels. ▪ None hides measurement labels. ▪ 1 selects one measurement label. ▪ 2 selects two measurement labels. ▪ 3 selects three measurement labels.
Save Image With And Without Measurements	Predefines one image with measurements and one image without measurements.
Label	Predefines the measurement label. You can predefine up to three measurement labels.
Exam	Predefines the exam for the measurement label.
Imaging Mode	Predefines imaging mode for the measurement label. ▪ 2D activates 2D-mode with the measurement label. ▪ D activates Doppler with the measurement label. ▪ M activates M-mode with the measurement label.
Label	Predefines the measurement label.

Importing and Exporting Protocols

To import or export a protocol:

1. Connect an external storage device to the ultrasound system.
2. Activate the configuration settings.
3. Click **Features** and then click **Protocols**.
4. To import a protocol, click **Import**.
5. To export a protocol, click **Export**.
6. Select the protocol.
7. To transfer all protocols in the list, click **Select All**.
8. Click **OK**.

Configuring Protocols on a Personal Computer

You can use your personal computer to edit an existing workflow protocol or to create a new protocol.

To configure a protocol on a personal computer:

1. Export one or more protocols from the ultrasound system to an external storage device.
The system copies the selected protocols and the protocol editor software tool to the external storage device.
2. Insert the external storage device into your personal computer.
3. Double-click **OfflineProtocolEditor.exe**.
The offline protocol editor software provides the same **Protocol** selections as the configuration menu on the ultrasound system.
4. Use the selections to edit an existing protocol or create a new protocol.
5. Import the protocols from the external storage device to the ultrasound system.

Connectivity & Network

See also: For information on network configuration settings, refer to Chapter 5 in this manual.

See also: For information on DICOM configuration settings, refer to Chapter 6 in this manual.

Export

Selection	Description
Report Data Export	---
Enable Transfer	Specifies options for transferring an XML report to a network destination.
Network File Share	When enabled, defines the destination network path.
Domain/User Name	When enabled, defines the domain or user name for the network resource.
Password	Specifies the domain or user password for the network resource.
Web API	Displays configuration information for the Web application program interface (API).
Server Address	Specifies the numerical label assigned to the server connected to your computer network.
User Name	Specifies your user name.
Password	Specifies the password required to access the Web application program interface (API).
Site	Specifies the web site address.

Peripheral Devices

Footswitch

The ultrasound system supports a three-pedal footswitch. You can assign a function to each pedal.

Selection	Equivalent Control or Selection
Left, Middle, Right	Identifies the footswitch pedal to assign the control or function.
Burst	(Available only for contrast agent imaging) Starts and stops the burst of contrast agent microbubbles.
Flash Sequence	(Available only for contrast agent imaging) Starts flash sequencing.
Clip Save	Acquires and saves a clip or volume to the ultrasound system and displays the image in the thumbnail panel. Assigns the function of the CLIP control to the footswitch.
Color	Activates or deactivates color imaging with 2D and Doppler.
CW	Activates or deactivates the steerable continuous wave (CW) Doppler function for phased array transducers. Assigns the function of the CW control to the footswitch.
DVR Record	Records or pauses video.
Auto TEQ	Activates or deactivates Auto Tissue Equalization (Auto TEQ) optimization.
Freeze	Freezes or unfreezes the acquisition of an image, sweep, or spectrum. Assigns the function of the FREEZE control to the footswitch.
Full Screen	Activates a full-screen format on the image screen.
Image Store	Captures an image. Assigns the function of the IMAGE control to the footswitch.
M Mode	Activates M-mode and displays the M-mode sweep and 2D image according to the format selected in the configuration settings. Assigns the function of the M control to the footswitch.
Next View	Activates the next view in the protocol.
Pause/Resume Protocol	Stops or starts the protocol.
Previous View	Activates the previous view in the protocol.
PW	Activates or deactivates the pulsed wave (PW) Doppler function for linear, curved, and phased array transducers. Assigns the function of the PW control to the footswitch.
Review	Activates or deactivates review to view images and clips.
Harmonics	Activates or deactivates Harmonics for enhanced contrast resolution.
UD Print	Prints an image, as defined in the configuration settings for print and store.
Update	Activates a selection depending on the active function during Doppler, for example, displays an image in full-screen format during review. Assigns the function of the UPDATE control to the footswitch.

DVR

Note: A digital video recorder (DVR) must be connected and set up with permanent access to the ultrasound system before using the selections.

Selection	Description
Enable DVR	When enabled, displays settings for recording video.
Default Video Destination	Specifies the default storage location for video recordings.
Network File Share	Specifies the network file share.
Path	Specifies the path for the network file share.
USB Storage	Specifies the destination for video recordings is a USB compatible storage drive.
USB Device	Specifies the destination for video recordings is a USB-compatible storage device.
File Naming Convention	Specifies the file name format for saving video recordings.
File names will be saved in this format:	Displays the file name format for saving video recordings.
Auto Start and Stop	Provides options for video recording.
Automatically start video recording when exam starts	When enabled, starts video recording when an exam starts.
Automatically stop video recording when an exam ends	When enabled, stops video recording when an exam ends.

Print/Store

Prerequisite: Ensure a printer or storage device is connected to the ultrasound system.

Selection	Description
Print Routing	Provides selections for configuring print and store functions. ▪ Control Panel: Image Capture provides selections for assigning print function to the IMAGE control on the control panel. ▪ Touch Screen: UD Print Control provides selections for assigning print function to the additional print selection on the touch screen.
BW	Assigns the print function to the designated control for sending black and white images to the selected printer.
Color Doppler	Assigns the print function to the designated control for sending images with color or power data to the selected printer.
Tinted	Assigns the print function to the designated control for sending tinted images to the selected printer.
2D Ref	Assigns the print function to the designated control for sending 2D-mode with pulsed wave Doppler images with color to the selected printer.
Misc.	Assigns the print function to the designated control for sending miscellaneous images to the selected printer. Miscellaneous images include secondary capture images, screen captures, and saved images from review containing multiple images.
Store	When enabled, assigns the store function to the designated control for storing images to the selected storage server.
Image Store	---
Store Server	Lists the storage servers available for storing images.
Image Auto Transfer	Indicates when images transfer to the storage device. ▪ During Exam transfers images during the exam. ▪ End of Exam transfers images at the end of the exam. ▪ Disabled does not transfer images.
Clip Auto Transfer	Indicates when clips transfer to the storage device. ▪ During Exam transfers clips during the exam. ▪ End of Exam transfers clips at the end of the exam. ▪ Disabled does not transfer clips.
SR Auto Transfer	Indicates when data in a Structured Report (SR) format transfers to the storage device. ▪ End of Exam transfers data at the end of the exam. ▪ Disabled does not transfer the data.
Embed Overlays	When enabled, stores graphics and text as an overlay on an image.
Advanced	Accesses advanced settings for configuring the transfer of patient data. See also: For configuring image compression and the number of attempts to send images to a network device, refer to page 1-25.

Selection	Description
Printers	---
Printer	Lists the available printers for printing images.
Auto Transfer	Indicates when patient images are sent to the printer. ▪ During Exam prints images during the exam. ▪ End of Exam prints images at the end of the exam. ▪ Disabled does not print images.
Layout	Lists the layout options for the number of images to print on each page.
Media Size	Specifies the default paper size for printing images and the size of the filming sheet. ▪ UserDefault indicates the factory default setting.
Orientation	Lists the print layout options. ▪ Portrait ▪ Landscape
Formatted by	Specifies the source of the page format. ▪ System indicates the ultrasound system as the source of the format. ▪ Printer indicates the printer as the source of the format.
Optimize large sheet	When enabled, prints the page without a full page of images.
Advanced	Accesses advanced settings for configuring the film sheets. Note: Do not change the advanced settings for transferring patient data.

Configuring Advanced Print and Store Settings

To configure advanced print settings:

Prerequisite: Ensure a printer, storage device, DICOM device, or PACS device is connected to the ultrasound system.

1. Tap the configuration button.



2. Click **Peripheral Devices**.
3. Click **Print / Store**.
4. Click the **Image Store** tab, if necessary.
5. To change the type of compression for images sent to a print or storage device connected to the ultrasound system:
 - a. Click **Advanced**.
 - b. Click the **Local Devices** tab.
 - c. Select a **Compression type** setting.
 - **None** indicates exported images are not compressed. No compression is the recommended setting.
 - **Lossless JPEG** indicates exported images are compressed without loss of information. The original quality of the images can be restored.
 - **Lossy JPEG** indicates exported images are compressed with loss of information. Lossy compression is irreversible and can result in the loss of image quality.
 - d. Click **OK**.
6. To change the type of compression for images sent to a DICOM or PACS device:
 - a. Click **Advanced**.
 - b. Click the **Network Nodes** tab.
 - c. Select a **Compression type** setting.
 - **None** indicates exported images are not compressed. No compression is the recommended setting.
 - **Lossless JPEG** indicates exported images are compressed without loss of information. The original quality of the images can be restored.
 - **Lossy JPEG** indicates exported images are compressed with loss of information. Lossy compression is irreversible and can result in the loss of image quality.
 - d. Click **OK**.

7. To indicate the number of retry attempts to send images to a DICOM or PACS device:
 - a. Click **Advanced**.
 - b. Click the **Network Nodes** tab.
 - c. Select a **Retry** setting.
 - **times with** indicates the number of times the system attempts to send data to the selected network device.
 - **minutes interval** indicates the time interval between attempts to send data to the selected network device.
 - d. Click **OK**.

Local Printer

See also: For information about the risks of connecting equipment to the ultrasound system, refer to Chapter 4 in the Instructions for Use.

Selection	Description
Local Printer Settings	---
Configure	Lists the printers connected to the ultrasound system.
Refresh	Refreshes the list of printers.
Add	Accesses options for configuring a printer.
Remove Printer	Deletes the selected printer from the list of printers.
Test Printer	Confirms the configuration of the selected printer.
Add Printer	---
USB Printer is automatically installed when connected.	Installs a printer connected to a USB port on the ultrasound system.

System Management

The system management section provides local and remote access for authorized Siemens Healthineers service representatives to troubleshoot and maintain the ultrasound system.

Users have limited access to the service section. The ultrasound system restricts access to additional options, for example, local service, date and time settings, and regional settings.

System Information

Selection	Description
System Information	Provides identifying information for the ultrasound system.
Serial Number	Displays the unique number identifying the ultrasound system.
Product Version	Displays the software version of the ultrasound system.
Version Details...	Displays information about the installed software.
Detail >	Displays detailed information about the installed software version.
Automatic Disk Management	Provides options for disk management.
Enable Auto Cleanup	When enabled, activates or deactivates deletion of unprotected patient studies when the amount of used storage space reaches a system-defined threshold. Specifies the work status criteria for the deletion of patient studies. ▪ Archived deletes archived patient studies. ▪ Archived & Committed deletes patient studies archived to and confirmed as archived. ▪ Sent deletes patient studies sent to a PACS. ▪ Sent & Committed deletes patient studies sent to and confirmed as sent to a PACS.
Fusion Power Line Frequency	---
Frequency	Specifies the power frequency for the Fusion tracking system. ▪ 50 Hz ▪ 60 Hz

Automatic Deletion of Transferred Patient Studies

You can configure the system to automatically manage disk space by deleting transferred patient studies when space falls below the automatic deletion threshold.

When automatic disk management is enabled and the amount of used storage space on the local database reaches a system-defined threshold, the system automatically deletes the oldest studies transferred to a PACS.

Criteria for Deletion

Note: Siemens Healthineers recommends that you limit automatic deletion to data that has been sent to a PACS or archive devices only.

To qualify for deletion through automatic disk management, a study must fulfill the following requirements:

- The date on which the study (or most recent series object within the study) was stored to the system is outside the delay threshold. The delay threshold is the number of days prior to the most recent storage date that qualifies for the deletion process.
- All series objects and all images within the study are unprotected (system default).
- The study's work status meets at least one (not necessarily all) of the criteria specified for automatic disk management.

Study Deletion Process

With automatic disk management enabled, the system begins study deletion as a background operation when the amount of used storage space reaches the system's automatic deletion threshold.

Storage space is checked every time an examination ends.

The system deletes older studies first, ignoring the most recently stored studies according to the system's delay threshold.

The storage date of the most recent series object within the study matches the date of the study ("study date"). Use the patient browser to view the study date.

Note: If no studies exist for a patient after the study deletion process, then the system automatically deletes the empty patient folder.

Notification of Storage Space Availability

Regardless of the automatic disk management settings, the system displays a message if the amount of used storage space reaches any of the system's notification thresholds (low warning and full warning).

The low warning message is displayed briefly on the lower left of the screen. The full warning message is displayed within a message box at the bottom of the screen and continues to display until you dismiss the message box.

Automatic Disk Management Thresholds

Automatic Disk Management Threshold	Value
Automatic Deletion	60 percent of the storage space
Low Warning (notification)	65 percent of the storage space
Full Warning (notification)	75 percent of the storage space

Security

You can view the list of enabled and disabled security features on the ultrasound system. A check mark indicates an enabled feature and an X indicates a disabled feature. The checklist also provides selections for configuring security settings.

Selection	Description
syngo Security	Indicates the status of the security feature. (Available only for the ultrasound system administrator) ▪ Configure displays a dialog box to set up user accounts. See also: For information about configuring user accounts, refer to Chapter 7 in this manual.
Windows 10	Indicates the operating system is Windows 10.
Firewall	Indicates the firewall is active.
Ports	Indicates which ports are open or closed on the ultrasound system. ▪ Detail displays a list of the names and descriptions of the ports. See also: Enabling Ports, page 1-32
Windows Hotfixes	Indicates which Windows hotfixes are installed on the ultrasound system. ▪ Detail lists the name and date of the Windows hotfixes.
User Account Management	Indicates the ultrasound system includes user account management.
Audit Trail	Indicates the ultrasound system is enabled for saving security log files to the archive location. ▪ Detail displays additional configuration settings for the audit trail. See also: For information about the audit trail for user accounts, refer to Chapter 7 in this manual.
Active Directory	(Available only for the ultrasound system administrator) A single asterisk (*) indicates account management of the system is active. A double asterisk (**) indicates Microsoft Active Directory can be used to manage user accounts for the ultrasound system. See also: For information on connecting to a domain controller, refer to Chapter 7 in this manual.
Signed Drivers	Specifies all utilized drivers on the system are signed.
FIPS (Federal Information Processing Standard)	Specifies the configuration of the Federal Information Processing Standard (FIPS). (Available only for the ultrasound system administrator) ▪ Enable enables or disables FIPS.
BIOS Password	Indicates the ultrasound system has a unique BIOS (basic input/output system) password.
Memory Protection (ASLR, SEHOP, DEP)	Indicates the memory protection is enabled for the operating system. ▪ ASLR indicates address space layout randomization is enabled. ▪ SEHOP indicates structured exception handling overwrite protection is enabled. ▪ DEP indicates data execution prevention is enabled.

Selection	Description
Disk Encryption	Indicates the data storage on the ultrasound system is encrypted.
Unlock USB	Provides access to unlock an encrypted USB storage device connected to the ultrasound system. ▪ Configure displays a form for entering a password. See also: Unlocking an Encrypted USB Storage Device, page 1-32
Signed Install Media	Indicates the install media is signed.
MDS2	Displays the Manufacturing Disclosure Statement 2 form. ▪ Detail displays a file with details regarding the manufacturing disclosure statement for medical device security standard. – Print sends the file to the printer. – Export (USB) transfers a copy of the file to the external storage device.
OSS Clearance	Displays the open source software included on the ultrasound system. ▪ Detail displays a file with details regarding the open source software clearance. – Print sends the file to the printer. – Export (USB) transfers a copy of the file to the external USB-compatible storage device.
Secure DICOM Transfer	Indicates DICOM is configured for secure transfer. (Available only for the ultrasound system administrator) ▪ Configure displays a form for configuring the transfer of DICOM information and certificates. See also: For information about DICOM transfer, refer to Chapter 6 in this manual.

Enabling Ports

(Available only for the ultrasound system administrator)

To open or close a port:

1. Activate the configuration settings.
2. Click **System Management** and then click **Security**.
3. Click **Detail** for the **Ports**.
4. Enable or disable a port.

Port Number	Port Group	Protocol
104 2762	DICOM	TCP
137	NetBIOS Name Service	TCP

Note: The following ports are enabled or disabled only by a Siemens Healthineers service representative.

Port Number	Port Group	Protocol
80 443	Siemens Remote Services	TCP
8226 8227 8228 12061 13001	System Management	TCP
11080	Remote Assistance	TCP

Unlocking an Encrypted USB Storage Device

To unlock an encrypted USB storage device:

1. Insert an encrypted USB storage device into a USB port on the ultrasound system.
2. Tap the additional selections button.



3. Tap **Unlock USB**.
4. Select the USB port with the **[locked]** indicator from the **Available Media** list.
5. If the USB storage device is not listed, ensure the device is connected to the USB port and then click **Refresh**.
6. Enter the password for the encrypted USB storage device.
7. Click **Unlock**.

Service

This section of the configuration settings provides local and remote access for authorized Siemens Healthineers service representatives to troubleshoot and maintain the ultrasound system.

Selection	Description
Local Service	Provides options to install software, back up and restore customized settings (for example, imaging, annotation, and network settings), view service images and licenses, save service logs, and export service images.
Install Software	Note: When security is enabled, software installation can be performed only by an administrator. Provides options for installing the software stored on the inserted media. Note: Reinstalling software may not securely destroy all patient data on the ultrasound system. For assistance in removing all patient data, contact your Siemens Healthineers service representative.
View Service Images	Prerequisite: Insert a USB-compatible storage device into a USB port on the ultrasound system. Displays a screen to view, delete, or export captured service images.
Capture Service Logs	Prerequisite: Insert a USB-compatible storage device into a USB port on the ultrasound system. Displays a screen to activate capturing and saving service logs.
View Licenses	Displays a list of licenses and status for the features installed on the ultrasound system.
Event Log	Displays a window to view a record of all service activities and events for a specified time range.
Restore All Defaults	Note: When you restore default settings the ultrasound system deletes all customized settings (for example, imaging, annotation, and network settings). This process should be performed only by an administrator. Deletes all customized settings and restores the original factory settings.
Backup	Displays options to back up customized settings (for example, imaging, annotation, and network settings) to the inserted media.
Restore	Note: Restoring customized settings should be performed only by an administrator. Displays options to restore customized settings (for example, imaging, annotation, and network settings) from the inserted media.

Selection	Description
Local Service	Note: All local service configuration settings are in the English language. Displays a screen for logon access to service options, for example, service level 0 accesses options to back up and restore ultrasound system files, upload a license file, change the host name of the ultrasound system, or view monitor test patterns. - To log on with service access level 0, click OK. Access to other service options, for example, hardware tests and utilities or service diagnostic support, requires the purchase of additional service access levels. - To log on with service access above level 0, enter or upload the service key and then click OK.
Remote Service	Accesses the remote service access control dialog box.
Remote Service Access Control	The name of the remote service window.
Service Activity	Displays a list of all service activities.
Mode	Assigns the type of access to the ultrasound system. When selecting a level of access, the system briefly displays a symbol:  Full Access provides complete, remote access to the service diagnostic tests on the ultrasound system. Note: The system is unavailable for use during full access. Remote application support provides remote access to the ultrasound system. Limited access permanent provides limited remote access to the ultrasound system with no expiration date. Limited access provides limited remote access to the ultrasound system. No access provides no remote access to the ultrasound system. When selected, the system briefly displays a symbol: 
Allow patient data access	When enabled, requests remote access to the patient database for authorized Siemens Healthineers service representatives to troubleshoot the ultrasound system.
Status	Displays the current access status, service mode status, and patient data access status of the following service activities.
OK	Saves changes to the configuration settings.
Apply	Applies changes to the configuration settings.
Cancel	Cancels and removes changes to the configuration settings.
Mail	Sends an email to your Siemens Healthineers service representative.
Properties	Displays the settings configured in the remote service window.
Help	Displays information about using the ultrasound system.

Selection	Description
Remote Assistance	Launches a remote service session. A Siemens Healthineers representative guides you through each session of virtual communication.
Local Settings	Exports and imports only the following customized configuration settings: ▪ System Settings ▪ Workflow Enhancement ▪ Imaging Settings ▪ Measurement & Report ▪ Annotations ▪ Features Note: The ultrasound system restarts after importing these settings. See also: Refer to the export and import procedure in Chapter 2 in this manual.

Backing Up and Restoring Customized Settings

You can back up customized configuration settings from the ultrasound system to a USB-compatible storage device. Before updating or reinstalling system software, you should back up the customized settings. The restore process overwrites existing customized settings on the ultrasound system.

The name of the backup file includes the backup date, time, ultrasound system serial number, and software version.

Note: If the backup or restore process is unsuccessful, contact your Siemens Healthineers service representative.

To back up customized settings:

Prerequisite: Insert a USB-compatible storage device into a USB port on the ultrasound system.

1. Tap the configuration button.



2. Click **System Management**.
3. Click **Service**.
4. Click **Backup**.
5. Select the backup location.
 - a. Click the **Available Media** list and then select the location, for example, the USB port with the storage device.
 - b. To refresh the list if the USB storage device is not listed, click **Refresh**.
6. Click **Backup filename** and then enter a unique name for the backup file.
7. Click **Backup**.
8. When the **Status** indicates backup is successful, click **Close**.
9. Remove the USB storage device from the ultrasound system.

To restore customized settings:

Prerequisite: Restoring settings requires a permission level of administrator. Insert a USB-compatible storage device with saved backup files into a USB port on the ultrasound system.

1. Tap the configuration button.



2. Click **System Management**.
3. Click **Service**.
4. Click **Restore**.
5. Select the backup file to restore.
 - a. Click the **Available Media** list and then select the location, for example, the USB port with the storage device.
 - b. To refresh the list if the USB storage device is not listed, click **Refresh**.
 - c. Click the **Backup filename** list and then select the backup file.
6. Select the customized settings to copy to the ultrasound system.

Selection	Description
Select all	Selects all settings to copy or apply to the ultrasound system.
Ultrasound Specific	---
Features	Includes user-defined workflow protocols.
Annotations	Includes libraries of user-defined body markers and text annotations.
Measurement & Report	Includes user-defined measurements, measurement labels, measurement packages, exam-specific measurement settings, measurement tools, and reports.
System Settings	Includes general, display, and patient banner settings.
Connectivity & Network	Includes settings for connections to wired networks, DICOM configuration settings, and network locations for importing and exporting patient data.
Peripheral Devices	Includes settings for recording, printing, and storage devices. Also includes footswitch assignments.
System Management	Includes settings for managing the ultrasound system, for example, enabling and disabling ports.
Procedure and Imaging Settings	Includes settings for procedures, exams, imaging, and transducers. Also includes capture settings, image display settings, general imaging settings, and settings by exam type.
Wireless Network	Includes wireless network settings.

Selection	Description
System Service and Security	---
SW Settings02	Includes settings for security, licensing, DICOM structured reporting, print devices, network nodes, import and export directories, and log files.
Auto Report	Includes customized report templates and file transfer protocol settings.
Security Settings	Includes customized security settings, for example, user account management, audit trail configuration, Active Directory domain controller settings, and certificates for encrypted DICOM communications.

7. Click **Restore**.

8. Click **OK**.

The ultrasound system validates and saves the selected settings and then the system restarts to activate the new customized settings.

9. Remove the USB storage device from the ultrasound system.

Patient Browser

You can configure the patient browser to display or hide patient data.

To configure the patient browser:

1. Tap **Patient**.
2. Tap **Patient Browser**.
3. Click **Options** and then click **Configure Browser**.
4. To configure the patient browser toolbar, click **General**.

Selection	Description
Confirm Deletion	Specifies confirmation to delete patient data.
Enable Image Stamp Preview for Media	Specifies miniature representations of the images for archive or export to external storage media.
Shown work status	Specifies the work status when the patient browser is activated.
Permit delete if	Specifies the deletion criteria of patient data.
Tool Pool	Specifies the icons available for the toolbar.
Tool Bar	Specifies the icons displayed in the toolbar.

5. To configure the patient browser in tree view format, click **Tree View**.

Selection	Description
(source of the patient data)	Displays a list of the storage locations for the patient data.
Patient	Specifies options for the selected level of patient data.
Study	Specifies options for the selected level of patient data.
Series	Specifies options for the selected level of patient data.
Instance	Specifies options for the selected level of patient data.
Modality	Specifies the imaging modality, for example, mammography.
Data Type	Specifies the data type.
Hide	Hides the display of patient data for the selected modality.
Heading Pool	Specifies the column headings available for the patient data.
List Configuration	Specifies information in the series folder.
Icon Configuration	Specifies the display of graphical representations of information in the series folder.
Heading Settings	Specifies column headings displayed in the patient data.

6. To configure the patient browser in single view format, click **Single View**.

Selection	Description
(source of the patient data)	Specifies storage locations for the patient data.
Display Level	Specifies the level of display of the patient data.
Level	Specifies the levels of patient data.
Heading Pool	Specifies the column headings available for the patient data.
Heading Settings	Specifies the column headings displayed in the patient data.

7. To save the selection, click **OK**.
8. To select the default settings, click **Default Settings**.
9. To cancel the selection, click **Cancel**.

2 Workflow Configuration Settings

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Overview

You can import and export the configuration settings described in this chapter from one ultrasound system to another ultrasound system of the same model.

Customizing Workflow

(Available only for ultrasound system administrators)

The exam selected during patient registration is called an image preset. An image preset consists of the exam, a transducer, and optimized imaging parameters for the transducer. You can create customized image presets to optimize the workflow of the ultrasound system.

See also: For information on configuration settings for protocols, refer to Chapter 1 in this manual.

Creating an Image Preset Based on an Existing Image Preset

A customized image preset is based on an existing image preset and can be modified. The image preset selected for customization is called a root preset.

See also: For information on designing customized image presets, refer to page 2-5.

To create a customized image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Image Preset Configuration**.
4. Select an image preset from the **Image Preset** list and then click **Create Preset**.
The system appends the name of the copied image preset with a number, for example, Abdomen (2).
5. Enter a unique name in the **Preset Name** text box.
6. To change the base preset, select another image preset to copy from the **Root Preset** list.
7. Click **OK** to save the image preset.

To modify a customized image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Image Preset Configuration**.
4. Select an image preset from the **Image Preset** list.

To	Do This
Change the default transducer assigned to an image preset	▪ Select an image preset and then select a transducer in the Image Presets and Default Transducers lists. Blue identifies the default transducer assigned to the exam selected during patient registration. Note: If the default transducer is not connected to the ultrasound system, the system activates the next transducer in the list during patient registration.
Change the default image preset assigned to a transducer	▪ Select a transducer and then select an image preset in the Transducers and Default Image Presets lists. Blue identifies the default image preset assigned to the transducer.
Reposition the image presets on the touch screen	Note: The image preset at the top of the Transducers and Default Image Presets list displays in the leftmost position on the touch screen. ▪ To reposition an image preset on the touch screen, select the image preset name in the list and then click the up or down arrow.
Show or hide the image preset on the touch screen	▪ To include an image preset, select the check box next to the image preset name. ▪ To hide an image preset, clear the check box next to the image preset name. ▪ To show all image presets, select the Show All check box. ▪ To hide all image presets, select and then clear the Show All check box.
Import or export image presets	See also: Exporting and Importing Files with Customized Configuration Settings, page 2-30
Delete a customized image preset	1. Select a customized image preset from the Image Preset list and then click Delete. The system prevents deletion of factory-defined image presets and the image preset in the active exam. 2. Click OK.

Designing a Customized Image Preset

You can design the default image preset options for an exam, including adding transducers to an image preset and changing the default image optimization settings by imaging mode for an image preset and a transducer.

Note: Actual values on the image screen may vary due to the dependency of a setting on other imaging parameters, for example, frequency of the transducer.

To add transducers to a customized image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Image Preset**.
4. Select an image preset from the **Image Presets** list.
5. To add a transducer to an image preset:
 - a. Click **Add transducer**.
 - b. Select a transducer name from the **Transducer** list, for example, 10V4.
 - c. Select a base exam name from the **Preset** list, for example, Abdomen.

Note: The selected exam is the base, also known as the root preset.
 - d. Click **OK**.

See also: To change the default transducer assigned to an image preset, refer to page 2-3.

6. To delete all transducers added to the selected exam:

Note: You cannot restore the transducer list for an active imaging preset.

 - a. Click **Restore Transducer List**.
 - b. Click **OK** to confirm the deletion.

To design a customized image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Image Preset**.
4. Select an image preset from the **Image Presets** list.
5. Select a transducer from the **Transducer** list.
6. Select an operating mode. Or, select a layout or editing tool.

Note: Configure the operating mode settings from left-to-right as settings may apply to more than one operating mode, for example, flow settings for pulsed wave and continuous wave Doppler also apply to color and power.

- Click an operating mode, for example, 2D.
 - Click a layout or editing tool.
 - **Multislice** provides selections for defining the default layout, for example, a layout of nine parallel slices.
 - **Editing** provides selections for defining the default tool for shaping a volume rendering, for example, a closed spline.
 - To access additional operating modes, position the cursor over the name of a mode and then position the cursor over the left or right arrow.
7. To customize 3D/4D settings:
 - a. Click **3D/4D**.
 - b. Tap **3D** or **4D**.
 - c. Select an option:
 - **Setup** provides imaging parameters available only during the 3D/4D setup step.
 - **Live** provides imaging parameters available only during the 3D/4D acquisition step.
 - **2D Only** provides imaging parameters available only during 2D-mode.

8. Customize the default settings for the image preset.

Note: The ultrasound system saves the configuration settings as you change the settings.

- To assign the default values to imaging parameters:

- Click the plus button to increase a setting.



- Click the minus button to decrease a setting.



- To assign an initial on or off setting to operating modes, features, and functions on the touch screen:

- Click a button.

Blue indicates the setting is initially active. Gray indicates the setting is initially inactive.

- Select settings from drop-down list boxes, for example, baseline.

- To access additional pages of settings for the touch screen, click the right or left arrow button.

9. To restore the default settings for the image preset:

- a. Click **Restore Defaults** : image preset, transducer.
- b. Confirm the names of the image preset and transducer for deletion.
- c. Click **OK** to delete the customized settings.

Customizing Global Image Presets

You can apply available settings to all transducer and exam combinations for all image presets, for example, you can align the maps and tint settings with the PACS display.

To add transducers to a customized image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Image Preset**.
4. Select the **Global Settings** tab.
5. Adjust the settings for **Maps** or **Tint**.

Note: You cannot undo this setting.

- Click the plus button to increase a setting.



- Click the minus button to decrease a setting.



6. Click **OK** to apply the settings to all transducer and exam combinations.

Assigning Annotations, Measurements, and Protocols to an Image Preset

Assign any exam package, body marker, text package, and protocol to an image preset.

To assign preferences to an image preset:

1. Tap the configuration button.



2. Click **Workflow Enhancement**.
3. Click **Exam Association**.
4. Configure your preferences.
 - Select the name of the image preset from the **Image Preset** list.
 - Select a measurement package from the **Measurement & Report Default Calc. Package** list.
 - Select a body marker package from the **Annotations Default Body Marker** list.
 - Select an annotation text package from the **Annotations Default Text Package** list.
 - Select a protocol from the **Protocol** list.
5. To restore the default settings for all image presets:
 - a. Click **Restore Defaults**.
 - b. Click **OK** to delete all customized settings.

Assigning an Exam to a Procedure Description

You can assign a default exam to a procedure description. The default exam displays on the patient registration form scheduled procedures. Scheduled procedures require a network connection to a worklist server.

You can also export a file from the ultrasound system, and use a personal computer to edit procedure descriptions.

See also: Exporting and Importing Files with Customized Configuration Settings, page 2-30

To assign an exam to a procedure description:

Prerequisite: Obtain procedure descriptions from your PACS administrator.

1. Tap the configuration button.



2. Click **Workflow Enhancement**.

3. Click **Procedure Configuration**.

The system lists procedure descriptions and a list of exams assigned to the procedure descriptions.

4. Enter a procedure description in the **Requested Procedure Description** text box and then click **Add**.

Note: The maximum number of characters including spaces is 40.

5. To assign an exam to a procedure description, select a procedure description and then click exam name.
6. To remove a procedure description, select the procedure description and then click **Delete**.

Customizing Annotations

An annotation package is a collection of exam-specific body markers or text labels.

You can select and then customize a body marker package or a text package on the ultrasound system using an annotation package as a base and then delete, group, and rearrange the position of the annotations on the touch screen. You can also add custom text to a text package.

To customize an annotation package:

1. Tap the configuration button.



2. Click **Annotations**.
3. Select the type of annotation.
 - **Body Marker** provides options for configuring a collection of body markers by exam.
 - **Text** provides options for configuring a collection of text labels by exam.

To	Do This
Create an annotation package	1. To copy an existing annotation package, select a name in the list of annotation packages and then click Create Package. 2. To create a new annotation package, click Create Package. 3. Enter a unique name in the Package Name text box. 4. To save the package, click OK. The system displays the Touch Screen Layout Editor tab. See also: For information on modifying the touch screen layout of an annotation package, refer to page 2-12.
Rename a custom package	1. Select a custom package. 2. Enter a unique name in the Package Name text box. The prior name displays in the list until you select another name.
Show or hide an annotation package on the touch screen	▪ To include a package in the list, select the checkbox next to the package name. ▪ To hide a package, clear the checkbox next to the package name. ▪ To show all packages, select the Show All check box. ▪ To hide all packages, select and then clear the Show All check box.
Reorganize the list of annotation packages on the touch screen	Note: The order of the package names in the list identifies the order of packages on the touch screen when the annotations feature is enabled. ▪ Select the package name and then click the up arrow or the down arrow to reposition the name in the list.

To	Do This
Delete a custom annotation package	1. Select the package name. 2. Click Delete. 3. To delete the package, click OK. 4. To cancel the deletion, click Cancel.
Display a label matching the first characters you enter on the image screen	▪ Select the Auto text complete check box.

4. To delete annotations when you unfreeze the image, select a check box:
 - **Delete Text on unfreeze** deletes text annotations when you unfreeze the image during the use of any package.
 - **Delete Body Markers on unfreeze** deletes body markers when you unfreeze the image during the use of any package.

Modifying the Touch Screen Layout

You can modify the organization of body markers or text labels on the touch screen by rearranging body markers or labels, adding categories of labels, and organizing pages of annotations.

To modify the touch screen layout:

1. Tap the configuration button.

2. Click **Annotations**.
3. Click **Body Marker** or **Text**.
4. Select the name of the annotation package.
5. Click the **Touch Screen Layout Editor** tab.

To	Do This
Add a body marker	▪ Click a body marker in the library and then click a button.
Remove a body marker	▪ Double-click the body marker button.
Select body markers from another package	Note: The default library of body markers or text annotations is the package designated as the Root Label for the custom package. ▪ Select a different package from the Body Marker Package list.
Add a new page of annotations	▪ Click New Page.
Delete a page of annotations	▪ Click Delete Page.

To	Do This
Add a text label	Click any Text label on a button and then enter text using the keyboard.
Remove a text label	Click the text label on a button and then repeatedly press backspace on the keyboard to delete the text.
Add a text group	Click Add Text Group. The system adds a column of buttons as a text group.
Reposition a text group	- Click a button in the text group. - To reposition the text group to the left, click the move left button.  - To reposition the text group to the right, click the move right button. 
Add additional buttons to the text group	- Click a button in the text group. - Click the add button.  The system adds a new column to the right of the selected button in the text group. Note: You can add up to six columns of buttons on each page.
Delete a column from a text group	- Click a button in the column of the text group. - Click the delete column button. 
Delete a text group	- Click a button in the text group. - Click the delete text group button.  - To confirm the deletion, click OK.

Customizing Measurements

The configuration settings include selections for predefining measurement and report preferences.

To access the configuration settings:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click the required selection.
 - **Measurement** includes general and exam-specific measurement configuration options.
 - **Touch Screen Measurement Config** includes options for repositioning, displaying, and hiding measurement labels on the touch screen. This selection also includes options for creating and editing custom measurement categories. A measurement category is a group of measurement labels based on an exam.
 - **Custom Measurement Label** includes options for creating and editing user-defined measurement labels.
 - **Report** includes options for configuring the patient report.
 - **OB Tables** includes options for configuring gestational age, fetal growth, and estimated fetal weight tables.

