FUJIFILM | VISUALSONICS

Vevo F2 Imaging System

User Manual

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Legal Notices

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Table of Contents

Introduction

The Vevo F2 Imaging System is a high-resolution, real-time ultrasound system intended for diagnostic imaging and fluid flow analysis on small animals in laboratory environments. Available features depend on your system configuration, transducer, and operational mode.

The Vevo LAZR-X laser cart is a class 4 laser add-on that is used with the Vevo F2 for photoacoustic imaging.

> **WARNING:** THIS EQUIPMENT IS NOT APPROVED FOR USE ON HUMANS.
>
> The Vevo F2 Imaging System and Vevo LAZR-X laser cart have been designed and tested for use on laboratory research animals only.
>
> This equipment must not be used on any living human being.

This guide is written for users who are familiar with ultrasound, and does not provide training in sonography. Before using the Vevo F2 Imaging System, in-depth training from an experienced user, such as a FUJIFILM VisualSonics Applications Specialist, is recommended.

Document Conventions

Note boxes appear throughout this document to highlight key pieces of information.

> **WARNING:** Warns of issues that may result in injury or death.

> **Caution:** Warns of issues that may cause data loss or equipment damage.

> **Note:** Highlights important information.

In This User Guide

This user guide covers the following topics:

- Setup and Maintenance on page 26: How to set up and maintain the system.
- Session Tasks on page 78: How to run an imaging session or a review session.
- Modes on page 152: How to use each mode.
- Study Browser on page 264: How to use the Study Browser and work with saved data.
- System Settings on page 286: How to change configuration settings using the System Settings menu.
- Reference on page 331: Supplementary information.

System Overview

Vevo F2 Imaging System

The Vevo F2 Imaging System is an ultrasound system. It consists of the following major components:

- The top screen is the image display, which displays imaging data.
- The bottom screen is the touchscreen control panel, which serves as the control surface for the system.
- The base of the system houses the electronics that make up the Vevo F2 Imaging System.

The Vevo F2 Imaging System

For more information about the system and its components, refer to Component Reference on page 26.

Vevo LAZR-X Laser Cart

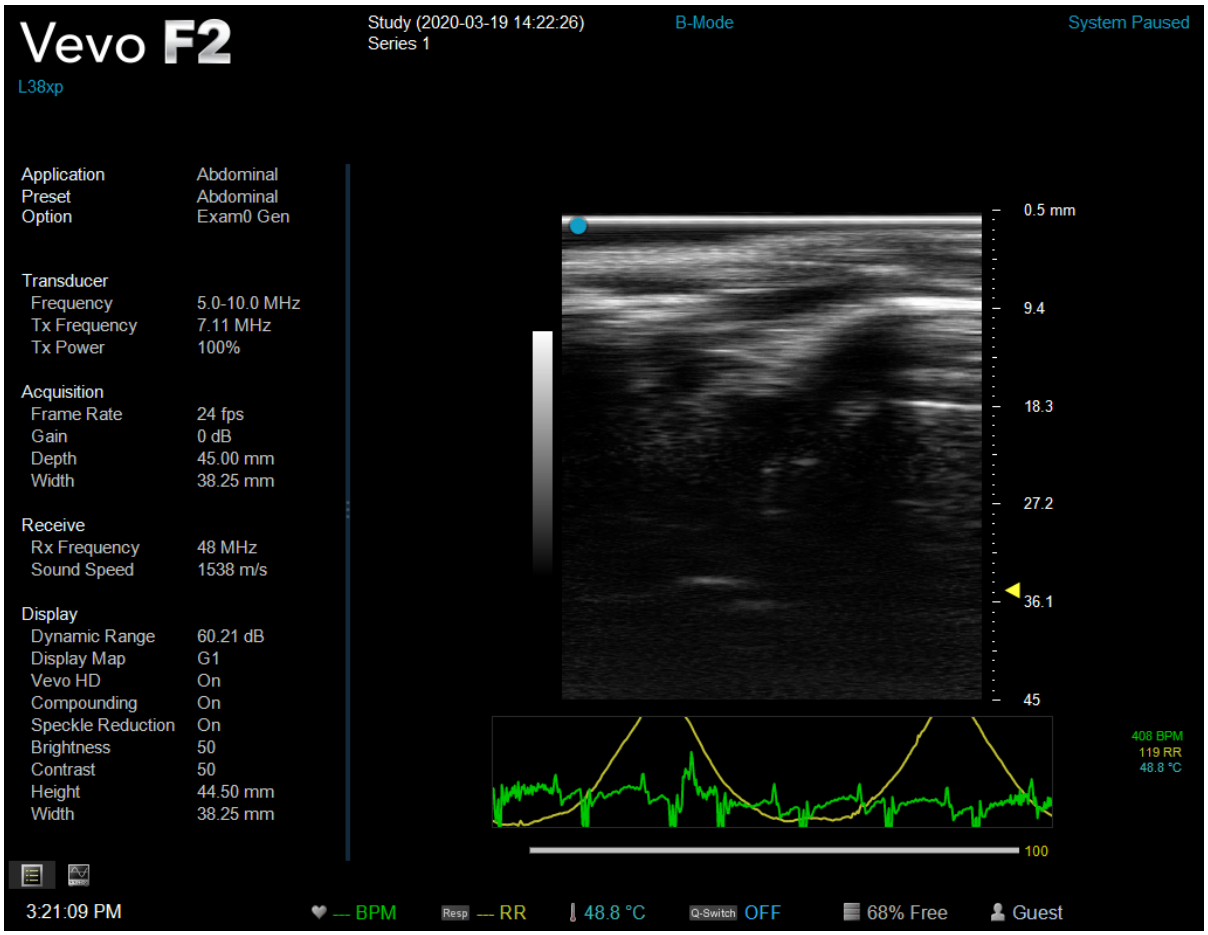
The Vevo F2 can be coupled with a Vevo LAZR-X laser cart for photoacoustic imaging.

Laser cart

Both the ultrasound unit and laser cart are on castors for easy transportation.

Image Display

The image display is the top monitor of the Vevo F2, and primarily displays imaging data.



The image display when the system is in B-Mode

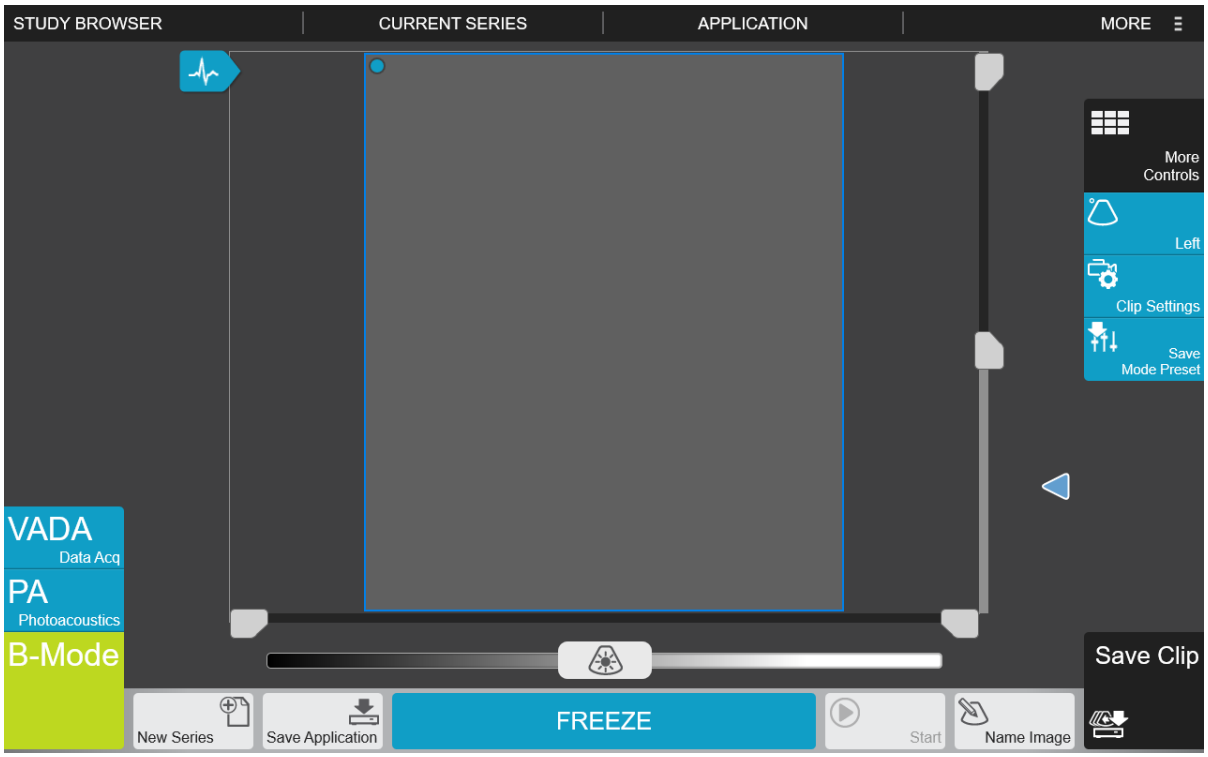
While the image display varies slightly depending on the current imaging mode, it always displays several categories of data:

- Experiment information: Contains information such as the name of the experiment (entered by the user), the imaging mode, and the transducer currently in use.
- Image: The current image. This can be a live image or a previously saved image.
- Animal physiology: Displays the animal's vital signs.

> **Note:** For more information about the image display layout, refer to Image Display on page 152.

Control Panel

The control panel is a touchscreen that displays the Vevo F2 user interface.



The control panel

The control panel contains the following features:

- A top bar that navigates between menus within the Vevo F2 software.
- A working area that contains image adjustment controls for the currently selected imaging mode.
- A collection of control buttons that carry out one of the following functions:
  - Selects an imaging mode
  - Opens features of the currently selected imaging mode
  - Adjusts the current image
  - Executes a function on the current image
- Customizable sidebars that are used to hold the most commonly used control buttons.

> **Note:** For more information about the control panel interface, refer to Control Panel Interface (Scanning) on page 82 and Control Panel Interface (Review) on page 84.

Basic Touchscreen Actions

The control panel is a touchscreen that serves as the main control interface for the Vevo F2. This screen supports the same actions as those of typical touchscreen devices.

The following table lists common touchscreen actions, and a list of Vevo F2 functions that associated with those actions.

Gesture	Description	Associated Actions
Drag	Touch the screen with a finger, and while continuously touching, drag the finger across the screen before lifting away. Usually done to move an object from one location to another.	• Adjust depth or gain • Move PA-Mode box • Move measurement calipers • Pan image in zoom area • Move through frames in a clip • Move controls to the Controls bar • Unfreeze a frozen image by dragging the Slide to Scan slider
Swipe	Move a finger quickly across the screen.	• Scroll through tables and pages
Tap	With one finger, touch and lift away from the screen once. Often used to press a button or make a selection.	• Freeze • Save an image • Select calipers • Select an imaging control or setting • Select a thumbnail in the Study Browser or Current Series screen to open it for review
Double tap	Tap the screen twice in quick succession.	• Load an image into review from the Study Browser by double tapping the image row • To enable the caps lock function on the onscreen keyboard, double tap the shift key
Two finger spread or pinch	Slide two fingers together or apart on the screen.	• Sample volume size • Resize zoom area by using a two finger spread action to zoom in and a two finger pinch to zoom out

Stylus Use

The control panel also supports the use of styluses. If using a stylus, ensure your stylus has the following properties:

- non-marking tip
- a touch area that is 7 mm in diameter or greater
- compatible with capacitive touch screens

If using a stylus with a precision disc, take care to clean the disc before using it on the control panel.

Onscreen Keyboard

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

Onscreen keyboard

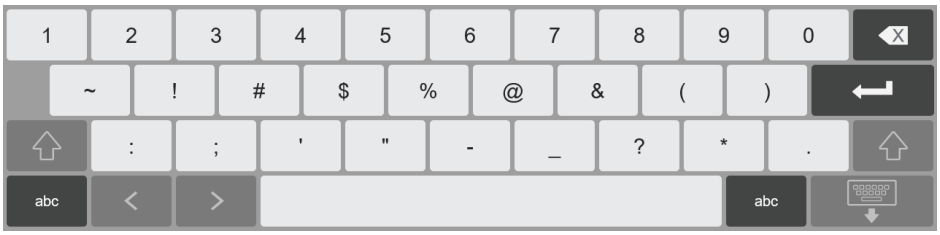
1. Alpha keys: Tap and hold the alpha keys to reveal options for selecting accented versions of the characters.
2. Shift key: Changes alphabet keys to between uppercase and lowercase letters.
3. Number/Alpha toggle: Changes between the alpha and number keyboards.
4. Jumps to the previous text box.
5. Jumps to the next text box.
6. Spacebar.
7. Keyboard Hide: Hides the onscreen keyboard, or saves entered text.
8. Return: Starts a new line, or jumps to the next text box.
9. Backspace: Deletes the character to the left of the cursor.

To Enter Text

1. Tap a text box (for example, the study name) to open the onscreen keyboard.
2. Tap keys as needed.

To Switch Between Numbers and Letters

1. Tap a text box (for example, the study name) to open the onscreen keyboard.
2. When the keyboard appears, tap the **123#?** key. The number and symbols keyboard appears.



3. To return to the alpha keyboard, tap the **abc** key.

To Enable Caps Lock

1. Tap a text box (for example, the study name) to open the onscreen keyboard.
2. Tap the shift key twice until the arrow becomes solid green.

3. To disable caps lock, tap the shift key again until it shows the clear arrow.

Transducers

> **Caution:** Only compatible transducers may be used with the Vevo F2 Imaging System.

The transducers used with the Vevo F2 Imaging System have the following features:

- Ergonomic design for rapid screening procedures.
- Usable frame rate of more than 500 frames per second, depending on model and the field of view set for image acquisition.

The following transducers can be used with the Vevo F2 Imaging System:

- UHF71x
- UHF57x
- UHF46x
- UHF29x
- UHF22x
- L38xp
- P10xp

Coupling Gels

When using coupling gels, use Aquasonic® 100 Ultrasound Transmission Gel, or a gel with similar properties.

Accessories

> **Note:** This page only covers accessories that are specific to the Vevo F2 Imaging System. It does not include common items used with all ultrasound devices, such as coupling creams or gels.

The Vevo F2 Imaging System features the following accessories that are used for certain imaging procedures:

- Vevo Integrated Rail System: An assembly of rails and mounts used to position the animal and any imaging devices.
- Vevo Animal Monitoring System: A heated platform and tablet that are used to support an animal, keep it warm, and monitor its vital signs.

The Vevo LAZR-X laser cart features the following additional accessories:

- Vevo Fiber Jacket and Vevo Optical Fiber: Used to direct the laser.
- Vevo LAZRTight Enclosure: Provides a safe environment for photoacoustic imaging.

Quick Start Guide - B-Mode

This tutorial provides a high-level overview for acquiring, analyzing, and exporting a B-Mode image.

For more information about imaging sessions, refer to Session Tasks on page 78.

Before You Begin

Ensure the following:

- A transducer is connected to a transducer port on the front of the Vevo F2.
- The animal is properly prepared on the animal platform and connected to the animal monitoring system.

> **WARNING:** Before using the Vevo F2 Imaging System, users must read and observe the safety warnings and precautions listed in Vevo F2 Imaging System Safety on page 338.

To Acquire, Analyze and Export a B-Mode Image

1. Ensure the system is plugged in, and the main power switch on.
2. Push the Power button to start the system. Refer to System Startup on page 59.
3. Log in as a user or a guest. Refer to Logging In on page 78.
4. Choose an application from the transducer panel.
   The B-Mode imaging window appears, and the system begins acquiring B-Mode data. Refer to Image Display on page 152.
5. Refine your image using the various control panel controls such as Image Depth, Gain, and Orientation. Refer to B-Mode Control Panel Interface on page 154 and B-Mode Controls on page 159.
6. Use the control panel controls to freeze the data image and save clips as needed.
   - To freeze the data acquisition, tap **Freeze**. Refer to Common Tasks on page 99.
   - To save the clip in the buffer, tap **Save Clip**. Refer to Saving Frames or Clips on page 148.
   - To resume data acquisition, slide the **Slide to Scan** control.
7. To view all saved images for the current series, tap the **Current Series** navigation button.
   You can also see these images in the Study Browser. Refer to Interacting with the Study Browser and Study Browser on page 264.
8. To open a thumbnail for review, tap the thumbnail.
   The mode window appears and plays the stored clip.
   You can navigate through the images stored in the series using the **Next/Previous** buttons.
9. Add measurements as needed.
   a. Pause the clip.
   b. Navigate to a frame where you would like to place a measurement.
   c. Tap **Measurements** and select a measurement.
      If you do not see the Measurements button on the controls bar, go to **More Controls**. Refer to

Measurements on page 111.

d. Once the measurement appears, place the measurement by dragging the calipers.
e. When you are done, tap **Save Clip** to save your image.

10. View a report, if desired.
    a. Navigate to either the Current Series or the Study Browser menu.
    b. Tap **More**.
    c. Tap **Report**.

    Refer to Reports on page 283.
11. To export the image, navigate to the Study Browser and then tap **Export**. Refer to Exporting Images from the Study Browser on page 279.

    When exporting images:
    - To export as a .csv, .dcm, or .txt file, tap **Other File Types**.
    - To export to Vevo LAB for further analysis, tap **To Vevo LAB**. Refer to Exporting Studies to Vevo LAB on page 281.

If you have exported your files to Vevo LAB, you can continue with more advanced analysis tools in Vevo LAB.

Quick Start Guide - PA-Mode

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

> **Note:** PA-Mode (Photoacoustics Mode) is only available when the Vevo F2 Imaging System is connected to a Vevo LAZR-X laser cart.

Before You Begin

Ensure the following:

- A transducer is connected to the transducer port on the front of the Vevo F2.
- The transducer is properly equipped with the Vevo Fiber Jacket and Vevo Optical Fiber.
- The animal is properly prepared on the animal platform and connected to the animal monitoring system.
- The Vevo Optical Fiber is connected to the appropriate port on the laser cart, according to your imaging needs (Signal 680-970 nm, Idler 1200-2000 nm).
- The laser is calibrated and warmed up.
- All safety precautions have been taken. This includes safety precautions related to the test environment, and safety equipment worn by the user.

> **WARNING:** Before using PA-Mode, users must read Vevo F2 Imaging System Safety on page 338 and Laser Safety on page 341.

To Acquire, Analyze and Export a PA-Mode Image

1. Ensure the Vevo F2 is plugged in, and the main power switch is on.
2. Push the power button to start the Vevo F2. Refer to System Startup on page 59.
3. Ensure the Vevo LAZR-X laser cart is plugged in, and the main power switch is on.
4. On the laser cart, turn the key to the **Enable** position, then push the power button to start the laser.

   > **Note:** The laser needs 20 minutes to warm up from the time it is turned on.

5. Log in as a user or as a guest. Refer to Logging In on page 78.
6. Choose an application from the transducer panel.
   The B-Mode imaging window appears, and the system begins acquiring B-Mode data. Refer to Image Display on page 152.
7. Tap **PA (Photoacoustics)**, but do not tap **Start**.
   If the laser hasn't been initialized, the system software will automatically begin the laser initialization process, and display a progress bar.

Once initialization is complete, the Laser Configuration panel appears. To configure the laser, refer to Laser Calibration on page 193.

8. Adjust the image and/or specimen until your region of interest is within the PA Guide area.
9. (Optional) To enable the Guide Line in the PA Guide, refer to PA Guide on page 190.
10. Tap **Start**.
    The system begins scanning in PA-Mode (Single) at the default wavelength of 750 nm.
11. Use the control panel to refine the image as needed. Refer to PA-Mode Control Panel Interface on page 170.
12. To swap PA-Mode sub-modes, tap the respective sub-mode (such as Spectro).
13. Use the control panel controls to freeze the data image and save clips as needed.
    - To freeze the data acquisition, tap **Freeze**. Refer to Common Tasks on page 99.
    - To save the clip in the buffer, tap **Save Clip**. Refer to Saving Frames or Clips on page 148.
    - To resume data acquisition, slide the **Slide to Scan** control.
14. To view all saved images for the current series, tap the **Current Series** navigation button.
    You can also see these images in the Study Browser. Refer to Interacting with the Study Browser and Study Browser on page 264.
15. To open a thumbnail for review, tap the thumbnail.
    The mode window appears and plays the stored clip.
    You can navigate through the images stored in the series using the **Next/Previous** buttons.
16. Add measurements as needed.
    a. Pause the clip.
    b. Navigate to a frame where you would like to place a measurement.
    c. Tap **Measurements** and select a measurement.
       If you do not see the Measurements button on the controls bar, go to **More Controls**. Refer to Measurements on page 111.
    d. Once the measurement appears, place the measurement by dragging the calipers.
    e. When you are done, tap **Save Clip** to save your image.
17. When imaging is complete, tap **Stop**.
18. View a report, if desired.
    a. Navigate to either the Current Series or the Study Browser menu.
    b. Tap **More**.
    c. Tap **Report**.
    Refer to Reports on page 283.
19. To export the image, navigate to the Study Browser and then tap **Export**. Refer to Exporting Images from the Study Browser on page 279.
    When exporting images:
    - To export as a .csv, .dcm, or .txt file, tap **Other File Types**.
    - To export to Vevo LAB for further analysis, tap **To Vevo LAB**. Refer to Exporting Studies to Vevo LAB on page 281.

If you have exported your files to Vevo LAB, you can continue with more advanced analysis tools in Vevo LAB.

Setup and Maintenance

This section contains information related to the set up and maintenance of the Vevo F2 Imaging System. This includes:

- Overview of the physical features on the Vevo F2 and Vevo LAZR-X laser cart. Includes connectors, indicators, plugs, and accessories (Component Reference below).
- Initial setup tasks (System Startup on page 59).
- Regular maintenance tasks (System Maintenance on page 63).
- How to move the system (Moving the System or Laser on page 70).
- How to dispose of the system (Disposal on page 70).
- Cleaning instructions (Cleaning and Disinfecting on page 63).
- Software tasks (System Upgrade on page 71 or License Update on page 77).

Component Reference

This section lists reference information about the Vevo F2 Imaging System's components, plugs, indicators, and labels.

Vevo F2 External Features

The Vevo F2 Imaging System consists of three major components:

- The top screen is the image display, which displays imaging data.
- The bottom screen is the touchscreen control panel, which serves as the control surface for the system.
- The base of the system houses the electronics that make up the Vevo F2 Imaging System.

The Vevo F2 Imaging 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.

FUJIFILM VisualSonics recommends ultrasound gels that are acoustically correct for the range of frequencies used and are completely aqueous. For example, use gels that have similar properties as *Aquasonic® 100 Ultrasound Transmission Gel*.

Transducer Connector Storage

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

Transducer connector storage with transducer connector

Image Display

The image display is an LED monitor mounted on an adjustable arm.

It shows the ultrasound image, as well as details about the imaging session and system status.

To Adjust the Image Display

Grasp the image display on both sides and then tilt or rotate it.

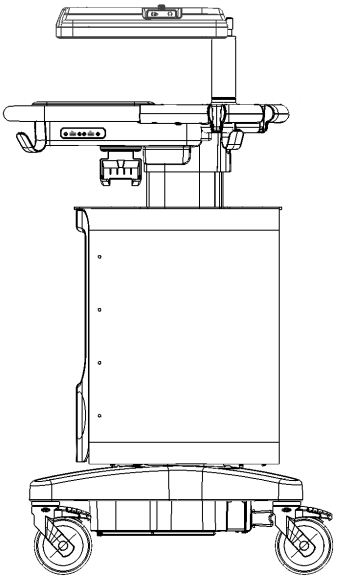
To Fold the Image Display For Transportation

Always fold the image display and control panel before moving or shipping the system.

To fold the display:

1. Adjust the control panel angle to the lowest position.
2. Grasp the image display on both sides, and then align it squarely above the control panel.
3. Fold the image display downward over the control panel until it is horizontal.

> **Note:** Folding the image display past the horizontal position may damage the monitor or support.



Vevo F2 with monitor folded

WARNING: To avoid possible injury from an unexpected image display collapse when moving a system, make sure to fold the image display before the system is moved.

WARNING: Do not place anything on the folded image display.

Control Panel

The control panel provides a touch screen user interface for the Vevo Imaging System. Its angle can be adjusted, from fully flat to fully vertical. For more information, refer to Control Panel Interface (Scanning) on page 82 and Control Panel Interface (Review) on page 84.

To adjust the control panel angle, grasp the sides of the control panel, then tilt the control panel to the desired angle.

Speakers

Integrated speakers on the image display provide audio for the following situations:

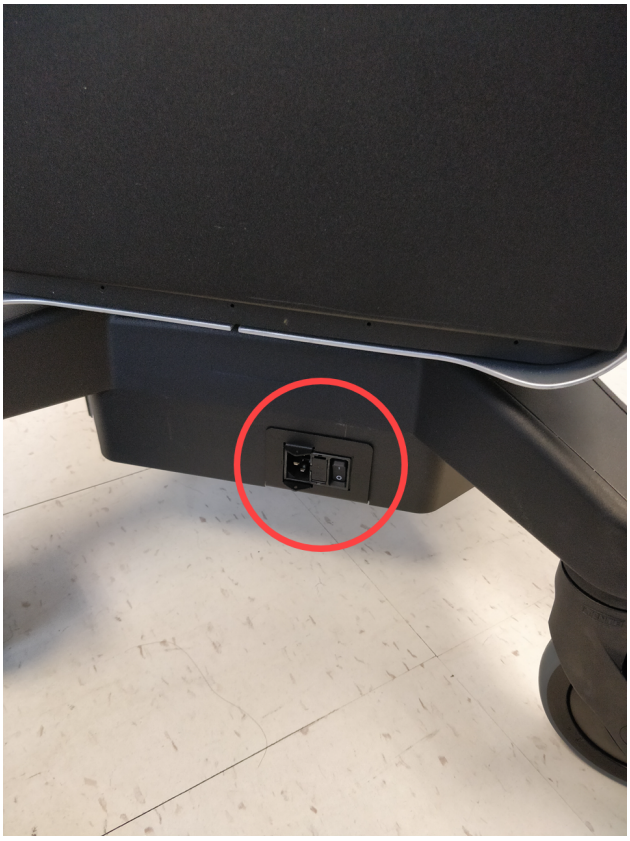
- Confirmation that an image was saved.
- Keyboard tones when typing with the onscreen keyboard.

For more information, refer to System Sounds on page 308.

> **Note:** If you have a headphone jack plugged into the back of the image display, the internal speakers and HDMI audio will be disabled, and audio will be played through the audio jack instead.

Power Module

The Vevo F2 Imaging System features a power module that consists of a power socket (equipped with a cable retainer), the main power switch, and a removable fuse box. This power module connects to the power supply, which is located inside the system.



Power module

Power Socket

The power socket for the Vevo F2 is a standard plug that connects to a power cable, which then connects to a wall outlet. Ensure the power plug and cable are both compatible with the wall outlet, and that the voltage is correct.

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

The power cable is securely connected to the Vevo F2 with a cable retainer. The retainer must be unlocked before the power cable can be removed from the system.

WARNING: Do not modify the power socket or use an adapter, as doing so could cause an electrical hazard. If you need to use a different plug, contact Technical Support. Refer to Contact and Legal Information on page 346.

WARNING: 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.

WARNING: Do not move the system when the power is plugged in.

WARNING: If you cannot power on the system, unplug the machine immediately and contact Technical Support. Refer to Contact and Legal Information on page 346.

Power Supply

The Vevo F2 is powered by an XMS500 Series power supply manufactured by TDK-Lambda. This power supply meets IEC 60601-1 medical electric safety standards for BF (Body Floating) use, which is the classification of applied parts that includes ultrasound equipment.

The Vevo F2 is designed to operate according to the electrical specifications of the region to which the system has been shipped.

A composite safety warning label located on the top of the system enclosure specifies the electrical requirements of the Vevo F2. For more information, refer to Label Information on page 334.

Fuses

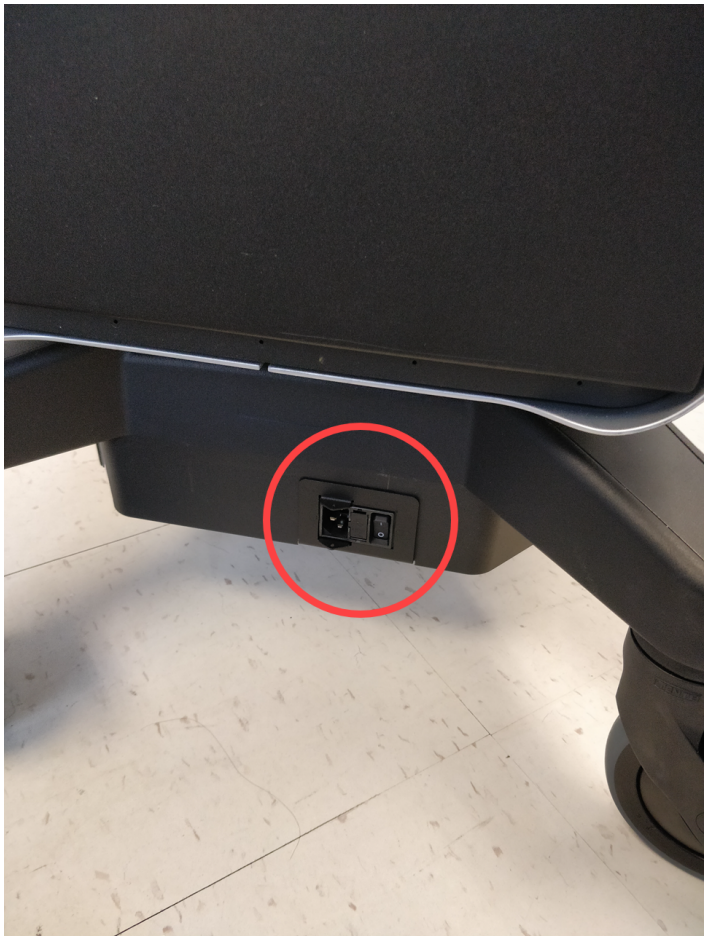
To protect the system from overcurrent damage, the power module of the Vevo F2 is protected by a series of replaceable fuses. If a fuse blows, it must be replaced by a FUJIFILM VisualSonics service technician.

Note: For fuse specifications, refer to Fuse Specifications on page 332.

System Connectors

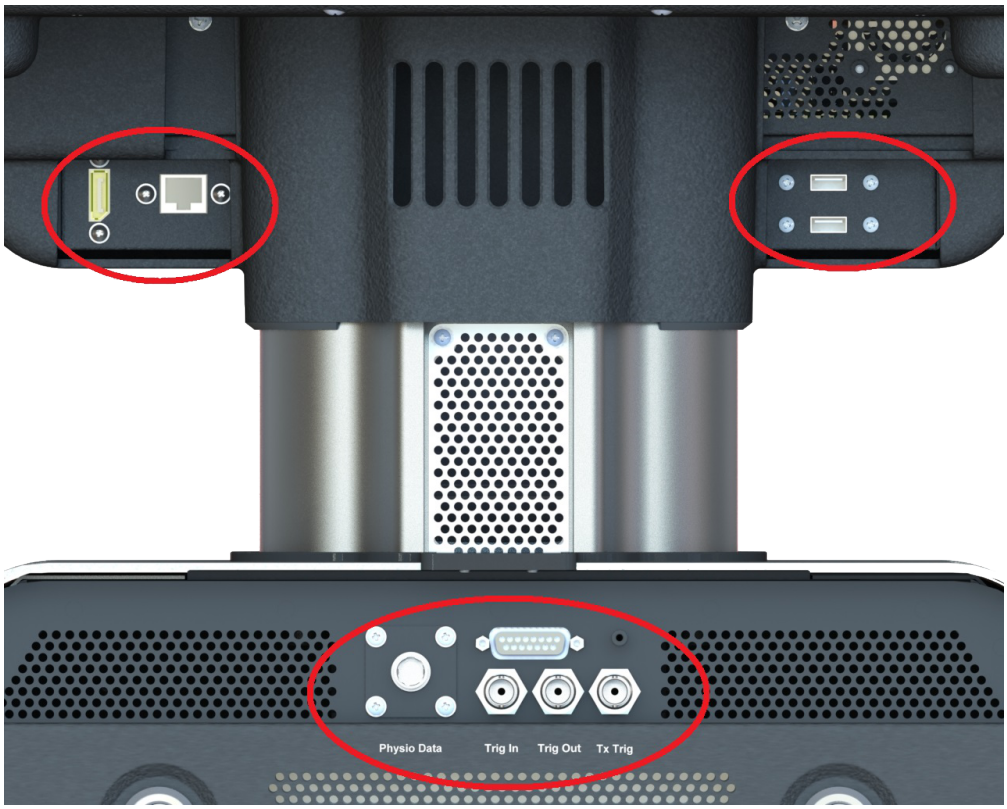
The Vevo F2 features the following connectors:

- **AC In and fuse box**: Located at the back of the system, near the bottom of the base.



- **HDMI and Headphone Jack**: Located at the back of the Image Display.

- **System Connectors**: Located behind the system. Includes the following connectors:
  - **Physio/ECG 10-pin locking connector**
  - **3D motor connector** (currently not supported)
  - **TX Trigger**
  - **Trig In**
  - **Trig Out**
  - **Ethernet**
  - **USB**
  - **DisplayPort++**



- **Additional USB Connectors**: Located on the side of the system, near the control panel. These ports are for external USB storage devices.

WARNING: Do not modify the power plug or use an adapter. Doing so could cause an electrical hazard. If you need to use a different plug, contact Technical Support. Refer to Contact and Legal Information on page 346.

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

WARNING: Before connecting the system, ensure that the voltage is correct.

WARNING: 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, which is located on the top of the system enclosure.

Connectors On Base

Connector	Description
Fuse box	The fuse box is located between the Main Power switch and the AC In socket. The fuse box contains replaceable fuses that must be replaced by a FUJIFILM VisualSonics service technician.
AC In	Connect the power cable here.
Physio Data	(Optional accessory) Connect the animal monitoring system cable here.
3D motor	(Currently not supported) Connect your 3D motor stage cable here.
TX Trigger	Not used for any Vevo F2 Imaging System.
Trig In	(LAZR-X Only) Connect a BNC cable from here to the Lamp Sync Out connector on the back of the laser.
Trig Out	(LAZR-X Only) Cconnect a BNC cable from here to the Q Trig In connector on the back of the laser.
USB connectors	Connect your USB data storage device here. (LAZR-X Only) Connect the USB/DB-9 cable from here to the RS232 Remote connector on the back of the laser.
Ethernet	Connect your network data cable here.

Connector	Description
DisplayPort++	Connect an optional monitor here. DisplayPort++ is V1.2. **Note:** FUJIFILM VisualSonics recommends using the HDMI port for a second monitor.

Connectors on Image Display

Connector	Description
HDMI	Connect a second monitor via an HDMI video cable here. The software will automatically detect a remote monitor and mirror what is displayed on the image display. HDMI video output resolution is 1920 x 1080.
Headphone jack	Connect a headphone jack for audio left and right output (TRS or TRRS plug configuration). **Note:** Once a headphone jack is connected, the internal speakers and HDMI audio will be disabled.

With the exception of the Ethernet cable, cables connected to the Vevo F2 must be 3 m (9' 10") in length or shorter.

Data Storage and Network

Internal Storage

The Vevo F2 has two internal hard drives :

- Hard drive 1: Contains system software required by the Vevo F2 (Windows® operating system, Vevo software)
- Hard drive 2: Used to store study data.

External Storage

In addition to the internal storage, the Vevo F2 features multiple USB ports that can be used to connect external USB storage devices.

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

> **Note:** For more information about the USB connectors, refer to System Connectors on page 30.

Network

The Vevo F2 features a 100 MB/s Ethernet connection. This connection can be used to connect to network drives, if necessary.

> **Note:** For information about the Ethernet port, refer to System Connectors on page 30.

Vevo LAZR-X Laser Cart External Features

The Vevo LAZR-X laser cart is a Class 4 laser. This section lists the external features of the laser cart.

Laser cart front

Laser cart back

Power Plug

The Vevo LAZR-X laser cart plugs into a wall outlet.

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

> **Note:** FUJIFILM VisualSonics recommends plugging the laser into a different circuit from the Vevo F2.

Precautions

- Make sure the plug is compatible with your type of wall outlet.
- Ensure the wall outlet provides the correct amount of voltage for the laser.
- Do not modify the power plug or use an adapter, as doing so could cause an electrical hazard. If you need to use a different plug, contact Technical Support. Refer to Contact and Legal Information on page 346.
- Do not move the laser cart while it is plugged in.
- Ensure the power cable is undamaged before plugging the laser directly into the wall outlet. Do not connect the laser's power supply to an MPSO or extension cord. The voltage is specified on the label located under the AC power cord connector on the back of the laser.

Laser Ports

The Vevo LAZR-X laser cart features two laser ports that provide different wavelengths.

- The **Signal** port provides wavelengths between 680 - 970 nm.
- The **Idler** port provides wavelengths betwen 1200 - 2000 nm.

To select a port and wavelength:

1. Insert the Vevo Optical Fiber bundle into the appropriate port for your imaging session.
2. On the control panel, select PA-Mode.
3. On the control panel, tap **LAZR Port** and then select the corresponding wavelength range.

> **Note:** The LAZR Port button is only available when the PA button displays **Start**. If the LAZR Port button is not on any of the control panel bars, open the More Controls menu and then tap it. For more information, refer to Customizing the Control Panel on page 140.

After switching ports, buttons and imaging functionality updates as follows:

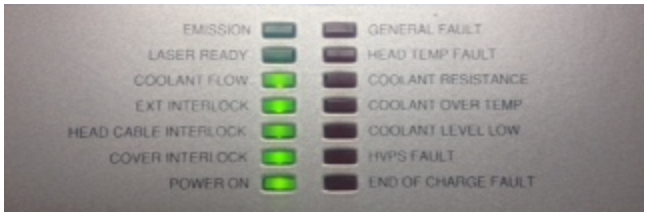
- PA-Mode (Oxy-Hemo): If the Idler port is selected, the PA-Mode (Oxy-Hemo) button becomes disabled because PA-Mode (Oxy-Hemo) is not available when using the Idler port (1200-2000 nm).
- PA-Mode (Single): The slider flyout range changes according to the wavelength range you are using, and the default single wavelength automatically changes to something applicable. If any single wavelength bookmarks are outside the current wavelength range, those bookmarks become disabled. For more information about bookmarks, refer to Single Wavelength Bookmarks on page 316.
- Imaging parameters: In the Mode Settings menu, the Wavelength Range under the Acquisition section displays the range currently used.
- PA-Mode (Multi-wavelength): If the Signal port is selected, the default components shown in the Multi-wavelength Scan Settings menu become Oxyhemoglobin and Deoxyhemoglobin.

If the Idler port is selected, no default components are listed.

- PA-Mode (Spectro): The Scan Method section in the Spectro Scan Settings menu are updated to display the Start and Stop wavelengths according to the wavelength range currently used.

Laser Indicators

There is a set of indicator lights located on top of the laser cart.



The laser indicators

Indicator	Description
EMISSION	Indicates that laser emission is occurring (when the internal shutter is open and allowing laser emission).
LASER READY	Indicates the laser is ready to generate a flashlamp output.
COOLANT FLOW	Indicates the cooling system is on.
EXT INTERLOCK	Indicates the back external interlock is satisfied. This indicator turns off when the back interlock is disconnected. **Note:** This only refers to the 15-pin port on the back of the system.
HEAD CABLE INTERLOCK	Indicates the laser head cable interlock is engaged.
COVER INTERLOCK	Indicates the optics cover interlock is engaged.
POWER ON	Indicates the laser is powered on.
GENERAL FAULT	Indicates a laser fault has occurred. Refer to Contact and Legal Information on page 346 and call Technical Support.
HEAD TEMP FAULT	Indicates the laser head temperature exceeds maximum limits (approximately +70°C/158°F).

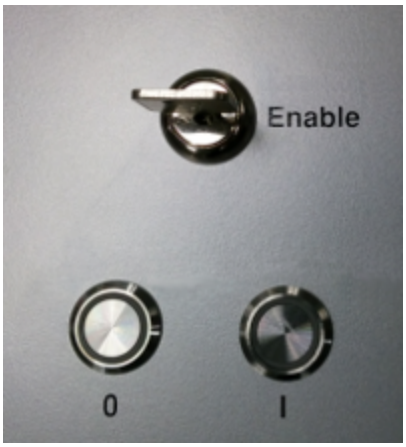
Indicator	Description
COOLANT RESISTANCE	Indicates the DI filter needs to be replaced. Refer to Contact and Legal Information on page 346 and call Technical Support. **Note:** If the laser has not been used for some time, this light may turn on for a few minutes, and then turn back off. If this occurs, the DI filter does not need to be replaced.
COOLANT OVER TEMP	Indicates the coolant in the cooling system reservoir exceeds minimum temperatures.
COOLANT LEVEL LOW	Indicates the volume of coolant in the cooling system reservoir is below minimum levels.
HVPS FAULT	Indicates an error in the high voltage power supply.
END OF CHARGE FAULT	Indicates the laser pulse forming network (PFN) has not charged to the programmed energy level.

Laser Connections

Front of Laser Cart

680-970 nm fiber port, 1200-2000 nm fiber port, delivery interlock and external power meter connector

Top of Laser Cart



Enable/disable key switch and on/off buttons

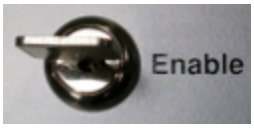
Emergency stop button

Back of Laser Cart

Rear connectors

AC in

Connector Descriptions

Connector	Description
Key switch	Designed as a safety switch. Laser operating commands will only be accepted by the laser when the key is in the Enable position. 
Emergency stop button	Refer to Emergency Stop Button on the next page.
Left fiber port	Idler fiber port with a tuning range of 1200 - 2000 nm.
Right fiber port	Signal fiber port with a tuning range of 680 - 970 nm.
Delivery interlock	A safety interlock that controls the delivery of laser light. The laser defeater or transducer interlock cable must be connected in order for the laser to operate.  *Defeater*  *Transducer interlock cable (top) and fiber optic ferrule (bottom)*
External energy sensor	Connect the external energy sensor when you need to calibrate the laser. Refer to Laser Calibration on page 193.

Connector	Description
RS232 REMOTE	Communication cable. Connect the USB/DB-9 cable from here to an USB connector on the system.
STATUS OUTPUT	Used by Technical Support only.
CONTROL INPUT	Used by Technical Support only.
USB 2.0 B	Used by Technical Support only.
LAMP SYNC IN	Used by Technical Support only.
LAMP SYNC OUT	Connect a BNC cable from here to the Trig In connector on the back of the system.
Q TRIG IN	Connect a BNC cable from here to the Trig Out connector on the back of the system.
Q TRIG OUT	Used by Technical Support only.
S TRIG OUT	Used by Technical Support only.
ENC A OUT	Used by Technical Support only.
ENC B OUT	Used by Technical Support only.
HOP TRIG OUT	Used by Technical Support only.
AC In	Connect the power cable here. Located on the back of the laser. **WARNING:** Do not modify the power plug or use an adapter. This could cause an electrical hazard. If you need to use a different plug, contact Technical Support. For contact information, refer to Contact and Legal Information on page 346.

Emergency Stop Button

The emergency stop button

The emergency stop button is located on the top of the laser cart. Push this button to make the laser stop firing immediately.

This button works by turning off the pump and the high voltage power supply (hvps).

Reset the Button

Once pressed, the emergency stop button stays down.

To reset the button back to its original position, twist the button clockwise (follow the arrows on the button).

Once the emergency stop button is reset, the laser needs 20 minutes to warm up before it can fire again.

Transducers

> **Caution:** Only compatible transducers may be used with the Vevo F2 Imaging System.

The transducers used with the Vevo F2 Imaging System have the following features:

- Ergonomic design for rapid screening procedures.
- Usable frame rate of more than 500 frames per second, depending on model and the field of view set for image acquisition.

The following transducers can be used with the Vevo F2 Imaging System:

- UHF71x
- UHF57x
- UHF46x
- UHF29x
- UHF22x
- L38xp
- P10xp

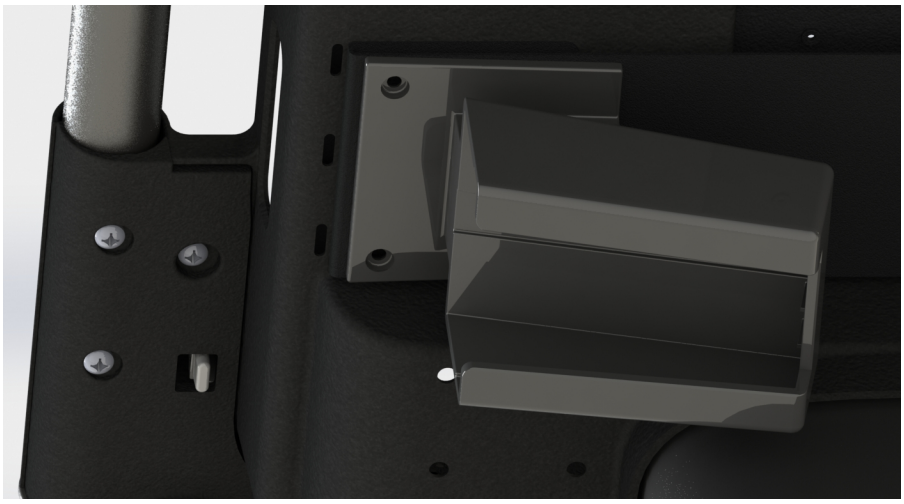
Coupling Gels

When using coupling gels, use Aquasonic® 100 Ultrasound Transmission Gel, or a gel with similar properties.

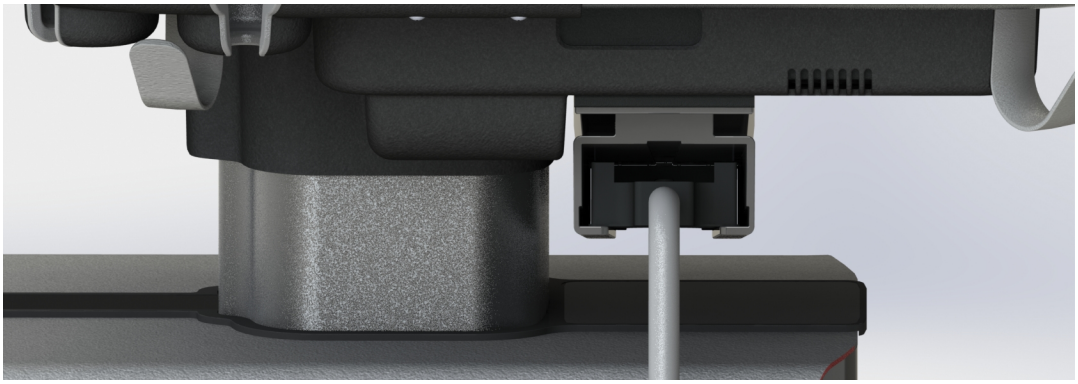
Storing Transducers

Store the nose of the transducer in one of the transducer and gel holders on either side of the Vevo F2 Imaging System. Position the transducer nose upward, and store each transducer cable on one of four hooks located on the side of the Vevo F2.

For unused transducers, slide their connectors into one of the transducer connector storage shelves.



An empty transducer connector shelf, as shown from below



A transducer connector shelf with a connector attached, as shown from the side

> **Caution:** FUJIFILM VisualSonics does not recommend storing transducers in the transducer holders with a Vevo Fiber Jacket and Vevo Optical Fiber attached. Make sure to remove both accessories and store them in their original packaging.

Packaging Transducers

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

- Make sure the Vevo Optical Fiber and Vevo Fiber Jacket are disconnected from all transducers.
- Make sure that transducers and all associated accessories (such as the Vevo Optical Fiber and Vevo Fiber Jacket) are clean and dry before you store them in their supplied packaging.
- Carefully route all transducer cables when storing them so that there are no kinks.
- Do not store transducers in areas of extreme temperatures, or in direct sunlight.
- Store transducers separately from other instruments so that they do not get damaged accidentally.

Transducer and Gel Holder

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.

FUJIFILM VisualSonics recommends ultrasound gels that are acoustically correct for the range of frequencies used and are completely aqueous. For example, use gels that have similar properties as *Aquasonic® 100 Ultrasound Transmission Gel*.

Connecting and Disconnecting Transducers

Transducers are connected to one of three transducer interfaces on the Vevo F2 Imaging System.

You can physically switch transducers at any time, without negatively affecting the current study or imaging session.

For information about how to switch from one connected transducer to another, refer to Selecting a Transducer or Application on page 100.

Transducer Interfaces	Transducer with Cable and Connector
	

To Connect a Transducer

1. Turn the handle on the transducer clockwise to the vertical (unlocked) position.
   The directional label on the transducer indicates which direction locks and unlocks the transducer.
2. Slide the transducer connector into the transducer bay located at the base of the Vevo F2, underneath the control panel.

3. Push the transducer connector onto the transducer interface.
4. Rotate the handle on the transducer counterclockwise to the horizontal (locked) position, then push down on the handle. This locks the transducer in place.

Once connected, the transducer can be placed on a transducer holder located at the back of the system, and the cable can be hung on one of the cable hooks.

System with three transducers connected

To Disconnect a Transducer

1. Flip the transducer connector handle up, then rotate it 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.

Cleaning and Disinfecting Transducers

For information on cleaning and disinfecting the system and transducers, see Cleaning and Disinfecting on page 63.

Transducer Applications

A transducer application is a predefined group of image acquisition settings that are tailored for the transducer model and the intended use for that transducer.

The Vevo software includes default applications for each supported transducer.

For information about how to select applications, refer to Selecting a Transducer or Application on page 100.

For information about how to manage applications, refer to Managing Applications on page 291.

LAZR-X Transducers

When using a transducer with the Vevo LAZR-X laser cart, the transducer must be equipped with a Vevo Fiber Jacket and a Vevo Optical Fiber. These accessories direct the laser to the animal, and are required for PA-Mode imaging.

Transducer	Vevo Fiber Jacket	Vevo Optical Fiber
P10xp	N/A	N/A
L38xp	(PN53740)	Yellow = 34 mm (PN52928) Blue = 24 mm (PN52927) Green = 14 mm (PN52926)
UHF22x	(PN52929)	Yellow = 34 mm (PN52928) Blue = 24 mm (PN52927) Green = 14 mm (PN52926)
UHF29x	(PN52930)	Blue = 24 mm (PN52927) Green = 14 mm (PN52926)
UHF46x	(PN52931)	Green = 14 mm (PN52926)
UHF57x	(PN52932)	Green = 14 mm (PN52926)
UHF71x	N/A	N/A

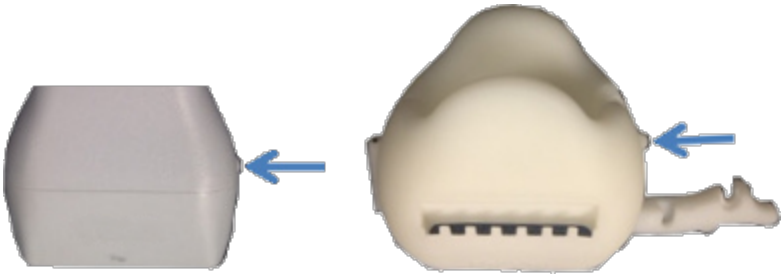
White Light from Vevo Optical Fiber

When the flashlamp is on, the Vevo Optical Fiber emits a white light. This light is a by-product of reflections and scattering from the flashlamp within the laser cart.

If the laser is not firing (Q-Switch disabled), this light has not been amplified and is not dangerous. However, FUJIFILM VisualSonics still recommends that users never direct the Vevo Optical Fiber towards their eyes.

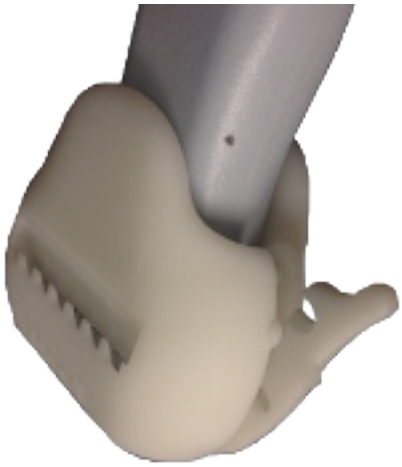
To attach the Vevo Fiber Jacket and Vevo Optical Fiber to a Transducer

1. Locate the orientation bump on the transducer, and note the similar bump on the fiber jacket. When the jacket is put on the transducer, make sure that these bumps are on the same side.



2. Open the jacket by pulling the lever slightly open.

3. Insert the transducer in the jacket, and close the jacket. The transducer should settle into a stable position within the jacket.
4. Close the lever, locking the jacket into place.



5. Obtain the fiber bundle and insert each piece into either side of the jacket.

6. When using a fiber bundle smaller than the transducer width (for example, the narrow fibers with the UHF22) ensure the fibers are centered with respect to the transducer.

Connecting Transducers to the Vevo LAZR-X laser cart

Connecting a transducer to the Vevo LAZR-X laser cart is similar to the procedure for the Vevo F2, except there are additional steps to connect the transducer to the laser cart.

The transducer connects to the laser cart via the Vevo Optical Fiber, which is a fiber optic cable. One end of this cable ends in a ferrule, which connects to one of two laser ports on the laser cart. The other end of the cable ends in a connector that is connected to the Vevo Fiber Jacket on the transducer.

> **Note:** You can switch transducers at any time during an imaging session. The Vevo LAZR-X laser cart software allows users to switch transducers without negatively affecting the current scan or study.

> **Caution:** If a transducer shows signs of damage, stop using it immediately and contact Technical Support. For details, refer to Contact and Legal Information on page 346.

Transducer interfaces

Transducer with cable and connector

Laser ports on laser cart

Transducer fiber optic ferrule

Before You Begin

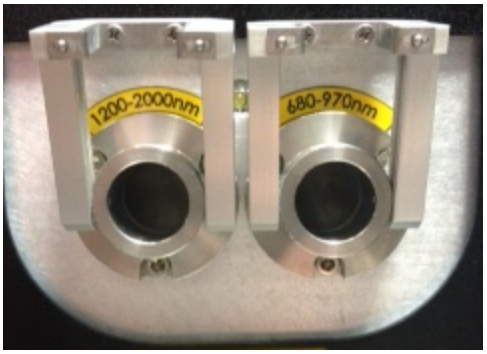
Ensure the transducer is connected to the Vevo Fiber Jacket and the Vevo Optical Fiber. For information about how to do this, refer to To attach the Vevo Fiber Jacket and Vevo Optical Fiber to a Transducer on page 47.

To Connect a Transducer to the Vevo LAZR-X laser cart

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

> **Note:** A label on the transducer indicates which direction to turn in order to lock or unlock the handle.

2. Slide the transducer connector into the transducer bay (underneath the control panel) of the Vevo F2.
3. Push the transducer connector into the transducer interface.
4. Rotate the handle on the transducer connector counterclockwise to the horizontal (locked) position, then push the handle down to lock the transducer.
5. On the laser cart, raise the lever lock on the port you want to use.



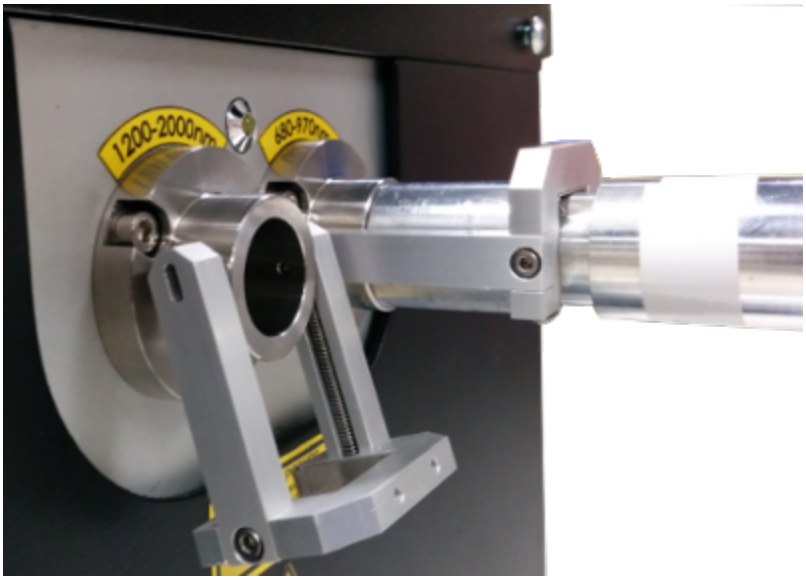
6. Insert the optical fiber bundle ferrule into a port on the laser. Push the ferrule into the port until it cannot go in any further.

Optical fiber bundle ferrule that is not pushed all the way into the port. Note the gap.

Optical fiber bundle ferrule that is correctly pushed all the way into the port.

> **Caution:** When connecting or disconnecting the optical fiber bundle ferrule from the laser, grasp the fiber optic cable by the ferrule. Do not push or pull the ferrule by the cable.

7. Lock the optical fiber bundle ferrule by lowering the lever lock.



The transducer is now connected to the Vevo LAZR-X laser cart.

To Disconnect a Transducer from the Vevo LAZR-X laser cart

1. On the laser, raise the lever lock from the port.
2. Grasp the optical fiber bundle ferrule and pull it out of the laser port.
3. On the Vevo F2, flip the transducer connector handle up, and rotate it clockwise to the vertical (unlocked) position.
4. Pull the transducer connector away from the transducer interface, then slide the connector up and out of the transducer bay.

Castors and Handles

Castors

Both the Vevo F2 and the Vevo LAZR-X laser cart feature castors for easy movement.

The four castors can be locked using a lever located above each castor. To lock any castor, move the lever down.

> **WARNING:** Lock the castors whenever either the Vevo F2 or the Vevo LAZR-X laser cart are unattended or stationary.

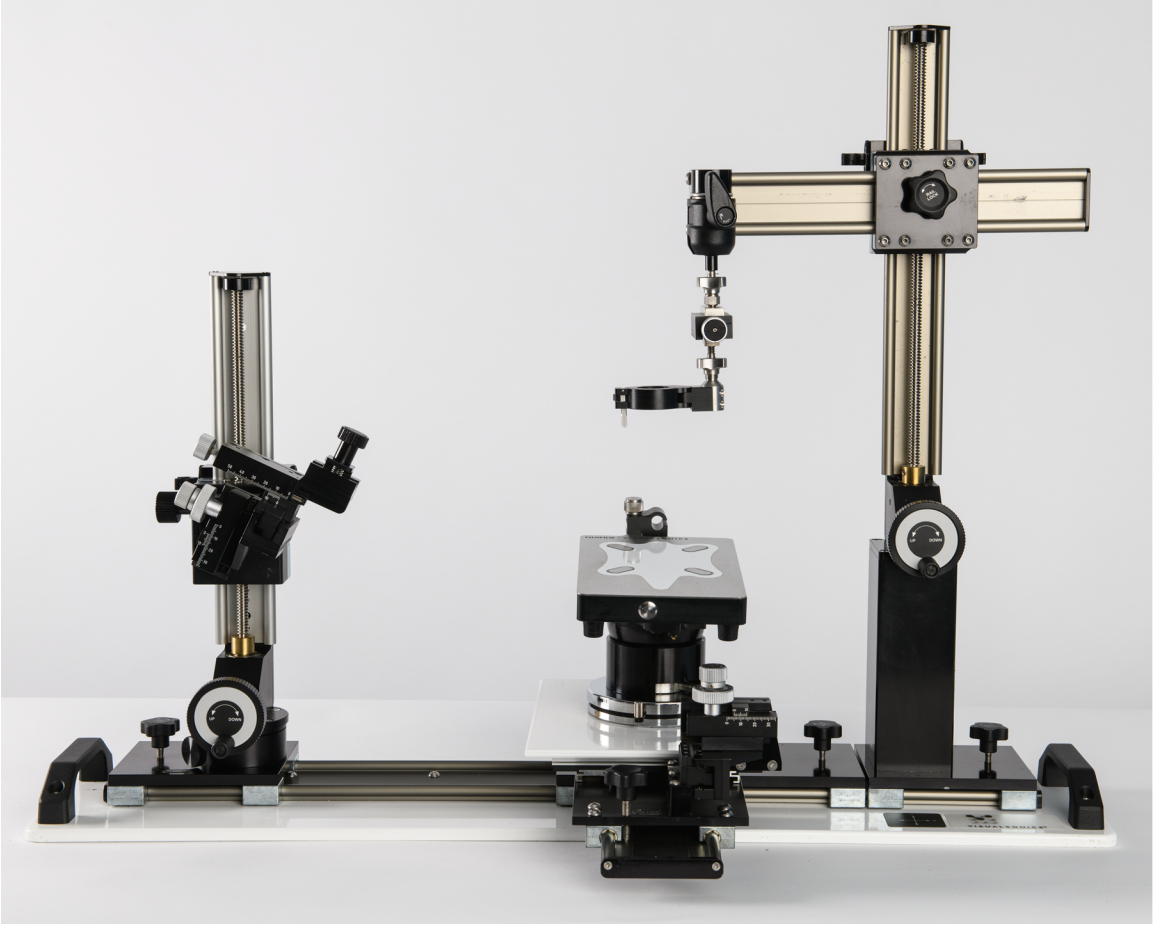
Handles

Both the Vevo F2 and the Vevo LAZR-X laser cart have handles for pushing or pulling each on its castors.

Do not use these handles to lift either the Vevo F2 or the laser cart, as the handles are not designed to bear the full weight of either system.

Vevo Integrated Rail System

The Vevo Integrated Rail System is a series of rails and mounting devices used to hold a small animal and related research devices during imaging procedures.



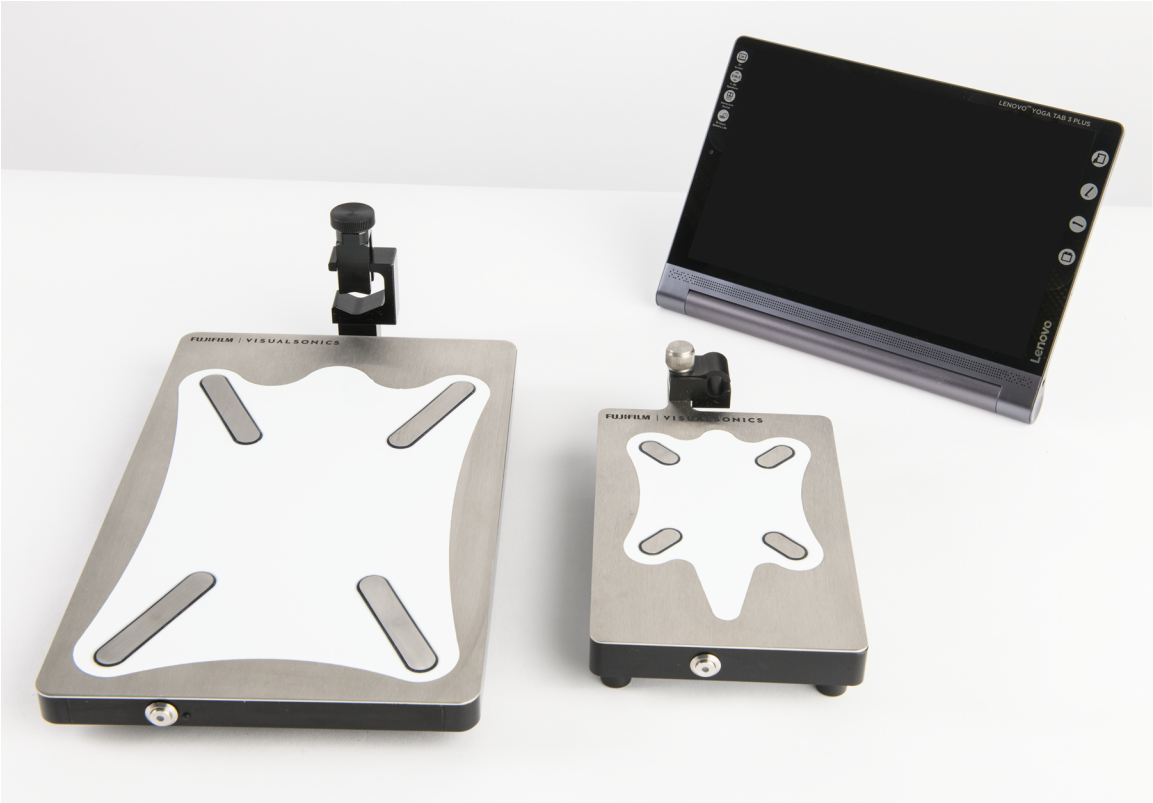
The Vevo Integrated Rail System

For information about how to use the Vevo Imaging Station, refer to the Vevo Integrated Rail System User Guide.

Vevo Animal Monitoring System

The Vevo Animal Monitoring System (also known as the Vevo Monitor) is an operating platform used to support and monitor small animals during research procedures. It consists of a heated platform, a touchscreen tablet with proprietary software, and a set of accessories.

The Vevo Monitor records physiological data about the animal during a procedure, which is then sent to the Vevo F2 Imaging System. This data is then displayed on the image display.

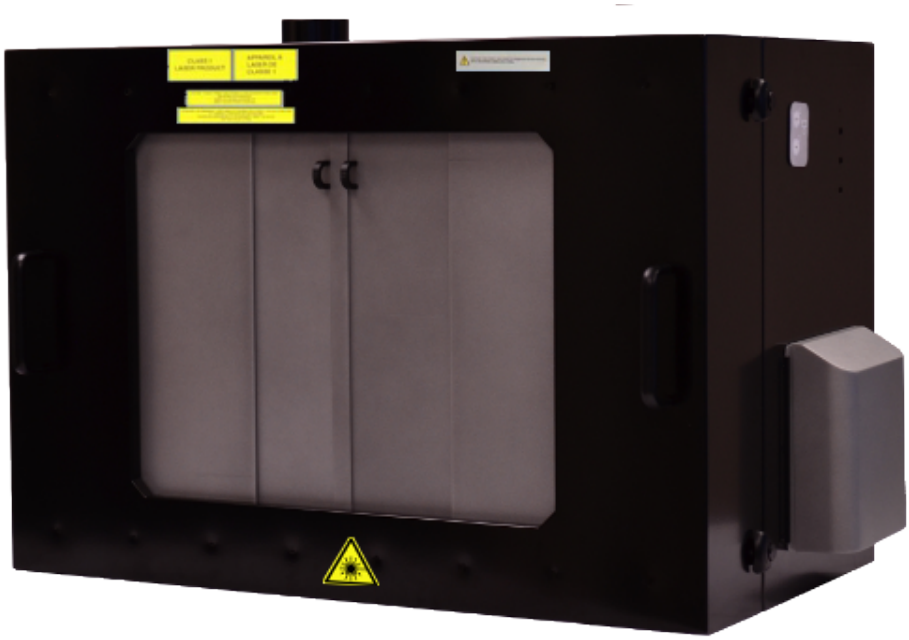


The Vevo Animal Monitoring System

For more information about how to set up and use the Vevo Animal Monitoring System, refer to the Vevo Animal Monitoring System User Guide.

Vevo LAZRTight

The Vevo LAZRTight is an enclosure that serves as a safe environment for lab studies involving laser light. Use the Vevo LAZRTight to perform lab studies that involve the Vevo LAZR-X laser cart.



The Vevo LAZRTight

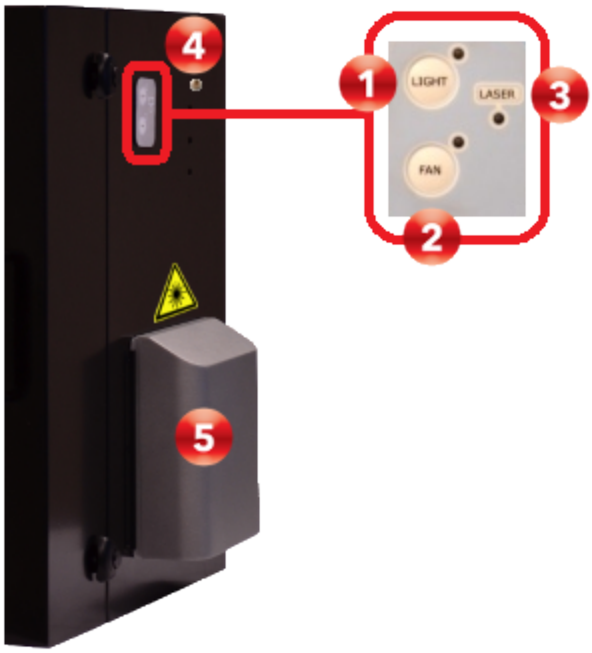
Precautions

- Do not attempt to defeat the switches inside the side access ports and front sliding doors of the Vevo LAZRTight.
- Do not use the Vevo LAZRTight if the front doors are damaged.
- Ensure that you orient the Vevo LAZRTight so that the laser is pointed away from any doorways.

Positioning the Vevo LAZRTight

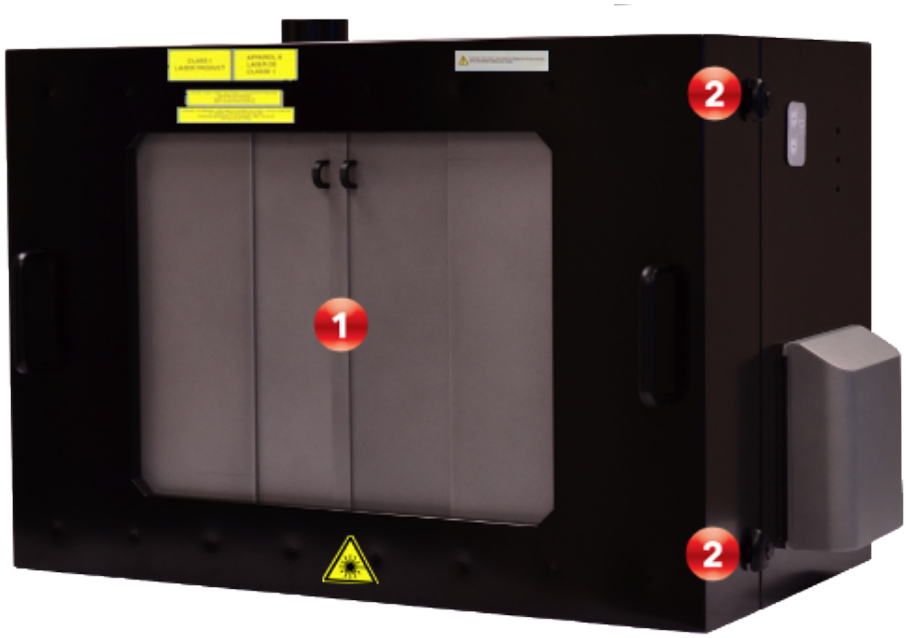
Set up the Vevo LAZRTight on a table, or under a fume hood to thoroughly vent anesthetic gases.

Right Side Controls



1. Interior light control: Press to cycle light brightness (on, low, medium, high and off).
2. Interior fan on/off toggle button: Press to toggle the interior fan. The light next to this button lights up when the fan is on.
3. Laser status light: A status light that has three signals:
    - On (blue light): Indicates that all the interlocks are engaged, and ready for laser operation.
    - Off: Indicates that at least one interlock is open. The system prevents the laser from firing in this state.
    - Blinking: Indicates that one of the interlocks is not engaged. The system prevents the laser from firing in this state.
4. 12 V power jack: Connects to the AC power cord. Used to power the Vevo LAZRTight.
5. Access port cover: Secures an access port that is used to run cables and tubing into the Vevo LAZRTight. There is one access port and cover on each side of the Vevo LAZRTight. A magnetic interlock prevents the laser from firing unless both covers are full closed.
   To remove the cover, slide the cover up and out of the magnetic interlock.

Front Panel



1. Sliding doors: An interlocking system allows the laser to fire only when the doors are completely closed. If the doors are opened while the laser is firing, the interlock will instantly stop the laser.
2. Front panel latches: Secures the front panel in place. Each side of the Vevo LAZRTight has a top and bottom latch.

Removing the Front Panel

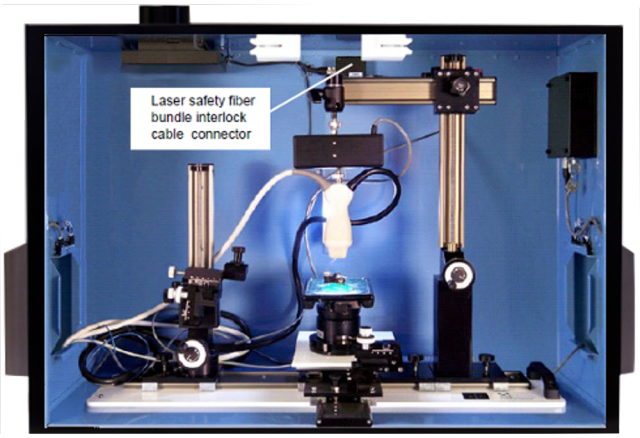
The front panel of the Vevo LAZRTight can be removed for tasks that do not require the laser, such as installing and removing the rail system.

