Vevo MD

Legal Notices

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Caution: United States federal law restricts this device to sale by or on the order of a physician.

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Contents

About the Vevo MD Imaging System User Manual

The *Vevo MD Imaging System User Manual* is intended for a user familiar with ultrasound; it does not provide training in sonography, ultrasound or clinical practices. Before using the Vevo MD Imaging System, training should be completed.

This manual provides detailed descriptions and procedures for configuring and using the system. The first half of the manual provides an overview of the system and the commonly used features, regardless of which imaging mode you are using. The second part of the manual covers image acquisition and the detailed analysis of your images, in each imaging mode.

Document Conventions

WARNING: Introduces precautions that prevent injury or death.

Caution: Introduces precautions that prevent damage to the equipment.

Important: Introduces important information that you need to be aware of.

Note: Introduces helpful information for you to better understand the subject matter.

- Numbered steps in procedures must be performed in order

- Bulleted lists in procedures can be performed in any order

- The step in a single-step procedure begins with ♦

- Lower-alpha lists display choices

Getting More Information

- *Vevo MD Getting Started Guide* printable PDF version provided with Vevo MD Imaging System

- Technical Support: See "Contact information" on page 415

Getting started

> **WARNING:** Do not use the system if it exhibits erratic or inconsistent behavior. Such behavior may indicate a system failure. Contact **"Technical support"** on page 415.

About the Vevo MD Imaging System

The Vevo MD Imaging System is a software-controlled device that acquires and displays high-resolution, real-time ultrasound images. Available features depend on your system configuration, transducer, and operational mode.

Basic Operating Steps

1 Connect a transducer. See "Transducers" on page 39.

2 Turn on the system. See "Starting up and shutting down the system" on page 22.

3 Select an exam type. See "Exam types" on page 55.

4 Scan. See "Scanning" on page 197.

5 Enter Patient information. See "Patient" on page 165.

6 Archive or export exams. See "Archiving exams" on page 95 or "Exporting patient exams" on page 190.

> **WARNING:** Use only the power cord provided by FUJIFILM SonoSite with the system.

> Caution: If the equipment is used in a manner not specified by the manufacturer, you void the terms of the product warranty, and the protection provided by the equipment may be impaired.

Quick start tutorial

This tutorial provides a high-level overview for acquiring and analyzing an image and then exporting your data.

> **WARNING:** Before using the Vevo MD Imaging System users must read and observe the Safety Warning and Precautions listed in .

To acquire and export a 2D image and analysis

1 Turn the system on. See "Starting up and shutting down the system" on page 22.

2 Log in, or use the **Guest** button. See "Logging on for the first time" on page 147.

3 Connect a transducer (see "Transducers" on page 39), and select an exam type. The system begins acquiring 2D data. See "Exam types" on page 55.

4 A new patient exam is created. To change the details of the exam, see "Editing patient information" on page 182.

5 Refine your image using the various controls, see "Scanning" on page 197 and "Controls in 2D" on page 222.

6 Tap **Freeze** to stop data acquisition, see "Freeze" on page 268. To re-start acquisition, tap **Unfreeze**.

7 To place a measurement on a paused clip, move to a frame where you would like to place a measurement, tap **Measurements** and select your measurement type. Place the measurement by dragging the calipers. See "Measurements" on page 282.

8 Tap **Save Frame** to save a frame. See "Saving images" on page 269.

9 Tap **Review Images** to review saved images. Double tap a thumbnail to load that image into review.

Vevo MD Imaging System Overview

The Vevo MD Imaging System houses the electronics, software, and monitors, that control the transducer functions, and processes the image data.

The Vevo MD Imaging System provides two imaging modes: Frame-based imaging mode and Time-Based imaging mode.

Frame-based imaging mode captures images in frames, based on two-dimensional 2D data. Frame-based mode includes:

- 2D

- Color Doppler Mode

Time-based imaging mode captures images measured in seconds, based on unique source data characteristics. Time-based mode includes:

- M-Mode

Moving and setting up the system

Remove the system from the packing box, see the *Vevo MD Getting Started Guide* included with the Vevo MD Imaging System.

Wheel the system to the intended destination by following these instructions—"Moving the system" on the facing page.

Before moving the system, read the warnings and cautions below to avoid injury to yourself and others, or the system.

WARNING: Before you complete the following step(s), ensure that the main power is off and that the Vevo MD Imaging System is not connected to any AC outlet.

WARNING: Do not move the system when the plug is connected to the power outlet.

WARNING: Keep the clinical display and control panel monitors folded until you have reached your destination. When moving the system, ensure your view is not obstructed.

WARNING: The glass used on the clinical display is very fragile, and can shatter upon impact causing cuts to the user. Adjust, move and position the clinical display monitor with care.

WARNING: Do not modify the attachment plug or use an adapter. This could cause an electrical hazard. If you need to use a different plug, contact a Technical Support Representative. See "Technical support" on page 415.

WARNING: When transporting your system, push forward on the grab bars instead of pushing or leaning on the clinical monitor. FUJIFILM SonoSite recommends having two people to move a system—one positioned at the front of the system and one positioned at the back of the system, both using the available grab bars.

> **WARNING: Lock the wheels whenever the system is unattended or stationary.**

> Caution: Care should also be taken when handling heavy items, as it is easy to crush limbs when lifting or moving them.

> Caution: Use extra care when moving the system over thresholds, inclines and on or off elevators.

> Caution: Folding the clinical display monitor past the horizontal position may damage the monitor or support.

> Caution: Do not place anything on the collapsed clinical display monitor.

Moving the system

Before moving the system, remove the cord from the power outlet and fold both monitors.

1 Turn off the system using the power button.

2 Turn off the main power switch.

3 Unplug the AC power cord from the power outlet at the bottom of the stand base.

4 Adjust the control panel angle to the lowest position.

5 Grasp the clinical display monitor on both sides, and then align it squarely above the control panel.

6 Fold the clinical display monitor downward over the control panel until it is horizontal.

7 Using one person at the front of the system and one person at the back of the system, use the grab bars provided to push or pull the system—do not push downward on the grab bar.

Clinical display collapsed for system transport

8 When the system is at its desired location, lock the wheels by pressing down on the lever on the wheels.

9 Grasp the clinical display monitor on both sides and fold it upward.

10 Grasp the clinical display monitor on both sides and tilt or rotate it to adjust its angle.

11 Grasp both sides of the control panel and pull it forward or push it backward to the desired angle.

Setting up the system

Ergonomic scanning guidelines are provided in the section "Ergonomic safety" on page 367, and are intended to assist you in setting up the system so you are comfortable and effective when using the Vevo MD Imaging System.

Review the warnings and cautions in this section when considering a location to set up your system.

WARNING: To avoid the risk of injury, do not operate the system in the presence of flammable gasses or anesthetics. Explosion can result.

WARNING: The power frequency magnetic field should be measured in the intended installation location to assure that it is sufficiently low. If image distortion occurs, it may be necessary to position the Vevo MD Imaging System further from sources of power frequency magnetic fields.

WARNING: Because the only method of completely removing AC power from the system is to disconnect the AC input power cord from the stand base, ensure that you place the system in a location in which you can easily remove the AC input power cord if necessary.

Caution: Avoid increasing the system and transducer connector temperature, do not block the airflow to the front and back of the system.

Starting up and shutting down the system

Before you power up the Vevo MD Imaging System, ensure that the AC power cord is plugged into the wall outlet using the proper plug, and that the main power switch on the back of the bottom of the system base is turned ON.

Description	Symbol
ON	I
OFF	O

Location of power cord connection and main power switch

Location of the Power button

To log in for a typical imaging session

1 Once powered on, the system software starts and displays the Login page.

Welcome. Please login to continue.

Administrator

Password
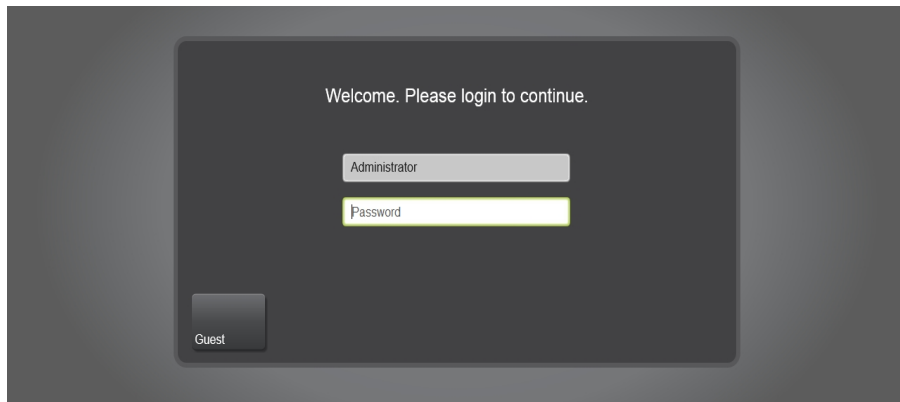
Guest

2 The user ID defaults to the Administrator. If you are not the Administrator tap the **Guest** button, or select your user ID.

3 Enter your password and tap **Log in**. The **Log in** control appears once you enter your password.

4 The home screen is displayed.

Hello, where would you like to start?

PATIENT

Enter patient information for a new exam, or pick a patient from the worklist.

COMPLETED EXAMS

Review, manage, and export completed patient exams.

UHF70
SCAN

Arterial

Small Parts

Superficial

Venous

HELP

Learn how to use the Vevo MD system.
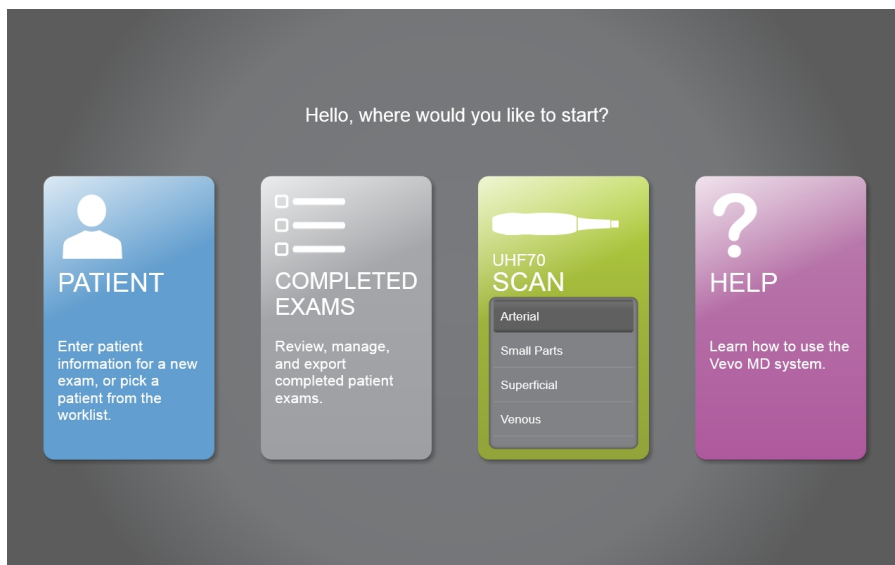
To log out and leave the system in standby

♦ When you want to log out and leave the system running in standby, tap the **Log Out** button located at the top of the control panel.

If the button is not displayed, tap the **More** button to see the other available options.

 or

System components

Vevo MD Imaging System views

Safety warning label

The composite safety warning label is located on the top of the system enclosure.

System enclosure with composite safety warning label location highlighted

Vevo MD Imaging System

REF 51475-10

51475-10

SN 041QKP

041QKP

120V ~50/60 Hz 5A

CSA c US   CE 0086

95.8 kg

2015-07

FUJIFILM SonoSite, Inc.
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Bothell, WA 98021
USA

Made in USA

The following table describes the symbols on the composite safety warning label.

Composite safety warning symbols

Symbol	Description
REF	Catalog number
SN	Serial number
	Electrostatic sensitive device.
CSA	Proof of product compliance (electrical, gas and other safety standards) to North American safety standards.
CE 0086	Conformité Européenne. Product meets the safety requirements of the European Union.
	Read usage instructions. This symbol instructs the user to consult the instructions of the device for information on how to properly use it. See the Vevo MD Getting Started Guide, Vevo MD User Manual or the Vevo MD system's HELP.
95.8 kg	Safe working load mass. Includes system at 95 kg, and a UHF transducer at 0.8 kg.
	Manufacturer

Composite safety warning symbols

Symbol	Description
	European Union WEEE (Waste Electrical and Electronic Equipment) Directive 96/86/EEC. Identifies the directive on waste electrical and electronic equipment. Refer to local regulations for disposal.

System connections

System connectors on bottom of back of stand base. Includes: Fuse box and AC in

Stand base labels

Symbol	Description
	Read usage instructions. This symbol instructs the user to consult the instructions of the device for information on how to properly use it. See the Vevo MD Getting Started Guide, Vevo MD User Manual or the Vevo MD system's HELP.

Symbol	Description
~AC In	Plug the AC power cord in here.
2x7A, 125V 10,000A BREAKING	Fuse label. Displays the type of fuses required for the system voltage; this example displays fuse requirements for a 125V system.

System connectors on back of the clinical display. Includes: HDMI and headphone jack connectors.

System connectors on back of the computer enclosure. Includes: Ethernet and USB connectors.

System connectors on side of system. Includes: USB connectors.

System connector on front of system. Includes:
Transducer interface.

System connectors

Connector	Description
HDMI	Connect a second monitor via an HDMI video cable here. Located on the back of the clinical display. HDMI video output resolution is 1920 x 1080 at 60 Hz. **WARNING: Do not use a monitor connected through the external HDMI for medical diagnosis.**
Headphone jack	Connect a headphone jack for audio left and right output (TRS or TRRS plug configuration). Located on the back of the clinical display.

System connectors

Connector	Description
	Note: Once a headphone jack is connected, the internal speakers and HDMI audio will be disabled.
Fuse box	The fuse box is located between the main power switch and the AC In socket, on the bottom of the back of the system enclosure. The fuse box contains replaceable fuses that must be replaced by a FUJIFILM SonoSite service technician.
AC In	Connect the power cable here. Located on the bottom of the back of the system enclosure.
Ethernet connector	Connect your network data cable here. Located on the back of the computer enclosure.
USB connectors	Connect your USB equipped data storage device here. 2 located on the back and 2 on the side of the computer enclosure.
Transducer interface	Connect the transducer here. Slide the transducer down into the transducer bay and lock into place.

With the exception of the Ethernet network cable, cables being connected to the ultrasound cart must be 3 m (9' 10") in length, or shorter.

Grab bars

Use the front and back grab bars when you are moving the system. Don't use them to lift the system—they are not designed to bear the weight of the system.

Transducer and gel holders

Use the transducer or gel holders located on the left and right sides of the system to store gel bottles and transducers. Store both items facing up.

> Caution: Only use gels with properties similar to *Aquasonic® 100 Ultrasound Transmission Gel* for use with the Vevo MD Imaging System.

Cable hooks

There are four cable hooks included on the Vevo MD Imaging System. Use the front cable hooks to store transducer cables and the back hooks to store Ethernet, power and accessory cables.

Castors

Castors allow the Vevo MD Imaging System to be moved easily. The four castors can be locked using a lever located above each castor. The castors are locked when their levers are down.

> **WARNING: Lock the wheels whenever the system is unattended or stationary.**

Internal data storage devices

The following table describes the range of storage device technology:

- Hard drive 1 (Windows® operating system, Vevo software)

- Hard drive 2 (exam storage)

- USB connectors (4) for exporting image data to an external device

    Note: You do not need to eject a connected USB device before removing.

Network connection

The computer unit includes a 100 MB/s Ethernet network connection.

Clinical display monitor

The LED monitor features an adjustable mounting arm so you can position the monitor according to your needs.

The clinical display shows the ultrasound image as well as details about the imaging session and system status.

To adjust the clinical display monitor, see "Moving and setting up the system" on page 18.

Control panel

The LED monitor can be adjusted at any angle from flat to vertical. The Control Panel provides a touch screen user interface. See "Using the control panel" on page 57.

To adjust the control panel angle

♦ Grasp the sides of the Control Panel, and then pull forward or push backward to the desired angle.

Speakers

Integrated speakers on the clinical display monitor provide audio indications when using the on board keyboard.

Isolation transformer

The isolation transformer that powers the system is located inside the system and protects you and the equipment from electrical shock and power surges.

The Vevo MD Imaging System is designed to operate according to the electrical specifications of the region to which the system has been shipped.

The composite safety warning label on the top of the system enclosure specifies the electrical requirements.

The Vevo MD Imaging System features a power module that integrates the AC In socket, the power switch, and a removable fuse box with replaceable fuses.

To protect the AC mains (the power switch on the system) from over current damage, the Vevo MD Imaging System fuses can be replaced. If the fuse blows, it must be replaced by a FUJIFILM SonoSite service technician.

WARNING: **If you cannot power on the system, unplug the machine immediately and contact a Technical Support Representative. See "Technical support" on page 415.**

Plug

Your Vevo MD Imaging System is equipped with the appropriate plug for a wall outlet. Check the power plug to ensure that the plug is suited for the configuration of your wall outlet.

Important: For optimal system performance, use a dedicated, interference-free grounded or earthed wall outlet.

The power cable is securely connected to the Vevo MD Imaging System with a cable retainer. If you need to remove the power cable from the cart, unlock the retainer.

Power cord connector

Do not modify the attachment plug or use an adapter. This could cause an electrical hazard. If you need to use a different plug, contact a Technical Support Representative. See "Technical support" on page 415.

WARNING: Do not move the system when the plug is connected to the power outlet.

WARNING: Before connecting the system ensure that the voltage is correct. Ensure the power cable is undamaged before plugging the system directly into the wall outlet. Do not connect the system's power supply to an MPSO or extension cord. The voltage is specified on the composite safety warning label, located on the top of the system enclosure.

Transcducers

> **WARNING:** The Vevo MD Imaging System uses ultra high frequency (UHF) series transducers. Each UHF transducer model has a different image scale that does not start at 0.0 mm, but includes an offset. Please be aware of this when placing measurements.

> **WARNING:** Use ONLY FUJIFILM SonoSite UHF transducers with the Vevo MD Imaging System. The use of other transducers may affect safety and system performance.

The transducer offers the following features:

- Designed ergonomically for rapid screening procedures

- 256-element linear array detector

- Delivers a usable frame rate of more than 500 frames per second depending on the transducer model you use and the field of view you have set for your image acquisition

- Connects to the front of the Vevo MD Imaging System

The following transducers can be used with the Vevo MD Imaging System:

Vevo MD Imaging System Ultra High-Frequency clinical transducers

Transducer	Description
	UHF22 10-22 MHz Center transmit: 15 MHz
	UHF48 20-46 MHz Center transmit: 30 MHz
	UHF70 29-71 MHz Center transmit: 50 MHz

Caution: Only use gels with properties similar to *Aquasonic® 100 Ultrasound Transmission Gel* for use with the Vevo MD Imaging System.

Safety warning label

The composite safety warning label is located on the top surface of the transducer connector.

Here is an example of a UHF22 transducer label:

The following table describes the symbols on the composite safety warning label:

Composite safety warning symbols

Symbol	Description
REF	Catalog number
SN	Serial number
(Manufacturer icon)	Manufacturer

Composite safety warning symbols

Symbol	Description
⚠ (Hot surface symbol)	Hot surface hazard.
IPX7	The International Protection Marking (IP Code), IEC 60529 rates the degrees of protection provided by enclosures of electrical equipment. UHF transducers are protected against water immersion—immersion for 30 minutes at a depth of 1 meter.
CE 0086	Conformité Européenne. Product meets the safety requirements of the European Union.
(Type BF symbol)	IEC 60601-1 uses this term to refer to the part of the medical device which comes into physical contact with the patient. The UHF transducers is classified as Type BF—devices that have conductive contact with the patient, or having medium or long term contact with the patient.
CSA (c/us)	Proof of product compliance (electrical, gas and other safety standards) to North American safety standards.
(WEEE symbol)	European Union WEEE (Waste Electrical and Electronic Equipment) Directive 96/86/EEC. Identifies the directive on waste electrical and electronic equipment. Refer to local regulations for disposal.

Connecting and Disconnecting Transducers

> **Important:** Please be aware that you switch a transducer at any time. You can switch transducers during a live scan, after acquiring an image and during review of an image. The Vevo MD Imaging System software allows for users to switch transducers without any negative affect to the current exam or imaging session.

> **Caution:** If damage is evident, do not use the transducer, and contact FUJIFILM SonoSite or your local representative.

Transducer interface	Transducer connector

To connect the transducer to the system

1 Turn the handle on the transducer clockwise to the vertical (unlocked) position.

Follow the directional label on the transducer to lock and unlock the handle.

2 Slide the transducer connector into the transducer bay underneath the control panel.

3 Push the transducer connector into the transducer interface.

4 Rotate the handle on the transducer counterclockwise to the horizontal (locked)position and push down on the handle to lock the transducer.

To disconnect the transducer from the system

1 Flip the handle up and rotate clockwise to the vertical (unlocked) position.

2 Pull the transducer connector away from the transducer interface.

3 Slide the connector up and out of the transducer bay.

Transducer bay with transducer connected

Storing Transducers

Store the nose of the transducer in the transducer and gel holder on either side of the Vevo MD Imaging System. Position the transducer nose upward.

You can also store the transducer cables on the cable hooks; there are four hooks available.

Store an inactive transducer by sliding the transducer connector into one of the four shelves in the transducer connector storage.

Transducer connector storage with transducer

When you move a transducer from one facility to another, always use the supplied packaging. Follow these guidelines when you store the transducer in its packaging:

- Make sure that the transducer is clean and dry before you store it in the supplied packaging

- Place the transducer in the supplied packaging carefully so the cable doesn't kink

- Don't store the transducer in areas of extreme temperatures or in direct sunlight

- Store the transducer separately from other instruments so it doesn't get damaged accidentally

Gel

Use acoustic coupling gel on the transducer during exams. Although most gels provide suitable acoustic coupling, some gels are incompatible with some transducer materials.

For general use, apply a liberal amount of gel between the transducer and the body. For interventional use, apply a transducer sheath.

> **WARNING: Some gels and sterilants can cause an allergic reaction in some individuals.**

> Caution: To avoid damage to the transducer, use only gels with properties similar to *Aquasonic® 100 Ultrasound Transmission Gel* for use with the Vevo MD Imaging System. Using other gels can damage the transducer and void the warranty. If you have questions about gel compatibility, contact FUJIFILM SonoSite or your local representative.

Sheaths

> **WARNING: When performing a vascular line placement or peripheral nerve block procedure, FUJIFILM SonoSite recommends using a single-use sterile gel and a single-use sterile transducer sheath to prevent contamination.**
>
> **Some transducer sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. FUJIFILM SonoSite recommends that you identify your latex and talc-sensitive patients and be prepared to treat allergic reactions promptly.**

To apply a transducer sheath

1 Place gel inside the sheath. Make sure the gel is at the end of the sheath.

2 Insert the transducer into the sheath.

3 Pull the sheath over the transducer and cable until the sheath is fully extended.

4 Secure the sheath using the bands supplied with the sheath.

5 Check for and eliminate air bubbles between the face of the transducer and the sheath. Air bubbles between the face of the transducer and the sheath may affect the ultrasound image.

6 Inspect the sheath to ensure that there are no holes or tears.

Transducer exam types by mode

Exam types by mode

Transducer	Exam type	Imaging mode		
		2D	**M-Mode**	**Color Doppler Mode**
UHF22	Abdominal	✓	✓	✓
	Arterial	✓	✓	✓
	Small Parts	✓	✓	✓
	Superficial	✓	✓	✓
	Venous	✓	✓	✓
UHF48	Abdominal			
	Arterial	✓	✓	✓
	Small Parts	✓	✓	✓
	Superficial	✓	✓	✓
	Venous	✓	✓	✓

Exam types by mode (continued)

Transducer	Exam type	Imaging mode		
		2D	**M-Mode**	**Color Doppler Mode**
UHF70	Abdominal			
	Arterial	✓	✓	✓
	Small Parts	✓	✓	✓
	Superficial	✓	✓	✓
	Venous	✓	✓	✓

Clinical applications

> **Important:** The clinical applications and procedures are only possible as they relate to the individual transducers and their depth limitations.

Clinical Applications

Clinical application	Description	Exam types
Abdominal	You can assess the liver, kidneys, pancreas, spleen, gallbladder, bile ducts, transplanted organs, abdominal vessels and surrounding anatomical structures for the presence or absence of pathology trans abdominally. You can evaluate and perform interventional abdominal procedures and evaluate blood flow in abdominal organs.	Abdominal
Musculoskeletal (conventional)	You can assess musculoskeletal structures, soft tissue structures, and surrounding anatomical structures for the presence or absence of pathology.	Superficial
Musculoskeletal (superficial)	You can assess musculoskeletal structures, soft tissue structures, and surrounding anatomical structures for the presence or absence of pathology.	Superficial
Pediatric	You can assess the liver, kidneys, pancreas, spleen, gallbladder, bile ducts, transplanted organs, abdominal vessels and surrounding anatomical structures for the presence or absence of pathology trans abdominally. You can	Abdominal, Arterial, Small parts, Superficial, Venous

Clinical Applications

Clinical application	Description	Exam types
	evaluate and perform interventional abdominal procedures and evaluate blood flow in abdominal organs.	
Peripheral vessel	You can assess the carotid arteries, deep veins, and arteries in the arms and legs, superficial veins in the arms and legs, great vessels in the abdomen, and various small vessels feeding organs for the presence or absence of pathology.	Arterial, Venous
Small Organs (breast, thyroid, testicles, prostate)	You can assess the breast, thyroid, testicles, prostate, lymph nodes, hernias, soft tissue structures and surrounding anatomical structures for the presence or absence of pathology. You can detect normal lung motion for the presence or absence of pathology. You can demonstrate blood flow in superficial anatomical structures.	Small parts
Interventional department imaging	You can use the system for ultrasound guidance in biopsy and drainage procedures, vascular line placement, and peripheral nerve block procedures. **WARNING: Nerve block and peripheral line placement procedures, should only be used by qualified and trained personnel.**	Arterial, Small Parts, Venous
Other (Dermatology)	High resolution ultrasound imaging for wounds, superficial musculoskeletal	Superficial

Clinical Applications

Clinical application	Description	Exam types
	diagnosis and assessment, plastic/reconstructive surgery planning and assessment, dermatological assessment and diagnosis, and aesthetic application.	

WARNING: When performing a vascular line placement or peripheral nerve block procedure, FUJIFILM SonoSite recommends using a single-use sterile gel and a single-use sterile transducer sheath to prevent contamination.

Some transducer sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. FUJIFILM SonoSite recommends that you identify your latex and talc-sensitive patients and be prepared to treat allergic reactions promptly.

Use market-cleared, sterile transducer sheaths and sterile coupling gel. Do not apply the transducer sheath and coupling gel until you are ready to perform the procedure. After use, remove and discard the single-use sheath, and clean and disinfect the transducer using a FUJIFILM SonoSite recommended high-level disinfectant. See "Cleaning and disinfecting" on page 316.

WARNING: Color Doppler Mode images can be used as an adjunctive method, not as a screening tool.

WARNING: To prevent injury or misdiagnosis, do not use this system for Percutaneous Umbilical Blood Sampling (PUBS) or *in vitro* Fertilization (IVF). The system has not been validated to be proven effective for these two uses.

WARNING: To avoid injury to the patient, never perform an Ophthalmic exam with the Vevo MD Imaging System. The FDA has established lower acoustic energy limits for ophthalmic use, and the Vevo MD Imaging System may exceed these limits.

Transducer cable lengths

Transducer cable lengths

Description	Cable length (in)	Cable length (m)
UHF22 transducer	78 ± 2	1.98 m ± 5
UHF48 transducer	78 ± 2	1.98 m ± 5
UHF70 transducer	78 ± 2	1.98 m ± 5

Note: Cable length is measured between the strain reliefs and includes the length under the strain relief. The stated lengths do not include the lengths of cable inside the transducer enclosure, or inside the transducer connector.

Exam types

Exam types are predefined groups of image acquisition settings. This way you can quickly get an optimal image to work with.

The system includes various default system exam types depending on the transducer you are working with.

When you start the system, select the exam type for the work you are doing.
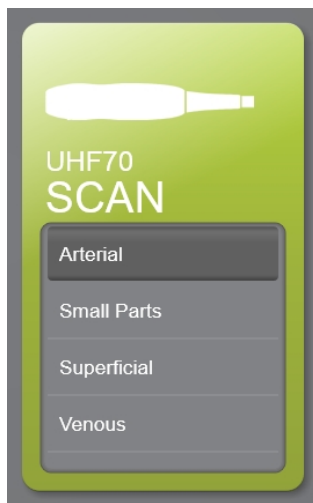
UHF70 transducer with the Arterial exam type selected

To switch the exam type for the attached transducer

♦ Tap the **EXAM TYPE** navigation button and select the desired exam type for the attached transducer.

EXAM TYPE

Important: Please be aware that you switch a transducer at any time. You can switch transducers during a live scan, after acquiring an image and during review of an image. The Vevo MD Imaging System software allows for users to switch transducers without any negative affect to the current exam or imaging session.

Using the control panel

The control panel is where you adjust settings. You can select the patient and exam type, transducer, imaging mode, and more. As you adjust the image settings or controls, the results appear on the clinical display. When an image is frozen, the control panel displays an outline of the image.

You interact with the control panel the same as with many other touchscreen devices:

- **Drag**: Move one or two fingers across the panel, usually to move an object from one location to another

- **Swipe**: Move your finger quickly across the panel. Faster than dragging

- **Tap**: Quickly touch the panel; for example, to activate a control

- **Double-tap**: Quickly touch the panel twice with one or more fingers

- **Two finger pinch or spread**: Slide two fingers together or apart on the panel

Use these gestures to perform the following actions:

Control panel gestures and actions

Gesture	Action
Drag	- Adjust depth or gain - Move color box handles - Move measurement calipers - Move M-Mode sample volume line - Move annotations - Move through frames in a clip - Move controls to the controls bar

Control panel gestures and actions

Gesture	Action
	• Pan image in zoom area
Swipe	• Scroll through tables and pages in forms • Scroll through M-Mode data
Tap	• Scan • Unfreeze • Freeze • Select calipers • Select an imaging control or setting • Save an image • Select a thumbnail in the review images screen to open it for review
Double tap	• Change keyboard to uppercase via the shift key • Change numbers and symbols to international characters via the shift key • Zoom in when viewing help, using two fingers
Two finger spread or pinch	• Adjust sample volume size • Resize zoom area • Change time scale (sweep speed) in time-based modes

Control panel gestures and actions

Gesture	Action
	• Zoom in or out

Control panel elements

Control panel elements:

1. *"Patient" on page 165.*

2. *Review Images, see "Patient image data" on page 166.*

3. *"Exam types" on page 106.*

4. *More Controls, see "Customizing controls" on page 207.*

5. *Imaging Controls bar, see "Customizing controls" on page 207.*

6. *Save Frame, see "Saving images" on page 269.*

Onscreen Keyboard

You can enter text into text boxes using the onscreen keyboard.

To enter text using the onscreen keyboard

1 Tap a text box (for example, the patient name), to display the onscreen keyboard.

2 Tap keys as needed.

3 Tap **Done** or anywhere outside of the keyboard, and the keyboard disappears.

Onscreen keyboard:

1. **Alpha keys**: *Tap and hold the alpha keys to reveal options for selecting alternate versions of the characters—alternate versions available depend on the system language you have selected.*

2. **Shift key**: *Changes alphabet keys to uppercase—single tap will enable uppercase for a single use, double tap will enable uppercase permanently. You can also change to international characters when the numbers and symbols keyboard is displayed with a double tap.*

3. **Back arrow key**: *Jumps to previous text box.*

4. **Forward arrow key**: *Advances to next text box.*

5. **Space bar**: *Adds a single space.*

6. **Keyboard toggle**: *Toggles between the alpha keyboard and the numbers and symbols keyboard.*

7. **Hide keyboard key**: *Hides the keyboard.*

8. **Return arrow key**: *Commits current information, starts a new line or advances to next text box . On the patient form and annotation page, this button is displayed as* **Done** *and will only hide the keyboard, not submit or close the page.*

9. **Backspace key**: *Deletes character on left side of pointer.*

Indications for use

The Vevo MD Imaging System is a general purpose imaging system intended for use by a qualified physician for evaluation by ultrasound imaging or fluid flow analysis of the human body.

Specific clinical applications and exam types include:

- Abdominal

- Pediatric

- Small Organ (breast, thyroid, testicles, prostate)

- Musculoskeletal (conventional)

- Musculoskeletal (superficial)

- Peripheral vessel

- Dermatological

The indications for use of the system depend on which transducer[1] is attached. The indications for use with each transducer are listed in the US FDA defined tables on the followings pages and are identified with a checkmark.

1

1. The Vevo MD Imaging System uses ultra high frequency (UHF) series transducers that limit the imaging depth. For this reason imaging of abdominal organs or non-superficial musculoskeletal structure may be limited to neonatal and small pediatric patients and all imaging is limited to the maximum imaging depth of the transducer as follows:

UHF22 = 38.4 mm
UHF48 = 23.5 mm
UHF70 = 10 mm

2. Includes imaging to assist in the placement of needles and catheters in vascular or other anatomical structures and imaging guidance for peripheral nerve block procedures.

UHF22 Intended Uses

System:	FUJIFILM SonoSite Vevo MD Ultrasound System						
Transducer:	UHF22						
Intended Use:	Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:						
Clinical Application	Mode of Operation						
	B (2D)	M	PWD	CWD	Color Doppler	Combined (Spec.)	Other (Spec.)[1]
Ophthalmic							
Fetal							
Abdominal	✔	✔			✔	2D+CD, 2D+M	1, 2
Intra-operative (Abdominal organs and vascular)							
Intra-operative (Neuro.)							
Laparoscopic							
Pediatric	✔	✔			✔	2D+CD, 2D+M	1, 2
Small Organ (breast, thyroid, testicles, prostate)	✔	✔			✔	2D+CD, 2D+M	1, 2
Neonatal Cephalic							
Adult Cephalic							
Trans-rectal							
Trans-vaginal							
Trans-urethral							
Trans-esoph. (Non-Card.)							
Musculo-skeletal (Convent.)	✔	✔			✔	2D+CD, 2D+M	1, 2
Musculo-skeletal (Superfic.)	✔	✔			✔	2D+CD, 2D+M	1, 2
Intra-luminal							
Other (spec.)							
Cardiac Adult							
Cardiac Pediatric							
Trans-esophageal (Card.)							
Other (Spec.)							
Peripheral vessel	✔	✔			✔	2D+CD, 2D+M	1, 2
Other (Dermatology)							

UHF48 Intended Uses

System:	FUJIFILM SonoSite Vevo MD Ultrasound System						
Transducer:	UHF48						
Intended Use:	Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:						
Clinical Application	Mode of Operation						
	B (2D)	M	PWD	CWD	Color Doppler	Combined (Spec.)	Other (Spec.)[1]
Ophthalmic							
Fetal							
Abdominal							
Intra-operative (Abdominal organs and vascular)							
Intra-operative (Neuro.)							
Laparoscopic							
Pediatric	✓	✓			✓	2D+CD, 2D+M	1, 2
Small Organ (breast, thyroid, testicles, prostate)	✓	✓			✓	2D+CD, 2D+M	1, 2
Neonatal Cephalic							
Adult Cephalic							
Trans-rectal							
Trans-vaginal							
Trans-urethral							
Trans-esoph. (Non-Card.)							
Musculo-skeletal (Convent.)	✓	✓			✓	2D+CD, 2D+M	1, 2
Musculo-skeletal (Superfic.)	✓	✓			✓	2D+CD, 2D+M	1, 2
Intra-luminal							
Other (spec.)							
Cardiac Adult							
Cardiac Pediatric							
Trans-esophageal (Card.)							
Other (Spec.)							
Peripheral vessel	✓	✓			✓	2D+CD, 2D+M	1, 2
Other (Dermatology)	✓	✓			✓	2D+CD, 2D+M	1, 2

UHF70 Intended Uses

System:	FUJIFILM SonoSite Vevo MD Ultrasound System						
Transducer:	UHF70						
Intended Use:	Diagnostic ultrasound imaging or fluid flow analysis of the human body as follows:						
Clinical Application	Mode of Operation						
	B (2D)	M	PWD	CWD	Color Doppler	Combined (Spec.)	Other (Spec.)[1]
Ophthalmic							
Fetal							
Abdominal							
Intra-operative (Abdominal organs and vascular)							
Intra-operative (Neuro.)							
Laparoscopic							
Pediatric	✓	✓			✓	2D+CD, 2D+M	1, 2
Small Organ (breast, thyroid, testicles, prostate)	✓	✓			✓	2D+CD, 2D+M	1, 2
Neonatal Cephalic							
Adult Cephalic							
Trans-rectal							
Trans-vaginal							
Trans-urethral							
Trans-esoph. (Non-Card.)							
Musculo-skeletal (Convent.)	✓	✓			✓	2D+CD, 2D+M	1, 2
Musculo-skeletal (Superfic.)	✓	✓			✓	2D+CD, 2D+M	1, 2
Intra-luminal							
Other (spec.)							
Cardiac Adult							
Cardiac Pediatric							
Trans-esophageal (Card.)							
Other (Spec.)							
Peripheral vessel	✓	✓			✓	2D+CD, 2D+M	1, 2
Other (Dermatology)	✓	✓			✓	2D+CD, 2D+M	1, 2

WARNING: When performing a vascular line placement or peripheral nerve block procedure, FUJIFILM SonoSite recommends using a single-use sterile gel and a single-use sterile transducer sheath to prevent contamination.

Some transducer sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. FUJIFILM SonoSite recommends that you identify your latex and talc-sensitive patients and be prepared to treat allergic reactions promptly.

Use market-cleared, sterile transducer sheaths and sterile coupling gel. Do not apply the transducer sheath and coupling gel until you are ready to perform the procedure. After use, remove and discard the single-use sheath, and clean and disinfect the transducer using a FUJIFILM SonoSite recommended high-level disinfectant. See "Cleaning and disinfecting" on page 316.

WARNING: Color Doppler Mode images can be used as an adjunctive method, not as a screening tool.

WARNING: To prevent injury or misdiagnosis, do not use this system for Percutaneous Umbilical Blood Sampling (PUBS) or *in vitro* Fertilization (IVF). The system has not been validated to be proven effective for these two uses.

WARNING: To avoid injury to the patient, never perform an Ophthalmic exam with the Vevo MD Imaging System. The FDA has established lower acoustic energy limits for ophthalmic use, and the Vevo MD Imaging System may exceed these limits.

Contraindications

The Vevo MD Imaging System system has no known contraindications.

System settings

You can customize your system and set your user preferences through the system settings panel.

> **Note:** Some system settings are only available to system users with Administrator status. Additionally, not all system settings are available if you log in to the system as a Guest. See "Logging on for the first time" on page 147.

To display the system settings page

♦ Tap **MORE**, and then tap **SYSTEM SETTINGS**

MORE ☰

SYSTEM SETTINGS

Tapping a settings tab displays its available settings on the right side. The active selection is highlighted.