See also: For information about customizing the obstetric exam, refer to Chapter 3 in this manual.

Configuring General Measurements

You can customize measurement tools, measurements, and calculations for use with all exams on the ultrasound system.

To configure general measurements:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Measurement**.
4. Click the **General** tab.

To	Do This
Show or hide dotted lines between the beginning and ending measurement markers during 2D measurements	▪ To show the lines, select the Draw Dotted Lines Between Calipers check box. ▪ To hide the lines, clear the check box.
Show or hide a negative symbol for a measurement value less than zero during Doppler velocity measurements	▪ To show the symbol, select the Show Negative Symbol check box. ▪ To hide the symbol, clear the check box.
Configure the number of heart cycles for the heart rate tool	▪ Select a number from the Number of Heart Cycles list.
Show calculations in the measured results	1. Enter a label in the search text box. Or, use the scrollbar to locate a label name. 2. Select the check box next to the calculation label. 3. To remove the calculation label from the measured results, clear the check box.

Configuring Measurement Tools and Measured Results

You can configure default settings for measurement tools and the presentation of measured results for each exam package.

To configure measurement tools and measured results:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Measurement**.
4. Click the **Exam Package** tab.
5. Select the required exam from the **Exam Package** list.

To	Do This
Show or hide measurement markers during CINE	▪ To show the markers, select the Erase in CINE check box. ▪ To hide the markers, clear the check box.
Specify default measurement tools	▪ For volumes, select an option from the Volume Tool list, for example, three distance measurements or an ellipse and a distance measurement. ▪ For area percentage stenosis, select an option from the Area %Stenosis Tool list, for example, ellipse or trace. ▪ For area ratios, select an option from the Generic Area Ratio list, for example, ellipse or trace. ▪ For Doppler measurements, select an option from the Default Tool list, for example, velocity or acceleration. ▪ For volume flow: a. Select a 2D measurement tool from the Volume list, for example, distance or ellipse. b. Select a Doppler measurement tool from the Flow list, for example, heart cycle.
Assign the unit of measure	▪ Select an option from the Unit list, for example, millimeters or centimeters.
Specify the precision for the measured result using whole numbers or decimals (in tenths or hundredths)	▪ Select an option from the Precision list, for example, 0 or 0.00, where zero represents the measured value.
Show or hide a result on the image screen	▪ To show the result, select the check box next to the result name. ▪ To hide the result, clear the check box next to the result name.

See also: For additional information about measurement tools, refer to Chapter 10 in the Instructions for Use.

Configuring Exam-Specific Measurement Settings

You can configure settings for exam-specific measurements.

To configure measurement settings for an exam:

- 1. Tap the configuration button.



- 2. Click **Measurement & Report**.
- 3. Click **Measurement**.
- 4. Click the **Exam Specific** tab.

To	Do This
Configure settings for the obstetric exam	See also: For information about customizing the obstetric exam, refer to Chapter 3 in this manual.
Specify the default setting for calculating a prostate weight	▪ Select a setting for the Prostate Specific Gravity, for example, 1.0 or 1.05.
Specify the default settings for calculating the ratio of the internal carotid artery and common carotid artery	1. Select a setting for the Carotid Ratio numerator, for example, proximal or distal internal carotid artery. 2. Select a setting for the Carotid Ratio denominator, for example, middle or maximum common carotid artery. Note: You can change the numerator and denominator in the report.

Configuring Settings for a Measurement Label

You can configure settings for a measurement label in each exam.

See also: For additional information about measurement tools, refer to Chapter 10 in the Instructions for Use.

To configure settings for labels in an exam package:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Measurement**.
4. Click the **Per Label Configuration** tab.
5. Select the required exam from the list.
6. Enter a label in the search text box. Or, use the scrollbar to locate a label name.
The system selects and highlights the label name in blue.

To	Do This
Specify the default method for measuring or calculating the selected label name for each operating mode	▪ Select options from the Default Tool and Method list for each operating mode. – Select the default measurement tool from the list. – Select an option for using the most recent measurement or an average of measurements, for example, mean, minimum, or maximum.
Assign the unit of measure	▪ Select an option from the Unit list, for example, centimeters squared or centimeters per second.
Specify the precision for the measured result using whole numbers or decimals (in tenths or hundredths)	▪ Select an option from the Precision list, for example, 0 or 0.00, where zero represents the measured value.
Show or hide a result on the image screen	▪ To show the result, select the check box next to the result name. ▪ To hide the result, clear the check box next to the result name.
Restore the factory settings for the default method, unit of measure, and precision for the selected label	▪ Click Restore. Note: The name of the label displays on the restore button.
Apply configuration settings to similar labels	1. Click Find Similar Labels. The system displays all related label names. 2. To exclude a label, clear the check box next to the label name. 3. To apply the changes to all labels, click Apply to Similar Label.
Show or hide the caliper indicating end diastole during Doppler velocity measurements	▪ To show the caliper indicating end diastole, enable the ED check box. ▪ To hide the caliper, clear the check box.
Show or hide time-averaged traces during Doppler velocity measurements	▪ To show the time-averaged mean velocity trace, enable the TAMn check box. ▪ To show the time-averaged maximum velocity trace, enable the TAMx check box. ▪ To hide a time-averaged trace, clear the check box.

Customizing a Measurement Package

A measurement package is a collection of exam-specific measurement labels.

You can select and then customize a measurement package on the ultrasound system. The package selected for customization is called a root package.

- **Root Package** identifies the base library of exam-specific measurement labels for the custom package.
- A **Root Package** of **None** indicates there is no base measurement package. All libraries of measurement labels are available for the custom package.

To customize a measurement package:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Touch Screen Measurement Config**.

To	Do This
Create a measurement package	1. To copy an existing measurement package, select a name in the list of Measurement Packages and then click Create Package. The system appends the name of the copied measurement package with a number, for example, Abdomen (2). 2. To create a new measurement package, click None in the list of Measurement Packages and then click Create Package. 3. Click Package Name and then enter a unique name. 4. To save the package, click OK. The system displays the Touch Screen Layout Editor tab. See also: For information on modifying the touch screen layout of an exam package, refer to page 2-21.
Rename a custom package	1. Select the package name. 2. Click Package Name and then enter a unique name. The prior name displays in the list until you select another name.
Show or hide a measurement package on the touch screen	▪ To include a measurement package in the list, select the check box next to the package name. Note: Included measurement packages are accessible on the touch screen by activating the measurement function and then tapping exam package. ▪ To hide a measurement package, clear the check box next to the package name. ▪ To show all measurement packages, select the Show All check box. ▪ To deselect all packages, select and then clear the Show All check box.

To	Do This
Reorganize the list of measurement packages on the touch screen	Note: The order of package names identifies the order of exam packages on the touch screen when the measurement function is enabled. ▪ Select the package name and then click the up arrow or the down arrow to reposition the name in the list.
Restore a factory-defined measurement package to the original settings	1. Select the package name. 2. Click Restore Defaults. 3. To restore the original settings, click OK. Note: The following items are reverted: categories, subcategories, measurement labels, and layout. 4. To cancel the restoration, click Cancel.
Delete a custom measurement package	1. Select the package name. 2. Click Delete. 3. To confirm the deletion, click OK. 4. To cancel the deletion, click Cancel.

Modifying the Touch Screen Layout

You can modify the organization of measurement labels on the touch screen by rearranging labels, adding categories and subcategories of labels, and organizing pages of label selections.

See also: For an overview of the touch screen during the measurement function, refer to Chapter 10 in the Instructions for Use.

To modify the touch screen layout:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Touch Screen Measurement Config**.
4. Select the name of the measurement package.
5. Click the **Touch Screen Layout Editor** tab.

To	Do This
Access labels for an operating mode	▪ Select an Imaging Mode. Note: Available operating modes are exam dependent.
Add a measurement label	▪ Drag a label from the list of measurement packages to a button in the layout preview. Or, double-click a label in the list to place the label on a button.
Find a label	▪ Select another package in the Measurement Library List to filter the measurement labels by an exam-specific library. ▪ Enter a label name in the search box. ▪ Scroll the measurement library list.
Reposition a label	▪ Drag the label to the required location in the layout preview.
Delete a label	▪ Drag the label in the layout preview to the library list.
Add a category or measurement labels	Note: The system allows a maximum of five categories for general imaging exams and a maximum of ten categories for cardiac exams. 1. Click Add Group. 2. Select a category to copy from the Group list. Note: You can select a different base package to change the list of available categories. The system appends a number to the name of a copied category, for example, Systemic Side (2). 3. To select a location on the touch screen for the category, click a placement, for example, Placement 1. 4. Click Group Name (New) and then enter a unique name for the category. 5. Click OK.

To	Do This
Add a subcategory of measurement labels	1. Click Add Subgroup. 2. Select a subcategory to copy from the Sub Group list. Note: You can select a different base package or a different group to change the list of available subcategories. The system appends a number to the name of a copied subcategory, for example, Aorta (2). 3. To select a location on the touch screen for the subcategory, click a placement, for example, Placement 1. 4. Click Sub group Name (New) and then enter a unique name for the subcategory. 5. Click OK.
Rename a category or subcategory of labels	▪ Select the name and then enter a new name.
Reposition a category or subcategory of labels	1. Click a button in the category or subcategory group. 2. To move the group to the left, click < on the group bar. 3. To move the group to the right, click > on the group bar.
Delete a category or subcategory of labels	1. Click a button in the category or subcategory group. 2. Click x on the button. 3. To confirm the deletion, click OK.
Add or delete a page of measurement labels	▪ To add a page of labels, click New Page. ▪ To remove a page of labels, Delete Page. ▪ To access the next page or previous page of labels, click an arrow on either side of the page number.

Creating User-defined Measurement Labels

You can create user-defined measurement labels by defining a label root and then adding system-defined modifiers and segments, for example, left, right, proximal, middle, distal, origin. The ultrasound system indicates user-defined measurement labels with an asterisk (*) in configuration settings.

Note: The following labels cannot be copied, edited, or remapped: Virtual Touch labels, amniotic fluid index labels, the mean sac diameter label, length label, width label, and anterior-posterior labels.

To create a user-defined measurement label:

Prerequisite: Knowledge of operating modes, measurement tools for the ultrasound system, and DICOM structured reporting.

1. Tap the configuration button.



2. Click **Measurement & Report**.

3. Click **Custom Measurement Label**.

4. To create a new measurement label:

- a. Click **New**.

- b. Enter a label name, excluding modifiers and segments, in **Label Root**.

Note: The ultrasound system displays the name on the touch screen when the selected exam package is active.

5. To use an existing measurement label as a template:

- a. Select a label.

Selection	Description
Exam Package	Displays a list of the exam packages, including the following categories of measurement labels. ▪ All displays a list of default or user-defined labels for all exam packages.
Custom Measurements	When enabled, displays a list of user-defined labels for the selected exam package.
(search text box)	Enter the name of a label to filter the Label Root list.

- b. Click **Copy**.

6. To edit an existing user-defined measurement label, select the label in the **Label Root** list and then click **Edit**.
7. Enter or edit the following information for the measurement label.

Note: Required selections are indicated with an asterisk (*) in the configuration settings.

Selection	Description
Label Root	Displays a list of measurement labels without modifiers or segments. You can filter the label root list using the exam package drop-down list, the search text box, or the scrollbar to locate a measurement label.
Exam Package	Assigns the label to the selected exam package.
Modifiers	When enabled, the ultrasound system generates modifiers for the anatomical location of the label root. ▪ Right / Left indicates the patient's right and left anatomy.
Segments	(Not available for obstetric, early obstetric, gynecology, and fetal echo exams) When enabled, the ultrasound system generates segment prefix modifiers to identify the anatomical location of the label root. ▪ None indicates no segments. ▪ Prox indicates proximal. ▪ Mid indicates mid. ▪ Dist indicates distal. ▪ Origin indicates origin.
Measurement Type	(Available only for obstetric, early obstetric, and fetal echo exams) Indicates the type of obstetrical measurement. ▪ Fetal indicates the label is available for all fetuses. ▪ Maternal indicates the label is available for the mother.
Tools	Tab of selections for defining the measurement label.
Imaging Mode	Indicates the measurement tools available for the label by mode: 2D Mode , Doppler Mode , M-Mode .
Report Section	Indicates the section the label displays in the report. A custom measurements section is also available.
Tools	Displays a list of available tools for the selected mode. Select the check box to enable the tool for the measurement label.
Label	Displays the label root associated with the tool.
2D Tools	Displays the 2D-mode tools available for assigning to the label.
Doppler Tools	Displays the Doppler tools available for assigning to the label.
M Tools	Displays the M-mode tools available for assigning to the label.
Outputs	Lists the available measurement tools and the measured result for each tool.

8. To include the label in DICOM structured reporting, click the **SR Template** tab.
9. To save the label, click **Save All & Close**.

Note: If you do not map a user-defined label for DICOM structured reporting, the measured result is excluded from the structured report.

To delete a user-defined measurement label:

Note: Deleting a measurement label during an exam deletes any measurements for the label.

1. Select a user-defined measurement label.
2. Click **Delete**.
3. Click **OK**.
4. To cancel the deletion, click **Cancel**.

Mapping a Measurement Label for DICOM Structured Reporting

You must map a user-defined measurement label to include the measured result in DICOM structured reporting (SR). The ultrasound system provides sections and codes for mapping a measurement label to a DICOM SR template structure.

You can edit the SR mapping of system-defined measurement labels, except Stenosis labels.

To include a measurement label in DICOM structured reporting:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Custom Measurement Label** and then select the required measurement label.
4. Click the **SR Template** tab.
5. Select the structured reporting template for the measurement label.

Note: Required selections are indicated with an asterisk (*) in the configuration settings.

Selection	Description
SR Template	Identifies the DICOM structured reporting (SR) template. ▪ OB-GYN selects template identification (TID) 5000 OB-GYN Ultrasound Procedure Report. ▪ Fetal Echo selects TID 5220 Pediatric, Fetal and Congenital Cardiac Ultrasound Reports. ▪ Vascular selects TID 5100 Vascular Ultrasound Procedure Report. ▪ Cardiac selects TID 5200 Echocardiography Ultrasound Procedure Report. Note: The ultrasound system displays the structured reporting template for the selected exam package. When more than one exam package is selected, you must select one structured reporting template.
SR Template Section	Lists available sections for the selected SR template. Note: If the template identification (TID) sections are not applicable to the measurement label, a user-defined results section is available.
Anatomy or Vessel	(Available only for double concept codes) Lists predefined anatomical structure or a vessel for the structured report. The predefined anatomy or vessels are based on the selected SR template section. ▪ Anatomy lists anatomical structures. ▪ Vessels lists vascular structures. Note: You cannot modify the coding scheme designator and code value for predefined structures. To customize the coding scheme designator and code value, enter a user-defined anatomical or vascular structure. ▪ User defined anatomy or vessel.

Selection	Description
Coding Scheme Designator	Identifies the source of the code. ▪ LN indicates the mapping is defined by Logical Observation Identifiers Names and Code (LOINC). ▪ SRT indicates the mapping is defined by Systematized Nomenclature of Medicine Reference Terminology (SNOMED RT). ▪ DCM indicates the mapping is defined by Digital Imaging and Communications in Medicine (DICOM). ▪ 99SIEMENS indicates the mapping is factory defined. ▪ New creates a user-defined coding scheme designator. Use 99 as a prefix to indicate a private coding scheme designator, for example, 99NAME, where NAME is the name of your facility. The maximum number of characters, including the prefix, is 16.
Code value	System-generated based on the selected predefined anatomy or vessel. Note: If you created a user-defined anatomy or vessel, you must also create a user-defined code value. The maximum number of characters is 16.

6. Click the **SR Mapping** tab.

7. Map each tool result for the measurement label.

Selection	Description
Tools & Outputs	Lists the measurement tools assigned to the measurement label and each tool result. Note: Map each tool result for structured reporting.
Text String for SR	Adds a user-defined description of the tool result.
Concept Code Meaning	Provides a list of concept code meanings for a tool result. When you select a predefined meaning, the system completes the following fields: Coding Scheme Designator, Code value. Note: If you create a user-defined concept code meaning, you must also specify the coding scheme designator and code value.
Post-prandial	(Available for vascular exams) When enabled, specifies the measurement is taken after a meal.
Measurement Orientation	(Available for obstetric, early obstetric, gynecological, and vascular exams) Specifies the position of the measurement, for example, longitudinal.
Measurement Method	(Available for fetal echo exams) Specifies the echo measurement method, for example, Planimetry.
Finding Site	(Available for fetal echo exams) Specifies the echo anatomic site, for example, Cardiac valve annulus.

Selection	Description
Flow Direction	(Available for fetal echo exams) Specifies the direction of blood flow.
Cardiac Cycle Point	(Available for fetal echo exams) Specifies the cardiac phase.
Image View	(Available for fetal echo exams) Specifies the echocardiography image view.
Previous Output	Displays the previous measured result in the Tools & Outputs list.
Next Output	Displays the next measured result in the Tools & Outputs list.

8. Click **Next Output**.
9. To exit while SR mapping is in progress, click **Cancel**.
The ultrasound system saves only the user-defined measurement label.
10. Click **Save**.
The ultrasound system saves the measurement label and the SR mapping definitions.

To restore system-defined SR mapping for a predefined measurement label:

1. Select the measurement label.
2. Click **Restore SR Mapping**.

Reports

Selection	Description
Report Content	Provides options for displaying or hiding sections in a report.
Show	Displays or hides a specified section in the patient report. Note: Measured values do not display in a report if the corresponding section is hidden.
Expand All or Collapse All	Displays or hides all sections in the patient report.
Assessments	Provides options for displaying or hiding assessments in a report.
(name of the assessment)	Displays a list of the assessments in the report.
Show	Displays or hides an assessment in the patient report.
Create Custom Assessment Items	Provides selections to create and delete user-defined assessments for reuse in a report.
Type	Specifies the format for the assessment. ▪ Checklist selects a check box. ▪ Comment Text Box selects a text box.
Label	Specifies the name of the label.
Add	Inserts the user-defined assessment into the list.
Delete	Removes the selected user-defined assessment from the list.
Comments	Provides options for adding comments in a report.
Comments for Exam Package:	Provides options for the following selections.
(name of the exam package)	Displays a list of the exam packages.
(text box)	Enter a name for the user-defined comment.
Add	Inserts the user-defined comment into the list.
(text box)	Displays a list of the recently added user-defined comments.
Delete	Removes the selected user-defined comment from the list.

To customize the report template:

Prerequisite: Connect a USB-compatible storage device to the ultrasound system.

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Report**.
4. Select the **Report Template** tab.

To	Do This
Add your hospital, institution, or facility logo to the report template	1. Click Load. 2. Select a USB-compatible storage device from the Available Media list. 3. Select the logo. Note: The maximum width for the logo is 250 pixels. The maximum height for the logo is 100 pixels. 4. Click Load Image.
Delete the logo from the report template	1. Click Remove. 2. Click OK.
Enter additional details in the report template	1. Enter up to three lines of text, for example, the name and address of your hospital, institution, or facility. 2. Select a font size and style for each line of text from the Font Size list.
Specify a layout for the report template	▪ Select an option from the Template list, for example, the position of the text and the logo.

Exporting and Importing Files with Customized Configuration Settings

You can export files with specific configuration settings from the ultrasound system to a USB-compatible storage device and then import the files to other ultrasound systems of the same model.

See also: For information about backing up and restoring all configuration settings, refer to Chapter 1 in this manual.

To export a file with customized configuration settings:

Prerequisite: Connect a USB-compatible storage device to the ultrasound system.

1. Tap the configuration button.



2. Access the configuration settings to export a file from the ultrasound system:

To	Do This
Export scheduled procedure descriptions	1. Click Workflow Enhancement. 2. Click Procedure Configuration.
Export image presets and default transducer assignments	1. Click Workflow Enhancement. 2. Click Image Preset Configuration.
Export body marker packages	1. Click Annotations. 2. Click Body Marker.
Export text annotation packages	1. Click Annotations. 2. Click Text.
Export measurement packages	1. Click Measurement & Report. 2. Click Touch Screen Measurement Config.
Export protocols	See also: Refer to Chapter 1 in this manual.
Export the local settings	Note: Local settings do not include the following customized configuration settings: Imaging Settings, Connectivity & Network, Peripheral Devices, and System Management. See also: For information about backing up all customized configuration settings, refer to Chapter 1 in this manual. 1. Click System Management. 2. Click Service.

3. Click **Export**.
 - a. Select the USB storage device from the **Available Media** list.
 - b. If the USB storage device is not listed, ensure the device is connected to the USB port and then click **Refresh**.
4. (For packages only) If you are exporting a package, select the name of the exam. Or, click **Select all** to export all packages.
5. Enter or edit the name of the file in the **File Name** text box.
 - **.xlsx** indicates a file you can edit on your personal computer, for example, the scheduled procedure descriptions
 - **.image** indicates a file with image presets and default transducer assignments
 - **.anno** indicates a package of text annotations
 - **.body** indicates a package of body markers
 - **.calc** indicates a package of measurement labels
 - **.rp** indicates a file with specific local settings
6. Click **OK**.

To import a file with customized configuration settings:

Prerequisite: Connect a USB-compatible storage device to the ultrasound system.

1. Tap the configuration button.



2. Access the configuration settings to import a file to the ultrasound system:

To	Do This
Import scheduled procedure descriptions	1. Click Workflow Enhancement . 2. Click Procedure Configuration .
Import image presets and default transducer assignments	1. Click Workflow Enhancement . 2. Click Image Preset Configuration .
Import body marker packages	1. Click Annotations . 2. Click Body Marker .
Import text annotation packages	1. Click Annotations . 2. Click Text .
Import measurement packages	1. Click Measurement & Report . 2. Click Touch Screen Measurement Config .

To	Do This
Import protocols	See also: Refer to Chapter 1 in this manual.
Import the local settings	Note: Local settings do not include the following customized configuration settings: Imaging Settings, Connectivity & Network, Peripheral Devices, and System Management. See also: For information about restoring all customized configuration settings, refer to Chapter 1 in this manual. 1. Click System Management. 2. Click Service.

3. Click **Import**.
 - a. Select the USB storage device from the **Available Media** list.
 - b. If the USB storage device is not listed, ensure the device is connected to the USB port and then click **Refresh**.
4. Select the file to import from the **File Name** list and then click **OK**.
5. (For packages only) If the file contains an exam name existing on the ultrasound system, select an option.
 - **Update** overwrites the settings for the exam on the ultrasound system.
 - **Rename** displays selections to edit the name of the exam, for example, Abdomen2.
 - **Ignore** keeps the dialog box open for subsequent action.
 - **Cancel** stops the import process and closes the dialog box.
6. Remove the USB storage device from the ultrasound system.
Note: The ultrasound system restarts after importing the local settings.

3 Obstetric Measurement Configuration

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Overview

You can modify measurement features for the obstetric exam and the early obstetric exam, including the default author used for obstetric calculations. You can also create, edit, and delete custom gestational age tables and fetal growth tables (growth curves).

The ultrasound system places an asterisk (*) next to the author's name for custom tables and measurements.

- An asterisk before the author's name identifies user-defined tables and measurement labels.
- An asterisk after the author's name identifies factory-defined custom tables, for example, a table without standard deviation data.

See also: For information about customizing general measurements, refer to Chapter 2 in this manual.

Designating the Reference Author

Each author uses a specific range of values to calculate gestational age, gestational analysis data, and estimated fetal weight.

You can change the default reference author for a fetal measurement label.

To change the default author:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **OB Tables**.
4. Click the **Default OB Author** tab.
5. Select an author for the measurement label.
 - For simple gestational age, select an author from the **Gestational Age** list.
 - For composite gestational age, select an author from the **US Age (Ultrasound Age)** list.
 - For fetal growth charts, select an author from the **Growth Analysis** list.
 - For estimated fetal weight, select an author from the **EFW (Estimated Fetal Weight)** list.
6. To calculate the average of existing valid simple gestational ages, excluding the estimated fetal weight, select **Average** from the **US Age (Ultrasound Age)** list.

Customizing Obstetric Tables

You can create, edit, and delete user-defined obstetric tables, such as gestational age tables and fetal growth tables (growth curves). You can also assign a predefined measurement label to a user-defined obstetric table.

To create or edit a user-defined obstetric table:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **OB Tables**.
4. Click the required tab.
 - **Custom GA Table** selects a gestational age table.
 - **Custom Growth Curves** selects a growth curve table.
5. Select a measurement label from the **Measurement** list.
 - To create a new table, click **New**.
 - To use an existing table as a template, select the name of the author and then click **Copy**.
 - To edit a user-defined table, select the name of a user-defined author and then click **Edit**.
6. Enter the following information.

Selection	Description
Author Name	Specifies the name of the author for the table. The name of the table is the name of the author. Note: For copied tables, the ultrasound system assigns a numeric extension to the existing author name. You can edit the author name.
Units	Specifies the measurement unit for the label. ▪ mm indicates millimeters. ▪ cm indicates centimeters. ▪ cm2 indicates centimeters squared. ▪ cm3 indicates centimeters cubed. ▪ g indicates grams. ▪ lbs indicates pounds. ▪ ° indicates the arc of an angle in degrees. ▪ cm/sec indicates centimeters per seconds.

Selection	Description
Low/High Range	(Applies only to growth curves) Selects the range for the fetal growth pattern. ▪ 5%/95% indicates a low range of 5% and a high range of 95%. ▪ 10%/90% indicates a low range of 10% and a high range of 90%. ▪ +/-1.5SD indicates a standard deviation of plus or minus 1.5. ▪ +/-1SE indicates a standard error of plus or minus 1.0.
Row	Identifies the row of values in the table. The system rennumbers the rows when you add or delete a row.
(Fetal measurement labels)	Identifies the variable values for the reference author. The lower limit for the variable value is in the first row of the table. The upper limit for the variable value is in the last row of the table. Include a table row for every variable value between the lower and upper limits. Variable values must be less than the values in the prior row. For example, if you specify a range from 10.0 (lower limit) to 11.0 (upper limit) for a gestational age table, you must create rows for 10.0, 10.1, 10.2, progressively up to 11.0. Note: The ultrasound system does not recognize measurements corresponding to table values outside the indicated range.
Gestational Age	(Available only for gestational age tables) ▪ Weeks indicates the gestational age in weeks. ▪ Days indicates the gestational age in days.
2SD Days	(Available only for gestational age tables) Specifies the number of days for the standard deviation (SD). An entry is not required.
GA	(Available only for growth curves) Specifies the gestational age in weeks and days.
(ranges)	(Available only for growth curves) Identifies the limits of the growth curve. ▪ Mean indicates the limits for the average mean. ▪ Low indicates the limits for the lower range. ▪ High indicates the limits for the upper range.

7. To add or remove table rows:
 - a. Click the required row.
 - b. To add a row, click **Insert Row Before** or **Insert Row After**.
 - c. To delete the row, click **Delete Row**.
8. To remove all data from the table, click **Clear All**.

9. Click **Validate Table** to confirm the table.
The system checks for invalid data and then displays a message. If the table is not valid, correct the errors and then repeat this step.
10. Click **Save**.
11. To map the validated table for DICOM structured reporting:
Note: For additional information on DICOM structured reporting mapping, refer to Chapter 2 in this manual.
 - a. Click **SR Mapping**.
The system displays a dialog box for mapping the table.
 - b. Enter a name in the **Author Name** field.
 - c. Select a code in the **Coding Scheme Designator** field.
 - d. Enter a value in the **Code value** field.
 - e. Click **OK**.
 - f. To exit without saving the changes, click **Cancel**.
12. To discard the changes and exit the table, click **Cancel**.

To delete a user-defined obstetric table:

1. Select a fetal measurement label.
2. Select the name of the table to delete.
3. Click **Delete**.
4. Click **OK**.
5. To exit without deleting the table, click **Cancel**.

Selecting the Default Measurement Method

You can customize the obstetric tools and measurement methods.

To select the default measurement method:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Measurement**.
4. Click the **Exam Specific** tab.

To	Do This
Select the BPD method for the eSieOB feature	▪ Click the required option. – European - BPD outer to outer measures the biparietal diameter (BPD) from outer edge to outer edge. – US - BPD outer to inner measures the BPD from outer edge to inner edge.

Customizing the Display of Fetal Information

You can customize the display of fetal data on the image screen, on the touch screen, and in the patient report.

To customize the display of fetal information:

1. Tap the configuration button.



2. Click **Measurement & Report**.
3. Click **Measurement**.
4. Click the **Exam Specific** tab.

To	Do This
Display fetal information on the image screen	▪ Select the check boxes next to the required selections. – LMP/DOC displays the date of the last menstrual period or date of conception. – Clinical Age displays the estimated gestational age. – EDD displays the estimated date of delivery. – EFW displays the estimated fetal weight.
Display the SD or GA on the touch screen	▪ Select an option from the Display Averaged GA or $\pm$SD on Touch Screen list. – GestationalAge displays the averaged gestational age (GA). – StandardDeviation displays the standard deviation (SD). – None excludes the SD and the averaged GA from the touch screen.
Display the SD or GA with the measured results	▪ Select an option from the Display Averaged GA or $\pm$SD in Measured Results list. – GestationalAge displays the averaged gestational age (GA). – StandardDeviation displays the standard deviation (SD).

To	Do This
Select the upper limit of the range for the SD	▪ Select an option from the Display Out of Range list. – Off displays the gestational age instead of the standard deviation (SD). – 1.5 indicates the upper limit of the SD is 1.5. – 2 indicates the upper limit of the SD is 2.0. – 2.5 indicates the upper limit of the SD is 2.5.
Identify the ratios to display in the report	▪ Select the check boxes next to the required selections. – HC/AC displays a ratio of the head circumference and abdominal circumference measurements. – FL/BPD displays a ratio of the femur length and biparietal diameter measurements. – FL/HC displays a ratio of the femur length and head circumference measurements. – FL/AC displays a ratio of the femur length and abdominal circumference measurements. – TCD/AC displays a ratio of the trans cerebellar diameter and abdominal circumference measurements. – LVW/HW displays a ratio of the lateral ventricle width and hemispheric width measurements. – Cephalic Index

4 Reserved for Future Use

5 Network Configuration

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Overview

Prerequisite: A working knowledge of networking principles is beneficial for configuring network connections.

You can connect the ultrasound system (the local host) to a local area network (LAN) through a wired or a wireless connection. When both wired and wireless connections are configured and available, the ultrasound system gives priority to the wired LAN connection.

See also: For information on creating and editing DICOM configuration profiles, refer to Chapter 6 in this manual.

Configuring a Wireless Network Connection

The ultrasound system uses network profiles to store wireless network configurations. The profile names list displays the name of the network profile for the wireless network.

Note: The ultrasound system connects only to wireless networks with saved network profiles.

To configure a connection to a wireless network:

Prerequisite: A USB storage device with a transport layer security (TLS) or secure socket layer (SSL) certificate, if necessary.

1. Tap the configuration button.



2. Click **Connectivity & Network**.
3. Click **Wireless Network**.
4. To enable connections to wireless networks, click **Enable WiFi**.
5. If the wireless network is not listed, click **Refresh**.
6. To create a new network profile, click **Add** and then enter the required settings.

Note: Consult your network administrator for the required settings.

Selection	Description
SSID	Specifies the SSID (Service Set Identification) of the wireless network.
Channel	Specifies the required channel.
Security	Specifies the authentication method.
Encryption	Specifies the encryption method.
Signal Strength	Displays the signal strength of the wireless network.
Profile Saved	▪ True indicates the profile has been saved. ▪ False indicates the profile has not been saved.
Network Key	The security password, if required.
EAP Type	Specifies the Extensible Authentication Protocol (EAP) authentication method, if required. ▪ TLS indicates transport layer security ▪ PEAP indicates protected extensible authentication protocol

Selection	Description
Certificate Name	Name of the certificate used for EAP TLS profile, if required.
Browse	Accesses a list of available transport layer security (TLS) certificates on the ultrasound system.
User Name	Specifies the EAP user name, if required.
User Password	The EAP password, if required.
Import Certificate	Displays a Windows dialog box for importing a certificate from a USB storage device, for example, an SSL certificate for a remote desktop connection. To import the certificate, you must enter the password for the certificate's private key file. Contact your archival and information system administrator to obtain the password.

- To disconnect from a wireless network, select the name of the wireless network and then click **Disconnect**.

To modify a network profile:

- Tap the configuration button.



- Click **Connectivity & Network**.
- Click **Wireless Network**.
- Select the name of the required wireless network from the profile names list and then enter the required settings.
- To delete a network profile, select the name of the required wireless network from the profile names list and then click **Remove**.

Note: Consult your network administrator for the required settings.

Configuring a Virtual Workstation

(Available only for the ultrasound system administrator)

A virtual workstation on the ultrasound system provides remote access to a facility's archival and information system.

The virtual workstation uses either a web browser or a remote desktop connection. A remote desktop connection requires importing a secure socket layer (SSL) certificate for the wireless network connection.

See also: For information on importing a certificate, refer to page 5-3.

To configure a virtual workstation on the ultrasound system:

Prerequisite: Connect to a wireless network. Upload an SSL certificate for a remote desktop connection.

1. Tap the configuration button.



2. Enable the NetBIOS port.
 - a. Click **System Management** and then click **Security**.
 - b. Click **Detail** for the **Ports**.
 - c. Enable the port assigned to the NetBIOS.
3. Click **Connectivity & Network** and then click **Virtual Workstation**.
4. Select a connection option in the **Access Type** list.
 - **Browser** enables access to your archival and information system from a web browser.
 - **Remote Desktop** enables access to your archival and information system using a remote desktop session.
5. To modify an existing virtual workstation, select a workstation from the list.
6. To add a new virtual workstation, click **Add**.
7. Enter or edit the properties for connecting the virtual workstation to the archival and information system.

Selection	Description
Name	Specifies a unique name for the virtual workstation.
URL	(Available only for the web browser) Specifies the universal resource locator (URL), or web site address, of the archival and information system. Requires hypertext transfer protocol secure (https) format.
Host	(Available only for the remote desktop) Specifies the Internet protocol (IP) address, or domain name, of the archival and information system's server.
Username	(Available only for the remote desktop) Specifies the domain name of the archival and information system's server.
Password	(Available only for the remote desktop) Specifies the domain password for the archival and information system's server.

8. Click **Ping** to confirm the connection.
9. To delete an existing virtual workstation, select a workstation from the list and then click **Delete**.

6 DICOM Configuration

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Overview

The ultrasound system has integrated networked communication capability to support communication with DICOM archive, worklist, and documentation devices.

The networked communication on the ultrasound system is in compliance with the Digital Imaging Communications in Medicine (DICOM) 3.0 standard (also known as ACR/NEMA 3.0).

You can select encrypted DICOM communications by importing a certificate and configuring the ultrasound system for a secure study transfer.

Prerequisites

(Available only for the network administrator)

- Connect the ultrasound system, or local host, to a local area network (LAN) through a wired or a wireless connection.
- A working knowledge of networking principles is necessary and beneficial for completing network configuration. An understanding of DICOM principles is necessary and beneficial for completing DICOM configuration.
- Check the storage server for compatibility with the ultrasound system settings.
- Requires the following DICOM configuration settings for each device.
 - The host name, Application Entity (AE) title, and port number for the ultrasound system.
 - Media type and duplex mode for connection to the host.
 - Alias, AE title, IP address, and port number for each DICOM device.

Note: If you are using Dynamic Host Control Protocol (DHCP), you are not required to provide the IP address, subnet mask, or default gateway information.

Configuring and Managing DICOM Profiles

(Available only for the network administrator)

You can configure the ultrasound system and connected devices, for example, servers and printers for DICOM by creating and editing profiles (DICOM configurations).

To access a DICOM profile:

1. Tap the configuration button.



2. Click **Connectivity & Network**.
3. Click **DICOM Configuration**.
4. Click the **DICOM Service** tab.
5. Select the required DICOM server type from the **Server Type** drop-down list.
 - **DICOM Storage** specifies settings for a DICOM storage location profile.
 - **DICOM Worklist** specifies settings for a DICOM worklist profile.
 - **DICOM Print** specifies settings for a DICOM printer profile.
6. To delete a profile, select the profile in the **Server Name** list and then click **Delete**.
Note: The ultrasound system saves configuration settings changes when you navigate away from the page.

Configuring a Local Host

You can configure network settings for the ultrasound system (the local host).