To remove the front panel:

1. Open the sliding front doors.
2. Unlatch the top and bottom latches on each side of the front panel.
3. Carefully remove the front panel.

> **WARNING:** You must open the sliding front doors BEFORE you remove or replace the front panel. If you do not open the sliding doors, you can permanently damage the interlock assembly for the sliding doors.

Interior



On the back panel inside the Vevo LAZRTight, there is a device called the laser safety fiber bundle interlock cable connector, which prevents users from using the transducer unless the Vevo LAZRTight is completely closed.

This device connects to a cable that feeds out from one side of the fiber optic bundle, and connects to the delivery interlock connector on the laser cart.

Vevo PHANTOM Imaging Chamber

The Vevo PHANTOM is an acrylic imaging chamber (or dish) that is used for *in vitro* characterization of photoacoustic contrast agents when imaging in PA-Mode.

The Vevo PHANTOM imaging chamber

Vevo PHANTOM Tubing

Vevo PHANTOM tubing

The Vevo PHANTOM uses specially designed polyurethane tubes called Vevo PHANTOM Tubing. These tubes are injected with photoacoustic contrast agents, then secured to the Vevo PHANTOM for photoacoustic imaging.

The Vevo PHANTOM can hold up to 11 such tubes.

Vevo PHANTOM Tubing has the following properties:

- Inner diameter: 0.015"
- Outer diameter: 0.033"
- Needle size: 27 G

> **Note:** For more information, refer to Imaging Guides on page 331.

Vevo LAB

Vevo LAB is a software application used to perform additional data analysis of images acquired on a Vevo imaging system. Vevo LAB contains additional analysis features such as protocol-based measurements, and also related analysis applications such as Vevo CQ, Vevo Strain, and Vevo Vasc.

Vevo LAB can be installed on any Windows-based system that meets the technical requirements.

> **Note:** You cannot acquire images using Vevo LAB.

For more information about how to use Vevo LAB, refer to the Vevo LAB user guide.

Vevo Strain

Vevo Strain software is the only commercial strain analysis package optimized for assessing cardiac function in preclinical rodent studies. Optimized for use with the Vevo Imaging System, this advanced post-processing tool provides the preclinical researcher with multi-measurement capabilities used in the assessment of myocardial dysfunction. Features such as global strain and time-to-peak enables early detection of regional abnormalities and tissue deformation to determine disease onset.

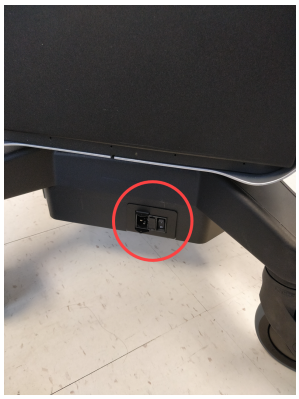
Vevo Vasc

Vevo Vasc is a vascular strain analysis package that utilizes advanced speckle tracking algorithms on high-resolution ultrasound data to quantify vascular pathologies non-invasively and *in vivo*. It is the first software of its kind available for preclinical researchers studying vascular disease (optimized for mouse and rat models). The software includes both qualitative and quantitative tools to study various vascular disease models. By taking advantage of the Vevo Imaging System's high spatial and temporal resolution, it is now possible to visualize and quantify early indicators of vascular disease and/or tissue remodeling.

System Startup

To turn on the Vevo F2:

1. Connect an AC power cord to the power outlet located at the back of the system, where the power cord connects to the base.



Location of the power cord and main power switch

2. Plug the other end of the AC power cord into a wall outlet.
3. Turn on the main power switch located at the back of the system, next to where the power cord connects to the base.

4. Press the power button located behind the control panel, near the transducer holders.

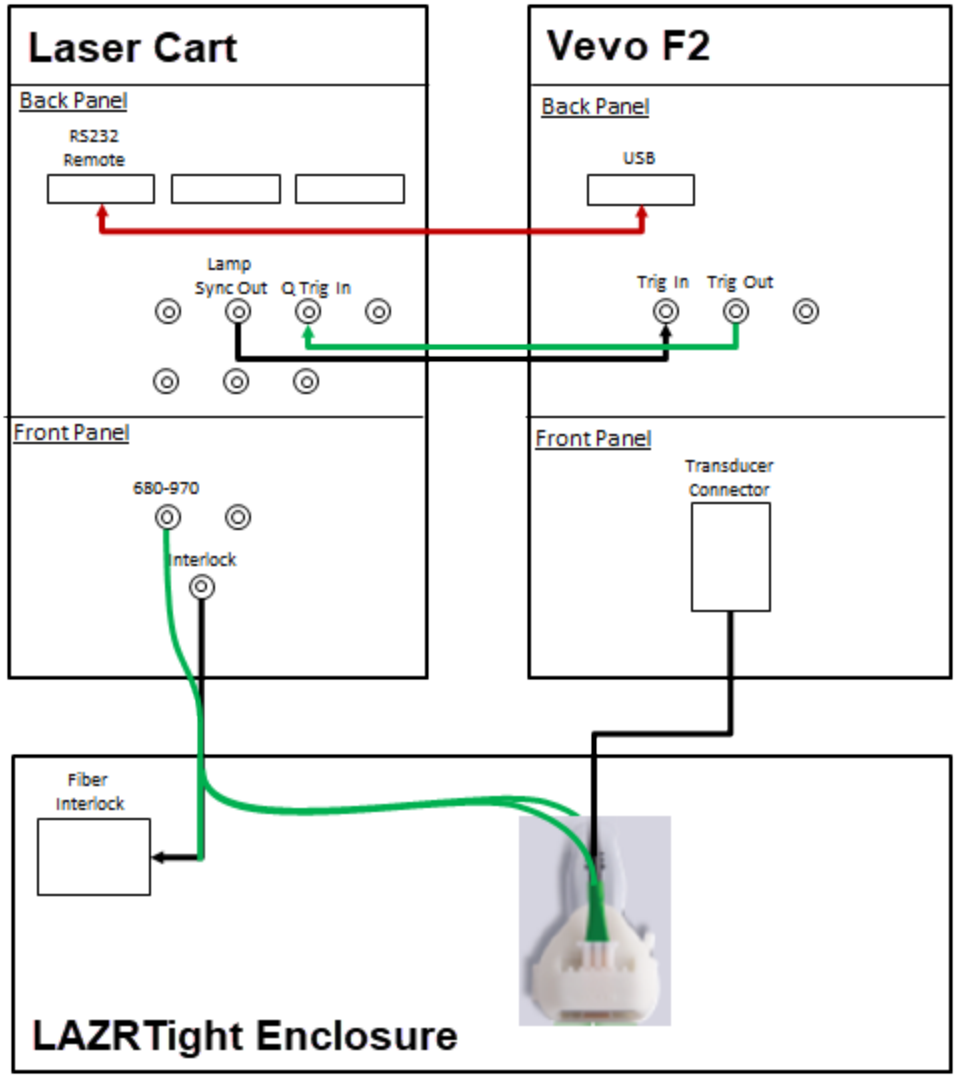
Location of the power button

To Turn On the Laser Cart

If using the Vevo LAZR-X laser cart, follow these steps to turn on the laser cart after turning on the Vevo F2.

1. Connect an AC power cord to the power outlet located at the back of the cart.
2. Connect the other end of the AC power cord into a wall outlet with the proper plug.
3. Turn on the main power switch on the back of the laser cart.
4. Confirm the following cables are connected from the system to the laser cart. If using a Vevo LAZRTight, refer to the diagram below.

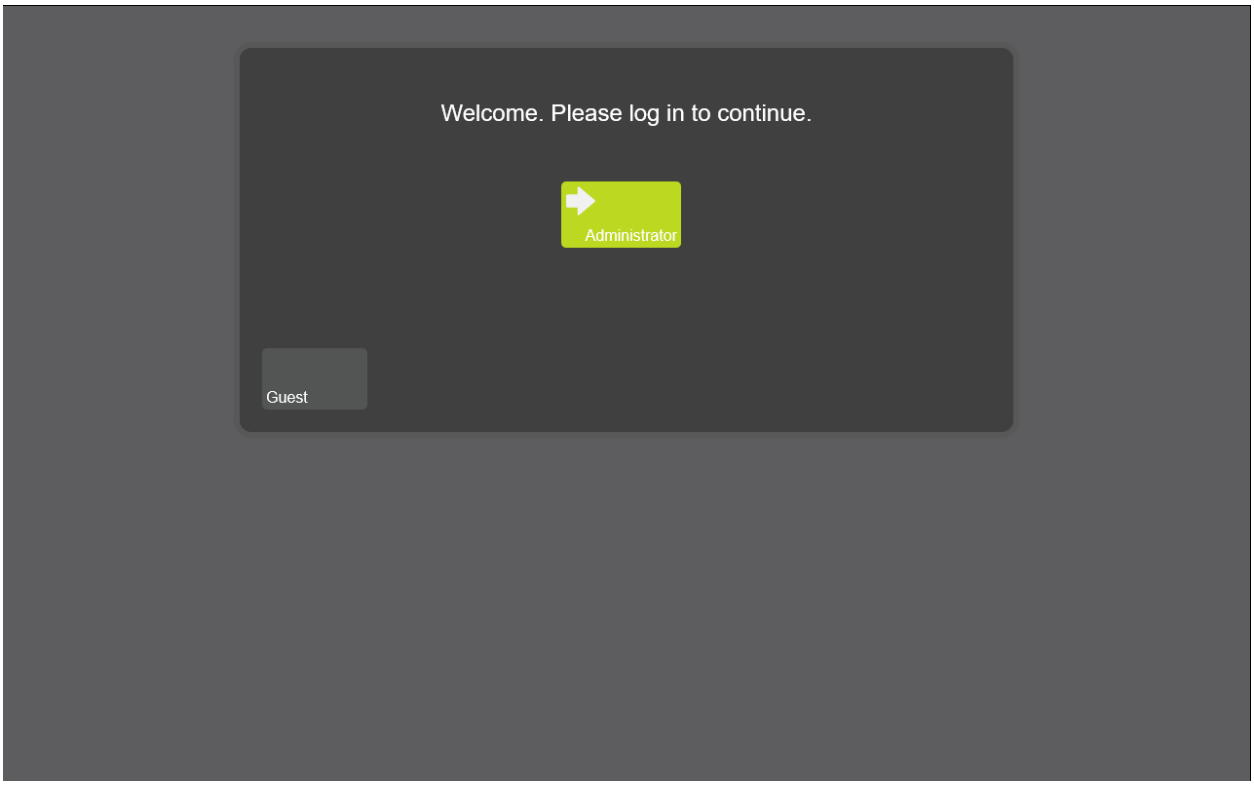
Vevo LAZR-X laser cart	Vevo F2
Q Trig In	Trig Out
Lamp Sync Out	Trig In
RS232/Remote	USB



5. Turn the key switch to the Enable position.
6. Press the ON button on top of the laser cart.
7. Wait at least 20 minutes for the laser to warm up.

Logging On for the First Time

The first time you turn on the system, you will see the log in screen with two buttons.



The login screen when a system is turned on for the first time

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 as a guest user. However, data saved during this session is not associated with a unique user account, and some system settings are blocked.

To Configure the Administrator Account

1. Tap **Administrator** on the login screen. The system directs you to the **User Management** settings 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; this user will be the 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.

The system updates the name of the logged in administrator user, if the name was changed. You are then directed to the User List page.

Note: You must create a password for the Administrator account the first time you log in. If you do not do this, you can only use the system as a guest user, which has limited access to system settings.

System Maintenance

The Vevo F2 Imaging System and Vevo LAZR-X laser cart require proper care and cleaning. See Cleaning and Disinfecting below for more information.

FUJIFILM VisualSonics requires that service technicians clean the Vevo Imaging System air filters once every three months. Contact a FUJIFILM VisualSonics Technical Support Representative for more information.

Performing maintenance procedures not described in the user guide may void the product warranty. Please contact Technical Support for any questions or concerns about the maintenance of the system.

Note: For technical support, refer to Contact and Legal Information on page 346.

Cleaning and Disinfecting

The system, laser, transducer and accessories must be cleaned and disinfected after each imaging session. It is important to follow these cleaning and disinfecting instructions without skipping any steps.

Note: Please be aware that you must perform both a cleaning as well as a disinfection for each component.

System	Laser	Transducer
		

Before Getting Started

- Inspect the system, laser, transducer and accessories to determine they are free of any unacceptable deterioration, such as corrosion, discoloration, pitting, or cracked seals. If damage is evident, discontinue use, and contact FUJIFILM VisualSonics or your local representative.
- Confirm that cleaning and disinfecting materials are appropriate for your facility's use. FUJIFILM VisualSonics tests disinfectants and disinfectant devices for use with the system, laser, transducers and accessories.
- Verify expiration dates, concentration, and efficacy of chemicals (for example, a chemical strip test). Disinfectants and cleaning methods listed are recommended by FUJIFILM VisualSonics for efficacy and material compatibility with our products.
- Ensure that the disinfectant type, 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, laser, transducer or accessory connectors.

Do not use strong solvents such as thinner or benzene, or abrasive cleansers, since these will damage the exterior surfaces. Use only FUJIFILM VisualSonics recommended cleaners or disinfectants.

List of Compatible Cleaners and Disinfectants

The materials listed in the table below are chemically compatible with the system and transducer.

Product	System	Transducer	Laser	Wet Contact Time
Tristel™ Sporicidal Wipes	✓	✗	✗	30 seconds
Mikrobac® Tissues	✗	✓	✗	1 minutes
Cleanisept® wipes	✓	✓	✗	2 minutes
CaviCide™	✓	✓	✓	3 minutes
CaviWipesXL™	✓	✓	✓	3 minutes

Precautions

- Use only FUJIFILM VisualSonics recommended disinfectants. Using a non-recommended disinfecting solution or incorrect solution strength may cause damage and void the warranty.
- To avoid electric shock, always disconnect the system, laser, transducer(s) and accessories from the power before cleaning or disinfecting them.

- When using cleaners or disinfectants, always wear appropriate personal protective equipment (PPE) recommended by the chemical manufacturer, such as eyewear and gloves.
- Do not spray cleaners and disinfectants directly on surfaces or in the ports of the system, laser, transducer(s) or accessories. Doing so may cause damage and void the warranty.
- When using a cleaner or disinfectant, always follow the manufacturer's recommendations.

Cleaning and Disinfecting the Vevo F2 Imaging System

This section contains instructions on how to clean the ultrasound system. This includes the cart, monitor, control panel, transducer holders, and cable hooks.

> **Note:** For information about compatible cleaners, compatible disinfectants, and recommended soak times, refer to List of Compatible Cleaners and Disinfectants on the previous page.

Before You Begin

- Turn off the system by pressing the Power button.
- Turn off the main power switch located at the back of the system, at the base.
- Unplug the system to avoid electric shock.
- Remove the power cable from the system.
- Unplug the network cable, if connected.
- Disconnect and remove any transducers connected to the system.
- Wear appropriate personal protective equipment (PPE) recommended by the cleaning product manufacturer, such as eyewear and gloves.

Precautions

- Only use approved cleaners and disinfectants at their recommended solution strengths. Using other products or incorrect solution strengths may damage the system and void the warranty. For more information, refer to List of Compatible Cleaners and Disinfectants on the previous page.
- Do not spray cleaners and disinfectants directly on surfaces or on the connectors of the system. Doing so may cause solutions to leak into the system, damaging it and voiding the warranty.
- Wipe from clean areas to soiled areas to avoid cross-contamination.
- If using a solution instead of a wipe, apply the solution to a cloth and wipe with the cloth instead of spraying the solution directly on the system.
- Do not wipe the transducer connector.
- Ensure that cleaning or disinfecting solution does not get into any of the connector ports.

To Clean and Disinfect the Vevo F2

1. Using an approved cleaner, clean the system to remove any visible gel, debris, or fluids.
2. Verify that all gel, debris and animal fluids have been removed from the system. If necessary, clean the system again with a new wipe.
3. Using an approved disinfectant, disinfect the system by wiping all surfaces that may have been

contaminated. This includes:
    - Image display (upper monitor)
    - Control panel (lower monitor)
    - All transducer/gel holders
    - Cable hooks
    - handles
4. Ensure the system stays wet with the disinfectant for the recommended wet contact time. This may require reapplication to achieve the required wet time.
5. Allow the system to air dry in a clean, well ventilated space. Do not dry with a cloth.

Cleaning and Disinfecting the Transducer

This section contains instructions on how to clean the transducer. This includes the transducer scanhead, cable, and connector.

> **Note:** For information about compatible cleaners, compatible disinfectants, and recommended soak times, refer to List of Compatible Cleaners and Disinfectants on page 65.

Before You Begin

- Disconnect and remove the transducer from the system.
- If they are connected, remove the Vevo Fiber Jacket and Vevo Optical Fiber from the transducer.
- Wear appropriate personal protective equipment (PPE) recommended by the cleaning product manufacturer, such as eyewear and gloves.

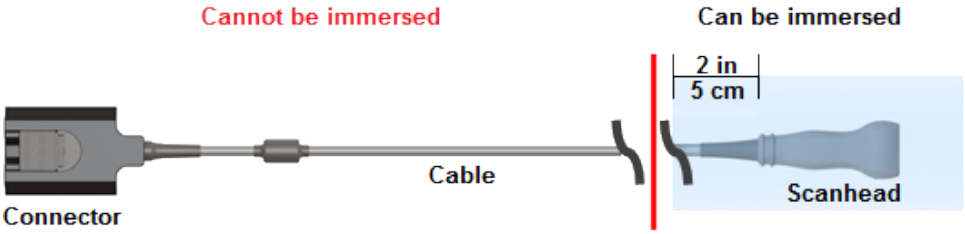
Precautions

- Only use approved cleaners and disinfectants at their recommended solution strengths. Using other products or incorrect solution strengths may damage the system and void the warranty. For more information, refer to List of Compatible Cleaners and Disinfectants on page 65.
- Wipe from clean areas to soiled areas to avoid cross-contamination.
- If using a solution instead of a wipe, apply the solution to a cloth and wipe with the cloth instead of spraying the solution directly on the system.
- Do not wipe the transducer connector.

To Clean and Disinfect the Transducer

1. Using an approved cleaner, wipe the transducer cable and transducer body to remove any visible gel, debris or fluids.
   Use a downward wiping motion that starts from the transducer connector and towards the scanhead.
2. Verify that the transducer is clean. If necessary, repeat the previous step with a new wipe.
3. Immerse the scanhead (not the connector) into a pool of approved disinfectant solution.

- Ensure that only the scanhead and up to the first 2 in (5 cm) of cable are immersed. Refer to the figure below:



4. Let the scanhead soak in the solution for the soak time recommended by the disinfectant manufacturer.
5. Remove the scanhead from the solution.
6. Rinse the part of the transducer that was soaked in sterile or clean water, according to the disinfectant manufacturer's instructions.
7. Dry the transducer with a clean, lint-free cloth, or allow it to air dry completely.
8. Examine the transducer and cable and verify that there is no damage. If the transducer is damaged, stop using it, and contact FUJIFILM VisualSonics support.

Cleaning and Disinfecting the Laser

This section contains instructions on how to clean the laser cart.

> **Note:** For information about compatible cleaners, compatible disinfectants, and recommended soak times, refer to List of Compatible Cleaners and Disinfectants on page 65.

Before You Begin

- Turn off the laser by pressing the main power button.
- Turn off the laser main power switch, located at the back of the system, near where the power cable connects into the cart.
- Disconnect all cables from the laser cart.
- Wear appropriate personal protective equipment (PPE) recommended by the cleaning product manufacturer, such as eyewear and gloves.

Precautions

- Only use approved cleaners and disinfectants at their recommended solution strengths. Using other products or incorrect solution strengths may damage the system and void the warranty. For more information, refer to List of Compatible Cleaners and Disinfectants on page 65.
- Wipe from clean areas to soiled areas to avoid cross-contamination.
- If using a solution instead of a wipe, apply the solution to a cloth and wipe with the cloth instead of spraying the solution directly on the system.
- Make sure no solution gets into the laser ports. Do not wipe any exposed ports or connectors.

To Clean and Disinfect the Laser

1. Using an approved cleaner, clean the system to remove any visible gel, debris, or fluids.
2. Verify that all gel, debris and animal fluids have been removed from the laser. If necessary, repeat the previous step with a new wipe.
3. Using an approved disinfectant, disinfect the system by wiping all surfaces that may have been contaminated.
4. Ensure the laser stays wet with the disinfectant for the recommended wet contact time. This may require reapplication to achieve the required wet time.
5. Allow the laser to air dry in a clean, well ventilated space. Do not dry with a cloth.

Cleaning and Disinfecting Accessories

All accessories must be cleaned and disinfected after each exam.

Before You Begin

- (If applicable) Disconnect the accessory from any wires or cables.
- (If applicable) Turn off the accessory.
- Wear appropriate personal protective equipment (PPE) recommended by the cleaning product manufacturer, such as eyewear and gloves.

Precautions

- Ensure that all cleaning and disinfecting products are appropriate for your facility's use, and are compliant with the List of Compatible Cleaners and Disinfectants on page 65.
- Do not use strong solvents such as thinner or benzene, or abrasive cleansers, since these will damage the exterior surfaces.
- Ensure that all cleaning and disinfecting products are not expired, and are in the right concentrations.
- Always follow the manufacturer recommendations and local regulations when preparing, using, and disposing of cleaning and disinfecting products.
- Wipe from clean areas to soiled areas to avoid cross-contamination.
- If using a solution instead of a wipe, apply the solution to a cloth and wipe with the cloth instead of spraying the solution directly on the system.
- Make sure no solution gets into any connectors or ports. Do not wipe any exposed ports or connectors.
- Some cleaners and disinfectants can cause an allergic reaction to certain individuals. Ensure that the person handling the product is not allergic to them.

> **Caution:** Do not use cleaning or sterilizing chemicals on the foot pedal, Vevo Animal Monitoring System, Vevo Infusion Pump or the Vevo Optical Fiber. Doing so could cause damage.

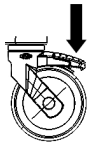
To Clean and Disinfect an Accessory

1. Using an approved cleaner, clean the accessory of any visible gel, debris, or fluids.
2. Verify that all gel, debris and animal fluids have been removed. If necessary, repeat the previous step with a new wipe.
3. Using an approved disinfectant, disinfect the accessory by wiping all surfaces that may have been contaminated.
4. Ensure the accessory stays wet with the disinfectant for the recommended wet contact time. This may require reapplication to achieve the required wet time.
5. Allow the accessory to air dry in a clean, well ventilated space. Do not dry with a cloth.
6. Inspect the accessory, and ensure it is free of any damage, such as corrosion, discoloration, pitting, or cracked seals. If damage is evident, discontinue use immediately, and contact FUJIFILM VisualSonics or your local representative.

Moving the System or Laser

To move the Vevo F2 or the laser cart:

1. Turn the system/laser off and disconnect the power cord.
2. Disconnect any other cords connected to the system. Secure all loose cables.
3. Disconnect all transducers.
    a. Remove all fiber jacket/optical fibers, if connected.
    b. Disconnect all transducers from the system.
    c. Store all transducers, connectors, and related accessories in their supplied packaging.
4. Unlock the castors on the system.
5. Move the system/laser to its desired location.
    - Make sure to push or pull the system by its handles. Do not move the system by its monitor.
    - Do not use the handles to lift the system.
6. When the system/laser is in place, lock all castors by pressing down on the lever above each castor.



Disposal

The Vevo F2 Imaging System must be disposed of in accordance with current local regulations.

For information about proper disposal of the Vevo F2 or Vevo LAZR-X laser cart, or information about any substances inside either item, refer to Contact and Legal Information on page 346 and contact FUJIFILM VisualSonics Technical Support.

System Upgrade

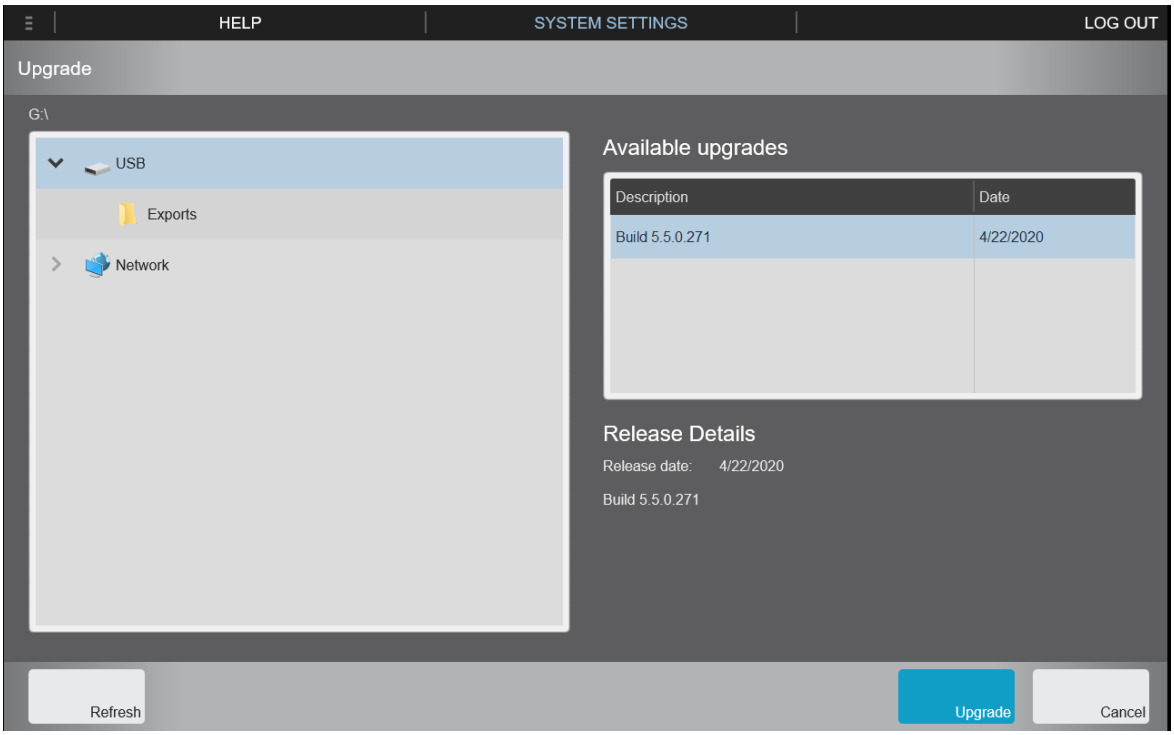
A system upgrade can only be performed by a user with administrative privileges, and can take up to 30 minutes.

Before You Begin

- Make an external backup of all imaging files on the system.
- Download the Vevo Imaging System software installation file. To do this:
    a. On a separate computer, sign in at https://www.visualsonics.com/ and navigate to the Customer Portal.
    If you do not have a Customer Portal account, go to https://www.visualsonics.com/registration to create an account.
    b. On the Vevo F2 tab, click **Update Vevo F2 Software**, fill out all required information and then click **Download**.
    The upgrade file name follows the format "Vevo F2 Imaging System Software VX.X.X.zip".
    c. Unzip the upgrade file into the root directory of a USB storage device.
- Power cycle the Vevo F2 Imaging System.
    a. Press the power button near the rear-right corner of the system to turn it off.
    b. Turn off the main power switch at the back of the system base.
    c. Wait a moment, then turn the main power switch back on.
    d. Turn the system back on.

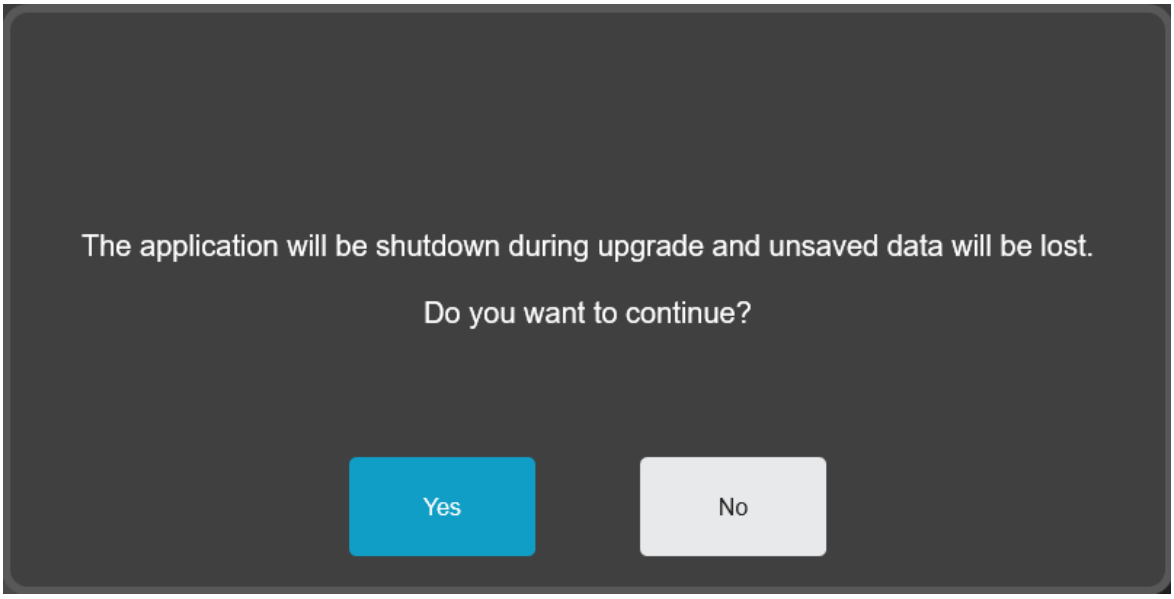
To Install a System Upgrade

1. Insert the USB storage device containing the contents of the upgrade zip file into a USB port on the right side or back of the system.
2. On the control panel of the system, navigate to **More** > **System Settings** > **System Information**.
3. On the **System Information** tab, tap **System Upgrade**. The Upgrade window appears.



4. In the file browsing panel on the left, click on the drive letter for the USB storage device.
5. In the Available upgrades list on the right, select the upgrade and then tap **Upgrade**.

6. The upgrade prompt appears.



7. From this upgrade prompt, choose an option:

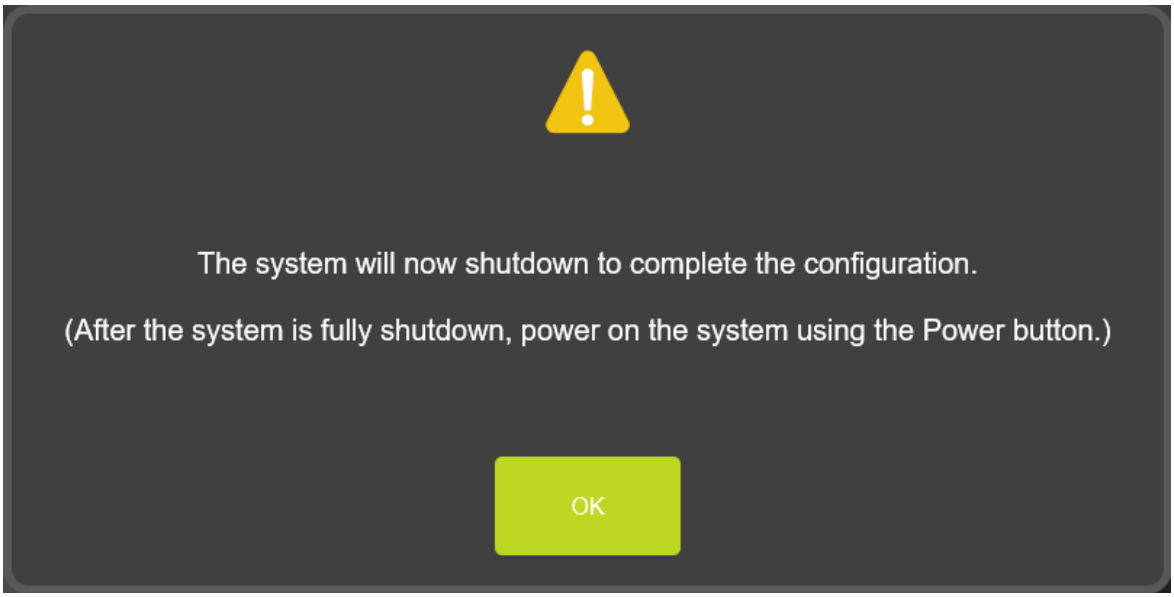
- Tap **Yes** to continue the installation.

> **Note:** It may take up to one minute before the screen starts showing the installation progress.

> **Caution:** DO NOT start any acquisition sessions during the upgrade process.

- Tap **No** to cancel the installation.

8. After tapping **Yes**, the following upgrade prompt will appear.



9. Tap **OK** to continue the installation.
10. Once the system has fully shutdown, power on the system by pressing the power button near the rear-right corner of the system.
11. Once the system restarts, installation will continue. Continue to follow the on-screen instructions.

> **Note:** DO NOT manually reboot the system while the system is upgrading.

12. Restart the system and verify the installed version on the **System Information** page.
13. Remove the USB storage device from the USB port on the system.

Troubleshooting

If a problem is encountered when using the Vevo F2 Imaging System, try the solutions described below. If none of the solutions solve the problem, contact a FUJIFILM VisualSonics Technical Support Representative. Refer to Contact and Legal Information on page 346.

Performing maintenance procedures not described in this user manual may void the product warranty.

Vevo F2 Troubleshooting

Problem	Solution
System does not power up	• Ensure that the main power cable for the system is properly connected to the Vevo F2 Imaging System. • Ensure that the system is plugged into a grounded/earthed wall outlet, and that the main power switch is on. • If you still cannot power on the system, the fuses may need to be replaced. Contact FUJIFILM VisualSonics to schedule a service technician.
No audio	• For keyboard and saving tones, adjust their slider controls in the **General** tab in **System Settings**. • Ensure there is nothing connected to the headphone jack on the side of the image display. When the headphone jack is used, the internal speakers and HDMI audio will be disabled.

Laser Troubleshooting

Problem	Solution
Laser does not power up	• Use only the plug that was sent with laser and ensure it is plugged into a dedicated, interference-free grounded/earthed wall outlet. • Ensure the voltage of the wall outlet is correct for the laser. • Do not plug the power cord into an MPSO or extension cord. • Ensure the main power switch beside the power cord connector is in the on position. • Ensure the Emergency Stop button is released back up. • Ensure the key switch is in the Enable position. • Press the laser power on button (confirm that the laser panel 'Power on' LED is lit).
Laser energy low	• A laser energy bar is displayed at the bottom of the image display. When the energy bar turns white, the laser will need to be optimized. This process is done by Technical Support.
Laser does not fire	• If using a LAZRTight and the transducer interlock cable, you must ensure that the LAZRTight doors are properly closed.

LAZRTight Troubleshooting

Problem	Solution
Laser light on side panel is blinking/off	• One of the interlocks is open and/or not engaged. Check that the doors are closed properly, baffles are secure and the transducer interlock cable is attached.

Study Browser Troubleshooting

Problem	Solution
Unable to create new studies	• Ensure that a transducer is connected to the front panel of the Vevo F2 Imaging System, and ensure that it has been initialized.
Unable to commit a study session	• Ensure that a user has been specified.
Unable to delete an study/series/image	• The study/series/image could be pending or in process of being background data transferred. To stop Background Data Transfer, go to Export in System settings and turn Background Data transfer off. • Ensure the study/series is not locked. If it is locked, unlock it by unchecking the box in the Lock column.

B-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 animal. • Adjust the position of the TGC sliders. • Ensure the appropriate transducer is being used.

PA-Mode Troubleshooting

<table>
<tr><th>Problem</th><th>Solution</th></tr>
<tr><td>No PA signal</td><td>• Check all connections from the system to the laser as follows:
<table><tr><th>System</th><th>Laser</th></tr><tr><td>Trig Out</td><td>Q Trig In</td></tr><tr><td>Trig In</td><td>Lamp Sync Out</td></tr><tr><td>USB</td><td>RS232/Remote</td></tr></table></td></tr>
<tr><td>PA signal is poor</td><td>• Select the appropriate port for your imaging session (Signal 680-970 nm, Idler 1200-2000 nm).
• Select the appropriate Vevo Fiber Jacket and Vevo Optical fiber for your transducer.
• Ensure the transducer fiber optic ferrule is pushed into the port as far as it can and that the lever lock is down.
• Adjust the PA Gain and TGC sliders.</td></tr>
<tr><td>PA-Mode (Oxy-Hemo) button is disabled</td><td>• PA-Mode (Oxy-Hemo) is not available when using the Idler (1200-2000 nm) laser port.</td></tr>
</table>

Physiological Data Troubleshooting

Problem	Solution
No ECG signal is displayed	• Ensure the ECG cable is connected to the physiological monitoring and control system, and the keyed end of the cable is connected to the Vevo cart.
ECG signal appears flatlined	• Ensure that the ECG monitor is producing a strong, consistent signal.
ECG signal is poor	• Ensure that all of the animal's limbs are secured to the ECG pads on animal platform. • Ensure that no gel has leaked onto any of the contacts on the animal platform. • Ensure that there is no 50/60 Hz noise source near the animal platform (for example a lamp or a power cable).
Blood pressure signal is not accurate	• Calibrate the blood pressure signal. • Check calibration in Physiology panel. • Check positioning and operation of blood pressure catheter.

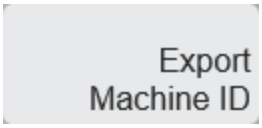
License Update

Your system license and enabled features are mapped to your specific machine, as identified by the machine ID. To update your license and enable new features, you need to:

1. Export your Machine ID and send it to Technical Support (refer to Contact and Legal Information on page 346)
2. Receive a new license file from Technical Support.
3. Use the updated license file to update your system.

To Export Your Machine ID

1. Open the **System Information** menu, and navigate to the **System Information** tab.
2. Tap **Export Machine ID**.



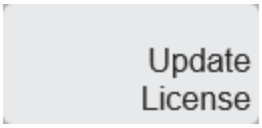
3. When prompted, select a desired location for the export and then tap **Export**.

The machine ID is then saved to a text file that can be sent to Technical Support.

To Update Your System License

Once you have received a new license file:

1. Save the license file on a USB storage device.
2. Open the **System Information** menu, and navigate to the **System Information** tab.
3. Tap **Update License**.



4. In the file browsing panel on the left, navigate to the appropriate location for the USB storage device and select the update file.
5. Tap **Update**. An Update Progress dialog appears.
6. Once the update is complete, tap **Done**.

Session Tasks

An imaging session involves either scanning and acquiring a new image, or reviewing an image saved from a previous imaging session.

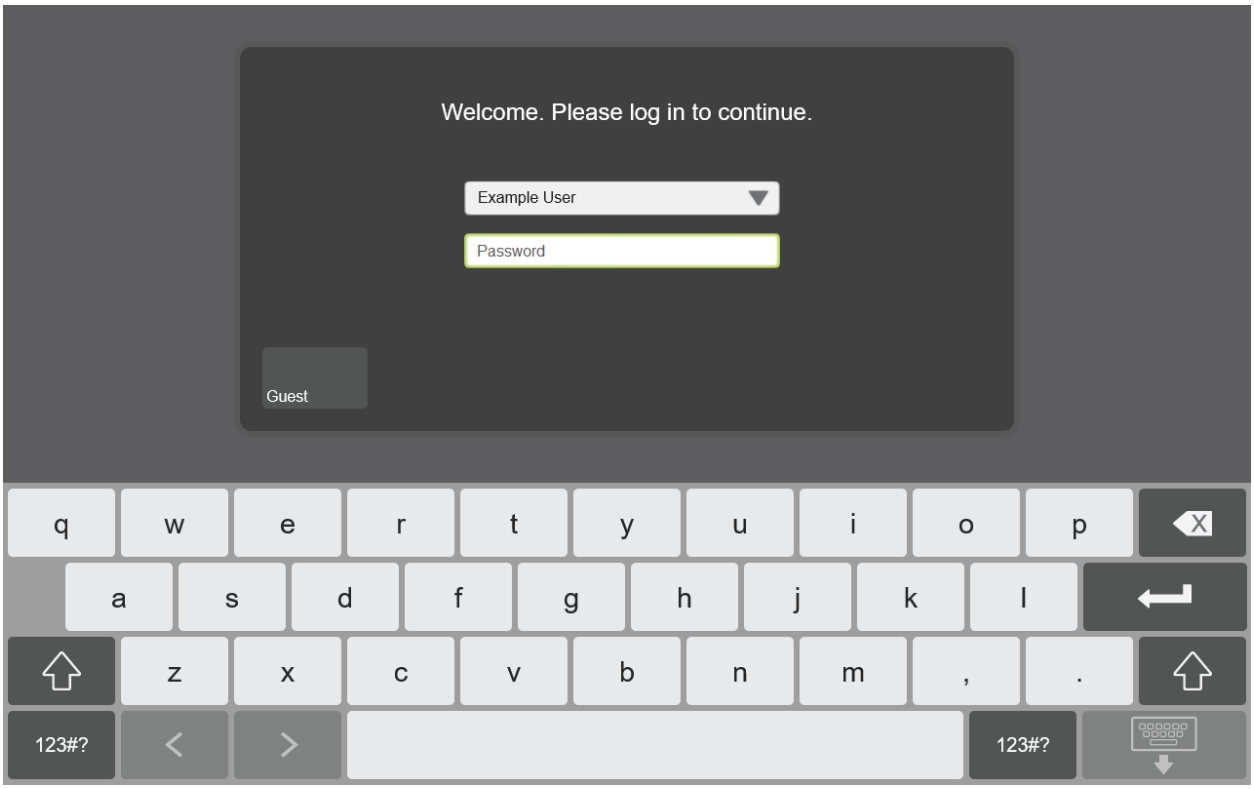
A typical imaging session consists of the following steps:

1. Turn on the Vevo F2 (refer to System Startup on page 59).
2. Log into the Vevo F2 (refer to Logging In below).
3. Acquire an image, or open a previously saved image.
    - To acquire an image, select a transducer and an imaging mode (from the Modes on page 152), then position the transducer on the animal.
    - To open a previously saved image, refer to Working With Images on page 276.
4. Navigate the interface, using the controls to switch viewing modes and adjust the image as necessary. For more information, refer to:
    - Image Display on page 152
    - Control Panel Interface (Scanning) on page 82
    - Control Panel Interface (Review) on page 84
5. Add markup to the image, such as:
    - Annotations on page 106
    - Measurements on page 111
6. Save the image (refer to Saving Frames or Clips on page 148).
7. Log out (refer to Logging Out on page 150).

> **Note:** This section assumes that the Vevo F2 Imaging System, Vevo LAZR-X laser cart (if required), all required accessories, and all specimens are ready for the imaging session. For information about setup, refer to Setup and Maintenance on page 26.

Logging In

Once the Vevo F2 is on, the system software starts and the control panel displays the login page:



The login page

To log in:

1. At the login page, tap the appropriate user ID.
    - If you are the administrator, tap **Administrator**.
    - If you are have a user ID, tap your user ID.
    - If you do not have an account, tap **Guest**.

    Note: User accounts must be created by an administrator. For more information, refer to Add a New User on page 322.

    Note: If no accounts have been made, refer to Logging On for the First Time on page 61.

2. If prompted, enter your password and tap **Log in**.

Interface Overview

Once logged in, the Vevo F2 interface appears.

This interface is split between two screens:

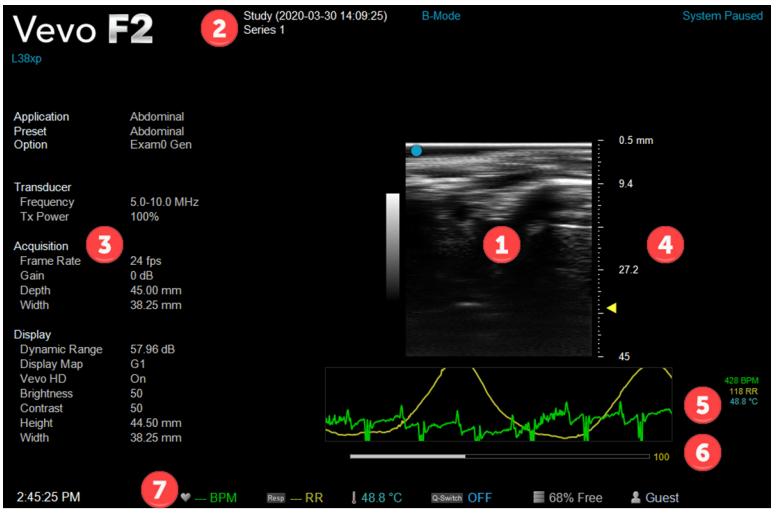
- The image display: The top monitor, which displays imaging data.
- The control panel: The bottom touch screen, which serves as the interface for the system.

Image Display

The image display displays imaging data.

The following example is from a B-Mode image.

> **Note:** The interface shown on the image display may vary slightly depending on scanning mode.



The image display when in B-Mode.

The image display interface is split into common elements that appear across all imaging modes, and a central working area that contains elements specific to the active imaging mode.

This section lists all common interface elements. For information about mode-specific elements, refer to subsections linked from the Modes on page 152.

Common Interface Elements:

1. Image feed
2. Image status area
3. Mode settings panel
4. Image scale
5. Physiological data trace
6. Clip buffer
7. Status bar

Image Feed

This area displays the current image, which is either a live image, a frozen image taken from the live image, or a previously saved image.

Image Status Area

This area contains general information about the current image. Information displayed includes:

- The transducer currently in use
- Study/series information
- Image status (whether it is a live image, or an image in review)
- Mode-specific information (which varies depending on the current imaging mode)

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.

Image Scale

Indicated in millimeters, the distance from the face of the transducer to the tissue being imaged.

Physiological Data Trace

Displays the animal's dynamic heart rate, respiration rate and blood pressure data.

> **Note:** The animal's temperature is not included as a data trace however, it is shown on the status bar and also to the right of the physiological data trace window.

This data is gathered by the animal monitoring system that connects to the Vevo Imaging Station.

During acquisition, this area shows the live physiological parameters. During review, this area shows the physiological parameters at the time of acquisition. During review, live physiological data values for the animal are also shown on the status bar.

Clip Buffer

Displays the length of the clip. When in review mode, there is a triangular white marker that identifies the individual frame number within the clip. To display a sub-range of the original clip, use the **Clip Sub-range** button (refer to Clip Sub-range on page 90).

Status Bar

The following information is shown on the status bar:

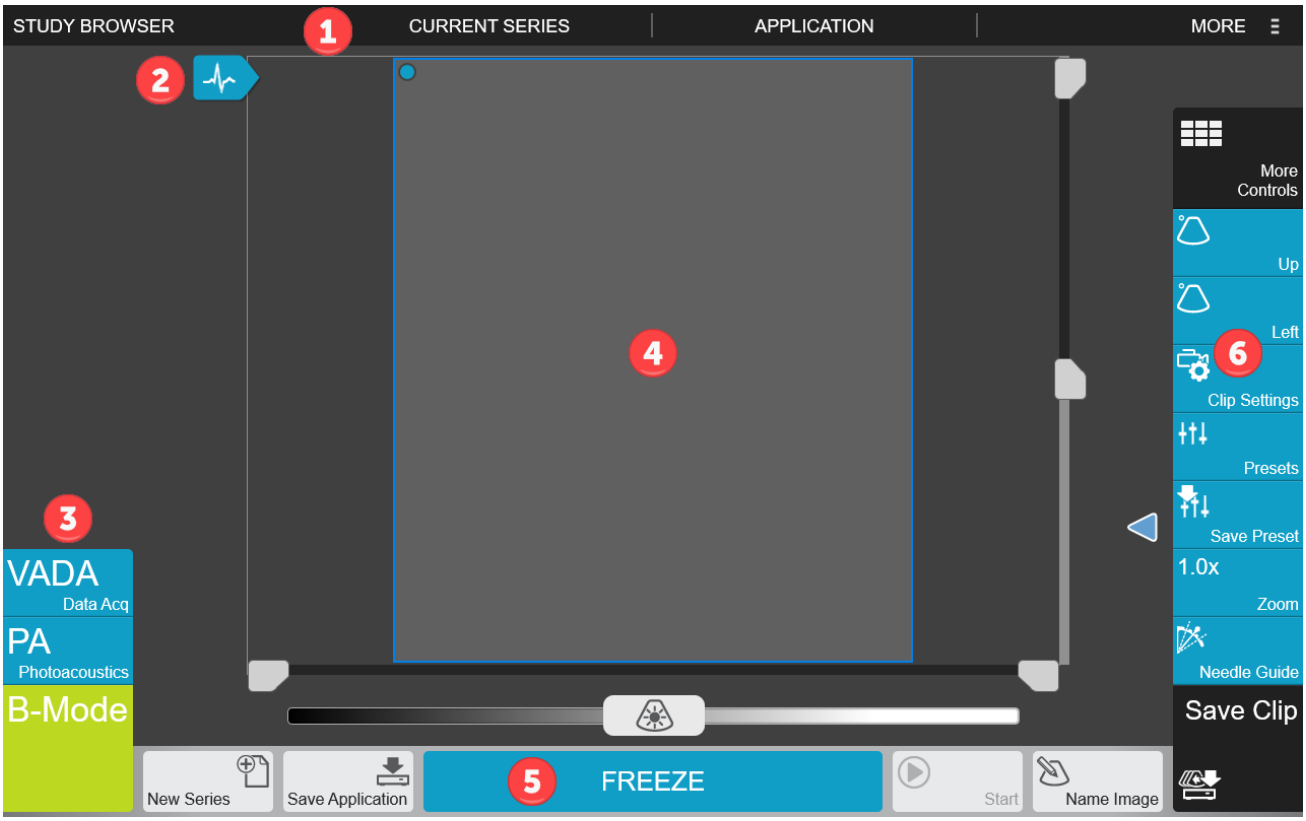
- Monitored physiological values in real time during image acquisition, if the Vevo Imaging Station is connected and the system is configured appropriately. These value are color-coded to correspond to the physiological trace.

- Percentage of free space available for image data. Used to see when you should start to back up image data to free up space on the system.
- Current user name.
- Current time.
- Various status updates when imaging parameters are changed and some image processing progress information.

Control Panel Interface (Scanning)

During an imaging session, the control panel displays universal controls that can be used during any scanning session, as well as controls that are specific to the currently selected scanning mode.

The control panel interface is split into the following sections.



1. Navigation Bar
2. Tabs
3. List of Scanning Modes
4. Mode-Specific Controls
5. General Controls
6. Imaging Controls

Navigation Bar

The bar across the top of the interface contains a series of items that are used to access studies, applications, and other menus in the Vevo F2 software.

Tap an item on the navigation bar to navigate to the respective menu.

- Study Browser: Opens the Study Browser.
- Current Series: Opens the current series.
- Application: Opens the application menu, which allows the user to switch application packages and transducers.
- More: Opens a submenu that leads to the following features:
    - Vevo F2 Imaging System Help
    - System Settings
    - Log Out

Tabs

This is a series of tabs that lead to additional control panels related to the imaging session.

- Physiology: Used to access the animal monitor menu, which manages and tracks the animal's physiology during an imaging session.
- Laser: Used for laser-specific functions when in PA-Mode.

List of Scanning Modes

The bar to the left of the interface features a customizable list of scanning modes. This list serves as a hotbar, allowing the user to quickly swap between modes during an imaging session.

- To switch scanning modes, tap the appropriate mode button (such as B-Mode).

> **Note:** To set which modes appear on this bar, refer to Mode Controls on page 141.

Mode-Specific Controls

The gray square in the middle of the interface, and the immediate area surrounding it, contain controls that are specific to the currently selected imaging mode. This includes controls that adjust the image to bring desired elements into focus.

For example, when scanning in B-Mode, this area contains controls for things such as focus, depth, gain, and TGC control.

For a list of each mode's mode-specific controls, refer to Modes on page 152.

General Controls

The bar along the bottom of the interface contains controls that are universal to all imaging modes. This includes functions such as:

- Freeze: Freezes the current frame of the image for viewing or to insert markups (such as measurements or annotations).
    - To freeze the image at any time, tap **Freeze**.

      Once the image is frozen, the **Freeze** button is replaced by a **Slide to Scan** slider.

    - To resume the live image, slide the green arrow to the right.
- Save Clip: Saves the currently captured images as a video clip.

> **Note:** For more information about general controls, refer to General Controls on page 142.

Imaging Controls

The bar along the right of the interface contains controls that adjust or refine the image. This list serves as a hotbar, allowing the user to easily access commonly used adjustment features.

- To use an imaging control, tap the control mode button.
- To set which imaging controls appear on this bar, tap **More Controls**.

> **Note:** For more information about the More Controls menu, refer to Imaging Controls on page 145.

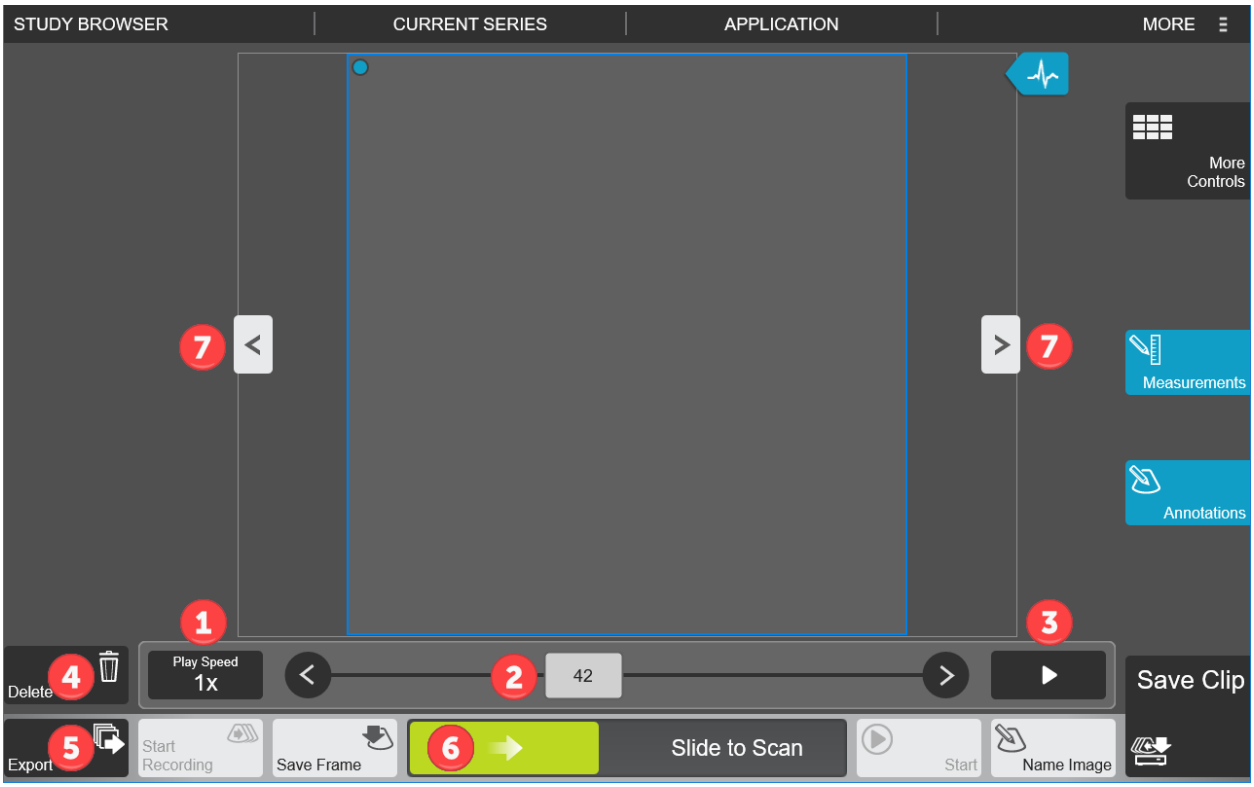
Control Panel Interface (Review)

When viewing a previously saved image, the control panel displays a different set of controls than those that appear during a scanning session.

The controls that appear during a review allow the user to manipulate the view of the recorded image, as well as add markup to it.

> **Note:** The control layout in review mode is stored separately from the control layout in scanning mode. Users can customize the control layout in one mode without interfering with the layout in the other mode.

The control panel interface is split into the following sections.



1. Play Speed
2. Clip slider
3. Play/Pause
4. Delete
5. Export
6. Slide to Scan
7. Next/Previous Image

Play Speed

Adjusts the playback speed of a clip. To adjust the play speed, tap this button, then use the **Up** and **Down** buttons to increase or decrease the play speed.

This control is not available when reviewing images that consist of a single frame.

Clip Slider

Shows the current position and frame viewed in a clip.

- To view different frames in a clip, drag this slider along the line.
- To view the next or previous frame in the clip, use the arrow buttons at the each end of the slider.

This control is not available when reviewing images that consist of a single frame.

Play/Pause

Plays, pauses, or resumes the currently selected clip. Not available when viewing single image frames.

Delete

Deletes the current image. You will be prompted with a confirmation message before the image is deleted.

Only available when viewing saved images.

Export

Exports the current image.

Slide to Scan

Used to resume live imaging. To use this control, slide the green arrow to the right.

Next/Previous Image

Used to switch to the next or previous image in the series.

Only available when viewing saved images.

List of Imaging Controls

This section lists all imaging controls that are available in the Vevo F2, and which modes they are available in. The Controls and Modes table indicates whether each control is available in live mode, review mode, or both.

To select a control, tap the appropriate icon on the Controls bar.

> **Note:** If a control is not on the Controls bar, it can be found in the More Controls menu. To customize which controls appear in the Controls bar, see Customizing the Control Panel on page 140.

Controls and Modes

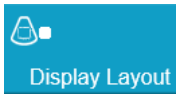
Control	B-Mode	PA-Mode	VADA Mode
Annotations on page 90	Review	Review	Review (If live image collected)
Brightness on page 90	Review	Review	Review (If live image collected)
Clip Settings on page 90	Both (Only in review if transducer is initialized)	Both (Only in review if transducer is initialized)	Both (Only in review if transducer is initialized)

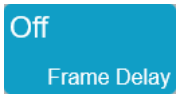
Control	B-Mode	PA-Mode	VADA Mode
Clip Sub-range on page 90	Review	Review	
Contrast on page 90	Review	Review	Review (If live image collected)
Display Layout on page 90		Both	
Display Map on page 91	Both	Both	Both (In review if live image collected)
Dynamic Range on page 91	Live		
Focal Zone on page 91	Live		
Frame Delay on page 91		Live	
LAZR Port on page 92		Live	
Live Image on page 92			Live
Magnify Scale on page 92	Review	Review	
Measurements on page 92	Review	Review	
Multi-wavelength on page 92		Live	

Control	B-Mode	PA-Mode	VADA Mode
Multiplex on page 93		Review	
Needle Guide on page 93	Both		
Option on page 93	Live		
Orientation on page 93	Both	Both	Both
Oxy-Hemo on page 94		Live	
PA Guide on page 94		Live	
Persistence on page 94	Live	Live	
Presets on page 95	Live	Live	Live
Preview on page 95			Live
Priority on page 95		Live	
Pulse Sequences on page 95			Live
Review on page 95			Review
RF on page 96	Both	Both	
Save Preset on page 96	Both	Both	Live

Control	B-Mode	PA-Mode	VADA Mode
Sensitivity on page 96		Live	
Show Values and Labels on page 96	Review	Review	
Single on page 97		Live	
Spectro on page 97		Live	
Spectro Settings on page 97		Live	
Speed of Sound on page 97			Live
Transducer Settings on page 97			Both
Transmit Delays on page 98			Live
Transmit Power on page 98	Live		
Vevo HD on page 98	Live		
Voltage on page 98			Live
Waveforms on page 98			Live
Zoom on page 98	Both	Both	

Control Descriptions

Control	Description
Annotations 	Adds annotations to an image.
Brightness 	Adjusts the brightness of the image. The current brightness is displayed on the button.
Clip Settings 	Opens the Clip Settings menu. For more information, refer to Configuring Clip Settings on page 149.
Clip Sub-range 	Opens the Clip Slider, which is used to crop newly acquired clips before saving them, or to crop saved clips to a desired portion of the full clip length. When the Clip Slider appears: 1. Move the crop sliders to their desired positions. 2. (unsaved clips only) **Tap Crop and Save**. 3. Tap **Cancel** to remove the clip sliders. Not available for Multi-wavelength, Spectro, and Unmixed images.
Contrast 	Adjusts the contrast level of the image. The current contrast is displayed on the button, and also stored in the Mode Settings menu, under PA Contrast. Only available when the Display Layout is set to Both, PA Only, or Side by Side. Not available for Oxy-Hemo images, or for images that have been multiplexed.
Display Layout 	Changes the layout shown on the image display when in PA-Mode. Used to swap between B-Mode Only, Both, PA Only, or Side by Side layouts. Does not affect the actual image data collected.

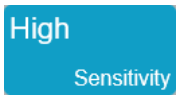
Control	Description
Display Map 	Opens a menu of predefined display maps that can be applied to the current image. Can be used at any time during live scanning or review. Only displays display maps available for the currently selected imaging mode.
Dynamic Range 	Adjusts the input signal strength that is mapped to the spectral display. The allowed range varies depending on the transducer connected. Tap this control to open a set of flyout controls: • Tap the **Up** and **Down** buttons to adjust the dynamic range up or down. For reference, the current range appears on the control, and is also embedded in the image when it is saved.
Focal Zone 	Adjusts the focal zone (or zones) applied to the image. Focal zones increase the resolution of the image, at the cost of a reduced frame rate. The system always has at least one focal zone, but additional focal zones can be added. Tap this control, and then use the **Up** and **Down** buttons to cycle through the available focal zone options: • Single zone • Two zones • Three zones **Note:** This control is disabled when using system factory presets that do not support focal zone adjustments. If the selected preset uses Vevo HD, then disable Vevo HD to enable the Focal Zone control.
Frame Delay 	Sets the delay between sets of images during acquisition. For example, if you acquire a PA-Mode (Multi-wavelength) image at 700 nm, 750 nm and 800 nm, the system will collect the first three wavelengths, then wait for the time specified by this setting before acquiring the next three wavelengths. The following frame delay settings are available: Off, 5 seconds, 10 seconds, 30 seconds, and 60 seconds.

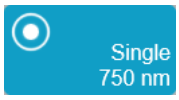
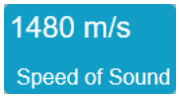
Control	Description
LAZR Port 	Selects the laser port used on the Vevo LAZR-X laser cart. To set the laser port: 1. Tap **LAZR Port**. 2. Select either the 680-970 nm (Signal) or 1200-2000 nm (Idler) range. 3. Insert the Vevo Optical Fiber into the corresponding port on the laser cart, and secure the fiber with the lever lock. The LAZR Port button then updates to the selected port wavelength range, and the default wavelength value of the Single scanning sub-mode is also updated.
Live Image 	Displays channel data on the clinical display from an unsteered plane wave acquisition.
Magnify Scale 	Adjusts the magnification level of an area when placing a measurement or annotation. To change the magnification, tap this button, then use the **Increase** or **Decrease** flyout buttons to select a magnification level between 2x and 8x.
Measurements 	Opens the Measurements menu. Use this menu to select and add a measurement to an image. For more information, refer to Measurements on page 111.
Multi-wavelength 	A sub-mode used to acquire images at multiple wavelength. Such images can then be multiplexed or unmixed, if necessary. This button opens a Scan Settings menu, which is used to add components and customize wavelengths before you start scanning. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176

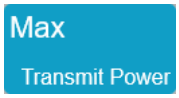
Control	Description
Multiplex 	The Multiplex control combines groups (or sets) of wavelengths and components into a single frame, as a way to visualize more information at the same time. Available for the PA-Mode (Spectro) and PA-Mode (Multi-wavelength) sub-modes. For more information, refer to Multiplex.
Needle Guide 	Toggles the Needle Guide on and off. For more information, refer to B-Mode Needle Guide for Injections on page 164.
Option 	Used to optimize the image during acquisition. Opens a list of options that help optimize the image based on the specimen being imaged. Tap **Option**, then select one of the options from the flyout menu.
Orientation    	Sets the image orientation, allowing you to align the image with the transducer. The blue dot shown at the corner of the control panel and image display corresponds to this setting. There is an Up/Down button and a Left/Right button. Each button shows the orientation that is not currently selected. Tap the appropriate button to select an orientation.

Control	Description
Oxy-Hemo 	A sub-mode used to create an overlay of oxygen saturation on an image. These images are created by acquiring two wavelengths — 750 nm and 850 nm. Use when you want to see an overlay of oxygenated (red) and deoxygenated (blue) blood on one image. This sub-mode is not available if the laser cart is using the Idler (1200-2000 nm). For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Oxy-Hemo Settings 	Opens a submenu that is used to set the display type, threshold HbT, and sO_2 range for Oxy-Hemo images. Available in PA-Mode For more information, refer to Oxy-Hemo Settings.
PA Guide 	Activates a series of screen overlays intended to help you position the transducer to the animal's skin line for optimal image quality. For more information, refer to PA Guide on page 190.
Persistence 	Applies a pixel-averaging algorithm to the most recently acquired frames to produce a more uniform view of the image area. This feature reduces shimmering and motion artifacts in faster moving tissue, and is useful for imaging uniform tissues such as the liver, kidney, or prostate. If in PA-Mode, tap **Persistence**, then select a desired level of strength for the feature. Each level corresponds to the number of frames used in the algorithm: • Off = 1 frame • Low = 4 frames • Med = 8 frames • High = 12 frames • Max = 20 frames

Control	Description
Presets 	Opens the Presets menu. Use this menu to select an appropriate preset. Each preset contains settings for the following: • Pulse Sequence • Speed of Sound • Voltage • Gain/TGC sliders • Display map settings For more information, refer to Applications & Presets on page 287.
Preview 	Opens the Preview tab of the VADA configuration panel. For more information, refer to Preview on page 255.
Priority 	Adjusts the priority relationship between the overlay data and the background B-Mode data to 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. To use this feature, tap **Priority** and use the up/down buttons to select a desired value. Priority is only available in the Both display layout. This feature is disabled if the image is multiplexed.
Pulse Sequences 	Opens the Pulse Sequences tab of the VADA configuration panel. For more information, refer to Pulse Sequences on page 229.
Review 	Opens the Review dialog in VADA Mode. Only available after acquiring and/or saving an image. For more information, refer to Review on page 262.

Control	Description
RF 	Toggles RF data collection and RF data display. During live imaging, you can toggle both RF data collection and RF data display. During review, the RF Display button is only enabled for images that were captured with RF data. For more information, refer to Digital RF on page 103.
Save Preset 	Saves all current settings into a preset. Saved presets are accessed through the Presets control. If in staging mode in PA-Mode (PA-Mode is selected but the Start button has not been pressed), preset settings will apply to PA-Mode. To save or load a B-Mode preset, tap outside the PA-Mode box to deactivate it first, then save or load a preset. For more information: • Applications & Presets on page 287 • PA-Mode Image Acquisition Workflow on page 173
Sensitivity 	Changes the sensitivity level of the ultrasound signal by adjusting the signal-to-noise ratio. Use this setting to: • identify weak-signal targets in the near field (difficult to distinguish because of small size). • identify large targets in the far field (difficult to distinguish because of attenuation). **Note:** The higher the sensitivity level, the lower the frame rate of the image.
Show Values and Labels 	Shows or hides measurement values and labels on an image in review.

Control	Description
Single 	A PA-Mode sub-mode used to acquire images at one wavelength. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Spectro 	A PA-Mode sub-mode that acquires data across the entire wavelength range (680-970 nm or 1200-2000 nm). This mode is typically used for characterizing photoacoustic contrast agents. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Spectro Settings 	Opens the Spectro Scan Settings menu, where the following options can be changed: • Step Size (1 nm, 5 nm, or 10 nm) • Scan Method (low to high, or high to low) Only available when the Spectro sub-mode is selected.
Speed of Sound 	Sets the expected speed of sound for a VADA Mode session. Used to select a speed of sound that corresponds to the medium used (such as gel or water). To set the speed of sound, tap this button and then click **Configure** to open the Speed of Sound menu. The button itself also shows the currently selected speed of sound. For more information, refer to Speed of Sound on page 205.
Transducer Settings 	Opens the Transducer Settings menu in VADA Mode. This menu displays the properties of the currently selected transducer.

Control	Description
Transmit Delays 	Opens the Transmit Delays tab of the VADA configuration panel. For more information, refer to Transmit Delays on page 217.
Transmit Power 	Adjusts the power of the ultrasound signal transmission. To adjust the transmit power, tap this control, then select one of the following power levels: • Max • High • Mid • Low • Min
Vevo HD 	Toggles the Vevo HD feature. Vevo HD is an image processing filter that reduces speckle noise and artifacts in images while enhancing critical tissue information. This control is only available if Vevo HD is supported by the currently selected preset. For some exams, Vevo HD will also activate spatial compounding. The left side of the image indicates whether this is activated.
Voltage 	Opens the Voltage flyout menu in VADA Mode, which allows you to select the voltage range used by the transducer. For more information, refer to Voltage on page 209.
Waveforms 	Opens the Waveforms tab of the VADA configuration panel. For more information, refer to Waveforms on page 222.
Zoom 	Changes the amount of zoom applied to the image.

Common Tasks

During an imaging session, the Image Display shows a live feed of the image, and the control panel shows an interface specific to the currently selected mode.

You can do any of the following tasks at any time during an imaging session:

- Change modes
- Change transducers or applications
- Adjust the image
- Freeze the image or resume scanning
- Insert markup into the image
  The following markup types are available:
  - Annotations
  - Measurements
- Change the controls shown on the control panel
- Save an image or clip

Change Scanning Modes

To change scanning modes, tap the appropriate mode button on the control panel.

For a full list of available modes and descriptions, refer to Modes on page 152.

Change Transducers or Applications

To change transducers, refer to Connecting and Disconnecting Transducers on page 44.

To change transducer applications, refer to Selecting a Transducer or Application on the next page.

For more information about transducer applications, refer to Managing Applications on page 291.

Adjust Image

To adjust the image currently displayed, use the imaging controls on the control panel.

Image adjustment controls vary between modes. For more information about the image adjustment controls for a particular mode, refer to the list of controls for that mode. For example, for B-Mode controls, refer to B-Mode Control Panel Interface on page 154.

Freeze Image/Resume Scanning

Certain tasks, such as viewing a clip or adding measurements, require you to stop live imaging by freezing the image.

To freeze the image at any time, tap **FREEZE**.

When an image is frozen, the bottom bar of the control panel changes to a Slide to Scan slider.

To resume live imaging, drag the green arrow in the **Slide to Scan** slider to the right.

If you freeze the clip while recording, the recording continues in the background while you work with the frozen image. Using the Slide to Scan slider returns the interface to the live image.

Insert Markup

There are several types of markup that can be added to an image:

- Measurements on page 111: A marker highlighting a measurement, such as angle or distance.
- Annotations on page 106: User-entered notes that are embedded into the image.

Change Controls on Control Panel

Most buttons along the left, bottom, and right bars on the control panel are interchangeable. Users can move and swap buttons on each of these bars to ensure that their most commonly used controls are in convenient places.

All buttons that are not on the control panel are stored in the More Controls menu.

For more information, refer to Customizing the Control Panel on page 140.

Save an Image or Clip

Images can be saved as single frames, or as video clips. This can be done at any time during an imaging or review session.

For more information, refer to Saving Images on page 147.