Measurements & Annotations
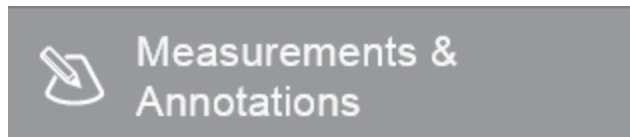
Backup & Restore

Connectivity

Display Information

Exam Types & Presets

Export

General

System Information

System Logs

User Management

Backup and restore

The backup and restore settings provide the tools to create and manage the backup of:

- System users

- The state of User Login

- Custom exam types and presets

- The state of configurable preferences

When backing up and restoring data, be aware of the following user access permissions and conditions:

- Standard users and administrators can perform a system backup

- Only administrators can restore, import, export or delete a backup

- Guest has no access to the backup and restore page in system settings

To display the backup and restore page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap the **Backup & Restore** tab.

To create a backup file

1 On the backup and restore page, tap **System Backup**.
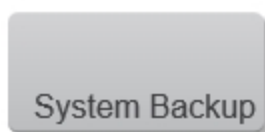
The system creates a backup and lists the backup as a time-stamped item.

2 Tap **Done** to close the settings page.

To restore from a backup file

1 On the Backup & Restore page, select the time-stamped backup you want to restore. Tap **System Restore**.

2 A confirmation screen will be displayed. Confirm that the selected backup file is correct. Tap **Restore** to continue or **Cancel** to exit.

The system completes an automatic backup of the current settings first, then completes the restore.

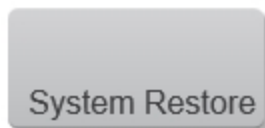**3** When the system settings have been restored successfully, you will be presented with another confirmation screen. Tap **OK**.

Importing, Exporting and Deleting Backup Files

To export a backup file

1 Select the time-stamped backup you want to export and then tap **Export**.
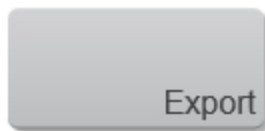
Export

2 On the export page, browse and select the folder to which you want to export the file.

3 (Optional) To add a subfolder, tap **New Folder**, name the folder and then click **Done**.

4 Tap **Export**.

5 Tap **Done** to close the settings page.

Done

To import a backup file

1 On the backup and restore page, tap **Import**.

2 In the import page, browse to the folder that contains the file and then select it. Backup files appear with a ⬛ logo.

3 Tap **Import**. Tap **Yes** to confirm the import operation.

> **Note:** The imported files will overwrite the files in your current file location.

4 Tap **Done** to close the settings page.

To delete a backup file

1 Select one or more backup files from the list.

2 Tap **Delete** and confirm you want to delete the file(s).

3 Tap **Done** to close the page and return to your imaging session.

Connectivity

On the connectivity page, you can select the network location, define network settings and setup DICOM transfer.

> **Note:** A guest user will not be able to change connectivity settings.

Connecting to the network

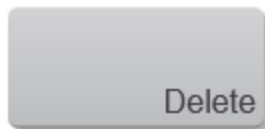Before configuring the system for DICOM transfer, you must connect to the network; you can connect by using a standard Ethernet 10/100/1000 network.

To connect to the network

Devices connected to the system's Ethernet port must comply with the IEC 60601-1 or IEC 60950 standards.

♦ Plug the Ethernet cable into the Ethernet connector on the back of the computer enclosure. See "System components" on page 26.

To display the connectivity page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **Connectivity** in the list on the left.

Network Status

The location you specify represents the active location of the system.

♦ Choose a network location from the **Location** list.

> **Note:** Once a location is selected, the IP address, Subnet mask, Default gateway and MAC address fields are populated automatically.

DICOM setup

Use this page to configure your system to archive images and exams to different locations depending on what type of procedure is being performed and if it is billable. See "DICOM configuration pages" on page 82.

To display the DICOM setup page.

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

2 Tap **Connectivity** in the list on the left.

3 Tap **DICOM Setup**.

DICOM

Using data in the Digital Imaging and Communications in Medicine (DICOM) standard, the ultrasound system can do the following:

- Transfer patient exam data to an archiver, see "Archiving" on page 95

- Import patient data from a worklist, see "Patient" on page 165

- Export exam data in PACS format to a USB storage device

DICOM is a licensed feature. The system conforms to the DICOM standard as specified in the *Vevo MD DICOM Conformance Statement*, contact FUJIFILM SonoSite for a copy of this statement.

The *Vevo MD DICOM Conformance Statement* provides information about the purpose, characteristics, configuration, and specifications of the network connections supported by the system.

The system connects over a local area network (LAN) to the following:

- Picture Archive and Communication Systems (PACS) archivers

- Worklist servers

- Modality Performed Procedure Step (MPPS) servers

- Storage commitment servers

The system can transfer to one or more devices and connect to different networks—depending on how you configure it.

Configuring the system for DICOM transfer

To configure the system for DICOM transfer, perform the following tasks (typically completed by a network administrator or PACS manager):

To configure the system for DICOM transfer

1 Connect to the network. See "Connectivity" on page 75.

2 Complete the configuration pages for locations and devices. See "DICOM configuration pages" on page 82.

3 Associate devices with locations. See "Associating devices with locations" on page 90.

4 Select your DICOM location. See Select your DICOM location below.

Select your DICOM location

Once you have configured your DICOM location, you can now select it from the DICOM location list.

1 Each DICOM location will list the following:

- **SC**: Storage commitment

- **MPPS**: Modality Performed Procedure Step

- **Type**: Archiver, MPPS, Worklist, SC

- **Device**: Device used to perform the exam

- **Status**: Confirmation that it has completed archiving

2 (Optional) If you want to use the MPPS service, associate the MPPS server with the archiver:

Note: Only one MPPS server can be selected for a location.

i.   Select the check box of the MPPS server that you want

ii.   Select the check box of the archiver

iii.   Select the check box in the archiver's MPPS column

3 (Optional) If you want to use the storage commitment service, associate the storage commitment server with the archiver:

> **Note:** Only one storage commitment server can be selected for a location.

i.   Select the check box for the storage commitment server that you want

ii.   Select the check box for the archiver

iii.   Select the check box in the archiver's storage commit (SC) column

4 Once you have selected your preferred location, tap **Verify** to confirm that the selected servers in the selected location are properly configured and able to communicate as a DICOM device.

One of the following connection status of the device appears in the status column:

- **Failed**: DICOM cannot communicate with the device

- **Success**: DICOM can communicate with the device

- **Unknown**: The device does not support the C-ECHO (for example, verify query command)

> **Note: Unknown** is also displayed for locations that have not be checked; in this case, the meaning of **Unknown** is to tell you that the device verification has not been done.

5 Tap **Done**.

4. Tap **OK**. The system will shutdown to complete the configuration. After the system is fully shutdown, restart the system by using the power button.

DICOM configuration pages

In order to archive exams, patient data and images, you must first configure the DICOM settings.

You must also configure the Vevo MD Imaging System for DICOM transfer. Have your Network Administrator or PACS Manager perform the configuration task. See "Configuring the system for DICOM transfer" on page 79.

> **Important:** Changing the configuration requires a system restart.

The DICOM configuration pages are as follows:

- **Location** Configuration for network settings. Also specifies which devices you want to associate with that network. For example, configure a location called "Office," and then associate an archiver with it. You can configure up to eight locations. See "Associating devices with locations" on page 90.

- **Archive** Configuration for PACS archivers, devices for storing patient exams (images and clips). Only one archiver per location can receive image transfers at a time. You can associate up to four archivers per location.

- **Storage Commit** Configuration for storage commitment servers, devices that take responsibility for and provide receipt of content sent by the ultrasound system.

- **Worklist** Configuration for worklist servers, devices that contain scheduled patient procedure data. You can import the data into the patient form, see "Patient" on page 165.

- **MPPS** or Modality Performed Procedure Step. Configuration for MPPS servers that coordinate detailed information about the exam performed. You can associate one MPPS server per location.

To add DICOM configuration pages

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **Connectivity** in the list on the left.

Connectivity

3 Tap **DICOM Setup**.
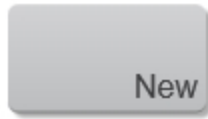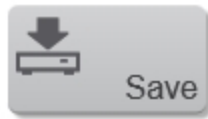
DICOM Setup

4 Tap **Config**.
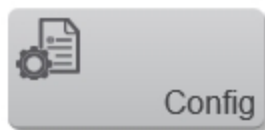
Config

5 Select a configuration page: Location, Archive, Storage Commit, Worklist or MPPS.

6 Tap **New**.

New

7 Enter information into the available fields. Tap **Save**.
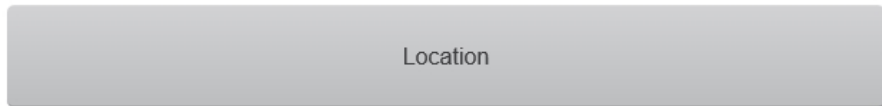
Save

DICOM configuration page fields

To configure DICOM, you will need to define fields in each of the configuration pages: Location, Archive, Storage Commit, Worklist and MPPS.

Note: Required fields are marked with asterisks.

1 Location

Location

Configuration for network settings. Also specifies which devices you want to associate with that network. For example, configure a location called "Office," and then associate an archiver with it. You can configure up to eight locations. See "Associating devices with locations" on page 90.

Each location can support up to four active archivers, one active modality worklist server, one storage commit server and one MPPS server.

The following fields are available in the Location configuration page:

- **Name**: Unique network name for the Vevo MD Imaging System. The default is **VisualSonics**

- **Alias**: Name that identifies the network location of the Vevo MD Imaging System

- **AE Title**: DICOM Application Entity Title

- **DHCP**: If desired, select to enable Dynamic Host Configuration Protocol. The IP Address, Subnet mask and Default Gateway fields become unavailable

- **IP Address**: Unique identifier of the Vevo MD Imaging System location. Cannot be between 127.0.0.0 and 127.0.0.8.

- **Port**: Device port number.

- **Subnet Mask**: Identifies a network subdivision. The default value is 255.255.0.0

- **Default Gateway**: IP address where the network connects to another network. Cannot be between 127.0.0.0 and 127.0.0.8
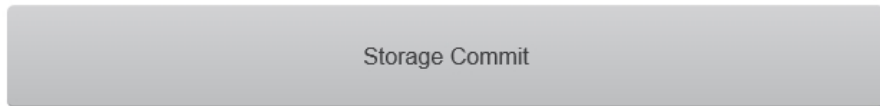
2 Archive
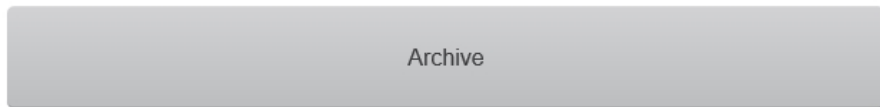
Archive

Configuration for PACS archivers and devices for storing patient exams (images and clips). Only one archiver per location can receive in-progress image transfers.

You can associate up to eight archivers for each system.

The following fields are available on the Archive configuration page:

- **Name**: Network host name for an archiver

- **Alias**: Personalized name for an archiver

- **AE Title**: Archiver DICOM Application Entity Title

- **Images**: Defines how images are sent to the archiver: RGB (uncompressed) or JPEG

- **IP Address**: Unique identifier for the archiver

- **Port**: Device port number

- **Exclude Video Clips**: If the check box is selected, only images (no videos) are transferred. Available only if Image Type is set to Ultrasound

- **Educational**: Select this check box to associate the archiver with the Educational routing select. See "Routing selections" on page 100

- **Ping**: Tap to determine whether the IP address is accessible. The system displays OK or Failed

**3 Storage Commit**

Storage Commit

Configuration for storage commitment servers that take responsibility for and provide receipt of content sent by the ultrasound system.

Up to eight storage commitment servers can be configured, but only one active archive server is allowed at a specific location at any given time.

The following fields are available on the Storage Commit configuration page:

- **Name**: Unique network name for the storage Commit serve. The default is **Name**

- **Alias**: Name that identifies the network location of the Storage Commit server

- **AE Title**: DICOM Application Entity Title

- **IP Address**: Unique identifier of the storage commitment server

- **Port**: Device port number.

- **Ping**: Tap to determine whether the IP address is accessible. The system displays OK or Failed

4 Worklist
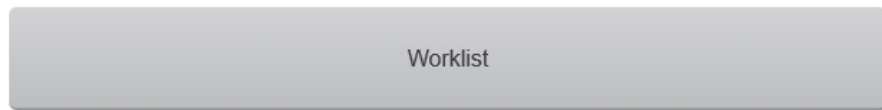
Worklist

Configuration for the worklist servers that contain scheduled patient procedure data. You are allowed to configure up to eight Worklist servers.

You can perform a manual query from the worklist by filling out certain fields, or you can set a worklist query to update automatically. See "Updating and querying the worklist" on page 178.

You can also import the data into the patient form. See "Entering patient information from the worklist" on page 175.

The following fields are available on the Worklist configuration page:

- **Name**: Network host name for a worklist server

- **Alias**: Personalized name for a worklist server

- **AE Title**: Application Entity Title

- **Worklist**: Today; Yesterday, today, tomorrow; All

- **This Device Only**: Restricts the query to patient procedures that are scheduled for the Vevo MD Imaging System based on its AE Title

- **IP Address**: Unique identifier for the worklist server

- **Port**: Device port number

- **Automatic Query**: Turns automatic query on/off

- **Occurs Every**: In an automatic query, length of time between automatic updates

- **Start Time**: In an automatic query, start time for the automatic update (displayed in 24 hour time)

- **Ping**: Tap to determine whether the IP address is accessible. The system displays OK or Failed

5 MPPS
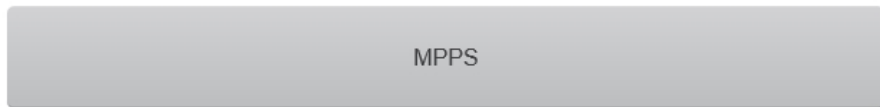
MPPS

MPPS or Modality Performed Procedure Step. Configuration for MPPS servers that coordinate detailed information about the exam performed. You can associate one MPPS server per location.

You can associate up to eight MPPS servers on the system.

> **Note:** You can discontinue MPPS for an exam before completing the exam—on the patient form, tap **Discontinue**.

The following fields are available on the MPPS configuration page:

- **Name**: Network host name for the MPPS server

- **Alias**: Name that identifies the network location of the MPPS system

- **AE Title**: DICOM Application Entity Title

- **IP Address**: Unique identifier for the MPPS server

- **Port**: Device port number

- **Ping**: Tap to determine whether the IP address is accessible. The system displays OK or Failed

To delete a location or device

1 On the proper configuration page, select the name from the list of locations or devices.

2 Tap **Delete**.

3 Tap **Done**.

Associating devices with locations

For each location, select which archivers you want to receive the data that you transfer, which archiver you want to associate with MPPS or storage commitment server, and which worklist server you want to receive data from.

After you select a location, choose which devices you want associated with that location.

> **Note:** Changing the configuration requires a system restart.

To associate devices with a location

The devices must be configured before you can associate them. See "DICOM configuration pages" on page 82.
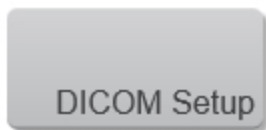
1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE   ☰

SYSTEM SETTINGS

2 Tap **Connectivity** in the list on the left.

Connectivity

3 On the **Connectivity** setup page, tap **DICOM Setup**.

DICOM Setup

4 In the **Location** list, select the location of the system.

5 In the list of devices, select the check box next to one or more archivers, or worklist servers.

You can select a maximum of four archivers, and one worklist server for each location. Only one archiver can be associated with an MPPS and storage commitment server. Selected devices have a check mark in the left-hand column.

6 (Optional) If you want to use the MPPS service, associate the MPPS server with the archiver:

Note: Only one MPPS server can be selected for a location.

   i. Select the check box of the MPPS server that you want (MPPS servers appear near the end of the list)

   ii. Select the check box of the archiver

   iii. Select the check box in the archiver's MPPS column

7 (Optional) If you want to use the storage commitment service, associate the storage commitment server with the archiver:

Note: Only one storage commitment server can be selected for a location.

   i. Select the check box for the storage commitment server that you want (storage commitment servers appear at the end of the list)

   ii. Select the check box for the archiver

   iii. Select the check box in the archiver's storage commit (SC) column

8 Complete any additional configuration tasks, and then tap **Done**.

To disassociate devices with a location

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

2 Tap **Connectivity** in the list on the left.

3 On the **Connectivity** setup page, tap **DICOM Setup**.

4 In the **Location** list, select the location.

5 Do any of the following:

- To disassociate an archiver or worklist server, deselect its check box

- To disassociate an MPPS server from an archiver, deselect the check box for the MPPS server

- To disassociate a storage commitment server from an archiver, deselect the check box for the storage commitment server

6 Tap **Done**.

To verify the connection status of devices

1 On the **Connectivity** setup page, tap **DICOM Setup**.
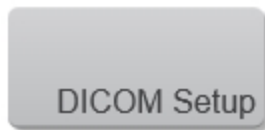
2 Select your location from the drop down menu.

3 Tap **Verify** to confirm the associated devices are connected.

The connection status of the devices appears in the **Status** column as one of the following:

- **Verifying**: DICOM is communicating with the device

- **Failure**: DICOM cannot communicate with the device

- **Success**: DICOM can communicate with the device

- **Unknown**: The device does not support the C-ECHO (for example, verify query command)

> **Note:** **Unknown** is also displayed for locations that have not be checked; in this case, the meaning of **Unknown** is to tell you that the device verification has not been done.

Archiving

The completed exams list organizes saved images and video clips.

You can *archive* completed exams to a DICOM archive server.
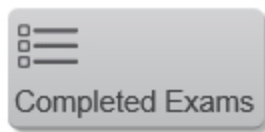
Archiving exams

If you have configured the system for DICOM transfer, the system automatically archives saved images and video clips to DICOM devices.

The system archives images and video clips at the end of the exam.

You can also manually archive exams.

To display archive status for an exam

1 From the **REVIEW IMAGES** or **PATIENT** page, tap **Completed Exams**.

2 Select an exam.

3 Do either of the following:

    a. Tap the icon in the archive status column for that exam

    b. Tap **More Options** and select **Archive Status**

A flyout will display applicable icons and information for the selected exam.

Note: If there is no icon displayed in the archive status column, your exam is pending archive or the system is not connected to DICOM services.

Archive status icons

Icon	Description
	Patient exam has been exported to USB.
	Patient exam is transferring.
	Patient exam is archived.
	Patient exam archive is suspended. Network connection settings may be wrong (see "Connecting to the network" on page 75), or there may be a network or server problem. The exam needs to be manually archived, see "To manually archive exams" on the facing page.
	Storage commit for this exam is suspended.
	Storage commit for the exam was successful.

Additional archive status information is provided as follows:

- Patient name

- Frame or Clip transfer—N/A (Not Available), Suspended, Pending, Transferring or Completed

- Storage commitment—N/A (Not Available), Suspended, Pending or Completed

- MPPS—N/A (Not Available), In Progress, Discontinued or Completed

- Patient edit allowed—no or yes

To manually archive exams

1 Verify the following:

- The correct location is selected. See "Connectivity" on page 75

- The system is connected to a network via an Ethernet connection

2 From the **REVIEW IMAGES** or **PATIENT** page, tap **Completed Exams**.
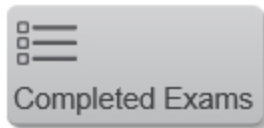
3 Select the check box next to one or more exams.

4 Tap **Archive**.
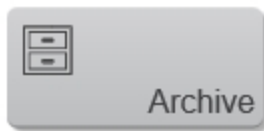
To discontinue MPPS for an exam

You can discontinue MPPS for an exam before completing the exam.

♦ On the patient form, tap **Discontinue**.

Discontinue

Specifying educational DICOM archivers

When you associate the **Educational**/**Accreditation** routing selection with a DICOM archiver, the system archives exams associated with the **Educational**/**Accreditation** routing selection to that archiver.

Archivers that are not specified as educational are *procedural* (billing) archivers. The system archives exams associated with the **Diagnostic** and **Procedural** routing selections to these archivers.

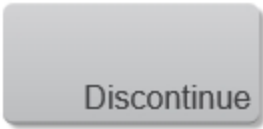If you do not specify an archiver as an educational archiver, exams associated with the **Educational**/**Accreditation** routing selection are also sent to the procedural (billing) archiver.

If an exam is associated with more than one routing selection, the system archives it to both the procedural (billing) archiver and to the educational archiver.

To specify an educational archiver

Note: If you specify an archiver as an educational archiver, exams that are not associated with an **Accreditation** routing selection will not transfer to any archiver. (You can associate an exam with a routing selection once the exam has ended. See "To associate a routing selection during an exam" on page 100).

1 Make sure that the system is configured for DICOM transfer. See "DICOM" on page 78.

2 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

3 Tap **Connectivity**.

Connectivity

4 On the **Connectivity** system setup page, tap a location.

5 Tap **DICOM Setup**.

DICOM Setup

6 Tap **Config**.

Config

7 From the DICOM list, select the **Archive** configuration page for the archiver.

8 Select **Educational**.

9 Tap **Done**.

Routing selections

Routing selections let you control where patient exams are archived. You can associate one or more routing selection with an exam.

The system supports three routing selections:

- Diagnostics (Documentation)

- Procedural (Documentation)

- Accreditation (Educational)

You can associate the accreditation routing selection with a DICOM archive device. See "Specifying educational DICOM archivers" on page 98.

Associating routing selections with exams

You can associate an exam with a routing selection during an exam or after ending an exam.

To associate a routing selection during an exam

1 Tap **PATIENT**.

2 Select one or more routing selections in the **Routing Selection** section of the patient form.

To associate a routing selection after an exam has ended

1 From the **Completed Exams** page, select the check box next to an exam.

2 Tap **More Options**.
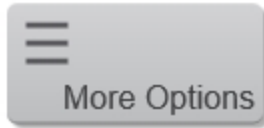
3 Tap **Route Exam**.
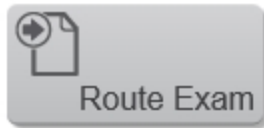
4 Select one or more options in the **Routing Selection** section.

> **Note:** **Procedural** and **Diagnostics** routing selections are billable, **Accreditation** is not.

DICOM log files

The Vevo MD Imaging System logs transfer failures due to incorrect settings or an archive location that cannot be reached.

Note: DICOM log files will be displayed in English only.

To view DICOM logs

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

2 Tap **System Logs** in the list on the left.

3 Select DICOM from the **Show log type** drop down menu.

To export DICOM logs

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

SYSTEM SETTINGS

2 Tap **System Logs** in the list on the left.

System Logs

3 Select **ALL** from the **Show log type** drop down menu.

Note: The DICOM log files are embedded within the system log files.

4 Tap **Export**.
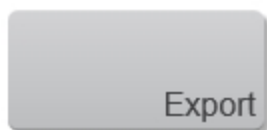
Export

5 Locate and select your USB device.

6 (Optional) Add an additional folder by tapping **New Folder**.

7 Tap **Export**. A confirmation will be displayed to confirm the export is complete.

Display information

On the display information page, you can select what information will be displayed in the patient header and what thermal index to display.

To display the display information page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ≡

SYSTEM SETTINGS

2 Tap **Display Information** from the list on the left.

Display Information

Patient Header

The patient header contains information about the patient and the person who performed the exam. You can choose what to display while scanning and what will be included when you export an image or a report.

Note: If you save an image without the patient header, it is not possible to display a patient header in review.

Select to display between the following options:

- Patient name

- Patient ID

- User

- Date and time

- Department ID

- Institution

Thermal Index

The thermal index (TI) is the ratio of power used, to that required to produce a temperature increase of 1°C.

The setting is used for the current session only, so when the exam is ended or another transducer or exam type is selected, the exam type default setting is used.

> **Note:** When saving an image, the current thermal indices will be saved and will not be editable in review.

There are three sub-indices:

- **TIS**: Thermal index in soft tissue

- **TIB**: Thermal index in bone

- **TIC**: Thermal index in the cranium

Exam types and presets

The exam types and presets page contains the settings for viewing and configuring imaging presets and transducer exam types.

Exam types

The system displays both system-defined and user-defined exam types, organized by transducer.

Use the options to change a default transducer exam type or to change a default preset.

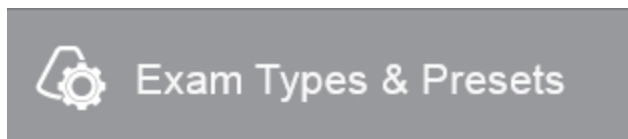You cannot share user-defined exam types among transducers.

To display the exam types and presets page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **Exam Types & Presets** in the list.

Exam Types & Presets

To manage exam types

A transducer exam type contains the imaging presets you can use to instantly optimize your image during an acquisition session.

Select the transducer you are planning to use to acquire image data, then select an available exam type from the list. All of the available transducers that the Vevo MD Imaging System supports will be displayed.

The transducer displayed at the top of the display is the one that is currently connected to the system.

> **Note:** The exam type displayed in blue on each transducer panel is the current default application for that transducer.

See "Transducers" on page 39 for the different transducers compatible with the Vevo MD Imaging System.

To manage exam types

1 On the **Exam Types & Presets** page, tap the transducer that includes the exam type you want to manage (not necessary for importing and exporting exam types).

2 Do any of the following:

- To make an exam type the default, tap **Make Default**
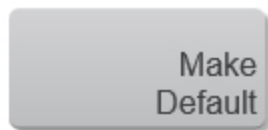
- To disable an exam type, tap **Disable Exam Type**. Once the exam type is disabled, the button becomes **Enable Exam Type**

> **Note:** You cannot disable the default exam types.

- To create a new exam type, tap **New**

- To import an exam type, tap **Import**

- To export an exam type, tap **Export**

- To edit an exam type, tap **Edit**

- To delete the exam type, tap **Delete**
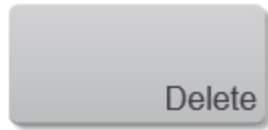
Note: You can only delete user-defined exam types.

3 Tap **Done**.

Creating a custom exam type

Factory default exam types are defined for each transducer which contain the imaging presets you can use to instantly optimize your image during an acquisition session.

You cannot modify factory default exam types, except to add custom presets. However, you can create custom exam types based on existing exam types.

Creating a custom exam type from within the exam types and presets page allows you to copy all of the presets associated with that exam type. You can delete factory defined presets only from custom exam types.

You can also save an exam type during imaging using the **Save Exam Type** button. See "Customizing controls" on page 207. This allows you to save your current configuration of controls and presets for all of the modes.

To create a custom exam type from system settings

1 On the **Exam Types & Presets** page, tap the transducer for which you want to create the exam type.

2 Click **New**.

3 In the **Copy From** drop down menu, select an existing exam type that contains presets that are similar to what you want to create.

4 Type a name for your custom exam type in the **Name** field.

5 Click **Done**. The new exam type appears in the exam types list of the selected transducer. Custom exam types and presets are user specific.
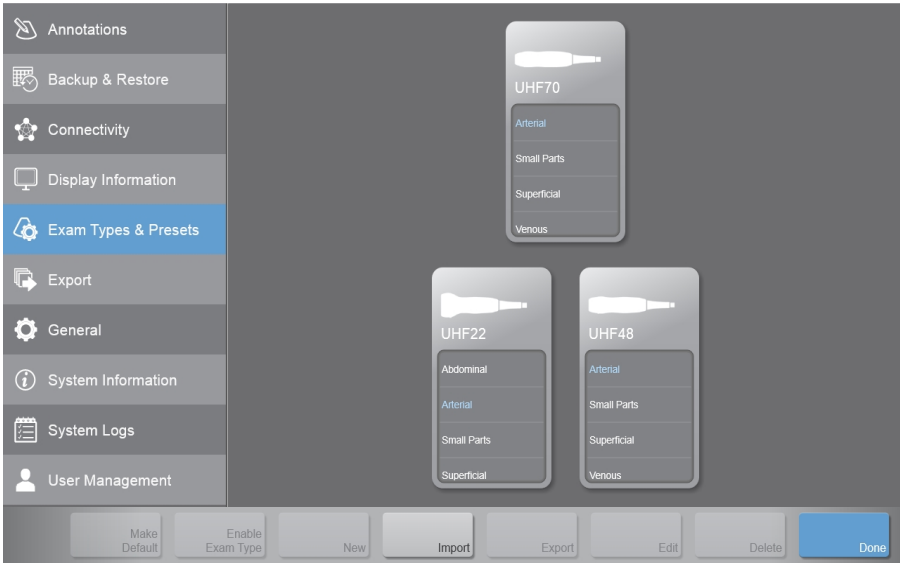
Importing, exporting, disabling, and deleting exam types

To export exam types and presets see "Exporting exam types and presets" on page 115.

To import exam types and presets see "Importing exam types and presets" on page 117.

To disable an exam type

1 Tap to select the transducer that contains the exam type that you want to disable.

2 Tap to highlight the exam type.

3 Tap **Disable Exam Type**.

The exam type is grayed out, indicating that it has been disabled. To enable the exam type, select a disabled exam type and tap **Enable Exam Type**.

To delete a custom exam type

1 Tap to select the transducer that contains the custom exam type that you want to delete.

2 Tap to highlight the custom exam type.

> **Note:** You cannot delete a default exam type—this is still true if the default exam type is custom.

3 Tap **Delete** and confirm you want to delete the exam type.

4 Tap **Done** to close the settings page.

Customizing exam types

You can customize, or *define*, any exam type to use your favorite settings. When you select the new exam type (that is, the *user-defined exam type*) the system automatically uses the settings you specified.

The system displays user-defined exam types along with the original exam types in the transducer-selection lists and also in the exam drop down menu in the patient form.

You can rename, delete, export, show, hide, reorder, group and import user-defined exam types. See "Exam types and presets" on page 106.

To customize an exam type

1 Select a transducer and exam type. See "Exam types and presets" on page 106.

2 Adjust imaging controls to your favorite settings.

You can set gain, depth, dynamic range, image orientation, sweep speed, wall filter level, scale, baseline, optimization.

3 Tap **Save Exam Type**.
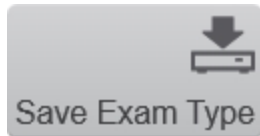
4 Type a name for the exam type.

> **Note:** The exam type must have a unique name.

5 Tap **Done**.

Exporting exam types and presets

When you export from the exam types and presets page, you export the exam type, presets and groupings.

Note: You must be an administrator to export exam types.

To export

Note: When exporting an exam type, only the custom presets are exported, not the factory default presets.

1 Insert a USB memory stick.

2 On the **Exam Types & Presets** page, select the exam type that you want to export.

3 Tap **Export**.

4 On the Export page, select the desired USB memory stick.

5 (Optional) To add a subfolder, tap **New Folder**, name the folder and then click **Done**.

6 Select the folder containing the file, then tap **Export**.

The exam type, presets and groupings are added to the selected folder.

7 Tap **Done** to close the settings page.
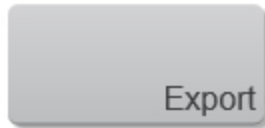
Importing exam types and presets

When you import from the exam types and presets page, you import the exam type, presets and groupings.

> **Note:** You must be an administrator to import exam types.

To import

1 Insert a USB memory stick.

2 On the **Exam Types & Presets** page, tap **Import**.

Import

3 In the import page, browse to the folder that contains the exam type and then select it. Exam type files appear with a ▦ logo.

4 Tap **Import**. Tap **Yes** to confirm the import operation.

> **Note:** The imported files will overwrite the files in your current file location, if the exam type being imported already exists for the selected transducer.

The exam type you imported appears in the selected transducer exam types list, in alphabetical order.

5 Tap **Done** to close the settings page.

Done

Presets

Presets preferences

A preset is a way to capture a set of acquisition parameters that you have customized to save and then apply as required. You can create presets with new settings while scanning.

The presets preferences page allows you to manage how you work with the existing presets. Use this section to:

- Set the default preset for an imaging mode

- Enable and disable existing presets for a mode

- View the parameters associated with a preset

- Link presets between modes while imaging using groups

Setting the default preset for a mode

A default preset for a mode is the set of acquisition parameters that is applied to the system when a user begins scanning in that mode.

Note: The default preset is indicated in bold black text for each mode.

To set the default preset for a mode

1 On the **Exam Types & Presets** page, tap the exam type on the transducer for which you want to modify the default preset.

2 Tap **Edit** to access the presets page for that exam type.

3 In the mode list, select the mode for which you want to set the default preset. The system populates the presets list for that mode.
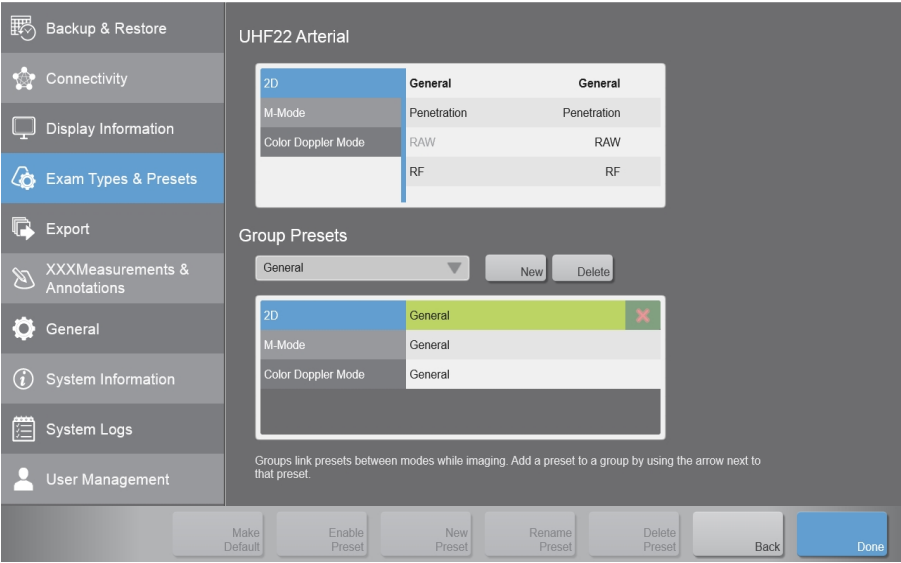
4 Tap **Make Default**.

5 Repeat this selection process for the modes that are available for the selected transducer exam type.

6 Tap **Done** to save the new default settings.

Enabling and disabling existing presets

When a preset is enabled, it will appear in the list of available presets when you tap the **Presets** control while scanning.

To disable an existing preset

1 On the **Exam Types and Presets** page, tap the exam type on the transducer for which you want to modify the preset.

2 Tap **Edit**.

3 In the mode list, select the mode for which you want to disable a preset. The system populates the presets list for that mode.

4 Tap the preset you would like to disable. The preset will be highlighted.

5 Tap **Disable Preset**.

The preset is grayed out, indicating that it has been disabled. To enable the preset, select a disabled preset and tap **Enable Preset**. The preset is enabled.

Creating a Preset

Every transducer exam type includes factory presets for each imaging mode. You can create custom presets that store your own settings from within system settings and while scanning. See "To create a custom preset during scanning" on the next page below.

> **Note:** Custom presets are transducer and mode specific.

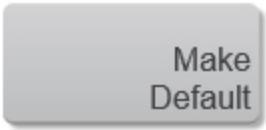**To create a custom mode settings preset from the system settings**

1 On the **Exam Types & Presets** page, tap the exam type on the transducer for which you want to create the preset.

2 Tap **Edit**.

Edit

3 In the mode list, select the mode for which you want to create the preset.

4 Select the preset from the list that you want to copy.

5 Tap the **New Preset** button.

New Preset
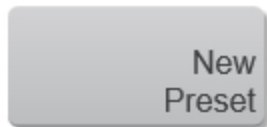
6 In the dialog, type the name for the preset. You also have the option of changing the preset you are copying.

7 Tap **Done** to save the preset.

To create a custom preset during scanning

A typical workflow would be to create your 2D presets first. 2D includes the largest number of controls that can be saved; Color Doppler Mode and M-Mode are based on 2D.

The new preset appears in the presets list for the specific mode, exam type and transducer.

The **Save Preset** button is used to save all of the parameters being used in the current mode. This allows you to apply these exact parameters again later using the **Presets** button.

1 Begin scanning in the desired mode. Adjust the controls to optimize your image.

2 Tap **Save Preset** to save the current settings as a preset.

3 Enter the name of your preset in the displayed field and tap **Done** to save the setting.

The new preset appears in the mode-specific flyout when you use the **Presets** control.

Deleting a preset

Users are only allowed to delete custom presets.

> **Note:** You cannot delete a default preset or if it is the last remaining preset in a mode.

To delete a preset

1 On the **Exam Types & Presets** page, tap the exam type on the transducer for which you want to delete a preset.

2 Tap **Edit**.


3 In the Presets list, tap the name of the preset you want to delete.

4 Tap **Delete Preset**.
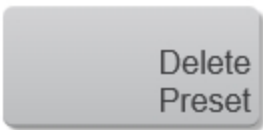
> **Note:** The delete preset button is disabled until you select a preset that can be deleted.

5 Tap "Yes" at the confirmation prompt.

6 (Optional) Tap **Back** if you want to return to the previous exam type screen.

7 Tap **Done**.

Creating preset groups for multi-mode acquisition sessions

A preset group is a way to set your system to automatically apply a selected preset in multiple-mode image acquisition sessions.

You create a preset group in the **Exam Types & Presets** page. When creating the group preset, observe the following:

- Name and apply the group to each mode you work with in a particular multiple mode session sequence such as you would follow in a protocol SOP

- You can assign a particular preset to only one group. If you need to use a preset in a second preset group, create a copy of that preset using the **New Preset** button and then add that preset to the new group

- You can assign only one preset per mode to the same group

- You can activate a preset group during an acquisition session by selecting a preset which is part of a group

To create a preset group

1 While editing an application, in the group presets section of the window, tap **New** and enter a name for your new preset group.

2 Tap **Save**.

3 From the mode list, displayed at the top of the window, select the mode from which you want to select a preset.

4 In the presets list select the preset to add to the group.

Tap the down arrow .

The system populates the corresponding mode, within your group, with the selected preset.

The name of the group is displayed in the presets list.

> **Note:** A preset can be used in only one group. If you create another group and add a preset already used in a group, it will be removed from its existing group.

5 Select the next mode in the group presets and select the required preset from the available options for the corresponding presets list from the top of the window.

6 You can change the preset in a group.

Tap the preset to be replaced and tap to remove it, then replace it by selecting the required preset from the available options for the corresponding presets list from the top of the window.

7 Tap **Done** to save and apply the settings.

Export

Use the export settings to define the content of your exported image files. You can select between **Multimedia** or **DICOM** export options.

You are able to export:

- Images that are acquired or in review from within the mode

- Images from the thumbnails page

- Exams from the completed exams list; includes all images in the exam

You can also review and export reports, see "Report" on page 312.

> **Important:** A user with Administrator privileges can choose to restrict exports to a USB device. See "To enable USB export" on page 163.

To display the export page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ≡

SYSTEM SETTINGS

2 Tap **Export** in the list.
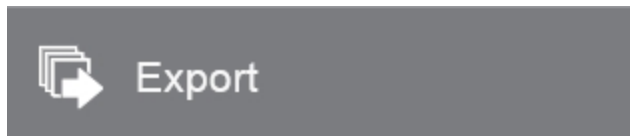
Export

To define multimedia export options

1 Select **Hide measurements and annotations on exported images** if you do not want measurements and annotations to appear on the exported image.