To configure Local Host settings:

1. Access the DICOM configuration settings and then click the required DICOM server type from the **Server Type** drop-down list.
2. Click the **Local Host** tab.
3. Select **Wired** from the **Connection Type** drop-down list.
4. Enter the host name and MAC address, if necessary.
5. Choose a method to enter the **IPv4 Configuration Settings**:
 - If the ultrasound system uses a dynamic IP address assigned by a Dynamic Host Configuration Protocol (DHCP) server, click **Use DHCP**.
 - If the ultrasound system uses a static IP address, enter the required settings for **IP Address**, **Subnet Mask**, and **Gateway**.
6. Configure the advanced local host settings, if necessary.

Selection	Description
Local AE Titles	Specifies local application entity title settings
HIS/RIS [SCU]	Specifies the AE Title used by the HIS/RIS server to schedule procedures for the ultrasound system
Print [SCU]	Specifies the AE Title used to identify the ultrasound system to DICOM print devices
Study Transfer (Secure) [SCP+SCU]	Specifies the AE Title used by DICOM storage SCPs (Storage Class Providers) to identify the ultrasound system for encrypted DICOM storage communication
Study Transfer (Unsecure) [SCP+SCU]	Specifies the AE Title used by DICOM storage SCPs (Storage Class Providers) to identify the ultrasound system for unencrypted DICOM storage communication
DNS	Specifies the DNS (Domain Name Server) settings
Domain	Specifies the DNS name
DNS Service Search Order	Specifies the IP addresses of the DNS servers in the order they are used for domain name resolution
Add	Adds an IP address to the DNS Service Search Order drop-down list
Delete	Deletes the selected IP Address in the DNS Service Search Order drop-down list

Configuring DICOM Storage Locations

To configure a DICOM storage location:

1. Access the DICOM configuration settings and then click the **DICOM Service** tab, if necessary.
2. Click **DICOM Storage** from the **Server Type** drop-down list.
3. Configure a DICOM storage location.
 - To configure a new DICOM storage location, click **Add**.
 - To configure an existing DICOM storage location, select the name of the required storage device in the **Server Name** list.
4. Enter or modify configuration settings for the device.

Note: The IP Address and the Port Number settings must be correct for the Ping and Verify tests to work. Confirm this setting with your network administrator.

Selection	Description
Alias	Specifies the name the ultrasound system uses to identify the storage device in the user interface
IP Address	Specifies the IP address of the storage device
AE Title	Specifies the AE Title for the storage device
Port Number	Specifies the network port the storage device uses to communicate with the ultrasound system

5. Configure the advanced options for the DICOM storage location, if necessary.

Selection	Description
Transfer Syntax	Configures how data is sent to the server. You must select at least one of the Transfer Syntax options.
Implicit Little Endian	Implicit (without) value representation (string, integer, and date). When enabled, the value representation for each attribute is not sent in the image header and needs to be added at the destination using a data dictionary file. Little Endian means the least significant byte is sent first.
Explicit Little Endian	Explicit (with) value representation (string, integer, and date). When enabled, the value representation for each attribute is sent in the image header. Little Endian means the least significant byte is sent first.
Explicit Big Endian	Explicit (with) value representation (string, integer, and date). When enabled, the value representation for each attribute is sent in the image header. Big Endian means the most significant bit is encoded first.
Transfer	---
Send/Receive Acoustic Data	(Available for volume imaging) When enabled, includes acoustic data with images or clips sent to or retrieved from the storage location.
Enable DICOM GSDF	When enabled, selects the DICOM Grayscale Standard Display Function (GSDF). This selection applies an image quality standard to images exported from the ultrasound system to an offline review station.

Selection	Description
Compression	---
JPEG Lossy	When enabled, indicates the PACS accepts compressed images in JPEG Lossy format. Lossy compression is irreversible and can result in the loss of image quality.
JPEG Lossless	When enabled, indicates the PACS accepts compressed images in JPEG Lossless format. The original quality of the images can be restored.
Convert RGB to Monochrome	Specifies image conversion settings. ▪ No RGB Conversion does not convert images when transferred. ▪ Convert RGB Color Images converts all single frame images to monochrome when transferred. ▪ Convert Ultrasound Non-Color Data converts images without color ultrasound data to monochrome when transferred.
Archive Node	When enabled, studies sent to the DICOM device are marked with a flag for archive in the patient browser. When disabled, studies are not marked for archive.
Secure Connection	Enables or disables the secure mode of DICOM storage communication
Provides Query Model	Specifies the required query model. ▪ Patient Root accesses all patient information, including patient registration and patient studies. ▪ Study Root accesses all patient studies. ▪ Patient/Study only accesses a patient's information and studies.
Storage Commitment	Specifies the device used for storage commitment. ▪ Use Same Association retains the currently selected device.
Select SC Server	Specifies available storage servers

6. To delete a storage device from the profile list, select the device and then click **Delete**.
7. To specify a default DICOM storage location, move the preferred location to the top of the DICOM storage locations list.

Configuring DICOM Printers

To configure a DICOM printer:

1. Access the DICOM configuration settings and then click the **DICOM Service** tab, if necessary.
2. Click **DICOM Print** from the **Server Type** drop-down list.
3. Configure a printer.
 - To configure a new DICOM printer, click **Add**.
 - To configure an existing DICOM printer, select the name of the required printer in the list.
4. Enter or modify configuration settings for the device.

Selection	Description
Alias	Specifies the name the ultrasound system uses to identify the printer in the user interface. The alias is not used by DICOM.
IP Address	Identifies the IP address of the printer
AE Title	Identifies the AE Title for the printer
Port Number	Identifies the network port the printer uses to communicate with the ultrasound system
Printer Model	Lists the printers configured in the Service menu

5. Select additional configuration options, if necessary.

Selection	Description
Hold Printed Filmjobs	Specifies the number of print jobs (from 0 to 10) to display in the Film Task Status dialog box
Medium Type	Specifies the print medium, BlueFilm , ClearFilm , or Paper
Film Destination	Specifies how the film is developed. ▪ FilmDestMagazine specifies the exposed film sheet is developed in a darkroom. ▪ FilmDestProcessor specifies the exposed film sheet is fed directly into a processor that develops the film.
Transformation	Specifies how the system sends data to the camera if pixel interpolation is necessary. Pixel interpolation may be necessary when sending data to a high-resolution camera. ▪ Replicate specifies the interpolated value is identical to the last pixel value. ▪ Bilinear specifies the interpolated value is calculated linearly between the last pixel value and the next pixel value. ▪ Cubic specifies the interpolated value is calculated on a curve between the last pixel value and the next pixel value. This option is slowest but preserves fine detail better than bilinear interpolation. ▪ NoMagnification specifies the image is not magnified.
Background	Sets the background color of the film to black or white
Secure Connection	Enables or disables the secure mode of DICOM storage communication
Min. Density (0.1)	Specifies the minimum density value for the camera (from 0 to 50). Note: Consult the printer manufacturer for the appropriate setting. Note: The maximum density value is modality-dependent.
Color Appearance	Specifies color settings for the print device, monochrome, color, or 12 bit monochrome. Configure this setting if you want to print color ultrasound images to a camera that supports color.

6. To delete a DICOM printer from the profile list, select the printer and then click **Delete**.
7. To specify a default DICOM printer, move the preferred printer to the top of the DICOM printers list.

Configuring DICOM Worklist

Note: Query/Retrieve is intended for use with ultrasound images only.

To configure a DICOM worklist:

1. Access the DICOM configuration settings and then click the **DICOM Service** tab, if necessary.
2. Click **DICOM Worklist** from the **Server Type** drop-down list.
3. Configure the DICOM worklist.
 - To configure a new DICOM worklist, click **Add**.
 - To configure an existing DICOM worklist, select the required server in the server list.
4. Enter or modify configuration settings for the worklist, if necessary.

Selection	Description
Alias	Specifies the name the ultrasound system uses to identify the HIS/RIS server in the user interface. The alias is not used by DICOM.
IP Address	Specifies the IP address of the HIS/RIS server.
AE Title	Specifies the AE Title for the HIS/RIS server.
Port Number	Specifies the network port the HIS/RIS server uses to communicate with the ultrasound system.
Services	Specifies the type of data to be downloaded from the HIS/RIS server. You must select at least one of the Services options.
Basic Worklist	Downloads basic patient data to the patient browser.
Performed Procedure Step	Downloads scheduled procedure information for HIS/RIS systems configured for Modality Performed Procedure Step (MPPS).

5. Click the **General Worklist Settings** tab to access additional configuration options, if necessary.

Selection	Description
Worklist	When selected, enables the selected worklist
RIS Query/PPS Communication Modality	Specifies if a query will include only Modality Worklist (MWL) results for the US modality or all modalities
Modality	Specifies the location of the modality ▪ US specifies the US modality ▪ Any specifies all other modalities
AET	Specifies the AE Title for the HIS/RIS server
From RIS	Specifies the name of the RIS server being queried
MPPS Node	Specifies the DICOM Modality Performed Procedure Step (MPPS) node. Note: If more than one worklist server is configured, one server can be used to query the Modality Worklist (MWL) while the other server sends MPPS messages.
Worklist Update	Specifies worklist update configuration options
Update Worklist in Background	When selected, updates the worklist in the background
Ask for Time Range in Manual Update	When selected, displays a dialog box to specify the required time range, and then limits the search to patients scheduled for dates and times within that range. When not selected, limits search of the worklist to patients scheduled for today.
Time Range	Performs a search query on procedures scheduled within a specified time range. ▪ Today and Previous day(s) displays the procedures scheduled for today, and a specified time range before today ▪ Today and Following day(s) displays the procedures scheduled for today, and a specified time range after today
Patient Attributes (sent/read only from HIS/RIS system)	Specifies the patient information to transfer to and from the HIS/RIS system. This information displays in the patient browser. ▪ Date of Birth specifies the patient's date of birth including the month, day, and year ▪ Gender specifies the patient's gender ▪ Accession Number specifies the identification number indicating the sequence of the current study as related to other studies for this patient

6. Click the **Advanced Settings** tab to access additional configuration options, if necessary.

Selection	Description
Query Interval (min)	Specifies the interval between queries (minutes)
Query Waiting Time (sec)	Specifies the timeout value for an attempted connection between the host and the HIS/RIS server
Max. Query Match Number	Specifies the limits the number of Worklist entries the HIS/RIS system transfers to the ultrasound system
Update Worklist in Background	Initiates a HIS/RIS query at the configured interval.
Secure Connection	Enables or disables the secure mode of DICOM storage communication

7. To delete a DICOM worklist from the profile, select the worklist and then click **Delete**.
8. To specify a default DICOM worklist, move the preferred worklist to the top of the list.

Verifying DICOM Settings

After you have finished creating a DICOM profile, test the profile settings to confirm that they are correct. To test the DICOM configuration, the system must be connected to a local area network (LAN) through a wired or wireless network connection.

To verify DICOM settings for a profile:

1. Access the DICOM configuration settings and then click the **DICOM Service** tab, if necessary.
2. Select the host DICOM Storage profile.
3. To validate an IP address, click **Ping**.
Results of the test display next to the **Ping** button.
4. To validate the host AE title and port number, click **Verify**.
Results of the test display next to the **Verify** button.
5. If the verification fails:
 - a. Check the **IP Address**, **AE Title**, and **Port Number**.
 - b. Verify the **AE Title** of the ultrasound system is registered on the applicable server, if required.
6. Repeat steps 2 through 5 for the **DICOM Print** profile and **DICOM Worklist** profile.

Exporting Configuration Settings to Media

(Available only for the network administrator administrator)

You can export current configuration settings to external media, for example, a USB storage device.

To export network settings to external media:

1. Tap the configuration button.



2. Click **Connectivity & Network**.
3. Click **Export**.
4. Configure the export options, if necessary.

Selection	Description
Image Export	Specifies how images are exported
XML Report Export	Specifies how XML measurement reports are exported
Enable Transfer	Enables or disables the transfer of XML measurement reports
Network File Share	Displays the network file share
Domain/User Name	Specifies your domain user name
Password	Specifies your domain password
Web API	Specifies information about the Web API, Nuance, and PowerScribe
Server Address	Specifies the server address
User Name	Specifies the user name used to log on to the server
Password	Specifies the password required to access the server
Site	Specifies the web site address

Importing or Exporting a Certificate

You can import a certificate or select a self-signed certificate for use with encrypted DICOM communications.

To import or export a certificate:

1. Tap the configuration button.



2. Click **System Management**.
3. Click **Security**.
4. Click **Configure**.
5. Select the required type of certificate from the drop-down list: **Client Certificates** or **Root Certificates**.
6. Select the required import and export options.

Option	Description
Import/Export intermediate/root certificates (PKI, SSL) with Windows Certificate Wizard	Displays a dialog box to import an intermediate or root certificate using the Windows certificate wizard
Import remote system intermediate/root/self-signed certificate for authentication in DICOM secure connection	Displays a dialog box to import an intermediate or root certificate for authentication in a DICOM secure connection
Import certificate for secure connection to syngo service portal	Displays a dialog box to import a certificate for a secure <i>syngo</i> service portal connection
Import certificate and key for binding to DICOM secure connection	Displays a dialog box to import a certificate and the private key files (.PFX) for a secure DICOM connection
Export DICOM certificate/reset to self-signed certificate (DICOM and service portal)	Displays a dialog box to export a DICOM certificate or a self-signed certificate for a secure DICOM connection or service portal
Generate CSR for the certificate	Generates a certificate in Compressed Row Storage (CSR) format

7. Select the required certificate from the list and then enter a password, if necessary.
8. Click **Import**.

7 Security Configuration

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Overview

The security package provides configuration options for managing user accounts and providing data access permissions and functional privileges.

The ultrasound system administrator can access the configuration settings on the ultrasound system to manage user accounts and establish data access permissions and functional privileges. The ultrasound system administrator can also connect the ultrasound system to an Active Directory domain controller with the assistance of the domain controller administrator.

Prerequisites:

- A working knowledge of networking principles is necessary and beneficial for completing the network configuration.
- A working knowledge of Microsoft Active Directory is necessary for configuring users and groups on the domain controller.

Terminology Used in this Chapter

Term	Definition
User account	A login account assigned to each user to log in to the ultrasound system. User accounts are configured to restrict access to functional privileges and patient information on the ultrasound system.
Ultrasound system administrator	An administrative account with permissions to configure the ultrasound system for use in a networked environment. This person also manages access to functional privileges and patient data on the ultrasound system by configuring user accounts, groups, and roles and manages the audit trail. The ultrasound system administrator can also connect the ultrasound system to the Active Directory domain controller, with the assistance of the domain controller administrator.
Privilege	A restriction of access to functions or tasks on the ultrasound system, for example, sending data. User accounts can be assigned to roles to manage privileges. Privileges are also referred to as Functional Privileges. Note: The assignment of privileges to roles is not stored or editable on the Active Directory domain controller.
Permission	A restriction of access to patient data on the ultrasound system. User accounts can be assigned to a group to manage permissions. Permissions are also referred to as Data Access Permissions. Permissions include the following options: ▪ No Access indicates the user account does not have access to patient data in the specified patient group. ▪ Full Control indicates the user account has access to patient data in the specified patient group, including the following functions: – Creating a study – Viewing a study – Updating or modifying data; for example, correcting the patient's name – Deleting data – Changing the security level of data, for example, hiding patient identifying information from the screen
User	A single user, identified on the system with a user account.
Group	A classification for a user account, providing access to patient data on the ultrasound system. Groups include user groups and patient groups. The following list includes the default groups: ▪ Administrator and SecurityAdmins provides access to patient data in all patient groups and access to configure the ultrasound system. This group includes the ultrasound system administrator. ▪ EmergencyAccess provides access without a password for emergency login. The accounts have limited access. ▪ Standard provides access to all patient groups except service. The standard group and role cannot be deleted.

Term	Definition
User group	A group of user accounts requiring similar access; for example, users from the same team or department. One or more user groups can be assigned to a patient group.
Patient group	A group of user accounts requiring the same access to patient data.
Role	A classification for a user account, providing access to functions or tasks on the ultrasound system. The following list includes the default groups and roles: ▪ Administrator/SecurityAdmins provides access to patient data in all patient groups and access to configure the ultrasound system. This group and role includes the ultrasound system administrator. ▪ EmergencyAccess provides access without a password for emergency login. The accounts have limited access. ▪ Standard provides access to all patient groups except service. The standard group and role cannot be deleted. ▪ DICOM_Group provides access for processing DICOM services. This role is a virtual account for transferring network data. ▪ syngoServiceUsers provides access for remote service from your service representative.
Audit trail	A collection of security log files. The security log file tracks user actions, including powering on the ultrasound system, logging in, accessing files, modifying patient data and images, and powering off the ultrasound system. Only authorized users can view the security log files. Security log files are saved to the system hard disk, a storage device, or a network location. Saving the security log file is also referred to as archiving the audit trail.
Domain	A group of computers in a network with a common file database. Groups and roles can be managed within domains on a network, for example, a Hospital Information System/Radiology Information System server.
Federal Information Processing Standard (FIPS)	The Federal Information Processing Standard is a United States government computer security standard used to accredit cryptographic modules.
Active Directory domain controller	Microsoft Active Directory is a domain server for controlling access to Windows resources, for example, enabling user account management, authenticating user logon requests, and providing access to network resources, for example, data and printers on the local area network. Active Directory domain controller is also referred to as domain controller.
Domain controller administrator	The person designated in your organization to configure user accounts and groups on the domain controller. This administrator also creates a user account for the domain controller on the ultrasound system.
Service representative	A Siemens Healthineers representative who configures the ultrasound system during initial installation, supports troubleshooting activities, and repairs the system.

Configuring Security Settings

You can manage access to functional privileges and patient data on the ultrasound system by configuring user accounts.

To configure security settings:

1. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
2. Select a domain from the list, for example, the ultrasound system or a domain controller.
3. Click the menu option for the required settings.

Selection	Description
User Management	---
Users	Lists the individual user accounts. Use this selection to add and configure additional user accounts.
DICOM Nodes	Lists the virtual accounts for transferring network data. The following icon identifies virtual accounts: 
Internal Users	Lists factory-defined user accounts with access to all patient data and access to configure the ultrasound system. The following icon identifies internal users: 
Groups	Lists the current group accounts. Use this selection to add and configure additional groups.
Roles	Lists the current roles. Use this selection to add and configure additional roles.
Security Management	---
Data Access Permissions	Prerequisite: Your service representative must enable the Data access check in the security settings. Lists access to patient data on the ultrasound system.
Functional Privileges	Lists access to functions and tasks on the ultrasound system.

4. Enter the required settings.

5. Save the changes.

Note: If the selections for saving the changes are not visible, resize the dialog box. Position your cursor on the edge of the dialog box and then click and drag the edges to resize the dialog box.

- To save the settings, click **Apply**.
- To save the settings and close the dialog box, click **OK**.
- To discard the changes and exit the configuration settings, click **Cancel**.

To enable the Federal Information Processing Standard:

1. Tap the configuration button.



2. Click **System Management** and then click **Security**.
3. Click the **Enable** selection for the **FIPS (Federal Information Processing Standard)**.

Connect to an Active Directory Domain Controller

You must complete all steps of this multiple-step procedure to connect the ultrasound system to an Active Directory domain controller. In the final step, the service representative must be present to map an administrator group and a user group from the domain controller to the security settings on the ultrasound system and reinstall the system management controls.

Step 1: Renaming the Ultrasound System

(Available only for the ultrasound system administrator)

Each ultrasound system connected to the domain controller must have a unique host name.

To create a unique host name:

1. Access the configuration settings.
 - a. Tap the configuration button.



- b. Click **System Management** and then click **Service**.
2. Click **Local Service** and then click **OK**.
3. Click **Configuration**.

Note: If this is the first time configuring the **TCP/IP LAN** setting, you may be required to click **Next** repeatedly to access the setting.
4. Click **TCP/IP LAN**.
5. Enter a unique host name for the ultrasound system in the **Computer Name** text box.

Note: The default host name for the ultrasound system is US2015.
6. Click **Save**.
7. Click **OK** to confirm the changes can result in a loss of communication.

Note: Precisely follow the steps in this procedure, including clicking the home button, to prevent loss of communication.
8. Click **OK** to acknowledge your agreement to validate the host name.

The ultrasound system displays status messages in the lower left and lower center of the screen, for example, please wait, ready, and reboot system pending.

9. Click **OK** to confirm the system saved the host name.
10. Click **Home** to validate the host name.

Note: Do not restart the system or interrupt this process.

The ultrasound system displays status messages in the lower left and lower center of the screen, for example, starting report creation and reboot system pending.

11. Click **OK** to restart the ultrasound system and apply the changes.
The system restarts and displays the new host name in the domain list of the login screen.

Step 2: Configuring the Domain Name Server

(Available only for the ultrasound system administrator)

To configure the network settings for the domain:

1. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **Connectivity & Network** and then click **DICOM Configuration**.
2. Select the **Use DHCP** check box to specify the domain name server (DNS) settings for the Active Directory domain controller.
Note: If the DNS settings are incorrect, enter the domain name server for the domain controller in the **DNS Service Search Order** text boxes and then click **Add**.
3. Click **Apply**.
4. Click **OK** to restart the ultrasound system.

Step 3: Connecting to the Domain Controller

(Available only for the ultrasound system administrator and the domain controller administrator)

The domain controller administrator must create a user account for the domain controller on the ultrasound system.

To connect the ultrasound system to the domain controller:

1. Log in to the ultrasound system as an ultrasound system administrator.
2. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **Active Directory**.
3. Click **Domain** and then enter the name of the domain controller.
4. Click **Apply**.
5. Log in to the domain controller from the ultrasound system as a domain controller administrator.
 - a. Enter the identification and password for the domain controller and then click **OK**.
Note: The system displays a restart window when login is successful. If login is unsuccessful, confirm and then re-enter the identification and password for the domain controller.
 - b. Click **OK**.
 - c. Click **Restart Now**.
6. Log in to the ultrasound system.
 - a. Select the domain controller from the **Domain** list.
 - b. Log in as a domain controller administrator.
7. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
8. Add a user account for the Active Directory domain controller in the configuration settings on the ultrasound system.
 - a. Select the ultrasound system domain from the list.
 - b. Select **User Management**.
 - c. Right-click **Users** and then select **New**.
 - d. Click **User**.
 - e. Create a new user for the domain controller, for example, AD Domain.

See also: For additional information on adding a user account, refer to page 7-18.

Step 4: Establishing Access to the Ultrasound System

(Available only for the domain controller administrator and your service representative)

Create an administrative user group on the domain controller for managing access to the ultrasound system and a non-administrative user group for performing imaging functions on the ultrasound system.

Step 4.1 Create User Groups on the Domain Controller

- Create an administrative and a non-administrative user group on the Active Directory domain controller and then add members to the groups, for example:
 - SH Administrators as the administrative group
 - SH Sonographers as the non-administrative group

Step 4.2 Map Domain Controller Groups to the Ultrasound System

Prerequisite: Your service representative must perform this step.

- Add the groups created in the preceding step to the security settings on the ultrasound system, for example:
 - Your service representative adds the SH Administrator group to the Administrator and SecurityAdmins groups on the ultrasound system.
 - Your service representative adds the SH Sonographers group to the Standard group on the ultrasound system.

Note: SH Administrator and SH Sonographer are examples only.

- If the host name was changed, reinstall the system management controls, if necessary.

User Account Management

You can manage the following user account configuration:

- Creating, editing, and deleting user accounts, including user names and passwords
- Configuring access to patient data and ultrasound tasks
- Configuring password complexity
- Configuring, viewing, and archiving the security log file

Managing Groups and Roles

You can create groups and roles to use in addition to the default groups and roles. Each name of the group or role must be unique and cannot include special characters. If a user group name and role name are identical, the system displays a message indicating all changes are applicable for both the user group and the role. After you create a group or a role, you cannot change the name.

To create or delete a user group or role:

1. Access the configuration settings.
 - a. Tap the configuration button.
 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
2. Select **User Management**.
3. Select a domain from the list, for example, the ultrasound system or a domain controller.
4. To create a user group:
 - a. Right-click **Groups**, select **New**, and then click **Group**.
 - b. Enter a name and description.
 - c. Select the **Members** tab.
 - d. To add users, select the users from the **Available Users** list and then click **Add**.
 - e. To delete users, select the users from the **Assigned Users** list and then click **Remove**.
 - f. Save the changes.
5. To create a role:
 - a. Right-click **Roles**, select **New**, and then click **Role**.
 - b. Enter a name and description.
 - c. Select the **Owners** tab.
 - d. To add users, select the users from the **Available Users** list and then click **Add**.
 - e. To delete users, select the users from the **Assigned Users** list and then click **Remove**.
 - f. Save the changes.

6. To edit an existing user group or role:
 - a. Double-click the name of the group or role.
 - b. Select the tab with the information for editing and then enter the required updates.
 - c. Save the changes.
7. To delete a user group or role:
 - a. Right-click the group or role.
 - b. Select **Delete** and then select **Yes**.
 - c. Restart the ultrasound system.

Creating a Patient Group

(Available only for the ultrasound system administrator)

You can create a group for patients, assign the patient group to user accounts, and then use the patient browser to assign patients to the patient group.

To create or delete a patient group:

Prerequisite: Your service representative must enable the **Data access check** in the security settings.

1. Access the configuration settings.
 - a. Tap the configuration button.
 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
2. Select **Security Management** and then select **Data Access Permissions**.
3. Right-click **Patient Groups** and then select **New**.
4. Click **Patient Group**.
5. Enter a name and description.
6. To provide read-only access for service representatives, select the required check box.
7. To delete a patient group:
 - a. Right-click the patient group.
 - b. Select **Delete** and then select **Yes**.
8. Save the changes.

Configuring User Groups, Roles, and Patient Groups

You can assign access to a user account by configuring user accounts, groups, and roles. The system displays an asterisk (*) next to any field with unsaved changes.

You can limit the list of groups and roles by selecting a filter at the top of the screen. The system displays a drop-down list of groups or roles based on the filter.

Note: To avoid unpredictable results, never modify the syngo text in the user group description on the domain controller.

To configure user groups, roles, and patient groups:

1. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
2. To configure a patient group:
 - a. Select **Security Management** and then select **Data Access Permissions**.
 - b. To display the access by patient groups, select **By Patient Groups**.
 - c. To display the access by user groups, select **By User / Groups**.
 - d. Select the group and then enter or modify the configuration settings.
 - To assign permissions, select the permission option from the **Permission** drop-down list.

 Access provided to a group is included in the effective permissions for all user accounts in the group.
 - To assign the default permissions, select the **Default** check box. This option is only available for groups with access to the patient group.

Selection	Description
List only objects with permissions assigned	When the check box is selected, lists only patient groups with Full Control access to patient data on the ultrasound system
User/Group	List the individual user accounts and the groups
Patient Groups	List the patient groups
Permission	Selects the group's access to patient data, for example, Full Access
Eff. Default Patient Group	When the check box is selected, access provided to a patient group is included in the effective permissions for all user accounts in the patient group.
Description	Describes the access assigned to a group

3. To assign access to a patient group:
 - a. Select **Patient Group**, select the name of the required group, and then select the **Default** check box.
 - b. To provide limited access during maintenance of the ultrasound system, select the **Grant Read Access for syngoServiceUser in service sessions** check box.
4. To assign access to functional privileges:
 - a. Select a domain from the list, for example, the ultrasound system or a domain controller.
 - b. Select **Security Management** and then select **Functional Privileges**.
 - c. Select **By User / Role**.
 - d. Select a classification.
 - **Everyone** includes all users and all groups
 - **Roles** includes a list of roles
 - **Users** includes a list of individual user accounts
 - e. Select a name from the **Privileges of** list, for example, if the selected classification is **Groups**, select a group name from the list.
 - f. Select the required category and then select the **Grant** check box to assign the privilege.

Note: You cannot remove effective privileges from factory-assigned roles.

See also: For information on effective privileges, refer to page 7-17.

Category	Privilege
ArchNet	Archive indicates access to archive patient data in DICOM format, for example, to a recording device or network location. Export indicates access to export patient data in DICOM format from the patient browser. This setting does not affect the ability to export patient data to a USB-compatible storage device in PC format. Send indicates access to send patient data to a DICOM print store, for example, PACS or HIS/RIS
AuditTrail	Archive indicates access to save the security log file ConfigureReadWrite indicates access to configure, read, and edit the security log file SetFilter indicates access to configure the filter settings of the security log file View indicates access to view the security log file

Category	Privilege
Common	CopyToClipboard indicates access to copy patient data NetworkConfiguration indicates access to configure the network, including DICOM configuration EmergencyServiceAccess indicates emergency access to service pages RemoteAssistance indicates access to virtual communication with a Siemens Healthineers service representative SaveLog indicates access to save logs on the ultrasound system ServiceAccess indicates access to the local service page, including access to the backup and restore feature
CorrectRearrange	Correct indicates access to edit the patient registration information History indicates access to edit the patient history Rearrange indicates access to change the sequence of the patient registration information
Filming	Expose indicates access to print patient data
PatientBrowser	Delete indicates access to delete patient data ModifyPatientGroups indicates access to edit the patient group SetStateCompleted indicates access to view and edit patient data SetStateRead indicates access to view patient information SetStateVerified indicates access to view patient information
PatientRegistration	InvokeRegistration indicates access to register a patient.
SecuritySystem	BypassBlockedSystem indicates access to bypass an ultrasound system blocked as a result of the security log file filling the system hard disk ConfigurationRead indicates access to view the security configuration settings ConfigurationReadWrite indicates access to view and edit the security configuration settings EnableServiceAccount indicates the password for a user account of Siemens Healthineers service personnel InteractiveLogin indicates access to log in when the ultrasound system is locked. When managing users in a domain, this privilege defines which users have access to the ultrasound system. OverrideLoginErrors indicates a user can access the ultrasound system when the ultrasound system displays login errors, for example, when an exam is in progress SetMode indicates a user can access and edit the security settings for the ultrasound system

5. Save the changes.

Factory-assigned Privileges for Roles

The following table identifies factory-assigned privileges (effective privileges) for roles on the ultrasound system with a checkmark (✓).

Categories and Privileges	Everyone	Standard	EmergencyAccess	DICOM_Group	SecurityAdmins	syngoServiceUsers
ArchNet						
Archive		✓	✓	✓	✓	✓
Export		✓	✓	✓	✓	✓
Send		✓	✓	✓	✓	✓
AuditTrail						
Archive					✓	
SetFilter					✓	
ConfigurationReadWrite					✓	
View		✓		✓	✓	✓
Common						
ServiceAccess					✓	✓
NetworkConfiguration				✓	✓	✓
RemoteAssistance		✓	✓	✓	✓	✓
EmergencyServiceAccess		✓	✓		✓	✓
SaveLog		✓	✓	✓	✓	✓
CopyToClipboard		✓		✓	✓	✓
CorrectRearrange						
Correct		✓	✓	✓	✓	✓
History		✓	✓	✓	✓	✓
Rearrange		✓	✓	✓	✓	✓
Filming						
Expose		✓	✓	✓	✓	✓
PatientBrowser						
Delete		✓	✓	✓	✓	✓
ModifyPatientGroups		✓		✓	✓	✓
SetStateCompleted		✓	✓	✓	✓	✓
SetStateRead		✓	✓	✓	✓	✓
SetStateVerified		✓	✓	✓	✓	✓
PatientRegistration						
InvokeRegistration		✓	✓	✓	✓	✓
SecuritySystem						
BypassBlockedSystem			✓		✓	
OverrideLoginErrors			✓		✓	
ConfigurationRead		✓		✓	✓	✓
ConfigurationReadWrite					✓	
EnableServiceAccount					✓	✓
InteractiveLogin		✓	✓	✓	✓	✓
SetMode					✓	

Adding a User Account

You can add and configure user accounts for the ultrasound system.

Note: User accounts on a domain server must be added and managed using the domain server, not the ultrasound system.

To add a user account:

1. Access the configuration settings.
 - a. Tap the configuration button.
2. Select the ultrasound system domain from the list.
3. Create a user account.
 - a. Select **User Management**.
 - b. Right-click **Users** and then select **New**.
 - c. Click **User**.
 - d. Enter the information in the **User** tab.



Selection	Description
Name	Login name for the user account. The name is not editable after you save the user account.
Full name	Full name including first name and last name of the user
Description	Description of the user
New password	Password for the user
Confirm password	Password for the user
Account is disabled	When the check box is selected, the user account is not active, and the user cannot log in using a user name and password.
Password never expires	When the check box is selected, the password for the user account does not expire.
User cannot change password	When the check box is selected, the user cannot modify the password for the user account.
Account is locked out	When the check box is selected, the user account is locked, and the user cannot log in to the ultrasound system.

- e. Save the changes.

4. To assign group permissions to a user:
 - a. Select the **Member of** tab.
 - b. Select a group from the **Available Groups** list and then click **Add**.
 - c. To remove the user from a group, select the group from the **Assigned Groups** list and then click **Remove**.
 - d. Save the changes.
5. To assign role privileges to a user:
 - a. Select the **Owner of** tab.
 - b. Select a role from the **Available Roles** list and then click **Add**.
 - c. To remove the user from a role, select the role from the **Assigned Roles** list and then click **Remove**.
 - d. Save the changes.
6. To delete a user account:
 - a. Right-click the user account.
 - b. Select **Delete** and then select **Yes**.
 - c. Restart the ultrasound system.

Editing a User Account

To edit a user account:

1. Access the configuration settings.
 - a. Tap the configuration button.

 - b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
 - d. Click **Security Configuration**.
2. Select **User Management** and then select **Users**.
3. To filter the list of users, use the drop-down menus.
 - a. Select a user, group, or role filter.
 - b. Enter the search criteria and then press enter on the keyboard.
4. To change a user password:
 - a. Double-click the user name.
 - b. Enter and then confirm the new password.
 - c. Save the changes.
5. To edit user information, for example, group permissions or role privileges:
 - a. Double-click the user name.
 - b. Select a tab and then update the required information.
 - c. Save the changes.

Assigning Patients to a User or a Patient Group

You can assign patients or patient studies to a patient group. Patient groups or individual patients can also be assigned to individual users or user groups.

To assign patients to a patient group:

Prerequisite: Create a patient group.

1. Access the patient browser.
2. Select a patient study.
3. Select **Edit** and then click **Modify Patient Groups**.
4. Select the patient group to assign to the selected patient.
5. Click **OK**.

To assign patients to a user:

1. Access the patient browser.
2. Select a patient study.
3. Select **Edit** and then click **Modify Patient Groups**.
4. Click **Users**.
5. Select the user name and then click **Add**.
6. Select a domain from the **Domain** list, for example, the ultrasound system or a domain controller.
7. To search for a user, enter the search criteria in the **Filter** text box and then click **Find**.
8. Select the user name from the list and then click **OK**.
9. Click **OK** in each subsequent window.

Configuring Password Complexity

You can configure the password requirement for user accounts on the ultrasound system. You can also reset internal account passwords.

To configure password complexity or reset internal passwords:

1. Access the configuration settings.
 - a. Tap the configuration button.



- b. Click **System Management** and then click **Security**.
 - c. Click the **Configure** selection for **syngo Security**.
2. Click **Password Configuration**.
3. Select the required tab and then enter or modify the configuration settings.

Selection	Description
Reset Password	---
Users List	Lists internal accounts essential for the underlying operating system of the ultrasound system. You can reset passwords for internal users. ▪ AET DICOM_USER performs processes using DICOM services ▪ BRAdmin backs up and restores files on the computer ▪ LocalServiceUser provides local service access ▪ RemoteServiceUser provides remote service access ▪ ReplACCUser is reserved for future use
Select All	Selects all internal accounts in the list
Default Settings	Selects the default setting for the password of the selected internal accounts
Reset Password	Resets the password for the selected internal accounts. The system displays a dialog box requesting confirmation to reset the password for the selected accounts and restart the ultrasound system.
Password Complexity	Displays the password configuration requirements, for example, a minimum number of uppercase characters
Account Policy	Displays account configuration requirements, for example, the duration to lock an account

4. To save the settings and close the dialog box, click **OK**.
5. To restart the ultrasound system, click **OK**.

Audit Trail Management

Configuring the Audit Trail

You can configure the audit trail by selecting the events recorded in the security log file and specifying the archive location. The archive location is called an auditing mode.