Selecting a Transducer or Application

Transducers and applications are selected in two different parts of the interface:

- From the Home screen
- From the Application menu

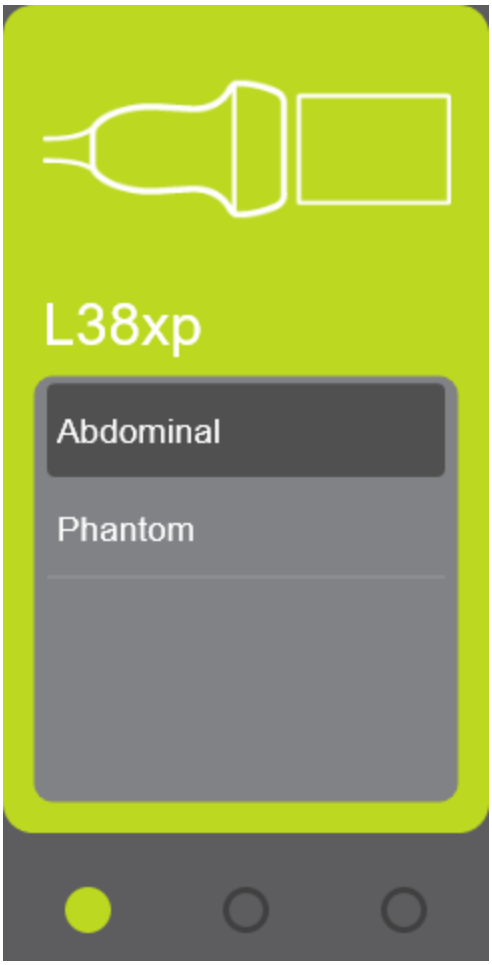
For information about how to manage applications, refer to Managing Applications on page 291.

Selecting a Transducer or Application from the Home Screen

By default, the Home screen appears after logging in.

> **Note:** The Home screen can be skipped by selecting a different startup page in the General section of the System Settings menu. For more information, refer to Startup on page 307.

On the Home screen, a green button appears.



This button contains the following information:

- The name at the top is the model of the transducer.
- The gray list is a list of applications for the transducer.
- The three dots below the button show which transducer interface the currently displayed transducer is connected to. For example, the leftmost dot represents the leftmost transducer interface, from the perspective of a user facing the front of the Vevo F2
    - Each dot represents the status of each transducer interface.
        - A green dot represents the interface that is currently in use. The black dots represent interfaces that are not in use.
        - If the dot is an empty circle instead of a filled dot, this indicates that the transducer port is currently not connected to a transducer.

To Select a Transducer and Application After Logging In

1. Tap the appropriate dot for the transducer interface you intend to use.
2. When the transducer appears, tap the desired application for the transducer.

A progress bar will appear while the selected transducer and application are loaded. Once loading is complete, the scanning interface appears.

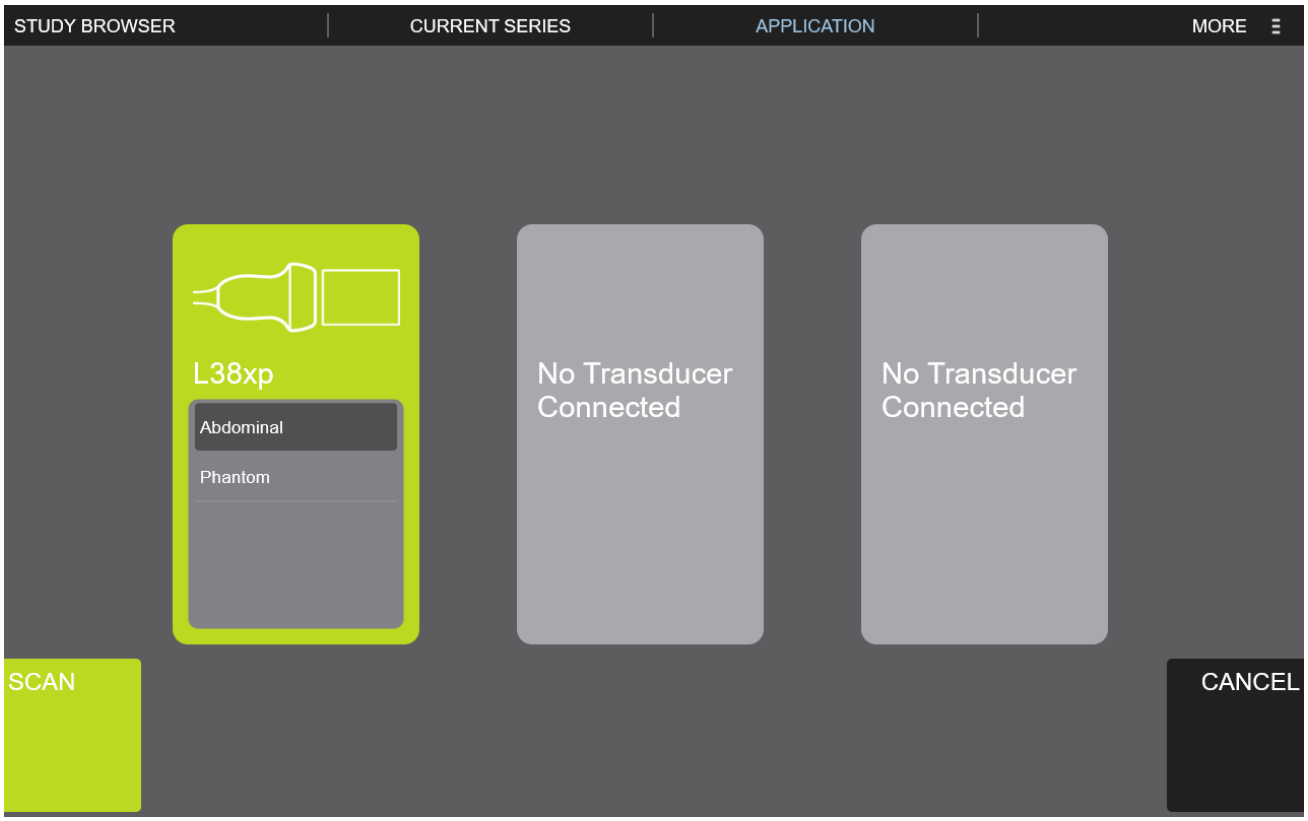
Selecting a Transducer or Application From the Application Menu

During an imaging session, you can switch transducers or applications at any time through the Application menu.

To Select a Transducer and Application Through the Application Menu

1. During an imaging session, tap **Application**.

The Application menu appears.



2. Tap the desired transducer or application.

A progress bar will appear while the selected transducer and application are loaded. Once loading is complete, the scanning interface appears.

Digital RF

Digital RF (or RF-Mode) allows users to acquire, digitize and view the RF data from the high-frequency ultrasound signal.

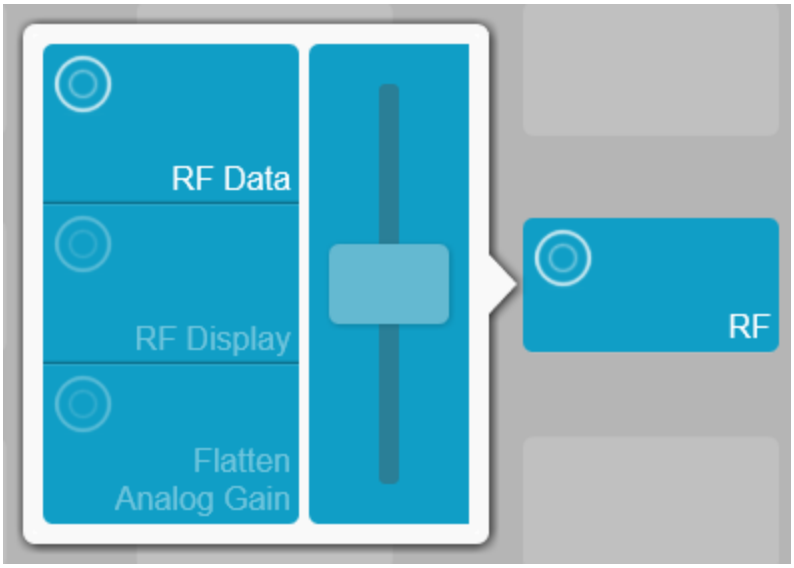
The data can be envelope-detected and log-compressed to then be exported in a range of file formats, including a Raw data file. The envelope format is a useful way of storing raw data that correlates exactly to what is seen in the B-Mode image, and is readily available for image processing applications.

RF data acquisition is available for B-Mode and PA-Mode.

Acquire RF Data

To acquire RF data:

1. During image acquisition, tap **RF**. This opens a flyout menu.



2. Tap **RF Data** to start acquiring RF data.

When RF Data is enabled, the following things occur:

- The image display shows the envelope signal from the grayscale data as an A-scan line appearing in yellow at the position in the image indicated by the red arrow at the top of the field of view.
- Saturation of the image is shown in the A-scan line as a plateau in any of the peaks. Saturation is also indicated on the image by a blue overlay. The overlay is displayed together with the A-scan line, and can be toggled by tapping **RF Display**.
- On the image display, the name of the active mode is prefaced with **RF** on the screen label to

indicate that you are in RF-Mode.
- Respiration gating is disabled.

3. If desired, enable the other RF options:
   - To see the envelope signal, A-scan line, and RF overlay, tap **RF Display**.

> **Note:** When reviewing images, only the **RF Display** control is available, and only if the image was acquired with RF data. The button toggles the display of RF data on or off.

   - To replace the default gain curve and replace it with a fixed gain across all depths, tap **Flatten Analog Gain** and then use the slider to select the desired gain.

> **Note:** This function is available because all Vevo F2 imaging modes apply a base gain curve that varies with depth to account for the attenuation of the ultrasound signal through tissue. This control replaces that gain curve with a fixed gain for applications that benefit from it.

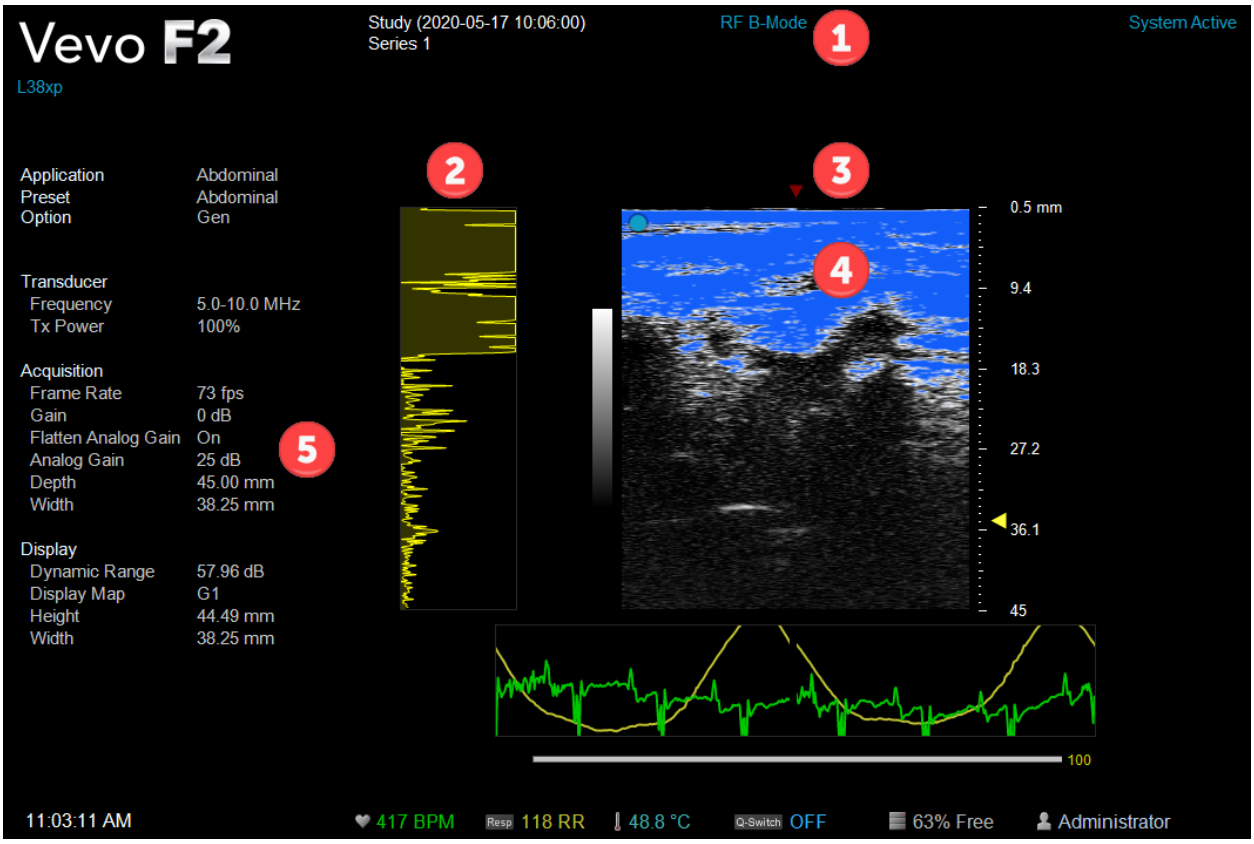
4. Save the image (refer to Saving Images on page 147).

Once saved, RF data is saved for all data lines in the image.

> **Note:** The file size of an image saved with RF data enabled is significantly larger (approximately 3 times larger) than the same image saved without RF data.

RF Image Display Interface

When RF Data is on, the image display shows several additional items.



The image display when RF is turned on in B-Mode

1. **Image status area**: Adds "RF" before the imaging mode name (such as "RF B-Mode) to indicate that RF is turned on.
2. RF signal envelope: The RF signal envelope is displayed as a yellow A-scan line. This is only shown when both RF Data and RF Display are enabled.
3. **A-scan line indicator**: Indicates where the A-scan line is positioned on the image. This is only shown when both RF Data and RF Display are enabled.
4. **RF overlay**: A blue overlay is displayed on the acquired image, and indicates saturation. This is only shown when both RF Data and RF Display are enabled.
5. **Analog gain**: If Flatten Analog Gain is enabled, the information to the left of the screen shows that it is enabled, along with the current analog gain setting.

Review an RF Image

Reviewing an image saved with RF data is similar to reviewing the image in its base mode.

The only difference is that the **RF Display** control is available.

Tap **RF Display** to toggle the display of RF data in the saved image.

Export RF Data

RF data files can be exported from open images or directly from the Study Browser by tapping the **Export** button.

Before You Begin

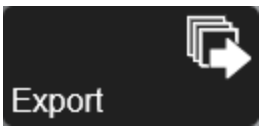
1. Tap **More**, and then tap **System Settings**.

2. Tap the **Export** tab.

3. On the Export page, select the desired RF data file formats. Depending on the mode that was used with RF data, the following formats are available:
   - **RAW data file (*.raw.xml)**: Data file used to display the log compressed data as gray scale.
   - **RF data file (*.rf.xml)**: Reconstructed RF data. Useful when the original frequency information is required.

To Export RF Data

1. Open a saved image that has RF data.
2. Tap **Export**.



3. In the Export Image window, select the target folder for the export.
   (Optional)To add a subfolder, tap **New Folder**, name the folder, and then tap **OK**.
4. In the list of export types, select **RAW/RF Data**.
5. Tap **Export**.

The system exports the files to the selected folder.

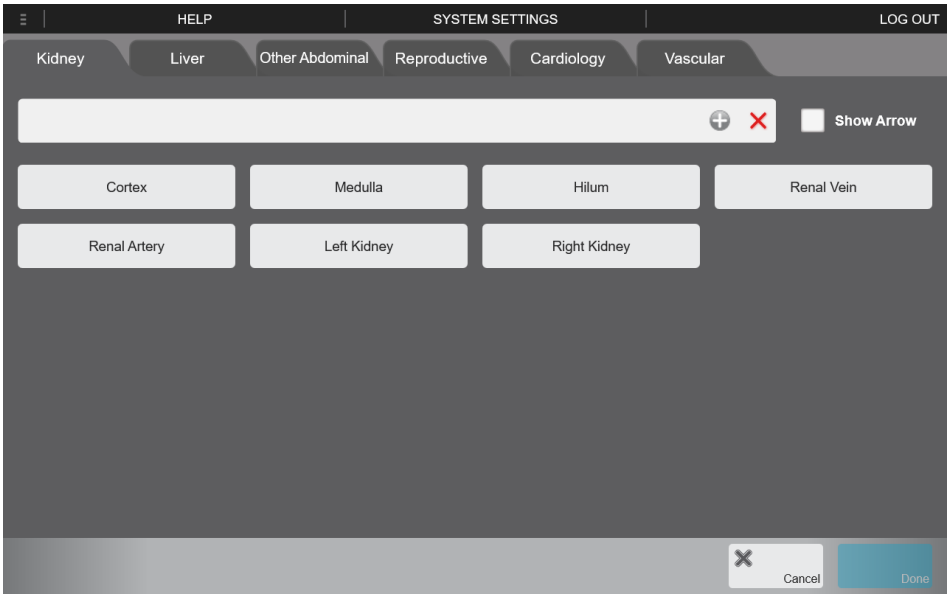
Annotations

Annotations are text labels that you can add to any 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 acquired image.

Predefined Annotations

When placing an annotation on an image, an annotations page appears with a list of predefined labels.



Annotations page

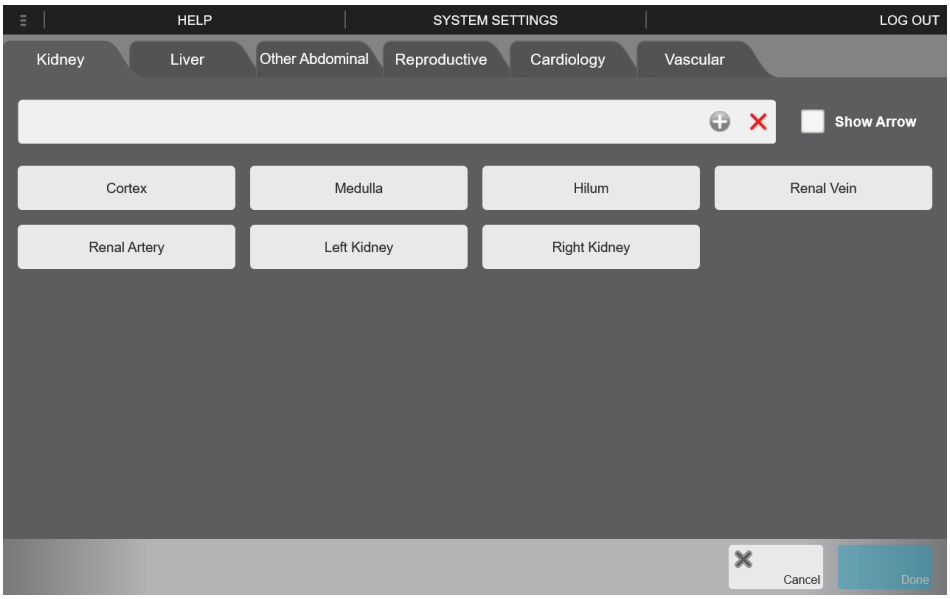
You can also create and save custom predefined labels in the System Settings menu. See Measurements & Annotations on page 310.

To Add an Annotation

1. Select the image you want to annotate in one of the following ways:
   - Acquire an image with the **Freeze** button.
   - Load an image from the **Study Browser**.
   - Select an image from the **Current Series** option from the top menu.
2. In the imaging controls, tap **Annotations**.

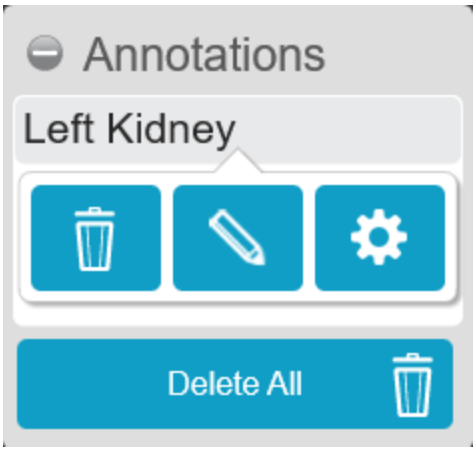
   The Annotations page is displayed.



3. You can select a predefined annotation, or enter custom text.
    - To enter a predefined annotation, select the category from the top of the page, then select the predefined label you want to add.
    - To enter custom text, tap the text entry area to show the onscreen keyboard. Enter the text you want to add as a one time custom annotation.
4. (Optional) Tap the **Show Arrow** checkbox to show an arrow when the annotation is dragged.
5. Tap **Done** to add the annotation. The annotation is placed on the image. You can then interact with the annotation using the control panel.

> **Note:** While you are placing the annotation, a magnified view of the placement area is displayed on the image display to help with a more accurate placement.

6. Drag the annotation to the desired location on the image.
7. Annotations on the image will be shown on the Annotations panel on the left of the control panel. Use the Annotations panel to edit the annotations.



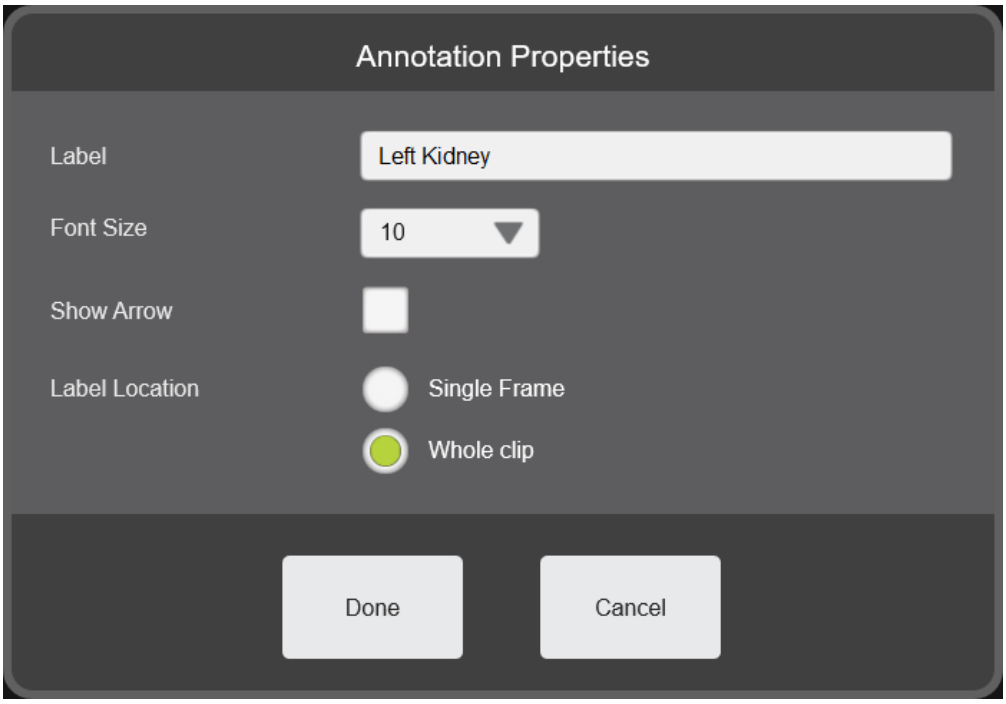
To Change Annotation Properties

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.

- Label – Tap the text box and modify the existing label as needed.
- Font Size – Tap the Font Size and select the preferred size – range is from 6 to 48. The default font size is set in the system settings. See Measurements & Annotations on page 310.
- Show Arrow – Select whether or not to show an arrow from the text to a location on the image.
- Label Location – Specify whether you want to show the annotations on the current frame of a clip or on each frame of the clip. This option is only available for frame-based modes.



To Edit an Annotation

Once an annotation is placed, you can edit the text. The image is saved automatically after you edit an annotation.

1. Tap the annotation on the image or on the Annotation panel.
2. Tap the **Edit** button and edit the text or select another predefined annotation.

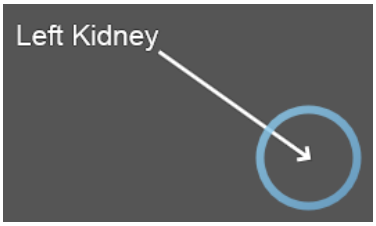
To Move an Annotation

Once an annotation is placed, you can move it to a different location on the image.

The image is saved automatically after you move an annotation.

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 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.

To Delete an Annotation

1. On the Annotations panel, tap the measurement you want to delete.
2. Tap the **Delete** button displayed below the selected annotation. The annotation will be immediately deleted.

3. If you want to delete all of the annotations on the selected image, tap **Delete All**. located at the bottom of the Annotation panel. You will be prompted to confirm the deletion of all annotations.

The annotation(s) are deleted from the image and the Annotations panel.

Measurements

The Vevo Imaging System offers several types of generic measurements.

This section lists available generic measurements, and describes how to add each one.

> **Note:** Available measurements vary depending on the currently selected imaging mode. Measurements are only available for imaging modes that support them.

When adding generic measurements, please note the following:

- Measurements will be displayed on the image display and the control panel.
- Measurements can be placed on a saved image loaded into review, any image that has been acquired during an acquisition session and an image that is in the zoom state.
- Placing or editing a measurement will automatically save the image.
- 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.

> **Note:** Protocol measurements are only available on Vevo LAB.

Measurement	B-Mode	PA-Mode
Angle on page 117	✓	✓
Area on page 118	✓	✓
Ellipse on page 124	✓	✓
Linear on page 126	✓	✓
Distance on page 122	✓	✓

Using the Measurements Panel

The Measurements panel provides tools for editing measurements on an image and options to change which measurement properties are displayed.

The Measurements panel is only displayed once the first measurement is placed on an acquired or saved image. The panel is not available during image acquisition.

> **Note:** You must pause a clip before you can place a new measurement or interact with previously saved measurements.

Common Tasks

To View Available Generic Measurements for an Image

1. Load/acquire an image into review by doing one of the following:
   - If you are in the Study Browser open a saved image. If the image is a clip, then pause the clip at the frame you want to work with.
   - If you are acquiring image data, tap **Freeze** on the control panel.
   - Select an image from the **Current Series** option from the top menu.
2. View the available measurements by tapping the **Measurements** button. Only the available measurements for the active mode will be available.

To Place a Measurement on an Image

1. Tap **Measurements**.

2. Tap a measurement from the list. The measurement is placed on the image.
3. Interact with the measurement using the control panel.
   When placing a measurement, a magnified view of the placement area is displayed on the image display.

> **Note:** The default magnification is 4x.

To change the magnification, tap **Magnify Scale** and then use the **Increase** or **Decrease** buttons.

A measurement label is displayed next to the measurement on the image. It contains the

measurement's label, number, and value.

> **Note:** The zoom can be changed while placing measurement. Changing the zoom value does not affect the measurement value, parameters, or font size.

To Use the Measurements Panel

Once a measurement is added, a Measurements panel appears on the left side of the control panel.

Use this panel to select and edit measurements.

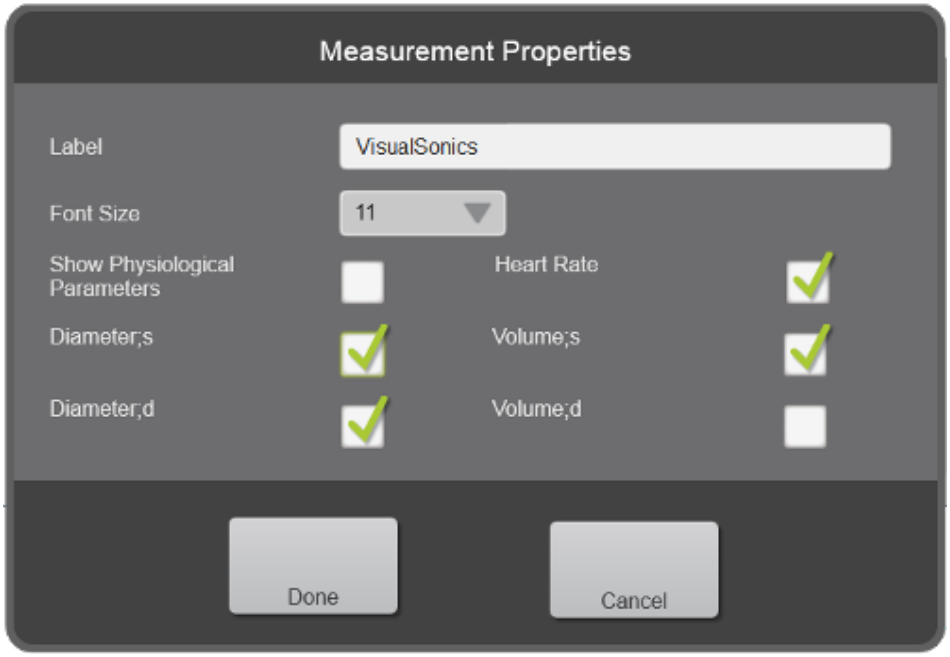
To expand or collapse the Measurements panel, tap the expand ( ) or collapse ( ) icons.

To Modify Measurement Properties

Each measurement has its own set of measurement properties that you can modify.

1. Tap a measurement in the Measurements panel.
2. Tap the **Properties** button.

3. The Measurement Properties panel is displayed.



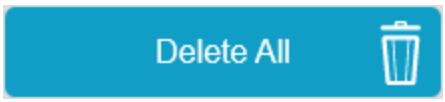
- Label – Tap the text box and modify the existing label as required.
- Font Size – Tap the Font Size and select the preferred size; range is from 6 to 48.
- Parameters – Select the measurement parameters to be displayed on both the Measurement Label and in the Measurement panel.

4. Tap the parameters that you want to display. The number and type of items displayed changes depending on the type of measurement that is selected.

To Delete a Measurement

1. On the Measurements panel, tap the measurement you want to delete.
2. Tap the **Delete** button displayed below the selected measurement.

To delete all measurements on an image, tap **Delete All** at the bottom of the Measurements panel, and accept the confirmation prompt that appears.



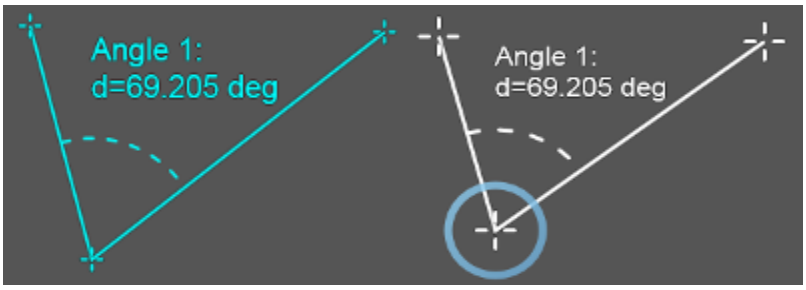
To Edit a Measurement

Once a measurement is placed, you can edit individual anchor points along the measurement. After you edit a measurement, the system software automatically saves the image.

> **Note:** Not all measurements can be modified after being placed. If you cannot modify a measurement, delete the measurement and add it again.

To edit a measurement:

1. Tap the measurement on the image or on the Measurements panel. The measurement will change color from cyan (left) to white (right).



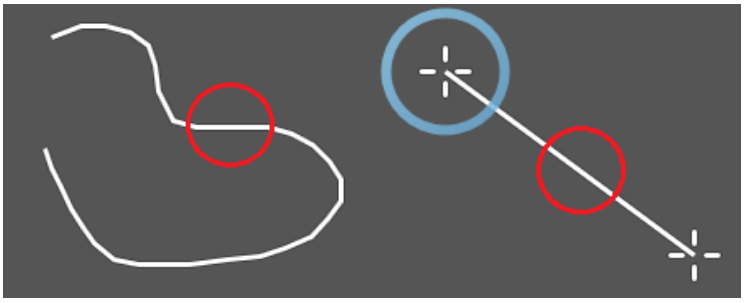
2. Tap and drag one of the measurement anchor points to the desired position. The measurement parameters automatically update on the Measurements panel.

> **Note:** Moving a measurement anchor point for a depth or time measurement will also allow you to change the location of the measurement at the same time.

To Move a Measurement

Once a measurement is placed, you can move the entire measurement to a different location on the image while maintaining its original measurement value. The image is saved automatically after you have moved your measurement.

1. Tap the measurement on the image or on the Measurement panel. When the measurement is active, it changes color to white.
2. If the measurement has a center anchor point, tap the center of the measurement. If there is no center anchor point, then drag the measurement line.
   The following examples show the center point for Distance and Linear measurements.



3. When the move is complete, lift your finger and tap anywhere outside of the measurement area to commit the measurement.

Angle

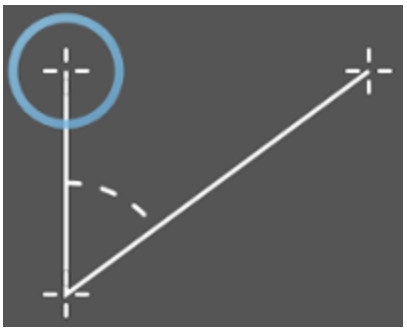
The angle measurement is available in B-Mode and PA-Mode.

To Add an Angle Measurement

1. Tap **Measurements**.

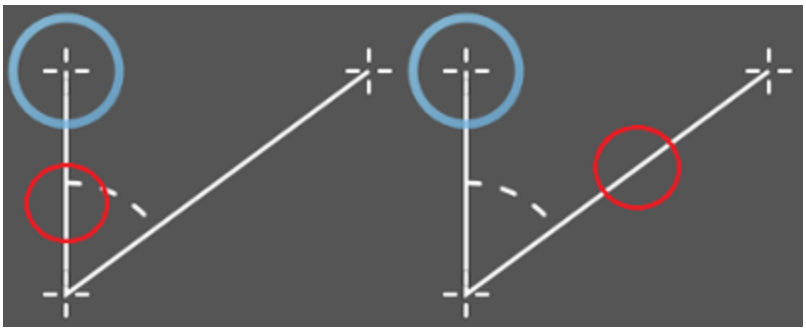
2. Tap **Angle**.

The measurement is placed on the image.

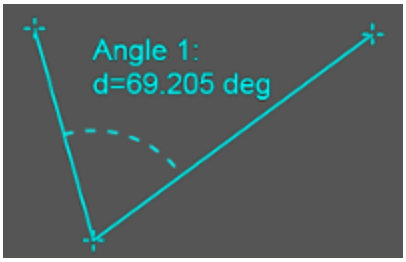


3. You can select any of the 3 anchor points for editing. Tap and drag an anchor anywhere on the image. As you move the anchor points, the parameters are updated on the Measurements panel. See Using the Measurements Panel on page 112.

4. Tap and drag either one of the two measurement lines to move the whole measurement.



5. The measurement and image are automatically saved as the measurement is adjusted.



Area

Area measurements are available in B-Mode and PA-Mode.

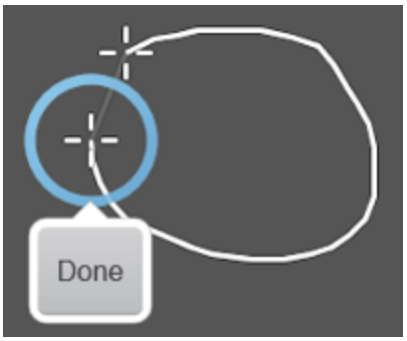
To Add an Area Measurement

1. Tap **Measurements**.

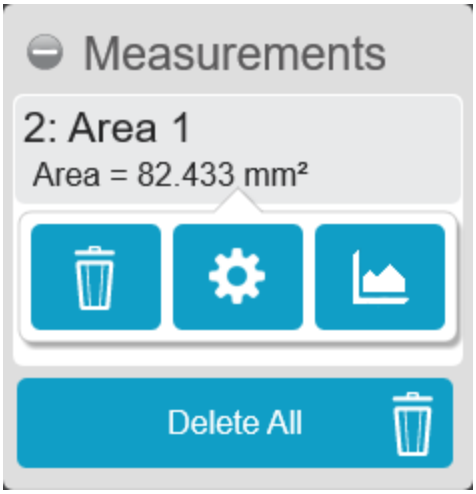
2. Tap **Area**.

An active anchor is placed on the image.

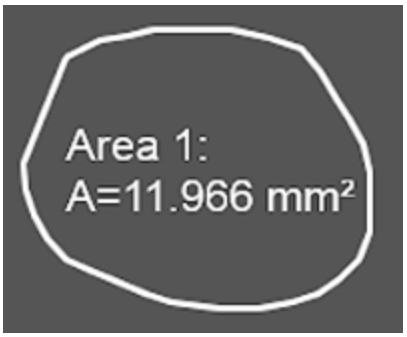
3. Tap and drag the active anchor to the desired location on the image. When you have placed the anchor in the desired starting position, tap **Set**.
4. Tap and drag the handle to draw the measurement within the image area.



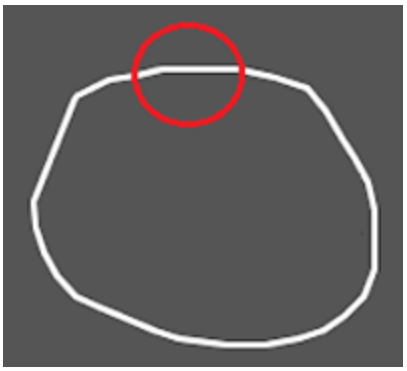
As you draw the area, the parameters are updated on the Measurements panel. Refer to Using the Measurements Panel on page 112.



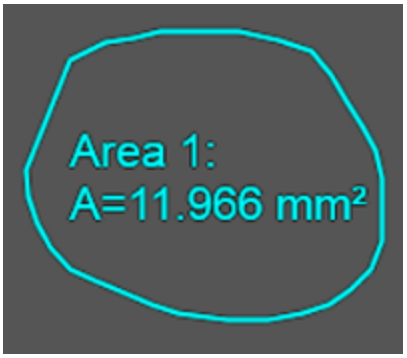
5. When you are finished drawing your measurement, lift your finger from the control panel and tap **Done**.



6. (Optional) Tap and drag the line of the area to move the entire measurement while maintaining the area.



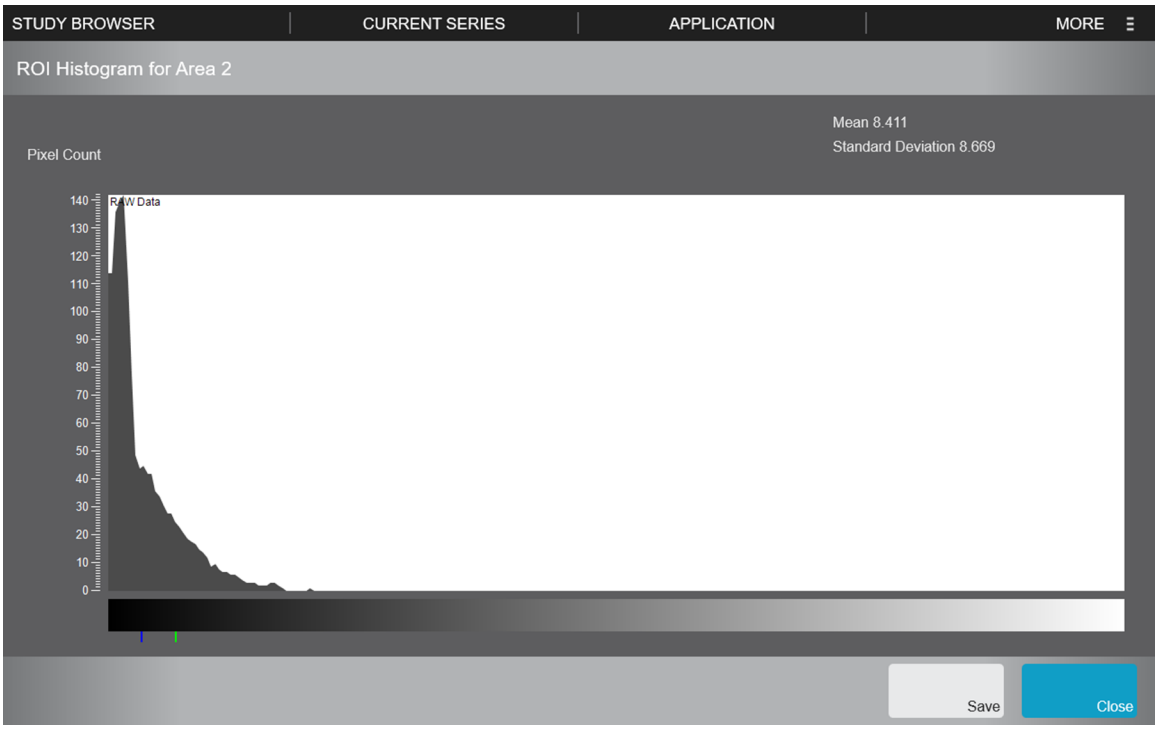
7. The measurement and image are automatically saved after the measurement is moved.



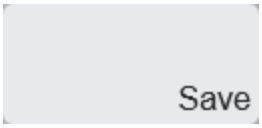
To Create a Histogram for the Area

1. Tap the measurement from the Measurements panel for which you want to create the histogram. Refer to Using the Measurements Panel on page 112.
2. Tap the **Graph** icon for the selected measurement.

The histogram appears. The histogram contains a pixel count scale of the RAW data, the mean, and the standard deviation.



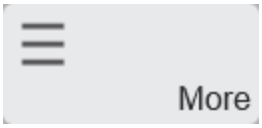
3. Tap **Save** to save the histogram to the report.



4. Tap **Close** to return to the image.

To View a Saved Histogram

1. Open the Study Browser.
2. Select the image that you performed the measurement on, or select the series containing that image.
3. Tap **More** and select **Report**.



The Report window is displayed containing the saved histogram.

4. Within the Report screen, you can perform the following actions:

- Change Graph Size: Select either 100%, 50% or 25% from the drop down list.
- Delete: Tap this button to delete the graph from the report.
- Export: Tap this button to export the report with the graph data.

> **Note:** The graph image cannot be exported. Only the numerical data is exported, which can then be used to recreate the graph.

Distance

Distance measurements are available in B-Mode and PA-Mode.

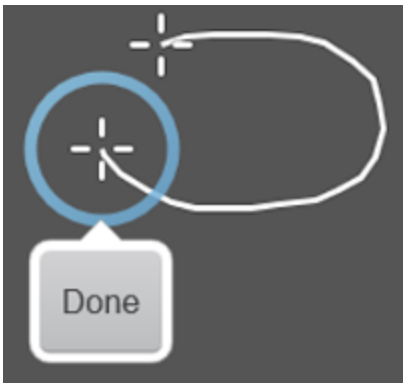
To Add a Distance Measurement

1. Tap **Measurements**.

2. Tap **Distance**.

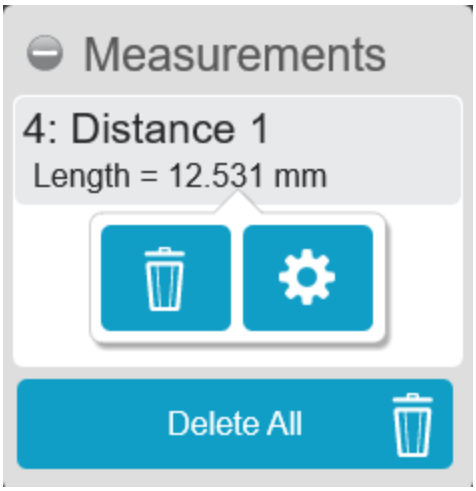
An active anchor for the measurement is placed on the image.

3. Tap and drag the anchor point to the desired location on the image.
4. Tap **Set** when you have placed your anchor at the desired start location.
5. Tap and drag the anchor point to trace the distance on the image area.

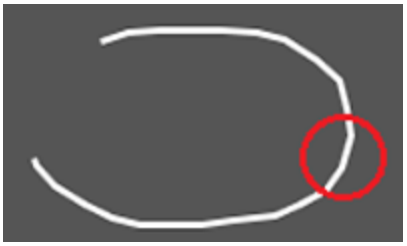


6. When you are finished drawing your measurement, lift your finger from the control panel and tap **Done**.

7. The measurement parameters will update on the Measurements panel. Refer to Using the Measurements Panel on page 112.



8. (Optional) Tap and drag the line of the measurement to move the measurement to another location on the image.



9. The measurement and image are automatically saved as the measurement is adjusted.

Ellipse

Ellipse measurements are available in B-Mode and PA-Mode.

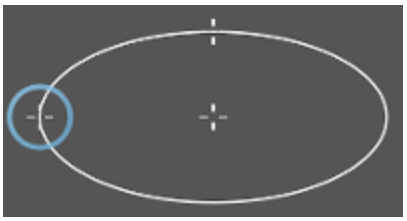
> **Note:** The volume estimate from an ellipse measurement is based on the following:
>
> Volume = 0.52 x width^2 x length
>
> The 'width' component of the formula is the lesser of the two axes of the ellipse measurement, while the 'length' component is the greater.

To Add an Ellipse Measurement

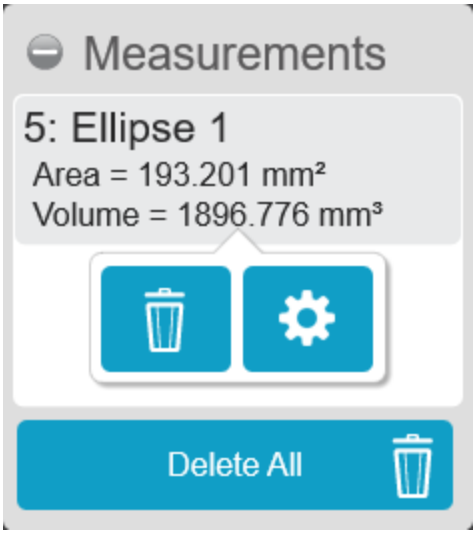
1. Tap **Measurements**.

2. Tap **Ellipse**.

The ellipse measurement is placed on the image.



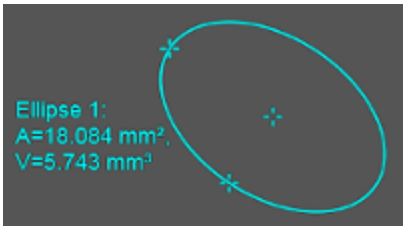
3. Tap and drag one of the line points to the desired location on the image. As you move the point, the measured length is updated on the Measurements panel. Refer to Using the Measurements Panel on page 112.



4. (Optional) Tap and drag the center point to move the entire measurement while maintaining the ellipse.

The measurement and image are automatically saved as the measurement is adjusted.

5. Remove your finger from the control panel to commit the measurement.



Linear

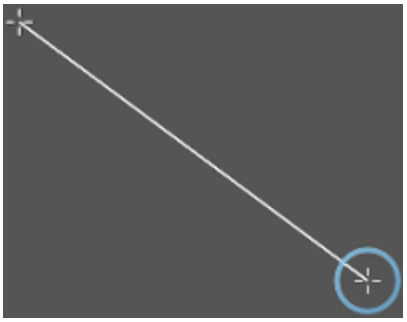
Linear measurements are available in B-Mode and PA-Mode.

To add a linear measurement

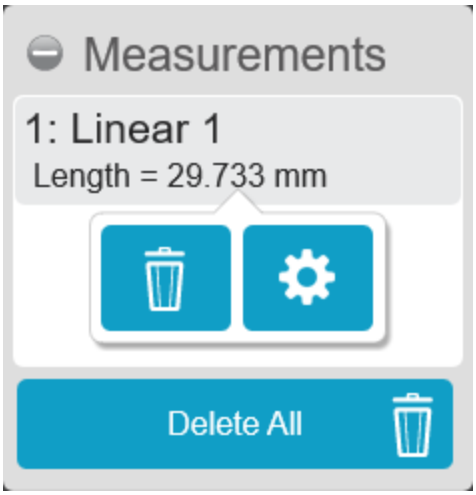
1. Tap the **Measurements** button.

2. Tap the **Linear** button.

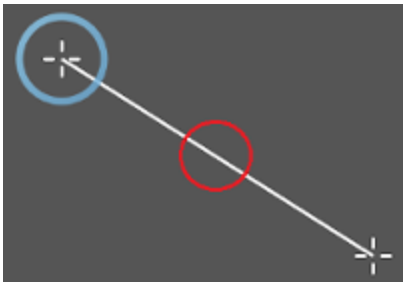
The linear measurement is placed on the image.



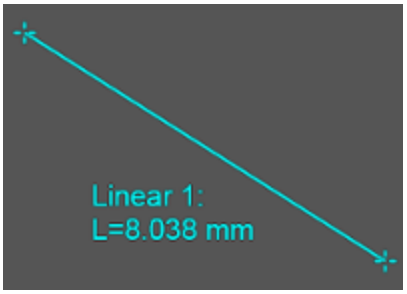
3. Tap and drag one of the end points to the desired location on the image.
   As you move the point, the measured length is updated on the Measurements panel. See Using the Measurements Panel on page 112.



4. Tap and drag the measurement line to move the entire measurement.



5. The measurement and image are automatically saved as the measurement is adjusted.



PA Region

The PA (Photoacoustic) Region measurement traces a region of interest in a PA frame. The Vevo software then measures the total area of the defined contrast region.

Quantification is available for the average threshold signal power of each PA Region measurement displayed by the label "PA Thresh".

Quantification is also available for the average signal power and the average threshold signal power for Multiplexed PA Region measurements. Displayed by the label "Avr" and "Thresh" preceded by the Layer name.

For more details on placing a PA Region measurement on a Multiplexed image, refer to To Measure Signal Changes in a PA-Mode (Multi-wavelength) Loop on page 135.

Placing PA Region Measurements

You can draw up to 20 PA Region measurements on one image.

> **Note:** When you add a PA Region measurement on a frame in a PA-Mode cine loop, the PA average value changes when you view another frame in the cine loop. This can cause inconsistencies when exporting data. FUJIFILM VisualSonics recommends resaving the loop on the frame of interest prior to exporting to prevent these inconsistencies.

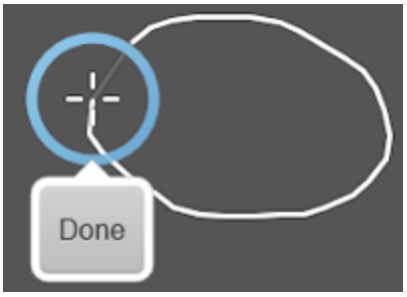
To Place a PA Region Measurement

1. Tap **Measurements**.

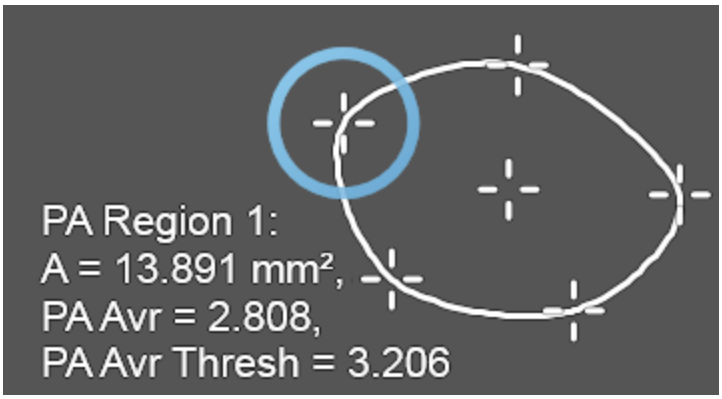
2. Tap **PA Region**.

An active anchor point for the measurement appears on the image.

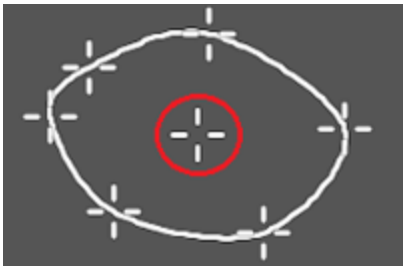
3. Drag the anchor point to the desired start point, and then tap **Set**.
4. Tap and drag the anchor point to trace the desired area.



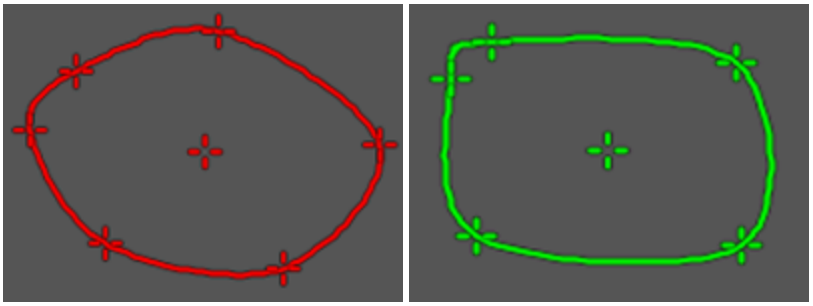
5. When you are done drawing your measurement, lift your finger from the control panel and tap **Done**.



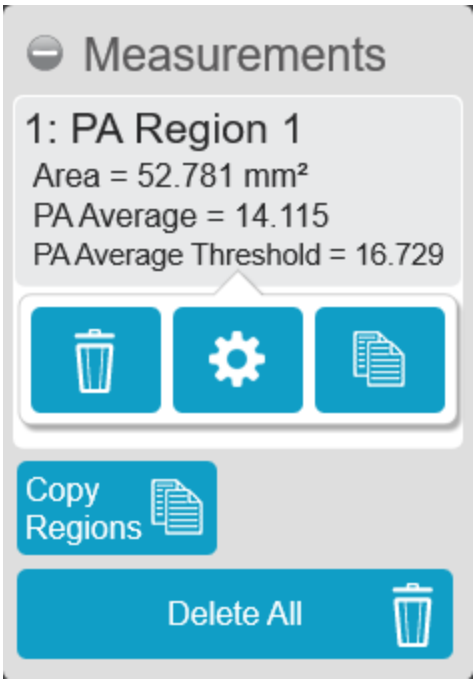
6. (Optional) You can edit any point on the measurement by tapping and dragging the point anywhere on the image.
7. (Optional) To move the entire measurement to another location while maintaining the area, tap and drag the center point of the area.



8. Lift your finger after you have completed your edits. Tap anywhere outside of the measurement area to commit the measurement.
   Subsequent PA Region measurements placed on the image will be colored differently by the system.



9. Once the PA Region is placed, the measurement parameters are updated on the Measurement panel. Refer to Using the Measurements Panel on page 112.



10. You can also copy a measurement. Refer to Copying and Pasting PA Region Measurements below.

Copying and Pasting PA Region Measurements

When copying and pasting PA Region measurement, please keep the following in mind:

- You can copy a PA Region measurement from a PA-Mode image and paste it to another PA-Mode image image.
- Pasting a measurement on the destination image will only be allowed if the image area is large enough to fit the copied measurement.
- Copying and pasting supports one or multiple measurements and is only available while reviewing an image in the 2D view.
- 20 PA Regions are allowed on one PA-Mode image.

To Copy a Single PA Region Measurement

1. Tap the PA Region measurement you wish to copy.
2. Tap the copy button.

3. Acquire a new image, load an image into review or use the currently loaded image.
4. Tap **Paste Regions**.

5. The copied PA Region measurement is placed on the image, with its original coordinates.

To Copy and Paste all PA Region Measurements

1. Tap **Copy Regions** from the Measurements panel.

2. Acquire a new image, load an image into review or use the currently loaded image.
3. Tap **Paste Regions**.

4. The copied PA Region measurements are placed on the image, with their original coordinates.

Creating PA Region Graphs

Use the PA Region Graph to measure and graph the changes in PA-Mode data across wavelengths or frames in a defined region. Define the region of interest, then generate a graph that measures the signal changes that appear in that region over your PA-Mode cine loop.

Quantification is available for the average threshold signal power of each PA Region measurement. Displayed by the label 'PA Avr Thresh', quantification values represent the average maximum intensity and applies only to the frame on which it appears (expect this value to change from frame to frame within a cine loop). This quantification is available for PA-Mode (Single), PA-Mode (Multi-wavelength), and PA-Mode (Spectro).

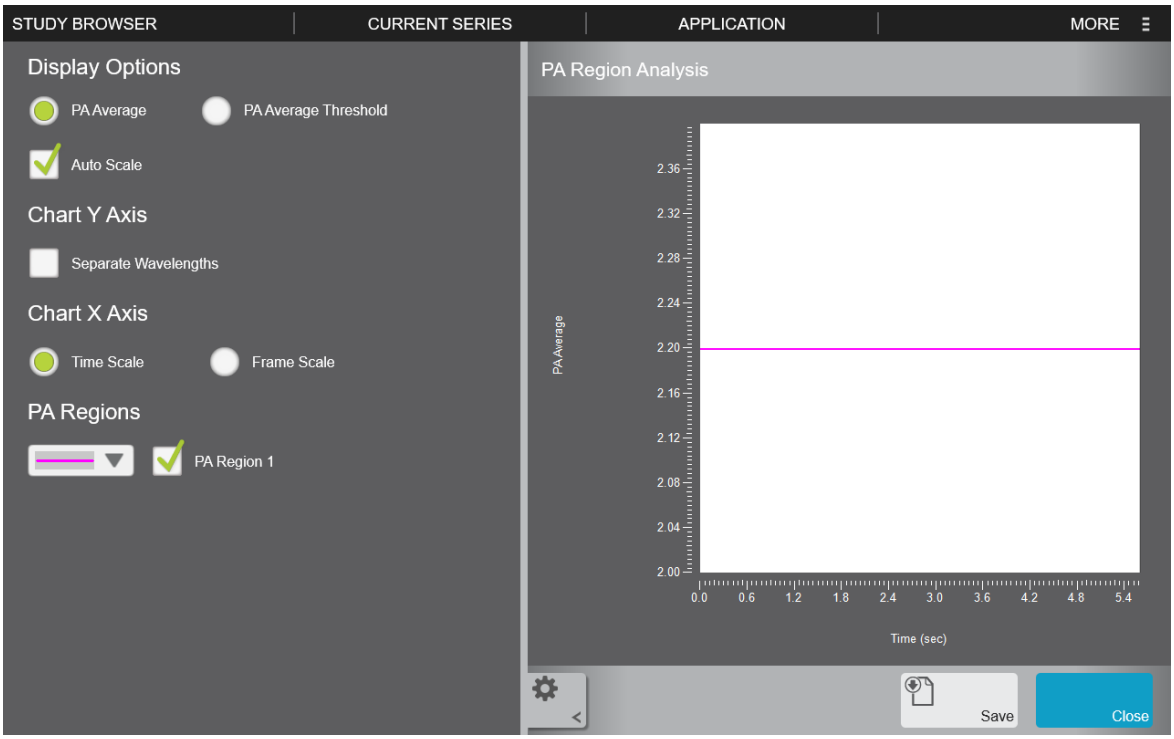
Quantification is also available for the average signal power and the average threshold signal power for Multiplexed PA Region measurements. Displayed by the label 'PA Avr' and 'PA Avr Thresh' preceded by the Layer name, quantification values calculate the average based on calculations described on the multiplexer panel. This quantification is available for PA-Mode (Multi-wavelength), and PA-Mode (Spectro).

A PA Region graph can be populated from any PA Region measurement.

To Create a PA Region Graph

1. Select the PA Region from the Measurements panel, then tap the **Graph** icon for that measurement.

2. The PA Region Analysis is displayed.



3. You can now edit how the analysis is displayed. The available settings are different for each PA sub-mode.

PA-Mode (Single)

- Display Options – Auto Scale and PA Average or PA Average Threshold for the Y axis.
- Chart X Axis – Time Scale or Frame Scale
- PA Regions – When displaying multiple regions, you can choose to display one, some, or all on one graph. You can also choose a different color for the data on the chart for each PA Region displayed.

PA-Mode (Spectro)

- Display Options – Auto Scale and PA Average or PA Average Threshold for the Y axis.
- PA Regions – When displaying multiple regions, you can choose to display one, some, or all on one graph. You can also choose a different color for the data on the chart for each PA Region displayed.
  For an unmixed PA-Mode (Spectro) image, you also have a Save Spectral Curves button to save a custom curve.

> **Note:** The Save Spectral Curves button is only available for Spectro images that have acquired the full wavelength range.

> **Note:** Your custom curve will be displayed in the Select Components list on the Spectral Curves window found on the Photoacoustics page in System Settings, in the Unmixing panel and the Multi-wavelength setup panel.

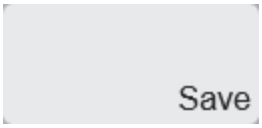
PA-Mode (Oxy-Hemo)

- Display Options – Auto Scale and sO_2 Average, sO_2 Average Total, HbT Average or HbT Average Threshold for the Y axis.
- Chart X Axis – Time Scale or Frame Scale
- PA Regions – When displaying multiple regions, you can choose to display one, some, or all on one graph. You can also choose a different color for the data on the chart for each PA Region displayed.

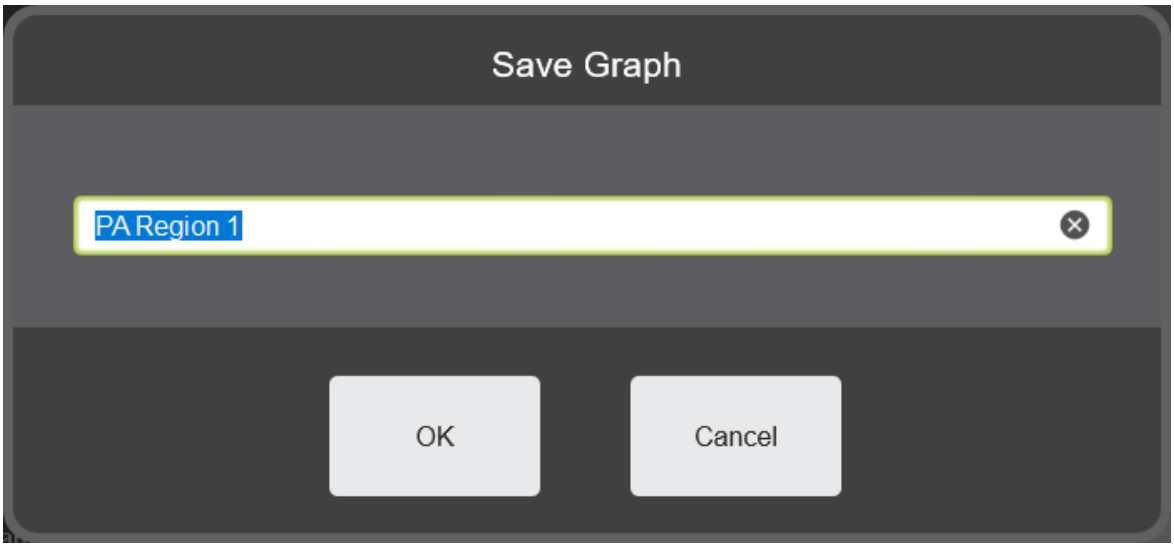
PA-Mode (Multi-wavelength)

- Display Options – Auto Scale and PA Average or PA Average Threshold for the Y axis.
- Chart Y Axis – Choose whether or not to Separate Wavelengths.
- Chart X Axis – Time Scale or Frame Scale.
- PA Regions – When displaying multiple regions, you can choose to display one, some, or all on one graph. You can also choose a different color for the data on the chart for each PA Region displayed.
- PA Wavelengths – Only displayed when the Separate Wavelengths option is enabled. Choose which wavelengths to display on the graph and what icon you want for each wavelength.
- PA Components – Only displayed when viewing a PA-Mode (Multi-wavelength) that had components added before acquisition (within the Multi-wavelength Scan Settings panel). Choose which components to display on the graph and what icon you want for each component.

4. To save your edits, tap **Save**.

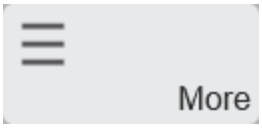


5. (Optional) Enter a new name for the graph. Once saved, an image of the graph will be saved to the Report in the Graphs section.



To View a Saved PA Region Graph

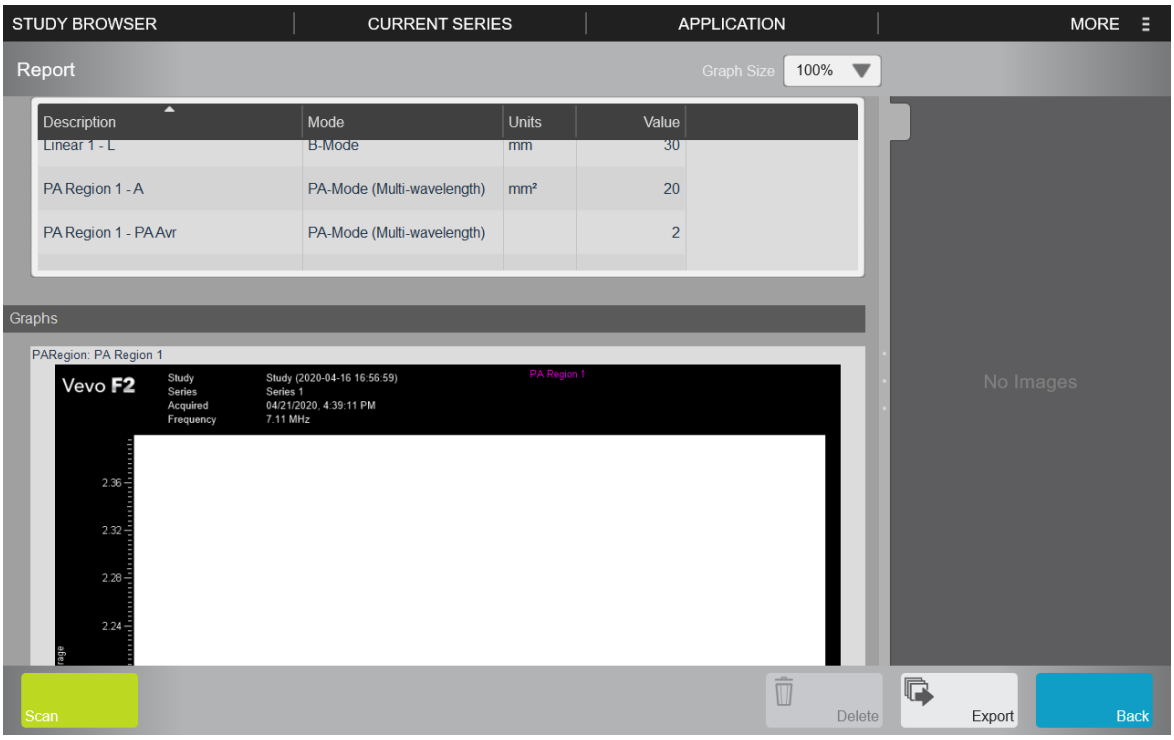
1. Navigate to the Study Browser. Select the image that you performed the measurement on, or select the series containing that image. Tap **More** and select **Report**.



2. The Report window is displayed containing the saved graph.
   Within the Report screen, you can perform the following actions:
   - Change Graph Size: Select either 100%, 50% or 25% from the drop down list.
   - Delete: Tap this button to delete the graph from the report.
   - Export: Tap this button to export the report with the graph data.

> **Note:** The graph image will not be exported. Only the numerical data is

exported.



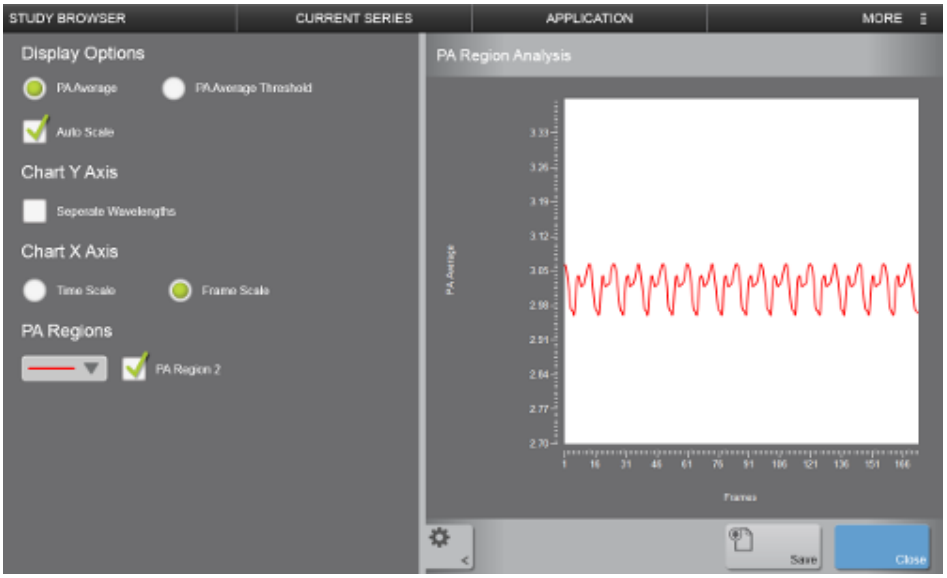
To Export a Saved PA Region Graph

1. From the Report page, tap **Export**, the export window will be displayed.
2. In the folder browser, browse to the location where you want to export the data and select the folder.
3. (Optional) Tap **New Folder** to create a new folder. Enter a name then tap **Done**.
4. Under Export Type, Measurement report will already be selected.
5. (Optional) To export all of the images with measurements in the report, enable the option **Include images with measurements**, then select from other image options that will become available.
6. (Optional) Rename the report by typing a new name in the text box.
7. Tap **Export**. A progress bar will be displayed and once the export is complete a confirmation message will be displayed.

To Measure Signal Changes in a PA-Mode (Multi-wavelength) Loop

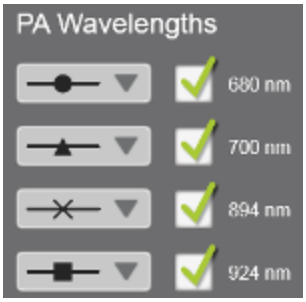
1. Acquire or load a PA-Mode (Multi-wavelength) image to review.
2. Tap **Measurements**, then tap **PA Region**.
3. Place your measurement, as described in Placing PA Region Measurements on page 128.
4. (Optional) Multiplex your image, by tapping the **Multiplex Wavelengths** button. Tap the On/Off button to enable/disable this option.
5. Tap the PA Region on the Measurement panel, then tap the graph icon.

6. The system software calculates the PA signal within the boundaries of the region curve and displays the data in the PA Region Analysis window.



7. The PA Region Analysis window is different depending on if the image is Multiplexed or not.
   - If you chose not to Multiplex your image, a Separate Wavelengths option is available under the Chart Y Axis section. Tap the Separate Wavelengths checkbox to allow separation of the curve based on wavelength.

     Once the Separate Wavelengths option is checked, all of the wavelengths used to acquire the image are displayed. Uncheck the wavelengths that you do not want displayed on your graph and select what icon the data line will be displayed with on the graph.

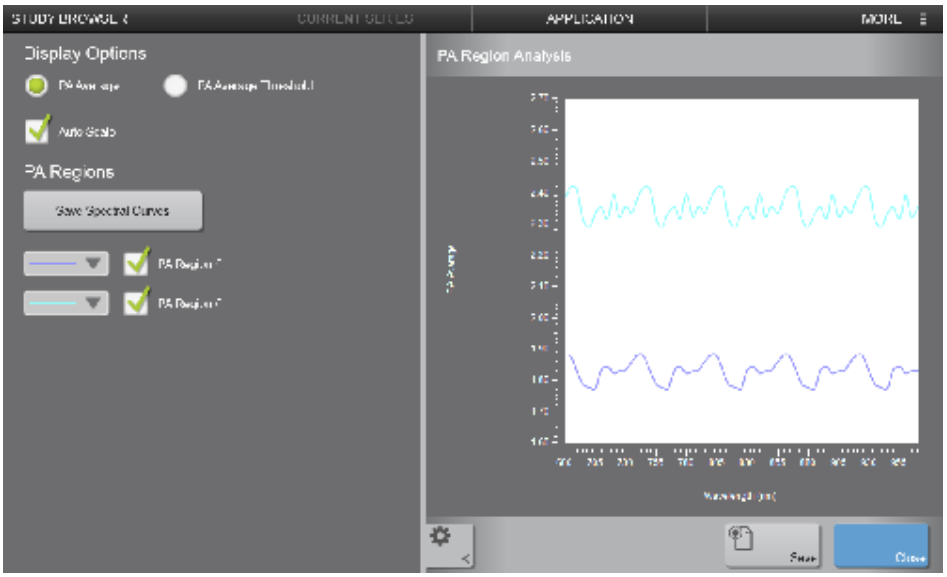


   - If you chose to Multiplex your image, the layers are automatically separated and the Separate Components checkbox becomes disabled. Select which layers will be displayed by checking or unchecking the layers listed in the PA Layers section of the PA Region Analysis window. Toggle to display the additional measurement options—PA Average (Calculation) and PA Average Threshold (Calculation)—from the Display Options section.

To Measure Signal Changes in a PA-Mode (Spectro) Loop

1. Acquire or load a PA-Mode (Spectro) image to review.
2. Tap **Measurements**, then tap **PA Region**.
3. Place your measurement, as described in To Measure Signal Changes in a PA-Mode (Spectro) Loop above.
4. Tap the PA Region on the Measurement panel, then tap the graph icon.

5. The system software calculates the PA signal within the boundaries of the region curve and displays the data in the PA Region Analysis window.