2 Select the clip format.

Option	Description
Uncompressed AVI (*.avi)	Largest file size, provides the original image quality.
Animated GIF (*.gif)	Medium file size, provides fair image quality.
MPEG (*.mp4)	Smallest file size, provides good image quality.

3 Select the frame format.

Option	Description
TIFF (*.tif)	Full screen image.
BMP (*.bmp)	Full screen image.

4 Tap **Done** to close the page and return to your imaging session.

To define DICOM export options

1 Select image format.

Option	Description
RGB (Uncompressed)	Uncompressed, low compression, choose for optimal DICOM image quality.
JPEG	Uses *lossy compression* and may have less absolute detail than BMP format that don't render identically to the original images. **WARNING: In some circumstances, lossy-compressed image quality may be reduced and therefore inappropriate for clinical use.** **Note:** Clips will always be exported as JPEG.

2 Tap **Done** to close the page and return to your imaging session.

Done

USB devices

You can use the USB ports on the system for connecting devices such as a USB foot switch, USB memory stick or USB hard drive.

> **Important:** Only a user with Administrator privileges can choose to enable or disable exports to a USB device—this option is off by default. See "To enable USB export" on page 163.

USB memory sticks

You can use a USB memory stick to export patient exams, import and export logs and setup configurations.

> **Important:** The system does not support password-protected USB memory sticks. Make sure that the USB memory stick you use does not have password protection enabled.

> **Caution:** Do not remove the USB memory stick or turn off the ultrasound system while the system is exporting, to avoid damaging the USB memory stick and losing patient data from it.

> **Caution:** Do not bump or otherwise apply pressure to the USB memory stick while it is in a USB port on the system as the connecter or USB could break and patient data could be lost.

To connect a USB memory stick for importing or exporting

♦ Insert the USB memory stick into a USB port. See "System components" on page 26.

To disconnect a USB memory stick

Disconnecting the USB memory stick while the system is exporting to it may cause the exported files to be corrupted or incomplete.

1 When exporting, a message is displayed on the clinical display. Wait until the export report is displayed before removing the USB.

2 Remove the USB memory stick from the port.

DICOMDIR

When exporting DICOM to a USB, a DICOMDIR file is created. DICOMDIR files are readable by a DICOM reader.

To export DICOMDIR files

1 Within the **Export** page in **System Settings**, DICOM export options, select either **JPEG** or **RGB** image format.

2 Go to **Completed Exams** and select an exam to export.

3 Tap **Export USB**.
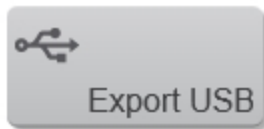
4 Tap **PACS format to USB** to export exams in DICOM format to be read on a PACS station or other DICOM viewer.

5 Locate and select your USB device.

6 (Optional) Add an additional folder by tapping **New Folder**.

7 Tap **Export**.

Once the export is complete, a report will be displayed telling you the number of exams exported and if any exams were skipped.

8 Tap **Done**.

Measurements and annotations

On the measurements and annotations page, you can set the default font size for measurements and annotations and enable or disable the IMT measurement tools.

The IMT measurement tools allow you to perform manual measurements of the Intima-Media thickness

Measurement and annotations font size

This font size will be displayed when placing measurements or annotations. The default font size is 10.

♦ Select a default font size from the drop down menu.

IMT measurement tools

Once enabled, users will be able to place IMT measurements on 2D and M-Mode images; select from IMT and I/M in 2D and IMT in M-Mode. See "Adding an IMT measurement" on page 302.

♦ Tap the **Enable IMT measurement tools** check box to enable the IMT measurement tools.

A confirmation dialog will be displayed. Before enabling the IMT tools, it is suggested to read "Adding an IMT measurement" on page 302 to ensure you understand how to use these tools properly.

Annotations

On the annotations page, you can add custom annotation labels used on acquired or saved images.

Custom annotation labels can be edited and deleted—predefined annotation labels cannot.

In an exam, once an annotation is placed on a saved image, subsequent scans will display the same annotation label—turn off this feature by enabling the **Clear Annotations on Scan** selection box.

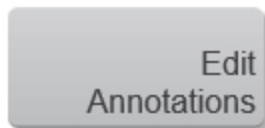*To display the annotations page*

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

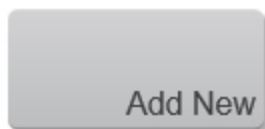**2** Tap the **Measurements & Annotations** tab.
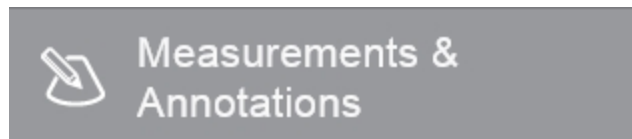
3 Tap **Edit Annotations**.

To add a custom annotation label

1 In the annotations page, tap **Add New**.

2 Add the text of the new annotation label.

> **Note:** You can also select predefined labels and add more text or edit the existing labels, then save as a custom annotation. Custom annotation labels are limited to 40 characters in length.

3 If you want to create more than one, tap **Add New** again.

4 Tap **Done** to close the page and return to your imaging session.

5 Custom annotation labels will be indicated by the edit icon in the upper left corner on the annotation label button.

To edit an annotation label

1 To edit an annotation label, tap to select the annotation label.

2 In the annotation label text box, edit the text.

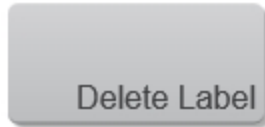> **Note:** You cannot edit the default annotation labels.

3 Tap **Done** to close the page and return to your imaging session.

To delete an annotation label

1 To delete an annotation label, tap to select the annotation label, and tap **Delete Label**.

Delete Label

Note: You cannot delete the default annotations.

2 Tap **Done** to close the page and return to your imaging session.

Done

General

Use general preferences to set basic system settings.

All users can set their **Startup**, **Display Brightness**, **Default Save Type**, **System Sounds**, and **Foot Switch Configuration**.

An **Administrator System Settings** section has additional settings that only a user with administrative privileges can change. These settings include date and time, preferred language and patient ID generation.

To display the general page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **General** in the list on the left.

⚙ General

To set your general preferences

After you are done setting your general preferences, you must tap **Done**.

> **Note:** The Vevo MD Imaging System will need to be restarted if the date, time or language settings are changed.

- **Startup**: Specify the system state you want to see when you start and log into the system: home screen, patient entry, completed exams or scanning.

- **Display Brightness**: You can adjust the brightness of the clinical display or the control panel to compensate for the level of light in the room in which the system is located. Do either or both of the following:

    - Drag the upper slider for the clinical display

    - Drag the lower slider for the control panel

- **Default Save Type**: When you want to save an image in the mode window, you can decide if the save button will be a **Save Clip** or a **Save Frame** button.

- **System Sounds**: Adjust the volume of system sounds by tapping and dragging the sliders of either the **Keyboard Tones** or **Saving Tones**. You can also choose to mute the system sounds by tapping the speaker icons, 🔊 to 🔇 to mute sounds, tap again to enable sounds.

    - Keyboard Tones: Enable if you want to hear a tone when the keyboard keys are tapped

    - Saving Tones: Enable if you want to hear a tone when saving images

    > **Note:** You will hear the sound at the selected volume after a new volume has been selected.

- **Foot Switch Configuration**: If you have a foot switch, you can define the function of the left and right foot switches. Tap the drop down to select the function to assign to the selected foot switch:

    - 2D Scanning

    - Reset Preset

    - Save Clip (left default)

    - Save Frame

    - Unfreeze/Freeze (right default)

- Start/Stop

- **Date and Time**: Enter the date, time and time zone values as required. By default, the system updates the internal clock automatically for daylight savings time. You can disable this option, if required.

  You can also choose to display the time using the 24 hour time format.

  Date and time settings can only be changed by an administrator.

- **Preferred Language**: From the drop down menu, select a language: English, Français, Deutsch, Italiano and Español.

  The control panel, clinical display, exports and keyboard will be updated to the chosen language. The keyboard will contain alternative options for letters in some languages—tap and hold a letter to display the options.

> **Note:** When the language has been changed the system will require you to restart the system.

- **Patient ID**: The system will generate a patient ID in the patient form. If you want to add a prefix to the generated patient ID, type it in the text box. The Patient ID is set to ON by default.

System information

The system information page displays system hardware, software and transducer versions, licensed features and Contact Information.

On this page you can upgrade the system and update your license.

Note: These tasks can only be completed by a user with administrator privileges.

To display the system information page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **System Information** in the list on the left.

ⓘ System Information
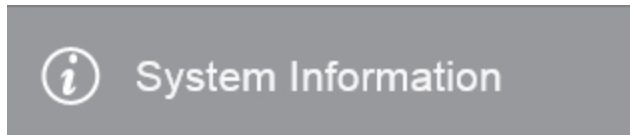
To upgrade your system

Before upgrading your system, ensure any imaging files are saved.

To perform a system upgrade, you will need the software upgrade file on a USB.

Note: To complete an upgrade, a system restart is required.

1 Connect the software upgrade USB to the system.

2 Tap **System Upgrade**.

> System
> Upgrade

The upgrade window appears.

3 In the file browsing panel on the left, navigate to the appropriate location.

4 In the available upgrades list, select the file.
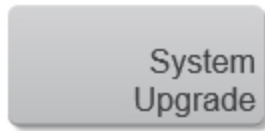
5 Tap **Upgrade** and confirm.

6 Follow the on screen instructions.

Note: The installation and restart process could continue for up to 30 minutes.

To update your license

Your system license and the enabled features are mapped to your specific machine, as identified by the machine ID. In order to update your license and enable new features, you may need to provide the machine ID to FUJIFILM SonoSite.

1 Insert a USB stick.

2 On the system information page tap **Export Machine ID**.
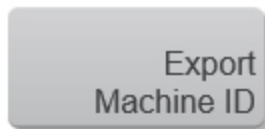
> Export
> Machine ID

3 Select the location for the export and tap **Export**. The ID is saved to a text file that can be sent to FUJIFILM SonoSite.

Once you have the license file on a USB stick you can perform the update

1 Insert the USB stick with the license file.

2 Tap **Update License**.
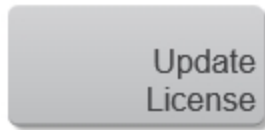
Update
License

3 In the file browsing panel on the left, navigate to the appropriate location.

4 Select the update file and then tap **Update**. The update progress begins and a progress bar is displayed.

5 You will be asked to restart the system to complete the upgrade.

6 Tap **Done** to close the page and return to your imaging session.

Done

System logs

On the system logs page, you can choose to display the following log types:

- **All**: Displays all types of log files, including DICOM

- **DICOM**: Displays *current* DICOM session log entries

- **Error**: Collects errors and events typically to support diagnostics

- **Exit**: Collects processor exceptions and software-generated assertions to support diagnostics

- **Terminate**: Collects errors and events that cause the system to shut down to support diagnostics

To display the system logs page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **System Logs** in the list on the left.

System Logs

To export log files

> Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

1 Select the log type.

2 Connect a USB memory stick.

3 Select the files from the list that you want to export.

4 Tap **Export**.
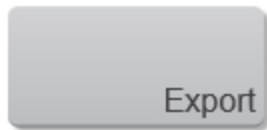
5 In the export page, browse and select the folder to which you want to export the file.

6 (Optional) To add a sub-folder, tap **New Folder**, name the folder and then tap **Done**.

7 Tap **Yes** to confirm the export.

Once the export has been completed and confirmed, you can safely remove the USB memory stick.

To delete a log file

> Note: Only an administrator can delete log files.

1 Select the log type.

2 Select the files from the list that you want to delete.

3 Tap **Delete** to delete the selected files.
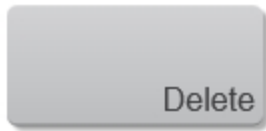
4 Tap **Yes** to confirm the deletion.

5 Tap **Done** to close the page and return to your imaging session.

User management

The user management page is used to configure user profiles on the system.

You can configure the placement of controls on the control panel for each user, see "Customizing controls" on page 207. You can also set a user's preference for their "Startup" screen, see "General" on page 136.

Each user should have their own account in order to take advantage of this customization.

There are three components to user management:

1. **Create an Administrator password**: The first time you log on to the system, you are prompted to create an administrator password. See "Logging on for the first time" on page 147.

2. **Create User accounts**: After creating the initial administrator account, the administrator can add more user accounts. See "Managing user accounts" on page 156.

3. **Turn User Login on or off**: User login is on by default. Only a user with administrative privileges can turn user login on or off. When user login is on, administrators and standard users are required to enter a password to enter the system.

WARNING: When User Login is OFF, there are no restrictions for unauthorized users. FUJIFILM SonoSite recommends leaving the default setting of User Login in the ON state at all times.

Note: When user login is off, the guest account is not available.

To open the user management page

1 Tap **MORE**, and then tap **SYSTEM SETTINGS**.

MORE ☰

SYSTEM SETTINGS

2 Tap **User Management** in the list on the left.

User Management

Logging on for the first time

The first time you turn on the system, you will see the login screen with two buttons.
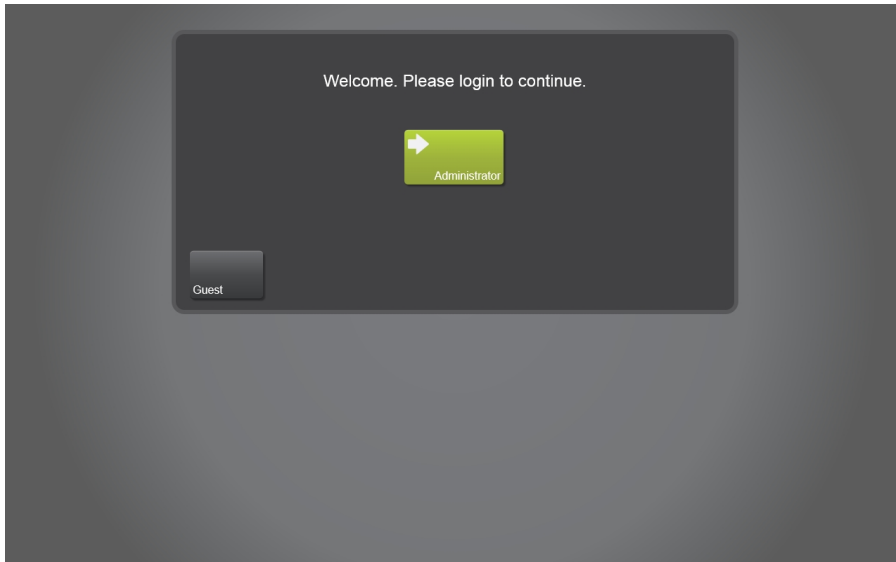
The **Administrator** button allows you to log on as an administrator with all of the associated administrative privileges.

The **Guest** button allows you to begin imaging immediately; however, any saved data is not associated with a unique user account and some system settings are blocked.

To configure the administrator account:

1 Tap the **Administrator** button on the log in screen. The system directs you to the **User Management** panel.

2 (Optional) Change the name of the currently logged in user in the **Name** field.

3 Set and confirm the password for the current user, who will be an administrator for the system.

> **Note:** This password is for future use. You will need it to log in for subsequent sessions.

4 Tap **Done** to create the account.

5 The system updates the name of the logged in administrator user, if the name was changed.

You can now add other user accounts to the system. See "Managing user accounts" on page 156.

> **Note:** If you do not create a password for the administrator account the first time you log in, you will be prompted to create a password each time you start up and log in to the system.

User login

The Vevo MD Imaging System default setting for user login is set to on.

When the system is first turned on, you are presented with the user login screen and two options. Your first option is to sign in as a guest that requires no password. Your second option is to sign in as an administrator where you will be required to define a password.

User login options

The following options are available on the user login screen and are only for a user with administrative privileges.

Some of the options are only available when user login is set to on.

User login options

Option	Availability	
	Login on	Login off
Enable USB Export (if unchecked, users are unable to export data to a USB device or memory stick)	✓	✓
Enable Patient Header	✓	✓
Enable password changes	✓	

User Login on

- Only an administrator can turn user login off

- When user login is set to on, the login screen will provide a list of available users

- Users will only be able to try their password 10 times. If the user exceeds their 10 attempts, the user becomes disabled; this only applies to the current session and is not permanent

- Each user can define what their "Startup" screen will be after login from the general page in system settings. Startup options includes: home screen, patient entry, completed exams and scanning

- Once logged in, the user name is displayed on the bottom right of the clinical display monitor

- A log out option is now available in the more drop down menu

- Only an administrator can delete other users. This is true when user login is both on or off. The administrator must confirm the deletion with their password

With user login on, a non-administrator user will be able to:

- Enable and disable IMT measurement tools

- Choose the startup screen for themselves

- Define all button layouts for themselves

- Edit, create new and delete custom annotations

- Change the monitor brightness or contrast and the keyboard sound levels for themselves

- Configure the foot switch for themselves

- Perform system backups

- Save and delete exam type presets

- Configure settings for export

- Configure display information

- View list of users in user management

- Select only themselves in the list of users

- Export system logs

- Use **Help**

- View system information

- Change their own password (if the administrator has allowed this)

- Restore their own user settings (and button configuration)

- Configure DICOM archives and export

- Set the default font size

With user login on, an administrator can define the above, but will also be able to define these additional settings:

- Enable and disable password changes for users and by users

- Enable and disable USB export

- Enable and disable patient header on the mode window

- Generate patient ID

- Add and delete users, except themselves

- Change password for anyone

- Restore the user settings for anyone

- Upgrade the system software

- Get the machine ID to update the software license

- Restore the system configuration from backups

- Import and export backups

- Delete backups

- Set the localization language

With user login on, a guest user will be able to:

- Configure button layout

- Adjust the monitor brightness and contrast, and keyboard sound level

- Choose the foot switch configuration

- Export system logs

- Use **Help**

- View system information

- Perform system backup

User Login off

- When user login is turned off in system settings and an exam is open, it will remain open and the software will return to the last screen displayed before accessing system settings

- User name will be removed from the status bar

- Only an administrator can access the user management panel in system settings, and only an administrator can delete other users

With user login off, an non-administrator user will be able to:

- Choose the startup screen used

- Configure button layout

- Set DICOM locations and servers

- Edit, create new and delete custom annotations

- Change the system date and time, monitor brightness and contrast, and keyboard sound levels

- Choose the foot switch configuration

- Perform a system backup

- Save and delete custom exam types

- Define non-DICOM export formats

- Export system logs

- Use **Help**

- View system information

With user login off, an administrator can define the above, but will also be able to define these additional settings:

- Access the user management page (administrator password required)

- Enable and disable USB export

- Enable and disable patient header on the mode window

- Generate patient ID

- Add and delete users, except themselves

- Delete system logs

- Change their own password

- Restore the user settings for anyone

- Upgrade the system software

- Get the machine ID to update the software license

- Restore the system configuration from backups

- Import and export backups

- Delete backups

- Set the localization language

With user login off, the guest will be able to:

> **Note:** When user login is off, the guest will only be available at the very first startup screen before any administrator is setup.

- Choose the startup screen used

- Configure button layout

- Edit, create new and delete custom annotations

- Adjust the monitor brightness and contrast , and keyboard sound level

- Choose the foot switch configuration

- Save and delete custom exam types

- Export system logs

- Use **Help**

- View system information

- Perform system backup

Managing user accounts

There are three types of user accounts available on the system:

- **Guest**: The guest account does not require a password and has access to all of the imaging and review functionality within the current exam. Any user can access the guest account using the **Guest** button on the log in screen.
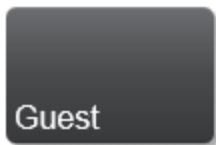
- **Standard user**: User accounts that are not defined as administrators have access to all of the imaging and review functionality and can take advantage of the customization features of the system. Features, such as creating new user accounts, defining connectivity settings, and some other system settings are not accessible to an account without administrative privileges.

- **Administrator**: A user account with administrative privileges has access to all system features, such as creating and deleting users, turning user login on or off, and upgrading the system software.

Confirm the type of user by the icon displayed in the bottom right corner of the clinical display as follows:

User icons

	Administrator
	Standard
	Guest

> **Important:** When user login is off, only an administrator has access to the user management panel in system settings; a password must be provided to proceed.

To create a new user account

Only a user with administrative privileges can add a new user to the system.

1 Open the **User Management** page from the system settings.

2 Tap **Add User**.

Add User
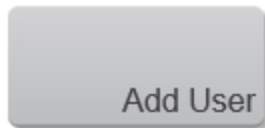
3 Tap the **Name** field and enter the user name.

4 (Optional) Check the **Administrator** check box to add administrative privileges to this account.

5 Enter and confirm the password for the user. This can be changed by the user or an administrative user. See "To change a user account's password" on page 161.

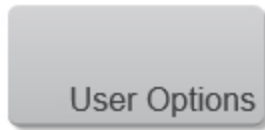**6** Tap **Done** to create the user account. You are then directed to the user list page.

Done

To delete a user account

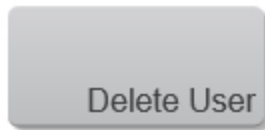Only a user with administrative privileges can delete a user account from the system.

1 Open the **User Management** page from the system settings.

2 In the user list, select the user you want to delete.

3 Tap **User Options**.

User Options

4 Tap **Delete User**.

Delete User

5 Enter your administrator password to confirm deletion of the user account. The user account is deleted and you are returned to the User List.
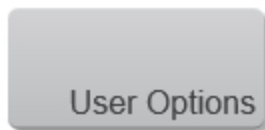
To modify a user's settings

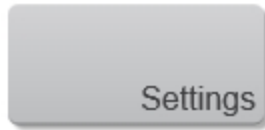Only a user with administrative privileges can modify a user's settings.

1 Open the **User Management** page from the system settings.

2 In the user list, select the user you want to modify.

3 Tap **User Options**.

User Options

4 Tap **Settings**.

Settings

5 From this page you can:

- Change the administrator status of a user

- Disable a user so they cannot log in

6 After making the desired changes, tap **Done** to update the user account.

Done

Note: A user with administrative privileges cannot remove their own administrator status while they are using the account.

To restore a user account's settings

Restore User restores user account's settings to the system default user profile; this includes button configurations, and user specific settings for the current user only. Data and custom presets are not affected.
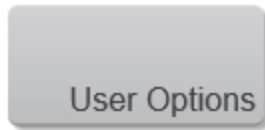
Only a user with administrative privileges can restore any user account's settings. Standard users can only restore their own account's settings.

1 Open the **User Management** page from the system settings.

User Management

2 In the user list, select the user account for which you want to restore the settings.

3 Tap **User Options**.

4 Tap **Restore User**. A confirmation dialog box is displayed.

5 Tap **Restore**. A message is displayed confirming the settings have been restored, and you are returned to the log in page.

To restore a user account's more controls settings

More Controls Restore restores the location of all customizable controls available during scanning and review to the system default. Other system settings, data and custom presets are not affected.

Only a user with administrative privileges can restore a user account's more controls settings.

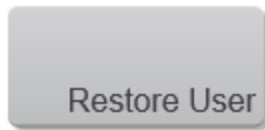**1** Open the **User Management** page from the system settings.

2 In the user list, select the user account for which you want to restore the settings.

3 Tap **User Options**.

User Options

4 Tap **Restore More Controls**. A confirmation dialog box is displayed.
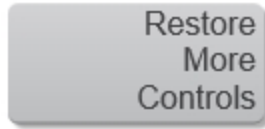
Restore
More
Controls

5 Tap **Restore**. A message is displayed confirming the settings have been restored, and you are returned to the log in page.

To change a user account's password

Only a user with administrative privileges can change another user account's password.
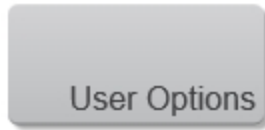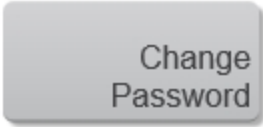
1 Open the **User Management** page from the system settings.

User Management

2 In the user list, select the user account for which you want to change the password.

3 Tap **User Options**.
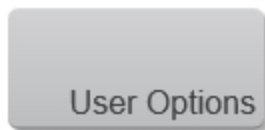
User Options

4 Tap **Change Password**.

Change Password

5 Enter your administrative password in the **Your Password** field.

6 Enter a password for the standard user in the **New Password** field and also in the **Confirm New Password** field.

7 Tap **Done** to change the password.

Done

To enable password changes for standard users

Only a user with administrator privileges can enable the **Enable password changes** option to allow a standard user to change their own passwords.

1 Open the **User Management** page from the system settings.

User Management

2 Check the **Enable password changes** check box below the user list.

3 Tap **Done**.

Done

4 When a standard user is in user management, a **Change Password** button is displayed.

To enable USB export

Only a user with administrative privileges can enable or disable USB export.

If the USB export option is disabled, no user can export data to a USB.

1 Open the **User Management** page from the system settings.

2 Check the **Enable USB export** check box.

3 Tap **Done**.

To enable patient header

Only a user with administrative privileges can enable or disable the patient header.

If enabled, the patient header will be displayed on the clinical display monitor while scanning and will also be included on images and reports when exporting.

1 Open the **User Management** page from the system settings.

2 Check the **Enable Patient Header** check box below the user list.

3 Tap **Done**.

Patient

The **Patient** page displays a patient entry form that lets you enter current patient demographic data, exam type, facility information and clinical details for the patient exam.

After you begin a new patient form, all images, video clips, and other information you save during the exam are linked to that patient.

You can enter patient information by:

a. Entering the information manually, see "Entering patient information manually" on page 173.

b. Importing information from a DICOM worklist server, see "Entering patient information from the worklist" on page 175.

> **WARNING:** To avoid mixing images saved from multiple patients, make sure that the patient ID is displayed before you save an image. See "Entering patient information manually" on page 173 and "Display information" on page 104.

> **WARNING:** To avoid incorrect measurement calculations, verify that the patient information, and system date and time settings are accurate and correct before beginning an exam.

> **WARNING:** To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing measurement calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information manually" on page 173.

> **WARNING:** To avoid misdiagnosis or harming the patient outcome, do not use single calculations as sole diagnostic criteria. Use calculations in conjunction with other clinical information.

Patient image data

Digital Imaging and Communications in Medicine (DICOM) provides a way to archive patient image data by connecting your ultrasound system over a local area network (LAN) with various archivers for storage after every patient exam. FUJIFILM SonoSite recommends that you configure and use DICOM transfer to prevent patient image data loss in the event of a system fault. For more information, see "DICOM" on page 78.

If you do not use DICOM networking, then FUJIFILM SonoSite recommends that you export patient image data to a USB memory stick after every exam. For more information, see "DICOM" on page 78.

Reviewing patient image data

During an exam or after an exam has ended, you can review patient image data that was saved during the exam.

Reviewing image data from an active exam

1 During an active exam, tap **REVIEW IMAGES** from the top menu.

2 All of the saved frames and clips are displayed as thumbnails with an icon as follows:

- clip

- frame

- or active image in mode window

3 You can name the image, export or delete any image. You can also request a **Report**, see "Report" on page 312.

4 Double tap the image you want to load into review.

Reviewing image data from an ended exam

1 Go to the **Completed Exams** and tap the patient exam that you would like to review.

2 Tap **Review Images**.

> **Note:** If you are selecting more than one exam from the completed exams list, the **Review Images** button is not available.

3 You can name, export or delete any image from an ended exam.

> **Note:** You can only export patient image data via the **Report** button from an ended exam.

4 Double tap the image you want to load into review.

5 The review screen is displayed.
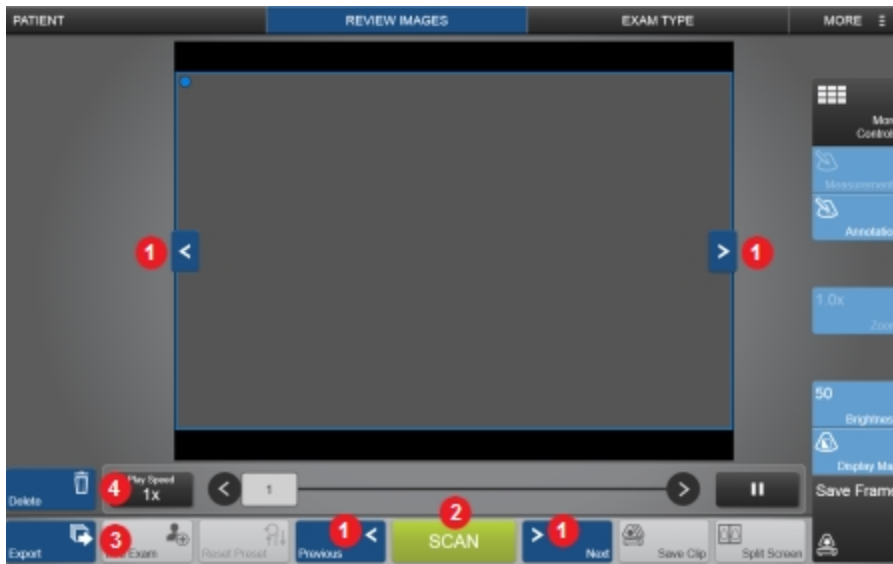
Review images screen

1. *Next and previous image*

2. *Scan*

3. *Export*

4. *Delete*

The review image screen provides the following:

Next and previous image controls

There are two sets of the **Next/Previous** image controls on the control panel; use the directional arrows on either side of the image area or use the next and previous buttons on either side of the **Scan** button.

Tap a control to cycle through the images in the current exam.

Note: These controls are only available for saved images and if there is more than one image in the current exam.

Patient form fields

Field descriptions

The patient form fields available depend on exam type. In some fields, you can enter symbols and special characters, select from drop down menus or calendar pickers. Fields that require entered text will display a keyboard when tapped; to dismiss the keyboard tap outside of the patient form.

Patient

- **Last**, **First**, **Middle**: Patient name

- **ID**: Patient identification number

- **Date of Birth**

- **Gender**

- **Accession**: Enter number, if applicable

- **Indications**: Enter desired text

Exam

- **Exam**: The exam types available depend on the transducer that is connected to the system and the drop down list includes both custom and system defined exam types, see "Exam types and presets" on page 106

Facility

- **Institution**

- **Department ID**

- **User**: The User field is prepopulated by the logged in user. If User Login is OFF, the User field will be blank

- **Reading Doctor**

- **Referring Doctor**

Routing Selection

When you associate one or more routing selections with an exam, the system reflects the routing selection in the patient report.

If you have specified a DICOM archive as an **Educational** archive, setting routing selections in the patient form affects how exams are archived. For more information, see "Routing selections" on page 100 and "Specifying educational DICOM archivers" on page 98.

- **Procedural**

- **Diagnostics**

- **Educational/Accreditation**

Scheduled Procedure

Procedure fields are available only if the DICOM worklist feature is licensed and configured. See "DICOM" on page 78.

- **Name**

- **Protocol**: Protocol for the selected procedure

- **Meaning**: Definition of the selected procedure

Performed Procedure

- **Code**: Drop down menu

- **Edit**: You can edit codes or add new ones

- **Meaning**

Additional Worklist Query Parameters

- **Modality**: Procedure types. The modality for the Vevo MD Imaging System is Ultrasound (US) and cannot be edited.

- **Requested Procedure ID**: The procedure ID

Entering patient information manually

To enter patient information manually

1 End the previous exam. See "Ending the exam" on page 181.

2 Tap **PATIENT** from either:

   a. the top menu

   b. the home screen
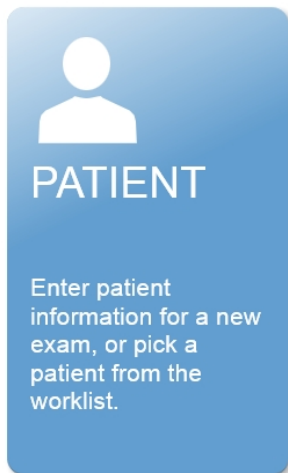
The patient form is displayed.

3 Tap a text box, and fill in the field. See "Patient form fields" on page 170.

4 Tap **Done**.

Entering patient information from the worklist

Using the worklist, you can import patient information from the Hospital Information System or Radiology Information System. (DICOM worklist is a licensed feature.)

The worklist is available after you do the following:

- Connect the system to the network

- Configure the system for DICOM transfer

- Select a worklist server for the active location

See "DICOM" on page 78.

To enter patient information from the worklist

1 Tap **PATIENT**.

PATIENT

2 Tap **Worklist**.

Worklist

3 To sort the worklist, tap a column heading to sort by. By default, the worklist sorts in ascending order.

4 Tap a procedure from the worklist.

(Optional) To re-query the server for an updated worklist, tap **Update**.
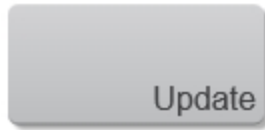
5 Tap **Select**.
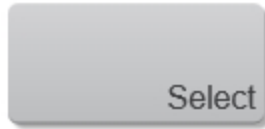
The system populates the patient form. (Patient information from the worklist is not editable.)

6 To return to the patient form without selecting a procedure, tap **Back**.

To view scheduled procedures

The patient information that you import from the worklist includes scheduled procedures.

♦ On the patient form, see the following lists under **Scheduled Procedures**:

- **Name**: Scheduled procedures

- **Protocol**: Protocol for the selected procedure

- **Meaning**: Definition of the selected procedure

To change the procedure

You can select a procedure different from the performed procedure.

1 Under **Performed Procedure** on the patient form, select the desired procedure from the **Code** list.

The definition of the procedure appears in the **Meaning** field.

2 If you want to modify the **Code** list, tap **Edit**, and do one of the following:

Note: Required fields are marked with asterisks.

- Add an item: Tap **Add New**, and then fill in the **Code**, **Code Scheme Name**, and **Meaning** fields, and then tap **Save**

- Delete an item: Select the item, and then tap

Updating and querying the worklist

The worklist automatically updates if set up for an automatic worklist query, see "Worklist" on page 87. You can also manually update the worklist, and you can query the worklist server for a matching patient procedure.

The following table shows the parameters used for worklist queries. You set parameters on the worklist configuration page, see "Connectivity" on page 75.

You can also query the worklist using any of the available fields within the patient form, see "To perform a manual query" on the facing page.

Query Parameters

	Manual Patient Query	Manual Update from Worklist	Automatic Query Update
Patient Data	✓		
Date Range	✓	✓	✓
This Device Only	✓	✓	✓
Automatic Query On/Off			✓
Occurs Every			✓
Start Time			✓

To manually update the worklist

1 On the patient form, tap **Worklist**.

2 Tap **Update**.
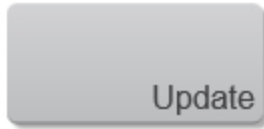
To perform a manual query

1 On a new patient form, do any of the following:

    a. Fill in any of the following fields for the query: **Last**, **First**, **Middle**, **Accession**, or **ID**

> **Note:** The query is on the characters you enter. For example, *Smith* returns *Smith*, *Smithson*, *Smithy*.

    b. Under **Additional Worklist Query Parameters**, specify a **Requested Procedure ID**

2 Tap **Query**.
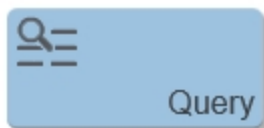
The system will indicate if a worklist query is in process.

The system will notify you when the worklist is complete, if the query returns more entries than the system can display or if the query has failed.

When the worklist is complete, the query results, quantity and time of the **Last Query** are displayed below the worklist.

> **Note:** If the query returns more than 200 entries, **Incomplete Query** will be displayed.

3 Highlight the patient procedure you want, and then tap **Select**.

Select
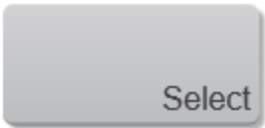
The system imports the information into the patient form.

Ending the exam

Note: Although you cannot add images and video clips to a patient exam that is ended, you can automatically start a new patient exam that has the same patient information. See "To append images and video clips to a patient exam" on page 188.

When you end an exam, the system resets imaging settings to the default settings for the selected exam type.

To end an exam

1 Make sure that you have saved images and other information that you want to keep. See "Saving images" on page 269.

2 From the **PATIENT** or **REVIEW IMAGES** page, or from the mode window, tap **End Exam**.
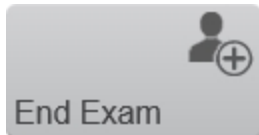
3 A confirmation page is displayed; select **OK** or **Cancel**.

Editing patient information

You can edit patient information if an exam has ended.

You cannot edit patient name, patient ID, accession number, birth date and gender for any exam in the following situations:

- If the exam is transferring or is already archived

- If the MPPS transfer is configured and enabled for the current location

- If the exam is coming from a worklist

- If the exam is appended and without MPPS configuration

To check archive status of a patient exam

1 Select a patient exam from **Completed Exams**.

2 Do either of the following:

    a. Tap **More Options** then **Archive Status**

    b. Tap the archive column for the exam. The archive column will display an archive status icon or nothing at all; for either option, tap the column

3 Review the archive status. See "Archiving exams" on page 95 for details on the information displayed and what the archive status icons mean.

To edit patient information in an open exam

1 Tap **PATIENT**.

PATIENT

2 Make changes as desired.

3 Tap **Done**.

Done

4 A pop up window will be displayed. Do one of the following:

    a. Tap **New** to start a new patient exam using the current data

    b. Tap **Modify** to change the current patient data

    c. Tap **Cancel** to do nothing

To edit patient information in an ended exam

1 Select a patient exam from **Completed Exams**.

2 Tap **More Options**.

More Options
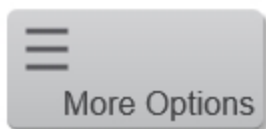
3 Tap **Edit Information**.

Edit Information

Note: The **Edit Information** button is not available for a patient exam that is transferring or is already archived.

4 Make changes as desired.

5 Tap **Done**.

Done

Completed exams

The completed exams list organizes saved images and video clips from patients. You can review, manage, and export completed patient exams. You can also append images and video clips to an existing exam.

From the completed exams list, you can also export exams to a USB memory stick, associate a routing selection with an exam, or archive exams to a DICOM server. For more information, see "To connect a USB memory stick for importing or exporting" on page 129, "Associating routing selections with exams" on page 100, and "Archiving exams" on page 95.

> **Note:** From the completed exams list, if there is no open exam and you tap **SCAN**, the software will automatically start a new exam and begin acquisition in 2D.

Column headings of the completed exams indicate:

- **Name**: Patient name

- **ID**: Patient ID

- **Date/Time**: The date and time of the exam

- The user who performed the exam

- The number of images and video clips saved with the exam

- The archive status of the exam, for more details on the archive status icons displayed, see "Archiving exams" on page 95

To display the completed exams

Do one of the following:

a. Tap **REVIEW IMAGES** then **Completed Exams**

b. Tap **PATIENT** then **Completed Exams**

c. From the home screen, tap **Completed Exams**

To sort the completed exams

By default, completed exams are sorted by date and time, with the most recent patient listed first. You can re-sort the completed exam list.

1 Tap the column heading that you want to sort by.

2 Tap it again to sort in reverse order.

To select all completed exams

1 In **Completed Exams**, tap **Select All**.
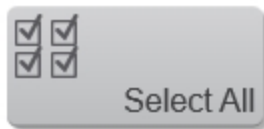
2 To deselect all exams, tap **Clear All**.
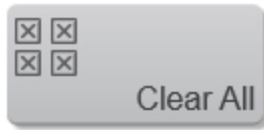
To delete an exam

You can delete an exam that hasn't been archived, that is pending archive or that has already been archived.