To configure the audit trail:

1. Tap the configuration button.



2. Click **System Management** and then click **Security**.
3. Click the **Detail** selection for **Audit Trail**.
4. Click **Audit Trail Settings**.
5. Click **Setup**, if necessary.
6. Select the required archive location for the security log file and then enter or modify the configuration settings.
7. To view the next configuration screen, click **Next**.
8. To view the previous configuration screen, click **Back**.

Selection	Description
Local file system	Select the ultrasound system as the destination for the security log file.
Audit Trail directory	Select the location for the archive of the security log file.
Max size (kBytes)	Enter the maximum size of the security log file.
Zippered	Select the check box to compress the security log file.
Disc quota checks	Note: The system displays the total disk space of the audit trail drive, including the total disk space used by the audit trail.
Warning level [%]	Select the check box to specify the storage capacity level of the security log file as a percentage of the maximum size.
Quota limit [%]	Select the check box to specify the quota limit of the security log file as a percentage of the maximum size.
Optical Drives	Prerequisite: Attach and configure the optional Blu-ray/DVD/CD combination drive. Enter the location of the device and select additional options.
Network Share	Enter the user name, domain, password, and network location.
Test	Validate the connection to the network location.
USB	Select the drive letter for the USB-compatible storage device. Note: USB ports E and F are located on the touch screen.

Selection	Description
Central syslog server	Select a network location as the destination for the security log file.
Host	Enter the host name of the network location.
Port	Enter the port number of the network location.
Protocol	Enter the protocol name of the network location.
Encoding	Enter the encoding option of the network location.
Test	Validate the connection to the network location.

9. Click **Finish**.

To view the audit trail:

1. Tap the configuration button.



2. Click **System Management** and then click **Security**.
3. Click the **Detail** selection for **Audit Trail**.
4. Click **Audit Trail View**.
 - **Audit Filter** lists the filters available for security log files.
 - **Audit Viewer** lists the viewing selections for security log files.
5. To exit, close the dialog box.

Archiving the Audit Trail

You can archive the audit trail by saving the security log file to the location specified in the configuration settings.

To archive the audit trail:

Prerequisite: Configure an archive location for the audit trail, for example, a network location.

1. Tap the configuration button.



2. Click **System Management** and then click **Security**.
3. Click the **Detail** selection for **Audit Trail**.
4. Click **Audit Trail Archive**.

The system displays an icon next to the name of the security log file to indicate the archive status of the log file.

Icon	Function
	The security log file is not stored.
	The security log file is stored.
	The security log file is not stored and includes edits to patient data.
	The security log file is stored and includes edits to patient data. The security log files must be saved according to national and local regulations.

5. Select the file and then click **Archive**.
The ultrasound system displays the disk space available on the system and total quota limit in megabytes.
6. To initiate the archive process after an incomplete archive, click **Restart**.
7. To remove the security log file from the ultrasound system, click **Delete**.

Appendix A EMC Publication

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Electromagnetic Compatibility

The electromagnetic compatibility (EMC) testing of this system was performed according to the international standard for EMC of medical devices (IEC 60601-1-2). This International Electrotechnical Commission (IEC) standard has been adopted in Europe as the European Norm (EN) standard (EN 60601-1-2). The ultrasound system from Siemens Healthineers meets the requirements of the standard and is suitable for a professional healthcare environment. Compliance with test limits does not guarantee that a particular installation will be free from electromagnetic interference.

The following is the definition for the essential performance of the ultrasound equipment:

- The image display is free of noise or distortion of the image or numerical value errors which may cause misdiagnosis.
- The image display is free from incorrect safety-related indications, for example, MI or TI.
- The device is free from unintended or excessive ultrasound output, transducer surface temperature, or uncontrolled motion of transducer assemblies intended for intra-corporeal (endocavity) use.

Avoiding Electromagnetic Interference

⚠ WARNING: Operating the ultrasound system in close proximity to other equipment can cause reciprocal interference. You should observe and ensure normal operation of the ultrasound system and other equipment.

Medical devices either generate (emit) or receive electromagnetic interference. The EMC standards describe tests for both emitted and received interference. Emission tests address interference generated by the device being tested. The ultrasound system from Siemens Healthineers meets the standard for radiated emissions.

Radio frequency (RF) is a form of electromagnetic energy tested by the EMC standards. Ultrasound systems and ultrasound transducers operate in the range of RF frequencies and are therefore susceptible to interference generated by other RF energy sources. Sources of RF interference include medical devices, information technology products, and radio/television transmission towers. To reduce interference from an RF energy source:

- Increase the separation (distance) between the ultrasound equipment and the interfering device (RF energy source).
- Connect the ultrasound equipment and the interfering device (RF energy source) to separate outlets on separate circuits, if possible.

In some environments, it is difficult to identify the source of radiated interference. To identify the source of the interference, determine the answers to these questions and then contact your service representative with the information you have collected.

- Is the interference intermittent or constant?
- Is the interference present with only one transducer or with several transducers?
- Do two different transducers operating at the same frequency have the same problem?
- Is the interference present if the ultrasound system is moved to a different location in the facility?
- Is the interference mode-dependent? That is, does the interference occur only in one mode, such as during Doppler?
- Can the EMC coupling path be attenuated? For example, does placing a transducer close to an ECG cable increase electromagnetic interference? Does moving the cable or other medical equipment away from the transducer result in reduced electromagnetic interference?

Electrosurgical Units

Electrosurgical units (ESUs) and other devices intentionally introduce radio frequency electromagnetic fields or currents into patients. Because ultrasound imaging frequencies are coincidentally in this radio frequency range, ultrasound transducer circuits are susceptible to radio frequency interference. When an ESU is in use, expect the ultrasound image to experience severe interference that may make the image unusable. This interference stops as soon as the ESU is powered off.

Restrictions for Use

If RF interference is detected, then the physician must determine if an artifact caused by the interference will negatively impact image quality and the subsequent diagnosis.

Immunity Level Test Results

Immunity is defined in the standard as the ability of a system to perform without degradation in the presence of electromagnetic disturbance. The EMC standards require manufacturers of patient-coupled equipment to specify immunity levels for their systems. The standards recognize that ultrasound equipment is designed to receive and amplify low-level signals in the same bandwidth as the interference. Therefore, it is reasonable to expect image noise during electromagnetic disturbance.

Electromagnetic Compatibility (EMC) Note: Operating the ultrasound imaging system in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations, as well as portable and mobile RF (radiated frequency) may lead to temporary degradation or interference visible on the monitor screen. A lightening of image background may be noticed while visualizing hypoechoic structures, or color spectral interference, or jitter, or horizontal lines in the image screen may occur. However, the device has been designed and tested to withstand such interference and will not be permanently damaged. Wait until the interference disappears or restart the ultrasound system.

When comparing immunity levels of different ultrasound systems, recognize that although the EMC standard does define the test methodology, it does not specify the criteria to assess degradation. Degradation assessment may vary by manufacturer.

A qualitative assessment of degradation in image quality is subjective. Noting when the first sign of an artifact is seen in the image minimizes the issue of subjectivity and also provides for stringent test results.

The results of emissions testing and immunity testing are provided in the accompanying tables. The standards used in testing are also provided in the tables. Testing was performed on a typical ultrasound system configuration. The values in the compliance level column of the tables specific to transducers is the level at which the RF interference is no longer discernable from the ambient background noise.

Transducers, Accessories, and Cables

 **WARNING:** Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN or IEC standards (for example, EN 60950 or IEC 60950 for data processing equipment and EN 60601-1 or IEC 60601-1 for medical equipment). Anyone who connects additional equipment to any of the signal input or signal output ports configures a medical system and is therefore responsible that the system complies with the requirements of the system standards EN 60601-1 or IEC 60601-1. Siemens Healthineers can only guarantee the performance and safety of the devices listed in the *Instructions for Use*. If in doubt, consult the Siemens Healthineers service department or your local Siemens Healthineers representative.

 **WARNING:** You must only use the transducers, accessories, cables, and replacement parts for internal components specified by Siemens Healthineers to reduce the risk of increased RF (radio frequency) emissions or decreased immunity of the ultrasound system.

User-Accessible Cables

See also: For information about cables, refer to Appendix A in the Instructions for Use.

Table 1. Guidance and manufacturer's declaration — electromagnetic emissions for the ultrasound system

The ultrasound system is intended for use in the electromagnetic environment specified below. The customer or the user of the ultrasound system should assure that it is used in such an environment.		
Emissions Test	Compliance	Electromagnetic Environment - Guidance
RF emissions 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. 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.
RF emissions CISPR 11	Class A	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Table 2. Guidance and manufacturer's declaration — electromagnetic immunity for the ultrasound system independent of transducer type

The ultrasound system is intended for use in the electromagnetic environment specified below. The customer or the user of the ultrasound system should assure that it is used in such an environment.			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
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	±1 kV line to line ±2 kV line to ground	±1 kV differential mode ±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 cycle	System may shut down and the mains circuit breaker could be switched to the off position (O = OFF).	Ensure the mains circuit breaker is in the on position (I = ON) and then use the power on sequence to reboot the system. Mains power quality should be that of a typical commercial or hospital environment. If the user of the ultrasound system requires continued operation during power mains interruptions, it is recommended that the ultrasound system be powered from an uninterruptible power supply or a battery.
	0% U_T (100% dip in U_T) for 1 cycle	0% U_T (100% dip in U_T) for 1 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the ultrasound system requires continued operation during power mains interruptions, it is recommended that the ultrasound system be powered from an uninterruptible power supply or a battery.
	70% U_T (30% dip in U_T) for 25 cycles	70% U_T (30% dip in U_T) for 25 cycles	
	0% U_T (100% dip in U_T) for 250 cycles	System goes to normal power down condition.	For extended mains power outages without the use of an uninterruptible power supply or a battery, the system will shut down normally. Use the power on sequence to reboot the system.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note: U_T is the a.c. mains voltage prior to application of the test level.			

Table 3. Guidance and manufacturer's declaration — electromagnetic immunity for the ultrasound system

The ultrasound system is intended for use in the electromagnetic environment specified below. The customer or the user of the ultrasound system should assure that the system is used in such an environment.			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the ultrasound system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance (<i>d</i>) $d = 1.2 \sqrt{P}$ $d = 2.0 \sqrt{P}$ where <i>P</i> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <i>d</i> is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	6 Vrms 150 kHz to 80 MHz within ISM bands	6 Vrms	
	3 V/m 80 MHz to 2.7 GHz	3 V/m	
Note 1: At 80 MHz and 800 MHz, the higher frequency range applies. Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people. Note 3: The ISM (Industrial, Scientific, and Medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.			
^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasound system is used exceeds the applicable RF compliance level above, the ultrasound system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as changing transducers or transducer operating frequency, or re-orienting or relocating the ultrasound system. ^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than the compliance level 3 V/m.			

Table 4. Recommended separation distances between portable and mobile RF communications equipment and the ultrasound system

The ultrasound system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ultrasound system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ultrasound system as recommended below, according to the maximum output power of the communications equipment.		
Rated maximum output power of transmitter W (watts)	Separation distance according to frequency of transmitter m (meters)	
	150 kHz to 80 MHz	80 MHz to 2.7 GHz
	$d = 1.2 \sqrt{P}$	$d = 2.0 \sqrt{P}$
0.01	0.12	0.20
0.1	0.38	0.63
1	1.2	2.0
10	3.8	6.3
100	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 manufacturer.		
Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.		
Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.		

Table 5. Guidance and manufacturer's declaration - electromagnetic immunity

The ultrasound system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Portable RF communications equipment should be used no closer than 30 cm (12 inches) to any part of the ultrasound system. Otherwise, degradation of the performance of this equipment could result.					
Immunity Test	Band ^a	Service ^a	Modulation	IEC 60601 test level	Compliance level
Proximity fields from RF wireless communications equipment IEC 61000-4-3	380 - 390 MHz	TETRA 400	Pulse modulation 18 Hz	27 V/m	27 V/m
	430 - 470 MHz	GMRS 460 FRS 460	FM ± 5 kHz deviation 1 kHz sine	28 V/m	28 V/m
	704 - 787 MHz	LTE Band 13, 17	Pulse modulation 217 Hz	9 V/m	9 V/m
	800 - 960 MHz	GSM 800/900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5	Pulse modulation 18 Hz	28 V/m	28 V/m
	1700 - 1990 MHz	GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1, 3, 4, 25 UMTS	Pulse modulation 217 Hz	28 V/m	28 V/m
	2400 - 2570 MHz	Bluetooth WLAN 802.11 b/g/n RFID 2450 LTE Band 7	Pulse modulation 217 Hz	28 V/m	28 V/m
	5100 - 5800 MHz	WLAN 802.11 a/n	Pulse modulation 217 Hz	9 V/m	9 V/m
Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.					
^a For some services, only the uplink frequencies are included.					

Appendix B Patient Browser Selections

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Overview

You can access patient data from patient registration and from the patient browser.

Patient registration includes selections for scheduling a new patient or searching for a study saved to a worklist server or the ultrasound system. Use patient registration to update patient information or select the exam.

The patient browser displays a list of patient studies saved to a worklist server, the ultrasound system, or an external storage device. Use the patient browser to manage patient data, including correcting patient information or transferring a patient study.

Location of Patient Data

Patient data is available from the following locations during patient registration and in the patient browser.

Note: When the ultrasound system is connected to a Hospital Information System/Radiology Information System (HIR/RIS) worklist server, an image of a clock displays on the icon.

Selection	Description	Icon
Local Database	Lists patient data stored on the local database of the ultrasound system.	
Scheduler	Lists the pre-registered patient data entered on the ultrasound system and scheduled patient data retrieved from a connected Hospital Information System/Radiology Information System (HIS/RIS) worklist server. Note: The patients listed in the Scheduler are also listed in the Worklist .	
USB	Lists the patient data stored on an external storage device. To view a study saved on an external storage device, you must import the study to the local database on the ultrasound system.	
DVD	Lists patient data stored on digital video disk media.	---

Types of Patient Data

The ultrasound system includes the following types of patient data. An image of a clock displays on the icon of a scheduled procedure.

Selection	Description	Icon
Patient	Accesses the patient information, including patient registration and patient studies.	
Study	Accesses a patient study.	
Series	Accesses exam data, for example, images and clips, from a patient study.	
Instance	Accesses DICOM images from a patient study.	

Patient Browser Menu Selections

The following selections are available in the patient browser, depending on the location of the patient data and the selected layout for the patient browser:

- **Patient** includes selections to register a patient and search patient studies.
- **Transfer** includes selections to archive, send, export, and import patient data to other devices.
- **Edit** includes selections to delete or protect patient data, mark patient data for later retrieval, change workflow status, or edit and rearrange patient data.

When you edit patient information to match the information in a different patient folder, the ultrasound system displays a message requesting confirmation to merge the patient data.

- **View** includes selections to customize the display of patient data.
- **Filter** includes selections to hide or display patient information.
- **Sort** includes selections to reposition patient information in a list.

The selections available depend on the selected level of patient data and the location of the patient data.

- **Options** includes selections to configure the patient browser.

Patient Menu Selections

Selection	Description	Icon
Register	Activates the patient registration form.	
Load to Review	(Available only for patient data stored on the local database) Activates review for the images in the selected patient data.	
De-Identify	Displays selections to replace patient identifying information in the images.	---
Upload to Siemens	Removes patient-identifying information from the images and then transmits the study to your service representative for troubleshooting the ultrasound system.	---
Film Task Status	Lists the status of film jobs in the queue and provides selections to manage the film jobs.	
Expose Film Task	Transfers images to the printer.	
Copy to Film Sheet	(Available only for patient data stored on the local database) Copies the selected images to the queue for formatting and exposure.	
Show MPPS	(Available only for patient data stored on the local database) Lists the Modality Performed Procedure Step (MPPS) data for the selected study.	
Search	Displays a search dialog box to enter search criteria for patient data stored on a configured picture archiving and communication system (PACS).	
Search Selected	Displays a search dialog box to search for the selected patient data stored on a PACS.	
Close Browser	Exits the patient browser.	---

Transfer Menu Selections

See also: For additional information about importing and exporting patient data, refer to Chapter B2 in the Advanced Imaging Manual.

Selection	Description	Icon
Import	(Available only for patient data stored on an external storage device) Transfers the selected patient data in DICOM format to the local database on the ultrasound system.	
Archive to	(Available only for patient data on the local database) Displays selections for transferring the selected patient data in DICOM format to an external storage device configured as an archive device.	---
Send to...	(Available only for patient data on the local database) Displays selections for transferring the selected patient data in DICOM format to a network storage device, for example, a configured picture archiving and communication system (PACS).	---
Export to...	(Available only for patient data on the local database) Displays selections for transferring the selected patient data in DICOM portable media format to an external storage device.	
Eject from...	Displays selections for ejecting the external storage device.	---
Nuance Data Transfer Status...	Lists pending transfers of measured results to a Nuance report template.	---
Local Job Status...	Lists local transfers of patient data and provides selections to manage the local transfers.	
Network Job Status...	Lists transfers of patient data to and from the network and provides selections to manage the network transfers.	
Import from Off-line...	Transfers the selected patient data in DICOM format from a configured network location to the local database on the ultrasound system.	---
Export to Off-line...	(Available only for patient data on the local database) Transfers the selected patient data in DICOM format to a network location or a local folder.	---
Export to DVD in PC Format	Transfers the selected images and clips to the external storage device. Images are stored in JPEG format. Clips are stored in audio-video interleave (AVI) format. Patient data and DICOM information are not copied with the images and clips.	---
Export to USB in PC Format	Transfers the selected images and clips to a USB storage device. Images are stored in JPEG format. Clips are stored in audio-video interleave (AVI) format. Patient data and DICOM information are not copied with the images and clips.	---

Edit Menu Selections

Note: Do not modify patient data after transferring data to other storage devices.

Selection	Description	Icon
Cut	Copies the selected patient data into the clipboard for future removal.	
Delete	Removes the selected patient data from the current storage location.	
Paste	Prerequisite: Enter the patient data on the ultrasound system and activate the study. Copies the contents of the clipboard into the selected location. The destination for the patient data must be at the same data level or one data level higher than the selected item, for example, an image cannot be a destination. For data at the same level, the ultrasound system disregards the protection status of the destination and copies the contents into the destination folder and deletes the empty item.	---
Protect	(Available only for patient data on the local database) Assigns a protection work status to the selected patient data and prevents deletion, correction, or rearrangement of the data. Protection status applies to the selected level of patient data and any related data, even if protection status is not assigned. For example, if you enable protection for a study folder, the ultrasound system restricts deletion, correction, or rearranging of the related patient folder, series objects, or images.	
Remove Protection	Removes a protection work status from the selected patient data.	
Clear Scheduler	Removes pre-registered patients and scheduled patients from the list of patients in the Scheduler .	---
Find	Locates patient data on the ultrasound system based on specified parameters.	---
Mark	Assigns a mark to the selected patient data for filtering the display of patient data or marking the patient data for retrieval. When you mark patient data, the ultrasound system updates the mark status.	---
Unmark	Removes a mark from the selected patient data for filtering the display of patient data or unmarking the patient data for later retrieval.	---

Selection	Description	Icon
Set State ►	Indicates the workflow status for the selected patient data.	---
Completed	Indicates a completed workflow status.	
Read	Indicates a read workflow status.	
QA Verified	Indicates a verified workflow status.	
Correct	Lists information about the selected patient data. The ultrasound system applies any entered corrections, for example, a revised study comment, to the selected patient data. You can make corrections to the following patient-identifying information: patient name, patient identification number, date of birth, gender, accession number, and study ID. When you correct the patient name, patient identification, and date of birth to match information in another patient folder, the ultrasound system displays a message requesting confirmation of the merge operation.	---
History	Lists information about previous corrections to patient data and rearrangement of patient data.	---

View Menu Selections

Selection	Description	Icon
Open Subtree	(Available only for patient folders in tree view layout) Displays a hierarchy of all series objects for the selected patient folder. A series object may contain multiple images.	
Close Subtree	(Available only for patient folders and study folders in tree view layout) Hides the hierarchy of all series objects for the selected patient folder.	---
Refresh	Updates the display of patient data, but does not update the worklist.	
Patient based worklist query	(Available for systems connected to a HIS/RIS server) Displays selections to enter search criteria for patient data saved to the worklist server.	---
Update Worklist	(Available for systems connected to a HIS/RIS server) Updates the list of scheduled patient procedures for a configured interval.	---
Tree	Enables or disables a tree view layout of patient data. A tree view layout lists the patient name and patient data selections, for example, a series folder with images and clips from a patient study.	---
Image Stamps	Displays miniature representations of the images or a list of information about the images.	---
Toolbar	Displays or hides the toolbar.	---
Info Area	Displays or hides patient or exam information.	---
Source►	---	---
Scheduler	Displays the pre-registered and scheduled patients.	---
Local Database	Displays the patient data stored on the local database.	---
DVD	Displays the patient data stored on an inserted disk.	---
USB	Displays the patient data stored on an inserted USB drive.	---

Filter Menu Selections

Selection	Description	Icon
Off	Disables any filters and displays all patient data.	
Not Archived	Displays only patient data without an archived work status.	
Not Printed	Displays only patient data without a printed work status.	
Not Sent	Displays only patient data without a sent work status (for sending over the network).	
Not Marked	Displays only patient data without a marked work status.	
Marked	Displays only patient data with a marked work status.	
Not Exported	Displays patient data not exported.	
(user-defined filter)	Displays only patient data that meets the criteria specified for the selected user-defined filter.	---
Scheduled	Displays patient data for unregistered procedures, including pre-registered and scheduled procedures.	---

Sort Menu Selections

The ultrasound system displays a check mark next to the selected option.

Selection	Description
Patient Name	Arranges patient data by the patient name.
DB Date and Time	Arranges patient data by the date and time the patient folder was created on the local database.
Patient ID	Arranges patient data by the identification code for the patient.
Patient Latest Exam Date	Arranges patient data by the most recent exam date for the patient.
Study Description	Arranges patient data by the study description.
Study Date and Time	Arranges patient data by the study date and time.
Series Number	Arranges patient data by the series number.
Series Description	Arranges patient data by the series description.
Series Date and Time	Arranges patient data by the series date and time.
Modality	Arranges patient data by the modality, for example, CT and Mammography.
Performing Physician	Arranges patient data by the physician's name.
Instance Number	Arranges patient data by the instance (image) number.
Instance Date and Time	Arranges patient data by the instance (image) date and time of acquisition.
Slice Position	Arranges patient data by the slice position (transversal-coronal-sagittal).
Modality Specific Data ►	Specifies the data specific to the exam modality, for example, anatomical orientation, image slice position, or time of acquisition.
Work Status ►	---
1 Printed	Specifies a printed work status.
2 Archived	Specifies an archived work status.
3 Sent	Specifies a sent work status.
4 Workflow	Specifies a workflow work status.
Multiple...	---
Image Display Order	Lists multiple sorting options.
Reverse Order	Specifies the display of the information in reverse sequence.

Options Menu Selections

Selection	Description
Configure Browser...	Lists options for customizing the contents of the patient browser.
Filter Settings...	Displays selections to create a user-defined filter.

Patient Browser Status Indicators

The system displays and tracks the following types of status indicators:

- **Work Status** indicates processing stages and corrections (for patient data on the **Local Database** only).
- **Mark Status** indicates whether data is marked.
- **MPPS Status** indicates Modality Performed Procedure Step processing stage (for patient data on the **Local Database** only).
- **SPS Status** indicates the progress of a procedure step scheduled on a connected HIS/RIS server (for patient data on the **Scheduler** only).

If configured for display, status indicators display in the content section and to the right of each patient folder, study folder, and series object in the navigation section when the patient browser is in tree view layout.

Work Status Legend

The work status includes a field for each type of status. For example: R/com/P/a/ / /H

Note: The work status indicators **AC**, **AV**, and **SC** are displayed at the image data level only.

As described below in the list of indications and legends, this example of a work status (R/com/P/a/ / /H) indicates that the patient data has been entirely received, completed, entirely printed, partly archived, not sent, not exported, and has history available.

Field (Work Status)	Indication	Legend
Received	Patient data has been received.	▪ R/: All data Received ▪ r/: Only parts received ▪ /: No data received
Work Flow	Patient data has reached the indicated stage in the examination/editing process.	▪ /com/: Study or series has been completed ▪ /rea/: Study or series has been read or reassessed ▪ /ver/: Study or series has been verified
Printed	Patient data has been printed.	▪ /P/: All data Printed ▪ /p/: Only partly printed ▪ / /: No data printed
Archived	Patient data has been transferred to an archive device.	▪ /AC/: Archived and Committed from an archive node ▪ /Af/: Archived but commitment failed ▪ /A?/: Archived and waiting to be committed from an archive node ▪ /AV/: Archived and Verified on a local device ▪ /A/: All data archived ▪ /a/: Only partly archived ▪ / /: Not archived
Sent	Patient data has been transferred to a storage device.	▪ /SC/: Sent and Committed from a network node ▪ /Sf/: Sent but commitment failed ▪ /S?/: Sent and waiting to be committed from a network node ▪ /S/: All data Sent ▪ /s/: sent ▪ / /: No data sent
History available	Patient data has a history of modifications, such as correction of the patient name or rearrangement of images.	▪ /H: History available ▪ /: No history available, no changes have been made

Note: You can edit the **Work Flow** status for selected study folder(s) or series object(s) only.

Mark Status Legend

The mark status includes a field for each type of status (for example: Prot/M).

As described below in the list of indications and legends, this example of a mark status (Prot/M) indicates that the patient data is delete-protected and is marked for later retrieval.

Field (Mark Status)	Indication	Legend
Delete protected	Patient data is protected against deletion.	▪ prot/: Patient data is protected ▪ /: Patient data is not protected
Mark	Patient data is marked for later retrieval.	▪ /M: Patient data is marked ▪ /: Patient data is not marked

MPPS Status Legend

The MPPS status includes a field for each type of status. For example: IN PROGRESS/HIS/s

Note: The second and third MPPS fields (**Creation of SPS** and **Feedback**) are displayed for series objects only.

As described below in the list of indications and legends, this example of a MPPS status (IN PROGRESS/HIS/s) indicates that the procedure step has begun but is not yet completed, the corresponding procedure step was scheduled by the HIS/RIS, and information was successfully sent that the procedure step is in progress.

Field (MPPS Status)	Indication	Legend
Work flow	Patient data has reached an MPPS stage.	▪ IN PROGRESS/: The procedure step has begun but is not yet completed ▪ COMPLETED/: The procedure step is finished ▪ DISCONTINUED/: The procedure step was interrupted before being complete ▪ OPEN/: At least one subordinate MPPS is not yet completed (applies to patient/study level only) ▪ DONE/: All subordinate MPPS are completed (applies to patient/study level only) ▪ /: No MPPS available
Creation of SPS Note: This field is displayed for series objects only.	The corresponding procedure step was scheduled at the named location.	▪ /HIS/: The corresponding performance step was scheduled by the HIS/RIS ▪ /LOC/: The corresponding performance step was scheduled (pre-registered) locally, on the ultrasound system ▪ /: No information available; patient folder or study folder is selected
Feedback Note: This field is displayed for series objects only.	Information was sent to the HIS/RIS about the progress of the procedure step.	▪ /s: Information was successfully sent that the procedure step is in progress ▪ /S: Information was successfully sent that the procedure step is completed or discontinued ▪ /: No information sent

SPS Status Legend

The SPS status includes one field. For example: SCH

As described below in the list of indications and legends, this example of a SPS status (SCH) indicates that the scheduled procedure step (examination) has been scheduled by HIS/RIS.

Field (SPS Status)	Indication	Legend
SPS Status	Progress of a scheduled procedure step.	▪ SCH: Examination scheduled by HIS/RIS ▪ ARR: Arrived — patient examination has started ▪ " ": No SPS status set

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Overview

The ultrasound system calculates the value when the required labeled measurements have been made.

The measurement label for the required measurements can include the location, view, or dimension of the anatomy.

Modifiers for Measurement Labels

(Not available for the cardiac exam)

You can configure the display of measurement labels.

Measurement labels are organized on the touch screen as specified in the configuration settings. Measurement labels can include the location, view, or dimension of the anatomy, for example, proximal or distal.

Abdomen and Pediatric Abdomen

The ultrasound system organizes the measurement labels into the following categories and sub-categories:

- **General** includes general measurements.
 - **Abdomen** lists abdominal measurement labels.
 - **Miscellaneous** lists general measurement labels.
- **Abdominal Vascular** includes vascular measurements.
 - **Aorta-iliac** lists labels for measuring the iliac aorta.
 - **Hepatoportal/TIPS** lists labels for measuring the liver.
 - **Liver Transplant** lists measurement labels for measuring a liver transplant.
 - **Mesenteric** lists labels for measuring abdomen vessels (Doppler).
- **Renal Vascular** includes renal vascular measurements.
- **Virtual Touch** includes shear wave velocity and elasticity labels.

2D-mode General Abdominal Measurement Labels

Measurement Label	Definition
Aorta	Aorta
Liver	Liver length, anterior to posterior diameter, and width
Spleen	Spleen length, anterior to posterior diameter, and width
Kidney	Kidney length, anterior to posterior diameter, and width
Pre-Void Bladder	Pre-void bladder length, anterior to posterior diameter, and width
IVC	Inferior vena cava
Pancreatic Duct	Pancreatic duct
GB Wall Thickness	Gall bladder wall thickness
Cortical Thickness	Cortical thickness
Post-Void Bladder	Post-void bladder, length, and width
CBD	Common bile duct
CHD	Common hepatic duct
GB	Gall bladder length, anterior to posterior diameter, and width
Pancreas	Pancreas head, body, and tail

Doppler General Abdominal Measurement Labels

Measurement Label	Definition
Aorta	Aorta
Celiac Axis	Celiac axis
RHV	Right hepatic vein
Portal V	Portal vein
IVC	Inferior vena cava
CHA	Common hepatic artery
SMA	Superior mesenteric artery
MHV	Middle hepatic vein
SMV	Superior mesenteric vein
Splenic A	Splenic artery
IMA	Inferior mesenteric artery
LHV	Left hepatic vein
Splenic V	Splenic vein

2D-mode Abdominal Vascular Measurement Labels

Abdominal vascular measurement labels include portal end, mid, and hepatic end measurements.

Measurement Label	Definition
Liver	Liver
Stent	Stent
Spleen	Spleen
Portal V	Portal vein
Splenic V	Splenic vein
CHA	Common hepatic artery
IVC	Inferior vena cava
AAA	Abdominal aortic aneurysm
CIA	Common iliac artery
AAA (Post Repair)	Abdominal aortic aneurysm, post repair
Ao Stent Graft	Aortic stent graft
AAA Sac Length	Abdominal aortic aneurysm sac length
EIA	External iliac artery
IIA	Internal iliac artery
Portal V Pre-anast	Portal vein pre-anastomosis
Portal V Anast	Portal vein anastomosis
Aorta	Aorta
CBD	Common bile duct
CHD	Common hepatic duct
Celiac A Origin	Celiac artery origin
SMA	Superior mesenteric artery
IMA Origin	Inferior mesenteric artery origin
Celiac A Origin, Postprandial	Celiac artery origin, postprandial
Splenic A	Splenic artery
IMA	Inferior mesenteric artery
SMA Origin, Postprandial	Superior mesenteric artery origin, postprandial
SMA Origin	Superior mesenteric artery origin

Doppler Abdominal Vascular Measurement Labels

Measurement Label	Definition
IVC	Inferior vena cava
Stent-Portal End Vmax	Stent-portal end, maximum velocity
Splenic V	Splenic vein
RHV	Right hepatic vein
Portal V	Portal vein
Stent-Mid Vmax	Stent-mid, maximum velocity
SMV	Superior mesenteric vein
MHV	Middle hepatic vein
CHA	Common hepatic artery
Stent-Hepatic End Vmax	Stent-hepatic end, maximum velocity
LHV	Left hepatic vein
AAA	Abdominal aortic aneurysm
CIA	Common iliac artery
AAA (Post Repair)	Abdominal aortic aneurysm, post repair
Ao Stent Graft	Aortic stent graft
AAA Sac Length	Abdominal aortic aneurysm sac length
EIA	External iliac artery
IIA	Internal iliac artery
Portal V Pre-anast	Portal vein pre-anastomosis
Portal V Anast	Portal vein anastomosis
CHA	Common hepatic artery
RHA	Right hepatic artery
LHA	Left hepatic artery
Aorta	Aorta
Celiac A Origin	Celiac artery origin
SMA	Superior mesenteric artery
IMA Origin	Inferior mesenteric artery origin
Celiac A Origin, Postprandial	Celiac artery origin, postprandial
Splenic A	Splenic artery
IMA	Inferior mesenteric artery
SMA Origin, Postprandial	Superior mesenteric artery origin, postprandial
SMA Origin	Superior mesenteric artery origin

2D-mode Renal Vascular Measurement Labels

Measurement Label	Definition
Kidney	Kidney
IVC	Inferior vena cava
Main RA	Main renal artery
Suprarenal Ao	Suprarenal aorta
ARA	Accessory renal artery
Aorta	Aorta
Cortical Thickness	Cortical thickness

Doppler Renal Vascular Measurement Labels

Measurement Label	Definition
Segmental A	Segmental artery
Arcuate A	Arcuate artery
Main RA	Main renal artery
Suprarenal Ao	Suprarenal aorta
ARA	Accessory renal artery
Aorta	Aorta

Virtual Touch Abdominal Measurement Labels

Measurement Label	Definition
Liver Segment	Liver segments, numbered 1 through 8
Mass	Mass, numbered 1 through 10
Site	Site, numbered 1 through 10

Abdomen and Pediatric Abdomen Calculation Labels

During Virtual Touch imaging, liver calculations include mass, segment, site, and overall statistics calculations for shear wave velocity and elasticity measurements.

Calculation Label	Definition	Required Measurements
Main RA/Suprarenal Ao	Ratio of the main renal artery to the suprarenal aorta	Renal artery Suprarenal aorta
ARA/Suprarenal Ao	Ratio of the accessory renal artery to the suprarenal aorta	Renal artery Suprarenal aorta
GB	Gall bladder volume	Length Anterior to posterior diameter Width
Kidney	Kidney volume	Length Anterior to posterior diameter Width
Transplant Kidney	Kidney volume	Length Anterior to posterior diameter Width
Liver	Liver volume	Length Anterior to posterior diameter Width
Spleen	Spleen volume	Length Anterior to posterior diameter Width
Portal V Anast/Pre-Anast Vel Ratio	Velocity ratio of the portal vein anastomosis to the portal vein pre-anastomosis	Portal vein anastomosis Portal vein pre-anastomosis

Breast

The ultrasound system organizes the measurement labels into the following categories:

- **Default** lists general measurement labels.
- **SWE** lists Virtual Touch shear wave elastography measurement labels.

2D-mode Breast Measurement Labels

Measurement Label	Definition
Mass 1	Mass, numbered 1 through 5
Cyst 1	Breast cyst, numbered 1 through 5
Axillary LN 1	Axillary lymph node, numbered 1 through 5
Int Mammary A	Internal mammary artery
Site 1	Breast site, numbered 1 through 5

2D-mode and Doppler Breast Measurement Labels

Measurement Label	Definition
Int Mammary A	Internal mammary artery

Virtual Touch Breast Measurement Labels

Measurement Label	Definition
Mass	Mass, numbered 1 through 3
Site	Site, numbered 1 through 3

Breast Calculation Labels

During Virtual Touch imaging, breast calculations include left and right mass, left and right site, and overall statistics calculations for shear wave velocity and elasticity measurements.

Calculation Label	Definition	Required Measurements
Mass 1	Mass volume, numbered 1 through 5	Distance
Cyst 1	Cyst volume, numbered 1 through 5	Distance
Axillary Ln	Axillary lymph node volume, numbered 1 through 5	Distance
Int Mammary A	Internal mammary artery volume	Diameter

Carotid

The ultrasound system organizes the measurement labels into the following categories:

- **Default** lists general measurement labels.

2D-mode and Doppler Carotid Measurement Labels

Measurement Label	Definition
CCA	Common carotid artery
ECA	External carotid artery
ICA	Internal carotid artery
Vert A	Vertebral artery
Subclav A	Subclavian artery
Bulb	Carotid bulb
IMT	Intima-media thickness

Carotid Calculation Labels

The ultrasound system calculates the ratio of the internal carotid artery and common carotid artery with the required measurements from the RI-S/D Doppler trace tool. You can also perform the required measurements using the Doppler Trace and Heart Cycle tools.