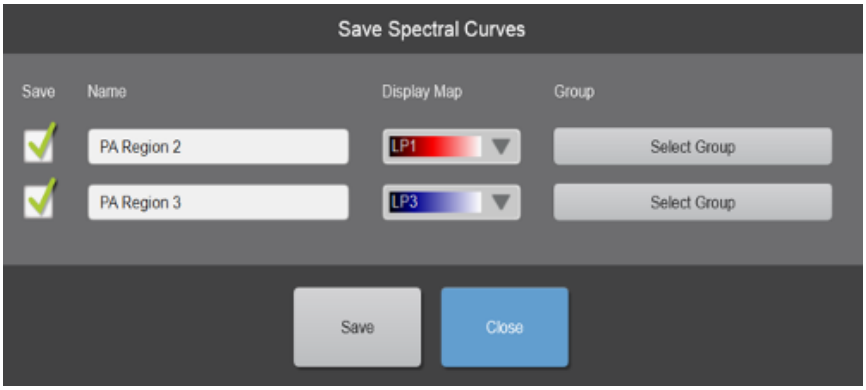
6. The PA Region Analysis window is different depending on if the image is Multiplexed or not.
   - If you chose not to Multiplex your image, an additional Save Spectral Curves option is available in the PA Regions section. The PA Region(s) will also be listed with the option to enable/disable and the option to select what color the line of data will be displayed as on the graph.

> **Note:** Once the spectral curve is saved, you will see your curve on the Photoacoustics page in System Settings. See Photoacoustics on page 316 for more information.

To save a spectral curve:

i. On a PA-Mode (Spectro) image with a PA Region, tap the graph button.

ii. Tap **Save Spectral Curves.** The Save Spectral Curves panel is displayed.



iii. Select which PA Region to save by tapping the check box for each PA Region you want to save.

iv. (Optional) Change the PA Region default name by tapping the text box and typing a new name.

v. (Optional) Tap the Display Map drop down and choose a color. When unmixing a Multi-wavelength or Spectro image, the default display map for the component will be set to this option.

vi. (Optional) Tap **Select Group** to display a tree that lists all available groups. Select an existing group for your PA Region or create a new group.

vii. Tap **Save** when you are done.

- If you chose to Multiplex your image, you have the option to check or uncheck each PA Region and the ability to select what color the line of data will be displayed as on the graph.

  There is also a PA Components section with a list of layers that you can check or uncheck and/or select what icon the line of data will be displayed with on the graph.

To Measure Blood Oxygenation in a PA-Mode (Oxy-Hemo) Loop

When you are analyzing an Oxy-Hemo sub-mode image, you can select specific regions of interest and precisely measure the percentage level of blood oxygenation in that region.

The Vevo Imaging System provides two display types for Oxy-Hemo acquisition. Choose the appropriate display before taking measurements:

- OxyZated Display Type: Used to calculate and quantify oxygen saturation; also particularly useful for studying the hypoxic state of tumor microenvironment to predict disease burden, studying fetal/maternal physiology, and studying stroke/ischemia.

- HemoMeaZure Display Type: Used to measure and quantify hemoglobin content; also particularly useful for studying anemia.

To Complete an Oxygenation Measurement

1. Acquire an Oxy-Hemo image or load an Oxy-Hemo image to review.
2. Tap Display Map and select an appropriate map—PA1–PA9.
3. Tap Display Layout and select a layout—Both, PA Only, B-Mode Only or Side by Side.
4. Select your Display Type for PA-Mode (Oxy-Hemo). Tap **Display Type**, then tap either OxyZated or HemoMeaZure.
5. Tap **Measurements**, then **PA Region**. An active anchor point for the measurement will be placed on the image.
6. Drag the anchor point to the desired start point, and then tap **Set**.
7. Tap and drag the anchor point to trace the desired area.
8. When you are done drawing your measurement, lift your finger from the control panel and tap **Done**.

The completed Oxy-Hemo measurement appears.

Customizing Controls

There are three categories of controls on the control panel that can be customized. These controls can be changed at any time during an imaging or review session.

- Mode controls
- General controls
- Imaging controls

> **Note:** The Screen Pointer control cannot be customized.

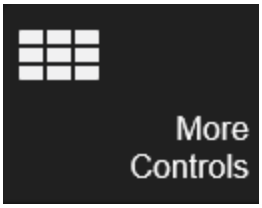
Customizing the Control Panel

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 always accessible in the More Controls window.

> **Note:** You do not have to place a control on a hotbar to use it. Controls can be tapped and used directly from the More Controls panel.

To Customize Your Controls

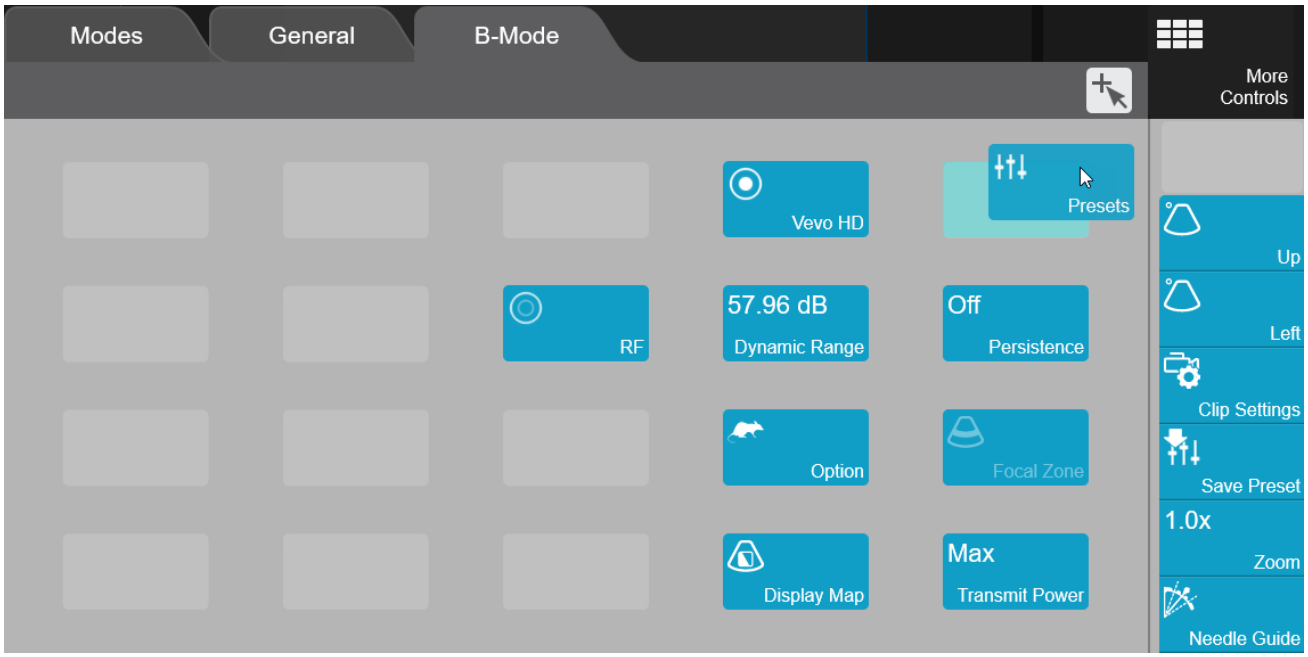
1. Tap **More Controls**.



2. Tap the desired tab within the More Controls panel. When live scanning, there is a Modes tab, a General tab, and a tab for each active imaging mode.

> **Note:** When reviewing an image, the Modes tab is not available.

3. Drag a control from the More Controls panel to its desired hotbar, or vice versa. There is one hotbar for each type of control:
    - Imaging modes (from the Modes tab) go in the hotbar along the left of the control panel.
    - General controls (from the General tab) go in the hotbar along the bottom of the control panel.
    - Imaging controls (from its respective tab, such as B-Mode) go in the hotbar along the right of the control panel.



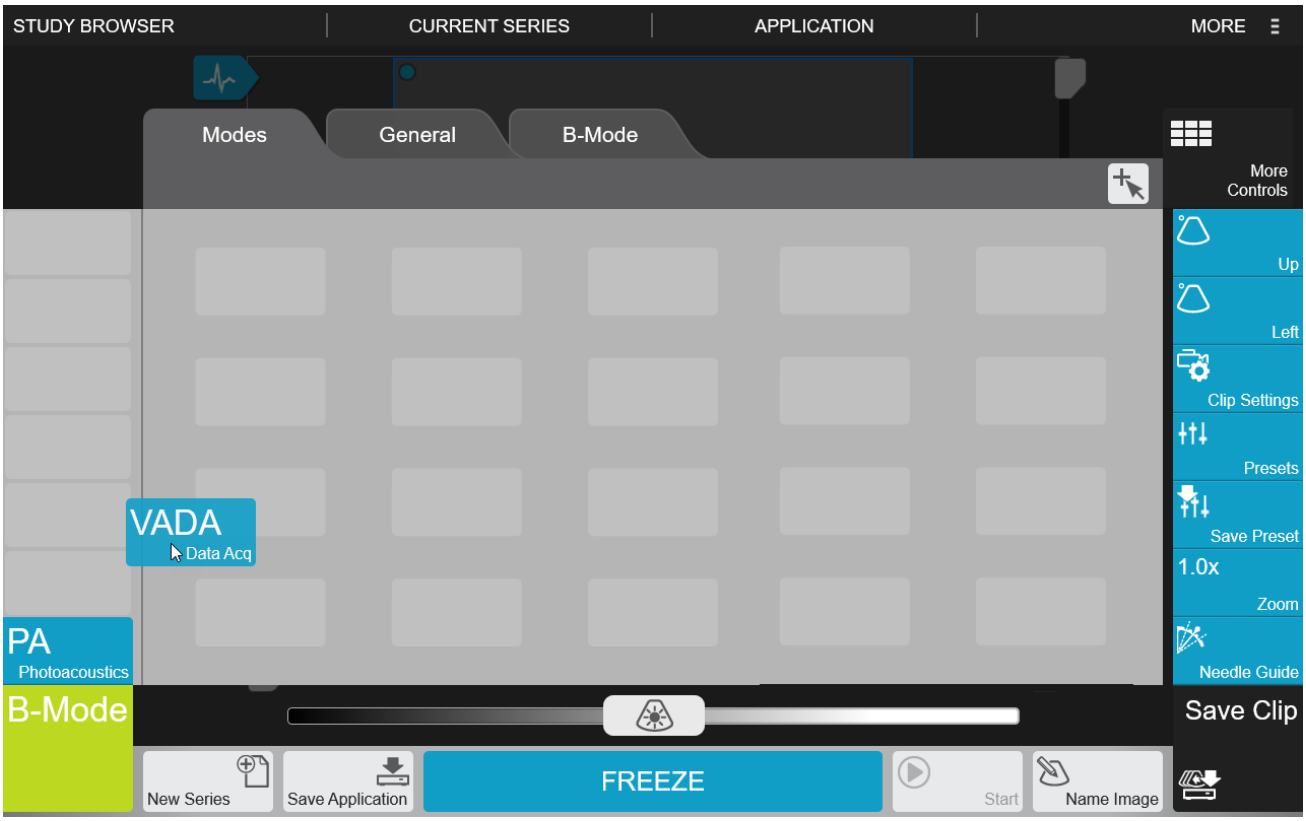
Dragging a control from the right hotbar back into the More Controls panel

4. Close the More Controls panel by tapping the **More Controls** button, or by tapping anywhere else on the control panel.

Mode Controls

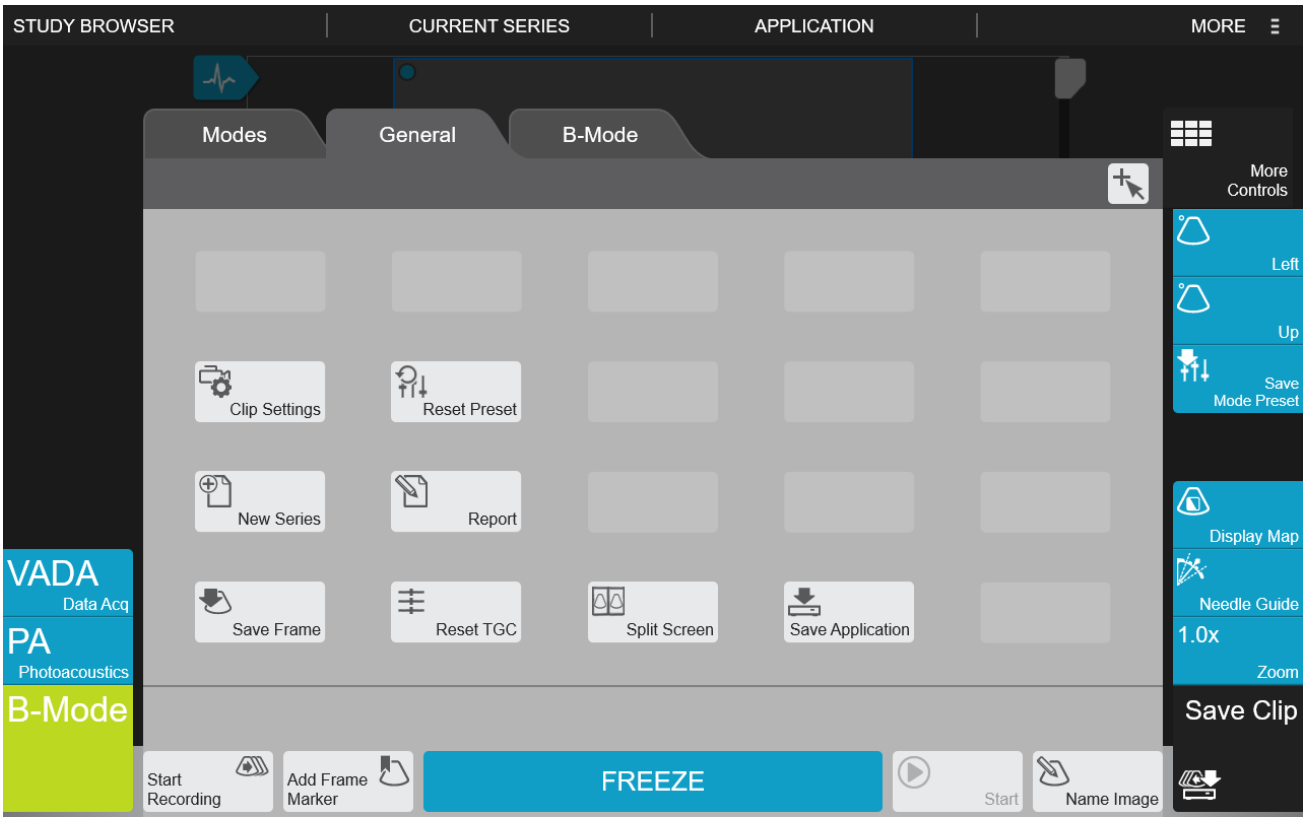
The mode controls appear on the left side of the control panel during live imaging. The button placement for each mode, except for B-Mode, can be customized. The B-Mode button is permanently docked on the lower left corner of the control panel during scanning.

See Modes on page 152 for a list of available modes. The available modes may differ depending on your system configuration.

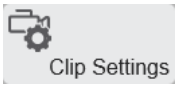
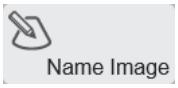


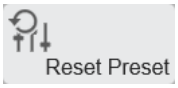
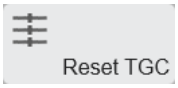
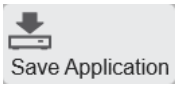
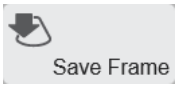
General Controls

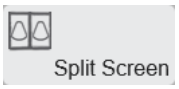
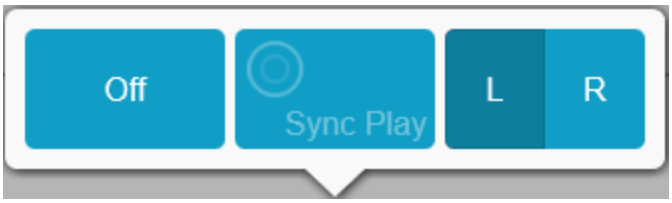
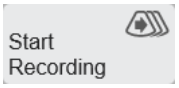
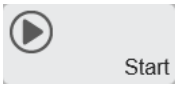
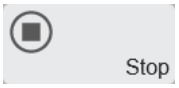
General controls are located along the bottom of the control panel (on either side of the Slide to Scan/Freeze button) and stay on the control panel regardless of the currently selected imaging mode.



Control Descriptions

Control	Description
Clip Settings 	Opens the Clip Settings panel. Within the Clip Settings panel, you can set various options for saving a clip, including the clip length in each mode. See Saving Frames or Clips on page 148.
Name Image 	Allows you to enter a name for an image. Using the Name Image button will trigger a save of either a clip or frame. Select either Save Clip or Save Frame on the Save tab in Clip Settings for the **On "Name Image"** option.
New Series 	Closes the current series and opens a new one. If you are scanning, this is quicker than going into the Study Browser.

Control	Description
Report 	Opens a report of the measurements and calculations for the current series. Scanning stops when you open the report. The scan restarts automatically once you leave the report.
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. **Note:** The Reset Preset control is disabled during review. **Note:** When imaging in a mode that uses B-Mode as the background image over which the active mode data are applied (such as PA-Mode), you must use the Reset Preset button for your active mode found in More Controls on the active mode panel.
Reset TGC 	Resets the positions of all TGC sliders on the control panel to their default position.
Save Application 	Tap this control to save the current configuration in all modes into a new application for the current transducer. See Applications & Presets on page 287. **Note:** The Save Application control is disabled during review.
Save Frame 	Tap this control to save a single frame in frame-based modes (such as B-Mode).

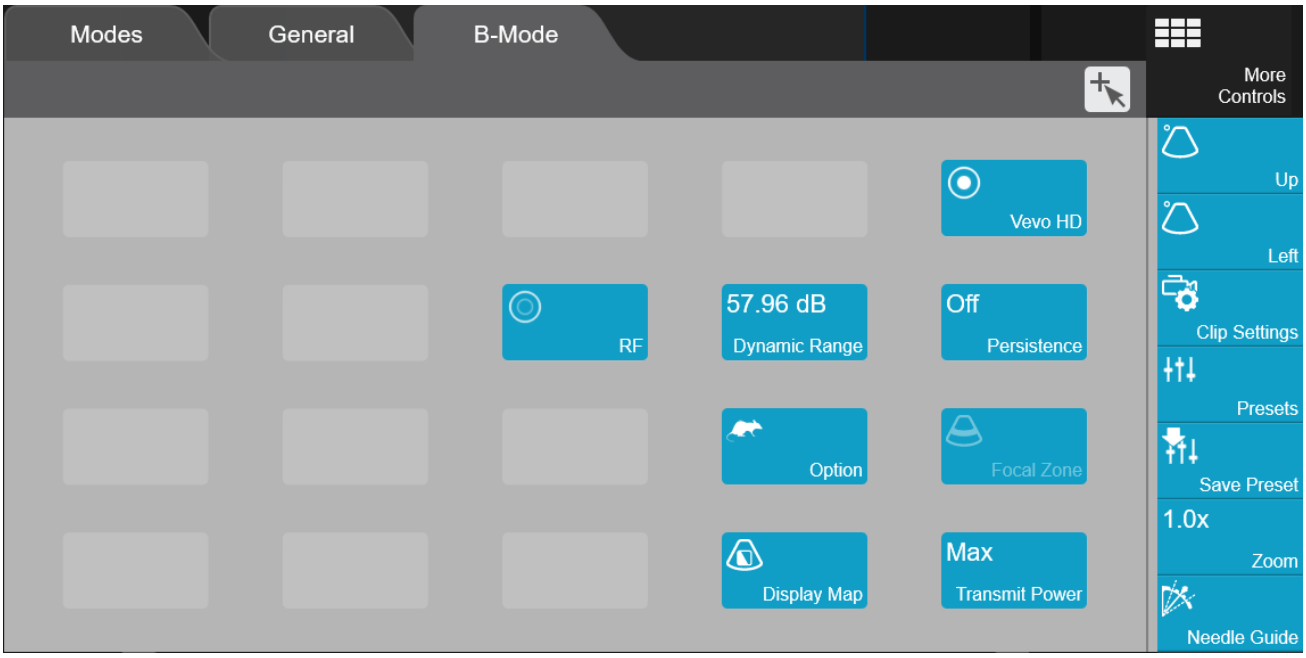
Control	Description
Split Screen 	Tap this control to enable split screen viewing. This feature allows you to compare two images side by side in the image display, or to view a stored or acquired image next to a live image.  This allows images to be compared side by side. Only one side can be acquiring live data at a time. Use the L/R toggle to switch the active side from left to right. You cannot display live images in both panels. Tap **Split Screen** to turn on Split Screen view and configure the view: • Off – Turn split screen view off. • Sync Play – Syncs the playback between two frame-based images. • L/R – Toggles between the left and right images panels on the image display.
Start Recording 	Tap this control to start a save for frame based modes. This button clears the existing buffer, then acquires and saves the number of frames (or length of time) specified for that mode. This control is disabled during review. Available for B-Mode, PA-Mode (Single), PA-Mode (Oxy-Hemo) and PA-Mode (Multi-wavelength).
Start/Stop  	This button is available while acquiring data in PA-Mode. It provides the same functionality as the Start/Stop flyout from these mode controls. Using this control allows you to position the transducer in a customized location. This control toggles between the full B-Mode image and the desired mode. **Note:** The Start/Stop control is disabled during review.

Imaging Controls

Imaging controls are buttons that adjust the properties of the currently selected imaging mode. This includes things such as power, orientation, and presets.

The set of available imaging controls changes between scanning and reviewing an image. Some controls are only available during scanning or reviewing, while others are available during both.

A full list of imaging controls is available in the More Controls menu, and the right bar on the control panel serves as a hotbar for commonly selected imaging controls. You can drag any control between the More Controls menu and the right hotbar at any time.



For a list of all imaging controls, refer to List of Imaging Controls on page 86. Some imaging modes have their own tab, which contains a list of controls specific to that imaging mode.

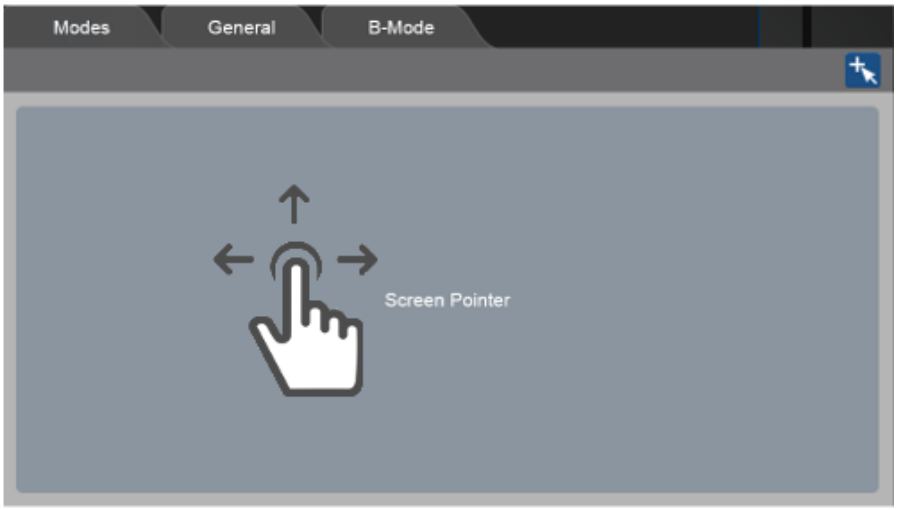
Screen Pointer

The Screen Pointer is useful if you have a second monitor attached to the system and would like to point out features on the image display to others during an imaging session.

> **Note:** The Screen Pointer will not be saved with your image.

1. Tap the Screen Pointer button located on the top right corner of any control panel.

2. Once enabled, the panel becomes a template for the image display.



3. Tap and drag anywhere within the template to display a red pointer on the image display.
4. To disable the Screen Pointer, tap the active screen pointer icon the top right corner or anywhere outside of the panel.

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.

When the system saves the image, a message will be displayed at the bottom of the image display as follows:

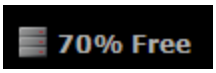
Button	Message
Save Frame	Frame Stored.
Save Clip	Clip Stored.
Start Recording	Recording: Displayed during the save. Clip Stored: Displayed when save is complete. **Note:** Available for frame-based modes, such as B-Mode, PA-Mode (Single), PA-Mode (Oxy-Hemo) and PA-Mode (Multi-wavelength).

When the system saves the image, it will also provide an audible saving tone. When tapping **Save Frame** or **Save Clip**, only one audible saving tone is heard. When tapping **Start Recording**, one audible saving tone is heard when the save begins and another when the save is complete. For more information, refer to System Sounds on page 308.

To review saved images for the current series, tap **Current Series**. For closed series, you must access the images from the **Study Browser**.

Storage Space Indicator

The space available icon, located in the system status area at the bottom of the image display shows the percentage of space available in internal storage.



If you try to save an image when space is low, the system alerts you that internal storage is low and prompts you to delete data from the system.

Saving Frames or Clips

An image can be saved during live scanning or from an acquired image by tapping **Save Frame** or **Save Clip**. The Save Clip control is permanently docked in the lower right corner of the control panel.

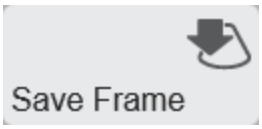
If the Save Frame button is not available, you can configure the system to display it. Tap **More Controls** and then tap the **General** tab. See Customizing the Control Panel on page 140.

You can also save a frame-based image (such as B-Mode) by tapping **Start Recording**. If the Start Recording button is not available, it can also be found on the General tab in More Controls.

To Save an Image While Scanning

Select one of the following options:

- To save only the frame, tap **Save Frame**.

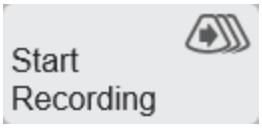
  Save Frame can be used to save a frame from an acquired or saved clip, as well as saving a frame during imaging.
- To save a clip, tap **Save Clip**.

This button can be used to save a clip while scanning (including existing data in the buffer), save an acquired clip after tapping **Freeze**, and re-saving a clip with new parameters (i.e. changing the display map or brightness).

> **Note:** Placing measurements or annotations on a clip automatically saves the clip.

- To record a frame-based clip, tap **Start Recording**.



Tap **Start Recording** button to clear the buffer, record or acquire, then save the number of frames specified for that mode.
Tap **Stop Recording** to save the acquired truncated data. The system will continue to scan while saving.

To Capture and Save a Clip

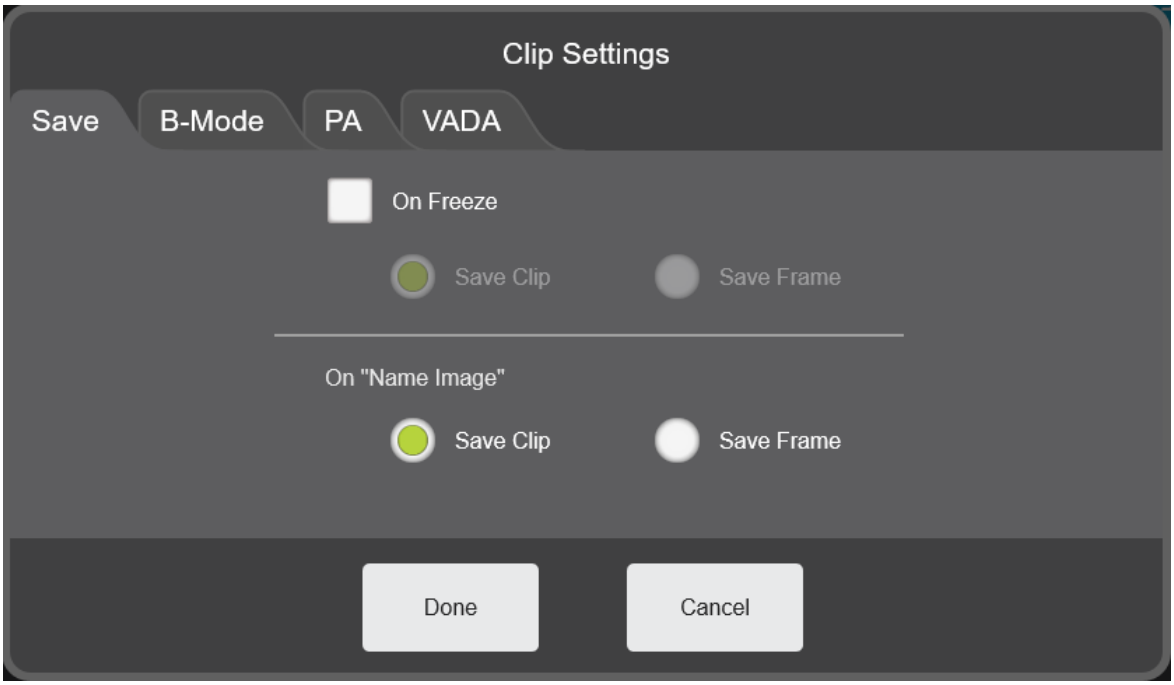
1. Ensure that clip settings are set as desired. See Configuring Clip Settings below.
2. Tap **Freeze**.
3. (Optional) To trim the clip, tap **Clip Sub-range** and drag the sliders that appear on the Clip Slider to the desired position. Tap **Crop & Save**.
4. Tap **Save Clip**.

Configuring Clip Settings

To Configure Clip Settings

1. Tap **Clip Settings**.

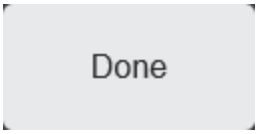
The Clip Settings control is available in the General controls as well as in each imaging mode. If this control is not on the Controls bar, tap **More Controls**. See Customizing the Control Panel on page 140.



2. Tap the **Save** tab and set the following as required:

Control	Description
On Freeze	Select either a Clip or Frame to be automatically saved when you use the Freeze button.
On "Name Image"	Select either a Clip or Frame to be saved when you name your image. Use the Name Image button during scanning or in review. **Note:** This will not affect time based imaging modes.

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:
   - Specify a number of **Frames**.
   - Save **Maximum Frames**. If you select the **Maximum Frames** option, then the system will save the highest number of frames possible. The number of frames depends on the imaging parameters.
4. Tap **Done** to save your changes and close the panel.



Logging Out

To log out from the Vevo F2 Imaging System:

1. Tap **Log Out** at the top of the control panel.

If the Log out button is not displayed, tap **More** and then tap **Log Out**.

2. 

After logging out, the Vevo F2 Imaging System enters standby mode.

Modes

The following modes are available for the Vevo F2:

- B-Mode
- PA-Mode
- VADA Mode

To switch scanning modes, tap the appropriate scanning mode icon on the control panel.

B-Mode

B-Mode is the default imaging mode for the Vevo F2 Imaging System. This mode displays echoes in a two-dimensional view by assigning a brightness level based on echo signal amplitude.

B-Mode is the most common imaging mode because it is the most effective mode for locating anatomical structures. Conventional ultrasound images are typically made in B-Mode.

B-Mode is also used as:

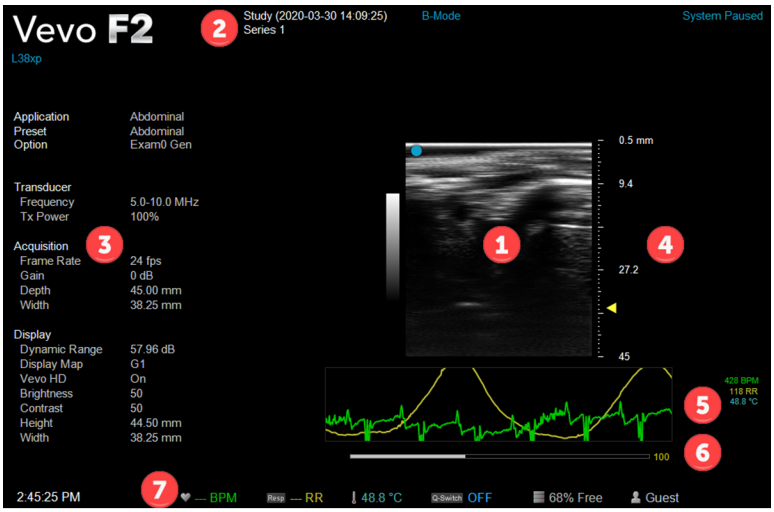
- A background image over which other active mode data is applied.
- A real-time orientation view for guiding the transducer to a desired location.
- A visual guide for needle injections.

Image Display

The image display displays imaging data.

The following example is from a B-Mode image.

> **Note:** The interface shown on the image display may vary slightly depending on scanning mode.



The image display when in B-Mode.

The image display interface is split into common elements that appear across all imaging modes, and a central working area that contains elements specific to the active imaging mode.

This section lists all common interface elements. For information about mode-specific elements, refer to subsections linked from the Modes on the previous page.

Common Interface Elements:

1. Image feed
2. Image status area
3. Mode settings panel
4. Image scale
5. Physiological data trace
6. Clip buffer
7. Status bar

Image Feed

This area displays the current image, which is either a live image, a frozen image taken from the live image, or a previously saved image.

Image Status Area

This area contains general information about the current image. Information displayed includes:

- The transducer currently in use
- Study/series information
- Image status (whether it is a live image, or an image in review)
- Mode-specific information (which varies depending on the current imaging mode)

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.

Image Scale

Indicated in millimeters, the distance from the face of the transducer to the tissue being imaged.

Physiological Data Trace

Displays the animal's dynamic heart rate, respiration rate and blood pressure data.

> **Note:** The animal's temperature is not included as a data trace however, it is shown on the status bar and also to the right of the physiological data trace window.

This data is gathered by the animal monitoring system that connects to the Vevo Imaging Station.

During acquisition, this area shows the live physiological parameters. During review, this area shows the physiological parameters at the time of acquisition. During review, live physiological data values for the animal are also shown on the status bar.

Clip Buffer

Displays the length of the clip. When in review mode, there is a triangular white marker that identifies the individual frame number within the clip. To display a sub-range of the original clip, use the **Clip Sub-range** button (refer to Clip Sub-range on page 90).

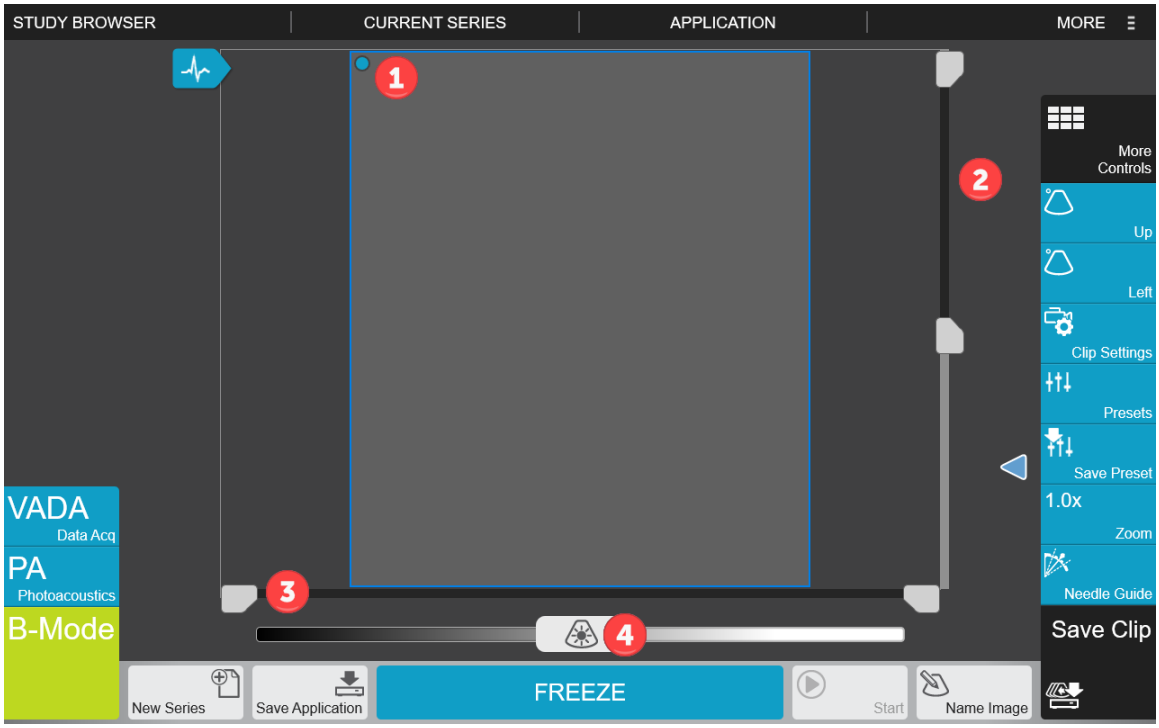
Status Bar

The following information is shown on the status bar:

- Monitored physiological values in real time during image acquisition, if the Vevo Imaging Station is connected and the system is configured appropriately. These value are color-coded to correspond to the physiological trace.
- Percentage of free space available for image data. Used to see when you should start to back up image data to free up space on the system.
- Current user name.
- Current time.
- Various status updates when imaging parameters are changed and some image processing progress information.

B-Mode Control Panel Interface

The mode-specific controls for B-Mode are split into several categories:



The control panel when in B-Mode

1. Orientation
2. Depth Controls
3. Width Controls
4. Gain Controls

Orientation

The blue dot in the grey square represents the orientation ridge on the transducer nose, and indicates the orientation of the transducer, relative to the anatomy.

To change the orientation of the transducer, use the orientation buttons on the imaging control bar. Each button toggles between two directions:

- **Right/Left**
- **Up/Down**

You can also change the orientation by tapping the desired corner. The orientation (and the blue dot) changes to the tapped corner.

> **Note:** Phased array transducers (such as the P10xp) cannot change their up/down orientation by tapping the screen. To change their orientation, use the **Up/Down** buttons.

For more information about controls, refer to List of Imaging Controls on page 86.

Depth Controls

The vertical bar to the right contains depth controls. There are three depth controls:

- Image depth offset
- Image depth
- Focus zone

Image Depth Offset

The gray control at the top of the depth bar represents the image depth offset. This control adjusts the distance at which the system begins to display the ultrasound image, starting from the face of the transducer.

For example, if the default offset is 2 mm, the top of the screen will read 2 mm.

To change the image depth offset, slide this control up or down the line. When moving the slider, the image depth offset is displayed in millimeters beside the slider control. After releasing the control, the offset is displayed on the lower-left corner of the image display.

> **Note:** The minimum depth varies by transducer.

Image Depth

The gray control at the bottom of the depth bar indicates the maximum depth of the ultrasound signal. Slide this control up or down to adjust the depth.

- Slide up to decrease the depth.
- Slide down to increase the depth.

When you move this control, the image depth is displayed in millimeters beside the control. After releasing the control, the depth is displayed on the lower-left corner of the image display.

> **Note:** The depth value in the lower-left corner of the image display indicates the total acquired depth of the unzoomed image. This value does not change if you zoom the image.

> **Note:** The available depth is transducer dependent.

Focal Zone

Blue triangles on the depth bar represent the current depth of any focal zones that have been added to the image.

- To add a focal zone to the image, use the Focal Zones control. You can add up to three focal zones to an image.

> **Note:** For more information about the Focal Zones control, refer to List of Imaging Controls on page 86.

- To adjust the depth of any focal zone, drag the blue arrow up or down. If there is more than one focal zone, this control moves all focal zones as a group.
  - Move up to decrease the depth.
  - Move down to increase the depth.

Width Controls

The black horizontal bar near the bottom of the screen represents the physical width of the area captured by the transducer.

To adjust the width of the image, move the gray sliders on either end of this bar. The two sliders move together, and the image width is displayed in millimeters above the slider control as you move them.

- Move the sliders further apart to increase the width.
- Move the sliders closer together to decrease the width.

> **Note:** The acquisition frame rate increases as the width of the image decreases. The closer you can narrow the image around your target structure, the higher the frame rate of the image acquired. This is helpful when high framerates are required, such as when studying cardiac tissue movement.

Gain Controls

Gain refers to the level of amplification applied to the returning sound waves that make up the ultrasound image, and effectively acts as a brightness control for the image.

When you move the gain slider, the gain value is displayed above the control.

There are two sets of gain controls in B-Mode:

- Master Gain
- Time Gain Compensation (TGC)

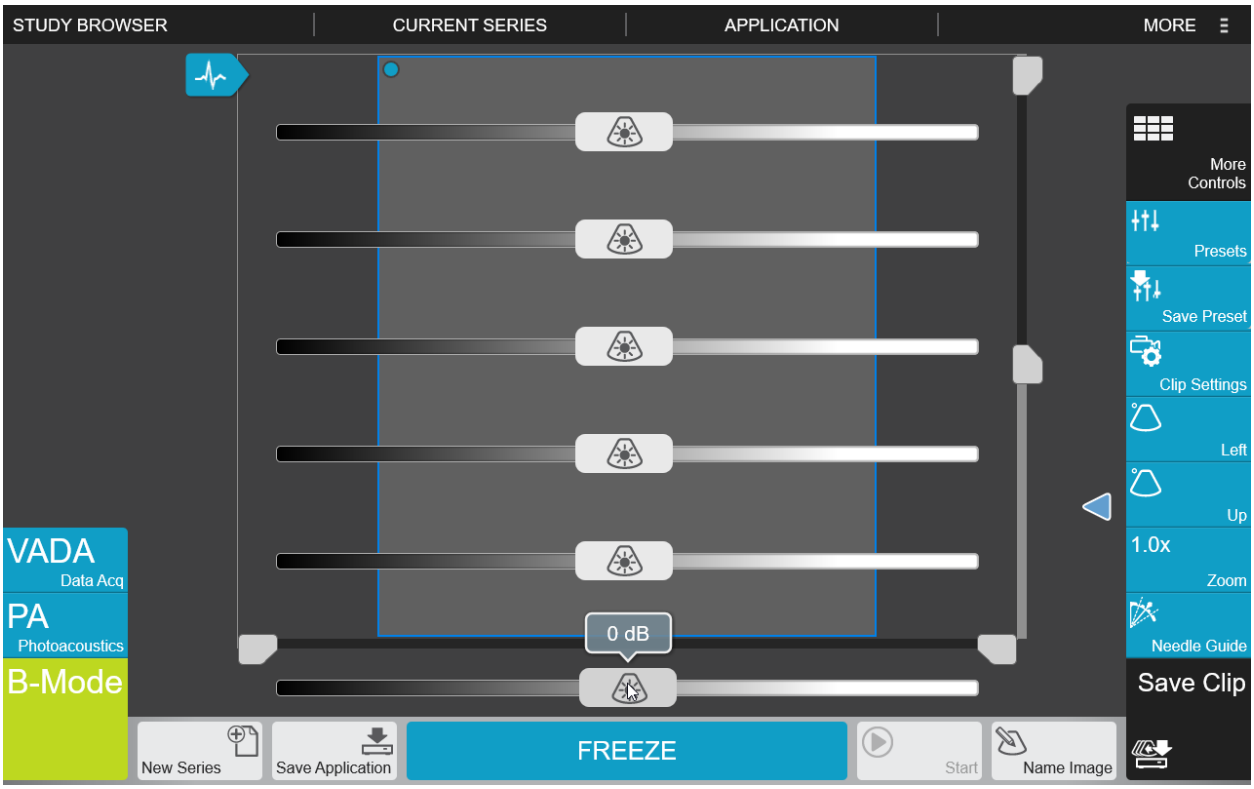
Master Gain

Slide the gain control left or right to adjust the brightness of the image.

- Slide to the right to brighten the image (boosts the signal)
- Slide to the left to darken the image (attenuates the signal)

Time Gain Compensation (TGC)

If you touch the master gain control, the Time Gain Compensation (TGC) controls appear in the middle of the screen.



Control panel with TGC controls

The TGC controls are five sliders that affect the gain applied at different depths. Use these controls to compensate for minor attenuation of the ultrasound signal as it returns through deeper tissue.

The five sliders are arranged in order of depth. The top slider controls the gain of the field nearest to the transducer, while the bottom slider controls the gain of the field furthest from the transducer.

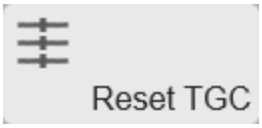
From top (nearest) to bottom (furthest), the five sliders are named:

- Near Gain
- Near Middle Gain
- Middle Gain
- Far Middle Gain
- Far Gain

Slide any of the TGC sliders left (darker) or right (brighter) to adjust the brightness of that band of the ultrasound image.

> **Note:** TGC settings can be saved using the Mode Settings control. For more information, refer to Presets on page 162.

To reset the position of the TGC sliders to their default positions, tap the **Reset TGC** control in the General Controls menu.



B-Mode Controls

This section contains a list of controls that appear on the B-Mode tab of the More Controls menu.

Any control listed here can be added to, or removed from, the right sidebar of the control panel during an imaging session. For more information, refer to Customizing the Control Panel on page 140.

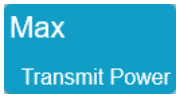
> **Note:** For a full list of controls, refer to List of Imaging Controls on page 86.

Control	Live/Review	Description
Annotations 	Review	Adds annotations to an image. For more information, refer to Annotations on page 106.
Brightness 	Review	Adjusts the brightness of the image. The current brightness is displayed on the button.
Clip Settings 	Both	Opens the Clip Settings menu. For more information, refer to Configuring Clip Settings on page 149.

Control	Live/Review	Description
Clip Sub-range 	Review	Opens the Clip Slider, which is used to crop clips using two sliders. Cropping a clip before saving saves only the data within the sliders. The data outside the sliders is discarded. Cropping a clip in a saved image only defines which frames are played back. The underlying data of the entire saved image is not changed. When the Clip Slider appears: 1. Move the crop sliders to their desired positions. 2. (unsaved clips only) **Tap Crop and Save**. 3. Tap **Cancel** to remove the clip sliders.
Contrast 	Review	Adjusts the contrast level of the image. The current contrast is displayed on the button.
Display Map 	Both	Opens a menu of predefined display maps that can be applied to the current image. Can be used at any time during live scanning or review. Only displays display maps available for the currently selected imaging mode.
Dynamic Range 	Live	Adjusts the input signal strength that is mapped to the spectral display. The allowed range varies depending on the transducer connected. Tap this control to open a set of flyout controls: • Tap the **Up** and **Down** buttons to adjust the dynamic range up or down. For reference, the current range appears on the control, and is also embedded in the image when it is saved.

Control	Live/Review	Description
Focal Zone 	Live	Adjusts the focal zone (or zones) applied to the image. Focal zones increase the resolution of the image, at the cost of a reduced frame rate. The system always has at least one focal zone, but additional focal zones can be added. Tap this control, and then use the **Up** and **Down** buttons to cycle through the available focal zone options: • Single zone • Two zones • Three zones **Note:** This control is disabled when using system factory presets that do not support focal zone adjustments. If the selected preset uses Vevo HD, then disable Vevo HD to enable the Focal Zone control.
Magnify Scale 	Review	Adjusts the magnification level of an area when placing a measurement or annotation. To change the magnification, tap this button, then use the **Increase** or **Decrease** flyout buttons to select a magnification level between 2x and 8x.
Measurements 	Review	Opens the Measurements menu. Use this menu to select and add a measurement to an image. For more information, refer to Measurements on page 111.
Needle Guide 	Both	Toggles the Needle Guide on and off. For more information, refer to B-Mode Needle Guide for Injections on page 164.

Control	Live/Review	Description
Option 	Live	Used to optimize the image during acquisition. Opens a list of options that help optimize the image based on the specimen being imaged. Tap **Option**, then select one of the options from the flyout menu.
Orientation 	Both	Sets the image orientation, allowing you to align the image with the transducer. The blue dot shown at the corner of the control panel and image display corresponds to this setting. There are two buttons: • One button toggles between Up and Down. • Another button toggles between Left and Right. Tap the appropriate button to select an orientation.
Persistence 	Live	Applies a pixel-averaging algorithm to the most recently acquired frames to produce a more uniform view of the image area. This feature reduces shimmering and motion artifacts in faster moving tissue, and is useful for imaging uniform tissues such as the liver, kidney, or prostate. Tap **Persistence**, then use the Up or Down buttons to select a desired level of strength:
Presets 	Live	Opens the Presets menu. Use this menu to select an appropriate preset. Each preset contains settings for the following: • Pulse Sequence • Speed of Sound • Voltage • Gain/TGC sliders • Display map settings For more information, refer to Applications & Presets on page 287.

Control	Live/Review	Description
RF 	Both	Toggles RF data collection and RF data display. During live imaging, you can toggle both RF data collection and RF data display. During review, the RF Display button is only enabled for images that were captured with RF data. For more information, refer to Digital RF on page 103.
Save Preset 	Both	Saves all current settings into mode preset. Saved presets are accessed through the Presets control. For more information: • Applications & Presets on page 287 • PA-Mode Image Acquisition Workflow on page 173
Show Values and Labels 	Review	Shows or hides measurement values and labels on an image in review.
Transmit Power 	Live	Adjusts the power of the ultrasound signal transmission. To adjust the transmit power, tap this control, then select one of the following power levels: • Max • High • Mid • Low • Min

Control	Live/Review	Description
Vevo HD 	Live	Toggles the Vevo HD feature. Vevo HD is an image processing filter that reduces speckle noise and artifacts in images while enhancing critical tissue information. This control is only available if Vevo HD is supported by the currently selected application. For some applications, Vevo HD will also activate spatial compounding. The left side of the image indicates whether this is activated.
Zoom 	Both	Changes the amount of zoom applied to the image. For more information, refer to List of Imaging Controls on page 86.

B-Mode Needle Guide for Injections

B-Mode is sometimes used for ultrasound-guided injections.

When doing such injections, use the Needle Guide feature in B-Mode. This feature displays a needle overlay on the image display to help you visualize the alignment of the needle with the injection target.

Before You Begin

- Ensure the needle is aligned with the transducer in a coupling medium such as gel or water, or inserted in the anatomy of the animal. This ensures the needle appears in the image area.
- If you intend to save a clip of the injection, ensure the B-Mode clip size is set long enough to capture the event.
- The Needle Guide feature is only available when acquiring data in B-Mode.

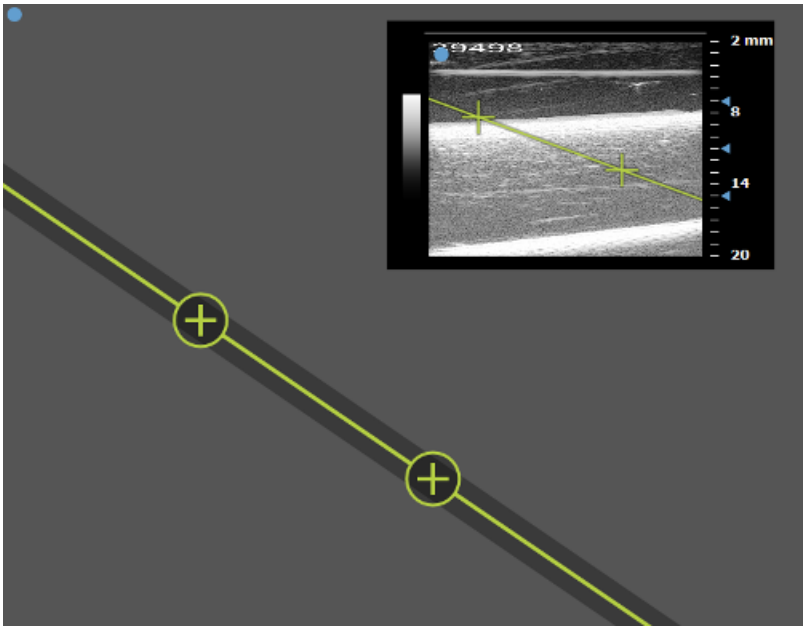
To Perform an Image-Guided Needle Injection

1. Begin acquiring image data in B-Mode.
2. With the injection target below focus (in or out of the plane), extend the needle into the image toward the expected target location. Bring the needle tip as close to the focal depth as possible.
3. On the Control Panel, tap **Needle Guide**.

   A Needle Guide overlay with two calipers appears on the control panel. A line extends through the calipers, indicating the direction the needle will take during the injection.
4. Drag the Needle Guide controls to the desired location on the control panel. You will see the changes in

the overlay on the image display.



5. Drag the first caliper to the location where the needle enters the edge of the image window.
6. Drag the second caliper to the tip of the needle (where it appears on the image display).
7. Retract the needle, and ensure that the needle moves along the needle guide overlay.
8. Bring the target into the image plane, and line up the target with the part of the needle guide that indicates the needle tip.
9. Bring the needle back into the image plane.
10. Slowly advance the needle tip to the tissue target and start the guided injection.
11. When the needle tip is within the target area, inject the sample.
12. If saving a clip of the injection event, tap **Save Clip**.

> **Note:** The needle guide is included in the saved clip/frame.

13. Retract the needle.

PA-Mode

PA-Mode (Photoacoustics mode) is the photoacoustic imaging mode for the Vevo F2 Imaging System.

Photoacoustic imaging works by illuminating tissue with laser light, which causes thermoelastic expansion of the affected tissue. This expansion creates ultrasonic waves, which are then detected by an ultrasound transducer to produce an image.

> **WARNING:** Before using PA-Mode, users must read Vevo F2 Imaging System Safety on page 338 and Laser Safety on page 341.

Before You Begin

PA-Mode requires the Vevo LAZR-X laser cart and the following components:

- A transducer equipped with a Vevo Fiber Jacket
- A Vevo Optical Fiber
- A Vevo PHANTOM contrast agent imaging chamber

Before using PA-Mode:

- Read all safety instructions listed in Laser Safety on page 341.
- Ensure the test environment is prepared. For more information, refer to Vevo LAZRTight on page 53.
- Ensure the laser is calibrated. For more information, refer to Laser Calibration on page 193.
- Determine which wavelength range to use and connect the Vevo Optical Fiber to the appropriate port on the laser cart. For more information, refer to Connecting Transducers to the Vevo LAZR-X laser cart on page 48.

Staging and Acquisition States

PA-Mode has a "staging" and an "acquisition" state.

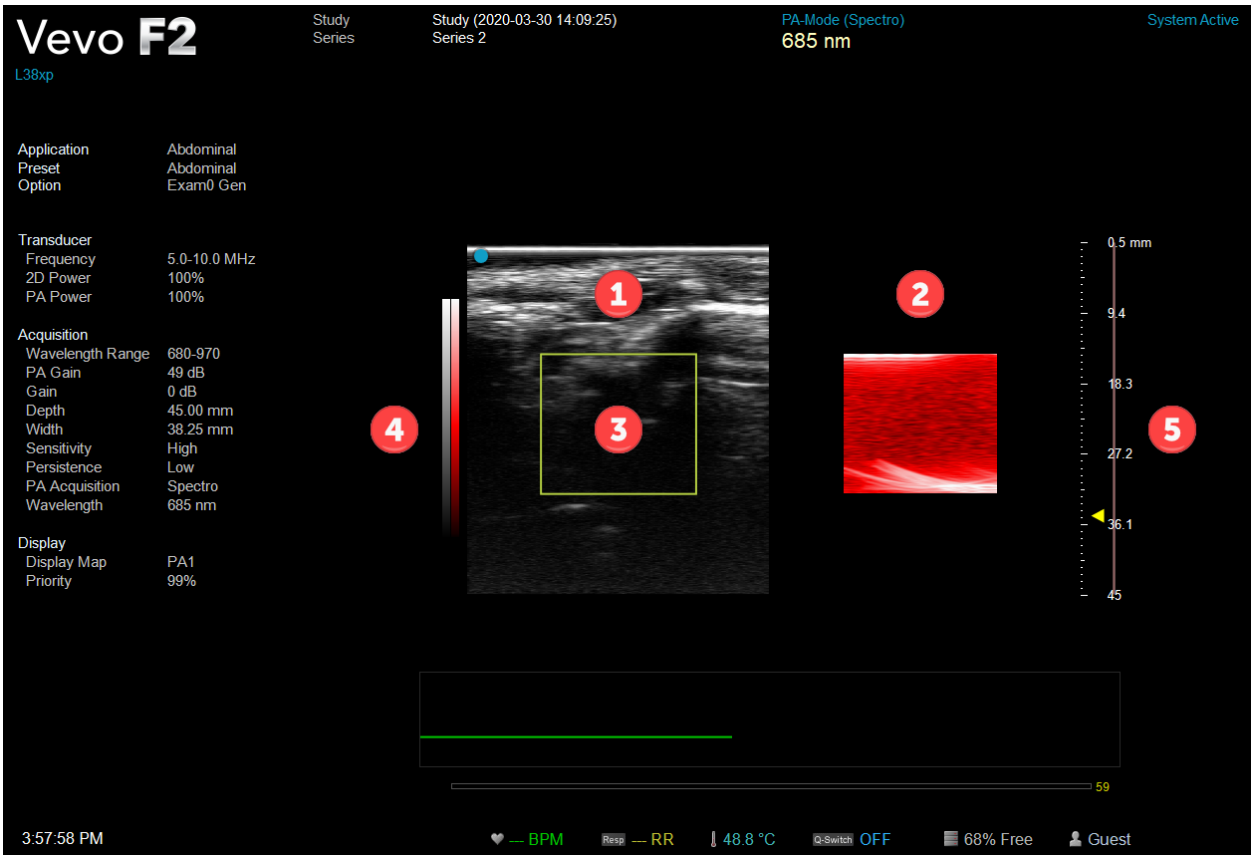
The **Staging** state is when PA-Mode is selected on the control panel, but before the **Start** button is pressed. This mode allows the user to set up desired acquisition features before starting the laser. Once preparations are complete, the press **Start** to start image acquisition.

The **Acquisition** state occurs after pressing the Start button on the control panel. Once this happens, the laser begins firing, and the system begins acquiring image data.

PA-Mode Image Display Interface

This section covers how the Image Display interface looks when in PA-Mode.

> **Note:** For a list of interface elements that appear for all imaging modes, refer to Image Display on page 152.



The PA-Mode image display

When in PA-Mode, the image display features the following mode-specific elements:

1. B-Mode image area
2. PA-Mode image area
3. PA-Mode box
4. PA-Mode display map
5. B-Mode/PA-Mode TGC curve

Mode-Specific Elements

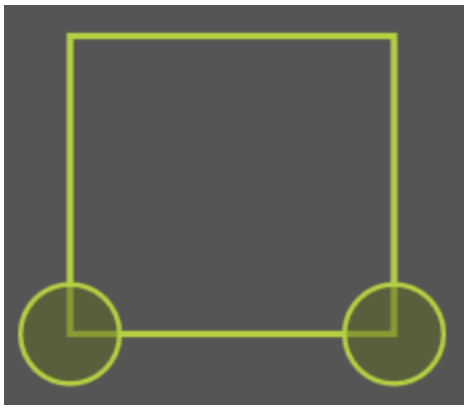
B-Mode and PA-Mode Image Areas

When in PA-Mode, the default view on the image display is a side-by-side view, with the left window showing a B-Mode image and the right window showing the same image in PA-Mode.

To change this view, tap the Display Layout control. The following alternate views are available:

- B-Mode Only
- Both
- PA Only
- Side by Side

PA-Mode Box



The PA-Mode box in the Control Panel

In PA-Mode, the system applies color only to the image data within the PA-Mode box. When the display layout is set to Side by Side, the PA-Mode box is displayed as an overlay on the B-Mode data.

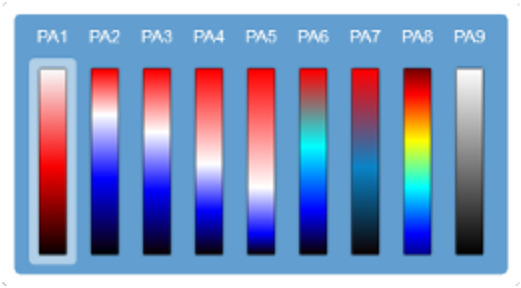
To adjust the area highlighted in color, adjust the size and shape of the PA-Mode box.

- To move the box, tap and drag the box frame.
- To resize the box, tap and drag one of the circular handles at the bottom-left and bottom-right corners of the box.

PA-Mode Display Map

The two vertical bars shown to the left of the image are the B-Mode display map (left) and the PA-Mode display map (right).

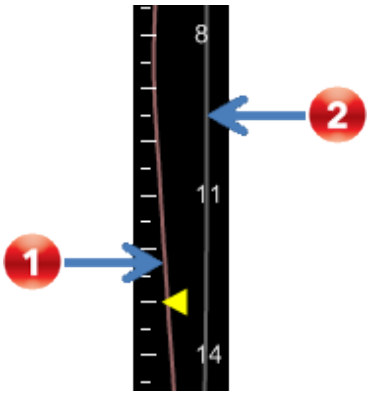
The following image shows which bars correspond to which display map:



The default PA-Mode display map is PA1 for PA-Mode (Single), PA-Mode (Spectro) and PA-Mode (Multi-wavelength). When scanning on Oxy-Hemo, the default Display Map changes depending on your Display Type—OxyZated (PA2), HemoMeaZure (PA8).

B-Mode/PA-Mode TGC curve

The two vertical curved lines shown to the right of the image are TGC curves.



1. PA-Mode TGC curve
2. B-Mode TGC curve

Common Elements

In addition to mode-specific elements, the following common interface elements contain additional information:

- Image Status
- Mode Settings Panel
- Status Bar

Image Status

The Image Status area displays additional information, depending on the sub-mode selected:

- PA-Mode (Single): Displays the current wavelength.
- PA-Mode (Oxy-Hemo): Displays the two wavelengths used (such as 750/850 nm).
- PA-Mode (Spectro): Displays each wavelength used, one by one, according to the Spectro Scan Settings for Step Size and Scan Method. If not multiplexed, this field displays the wavelength for the current frame.
- PA-Mode (Multi-wavelength): Displays each wavelength used, one by one, according to the Multi-wavelength Scan Settings and will include both the Component wavelengths and Custom wavelengths. If not multiplexed, this field displays the wavelength for the current frame.
- PA-Mode (Unmixing): If not multiplexed, this field displays the component for the current frame.

Mode Settings Panel

The following additional settings are displayed, depending on the sub-mode selected:

- PA Power: Displays the optical power (100% by default).
- Wavelength Range: Displays the wavelength range used during acquisition (680-970 nm or 1200 - 2000 nm).
- PA Acquisition: Displays the selected submode (Single, Spectro, etc.).
- Wavelength: Displays the wavelength(s) used during acquisition.
- PA Brightness/Contrast: Only displayed when acquisition is paused or in review.

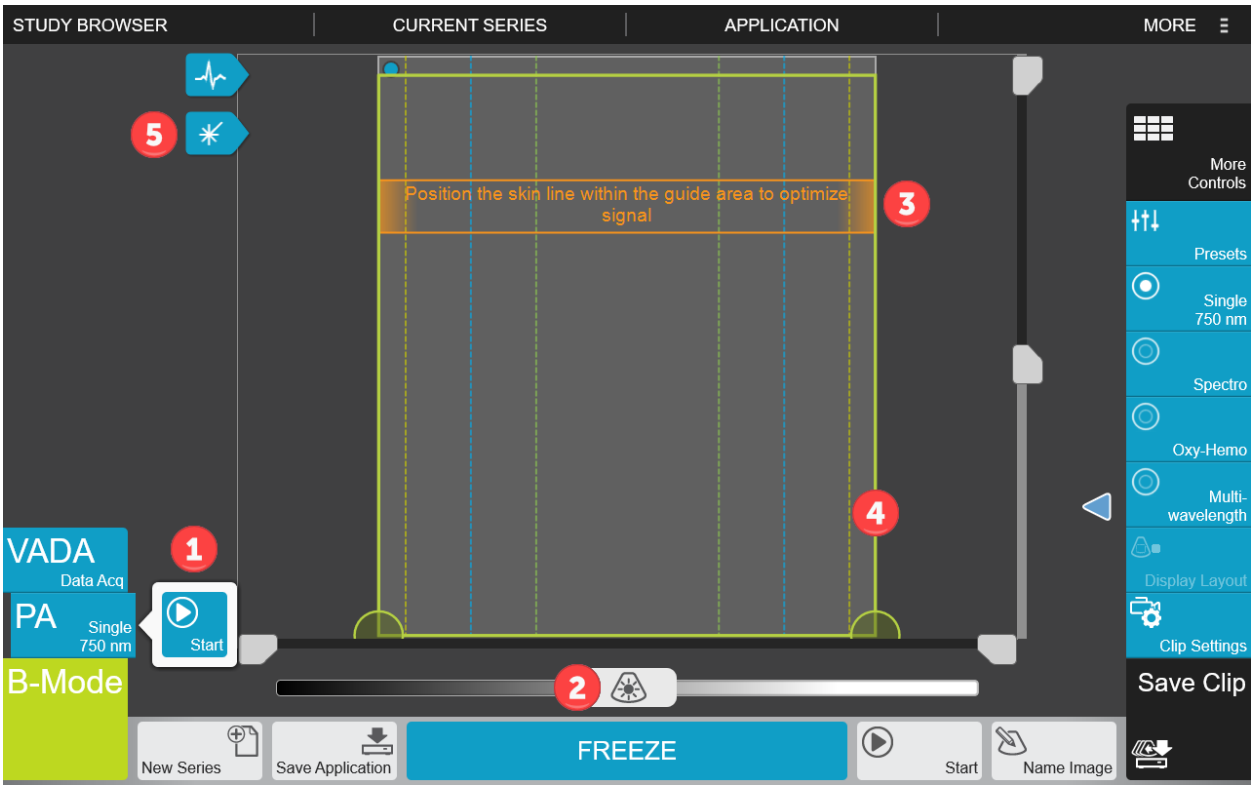
Status Bar

Displays the following additional laser information:

- Status of the Q-Switch: OFF or ON. Toggle the Q-Switch via the Laser tab.
- The current energy of the laser is displayed as a laser energy bar. The laser energy bar will indicate if the energy is within 10% of the baseline energy value. If the laser energy bar turns white, the laser baseline must be re-established by technical support.

PA-Mode Control Panel Interface

When PA-Mode is selected, the Control Panel shows the following interface:



The PA-Mode control panel

Image controls:

1. Start/Stop button
2. B-Mode/PA-Mode gain
3. PA Guide
4. PA-Mode box
5. Laser tab

Start/Stop Button

When you select PA-Mode, a **Start** button appears. When this happens, the system is in staging mode, which allows the user to make any necessary preparations (such as positioning the transducer) before starting PA-Mode acquisition.

When in staging mode, make all necessary preparations, then tap **Start**. Once this button is pressed, the system moves into acquisition mode and begins acquiring data.

When in acquisition mode, the **Start** button changes into a **Stop** button. Tap this button at any time to stop acquiring PA-Mode data and return to staging mode.

Note that the following UI changes also occur once you tap the PA-Mode button:

- The PA-Mode button changes to display the currently selected sub-mode (for example, Spectro or Multi-Wavelength).
- The PA guide appears to help with transducer positioning.

> **Note:** For a more detailed outline of the PA-Mode acquisition process, refer to PA-Mode Image Acquisition Workflow on page 173.

B-Mode/PA-Mode Gain

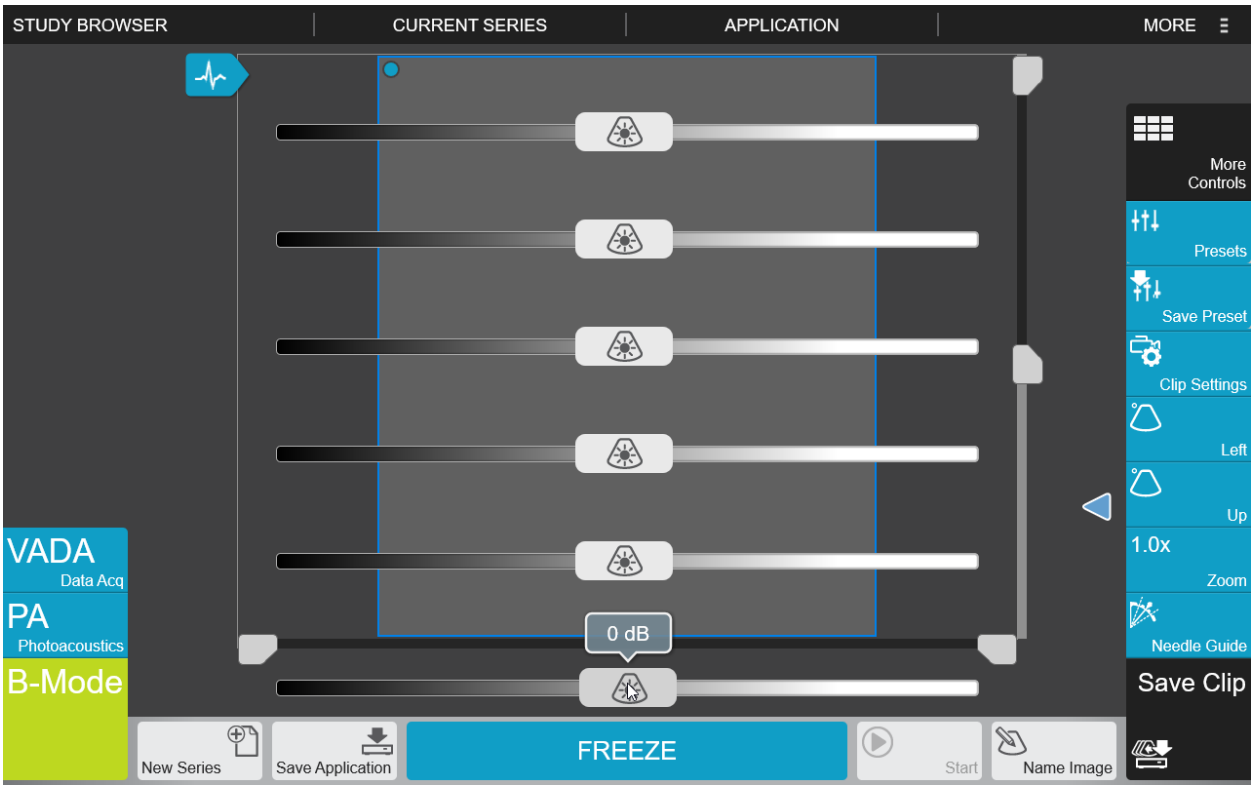
The slider along the bottom of the screen controls gain (brightness), but it can control either B-Mode gain or PA-Mode gain, depending on whether PA-Mode acquisition is active.

- If the system is in staging mode (PA-Mode selected, but the **Start** button was not tapped), then this slider controls B-Mode gain.
  When the slider controls B-Mode gain, it appears the same as it does when imaging in B-Mode.

- If the system is actively acquiring PA-Mode data (PA-Mode is selected and the **Start** button was tapped), then this slider controls PA-Mode gain.
  When the slider controls PA-Mode gain, the slider features an additional **PA** marker.

Slide either gain control left or right to adjust the visual intensity of the signal received by the face of the transducer. Slide right to add gain (brightens the image), and slide the slider left to reduce gain (darkens the image).

When you move the slider, five Time Gain Compensation (TGC) sliders appear on the control panel. Move these sliders to adjust the gain of the signal at specific depths.



The control panel with TGC sliders

> **Note:** For more information about the TGC sliders, refer to B-Mode Control Panel Interface on page 154.

To adjust the gain of the mode that you not currently on, tap **Start** or **Stop** to switch modes as needed.

PA Guide

The PA guide is a series of screen overlays intended to help you position the transducer to the animal's skin line for optimal image quality.

> **Note:** For more information about the PA guide, refer to PA Guide on page 190.

PA-Mode Box

The PA-Mode box controls where PA-Mode colors are applied to the image.

- To move the box, tap and drag it on the control panel.
- To resize the box, tap and drag one of the circular handles located at the bottom-left and bottom-right corners of the box.

> **Note:** By default, if the B-Mode image dimensions are changed, the PA-Mode box will maximize to fit the entire image. Making the PA-Mode box smaller will disable this feature. Manually maximizing the PA-Mode box will re-enable this feature.

Laser Tab

Tap this control to calibrate, initialize and configure the laser. The laser must be calibrated to ensure optimal image quality.

> **Note:** For more information about laser calibration, refer to Laser Calibration on page 193.

PA-Mode Image Acquisition Workflow

Acquiring an image in PA-Mode involves the following workflow:

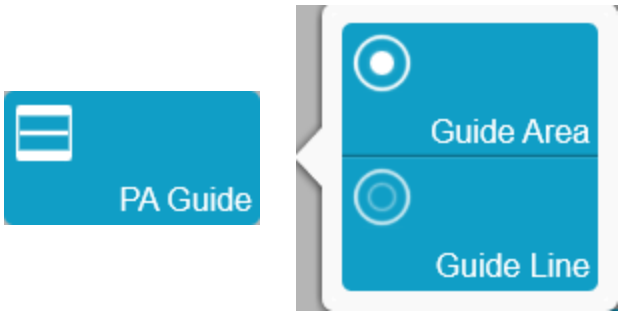
1. Start an imaging session, then tap PA-Mode.

   The system enters staging mode and shows B-Mode data. The PA-Mode box and the Guide Area from the PA Guide appears.

   > **Note:** For more information about the PA Guide, refer to PA Guide on page 190.