You cannot delete an exam while transferring to a DICOM server. When an exam is transferring, the transfer icon is displayed on the clinical display and in the completed exams list for that exam.

1 In the completed exams list, select the check box next to one or more exams.

2 Tap **Delete**.
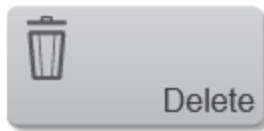
To review images from completed exams

1 Tap the exam in the completed exams list.

2 Tap **Review Images**.
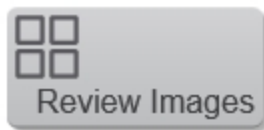
> **Note:** Images will be listed in numerical order from top-left to bottom-right.

3 Double tap a thumbnail to load into review.

To append images and video clips to a patient exam

Although you cannot add images and video clips to a patient exam that is ended, you can automatically start a new patient exam that has the same patient information.

> **Note:** When you have an open exam and select to append to a closed exam, the system will close the open exam before appending.

1 Tap the exam in the completed exams list.

2 Tap **More Options**.
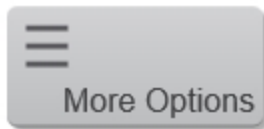
3 Tap **Append**.
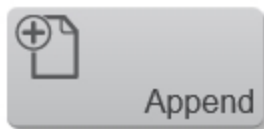
A new patient form appears; the form will have the same information as the exam you selected.

To view a report of an exam

A report will display patient information, thumbnails of the images or videos within the exam and any measurements.

1 Tap the exam in the completed exams list.

2 Tap **Report**.

3 Tap a thumbnail if you wish to load it into review.

4 Tap a measurement, and the corresponding thumbnail image will be highlighted.

5 Tap **Export** if you want to export the report.
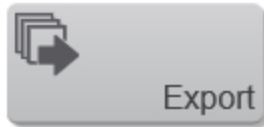
Exporting patient exams

Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

You can export patient exams if the system administrator has not disabled USB export (see "Ending the exam" on page 181). Exams include images, video clips, and a report.

A USB memory stick is for temporary storage of images and clips. Archive patient exams regularly.

To export patient exams manually to a USB memory stick

Before you begin to export, specify the file format for exported images, (see "Export" on page 126) and connect a USB memory stick.

There are several ways to export exams; from the **REVIEW IMAGES** page, the **Completed Exams** page and from the mode window.

Important: Removing the USB memory stick or turning off the system while exporting may cause exported files to be corrupted or incomplete. To stop in-progress exporting, tap **Cancel**.

To export completed exams

1 From the **PATIENT** page or startup screen, tap **Completed Exams**.
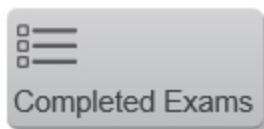
2 In the completed exams page, tap either:

a. Ended exam(s): Displayed with black text and all export options will be available

b. Active exam: Displayed with blue text— PACS will not be an available option for export

3 Tap **Export USB**.
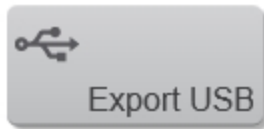
4 In the export page, choose the export type.

- **PACS**: Exports completed Patient Exams in DICOM format to be read on a PACS station or other DICOM viewer

- **Multimedia**: Allows export of individual images and reports. You can change the file name and select the file type (Clips, Frames or Report)

Note: When you select Multimedia, an image summary (quantity of images and space available) is displayed in the top left corner of the Export USB page; similarly when you select PACS, an exam summary is displayed.

5 (Optional) Decide if you wish to **Hide patient information on exported images**— when the checkbox is enabled, the patient information will not be displayed on exported images.

6 Tap **Export**.

During export, a report will be displayed; when export is complete, a message confirming a successful export will be shown.

Note: If you export to DICOMDIR, the archive status column on the **Completed Exams** page will indicate the archive status of the exam. See "Archiving exams" on page 95.

To export from the review images page

You can export images from an ended exam or your current exam from the **REVIEW IMAGES** page.

1 Select **REVIEW IMAGES**.

2 In the completed exams page, tap either:

    a. Ended exam(s): Displayed with black text and all export options will be available

    b. Active exam: Displayed with blue text— PACS will not be available option for export
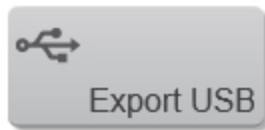
3 Tap **Export USB**.

4 In the export page, choose your export type (PACS or Multimedia), and decide if you wish to hide patient information on exported images; when the checkbox is enabled, the patient information will not be displayed on exported images.

5 Tap **Export**. During export, a report will be displayed; when export is complete, a message confirming a successful export will be shown.

To export from the mode window

1 Load an image into review or if you are acquiring data, **Freeze** acquisition.

2 Tap **Export**.

3 In the export page, choose your export type (PACS or Multimedia), and decide if you wish to hide patient information on exported images; when the checkbox is enabled, the patient information will not be displayed on exported images.

> **Note:** PACS will not be available for an active exam.

4 Tap **Export**. During export, a report will be displayed; when export is complete, a message confirming a successful export will be shown.

Export folder structure

A unique folder structure for each patient will be used when exporting.

The folder name will include the patient name, **ID** and a unique internal identifier, ex. John Smith-**122C597D0**-0000027.

Within this folder, a folder for images will be created; this folder is named with the date and time of the exam and contains a file for each image as well as a report (if selected to export).

When you choose to append an exam, the patient folder will have an additional image folder created. See "To append images and video clips to a patient exam" on page 188.

Protecting patient information

To require user login

You can set the system to require a user name and password at startup. If you require user login, you also need to set up user accounts. See "Managing user accounts" on page 156.

1 On the **Administration Login** settings page, log in as a user with administrative privileges.

2 Toggle **User Login** to **On**.

3 Tap **Done**.

To hide patient information when scanning

You can choose not to display the patient name and ID number on the clinical monitor and to remove it from exported images and video clips.

1 Log in as a user with administrative privileges.

2 In system settings, go to **User Management**.

3 Uncheck **Enable Patient Header**.

4 Tap **Done**.

To hide patient information when exporting

You can choose to hide the patient name and ID number when you export images and video clips.

1 From **Review Images** or **Completed Exams**, select your image or exam and tap **Export USB**. If you are viewing your image in the mode window, tap **Export**.

2 On the export page, select and check the **Hide patient information on exported images** option.

3 Tap **Export**.

Exported images will not include the patient name or ID number.

To disable export of patient data

You can prevent users from exporting patient data to USB memory sticks.

1 Log in as a user with administrative privileges.

2 In system settings, go to **User Management**.

3 Uncheck **Enable USB Export**.

4 Tap **Done**.

HIPAA standard

The system includes security settings that help you to meet the applicable security requirements listed in the HIPAA standard. Users are ultimately responsible for ensuring the security and protection of all electronic protected health information collected, stored, reviewed, and transmitted on the system.

The Health Insurance and Portability and Accountability Act, Pub.L. No. 104-191 (1996). 45 CFR 160, General Administrative Requirements.

45 CFR 164, Security and Privacy.

Scanning

> **Important:** The Vevo MD Imaging System is designed to stop acquisition after one hour of uninterrupted scan time. Therefore, FUJIFILM SonoSite recommends freezing scanning if the system is not in use, and to save images if you need to leave the system for a long period of time.

Vevo MD Imaging System offers the following scanning modes:

- 2D

- M-Mode

- Color Doppler Mode

Viewing the clinical display

While scanning and reviewing images, you will view your image data on the clinical display. The features on the screen and the image parameters will differ slightly in each scanning mode.

Clinical display elements

1. *Image status area*

2. *Mode settings panel*

3. *Display map*

4. *Image area*

5. *Transducer orientation indicator*

6. *Image scale*

7. *Focal zone indicator*

8. *Status bar*

The clinical display provides the following:

Image status area

The following information is shown on the image status area:

- The transducer in use

- The institution and department ID

- The patient name, patient ID and user

- Image acquisition mode and status; acquired, stored or recalled

- System status, date and time

Note: Some of the information displayed is dependent on the patient header options selected in display information, within system settings. See "Display information" on page 104.

Mode settings panel

The mode settings panel displays a unique set of information depending on the current control selections.

Specific values for image controls are displayed. As you modify the settings during imaging, your changes are temporarily highlighted so you can see the updates.

Display map

Indicates the chosen display map for the image. The display map can be changed using the display map control.

Image area

This is the area where the image data acquired by the transducer appears. This is the area of the window that the system exports—along with header information—when you export a stored image and configure your export to send only the image area.

The image area is not interactive, you control the content of the image area from the control panel.

This area is also known as the workspace.

Transducer orientation indicator

The blue dot corresponds to the orientation ridge on the transducer nose and indicates the orientation relative to the anatomy.

Tap either of the orientation buttons to flip the image between the following options: **Right**, **Left**, **Up** and **Down**.

Image scale

Indicates, in mm, the distance from the face of the transducer to the tissue being imaged.

> **WARNING:** The Vevo MD Imaging System uses ultra high frequency (UHF) series transducers. Each UHF transducer model has a different image scale that does not start at 0.0 mm, but includes an offset. Please be aware of this when placing measurements.

Focal zone indicator

When you acquire data, use the focal zone control on the control panel to adjust the configuration of the focal zone in order to optimize the image based on its depth; drag the control up to decrease depth, and down to increase depth or tap on the scale where you would like the focal zone to be.

Status bar

The following information is shown on the status bar:

- A message confirmation when saving a frame or clip

- Percentage of free space to store image data; indicates when you should back up your image data to free up space on the system

- Current user name

- Current user icon. A user with administrative privileges will have displayed, and a standard user will have displayed

- Current time

- Various status updates when imaging parameters are changed and some image processing progress information

Using the control panel during scanning

You can control image acquisition and management through the control panel. A general overview of the interface is provided here and specific details are provided with each scanning mode.

Control panel elements:

1. *Patient*

2. *Review images*

3. *Exam type*

4. *More*

5. *More Controls*

6. *Imaging controls bar*

7. *Save Frame*

8. *Freeze*

9. *General controls bar*

10. *Scanning modes*

While scanning, the control panel provides the following controls:

Patient

Tap this control to open the patient entry form. See "Patient" on page 165.

Review images

Tap this control to open the review page. See "Patient image data" on page 166.

Exam type

Tap this control to switch to another exam type. See "Exam types" on page 106.

More

Tap this control to access **Help**, system settings, or to log out from the system. See "System settings" on page 68.

More controls

Tap this control to access additional controls that are not displayed in the controls bar. See "Customizing controls" on page 207

Imaging controls bar

Controls available in the controls bar depend on the imaging mode, your system configuration, and whether the image is live scanning or review. See "Customizing

controls" on page 207. Also refer to each scanning mode to see information on mode-specific controls. See "Color Doppler Mode image acquisition" on page 248, "M-Mode image acquisition" on page 230, "2D image acquisition" on page 216.

Save frame

Tap this control to save the current frame. See "Saving images" on page 269.

Freeze

Tap this control to stop scanning and review or save the clip. See "Freeze" on page 268.

General controls bar

The controls on either side of the freeze button are the general controls. These controls are available during live scanning and review. To see the details on each of the available general controls, see "Customizing controls" on page 207.

Scanning modes

Tap one of these controls to begin scanning in that mode. The modes are described in the following sections. See also "Customizing controls" on page 207.

Using the control panel during review

When you stop scanning, the control panel provides the following options:
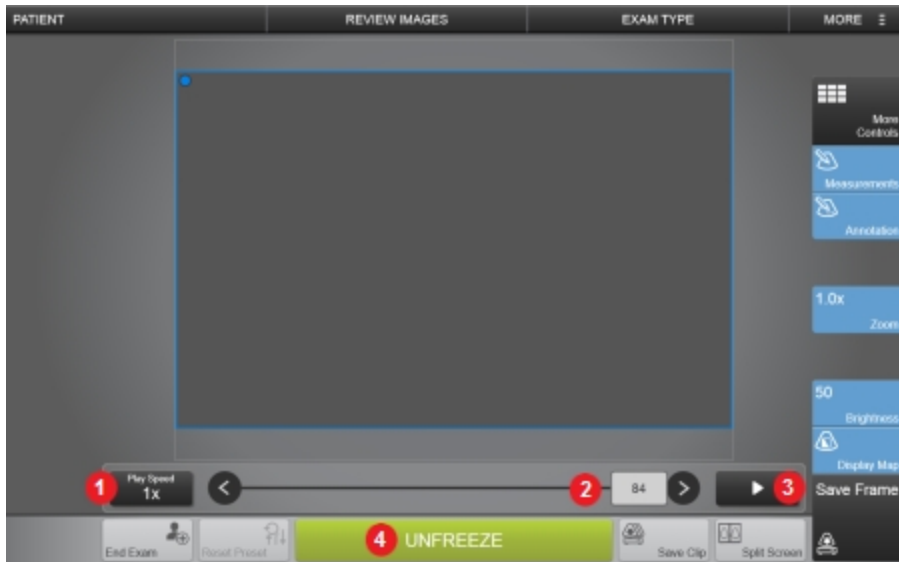
Control panel elements:

1. *Play speed*

2. *Clip slider*

3. *Play and pause*

4. *Unfreeze*

Play speed

Allows control of the playback speed of a clip. Tap **Play Speed** and use the **Up** and **Down** buttons to cycle through the available options.

This control is not available when reviewing a single frame or when reviewing non-frame based clips.

Clip slider

The slider shows the current position within the clip. The slider can be dragged to view a different frame or time in the clip. The arrows at each end of the slider can be used to move in small increments.

This control is not present when reviewing a single frame.

Play and pause

Allows for the clip to be paused during playback, and to resume playback. Tap the button to toggle the playback state.

This control is not present when reviewing a single frame.

Unfreeze

To continue live imaging, tap the **Unfreeze** button.

Customizing controls

There are three categories of controls on the control panel during scanning and reviewing images that can be customized. These include:

- Mode controls
- General controls
- Imaging controls

Customizing the control panel

For each of the three categories of customizable controls, there is a tab located in the more controls panel accessed through the **More Controls** button. By default, certain controls are shown on each of the customizable bars. The remaining controls are still accessible in the more controls window.

To customize your controls

1 Tap **More Controls**.
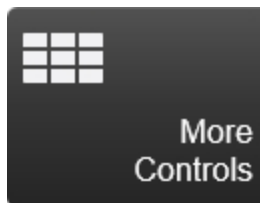
2 Tap the desired tab within the more controls panel. When live scanning, there is a general tab and a tab for each active mode.

3 Drag the desired control from the panel to the bar or *vice versa*. Controls on the general tab go on the general bar (bottom of screen), and controls on the imaging controls tab go on the imaging controls bar (right of screen).
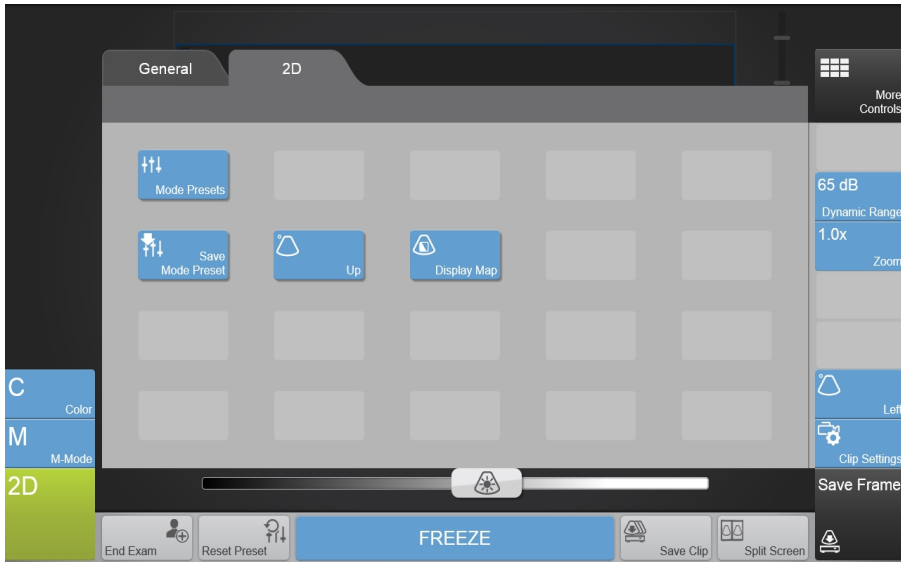
> **Note:** You do not have to place a control on a bar to use it. Controls can be used directly from the more controls panel.

4 Close the more controls panel by tapping the **More Controls** button or anywhere else on the control panel.

General controls

General controls are located along the bottom of the control panel (on either side of the **Freeze/Unfreeze** button) and stay on the control panel regardless of the mode during live scanning and in review.
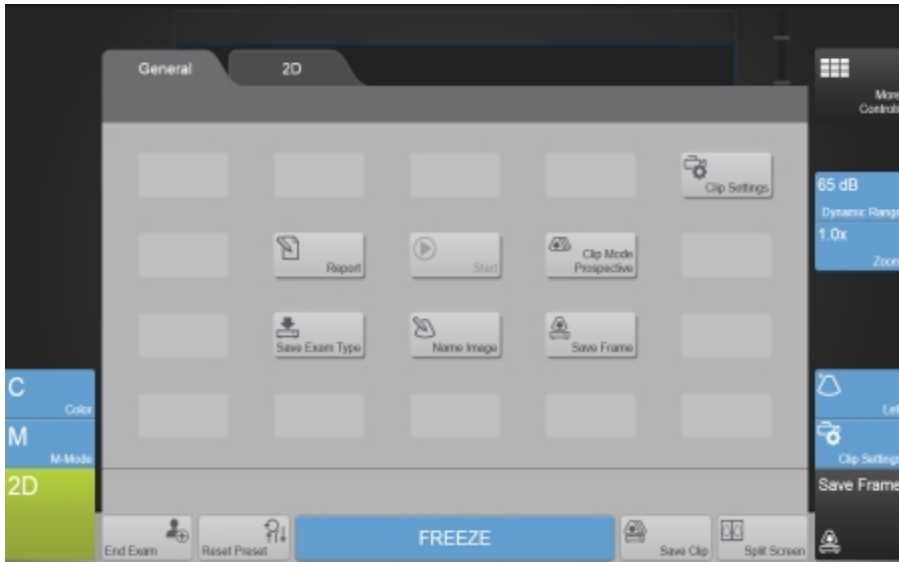
The options available for the general controls include:

Clip Mode
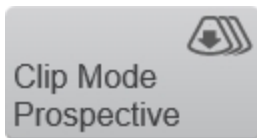
Tap this control to specify how the system saves a clip. This control toggles between Retrospective save and Prospective save. See This is a shortcut from setting this option in the General tab of the Clip Settings panel. Changing the setting in one location will update the other location.

This control is disabled during review.

Save Clip
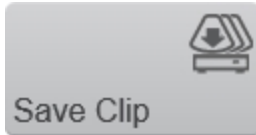
Tap this control to save a clip. This control toggles between retrospective save and prospective save. See "Saving images" on page 269. This is a shortcut from setting this option in the general tab of the clip settings panel.

Clip Settings
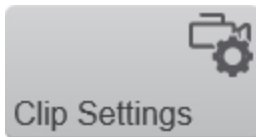
Tapping the **Clip Settings** control opens the clip settings panel. You can set various options for saving a clip, including the clip length in each mode. See "Saving images" on page 269.

Name Image
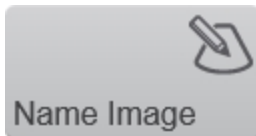
This control allows you to set the name of an image. If the "Autosave Image on Name Image" option is selected in the clip settings panel, then this button also triggers a save.

End Exam
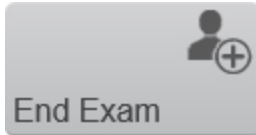
Tap this button to close the current exam.

Report
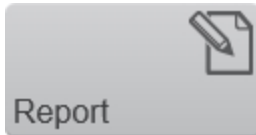
Tap this button to see a report of the measurements for the current exam. Scanning stops when you open the report.

Tap the **Scan** control to restart scanning.

Reset Preset

If you have selected a preset while scanning and have changed some of the scanning parameters, tapping this control will reset the controls to the currently selected preset values.

This control is disabled during review.

Save Exam Type
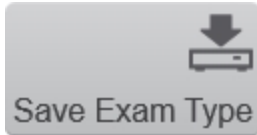
Tap this control to save the current configuration in all modes into a new exam type for the current transducer. See "Exam types and presets" on page 106.

Save Frame
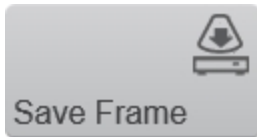
Tap this control to save a single frame in 2D and Color Doppler Mode. You can also use save frame in M-Mode; this control stores only the data that is visible at the time of using save frame.

You can change the default save type to either **Save Frame** or **Save Clip**, see "General" on page 136 in system settings.

Split Screen
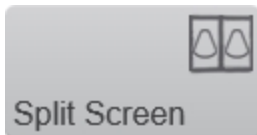
Tap this control to enable split screen viewing. This feature allows you to compare two images side-by-side in the clinical display, or to view a stored or acquired image next to a live image.

Only one side can be acquiring live data at a time.

A flyout button menu will be displayed when you tap split screen. Configure the view using the following buttons:

- **Off**: Turn split screen view off

- **L**: Toggles to the left image panel on the clinical display

- **R**: Toggles to the right image panel on the clinical display

Start and stop
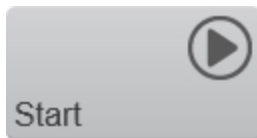
This button is available while acquiring data in M-Mode. It provides the same functionality as the start and stop flyout from the mode controls.

Using this control allows you to position the transducer in a customized location. This control toggles between the full 2D image and M-Mode.

This control is disabled during review.

Imaging controls

You can adjust parameters that are available during live scanning and review using the imaging controls.

For each imaging mode, you can drag your commonly used controls onto the controls bar located on the right side of the control panel.

Different controls are available when you are scanning or reviewing an image. The controls can be customized for both scanning or review for each mode.

When imaging in duplex modes, you can access the available controls from both modes. For example, you can choose from both 2D and M-Mode controls when scanning in M-Mode.
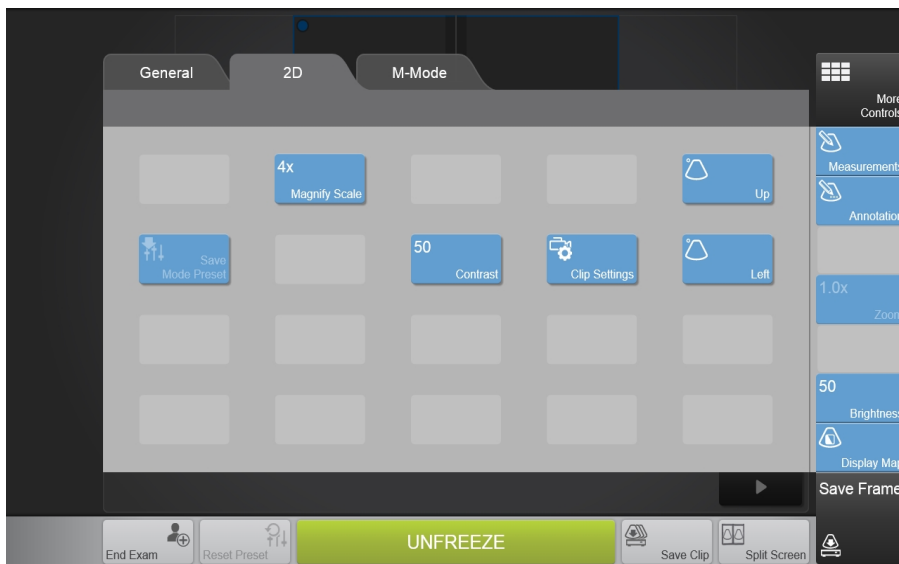
2D acquisition and analysis

2D is the system's default imaging mode. The system displays echoes in a two-dimensional view by assigning a brightness level based on the echo signal amplitude. If you have seen a conventional ultrasound image, then you are already familiar with 2D.

You will also:

- Use 2D in other imaging modes as the background image over which the active mode data is applied

- Use 2D as a real-time orientation window in other imaging modes to visually guide the transducer to the desired location

2D image acquisition

To acquire an image in 2D

1 Tap 2D.

2 Adjust the controls as needed. See "Controls in 2D" on page 222.

3 Save the image for later review using **Save Frame**. See "Saving images" on page 269.
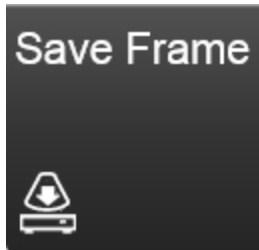
4 Tap Freeze to stop scanning.

2D clinical display
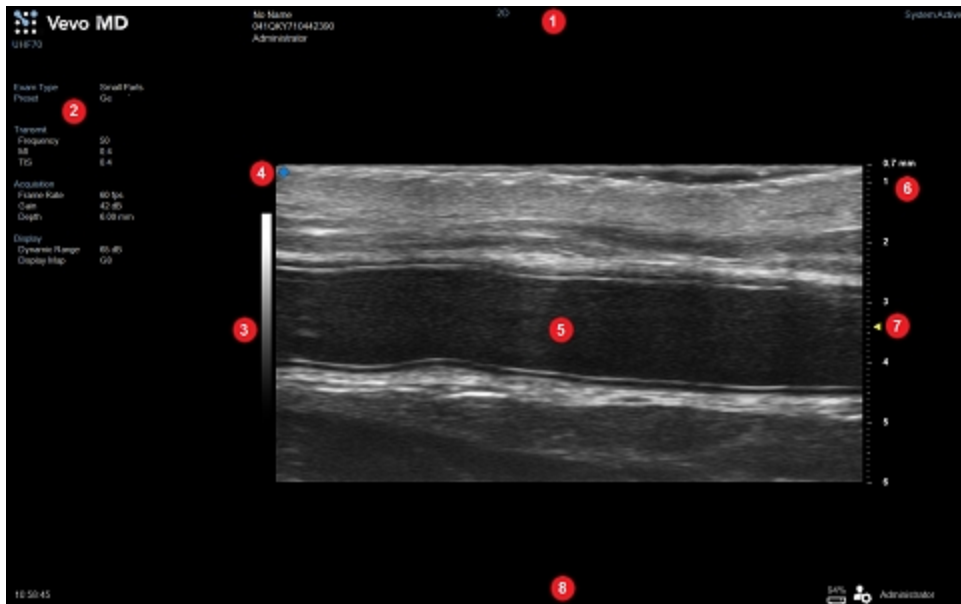
2D clinical display

1. Image status area

2. Mode settings panel

3. Display map

4. Transducer orientation indicator

5. Image area

6. Image scale

7. Focal zone indicator

8. Status bar

When working in 2D, the clinical display is exactly as shown in "Scanning" on page 197.

2D control panel

When imaging in 2D, there are a number of controls on the control panel that you can use to manipulate in order to optimize your image.
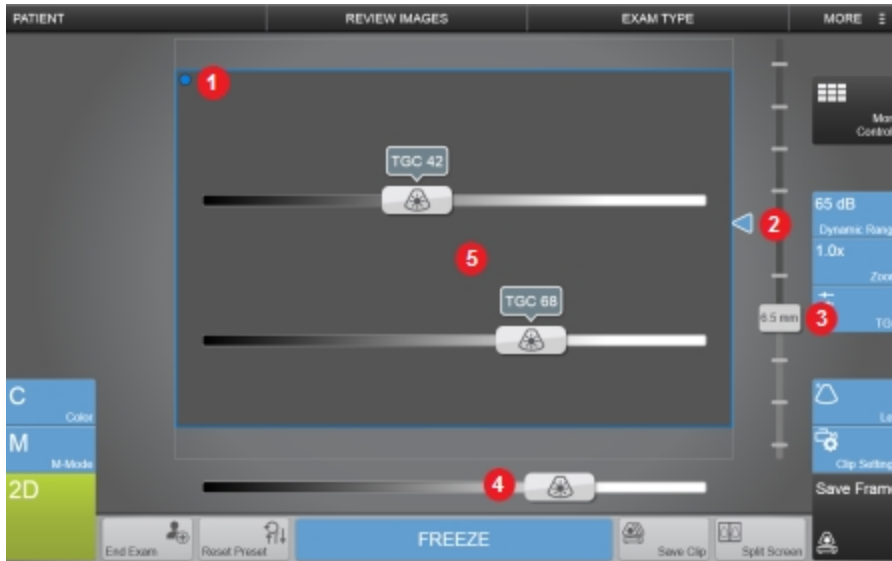
Image controls:

1. *Transducer orientation indicator*

2. *Focal zone*

3. *Image depth*

4. *Gain*

5. *Time gain compensation (TGC)*

Transducer orientation indicator

The blue dot corresponds to the orientation ridge on the transducer nose and indicates the orientation relative to the anatomy.

Tap either of the **Orientation** buttons to flip the image between the following options: **Right** and **Left** or **Up** and **Down**.

Focal zone

When you acquire data, this blue arrow indicates the current focus depth.

Adjust the depth of the 2D focal zone on your image by tapping and dragging the arrow up to decrease the depth or down to increase the depth.

Image depth

Adjust the image depth to display how deep you want the ultrasound signal. The image depth is displayed in millimeters beside the control as you adjust it.

Note: The available depth is transducer dependent.

To adjust the image depth

1 You can adjust the image depth in two ways:

    a. Tap and drag the depth control down to increase the depth, or up to decrease the depth—as you slide the control, the image depth is displayed beside the

control

b. Tap any location along the depth scale and the depth control will automatically move to the new position—once the depth is moved, the value will update

2 As you adjust the depth, the depth value also appears in the lower left corner of the clinical display.

> **Note:** The depth value in the lower left corner of the clinical display is always the total acquired depth of the non zoomed image. When you zoom, this value stays the same.

Gain and TGC controls

Gain refers to amplifying the intensity of the returning sound waves on the screen display. Increasing the gain brightens the image. Decreasing the gain darkens the image. Use the gain control to adjust the visual intensity of the signal.

As you adjust the master gain control the Time Gain Compensation (TGC) controls are displayed. During image acquisition in any 2D-based imaging mode, each slider adjusts the ultrasound signal to compensate for minor attenuation as it returns through deeper situated tissue.

Each slider adjusts the return signal across a specific depth band. The top slider adjusts the return signal across the area closest to the transducer face. The bottom slider adjusts the return signal across the area furthest from the transducer face.

Slide the control to the right to boost the signal and brighten the image data in that horizontal band, and left to attenuate the signal and darken that band.

The current value is displayed above the control as you adjust it.

A **TGC** button is also available on the imaging controls bar on the right of the control panel. Tap the **TGC** button to enable the TGC sliders. The TGC sliders will remain on the control panel until they are changed or if you tap anywhere else on the control panel.

To adjust gain and TGC

1 Drag the slider left or right, to decrease or increase the master gain respectively:

2 When the master gain control is touched, the two TGC sliders will appear on the control panel. Drag each slider left or right.

The upper slider adjusts the near gain of the 2D image, controlling the display intensity in the near field (nearer to the transducer).

The lower slider adjusts the far gain of the 2D image, controlling the display intensity in the far field (further from the transducer).

3 (Optional) Tap the **TGC** button in **More Controls**. Once tapped, the **More Controls** page will close and the TGC sliders will be displayed on the image.

Controls in 2D

The following table provides an overview of the 2D controls and when they are available.

If the listed control is not on the controls bar, it will be in more controls. You can customize which controls appear in the controls bar, see "Customizing controls" on page 207.

Some controls appear only when the image is live, others only when the image is in review and some appear in both cases.

Some controls are related to measurements for this mode. See "Adding 2D measurements" on page 228 for details.

> **Note:** If an image is part of an exam that is pending archive or archived, you will not be able to adjust any of the image properties: brightness, contrast, display map, display layout, zoom, priority, orientation, and image name.

2D controls

Control	Live	Review
Annotation		✔
Brightness		✔
Clip Settings	✔	✔
Contrast		✔
Display Map	✔	✔

Control	Live	Review
Dynamic Range	✓	
Magnify Scale		✓
Presets	✓	
Orientation	✓	✓
Presets	✓	✓
Zoom	✓	✓

Annotation

Allows you to add annotations to your acquired or stored image. Select the desired text from the annotation page or enter custom text. See "Annotations" on page 276.

50

Brightness

Indicates the image brightness level. Tap the **Brightness** control and adjust the slider up or down to obtain the required setting. The setting is displayed on the button for easy reference and is stored with the image.

Tap the **Clip Settings** button to open the clip settings panel. You can set various options for saving a clip, including the clip length for each mode. See "Configuring clip settings" on page 272.

Indicates the image contrast level. Tap the **Contrast** button to adjust the slider up or down to obtain the required setting. The setting is displayed on the button for easy reference and is stored with the image.

Predefined sets of overlays and image maps that you can apply at any time during live scanning or review.

Tap the **Display Map** control to see the available maps for the active imaging mode.

In 2D, you also have the option of choosing a color for the display of the data.

70 dB
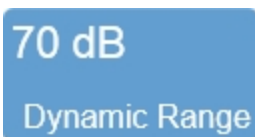
Dynamic Range

This control adjusts the input signal strength that is mapped to the spectral display.

Tap **Dynamic Range** to display the flyout. Adjust the slider up or down to obtain the required setting.

You can increase or decrease the range in 5 dB increments. The setting is displayed on the control for easy reference and the value is stored with the image.

4x

Magnify Scale

Use this control to change the magnification level of the area that is shown when a measurement or annotation is being placed.

Presets

Tap **Presets** to see the available presets and then select an appropriate set of optimized image acquisition settings. This button is active during image acquisition in every mode.

The list of presets includes the factory default presets as well as any custom presets you have added to the system. All presets are mode, exam type, transducer, and user dependent.

You can customize the preset values to your specific exam type. See "Exam types and presets" on page 106.

Sets the image orientation, allowing you to align the image with the transducer. The blue dot ● in the corner of the control panel image area and clinical display image corresponds to this setting.

Tap either of the orientation controls to toggle the orientation between the following options: **Left/Right** and **Up/Down**.

The **Save Preset** button is used to save all of the parameters being used in the current mode. This allows you to apply these exact parameters again later using the **Presets** button.

1 Begin scanning in the desired mode. Adjust the controls to optimize your image.

2 Tap **Save Preset** to save the current settings as a preset.

3 Enter the name of your preset in the displayed field and tap **Done** to save the setting.

The new preset appears in the mode-specific flyout when you use the **Presets** control.

Create your 2D presets first. 2D includes the largest number of controls that can be saved. Many other modes are based on 2D, including Color Doppler Mode and M-Mode. These modes include fewer available settings. If your exam protocol requires any of these 2D based modes you will still be able to use your 2D presets.

See for details on working with presets.

1.0x

Zoom

Use this control to zoom in on an image during scanning or in review.

Tap the **Zoom** button to activate the adjustable zoom control. Tap the **In** or **Out** button, or drag the slider. The zoom factor is displayed within a range from 1.0x to 8.0x on the **Zoom** button.

You can also use a two finger spread gesture within the image area to zoom in; once activated, four arrows will be displayed indicating zoom is on. To zoom out, use a two finger pinch gesture.

To view other areas of the zoomed image, pan the image by dragging one finger in any direction within the image area.

A magnifier icon and location guide is shown in the image on the clinical display. The location guide displays the original image area with a white inner area that represents the visible zoom area.

You can save an image with the zoom state activated and if you load the image in review, you can zoom again using the same control. If you wish to return to the image in its original state with no zoom activated, tap **Default** from the zoom controls.

Please note the following:

- The maximum zoom factor may be less depending on the image size and the minimum physical size of the image that can be displayed

- If you change presets while in the zoom state, the zoom state will be turned off

- If your image contains measurements and annotations, the text is not enlarged when zoom is activated

Adding 2D measurements

2D provides several measurement tools. Use these tools when you want to add measurements to an image.

To access measurements for 2D

♦ Do one of the following:

a. If you are acquiring image data, tap **Freeze**, then **Measurements** and select a measurement

b. If you are in **Completed Exams** tap the patient exam you want to work with, tap **Review Images**, then tap your image to open and select **Measurements**

c. If there is an open exam and you are in **Completed Exams**, select the active exam (displayed in blue text), tap **Review Images**, then tap your image to open and select **Measurements**

The following measurements are available for 2D images:

- Traced Area
- Linear
- Traced Distance
- IMT
- I/M

M-Mode acquisition and analysis

Motion mode (M-Mode) provides the trace of a line from the 2D image displayed over time. A single beam of ultrasound is transmitted, and reflected signals are displayed as dots of varying intensities, creating lines across the screen.

M-Mode works fundamentally differently than 2D. Where 2D is a frame-based image that uses multiple scanning beams to create its image, M-Mode is a time-based image that uses just one beam.

So, when you have guided your transducer beam to the depth that gives you a proper cross-section of a vein or artery, you can then set M-Mode to lay its single beam across that cross-section. In effect, it is like positioning a tight string through the vein or artery, and recording the movement of the structure cross-sections along that string.

This way, the movement of the vein or artery structures move up and down that single line so you can then take measurements along that line over time.

M-Mode image acquisition

To acquire an image in M-Mode

To begin acquisition in M-Mode, tap the M-Mode button, then tap the **Start** button flyout; once acquisition begins, the button flyout will change to **Stop**.

To end an M-Mode acquisition, you can tap **Freeze** or tap the M-Mode **Stop** button flyout. M-Mode acquisition stops, the button flyout will change to **Start** and the system will begin 2D acquisition with the green M-Mode sample gate.

1 Tap **M-Mode**.

The system begins acquiring 2D image data while displaying the green M-Mode sample gate on the 2D image.
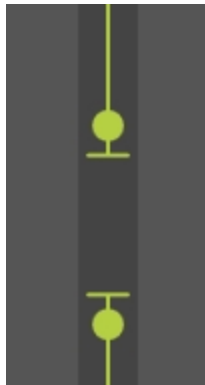
2 Position the sample gate and adjust the size. See "M-Mode control panel" on page 234.

3 Tap **Start**.

A dual-window image area appears. The M-Mode window is on the bottom, the 2D scout window is on the top. The system begins storing data in the acquisition buffer, and live acquisition data appears in both windows.

4 Adjust the controls as needed. See "Controls in M-Mode" on page 238 and also "Controls in 2D" on page 222.

5 Save the image for later review using **Save Frame**. See "Saving images" on page 269.
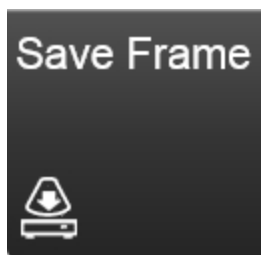
6 Tap the M-Mode **Stop** button to return to 2D acquisition or tap **Freeze** to stop scanning.