Use the patient report to specify proximal, mid, or distal peak systolic values for the numerator and denominator.

Calculation Label	Definition	Required Measurements
ICA PS/CCA PS	Ratio of the internal carotid artery peak systolic velocity to the common carotid artery peak systolic velocity	Common carotid artery Internal carotid artery

Gynecology

The ultrasound system organizes the measurement labels into the following categories:

- **EV** lists endovaginal measurement labels.
- **Default** lists general Doppler measurement labels.
- **Follicle** lists measurement labels for measuring follicles.
- **TA** transabdominal lists pelvic measurement labels.
- **Pelvic Floor** lists pelvic measurement labels.
- **Renal/Bladder** lists renal and bladder measurement labels.

2D-mode Gynecology Measurement Labels

Measurement Label	Definition
Uterus (TA)	Uterus, transabdominal
Endo Thick (TA)	Endometrium thickness, transabdominal
Cyst 1	Cyst, numbered 1 through 5
Fibroid 1	Fibroid, numbered 1 through 5
Mass 1	Mass, numbered 1 through 5
Ovary (TA)	Ovary, transabdominal
Cervix (TA)	Cervix length, transabdominal
Uterus (EV)	Uterus, endovaginal
Endo Thick (EV)	Endometrium thickness, endovaginal
Ovary (EV)	Ovary, endovaginal
Cervix (EV)	Cervix length, endovaginal
Follicle 1	Follicle, numbered 1 through 4
Pre-Void Bladder	Pre-void bladder
Post-Void Bladder	Post-void bladder
Kidney	Kidney
Bladder neck-Symphysis	Bladder neck-symphysis distance
Rectovesical Angle at Rest	Rectovesical angle at rest
Rectovesical Angle at Valsalvas	Rectovesical angle at valsalvas
Rectal Ampulla descent	Rectal ampulla descent
Levator Hiatus	Levator hiatus

Doppler Gynecology Measurement Labels

Measurement Label	Definition
Uterine A	Uterine artery
Ovarian A	Ovarian artery
Ovarian V	Ovarian vein

Gynecology Calculation Labels

Calculation Label	Definition	Required Measurements
Mass 1	Mass, numbered 1 through 5	Length Anterior to posterior diameter Width
Axillary LN	Axillary lymph node, numbered 1 through 5	Length Anterior to posterior diameter Width
Cyst 1	Cyst, numbered 1 through 5	Length Anterior to posterior diameter Width
Ovary (EV)	Ovarian volume, endovaginal	Length Anterior to posterior diameter Width
Ovary (TA)	Ovarian volume, transabdominal	Length Anterior to posterior diameter Width
Uterus (EV)	Uterine volume, endovaginal	Length Anterior to posterior diameter Width
Uterus (TA)	Uterine volume, transabdominal	Length Anterior to posterior diameter Width
Kidney	Kidney volume	Length Anterior to posterior diameter Width

Calculation Label	Definition	Required Measurements
Fibroid 1	Fibroid, numbered 1 through 5	Length Anterior to posterior diameter Width
Int Mammary A	Internal mammary artery	Length Anterior to posterior diameter Width
PreVoid Bladder	Prevoid bladder volume	Length Anterior to posterior diameter Width
PostVoid Bladder	Postvoid bladder volume	Length Anterior to posterior diameter Width
Micturated Vol	Micturated volume	Prevoid bladder Postvoid bladder
Levator Hiatus	Levator hiatus	Anterior to posterior diameter Lateral distance Hiatal area

Pediatric Hip

The ultrasound system organizes the measurement labels in the following category:

- **Default** lists general measurement labels.

2D-mode Pediatric Hip Measurement Labels

Measurement Label	Definition
Hip Angle	Hip angle
Stressed %FHC	Stressed percentage of femoral head coverage
Flexed %FHC	Flexed percentage of femoral head coverage

Pelvis

The ultrasound system organizes the measurement labels into the following categories and sub-categories:

- **Default** lists general measurement labels.

2D-mode Pelvis Measurement Labels

Measurement Label	Definition
Prostate	Prostate
Pre-Void Bladder	Pre-void bladder
Post-Void Bladder	Post-void bladder
Seminal Ves	Seminal vesicle
Urethra	Urethra
Ureter	Ureter
Kidney	Kidney
Cortical Thickness	Cortical thickness

Pelvis Calculation Labels

Calculation Label	Definition	Required Measurements
Micturated Vol	Micturated volume	Prevoid bladder Postvoid bladder
Prostate	Prostate weight	Length Anterior to posterior diameter Width Weight
PreVoid Bladder	Prevoid bladder volume	Length Anterior to posterior diameter Width
PostVoid Bladder	Postvoid bladder volume	Length Anterior to posterior diameter Width

Penile

The ultrasound system organizes the measurement labels into the following categories:

- **Default** lists general measurement labels.

2D-mode Penile Measurement Labels

Measurement Label	Definition
Penile V	Penile vein

2D-mode and Doppler Penile Measurement Labels

Measurement Label	Definition
Penile V	Penile vein
Pre-inj Cavernosal A	Pre-injection cavernosal artery
Post-inj Cavernosal A	Post-injection cavernosal artery
Pre-inj Dorsal A	Pre-injection dorsal artery
Post-inj Dorsal A	Post-injection dorsal artery

Peripheral Vascular Arterial, Lower Extremity (LEA)

The ultrasound system organizes the measurement labels into the following categories:

- **Bypass** lists bypass measurement labels.
- **Native** lists general measurement labels.

System-defined calculation labels are not available for this exam package.

2D-mode and Doppler LEA Measurement Labels

Measurement Label	Definition
CFA	Common femoral artery
SFA	Superficial femoral artery
Pop A	Popliteal artery
PTA	Posterior tibial artery
Peroneal A	Peroneal artery
ATA	Anterior tibial artery
EIA	External iliac artery
DFA	Deep femoral artery
CFA Pseudoaneurysm	Common femoral artery pseudoaneurysm distance
Anast 1	Anastomosis, numbered 1 through 2
Graft 1	Graft, numbered 1 through 2

Peripheral Vascular Arterial, Upper Extremity (UEA)

The ultrasound system organizes the measurement labels into the following categories:

- **Bypass** lists bypass measurement labels.
- **Native** lists general measurement labels.
- **AVF** lists arteriovenous fistula labels for arterial blood vessels.

System-defined calculation labels are not available for this exam package.

2D-mode and Doppler UEA Measurement Labels

Measurement Label	Definition
Subclav A	Subclavian artery
Axillary A	Axillary artery
Brach A	Brachial artery
Radial A	Radial artery
Ulnar A	Ulnar artery

Peripheral Vascular Venous, Lower Extremity (LEV)

The ultrasound system organizes the measurement labels into the following categories:

- **Deep Venous** lists general measurement labels.
- **Superficial Venous** lists superficial venous measurement labels.

System-defined calculation labels are not available for this exam package.

2D-mode and Doppler LEV Measurement Labels

Measurement Label	Definition
CFV	Common femoral vein
Fem V	Femoral vein
Pop V	Popliteal vein
PTV 1	Posterior tibial vein, numbered 1 through 2
Peroneal V1	Peroneal vein, numbered 1 through 2
Gastroc V1	Gastrocnemius vein, numbered 1 through 2
SFJ	Saphenofemoral junction
Soleus V	Soleus vein
GSV: Thigh	Great saphenous vein, thigh
GSV: Knee	Great saphenous vein, knee
GSV: Calf	Great saphenous vein, calf
GSV: Ankle	Great saphenous vein, ankle
SSV: Calf	Small saphenous vein, calf
SSV: Ankle	Small saphenous vein, ankle
Cockett's Perf 1	Cockett's perforator, numbered 1 through 3
Dodd Perf	Dodd perforator

Peripheral Vascular Venous, Upper Extremity (UEV)

The ultrasound system organizes the measurement labels into the following categories:

- **Deep Venous** lists general measurement labels.
- **Superficial Venous** lists superficial venous measurement labels.

System-defined calculation labels are not available for this exam package.

2D-mode and Doppler UEV Measurement Labels

Measurement Label	Definition
IJV	Internal jugular vein
Subclav V	Subclavian vein
Axillary V	Axillary vein
Brachial V1	Brachial vein, numbered 1 through 2
Radial V1	Radial vein, numbered 1 through 2
Ulnar V1	Ulnar vein, numbered 1 through 2

Prostate

The ultrasound system organizes the measurement labels into the following categories:

- **Transabdominal** lists transabdominal measurement labels.
- **Endorectal (2D)** lists endorectal measurement labels.
- **SWE** lists Virtual Touch shear wave elastography measurement labels.

2D-mode Prostate Measurement Labels

Measurement Label	Definition
Prostate	Prostate
Seminal Ves	Seminal vessel
Prostatic Urethra	Prostatic urethra
Mass 1	Mass, numbered 1 through 5
Prostate Mass 1	Prostate mass, numbered 1 through 5
Ejaculatory Duct	Ejaculatory duct
Vas Deferens	Vas deferens
Kidney	Kidney
PreVoid Bladder	Pre-void bladder
PostVoid Bladder	Post-void bladder

Doppler Prostate Measurement Labels

Measurement Label	Definition
IIA	Internal iliac artery
IIV	Internal iliac vein

Virtual Touch Prostate Measurement Labels

Measurement Label	Definition
Mass	Mass, numbered 1 through 5

Prostate Calculation Labels

Calculation Label	Definition	Required Measurements
Prostate	Prostate volume	Length Anterior to posterior diameter Width
Prostate	Prostate weight	Length Anterior to posterior diameter Width
Prostate Mass 1	Prostate mass, numbered 1 through 5	Length Anterior to posterior diameter Width
Kidney	Kidney volume	Length Anterior to posterior diameter Width
Micturated Vol	Micturated volume	Prevoid bladder Postvoid bladder
PreVoid Bladder	Prevoid bladder volume	Length Anterior to posterior diameter Width
PostVoid Bladder	Postvoid bladder volume	Length Anterior to posterior diameter Width

Renal

The ultrasound system organizes the measurement labels into the following categories:

- **Renal/Bladder** lists bladder measurement labels.
- **Renal Vascular** lists vascular measurement labels.
- **Renal Transplant** lists Doppler transplant measurement labels.

2D-mode Renal Measurement Labels

Measurement Label	Definition
Kidney	Kidney
Ureter	Ureter
Prostate	Prostate
PreVoid Bladder	Pre-void bladder
PostVoid Bladder	Post-void bladder
Cortical Thickness	Cortical thickness
Urethra	Urethra
Aorta	Aorta
Renal V	Renal vein

Doppler Renal Measurement Labels

Measurement Label	Definition
Aorta	Aorta
Suprarenal Ao	Suprarenal aorta
Main RA	Main renal artery
ARA	Accessory renal artery
Segmental A	Segmental artery
Arcuate A	Arcuate artery

Renal Calculation Labels

Calculation Label	Definition	Required Measurements
RA/Suprarenal Ao	Ratio of the main renal artery to the suprarenal aorta	Renal artery Suprarenal aorta
ARA/Suprarenal Ao	Ratio of the accessory renal artery to the suprarenal aorta	Renal artery Suprarenal aorta
PreVoid Bladder	Prevoid bladder volume	Length Anterior to posterior diameter Width
PostVoid Bladder	Postvoid bladder volume	Length Anterior to posterior diameter Width

Testis

The ultrasound system organizes the measurement labels into the following categories:

- **Default** lists general measurement labels.

2D-mode Testis Measurement Labels

Measurement Label	Definition
Testicle	Testicle
Testis Mass 1	Mass, numbered 1 though 3
Epididymal A	Epididymal artery
Testicular A	Testicular artery
Epididymis	Epididymis
Scrotal Wall	Scrotal wall

Doppler Testis Measurement Labels

Measurement Label	Definition
Epididymal A	Epididymal artery
Testicular A	Testicular artery
Testicular V	Testicular vein

Testis Calculation Labels

Calculation Label	Definition	Required Measurements
Testicle	Testicle volume	Length Anterior to posterior diameter Width
Epididymis	Epididymis volume	Length Anterior to posterior diameter Width
Testis Mass 1	Testis mass volume, numbered 1 through 3	Length Anterior to posterior diameter Width

Thyroid

The ultrasound system organizes the measurement labels into the following categories:

- **Default** lists general measurement labels.
- **SWE** lists Virtual Touch shear wave elastography measurement labels.

2D-mode Thyroid Measurement Labels

Measurement Label	Definition
Thyroid	Thyroid lobe
Isthmus	Isthmus
Isthmus Mass 1	Isthmus mass, numbered 1 through 5
Parathyroid	Parathyroid
Mass 1	Mass, numbered 1 through 5
Neck Mass 1	Mass, numbered 1 through 5
Thyroid Mass 1	Thyroid mass, numbered 1 through 5
Site 1	Site, numbered 1 through 5

Doppler Thyroid Measurement Labels

Measurement Label	Definition
Thyroid A	Thyroid artery

Virtual Touch Thyroid Measurement Labels

Measurement Label	Definition
Mass	Mass, numbered 1 through 3
Site	Site, numbered 1 through 3

Thyroid Calculation Labels

During Virtual Touch imaging, thyroid calculations include left and right mass, left and right site, and overall statistics calculations for shear wave velocity and elasticity measurements.

Calculation Label	Definition	Required Measurements
Thyroid	Thyroid volume	Length Anterior to posterior diameter Width
Thyroid Mass 1	Thyroid mass volume, numbered 1 through 5	Length Anterior to posterior diameter Width
Isthmus Mass 1	Isthmus mass volume, numbered 1 through 5	Length Anterior to posterior diameter Width
Neck Mass 1	Neck mass volume, numbered 1 through 5	Length Anterior to posterior diameter Width

Transcranial Imaging (TCI)

The ultrasound system organizes the measurement labels into the following category:

- **Default** lists general measurement labels.

Doppler TCI Measurement Labels

Measurement Label	Definition
ACoA	Anterior communicating artery
Basilar A	Basilar artery
ACA A1	Anterior cerebral artery, A1 segment
ACA A2	Anterior cerebral artery, A2 segment
Vert Atlas Loop	Loop vertebral artery
ICA-skull entrance	Skull internal carotid artery
MCA M1	Middle cerebral artery, M1 segment
MCA M2	Middle cerebral artery, M2 segment
Ophthalmic A	Ophthalmic artery
Vert A	Vertebral artery
ICA Siphon	Internal carotid artery siphon
PCA P1	Posterior cerebral artery, P1 segment
PCA P2	Posterior cerebral artery, P2 segment
PCoA	Posterior communicating artery
Terminal ICA	Terminal internal carotid artery
Terminal Vert A	Terminal vertebral artery

Transcranial Imaging (TCI) Calculation Labels

Calculation Label	Definition	Required Measurements
MCA/ICA	Ratio of the middle cerebral artery to the internal carotid artery	Middle cerebral artery Internal carotid artery
MCA M2 PS/MCA M1 PS	Ratio of the middle cerebral artery M2 peak systolic velocity to the middle cerebral artery M1 peak systolic velocity	Middle cerebral artery M2 Middle cerebral artery M1

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Overview

The system provides a separate menu display page for groups of measurements, such as valves and ventricles. The patient report provides a separate table for each group.

Arteries

Arteries 2D-mode Measurement Labels

Measurement Label	Definition
Aorta	Aorta
Ao Abd	Abdominal aorta
Ao Arch d	Aortic arch diastole
Ao Arch	Aortic arch
Ao Asc d	Ascending aorta diameter, diastole
Ao Coarct Diam	Aortic coarctation diameter
Ao Desc	Descending aorta
Ao Isthmus	Aortic isthmus
Ao Root d	Aortic root diameter, diastole
Ao Sinus d	Aortic sinus diameter, diastole
Ao STJ d	Aortic sinotubular junction diameter, diastole
Ao Thoracic	Thoracic aorta

Arteries Doppler Measurement Labels

Measurement Label	Definition
Aorta	Aorta
Ao Asc Vmax	Ascending aorta maximum velocity
Ao Asc VTI	Ascending aorta velocity time integral
Ao Coarct Vmax	Aortic coarctation maximum velocity
Ao Desc Vmax	Descending aorta maximum velocity

Arteries Calculation Labels

Calculation Label	Definition	Units
Ao Root d/BSA	Aortic root diameter, diastole indexed by body surface area	cm/m ²
Ao Sinus d/BSA	Aortic sinus diameter, diastole indexed by body surface area	cm/m ²
Ao STJ d/BSA	Aortic sinotubular junction diameter, diastole indexed by body surface area	cm/m ²
Ao Asc d/BSA	Ascending aorta diameter, diastole indexed by body surface area	cm/m ²
Ao Arch d/BSA	Aortic arch diameter, diastole indexed by body surface area	cm/m ²
Ao Asc Peak Grad	Ascending aorta peak pressure gradient	mmHg
Ao Desc Peak Grad	Descending aorta peak pressure gradient	mmHg

Aortic Valve

Aortic Valve 2D-mode Measurement Labels

Measurement Label	Definition
AoV	Aortic valve
AoV Area (Vmax)	Aortic valve area, maximum velocity, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV Area (VTI)	Aortic valve area, velocity time integral, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV CO	Aortic valve cardiac output, folder of labels
AoV Annulus s	Aortic valve annulus, systole
AR EROA (PISA)	Aortic regurgitation effective regurgitant orifice area, proximal isovelocity surface area method, folder of labels
AR PISA Radius	Aortic regurgitation, proximal isovelocity surface area method, radius
AR RF (Doppler)	Aortic regurgitation, regurgitant fraction, Doppler, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV Site 2 Diam	Aortic valve site 2 diameter
AR RF (PISA)	Aortic regurgitation, regurgitant fraction, proximal isovelocity surface area method, folder of labels
AR PISA Radius	Aortic regurgitation, proximal isovelocity surface area method, radius
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV Annulus s	Aortic valve annulus, systole
AoV Planimetry	Aortic valve, planimetry method
AR Jet Area	Aortic regurgitation jet area
AR Jet Ht	Aortic regurgitation jet height
AR VC Width	Aortic regurgitation, vena contracta width
LVOT Area d	Left ventricular outflow tract area, diastole
LVOT Ht PLAX	Left ventricular outflow tract height, parasternal long axis view

Measurement Label	Definition
AVR	Aortic valve repair/replacement
AoV Area (Vmax)	Aortic valve area, maximum velocity, folder of labels
AoV Area (VTI)	Aortic valve area, velocity time integral, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV CO	Aortic valve cardiac output, folder of labels
AoV Annulus s	Aortic valve annulus, systole
AR EROA (PISA)	Aortic regurgitation effective regurgitant orifice area, proximal isovelocity surface area method, folder of labels
AR PISA Radius	Aortic regurgitation, proximal isovelocity surface area method, radius
AR RF (Doppler)	Aortic regurgitation, regurgitant fraction, Doppler, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
Site 2 Diam	Site 2 diameter
AR RF (PISA)	Aortic regurgitation, regurgitant fraction, proximal isovelocity surface area method, folder of labels
AR PISA Radius	Aortic regurgitation, proximal isovelocity surface area method, radius
LVOT Diam s	Left ventricular outflow tract diameter, systole
AoV Annulus s	Aortic valve annulus, systole
AoV Planimetry	Aortic valve, planimetry method
AR Jet Area	Aortic regurgitation jet area
AR Jet Ht	Aortic regurgitation jet height
AR VC Width	Aortic regurgitation, vena contracta width
LVOT Area d	Left ventricular outflow tract area, diastole
LVOT Ht	Left ventricular outflow tract height

Aortic Valve Doppler Measurement Labels

Measurement Label	Definition
AoV	Aortic Valve
AoV Area (Vmax)	Aortic valve area maximum velocity, folder of labels
LVOT Vmax	Left ventricular outflow tract maximum velocity
AoV Vmax	Aortic valve maximum velocity
AoV Area (VTI)	Aortic valve area, velocity time integral, folder of labels
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV VTI	Aortic valve, velocity time integral
AoV CO	Aortic valve cardiac output, folder of labels
AoV VTI	Aortic valve, velocity time integral
HR	Heart rate
AR EROA (PISA)	Aortic regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
AR Vmax	Aortic regurgitation maximum velocity
AR RF (Doppler)	Aortic regurgitation, regurgitant fraction, Doppler, folder of labels
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV Site 2 VTI	Aortic valve site 2 velocity time integral
AR RF (PISA)	Aortic regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
AR Vmax	Aortic regurgitation maximum velocity
AR VTI	Aortic regurgitation velocity time integral
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV AT	Aortic valve acceleration time
AoV ET	Aortic valve ejection time
AoV Vmax	Aortic valve maximum velocity
AoV VTI	Aortic valve, velocity time integral

Measurement Label	Definition
AR ED Velocity	Aortic regurgitation end diastolic velocity
AR Slope	Aortic regurgitation slope
AR VTI	Aortic regurgitation, velocity time integral
AVR	Aortic valve repair/replacement
AoV Area (Vmax)	Aortic valve area maximum velocity, folder of labels
LVOT Vmax	Left ventricular outflow tract, maximum velocity
AoV Vmax	Aortic valve maximum velocity
AoV Area (VTI)	Aortic valve area, velocity time integral, folder of labels
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV VTI	Aortic valve, velocity time integral
AoV CO	Aortic valve cardiac output, folder of labels
AoV VTI	Aortic valve, velocity time integral
HR	Heart rate
AR EROA (PISA)	Aortic regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
AR Vmax	Aortic regurgitation maximum velocity
AR RF (Doppler)	Aortic regurgitation, regurgitant fraction, Doppler, folder of labels
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV Site 2 VTI	Aortic valve site 2 velocity time integral
AR RF (PISA)	Aortic regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
AR Vmax	Aortic regurgitation maximum velocity
AR VTI	Aortic regurgitation, velocity time integral
LVOT VTI	Left ventricular outflow tract, velocity time integral
AoV AT	Aortic valve acceleration time
AoV ET	Aortic valve ejection time
AoV Vmax	Aortic valve maximum velocity
AoV VTI	Aortic valve, velocity time integral
AR ED Velocity	Aortic regurgitation end diastolic velocity
AR Slope	Aortic regurgitation slope
AR VTI	Aortic regurgitation, velocity time integral

Aortic Valve Calculation Labels

Calculation Label	Definition	Units
AoV Ann s/BSA	Aortic valve annulus, systole indexed by body surface area	cm/m ²
AoV AT/ET	Aortic valve acceleration time/ejection time ratio	---
LVOT Area s	Left ventricular outflow tract area, systole	cm ²
LVOT SV	Left ventricular outflow tract stroke volume	ml
AoV Peak Grad	Aortic valve peak pressure gradient	mmHg
LVOT/AoV Vmax	Left ventricular outflow tract/aortic valve maximum velocity	---
LVOT/AoV VTI	Left ventricular outflow tract/aortic valve velocity time integral	---
AVA (Vmax)	Aortic valve area continuity equation maximum velocity	cm ²
AVA (Vmean)	Aortic valve area continuity equation mean velocity	cm ²
AVA (VTI)	Aortic valve area continuity equation velocity time integral	cm ²
AVA/BSA (Vmax)	Aortic valve area continuity equation indexed by body surface area maximum velocity	cm ² /m ²
AVA/BSA (Vmean)	Aortic valve area continuity equation indexed by body surface area mean velocity	cm ² /m ²
AVA/BSA (VTI)	Aortic valve area continuity equation indexed by body surface area velocity time integral	cm ² /m ²
LV Pressure s	Left ventricular pressure, systole	mmHg
AR PHT	Aortic regurgitation pressure half-time	msec
AR ED Grad	Aortic regurgitation end diastolic pressure gradient	mmHg
LV Pressure ED	Left ventricular pressure, end diastole	mmHg
AR Jet/LVOT Area d	Aortic regurgitant jet area/left ventricular outflow tract diastolic area	---
AR Jet/LVOT Ht d	Aortic regurgitant jet height/left ventricular outflow tract diastolic height	---
Site 2 Area	Site 2 area	cm ²
Site 2 SV	Site 2 stroke volume	ml
AR Volume (Doppler)	Aortic regurgitant volume Doppler	ml
AR RF (Doppler)	Aortic regurgitation, regurgitant fraction, Doppler	%
AR PISA	Aortic regurgitation, proximal isovelocity surface area	cm ²
AR EROA	Aortic regurgitant, effective regurgitant orifice area	cm ²
AR Volume (PISA)	Aortic regurgitant volume proximal isovelocity surface area	ml
AR RF (PISA)	Aortic regurgitation, regurgitant fraction proximal isovelocity surface area	%
AoV Ann Area	Aortic valve annulus area	cm ²
AoV SV	Aortic valve stroke volume	ml
AoV SI	Aortic valve stroke index	ml/m ²
AoV CO	Aortic valve cardiac output	l/min
AoV CI	Aortic valve cardiac index	l/min/m ²

Shunts

Shunts 2D-mode Measurement Labels

Measurement Label	Definition
Qp	Pulmonary venous stroke volume, folder of labels
Pulm Side Diam	Pulmonary side diameter
Qs	Systemic stroke volume, folder of labels
Sys Side Diam	Systemic side diameter
Ao Coarct Diam	Aortic coarctation diameter
ASD Diam	Atrial septal defect diameter
ASD Major	Atrial septal defect major axis
ASD Minor	Atrial septal defect minor axis
ASD Sup-Inf	Atrial septal defect superior-inferior axis
PDA Diam	Patent ductus arteriosus diameter
VSD Diam	Ventricular septal defect diameter
VSD Major	Ventricular septal defect major axis
VSD Minor	Ventricular septal defect minor axis

Shunts Doppler Measurement Labels

Measurement Label	Definition
Qp	Pulmonary venous stroke volume, folder of labels
Pulm Side VTl	Pulmonary side velocity time integral
Qp HR	Pulmonary venous stroke volume heart rate
Qs	Systemic stroke volume, folder of labels
Qs HR	Systemic stroke volume heart rate
Sys Side VTl	Systemic side velocity time integral
Ao Coarct Vmax	Aortic coarctation maximum velocity
ASD Vmax	Atrial septal defect maximum velocity
PDA Vmax	Patent ductus arteriosus maximum velocity
VSD Vmax	Ventricular septal defect maximum velocity

Shunts Calculation Labels

Calculation Label	Definition	Units
Ao Coarct Peak Grad	Aortic coarctation peak pressure gradient	mmHg
ASD Peak Grad	Atrial septal defect peak pressure gradient	mmHg
PDA Peak Grad	Patent ductus arteriosus peak pressure gradient	mmHg
VSD Peak Grad	Ventricular septal defect peak pressure gradient	mmHg
RVSP (VSD)	Right ventricular systolic pressure, ventricular septal defect	mmHg
Pulm Side Area	Pulmonary side area	cm ²
Pulm Side SV	Pulmonary side stroke volume	ml
Pulm Side SI	Pulmonary side stroke index	ml/m ²
Pulm Side CO	Pulmonary side cardiac output	l/m ²
Pulm Side CI	Pulmonary side cardiac index	l/min/m ²
Sys Side Area	Systemic side area	cm ²
Sys Side SV	Systemic side stroke volume	ml
Sys Side SI	Systemic side stroke index	ml/m ²
Sys Side CO	Systemic side cardiac output	l/min
Sys Side CI	Systemic side cardiac index	l/min/m ²
Qp/Qs	Ratio of the pulmonary venous stroke volume to the systemic stroke volume	---
Qp-Qs	Difference between pulmonary venous stroke volume and systemic stroke volume	l/min

Coronary Arteries

Coronary Arteries 2D-mode Measurement Labels

Measurement Label	Definition
Coronaries	Coronary arteries
Circumflex Diam	Circumflex diameter
LAD Diam	Left anterior descending coronary artery diameter
Left Main Diam	Left main coronary artery diameter
RCA Diam	Right coronary artery diameter

Left Atrium (LA)

LA 2D-mode Measurement Labels

Measurement Label	Definition
LA A-P Diam s	Left atrium diameter systole anterior to posterior
LA Vol d A4C	Left atrium volume diastole apical four chamber view
LA Vol s A4C	Left atrium volume systole apical four chamber view
LA Major d A4C	Left atrium major axis diastole apical four chamber view
LA Major s A4C	Left atrium major axis systole apical four chamber view
LA Minor d A4C	Left atrium minor axis diastole apical four chamber view
LA Minor s A4C	Left atrium minor axis systole apical four chamber view
LA Vol d A2C	Left atrium volume diastole apical two chamber view
LA Vol s A2C	Left atrium volume systole apical two chamber view
LA Major d A2C	Left atrium major axis diastole apical two chamber view
LA Major s A2C	Left atrium major axis systole apical two chamber view

LA Calculation Labels

Calculation Label	Definition	Units
Ao d/LA s	Ratio of aortic diameter, diastole to left atrial diameter, systole	---
LA s/Ao d	Ratio of left atrial diameter, systole to aortic diameter, diastole	---
LA s/BSA	Left atrium systolic diameter indexed by body surface area	cm/m ²
LA %FAC A4C	Left atrium fractional area change apical four chamber view	%
LA %FAC A2C	Left atrium fractional area change apical two chamber view	%
LA EF A4C A-L	Left atrium ejection fraction apical four chamber view area and length	%
LA Vol d A4C A-L	Left atrium volume diastole apical four chamber view area and length	ml
LA Vol s A4C A-L	Left atrium volume systole apical four chamber view area and length	ml
LA Vol d A4C A-L/BSA	Left atrium volume diastole apical four chamber view area and length indexed by body surface area	ml/m ²
LA Vol s A4C A-L/BSA	Left atrium volume systole apical four chamber view area and length indexed by body surface area	ml/m ²
LA EF A2C A-L	Left atrium ejection fraction apical two chamber view area and length	%
LA Vol d A2C A-L	Left atrium volume diastole apical two chamber view area and length	ml
LA Vol s A2C A-L	Left atrium volume systole apical two chamber view area and length	ml

Calculation Label	Definition	Units
LA Vol d A2C A-L/BSA	Left atrium volume diastole apical two chamber view area and length indexed by body surface area	ml/m ²
LA Vol s A2C A-L/BSA	Left atrium volume systole apical two chamber view area and length indexed by body surface area	ml/m ²
LA EF Biplane A-L	Left atrium ejection fraction biplane area and length	%
LA Vol d Biplane A-L	Left atrium volume diastole biplane area and length	ml
LA Vol s Biplane A-L	Left atrium volume systole biplane area and length	ml
LA Vol d Biplane A-L/BSA	Left atrium volume diastole biplane area and length indexed by body surface area	ml/m ²
LA Vol s Biplane A-L/BSA	Left atrium volume systole biplane area and length indexed by body surface area	ml/m ²
A4C	Apical four chamber view calculations, folder of labels	---
LA EF A4C MOD	Left atrial ejection fraction, apical four chamber view, method of disks	%
LA Vol d A4C MOD/BSA	Left atrial volume, diastole, apical four chamber view, method of disk indexed by body surface area	ml/m ²
LA Vol s A4C MOD/BSA	Left atrial volume, systole, apical four chamber view, method of disk indexed by body surface area	ml/m ²
A2C	Apical two chamber view calculations, folder of labels	---
LA EF A2C MOD	Left atrial ejection fraction, apical two chamber view, method of disks	%
LA Vol d A2C MOD/BSA	Left atrial volume, diastole, apical two chamber view, method of disk indexed by body surface area	ml/m ²
LA Vol s A2C MOD/BSA	Left atrial volume, systole, apical two chamber view, method of disk indexed by body surface area	ml/m ²
Biplane	Biplane calculations, folder of labels	---
LA EF Biplane MOD	Left atrial ejection fraction, biplane, method of disks	%
LA Vol d Biplane MOD	Left atrial volume, diastole, biplane, method of disks	ml
LA Vol s Biplane MOD	Left atrial volume, systole, biplane, method of disks	ml
LA Vol d Bi-Plane MOD/BSA	Left atrial volume, diastole, biplane, method of disks indexed by body surface area	ml/m ²
LA Vol s Bi-Plane MOD/BSA	Left atrial volume, systole, biplane, method of disks indexed by body surface area	ml/m ²

Left Ventricle (LV)

LV 2D-mode Measurement Labels

Measurement Label	Definition
LV Mass	Left ventricular mass, folder of labels
LV MASS T-E	Left ventricular mass (Truncated Ellipse)
LV Area d A4C	Left ventricular area, diastole, apical four chamber view
LV Area d PSAX pap	Left ventricular area, diastole, parasternal short axis, papillary muscle level
LV Epi Area d PSAX pap	Left ventricular epicardial area, diastole, parasternal short axis, papillary muscle level
LV MASS A-L	Left ventricular mass (area and length)
LV Area d PSAX pap	Left ventricular area, diastole, parasternal short axis, papillary muscle level
LV Epi Area d PSAX pap	Left ventricular epicardial area, diastole, parasternal short axis, papillary muscle level
LV Major d A2C	Left ventricular major axis, diastole, apical two chamber view
LV Major d A4C	Left ventricular major axis, diastole, apical four chamber view
LV MASS ASE	Left ventricular mass, American society of echocardiography calculation method
IVS d PLAX	Interventricular septum thickness, diastole, parasternal long axis view
LVID d PLAX	Left ventricular internal dimension, diastole, parasternal long axis view
LVPW d PLAX	Left ventricular posterior wall dimension, diastole, parasternal long axis view
A2C	Apical two chamber view
Qs	Systemic stroke volume, folder of labels
Sys Side Diam	Systemic side diameter
LV Area	Left ventricular area
LV Major	Left ventricular major axis
LV Minor	Left ventricular minor axis
A4C	Apical four chamber view
LVOT CO	Left ventricular outflow tract cardiac output, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
Qs	Systemic stroke volume, folder of labels
Sys Side Diam	Systemic side diameter
LV Area	Left ventricular area
LV Major	Left ventricular major axis
LV Minor	Left ventricular minor axis

Measurement Label	Definition
PLAX	Parasternal long axis view
LV d Series	Left ventricular diastole series, folder of labels
IVS	Interventricular septal dimension
LV d Series	Left ventricular diastole series
LVID	Left ventricular internal dimension
LVPW	Left ventricular posterior wall dimension
IVS Bulge d	Interventricular septum thickness bulge, diastole
IVS Bulge s	Interventricular septum thickness bulge, systole
LVOT Diam s	Left ventricular outflow tract diameter, systole
LVOT Ht	Left ventricular outflow tract height
IVS d	Interventricular septum thickness, diastole
IVS s	Interventricular septum thickness, systole
LVID d A-P pap	Left ventricular internal diameter, diastole, anterior to posterior, papillary muscle level
LVID d chord	Left ventricular internal diameter, diastole, chordal level
LVID d M-L pap	Left ventricular internal diameter, diastole, medial to lateral, papillary muscle level
LVID s A-P pap	Left ventricular internal diameter, systole, anterior to posterior, papillary muscle level
LVID s chord	Left ventricular internal diameter, systole, chordal level
LVID s M-L pap	Left ventricular internal diameter, systole, medial to lateral, papillary muscle level
LVPW d chord	Left ventricular posterior wall thickness, diastole, chordal level
LVPW d pap	Left ventricular posterior wall thickness, diastole, papillary muscle level
LVPW s chord	Left ventricular posterior wall thickness, systole, chordal level
LVPW s pap	Left ventricular posterior wall thickness, systole, papillary muscle level
Subcostal	Subcostal
LV Major s	Left ventricular major axis, systole

LV Doppler Measurement Labels

Measurement Label	Definition
LV Diastolic Function	Left ventricular diastolic function
MV Inflow (Annulus)	Mitral valve inflow annulus
MV A Vmax	Mitral valve A wave, maximum velocity
MV A VTI	Mitral valve A wave, velocity time integral
MV E DT	Mitral valve E wave, deceleration time
MV E Vmax	Mitral valve E wave, maximum velocity
MV E VTI	Mitral valve E wave, velocity time integral
MV VTI	Mitral valve, velocity time integral
MV Inflow (Tips)	Mitral valve inflow, leaflet tips
LV IVRT	Left ventricular isovolumic relaxation time
MV A Vmax	Mitral valve A wave maximum velocity
MV A Vmax (valsalva)	Mitral valve A wave maximum velocity, valsalva
MV AT	Mitral valve acceleration time
MV E DT	Mitral valve E wave deceleration time
MV E Duration	Mitral valve E wave duration
MV E Vmax	Mitral valve E wave maximum velocity
MV E Vmax (valsalva)	Mitral valve E wave maximum velocity, valsalva
LV IVRT	Left ventricular isovolumic relaxation time
MV PW DTI	Myocardial velocity pulsed-wave Doppler tissue imaging
MV A' Vmax (L)	Late diastolic myocardial velocity, maximum velocity, lateral
MV A' Vmax (M)	Late diastolic myocardial velocity, maximum velocity, medial
MV E' AT (L)	Early diastolic myocardial velocity, acceleration time, lateral
MV E' AT (M)	Early diastolic myocardial velocity, acceleration time, medial
MV E' DT (L)	Early diastolic myocardial velocity, deceleration time, lateral
MV E' DT (M)	Early diastolic myocardial velocity, deceleration time, medial
MV E' Vmax (L)	Early diastolic myocardial velocity, maximum velocity, lateral
MV E' Vmax (M)	Early diastolic myocardial velocity, maximum velocity, medial
MV S' Vmax (L)	Systolic myocardial velocity, maximum velocity, lateral
MV S' Vmax (M)	Systolic myocardial velocity, maximum velocity, medial