2. Select the desired laser port (refer to LAZR Port on page 186).
3. (Optional) To enable the PA Guide Line, tap PA Guide and select Guide Line.

4. Position the skin line of the animal within the Guide Area.
5. Adjust the PA-Mode box to the desired size and position.
    - To move the box, tap and drag it on the control panel.
    - To resize the box, tap and drag one of the circular handles located at the bottom-left and bottom-right corners of the box.

> **Note:** By default, if the B-Mode image dimensions are changed, the PA-Mode box will maximize to fit the entire image. Making the PA-Mode box smaller will disable this feature. Manually maximizing the PA-Mode box will re-enable this feature.

6. Select a PA sub-mode.

> **Note:** For a list of PA sub-modes, refer to List of PA Sub-Modes on the next page.

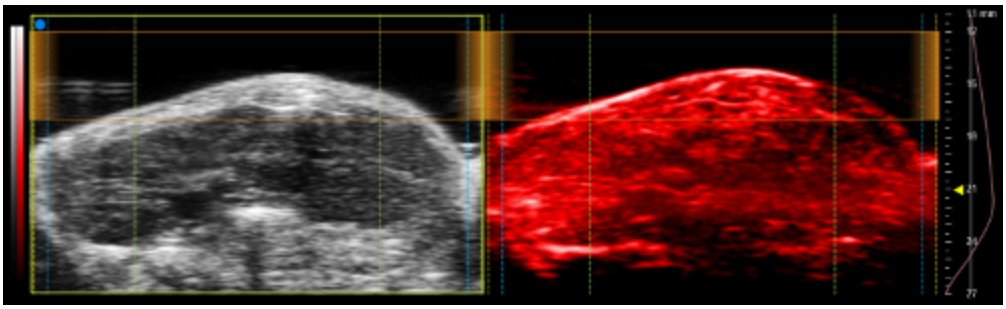
7. Adjust any mode-specific settings as necessary.

> **Note:** For a list of settings that appear after selecting a sub-mode, refer to PA Sub-Mode Settings on page 176.

8. Set desired PA-Mode scan parameters (such as frame delay, persistence, and respiration gating).
9. (Optional) Load or save a new PA-Mode preset.
10. Tap **Start**.

The system starts scanning in the selected PA sub-mode, with the following changes:

- The image display interface switches to PA-Mode, and shows additional data related to the selected sub-mode (such as wavelength data when in Single mode).
- The imaging area switches to the side-by-side PA-Mode image area, with the B-Mode window on the left and the PA-Mode window on the right. Both windows show live acquisition data.
- The system begins storing data in the acquisition buffer.



11. Use the control panel to make any adjustments to the interface or scan as necessary. For example:
    - Change the display layout to B-Mode Only, Both, PA Only, or Side by Side.
    - Tap Freeze to freeze the live image.
    - Adjust the PA-Mode gain slider.

      If the PA-Mode gain slider is adjusted, five Time Gain Compensation (TGC) sliders appear. Adjust these as necessary.

      > **Note:** For more information about gain sliders, refer to PA-Mode Control Panel Interface on page 170.

    - Adjust any other controls as needed.

      > **Note:** For more information about controls, refer to PA-Mode Controls on page 184.

12. When imaging is complete, tap **Stop**.

13. To save the image, tap **Save Clip** or **Save Frame**.

    > **Note:** For more information about saving images, refer to Saving Images on page 147

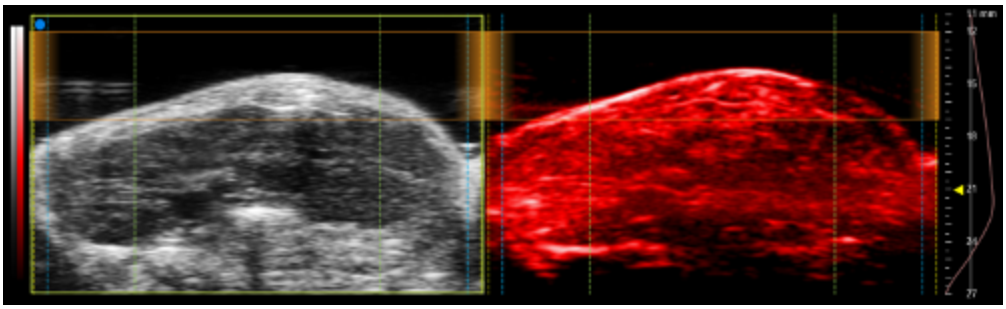
List of PA Sub-Modes

PA-Mode has several sub-modes:

- Single
- Spectro
- Oxy-Hemo
- Multi-wavelength

Single

PA-Mode (Single) acquires images at one wavelength.



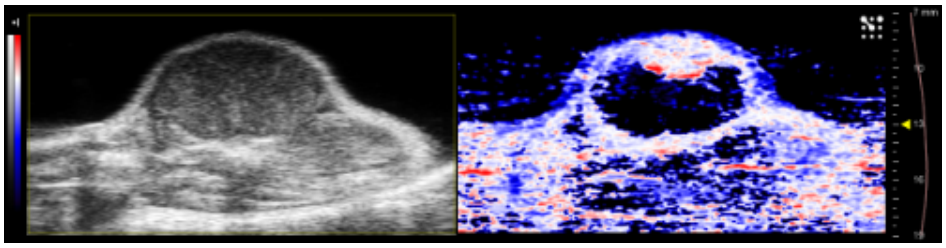
Left: B-Mode. Right: PA-Mode (Single)

Spectro

PA-Mode (Spectro) acquires data across the entire wavelength range. This mode is typically used for characterizing photoacoustic contrast agents.

Oxy-Hemo

PA-Mode (Oxy-Hemo) is used to create an overlay of oxygen saturation or total hemoglobin on an image. These images are created by acquiring two wavelengths — 750 nm and 850 nm.



Left: B-Mode. Right: PA-Mode (Oxy-Hemo)

Multi-wavelength

PA-Mode (Multi-wavelength) acquires data with a combination of wavelengths and components. This allows the user to multiplex and unmix captured data if desired.

PA Sub-Mode Settings

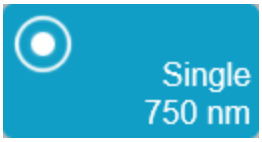
This section lists the options and controls available after selecting a PA sub-mode.

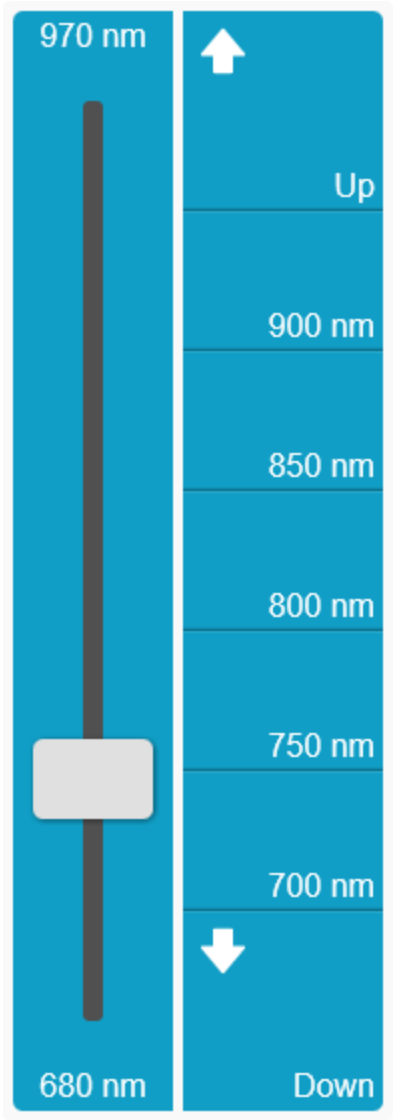
These options are meant to be carried out in the Adjust any mode-specific settings as necessary. step found in PA-Mode Image Acquisition Workflow on page 173.

Single

After selecting PA-Mode (Single), you can select which wavelength to use.

A set of wavelength settings appear after tapping **Single**.





Use one of the following controls to set the desired wavelength:

- Select a bookmarked (preset) wavelength.
- Tap and drag the wavelength slider.
- Tap the up/down buttons to adjust the wavelength in 1 nm increments.

Note: If a scan is currently active, the scan will stop and then restart a few seconds after you select a new wavelength.

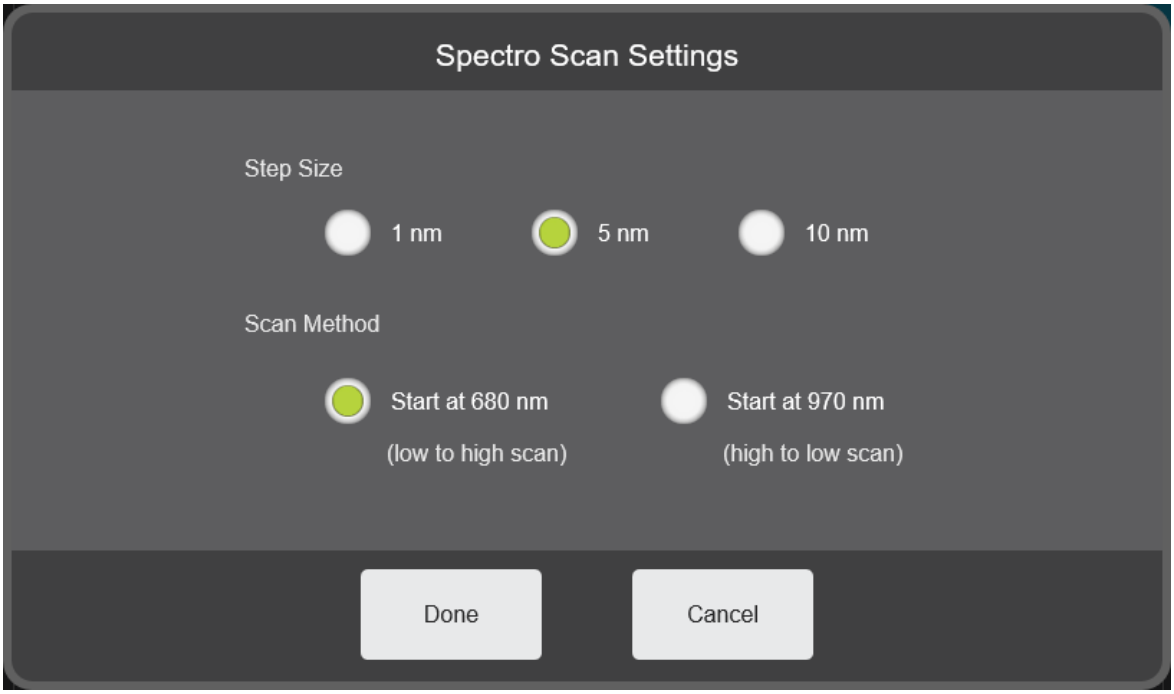
Note: To change bookmarked wavelengths, refer to Single Wavelength Bookmarks on page 316.

Spectro

To customize spectro scan settings:

1. Tap **Spectro Settings**.

The Spectro Scan Settings menu appears.



2. Select a step size.
   - 1 nm
   - 5 nm
   - 10 nm
3. Select a scan method appropriate for the laser port used.
   - Low to high scan (starts at 680 nm or 1200 nm)
   - High to low scan (starts at 970 nm or 2000 nm)

4. Tap **Done**.

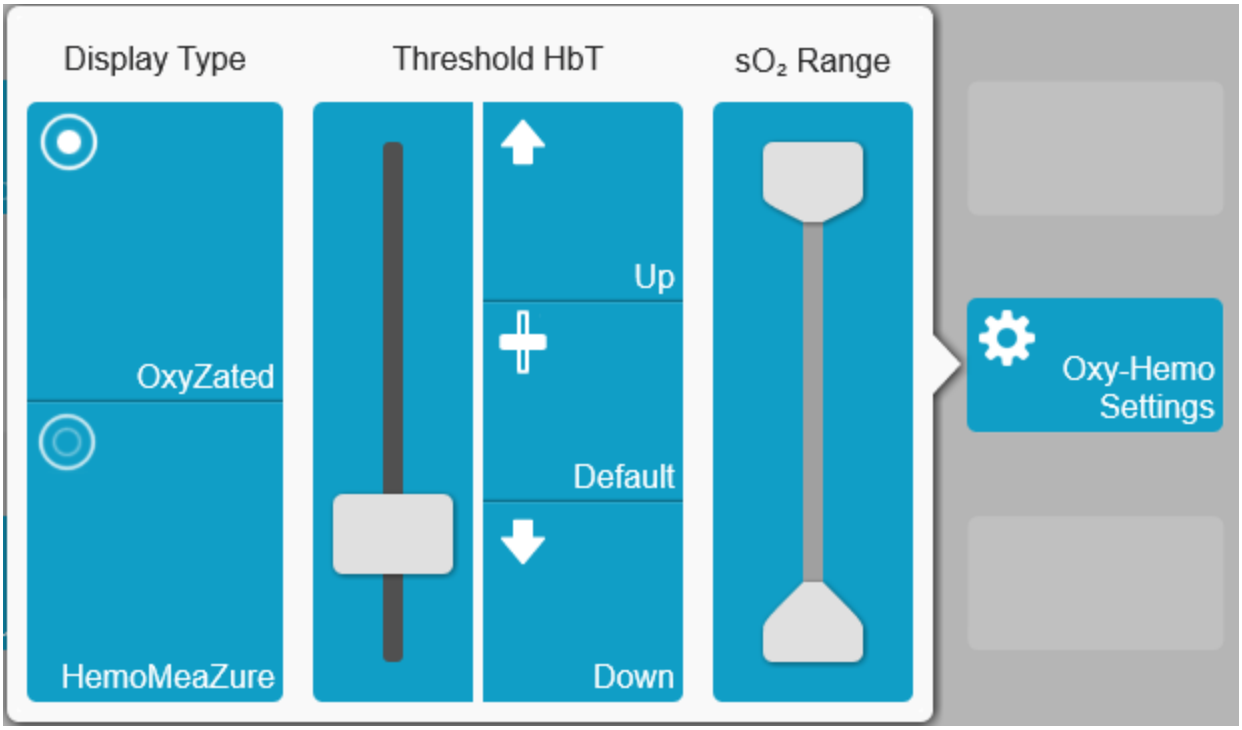
> **Note:** If this was not done while in Spectro mode, the system automatically switches to Spectro after you tap **Done**.

Oxy-Hemo

PA-Mode (Oxy-Hemo) settings are only available in acquisition mode.

To set Oxy-Hemo settings, tap the Oxy-Hemo Settings control.

This opens the following flyout menu:



This flyout menu contains controls for three settings: Display type, Threshold HbT, and sO_2 range.

Display Type

Use this control to select a display type. Tap a display type to select it.

Two display types are available:

- **OxyZated**: Displays oxygen saturation. Useful for studying the hypoxic state of tumor microenvironment (to predict disease burden), fetal/maternal physiology, and stroke/ischemia.
- **HemoMeaZure**: Displays hemoglobin content. Useful for studying anemia.

Threshold HbT

Sets the Threshold HbT (hemoglobin concentration) of the image. Increase this threshold to display the stronger signals of oxygen-saturated blood cells. Only available when displaying data with the OxyZated display type.

The threshold can be set between 0 (no threshold) and 100 (maximum threshold) with the following controls:

- Drag the slider up and down to quickly change the threshold.
- Tap the **Up** or **Down** buttons to increment the threshold by one in either direction.
- Tap **Default** to reset the threshold to the default of 20.

sO_2 Range

Sets the sO_2 range by dragging the two sliders. The range can be set between 0 and 100.

- The top slider changes the upper limit of the range.
- The bottom slider changes the lower limit of the range.

The range is displayed on the display map. If the range is not 0 and 100%, two red arrows appear to indicate the range.

Multi-Wavelength

After selecting PA-Mode (Multi-wavelength), the Multi-wavelength Scan Settings menu appears.

Use this menu to add additional components, delete existing components, or view/customize wavelengths. When done, tap **Start Scan** to start scanning.

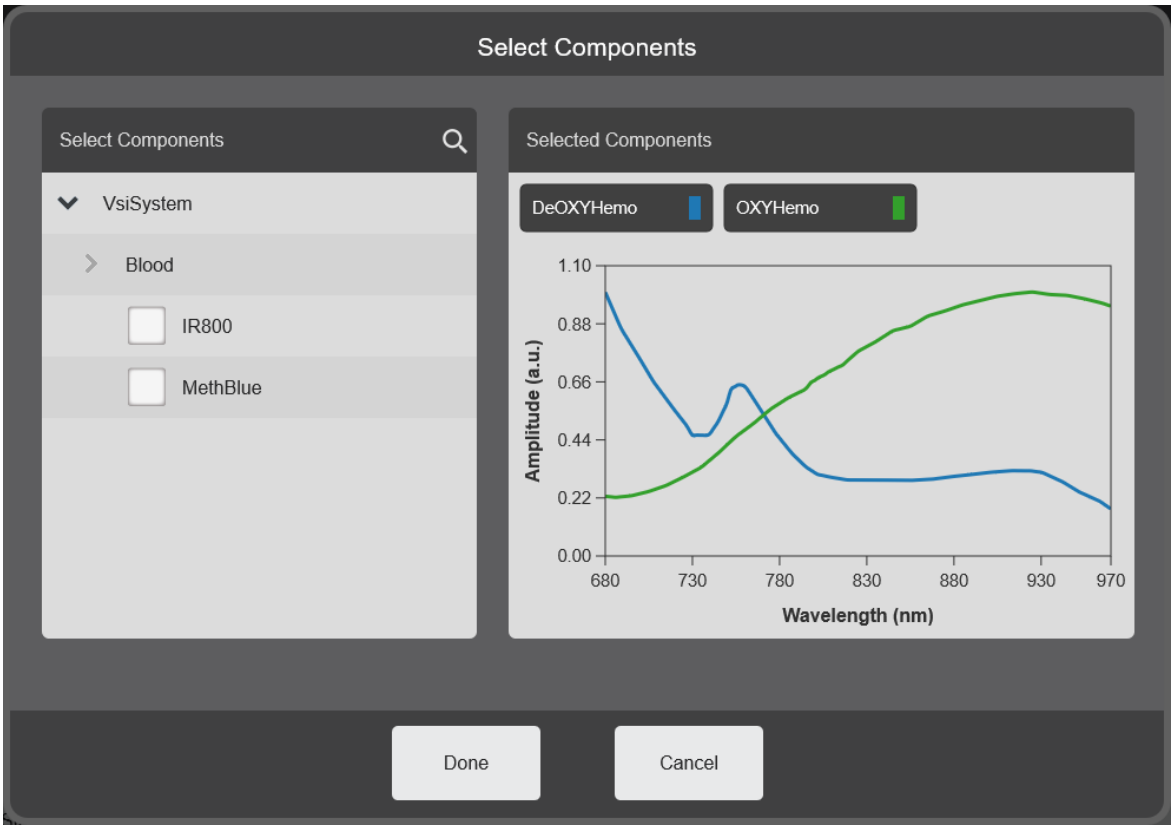
> **Note:** The Done and Start Scan buttons are disabled if there is less than one wavelength in the View/Customize wavelengths section.

To add additional components:

1. Tap **Add component**.

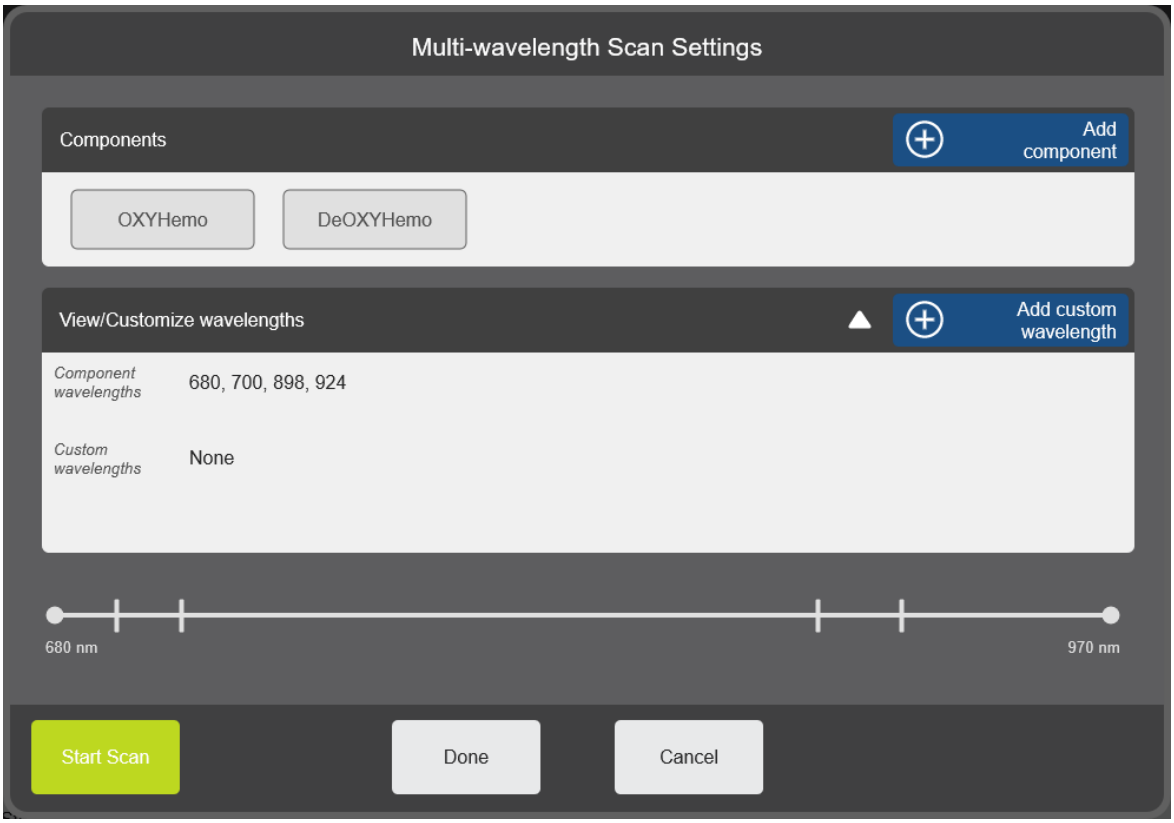
   The Selected Components menu appears.



2. In the list to the left of the interface, enable or disable the checkboxes for any components as desired. Selected components are displayed in a graph to the right.
3. When all updates are complete, tap **Done**.

To view or customize wavelengths:

1. Tap **View/Customize Wavelengths**.
   The **View/Customize Wavelengths** section expands and displays:
   - A list of default component wavelengths.
   - Any custom wavelengths previously added.



2. Add custom wavelengths as necessary.
   To add a wavelength:
   a. Tap **Add custom wavelength**.

   A text box appears in the list of custom wavelengths.

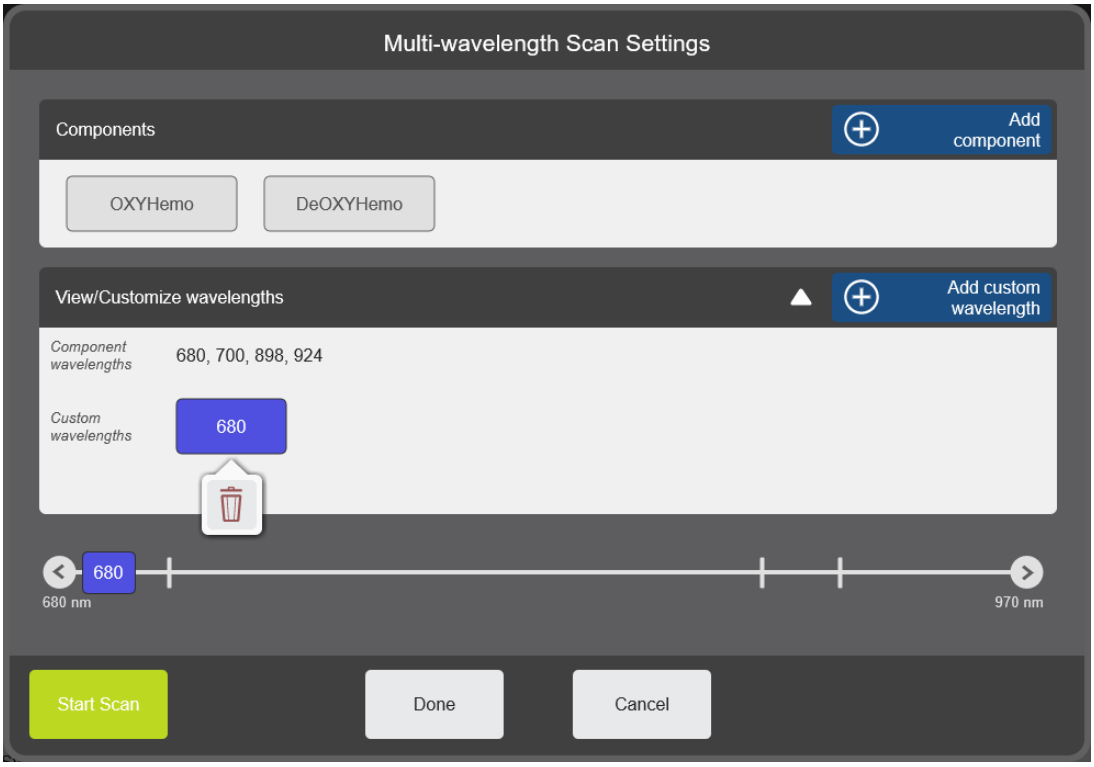
   b. Enter a custom wavelength and then tap **Add**.

   Once added, the custom wavelength appears in the list of custom wavelengths, and also on the wavelength scale.

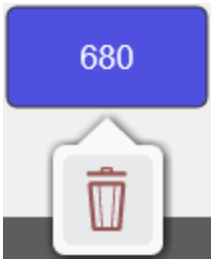
   > **Note:** The wavelength scale shows default wavelengths as light lines, while custom wavelengths are shown as dark lines.

3. Delete custom wavelengths as necessary.
   To delete a wavelength:

a. Tap a custom wavelength.
A delete icon appears under the selected wavelength.



b. Tap the delete icon.



4. When all settings are complete, tap **Start Scan** (if in staging mode) or **Done** (if scanning).

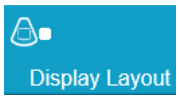
PA-Mode Controls

This section contains a list of controls that appear on the PA tab of the More Controls menu.

Any control listed here can be added to, or removed from, the right sidebar of the control panel during an imaging session. For more information, refer to Customizing the Control Panel on page 140.

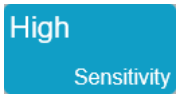
> **Note:** Some controls are only available when specific PA-Mode sub-modes are selected (such as Single or Spectro), or before tapping the **Start** button.

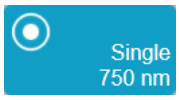
Control	Live/Review	Description
Annotations 	Review	Adds annotations to an image. For more information, refer to Annotations on page 106.
Brightness 	Review	Adjusts the brightness of the image. The current brightness is displayed on the button.
Clip Settings 	Both	Opens the Clip Settings menu. For more information, refer to Configuring Clip Settings on page 149.
Clip Sub-range 	Review	Opens the Clip Slider, which is used to crop clips using two sliders. Cropping a clip before saving saves only the data within the sliders. The data outside the sliders is discarded. Cropping a clip in a saved image only defines which frames are played back. The underlying data of the entire saved image is not changed. When the Clip Slider appears: 1. Move the crop sliders to their desired positions. 2. (unsaved clips only) **Tap Crop and Save**. 3. Tap **Cancel** to remove the clip sliders. Not available for PA-Mode (Multi-wavelength), PA-Mode (Spectro), and PA-Mode (Unmixed) images.
Contrast 	Review	Adjusts the contrast level of the image. The current contrast is displayed on the button. Only available when the Display Layout is set to Both, PA Only, or Side by Side. Not available for Oxy-Hemo images, or for images that have been multiplexed.

Control	Live/Review	Description
Display Layout 	Both	Changes the layout shown on the image display. Used to swap between B-Mode Only, Both, PA Only, or Side by Side layouts. Does not affect the actual image data collected.
Display Map 	Both	Opens a menu of predefined sets of overlays and image maps that can be applied to the current image. Can be used at any time during live scanning or review. Only displays display maps available for the currently selected imaging mode.
Frame Delay 	Live	Sets the delay between sets of images during acquisition. For example, if you acquire a PA-Mode (Multi-wavelength) image at 700 nm, 750 nm and 800 nm, the system will collect the first three wavelengths, then wait for the time specified by this setting before acquiring the next three wavelengths. The following frame delay settings are available: Off, 5 seconds, 10 seconds, 30 seconds, and 60 seconds.
LAZR Port 	Live	Selects the laser port used on the Vevo LAZR-X laser cart. To set the laser port: 1. Tap **LAZR Port**. 2. Select either the 680-970 nm (Signal) or 1200-2000 nm (Idler) range. 3. Insert the Vevo Optical Fiber into the corresponding port on the Vevo LAZR-X laser cart and secure the fiber with the lever lock. The LAZR Port button then updates to the selected port wavelength range, and the default wavelength value of the Single scanning sub-mode is also updated.
Magnify Scale 	Review	Sets the magnification level of the area shown when placing a measurement or annotation. Tap this button, then tap the **Increase** or **Decrease** flyout buttons to select a magnification level between 2x and 8x.

Control	Live/Review	Description
Measurements 	Review	Opens the Measurements menu. Use this menu to select and add a measurement to an image. For more information, refer to Measurements on page 111.
Multi-wavelength 	Live	A sub-mode used to acquire images at multiple wavelength. Such images can then be multiplex or unmixed, if necessary. This button opens a Scan Settings menu, which is used to add components and customize wavelengths before you start scanning. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Multiplex 	Review	The Multiplex control combines groups (or sets) of wavelengths or components into a single frame, as a way to visualize more information at the same time. Available for the PA-Mode (Spectro), PA-Mode (Multi-wavelength), and PA-Mode (unmix) sub-modes. For more information, refer to Multiplex.
Orientation    	Both	Sets the image orientation, allowing you to align the image with the transducer. The blue dot shown at the corner of the control panel and image display corresponds to this setting. There are two buttons: • One button toggles between Up and Down. • Another button toggles between Left and Right. Tap the appropriate button to select an orientation.

Control	Live/Review	Description
Oxy-Hemo 	Live	A sub-mode used to create an overlay of oxygen saturation and total hemoglobin on an image. These images are created by acquiring two wavelengths — 750 nm and 850 nm. Use when you want to see an overlay of oxygenated (red) and deoxygenated (blue) blood on one image. This sub-mode is not available if the Vevo LAZR-X laser cart is using the Idler (1200-2000 nm). For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Oxy-Hemo Settings 	Both	Opens a flyout menu that is used to set the display type, threshold HbT, and sO_2 range for Oxy-Hemo images. For more information, refer to Oxy-Hemo on page 179.
PA Guide 	Live	Activates a series of screen overlays intended to help you position the transducer to the animal's skin line for optimal image quality. For more information, refer to PA Guide on page 190.
Persistence 	Live	Applies a pixel-averaging algorithm to the most recently acquired frames to produce a more uniform view of the image area. This feature reduces shimmering and motion artifacts in faster moving tissue, and is useful for imaging uniform tissues such as the liver, kidney, or prostate. Tap **Persistence**, then select a desired level of strength for the feature. Each level corresponds to the number of frames used in the algorithm: • Off = 1 frame • Low = 4 frames • Med = 8 frames • High = 12 frames • Max = 20 frames

Control	Live/Review	Description
Presets 	Live	Opens the Presets menu. Use this menu to select an appropriate preset. For more information, refer to Applications & Presets on page 287.
Priority 	Live	Adjusts the opacity between the overlay data and the B-Mode data. To use this feature, tap **Priority** and use the up/down buttons to select a desired value. Priority is only available in the Both display layout. This feature is disabled if the image is multiplexed.
RF  	Both	Toggles RF data collection and RF data display. During live imaging, you can toggle both RF data collection and RF data display. During review, the RF Display button is only enabled for images that were captured with RF data. For more information, refer to Digital RF on page 103.
Save Preset 	Both	Saves all current settings into a preset. Saved presets are accessed through the Presets control. For more information: • Applications & Presets on page 287 • PA-Mode Image Acquisition Workflow on page 173
Sensitivity 	Live	Changes the sensitivity level of the ultrasound signal by adjusting the signal-to-noise ratio. Use this setting to: • identify weak-signal targets in the near field (difficult to distinguish because of small size). • identify large targets in the far field (difficult to distinguish because of attenuation). **Note:** The higher the sensitivity level, the lower the frame rate of the image.

Control	Live/Review	Description
Show Values and Labels 	Review	Shows or hides measurement values and labels on an image in review.
Single 	Live	A sub-mode used to acquire images at one wavelength. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Spectro 	Live	A sub-mode that acquires data across the entire wavelength range. This mode is typically used for characterizing photoacoustic contrast agents. For more information: • List of PA Sub-Modes on page 175 • PA-Mode Image Acquisition Workflow on page 173 • PA Sub-Mode Settings on page 176
Spectro Settings 	Live	Opens the Spectro Scan Settings menu, where the following options can be changed: • Step Size (1 nm, 5 nm, or 10 nm) • Scan Method (low to high, or high to low) Only available when the Spectro sub-mode is selected.
Zoom 	Both	Changes the amount of zoom applied to the image. For more information, refer to List of Imaging Controls on page 86.

PA Guide

The PA guide is a series of screen overlays that appear on both the image display and the control panel when you select PA-Mode. These overlays are visual guides intended to help you position the transducer to the animal's skin line for optimal image quality.

The PA guide features two sets of guides:

- Guide Area: A semi-transparent guide area and a series of dashed vertical lines that represent the widths of the fibers within the Vevo Optical Fiber, indicating the optimal imaging area.
- Guide Line: A line that shows the recommended depth for the tubes in the Vevo PHANTOM accessory. This line appears on the image display only, and does not appear on the control panel.

> **Note:** The PA Guide is an overlay only, and is not saved with your image. It will not appear for images that are paused, opened for review, or opened after an export.

To Use the PA Guide

The Guide Area of the PA Guide is automatically activated when you select PA-Mode, but the Guide Line can be activated manually.

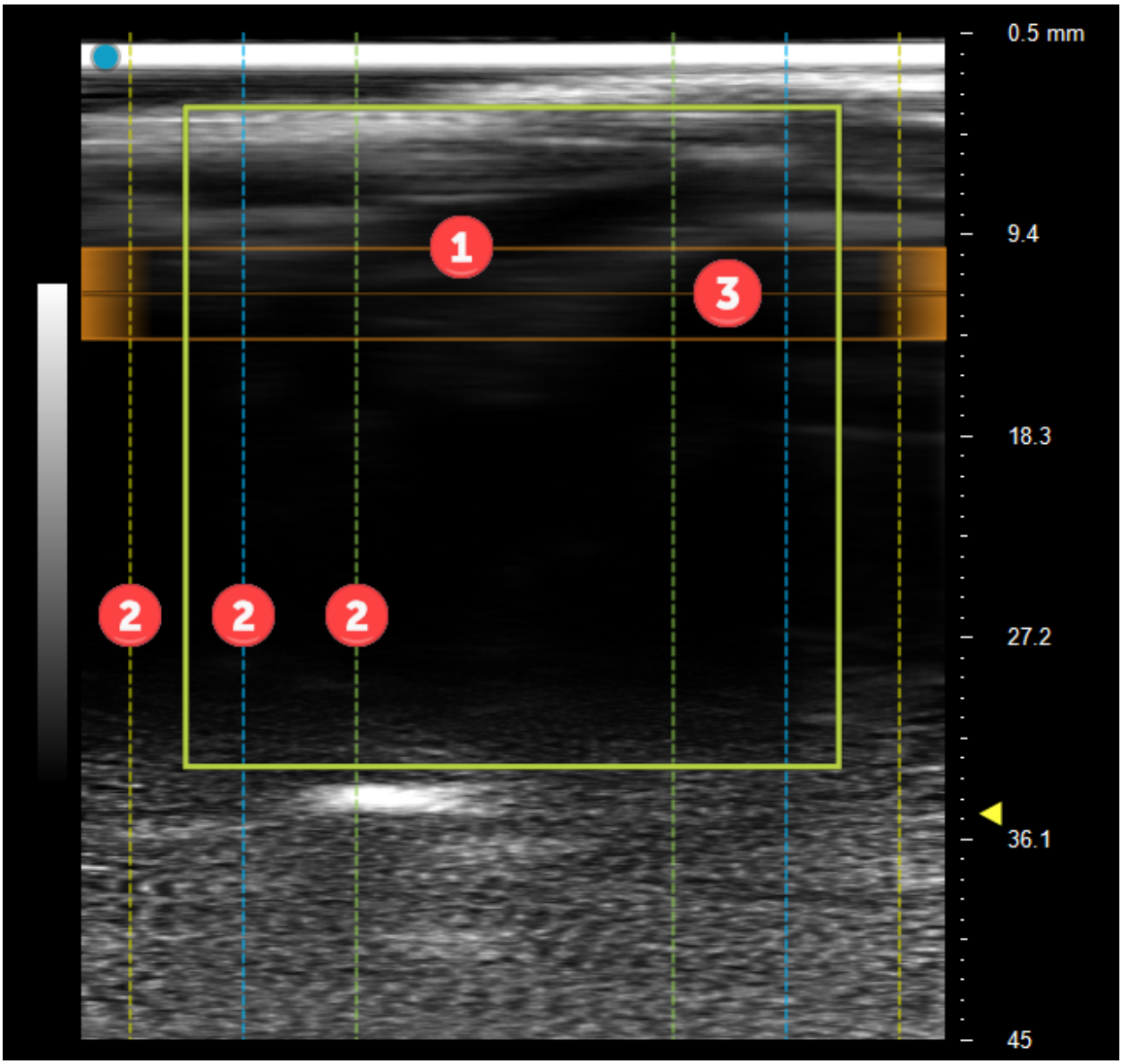
To use the PA Guide:

1. Select PA-Mode.

   The PA-Mode interface appears. The Guide Area of the PA Guide appears automatically
2. To turn on the Guide Line part of the PA Guide, tap **PA Guide** and then select **Guide Line**.

3. Position the skin line of the animal within the Guide Area.
4. Continue with PA-Mode image acquisition.
   For more information about PA-Mode image acquisition, refer to PA-Mode Image Acquisition Workflow on page 173.

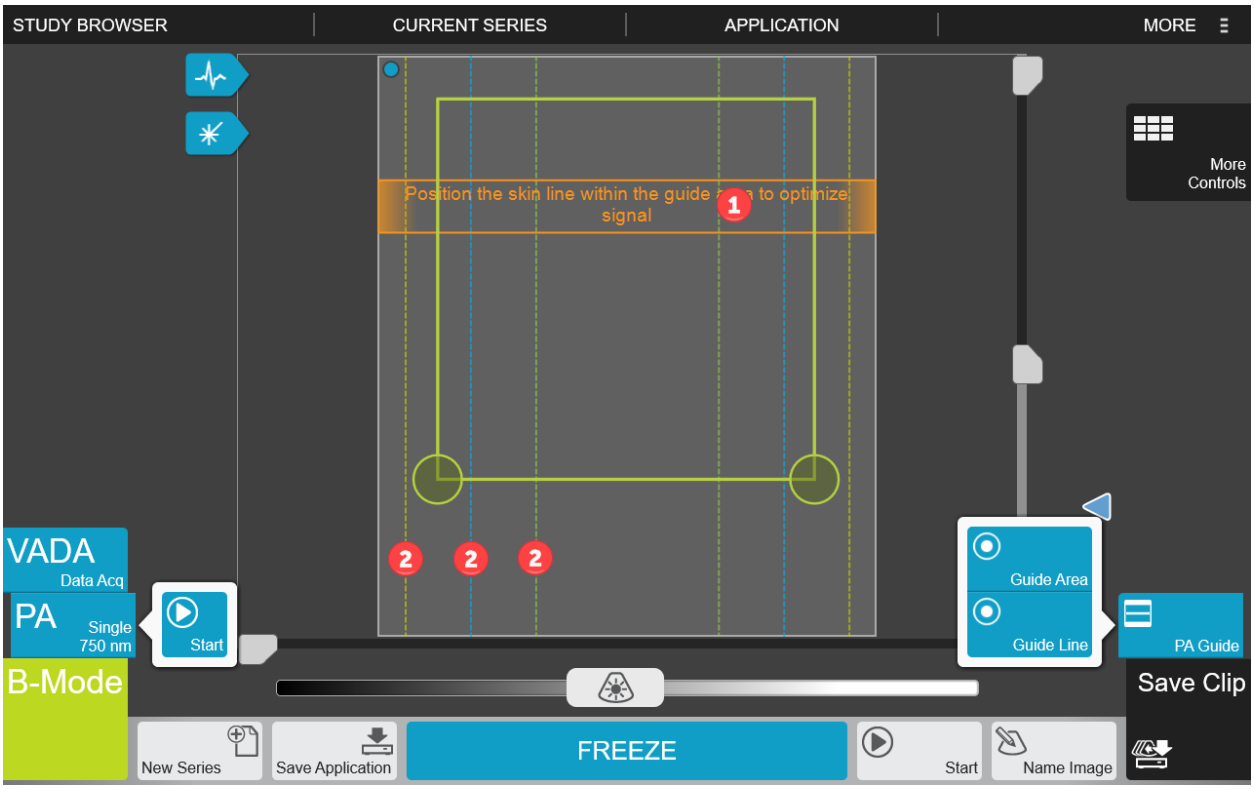
PA Guide View



PA Guides on the image display

PA Guides appear on the image display as the following:

1. Guide Area
2. Optical fiber guides
3. Guide Line



PA Guides on the control panel, with both Guide Area and Guide Line enabled

PA Guides appear on the control panel as the following:

1. Guide Area
2. Optical fiber guides: These indicate which area of the sample will be illuminated by the different fibers. The lines correspond to the yellow (wide), blue (medium), and green (narrow) fibers.

> **Note:** The Guide Line does not appear on the control panel.

Laser Calibration

Before using the laser, make sure it is properly calibrated.

Laser calibration characterizes the transmission energy of the Vevo Optical Fiber across the entire wavelength spectrum. It is a very important step to ensure that multi-wavelength data is normalized to the same energy scale.

When calibrating the laser, be aware of the following:

- Once started, the laser calibration process cannot be canceled.
- The date and time the laser was last calibrated, and the user who performed the calibration, are recorded and displayed on the Laser Configuration panel.

Items Required

The following items are required to calibrate the laser:

- The Vevo LAZR-X laser cart
- External energy sensor
- A transducer compatible with PA-Mode, equipped with a Vevo Fiber Jacket and a Vevo Optical Fiber.
- A transducer holder, such as the one on the Vevo Rail System.
- An imaging platform or another flat, slightly elevated surface
- Ultrasound gel
- Ultrasound cleaning products

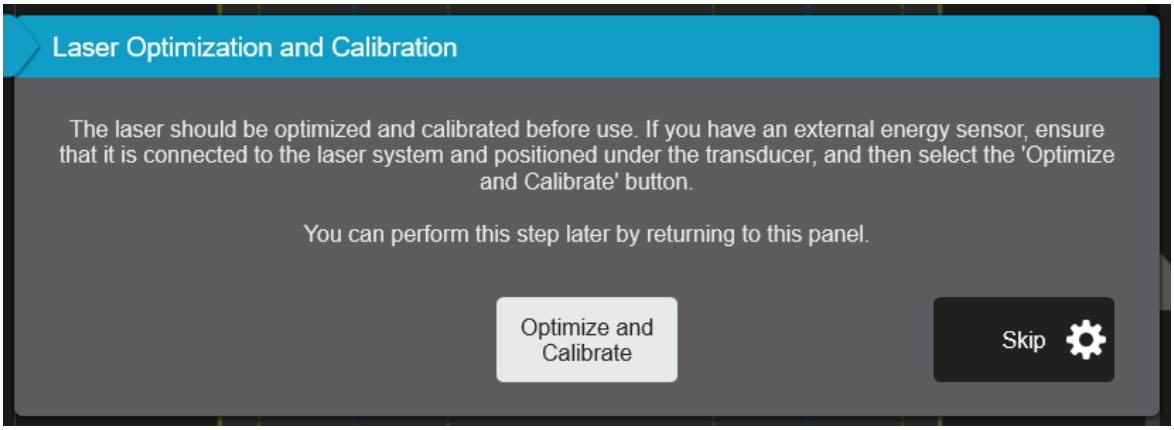
To Calibrate the Laser

1. Connect the transducer to the Vevo F2 Imaging System.
2. Connect the Vevo Optical Fiber to the laser.
3. Connect the external energy sensor to the external power meter on the front of the laser.
4. Place the external energy sensor on the base of an imaging platform, or on a flat, slightly elevated surface.
5. Using a damp cloth, clean the transducer and the output ends of the optical fibers attached to the Vevo Fiber Jacket. Ensure that there is no residue or dirt on the Vevo Fiber Jacket or the output ends of the optical fibers.
6. If calibrating for the 680 - 970 wavelength range, apply ultrasound gel to the transducer. Ensure the ultrasound gel completely covers the output ends of the optical fibers.
   Calibrating with gel is best for the 680 - 970 nm wavelength range because it compensates for the way the laser attenuates at longer wavelengths due to water absorption.
   If calibrating for the 1200 - 2000 nm wavelength range, do not apply gel to the transducer.
7. Affix the transducer so that it is directly above the external energy sensor, with the end of the transducer 6-10 mm away from the energy sensor. If the transducer has ultrasound gel, ensure the gel does not touch the energy sensor.

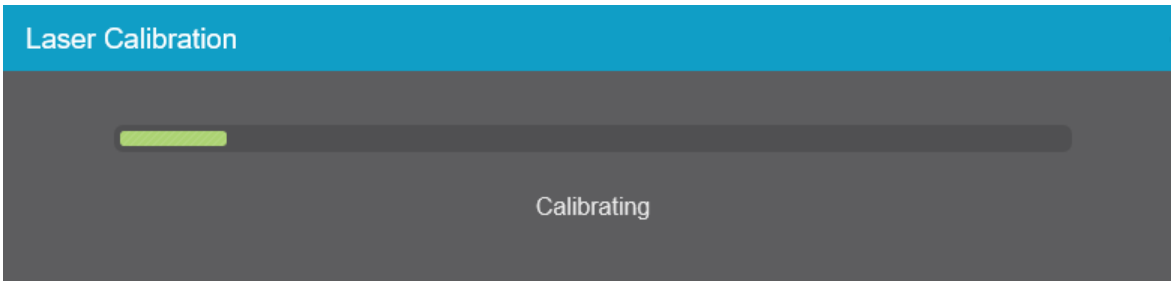
Transducer above energy sensor, with gel

Transducer above energy sensor, without gel

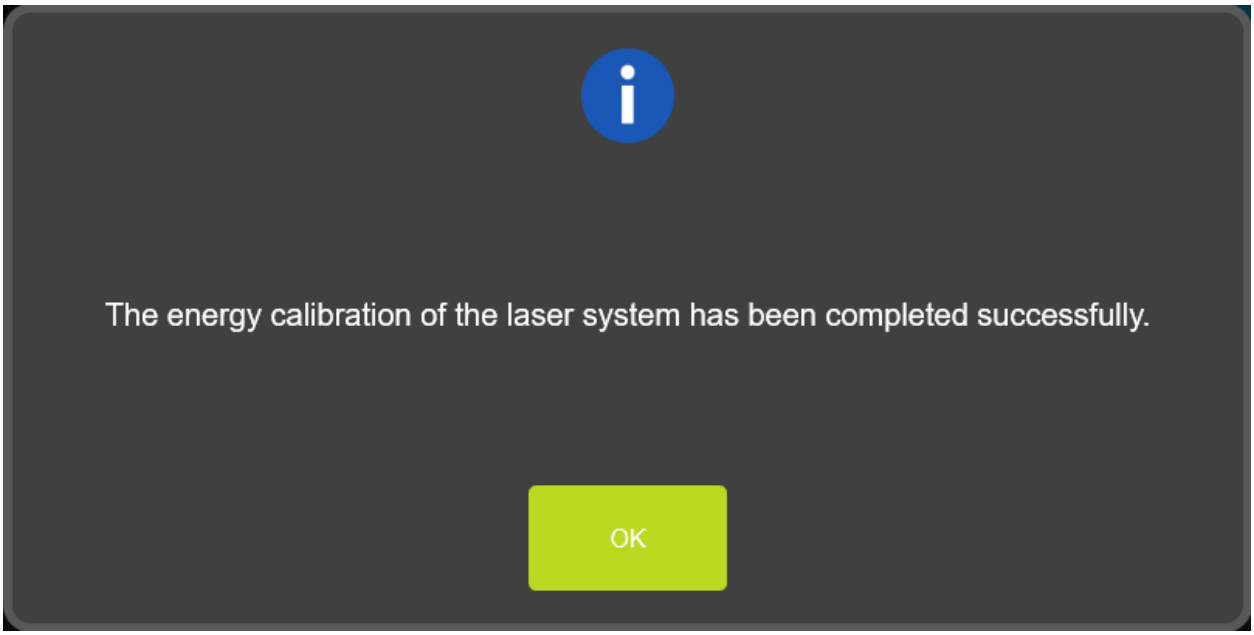
8. Start the laser and let it run for 2-5 minutes.
9. On the Vevo F2, tap **PA (Photoacoustics)**.
   The Laser Calibration panel appears with two buttons.
   - **Calibrate**
   - **Skip**



10. If the laser is not yet warm, tap outside the Laser Configuration panel to dismiss the panel and delay the calibration process.
    a. After the Laser Configuration panel is dismissed, wait at least 20 minutes for the laser to warm up.
    b. When the laser is warm, tap the Laser tab on the side of the image area of the control panel to re-open the Laser Calibration menu.
11. Tap **Calibrate**.
    Once calibration begins, a progress bar appears.



When the laser calibration is complete, the following message appears:



Laser Issue Notification

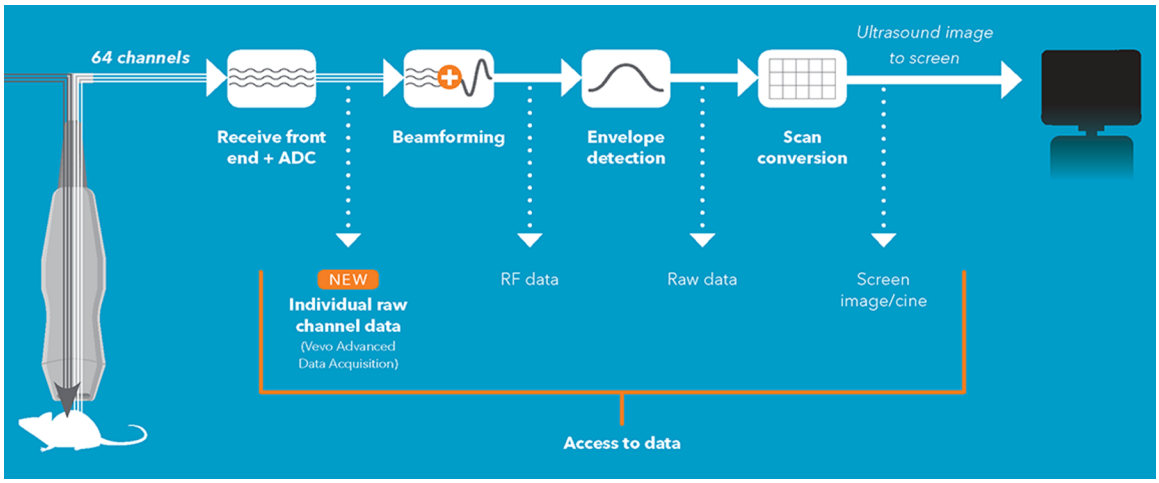
On the control panel, the color of the laser tab will change from blue to yellow if an error or issue is detected with the laser.

If the laser tab turns yellow, tap it to open a message box that describes the issue.

If laser optimization is required, refer to Contact and Legal Information on page 346 and contact FUJIFILM VisualSonics technical support.

VADA Mode

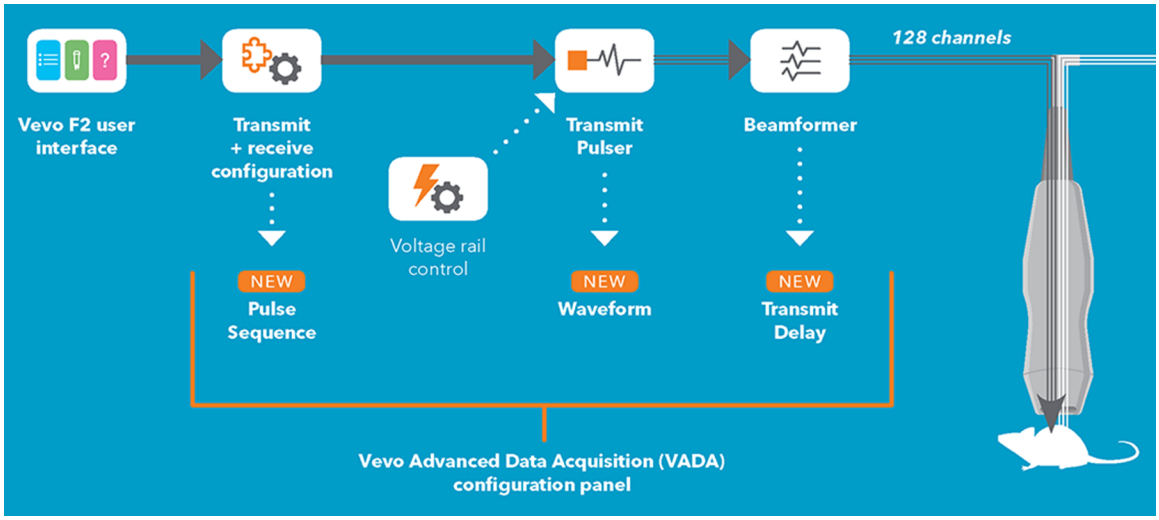
Vevo Advanced Data Acquisition (VADA) Mode is a unique mode specifically designed for ultrasound research. It provides individual raw channel data from the transducer, before the data has been processed to create an ultrasound image.



VADA Mode provides raw channel data, taken before any processing steps

Unlike other modes, VADA Mode does not display image data on the image display because it is a data acquisition mode, and the acquired data is not reconstructed. Instead, VADA Mode displays raw channel data on the image display.

Signal Customization in VADA Mode



The steps involved in forming an ultrasound signal

VADA Mode features a configuration panel that allows the user to customize what is transmitted by the ultrasound system. The configuration panel consists of a set of menus:

- Transmit Delays on page 217: Controls when each channel within a transmit aperture emits a signal. Transmit delays are used to control the manner in which transducer signals reach the target.
- Waveforms on page 222: Controls the voltage pattern that is applied to the transducer to generate an ultrasound signal.

- Pulse Sequences on page 229: Controls the sequence of actions and transmit/receive events carried out by the ultrasound system. This includes:
  - Ordering transmit/receive events.
  - Setting up the timing between transmit/receive events
  - Enabling or disabling trigger events.
  - Applying any other settings to the system.

For more information about the VADA configuration panel, refer to Navigation on page 211.

Hardware Limitations

While VADA Mode aims to provide full customizability over the system, certain settings may not be possible due to hardware limitations. For example, certain elements cannot be set to fire at the same time during system transmit and receive.

Transducer Thermal Management

In standard imaging modes (B-Mode, PA-Mode), the Vevo F2 has been calibrated with acoustic power and intensity tests to prevent the surface of the transducer probe from exceeding 50°C while imaging in air without coupling materials. While some limits have been put in place for pulse sequences in VADA mode, it cannot be guaranteed that a given pulse sequence will not induce dangerous levels of heating due to a combination of voltage, pulse repetition interval (PRI), aperture, transmit waveforms and imaging session length.

To minimize the chance of heating issues, FUJIFILM VisualSonics recommends running all sequences at the lowest voltage setting that will achieve the desired data output. Perform thermal validation of all sequences using a thermocouple or some other thermal measurement equipment before using them in experiments.

Known Causes of Increased Transducer Heating

Although full thermal models are difficult to derive for all VADA pulse sequences, particular combinations of parameters have been found to be more likely to cause increased heating of the transducer surface.

Be aware that the following characteristics are known to cause transducer heating:

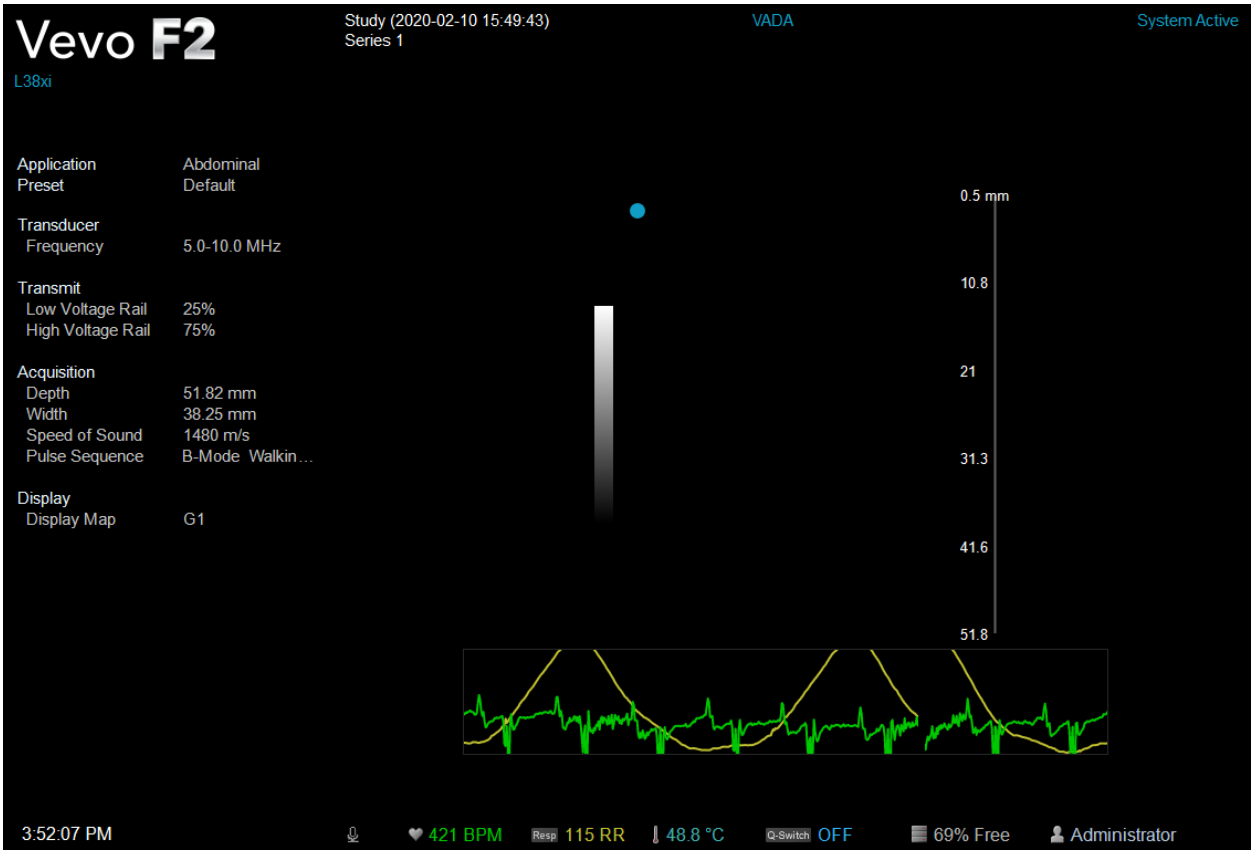
- Low PRI (Especially very shallow imaging depths, or disabling the **Display Channel Data** setting in the Preview tab of the VADA Configuration Panel)
- Long transmit waveforms
- Large, stationary apertures
- Very long pulse sequences, particularly on the L38xp
- Imaging in air, or other applications without good acoustic coupling across the entire aperture
- Inefficient transmit waveforms (such as transmit waveforms that are significantly off the center frequency of the transducer, or have unusual phase characteristics)

VADA Workflow

The process of acquiring VADA Mode data involves the following steps:

1. Set an active pulse sequence.
    a. Open the VADA configuration panel (Navigation on page 211).
    b. (Optional) Use the menus to create or edit transmit delay profiles, waveforms, and/or pulse sequences.
    c. (Optional) Preview the pulse sequence in the Preview menu.
    d. Navigate to the Pulse Sequences menu (Pulse Sequences on page 229).
    e. Select a pulse sequence, and tap **Set Active Pulse Sequence**.
    f. Tap **Done**.
2. Tap **Acquire and Save** (or **Acquire**, if **Automatically save after acquisition** is turned off in the Clip Settings menu).
   The system runs the selected pulse sequence, collects the data, and then downloads it into the system.
3. Review the data (Review on page 262).
4. If not yet saved, save the data.

VADA Image Display Interface



The image display when in VADA Mode

When in VADA Mode, the image display displays raw data instead of an image.

The left side of the image display shows the following information:

- Application: The currently selected application for the transducer.
- Preset: The currently selected preset for the transducer.
- Transducer frequency: The frequency range of the transducer.
- Transmit voltage: The current voltage settings on the high and low voltage rails, displayed in percentage of the max voltage.
- Acquisition: Lists acquisition settings.
    - Depth
    - Width
    - Speed of Sound: The speed of sound selected in the Speed of Sound control.
    - Pulse sequence: The active pulse sequence.
- Display Map: The setting selected in the Display Map control.
- Brightness: (Only displayed when reviewing a live image) The brightness applied to the live image.
- Contrast: (Only displayed when reviewing a live image) The contrast applied to the live image.

VADA Control Panel Interface

The control panel when in VADA Mode

The VADA Mode control panel interface has gain and depth sliders, similar to those in B-Mode.

Controls that are specific to VADA Mode are listed in VADA Mode Controls on the next page.

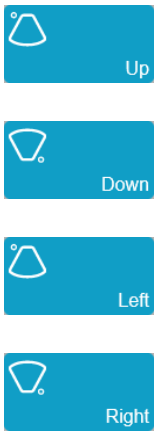
VADA Mode Controls

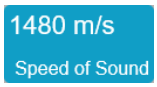
This section contains a list of controls that appear on the VADA Mode tab of the More Controls menu, or on the right sidebar of the control panel.

Any control listed here can be added to, or removed from, the right sidebar of the control panel. For more information, refer to Customizing the Control Panel on page 140.

> **Note:** For a full list of controls, refer to List of Imaging Controls on page 86.

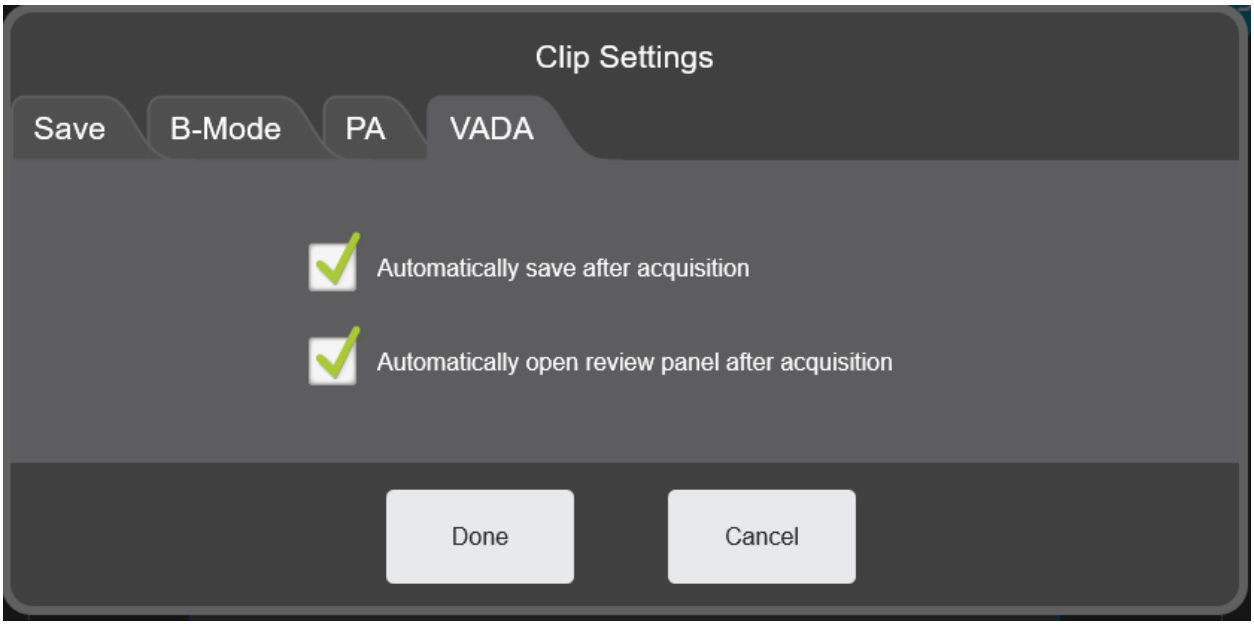
Control	Live/Review	Description
Contrast 	Review	Adjusts the contrast level of the image. The current contrast is displayed on the button. Enabled only if a live image was acquired.
Brightness 	Review	Adjusts the brightness of the image. The current brightness is displayed on the button. Enabled only if a live image was acquired.
Clip Settings 	Both	Opens the Clip Settings menu on the VADA Mode tab. For more information, refer to VADA Clip Settings on page 203.
Display Map 	Live	Opens a menu of predefined display maps that can be applied to the current image. Can be used at any time during live scanning or review. Only displays display maps available for the currently selected imaging mode.
Live Image 	Live	Displays channel data on the clinical display from an unsteered plane wave acquisition. This is useful for setting up the gain and TGC.

Control	Live/Review	Description
Presets 	Live	Opens the Presets menu. Use this menu to select an appropriate preset. Each preset contains settings for the following: • Pulse Sequence • Speed of Sound • Voltage • Gain/TGC sliders • Display map settings For more information, refer to Applications & Presets on page 287.
Orientation 	Both	Sets the image orientation, allowing you to align the image with the transducer. The blue dot shown at the corner of the control panel and image display corresponds to this setting. Tap any of the buttons to select an orientation. There is an Up/Down button and a Left/Right button. Each button shows the orientation that is not currently selected.
Preview 	Live	Opens the Preview tab of the VADA configuration panel. For more information, refer to Preview on page 255.
Pulse Sequences 	Live	Opens the Pulse Sequences tab of the VADA configuration panel. For more information, refer to Pulse Sequences on page 229.
Review 	Review	Opens the Review panel. For more information, refer to Review on page 262.

Control	Live/Review	Description
Save Preset 	Live	Saves all currently selected settings into a preset. Saved presets are accessed through the Presets control. For more information, refer to Applications & Presets on page 287.
Speed of Sound 	Live	Sets the speed of sound. Used to set a speed of sound that corresponds to the medium used (such as gel or water). To set the speed of sound, tap this button, then tap either the Speed of Sound adjustment buttons or **Configure** to open the Speed of Sound menu. The button shows the currently set speed of sound. For more information, refer to Speed of Sound on page 205.
Transducer Settings 	Both	Opens the Transducer Settings menu. This menu displays the properties of the currently selected transducer.
Transmit Delays 	Live	Opens the Transmit Delays tab of the VADA configuration panel. For more information, refer to Transmit Delays on page 217.
Voltage 	Live	Opens the Voltage flyout menu, which allows you to select the voltage used by the transducer. Voltages are selected as a percentage of the two voltage rails. For more information, refer to Voltage on page 209.
Waveforms 	Live	Opens the Waveforms tab of the VADA configuration panel. For more information, refer to Waveforms on page 222.

VADA Clip Settings

To access VADA clip settings, tap the Clip Settings control and navigate to the VADA tab.



The VADA tab in the Clip Settings menu

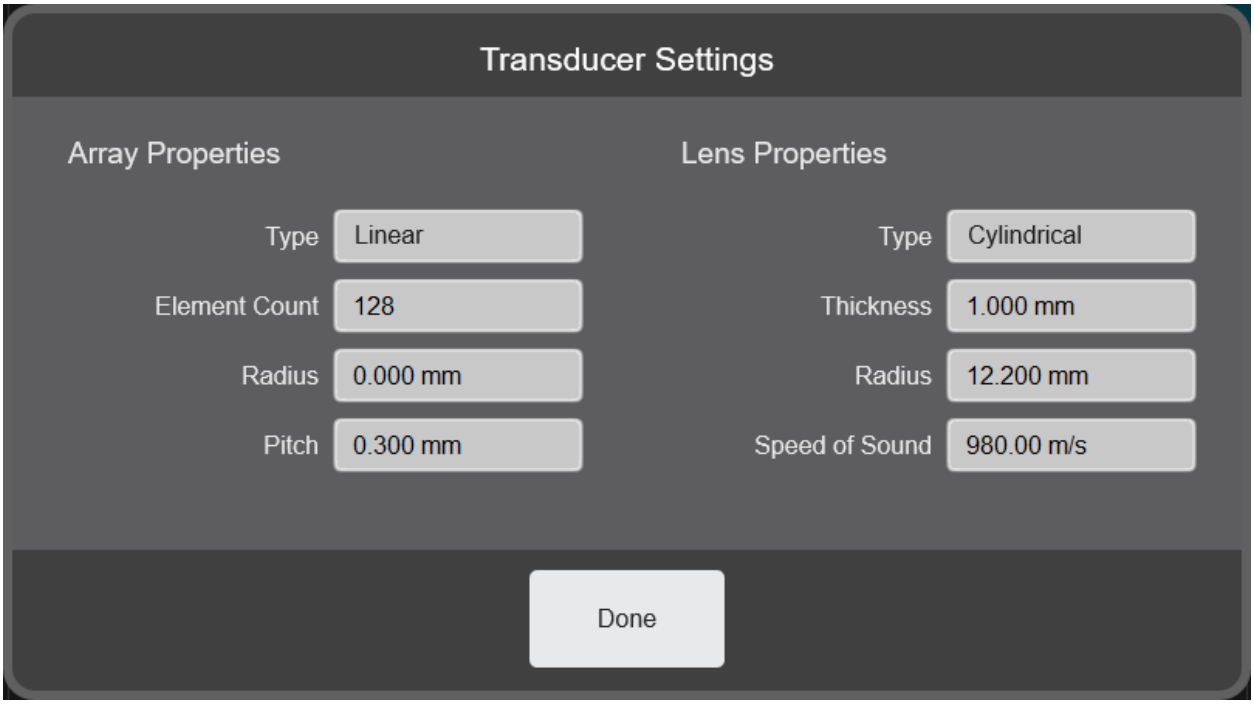
The Clip Settings menu features several controls specific to VADA Mode:

- **Automatically save after acquisition**: Toggles automatic saving of VADA data after acquisition. Selecting this check box also changes the **Acquire** button at the bottom-right corner of the control panel to read **Acquire and Save**.

- **Automatically open review panel after acquisition**: Toggles automatic opening of the Review menu after acquiring the VADA signal. For more information, refer to Review on page 262.

Transducer Settings Panel

To open the Transducer Settings panel, tap the Transducer Settings control.



The Transducer Settings menu

The Transducer Settings panel displays the properties of the current transducer. These text fields cannot be edited.

The following properties are listed:

- Array Properties
  - Type: The type of transducer.
  - Element Count: The number of elements on the transducer.
  - Radius: The radius of the curvature on the transducer (0 for linear arrays).
  - Pitch: The element spacing of the transducer.
- Lens Properties
  - Type: The type of lens on the transducer.
  - Thickness: The thickness of the lens.
  - Radius: The radius of the lens.
  - Speed of Sound: The speed of sound through the lens.

Speed of Sound

The Speed of Sound control is used to set the speed of sound, which varies depending on the target material.

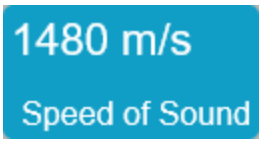
For example, if the transducer will be used in water, use this control to set the speed of sound in water.

> **Note:** Setting the correct speed of sound is important, as it is used when calculating plane and focus transmit delay profiles.