M-Mode clinical display

The M-Mode clinical display is similar to the 2D clinical display but with some differences.
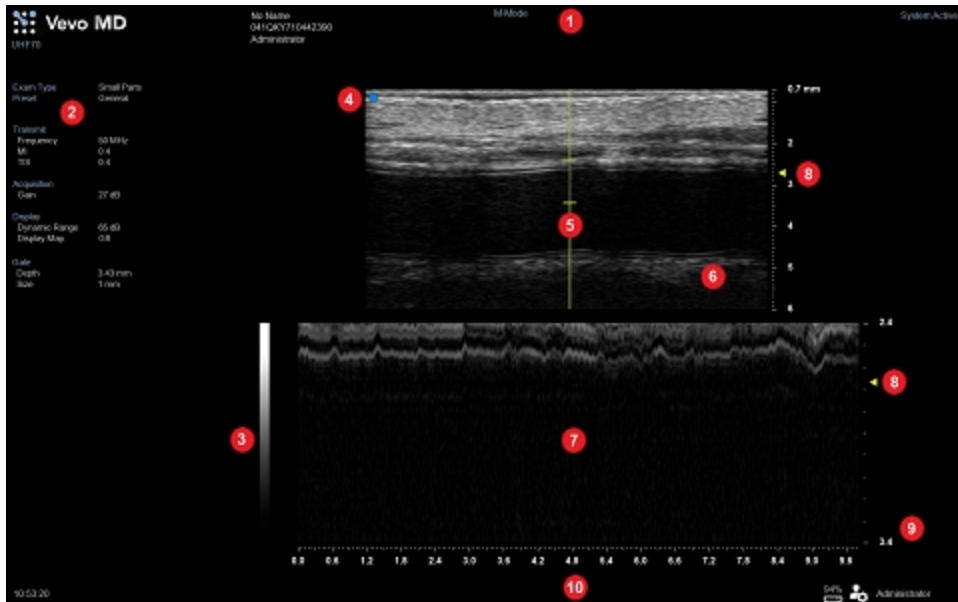
M-Mode clinical display

1. *Image status area*

2. *Mode settings panel*

3. *Display map*

4. *Transducer orientation indicator*

5. *Sample gate*

6. *2D scout window*

7. *M-Mode window*

8. *Focal zone indicator*

9. *Image scale*

10. *Status bar*

Sample gate

Displays the cross-section image data acquired along the sample gate line in the 2D scout window.

2D scout window

The region of interest is located between the sample gate line brackets. In this window, position your transducer and set the line brackets so you can acquire useful data.

M-Mode window

Displays the cross-section image data acquired along the sample gate line.

M-Mode control panel

When imaging in M-Mode there are a number of controls on the control panel that you can manipulate to optimize your image.

These controls adjust the image in the M-Mode data window.
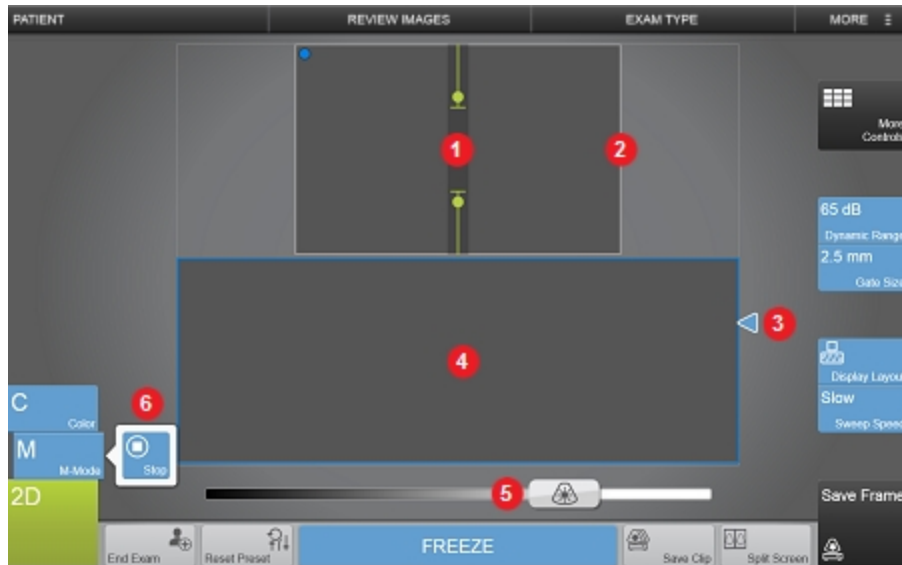
Image controls:

1. *Sample gate*

2. *2D scout window*

3. *Focal zone*

4. *M-Mode window*

5. *Gain*

6. *M-Mode Start/Stop flyout button*

To set the M-Mode sample gate

In M-Mode, the region of interest is the image data that the transducer acquires along the vertical line between the brackets of the green overlay in the 2D scout image. This line is called the sample gate.

1 Begin acquiring data in M-Mode. See "M-Mode image acquisition" on page 230.

2 Position your transducer to display your region of interest in the center of the 2D scout window.

3 While watching the 2D scout window, drag the sample gate to the desired position.

4 To change the size of the gate, tap and drag one end of the gate, or use a pinch. The **Gate Size** button can also be used.

2.5 mm
Gate Size

After you change the position or size of the gate, the system will pause briefly to apply the new settings, and then restarts acquisition.

To change the gain

Gain refers to amplifying the intensity of the returning sound waves on the screen display. Increasing the gain brightens the image. Decreasing the gain darkens the image. Use the gain control to adjust the visual intensity of the signal.

As you adjust the master gain control the Time Gain Compensation (TGC) controls are displayed. During image acquisition, each slider adjusts the ultrasound signal to compensate for minor attenuation as it returns through deeper situated tissue.

Slide the control to the right to boost the signal and brighten the image data in that horizontal band, and left to attenuate the signal and darken that band.

The current value is displayed above the control as you adjust it.

Adjustments to the master gain control and the TGC controls will apply to both the 2D image window and M-Mode image.

A **TGC** button is also available in **More Controls**. Once the **TGC** button is tapped, the **More Controls** page will close and the TGC sliders will be displayed on the image.

To increase the 2D image window

You can return to 2D at any time by tapping the M-Mode **Stop** flyout button to adjust the image depth of the 2D window for placement or sizing of the sample gate overlay.

You can increase the 2D window in order to position your transducer and sample gate more precisely.

To increase the 2D image window

1 Tap the M-Mode **Stop** flyout button to display the full 2D window.

2 Adjust the 2D image size. See "2D control panel" on page 218.

3 Tap the M-Mode **Start** flyout to return to M-Mode imaging.

To change the sweep speed of the M-Mode data

> **Note:** You can only change the sweep speed of M-Mode data that has been saved using **Save Clip**. M-Mode data that was saved using **Save Frame** will not have adjustable sweep speed.

♦ Adjust the sweep speed using a horizontal pinch motion in the M-Mode data window. The **Sweep Speed** button can also be used. See "Controls in M-Mode" on the next page.

To change the layout of the screen

The configuration of the clinical display can be customized to change the relative size of the 2D scout window to the M-Mode data window.

♦ Use the **Display Layout** button to customize this layout.

See "Controls in M-Mode" on the next page.

Controls in M-Mode

In M-Mode imaging, you can adjust the following controls in addition to most of the 2D controls.

If the listed control is not on the controls bar, it will be in more controls. You can customize which controls appear in the controls bar, see "Customizing controls" on page 207.

Some controls appear only when the image is live, others only when the image is in review and some appear in both cases.

Some controls are related to measurements for this mode. See "Adding M-Mode measurements" on page 246 for details.

> **Note:** If an image is part of an exam that is pending archive or archived, you will not be able to adjust any of the image properties: brightness, contrast, display map, display layout, zoom, orientation, and image name.

Accessing 2D controls

While imaging in M-Mode, certain 2D controls remain available.

The 2D controls can be accessed in two ways:

   a. Tapping on the 2D image (the active overlay will become gray)

   b. Opening **More Controls** and tapping on the **2D** tab

M-Mode controls

Control	Live	Review
Annotation		✔
Brightness		✔
Clip Settings	✔	✔
Contrast		✔
Display Layout	✔	✔
Display Map	✔	✔
Gate Size	✔	
Magnify Scale		✔
Presets	✔	
Orientation	✔	✔
Save Preset	✔	✔
Sweep Speed	✔	✔
Zoom		✔

Annotation

Allows you to add annotations to your acquired or stored image. Select the desired text from the annotation page or enter custom text. See "Annotations" on page 276.

Brightness (50)

Indicates the image brightness level. Tap the **Brightness** control and adjust the slider up or down to obtain the required setting. The setting is displayed on the button for easy reference and is stored with the image.

Clip Settings

Tap the **Clip Settings** button to open the clip settings panel. You can set various options for saving a clip, including the clip length for each mode. See "Configuring clip settings" on page 272.

Contrast (50)

Indicates the image contrast level. Tap the **Contrast** button to adjust the slider up or down to obtain the required setting. The setting is displayed on the button for easy reference and is stored with the image.

Display Layout

Use this control to change the size of the 2D scout window relative to the other imaging data window.

Tap the control and select one of the available options:
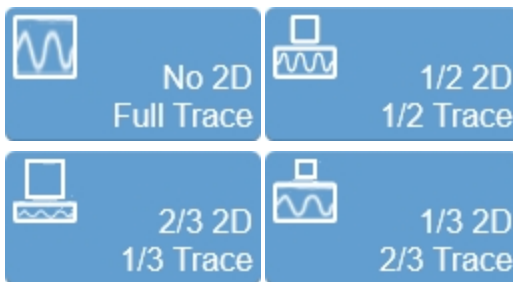
No 2D
Full Trace

1/2 2D
1/2 Trace

2/3 2D
1/3 Trace

1/3 2D
2/3 Trace

Display Map

Predefined sets of overlays and image maps that you can apply at any time during live scanning or review.

Tap the **Display Map** control to see the available maps for the active imaging mode.

In M-Mode, you also have the option of choosing a color for the display of the data.

2.5 mm
Gate Size

This control adjusts the size of the sample gate in millimeters (mm). The control adjusts the distance of the vertical line between the two calipers.

Tap the **Gate Size** button, then tap **Up** to increase the size, or tap **Down** to decrease the size. You can also drag the handles up or down on the control panel to adjust the gate size and position.

4x
Magnify Scale

Use this control to change the magnification level of the area that is shown when a measurement or annotation is being placed.

↑↑↓
Presets

Tap **Presets** to see the available presets and then select an appropriate set of optimized image acquisition settings. This button is active during image acquisition in every mode.

The list of presets includes the factory default presets as well as any custom presets you have added to the system. All presets are mode, exam type, transducer, and user dependent.

You can customize the preset values to your specific exam type. See "Exam types and presets" on page 106.

Sets the image orientation, allowing you to align the image with the transducer. The blue dot ● in the corner of the control panel image area and clinical display image corresponds to this setting.

Tap either of the orientation controls to toggle the orientation between the following options: **Left/Right** and **Up/Down**.

The **Save Preset** button is used to save all of the parameters being used in the current mode. This allows you to apply these exact parameters again later using the **Presets** button.

1 Begin scanning in the desired mode. Adjust the controls to optimize your image.

2 Tap **Save Preset** to save the current settings as a preset.

3 Enter the name of your preset in the displayed field and tap **Done** to save the setting.

The new preset appears in the mode-specific flyout when you use the **Presets** control.

Medium

Sweep Speed

Adjusts the scale of the data in the M-Mode window. A faster sweep speed will increase the speed and decompress or "stretch out" the clip image.

To set the sweep speed, tap the **Sweep Speed** button and select **Fast**, **Medium**, or **Slow**.

You can also use a horizontal pinch motion within the M-Mode window to adjust the sweep speed.

1.0x

Zoom

Use this control to zoom in on the M-Mode window in review.

Tap the **Zoom** button to activate the adjustable zoom control. Tap the **In** or **Out** button or drag the slider. The zoom factor is displayed within a range from 1.0x to 8.0x.

You can also use a two finger spread gesture within the image area to zoom in; once activated, four arrows will be displayed indicating zoom is on. To zoom out, use a two finger pinch gesture.

To view other areas of the zoomed image, pan the image by dragging one finger in any direction within the image area.

A magnifier icon and location guide is shown in the image on the clinical display. The location guide displays the original image area with a white inner area that represents the visible zoom area.

You can resave an image with the zoom state activated and if you load the image in review, you can zoom again using the same control. If you wish to return to the image in its original state with no zoom activated, tap **Default** from the zoom controls.

Please note the following:

- The maximum zoom factor may be less depending on the image size and the minimum physical size of the image that can be displayed.

- If you change presets while in the zoom state, the zoom state will be turned off.

- If your image contains measurements and annotations, the text is not enlarged when zoom is activated.

Note: Zoom is only allowed in the M-Mode window; zoom is not available for the 2D scout or the 2D image with M-Mode sample gate.

Adding M-Mode measurements

M-Mode provides several measurement tools. Use these tools when you want to add measurements to an image.

> **Important:** M-Mode frames will only display measurements that were in full view at the time of saving.

To access measurements for M-Mode

♦ Do one of the following:

    a. If you are acquiring image data, tap **Freeze**, then **Measurements** and select a measurement

    b. If you are in **Completed Exams** tap the patient exam you want to work with, tap **Review Images**, then tap your image to open and select **Measurements**

    c. If there is an open exam and you are in **Completed Exams**, select the active exam (displayed in blue text), tap **Review Images**, then tap your image to open and select **Measurements**

The following measurements are available for M-Mode images:

- Depth

- Time

- Velocity

- IMT

Color Doppler Mode acquisition and analysis

Color Doppler Mode is used to measure blood flow through vessels. The system converts the doppler sounds into colors. These colors are then overlaid on the image of the blood vessel, which represents the relative velocity and direction of blood flow through the vessel.

This mode is useful for blood flow applications such as:

- Distinguishing non-vascular tissue structures from vascular tissue structures

- Identifying vascular structures that can be more difficult to identify in other ultrasound modes

Color Doppler Mode image acquisition

To acquire an image in Color Doppler Mode

1 Tap **Color**.

The color box with two handles appears.
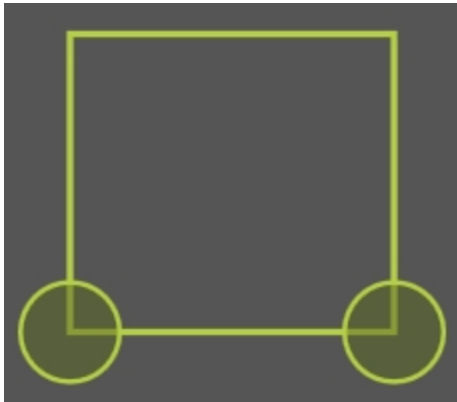
2 Position the color box as needed by dragging the color box on the control panel either left, right, up or down.

3 Resize the color box by tapping and dragging one of the handles.

4 Steer the color box if needed, by tapping **Beam Steering** and selecting an angle.

0°

Beam Steering
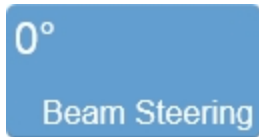
5 Adjust the Color Doppler gain using the gain slider.

C

6 Adjust other controls as needed. See "Controls in Color Doppler Mode" on page 255. Also see "Controls in 2D" on page 222.

> **Note:** While scanning, toggle between 2D and Color by tapping the image area border or the color box overlay—controls displayed will correspond to the current mode.

7 Save the image for later review using **Save Frame**. See "Saving images" on page 269.

8 Tap the **Color** button to return to 2D scanning or tap **Freeze** to stop scanning.

FREEZE

Color Doppler Mode clinical display

The Color Doppler Mode clinical display is similar to the 2D clinical display with some differences.
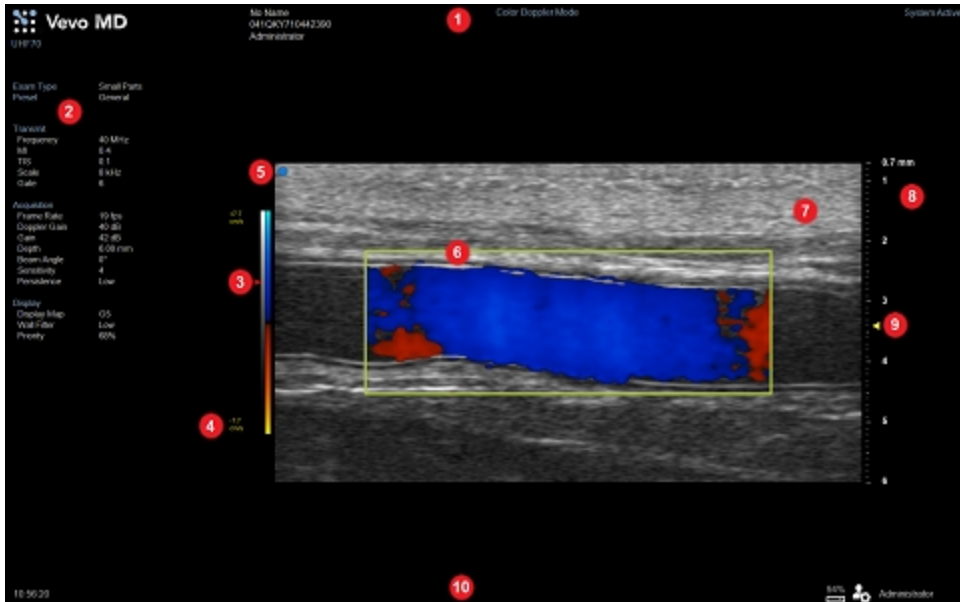
Color Doppler Mode clinical display

1. *Image status area*

2. *Mode settings panel*

3. *Priority indicator*

4. *Display maps and velocity scale*

5. *Transducer orientation indicator*

6. *Color box overlay*

7. *Image area*

8. *Image scale*

9. Focal zone indicator

10. Status bar

Color box overlay

In Color Doppler Mode, the region of interest is located within the green color box overlay.

Data is displayed in blue to display vascular flow moving away from the transducer and red to display vascular flow moving toward the transducer.

The system applies the colors only to the image data within the color box.

Display maps and velocity scale

Two display maps are shown to the left of the image while in Color Doppler Mode. The left column is the 2D display map. The right column is the color display map. It follows the acronym BART color principle for Doppler imaging (Blue=Away from the transducer, Red=Toward the transducer). In this principle, positive vascular flows are indicated by colors in the red range. Negative flows are indicated by colors in the blue range. Flow velocities for each direction increase from dark to light.

In Color Doppler, a velocity scale corresponding to the display map is shown to the left of the display maps.

Priority indicator

Adjust the priority relationship between the overlay data and the background 2D data so you can eliminate false readings, by using the **Priority** control.

Color Doppler Mode control panel

When imaging in Color Doppler Mode there are a number of controls on the control panel that you can manipulate to optimize your image.

Image controls:

1. *Color box*

2. *Focal zone*

3. *Image depth*

4. *Color Doppler Mode Gain*

To position and resize the color box overlay

In Color Doppler Mode, the region of interest is located within the green color box overlay. The system applies colors only to the image data within this color box. Adjust the box as follows:

1 Begin acquiring data in Color Doppler Mode. See "Color Doppler Mode image acquisition" on page 248.

2 Position the color box by dragging the color box left, right, up or down on the control panel.

3 Resize the color box by dragging one of the handles.

4 Steer the box if needed:

Tap **Beam Steering** and select an angle.

> **Note:** After you change the position or angle of the color box, the system pauses briefly to apply the new settings and then restarts acquisition.

To set the Color Doppler Mode gain

The Color Doppler Mode gain is the frequency shift in increments of 1.0 dB. When you are in Color Doppler Mode the gain control on the control panel adjusts the Doppler

gain. Color Doppler gain is indicated with a "C" on the Gain control.

You can switch to adjusting the 2D gain by tapping on the 2D image. The color box will become gray and the gain control bar will switch to 2D gain.

♦ Slide the gain control left or right to adjust the visual intensity of the signal that returns to the face of the transducer. Slide right to add gain and brighten the mode data, slide left to reduce gain and darken the mode data.

Controls in Color Doppler Mode

In Color Doppler Mode imaging, you can adjust the following controls in addition to most of the 2D controls.

You can specify which controls appear in the controls bar, see "Customizing controls" on page 207.

Some controls appear only when the image is live, others only when the image is in review and some appear in both cases.

Some controls are related to measurements for this mode. See "Adding Color Doppler Mode measurements" on page 267 for details.

> **Note:** If an image is part of an exam that is being transferred or is already archived, you will not be able to adjust any of the image properties: brightness, contrast, display map, display layout, zoom, priority, orientation, and image name.

Accessing 2D controls

While imaging in Color Doppler Mode, certain 2D controls remain available.

The 2D controls can be accessed in two ways:

a. Tapping on the 2D image (the active overlay will become gray)

b. Opening **More Controls** and tapping on the 2D tab

Color Doppler Mode controls

Control	Live	Review
Annotation		✓
Beam Steering	✓	
Clip Settings	✓	✓
Display Layout	✓	✓
Display Map	✓	✓
Line Density	✓	
Magnify Scale		✓
Orientation	✓	✓
Persistence	✓	
Presets	✓	
Priority	✓	✓
Save Preset	✓	✓
Scale	✓	

Control	Live	Review
Sensitivity	✓	
Wall Filter	✓	
Zoom	✓	✓

Annotation

Allows you to add annotations to your acquired or stored image. Select the desired text from the annotation page or enter custom text. See "Annotations" on page 276.

0°

Beam Steering

Use this control to generate flow direction information when the orientation of the target vessel is perpendicular or almost perpendicular to the ultrasound beam.

This control applies a graduated series of transmission and reception delays to the ultrasound sound signals of each element in the transducer. These carefully calibrated sequences can effectively steer the ultrasound beam in order to detect very small frequency shifts.

You can select from the following options, depending on the orientation of your transducer:

-15°   **0°**   **15°**

This control changes the Color Doppler Mode color box.

Clip Settings

Tap the **Clip Settings** button to open the clip settings panel. You can set various options for saving a clip, including the clip length for each mode. See "Configuring clip settings" on page 272.

Display Layout

Use this control to change which data is being displayed. This does not affect the actual data collection and can be changed at any time during live scanning or review.

Tap the button and select one of the available options:

2D Only   **Both**   **Color Only**

Display Map

Predefined sets of overlays and image maps that you can apply at any time during live scanning or review.

Tap the **Display Map** control to see the available maps for the active imaging mode.

Full
Line Density

Use this control to adjust the resolution of your image by adjusting how many lines of image data the transducer acquires over your image area.

The higher you set the line density, the lower the acquisition frame rate. Because of this trade off, you might find that higher line density is most useful for examining features in tissue that do not move very much.

4x
Magnify Scale

Use this control to change the magnification level of the area that is shown when a measurement or annotation is being placed.

Left   **Up**

Sets the image orientation, allowing you to align the image with the transducer. The blue dot ● in the corner of the control panel image area and clinical display image corresponds to this setting.

Tap either of the orientation controls to toggle the orientation between the following options: **Left/Right** and **Up/Down**.

Med

Persistence
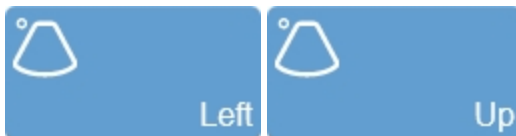
Persistence applies a pixel averaging algorithm to the most recently acquired frames to produce a more uniform view of the faster moving tissue in the image data. Persistence reduces distracting artifacts such as shimmering.

Tap the **Persistence** button and use the **Up** and **Down** buttons to cycle through the available options: **Off**, **Low**, **Med**, **High**, and **Max**.

Note: Options available vary depending on the transducer type.

Tap **Presets** to see the available presets and then select an appropriate set of optimized image acquisition settings. This button is active during image acquisition in every mode.

The list of presets includes the factory default presets as well as any custom presets you have added to the system. All presets are mode, exam type, transducer, and user dependent.
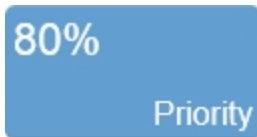
Adjusts the priority relationship between the overlay data and the background 2D data so you can eliminate false readings. Priority determines the threshold point on the gray scale above which the system does not apply color data. The red marker along the left side of the display map indicates the threshold point.

Tap the **Priority** button and use the **Up** and **Down** buttons to select the required value.

The **Save Preset** button is used to save all of the parameters being used in the current mode. This allows you to apply these exact parameters again later using the **Presets** button.

1 Begin scanning in the desired mode. Adjust the controls to optimize your image.

2 Tap **Save Preset** to save the current settings as a preset.

3 Enter the name of your preset in the displayed field and tap **Done** to save the setting.

The new preset appears in the mode-specific flyout when you use the **Presets** control.

You can customize the preset values to your specific exam type. See "Exam types and presets" on page 106.

Use this control to adjust the Pulse Repetition Frequency (PRF). Higher values apply to faster flow and low values apply to slow flow.

Tap the scale control and use the **Low**, **Medium** and **High** buttons to select the required value or drag the slider.

The value will be updated on the scale button as well as the velocity scale range to the left of the image area.

5

Sensitivity

Adjusts the signal-to-noise ratio so that you can better:

- Identify weak-signal targets in the near field that are difficult to distinguish because they are very small

- Identify large targets in the far field that are difficult to distinguish due to attenuation

The higher you set the sensitivity level, the lower the system sets the frame rate.

Tap the **Sensitivity** button and use the **Up** and **Down** buttons to select the required value.

Wall Filter

Filters out signals that correspond to low velocity axial motion. Typically these include vessel wall movements, and tissue movements caused by respiration.

Increase the filter to reduce the lower velocity signals and bring the waveform of the spectral data closer to the baseline. Reduce the filter to display more low velocity signals.

Tap the **Wall Filter** button and use the **Up** and **Down** buttons to cycle through the available options: **Min**, **Low**, **Med**, **High** and **Max**.

1.0x

Zoom

Use this control to zoom in on an image during scanning or in review.

Tap the **Zoom** button to activate the adjustable zoom control. Tap the **In** or **Out** button, or drag the slider. The zoom factor is displayed within a range from 1.0x to 8.0x on the **Zoom** button.

You can also use a two finger spread gesture within the image area to zoom in; once activated, four arrows will be displayed indicating zoom is on. To zoom out, use a two finger pinch gesture.

To view other areas of the zoomed image, pan the image by dragging one finger in any direction within the image area.

A magnifier icon and location guide is shown in the image on the clinical display. The location guide displays the original image area with a white inner area that represents the visible zoom area.

You can save an image with the zoom state activated and if you load the image in review, you can zoom again using the same control. If you wish to return to the image in its original state with no zoom activated, tap **Default** from the zoom controls.

Please note the following:

- The maximum zoom factor may be less depending on the image size and the minimum physical size of the image that can be displayed

- If you change presets while in the zoom state, the zoom state will be turned off

- If your image contains measurements and annotations, the text is not enlarged when zoom is activated

Important: When acquiring in Color Doppler Mode zoom is limited by the size of the color box.

Note: When you enable zoom from inside the color box the whole image is zoomed, not just the color box area.

Adding Color Doppler Mode measurements

Color Doppler Mode provides several measurement tools. Use these tools when you want to add measurements to an image.

To access measurements for Color Doppler Mode

♦ Do one of the following:

a. If you are acquiring image data, tap **Freeze**, then **Measurements** and select a measurement

b. If you are in **Completed Exams** tap the patient exam you want to work with, tap **Review Images**, then tap your image to open and select **Measurements**

c. If there is an open exam and you are in **Completed Exams**, select the active exam (displayed in blue text), tap **Review Images**, then tap your image to open and select **Measurements**

The following measurements are available for Color Doppler Mode images:

- Traced Area

- Linear

- Traced Distance

Freeze

Before performing certain tasks, such as viewing a clip or adding measurements, you need to stop live imaging by freezing the image.

To freeze the image

♦ Tap **FREEZE**.

> FREEZE

The buttons on the controls bar will change. See "Customizing controls" on page 207.

To continue live imaging

♦ Tap **UNFREEZE**.

> UNFREEZE

Saving images

You can save images as a frame or a clip. You can also save a frame from a clip.

When you save a frame or clip during live imaging, saving will happen in the background while the scanning will continue uninterrupted.

In review, when saving a clip using **Save Clip**, the system will always resave the existing clip, however when saving a frame using **Save Frame**, the system will always save a new frame.

When the system saves the image, a message will be displayed at the bottom of the clinical display as follows:

Button	Message
Save Frame	Frame stored
Save Clip (Prospective)	Prospective saving 100* frames *(displayed during the save of a Color or 2D image)* Prospective saving 10* seconds *(displayed during the save of an M-Mode image)* Clip stored *(displayed when save is complete)*
Save Clip (Retrospective)	Retrospective saving 100* frames - Clip stored Retrospective saving 9.73* seconds - Clip stored

*Quantity of frames length of time displayed is set by the user in clip settings, see

 This icon will also be displayed on the bottom right of the clinical display when the software is actively saving data.

The frame or clip that you selected to save will be added to the saved images for the current exam.

> **WARNING:** To avoid mixing images saved from multiple patients, make sure that the patient ID is displayed before you save an image. See "Entering patient information manually" on page 173 and "Display information" on page 104.

To review saved images for the current exam or an ended exam, tap **Review Images**.

To save an image while scanning

An image can be saved during live scanning using the **Save Frame** or **Save Clip** controls. The **Save Frame** control is permanently docked in the lower right corner of the control panel.
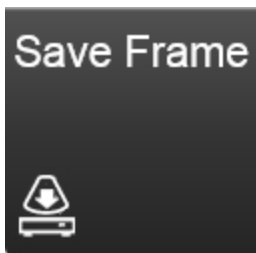
If the **Save Frame** button is not available, you can configure the system to display it. Tap **More Controls** and then tap the **General** tab. See "Customizing controls" on page 207.

The **Save Frame** button can be changed to **Save Clip**, see "General" on page 136. By default, when you save an image, an audio tone will sound, to turn this off, see "General" on page 136 again.
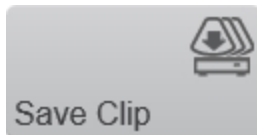
Do either of the following:

a. To save only a frame, tap **Save Frame**
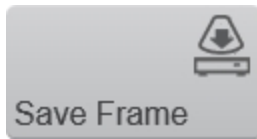
Save Frame can also be used to save a frame from an acquired or saved clip, as well as saving a frame during imaging.

> **Note:** Using **Save Frame** in M-Mode will save a short clip that will only include the M-Mode data that was visible on the clinical display at the time of saving.

b. To save a clip, tap **Save Clip**

This button can be used to:

- save a clip while scanning

- save an acquired clip after tapping the **Freeze** button

- re-save an already saved clip with adjusted display parameters (i.e. changing the display map or brightness)

To capture and save a frame

1 Ensure that clip settings are set as desired. See "Configuring clip settings" on the next page.

2 Tap **Freeze**.

<div style="text-align: center;">**FREEZE**</div>

Note: Regardless of the save clip setting defined in the clip settings, when you freeze acquisition, only retrospective saving will be available; prospective saving can only be performed while live imaging.

3 Tap **Save Frame**. An audio tone will confirm the save; **Saving Tones** are on by default, to turn sounds off, see "General" on page 136.
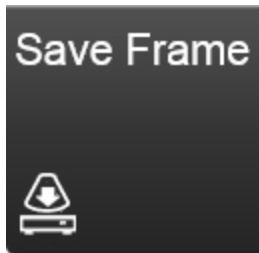
Note: If **Saving Tones** are on and you select prospective saving, you will hear a tone at the beginning and end of the save.
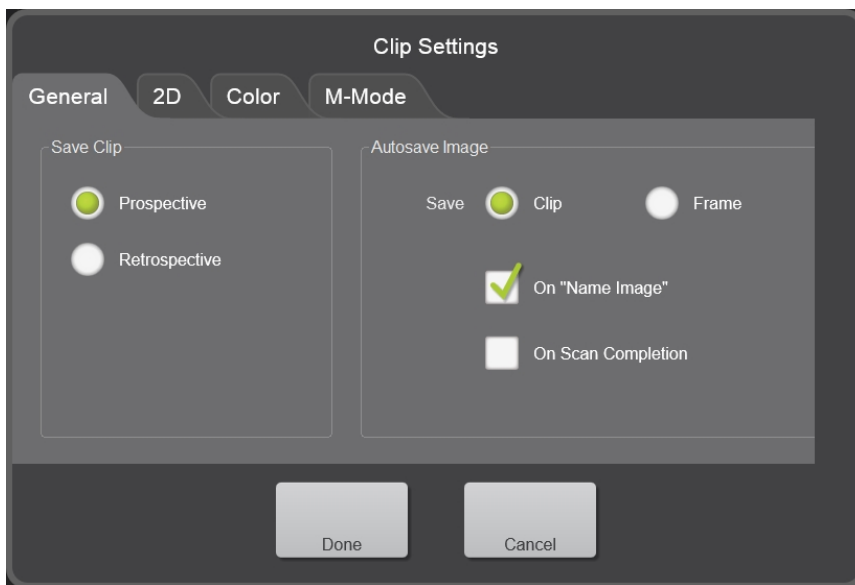
Configuring clip settings

Note: The **Clip Settings** control is available in the general controls as well as in each imaging mode. If this control is not on the controls bar, tap **More Controls**. See "Customizing controls" on page 207.

To configure clip settings

1 Tap **Clip Settings**. The clip settings screen is displayed.

Clip Settings

2 Tap the **General** tab and set the following as required:

Control	Description
Save Clip	**Prospective**: Captures data after you tap **Save Clip**. The system captures data for the number of frames or seconds you specify in each mode tab. Once the prospective save begins, the save clip button changes to **Stop Save**; if tapped, the system will restart scanning and the truncated data will be saved. A tone will be heard when saving begins and a different tone when saving has completed.
	Retrospective: Captures data from buffered data available before you tap **Save Clip**. The system captures data for the number of frames or seconds you specify in each mode tab. Data will

Control	Description
	continue to be acquired if you select to save a clip during scanning. A tone will be heard when saving has completed.
Autosave Image	**Save Clip/Frame**: Gives you the option to save either a clip or a frame when performing an autosave. There are two choices to trigger an autosave of a clip or frame for most imaging modes. • When you tap the **Name Image** control during live scanning or reviewing an image. • You can also choose to autosave a clip or frame **On Scan Completion**—this happens when you tap the **Freeze** button.

3 Tap any of the mode tabs in the clip settings panel to see the available options.

For frame-based modes you have the following options:

a. Specify a number of **Frames** in the range 10 to 1000 depending on the exam and preset that you select

b. Save **Maximum Frames** and the system will save the highest number of frames possible–he number of frames depends on the imaging parameters

For the time-based modes you have the option to specify the length of your clip, in seconds from 5 to 30 seconds.

4 Tap **Done** to save your changes and close the panel.

Managing internal storage space

The percentage of space available on the data drive and is located in the system status area at the bottom of the clinical display.

When storage space is at 25%, the text turns orange and at 10% the text turns red to alert you; if you try to save an image, the system prompts you to delete data from the system.

Annotations

Annotations are text labels that you can add to an acquired or saved image.

When you store an annotated frame or clip, the system stores the annotations along with the image. This topic describes how to work with annotations when you are analyzing an image.

When placing an annotation, please note the following:

- Annotations on 2D or Color Doppler Mode images will be visible during playback—this includes the 2D scout window for M-Mode images

- Annotations are not visible during playback for a clip or if exported to AVI format, except for annotations in the 2D scout in M-Mode

- When saving an M-Mode image using save frame, any annotations that are visible will be saved with the image—even if it is partially displayed

- You must save (or resave) your image after adding, editing or deleting an annotation

> **Important:** You cannot place a new annotation or edit an annotation's properties for an image in a patient exam that is transferring or committed to a DICOM server.

Predefined annotations

When placing an annotation on an image, the annotation panel is displayed. The annotation panel contains predefined groups and labels, an option to show an arrow once the annotation is placed on the image, and a text box to create and save custom labels.

See "Annotations" on page 132 in system settings for adding custom annotations.

To add a predefined annotation

1 Acquire an image, or load an image to review.

2 In the imaging controls, tap the **Annotation** button.

The annotation panel is displayed.

> **Note:** When placing annotations on M-Mode images, you can place annotations on either the M-Mode window, or the 2D scout. To place an annotation on either location, tap on the desired window on the control panel, and then tap the **Annotation** button for that mode. You can also do this by opening **More Controls**, selecting the mode tab, and then tapping the **Annotation** button for that mode.

3 Select a predefined annotation category: Abdominal, Small Parts, Superficial, Venous and Arterial. Once selected the annotation labels displayed will update.

4 Select a predefined annotation label. You can select multiple labels for one annotation; each label will be separated by a space.

> **Note:** When you select multiple predefined annotations, a limit of 40 characters in length is allowed.

5 (Optional) Tap the **Show Arrow** check box to show an arrow when the annotation is dragged.

6 (Optional) Tap the **Clear** button to delete all the text.

7 Tap **Done** to add the annotation.

The annotation is placed on the image. You can then interact with the annotation using the control panel.

While you are placing the annotation, a magnified view of the placement area is displayed on the Clinical Display.

8 Drag the annotation to the desired location on the image.

9 Annotations on the image will be shown in the annotation panel on the left of the control panel. Use the annotation panel to edit the annotations.

Expand ⊕ or collapse ⊖ the annotation panel to view your list of annotations and to delete, edit or change the properties.
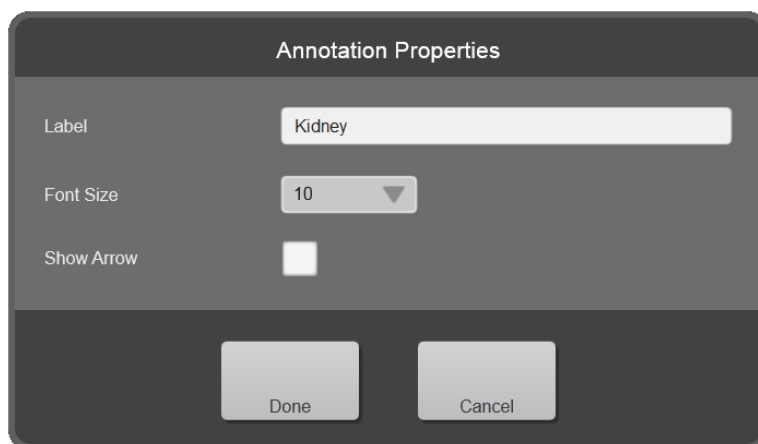
10 Save your image.

To change annotation properties

Each annotation has its own set of properties that you can modify.

1 Tap the annotation that you want to modify in the annotation panel.

2 Tap the **Properties** button. The annotation properties screen is displayed.

Edit the properties for your selected annotation as follows:

Label: Tap the text box and modify the existing label as required.

Font Size: Tap the font size drop down menu and select the preferred size – range is from 6 to 24. The default font size is set in the system settings. See "Measurements and annotations" on page 132.

Show Arrow: Select whether or not to show an arrow from the text to a location on the image.

3 (Optional) Tap the **Clear** button to delete all the text.

4 Tap **Done** to add the annotation.

5 Save your image.

To delete an annotation

1 On the annotation panel, tap the annotation you want to delete.

2 Tap the **Delete** button displayed below the selected annotation. The annotation will be immediately deleted.

3 Save your image.

To modify an annotation

Once an annotation is placed, you can edit the text.

1 Tap the annotation on the image or on the annotation panel.

2 Tap the **Edit** button or tap the **Annotation** button and edit the text or select another predefined annotation.

3 (Optional) Tap **Cancel** to return to the image with the annotation in its original state.

4 Tap **Done**.

5 Save your image.

To move an annotation

Once an annotation is placed, you can move it to a different location on the image.

1 Tap the annotation on the image or on the annotation panel. The annotation will change color.

2 Drag the annotation to the desired location. If an arrow is part of the annotation, the head of the arrow stays at the initial location on the image while you move the text. You can drag the arrow head separately, if required.