Measurement Label	Definition
P Vein	Pulmonary vein
P Vein A Duration	Pulmonary vein A wave duration
P Vein A Vmax	Pulmonary vein A wave maximum velocity
P Vein D Vmax	Pulmonary vein D wave maximum velocity
P Vein D VTI	Pulmonary vein D wave velocity time integral
P Vein S Vmax	Pulmonary vein S wave maximum velocity
P Vein S VTI	Pulmonary vein S wave velocity time integral
LV MPI	Left ventricular myocardial performance index, folder of labels
LVOT ET	Left ventricular outflow tract ejection time
MV C-O Duration	Mitral valve close-open duration
LVOT CO	Left ventricular outflow tract cardiac output
HR	Heart rate
LVOT VTI	Left ventricular outflow tract, velocity time integral
Qs	Systemic stroke volume
Qs HR	Systemic stroke volume heart rate
Sys Side VTI	Systemic side velocity time integral

LV Diastolic Function Calculation Labels

Calculation Label	Definition	Units
MV E/A, Tips	Mitral valve ratio of peak E wave velocity (E) to peak A wave velocity (A), leaflet tips	---
MV E/A, Tips (Valsalva)	Mitral valve ratio of peak E wave velocity (E) to peak A wave velocity (A), leaflet tips, valsalva	---
MV A/E, Tips	Mitral valve ratio of peak A wave velocity (A) to peak E wave velocity (E), leaflet tips	---
MV E/A (Annulus)	Mitral valve ratio of peak E wave velocity (E) to peak A wave velocity (A), annulus	---
MV A/E (Annulus)	Mitral valve ratio of peak A wave velocity (A) to peak E wave velocity (E), annulus	---
MV E/MV VTI (Annulus)	Mitral valve ratio of peak E wave velocity (E) to mitral valve velocity time integration, annulus	---
MV A/MV VTI (Annulus)	Mitral valve ratio of peak A wave velocity (A) to mitral valve velocity time integration, annulus	---
MV E'/A' (M)	Mitral valve ratio of early diastolic velocity (E') to late diastolic velocity (A'), medial	---
MV E'/E' (M)	Mitral valve ratio of peak E wave velocity (E) to early diastolic velocity (E'), medial	---
MV E'/A' (L)	Mitral valve ratio of early diastolic velocity (E') to late diastolic velocity (A'), lateral	---
MV E'/E' (L)	Mitral valve ratio of peak E wave velocity (E) to early diastolic velocity (E'), lateral	---
MV E'/E' Vmax (Average)	Mitral valve ratio of peak E wave velocity (E) to early diastolic velocity (E'), average maximum velocity	---
P Vein S/D Vmax	Pulmonary vein ratio of systolic / diastolic maximum velocity	---
P Vein A/MV A Dur	Pulmonary vein ratio of peak A wave velocity (A) to mitral valve A wave duration	---

LV Dimension Calculation Labels

Calculation Label	Definition	Units
IVS/LVPW	Interventricular septum thickness / Left ventricular posterior wall thickness	---
IVS %Thick	Interventricular septum percent thickening	%
LVPW %Thick	Left ventricular posterior wall percent thickening	%
LVID d/BSA	Left ventricular internal diameter, diastole indexed by body surface area	cm/m ²
LVID s/BSA	Left ventricular internal diameter, systole indexed by body surface area	cm/m ²
LV Relative Wall Thickness (LV RWT)	Left ventricular relative wall thickness	%
LV Eccentricity Index d (LVEI d)	Left ventricular eccentricity index, diastole	---
LV Eccentricity Index s (LVEI s)	Left ventricular eccentricity index, systole	---

LV Doppler Calculation Labels

Calculation Label	Definition	Units
LV MPI	Left ventricular myocardial performance index	---
LV PEP/LV ET	Ratio of the left ventricular pre-ejection period to the ejection time	---
dPEP	Difference in pre-ejection period	ms
LV AT/LV ET	Ratio of the left ventricular acceleration time to ejection time	---
LV Pressure s	Left ventricular pressure, systole	mmHg

LV Outflow Tract Calculation Labels

Calculation Label	Definition	Units
LVOT Peak Grad	Left ventricular outflow tract peak pressure gradient	mmHg
LVOT Area s	Left ventricular outflow tract area, systole	cm ²
LVOT SV	Left ventricular outflow tract stroke volume	ml
LVOT SI	Left ventricular outflow tract stroke index	ml/m ²
LVOT CO	Left ventricular outflow tract cardiac output	l/min
LVOT CI	Left ventricular outflow tract cardiac index	l/min/m ²

LV: Cubed Method Calculation Labels

Calculation Label	Definition	Units
LV %FS Cubed	Left ventricular fractional shortening, cubed	%
LV Vol d Cubed	Left ventricular volume diastole, cubed	ml
LV Vol s Cubed	Left ventricular volume systole, cubed	ml
LV EF PSAX Cubed	Left ventricular ejection fraction, parasternal short axis view, cubed	%
LV EF Cubed	Left ventricular ejection fraction, cubed	%
LV SV Cubed	Left ventricular stroke volume, cubed	ml
LV SI Cubed	Left ventricular stroke index, cubed	ml/m ²
LV CO Cubed	Left ventricular cardiac output, cubed	l/min
LV CI Cubed	Left ventricular cardiac index, cubed	l/min/m ²

LV: Teichholz Method Calculation Labels

Calculation Label	Definition	Units
LV %FS (Teichholz)	Left ventricular fractional shortening, Teichholz	%
LV EF (Teichholz)	Left ventricular ejection fraction, Teichholz	%
LV EF PSAX (Teichholz)	Left ventricular ejection fraction, parasternal short axis view, Teichholz	%
LV Vol d (Teichholz)	Left ventricular volume, diastole, Teichholz	ml
LV Vol s (Teichholz)	Left ventricular volume, systole, Teichholz	ml
LV Vol d (Teichholz)/BSA	Left ventricular volume, diastole, Teichholz indexed by body surface area	ml/m ²
LV Vol s (Teichholz)/BSA	Left ventricular volume, systole, Teichholz indexed by body surface area	ml/m ²
LV Vol d (Teichholz)/HT	Left ventricular volume, diastole, Teichholz indexed by height	ml/cm
LV Vol s (Teichholz)/HT	Left ventricular volume, systole, Teichholz indexed by height	ml/cm
LV SV (Teichholz)	Left ventricular stroke volume, Teichholz	ml
LV SI (Teichholz)	Left ventricular stroke index, Teichholz	ml/m ²
LV CO (Teichholz)	Left ventricular cardiac output, Teichholz	l/min
LV CI (Teichholz)	Left ventricular cardiac index, Teichholz	l/min/m ²

LV: A-L Method Calculation Labels

Calculation Label	Definition	Units
A4C	Apical four chamber view calculations	---
LV %FAC A4C	Left ventricular fractional area change, apical four chamber view	%
LV EF A4C A-L	Left ventricular ejection fraction, apical four chamber view, area and length	%
LV Vol d A4C A-L	Left ventricular volume, diastole, apical four chamber view, area and length	ml
LV Vol s A4C A-L	Left ventricular volume, systole, apical four chamber view, area and length	ml
LV Vol d A4C A-L/BSA	Left ventricular volume, diastole, apical four chamber view, area and length indexed by body surface area	ml/m ²
LV Vol s A4C A-L/BSA	Left ventricular volume, systole, apical four chamber view, area and length indexed by body surface area	ml/m ²
LV Vol d A4C A-L/HT	Left ventricular volume, diastole, apical four chamber view, area and length indexed by height	ml/cm
LV Vol s A4C A-L/HT	Left ventricular volume, systole, apical four chamber view, area and length indexed by height	ml/cm
A2C	Apical two chamber view calculations	---
LV %FAC A2C	Left ventricular fractional area change, apical two chamber view	%
LV EF A2C A-L	Left ventricular ejection fraction, apical two chamber view, area and length	%
LV Vol d A2C A-L	Left ventricular volume, diastole, apical two chamber view, area and length	ml
LV Vol s A2C A-L	Left ventricular volume, systole, apical two chamber view, area and length	ml
LV Vol d A2C A-L/BSA	Left ventricular volume, diastole, apical two chamber view, area and length indexed by body surface area	ml/m ²
LV Vol s A2C A-L/BSA	Left ventricular volume, systole, apical two chamber view, area and length indexed by body surface area	ml/m ²
LV Vol d A2C A-L/HT	Left ventricular volume, diastole, apical two chamber view, area and length indexed by height	ml/cm
LV Vol s A2C A-L/HT	Left ventricular volume, systole, apical two chamber view, area and length indexed by height	ml/cm

Calculation Label	Definition	Units
Biplane	Biplane calculations	---
LV EF Biplane A-L	Left ventricular ejection fraction, biplane, area and length	%
LV Vol d Biplane A-L	Left ventricular volume, diastole, biplane, area and length	ml
LV Vol s Biplane A-L	Left ventricular volume, systole, biplane, area and length	ml
LV Vol d Biplane A-L/BSA	Left ventricular volume, diastole, biplane, area and length indexed by body surface area	ml/m ²
LV Vol s Biplane A-L/BSA	Left ventricular volume, systole, biplane, area and length indexed by body surface area	ml/m ²
LV Vol d Biplane A-L/HT	Left ventricular volume, diastole, biplane, area and length indexed by height	ml/cm
LV Vol s Biplane A-L/HT	Left ventricular volume, systole, biplane, area and length indexed by height	ml/cm

LV: MOD Calculation Labels

Calculation Label	Definition	Units
A4C	Apical four chamber view calculations	---
LV EF A4C MOD	Left ventricular ejection fraction, apical four chamber view, method of disks	%
LV Vol d A4C MOD/BSA	Left ventricular volume, diastole, apical four chamber view, method of disks indexed by body surface area	ml/m ²
LV Vol s A4C MOD/BSA	Left ventricular volume, systole, apical four chamber view, method of disks indexed by body surface area	ml/m ²
LV Vol d A4C MOD/HT	Left ventricular volume, diastole, apical four chamber view, method of disks indexed by height	ml/cm
LV Vol s A4C MOD/HT	Left ventricular volume, systole, apical four chamber view, method of disks indexed by height	ml/cm
LV SV A4C MOD	Left ventricular stroke volume, apical four chamber view, method of disks	ml
LV SI A4C MOD	Left ventricular stroke index, apical four chamber view, method of disks	ml/m ²
LV CO A4C MOD	Left ventricular cardiac output, apical four chamber view, method of disks	l/min
LV CI A4C MOD	Left ventricular cardiac index, apical four chamber view, method of disks	l/min/m ²

Calculation Label	Definition	Units
A2C	Apical two chamber view calculations	---
LV EF A2C MOD	Left ventricular ejection fraction, apical two chamber view, method of disks	%
LV Vol d A2C MOD/BSA	Left ventricular volume, diastole, apical two chamber view, method of disks indexed by body surface area	ml/m ²
LV Vol s A2C MOD/BSA	Left ventricular volume, systole, apical two chamber view, method of disks indexed by body surface area	ml/m ²
LV Vol d A2C MOD/HT	Left ventricular volume, diastole, apical two chamber view, method of disks indexed by height	ml/cm
LV Vol s A2C MOD/HT	Left ventricular volume, systole, apical two chamber view, method of disks indexed by height	ml/cm
LV SV A2C MOD	Left ventricular stroke volume, apical two chamber view, method of disk	ml
LV SI A2C MOD	Left ventricular stroke index, apical two chamber view, method of disk	ml/m ²
LV CO A2C MOD	Left ventricular cardiac output, apical two chamber view, method of disk	l/min
LV CI A2C MOD	Left ventricular cardiac index, apical two chamber view, method of disk	l/min/m ²
Biplane	Bichamber calculations	---
LV Major s max	Left ventricular major systole maximum	cm
LV EF Biplane MOD	Left ventricular ejection fraction biplane, method of disks	%
LV Vol d Biplane MOD	Left ventricular volume, diastole, biplane, method of disks	ml
LV Vol s Biplane MOD	Left ventricular volume, systole, biplane, method of disks	ml
LV Vol d Biplane MOD/BSA	Left ventricular volume, diastole, biplane, method of disks indexed by body surface area	ml/m ²
LV Vol s Biplane MOD/BSA	Left ventricular volume, systole, biplane, method of disks indexed by body surface area	ml/m ²
LV Vol d Biplane MOD/HT	Left ventricular volume, diastole, biplane, method of disks indexed by height	ml/cm
LV Vol s Biplane MOD/HT	Left ventricular volume, systole, biplane, method of disks indexed by height	ml/cm
LV SV Biplane MOD	Left ventricular stroke volume, biplane, method of disks	ml
LV SI Biplane MOD	Left ventricular stroke index, biplane, method of disks	ml/m ²
LV CO Biplane MOD	Left ventricular volume, cardiac output, method of disks	l/min
LV CI Biplane MOD	Left ventricular volume, cardiac index, method of disks	l/min/m ²

LV Mass: ASE Calculation Labels

Calculation Label	Definition	Units
LV Mass ASE	Left ventricular mass, American Society of Echocardiography	g
LV Mass ASE/BSA	Left ventricular mass, American Society of Echocardiography indexed by Body surface area	g/m ²
LV Mass ASE/Ht	Left ventricular mass, American Society of Echocardiography indexed by Height	g/cm

LV Mass A-L Calculation Labels

Calculation Label	Definition	Units
LV Mass A-L	Left ventricular mass area and length	g
LV Mean Wall Thickness d	Left ventricular mean wall thickness, diastole	cm
LV Mass/BSA (A-L)	Left ventricular mass indexed by body surface area, area and length	g/m ²
LV Mass/Ht (A-L)	Left ventricular mass indexed by height, area and length	g/cm

LV Mass T-E Calculation Labels

Calculation Label	Definition	Units
LV Mass T-E	Left ventricular mass, truncated ellipse	g
LV Minor Rad d PSAX pap	Left ventricular minor radial diastole, parasternal short axis view, papillary muscle	cm
LV Mean Wall Thickness d	Left ventricular mean wall thickness diastole	cm
LV Mass/BSA (T-E)	Left ventricular mass indexed by body surface area, truncated ellipse	g/m ²
LV Mass/Ht (T-E)	Left ventricular mass indexed by height, truncated ellipse	g/cm

Mitral Valve (MV)

MV 2D-mode Measurement Labels

Measurement Label	Definition
Mitral Valve	Mitral Valve Function
MR EROA (PISA)	Mitral regurgitation effective regurgitant orifice area, proximal isovelocity surface area method, folder of labels
MR PISA Radius	Mitral regurgitation, proximal isovelocity surface area method, radius
MR RF (Doppler)	Mitral regurgitation, regurgitant fraction, Doppler, folder of labels
MV Annulus d	Mitral valve annulus diastole
MV Site 2 Diam	Mitral valve site 2 diameter
MR RF (PISA)	Mitral regurgitation, regurgitant fraction, proximal isovelocity surface area method, folder of labels
MR PISA Radius	Mitral regurgitation, proximal isovelocity surface area method, radius
MV Annulus d	Mitral valve annulus diastole
MV Area (PISA)	Mitral valve area, proximal isovelocity surface area method, folder of labels
MV Funnel Angle	Mitral valve funnel angle
MV PISA Radius	Mitral valve, proximal isovelocity surface area method, radius
LVOT Diam s	Left ventricular outflow tract diameter, systole
MV CO	Mitral valve cardiac output, folder of labels
MV Annulus d	Mitral valve annulus diastole
MR VC Width	Mitral regurgitation vena contracta width
MV Annulus d A-P	Mitral valve annulus, diastole, anterior to posterior
MV Annulus d M-L	Mitral valve annulus, diastole, medial to lateral
MV Annulus s	Mitral valve annulus systole
MV Annulus s A-P	Mitral valve annulus, systole, anterior to posterior
MV Annulus s M-L	Mitral valve annulus, systole, medial to lateral
MV Planimetry	Mitral valve planimetry method

MV Doppler Measurement Labels

Measurement Label	Definition
MV	Mitral Valve Function
MR EROA (PISA)	Mitral regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
MR Vmax	Mitral regurgitation, maximum velocity
MR RF (Doppler)	Mitral regurgitation regurgitant fraction, Doppler, folder of labels
MV VTI	Mitral regurgitation velocity time integral
MV Site 2 VTI	Mitral valve site 2 velocity time integral
MR RF (PISA)	Mitral regurgitation regurgitant fraction, proximal isovelocity surface area, folder of labels
MR Vmax	Mitral regurgitation maximum velocity
MR VTI	Mitral regurgitation velocity time integral
MV VTI, Annulus	Mitral valve velocity time integral, annulus
MV Area (PISA)	Mitral valve area, proximal isovelocity surface area, folder of labels
MV Vmax, Tips	Mitral valve maximum velocity, leaflet tips
MV Area (VTI)	Mitral valve area, velocity time integral, folder of labels
LVOT VTI	Left ventricular outflow tract, velocity time integral
MV VTI	Mitral valve velocity time integral
MV CO	Mitral valve cardiac output, folder of labels
HR	Heart rate
MV VTI	Mitral valve velocity time integral
LV dP/dt	Left ventricular rate of pressure rise during isovolumic contraction
LV IVRT, Tips	Left ventricular isovolumic relaxation time, leaflet tips
MR Vmax	Mitral regurgitation maximum velocity
MR VTI	Mitral regurgitation velocity time integral
MV A Vmax, Tips	Mitral valve A wave maximum velocity, leaflet tips
MV AT, Tips	Mitral valve acceleration time, leaflet tips
MV E DT, Tips	Mitral valve E wave deceleration time, leaflet tips
MV E Duration, Tips	Mitral valve E wave duration, leaflet tips
MV E Vmax, Tips	Mitral valve E wave maximum velocity, leaflet tips
MV PHT, Tips	Mitral valve pressure half time, leaflet tips
MV VTI	Mitral regurgitation velocity time integral

Measurement Label	Definition
MVR	Mitral valve repair/replacement
MR EROA (PISA)	Mitral regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
MR PISA Radius	Mitral regurgitation, proximal isovelocity surface area, radius
MR RF (Doppler)	Mitral regurgitation, regurgitant fraction, Doppler, folder of labels
MV Annulus d	Mitral valve annulus diastole
MV Site 2 Diam	Mitral valve site 2 diameter
MR RF (PISA)	Mitral regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
MR PISA Radius	Mitral regurgitation, proximal isovelocity surface area, radius
MV Annulus d	Mitral valve annulus diastole
MV Area (PISA)	Mitral valve area, proximal isovelocity surface area, folder of labels
MV Funnel Angle	Mitral valve funnel angle
MV PISA Radius	Mitral valve proximal isovelocity surface area, radius
MV Area (VTI)	Mitral valve area, velocity time integral, folder of labels
LVOT Diam s	Left ventricular outflow tract diameter, systole
MV CO	Mitral valve cardiac output, folder of labels
MV Annulus d	Mitral valve annulus diastole
MR VC Width	Mitral regurgitation vena contracta width
MV Annulus d	Mitral valve annulus diastole
MV Annulus d A-P	Mitral valve annulus diastole anterior to posterior
MV Annulus d M-L	Mitral valve annulus diastole medial to lateral
MV Annulus s	Mitral valve annulus systole
MV Annulus s A-P	Mitral valve annulus systole anterior to posterior
MV Annulus s M-L	Mitral valve annulus systole medial to lateral
MV Planimetry	Mitral valve planimetry method

MV Calculation Labels

Calculation Label	Definition	Units
MV E/A, Tips	Ratio of peak E wave velocity (E) to peak A wave velocity (A) of mitral inflow, tips	---
MV E/A, Tips (Valsalva)	Ratio of peak E wave velocity (E) to peak A wave velocity (A) of mitral inflow, tips valsalva	---
MV A/E, Tips	Ratio of peak A wave velocity (A) to peak E wave velocity (E) of mitral inflow, tips	---
MV PHT, Tips	Mitral valve pressure half-time, leaflet tips	msec
MV Area (PHT)	Mitral valve area pressure half-time	cm ²
MV Peak Grad, Tips	Mitral valve peak pressure gradient, leaflet tips	mmHg
MV Area (VTI)	Mitral valve area velocity time integral	cm ²
MV Area/BSA (VTI)	Mitral valve area indexed by body surface area velocity time integral	cm ² /m ²
MV PISA	Mitral valve proximal isovelocity surface area	cm ²
MV Inst Flow Rate	Mitral valve instantaneous flow rate	l/min
MV Area (PISA)	Mitral valve area proximal isovelocity surface area	cm ²
MV Area/BSA (PISA)	Mitral valve area indexed by body surface area proximal isovelocity surface area	cm ² /m ²
Site 2 Area	Site 2 area	cm ²
Site 2 SV	Site 2 area	ml
MR Volume (Doppler)	Mitral regurgitation volume Doppler	ml
MR RF (Doppler)	Mitral regurgitation, regurgitant fraction Doppler	%
MR PISA	Mitral regurgitation proximal isovelocity surface area	cm ²
MR Inst Flow Rate	Mitral regurgitation instantaneous flow rate	ml/s
MR EROA	Mitral regurgitation effective regurgitant orifice area	cm ²
MR Volume (PISA)	Mitral regurgitation volume proximal isovelocity surface area	ml
MR RF (PISA)	Mitral regurgitation regurgitant fraction proximal isovelocity surface area	%
MV Annulus Area	Mitral valve annulus area	cm ²
MV SV	Mitral valve stroke volume	ml
MV SI	Mitral valve stroke index	ml/m ²
MV CO	Mitral valve cardiac output	l/min
MV CI	Mitral valve cardiac index	l/min/m ²

Calculation Label	Definition	Units
MV E/A (Annulus)	Ratio of peak E wave velocity (E) to peak A wave velocity (A) of mitral inflow annulus	---
MV A/E (Annulus)	Ratio of peak A wave velocity (A) to peak E wave velocity (E) of mitral inflow annulus	---
MV E/MV VTI (Annulus)	Mitral valve E wave/mitral valve velocity time integral annulus	---
MV A/MV VTI (Annulus)	Mitral valve A wave/mitral valve velocity time integral annulus	---
MV E'/A' (M)	Mitral valve early diastolic/late diastolic medial	---
MV E'/E' (M)	Mitral valve E wave/early diastolic medial	---
MV E'/A' (L)	Mitral valve early diastolic/late diastolic lateral	---
MV E'/E' (L)	Mitral valve E wave/early diastolic lateral	---
MV E'/E' Vmax (Average)	Mitral valve E wave/early diastolic maximum velocity average	---

Pulmonary Artery (PA)

PA 2D-mode Measurement Labels

Measurement Label	Definition
PA	Pulmonary artery
LPA Diam	Left pulmonary artery diameter
MPA Diam	Main pulmonary artery diameter
RPA Diam	Right pulmonary artery diameter

PA Doppler Measurement Labels

Measurement Label	Definition
PA	Pulmonary artery
Pulmonary Vasc Resistance	Pulmonary vascular resistance, folder of labels
RVOT VTI	Right ventricular outflow tract, velocity time integral
TR Vmax	Tricuspid regurgitation maximum velocity
LPA Vmax	Left pulmonary artery maximum velocity
MPA Vmax	Main pulmonary artery maximum velocity
MPA VTI	Main pulmonary artery velocity time integral
RPA Vmax	Right pulmonary artery maximum velocity

PA Calculation Labels

Calculation Label	Definition	Units
MPA Peak Grad	Main pulmonary artery peak pressure gradient	mmHg
RV PEP/RV ET	Ratio of the right ventricular pre-ejection period to the right ventricular ejection time	---
RV AT/RV ET	Ratio of the right ventricular acceleration time to the right ventricular ejection time	---
PASP	Pulmonary artery systolic pressure	mmHg
PASP/SBP	Ratio of the pulmonary artery systolic pressure to the Systolic blood pressure	---
PAEDP	Pulmonary artery end diastolic pressure	mmHg
Mean PAP	Mean pulmonary artery pressure	mmHg
LPA Peak Grad	Left pulmonary artery peak pressure gradient	mmHg
RPA Peak Grad	Right pulmonary artery peak pressure gradient	mmHg
PVR	Pulmonary valve repair/replacement	---

Pericardial Effusion

Pericardial Effusion 2D-mode Measurement Labels

Measurement Label	Definition
Pericardial Effusion	Pericardial effusion
IVC Diam, exp	Inferior vena cava diameter, expiration
IVC Diam, insp	Inferior vena cava diameter, inspiration
LA d Diam, exp	Left atrial diastole diameter, expiration
LA d Diam, insp	Left atrial diastole diameter, inspiration
LVID d, exp	Left ventricular internal diameter diastole, expiration
LVID d, insp	Left ventricular internal diameter diastole, inspiration
PE d, Ant PLAX	Pericardial effusion diastole, anterior parasternal long axis view
PE d, Ant SCLAX	Pericardial effusion diastole, anterior subcostal long axis view
PE d, Apical A4C	Pericardial effusion diastole, apical four chamber view
PE d, Lt Lat A4C	Pericardial effusion diastole, left lateral apical four chamber view
PE d, Post PLAX	Pericardial effusion diastole, post parasternal long axis view
PE d, Post SCLAX	Pericardial effusion diastole, post subcostal long axis view
PE d, Rt Lat A4C	Pericardial effusion diastole, right lateral apical four chamber view
RA d Diam, exp	Right atrial diastole diameter, expiration
RA d Diam, insp	Right atrial diastole diameter, inspiration
RVID d, exp	Right ventricular internal diameter diastole, expiration
RVID d, insp	Right ventricular internal diameter diastole, inspiration

Pericardial Effusion Doppler Measurement Labels

Measurement Label	Definition
Pericardial Effusion	Pericardial effusion
HV	Hepatic vein
A Vmax, exp	A wave maximum velocity, expiration
A Vmax, insp	A wave maximum velocity, inspiration
D Vmax, exp	D wave maximum velocity, expiration
D Vmax, insp	D wave maximum velocity, inspiration
S Vmax, exp	S wave maximum velocity, expiration
S Vmax, insp	S wave maximum velocity, inspiration
MV	Mitral valve
A Vmax, exp	A wave maximum velocity, expiration
A Vmax, insp	A wave maximum velocity, inspiration
E DT, exp	E wave deceleration time, expiration
E DT, insp	E wave deceleration time, inspiration
E Vmax, exp	E wave maximum velocity, expiration
E Vmax, insp	E wave maximum velocity, inspiration
LV IVRT, exp	Left ventricular isovolumic relaxation time, expiration
LV IVRT, insp	Left ventricular isovolumic relaxation time, inspiration
P Vein	Pulmonary vein
A Vmax, exp	A wave maximum velocity, expiration
A Vmax, insp	A wave maximum velocity, inspiration
D Vmax, exp	D wave maximum velocity, expiration
D Vmax, insp	D wave maximum velocity, inspiration
S Vmax, exp	S wave maximum velocity, expiration
S Vmax, insp	S wave maximum velocity, inspiration
TV	Tricuspid valve
A Vmax, exp	A wave maximum velocity, expiration
A Vmax, insp	A wave maximum velocity, inspiration
E DT, exp	E wave deceleration time, expiration
E DT, insp	E wave deceleration time, inspiration
E Vmax, exp	E wave maximum velocity, expiration
E Vmax, insp	E wave maximum velocity, inspiration

Pericardial Effusion Calculation Labels

Calculation Label	Definition	Units
RA d Diam % change	Right atrial diastole diameter percent change	%
RVID d % change	Right ventricular internal diameter diastole percent change	%
LA d Diam % change	Left atrial diastole diameter percent change	%
LVID d % change	Right ventricular internal diameter diastole percent change	%
MV E Vmax % change	Mitral valve E wave maximum velocity percent change	%
MV A Vmax % change	Mitral valve A wave maximum velocity percent change	%
MV DT % change	Mitral valve deceleration time percent change	%
LV IVRT % change	Left ventricular isovolumic relaxation time percent change	%
P Vein S Vmax % change	Pulmonary vein S wave maximum velocity percent change	%
P Vein D Vmax % change	Pulmonary vein D wave maximum velocity percent change	%
P Vein A Vmax % change	Pulmonary vein A wave maximum velocity percent change	%
TV E Vmax % change	Tricuspid valve E wave maximum velocity percent change	%
TV A Vmax % change	Tricuspid valve A wave maximum velocity percent change	%
TV DT % change	Tricuspid valve deceleration time percent change	%
IVC Diam % change	Inferior vena cava diameter percent change	%
HV S Vmax % change	Hepatic vein S wave maximum velocity percent change	%
HV D Vmax % change	Hepatic vein D wave maximum velocity percent change	%
HV A Vmax % change	Hepatic vein A wave maximum velocity percent change	%

Pulmonary Valve (PV)

PV 2D-mode Measurement Labels

Measurement Label	Definition
PV	Pulmonary valve
PR EROA (PISA)	Pulmonary regurgitation effective regurgitant orifice area, proximal isovelocity surface area method, folder of labels
PR PISA Radius	Pulmonary regurgitation proximal isovelocity surface area method, radius
PR RF (Doppler)	Pulmonary regurgitation, regurgitant fraction, Doppler, folder of labels
RVOT Diam s PSAX	Right ventricular outflow tract diameter, systole, parasternal short axis view
PV Site 2 Diam	Pulmonary valve site 2 diameter
PR RF (PISA)	Pulmonary regurgitation, regurgitant fraction, proximal isovelocity surface area method, folder of labels
PR PISA Radius	Pulmonary regurgitation proximal isovelocity surface area method, radius
RVOT Diam s PSAX	Right ventricular outflow tract diameter systole, parasternal short axis view
PV Area (Vmax)	Pulmonary valve area, maximum velocity, folder of labels
RVOT Diam s PSAX	Right ventricular outflow tract diameter systole, parasternal short axis view
PV Area (VTI)	Pulmonary valve area, velocity time integral, folder of labels
RVOT Diam s PSAX	Right ventricular outflow tract diameter systole, parasternal short axis view
PV CO	Pulmonary valve cardiac output, folder of labels
PV Annulus s	Pulmonary valve annulus, systole
PR VC Width	Pulmonary regurgitation vena contracta width
PV Annulus s	Pulmonary valve annulus, systole
PVR	Pulmonary valve repair/replacement
PR EROA (PISA)	Pulmonary regurgitation, effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
PR PISA Radius	Pulmonary regurgitation, proximal isovelocity surface area, radius
PR RF (Doppler)	Pulmonary regurgitation, regurgitant fraction, Doppler, folder of labels
RVOT Diam s	Right ventricular outflow tract diameter, systole
PV Site 2 Diam	Pulmonary valve site 2 diameter
PR RF (PISA)	Pulmonary regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
PR PISA Radius	Pulmonary regurgitation, proximal isovelocity surface area, radius
RVOT Diam s	Right ventricular outflow tract diameter, systole
PV Area (Vmax)	Pulmonary valve area, maximum velocity, folder of labels
RVOT Diam s	Right ventricular outflow tract diameter, systole
PV Area (VTI)	Pulmonary valve area, velocity time integral, folder of labels
RVOT Diam s	Right ventricular outflow tract diameter, systole
PV CO	Pulmonary valve cardiac output, folder of labels
PV Annulus s	Pulmonary valve annulus, systole
PR VC Width	Pulmonary regurgitation vena contracta width
PV Annulus s	Pulmonary valve annulus, systole

PV Doppler Measurement Labels

Measurement Label	Definition
PV	Pulmonary valve
PR EROA (PISA)	Pulmonary regurgitation, effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
PR Vmax	Pulmonary regurgitation maximum velocity
PR RF (Doppler)	Pulmonary regurgitation, regurgitant fraction, Doppler, folder of labels
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV Site 2 VTI	Pulmonary valve site 2 velocity time integral
PR RF (PISA)	Pulmonary regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
PR Vmax	Pulmonary regurgitation maximum velocity
PR VTI	Pulmonary regurgitation, velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV Area (Vmax)	Pulmonary valve area, maximum velocity, folder of labels
PV Vmax	Pulmonary valve maximum velocity
RVOT Vmax	Right ventricular outflow tract, maximum velocity
PV Area (VTI)	Pulmonary valve area, velocity time integral, folder of labels
PV VTI	Pulmonary valve, velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV CO	Pulmonary valve cardiac output, folder of labels
HR	Heart rate
PV VTI	Pulmonary valve, velocity time integral
PR ED Velocity	Pulmonary regurgitation end diastolic velocity
PR Slope	Pulmonary regurgitation slope
PR Vmax	Pulmonary regurgitation maximum velocity
PR VTI	Pulmonary regurgitation velocity time integral
PV AT	Pulmonary valve acceleration time
PV ET	Pulmonary valve ejection time
PV Vmax	Pulmonary valve maximum velocity
PV VTI	Pulmonary valve velocity time integral

Measurement Label	Definition
PVR	Pulmonary valve repair/replacement
PR EROA (PISA)	Pulmonary regurgitation, effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
PR Vmax	Pulmonary regurgitation, maximum velocity
PR RF (Doppler)	Pulmonary regurgitation, regurgitant fraction, Doppler, folder of labels
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV Site 2 VTI	Pulmonary valve site 2 velocity time integral
PR RF (PISA)	Pulmonary regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
PR Vmax	Pulmonary regurgitation, maximum velocity
PR VTI	Pulmonary regurgitation, velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV Area (Vmax)	Pulmonary valve area maximum velocity, folder of labels
PV Vmax	Pulmonary valve maximum velocity
RVOT Vmax	Right ventricular outflow tract, maximum velocity
PV Area (VTI)	Pulmonary valve area, velocity time integral, folder of labels
PV VTI	Pulmonary valve, velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
PV CO	Pulmonary valve cardiac output, folder of labels
HR	Heart rate
PV VTI	Pulmonary valve, velocity time integral
PR ED Velocity	Pulmonary regurgitation end diastolic velocity
PR Slope	Pulmonary regurgitation slope
PR Vmax	Pulmonary regurgitation maximum velocity
PR VTI	Pulmonary regurgitation velocity time integral
PV AT	Pulmonary valve acceleration time
PV ET	Pulmonary valve ejection time
PV Vmax	Pulmonary valve maximum velocity
PV VTI	Pulmonary valve velocity time integral

PV Calculation Labels

Calculation Label	Definition	Units
PV AT/ET	Pulmonary valve acceleration time to ejection time ratio	---
RVOT Area	Right ventricular outflow tract area	cm ²
RVOT SV	Right Ventricular outflow tract stroke volume	ml
PV Peak Grad	Pulmonary valve peak gradient	mmHg
PV Area (Vmax)	Pulmonary valve area maximum velocity	cm ²
PV Area/BSA (Vmax)	Pulmonary valve area body surface area index, maximum velocity	cm ² /m ²
PV Area (VTI)	Pulmonary valve area velocity-time integral	cm ²
PV Area/BSA (VTI)	Pulmonary valve area body surface area index, velocity-time integral	cm ² /m ²
PR ED Grad	Pulmonary regurgitation end diastolic pressure gradient	mmHg
PR (Doppler-Doppler)	Pulmonary regurgitation Doppler calculation labels	---
Site 2 Area	Site 2 area	cm ²
Site 2 SV	Site 2 stroke volume	ml
PR Volume (Doppler)	Pulmonary regurgitation volume, Doppler	ml
PR RF (Doppler)	Pulmonary regurgitation, regurgitant fraction, Doppler	%
PR PISA	Pulmonary regurgitation, proximal isovelocity surface area method calculations	---
PR PISA	Pulmonary regurgitation, proximal isovelocity surface area method	cm ²
PR Inst Flow Rate	Pulmonary regurgitation instantaneous regurgitant flow rate	ml/s
PR EROA	Pulmonary regurgitation effective regurgitant orifice area	cm ²
PV Ann s Area	Pulmonary valve annulus systole area	cm ²
PV SV	Pulmonary valve stroke volume	ml
PV SI	Pulmonary valve stroke index	ml/m ²
PV CO	Pulmonary valve cardiac output	l/min
PV CI	Pulmonary valve cardiac index	l/min/m ²