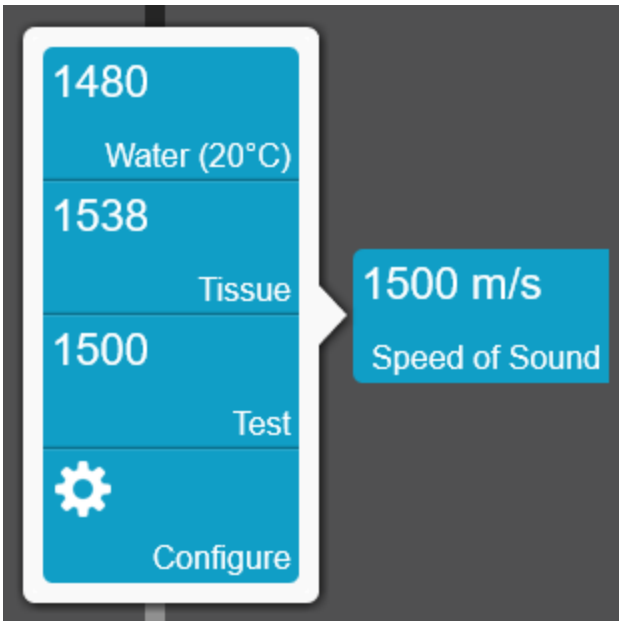
Set the Speed of Sound

To set the speed of sound:

1. Tap the **Speed of Sound** control.

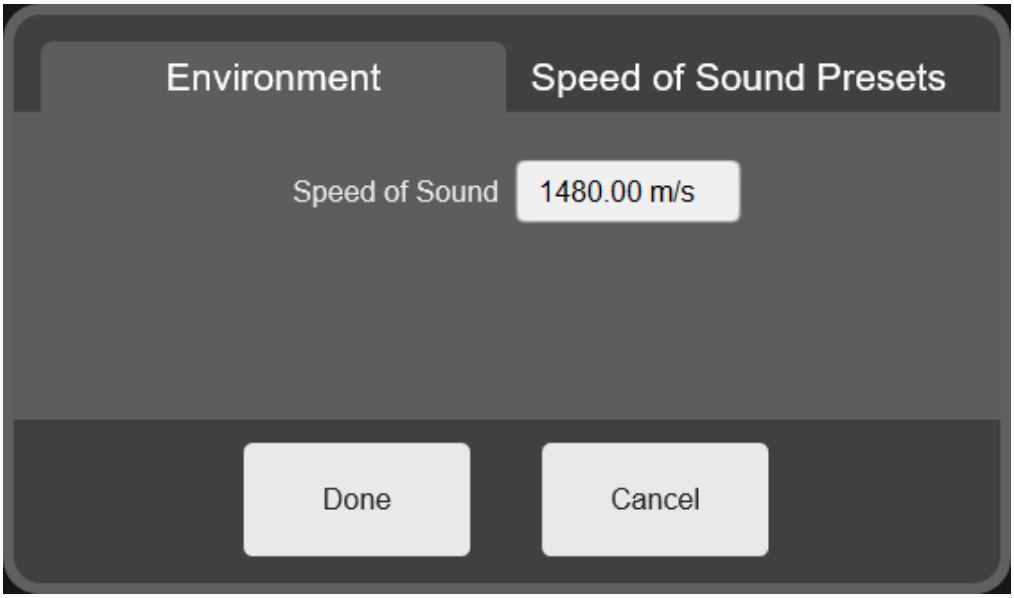
   

   This opens a flyout menu.

2. In the flyout menu, select the desired speed of sound.

- If the speed of sound is available as a preset, tap the preset.
- To enter a custom speed of sound, enter the speed of sound manually with the following steps:
  i. Tap **Configure**. This opens the Speed of Sound menu.



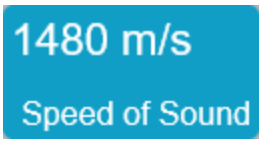
  ii. In the **Environment** tab of the menu, enter the desired speed of sound in the **Speed of Sound** text field.
  iii. Tap **Done**.

Configure Custom Speed of Sound Preset

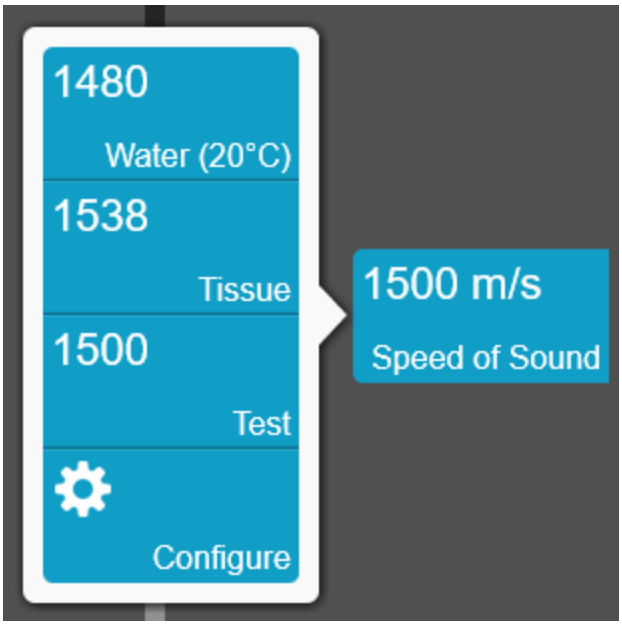
The Speed of Sound flyout menu contains two factory-default presets (water and tissue) that cannot be edited, and one preset that can be customized by the user.

To configure the custom speed of sound preset:

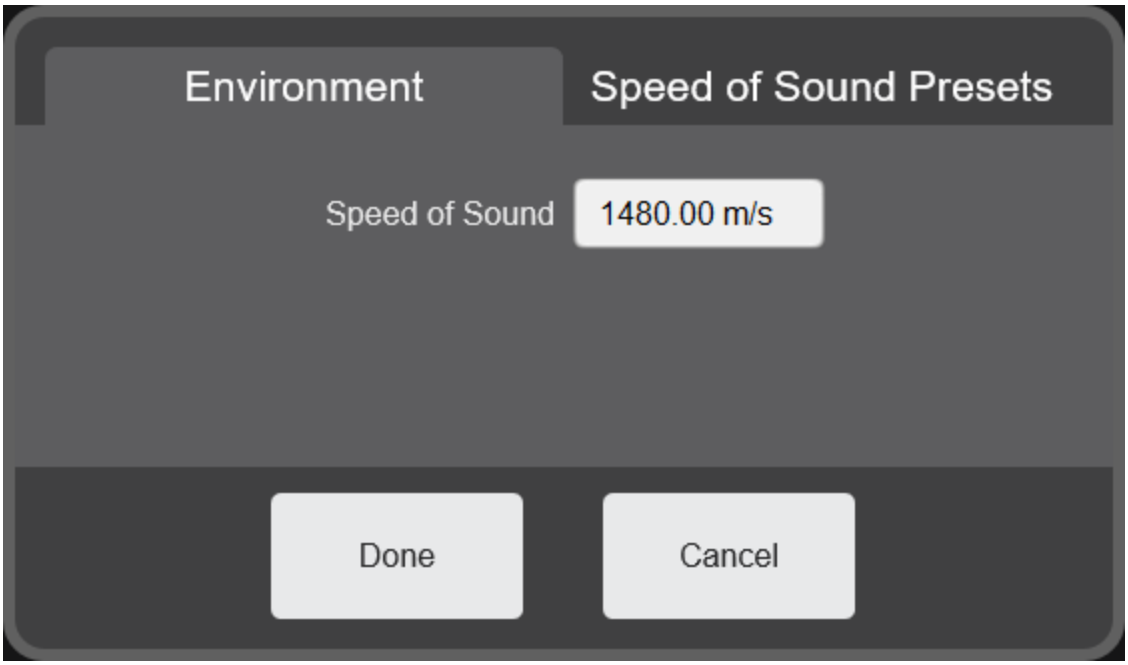
1. Tap the **Speed of Sound** control.



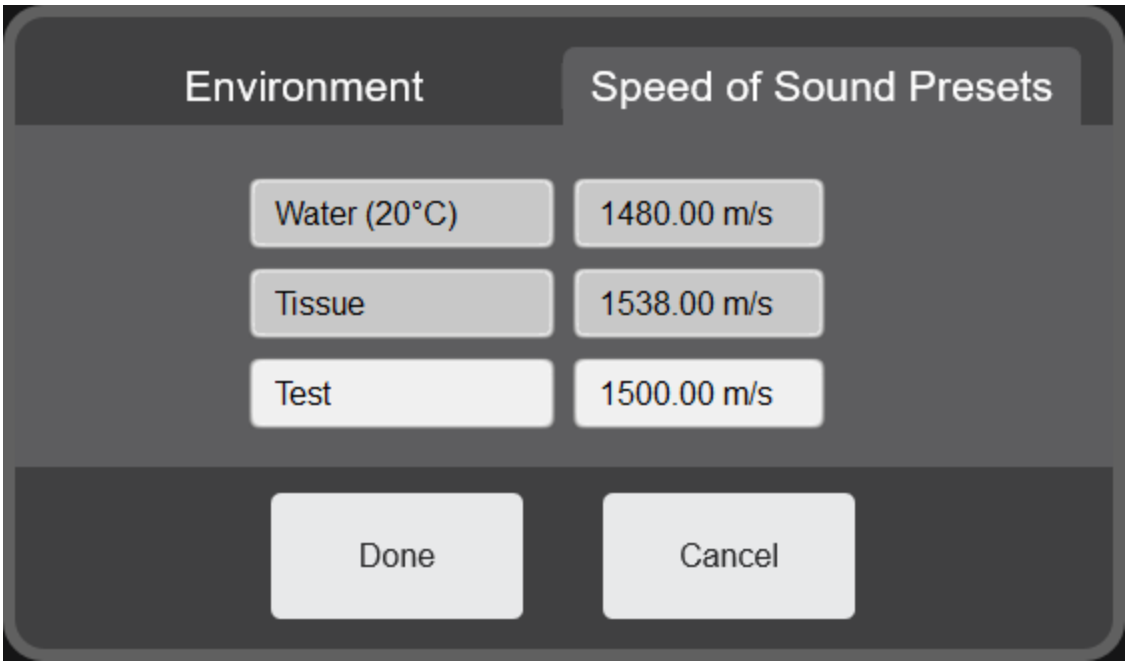
   This opens a flyout menu where you can select several preset speeds of sound or set a custom speed.



2. In the flyout menu that appears, tap **Configure**.
   This opens the Speed of Sound menu.



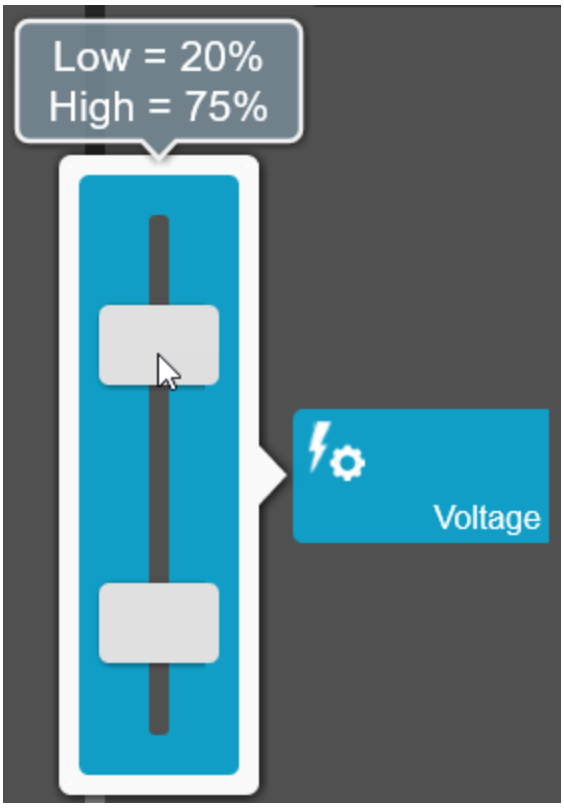
3. In the Speed of Sound menu, navigate to the **Speed of Sound Presets** tab.



4. In this menu, edit the two text fields on the bottom row with the desired values.
    - The left text field is the name of the preset that will appear in the flyout menu.
    - The right text field is the speed of sound for that preset, in meters per second.
5. Tap **Done**.

Voltage

To adjust the voltage of the transmit rails, tap the Voltage control.



The Voltage flyout menu

The Voltage flyout menu contains two sliders that control the voltage of the high and low voltage rails.

> **Note:** Voltages are set as a percentage of maximum voltage permitted for the active transducer. The slider range may be further reduced based on thermal considerations for a pulse sequence.

To adjust a voltage, tap and drag a slider up or down as needed.

- The top slider controls the high voltage rail.
- The lower slider controls the low voltage rail.

When dragging a slider, an additional bubble (shown above the flyout menu in the diagram) appears above the flyout menu to show the exact values selected.

> **Note:** VADA Mode will restart after adjusting a slider.

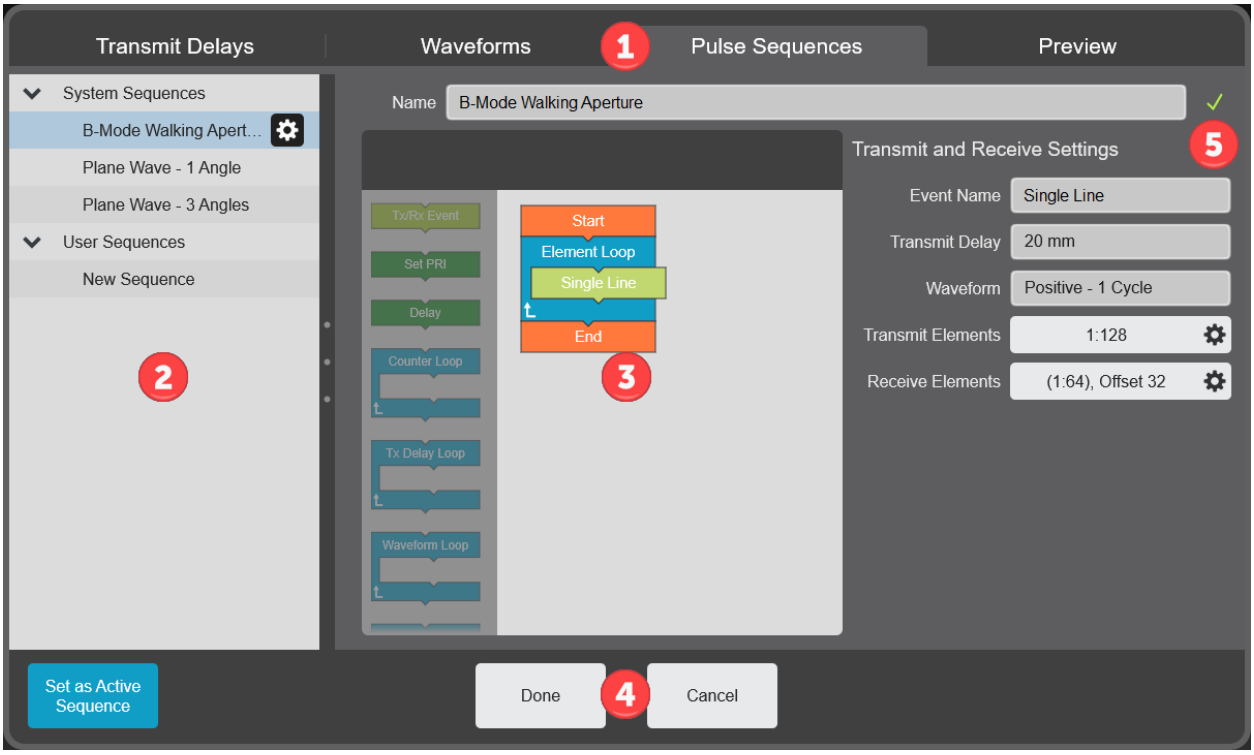
VADA Configuration Panel

In VADA Mode, there is a set of four menus that are used to create and select the pulse sequence used in the session. Collectively, these menus are called the VADA configuration panel.

Navigation

To open the VADA configuration panel, tap any of the four controls (Transmit Delays, Waveforms, Pulse Sequences, or Preview). Once the VADA configuration panel is open, you can use the tabs along the top to navigate to any of the four menus.

Each menu follows this basic layout:



VADA configuration panel layout

1. Tabs: Used to navigate between menus in the configuration panel.
2. Groups and Profiles: Contains saved profiles for the current menu. Profiles are organized in groups. Each menu has several factory-made profiles by default.
3. Working area: Contains controls specific to the particular menu.
4. Action buttons: Contains overall actions for the entire configuration panel, such as saving or discarding all changes.

> **Note:** Changes made in the VADA configuration panel are only saved when you tap **Done**.

5. Error checker: Indicates whether the settings entered in the menu are valid.

Tabs

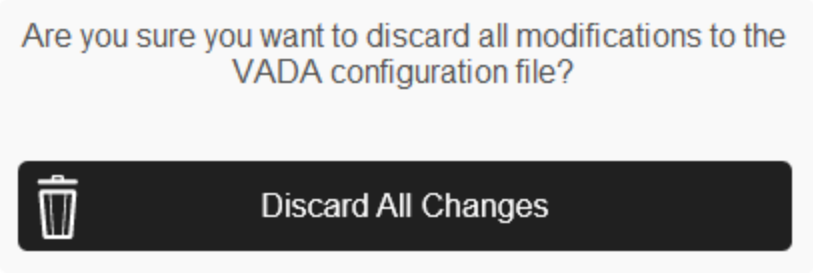
The tabs along the top show each menu in the configuration panel.

Click any of the tabs to switch to another menu.

Switching Tabs and Configuration Changes

If you make a change in one tab and navigate to another, any changes made in the tab you left still exist, so you can navigate between tabs freely without losing work. However, no changes made in the entire configuration panel are saved permanently until you tap **Done**.

If you tap **Cancel** after making changes, a confirmation dialog will appear and ask if you are sure you want to discard all changes made in the configuration panel.



Groups and Profiles

The left pane of the VADA configuration panel lists the profiles available for the currently selected menu.

Profiles are separated into groups. Groups can be expanded or collapsed for convenience.

- To expand a group, tap the **closed arrow icon** ( ) next to a group.
- To collapse a group, tap the **open arrow icon** ( ) next to a group.

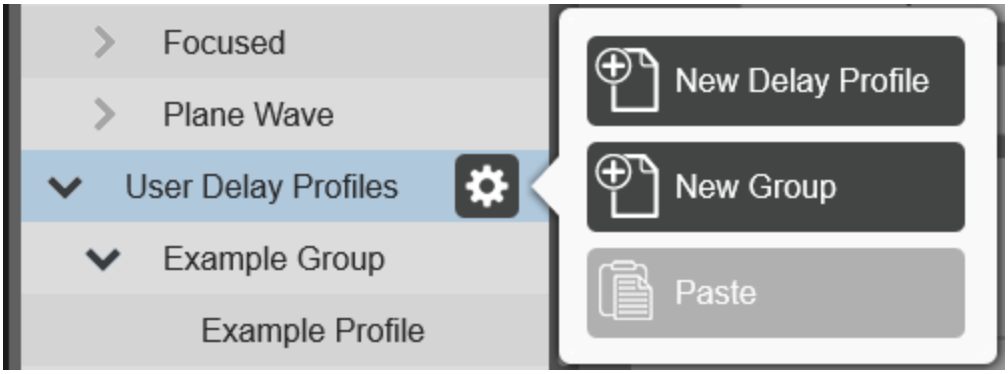
Profiles can be saved, loaded, copied, edited, or deleted.

> **Note:** Only user-created profiles can be edited or deleted. Factory default profiles appear in read-only mode, with all controls (such as text fields and drop-down lists) greyed out.

To view actions that can be done with a profile or a group, tap the gear icon ( ) next to it.

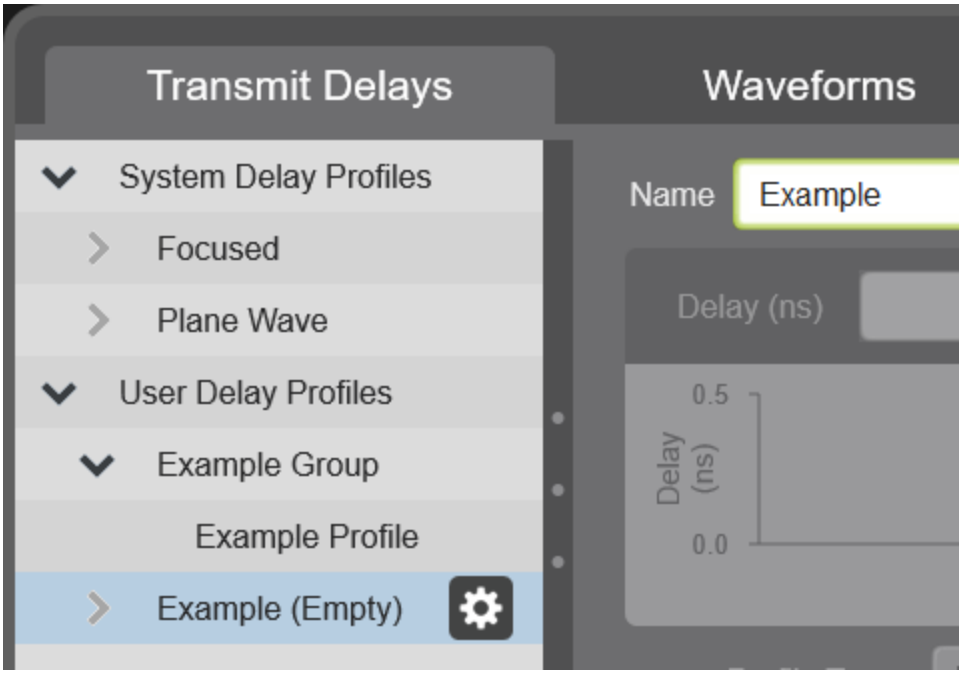
Create a Group

1. Tap the gear icon ( ) next to the list of user profiles.
2. In the menu that appears, tap **New Group**.



A new group appears on the list.

3. Enter a name for the group in the **Name** text field.



4. Add at least one profile to the group. For instructions about how to do this, see Create a Profile on the next page.
5. Tap **Done**.

Delete a Group

> **Caution:** Deleting a group also deletes all profiles saved under that group. To avoid losing profiles, move any profiles you want to retain to anywhere outside the group.

1. Select a group.
2. Tap the gear icon next to the group name () and then tap **Delete**.
3. When a confirmation message appears, tap **Delete**.

Create a Profile

1. Select the group that will contain the new profile.
2. Tap the gear icon () next to the group.
3. Tap the **New** option that appears in the flyout menu. The exact wording of this choice varies depending on the selected tab, but it follows the format "New ____" (such as "New Waveform").

Select a Profile

To select a profile, tap the profile name.

Edit a Profile

1. Select a user-made profile.
2. Make any changes needed.
3. Tap **Done**.

> **Note:** Default profiles cannot be edited or deleted.

Cut or Copy a Profile

1. Select a profile.
2. Tap the gear icon () next to the profile.
3. Tap **Cut** or **Copy**.
4. Tap a group that will be the target location for the profile.
5. Tap the gear icon () next to the group.
6. Tap **Paste**.

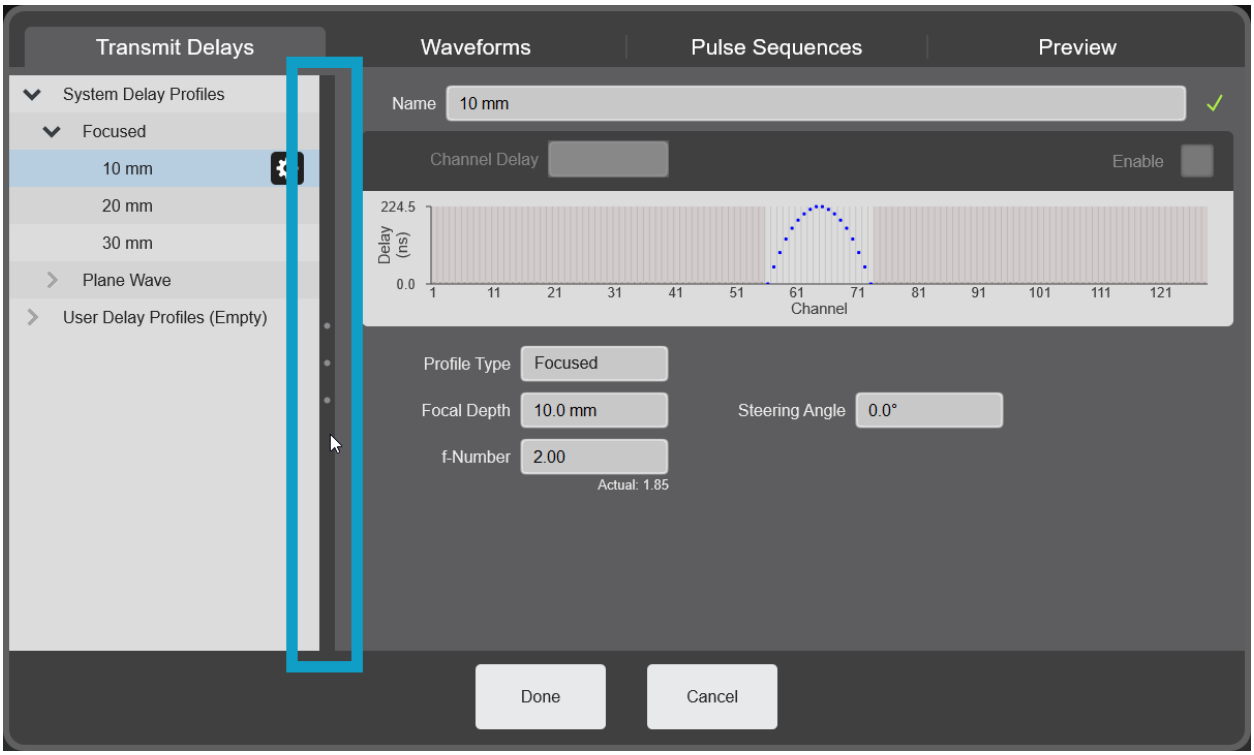
Delete a Profile

1. Select a profile.
2. Tap the gear icon () next to the profile.
3. Tap **Delete**.
4. When a confirmation message appears, tap **Delete**.

Hide Profiles

The list of profiles can be hidden to make more space on the menu.

To hide or open the list of profiles, tap the bar that separates the profiles from the working area.



Menu with the profile list open

Menu with the profile list hidden

Working Area

The working area of the menu contains controls specific to the submenu.

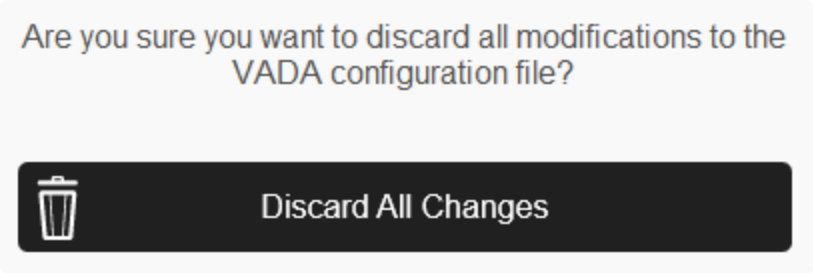
For more information about each submenu, refer to their respective pages:

- Transmit Delays
- Waveforms
- Pulse Sequences
- Preview

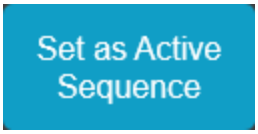
Action Buttons

The buttons at the bottom of the configuration panel apply to all settings made in any tab.

- To save all changes, tap **Done**.
- To discard all changes, tap **Cancel**. When the confirmation dialog appears, tap **Discard All Changes**.

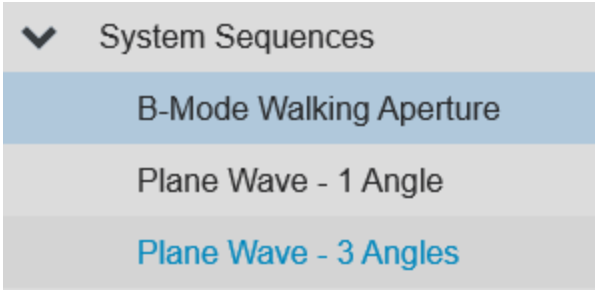


- To set the currently selected pulse sequence as the sequence to use in VADA Mode, tap **Set as Active Sequence**.



> **Caution:** When selecting a user-created pulse sequence, make sure thermal management issues have been taken into consideration. When selecting a user-created pulse sequence for the first time, a warning message appears to remind the user to do this.

The current active sequence is shown in blue text on the list of sequences.

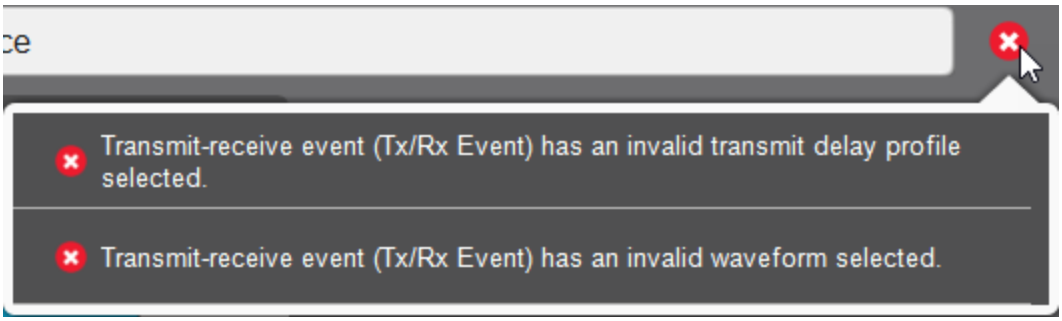


Error Checker

When in the Pulse Sequences or Preview tabs, the symbol that appears to the right of the **Name** text field indicates whether the settings entered in the tab are valid.

- If the symbol is an X (), there are one or more issues with the settings entered, and the profile cannot be used until all issues have been corrected.
- If the symbol is a check mark (), the settings are valid and the profile is ready for use (once it is saved).
- If the symbol is a caution sign (), the settings are valid but there are some issues that need to be addressed (such as if the profile has no name).

Tap the symbol at any time to open a list of details about the menu entries. If an error is detected, the list contains all the issues detected. Tap any issue on the list to automatically navigate to the menu item in question.



The details list when the menu is invalid

The details list when the menu is valid

Transmit Delays

Transmit delays are delays before a transducer channel transmits a signal. They are a way to control the manner in which transducer signals reach a point.

Interface

The Transmit Delays menu has three main areas:

1. Name: The name of the transmit delay profile.
2. Graph: A visual representation of the delays in the profile.
3. Details: This area varies depending on the profile type selected.

> **Note:** Portions of this menu may be read-only depending on the profile selected. For example, the settings of factory-made profiles cannot be edited.

Name

The name of the transmit delay profile. This name is what appears on any list of transmit delays, such as when selecting a transmit delay in other tabs within the VADA configuration panel.

Graph

A visual representation of the delays in the profile.

- Each vertical bar represents a single transmit channel.
  - Tap any bar to view its details in the header above the graph.
    - The **Delay** text field indicates the number of the channel selected, as well as the value of the delay, in nanoseconds (ns).

    - The **Enable** check box indicates whether the delay is currently enabled.
  - If the bar is grey, that channel will not transmit.
  - If the bar is white, the channel will transmit at the specified delay.
- Each blue dot represents a transmit delay.
  - The vertical position of the dot represents the length of the delay.
- Pinch to zoom in on the graph.

Details

This section contains details about the transmit delay profile. This section varies depending on the selection of the **Profile Type** drop-down list.

There are three profile types:

- Custom
- Focused
- Plane

Custom Profile

A custom profile allows you to set customized delays on every channel of the transducer.

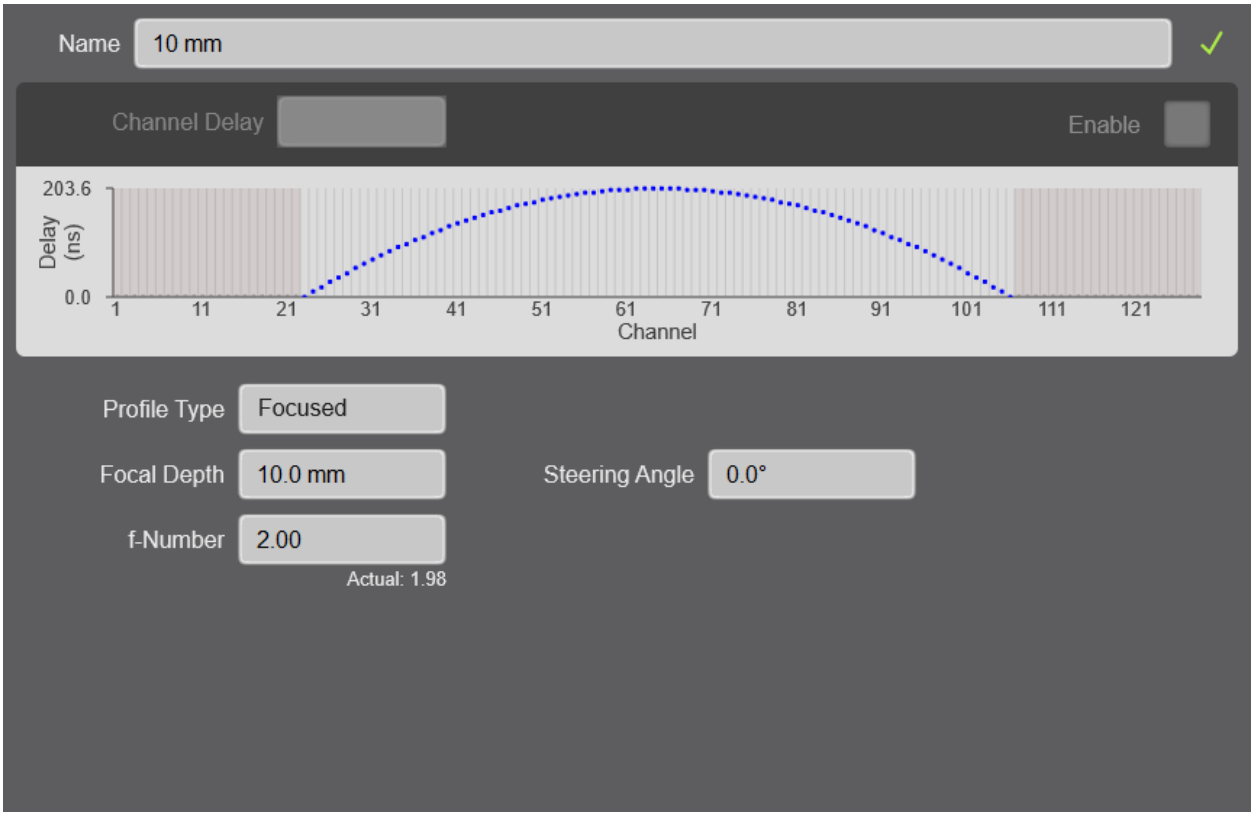
When this type is selected, a table appears that lists all channels with their delay information.

To edit the delay on a channel:

1. Tap a channel on either the graph or the table.
2. In the **Delay** text field, enter the desired delay.
3. Select the **Enable** check box to enable the transmit channel.

> **Note:** You can also tap the checkbox next to the channel number in the list to enable the transmit channel.

Focused Profile



A focused profile sets transmit delays so that all signals reach a focal point at the same time.

When this type is selected, the following settings are available:

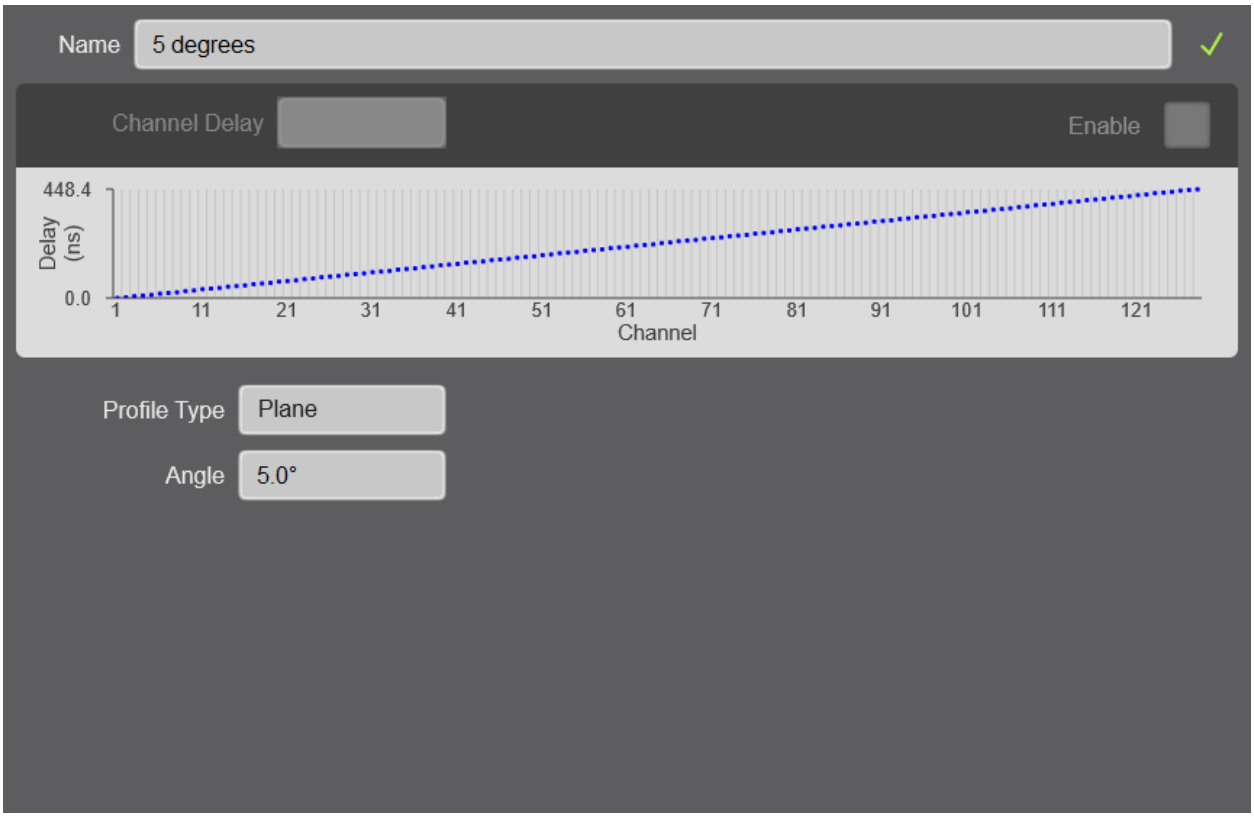
- Focal Depth (mm)
- Steering Angle (in degrees)
- f-Number

> **Note:** The f-number is the ratio of the imaging depth to the aperture size. Increase the f-number to be more object specific.

> **Note:** If the exact f-number is not possible, the actual value is displayed under the text field.

> **Note:** These settings are calculated based on the Speed of Sound setting (refer to Speed of Sound on page 205). If the Speed of Sound is changed, these settings will be automatically updated with the new Speed of Sound value.

Plane Profile



A plane profile uses a linear pattern of transmit delays so that signals are transmitted as a plane wave.

When this type is selected, the only setting available is the desired angle of the plane (in degrees).

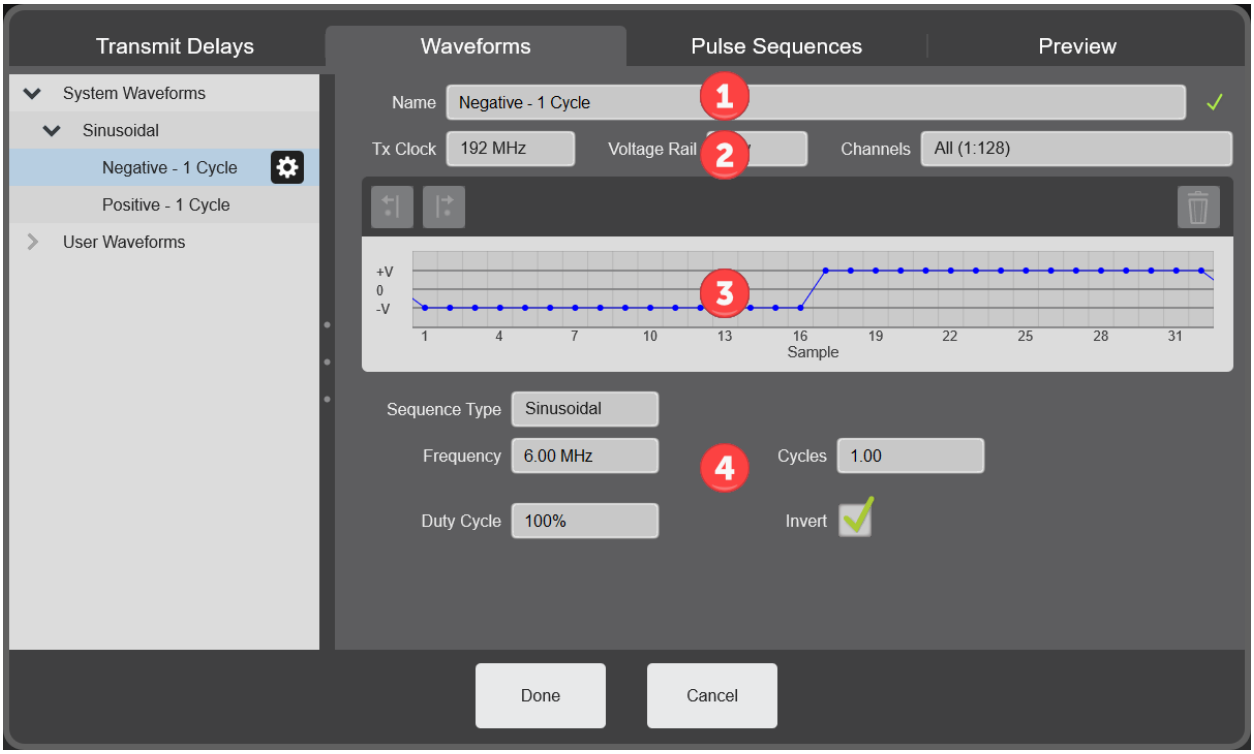
> **Note:** The Plane Profile setting is calculated based on the Speed of Sound setting (refer to Speed of Sound on page 205). If the Speed of Sound is changed, the plane profile will be automatically updated with the new Speed of Sound value.

Waveforms

Waveforms are the pattern of voltage signals applied to the transducer.

> **Note:** Due to the transfer function on the transducer, the waveform transmitted by the transducer may not exactly match the waveform specified on this tab. For an exact measurement of the waveforms generated, use a hydrophone.

Interface



The Waveforms menu has three main areas:

1. Name: General information about the waveform.
2. Waveform Details: Details about the waveform.
3. Graph: A visual representation of the waveform.
4. Waveform Channel Details: Details about the waveform channels.

> **Note:** Portions of this menu may be read-only depending on the type of settings selected. For example, the settings of factory-made profiles cannot be edited.

Name

This section contains the name of the waveform (which appears on the list of profiles to the left of the menu).

Waveform Details

The following fields appear underneath the name:

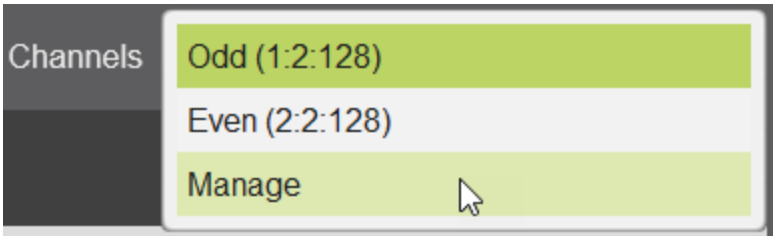
- Tx Clk: The clock frequency, in megahertz (MHz). This dictates the temporal resolutions of the samples specified in the waveform. The following frequencies are available:
  - 96 MHz
  - 192 MHz
  - 384 MHz
- Voltage Rail: The voltage rail used to generate the waveform. The following are available:
  - Low
  - High
- Channels: The channels that the waveform will be applied to.

Manage Channels

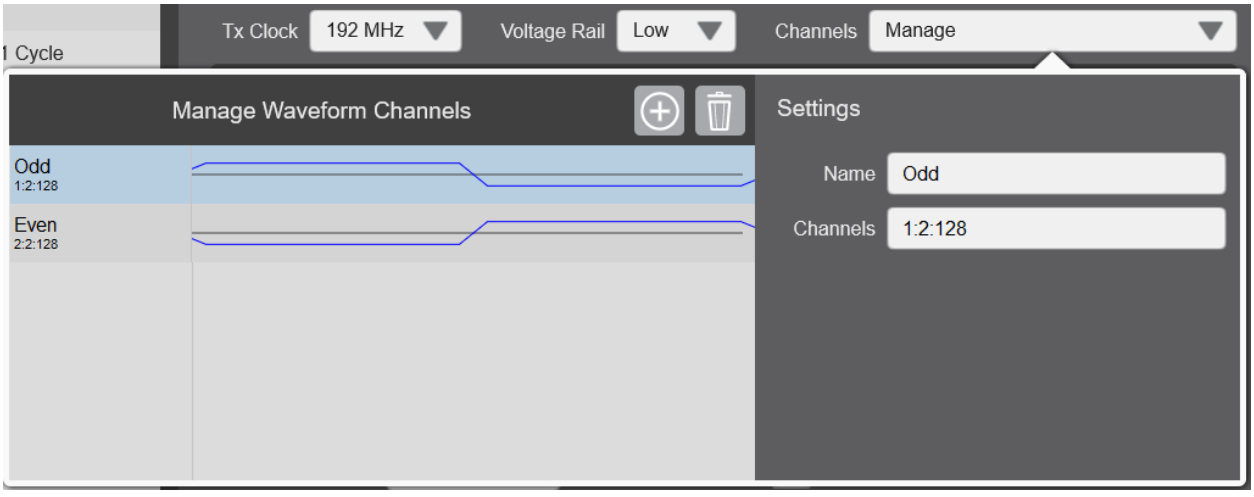
The Channels drop-down list opens a Manage Waveform Channels submenu where you can manage groups of channels. This menu allows you to create a waveform profile that uses different waveforms on different channels.

For example, you can create a waveform profile that produces one waveform on all even-numbered channels, and an inverted version of the same waveform on all odd-numbered channels.

To manage channels, open the **Channels** drop-down list and then tap **Manage**.



This opens the Manage Waveform Channels submenu.



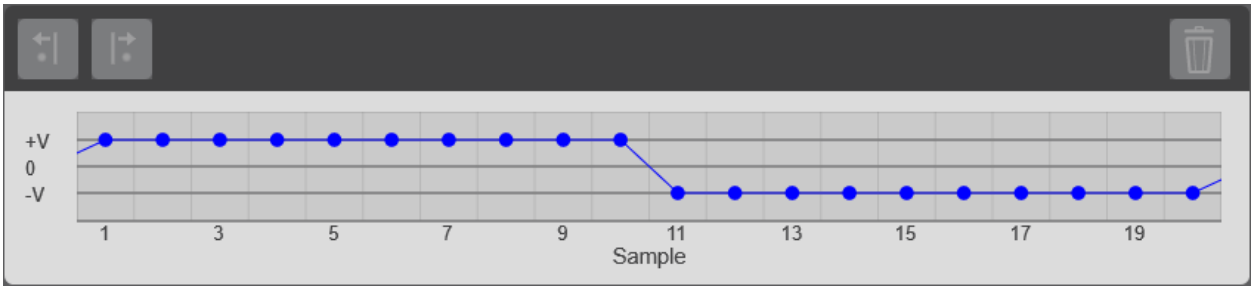
This menu lists all waveform channels on the left, and shows the name and channels of the currently selected group on the right.

To the right of each group, there is a simplified preview of the waveform currently assigned to that group.

This menu has the following controls:

- To select a group, tap the group's name or waveform.
- To add a new group of channels, tap the **New** ( ) button.
- To delete a group, tap the group and then tap the **Delete** ( ) button.
- To edit a group:
  a. Select a group.
  b. On the right side of the menu, edit the text fields as necessary.
     - **Name**: The name of the group. This name appears on this menu, and on the Channels drop-down list on the Waveforms tab.
     - **Channels**: The channels that make up this group. This field accepts text notation similar to that of common scientific computing languages (such as 1:2:128 for all odd channels in a 128-channel transducer). For details, refer to Channel Notation on page 227.
  c. Tap anywhere outside the menu.

Graph

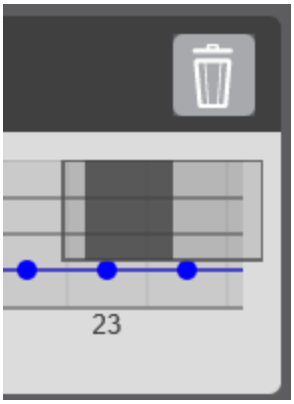


This graph is a visual representation of the waveform, with several controls across the top.

- The x-axis of this graph is time. Each column on the graph is a unit of time, as defined by the Tx Clk parameter.
- The y-axis of the graph shows positive, negative, or zero voltage in the waveform. This is represented by the line of dots on the graph. Each column always has a dot.

This graph has the following controls:

- Tap a column on the graph to select it.
- Tap and drag a blue dot up or down to change its voltage.
    - The content of the **Sequence** text field automatically updates to fit any changes you make on the graph.
- To delete a column, tap it and then tap the trash icon (). This also deletes the dot within the column.
- Tap the  and  icons to add a column (and dot) to the beginning or end of the currently selected segment.
- The graph supports pinch-to-zoom.
- Swipe left or right on the graph to scroll along it.
- When zooming or scrolling, a small box appears near the top-right corner of the graph. This box is a guide that shows where the current view of the graph is in relation to the entire waveform.
    - The box represents the entire waveform.
    - The dark section within the box represents the part of the waveform that is currently shown on the graph.



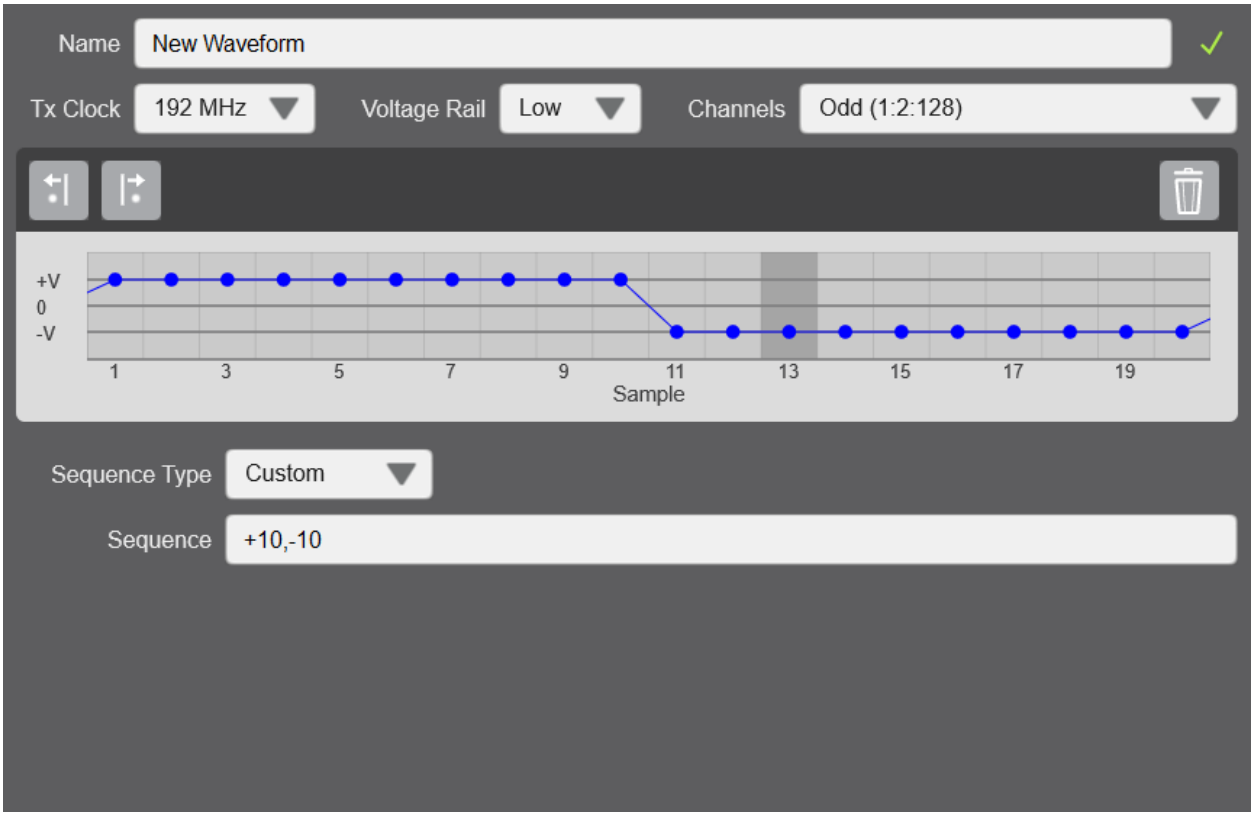
Waveform Channel Details

This section contains details about the waveform channel. This section varies depending on the selection of the **Sequence Type** drop-down list.

There are two sequence types:

- Custom
- Sinusoidal

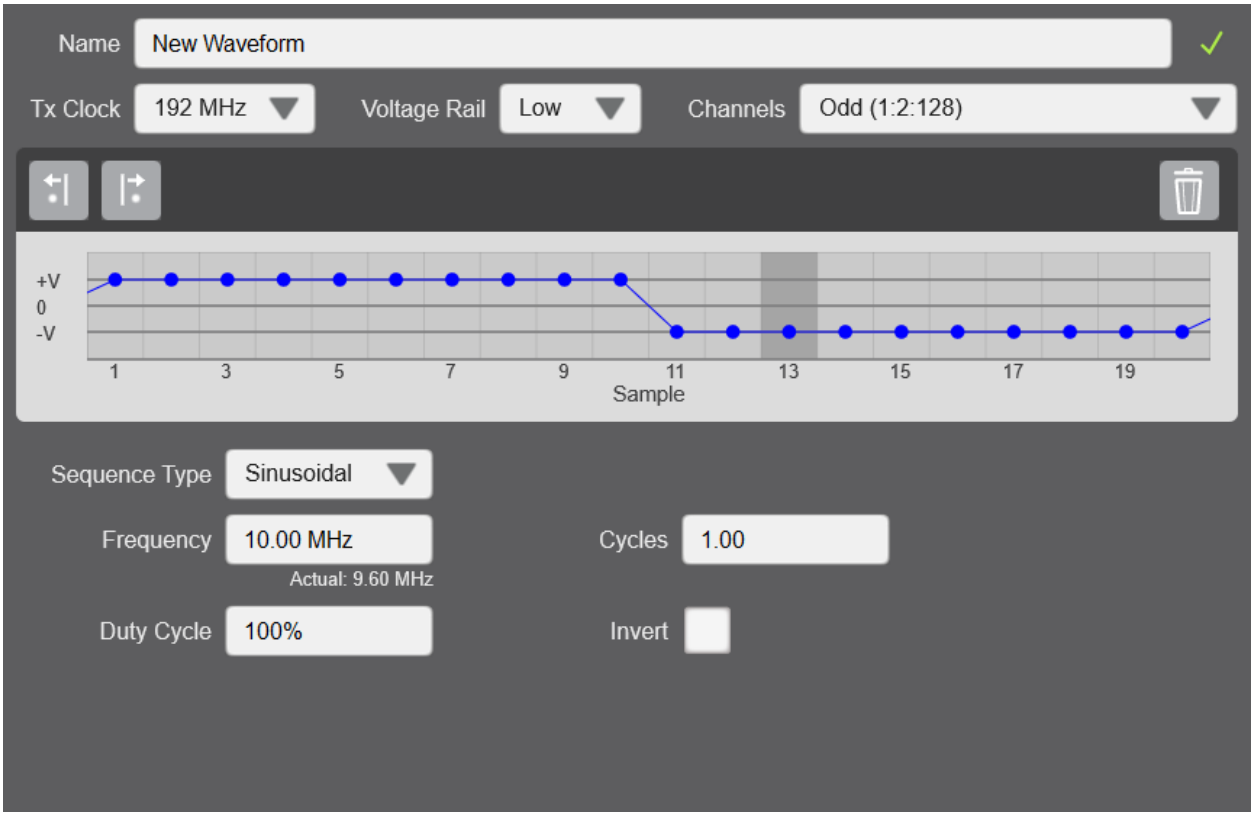
Custom



A custom sequence allows you to enter specific values to define the waveform.

For information about the notation used in this field, refer to Sequence Notation on page 228.

Sinusoidal



A sinusoidal sequence is a waveform that imitates a sine wave.

There are four parameters when this sequence type is selected:

- Frequency (MHz): The frequency of the waveform.
- Duty Cycle (%): The percentage of the cycle during which the pulser has voltage (either positive or negative).
- Cycles: The number of times this wave repeats.
- Invert: Inverts the sine wave.

> **Note:** If the exact value is not possible for any of the above fields, the actual value is displayed under the text field.

Channel Notation

The following notation guidelines apply to the contents of the Channel text field within the Manage Waveform Channels submenu.

> **Note:** This notation also applies to the transmit and receive element selection in the Pulse Sequences panel, when the aperture is set to Custom. In that panel, it is used to select elements instead of channels.

- Define groups of channels by using the format <start channel>:<step size>:<end channel>.
  - <start channel> is the starting point for the group ("1" for channel 1). The channel specified is included in the group.
  - <step size> is the number of channels that are skipped before the next channel is selected ("1" to count every channel, "2" to count every second channel). If not specified, this field defaults to 1.
  - <end channel> is the end point for the group ("128" for channel 128). The channel specified is included in the group.
  - If the step size in the statement is omitted (such as <start channel>:<end channel>), the system uses a default step size of 1 (every channel).
- Individual numbers specify single channels (such as "1" for channel 1)
- Use commas to separate individual channels or groups of channels (such as 1, 3, 5 for channels 1, 3, and 5)

For example, an entry of "1:2:128" selects all odd channels. This statement selects all channels between 1 and 128 with a step size of 2, which means it selects every second channel after channel 1 (1, 3, 5, etc. until reaching channel 127).

Sequence Notation

The following notation guidelines apply to the contents of the Sequence text field:

- Each number represents how many time segments (each segment on the graph is a unit of time, as defined in the Frequency text field) the voltage lasts for.
  - The symbol next to the number defines whether the voltage is positive, negative, or zero.
    - A plus symbol (+) is for positive voltage.
    - A minus symbol (-) symbol is for negative voltage.
    - No symbol is for neutral voltage.
  - Examples:
    - "5" means a neutral voltage for 5 Tx clock cycles (shown as 5 columns and dots on the graph).
    - "+5" means a positive voltage for 5 segments.
- Use commas to separate segments.
  - For example, "+5,-5" means positive voltage for 5 Tx clock cycles, then negative voltage for 5 cycles.
- Looped sequences are defined with square brackets.
  - The contents of the loop are contained in square brackets.

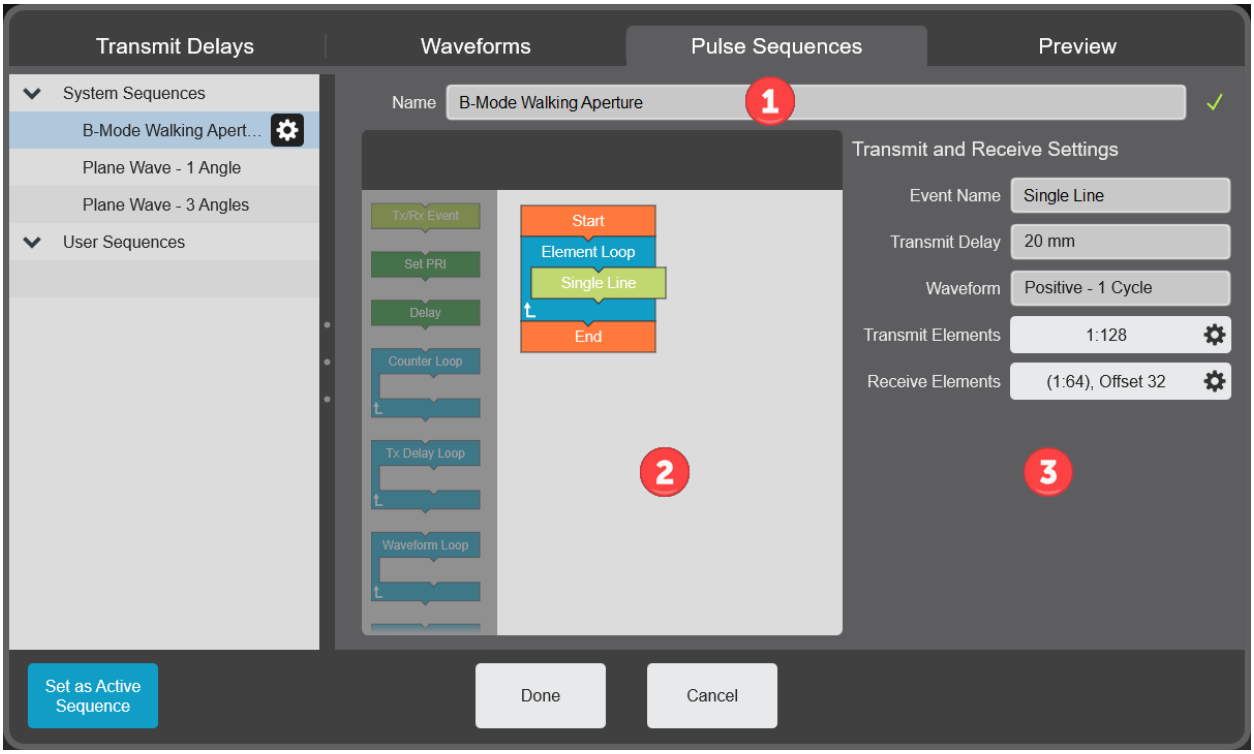
- The number of times the loop is repeated is defined by placing a number after the closing square bracket.
- For example, "[+5,-5]2" means a loop that consists of positive voltage for 5 segments, then negative voltage for 5 segments, and is repeated twice (5 positive, 5 negative, 5 positive, 5 negative).

Pulse Sequences

A pulse sequence is the sequence of actions and transmit/receive events carried out by the system. This includes transmit events, receive events, and modifiers associated with those events.

The sequence is built by assembling and configuring a series of interlocking blocks. Each block represents an event, or an action applied to an event.

Interface



The Pulse Sequences interface

The Pulse Sequences menu has three areas:

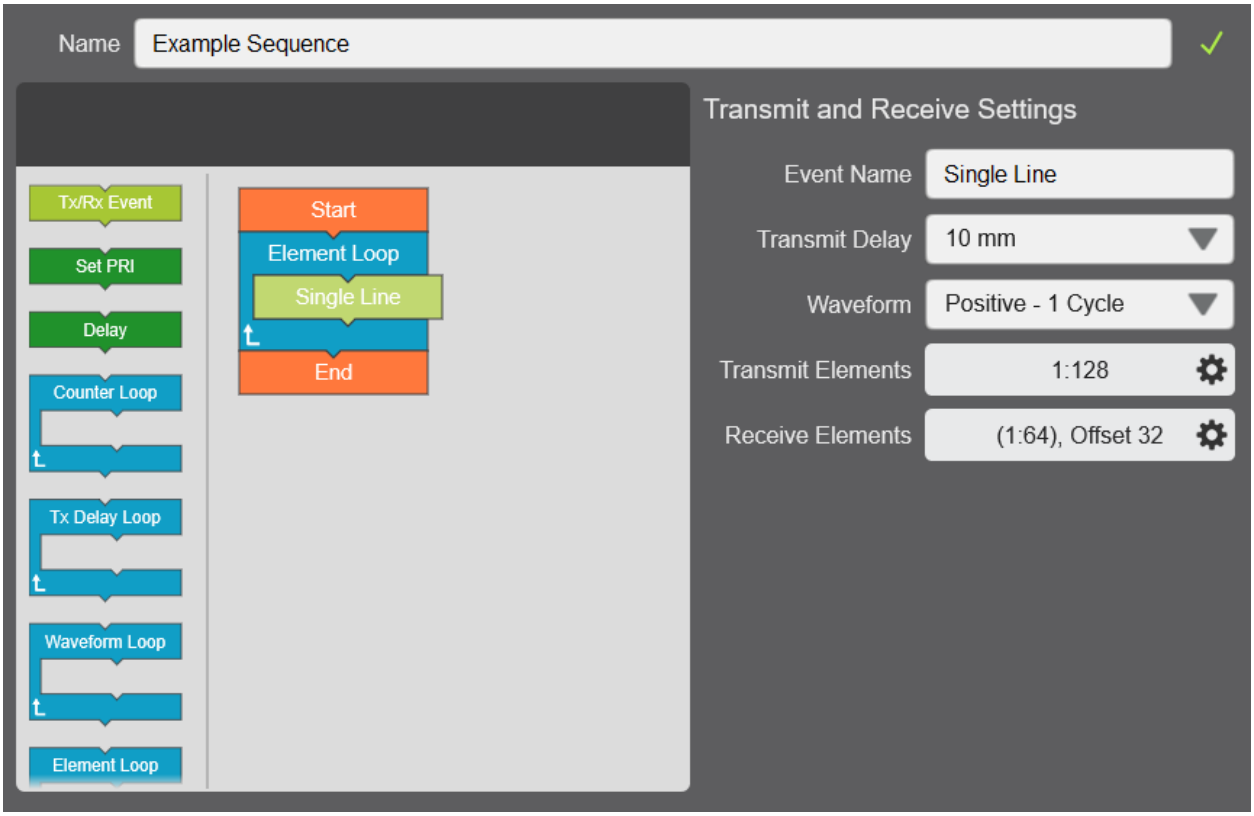
1. Name: The name of the pulse sequence.
2. Sequence: A diagram of the pulse sequence. Each event or modifier in the sequence is represented by an interlocking block.
3. Details: Displays details about the selected block. This area varies depending on the block selected.

> **Note:** Portions of this menu may be read-only depending on the sequence selected. For example, factory-default sequences can be viewed, but not edited.

Name

The name of the pulse sequence. This name is what appears on the list of pulse sequences.

Sequence and Details



This section lets you view and edit the pulse sequence as desired.

The pulse sequence is visually represented as a set of interlocking pieces. The color and shape of a piece indicates what it does:

- **Orange** blocks represent the start and end of the pulse sequence. Every pulse sequence has a start and end block.
- **Light green** blocks represent Tx/Rx events.
- **Blue** blocks are loops that are applied to events. These blocks are shaped like brackets, and loop any blocks contained within the bracket. For example, placing a Tx/Rx event block in a Delay blue block places a delay on the Tx/Rx event.

> **Note:** Blue blocks must contain at least one Tx/Rx event block.

> **Note:** Loops can be placed in other loops.

- **Dark green** blocks represent a modifier to Tx/Rx events.
- **Red** blocks represent actions related to the trigger ports on the system. These blocks control whether a trigger is sent out with an event, or whether the system waits for a trigger in signal before running an event.

The left side of the chart contains a list of blocks. Scroll up and down the list to view all blocks.

The right side of the chart contains the current sequence of blocks. Tap any block to view details about it in the **Details** section. For long sequences, scroll up and down the list to view different parts of the sequence.

Edit a Pulse Sequence

The following actions are available when assembling a pulse sequence:

- To add a block, drag it from the list of blocks on the left, and drop it into the desired area on the right.
- To move a block from one part of the sequence to another, drag the block to the desired location.
- To remove a block, drag it from the area on the right and drop it into the list on the left. The block will be deleted.
- To edit the properties of a block, tap the block and then make the appropriate edits in the **Details** section.

List of Blocks

Block Name	Description	Configurable Settings
Settings on page 239	A transmit and receive event.	• Event Name: The name of the event. • Transmit Delay: Selects a transmit delay profile from the Transmit Delays menu. • Waveform: Selects a waveform from the Waveforms menu. • Transmit Elements: The transducer elements that will transmit during this event. • Receive Elements: The transducer elements that will receive during this event.
Set PRI on page 240	Pulse Repetition Interval. Sets the pulse repetition interval for Tx/Rx events. **Note:** The minimum interval is dependent on the transmit delay profiles and waveforms used in the sequence, as well as the image depth. **Note:** The PRI is not used when using the trigger in setting.	• (Checkbox) Use Minimum Pulse Repetition Interval • PRI (µs)
Delay on page 242	Adds a delay before the next transmit/receive event.	• Delay (µs)
Counter Loop on page 242	Repeats by the number defined in the **Counter** text field.	• Loop Name • Counter

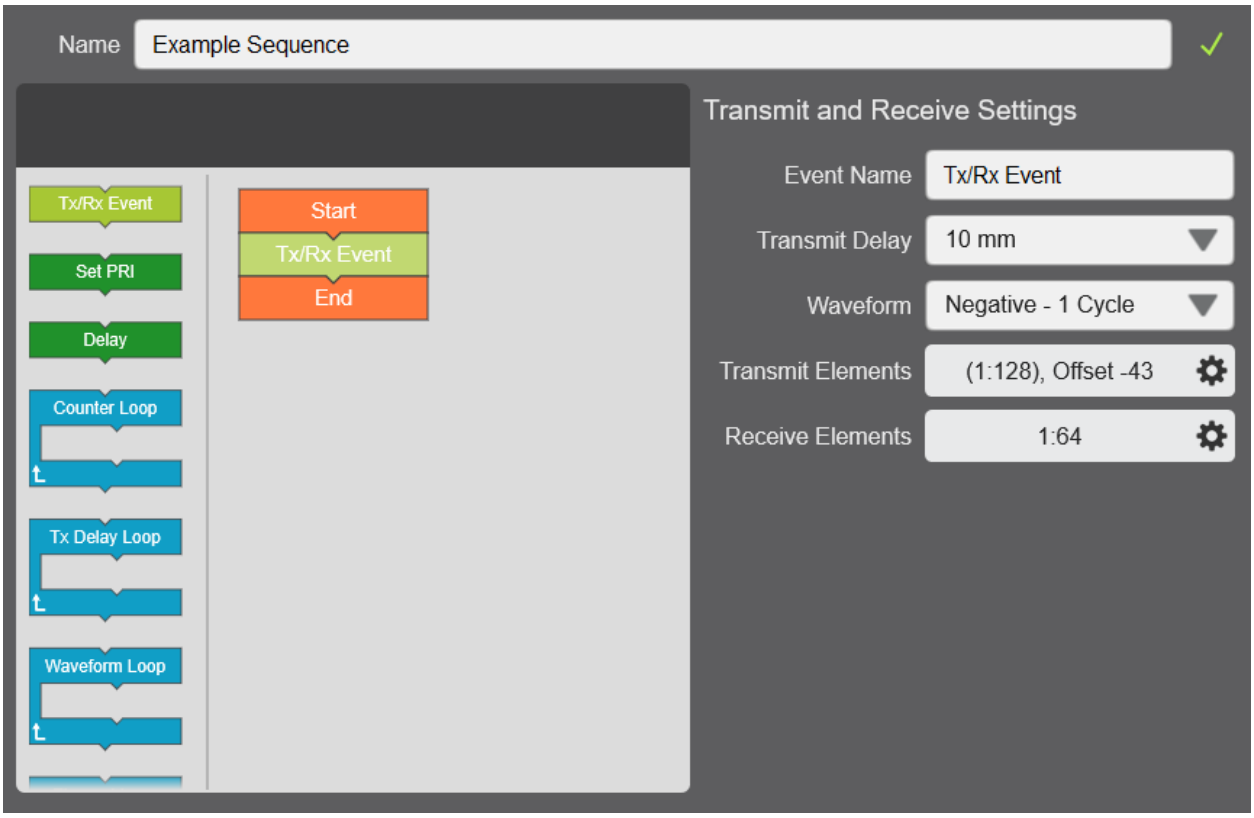
Block Name	Description	Configurable Settings
Tx Delay Loop on page 244	Cycles through a user-selected list of transmit delay profiles until each profile has been run once.	• Loop Name • Transmit Delay Profile Selector (see Transmit Delay on the next page)
Waveform Loop on page 248	Cycles through a user-selected list of waveform profiles until each item on the list has been run once.	• Loop Name • Waveform Selector (see Waveform on page 235)
Element Loop on page 252	Cycles through a series of offsets used by a Tx/Rx event to move the transmit or receive aperture with each repetition.	• Loop Name • Start Value • Stop Value • Increment
Wait for Trigger In on page 253	Makes the pulse sequence wait for an external trigger on the Trig In BNC port before continuing. Once the trigger is received, the next transmit/receive event occurs after the time specified in the Delay text box.	• (Checkbox) Use Minimum Delay • Delay (µs)
Trigger Out on page 254	Determines whether a "trigger out" signal is sent from the Trig Out BNC port when a transmit pulse occurs. **Note:** This applies to all subsequent transmit/receive events that take place after this action.	• (Checkbox) Enable Trigger Out

Tx/Rx Event

A **Tx/Rx Event** block represents a transmit and receive event.