The following example shows the arrow head selected for editing.
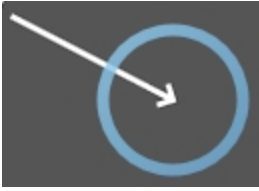
3 When the move is complete, lift your finger to commit the change.

4 Save your image.

Measurements

The Vevo MD Imaging System offers several types of measurements you can apply to any image acquired in a specific imaging mode.

The following table shows which measurements are available for each frame-based imaging mode:

Measurement	2D	Color
Traced Area	✓	✓
Linear	✓	✓
Traced Distance	✓	✓
IMT	✓	
I/M	✓	

The following table shows which measurements are available for M-Mode—a time-based imaging mode:

Measurement	M-Mode
Time	✓
Velocity	✓
Depth	✓

Measurement	M-Mode
IMT	✓

When adding measurements, observe the following:

- Measurements will be displayed on both the clinical display and the control panel

- Measurements can be placed on a saved image loaded into review or any image that has been acquired during an acquisition session

- Measurements cannot be placed on an image that is part of an exam that has been archived or transferring—the measurements button will not be displayed

- Measurements will not be displayed during playback of a clip or if the clip was exported to AVI format

- Measurements and their labels will be identified with a unique matching caliper which matches the measurement's listing caliper on the measurement panel

- If the unit value includes more than four digits before the decimal point, the unit of measure changes so that the value will have less than four digits displayed

- You will need to save (or resave) your image after adding, editing or deleting measurements

To view available measurements for a selected image

1 Review an image by doing one of the following:

a. If you are in **Review Images**, double tap a thumbnail image to open in review— if the image is a clip, pause the clip

b. If you are in completed exams, select an exam and tap **Review Images**, then double tap a thumbnail image to open in review—If the image is a clip, pause the clip

c. If you are acquiring image data, tap **Freeze** on the control panel

2 View the available measurements by tapping the **Measurements** button. Only the available measurements for the active mode will be available.

> **WARNING:** To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing measurement calculations. Starting a new patient form clears the previous patient's data. See "Entering patient information manually" on page 173.

> **WARNING:** To avoid incorrect measurement calculations, verify that the patient information, and system date and time settings are accurate and correct.

> **WARNING:** To avoid misdiagnosis or harming the patient outcome, do not use single calculations as sole diagnostic criteria. Use calculations in conjunction with other clinical information.

> **WARNING:** The Vevo MD Imaging System uses ultra high frequency (UHF) series transducers. Each UHF transducer model has a different image scale that does not start at 0.0 mm, but includes an offset. Please be aware of this when placing measurements.

To place a measurement on an image

1 Tap **Measurements**.

2 Tap a measurement from the list.

3 The measurement will be placed on the image. You can interact with the measurement using the control panel.

You perform most measurements by using calipers that you drag into position.

An active caliper has a round highlighted handle. Tap the caliper to activate it.

4 While you are placing the measurement, a magnified view of the placement area is displayed on the clinical display. The default magnification factor is 4x; change the magnification factor by tapping the **Magnify Scale** button and using the **Increase** or **Decrease** button.

A measurement label will be displayed next to the measurement on the image. It will display a unique caliper, the measurement label, number, and values associated with the type of measurement placed.

5 Measurements on the image will be shown in the measurement panel on the left of the control panel. Use the measurement panel to edit the measurements.

Expand or collapse the measurement panel to view your list of measurements and to delete, edit or change properties.
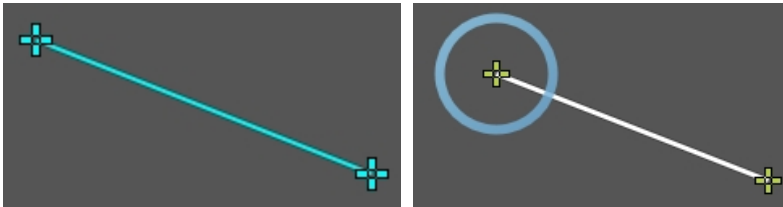
6 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

To modify a measurement

Once a measurement is placed, you can edit individual calipers along the measurement.

> **Note:** You cannot edit a traced distance or traced area measurement after being placed. In this case, delete the measurement and add it again.

1 Tap the measurement on the image or on the measurement panel. The measurement will change color.

2 Tap and drag one of the calipers to the desired position. The measurement will update on the measurement panel.

> **Note:** Moving a caliper for a depth or time measurement will also allow you to change the location of the measurement at the same time.

3 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Using the measurement panel

The measurement panel provides tools for editing measurements on an image and the ability to change what measurement properties are displayed.

The measurement panel is only displayed once the first measurement is placed on an acquired or saved image. The panel is not available in acquisition. When playing back a clip with measurements, you cannot interact with the panel until the clip is paused.

A measurement label will be displayed next to the measurement on the image. It will display a unique caliper, the measurement label, number, and values associated with the type of measurement placed.

Measurements on the image will be shown in the measurement panel on the left of the control panel. Use the measurement panel to edit the measurements.

Expand ⊕ or collapse ⊖ the measurement panel to view your list of measurements and to delete, edit or change properties.

> **Important:** You must pause a clip before you can place a new measurement or interact with previously saved measurements.

> **Important:** For an image in a patient exam that is transferring or committed to a DICOM server, you cannot place a new measurement or edit a measurement's properties.

To change measurement properties

Each measurement has its own set of measurement properties that you can modify.

> **Note:** Not all measurements have additional parameters.

1 Tap the measurement that you want to modify in the measurement panel.

2 Tap the **Properties** button. The measurement properties screen is displayed.

Note: Identical labels are not allowed in the same image. However, identical labels are allowed in different images in the same patient exam.

- **Label**: Tap the text box and modify the existing label as required

- **Font Size**: Tap the font size drop down menu and select the preferred size – range is from 6 to 24

- **Parameters**: Select the measurement parameters to be displayed on both the measurement label and in the measurement panel

Tap to select the parameters that you want to display. The parameters displayed change depending on the type of measurement that is selected.

3 (Optional) Tap **Cancel** to return to the image with the measurement in its original state.

4 Tap **Done**.

5 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

To delete a measurement

1 On the measurement panel, tap the measurement you want to delete.

2 Tap the **Delete** button displayed below the selected measurement. The measurement will be deleted immediately.

3 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a depth measurement

A depth measurement is available in M-Mode.

1 Tap **Measurements**.

2 Tap **Depth**.

The depth measurement is placed on the image.

3 Tap and drag either caliper to a desired location on the image. As you move the calipers, the measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

4 (Optional) When a caliper is enabled, drag the entire measurement line to a new location on the image.

5 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a linear measurement
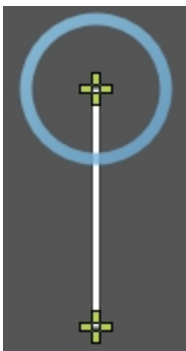
Linear measurements are available in B-Mode and Color Doppler Mode.

To add a linear measurement

1 Tap **Measurements**.

2 Tap **Linear**.

The linear measurement is placed on the image.

3 Tap and drag either caliper to a desired location on the image. As you move the caliper, the measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

Note: A linear measurement will only be committed to the image once a caliper has been adjusted.

4 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a time measurement

Time measurements are available in M-Mode.
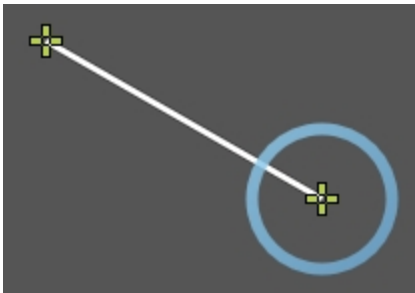
To add a time measurement

1 Tap **Measurements**.

2 Tap **Time**.

The time measurement is placed on the image.

3 Tap and drag either caliper to a desired location on the image. As you move the caliper, the measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

4 (Optional) When a caliper is enabled, drag the entire measurement line to a new location on the image.

5 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a traced area measurement

Traced area measurements are available in 2D and Color Doppler Mode.

> **Note:** You cannot edit a traced area measurement after being placed. In this case, delete the measurement and add it again.

To add a traced area measurement

1 Tap **Measurements**.

2 Tap **Traced Area**.

An active caliper is placed on the image.

3 Drag the active caliper to the initial point on the image.

4 Tap **Set**.

5 Drag the caliper to trace the area.

6 Tap **Done** to complete the measurement.

The measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

7 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a traced distance measurement

Traced distance measurements are available in 2D and Color Doppler Mode.

> **Note:** You cannot edit a traced distance measurement after being placed. In this case, delete the measurement and add it again.
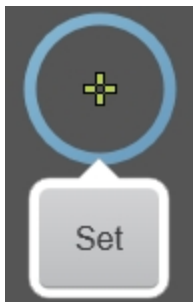
To add a traced distance measurement

1 Tap **Measurements**.

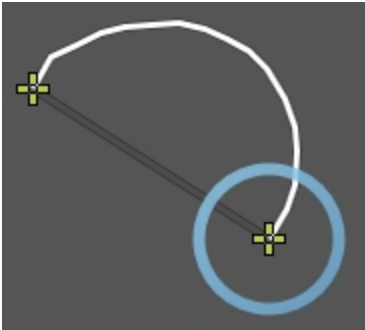**2** Tap **Traced Distance**.

An active caliper is placed on the image.
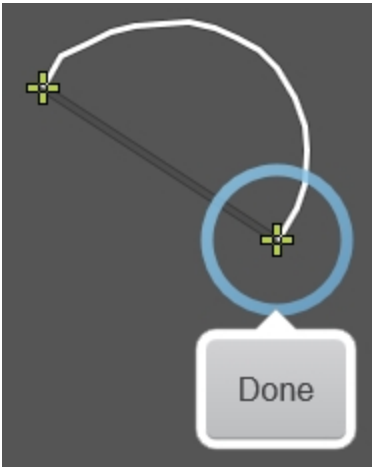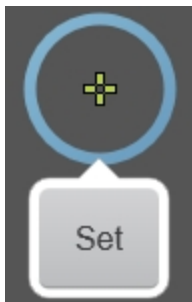

3 Drag the caliper to the initial point on the image.

4 Tap **Set**.
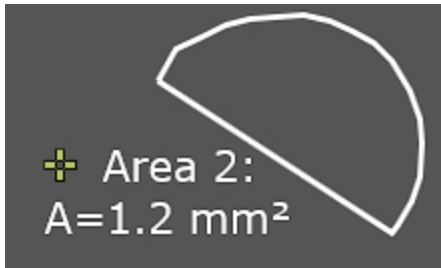
5 Drag the caliper to trace the distance.

6 Tap **Done** to complete the measurement.

The measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

Traced Distance 2:
L=4.5 mm

7 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding a velocity measurement

Use the velocity measurement to determine the velocity of vascular flow.

A velocity measurement is available in M-Mode.

To add a velocity measurement in M-Mode

1 Tap **Measurements**.

2 Tap **Velocity**.

The velocity measurement is placed on the image.
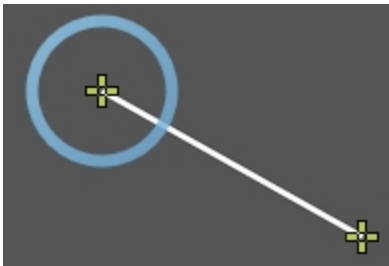
3 Tap and drag either caliper to a desired location on the image.

4 As you move the caliper, the velocity parameters are updated on the measurement panel. You may also want to display time as an additional parameter, see "Using the measurement panel" on page 287.

5 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Adding an IMT measurement

Use the IMT (Intima-Media Thickness) measurement tools to generate the following measurements across an artery:

- Intima-Media Thickness (IMT)

- Intima Thickness plus Media (I/M)

You can measure the IMT of the near or far walls of the artery or vein.

> **WARNING:** To ensure high-quality images, all patient images should be obtained by qualified and trained individuals in ultrasound.

> **WARNING:** To avoid interpretation errors that might affect patient safety, only a qualified and trained individual in ultrasound should interpret IMT results.

> **WARNING:** To avoid patient injury, IMT results should not be used as a sole diagnostic tool. All IMT results should be interpreted in conjunction with other clinical information or risk factors.

> **WARNING:** To avoid patient injury associated with misdiagnosis or measurement errors, verify that the patient information is accurate before transferring images from the Vevo MD Imaging System, before performing any IMT measurements and before every exam.

> **WARNING:** To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing measurement calculations. Starting a new patient form clears the previous patient's data. See "Entering patient information manually" on page 173.

> **WARNING:** To ensure accurate age computations, make sure that the date on your computer is correct.

IMT measurements availability per mode

Measurements	2D	M-Mode	Color Doppler Mode
IMT	✓	✓	
I/M	✓		

To add an IMT measurement on a 2D image

Note: If the IMT measurement is not available, ask an Administrator to enable the IMT Measurement Tools, see "Measurements and annotations" on page 132.

1 Tap **Measurements**.

2 Tap **IMT**.

An active caliper is placed on the image.
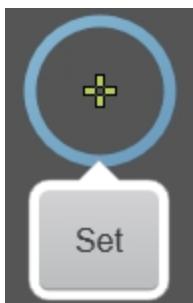
3 Tap and drag the first active caliper to a beginning point on the lumen/intima interface.

4 Tap **Set** to place the first caliper.

5 Tap and drag the second active caliper to another point on the lumen/intima interface.

6 Tap **Set** to place the second caliper.

7 Tap **Set** to place another caliper on the lumen/intima interface or tap **Done** if the trace is complete.

Note: A minimum of two calipers are required for this trace.
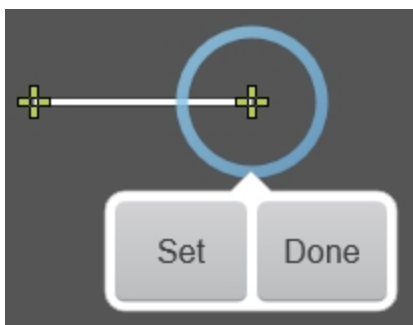
8 Repeat this process, drag and **Set**, for the media/adventitia interface.

9 When you are finished drawing your measurement, tap **Done**.

The measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

Your IMT measurement should look like the following measurement on your image on the clinical display:

1 = lumen/intima interface trace

2 = media/adventitia interface trace
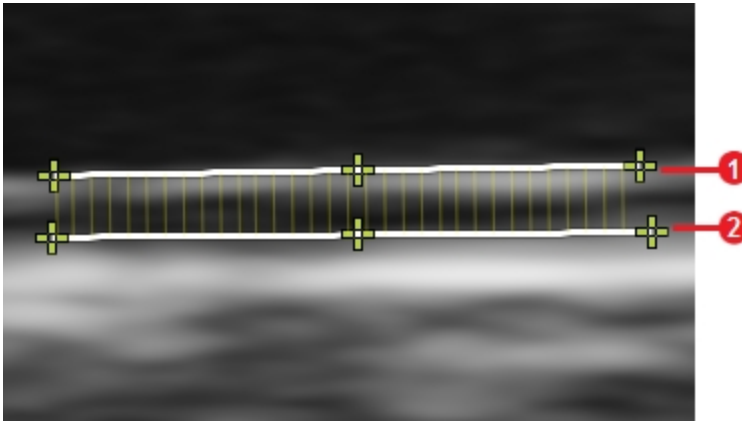
10 You can edit either trace by tapping on a caliper and dragging it to your desired location.

11 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

To add an IMT measurement to an M-Mode image

> **Note:** If the IMT measurement is not available, ask an Administrator to enable the IMT Measurement Tools, see "Measurements and annotations" on page 132.

Select your M-Mode image and load into review. Use the zoom control or pinch on the M-Mode window to expand and enlarge the M-Mode data so you can view your measurement area accurately.

Before adjustments	After adjustments

Note: When placing an IMT measurement in M-Mode, the software will restrict repositioning of both calipers to a vertical direction only.

1 Tap **Measurements**.

2 Tap **IMT**.

An active caliper is placed on the image.
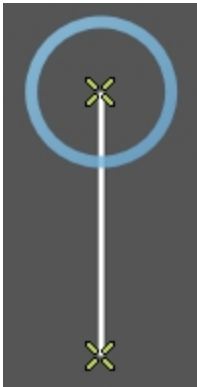
3 Tap and drag the caliper to a point along the lumen/intima interface.

**4** Tap and drag the other caliper to a point along the intima/adventitia interface.

**5** When you are finished drawing your measurement, tap anywhere on the control panel to commit the measurement.

The measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

Your IMT measurement should look like the following measurement on your image on the clinical display:

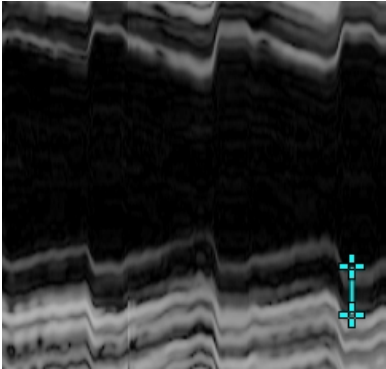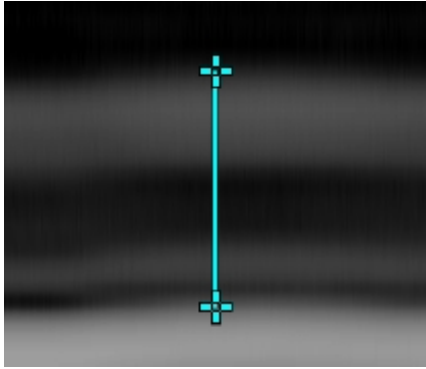**❶** = lumen/intima interface

❷ = media/adventitia interface
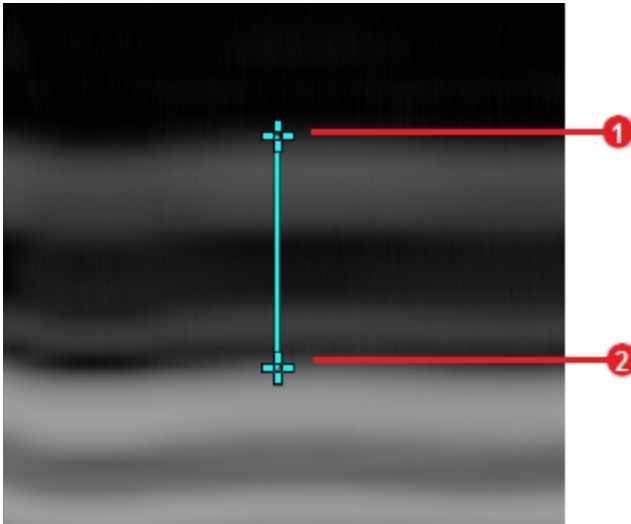
6 You can edit the measurement line by tapping on a caliper and dragging it to your desired location.

7 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

To add an I/M measurement to a 2D image

> **Note:** If the IMT measurement is not available, ask an Administrator to enable the IMT Measurement Tools, see "Measurements and annotations" on page 132.

1 Tap **Measurements**.

2 Tap **I/M**.

An active caliper is placed on the image.
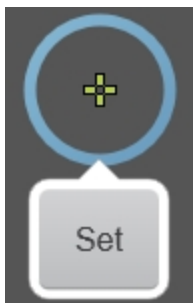
3 Tap and drag the active caliper to a beginning point on the lumen/intima interface.

4 Tap **Set** to place the first caliper.

5 Tap and drag the second active caliper to another point on the lumen/intima interface.

6 Tap **Set** to place the second caliper.

7 Tap **Set** if you want to drop another caliper on the lumen/intima interface or tap **Done** if the trace is complete.

Note: A minimum of two calipers are required for this trace.
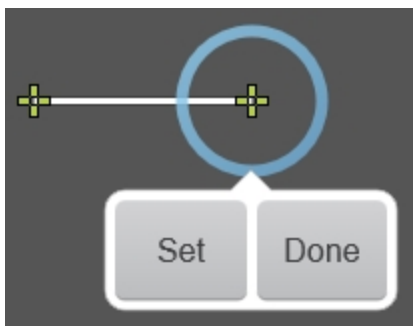
8 Repeat this process, drag and **Set**, for the intima thickness.
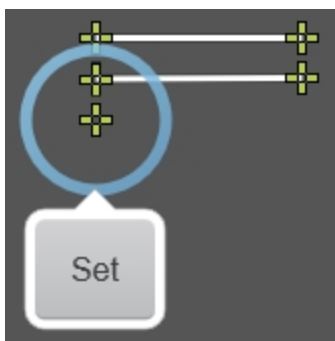
9 Tap and drag the third active caliper to a beginning point on the media/adventitia interface.

10 Tap **Set** if you want to drop another caliper on the media/adventitia line or tap **Done** if the trace is complete.

11 When you are finished drawing your measurement, tap **Done**.

The measurement parameters are updated on the measurement panel. See "Using the measurement panel" on page 287.

> **Note:** An I/M trace needs to be placed in order from either top-down or bottom-up as follows; lumen/intima interface=first, intima thickness=second and media/adventitia interface=third.

Your IMT measurement should look like the following measurement on your image on the clinical display:

1 = lumen/intima interface trace

2 = intima thickness trace

3 = media/adventitia interface trace
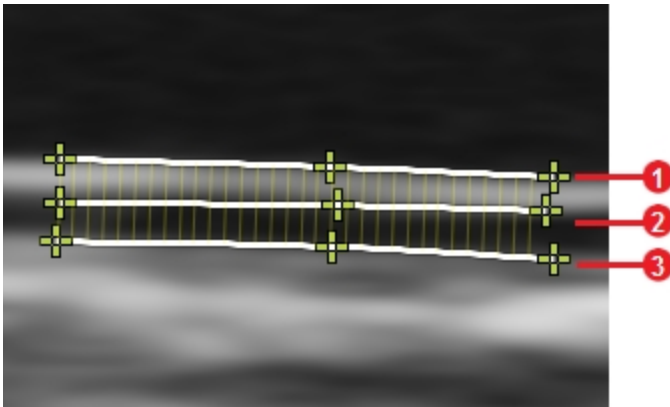
12 You can edit either of the traces by tapping on a caliper and dragging it to your desired location.

13 Tap **Save Clip** to save the entire clip or tap **Save Frame** to save a new single frame.

Report

You can create, view and export a patient report from an exam. The report includes patient information, date and time, user, image thumbnails, comments and measurements.

You can create a report from **Completed Exams**, **Review Images**, and while reviewing an image in the mode window.

When you are creating a report consider the following:

- When you select an exam for a report, the report includes all measurements and images for that exam

- The **Report** button is not available if more than one patient exam is selected from the completed exams list

To create a report

1 Open the **Completed Exams** list and select the exam that contains the measurements and images you want to compile into a report.

2 Tap the **Report** button.
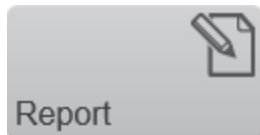
The system compiles your selections into a single report.

> **Note:** You can also create a report by tapping the **Report** button from the general controls while reviewing an image.

3 (Optional) Tap **Back** to return to previous screen.

4 (Optional) Tap **Scan** to begin scanning.

To interact with your report

Once your report is created, it will show the patient information, facility, procedure and measurements for the exam selected.

The report will also display thumbnails of all the images in the exam; including images without measurements.

1 Double tap on a measurement row to show the thumbnail of the image that measurement was placed on. You can export the thumbnail image from the report page by tapping **Export** once the measurement row is selected.

2 Single tap on a thumbnail to open that image in review.

To export a report

The report includes the date and time, software version, patient summary and measurement listing.

1 Select to export a report in three ways:

a. From the report page tap **Export**
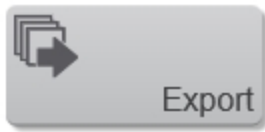
b. From completed exams, tap **Export USB** and select **Report** under multimedia in the export window
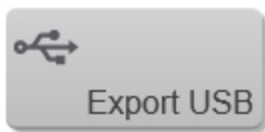
c. From the mode window, tap **Export** and select **Report** under multimedia in the export window
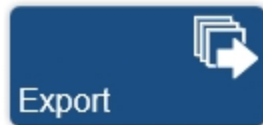
2 The export window appears. Browse to, and then select the destination folder.

3 (Optional) Tap **New Folder** to add a sub-folder. Enter a name for the folder and then tap **Done**.

4 (Optional) Check **Hide patient information on exported images** if you do not want the patient information displayed on exported images.

5 Tap **Export**.

6 The report is exported in CSV format and the status is displayed when the export operation completes. Tap **Done** to close the export page.

Cleaning and disinfecting

The system and transducer must be cleaned and disinfected after each exam. It is important to follow these cleaning and disinfecting instructions without skipping any steps.

System	Transducer

Determining the required cleaning and disinfecting level

> **Note:** Please be aware that you must perform both a cleaning as well as a disinfection for each component.

The level of cleaning and disinfecting required for the system and transducer is dictated by the type of tissue it contacts during use. Use the "Cleaning and disinfecting guide" on the facing page to determine the level of cleaning and disinfecting required.

Spaulding classifications

Spaulding classifications (non-critical, semi-critical) determine the approach for cleaning and disinfecting medical equipment based on the device, the way it has been used, and the risk of infection. The system and transducer are designed for use within the Spaulding classifications of non-critical and semi-critical, as per the "Cleaning and disinfecting guide" on the facing page.

Cleaning and disinfecting guide

Did any part of the system or transducer come in contact with broken skin, blood, or bodily fluids?		
A	**YES** (semi-critical)	▶ "Step A: Semi-critical contact cleaning and disinfecting of system and transducer" on page 319
OR		
B	**NO** (non-critical)	▶ "Step B: Non-critical contact cleaning and disinfecting of the system and transducer" on page 326

Before getting started

- **Inspect** the system and transducer to determine that it is free of any unacceptable deterioration, such as corrosion, discoloration, pitting, or cracked seals. If damage is evident, discontinue use, and contact FUJIFILM SonoSite or your local representative.

- **Confirm** that cleaning and disinfecting materials are appropriate for your facility's use. FUJIFILM SonoSite tests disinfectants and disinfectant devices for use with the system and transducer.

- **Verify** expiration dates, concentration, and efficacy of chemicals (for example, a chemical strip test). Disinfectants and cleaning methods listed are recommended by FUJIFILM SonoSite for efficacy and material compatibility with the products.

- **Ensure** that the disinfectant type and the solution strength and duration are appropriate for the equipment.

- **Follow** manufacturer recommendations and local regulations, when preparing, using, and disposing of chemicals.

- **Follow** the disinfectant manufacturer's recommendations regarding appropriate personal protective equipment (PPE), such as protective eye wear and gloves.

> **WARNING: Ensure that cleaning and disinfecting solutions and wipes are not expired.**
>
> **Some cleaners and disinfectants can cause an allergic reaction to some individuals.**

> Caution: Do not allow cleaning solution or disinfectant into the system or transducer connectors.
>
> Do not use strong solvents such as thinner or benzene, or abrasive cleansers, since these will damage the exterior surfaces. Use only FUJIFILM SonoSite recommended cleaners or disinfectants.

Step A: Semi-critical contact cleaning and disinfecting of system and transducer

Part 1 of 2: Cleaning of system and transducer, disinfecting of system for semi-critical contact

Follow the manufacturer's instructions when using cleaners and disinfectants. The materials listed in the table below are chemically compatible with the system and transducer. Confirm that cleaning and disinfecting materials are appropriate for your facility's use.

Compatible cleaners and disinfectants

Product	System	Transducers (UHF22, UHF48, UHF70)	Wet Contact Time
Tristel Sporicidal Wipes	✓	✗	30 seconds
Microbac Tissues	✗	✓	1 minutes
Cleanisept wipes	✓	✓	2 minutes
Sani-Cloth AF3 (grey top)*	✓	✗	3 minutes
Sani-Cloth Bleach (orange top)*	✓	✓	4 minutes
Sani-Cloth HB (green top)	✓	✓	10 minutes

Compatible cleaners and disinfectants

Product	System	Transducers (UHF22, UHF48, UHF70)	Wet Contact Time
PI-Spray II	✓	✓	10 minutes
*Qualified for use as an intermediate-level disinfectant for mycobacteria			

> **WARNING: Disconnect the system from the power before cleaning to avoid electrical shock.**
>
> **Wear the appropriate personal protective equipment (PPE) recommended by the chemical manufacturer, such as eyewear and gloves.**

> Caution: Do not spray cleaners and disinfectants directly on surfaces or on the connectors of the system and transducer—doing so may cause solutions to leak into the system, damaging it and voiding the warranty.
>
> Do not scratch the clinical display.
>
> Do not attempt to disinfect a transducer using a method or chemical that is not included here. This can damage the transducer and void the warranty.
>
> Use only FUJIFILM SonoSite recommended disinfectants. Using a non-recommended disinfecting solution or incorrect solution strength can damage the system and void the warranty. Follow the disinfectant manufacturer's recommendations.

START

Semi-critical cleaning and disinfection

1 Put on gloves, for protection from cleaning and disinfecting materials. Change gloves as needed throughout the procedure.

2 Turn off the system by pressing the **Power button**.

3 Turn off the main power switch located on the bottom of the system near the back, where the power cord connects.

4 Unplug the power cord from the outlet.

5 Unplug the network cable, if applicable.

6 Disconnect and remove the transducer from the system.

7 Remove the transducer sheath (probe cover), if applicable.

8 Obtain a compatible cleaner. Compatible cleaning materials are listed in the table "Compatible cleaners and disinfectants" on page 319.

> Caution: Make sure the solution does not get into any of the connector ports.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces if not using a wipe.

9 Clean the transducer cable and transducer body to remove any visible gel, debris, or bodily fluids.

♦ Starting from the transducer connector end, clean the transducer cable and transducer body in a downward motion toward the scanhead. Wipe from clean areas to the soiled areas to avoid cross-contamination.

> Caution: Do not wipe the transducer connector.

10 Clean the system to remove any visible gel, debris or bodily fluids.

♦ **Wipe** from clean areas to the soiled areas to avoid cross-contamination.

11 Verify that all gel, debris, and bodily fluids have been removed from the transducer and system. If necessary, repeat Steps 9 and 10, with a new wipe.

12 Obtain a compatible disinfectant. Compatible disinfectant materials listed in the table "Compatible cleaners and disinfectants" on page 319.

> Caution: Make sure the solution does not get into any of the connector ports.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces if not using a wipe.

13 Disinfect the system by wiping all surfaces including:

- clinical display (upper monitor)
- control panel (lower monitor)
- transducer and gel holders
- cable hooks
- grab bars
- all surfaces that may have been touched and/or contaminated

14 Ensure the system stays wet with the disinfectant for the wet contact time listed in the table "Compatible cleaners and disinfectants" on page 319. **This may require reapplication to achieve the required wet time**.

♦ For example, if you are using Sani-Cloth Bleach it has a wet contact time of 4 minutes. Wipe the entire system until thoroughly wet. If the system starts to dry before the 4 minutes is reached, use a new wipe and re-wet the system. Continue the process of re-wetting with a new wipe until a total wet time of 4 minutes is reached.

15 Allow the system to air dry in a clean, well ventilated space. Do not dry with a cloth.

16 Continue to below.

Part 2 of 2: High-level disinfecting of transducer for semi-critical contact

> **WARNING: Wear the appropriate personal protective equipment (PPE) recommended by the chemical manufacturer, such as eyewear and gloves.**
>
> **High-level disinfectants can cause harm to the patient if not completely removed from the transducer. Follow the manufacturer's rinse instructions to remove chemical residue.**

> Caution: Do not skip any steps or abbreviate the disinfecting process in any way.
>
> Do not use unapproved disinfecting agents.
>
> Do not soak the transducer longer than recommended by the chemical manufacturer.
>
> Do not immerse the transducer connector in any disinfectant solution.
>
> Use only FUJIFILM SonoSite recommended disinfectants. Using a non-recommended disinfecting solution or incorrect solution strength can damage or discolor the transducer and void the transducer warranty.

Compatible high-level disinfectants for semi-critical contact

Transducer	Disinfectant	Temperature	Disinfectant soak duration	Clean water soak time
UHF22 UHF48 UHF70	Cidex	25°C (77°F)	45 minutes	3 x 1 minute

1 Ensure you have cleaned the transducer as seen in

2 Obtain compatible high-level disinfecting materials. Compatible materials listed in the table "Compatible high-level disinfectants for semi-critical contact" on the previous page.

> Caution: Ensure that you select the proper disinfectant according to your transducer.
>
> **Cidex OPA is not compatible with any FUJIFILM SonoSite UHF transducer.**
>
> Use only FUJIFILM SonoSite recommended disinfectants listed in the table "Compatible high-level disinfectants for semi-critical contact" on the previous pageto avoid damage to the transducer.

3 Follow the information in the table "Compatible high-level disinfectants for semi-critical contact" on the previous page for solution strengths and soak times. Refer to the disinfectant manufacturer's instructions for additional information.

4 Immerse the transducer into the high-level disinfectant solution. Refer to the table "Compatible high-level disinfectants for semi-critical contact" on the previous page for soak times. Ensure that the transducer connector remains out of the fluid. Ensure that the scanhead and only 2 in (5 cm) are immersed. Refer to the figure below.
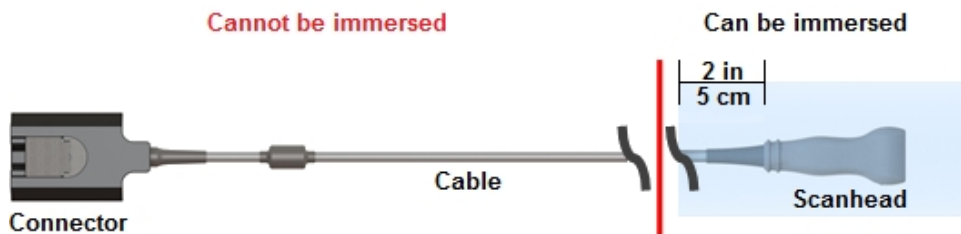
5 Rinse by soaking the area that was immersed, in sterile or clean water, according to the disinfectant manufacturer's instructions. See the table "Compatible high-level disinfectants for semi-critical contact" on the previous page for a list of clean water soak times.

♦ For example, Cidex OPA recommends a minimum 1 minute soak repeated 3 times. This requires either replacing the water three times or having 3 bins with fresh water.

6 Dry with a clean lint-free cloth, or allow to air dry completely.

7 Examine the transducer and cable for damage, such as cracks or splitting where fluid can enter. If damage is evident, discontinue use of the transducer, and contact FUJIFILM SonoSite or your local representative.

DONE

Step B: Non-critical contact cleaning and disinfecting of the system and transducer

Follow the manufacturer's instructions when using cleaners and disinfectants. The materials listed in the table below are chemically compatible with the system and transducer. Confirm that cleaning and disinfecting materials are appropriate for your facility's use.

Compatible cleaners and disinfectants

Product	System	Transducers (UHF22, UHF48, UHF70)	Wet Contact Time
Tristel Sporicidal Wipes	✓	✗	30 seconds
Microbac Tissues	✗	✓	1 minutes
Cleanisept wipes	✓	✓	2 minutes
Sani-Cloth AF3 (grey top)*	✓	✗	3 minutes
Sani-Cloth Bleach (orange top)*	✓	✓	4 minutes
Sani-Cloth HB (green top)	✓	✓	10 minutes
PI-Spray II	✓	✓	10 minutes
*Qualified for use as an intermediate-level disinfectant for mycobacteria			

WARNING: Disconnect the system from the power before cleaning to avoid electrical shock.

Wear the appropriate personal protective equipment (PPE) recommended by the chemical manufacturer, such as eyewear and gloves.

Caution: Do not spray cleaners or disinfectants directly on surfaces or on the connectors of the system and transducer—doing so may cause solutions to leak into the system, damaging it and voiding the warranty.

Do not scratch the clinical display.

Do not attempt to disinfect a transducer using a method or chemical that is not included here. This can damage the transducer and void the warranty.

Use only FUJIFILM SonoSite recommended disinfectants. Using a non-recommended disinfecting solution or incorrect solution strength can damage the system and void the warranty. Follow the disinfectant manufacturer's recommendations.

START

Non-critical cleaning and disinfecting

1 Put on gloves, for protection from cleaning and disinfecting materials. Change gloves as needed throughout the procedure.

2 Turn off the system by pressing the **Power button**.

3 Turn off the main power switch located on the bottom of the system near the back, where the power cord connects.

4 Unplug the power cord from the outlet.

5 Unplug the network cable, if applicable.

6 Disconnect and remove the transducer from the system.

7 Remove the transducer sheath (probe cover), if applicable.

8 Obtain a compatible cleaner. Compatible cleaning materials are listed in the table "Compatible cleaners and disinfectants" on page 326.

> Caution: Make sure that the solution does not get into any of the connector ports.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces, if not using a wipe.

9 Clean the transducer cable and transducer body to remove any visible gel, debris or bodily fluids.

♦ Starting from the transducer connector end, clean the transducer cable and transducer body in a downward motion toward the scanhead. Wipe from clean areas to the soiled areas to avoid cross-contamination.

> Caution: Do not wipe the transducer connector.

---

10 Clean the system to remove any visible gel, debris or bodily fluids.

♦ Wipe from clean areas to the soiled areas to avoid cross-contamination.

11 Verify that all gel, debris, and bodily fluids have been removed from the transducer and system. If necessary, repeat Steps 9 and 10, with a new wipe.

12 Obtain a compatible disinfectant. Compatible disinfectant materials are listed in the table "Compatible cleaners and disinfectants" on page 326.

> Caution: Make sure that the solution does not get into any of the connector ports.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces, if not using a wipe.

13 Disinfect the system by wiping all surfaces including:

- clinical display (upper monitor)

- control panel (lower monitor)

- transducer and gel holders

- cable hooks

- grab bars

- all surfaces that may have been touched and/or contaminated

14 Ensure the system stays wet with the disinfectant for the wet contact time listed in the table "Compatible cleaners and disinfectants" on page 326. **This may require reapplication to achieve the required wet time**.

♦ For example, if you are using Sani-Cloth Bleach it has a wet contact time of 4 minutes. Wipe the entire system until thoroughly wet. If the system starts to dry before the 4 minutes is reached, use a new wipe and re-wet the system. Continue the process of re-wetting with a new wipe until a total wet time of 4 minutes is reached.

15 Allow the system to air dry in a clean, well ventilated space. Do not dry with a cloth.

16 Obtain a new cloth moistened with a compatible disinfectant or disinfectant wipe. Compatible disinfectant materials are listed in the table "Compatible cleaners and disinfectants" on page 326.

17 Disinfect the transducer body by wiping the surface.

18 Ensure the transducer stays wet with the disinfectant for the wet contact time listed in the table "Compatible cleaners and disinfectants" on page 326. **This may require reapplication to achieve the required wet time**.

♦ For example, if you are using Sani-Cloth Bleach it was a wet contact time of 4 minutes. Wipe the transducer cable and body until thoroughly wet. If the transducer starts to dry before 4 minutes is reached, use a wipe and re-wet the transducer. Continue the process of re-wetting with a new wipe until a total wet time of 4 minutes is reached.

19 Allow the transducer to air dry in a clean, well ventilated space.

20 Examine the transducer and cable for damage, such as cracks or splitting where fluid can enter. **If damage** is evident, do not use the transducer, and contact FUJIFILM SonoSite or your local representative.