Pulmonary Veins

Pulmonary Veins 2D-mode Measurement Labels

Measurement Label	Definition
Pulm Veins	Pulmonary veins
LLPV Diam	Left lower pulmonary vein diameter
LUPV Diam	Left upper pulmonary vein diameter
RLPV Diam	Right lower pulmonary vein diameter
RUPV Diam	Right upper pulmonary vein diameter

Pulmonary Veins Doppler Measurement Labels

Measurement Label	Definition
Pulm Veins	Pulmonary veins
LLPV	Left lower pulmonary vein
S VTI	S wave velocity time integral
A Duration	A wave duration
A Vmax	A wave maximum velocity
A VTI	A wave velocity time integral
D Vmax	D wave maximum velocity
D VTI	D wave velocity time integral
S Vmax	S wave maximum velocity
RLPV	Right lower pulmonary vein
S VTI	S wave velocity time integral
A Duration	A wave duration
A Vmax	A wave maximum velocity
A VTI	A wave velocity time integral
D Vmax	D wave maximum velocity
D VTI	D wave velocity time integral
S Vmax	S wave maximum velocity

Pulmonary Veins Calculation Labels

Calculation Label	Definition	Units
LUPV A Dur - MV A Dur	Difference between A wave duration and mitral valve A wave duration, left upper pulmonary vein	msec
LUPV S Vmax / D Vmax	Ratio of the S wave maximum velocity to the D wave maximum velocity, left upper pulmonary vein	---
LUPV Systolic Filling Fraction	Left upper pulmonary vein systolic filling fraction	%
LLPV A Dur - MV A Dur	Difference between A wave duration and mitral valve A wave duration, left lower pulmonary vein	msec
LLPV S Vmax / D Vmax	Ratio of the S wave maximum velocity to the D wave maximum velocity, left lower pulmonary vein	---
LLPV Systolic Filling Fraction	Left lower pulmonary vein systolic filling fraction	%
RUPV A Dur - MV A Dur	Difference between A wave duration and mitral valve A wave duration, right upper pulmonary vein	msec
RUPV S Vmax / D Vmax	Ratio of the S wave maximum velocity to the D wave maximum velocity, right upper pulmonary vein	---
RUPV Systolic Filling Fraction	Right upper pulmonary vein systolic filling fraction	%
RLPV A Dur - MV A Dur	Difference between A wave duration and mitral valve A wave duration, right lower pulmonary vein	msec
RLPV S Vmax / D Vmax	Ratio of the S wave maximum velocity to the D wave maximum velocity, right lower pulmonary vein	---
RLPV Systolic Filling Fraction	Right lower pulmonary vein systolic filling fraction	%

Right Atrium (RA)

RA 2D-mode Measurement Labels

Measurement Label	Definition
RA Vol d A4C	Right atrium volume diastole apical four chamber view
RA Vol s A4C	Right atrium volume systole apical four chamber view
RA Major d A4C	Right atrium major axis diastole apical four chamber view
RA Major s A4C	Right atrium major axis systole apical four chamber view
RA Minor d A4C	Right atrium minor axis diastole apical four chamber view
RA Minor s A4C	Right atrium minor axis systole apical four chamber view

RA Calculation Labels

RA: A-L Method Calculation Labels

Calculation Label	Definition	Units
RA Vol d A4C A-L	Right atrial volume, diastole, apical four chamber view, area and length	ml
RA Vol s A4C A-L	Right atrial volume, systole, apical four chamber view, area and length	ml
RA Vol d A4C A-L/BSA	Right atrial volume, diastole, apical four chamber view, area and length indexed by body surface area	ml/m ²
RA Vol s A4C A-L/BSA	Right atrial volume, systole, apical four chamber view, area and length indexed by body surface area	ml/m ²

RA: MOD Method Calculation Labels

Calculation Label	Definition	Units
A4C	Apical four chamber view calculations	---
RA Vol d A4C MOD/BSA	Right atrial volume, diastole, apical four chamber view, method of disk indexed by body surface area	ml/m ²
RA Vol s A4C MOD/BSA	Right atrial volume, systole, apical four chamber view, method of disk indexed by body surface area	ml/m ²

Right Ventricle (RV)

RV 2D-mode Measurement Labels

Measurement Label	Definition
RV Systolic Function	Right ventricular systolic function
A4C	Apical four chamber view
RV Area d	Right ventricular area, diastole
RV Area s	Right ventricular area, systole
RV Major d	Right ventricular major axis, diastole
RV Major s	Right ventricular major axis, systole
RV Minor d Base	Right ventricular minor axis, diastole, base
RV Minor d Mid	Right ventricular minor axis, diastole, middle
RV Minor s Base	Right ventricular minor axis, systole, base
RV Minor s Mid	Right ventricular minor axis, systole, middle
PLAX	Parasternal long axis view
RVAW d	Right ventricular anterior wall thickness, diastole
RVAW s	Right ventricular anterior wall thickness, systole
RVID d	Right ventricular internal diameter, diastole
RVID s	Right ventricular internal diameter, systole
RVOT Diam s	Right ventricular outflow tract, diameter, systole
PSAX	Parasternal short axis view
Qp	Pulmonary venous stroke volume, folder of labels
Pulm Side Diam	Pulmonary side diameter
RVOT CO	Right ventricular outflow tract cardiac output, folder of labels
RVOT Diam s	Right ventricular outflow tract, diameter, systole
RVOT 1 Diam s	Right ventricular outflow tract 1 diameter, systole
RVOT 2 Diam s	Right ventricular outflow tract 2 diameter, systole
Subcostal	Subcostal
RVOT Diam s	Right ventricular outflow tract, diameter, systole

RV Doppler Measurement Labels

Measurement Label	Definition
RV Diastolic Function	Right ventricular diastolic function
IVC	Inferior vena cava
IVC A Duration	Inferior vena cava A wave duration
IVC A Vmax	Inferior vena cava A wave maximum velocity
IVC D VTI	Inferior vena cava D wave velocity time integral
IVC S VTI	Inferior vena cava S wave velocity time integral
TV Inflow (Annulus)	Tricuspid valve inflow annulus
RV IVRT	Right ventricular isovolumetric relaxation time
TV A Duration	Tricuspid valve A wave duration
TV A Vmax	Tricuspid valve A wave maximum velocity
TV DT	Tricuspid valve deceleration time
TV E Vmax	Tricuspid valve E wave maximum velocity
TV Inflow (Tips)	Tricuspid valve inflow, leaflet tips
TV A Vmax	Tricuspid valve A wave maximum velocity
TV E Vmax	Tricuspid valve E wave maximum velocity
TV PW DTI	Tricuspid valve, pulsed-wave, Doppler tissue imaging
TV A' Vmax (L)	Tricuspid valve A prime maximum velocity, lateral
TV E' Vmax (L)	Tricuspid valve E prime maximum velocity, lateral
TV S' Vmax (L)	Tricuspid valve S prime maximum velocity, lateral
RV Systolic Function	Right ventricular systolic function
Qp	Pulmonary venous stroke volume, folder of labels
Pulm Side VTI	Pulmonary side velocity time integral
Qp HR	Pulmonary venous stroke volume heart rate
RV MPI	Right ventricular myocardial performance index, folder of labels
RVOT ET	Right ventricular outflow tract ejection time
TV C-O Duration	Tricuspid valve close open duration
RVOT CO	Right ventricular outflow tract cardiac output, folder of labels
HR	Heart rate
RVOT VTI	Right ventricular outflow tract, velocity time integral
RV dP/dt	Right ventricular rate of pressure rise during isovolumic contraction
RV IVCT	Right ventricular isovolumic contraction time
RV PEP	Right ventricular pre ejection period
RVOT AT	Right ventricular outflow tract, acceleration time
RVOT ET	Right ventricular outflow tract, ejection time
RVOT Vmax	Right ventricular outflow tract, maximum velocity
RVOT VTI	Right ventricular outflow tract, velocity time integral
TV C-O Duration	Tricuspid valve close open duration

RV Diastolic Function Calculation Labels

Calculation Label	Definition	Units
TV E/A, Tips	Ratio of peak E wave velocity (E) to peak A wave velocity (A) of tricuspid valve flow, leaflet tips	---
TV E/E' (L)	Ratio of tricuspid valve E wave maximum velocity (E) to early diastolic velocity (E'), lateral	---
TV E'/A' (L)	Ratio of tricuspid valve end diastolic velocity to late diastolic velocity, lateral	---
HV S/D Vmax	Hepatic vein systolic/diastolic velocity ratio maximum velocity	---

RV Systolic Function Calculation Labels

Calculation Label	Definition	Units
RVID d/BSA	Right ventricular internal diameter, diastole indexed by body surface area	cm/m ²
RVID d/LVID d	Right ventricular internal diameter diastole/left ventricular internal diameter, diastole	---
RV %FAC A4C	Right ventricle fraction area change, apical four chamber view	%
RV MPI	Right ventricular myocardial performance index	---
RVSP (TR)	Right ventricular systolic pressure, tricuspid regurgitation	mmHg
RVSP (VSD)	Right ventricular systolic pressure, ventricular septal defect	mmHg
RVOT/LVOT VTI	Right ventricular outflow tract / Left ventricular outflow tract velocity time integral	---
RVOT Peak Grad	Right ventricular outflow tract peak gradient	mmHg
RVOT Area	Right ventricular outflow tract area	cm ²
RVOT SV	Right ventricular outflow tract stroke volume	ml
RVOT SI	Right ventricular outflow tract stroke index	ml/m ²
RVOT CO	Right ventricular outflow tract cardiac output	l/min
RVOT CI	Right ventricular outflow tract cardiac index	l/min/m ²
RV EF A4C A-L	Right ventricular ejection fraction, apical four chamber view, area and length	%
RV Area d A4C/BSA	Right ventricular area diastole, apical four chamber view indexed by body surface area	cm ² /m ²
RV Area s A4C/BSA	Right ventricular area systole, apical four chamber view indexed by body surface area	cm ² /m ²
RV Vol d A4C A-L	Right ventricular volume, diastole, apical four chamber view, area-length	ml
RV Vol s A4C A-L	Right ventricular volume, systole, apical four chamber view, area and length	ml
RV Vol d A4C A-L/BSA	Right ventricular volume, diastole, apical four chamber view, area and length indexed by body surface area	ml/m ²
RV Vol s A4C A-L/BSA	Right ventricular volume, systole, apical four chamber view, area and length indexed by body surface area	ml/m ²

Calculation Label	Definition	Units
RV EF A4C MOD	Right ventricular ejection fraction, apical four chamber view, method of disks	%
RV Area d A4C/BSA	Right ventricular area, diastole, apical four chamber view indexed by body surface area	cm ² /m ²
RV Area s A4C/BSA	Right ventricular area, systole, apical four chamber view indexed by body surface area	cm ² /m ²
RV Vol d A4C MOD/BSA	Right ventricular volume, diastole, apical four chamber view, method of disks indexed by body surface area	ml/m ²
RV Vol s A4C MOD/BSA	Right ventricular volume, systole, apical four chamber view, method of disks indexed by body surface area	ml/m ²

Systemic Veins

Systemic Veins 2D-mode Measurement Labels

Measurement Label	Definition
Systemic Veins	Systemic veins
HV Diam	Hepatic vein diameter
IVC Diam	Inferior vena cava diameter
IVC Diam Collapsed	Inferior vena cava diameter collapsed

Systemic Veins Doppler Measurement Labels

Measurement Label	Definition
Systemic Veins	Systemic veins
HV A Vmax	Hepatic vein A wave maximum velocity
HV D Vmax	Hepatic vein D wave maximum velocity
HV D VTI	Hepatic vein D wave velocity time integral
HV S Vmax	Hepatic vein S wave maximum velocity
HV S VTI	Hepatic vein S wave velocity time integral
IVC A Duration	Inferior vena cava A wave duration
IVC A Vmax	Inferior vena cava A wave maximum velocity
IVC D VTI	Inferior vena cava D wave velocity time integral
IVC S VTI	Inferior vena cava S wave velocity time integral
SVC A Duration	Superior vena cava A wave duration
SVC A Vmax	Superior vena cava A wave maximum velocity
SVC D VTI	Superior vena cava D wave velocity time integral
SVC S VTI	Superior vena cava S wave velocity time integral

Hepatic Vein Calculations

Calculation Label	Definition	Units
HV S/D Vmax	Hepatic vein, ratio of systolic / diastolic velocity, maximum velocity	---
HV Systolic Filling Fraction	Hepatic vein systolic filling fraction	%

Inferior Vena Cava Calculations

Calculation Label	Definition	Units
IVC Diam % change	Inferior vena cava diameter percent change	%
IVC Diam change (cm)	Inferior vena cava diameter change in centimeters	cm
IVC S/D Vmax	Inferior vena cava, ratio of systolic / diastolic velocity, maximum velocity	---

Tricuspid Valve Measurements

Tricuspid Valve 2D-mode Measurement Labels

Measurement Label	Definition
TV	Tricuspid Valve
TR EROA (PISA)	Tricuspid regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
TR PISA Radius	Tricuspid regurgitation, proximal isovelocity surface area, radius
TR RF (Doppler)	Tricuspid regurgitation, regurgitant fraction, Doppler, folder of labels
TV Site 2 Diam	Tricuspid valve site 2 diameter
TV Annulus d	Tricuspid valve annulus diastole
TR RF (PISA)	Tricuspid regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
TR PISA Radius	Tricuspid regurgitation, proximal isovelocity surface area, radius
TV Annulus d	Tricuspid valve annulus diastole
TV Area (PISA)	Tricuspid valve area, proximal isovelocity surface area, folder of labels
TV Funnel Angle	Tricuspid valve funnel angle
TV PISA Radius	Tricuspid valve, proximal isovelocity surface area, radius
TV Area (VTI)	Tricuspid valve area, velocity time integral, folder of labels
RVOT Diam s	Right ventricular outflow tract diameter, systole
TV CO	Tricuspid valve cardiac output, folder of labels
TV Annulus d A4C	Tricuspid valve annulus diastole, apical four chamber view
TR VC Width	Tricuspid regurgitation vena contracta width
TV Annulus d	Tricuspid valve annulus diastole
TV Annulus d A-P	Tricuspid valve annulus diastole anterior to posterior
TV Annulus d M-L	Tricuspid valve annulus diastole medial to lateral
TV Planimetry	Tricuspid valve planimetry method
TVR	Tricuspid valve repair/replacement
TR EROA (PISA)	Tricuspid regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
TR PISA Radius	Tricuspid regurgitation, proximal isovelocity surface area, radius
TR RF (Doppler)	Tricuspid regurgitation, regurgitant fraction, Doppler, folder of labels
TV Site 2 Diameter	Tricuspid valve site 2 diameter
TV Annulus d	Tricuspid valve annulus diastole

Measurement Label	Definition
TR RF (PISA)	Tricuspid regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
TR PISA Radius	Tricuspid regurgitation, proximal isovelocity surface area, radius
TV Annulus d	Tricuspid valve annulus diastole
TV Area (PISA)	Tricuspid valve area, proximal isovelocity surface area, folder of labels
TV Funnel Angle	Tricuspid valve funnel angle
TV PISA Radius	Tricuspid valve, proximal isovelocity surface area, radius
TV Area (VTI)	Tricuspid valve area, velocity time integral, folder of labels
RVOT Diam s	Right ventricular outflow tract diameter, systole
TV CO	Tricuspid valve cardiac output, folder of labels
TV Annulus d A4C	Tricuspid valve annulus diastole, apical four chamber view
TR VC Width	Tricuspid regurgitation vena contracta width
TV Annulus d	Tricuspid valve annulus diastole
TV Annulus d A-P	Tricuspid valve annulus diastole anterior to posterior
TV Annulus d M-L	Tricuspid valve annulus diastole medial to lateral
TV Planimetry	Tricuspid valve planimetry method

Tricuspid Valve Doppler Measurement Labels

Measurement Label	Definition
TV	Tricuspid valve
TR EROA (PISA)	Tricuspid regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
TR Vmax	Tricuspid regurgitation maximum velocity
TR RF (Doppler)	Tricuspid regurgitation, regurgitant fraction, Doppler, folder of labels
TV VTI	Tricuspid valve velocity time integral
TV Site 2 VTI	Tricuspid valve site 2 velocity time integral
TR RF (PISA)	Tricuspid regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
TR Vmax	Tricuspid regurgitation maximum velocity
TR VTI	Tricuspid regurgitation velocity time integral
TV VTI, Annulus	Tricuspid valve velocity time integral, annulus
TV Area (PISA)	Tricuspid valve area, proximal isovelocity surface area, folder of labels
TV Vmax, Tips	Tricuspid valve maximum velocity, leaflet tips
TV Area (VTI)	Tricuspid valve area, velocity time integral, folder of labels
TV VTI	Tricuspid valve velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
TV CO	Tricuspid valve cardiac output, folder of labels
HR	Heart rate
TV VTI	Tricuspid valve velocity time integral
RV dP/dt	Right ventricular rate of pressure rise during isovolumic contraction
TR Vmax	Tricuspid regurgitation maximum velocity
TR VTI	Tricuspid regurgitation velocity time integral
TV A Vmax, Tips	Tricuspid valve A wave, maximum velocity, leaflet tips
TV E Vmax, Tips	Tricuspid valve E wave, maximum velocity, leaflet tips
TV PHT, Tips	Tricuspid valve pressure half time, leaflet tips
TV VTI	Tricuspid valve velocity time integral
TVR	Tricuspid valve repair/replacement
TR EROA (PISA)	Tricuspid regurgitation effective regurgitant orifice area, proximal isovelocity surface area, folder of labels
TR Vmax	Tricuspid regurgitation maximum velocity
TR RF (Doppler)	Tricuspid regurgitation, regurgitant fraction, Doppler, folder of labels
TV VTI	Tricuspid valve velocity time integral
TV Site 2 VTI	Tricuspid valve site 2 velocity time integral

Measurement Label	Definition
TR RF (PISA)	Tricuspid regurgitation, regurgitant fraction, proximal isovelocity surface area, folder of labels
TR Vmax	Tricuspid regurgitation maximum velocity
TR VTI	Tricuspid regurgitation velocity time integral
TV VTI, Annulus	Tricuspid valve velocity time integral, annulus
TV Area (PISA)	Tricuspid valve area, proximal isovelocity surface area, folder of labels
TV Vmax, Tips	Tricuspid valve maximum velocity, leaflet tips
TV Area (VTI)	Tricuspid valve area, velocity time integral, folder of labels
TV VTI	Tricuspid valve velocity time integral
RVOT VTI	Right ventricular outflow tract, velocity time integral
TV CO	Tricuspid valve cardiac output, folder of labels
HR	Heart rate
TV VTI	Tricuspid valve velocity time integral
RV dP/dt	Right ventricular rate of pressure rise during isovolumic contraction
TR Vmax	Tricuspid regurgitation maximum velocity
TR VTI	Tricuspid regurgitation velocity time integral
TV A Vmax, Tips	Tricuspid valve A wave maximum velocity, leaflet tips
TV E Vmax, Tips	Tricuspid valve E wave maximum velocity, leaflet tips
TV PHT, Tips	Tricuspid valve pressure half time, leaflet tips
TV VTI	Tricuspid valve velocity time integral

Tricuspid Valve Calculation Labels

Calculation Label	Definition	Units
TV E/A, Tips	Ratio of peak E wave velocity (E) to peak A wave velocity (A) of tricuspid valve flow, leaflet tips	---
TV A/E, Tips	Ratio of peak A wave velocity (A) to peak E wave velocity (E) of tricuspid valve flow, leaflet tips	---
TV PHT, Tips	Tricuspid valve pressure half time, leaflet tips	msec
TV Area (PHT)	Tricuspid valve area, pressure half time	cm ²
TV Area (VTI)	Tricuspid valve area velocity time integral	cm ²
TV Area/BSA (VTI)	Tricuspid valve area indexed by body surface area, velocity time integral	cm ² /m ²
Tricuspid Valve PISA	Tricuspid valve proximal isovelocity surface area calculations	---
TV PISA	Tricuspid valve proximal isovelocity surface area	cm ²
TV Inst Flow Rate	Tricuspid valve instantaneous flow rate	l/min
TV Area (PISA)	Tricuspid valve area, proximal isovelocity surface area	cm ²
TV Area/BSA (PISA)	Tricuspid valve area indexed by body surface area, proximal isovelocity surface area	cm ² /m ²

Calculation Label	Definition	Units
TR Peak Grad	Tricuspid regurgitation peak pressure gradient	mmHg
TR (Doppler)	Tricuspid regurgitation Doppler calculations	---
Site 2 Area	Site 2 area	cm ²
Site 2 SV	Site 2 stroke volume	ml
TR Volume (Doppler)	Tricuspid regurgitation volume, Doppler	ml
TR RF (Doppler)	Tricuspid regurgitation, regurgitant fraction, Doppler	%
TR PISA	Tricuspid regurgitation, proximal isovelocity surface area calculations	---
TR PISA	Tricuspid regurgitation, proximal isovelocity surface area method	cm ²
TR Inst Flow Rate	Tricuspid regurgitation instantaneous flow rate	ml/s
TR EROA	Tricuspid regurgitation, effective regurgitant orifice area	cm ²
TR Volume (PISA)	Tricuspid regurgitation volume, proximal isovelocity surface area method	ml
TR RF (PISA)	Tricuspid regurgitation, regurgitant fraction, proximal isovelocity surface area method	%
TV Ann Area	Tricuspid valve annulus area	cm ²
TV SV	Tricuspid valve stroke volume	ml
TV SI	Tricuspid valve stroke index	ml/m ²
TV CO	Tricuspid valve cardiac output	l/min
TV CI	Tricuspid valve cardiac index	l/min/m ²
TV E/A (Annulus)	Tricuspid valve, ratio of peak E wave velocity (E) to peak A wave velocity (A), annulus	---
TV A/E (Annulus)	Tricuspid valve, ratio of peak A wave velocity (A) to peak E wave velocity (E), annulus	---
TV E/E' (L)	Tricuspid valve, ratio of E wave maximum velocity to early diastolic velocity, lateral	---
TV E'/A' (L)	Tricuspid valve, ratio of early diastolic velocity to late diastolic velocity, lateral	---

M-mode Measurements

M-mode Measurement Labels

Measurement Label	Definition
M-mode	M-mode
Ao/LA	Aorta/Left atrium measurements
Ao Diam d	Aortic diameter at end-diastole
AoV Cusp Sep	Aortic valve cusp separation
LA Diam s	Left atrial diameter systole
IVC	Inferior vena cava
IVC Collapsed Diam	Inferior vena cava collapsed diameter
IVC Diam	Inferior vena cava diameter
MV	Mitral valve function
CE Amp	Amplitude of the E wave
CA Amp	Amplitude of the A wave
DE Excursion	DE excursion
DE Slope	Anterior excursion of the mitral leaflet at early diastole
EPSS	E point to septal separation The distance between the anterior leaflet and the ventricular septum at early diastole.
EF Slope	Deceleration slope of the mitral leaflet's closure at early diastole
MAPSE	Mitral Valve annular plane systemic excursion
Systolic BP	Systolic blood pressure
TV	Tricuspid valve
DE Excursion	DE excursion
DE Slope	Anterior excursion of the mitral leaflet at early diastole
EF Slope	Deceleration slope of the mitral leaflet's closure at early diastole
TAPSE	Tricuspid annular plane systolic excursion
RV	Right Ventricle Dimensions
RV ET	Right ventricular ejection time
RV Inflow Vp	Right ventricular inflow propagation velocity
RV PEP	Right ventricular pre-ejection period
RVAW d	Right Ventricular Anterior Wall at end-diastole
RVAW s	Right Ventricular Anterior Wall at end-systole
RVID d	Right ventricular internal diameter at end-diastole
RVID s	Right ventricular internal diameter at end-systole

Measurement Label	Definition
LV	Left Ventricle
LV d Series	Left ventricular diastole series, folder of labels
IVS d	Interventricular septal dimension at end-diastole
LV d Series	Left ventricular diastole series
LVID d	Left ventricular internal dimension at end-diastole
LVPW d	Left ventricular posterior wall dimension at end-diastole
LV s Series	Left ventricular systole series, folder of labels
IVS s	Interventricular septal dimension at end-systole
LV s Series	Left ventricular systole series
LVID s	Left ventricular internal dimension at end-systole
LVPW s	Left ventricular posterior wall dimension at end-systole
LV Mass ASE	Left ventricular mass American Society of Echocardiography, folder of labels
IVS d	Interventricular septal dimension at end-diastole
LVID d	Left ventricular internal dimension at end-diastole
LVPW d	Left ventricular posterior wall dimension at end-diastole
Mean VCFc	Left Ventricular Mean Velocity of Circumferential Fiber Shortening, folder of labels
LV ET	Left ventricular ejection time
HR	Heart rate
LVID d	Left ventricular internal dimension at end-diastole
LVID s	Left ventricular internal dimension at end-systole
Wall Stress Circum	Wall stress circumference, folder of labels
LV Major s	Left ventricular major systole
LVID s	Left ventricular internal dimension at end-systole
LVPW s	Left ventricular posterior wall dimension at end-systole
Systolic BP	Systolic blood pressure
Wall Stress Meridian	Wall stress meridian, folder of labels
LVID s	Left ventricular internal dimension at end-systole
LVPW s	Left ventricular posterior wall dimension at end-systole
Systolic BP	Systolic blood pressure
LV ET	Left ventricular ejection time
LV Inflow Vp	Left ventricular inflow propagation velocity
LV PEP	Left ventricular pre-ejection period
LVOT Diam s	Left ventricular outflow tract diameter at end-systole

M-mode Calculation Labels

Calculation Label	Definition	Units
Ao d/LA s	Ratio of aortic diameter, diastole to left atrial diameter, systole	---
LA s/Ao d	Ratio of left atrial diameter, systole to aortic diameter, diastole	---
EPSS/LVID d	Ratio of the E point septal separation to the left ventricular internal diameter, diastole	---
IVS/LVPW	Ratio of interventricular septum thickness to the left ventricular posterior wall thickness	---
IVS %Thick	Interventricular septum percent thickening	%
LVPW %Thick	Left ventricular posterior wall percent thickening	%
LV %FS	Left ventricular percent fractional shortening	%
LV EF	Left ventricular ejection fraction	%
LV Vol d	Left ventricular volume, diastole	ml
LV Vol s	Left ventricular volume, systole	ml
LV SV	Left ventricular stroke volume	ml
LV SI	Left ventricular stroke index	ml/m ²
LV CO	Left ventricular cardiac output	l/min
LV CI	Left ventricular cardiac index	l/min/m ²
LV Mass ASE	Left ventricle mass American Society of Echocardiography calculation method	g
LV Mass ASE/BSA	Left ventricle mass American Society of Echocardiography calculation method indexed by body surface area	g/m ²
LV Mass ASE/Ht	Left ventricle mass American Society Of Echocardiography calculation method indexed by height	g/cm
Mean VCFc	Left ventricular mean velocity of circumferential fiber shortening	circs/s
Wall Stress Circum	Left ventricular wall stress, circumferential	g/cm ²
Wall Stress Merid	Left ventricular wall stress, meridional	g/cm ²

Calculation Label	Definition	Units
LV ETc	Left ventricle	msec
LV PEP corrected	Left ventricular pre-ejection period corrected	msec
LV PEP/ET	Ratio of the Left ventricular pre-ejection period to the ejection time	---
CA/CE	Mitral valve ratio of the CA amplitude to the CE amplitude	---
CE/CA	Mitral Valve ratio of the CE amplitude to the CA amplitude	---
RV ET corrected	Right ventricular ejection time corrected	msec
RV PEP corrected	Right ventricular pre-ejection period corrected	msec
RV PEP/ET	Ratio of the right ventricular pre-ejection period to the ejection time	---
IVC Diam % change	Inferior vena cava diameter percent change	%
IVC Diam change (cm)	Inferior vena cava diameter change	cm

syngo Velocity Vector Imaging

See also: For information about *syngo* Velocity Vector Imaging, refer to Chapter D2 in the Advanced Imaging Manual.

Bullseye Summary Results

The displayed results depend on the selected view, parameter, layer, and direction of analysis.

Overall Peak or Systolic Peak Summary Results

Label	Description
Twist	(Available only in SAX view) Average twist rate (apex - base). Mitral valve is used for the base, posteromedial is used for the mid, and apex is used for the apex.

Time to Peak Summary Results

Label	Description
TTPms	Time-to-peak
Maximum Opposing Wall Delay	(Available only in Apical views) Maximum opposing wall delay (MOWD)
Max Wall Delay	(Available only in SAX views) Maximum opposing wall delay (MOWD)

Velocity Results

Result Label	Description	Units
Pk cm/s	Peak systolic velocity	cm/s
TTP ms	Time-to-peak systolic velocity	ms

Displacement Results

Result Label	Description	Units
Pk mm	Peak displacement	mm
TTP ms	Time-to-peak displacement	ms
Twist	(Displayed only on the worksheet) Twist (apex rotation - mitral valve rotation)	deg

Strain Results

Result Label	Description	Units
ES	End systolic strain	%
ES-GLS ENDO	End systolic global longitudinal strain endocardium	%
ES-GLS-MYO	(Available only when the Endo+Epi selection is enabled) End systolic global longitudinal strain myocardium	%
ES-GCS ENDO	End systolic global circumferential strain endocardium	%
ES-GCS-MYO	(Available only when the Endo+Epi selection is enabled) End systolic global circumferential strain myocardium	%
ES-ROT ENDO	End systolic rotational endocardium	deg
ES- ROT-MYO	(Available only when the Endo+Epi selection is enabled) End systolic rotational myocardium	deg

Strain Rate Results

Result Label	Description	Units
Pk 1/s	Peak strain rate	1/s
TTP ms	Time-to-peak systolic strain rate	ms

Volume and Area Results

Result Label	Description	Units
EF	Ejection fraction	%
HR	Heart rate	bpm
EDV	End-diastolic volume	ml
ESV	End-systolic volume	ml
FAC	Fractional area change	%
MYO GCS	Myocardium global circumferential strain	%
ENDO GCS	Endocardium global circumferential strain	%
EDA	End diastolic area	cm ²
ESA	End systolic area	cm ²
ENDOROT	Endocardial rotation	deg
GRS	Global radial strain	deg

Descriptions for Exported Data Files

The program stores exported files in a user-selectable folder, using the following path:

<user-selected folder>\VVI\.

The file name format for exported files is (XXXX) MMDDYYYY-HHMMSS, where XXXX is the code indicating the exported window and MMDDYYYY-HHMMSS is the date and time of export; MM is the month, DD is the day, YYYY is the year, HH is the hour, MM is the minute, and SS is the second. The file name extension for image files is JPG; and for clip files, AVI. The file name codes are described below.

- MAIN: *syngo* VVI window.
- REG: Strain/Velocity Measurement window.
- REGz: Full-screen display of magnified curve plots.
- 3D: Full-screen display of 3D rendering (parametric M-mode graph).
- GLO: Global Measurement window.
- CRT: *syngo* VVI Analysis window.

Selection	Processing Algorithm(s)*	Description
*Note: Available processing algorithms include Apical, Apical for Endo/Epi, Short Axis, Short Axis for Endo/Epi, and Generic.		
Axis	All	Selected processing algorithm, for example, Apical.
Bpm	All	Heart rate, in beats per minute.
PixelDimension	All	Millimeters per pixel.
ProbeXY (pixel)	All	(x,y) pixel coordinates of the velocity reference point.
ProbeXY (mm)	All	(x,y) coordinates of the velocity reference point, converted to millimeters.
TracedPointsXY (pixel)	All	(x1,y1,x2,y2,x3,y3,...) pixel coordinates of the user-defined points to be tracked.
TracedPointsXY (mm)	All	(x1,y1,x2,y2,x3,y3,...) coordinates of the user-defined points to be tracked, converted to millimeters.
TracedPointsEpiXY (pixel)	Apical for Endo/Epi, Short Axis for Endo/Epi	(x1,y1,x2,y2,x3,y3,...) pixel coordinates of the endo and epi user-defined points to be tracked.
TracedPointsEpiXY (mm)	Apical for Endo/Epi, Short Axis for Endo/Epi	(x1,y1,x2,y2,x3,y3,...) coordinates of the endo and epi user-defined points to be tracked, converted to millimeters.
EcgPoints	All	Amplitude of the electrocardiogram, sampled every two milliseconds.
FrameTime (msec)	All	Time between adjacent frames.
TimeProgression (msec)	All	Time since the first frame.
Velocity (cm/sec)	All	Velocity towards (positive) or away from (negative) the velocity reference point.

Selection	Processing Algorithm(s)*	Description
Strain (%)	All	Strain (percentage) for all points along the trace, for every frame.
StrainRate (1/s)	All	Strain rate (per second) for all points along the trace, for every frame.
tX (pixel coord)	All	x-coordinates of the points along the trace, for every frame.
tY (pixel coord)	All	y-coordinates of the points along the trace, for every frame.
tVx (cm/sec)	All	x component of the velocity for every point along the trace, for every frame.
tVy (cm/sec)	All	y component of the velocity for every point along the trace, for every frame.
EpiVelocity (cm/sec)	Apical for Endo/Epi, Short Axis for Endo/Epi	Velocity towards (positive) or away from (negative) the epi velocity reference point.
EpiStrain (%)	Apical for Endo/Epi, Short Axis for Endo/Epi	Strain (percentage) for all epi points along the trace, for every frame.
EpiStrainRate (1/s)	Apical for Endo/Epi, Short Axis for Endo/Epi	Strain rate (per second) for all epi points along the trace, for every frame.
EpiX (pixel coord)	Apical for Endo/Epi, Short Axis for Endo/Epi	x-coordinates of the epi points along the trace, for every frame.
EpiY (pixel coord)	Apical for Endo/Epi, Short Axis for Endo/Epi	y-coordinates of the epi points along the trace, for every frame.
EpiVx (cm/sec)	Apical for Endo/Epi, Short Axis for Endo/Epi	x component of the velocity for every epi point along the trace, for every frame.
EpiVy (cm/sec)	Apical for Endo/Epi, Short Axis for Endo/Epi	y component of the velocity for every epi point along the trace, for every frame.
RadialStrain (%)	Apical for Endo/Epi, Short Axis for Endo/Epi	Radial strain (percentage) for all endo and epi points along the trace, for every frame.
RadialStrainRate (1/s)	Apical for Endo/Epi, Short Axis for Endo/Epi	Radial strain rate (per second) for all endo and epi points along the trace, for every frame.
Shear (%)	Apical for Endo/Epi, Short Axis for Endo/Epi	The difference in the tangential displacement of the endo and epi points (percentage), divided by the endo-epi distance.
ShearRate (1/s)	Apical for Endo/Epi, Short Axis for Endo/Epi	The difference in the tangential velocity of the endo and epi points (per second), divided by the endo-epi distance.
Vol (ml)	Apical, Apical for Endo/Epi	Modified method of disk volume for every frame, converted to milliliters.

Selection	Processing Algorithm(s)*	Description
Seg. Vol. (ml)	Apical, Apical for Endo/Epi	Segmental volumes, in milliliters.
Area (cm ²)	Short Axis, Short Axis for Endo/Epi	Short axis area for every frame, in squared centimeters.
Seg. Area (cm ²)	Short Axis, Short Axis for Endo/Epi	Segmental areas, in squared centimeters.
DMin (mm)	Apical, Apical for Endo/Epi	The maximum distance across the chamber (diameter), parallel to the mitral plane for every frame, in millimeters.
DMax (mm)	Apical, Apical for Endo/Epi	Distance from the mitral plane to the apex for every frame, in millimeters.
dV/dt (ml/s)	Apical, Apical for Endo/Epi	The rate of change in the volume.
dA/dt (ml/s)	Short Axis, Short Axis for Endo/Epi	The rate of change in the area.
EndoEpiDistance (mm)	Apical for Endo/Epi, Short Axis for Endo/Epi	Distance between corresponding endo and epi points. Not the perpendicular distance between the point and the other trace.