Interface

When a **Tx/Rx Event** is selected, the following interface appears:



The Pulse Sequences menu when a Tx/Rx Event is selected

A Tx/Rx Event has the following configurable settings:

- Event Name
- Transmit Delay
- Waveform
- Transmit Elements
- Receive Elements

To edit a detail, tap the related field and make any necessary changes.

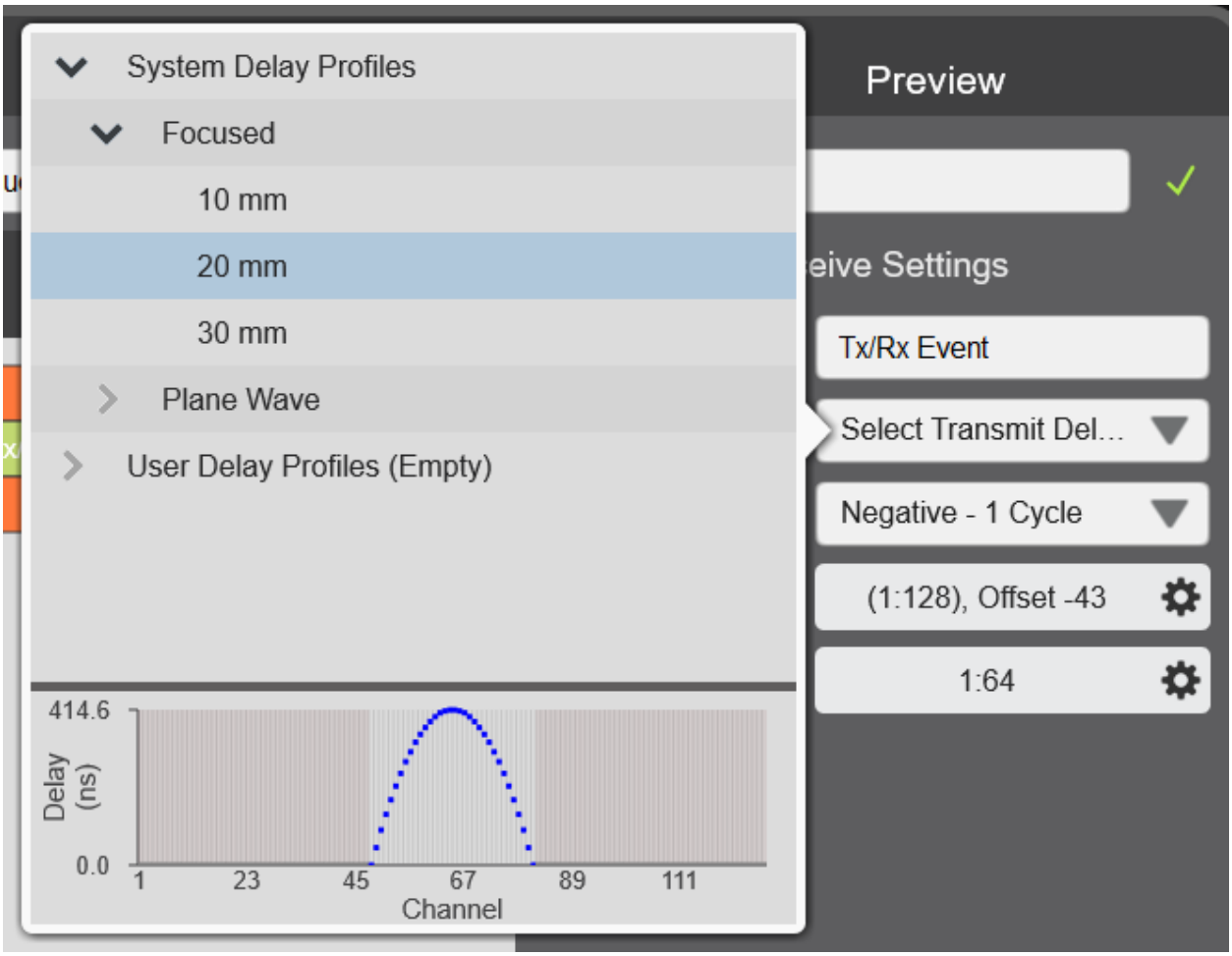
Event Name

The name of the transmit and receive event.

Transmit Delay

The transmit delay used by the transmit event. This drop-down list shows the currently selected transmit delay, a Select Transmit Delay option, and any Tx Delay loop blocks that enclose the event.

To change the delay profile used by this event, tap this drop-down list and tap **Select Transmit Delay** to open a selection submenu:



The top section of this submenu is a list of transmit delay profiles. This is identical to the list to the left of the Transmit Delay menu.

The bottom section of this submenu is a preview that shows the selected transmit delay profile.

> **Note:** The preview cannot be used to edit the delay profile.

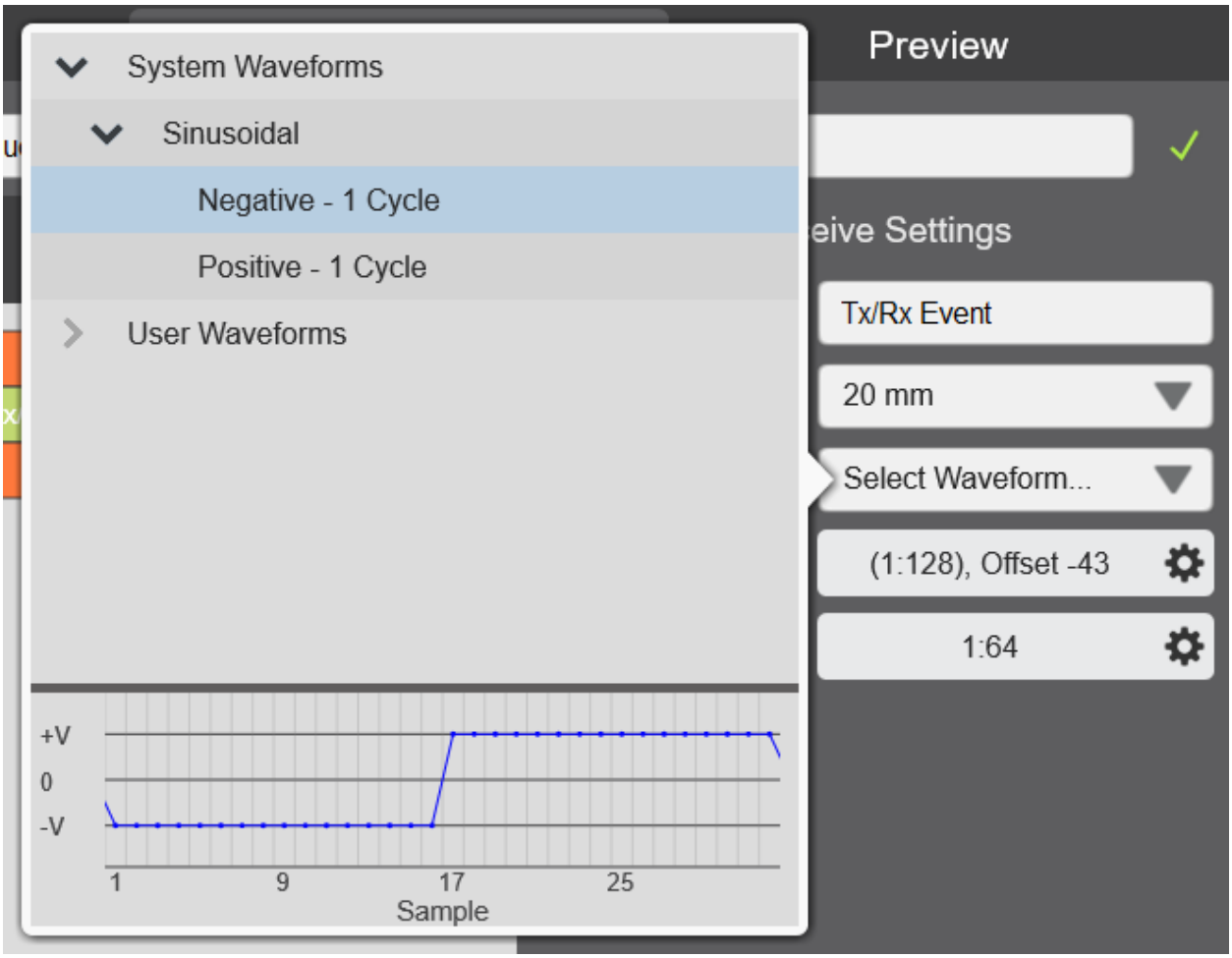
To select a transmit delay profile:

1. Select a profile from the list.
2. Tap outside the submenu to close it.

Waveform

The waveform profile used by the transmit event. This drop-down list shows the currently selected waveform, a Select Waveform option, and any waveform loop blocks that enclose the event.

To change the waveform profile used by this event, tap this drop-down list and tap **Select Waveform** to open a selection submenu:



The top section of this submenu lists waveform profiles. This is identical to the list to the left of the Waveforms menu.

The bottom section of this submenu is a preview that shows the selected waveform profile.

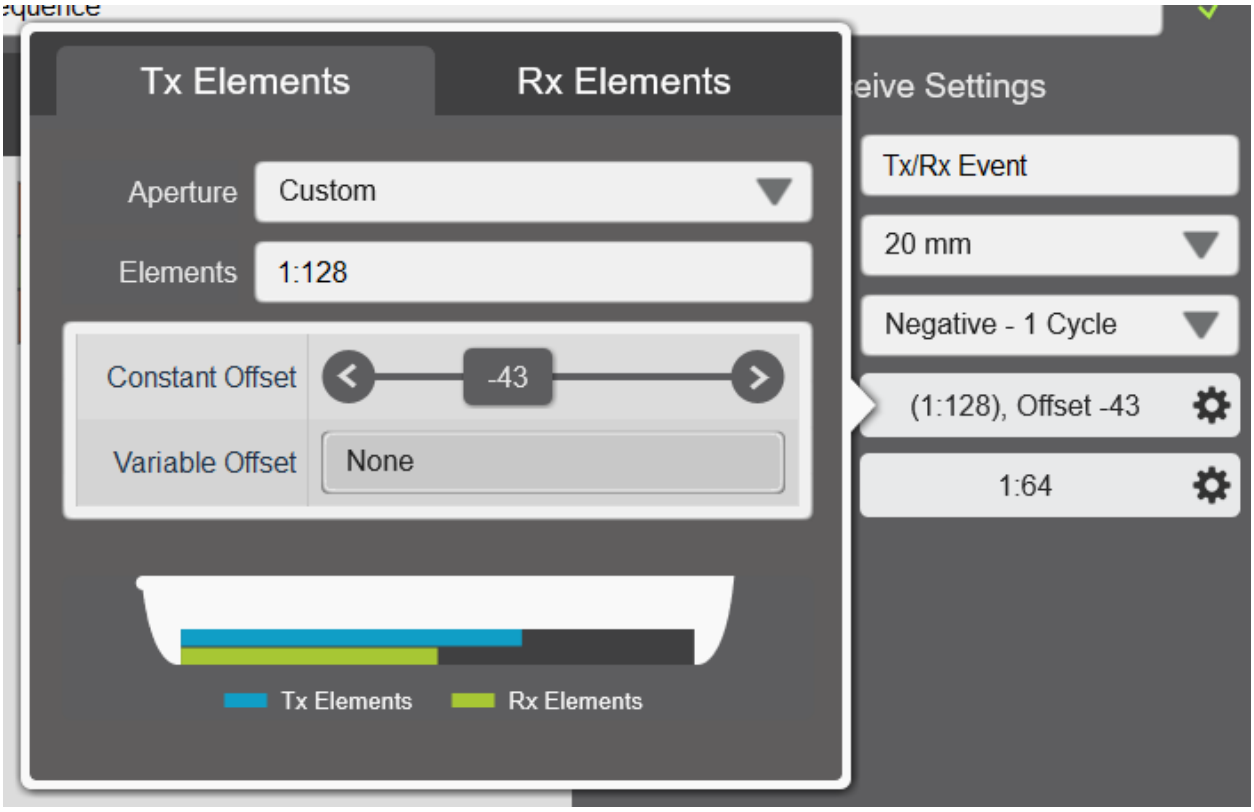
> **Note:** The preview cannot be used to edit the waveform profile.

To select a waveform profile:

1. Select a waveform profile from the list.
2. Tap outside the submenu to close it.

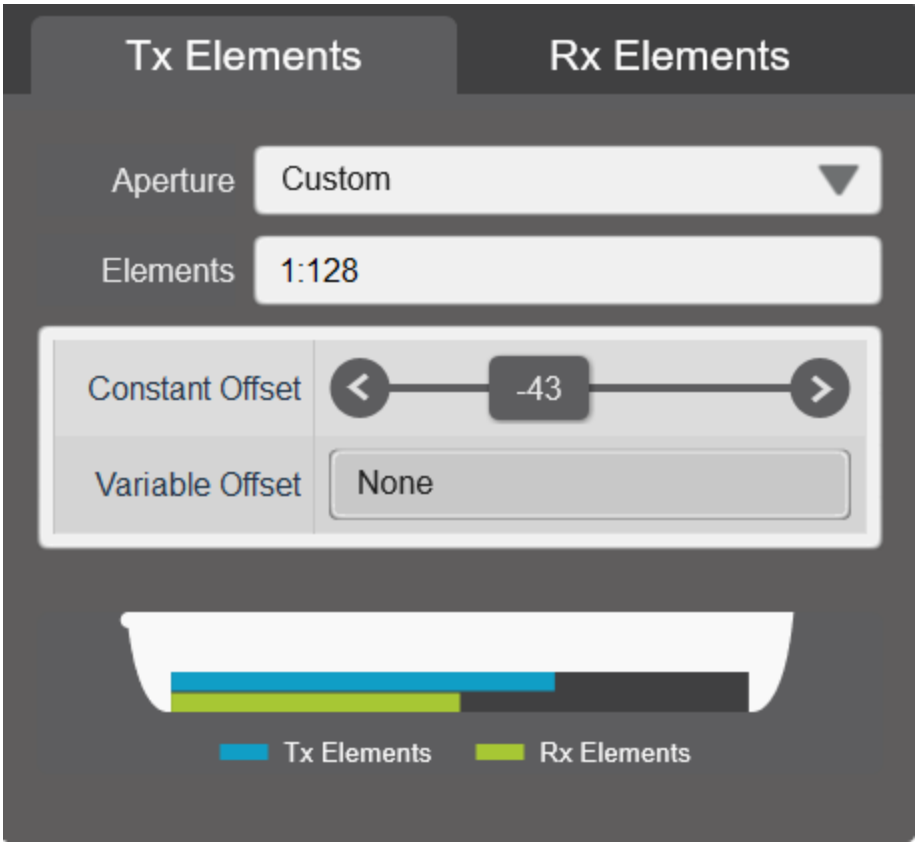
Transmit and Receive Elements

The Transmit Elements and Receive Elements fields are used to select the elements that will be used to transmit or receive. Tap either field to open the following submenu:

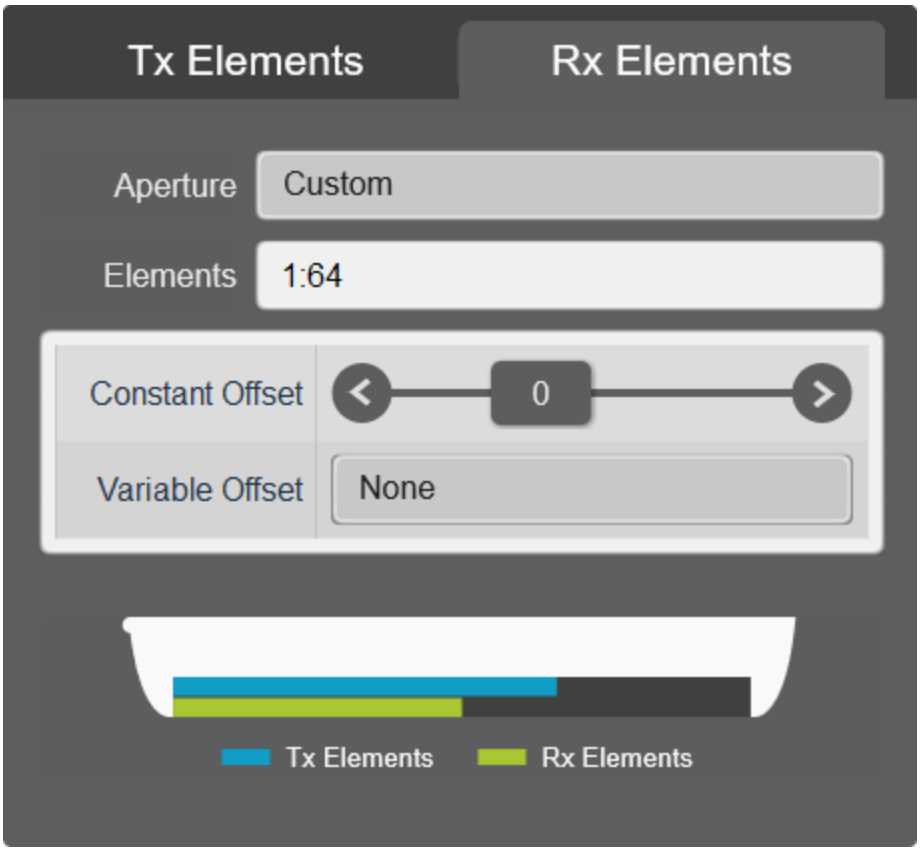


This submenu has one tab for transmit elements, and another for receive elements. The two tabs have identical interfaces.

- Tap **Transmit Elements** to open the Tx Elements tab of this submenu.



- Tap **Receive Elements** to open the Rx Elements tab of this submenu.



Settings

The Tx Elements/Rx Elements submenu has the following settings:

- **Aperture**: The type of transmit event. The following options are available:
  - Consecutive
  - Custom
- **Elements**: (Only selectable if Aperture is set to Custom) Selects the transducer elements to transmit/receive on. Use the following notation:
  - To specify a range of elements, enter the start and end points of the range, separated by a colon. For example, "1:128" means all elements between elements 1 and 128 (includes elements 1 and 128).

    > **Note:** This field uses a similar <start>:<increment>:<end> notation used when selecting channels in the Waveforms tab. For more information, refer to Channel Notation on page 227.

  - To list individual elements, enter specific elements, separated with commas. For example, "1, 5, 10" means elements, 1, 5, and 10.

  - Colons and commas can be combined in the same statement to list separate ranges of elements. For example, "1:32, 64:128" means all elements between 1 and 32, and all elements between 64 and 128.
- **Constant Offset**: Sets a constant offset for the elements specified in the Elements field. In consecutive increments, it is important to position the Tx and Rx elements relative to each other (because they are defined as 1:128/1:64), to allow for the absolute positioning of the base elements.
- **Variable Offset**: (Only available when the Tx/Rx event is within an Element Loop) Sets whether the Element loop offset is added to the constant offset when calculating offset increments. This is a drop-down list with two choices:
  - **Loop: Element Loop**: Adds the offset specified in the Element Loop settings to the Constant Offset value.
  - **None**: Uses only the Constant Offset value.

Transducer Preview

The graphic at the bottom of this submenu is a preview for which transducer elements are currently selected.

- The blue bar represents selected transmit elements.
- The green bar represents selected receive elements.
- The arrows show that the elements are changing within the loop, using the variable offset option. They do not appear if the variable offset option is not used.

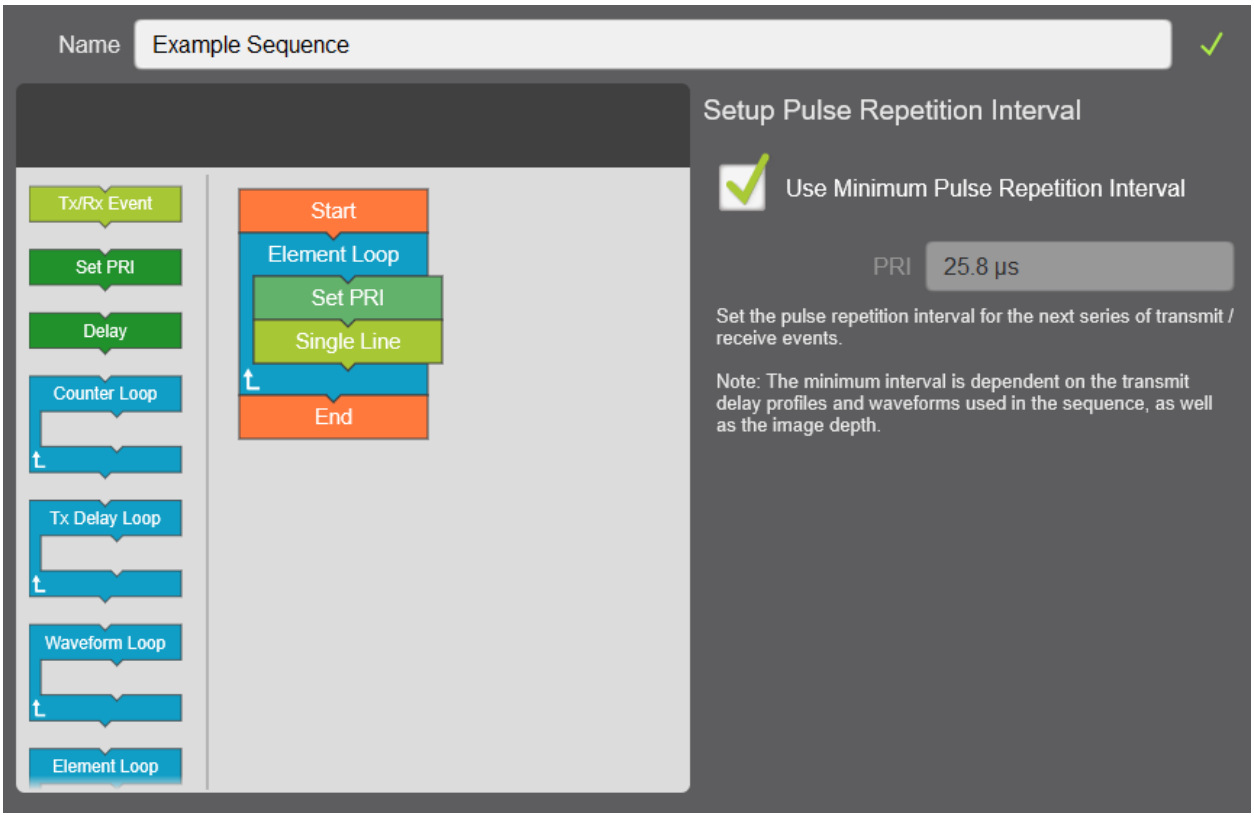
Set PRI

A **Set PRI** block sets the pulse repetition interval (PRI) for Tx/Rx events. It applies to events differently, depending on where it is placed in the pulse sequence.

- If it is placed outside a loop (blue block), then it applies to every Tx/Rx event that takes place after it, including events that are in loops.
- If it is placed inside a loop (blue block), then it applies to all Tx/Rx events within that loop, but does not apply to events outside that loop.

Interface

When a **Set PRI** block is selected, the following details appear:



The Pulse Sequences menu when a Set PRI piece is selected

A Set PRI block has the following configurable settings:

- Use Minimum Pulse Repetition Interval
- PRI

To edit a setting, tap the field and make any necessary changes.

Use Minimum Pulse Repetition Interval

When this checkbox is selected, the system will automatically use the minimum pulse repetition interval, and the PRI text field is disabled.

PRI (µs)

Defines the pulse repetition interval, in microseconds. Only available if the Use Minimum Pulse Repetition Interval check box is not selected.

> **Note:** This value has to be higher than the minimum PRI, which is displayed when the Minimum Pulse Repetition Interval check box is selected.

> **Note:** The delay that results from this setting varies depending on factors such as the transmit delay profile, waveform preset, and the image depth.

Delay

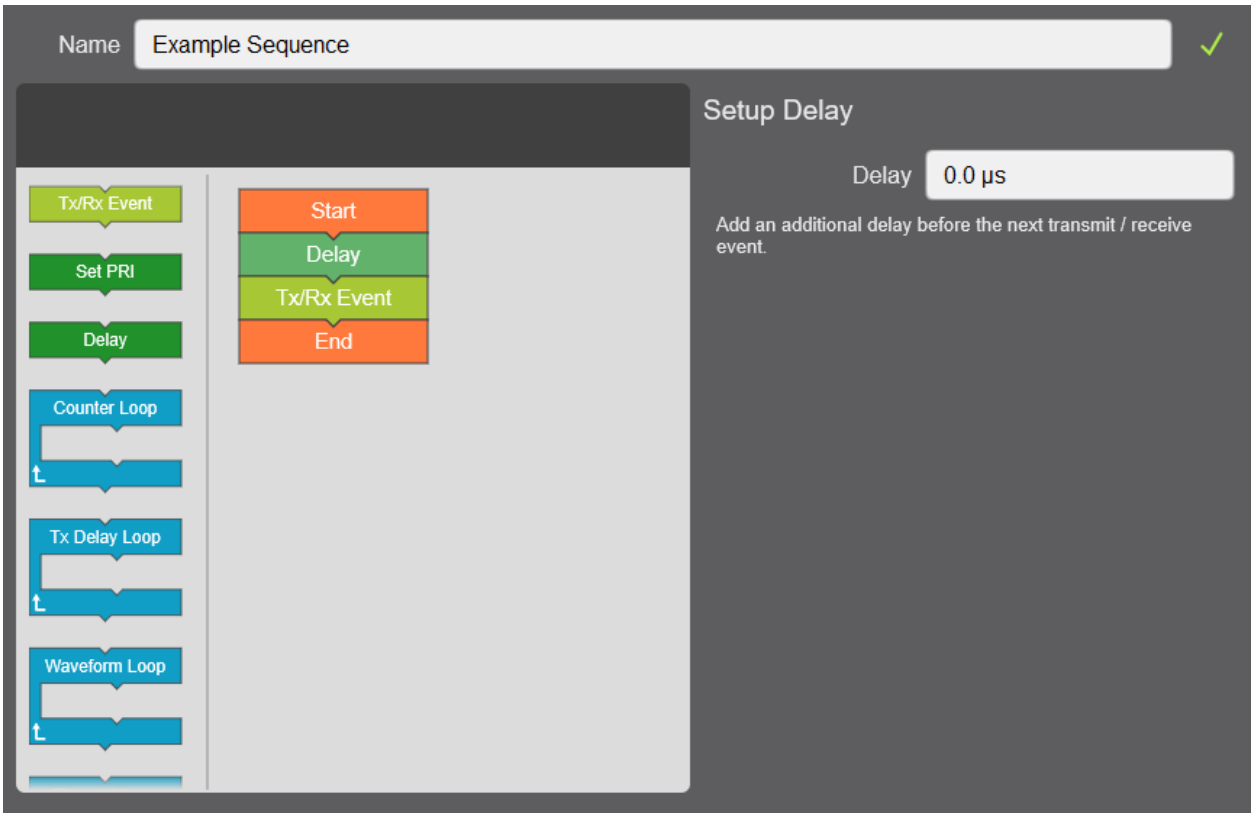
A **Delay** block adds an additional block of time before the next transmit/receive event.

This is a delay that occurs independently of any other delays or settings in the pulse sequence.

> **Note:** This block adds a time delay to only the next transmit/receive event. This differs from the Set PRI delay, which affects all transmit/receive events that are placed after it, if the Set PRI block was placed outside a loop (any blue block).

Interface

When a **Delay** block is selected, the following details appear:



To set the delay, tap the **Delay** field and enter the desired delay (in microseconds).

Counter Loop

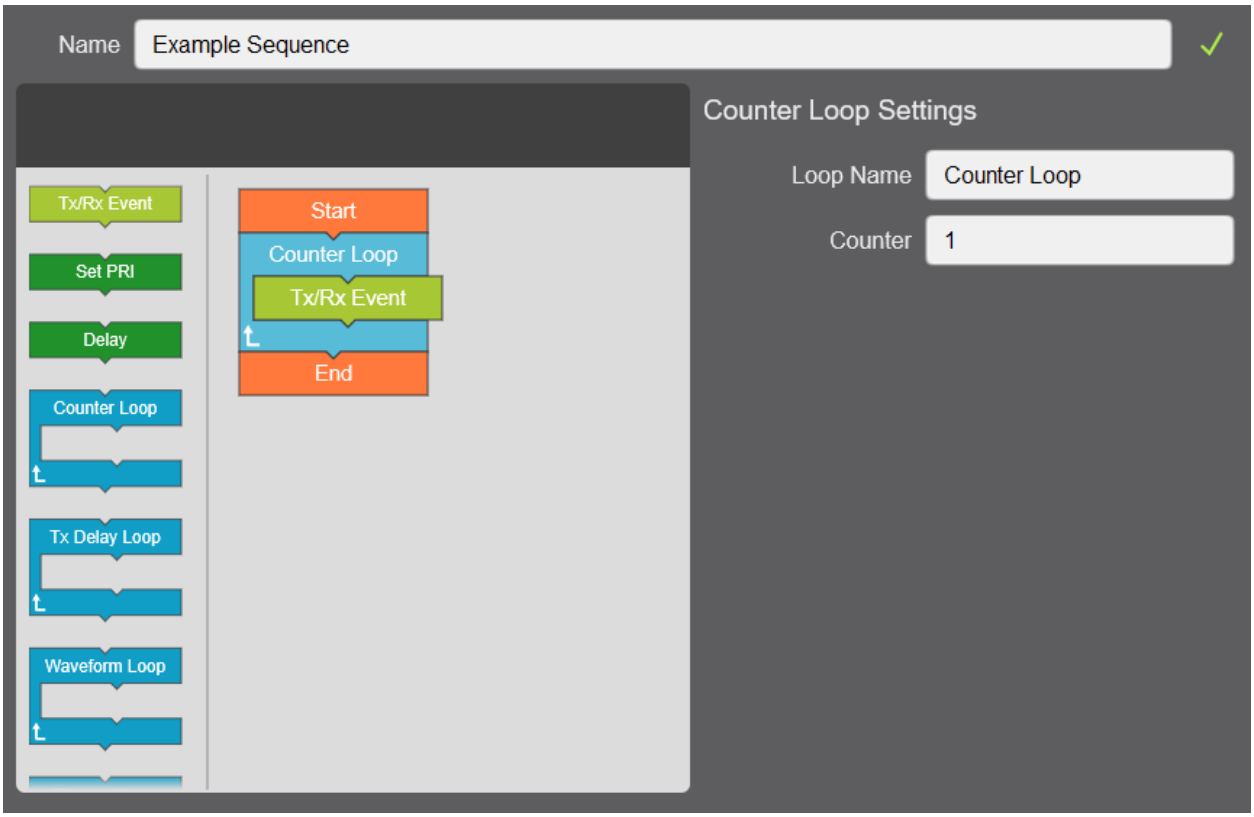
A **Counter Loop** block repeats any actions within it a set number of times.

For example, if a Tx/Rx Event is inside a Counter Loop, and the Counter Loop is set to repeat 5 times, the pulse sequence will run that Tx/Rx event 5 times.

> **Note:** Loops can be nested within each other.

Interface

When a **Counter Loop** is selected in the Pulse Sequences menu, the following list of details appear:



A Counter Loop has two configurable settings:

- Loop Name
- Counter

To edit a setting, tap the related field and make any necessary changes.

Loop Name

The name of the loop, as it appears on the pulse sequence.

Counter

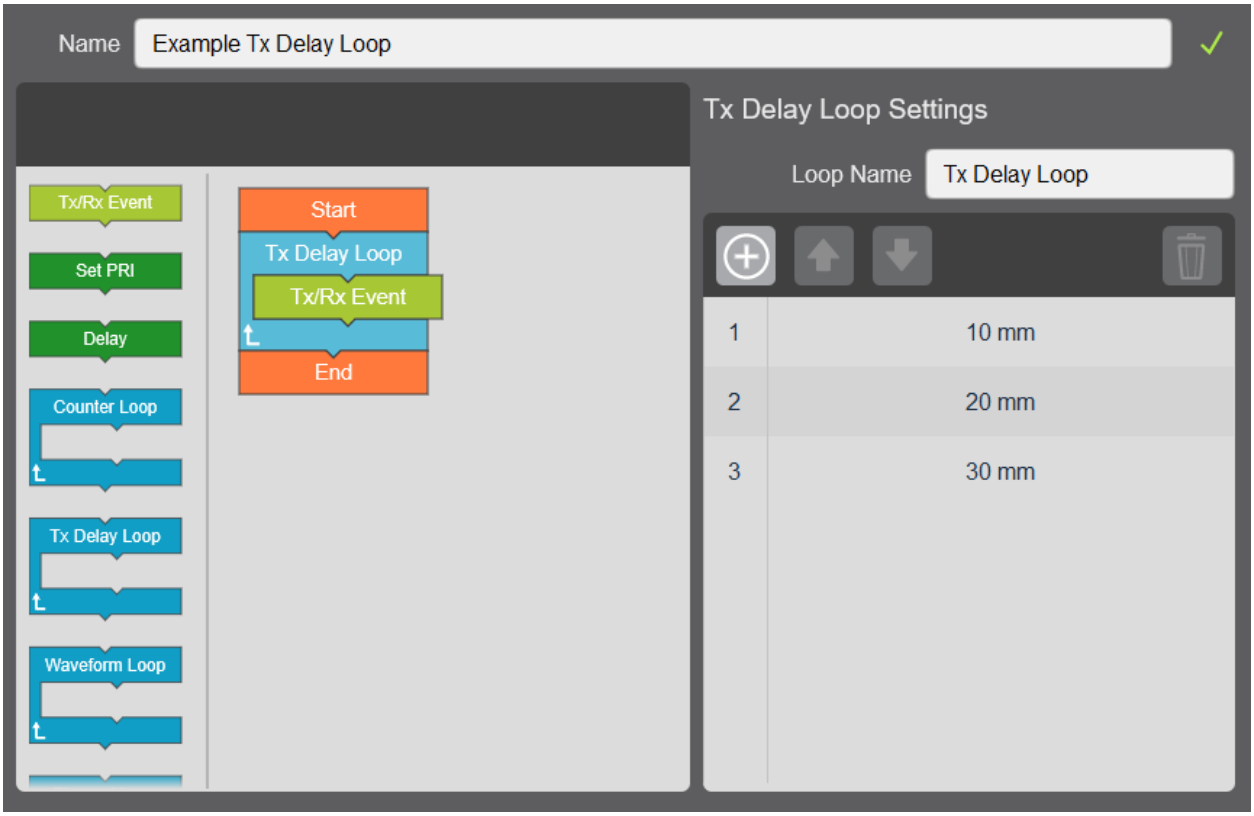
The number of times the loop will run its contents.

Tx Delay Loop

A **Tx Delay Loop** block cycles through a user-selected list of transmit delay profiles until each profile has been run once. Users can also set the Tx/Rx event contained in the loop to use the transmit delay profile in the loop instead of the delay set in the Tx/Rx event.

For example, if a Tx/Rx Event is inside a Tx Delay Loop, and the Tx Delay Loop contains the following list of transmit delay profiles:

1. Focused at 10 mm
2. Focused at 20 mm
3. Focused at 30 mm

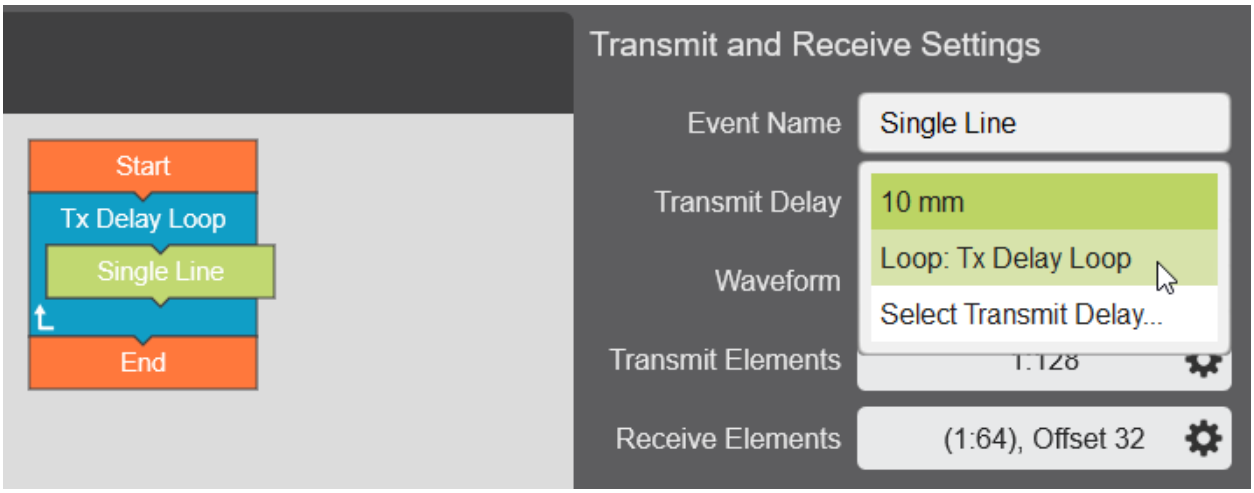


With these settings, and if the Tx/Rx event is set to use the transmit delay specified in the loop, the pulse sequence will run the same Tx/Rx event three times, with the following results:

1. The first event runs with the "Focused at 10 mm" transmit delay.
2. The second event runs with the "Focused at 20 mm" transmit delay.
3. The third event runs with the "Focused at 30 mm" transmit delay.

Tx Delay Profiles and Tx/Rx Events

When this loop is used and contains a Tx/Rx Event, the **Transmit Delay** drop-down list when editing the Tx/Rx Event has an additional option to use the transmit delays defined in the loop:

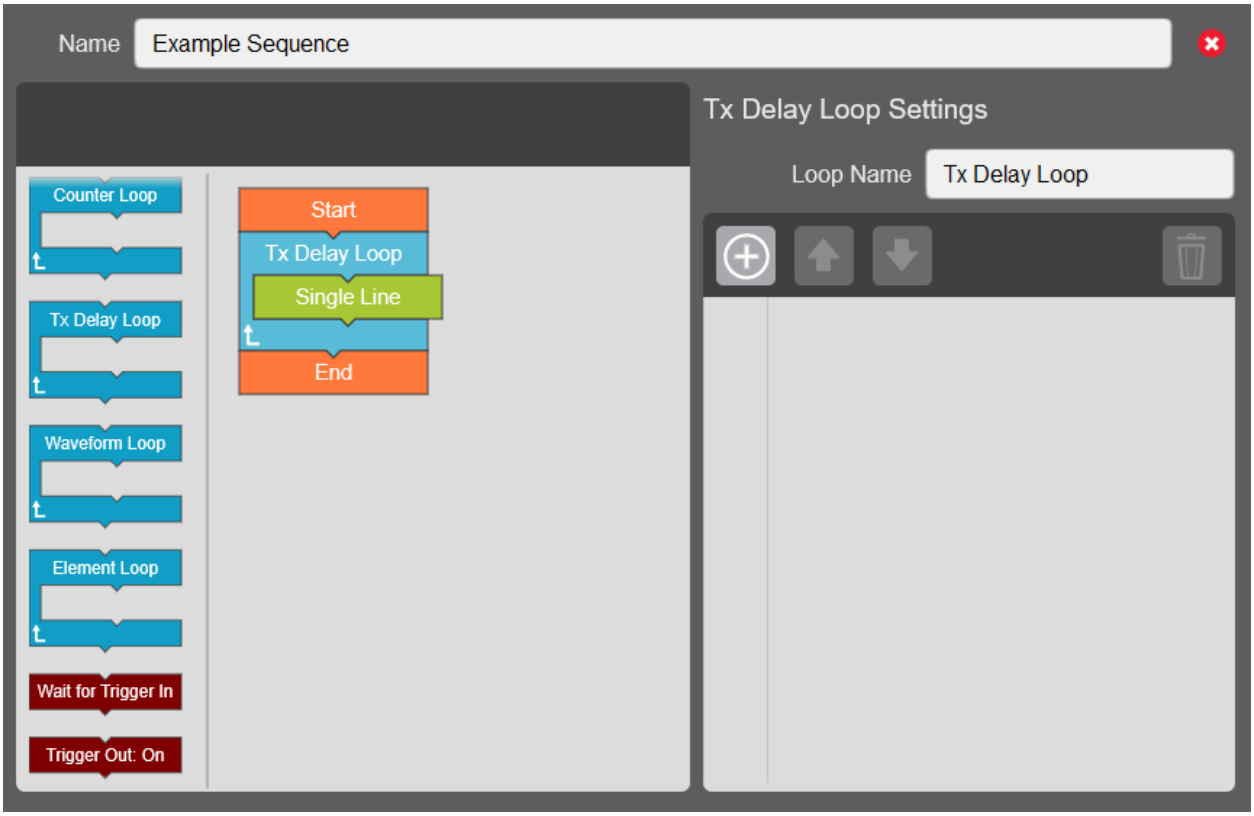


- When **Loop** is selected, the Tx/Rx event will use the transmit delays set in the Tx Delay Loop settings.
- When **Select Transmit Delay** is selected, the Tx/Rx event will use the transmit delays set in the Tx/Rx Event. This ignores the transmit delays set in the Tx Delay Loop.

For more information about configuring information in Tx/Rx Event blocks, refer to Settings on page 239.

Interface

When a **Tx Delay Loop** is selected, the following interface appears:

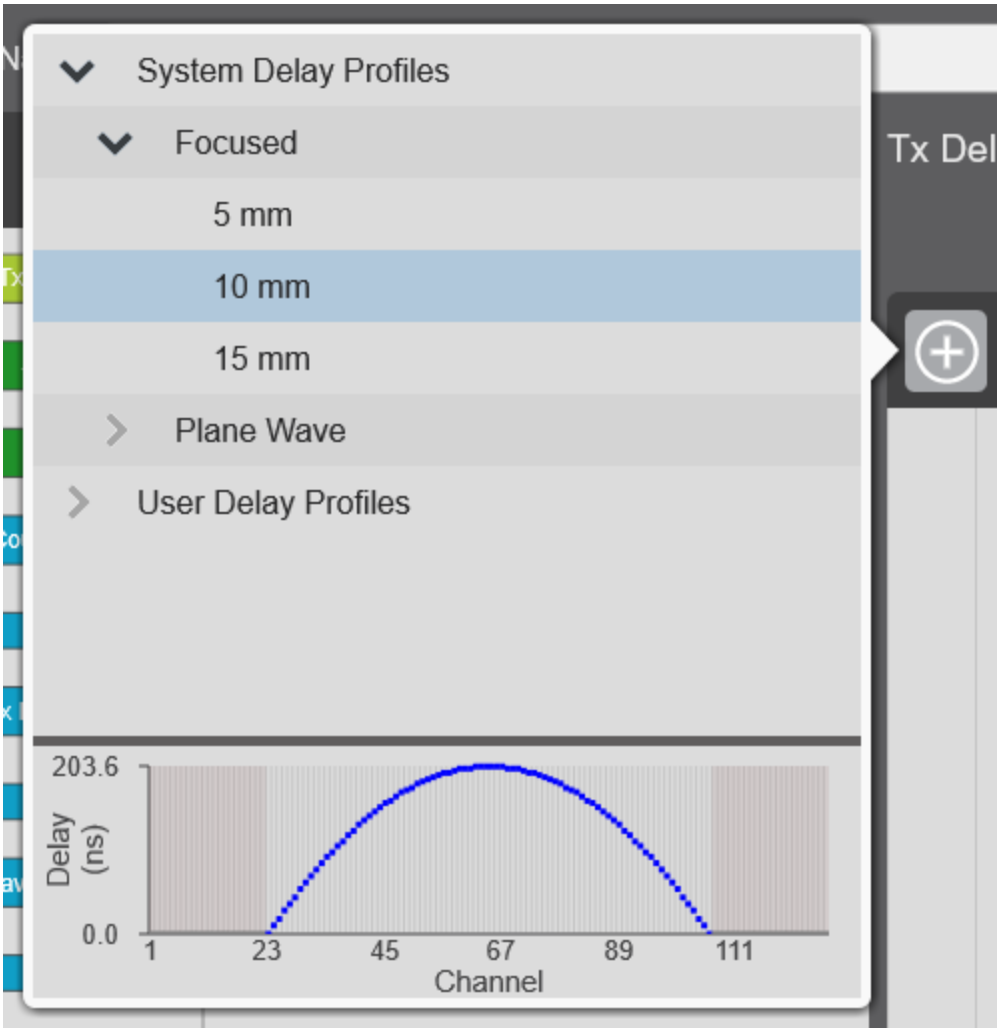


The **Loop Name** field is the name of the loop. This name appears in other menus, such as the **Transmit Delay** drop-down list in the Tx/Rx Event details.

The menu below the name is the list of transmit delay profiles that will be used in this loop.

Add a Transmit Delay Profile

1. Tap the **Add** button ( ).
2. In the menu that appears, select a transmit delay profile. This menu is identical to the one that appears when selecting a transmit delay in an Tx/Rx Event.



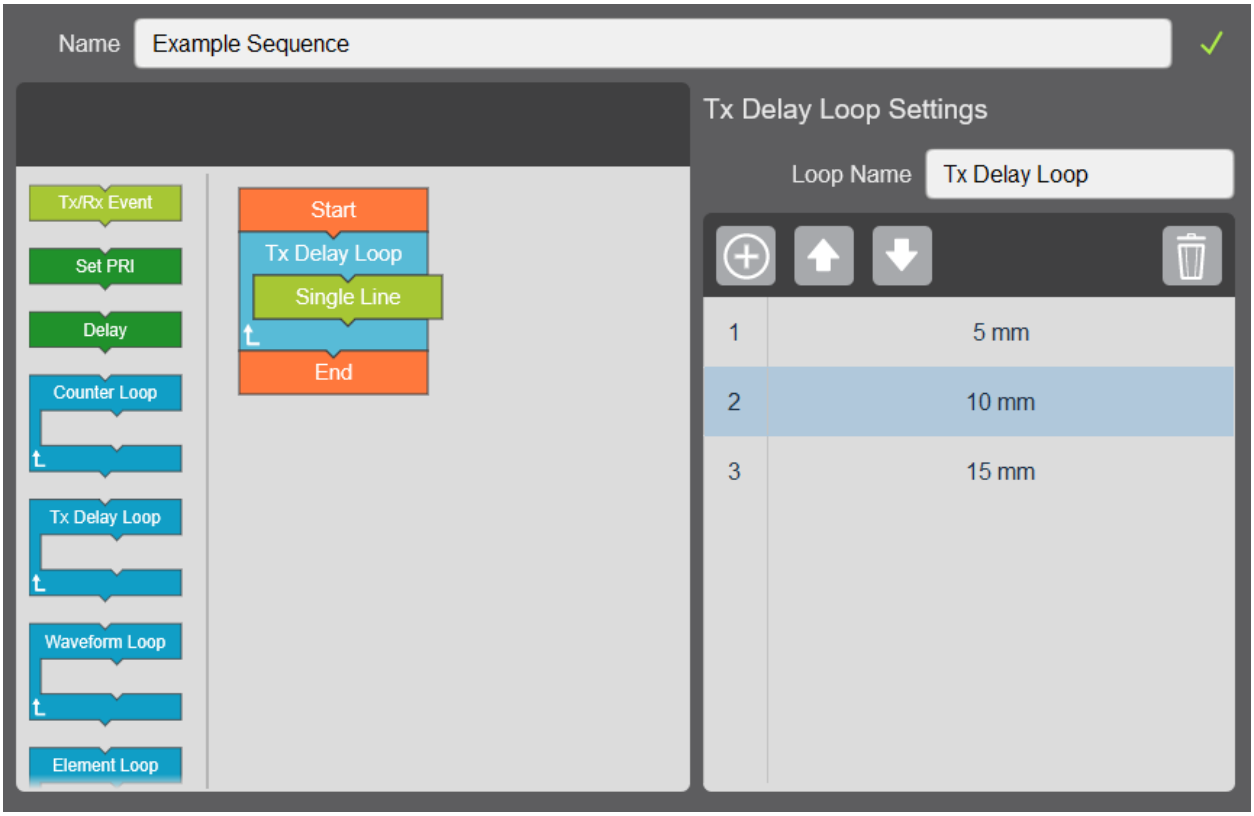
The top section of this submenu is a list of transmit delay profiles. This is identical to the list to the left of the Transmit Delay menu.
The bottom section of this submenu is a preview that shows the selected transmit delay profile.

> **Note:** The preview cannot be used to edit the delay profile.

To select a transmit delay profile:

a. Select a profile from the list.
b. Tap outside the submenu to close it.

Once added, the transmit delay profile appears in the list of transmit delays.



Transmit delay menu with three transmit delays entered

This numbered list shows transmit delays in the order in which they will be looped. In the above example, the pulse sequence will use the 5 mm profile on the first pass of the loop, the 10 mm profile on the second pass, and the 15 mm profile on the third pass before exiting the loop.

Delete a Transmit Delay Profile

1. Select a transmit delay profile.
2. Tap the **Delete** button ().

Rearrange Transmit Delay Profiles

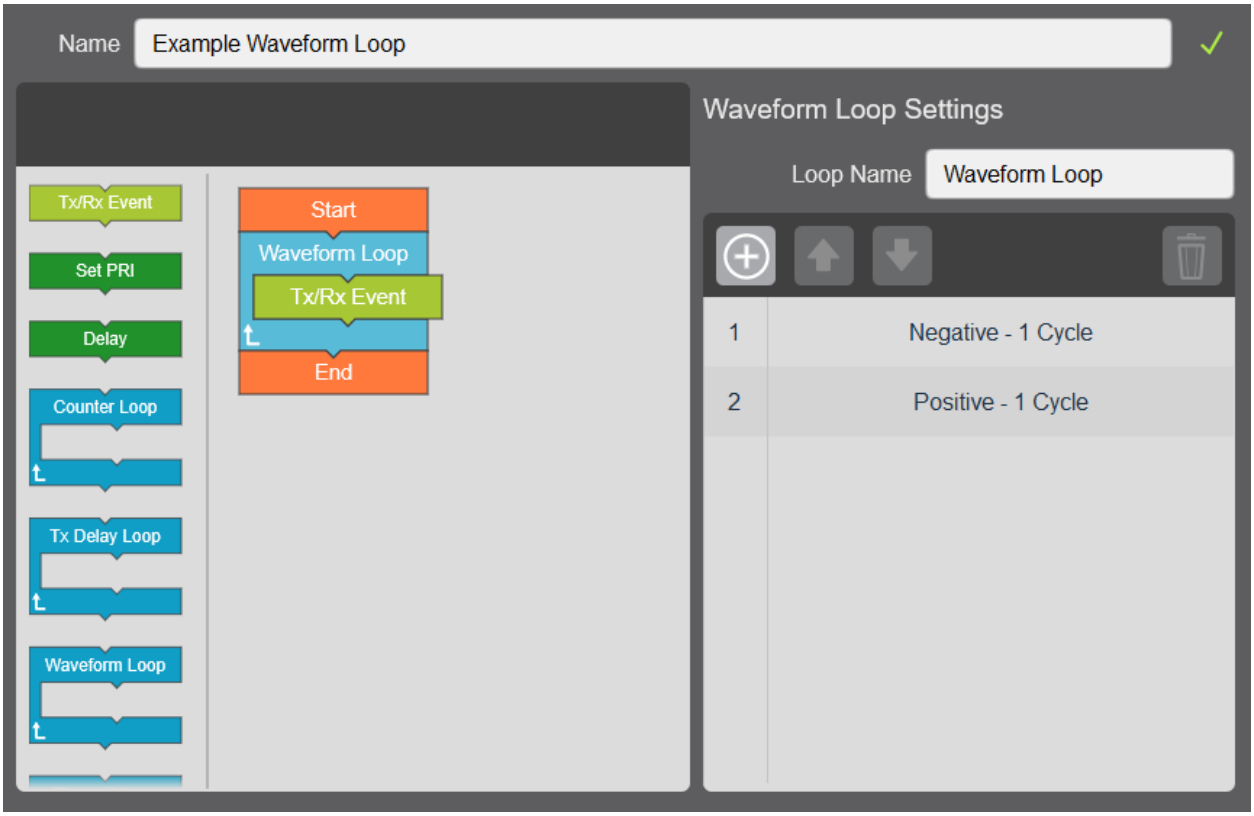
1. Select a transmit delay profile.
2. Tap the **Up** () or **Down** () buttons to move the profile up or down in the list.

Waveform Loop

A **Waveform Loop** block cycles through a user-selected list of waveforms until each item on the list has run once. Users can also set the Tx/Rx event contained in the loop to use the waveform profile in the loop instead of the waveform set in the Tx/Rx event.

For example, if a Tx/Rx Event block is inside a Waveform Loop, and the Waveform Loop has the following settings:

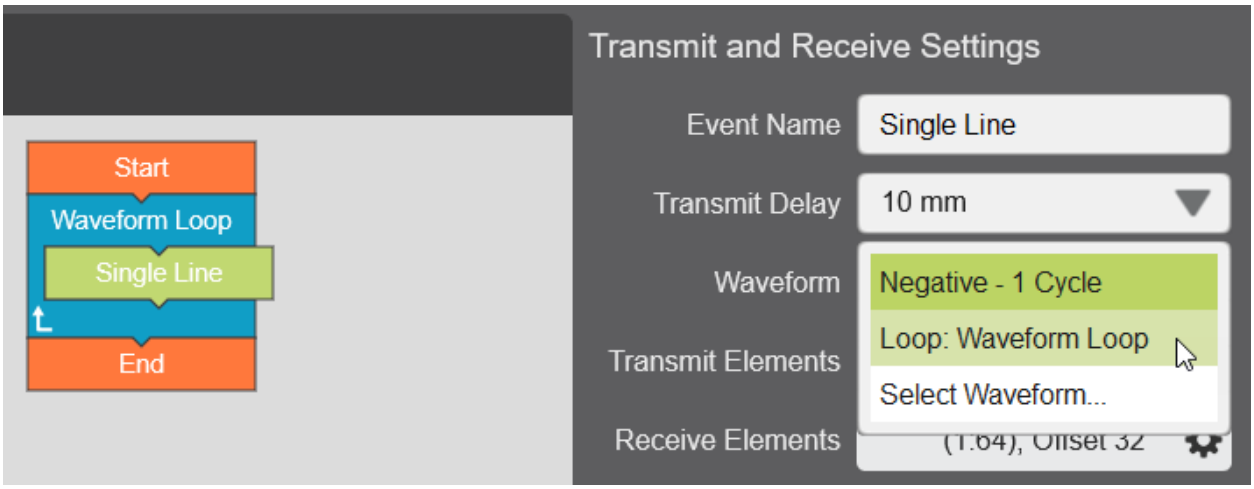
1. Negative - 1 Cycle
2. Positive - 1 Cycle



With these settings, and if the Tx/Rx event is set to use waveform specified in the loop, the pulse sequence will run the same Tx/Rx event two times, using the following waveforms:

1. The first event runs with the "Negative - 1 Cycle" waveform.
2. The second event runs with the "Positive - 1 Cycle" waveform.

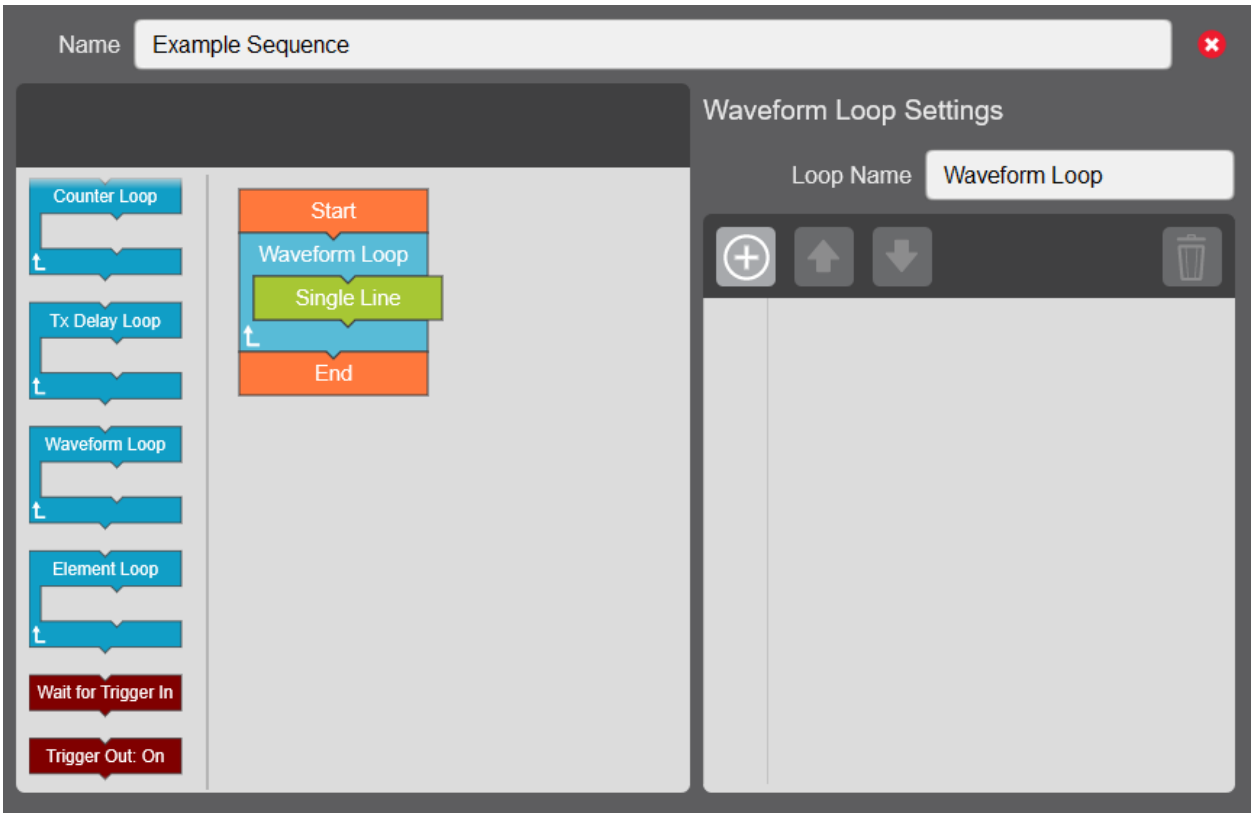
When this loop is used and contains a Tx/Rx Event, the **Waveform** drop-down list when editing the Tx/Rx Event has an additional option to use the waveforms defined in the loop:



- When **Loop** is selected, the Tx/Rx event will use the waveforms set in the Waveform Loop settings.
- When **Select Waveform** is selected, the Tx/Rx event will use the waveform set in the Tx/Rx Event. This ignores the waveforms set in the Waveform Loop.

Interface

When a **Waveform Loop** is selected, the following interface appears:

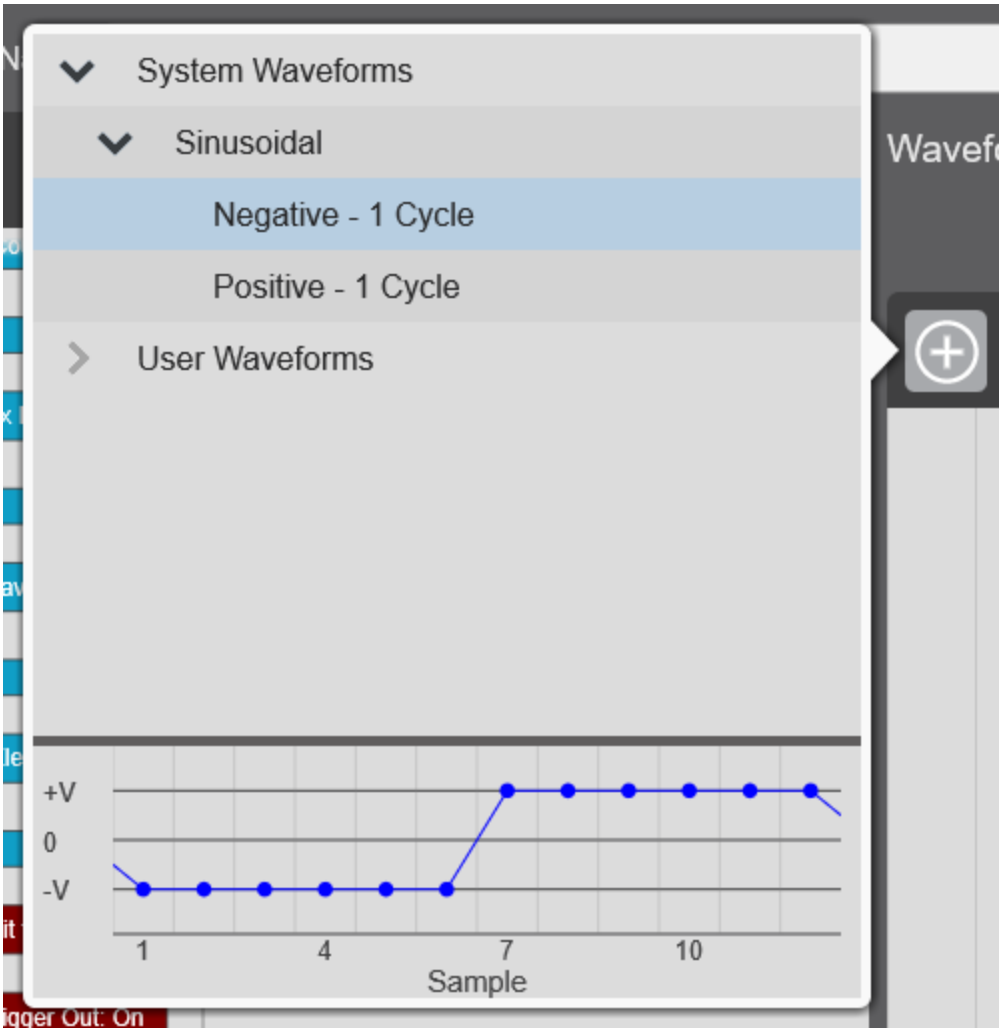


The **Loop Name** field is the name of the loop. This name appears in other menus, such as the **Transmit Delay** drop-down list in the Tx/Rx Event details.

The menu below the loop name is used to select and arrange which waveforms will be used in this loop.

Add a Waveform

1. Tap the **Add** button ( ).
2. In the menu that appears, select a waveform.



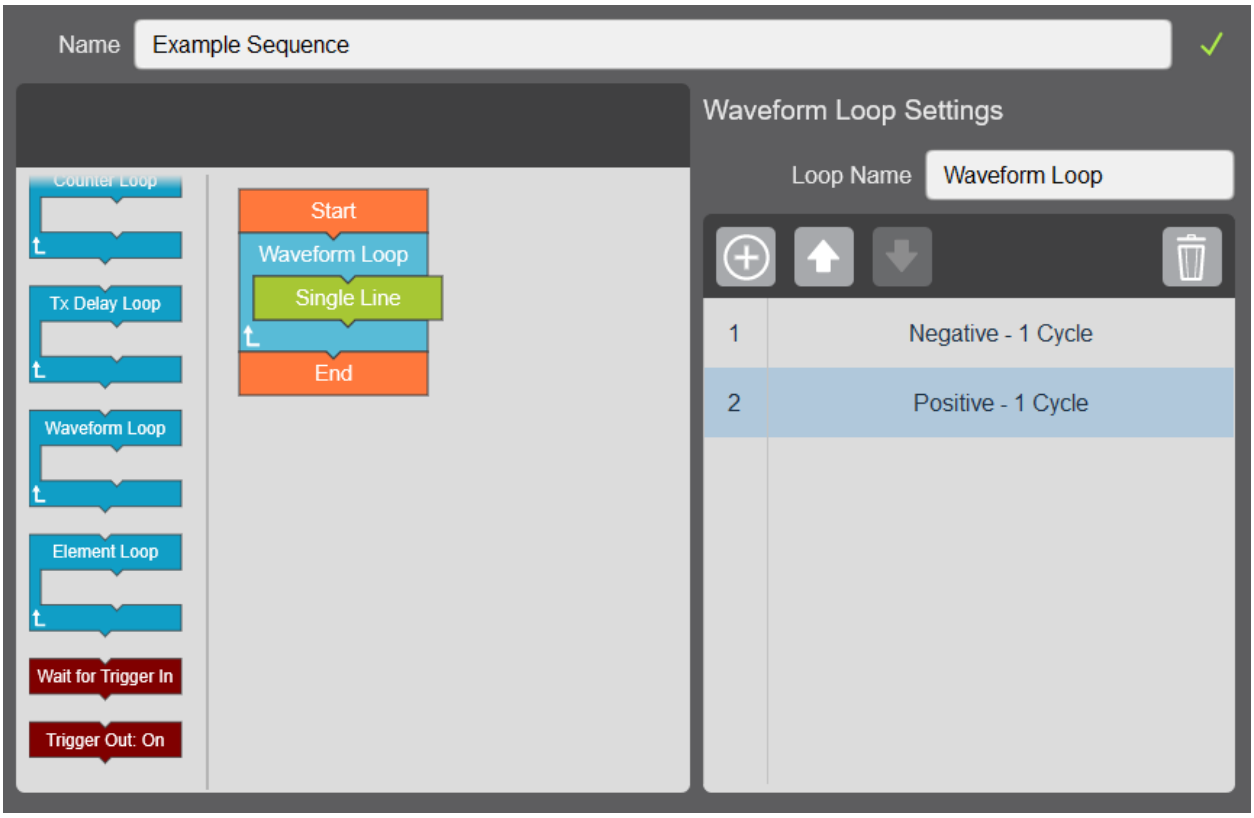
The top section of this submenu lists waveform profiles. This is identical to the list to the left of the Waveforms menu.
The bottom section of this submenu is a preview that shows the selected waveform profile.

> **Note:** The preview cannot be used to edit the waveform profile.

To select a waveform profile:

a. Select a waveform profile from the list.
b. Tap outside the submenu to close it.

Once added, the waveform appears in the list of waveforms.



Waveforms menu, with multiple waveforms entered

This numbered list shows the waveforms selected, in the order in which they will be used in the loop. In the above example, the pulse sequence will use the "Negative - 1 Cycle" waveform on the first pass of the loop, and the "Positive - 1 Cycle" waveform on the second pass before exiting the loop.

Delete a Waveform

1. Select a waveform.
2. Tap the **Delete** button ().

Rearrange Waveforms

1. Select a waveform.
2. Tap the **Up** () or **Down** () buttons to move the waveform up or down in the list.

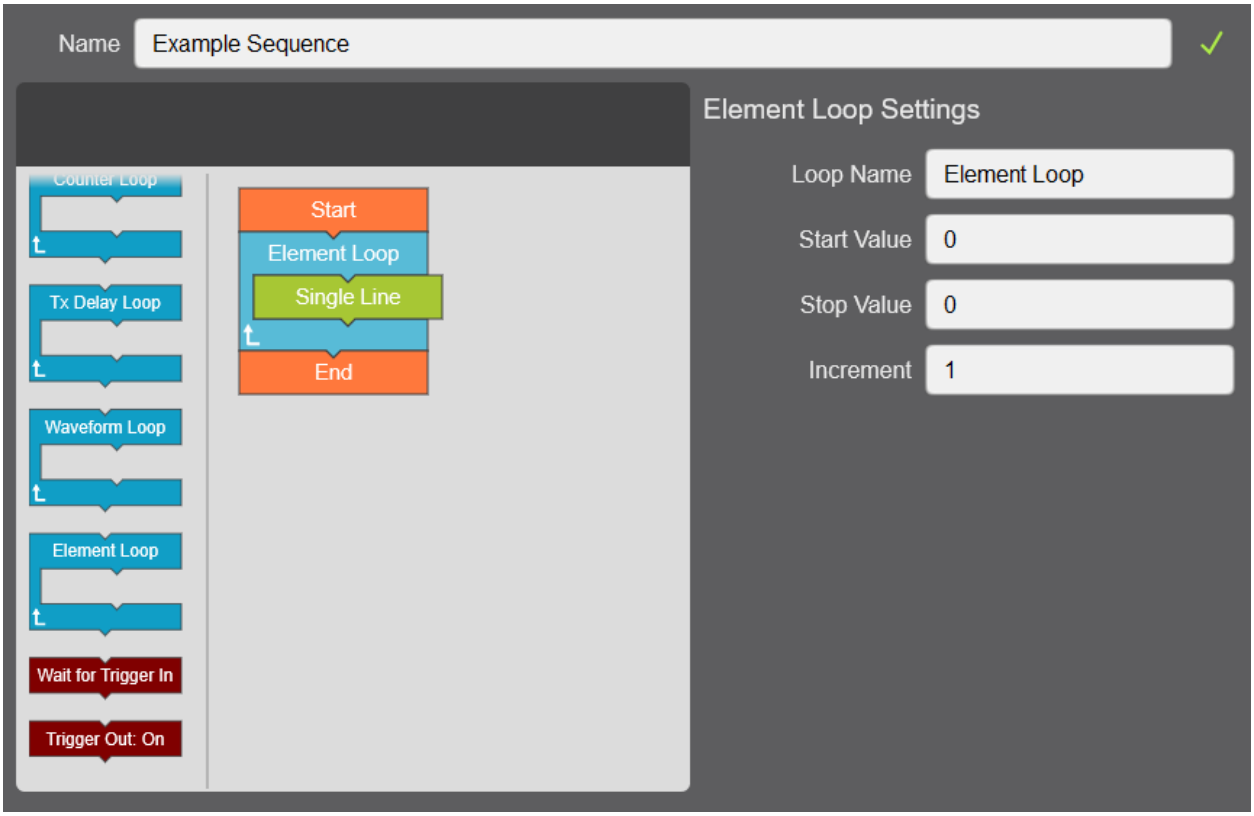
Element Loop

An **Element Loop** block cycles through a series of offsets used by a Tx/Rx event to move the transmit or receive aperture with each repetition.

Users can also set the Tx/Rx event contained in the loop to use the offsets in the loop instead of the offsets set in the Tx/Rx event.

Interface

When an **Elements** block is selected, the following interface appears:



- Loop Name: The name of the loop.
- Additional options when the Tx/Rx Event block in the loop is set to use Variable Offset:

> **Note:** These values do not specify the exact transducer element, but are values that are added on top of the constant offset value.

  - Start Value: The element at which to start the Tx/Rx event.
  - Stop Value: The element at which to end the Tx/Rx event.
  - Increment: The number of elements to increment with each repetition of the loop.

Examples

- Start Value: 5
- Stop Value: 50
- Increment: 1

With these settings, the Tx/Rx event will start at element 5 on the transducer, then increment by 1 with each repetition of the loop (5, 6, 7, etc.) until it reaches element 50.

- Start Value: 1
- Stop Value: 100
- Increment: 10

With these settings, the Tx/Rx event will start at element 1, then increment by 10 with each repetition (1, 11, 21, etc.) until it reaches element 91 (because the next element would be 101, which exceeds the stop value).

Wait for Trigger In

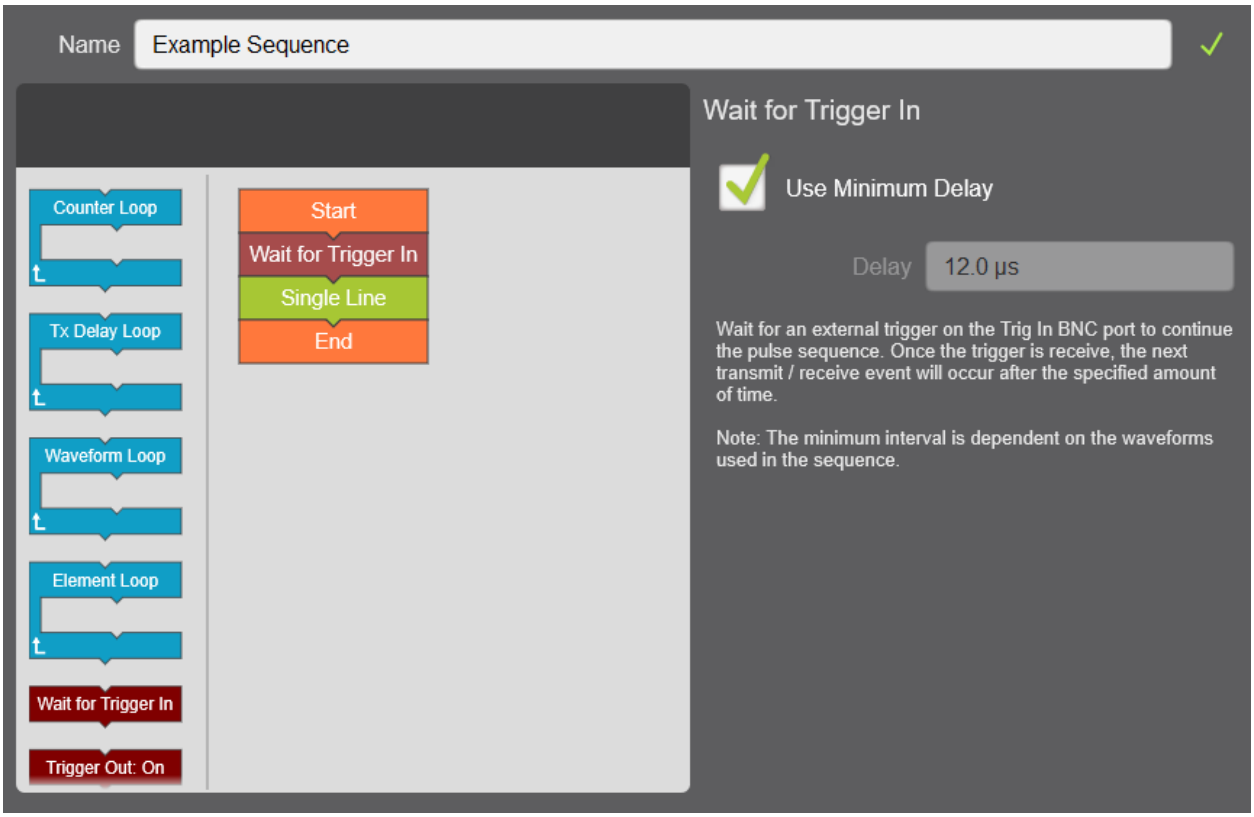
A **Wait for Trigger In** block causes the system to wait for an external trigger signal into the Trig In BNC port before running the next event in the pulse sequence.