DONE

Cleaning and disinfecting the foot switch

The foot switch must be cleaned and disinfected after each exam. It is important to follow these cleaning and disinfecting instructions without skipping any steps.

WARNING: The foot switch is not intended for use in a sterile environment.

Caution: To avoid damaging the foot switch, do not sterilize.

Cleaning and disinfecting level

An intermediate-level of cleaning and disinfecting is required for the foot switch.

Spaulding classification

The foot switch is designed for use within the Spaulding classifications of non-critical.

Before getting started

Before cleaning and disinfecting:

- **Inspect** the foot switch to determine that it is free of any unacceptable deterioration, such as corrosion, discoloration, pitting, or cracked seals. If damage is evident, discontinue use, and contact FUJIFILM SonoSite or your local representative.

- **Confirm** that cleaning and disinfecting materials are appropriate for your facility's use. FUJIFILM SonoSite tests disinfectants and disinfectant devices for use with the foot switch.

- **Verify** expiration dates, concentration, and efficacy of chemicals (for example, a chemical strip test). Disinfectants and cleaning methods listed are recommended by FUJIFILM SonoSite for efficacy and material compatibility with the products.

- **Ensure** that the disinfectant type and the solution strength and duration are appropriate for the equipment.

- **Follow** manufacturer recommendations and local regulations, when preparing, using, and disposing of chemicals.

- **Follow** the disinfectant manufacturer's recommendations regarding appropriate personal protective equipment (PPE), such as protective eye wear and gloves.

> **WARNING: Ensure that cleaning and disinfecting solutions and wipes are not expired.**
>
> **Some cleaners and disinfectants can cause an allergic reaction to some individuals.**

> Caution: Do not allow cleaning solution or disinfectant into the system or foot switch connectors.
>
> Do not use strong solvents such as thinner or benzene, or abrasive cleansers, since these will damage the exterior surfaces. Use only FUJIFILM SonoSite recommended cleaners or disinfectants.

Non-critical contact cleaning and disinfecting of the foot switch

Follow the manufacturer's instructions when using cleaners and disinfectants. The materials listed in the table below are chemically compatible with the foot switch. Confirm that cleaning and disinfecting materials are appropriate for your facility's use.

Compatible cleaners and disinfectants

Product	System	Transducers (UHF22, UHF48, UHF70)	Wet Contact Time
Tristel Sporicidal Wipes	✓	✗	30 seconds
Microbac Tissues	✗	✓	1 minutes
Cleanisept wipes	✓	✓	2 minutes
Sani-Cloth AF3 (grey top)*	✓	✗	3 minutes
Sani-Cloth Bleach (orange top)*	✓	✓	4 minutes
Sani-Cloth HB (green top)	✓	✓	10 minutes
PI-Spray II	✓	✓	10 minutes
*Qualified for use as an intermediate-level disinfectant for mycobacteria			

WARNING: Disconnect the system from the power before cleaning to avoid electrical shock.

Wear the appropriate personal protective equipment (PPE) recommended by the chemical manufacturer, such as eye wear and gloves.

Caution: Do not spray cleaners or disinfectants directly on surfaces or on the connectors of the foot switch—doing so may cause solutions to leak into the foot switch, damaging it and voiding the warranty.

Do not attempt to disinfect the foot switch using a method or chemical that is not included here. This can damage the foot switch and void the warranty.

Use only FUJIFILM SonoSite recommended disinfectants. Using a non-recommended disinfecting solution or incorrect solution strength can damage the foot switch and void the warranty. Follow the disinfectant manufacturer's recommendations.

START

Non-critical cleaning and disinfecting

1 Put on gloves, for protection from cleaning and disinfecting materials. Change gloves as needed throughout the procedure.

2 Unplug the foot switch from the system.

3 Obtain a compatible cleaner. Compatible cleaning materials are listed in the table "Compatible cleaners and disinfectants" on page 333.

> Caution: Make sure the solution does not get into any of the connector ports.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces if not using a wipe.

4 Clean the foot switch and cable to remove any visible gel, debris or bodily fluids.

♦ **Wipe** from clean areas to the soiled areas to avoid cross-contamination.

> **WARNING: Do not wipe the USB connector on the foot switch cable.**

5 Verify that all gel, debris and bodily fluids have been removed from the foot switch and cable. If necessary, repeat Steps 4, with a new wipe.

6 Obtain a compatible disinfectant. Compatible disinfectant materials listed in the table "Compatible cleaners and disinfectants" on page 333.

> Caution: Make sure that the solution does not get into any of the foot switches.
>
> Apply the disinfectant solution to the cloth rather than applying it directly to surfaces, if not using a wipe.

7 Disinfect the foot switch by wiping all surfaces including:

- left switch

- right switch

- foot switch body

- USB power cord (not USB connector)

8 Ensure the foot switch stays wet with the disinfectant for the wet contact time listed in the table "Compatible cleaners and disinfectants" on page 333. **This may require reapplication to achieve the required wet time**.

♦ For example, if you are using Sani-Cloth Bleach it has a wet contact time of 4 minutes. Wipe the entire system until thoroughly wet. If the system starts to dry before the 4 minutes is reached, use a new wipe and re-wet the system. Continue the process of re-wetting with a new wipe until a total wet time of 4 minutes is reached.

9 Allow the foot switch to air dry in a clean, well ventilated space. Do not dry with a cloth.

10 Examine the foot switch and USB cable for damage, such as cracks or splitting where fluid can enter. **If damage** is evident, do not use the foot switch and contact FUJIFILM SonoSite or your local representative.

DONE

Appendices

This section contains product safety information, acoustic output information, specifications and standards that are specific details required by regulatory agencies.

Additionally some basic troubleshooting information, related guidance documents, and technical and customer support information is provided in these appendices.

Safety

This section contains general safety information that applies to the ultrasound system, transducers, accessories and peripherals.

Product safety

This section contains information required by regulatory agencies; the output display standard, acoustic power and intensity tables, and other safety information. The information applies to the ultrasound system, transducer, accessories, and peripherals.

Please read the safety information before using the Vevo MD Imaging System. The following information applies to the Vevo MD Imaging System and supporting equipment.

This equipment is intended to be used by qualified research scientists.

Read all warnings and cautionary notes carefully before you use this equipment.

> **WARNING: High levels of transmitted ultrasound energy can damage tissue. Never tamper with or alter the Vevo MD Imaging System in any way such that the acoustic power level is increased.**

> **WARNING: Use ONLY FUJIFILM SonoSite UHF transducers with the Vevo MD Imaging System. The use of other transducers may affect safety and system performance.**

Electric shock

> **WARNING: Before connecting the Vevo MD Imaging System to the mains, verify that the specified power supply voltage range on the safety label matches the hospital supply voltage.**
>
> **An incorrect power source voltage could cause an electrical hazard and could cause serious damage to the equipment.**

> **WARNING: Before connecting the Vevo MD Imaging System to the mains, always check that the mains cable is undamaged.**

WARNING: Do not remove any panels from the Vevo MD Imaging System. Do not remove the outer transducer housing.

Service to the system is to be performed by qualified personnel only. No user-serviceable parts are located inside the system.

Any internal adjustments, replacements or modifications to the Vevo MD Imaging System electronics or to the transducers should be made only by qualified FUJIFILM SonoSite Technical Support Representatives.

WARNING: If the system is not properly grounded or earthed, it becomes a possible electrical shock hazard. Protection against electrical shock has been provided through an isolation transformer and chassis grounding via a plug to an appropriate power source.

DO NOT remove the ground wires from any part of the Vevo MD Imaging System for any reason.

WARNING: Ensure that all power sources, whether a UPC or a wall outlet, are properly grounded or earthed.

WARNING: Disconnect the system from the power source before cleaning the system or performing any maintenance operations.

WARNING: Connection of equipment not authorized by FUJIFILM SonoSite to the Vevo MD Imaging System isolation transformer could result in an electrical hazard.

WARNING: DO NOT spray or drip any liquid into the system or onto the control panel, as this could affect reliable operation and electrical safety.

WARNING: Do not connect the system's power supply to a Multiple Socket-Outlet (MSO) or extension cord.

Electromagnetic interference

> **WARNING:** To avoid possible electrical shock or electromagnetic interference, verify proper operation and compliance with relevant safety standards for all equipment before clinical use. Connecting additional equipment to the Vevo MD Imaging System constitutes configuring a medical system. FUJIFILM SonoSite recommends verifying that the system, all combinations of equipment, and accessories connected to the Vevo MD Imaging System comply with JACHO installation requirements and/or safety standards such as AAMI-ES 60601-1, NFPA 99 or EN/IEC Standard 60601-1-1 and electromagnetic compatibility standard IEC 60601-1-2 (Electromagnetic compatibility), and are certified according to IEC Standard 60950 Information Technology Equipment (ITE) or IEC 60601-1.

> **WARNING:** The Vevo MD Imaging System system has been found to temporarily lose touch screen functionality during 430kHz~2MHz common-mode noise injection on the AC mains. FUJIFILM SonoSite recognizes system's sensitivity to this kind of noise and assures users that such a loss of the touch screen capability doesn't affect core ultrasound imaging functionality of the system. This phenomenon is qualified as permissible loss of performance for the Conducted Immunity test as per EC 61326-1:2012, Table 1.

> Caution: To avoid the risk of increased electromagnetic emissions or decreased immunity, use only accessories and peripherals recommended by FUJIFILM SonoSite. Connection of accessories and peripherals not recommended by FUJIFILM SonoSite could cause your ultrasound system to malfunction or cause other medical electrical devices in the area to malfunction.

> Caution: The use of accessories, transducers and cables other than those specified (with the exception of UHF transducers and Vevo MD Imaging System cables sold by FUJIFILM SonoSite as replacement parts for internal components) may result in increased emissions or decreased immunity of the Vevo MD Imaging System.

Chemicals

> **WARNING:** If any part of the Vevo MD Imaging System is in contact with hazardous chemicals or biological materials, appropriate precautions must be taken by all who come into contact with the Vevo MD Imaging System until the device is declared completely free of harmful contamination.

Cart movement

> **WARNING:** The Vevo MD Imaging System is both delicate and heavy.
>
> Careless moving and rough handling can damage the system and cause injury to others (e.g., rolling over feet, colliding with people or walls). Never use the system if there is damage to the cart, cables or accessories.

> **WARNING:** Do not position the cart and its accessories in a way that makes it difficult to disconnect the plug from the socket.

> **WARNING:** To avoid possible injury from an unexpected clinical display collapse during system transport, collapse the clinical display monitor before system transport.

HDMI video output

> **WARNING:** The external HDMI video output is intended for non-diagnostic use. FUJIFILM SonoSite has not approved any monitors that can connect to the external HDMI video output.

> **WARNING:** Connection of accessories and peripherals is not recommended by FUJIFILM SonoSite and could result in electrical shock. Contact FUJIFILM SonoSite or your local representative for a list of accessories and peripherals available from or recommended by FUJIFILM SonoSite.

> **WARNING:** Using a medical-grade device to connect to the external HDMI video out port does not protect against shock. To avoid applying unsafe voltage levels to the patient while a device is connected to the external HDMI video out port, do not touch the ultrasound system and the patient simultaneously. Check the electrical safety of your system with a trained biomedical engineer prior to use.

Ergonomics

> **WARNING:** The height of the Vevo MD Imaging System is not adjustable. Users who find standing at the system uncomfortable may require an adjustable chair or stool.

Cautionary notes

This manual includes a broad range of cautionary notes.

Radiation

> Caution: The use of controls or adjustments or performance of procedures in ways other than those specified in this manual may result in hazardous radiation exposure.

Vevo MD Imaging System safety labels

The following table describes the safety symbols used on the system cart:

Composite safety warning symbols

Symbol	Description
REF	Catalog number

Composite safety warning symbols

| Symbol	Description
SN	Serial number
	Electrostatic sensitive device.
	Proof of product compliance (electrical, gas and other safety standards) to North American safety standards.
CE 0086	Conformité Européenne. Product meets the safety requirements of the European Union.
	Read usage instructions. This symbol instructs the user to consult the instructions of the device for information on how to properly use it. See the Vevo MD Getting Started Guide, Vevo MD User Manual or the Vevo MD system's HELP.
95.8 kg	Safe working load mass. Includes system at 95 kg, and a UHF transducer at 0.8 kg.
	Manufacturer
	European Union WEEE (Waste Electrical and Electronic Equipment) Directive 96/86/EEC. Identifies the directive on waste electrical and electronic equipment. Refer to local regulations for disposal.

Stand base labels

| Symbol	Description
	Read usage instructions. This symbol instructs the user to consult the instructions of the device for information on how to properly use it. See the Vevo MD Getting Started Guide, Vevo MD User Manual or the Vevo MD system's HELP.
~AC In	Plug the AC power cord in here.
2x7A, 125V 10,000A BREAKING	Fuse label. Displays the type of fuses required for the system voltage; this example displays fuse requirements for a 125V system.

The following table describes the safety symbols used on the transducer:

Composite safety warning symbols

Symbol	Description
REF	Catalog number
SN	Serial number
	Manufacturer
	Hot surface hazard.
IPX7	The International Protection Marking (IP Code), IEC 60529 rates the degrees of protection provided by enclosures of electrical equipment. UHF transducers are protected against water

Composite safety warning symbols

Symbol	Description
	immersion—immersion for 30 minutes at a depth of 1 meter.
CE 0086	Conformité Européenne. Product meets the safety requirements of the European Union.
人	IEC 60601-1 uses this term to refer to the part of the medical device which comes into physical contact with the patient. The UHF transducers is classified as Type BF—devices that have conductive contact with the patient, or having medium or long term contact with the patient.
CSA c us	Proof of product compliance (electrical, gas and other safety standards) to North American safety standards.
🗑	European Union WEEE (Waste Electrical and Electronic Equipment) Directive 96/86/EEC. Identifies the directive on waste electrical and electronic equipment. Refer to local regulations for disposal.

Physical hazards

Caution: Watch out for strained and twisted cables.

Some of the optional accessories have long cables. Take care when working around the cables.

> Caution: FUJIFILM SonoSite recommends that the Vevo MD Imaging System be pushed by one person from behind and guided by another person in front, using the grab bars. Please use caution when going up or down ramps. Keep the system upright during transport.
>
> Ensure that the castors are locked when the Vevo MD Imaging System is not being transported.
>
> Never lift the system using the grab bars.

> Caution: Watch out for pinching from the adjustable monitors. Both the control panel and clinical display monitors can be adjusted. When moving the system, or adjusting these monitors, take care near these moving parts to ensure safety.

> Caution: Watch out for pinching at the bottom of the transducer bay when attaching the transducer connector to the transducer interface on the system. Use the transducer handle to push the transducer connector into place and when sliding transducer in or out of the transducer bay.

Magnetic field sensitivity

> Caution: DO NOT situate the Vevo MD Imaging System close to large clinical magnets as the magnetic fields may affect the performance of the Vevo MD Imaging System and cause distortion in the acquired image.

Labeling and verification

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference

- This device must accept any interference received, including interference that may cause undesired operation

This equipment uses RF energy only for its internal function. Therefore, the RF emissions are very low and are not likely to cause any interference to nearby electronic equipment.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

> **WARNING:** Changes or modifications not expressly approved by FUJIFILM SonoSite could void the user's authority to operate the equipment.

Clinical safety

> **WARNING:** To avoid injury, inspect all fasteners and connections.

> **WARNING:** To avoid the risk of a burn hazard, do not use the transducer with high frequency surgical equipment. Such a hazard may occur in the event of a defect in the high frequency surgical neutral electrode connection.

> **WARNING:** Do not use the system if it exhibits erratic or inconsistent behavior. Discontinuities in the scanning sequence are indicative of a hardware failure that must be corrected before use.

> **WARNING:** Some transducer sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. FUJIFILM SonoSite recommends identifying your latex and talc-sensitive patients and being prepared to treat allergic reactions promptly.

> **WARNING:** Perform ultrasound procedures prudently. Use the ALARA (as low as reasonably achievable) principle and follow the prudent use information concerning MI and TI.

> **WARNING:** To avoid injury or reduce the risk of infection to the patient, observe the following: follow Universal Precautions when inserting a needle and maintaining a medical device for interventional procedures, appropriate training in interventional procedures as dictated by current relevant medical practices as well as in proper operation of the ultrasound system and transducer is required. During vascular access, the potential exists for serious complications including without limitation the following: pneumothorax, arterial puncture, and guide wire misplacement.

Direct, indirect, and receive controls

Direct Controls

The system does not have a direct user control for output. Rather, the system has been designed to automatically adjust output to ensure that acoustic and thermal limits are not exceeded for all imaging modes. Since there is no direct user control for output, the sonographer should rely on controlling exposure time and scanning technique to implement the ALARA principle.

The system does not exceed a spatial peak temporal average intensity (ISPTA) of 720 mW/cm2 for all imaging modes. The mechanical index (MI) and thermal index (TI) may exceed values greater than 1.0 on some transducers in some imaging modes. Ultrasound users can monitor the MI and TI values on the left side of the clinical monitor under *Transmit* and implement the ALARA principle accordingly. For more information on MI and TI, see "Related guidance documents" on page 418.

Indirect Controls

The controls that indirectly affect output are controls affecting imaging mode, freeze, and depth. The imaging mode determines the nature of the ultrasound beam. Freeze stops all ultrasound output but keeps the last image displayed on screen. Freeze can be used by the ultrasound user to limit exposure time while studying an image and maintaining probe position during a scan. Some controls, such as depth, show a rough correspondence with output, and may be used as a general means for indirectly reducing MI or TI. See "Guidelines for reducing MI and TI" on page 379.

Receive Controls

The receive controls are the gain controls. Receive controls do not affect output. They should be used, if possible, to improve image quality before using controls that indirectly affect output.

Electrical safety

This system meets EN60601-1, Class I, mobile equipment requirements and Type BF (transducers) isolated patient-applied parts safety requirements.

This system complies with the applicable medical equipment requirements published in the Canadian Standards Association (CSA), European Norm Harmonized Standards, and Underwriters Laboratories safety standards. See "Specifications and standards" on page 403.

Observe the following warnings and cautions.

> **WARNING:** **To avoid the risk of injury, do not operate the system in the presence of flammable gasses or anesthetics. Explosion can result.**

> **WARNING:** **To avoid the risk of electrical shock or injury, do not open the system enclosures. All internal adjustments and replacements must be made by a qualified technician.**

WARNING: To avoid the risk of electrical shock: Use only properly grounded equipment. Shock hazards exist if the power supply is not properly grounded.

Grounding reliability can only be achieved when equipment is connected to a receptacle marked "Hospital Only" or "Hospital Grade" or the equivalent. This equipment must be connected only to a supply mains with protective earth.

Do not let any part of the system (including the power supply, or power supply connector), touch the patient. Do not touch the power supply and the patient at the same time.

Do not touch the signal input/output connectors on the back of the ultrasound system or the system transducer connector when the transducer is disconnected.

Do not connect the system's power supply to a Multiple Socket-Outlet (MSO) or extension cord.

Before using the transducer, inspect the transducer face, housing, and cable. Do not use the transducer if the transducer or cable is damaged. Turn the system off when cleaning. Do not use any transducer that has been immersed beyond the specified cleaning or disinfection level.

See "Compatible accessories and peripherals" on page 361 recommended by FUJIFILM SonoSite, including the power supply. Connection of accessories and peripherals not recommended by FUJIFILM SonoSite could result in shock. Contact FUJIFILM SonoSite for a list of accessories and peripherals available from or recommended by FUJIFILM SonoSite.

WARNING: Inspect the AC power cords, cables, and plugs on a regular basis. Ensure that they are not damaged to avoid the risk of electrical shock and fire hazard.

WARNING: The power cord that connects the ultrasound system to mains power must only be used with the system, and cannot be used to connect other devices to mains power to avoid the risk of electrical shock and fire hazard.

WARNING: To prevent injury to the operator/bystander, the transducer must be removed from patient contact before the application of a high-voltage defibrillation pulse.

WARNING: To avoid possible electrical shock or electromagnetic interference, verify proper operation and compliance with relevant safety standards for all equipment before clinical use. Connecting additional equipment to the ultrasound system constitutes configuring a medical system. FUJIFILM SonoSite recommends verifying that the system, all combinations of equipment, and accessories connected to the ultrasound system comply with JACHO installation requirements and/or safety standards such as AAMI-ES1 60601-1, NFPA 99 or EN/IEC Standard 60601-1 and electromagnetic compatibility standard IEC 60601-1-2 (Electromagnetic compatibility), and are certified according to IEC Standard 60950 Information Technology Equipment (ITE) or IEC 60601-1.

WARNING: Because the only method of completely removing AC power from the Vevo MD Imaging System is to disconnect the AC input power cord from the stand base, ensure that you place the system in a location in which you can easily remove the AC input power cord if necessary.

WARNING: Failures in the electrical safety design of connected devices may result in a voltage on the ultrasound system. To minimize the risk of electrical shock to the patient and/or operator: Use medical-grade devices; After connections are made, test the electrical safety utilizing biomedical department electrical safety procedures; For added protection, use an isolation transformer between the connecting device and AC power.

Caution: Do not use the system if an error message appears on the clinical display. Note the error code and call FUJIFILM SonoSite or your local representative, turn off the system by pressing the power button until the system powers down.

Caution: To avoid increasing the system and transducer connector temperature, do not block the airflow to the ventilation holes on the front and back of the system.

Electrical testing

FUJIFILM SonoSite products tested

The following equipment has been tested:

- Vevo MD Imaging System

- Vevo MD Imaging System transducers: UHF22, UHF48, UHF70

- Foot switch

Electrical safety testing

The system complies with the following medical equipment standards related to electrical safety as follows:

- CAN/CSA-C22.2 No. 60601-1:14 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

- EN 60601-1:2006/A1:2013 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

- ANSI/AAMI ES 60601-1:2005/(R)2012/A1:2012, C1:2009/(R)2012 and A2:2010/(R)2012 Medical electrical equipment-Part 1: General requirements for basic safety and essential performance

- JIS T 0601-1:2012 Medical electrical equipment-Part 1: General requirements for basic safety and essential performance

Electromagnetic compatibility

The system complies with the electromagnetic compatibility (EMC) limits as per the following standards:

- IEC 60601-1-2:2007 / EN 60601-1-2:2007/AC:2010 / CSA C22.2 No. 60601-1-2:08, Medical electrical equipment - part 1-2: general requirements for basic safety and essential performance - collateral standard: electromagnetic disturbances - requirements and tests

- EN 55011:2009/A1:2010, CISPR 11:2003/A1:2004, Class A Group 1 - Industrial, scientific and medical equipment - radio-frequency disturbance characteristics - limits and methods of measurement

- FCC Part 15 Subpart B:2012

Test laboratories

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Inquiries

Send any questions to:

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114 Old Pittwater Road
BROOKVALE, NSW, 2100
Australia

Compliance

The Vevo MD Imaging System complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The Vevo MD Imaging System Class A digital apparatus complies with Canadian ICES-001.

Electrical safety classification

Safety classification

Classification	Description
Class I equipment	The ultrasound system is classified as Class I equipment.
Type BF applied parts	Ultrasound transducers
IPX-7	Ultrasound transducers (except connector)
IPX-8	Foot switch
Non AP/APG	Ultrasound system power supply, system transducer connector, and peripherals. Equipment is not suitable for use in the presence of flammable anesthetics.

General purpose classification

Specifications	Value
Means of protection	Class I
Degree of protection	IPXO
Pollution degree	2
Over voltage category	2
Operating condition	Continuous

Electrical power supply

FUJIFILM SonoSite manufactures the Vevo MD Imaging System to operate with AC line voltages of 100V, 120V, and 240V. The electrical configuration of the system is noted on the safety label.

- 100V~, 50/60Hz, 6A

- 120V~, 50/60Hz, 5A

- 240V~, 50/60Hz, 2.5A

WARNING: Before having the system installed, ensure that the electrical service in the facility is adequate. Do not modify the attachment plug or use an adapter. Doing so may cause an electrical hazard.

WARNING: Use only power cords provided by FUJIFILM SonoSite with the Vevo MD Imaging System: 10A rating for 100V/120V/240V supply voltage.

Isolating the Vevo MD Imaging System from power

The Vevo MD Imaging System does not become completely isolated from power by pressing the power off button. The only way to completely remove power is to perform the following procedure.

To isolate the system from power

1 Press the power button.

2 Wait for the system to power down.

3 Set the main power switch on the system base to the off position. See "Starting up and shutting down the system" on page 22.

4 Disconnect the AC input power cord from the stand base.

Compatible accessories and peripherals

FUJIFILM SonoSite has tested the Vevo MD Imaging System with the following accessories and peripherals and has demonstrated compliance to the requirements of IEC 60601-1-2:2007.

> **WARNING:** Use of the accessories with medical systems other than the Vevo MD Imaging System ultrasound system may result in increased emissions or decreased immunity of the medical system.

> **WARNING:** Use of accessories other than those specified may result in increased emissions or decreased immunity of the ultrasound system.

Accessories and peripherals compatible with Vevo MD Imaging System

Description	Maximum cable length (in)	Maximum cable length (m)
UHF22 transducer[a]	78 ± 2	1.98 ± 5
UHF48 transducer[a]	78 ± 2	1.98 ± 5
UHF70 transducer[a]	78 ± 2	1.98 ± 5
Foot switch	120	3
AC input power cord	120	3.1
[a]For transducers, maximum cable length is measured between the strain reliefs and includes the length under the strain relief. The stated lengths do not include the lengths of cable inside the transducer enclosure, or inside the transducer connector.		

Electromagnetic compatibility

The ultrasound system has been tested and found to comply with the electromagnetic compatibility (EMC) limits for medical devices to IEC 60601-1-2. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation.

WARNING: **To avoid the risk of increased electromagnetic emissions or decreased immunity, use only accessories and peripherals recommended by FUJIFILM SonoSite Connection of accessories and peripherals not recommended by FUJIFILM SonoSite could result in malfunctioning of your ultrasound system or other medical electrical devices in the area. Contact FUJIFILM SonoSite for a list of accessories and peripherals available from or recommended by FUJIFILM SonoSite See "Compatible accessories and peripherals" on the previous page.**

Caution: Do not stack equipment on the ultrasound system or use other equipment in close proximity and adjacent to the ultrasound system. If stacking or using other equipment in close proximity is unavoidable, then you must observe the system to verify normal operation.

Caution: Medical electrical equipment requires special precautions regarding EMC and must be installed and operated according to these instructions. It is possible that high levels of radiated or conducted radio-frequency (RF) electromagnetic interference (EMI) from portable and mobile RF communications equipment or other strong or nearby radio-frequency sources, could result in performance disruption of the ultrasound system. Evidence of disruption may include image degradation or distortion, erratic readings, equipment ceasing to operate, or other incorrect functioning.

If this occurs, survey the site to determine the source of disruption, and take the following actions to eliminate the source(s):

• Turn equipment in the vicinity off and on to isolate disruptive equipment

• Relocate or re-orient interfering equipment

• Increase distance between interfering equipment and your ultrasound system

• Manage use of frequencies close to ultrasound system frequencies

• Remove devices that are highly susceptible to EMI

• Lower power from internal sources within facility control (such as paging systems)

• Label devices susceptible to EMI

• Educate clinical staff to recognize potential EMI-related problems

• Eliminate or reduce EMI with technical solutions (such as shielding)

• Restrict use of personal communicators (cell phones, computers) in areas with devices susceptible to EMI

• Share relevant EMI information with others, particularly when evaluating new equipment purchases which may generate EMI

• Purchase medical devices that comply with IEC 60601-1-2 EMC Standards

Electrostatic discharge

> Caution: Electrostatic discharge (ESD), or static shock, is a naturally occurring phenomenon. ESD is common in conditions of low humidity, which can be caused by heating or air conditioning. ESD is a discharge of the electrical energy from a charged body to a lesser or non-charged body. The degree of discharge can be significant enough to cause damage to a transducer or an ultrasound system. The following precautions can help reduce ESD: anti-static spray on carpets, anti-static spray on linoleum, and anti-static mats.

Separation distance

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

Separation distance

Rated maximum output power of transmitter *(Watts)*	Separation distance according to frequency of transmitter (*m*)		
	150 kHz to 80 MHz $d=1.2\ \sqrt{P}$	80 MHz to 800 MHz $d=1.2\ \sqrt{P}$	800 MHz to 2.5 GHz $d=2.3\ \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73

Separation distance (continued)

Rated maximum output power of transmitter *(Watts)*	Separation distance according to frequency of transmitter (*m*)		
	150 kHz to 80 MHz d=1.2 √P	80 MHz to 800 MHz d=1.2 √P	800 MHz to 2.5 GHz d=2.3 √P
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance (d) in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Environmental limits

The Vevo MD Imaging System operating environment should be free of fumes, dirt, and electrical interference.

Note: The temperature, pressure, and humidity limits apply only to the ultrasound system and transducers.

Vevo MD Imaging System and transducer operating limits

Specifications	Value
Temperature	10 to 40°C (50 to 104°F)
Relative humidity	15 to 80% non-condensing
Altitude	Up to 2000 m

Vevo MD Imaging System shipping and storage limits

Specifications	Value
Temperature	-35 to 50°C (-31 to 122°F)
Relative humidity	15 to 95%
Altitude	500 to 1060hPa (0.5 to 1.05 ATM)

Ergonomic safety

These scanning guidelines are intended to assist you in the comfortable and effective use of your ultrasound system.

> **WARNING: To prevent musculoskeletal disorders, follow the guidelines in this section. Use of an ultrasound system may be linked to musculoskeletal disorders (MSDs). [123] Use of an ultrasound system is defined as the physical interaction between the operator, the ultrasound system, and the transducer.**

Position the system

Minimize eye and neck strain

- If possible, position the system within reach

- Adjust the angle of the clinical monitor or control panel to minimize glare

Position yourself

Support your back during an exam

- Use a chair that supports your lower back, that adjusts to your work surface height, that promotes a natural body posture, and that allows quick height adjustments

- Always sit or stand upright and Avoid bending or stooping

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[1]Magnavita, N., L. Bevilacqua, P. Mirk, A. Fileni, and N. Castellino. "Work-related Musculoskeletal Complaints in Sonologists." Occupational Environmental Medicine. 41:11 (1999), 981-8.
[2]Craig, M. "Sonography: An Occupational Hazard?" Journal of Diagnostic Medical Sonography. 3 (1985), 121-5.
[3]Smith, C.S., G.W. Wolf, G. Y. Xie, and M. D. Smith. "Musculoskeletal Pain in Cardiac Ultrasonographers: Results of a Random Survey." Journal of American Society of Echocardiography. (May1997), 357-62.

Minimize reaching and twisting

- Use a bed that is height adjustable

- Position the patient as close to you as possible

- Face forward and avoid twisting your head or body

- Move your entire body front to back, and position your scanning arm next to or slightly in front of you

- Stand for difficult exams to minimize reaching

- Position the monitor directly in front of you

Promote comfortable shoulder and arm postures

- Keep your elbow close to your side

- Relax your shoulders in a level position

- Support your arm using a support cushion or pillow, or rest it on the bed

Promote comfortable hand, wrist, and finger postures

- Hold the transducer lightly in your fingers

- Minimize the pressure applied on the patient

- Keep your wrist in a straight position

Take breaks, exercise, and vary activities

- Minimizing scanning time and taking breaks can effectively allow your body to recover from physical activity and help you avoid MSDs as some ultrasound tasks may require longer or more frequent breaks, however, simply changing tasks can help some muscle groups relax while others remain or become active

- Work efficiently by using the software and hardware features correctly

- Keep moving and avoid sustaining the same posture by varying your head, neck, body, arm, and leg positions

- Do targeted exercises to strengthen muscle groups, which may help you avoid MSDs—contact a qualified health professional to determine stretches and exercises that are right for you

Equipment safety

To protect your ultrasound system, transducer, and accessories, follow these precautions.

> **WARNING: When transporting your system, to avoid possible injury from the system tipping, always collapse the clinical monitor and push forward on the bar on the platform instead of pushing downward on the bar or pushing the clinical monitor.**

> Caution: Excessive bending or twisting of cables can cause a failure or intermittent operation.

> Caution: Improper cleaning or disinfecting of any part of the system can cause permanent damage. For cleaning and disinfecting instructions, see "Cleaning and disinfecting" on page 316.

> Caution: Do not use solvents such as thinner or benzene, or abrasive cleaners on any part of the system.

> Caution: Do not spill liquid on the system.

> Caution: Position the system to allow access to the mains power cord connector.

Hazardous materials

WARNING: Products and accessories may contain hazardous materials. When disposing of products and accessories, be environmentally responsible and meet federal and local regulations for disposing hazardous materials.

Manufacturer's declaration

The following tables document the intended use environment and EMC compliance levels of the system. For maximum performance, ensure that the system is used in the environments described in this table.

The system is intended for use in the electromagnetic environment specified below.

Manufacturer's declaration - Electromagnetic emissions

Emissions Test	Compliance	Electromagnetic Environment
RF emissions CISPR 11	Group 1	The Vevo MD Imaging System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Vevo MD Imaging System is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network which supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Manufacturer's declaration - Electromagnetic immunity

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment
Electrostatic Discharge (ESD) IEC 61000-4-2	± 2.0KV, ± 4.0KV, ±6.0KV contact ±2.0KV, ±4.0KV, ±8.0KV air	± 2.0KV, ± 4.0KV, ±6.0KV contact ±2.0KV, ±4.0KV, ±8.0KV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast Transient burst IEC 61000-4-4	±2KV on the mains ±1KV on signal lines	±2KV on the mains ±1KV on signal lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1KV lines(s) to line(s) ±2KV line(s) to earth	±1KV line(s) to lines(s) ±2KV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5s	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Vevo MD Imaging System be requires continued operation during power mains interruptions, it is recommended that the Vevo MD Imaging System be powered from an uninterruptible power supply.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment
Power Frequency Magnetic Field IEC-61000-4-8	3 A/m	3 A/m	If image distortion occurs, it may be necessary to position the Vevo MD Imaging System further from sources of power frequency magnetic fields or to install magnetic shielding. The power frequency magnetic field should be measured in the intended installation location to assure that it is sufficiently low.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Vevo MD Imaging System including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance $d=1.2\sqrt{P}$
Radiated RF	3 Vim	3 V/m	$d=1.2\sqrt{P}$

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment
IEC 61000-4-3	80 MHz to 2.4 GHz		80 MHz to 800 MHz d=2.3$\sqrt{P}$ 800 MHz to 2.5 GHz Where $\sqrt{P}$ is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic Site survey[1], should be less than the compliance level in each frequency range[2]. Interference may occur in the vicinity of equipment marked with

[1]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 Vevo MD Imaging System is used exceeds the applicable RF compliance level above, the Vevo MD Imaging System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Vevo MD Imaging System. [2]Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment
			the following symbol: (IEC 60417 No. 417-IEC-5140: "Source of non-ionizing radiation")

Note: U_T is the AC mains voltage prior to application of the test level. At 80 MHz and 800 MHz, the higher frequency range applies. These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflections from structures, objects and people.

Caution: FCC Caution: Changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

• This device may not cause harmful interference.

• This device must accept any interference received, including interference that may cause undesired operation.

Immunity testing requirements

The Vevo MD Imaging System complies with the essential performance requirements specified in IEC 60601-1-2:2007 and IEC 60601-2-37:2007. Results of immunity testing show that the Vevo MD Imaging System meets these requirements and is free from the following:

- Noise on a waveform or artifacts[1][2][3]or distortion in an image or error of a displayed numerical value that cannot be attributed to a physiological effect and that may alter the diagnosis

- Display of incorrect numerical values associated with the diagnosis to be performed

- Display of incorrect MI/TI indications

- Display of incorrect safety related indications

- Production of unintended or excessive ultrasound output

- Production of unintended or excessive transducer assembly surface temperature

- Production of unintended or uncontrolled motion of transducer assemblies intended for intracorporeal use

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[1]Degradation of the performance of the system was recorded during the tests. Indirect Contact discharge on VCP at ±4kV & ±6kV and direct contact discharge on the metal enclosure at ±4kV & ±6kV affected the display and control panel. The Vevo MD Imaging System recovered on its own after the test. The EUT met the performance level specified by the manufacturer (61000-4-2).
[2]Degradation of the performance of the system was noted during the tests. The image was affected between 80-100MHz and the Vevo MD Imaging System recovered on its own after the test. The EUT met the performance level specified by the manufacturer (61000-4-3).
[3]The control panel and clinical display was flickering during the test on AC Mains and foot pedal switch, but the Vevo MD Imaging System recovered on its own after the test. The EUT met the performance level specified by the manufacturer (61000-4-4).

Acoustic output

This section contains information about the ALARA (as low as reasonably achievable) principle, the output display standard, and acoustic power and intensity tables. The information applies to the ultrasound system, transducer, accessories, and peripherals.

ALARA principle

ALARA is the guiding principle for the use of diagnostic ultrasound. Sonographers and other qualified ultrasound users, using good judgment and insight, determine the exposure that is "as low as reasonably achievable." There are no set rules to determine the correct exposure for every situation. The qualified ultrasound user determines the most appropriate way to keep exposure low and bio effects to a minimum, while obtaining a diagnostic examination.

A thorough knowledge of the imaging modes, transducer capability, system setup and scanning technique is necessary. The imaging mode determines the nature of the ultrasound beam. A stationary beam results in a more concentrated exposure than a scanned beam, which spreads that exposure over that area. The transducer capability depends upon the frequency, penetration, resolution, and field of view. The default system presets are reset at the start of each new patient. It is the scanning technique of the qualified ultrasound user along with patient variability that determines the system settings throughout the exam.

The variables which affect the way the qualified ultrasound user implements the ALARA principle include patient body size, location of the bone relative to the focal point, attenuation in the body, and ultrasound exposure time. Exposure time is an especially useful variable, because the qualified ultrasound user can control it. The ability to limit the exposure over time supports the ALARA principle.

Applying the ALARA principle

The system imaging mode selected by the qualified ultrasound user is determined by the diagnostic information required. 2D imaging provides anatomical information; Color Doppler Mode imaging provides information about the energy or amplitude strength of the Doppler signal over time at a given anatomical location and is used for detecting the presence of blood flow. Understanding the nature of the imaging mode used allows the qualified ultrasound user to apply the ALARA principle.

Prudent use of ultrasound means limiting ultrasound to situations in which it is medically useful and limiting patient exposure to the lowest ultrasound output for the shortest time necessary to achieve acceptable diagnostic results. Although there are no direct user controls for acoustic output, users can indirectly control output by

varying depth. Decisions that support prudent use are based on the type of patient, exam type, patient history, ease or difficulty of obtaining diagnostically useful information, and potential localized heating of the patient due to transducer surface temperature. See "Transducer surface temperature rise" on page 383. In the event of a device malfunction, there are redundant controls that limit transducer power. This is accomplished by an electrical design that limits both power supply current and voltage to the transducer.

The sonographer uses the system controls to adjust image quality and limit ultrasound output. The system controls are divided into three categories relative to output: controls that directly affect output, controls that indirectly affect output, and receiver controls.

Acoustic artifacts

An acoustic artifact is information, present or absent in an image, that does not properly indicate the structure or flow being imaged. There are helpful artifacts that aid in diagnosis and those that hinder proper interpretation. Examples of artifacts include shadowing, through transmission, aliasing, reverberations, and comet tails.