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Obstetric Measurement Labels

You can configure the display of measurement labels.

Measurement labels are organized on the touch screen as specified in the configuration settings. Measurement labels can include the location, view, or dimension of the anatomy, for example, proximal or distal.

Early Obstetric 2D-mode Measurement Labels

The ultrasound system organizes the measurement labels into the following categories:

- **Fetal** lists selections for the fetus.
- **Maternal (TA)** lists maternal transabdominal measurement labels.
- **Maternal (EV)** lists maternal endovaginal measurement labels.
- **Renal / Bladder** lists renal and bladder measurement labels.
- **Fetus A** lists measurement labels for the fetus.
- **Add Fetus** displays the patient registration form to add a fetus when multiple fetuses are present.

2D-mode Labels for Estimating Gestational Age

Measurement Label	Definition
BPD	Biparietal diameter
HC	Head circumference
FL	Femur length
CRL	Crown rump length
MSD	Mean sac diameter

2D-mode Labels for Obstetrical Structures

Measurement Label	Definition	Fetal or Maternal
Yolk Sac	Yolk sac	Fetal
Nuchal Translucency	Nuchal translucency	Fetal
Cervix (EV)	Cervix length, endovaginal	Maternal
Cervix (TA)	Cervix length, transabdominal	Maternal
Kidney	Kidney	Maternal
Ovarian A	Ovarian artery	Maternal
Ovarian V	Ovarian vein	Maternal
Uterine A	Uterine artery	Maternal
Nasal Bone	Nasal bone	Fetal
Ovary (EV)	Ovary, endovaginal	Maternal
Ovary (TA)	Ovary, transabdominal	Maternal
Uterus (EV)	Uterus, endovaginal	Maternal
Uterus (TA)	Uterus, transabdominal	Maternal
Endo Thick (EV)	Endometrium thickness, endovaginal	Maternal
Endo Thick (TA)	Endometrium thickness, transabdominal	Maternal
Pre-Void Bladder	Bladder	Maternal
Post-Void Bladder	Bladder	Maternal
Cyst 1	Cyst, numbered 1 through 5	Maternal
Mass 1	Mass, numbered 1 through 5	Maternal
Fibroid 1	Fibroid, numbered 1 through 5	Maternal

Early Obstetric Doppler Measurement Labels

You can perform Doppler measurements using the velocity or frequency scale. The system displays results in the appropriate measurement units.

Measurement Label	Definition	Fetal or Maternal
Ovarian A	Ovarian artery	Maternal
Uterine A	Uterine artery	Maternal
Fetal HR	Fetal heart rate	Fetal
Ductus V A Vmax	Ductus venosus atrial systole maximum velocity	Fetal
Ductus V D Vmax	Ductus venosus diastole maximum velocity	Fetal
Ductus V S Vmax	Ductus venosus systole maximum velocity	Fetal
Ovarian V Vmax	Ovarian vein maximum velocity	Maternal
Ovarian V Vmin	Ovarian vein minimum velocity	Maternal

Early Obstetric M-mode Measurement Labels

Measurement Label	Definition	Fetal or Maternal
Fetal HR	Fetal heart rate	Fetal

Obstetric 2D-mode Measurement Labels

The ultrasound system organizes the measurement labels into the following categories:

- **Fetal** lists fetal measurement labels.
- **Maternal** lists maternal measurement labels.
- **Fetus A** lists measurement labels for the fetus.
- **Add Fetus** displays the patient registration form to add a fetus when multiple fetuses are present.

2D-mode Labels for Estimating Gestational Age

Measurement Label	Definition
BPD	Biparietal diameter
HC	Head circumference
AC	Abdominal circumference
CRL	Crown rump length
Binoc D	Binocular distance (outer orbital diameter)
GSD	Gestational sac diameter
HL	Humerus length
Radius	Radius
Ulna	Ulna length
FL	Femur length
Tibia	Tibia length
Fibula	Fibula
Clavicle	Clavicle length
Foot	Foot length
OFD	Occipital frontal diameter
FTA	Fetal trunk area
Facial Angle	Facial angle

2D-mode Labels for Obstetrical Structures

Measurement Label	Definition	Fetal or Maternal
AFI - Q1	Amniotic Fluid Index, numbered 1 through 3; quadrant numbered 1 through 4	Fetal
APAD	Anterior-posterior abdominal diameter	Fetal
APTD	Anterior-posterior trunk diameter	Fetal
TAD	Transverse abdominal diameter	Fetal
TC	Thoracic circumference	Feta
Cerebellum	Trans cerebellar diameter	Fetal
HW	Hemispheric width	Fetal
Radius	Radius length	Fetal
Yolk Sac	Yolk sac length	Fetal
Cist Magna	Cisterna magna length	Fetal
Nuchal Thickness	Nuchal fold thickness	Fetal
Cervix (TA)	Cervix, transabdominal	Maternal
Kidney	Kidney	Maternal
Ovarian A	Ovarian artery	Maternal
Uterine A	Uterine artery	Maternal
Fetal Kidney	Fetal kidney	Fetal
TA	Thoracic area	Fetal
IOD	Interocular distance (inner orbital diameter)	Fetal
Nasal Bone	Nasal bone length	Fetal
CSP	Cavum septum pellucidum	Fetal
Fibula	Fibula length	Fetal
TTD	Transverse thoracic diameter	Fetal
Ovarian V	Ovarian vein	Maternal
Ovary (TA)	Ovary, transabdominal	Maternal
Cyst 1	Cyst, numbered 1 through 5	Maternal
Mass 1	Mass, numbered 1 through 5	Maternal
Fibroid 1	Fibroid, numbered 1 through 5	Maternal
LV-A	Anterior horn lateral ventricular width	Fetal
Lat Vent	Lateral ventricle width	Fetal
LV-P	Posterior horn lateral ventricular width	Fetal

Obstetric Doppler Measurement Labels

You can perform Doppler measurements using the velocity or frequency scale. The system displays results in the appropriate measurement units.

Measurement Label	Definition	Fetal or Maternal
Fetal HR	Fetal heart rate	Fetal
Aorta	Fetal aorta	Fetal
MCA	Middle cerebral artery	Fetal
Umb A	Umbilical artery	Fetal
Ovarian A	Ovarian artery	Maternal
Uterine A	Uterine artery	Maternal
Ductus V A Vmax	Ductus venosus atrial systole maximum velocity	Fetal
Ductus V D Vmax	Ductus venosus diastole maximum velocity	Fetal
Ductus V S Vmax	Ductus venosus systole maximum velocity	Fetal
Ovarian V Vmax	Ovarian vein maximum velocity	Maternal
Ovarian V Vmin	Ovarian vein minimum velocity	Maternal

Obstetric M-mode Measurement Labels

Measurement Label	Definition	Fetal or Maternal
Fetal HR	Fetal heart rate	Fetal

Obstetric Calculation Labels

Obstetric, 2D-mode

Calculation Label	Definition	Required Measurements
CTR Area	Cardiothoracic area ratio of the fetal heart area to the fetal thoracic	Heart area Thoracic area
CI	Cephalic index $CI = (BPD / OFD) * 100$	Biparietal diameter Occipital-frontal diameter
AFI	Amniotic fluid index, numbered 1 through 4	Amniotic fluid index, quadrants 1 through 4
BPDa	Area-corrected biparietal diameter	Biparietal diameter
APTDxTTD	Fetal thoracic cross-sectional area	Anterior-posterior trunk diameter Transverse thoracic diameter
APADxTAD	Abdominal cross-sectional area	Anterior-posterior trunk diameter Thoracic area diameter
Fetal Kidney	Ellipsoid volume	Length Anterior to posterior diameter

Obstetric, Doppler

Calculation Label	Definition	Required Measurements
Rt CP Ratio	Ratio of the middle cerebral artery pulsatility index to the umbilical artery pulsatility index	Middle cerebral artery
Lt CP Ratio		Umbilical artery

Fetal Echo

The ultrasound system organizes the measurement labels into the following categories and sub-categories:

- **General** lists general measurement labels.
 - **General** lists general measurement labels.
 - **Z-Score** lists measurement labels calculating a Z-score.
- **Systemic Side** lists systemic side measurement labels.
 - **LV** lists left ventricle measurement labels.
 - **LA** lists left atrium measurement labels.
 - **MV** lists mitral valve measurement labels.
 - **Aorta** lists aorta measurement labels.
 - **Shunts** lists shunts measurements labels.
- **Pulmonic Side** lists pulmonic side measurement labels.
 - **RV** lists right ventricle measurement labels.
 - **RA** lists right atrium measurement labels.
 - **TV** lists tricuspid valve measurement labels.
 - **PA** lists pulmonary artery measurement labels.
 - **Shunts** lists shunts measurement labels.
- **Veins** lists labels for measuring pulmonary veins and inferior-superior vena cava.
- **Truncus Arteriosus** lists truncus arteriosus measurement labels.
- **OB** lists obstetric measurement labels.

Measurement labels are organized on the touch screen as specified in the configuration settings. Measurement labels can include the location, view, or dimension of the anatomy, for example, systole or diastole.

2D-mode General Fetal Echo Measurement Labels

Measurement Label	Definition
Ao Asc	Ascending aorta
Ao Desc	Descending aorta
Ao Root	Aortic root
Ductus A 3VV	Ductus arteriosus, three vessel view
LA	Left atrium
LPA	Left pulmonary artery
LV	Left ventricle
MPA	Main pulmonary artery
RV	Right ventricle
RA	Right atrium
RPA	Right pulmonary artery
LVOT CO	Left ventricular outflow tract, cardiac output
RVOT CO	Right ventricular outflow tract, cardiac output
Ao Isthmus 3VV	Aortic isthmus, three vessel view
Ao Isthmus Sagittal	Aortic isthmus sagittal
AoV Annulus	Aortic valve annulus
MV Annulus	Mitral valve annulus
PV Annulus	Pulmonary valve annulus
TV Annulus	Tricuspid valve annulus
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

Doppler General Fetal Echo Measurement Labels

Measurement Label	Definition
Ao Desc Vmax	Descending aorta, maximum velocity
AoV Vmax	Aortic valve, maximum velocity
Ductus Art	Ductus arteriosus resistive index
LPA Vmax	Left pulmonary artery, maximum velocity
LVOT Vmax	Left ventricular outflow tract, maximum velocity
MR Vmax	Mitral valve regurgitation, maximum velocity
MV A Vmax	Mitral valve A wave, maximum velocity
MV E Vmax	Mitral valve E wave, maximum velocity
PR Interval	Time interval P-R
PV Vmax	Pulmonary valve, maximum velocity
RPA Vmax	Right pulmonary artery, maximum velocity
RVOT Vmax	Right ventricular outflow tract, maximum velocity
TR Vmax	Tricuspid valve regurgitation, maximum velocity
TV Vmax	Tricuspid valve, maximum velocity
LVOT CO	Left ventricular outflow tract, cardiac output
RVOT CO	Right ventricular outflow tract, cardiac output
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

2D-mode Pulmonic Side Fetal Echo Measurement Labels

Measurement Label	Definition
RV	Right ventricle
RVFW	Right ventricular free wall
RVID	Right ventricular internal diameter
RVOT	Right ventricular outflow tract
RVOT CO	Right ventricular outflow tract, cardiac output calculation
Cor Sinus	Coronary sinus
IVC	Inferior vena cava
RA	Right atrium
SVC	Superior vena cava
TV Annulus	Tricuspid valve annulus
LPA	Left pulmonary artery
MPA	Main pulmonary artery
PV Area (VTI)	Pulmonary valve area, velocity time integral calculation
PV Annulus	Pulmonary valve annulus
RPA	Right pulmonary artery
A Septum	Atrial septum
ASD	Atrial septal defect
AVSD	Atrioventricular septal defect
Ductus A 3VV	Ductus arteriosus, three vessel view
PFO	Patent foramen ovale
VSD	Ventricular septal defect
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

Doppler Pulmonic Side Fetal Echo Measurement Labels

Measurement Label	Definition
RV ET	Right ventricular ejection time
RV IVCT	Right ventricular isovolumic contraction time
RV IVRT	Right ventricular isovolumic relaxation time
RV PEP	Right ventricular pre-ejection period
RVFW A' Vmax	Right ventricular free wall A prime, maximum velocity
RVFW E' Vmax	Right ventricular free wall E prime, maximum velocity
RVFW S' Vmax	Right ventricular free wall S prime, maximum velocity
RVOT Vmax	Right ventricular outflow tract, maximum velocity
RVOT VTI	Right ventricular outflow tract, velocity time integral
RV MPI	Right ventricle, myocardial performance index calculation
RVOT CO	Right ventricular outflow tract, cardiac output calculation
TR Vmax	Tricuspid valve regurgitation, maximum velocity
TR VTI	Tricuspid valve regurgitation, velocity time integral
TV A Vmax	Tricuspid valve A wave, maximum velocity
TV C-O	Tricuspid valve close-open duration
TV Decel Slope	Tricuspid valve deceleration slope
TV E Vmax	Tricuspid valve E wave, maximum velocity
TV Vmax	Tricuspid valve, maximum velocity
TV VTI	Tricuspid valve, velocity time integral
PR Decel Slope	Pulmonary regurgitation deceleration slope
PR ED	Pulmonary regurgitation, end diastolic maximum velocity
PR Interval	Time interval P-R
PR Vmax	Pulmonary regurgitation, maximum velocity
PR VTI	Pulmonary regurgitation, velocity time integral
PV AT	Pulmonary valve, acceleration time
PV ET	Pulmonary valve, ejection time
PV Vmax	Pulmonary valve, maximum velocity
PV VTI	Pulmonary valve, velocity time integral
PV Area (VTI)	Pulmonary valve area, velocity time integral calculation

Measurement Label	Definition
LPA AT	Left pulmonary artery, acceleration time
LPA ET	Left pulmonary artery, ejection time
LPA Vmax	Left pulmonary artery, maximum velocity
LPA VTI	Left pulmonary artery, velocity time integral
MPA Vmax	Main pulmonary artery, maximum velocity
RPA AT	Right pulmonary artery, acceleration time
RPA ET	Right pulmonary artery, ejection time
RPA Vmax	Right pulmonary artery, maximum velocity
RPA VTI	Right pulmonary artery, velocity time integral
ASD Vmax	Atrial septal defect, maximum velocity
AVSD Vmax	Atrioventricular septal defect, maximum velocity
Ductus Art	Ductus arteriosus
Ductus V A Vmax	Ductus venous A wave, maximum velocity
Ductus V D Vmax	Ductus venous D wave, maximum velocity
Ductus V S Vmax	Ductus venous S wave, maximum velocity
Ductus V VTI	Ductus venous, velocity time integral
PFO Vmax	Patent foramen ovale, maximum velocity
VSD Vmax	Ventricular septal defect, maximum velocity
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

2D-mode Systemic Side Fetal Echo Measurement Labels

Measurement Label	Definition
LV	Left ventricle
LVID	Left ventricular internal diameter
LVOT	Left ventricular outflow tract
PE	Pericardial effusion
LV d Series	Left ventricle diastolic measurement series
LV s Series	Left ventricle systolic measurement series
LVOT CO	Left ventricular outflow tract, cardiac output calculation
LA	Left atrium
MR VC	Mitral valve regurgitation vena contracta
MV Annulus	Mitral valve annulus
MV Planimetry	Mitral valve planimetry
MV Area (VTI)	Mitral valve area, velocity time integral calculation
Ao Abd	Abdominal aorta
Ao Arch	Aortic arch
Ao Asc	Ascending aorta
Ao Coarct	Aortic coarctation
Ao Desc	Descending aorta
Ao Isthmus 3VV	Aortic isthmus, three vessel view
Ao Isthmus Sagittal	Aortic isthmus sagittal
Ao Root	Aortic root
AoV Annulus	Aortic root valve annulus
AoV Area (VTI)	Aortic valve area, velocity time integral calculation
A Septum	Atrial septum
ASD	Atrial septal defect
AVSD	Atrioventricular septal defect
Ductus A 3VV	Ductus arteriosus, three vessel view
PFO	Patent foramen ovale
VSD	Ventricular septal defect
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

Doppler Systemic Side Fetal Echo Measurement Labels

Measurement Label	Definition
LV ET	Left ventricular ejection time
LV IVCT	Left ventricular isovolumic contraction time
LV IVRT	Left ventricular isovolumic relaxation time
LV PEP	Left ventricular pre-ejection period
LVOT Vmax	Left ventricular outflow tract, maximum velocity
LVOT VTI	Left ventricular outflow tract, velocity time integral
PR Interval	Time interval P-R
LV MPI	Left ventricle, myocardial performance index calculation
LVOT CO	Left ventricular outflow tract, cardiac output calculation
MR Vmax	Mitral valve regurgitation, maximum velocity
MR VTI	Mitral valve regurgitation, velocity time integral
MV A	Mitral valve A wave duration
MV A Vmax	Mitral valve A wave, maximum velocity
MV C-O Duration	Mitral valve close-open duration
MV Decel Slope	Mitral valve deceleration slope
MV E Vmax	Mitral valve E wave, maximum velocity
MV Vmax	Mitral valve, maximum velocity
MV VTI	Mitral valve, velocity time integral
MV Area (VTI)	Mitral valve area, velocity time integral calculation
AoV Accel Slope	Aortic valve acceleration slope
AoV ET	Aortic valve ejection time
AoV Vmax	Aortic valve, maximum velocity
AoV VTI	Aortic valve velocity time integral
AR Decel Slope	Aortic regurgitation deceleration slope
AR ED	Aortic regurgitation end diastole
AR VTI	Aortic regurgitation velocity time integral

Measurement Label	Definition
AoV Area (VTI)	Aortic valve area, velocity time integral calculation
Ao Arch Vmax	Aortic arch, maximum velocity
Ao Asc Vmax	Ascending aorta, maximum velocity
Ao Coarct AT	Aortic coarctation acceleration time
Ao Coarct ET	Aortic coarctation ejection time
Ao Coarct Vmax	Aortic coarctation, maximum velocity
Ao Coarct VTI	Aortic coarctation velocity time integral
Ao Desc AT	Descending aorta acceleration time
Ao Desc ET	Descending aorta ejection time
Ao Desc Vmax	Descending aorta, maximum velocity
Ao Desc VTI	Descending aorta, velocity time integral
LAD D Vmax	Left anterior descending coronary artery D wave, maximum velocity
LAD S Vmax	Left anterior descending coronary artery S wave, maximum velocity
Left Main D Vmax	Left main coronary artery D wave, maximum velocity
Left Main S Vmax	Left main coronary artery S wave, maximum velocity
RCA D Vmax	Right coronary artery D wave, maximum velocity
RCA S Vmax	Right coronary artery S wave, maximum velocity
ASD Vmax	Atrial septal defect, maximum velocity
AVSD Vmax	Atrioventricular septal defect, maximum velocity
Ductus Art	Ductus arteriosus
Ductus V A Vmax	Ductus venous A wave, maximum velocity
Ductus V D Vmax	Ductus venous D wave, maximum velocity
Ductus V S Vmax	Ductus venous S wave, maximum velocity
Ductus V VTI	Ductus venous, velocity time integral
PFO Vmax	Patent foramen ovale, maximum velocity
VSD Vmax	Ventricular septal defect, maximum velocity
Qp	Pulmonic stroke volume
Qs	Systemic stroke volume

2D-mode Truncus Arteriosus Fetal Echo Measurement Labels

Measurement Label	Definition
TruncArt V Annulus	Truncal valve annulus
Truncus Art	Truncus arteriosus

Doppler Truncus Arteriosus Fetal Echo Measurement Labels

Measurement Label	Definition
TruncArt V AT	Truncal valve, acceleration time
TruncArt V ET	Truncal valve, ejection time
TruncArt V Regurg Decel Slope	Truncal valve regurgitation, deceleration slope
TruncArt V Regurg ED Velocity	Truncal valve regurgitation, end diastolic maximum velocity
TruncArt V Regurg VTI	Truncal valve regurgitation, velocity time integral
TruncArt V Vmax	Truncal valve, maximum velocity
TruncArt V VTI	Truncal valve, velocity time integral

2D-mode Veins Fetal Echo Measurement Labels

Measurement Label	Definition
IVC	Inferior vena cava
LLPV	Left lower pulmonary vein
LUPV	Left upper pulmonary vein
RLPV	Right lower pulmonary vein
RUPV	Right upper pulmonary vein
SVC	Superior vena cava

Doppler Veins Fetal Echo Measurement Labels

Measurement Label	Definition
LLPV A Duration	Left lower pulmonary vein A wave duration
LLPV A Vmax	Left lower pulmonary vein A wave, maximum velocity
LLPV D Vmax	Left lower pulmonary vein D wave, maximum velocity
LLPV D VTI	Left lower pulmonary vein D wave, velocity time integral
LLPV S Vmax	Left lower pulmonary vein S wave, maximum velocity
LLPV S VTI	Left lower pulmonary vein S wave, velocity time integral
LUPV A Duration	Left upper pulmonary vein A wave duration
LUPV A Vmax	Left upper pulmonary vein A wave, maximum velocity
LUPV D Vmax	Left upper pulmonary vein D wave, maximum velocity
LUPV D VTI	Left upper pulmonary vein D wave, velocity time integral
LUPV S Vmax	Left upper pulmonary vein S wave, maximum velocity
LUPV S VTI	Left upper pulmonary vein S wave, velocity time integral
RLPV A Duration	Right lower pulmonary vein A wave duration
RLPV A Vmax	Right lower pulmonary vein A wave, maximum velocity
RLPV D Vmax	Right lower pulmonary vein D wave, maximum velocity
RLPV D VTI	Right lower pulmonary vein D wave, velocity time integral
RLPV S Vmax	Right lower pulmonary vein S wave, maximum velocity
RLPV S VTI	Right lower pulmonary vein S wave, velocity time integral
RUPV A Duration	Right upper pulmonary vein A wave duration
RUPV A Vmax	Right upper pulmonary vein A wave, maximum velocity
RUPV D Vmax	Right upper pulmonary vein D wave, maximum velocity
RUPV D VTI	Right upper pulmonary vein D wave, velocity time integral
RUPV S Vmax	Right upper pulmonary vein S wave, maximum velocity
RUPV S VTI	Right upper pulmonary vein S wave, velocity time integral
Ductus V A Vmax	Ductus venous A wave, maximum velocity
Ductus V D Vmax	Ductus venous D wave, maximum velocity
Ductus V S Vmax	Ductus venous S wave, maximum velocity
Ductus V VTI	Ductus venous, velocity time integral
IVC Vmax	Inferior vena cava, maximum velocity
LHV Vmax	Left hepatic vein, maximum velocity
MHV Vmax	Middle hepatic vein, maximum velocity
RHV Vmax	Right hepatic vein, maximum velocity
SVC Vmax	Superior vena cava, maximum velocity

2D-mode Obstetric Fetal Echo Measurement Labels

Measurement Label	Definition
AC	Abdominal circumference
AFI - Q1	Amniotic fluid index for the quadrant, numbered 1 through 4
APTD	Anterior posterior trunk diameter
BPD	Biparietal diameter
Cardiac Axis	Cardiac axis
Cerebellum	Cerebellum
FL	Femur length
HA	Heart area
HC	Head circumference
Heart Circum	Heart circumference
HL	Humerus length
HW	Hemispheric width
Lat Vent	Lateral ventricle
OFD	Occipital frontal diameter
TA	Thoracic area
TC	Thoracic circumference
TTD	Transverse thoracic diameter

Doppler Obstetric Fetal Echo Measurement Labels

Measurement Label	Definition
MCA	Middle cerebral artery
Umbilical A	Umbilical artery
Umbilical V A Vmax	Umbilical vein A wave, maximum velocity
Umbilical V D Vmax	Umbilical vein D wave, maximum velocity
Umbilical V S Vmax	Umbilical vein S wave, maximum velocity
Umbilical V VTI	Umbilical vein, velocity time integral
Uterine A	Uterine artery

M-mode Fetal Echo Measurement Labels

Measurement Label	Definition
LVID	Left ventricular internal diameter
MAPSE	Mitral annular plane systolic excursion
PR Interval	Time interval P-R
RVFW	Right valve free wall
RVID	Right ventricular internal diameter
TAPSE	Tricuspid annular plane systolic excursion
LV d Series	Left ventricle diastolic measurement series
LV s Series	Left ventricle systolic measurement series

Fetal Echo Calculation Labels

Calculations may require measurements in the same unit.

Fetal Echo, 2D-mode

Calculation Label	Definition	Required Measurements
LV%FS	Left ventricular percentage of fractional shortening	Left ventricular internal diameter at diastole Left ventricular internal diameter at systole
CTR Circum	Cardiothoracic circumference ratio	Heart circumference Thoracic circumference
CTR Area	Cardiothoracic area ratio	Fetal heart area Thoracic area
Ao Root/MPA Diam	Ratio of the aortic root diameter to the main pulmonary artery diameter	Aortic root diameter Main pulmonary artery diameter
AoV/PV Annulus s	Ratio of the aortic valve annulus systole to the pulmonary valve annulus systole	Aortic valve annulus diameter systole Pulmonary valve annulus diameter systole
AoV Annulus Area s	Aortic valve annulus area systole derived	Aortic valve annulus diameter systole
AoV SV	Aortic valve stroke volume	Aortic valve annulus area systole Aortic valve velocity time integral
Cor Sinus Length/Diam	Coronary sinus length-to-diameter ratio	Coronary sinus length Coronary sinus diameter
LA A-P Diam s/Ao Root	Ratio of the left atrium anterior to posterior diameter systole to the aortic root diameter	Left atrium anterior to posterior diameter systole Aortic root diameter
LA/RA Major d	Ratio of the left atrium major diastole to the right atrium major diastole	Left atrium major diastole Right atrium major diastole
LA %FAC	Left atrium percentage of fractional area change	Left atrium fractional area change diastole Left atrium fractional area change systole
IVS/LVPW	Ratio of the interventricular septum to the left ventricular posterior wall thickness	Interventricular septum diastole Left ventricle posterior wall thickness diastole
IVS %Thick	Interventricular septal percentage of thickness	Interventricular septum diastole Interventricular septum systole

Calculation Label	Definition	Required Measurements
LVPW %Thick	Left ventricle posterior wall percentage of thickness	Left ventricle posterior wall thickness diastole Left ventricle posterior wall thickness systole
LV/RV Major d	Ratio of the left ventricle major diastole to the right ventricle major diastole	Left ventricle major diastole Right ventricle major diastole
LVOT Area s	Left ventricular outflow tract area systole derived	Left ventricle outflow tract diameter systole
MV Annulus Area d	Mitral valve annulus area diastole derived	Mitral valve annulus diameter diastole
MV/TV Annulus d	Ratio of the mitral valve annulus diameter diastole to the tricuspid valve annulus diameter	Mitral valve annulus diameter diastole Tricuspid valve annulus diastole
MV SV	Mitral valve stroke volume	Mitral valve annulus diameter diastole Mitral valve annulus velocity time integral
PV Annulus Area s	Pulmonary valve annulus area systole derived	Pulmonary valve annulus systole
PV SV	Pulmonary valve stroke volume	Pulmonary valve annulus systole Pulmonary valve velocity time integral
RVOT Area s	Right ventricular outflow tract area systole derived	Right ventricle outflow tract diameter systole
PFO/A Septum Length	Ratio of the patent foramen ovale to the atrial septum length	Patent foramen ovale diameter Atrial septum length
Pulm Side Area	Pulmonic side valve area derived	Pulmonic side diameter velocity time integral
Sys Side Area	Systemic side valve area derived	Systemic side diameter velocity time integral
TV Annulus Area d	Tricuspid valve annulus area diastole derived	Tricuspid valve annulus diastole
TV SV	Tricuspid valve stroke volume	Tricuspid valve annulus diastole Tricuspid valve velocity time integral
TruncArt V Annulus Area s	Truncus arteriosus valve annulus area systole derived	Truncal valve annulus diameter systole

Fetal Echo, Doppler

Calculation Label	Definition	Required Measurements
AoV AT/ET	Ratio of the aortic valve acceleration time to the ejection time	Aortic valve acceleration time Aortic valve ejection time
AoV Area (VTI)	Aortic valve area velocity time integral	Left ventricle outflow tract area systole Left ventricle outflow tract velocity time integral Aortic valve velocity time integral
AoV Area (Vmax)	Aortic valve area maximum velocity	Left ventricle outflow tract area systole Left ventricle outflow tract maximum velocity Aortic valve maximum velocity
AR PHT	Aortic regurgitation pressure half time	Aortic regurgitation deceleration time
MV E/A	Ratio of the mitral valve E wave to the A wave	Mitral valve E wave maximum velocity Mitral valve A wave maximum velocity
MV A/E	Ratio of the mitral valve A wave to the E wave	Mitral valve A wave maximum velocity Mitral valve E wave maximum velocity
LV MPI	Left ventricle myocardial performance index	Mitral valve close-open duration Left ventricle ejection time
LVOT SV	Left ventricular stroke volume	Left ventricular outflow tract diameter systole Left ventricular outflow tract velocity time integral
LV CO	Left ventricular outflow tract cardiac output	Left ventricular outflow tract stroke volume Left ventricular outflow tract fetal heart rate
MV PHT	Mitral valve pressure half time	Mitral valve deceleration time
MV Area (PHT)	Mitral valve area, pressure half time	Mitral valve pressure half time
MV Area (VTI)	Mitral valve area, velocity time integral	Left ventricle outflow tract area systole Left ventricle outflow tract velocity time integral Mitral valve velocity time integral

Calculation Label	Definition	Required Measurements
MR RF	Mitral valve regurgitant fraction	Mitral regurgitation volume Mitral valve stroke volume
MR Vol	Mitral valve regurgitant volume	Mitral valve stroke volume Left ventricle outflow tract stroke volume
PV AT/ET	Ratio of the pulmonary valve AT wave to the ET wave	Pulmonary valve acceleration time Pulmonary valve ejection time
PV Area (Vmax)	Pulmonary valve area, maximum velocity	Right ventricle outflow tract area systole Right ventricle outflow tract maximum velocity Pulmonary valve maximum velocity
PV Area (VTI)	Pulmonary valve area, velocity time integral	Right ventricle outflow tract area systole Right ventricle outflow tract velocity time integral Pulmonary valve velocity time integral
RUPV A Dur - MV A Dur	Right upper pulmonary vein A wave duration minus the mitral valve A wave duration	Right upper pulmonary vein A wave duration Mitral valve A wave duration
RUPV S/D Vmax	Ratio of the right upper pulmonary vein S wave maximum velocity to the D wave maximum velocity	Right upper pulmonary vein S wave maximum velocity Right upper pulmonary vein D wave maximum velocity
RUPV Sys Filling Fraction	Right upper pulmonary vein systolic filling fraction	Right upper pulmonary vein systole velocity time integral Right upper pulmonary vein diastole velocity time integral
RLPV A Dur - MV A Dur	Right lower pulmonary vein A wave duration minus the mitral valve A wave duration	Right lower pulmonary vein A wave duration Mitral valve A wave duration
RLPV S/D Vmax	Ratio of the right lower pulmonary vein S wave maximum velocity to the D wave maximum velocity	Right lower pulmonary vein S wave maximum velocity Right lower pulmonary vein D wave maximum velocity
RLPV Sys Filling Fraction	Right lower pulmonary vein systolic filling fraction	Right lower pulmonary vein systole velocity time integral Right lower pulmonary vein diastole velocity time integral

Calculation Label	Definition	Required Measurements
LUPV A Dur - MV A Dur	Left upper pulmonary vein A wave duration minus the mitral valve A wave duration	Left upper pulmonary vein A wave duration Mitral valve A wave duration
LUPV S/D Vmax	Ratio of the left upper pulmonary vein S wave maximum velocity to the D wave maximum velocity	Left upper pulmonary vein S wave maximum velocity Left upper pulmonary vein D wave maximum velocity
LUPV Sys Filling Fraction	Left upper pulmonary vein systolic filling fraction	Left upper pulmonary vein S wave velocity time integral Left upper pulmonary vein D wave velocity time integral
LLPV A Dur - MV A Dur	Left lower pulmonary vein A wave duration minus the mitral valve A wave duration	Left lower pulmonary vein A wave duration Mitral valve A wave duration
LLPV S/D Vmax	Ratio of the left lower pulmonary vein S wave maximum velocity to the D wave maximum velocity	Left lower pulmonary vein A wave maximum velocity Left lower pulmonary vein D wave maximum velocity
LLPV Sys Filling Fraction	Left lower pulmonary vein systolic filling fraction	Left lower pulmonary vein S wave velocity time integral Left lower pulmonary vein D wave velocity time integral
RVOT SV	Right ventricular outflow tract stroke volume	Right ventricle outflow tract diameter Right ventricle outflow tract velocity time integral
RVOT CO	Right ventricular outflow tract cardiac output	Right ventricle outflow tract stroke volume Right ventricle outflow tract fetal heart rate
RV MPI	Right ventricle myocardial performance index	Tricuspid valve close-open duration Right ventricle ejection time
RVSP (TR)	Right ventricle systolic pressure, tricuspid regurgitation	Right atrial pressure, user-entered value Tricuspid regurgitation peak gradient

Calculation Label	Definition	Required Measurements
Pulm Side SV	Pulmonary side valve stroke volume	Pulmonary side valve area Pulmonary side velocity time integral
Pulm Side CO	Pulmonary side valve cardiac output	Pulmonary side valve stroke volume Pulmonary side fetal heart rate
Sys Side SV	Systemic side valve stroke volume	Systemic side valve area Systemic side velocity time integral
Sys Side CO	Systemic side valve cardiac output	Systemic side valve stroke volume Systemic side fetal heart rate
Qp/Qs (SV)	Ratio of the Qp to the Qs using stroke volume	Pulmonary side stroke volume Systemic side stroke volume
Qp/Qs (CO)	Ratio of the Qp to the Qs using cardiac output	Pulmonary side cardiac output Systemic side cardiac output
TV E/A	Ratio of the tricuspid valve E wave to the A wave	Tricuspid valve E wave maximum velocity Tricuspid valve A wave maximum velocity
TV PHT	Tricuspid valve pressure half time	Tricuspid valve deceleration time
TruncArt V Regurg PHT	Truncus arteriosus valve regurgitation pressure half time	Truncal valve regurgitation deceleration time
Ductus V S/D Vmax	Ratio of the ductus venosus systole velocity maximum to the diastole velocity maximum	Ductus venosus systole maximum velocity Ductus venosus diastole maximum velocity
CCO	Combined cardiac output	Left ventricle outflow tract cardiac output Right ventricle outflow tract cardiac output

Fetal Echo, Doppler Tissue Imaging

Calculation Label	Definition	Required Measurements
MV E/E' (L)	Ratio of the mitral valve E wave maximum velocity to the E' wave of lateral left ventricular wall	Mitral valve E maximum velocity Mitral valve E' maximum velocity lateral
MV E'/A' (L)	Ratio of the mitral valve lateral E' wave maximum velocity to the lateral A' wave maximum velocity	Mitral valve E' maximum velocity lateral Mitral valve A' maximum velocity lateral
MV E/E' (M)	Ratio of the mitral valve E wave to the E' wave of medial left ventricular wall	Mitral valve E maximum velocity Mitral valve E' maximum velocity medial
MV E'/A' (M)	Ratio of the mitral valve E' wave to the A' wave of medial left ventricular wall	Mitral valve E' maximum velocity medial Mitral valve A' maximum velocity medial
RVFW E/E'	Ratio of the tricuspid valve E wave to the E' wave of right ventricular free wall	Tricuspid valve E maximum velocity Right ventricular free wall E' maximum velocity

Fetal Echo, M-mode

Calculation Label	Definition	Required Measurements
LV Mass	Left ventricle mass	Left ventricular internal diameter diastole Left ventricular posterior wall diastole Interventricular septum diastole
LV EF	Left ventricle ejection fraction, Teichholz	Left ventricle volume diastole Left ventricle volume systole
LV Vol d	Left ventricle volume diastole, Teichholz	Left ventricular internal diameter diastole
LV Vol s	Left ventricle volume systole, Teichholz	Left ventricular internal diameter systole
LV SV	Left ventricle stroke volume, Teichholz	Left ventricle volume diastole Left ventricle volume systole
LV CO	Left ventricle cardiac output, Teichholz	Left ventricle stroke volume Fetal heart rate

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