For more information on detecting and interpreting acoustic artifacts, see the following reference:

Kremkau, Frederick W. Sonography: Principles and Instruments. 8th ed., W.B. Saunders Company, (2011).

Guidelines for reducing MI and TI

The following are general guidelines for reducing MI or TI. If multiple parameters are given, the best results may be achieved by minimizing these parameters simultaneously. In some modes changing these parameters does not affect MI or TI. Changes to other parameters may also result in MI and TI reductions.

Please note the MI and TI values on the left side of the clinical display monitor under *Transmit*.

Guidelines for reducing MI

Transducer	Control
UHF22	Focal zone*
UHF48	Focal zone*
UHF70	Focal zone*
* Adjusting the focal zone depth will affect the MI value. Tap and drag the focal zone indicator along the image scale of the control panel. As you adjust the focal zone, note the MI value on the clinical display; continue to adjust until your desired MI value is reached.	

Guidelines for reducing TI (TIS, TIC, TIB)

| Transducer | Color Doppler Mode Settings | | | | | Focal Depth |
	Box Width	Box Height	Box Location	Focal Depth	Optimize	
UHF22			⬆	⬆	PRF*	⬆
UHF48			⬆	⬆	PRF*	⬆
UHF70	⬆		⬆	⬆	PRF*	⬆

⬆ Increase or raise setting of parameter to reduce TI. For Box Location and Focal Depth, move towards transducer surface to reduce TI.

⬇ Decrease or lower setting parameter to reduce TI.

* Adjusting the PRF will affect the TI value. Tap and drag the PRF indicator in th control panel. As you adjust the PRF, note the TI value on the clinical display; continue to adjust until your desired TI value is reached.

Output display

The system meets the AIUM (American Institute of Ultrasound in Medicine) output display standard for MI and TI, see "Related guidance documents" on page 418. The following table indicates for each transducer and operating mode when either the TI or MI is greater than or equal to a value of 1.0, thus requiring display.

TI or MI ≥ 1.0

Transducer Model	Index	2D, M-Mode	Color
UHF22	MI	✔	✔
	TIC, TIB, or TIS	✔	✔
UHF48	MI	✘	✔
	TIC, TIB, or TIS	✘	✘
UHF70	MI	✘	✘
	TIC, TIB, or TIS	✘	✔

Even if MI is less than 1.0, the system provides a continuous real-time display of MI in all imaging modes, in increments of 0.1.

The system meets the output display standard for TI and provides a continuous real-time display of TI in all imaging modes, in increments of 0.1.

The TI consists of three user-selectable indices, and only one of these is displayed at any one time. In order to display TI properly and meet the ALARA principle, the user selects an appropriate TI based on the specific exam being performed. FUJIFILM SonoSite provides a copy of AIUM Medical Ultrasound Safety, which contains guidance on determining which TI is appropriate. See "Related guidance documents" on page 418 or "Guidelines for reducing MI and TI" on page 379.

MI and TI output display accuracy

The accuracy result for the MI is stated statistically. With 95% confidence, 95% of the measured MI values will be within +61.0% to -73.1% of the displayed MI value, or +0.2 of the displayed value, whichever value is larger.

The accuracy result for the TI is stated statistically. With 95% confidence, 95% of the measured TI values will be within +118.8% to -144% of the displayed TI value, or +0.2 of the displayed value, whichever value is larger.

A displayed value of 0.0 for MI or TI means that the calculated estimate for the index is less than 0.05.

Transducer surface temperature rise

The table in this section lists the measured surface temperature rise from ambient[1] temperatures of transducers used on the ultrasound system. The temperatures were measured in accordance with IEC 60601-2-37:2007 with controls and settings positioned to give maximum temperatures.

Transducer Surface Temperature Rise Limits, External Use

Test	UHF22		UHF48		UHF70	
	(°F)	(°C)	(°F)	(°C)	(°F)	(°C)
Still air	27	48.6	27	48.6	27	48.6
Simulated use	10	18	10	18	10	18

FUJIFILM SonoSite UHF series transducers pass surface temperature limits, however, in certain situations, temperatures may rise to 41°C (105.8°F).

WARNING: When the transducer scanhead is in contact with the patient, special precautions should be considered when using the transducer on children or on other patients who are sensitive to higher temperatures.

For example, Color Doppler Mode has higher frame rates with a maximum PRF setting, small color box and when imaging at the following depths (per transducer):

- UHF22 = 24 mm

- UHF48 = 12 mm

- UHF70 = 8 mm

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[1]Ambient temperature = 23°C ± 3°C (73.4°F ± 5.4°F) .

Acoustic output measurement

Since the initial use of diagnostic ultrasound, the possible human biological effects (bio effects) from ultrasound exposure have been studied by various scientific and medical institutions. In October 1987, AIUM ratified a report from its Bio effects Committee (Bio effects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1988: Vol. 7, No. 9 Supplement). The report, sometimes referred to as the Stowe Report, reviewed available data on possible effects of ultrasound exposure. Another report, "Bio effects and Safety of Diagnostic Ultrasound," dated January 28, 1993, provides more current information.

The acoustic output for this ultrasound system has been measured and calculated in accordance with "Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment" (NEMA UD2-2004), and "Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment" (NEMA UD3-2004).

In Situ, derated, and water value intensities

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

In Situ = Water $e^{[-(0.023alf)]}$

where:

> *In Situ* = *In Situ* intensity value
>
> Water = Water intensity value
>
> e = 2.7183
>
> a = attenuation factor (dB/cm MHz)

Attenuation factor (a) for various tissue types are given below:

brain = 0.53

heart = 0.66

kidney = 0.79

liver = 0.43

muscle = 0.55

l = skinline to measurement depth in cm

f = center frequency of the transducer/system/mode combination in MHz

Since the ultrasonic path during the exam is likely to pass through varying lengths and types of tissue, it is difficult to estimate the true *In Situ* intensity. An attenuation factor of 0.3 is used for general reporting purposes; therefore, the *In Situ* value commonly reported uses the formula:

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

Since this value is not the true *In Situ* intensity, the term "derated" is used to qualify it.

The maximum derated and the maximum water values do not always occur at the same operating conditions; therefore, the reported maximum water and derated values may not be related by the *In Situ* (derated) formula. For example: a multi-zone array transducer that has maximum water value intensities in its deepest zone, but also has the smallest derating factor in that zone. The same transducer may have its largest derated intensity in one of its shallowest focal zone settings.

Tissue models and equipment survey

Tissue models are necessary to estimate attenuation and acoustic exposure levels *In Situ* from measurements of acoustic output made in water. Currently, available models may be limited in their accuracy because of varying tissue paths during

diagnostic ultrasound exposures and uncertainties in the acoustic properties of soft tissues. No single tissue model is adequate for predicting exposures in all situations from measurements made in water, and continued improvement and verification of these models is necessary for making exposure assessments for specific exam types.

A homogeneous tissue model with attenuation coefficient of 0.3 dB/cm MHz throughout the beam path is commonly used when estimating exposure levels. The model is conservative in that it overestimates the *In Situ* acoustic exposure when the path between the transducer and site of interest is composed entirely of soft tissue. When the path contains significant amounts of fluid, as in many first and second-trimester pregnancies scanned transabdominally, this model may underestimate the *In Situ* acoustic exposure. The amount of underestimation depends upon each specific situation.

Fixed-path tissue models, in which soft tissue thickness is held constant, sometimes are used to estimate *In Situ* acoustic exposures when the beam path is longer than 3 cm and consists largely of fluid. When this model is used to estimate maximum exposure to the fetus during transabdominal scans, a value of 1 dB/cm MHz may be used during all trimesters.

Existing tissue models that are based on linear propagation may underestimate acoustic exposures when significant saturation due to non-linear distortion of beams in water is present during the output measurement.

The maximum acoustic output levels of diagnostic ultrasound devices extend over a broad range of values:

- A survey of 1990-equipment models yielded MI values between 0.1 and 1.0 at their highest output settings. Maximum MI values of approximately 2.0 are known to occur for currently available equipment. Maximum MI values are similar for real-time 2D and M Mode imaging.

- Computed estimates of upper limits to temperature elevations during transabdominal scans were obtained in a survey of 1988 and 1990 pulsed Doppler equipment. The vast majority of models yielded upper limits less than 1° and 4°C (1.8° and 7.2°F) for exposures of first-trimester fetal tissue and second-trimester fetal bone, respectively. The largest values obtained were approximately 1.5°C (2.7°F) for first-trimester fetal tissue and 7°C (12.6°F) for

second-trimester fetal bone. Estimated maximum temperature elevations given here are for a "fixed path" tissue model and are for devices having ISPTA values greater than 500 mW/cm2. The temperature elevations for fetal bone and tissue were computed based on calculation procedures given in Sections 4.3.2.1-4.3.2.6 in "Bioeffects and Safety of Diagnostic Ultrasound" (AIUM, 1993).

Acoustic output tables

The tables in this section indicate the acoustic output for the system and transducer combinations with a TI or MI equal to or greater than one.

These tables are organized by transducer model and imaging mode. For a definition of terms used in the tables, see the "Glossary" on page 419.

Transducer Model: UHF22 - **Operating Mode:** 2D Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		1.26	1.02	-	-	-	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	3.86					
W_0(mW)	(mW)		24.4	-		-	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
$Z@PII_{.3max}$	(cm)	1.22					
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	9.40	9.09	-	-	-	#
Dim of A_{aprt}	X (cm)		3.2	-	-	-	#
	Y (cm)		0.3	-	-	-	#
Other information							
PD	(µsec)	0.12					
PRF	(Hz)	19280					
$Pr@^{PII}max$	(MPa)	5.34					
$d_{eq}@PII_{max}$	(cm)					-	
Focal Length	FL_x (cm)		36	-	-		#
	FL_y (cm)		1.8	-	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	484.6					
Operating control conditions							
Control 1: Focal Zone Depth		14.7 mm	36 mm	-	-	-	#
Control 2: Depth		15.4 mm	38.4 mm	-	-	-	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							
# : No data is reported as the global maximum index value is not reported for the reason listed.							
- : Data are not applicable for this transducer/mode.							

Transducer Model: UHF22   -   **Operating Mode:** Color Doppler Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		1.26	3.29	-	-	-	1.86
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	3.86					
W_0(mW)	(mW)		55.4	-		-	51.5
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
Z@PII$_{.3max}$	(cm)	1.03					
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	9.40	12.5	-	-	-	12.5
Dim of A_{aprt}	X (cm)		3.2	-	-	-	1.2
	Y (cm)		0.3	-	-	-	0.3
Other information							
PD	(µsec)	0.12					
PRF	(Hz)	30197					
Pr@^{PII}max	(MPa)	5.33					
d_{eq}@PII$_{max}$	(cm)					-	
Focal Length	FL$_x$ (cm)		1.8	-	-		3.2
	FL$_y$ (cm)		1.8	-	-		1.8
$I_{PA.3}$@MI$_{max}$	(W/cm^2)	517.5					
Operating control conditions							
Control 1: Mode		Color	Color	-	-	-	Color
Control 2: Focal Zone Depth		11.5 mm	18.0 mm	-	-	-	18.0 mm
Control 3: Depth		14.4 mm	18.4 mm	-	-	-	18.4 mm
Control 4: Color Scale		107.8 cm/s	92.4 cm/s	-	-	-	92.4 cm/s
Control 5: Color Box Position/Size		Narrow	Wide	-	-	-	Narrow

(a) : This index is not required for this operating mode; value is <1.

(b) : This transducer is not intended for transcranial or neonatal cephalic uses.

| # : | No data is reported as the global maximum index value is not reported for the reason listed. |
| - : | Data are not applicable for this transducer/mode. |

Transducer Model: UHF22 - **Operating Mode:** M-Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt}\leq1$	$A_{aprt}>1$	Non-scan	
Global Maximum Index Value		1.26	(a)	(a)	-	(a)	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	3.86					
W_0(mW)	(mW)		#	#		#	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					#	
Z@PII$_{.3max}$	(cm)	1.22					
$d_{eq}(Z_{sp})$	(cm)					#	
f_c	(MHz)	9.40	#	#	-	#	#
Dim of A_{aprt}	X (cm)		#	#	-	#	#
	Y (cm)		#	#	-	#	#
Other information							
PD	(µsec)	0.12					
PRF	(Hz)	6000					
Pr@^{PII}max	(MPa)	5.34					
d_{eq}@PII$_{max}$	(cm)					#	
Focal Length	FL_x (cm)		#	#	-		#
	FL_y (cm)		#	#	-		#
$I_{PA.3}$@MI$_{max}$	(W/cm^2)	484.6					
Operating control conditions							
Control 1: Focal Zone Depth		14.7 mm	#	#	-	#	#
Control 2: Depth		16.4 mm	#	#	-	#	#

(a) : This index is not required for this operating mode; value is <1.

(b) : This transducer is not intended for transcranial or neonatal cephalic uses.

\# : No data is reported as the global maximum index value is not reported for the reason listed.

- : Data are not applicable for this transducer/mode.

Transducer Model: UHF48 - Operating Mode: 2D Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		(a)	(a)	-	-	-	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)						
W_0(mW)	(mW)	#	#	-		-	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
$Z@PII_{.3max}$	(cm)						
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	#	#	-	-	-	#
Dim of A_{aprt}	X (cm)	#	#	-	-	-	#
	Y (cm)	#	#	-	-	-	#
Other information							
PD	(µsec)						
PRF	(Hz)						
$Pr@^{PII}max$	(MPa)						
$d_{eq}@PII_{max}$	(cm)					-	
Focal Length	FL_x (cm)	#	#	-	-		#
	FL_y (cm)	#	#	-	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)						
Operating control conditions							
Control 1: Mode Focal Zone Depth		#	#	-	-	-	#
Control 2: Depth		#	#	-	-	-	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							
# : No data is reported as the global maximum index value is not reported for the reason listed.							
- : Data are not applicable for this transducer/mode.							

Transducer Model: UHF48 - **Operating Mode:** Color Doppler Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		0.98	(a)	-	-	-	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	3.95					
W_0(mW)	(mW)		#	-		-	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
$Z@PII_{.3max}$	(cm)	0.76					
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	16.26	#	-	-	-	#
Dim of A_{aprt}	X (cm)		#	-	-	-	#
	Y (cm)		#	-	-	-	#
Other information							
PD	(µsec)	0.7					
PRF	(Hz)	34791					
$Pr^{@PII}max$	(MPa)	6.03					
$d_{eq}@PII_{max}$	(cm)					-	
Focal Length	FL_x (cm)		#	-	-		#
	FL_y (cm)		#	-	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	579.9					
Operating control conditions							
Control 1: Mode		Color	#	-	-	-	#
Control 2: Focal Zone Depth		7.2 mm	#	-	-	-	#
Control 3: Depth		8.5 mm	#	-	-	-	#
Control 4: Color Scale		91.7 cm/s	#	-	-	-	#
Control 5: Color Box Position/Size		Narrow	#	-	-	-	#

(a) : This index is not required for this operating mode; value is <1.

(b) : This transducer is not intended for transcranial or neonatal cephalic uses.

 # : No data is reported as the global maximum index value is not reported for the reason listed.

 - : Data are not applicable for this transducer/mode.

Transducer Model: UHF48   -   **Operating Mode:** M- Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		(a)	-	(a)	-	(a)	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	#					
W_0(mW)	(mW)		-	#		#	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					#	
$Z@PII_{.3max}$	(cm)	#					
$d_{eq}(Z_{sp})$	(cm)					#	
f_c	(MHz)	#	-	#	-	#	#
Dim of A_{aprt}	X (cm)		-	#	-	#	#
	Y (cm)		-	#	-	#	#
Other information							
PD	(μsec)	#					
PRF	(Hz)	#					
$Pr^{@PII}max$	(MPa)	#					
$d_{eq}@PII_{max}$	(cm)					#	
Focal Length	FL_x (cm)		-	#	-		#
	FL_y (cm)		-	#	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	#					
Operating control conditions							
Control 1: Depth		#	-	#	-	#	#
Control 2: Focal Zone depth		#	-	#	-	#	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							
# : No data is reported as the global maximum index value is not reported for the reason listed.							
- : Data are not applicable for this transducer/mode.							

Transducer Model: UHF70 **-** **Operating Mode:** 2D Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		(a)	(a)	-	-	-	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	#					
W_0(mW)	(mW)		#	-		-	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
$Z@PII_{.3max}$	(cm)	#					
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	#	#	-	-	-	#
Dim of A_{aprt}	X (cm)		#	-	-	-	#
	Y (cm)		#	-	-	-	#
Other information							
PD	(μsec)	#					
PRF	(Hz)	#					
$Pr@^{PII}max$	(MPa)	#					
$d_{eq}@PII_{max}$	(cm)					-	
Focal Length	FL_x (cm)		#	-	-		#
	FL_y (cm)		#	-	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	#					
Operating control conditions							
Control 1: Focal Zone Depth		#	#	-	-	-	#
Control 2: Depth		#	#	-	-	-	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							
# : No data is reported as the global maximum index value is not reported for the reason listed.							
- : Data are not applicable for this transducer/mode.							

Transducer Model: UHF70 - **Operating Mode:** Color Doppler Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		(a)	1.37	-	-	-	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	#					
W_0(mW)	(mW)		7.32	-		-	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)				-		
Z_1	(cm)				-		
Z_{bp}	(cm)				-		
Z_{sp}	(cm)					-	
$Z@PII_{.3max}$	(cm)	#					
$d_{eq}(Z_{sp})$	(cm)					-	
f_c	(MHz)	#	39.58	-	-	-	#
Dim of A_{aprt}	X (cm)		0.97	-	-	-	#
	Y (cm)		0.10	-	-	-	#
Other information							
PD	(µsec)	#					
PRF	(Hz)	#					
$Pr@^{PII}max$	(MPa)	#					
$d_{eq}@PII_{max}$	(cm)					-	
Focal Length	FL_x (cm)		0.8	-	-		#
	FL_y (cm)		0.5	-	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	#					
Operating control conditions							
Control 1: Mode		#	Color	-	-	-	#
Control 2: Focal Zone Depth		#	8.0 mm	-	-	-	#
Control 3: Depth		#	8.5 mm	-	-	-	#
Control 4: Color Scale		#	48.1 cm/s	-	-	-	#
Control 5: Color Box Position/Size		#	Wide	-	-	-	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							

: No data is reported as the global maximum index value is not reported for the reason listed.

- : Data are not applicable for this transducer/mode.

Transducer Model: UHF70   -   **Operating Mode:** M-Mode

Index Label		M.I.	TIS			TIB	TIC
			Scan	$A_{aprt} \leq 1$	$A_{aprt} > 1$	Non-scan	
Global Maximum Index Value		(a)	-	(a)	-	(a)	(a)
Associated Acoustic Parameter							
$P_{r.3}$	(MPa)	#					
$W_0(mW)$	(mW)		-		-	#	#
min of $W_{.3}(z_1)$, $I_{TA.3}(z_1)$	(mW)			#			
Z_1	(cm)			#			
Z_{bp}	(cm)			#			
Z_{sp}	(cm)					#	
$Z@PII_{.3max}$	(cm)	#					
$d_{eq}(Z_{sp})$	(cm)					#	
f_c	(MHz)	#	-	#	-	#	#
Dim of A_{aprt}	X (cm)		-	#	-	#	#
	Y (cm)		-	#	-	#	#
Other information							
PD	(μsec)	#					
PRF	(Hz)	#					
$Pr@^{PII}max$	(MPa)	#					
$d_{eq}@PII_{max}$	(cm)					#	
Focal Length	FL_x (cm)		-	#	-		#
	FL_y (cm)		-	#	-		#
$I_{PA.3}@MI_{max}$	(W/cm^2)	#					
Operating control conditions							
Control 1: Exam Type		#	-	#	-	#	#
Control 2: Optimization		#	-	#	-	#	#
Control 3: Depth		#	-	#	-	#	#
Control 4: THI		#	-	#	-	#	#
(a) : This index is not required for this operating mode; value is <1.							
(b) : This transducer is not intended for transcranial or neonatal cephalic uses.							
# : No data is reported as the global maximum index value is not reported for the reason listed.							
- : Data are not applicable for this transducer/mode.							

Acoustic measurement precision and uncertainty

All table entries have been obtained at the same operating conditions that give rise to the maximum index value in the first column of the table. Measurement precision and uncertainty for power, pressure, intensity, and other quantities that are used to derive the values in the acoustic output table are shown in the table below. In accordance with Section 6.4 of the Output Display Standard, the following measurement precision and uncertainty values are determined by making repeat measurements and stating the standard deviation as a percentage.

Acoustic measurement precision and uncertainty for UHF22

Quantity	Precision (% of standard deviation)	Uncertainty (%) (95% confidence)
P_r	7.3	+37.7 to -37.7
$P_{r.3}$	7.8	+38.4 to -38.4
Wo	10.9	+75.1 to -75.2
fc	0.4	±3.0
PII	12.2	+74.7 to -74.8
$PII_{.3}$	15.2	+76.3 to -76.1

Acoustic measurement precision and uncertainty for UHF48

Quantity	Precision (% of standard deviation)	Uncertainty (%) (95% confidence)
P_r	26.5	+56.3 to -58.1
$P_{r.3}$	27.5	+57.0 to -58.8
Wo	18.2	+108.1 to -112.9

Quantity	Precision (% of standard deviation)	Uncertainty (%) (95% confidence)
fc	1.1	±3.0
PII	14.9	+107.8 to -112.7
PII.3	15.5	+109.6 to -114.0

Acoustic measurement precision and uncertainty for UHF70

Quantity	Precision (% of standard deviation)	Uncertainty (%) (95% confidence)
P_r	26.5	+60.5 to -72.8
$P_{r.3}$	27.5	+60.9 to -73.1
Wo	18.2	+118.8 to -144.0
fc	1.1	±3.0
PII	14.9	+118.6 to -143.9
PII.3	15.5	+119.6 to -144.4

Factors that contribute to display uncertainty

The net uncertainty of the displayed indices is derived by combining the quantified uncertainty from three sources: measurement uncertainty, system and transducer variability, and engineering assumptions and approximations made when calculating the display values.

Measurement errors of the acoustic parameters when taking the reference data are the major source of error that contributes to the display uncertainty. The measurement error is described in "Acoustic measurement precision and uncertainty" on page 400.

The displayed MI and TI values are based on calculations that use a set of acoustic output measurements that were made using a single reference ultrasound system with a single reference transducer that is representative of the population of transducers of that type. The reference system and transducer are chosen from a sample population of systems and transducers taken from early production units, and they are selected based on having an acoustic output that is representative of the nominal expected acoustic output for all transducer-system combinations that might occur. Of course every transducer-system combination has its own unique characteristic acoustic output, and will not match the nominal output on which the display estimates are based. This variability between systems and transducers introduces an error into displayed value. By doing acoustic output sampling testing during production, the amount of error introduced by the variability is bounded. The sampling testing ensures that the acoustic output of transducers and systems being manufactured stays within a specified range of the nominal acoustic output.

Another source of error arises from the assumptions and approximations that are made when deriving the estimates for the display indices. Chief among these assumptions is that the acoustic output, and thus the derived display indices, are linearly correlated with the transmit drive voltage of the transducer. Generally, this assumption is very good, but it is not exact, and thus some error in the display can be attributed to the assumption of voltage linearity.

Specifications and standards

For information on accessories and peripherals, see "Compatible accessories and peripherals" on page 361.

> **Important:** Ensure that sufficient clearance is available around the system for adequate airflow and cooling.

> **Important:** Do not block the air vents or air filters.

System

> Caution: The Vevo MD Imaging System is for indoor use only.

Weight

- Weight = 95 kg (209 lbs)

Dimensions

Stand

- Depth = 26.4 in (67.1 cm)

- Width = 21.2 in (53.8 cm)

- Height (with monitor folded) = 48 in (122 cm)

Clinical monitor

- Length (exterior dimension) = 18.8 in (47.8 cm)

- Height (exterior dimension) = 10.2 in (25.8 cm)

- Diagonal (viewable area) = 17 in (43 cm)

Control panel

- Length (exterior dimension) = 16.1 in (40.8 cm)

- Height (exterior dimension) = 10.2 in (25.8 cm)

- Diagonal (viewable area) = 12.1 in (30.7 cm)

Imaging modes

- 2D (256 gray shades)

- Color Doppler Mode (256 colors)

- M-Mode

Additionally, the system includes advanced imaging technologies:

- Vevo HD

Image and video clip storage capacity

The Vevo MD Imaging System has 700 GB of storage available, however the number of images and video clips you can save depends on imaging mode and file format.

Transducers

<div align="center">

Transducer specifications

</div>

Transducer	Center frequency (MHz)	Bandwidth (MHz)	Maximum image depth (mm)	Cable length (ft)*
UHF22	15	10-22	38.4	6.5 ± 2" (1.98 m ± 5 cm)
UHF48	30	20-46	23.5	6.5 ± 2" (1.98 m ± 5 cm)
UHF70	50	29-71	10	6.5 ± 2" (1.98 m ± 5 cm)

*Cable length is measured between the strain reliefs and includes the length under the strain relief. The stated lengths do not include the lengths of cable inside the transducer enclosure, or inside the transducer connector.

Electromechanical safety standards

The system complies with the following medical equipment standards related to electrical safety as follows:

- CAN/CSA-C22.2 No. 60601-1:14 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

- EN 60601-1:2006/A1:2013 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

- ANSI/AAMI ES 60601-1:2005/(R)2012/A1:2012, C1:2009/(R)2012 and A2:2010/(R)2012 Medical electrical equipment-Part 1: General requirements for basic safety and essential performance

- JIS T 0601-1:2012 Medical electrical equipment-Part 1: General requirements for basic safety and essential performance

The system complies with the electromagnetic compatibility (EMC) limits as per the following standards:

- IEC 60601-1-2:2007 / EN 60601-1-2:2007/AC:2010 / CSA C22.2 No. 60601-1-2:08, Medical electrical equipment - part 1-2: general requirements for basic safety and essential performance - collateral standard: electromagnetic disturbances - requirements and tests

- EN 55011:2009/A1:2010, CISPR 11:2003/A1:2004, Class A Group 1 - Industrial, scientific and medical equipment - radio-frequency disturbance characteristics - limits and methods of measurement

- FCC Part 15 Subpart B:2012

EMC standards classification

EMC standards classification

Standard	Description
IEC 60601-1-2:2007	Medical Electrical Equipment. General Requirements for Basic Safety and Essential Performance-Collateral Standard. Electromagnetic Compatibility. Requirements and Tests.
CISPR 11:2004	Industrial, Scientific, and Medical (ISM) Radio-Frequency Equipment Electromagnetic Disturbance Characteristics-Limits and Methods of Measurement.

The Classification for the ultrasound system, accessories, and peripherals when configured together is: Group 1, Class A.

DICOM standard

NEMA PS 3.15: 2011, Digital Imaging and Communications in Medicine (DICOM)-Part 15: Security and System Profiles.

DICOM is a registered trademark of the National Electrical Manufacturers Association.

The system conforms to the DICOM standard as specified in the Vevo MD Imaging System DICOM Conformance Statement. This statement provides information about the purpose, characteristics, configuration, and specifications of the network connections supported by the system. For more information contact FUJIFILM SonoSite.

HIPAA standard

The system includes security settings that help you to meet the applicable security requirements listed in the HIPAA standard. Users are ultimately responsible for ensuring the security and protection of all electronic protected health information collected, stored, reviewed, and transmitted on the system.

The Health Insurance and Portability and Accountability Act, Pub.L. No. 104-191 (1996). 45 CFR 160, General Administrative Requirements.

45 CFR 164, Security and Privacy.

Measurement accuracy

The measurements from the system are of a physical property such as distance for evaluation by the clinician. The accuracy values require that you can place the calipers over one pixel. The values do not include acoustic anomalies of the body.

The 2D linear distance measurement results are displayed in millimeters with one place past the decimal point.

The linear distance measurement components have the accuracy and range shown in the following tables.

2D Measurement Accuracy and Range

2D Measurement Accuracy and Range	System Tolerance[a]	Accuracy By	Test Method	Range
Linear distance	<± 2% plus 1%	Acquisition	Phantom	0-37.7 mm

2D Measurement Accuracy and Range	System Tolerance[a]	Accuracy By	Test Method	Range
(vertical)	of full scale			
Linear distance (horizontal)	<± 2% plus 1% of full scale	Acquisition	Phantom	0-32 mm
Traced area	<± 3% plus 1% of full scale	Acquisition	Phantom	0-1206.2 mm^2
Traced distance	<± 2% plus 1% of full scale	Acquisition	Phantom	0-139 mm

a. Full scale for distance implies the maximum depth of the image.

M-Mode Measurement Accuracy and Range

2D Measurement Accuracy and Range	System Tolerance	Accuracy By	Test Method	Range
Distance	<± 2% plus 1% of full scale[a]	Acquisition	Phantom	0.35.5 mm
Time	<± 0.2% plus 1% of full scale[b]	Acquisition	Phantom	0.30 sec

a. Full scale for distance implies the maximum depth of the image.
b. Full scale for time implies the total time displayed on the scrolling graphic image.

Sources of measurement errors

In general, two types of errors can be introduced into the measurement:

1. **Acquisition Error** Includes errors introduced by the ultrasound system electronics relating to signal acquisition, signal conversion, and signal processing for display. Additionally, computational and display errors are introduced by the generation of the pixel scale factor, application of that factor to the caliper positions on the screen, and the measurement display.

2. **Algorithmic Error** The error introduced by measurements, which are input to higher order calculations. This error is associated with floating-point versus integer-type math, which is subject to errors introduced by rounding versus truncating results for display of a given level of significant digit in the calculation.

Troubleshooting

If a problem is encountered when using the Vevo MD Imaging System, try the solutions described in this appendix. If none of the solutions solve the problem, contact a FUJIFILM SonoSite Technical Support Representative. See "Contact information" on page 415.

Performing maintenance procedures not described in the user manual may void the product warranty.

System troubleshooting

Problem	Solution
System does not power up	• Ensure that the main power cable for the system is properly connected to the Vevo MD Imaging System. • Ensure that the system is plugged into a grounded or earthed wall outlet. Turn the main power switch on. • If you still cannot power on the system, the fuses may need to be replaced. Contact FUJIFILM SonoSite to schedule a visit from a service technician.
No audio	• Adjust the volume control in the general page in the system settings.
System error	• The following image is displayed on both the clinical display and the control panel:

Problem	Solution
	• Follow the steps; write down the error information, call FUJIFILM SonoSite customer support, and power off the system.
Transducer is not recognized by the system	• Disconnect the transducer, then reconnect the transducer. • Clean the transducer interface on the system using a compressed air duster—never use a cloth or wipes as the pins on the connector could be damaged by direct contact.
Patient data is corrupted	• Patient data will not be available to be review, archive or export. • When exporting or archiving patient data, ensure that the USB device or Ethernet cable you are using, is not removed before the process is complete.

Patient management troubleshooting

Problem	Solution
Unable to create new exams	• Ensure that a transducer is connected to the front panel of the Vevo MD Imaging System, and ensure that it has been initialized.
Unable to archive an exam	• Ensure that the Ethernet cable is attached and that the connection is active.

2D and M-Mode troubleshooting

Problem	Solution
Lack of penetration or sensitivity	• Ensure that there is adequate coupling medium (for example, ultrasound gel) between the transducer and the patient. • Adjust the position of the TGC sliders. • Ensure the appropriate transducer is being used.

Color Doppler Mode troubleshooting

Problem	Solution
Color bands in the image	• Adjust wall filter setting. • Adjust the priority setting. • Adjust line density setting.
Respiration artifacts in the image	• Adjust wall filter setting.

Problem	Solution
Lack of sensitivity	• Ensure the anatomy being studied is in the focal zone for the transducer.
Lack of penetration or sensitivity	• Ensure that there is adequate coupling medium (for example, ultrasound gel) between the transducer and the patient. • Adjust the position of the TGC sliders. • Ensure the appropriate transducer is being used.

DICOM troubleshooting

Problem	Solution
One or more DICOM services are not working	• If in the Network Status page, the location is set to **Not Connected**, select a location and restart the system. See "Connecting to the network" on page 75. • Ask your IT Department if the IP address is correct and if it is in range of the local network. • Ensure the services you need are selected with check marks in the **DICOM Setup** page and that the **SC** (Storage Commit) and **MPPS** columns are also checked for the selected archiver.
DICOM service verification fails	• Tap **Config**, and select a service that you would like to check. • Select from the list and tap **Ping**. • If it has failed, the IP address is incorrect or the destination server is not seen on the network.

Problem	Solution
	• If it succeeds, the port number and/or AE Title is correct.

Measurement troubleshooting

Problem	Solution
I/M parameters are all zero	• Placement of the media wall trace is out of order. An I/M trace needs to be placed in order from either top-down or bottom-up as follows; lumen=first, intima=second and media=third.

Customer support: +1-416-484-5000

Contact information

Customer support

General information, product details, application support, operator instructions or training:

Phone	+1.416.484.5000
	+31 20 751 2020 (Europe)
Toll-free	+1.866.416.4636
	+800 0751 2020 (Europe)
Email	www.visualonics.com/support/customer-support
Email (training)	www.visualsonics.com/support/contact-sales/training-request

Technical support

Performing maintenance procedures not described in the user manual may void the product warranty.

The technical support representative can help you troubleshoot the situation by phone or by e-mail. For more complex problems, FUJIFILM SonoSite may:

- Send a technical support representative to the location to evaluate the problem

- Request that the equipment be transported to the FUJIFILM SonoSite service department

| Phone | +1-425-951-1200 |

	+31 20 751 2020 (Europe)
Toll-free	+1-888-482-9449
	+800 0751 2020 (Europe)
Email	www.visualonics.com/support/customer-support
Website	www.visualsonics.com
Europe service center	FUJIFILM SonoSite - Amsterdam
	Joop Geesinkweg 140
	1114 AB Amsterdam
	The Netherlands
	Tel (Main): +31 20 751 2020
	Tel (Toll free): +800 0751 2020

Maintaining the Vevo MD Imaging System

The Vevo MD Imaging System requires proper care and cleaning. Use the recommendations in this document when cleaning or disinfecting the ultrasound system. Performing maintenance procedures not described in the user guide may void the product warranty.

Disposal

This equipment must be disposed of in accordance with current local regulations.

Should there be any queries about any of the substances within, or the disposal of, the Vevo MD Imaging System, please contact FUJIFILM SonoSite. See "Technical support" on page 415.

Cleaning the air filters

FUJIFILM SonoSite requires that service technicians clean the Vevo MD Imaging System air filters once every three months. See "Technical support" on page 415.

Related guidance documents

Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers, issued September 9, 2008.

Medical Ultrasound Safety, American Institute of Ultrasound in Medicine (AIUM), 1994.

Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment, NEMA UD2-2004.

Acoustic Output Measurement and Labeling Standard for Diagnostic Ultrasound Equipment, American Institute of Ultrasound in Medicine, 1993.

Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment, NEMA UD3-2004.

Guidance on the interpretation of TI and MI to be used to inform the operator, Annex HH, BS EN 60601-2-37 reprinted at P05699.

Glossary

General terms

For ultrasound terms not included in this glossary, refer to *Recommended Ultrasound Terminology Available, third edition*, published in 2011 by AIUM.

AIUM	American Institute of Ultrasound in Medicine
ALARA	As low as reasonably achievable. The guiding principle of ultrasound use, which states that you should keep patient exposure to ultrasound energy as low as reasonably achievable for diagnostic results.
Aquasonic® 100	Ultrasound transmission gel. Widely used gel for diagnostic and therapeutic medical ultrasound. Acoustically correct for a broad range of frequencies used, is completely aqueous, formaldehyde and spermicide free. Produced by *Parker Laboratories, Inc.*
in situ	In the natural or original position.
Transducer	A device that transforms one form of energy into another form of energy. Ultrasound transducers contain piezoelectric elements, which when excited electrically, emit acoustic energy. When the acoustic energy is transmitted into the body, it travels until it encounters an interface, or change in tissue properties. At the interface, an echo is formed that returns to the transducer, where this acoustic energy is transformed into electrical energy, processed, and displayed as anatomical information.
Vevo HD	Real-time image technology that reduces speckle noise and artifacts in high-resolution images while preserving and enhancing critical tissue information.

Terminology in acoustic output tables

A_{aprt}	Area of the active aperture measured in cm^2.
$d_{eq}(z)$	Equivalent beam diameter as a function of axial distance z, and is equal to $\sqrt{(4/(\pi))((Wo)/(I_{TA}(z)))}$, where I_{TA} (z) is the temporal-average intensity as a function of z in centimeters.
$d_{eq}@PII_{max}$	Equivalent beam diameter at the point where the free-field, spatial-peak pulse intensity integral is a maximum in centimeters.
Dim. of A_{aprt}	Active aperture dimensions for the azimuthal (x) and elevational (y) planes in centimeters.
fc	Center frequency in MHz.
FL	Focal length, or azimuthal (x) and elevational (y) lengths, if different measured in centimeters.
$I_{pa.3}@MImax$	Derated pulse average intensity at the maximum MI in units of W/cm^2.
$I_{SPTA.3}$	Derated spatial peak, temporal average intensity in units of milliwatts/cm^2.
$I_{SPTA.3}(z_1)$	Derated spatial-peak temporal-average intensity at axial distance z_1 (milliwatts per square centimeter).
MI	Mechanical index.
PD	Pulse duration (microseconds) associated with the transmit pattern giving rise to the reported value of MI.

$P_{r.3}$	Derated peak rarefactional pressure associated with the transmit pattern giving rise to the value reported under MI (Megapascals).
$p_r@PII_{max}$	Peak rarefactional pressure at the point where the free-field, spatial-peak pulse intensity integral is a maximum in Megapascals.
PRF	Pulse repetition frequency associated with the transmit pattern giving rise to the reported value of MI in Hertz.
TI type	Applicable thermal index for the transducer, imaging mode, and exam type.
TI value	Thermal index value for the transducer, imaging mode, and exam type.
TIB	(Bone thermal index) is a thermal index for applications in which the ultrasound beam passes through soft tissue and a focal region is in the immediate vicinity of bone. TIB non-scan is the bone thermal index in the non-autoscanning mode.
TIC	(Cranial bone thermal index) is the thermal index for applications in which the ultrasound beam passes through bone near the beam entrance into the body.
TIS	(Soft tissue thermal index) is a thermal index related to soft tissues. TIS scan is the soft tissue thermal index in an auto-scanning mode. TIS non-scan is the soft tissue thermal index in the non-autoscanning mode.
$W_{.3}(z_1)$	Derated ultrasonic power at axial distance z_1 in units of milliwatts.
Wo	Ultrasonic power, except for TIS_{scan}, in which case it is the ultrasonic power passing through a one centimeter

	window in units of milliwatts.
z_1	Axial distance corresponding to the location of maximum min(W$_{.3}$(z), I$_{TA.3}$(z) x 1 cm^2)], where z ≥ zbp in centimeters.
z_{bp}	1.69 $\sqrt{(A_{aprt})}$ in centimeters.
z_{sp}	For MI, the axial distance at which $p_{r.3}$ is measured. For TIB, the axial distance at which TIB is a global maximum (for example, $z_{sp} = z_{b.3}$) in centimeters.

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zoom while scanning

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