When the trigger signal is received from the Trig In BNC port, the system will wait for the delay period set in this block (if set) before running the next event in the pulse sequence.

> **Note:** This block only affects the next transducer event in the pulse sequence. Subsequent transducer events in the sequence are not affected. This differs from the Trigger Out: On block, which affects every transducer event in the sequence that is placed after the block.

Interface

When a **Wait for Trigger In** is selected, the following interface appears:



The **Wait for Trigger In** block has two settings:

- Use Minimum Delay: Select this checkbox to use the minimum delay possible after receiving the external trigger. The minimum interval varies depending on the waveforms used in the pulse sequence.

  > **Note:** Selecting this checkbox disables the **Delay** field. The field then displays the minimum delay.

- Delay: Enter a number in this text field to set a constant delay (in µs) that occurs between receiving the external trigger and executing the next Tx/Rx event in the pulse sequence.

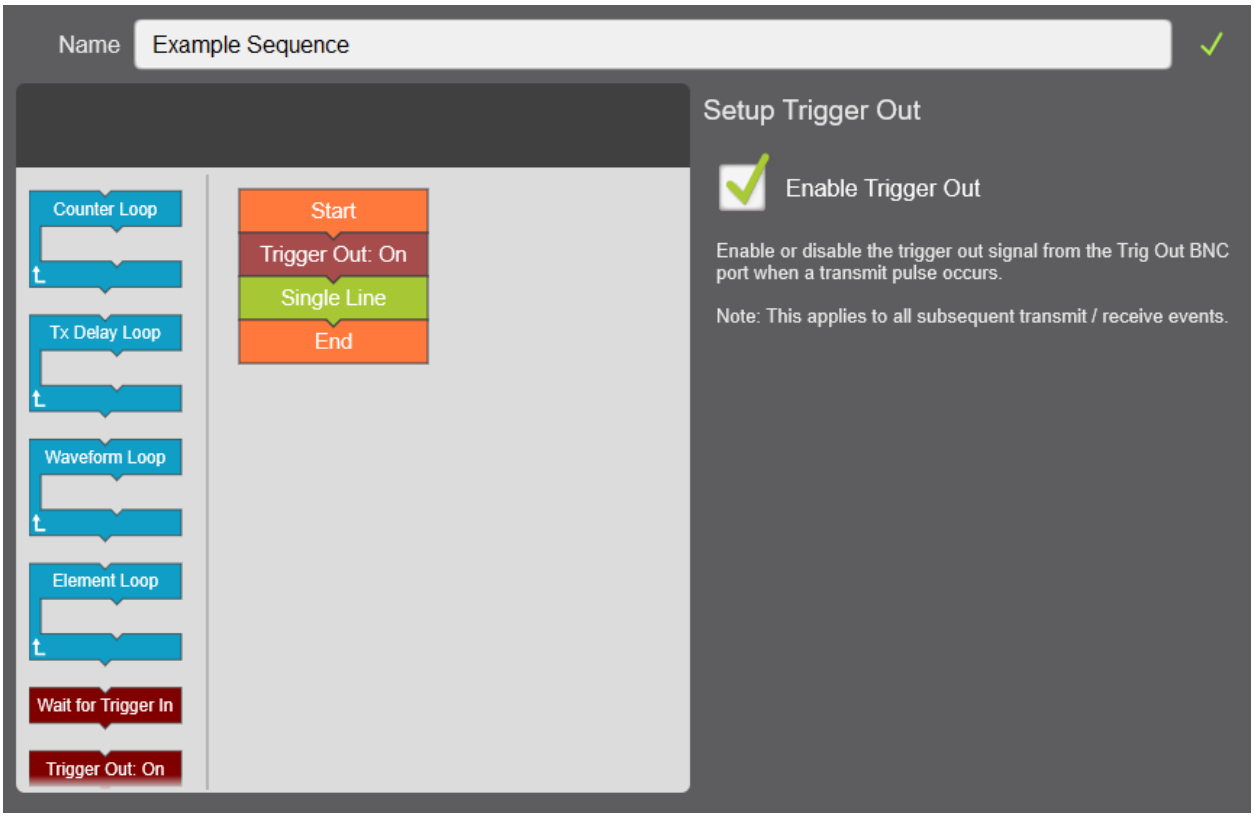
Trigger Out

A **Trigger Out** block determines whether a "trigger out" signal is sent from the Trig Out BNC port when a transmit pulse occurs.

> **Note:** This applies to all Tx/Rx events in the pulse sequence that take place after this block.

Interface

When a **Trigger Out** is selected, the following interface appears:



This block has a single check box named **Enable Trigger Out**.

- Select this check box to send a "trigger out" signal from the Trig Out BNC port for every Tx/Rx event that occurs after this block in the pulse sequence.
  Selecting this check box changes the red block's title to "Trigger Out: On".
- Disable this check box to stop sending the "trigger out" signal for all tx/rx events that take place after this block in the pulse sequence.
  Deselecting this check box changes the red block's title to "Trigger Out: Off"

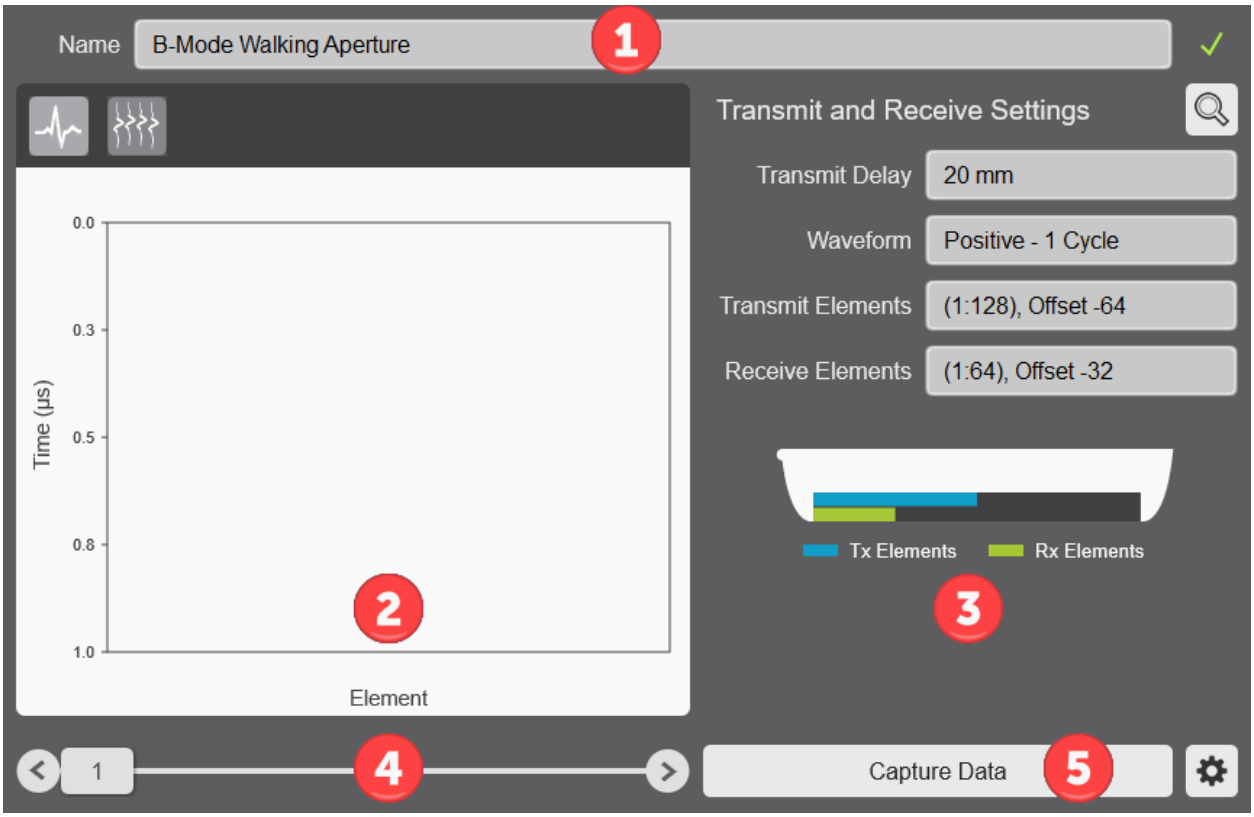
Preview

The Preview menu allows users to view a pulse sequence before it is used. It generates a graph where you can visualize the pre-beamformed channel data from the selected aperture or the selected element.

This feature allows users to send and receive data from a single transmit and receive event without stepping through the entire pulse sequence. This could be used to perform hydrophone measurements for a specific transmit configuration, or to look at the received ADC data to ensure appropriate gain or alignment of a target.

> **Note:** Note that the Preview menu is used for viewing pulse sequences only. To change any settings in a pulse sequence, return to the other tabs on the VADA configuration panel.

Interface



The Preview menu interface

The Preview menu has the following key areas:

1. Name: The name of the pulse sequence.
2. Graph: Displays the received data for the Tx/Rx event currently selected in the event slider (#4 in the above diagram).
3. Transmit and Receive Settings: A list of selected settings for the event.
4. Event Slider: (Only appears if the pulse sequence has more than one event) Used to select individual Tx/Rx events in the pulse sequence.
5. Capture Data: Press this button to view a live stream of data on the graph, from the Tx/Rx event currently selected in the event slider.

To preview a pulse sequence, select it from the list of pulse sequences to the left.

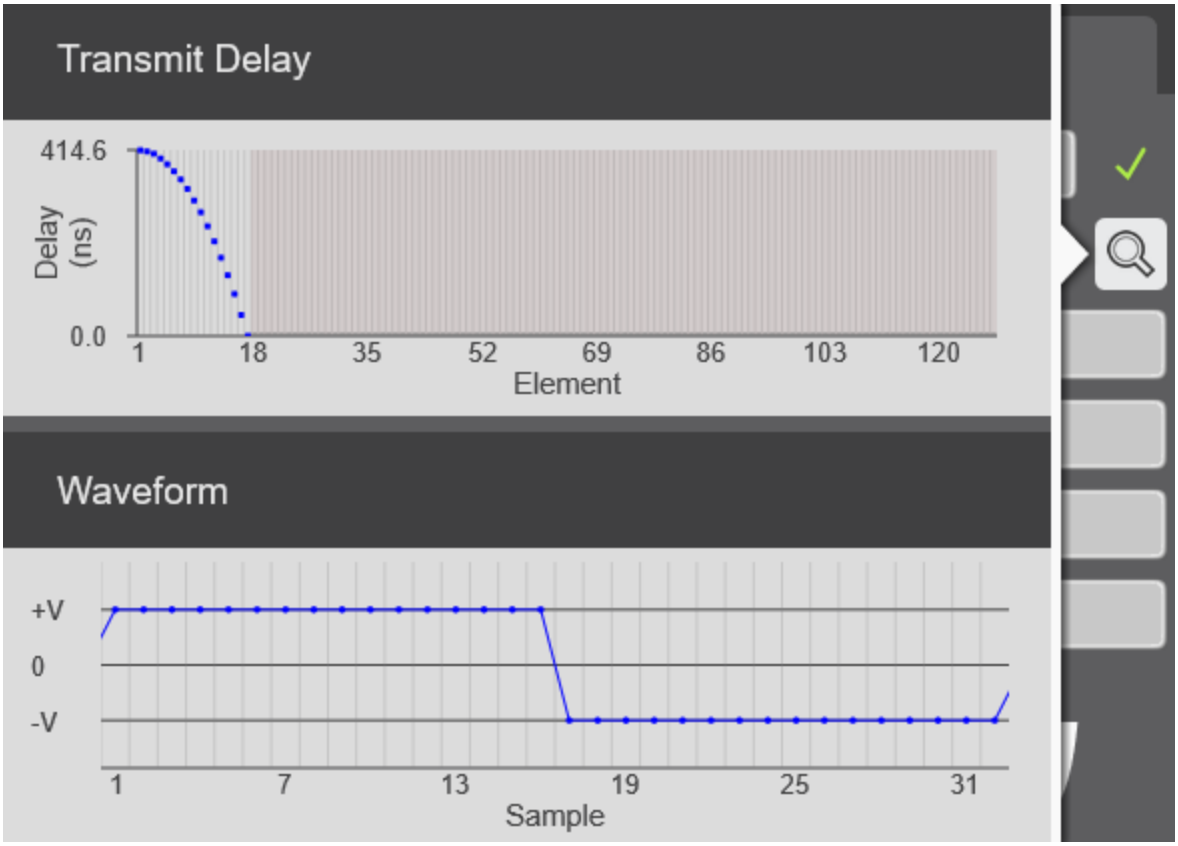
Transmit and Receive Settings

In the Transmit and Receive Settings section, the following fields are displayed:

- Transmit Delay
- Waveform
- Transmit Elements

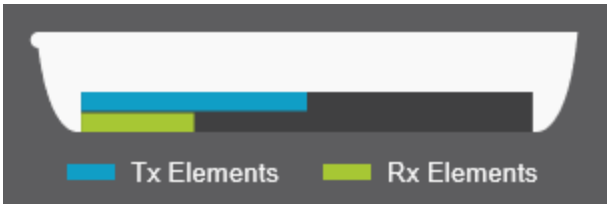
- Receive Elements

Click the magnifying glass icon () to see a visual preview of the selected transmit delay and waveform.



Transducer Preview

Below the Transmit and Receive Settings section, there is a graphic that shows which elements are being used for the current Tx/Rx event.

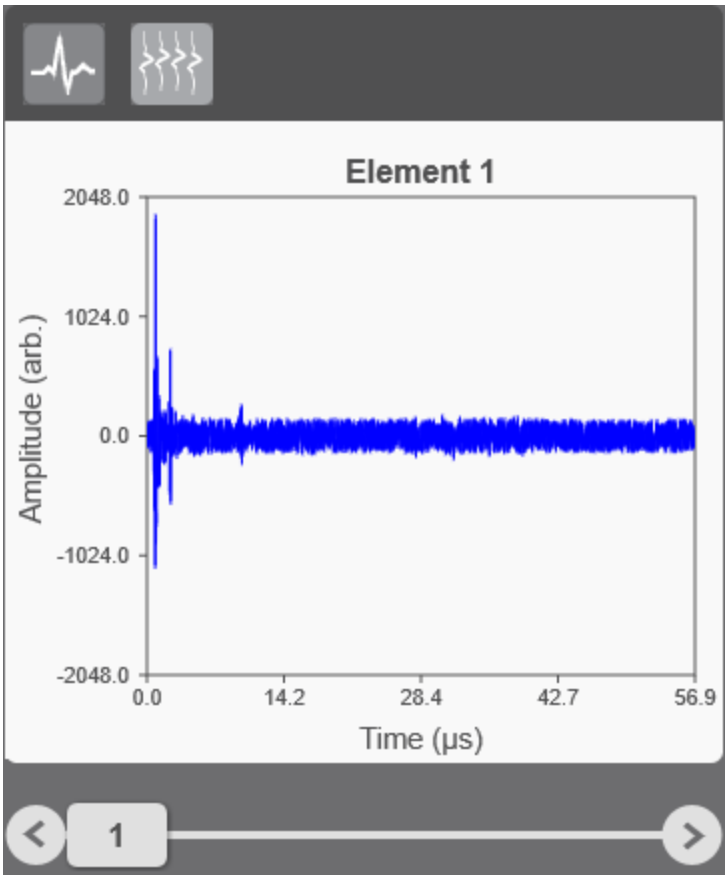


- The blue section represents the elements that will be used for the transmit event.
- The green section represents the elements that will be used for the receive event.

Each section may change in size and location depending on the transmit and receive settings set for the pulse sequence (set in the Pulse Sequence menu).

Capture Data

Tap the **Capture Data** button to preview a live stream of ADC data on the graph, from the currently selected Tx/Rx event.



- The two buttons above the graph ( and ) change the graph between viewing all elements on the transducer, and viewing only one element at a time.
  - To view all elements at once, tap the  icon.

- To view one element at a time, tap the  icon.

- Use the slider at the bottom of the menu to scroll between different points in the pulse sequence.

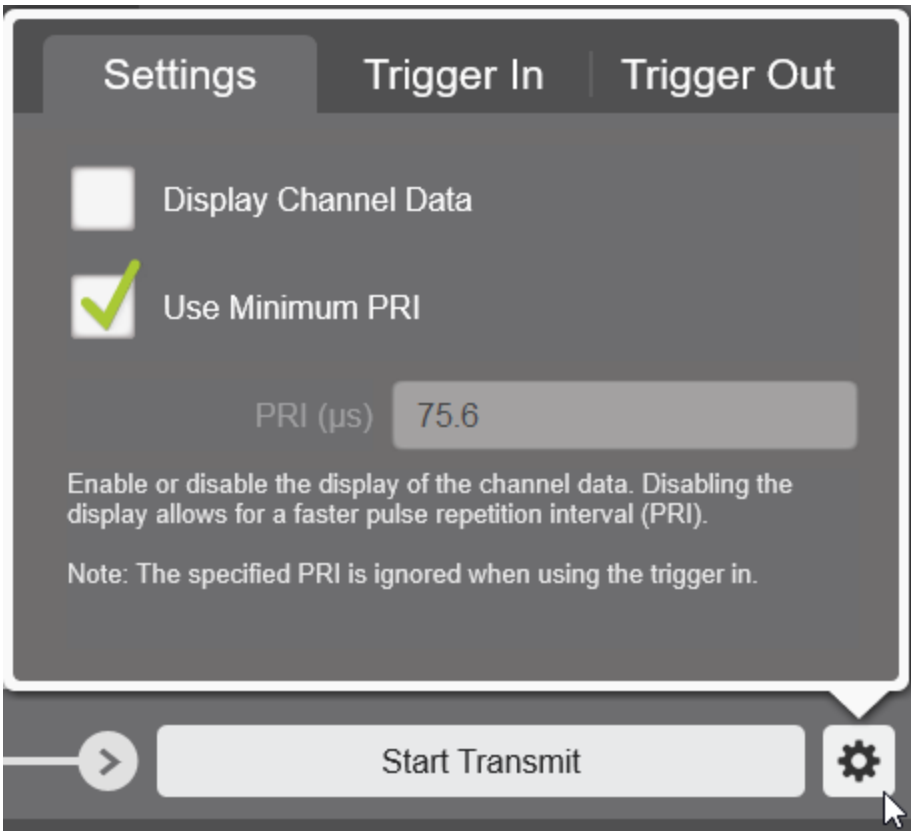
Capture Settings

The **gear icon** () next to the **Capture Data** button opens a submenu containing additional capture settings.

This submenu is used to select other options about the data capture.

This menu is split into three tabs:

- **Settings**



  - **Display Channel Data**: Toggles whether received channel data is displayed on the preview graph. If this setting is off, the transmit can be repeated much faster (approximately 50x faster or more) than with it on. This is useful for hydrophone measurements.

- When this setting is off, the "capture data" button changes to read "transmit data" because the transducer is transmitting data without processing it to display on the graph.

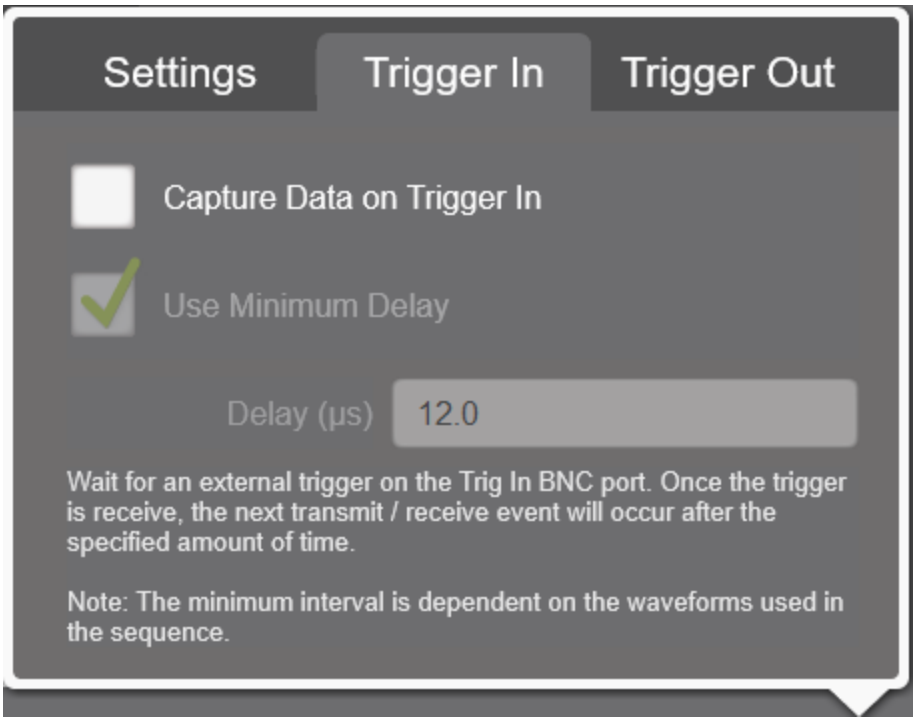
> **Caution:** Be aware of thermal considerations when turning off Display Channel Data. This is because the transmit rate is much higher when it is off. For more information, refer to Transducer Thermal Management on page 198.

- **Use Minimum PRI**: Select this setting to make the transducer fire as often as it can. The firing rate varies depending on whether channel data is displayed, and the depth of the signal.
  - When **Display Channel Data** is on, the frame rate is limited by the download rate, which greatly hinders the rate at which the transducer can fire.
  - When **Display Channel Data** is off, the transducer can fire at a much faster rate, but the fire rate can be limited using this setting.
  - When this setting is selected, the **Delay (µs)** field is automatically populated by the minimum PRI (pulse repetition interval) allowed by the depth setting.

> **Note:** In VADA Mode, transducer fire rates are measured by PRI (pulse repetition interval), which is the length of the delay between pulses. The other common unit of measurement for fire rate is PRF (pulse repetition frequency), which is the frequency of pulses themselves. PRF is used in other parts of the Vevo F2 interface.

- **Delay (µs)**: If not using the minimum PRI, use this text field to set the delay between pulses. If **Use Minimum PRI** is selected, this text field is disabled, but displays the minimum delay that is being used.

- **Trigger In**

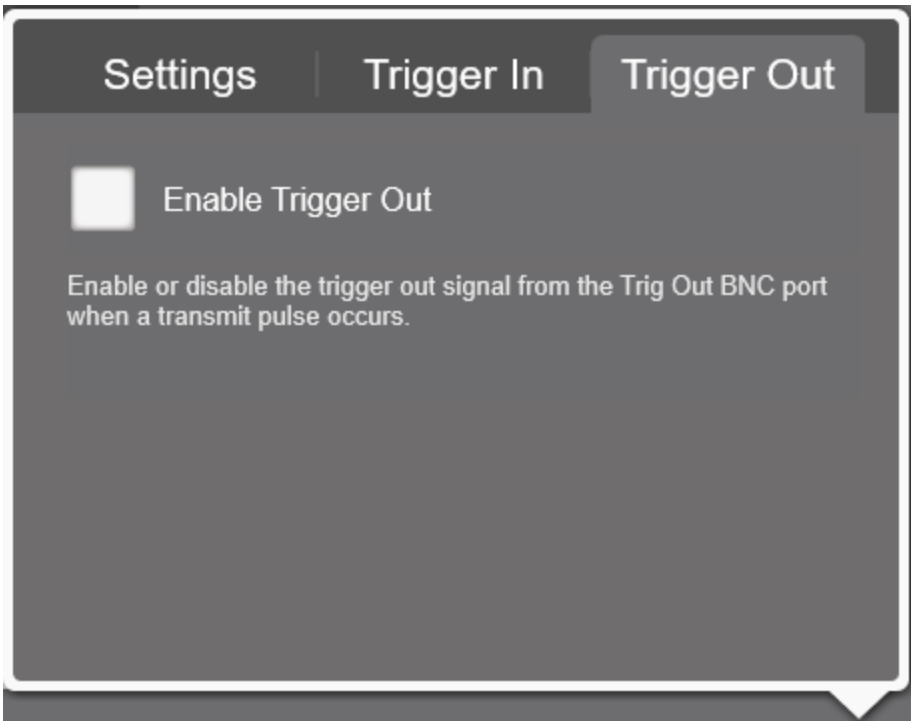


- **Capture Data on Trigger In**: Sets the system to only transmit after the trig in signal is received.
- **Use Minimum Delay**: Select this checkbox to use the minimum delay possible after receiving the external trigger. The minimum interval varies depending on the waveforms used in the pulse sequence.

  > **Note:** Selecting this checkbox disables the **Delay (µs)** field.

- **Delay (µs)**: Enter a number in this text field to set a constant delay that occurs between receiving the external trigger and executing the next Tx/Rx event in the pulse sequence. This is automatically populated with the lowest value possible. This value will vary depending on waveform.

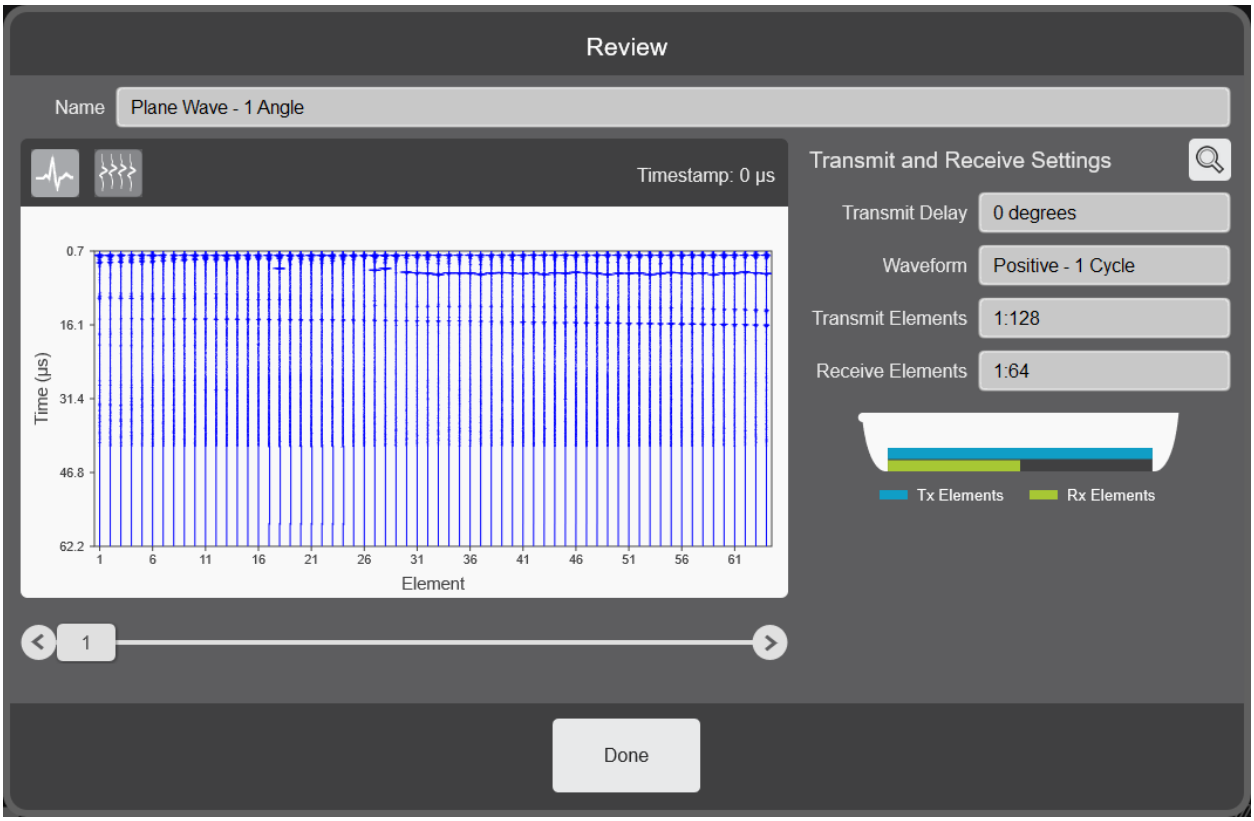
- **Trigger Out**



- **Enable Trigger Out**
  - Select this check box to send a "trigger out" signal from the Trig Out BNC port for every transmit pulse that occurs in the pulse sequence.
  - Disable this check box to have no trigger out signal.

Review

The Review menu allows the user to view the result of the VADA Mode signal that was acquired.



The Review menu

This interface is similar to the Preview tab of the VADA configuration panel, with the following exceptions:

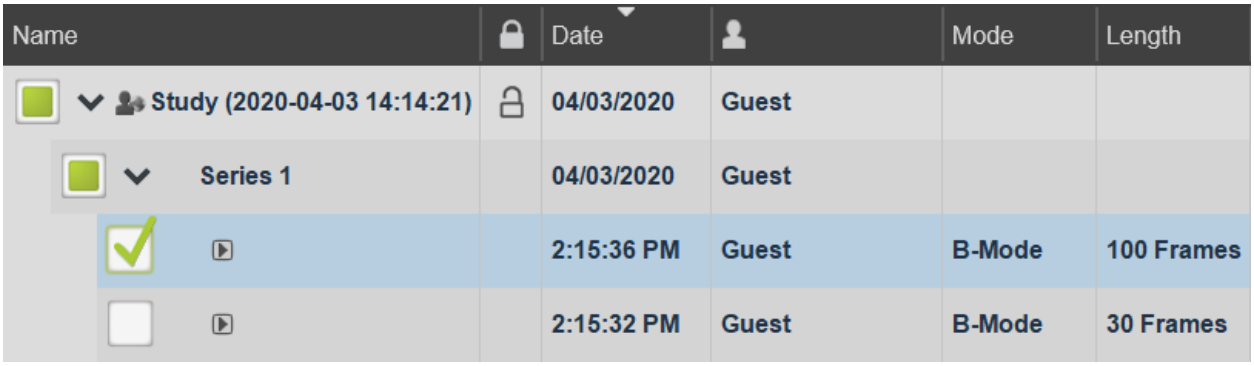
- The Capture Data button is not in this menu because data has already been captured.
- The Tx/Rx slider allows you to step through your captured data. This differs from the slider in the Preview menu, which shows a continuous stream of data because the selected Tx/Rx is constantly firing.
- When using the slider at the bottom of the menu, a timestamp appears at the top-right corner of the graph to show when that part of the sequence was captured.

Study Browser

When you acquire and save an image, the image can then be retrieved from the Study Browser at any time. Each saved image consists of a collection of saved frames (either a set of selected frames, a single frame, or all frames recorded during a time period).

You can also use the Study Browser to organize saved images in a hierarchy of studies and series:

1. Study: The highest level of organization. Used to group series.
2. Series: Used to group images.
3. Images: Individual collections of saved frames.



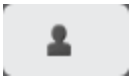
The study browser showing a study, a series, and two images

Filtering the List of Studies in the Study Browser

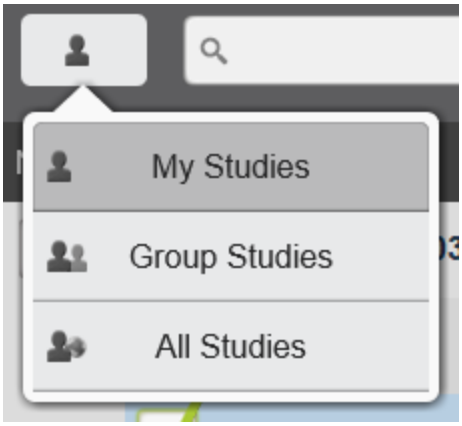
An icon is shown next to each study in the Study Browser list which shows if the study is private, shared with the group, or shared with everyone.

To filter the list of studies in the Study Browser:

1. Tap the privacy icon in the upper left corner of the Study Browser.



2. A list appears with three options.



3. Choose an option to filter the list of studies in the study browser. There are three options:
    - My Studies: Displays only studies that are owned by you.
    - Group Studies: Displays studies from users that are in the same group as you, and has their privacy set to "share with group".
    - All Studies: Displays all studies that are available to you. This includes:
        - Studies that are owned by you.
        - Studies by users that are in the same group as you, with the privacy setting "share with group".
        - All studies with the privacy setting "share with everyone".

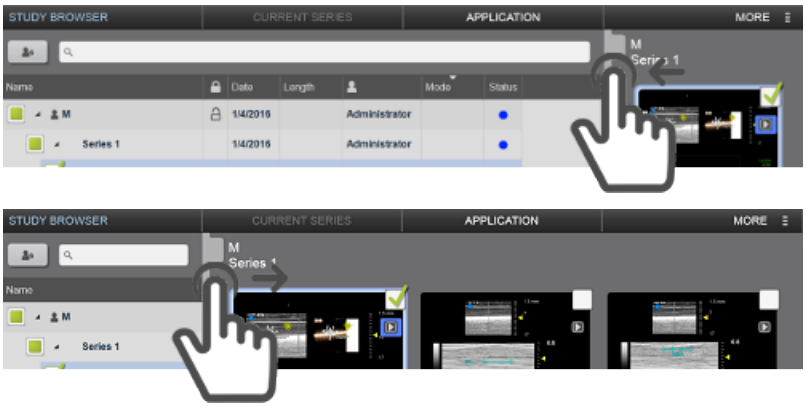
Adjusting Study Browser View

The following options are available to adjust the study browser interface:

- Arrange the order of the columns by tapping and dragging a column heading to a different location. The column heading will turn blue to indicate that it is active.

- Resize the width of a column by tapping and dragging a column divider.

- Resize the study browser or thumbnail gallery view by dragging the divider tab.



Working with Studies

Studies are the largest grouping you can work with in the Study Browser. Studies contain series, which in turn contain images, which contain all the images you save during an acquisition session.

You can organize your studies based on the type of study you are working on. For example, you may create a study that tracks a specific set of images of one animal over a period of time, or you may create a study that tracks a specific set of images of a series of animals at one time.

You can create a study from the Study Browser, or during an imaging session.

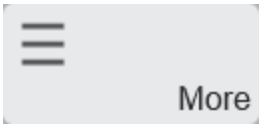
Creating a Study During an Imaging Session

When you begin imaging in a mode, the system automatically creates a new system-named study and series.

To Create a Study During an Imaging Session

1. After you start the system, choose an application.
2. The system creates a study. The system-generated study name and series name are displayed on the image display.
3. Add images to your series using **Save Frame** or **Save Clip**.
4. At the top bar on the control panel, tap **Study Browser**.

5. Tap **More**.



6. Tap the **Information** button in the flyout. The Study Information page is shown.

7. Complete the desired fields as needed and tap **Done**.

8. (Optional) Tap **Close Series** to close the series. You can reopen a series later and add more images by tapping **New** and then selecting **New Images**.

> **Note:** When you close a series that contains no images, the system deletes the series.

To create a new study from within the Study Browser

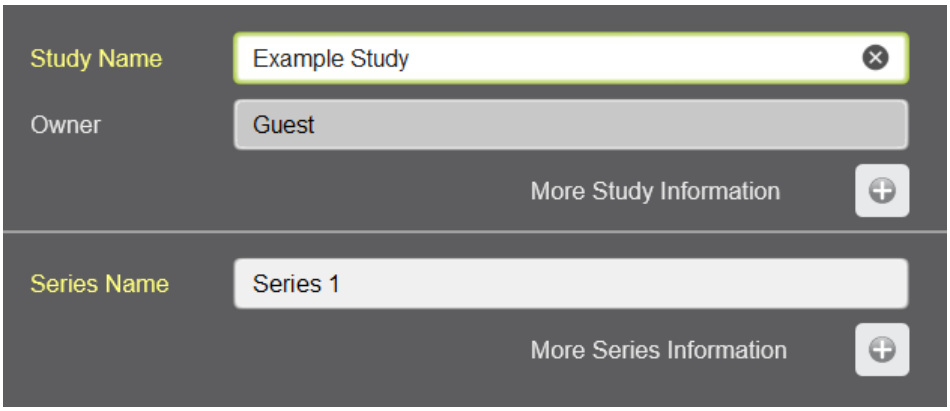
1. Tap the **Study Browser**. The Study Information window appears.

2. Tap **New**.

3. Tap **New Study**.

4. In the New Study window, the following information is already provided:
   - The name of the current user appears in the **Owner** field as well as the **Acquired By** field.
   - The **Series Name** defaults to Series 1.
5. Tap the expand icon to see more study information.

6. Enter a name in the **Study Name** field.



7. (Optional) Tap the **More Study Information** expand icon and add the following additional information:
   - Institution – Enter the name of your institution.
   - Study Notes – Enter specific notes related to this study.
   - Privacy – Select the option that is appropriate for this study:

Privacy Setting	Icon	Description
Keep Private		Provides study access to you and administrators.
Share with Group		Provides study access to you, to all users in your group, and to administrators.
Share with Everyone		Provides study access to everyone.

8. (Optional) Enter a name in the **Series Name** field.
9. (Optional) Enter applicable Series information.

> **Note:** A series is automatically created during the creation of a new study.

10. Tap **Done** to create the study. The system creates the study and series and begins acquiring in B-Mode.

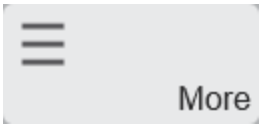
11. Add images to your series as required.

Editing a Study

You can update the information and settings for an existing study as long as you are the owner, have the required permissions and if the study is not locked.

To edit a study

1. In the Study Browser, select the study you want to edit and tap the **More** button.



2. Tap the **Information** button in the flyout.

3. Edit the information as described above.
4. Tap **Done** to save your changes and return to the Study Browser.

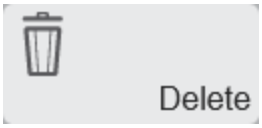
Deleting a Study

You can delete a study as long as you are the owner, have the required permissions and if the study is not locked.

> **Note:** You must unlock a study before you can delete a study, series or image.

To Delete a Study

1. In the Study Browser, select the study or studies you want to delete and tap the **Delete** button.



2. A message displays the study to be deleted and asks you to confirm the deletion.

> **Note:** When you delete items from the Study Browser, the system completely removes the data from your system. You cannot retrieve it.

3. Tap the **Delete Items** button to permanently remove the study and its contents.

Locking and Unlocking a Study

Studies can be locked to prevent unauthorized changes. Only the owner of a study or the administrator can lock or unlock the study. When a study is locked, it cannot be deleted or edited. The contents of the study can still be viewed and exported.

> **Note:** You must unlock a study before you can delete a study, series or image.

To lock or unlock a study, tap the lock icon. The icon will toggle between locked ( ) and unlocked ( ).

Searching in the Study Browser

When you need to find a specific study, series, or image, use the Study Browser's search box or sorting features.

To Search the Study Browser

1. Tap **Study Browser**.

2. Type your search phrase in the Search box.
3. Select your study from the returned list. If there are no matching results, then tap the search window and update the search criteria.
4. Tap the "x" to clear the search field and display the current list of studies.

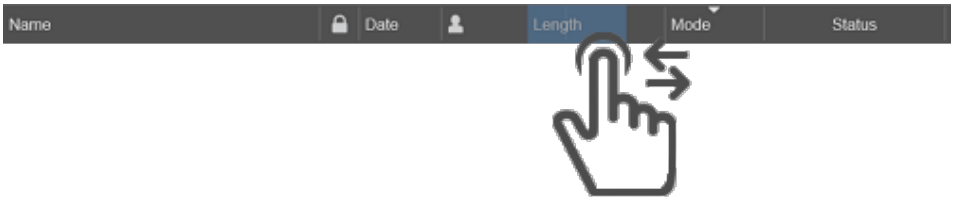
If you do not know the name of the study, you can try searching for any other identifying information, such as study name, owner name, study notes, or other parameters.

Editing and Sorting the Study Browser

To Edit and Sort the Study Browser

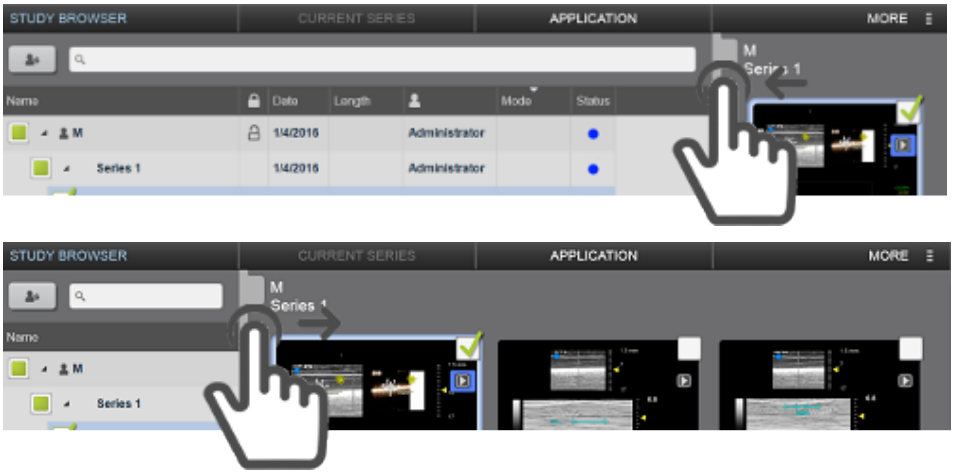
1. Tap **Study Browser**.

2. Edit the order of the columns by tapping and dragging any column heading to a new location—the active column header will turn blue.



3. Edit a column width by tapping and dragging a column divider—the active column divider will turn red.

4. Edit the size of the study browser or thumbnail gallery view by dragging the divider tab.



5. Tap any column heading to sort the list of studies. Toggle the column heading to switch from an ascending order to descending order.
    - Tap the Name column to display the list in alphanumeric order based on the study name.
    - Tap the Lock icon column heading to display the locked studies first. Tap the heading again to display the unlocked studies first.
    - Click the Date column heading to display the list in chronological order.
    - Tap the Study Owner icon to display the list in alphabetical order based on the name of the study owner.

6. Scroll through the list to find the study of interest.

Working with Series

Series are sub-groupings within studies that contain all the images you created during acquisition. Use series to create useful image groupings within your study.

Whenever you create a new study in the Study Browser, the system automatically creates the first series.

For example, if your study tracks a specific set of images of one animal over a period of time, you can create a new series for each point in time you need to acquire new images. All images taken at each point can then be added to its respective series.

If your study tracks a specific set of images of a series of animals at specific times, create a new series at each time point and add your images for each animal to that series.

Creating a New Series

You can create a new series by performing either of the following:

- Creating a new study (the system automatically creates the first series in the study).
- Adding a new series to an existing study from the Study Browser.
- Adding a new series to an existing study while imaging.

To Add a New Series to an Existing Study from the Study Browser

1. In the Study Browser, select the study that will contain the new series.
2. Tap **New**.

3. Tap **New Series**. The New Series window appears.

4. Expand the More Series Information section via  and enter the series parameters as required.

Parameter	Description
Series Name	(Required) Enter a name or use the default setting.
Date of Birth	(Optional) Click the calendar icon or the three spinners and select the date that the animal was born.

Parameter	Description
Sex	(Optional) Select the sex of your animal; if you select Female, the system displays the Pregnant option.
Pregnant	(Optional) Tap to select the checkbox. The system displays optional Date Mated and Date Plugged fields; if you want to add that data, tap the field and select the date.
All Other Fields	(Optional) Enter your information, as required.

> **Note:** If you want to add embryology measurements to any image in the series you must select the Pregnant checkbox. Embryology measurements are only available in Vevo LAB. You can edit the series information later while in Vevo LAB.

5. Tap **Done** to create the series in the selected study. The system starts acquiring image data in B-Mode.

To Add a New Series to an Existing Study while Imaging

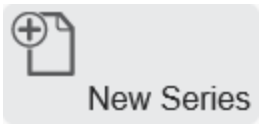
1. In the General controls, tap **New Series**. The New Series window appears.

2. If the New Series button is not on the control panel, open the More Controls panel and go to the General tab. See Customizing the Control Panel on page 140.
3. Enter the series parameters as required or copy the information from the previous series, as outlined above.
4. Tap **Done** to create the series in the selected study. The system starts acquiring image data in B-Mode.

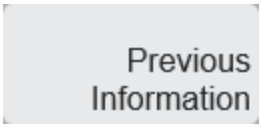
To Simplify the Addition of Subsequent Series in a Study

1. In the Study Browser, select a study or series, tap **New**.

2. Tap **New Series**. The New Series window appears.



3. Tap the **Previous Information** button. The system copies the series information for nearly all the fields from the previous series in the study (Series Name and Acquired By information is not copied).



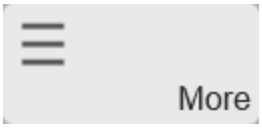
> **Note:** When copying previous series information, you can choose from up to 5 of the previous series in the same study.

Editing a Series

You can edit the information for an existing series as long as you are the owner or have the required permissions, and the study is unlocked.

To Edit a Series

1. In the Study Browser, select the series you want to edit and tap **More**.



2. Tap **Information**.

3. Expand the **More Series Information** field and edit the information.

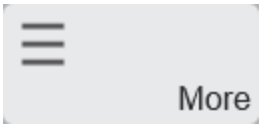
4. Tap **Done** to save your changes and return to the Study Browser.

Moving a Series

You can move a closed series from one study to another.

To Move a Series

1. From the Study Browser select the series you want to move.
2. Tap **More** .



3. Tap **Move** in the pop up menu.

4. In the target window, select the study to which you want to move the series and tap **Move**.

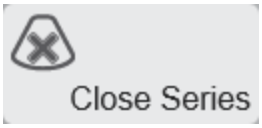
Closing a Series

When you are in an acquisition session adding images to your study, the series you are working with is the active series.

> **Note:** The closed series can be re-opened at any time to add or edit images

> **Note:** When you close a series that contains no images, the system deletes the series.

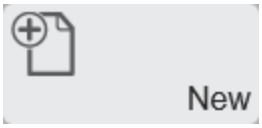
To close a series, tap the **Close Series** button.



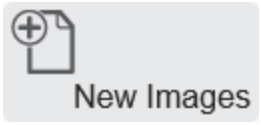
Re-opening a Series

To re-open a series

1. Select the series in the Study Browser.
2. Tap **New**.



3. Tap **New Images**.



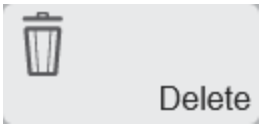
The system begins acquiring in B-Mode. Any saved images or clips are added to the selected series.

Deleting a Series

Any user, other than Guest, can delete a series as long as you can see it and it isn't locked.

To Delete a Series

1. In the Study Browser, select one or more series that you want to delete and tap the **Delete** button.



2. A message displays the series to be deleted and asks you to confirm the deletion.

> **Caution:** When you delete items from the Study Browser, the system completely removes the data from your system. You cannot retrieve it.

3. Tap the **Delete Items** button to permanently remove the series and its contents.

View Current Series

You can view the currently active series using the **Current Series** option at top of the control panel.

All of the controls for managing series are also available from this window. However, you cannot create a new series from this location. For more information on the controls, see Working with Series on page 271.

To Access the Thumbnail Images

1. Tap on a thumbnail to open that image for review.
2. Use the checkboxes on the upper right corners of the thumbnails to select multiple images for actions such as exporting or deleting.

3. (Optional) Tap **Scan** to resume scanning.

Working With Images

Images are saved clips and image frames that are listed within a series.

To Open an Image

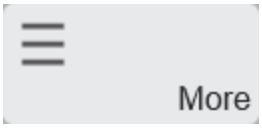
1. In the **Study Browser**, expand the study and series that contain the image you want to open.
2. Select the image you want to open, by either double tapping the image row or tapping the image thumbnail.

The system opens the image in review mode in the mode window.

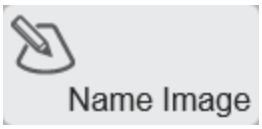
To Name an Image From the Study Browser

You can name a saved image from the Study Browser.

1. In the Study Browser, expand the study and series that contain the image you want to name.
2. Select the image you want to name and tap the **More** button.



3. Tap the **Name Image** button in the pop up menu.



> **Note:** The Name Image button will not be available if more than one image is selected.

4. Enter the name for the selected image and tap **Done** to update the name.

Modifying a Stored Image

Image processing tools for modifying images that have already been acquired are available in the Controls bar while reviewing the image.

The tools vary depending on the imaging mode. For information on the available image processing tools for a mode, see the Acquisition and Display subsections in the mode settings topic for each imaging mode.

> **Note:** Changes made in the Image Processing panel do not change the outcome for data quantification.

Storing an Image

You can store a clip or individual frame while you are acquiring image data or reviewing image data.

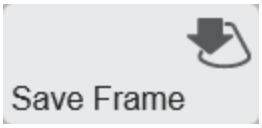
To Store a Clip

1. Begin acquiring data or load a stored clip from the Study Browser into review.
2. Tap **Save Clip**. The system saves the clip as a single image item and lists the image in the Study Browser.

To Store a Single-frame Image

You can use Save Frame for a single-frame image in B-Mode and PA-Mode.

1. Begin acquiring data or load a stored clip from the Study Browser into review.
2. Tap **Save Frame**. The system saves the frame and lists the image in the Study Browser.



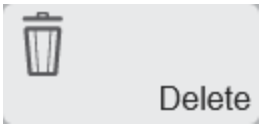
> **Note:** When you store a frame from a previously stored clip, the frame includes the same image label as the original clip.

Deleting an Image

You can delete an image as long as you are the owner or have the required permissions, the study is unlocked and the study is not in pending or in the process of being transferred.

To Delete an Image

1. In the Study Browser, select one or more images that you want to delete and tap the **Delete** button.



2. A message displays the images to be deleted and asks you to confirm the deletion.

> **Caution:** When you delete items from the Study Browser, the system completely removes the data from your system. You cannot retrieve it.

3. Tap the **Delete Items** button to permanently remove the images.

Export Images

The Export function translates your images from the proprietary Vevo F2 Imaging System file format into industry-standard formats that you can work with on another computer.

Export also transfers the translated files to a network location or an external storage device connected to the USB ports on the Vevo F2 Imaging System. For more information, refer to Data Storage and Network on page 34.

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

Before you begin, ensure that the Vevo F2 Imaging System is connected to a data storage location on your network, or to an external storage device through one of the USB ports on the system.

Exporting Images from the Study Browser

When you select a series or a study that includes clips as well as image frames, the system exports the last frame of any clip as an image frame.

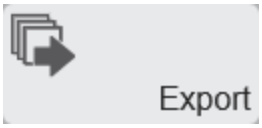
> **Note:** Select only clips if you want to export the entire clip.

If you have selected a clip that includes a measurement, the system exports the frame where the last measurement was placed, or the frame that was displayed when it was last saved.

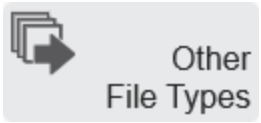
To Export Images from the Study Browser

1. Tap **Study Browser**.

2. Select the clips or frames that you want to export.
   - If you want to export a single clip or frame, expand the study and series that contains the image and tap to select it.
   - If you want to export multiple clips or frames, expand and select the study rows or series rows that contain the images you want to export.
3. Tap the **Export** button.



4. Tap the **Other File Types** button from the flyout.



5. The Export page appears. Do one of the following:
   a. Browse to and select the destination folder.
   b. Manually enter the destination folder in the field located above the Export Type options.

> **Note:** The **Export** button will be disabled if the destination selected does not have enough available space.

6. (Optional) Tap **New Folder** to add a sub-folder. Enter a name for the folder and then tap **Done**.
7. In the Export Type section select the appropriate format:
   - Clips – If the images are all multi-frame clips.
   - Frame – If the selected files are single-frame images.

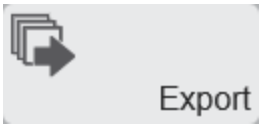
8. (Optional) Type a new file name.
   In the field located above the Export Type options, the system displays the system-defined date and time stamp file name. You can change the file name for any export.

   > **Note:** To identify and group these files more easily in your export folder, enter a new file name other than the default. When exporting multiple clips or frames, the text entered will be the start of each of the exported files.

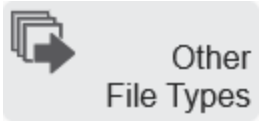
9. Tap **Export**. The system exports the images to the destination folder and then displays an export report.

To Export Physiological Data from the Study Browser

1. In the Study Browser, select the clips and/or image frames that contain the physiological data you want to export.
2. Tap **Export**.



3. Tap **Other File Types** from the flyout menu.

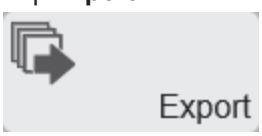


4. On the Export page, browse to or manually enter the destination folder.
5. In the Export Type section select the Physiological Data option.
6. Tap **Export**. The system exports the images to the destination folder. The file name ends with the extension physio.csv.

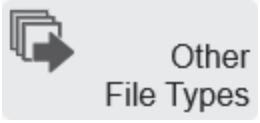
To Export Images to DICOM from the Study Browser

You can export saved clip and frame images as DCM files that you can import into a DICOM compatible workstation. You can export your saved images from the Study Browser or while you are reviewing them in the Mode window.

1. In the Study Browser, select the images you want to export.
2. Tap **Export**.



3. Tap **Other File Types** from the flyout menu.



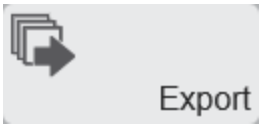
4. On the Export page, browse to or manually enter the destination folder.
5. In the Export Type section select the DICOM option. See Export Options on page 304 for DICOM export options.
6. Tap **Export**. The system exports the images to the folder you selected. The file name ends with the extension .dcm.

To Export Study Browser List View to a Text File

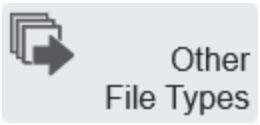
The export table feature exports the Study Browser window content as it appears, as a .txt file that you can open in any standard text editor.

For example if your Study Browser includes 50 studies and you expand only the sixth study and its series and images, your export will include all the listing information for the one study that you expanded completely, and include only the study rows for the other 49 studies.

1. In the Study Browser, expand the study rows and series rows as required to create the precise view you want to export
2. Tap the **Export**.



3. Tap **Other File Types** from the flyout menu.



4. In the Export Image window, browse to or manually enter the destination folder.
5. In the Export Type section select the **Study browser inventory table** option.
6. Tap **Export**. The system exports the Study Browser list view as a .txt file to the folder you selected.

Exporting Studies to Vevo LAB

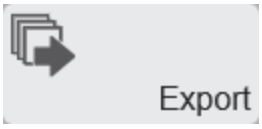
You can export studies from the Study Browser to the Vevo LAB for further analysis or processing.

To Export Images to Vevo LAB

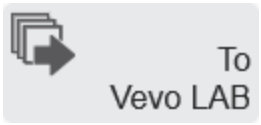
1. In the Study Browser, select the study or studies you would like to export.

> **Note:** You have the option to export individual series or images to Vevo LAB. However, this is not recommended as it may interfere with future data management.

2. Tap **Export**.



3. Tap **To Vevo LAB** from the flyout menu.



4. On the Export page, browse to or manually enter the destination folder.
5. Tap **Export**. The system exports the selected images to the destination folder.

Exporting From the Mode Window

The export function translates your images from the proprietary Vevo F2 Imaging System file format into industry-standard formats that you can work with on another computer.

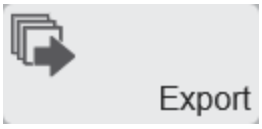
Export also transfers the translated files to a network location or an external storage device connected to the USB ports on the Vevo F2 Imaging System. See System Connectors on page 30.

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

Before you begin, ensure that the Vevo F2 Imaging System is connected to a data storage location on your network, or to an external storage device through the appropriate ports on the system.

To Export Images From the Mode Window

1. From the Mode window, tap **Export**.



2. The Export page appears. Browse to or manually enter the destination folder.

> **Note:** The **Export** button will be disabled if the destination selected does not have enough available space.

3. (Optional) Tap **New Folder** to add a sub-folder. Enter a name for the folder and then tap **Done**.
4. In the Export Type section select the appropriate format:
   - Select Clips if the image is a multi-frame clip.
   - Select Frame if the selected image is a single-frame image.
5. (Optional) Type a new file name.
   In the field located above the Export Type options, the system displays the system-defined date and time stamp file name. You can change the file name for any export.

> **Note:** To identify and group these files more easily in your export folder, enter a new file name other than the default. When exporting multiple clips or frames, the text entered will be the start of each of the exported files.

6. Tap **Export**. The system exports the images to the destination folder and then displays an export report.

> **Note:** The Study browser inventory table is the only option that is not available when exporting from the Mode window.

Reports

A report is the collection of measurements, calculations and graphs for a collection of series or studies.

When you are creating reports consider the following:

- You can create reports for studies or individual series.
- You cannot create a report for measurements of an individual image; the system builds a report for the entire series that includes that one image.
- When you select a study for a report, the report includes all measurements for all the series in the study.
- When you select multiple studies for a report, the report includes all measurements in all the studies you selected.

Creating a Report

To Create a Report

1. Open the Study Browser and select the images, series or studies that contain the measurements you want to compile into a report. See Searching in the Study Browser on page 269.
   You can also create a report for the current series from theView Current Series on page 275 page, or the report button located in the general controls during scanning or while reviewing an image.
2. Tap the **More** button and then tap the **Report** button in the flyout menu. The system compiles your selections into a single report and displays the report in the Report page.
3. If your selected series contains a saved graph, the graph will be displayed in the report. Tap the **Graph Size** control to select the size for the graph in the report (100%, 50%, 25%).

Interacting With Your Report

Once your report is created, it will show the study and series information for each study and series selected.

You can tap a measurement row to show the thumbnail of the image the measurement was placed on. Tapping on the image will open that image for review.

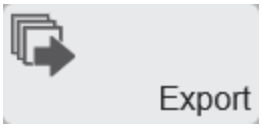
Exporting a Report

The system exports your report as a CSV file which you can load into third party applications such as spreadsheet software to allow for additional statistical analysis.

The system supports four ways to export your report:

- From the Study Browser
- From the Report page
- From the Mode window
- From the Current Series page

To Export a Report

1. Create the report as outlined in Exporting a Report above.
2. Tap the **Export** button.
   

3. The Export Image window appears. Browse to or manually enter the destination folder.
4. (Optional) Tap **New Folder** to add a sub-folder. Enter a name for the folder and then tap **Done**.
5. Tap **Export**.
   

6. The report is exported and the status is displayed when the export operation completes. Tap **Done** to

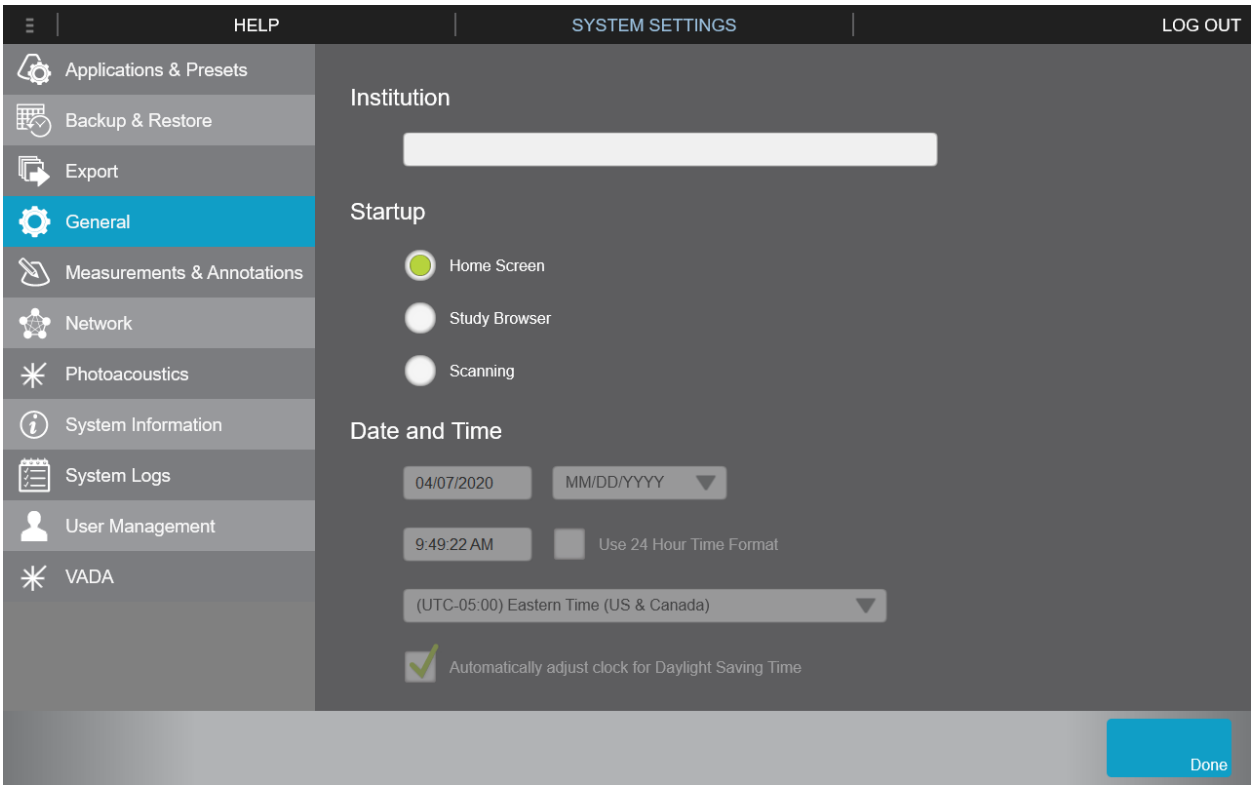
close the Export page.

System Settings

To open the System Settings menu, tap **More**, and then tap **System Settings**.

> **Note:** Some settings are only available to Administrator users, and some are disabled to Guest users.

Navigation



System settings are organized into tabs along the left side of the menu. The following tabs are available:

- Applications & Presets on the next page
- Backup and Restore on page 300
- Export on page 303
- General on page 306
- Measurements & Annotations on page 310
- Network on page 313

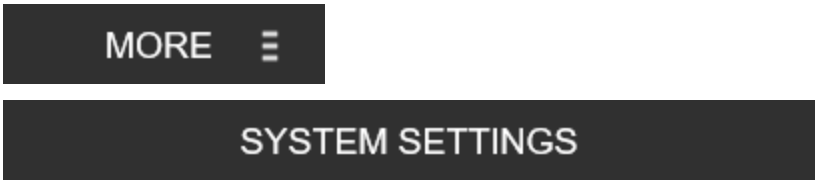
Applications & Presets

The Applications & Presets menu is where you manage saved sets of image acquisition settings.

> **Note:** For information about how transducers, applications, and presets are organized, refer to Transducers, Applications, and Presets on page 289.

To open the Applications & Presets menu:

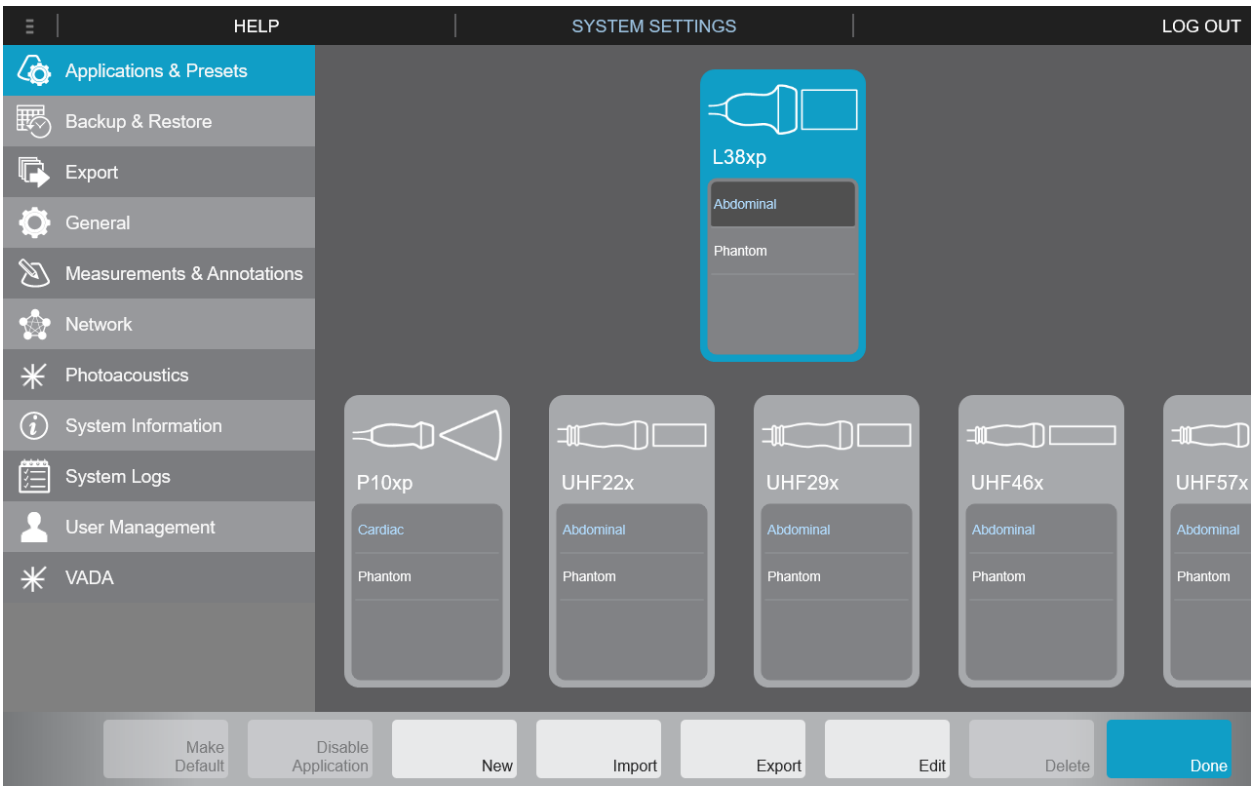
1. Tap **More**, and then tap **System Settings**.



2. In the System Settings menu, tap **Applications & Presets**.

Navigation

Applications



In the Applications and Presets menu, each transducer is listed as a rounded box. The currently selected transducer is highlighted in blue.

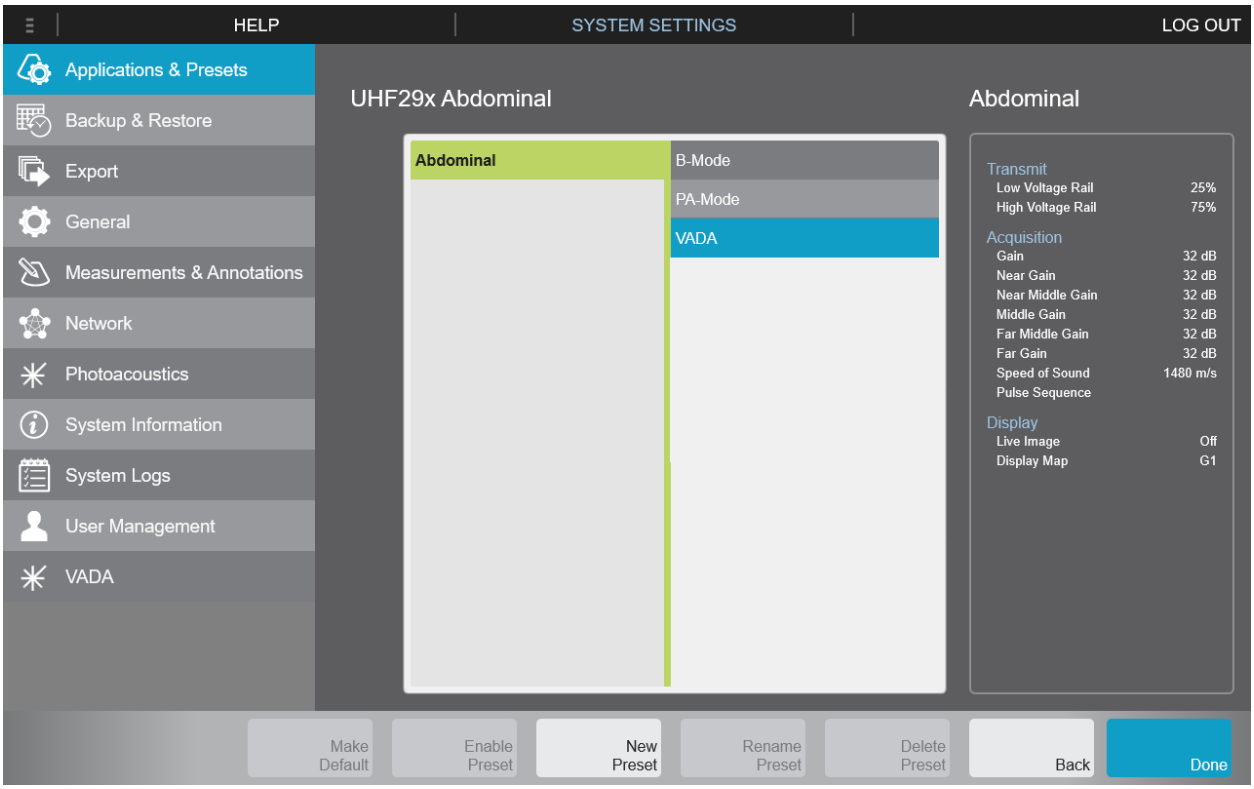
Within each transducer, there is a list of applications available for that transducer. The default application for each transducer is highlighted in blue.

Presets

Presets are subgroups of settings within an application.

To view the presets available for a given application, select an application and then tap **Edit**.

This opens the Presets menu.



The Presets menu

The Presets menu has the following layout:

- The leftmost pane ("Abdominal" in the screenshot) lists the presets available for the selected application.
- The middle pane lists the imaging modes available in the system for that preset.
- The right pane lists the specific image acquisition settings for the imaging mode selected in the middle pane.

To select a preset, tap the name of the preset in the left pane.

Transducers, Applications, and Presets

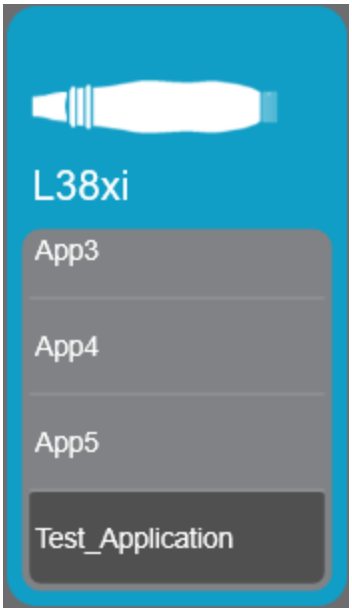
The Vevo F2 Imaging System can save sets of image acquisition settings (such as gain, focal points, transducer orientation, etc.) and reload them at any time. This lets users quickly load a consistent set of acquisition settings for routine tasks.

For example, if a study involves acquiring an image of a mouse's heart multiple times over time, a user may acquire an image of the heart, then save the settings used to acquire that image. The user (or any other user) can then reload those settings for all subsequent imaging sessions for the same study.

The Vevo Imaging System uses the following hierarchy to organize image acquisition settings:

- Transducers: The largest grouping. Imaging settings are grouped under the transducers they were set for.
    - Applications: A group of settings that can be selected for a given transducer.
        - Presets: A set of image acquisition settings that can be selected within an application.

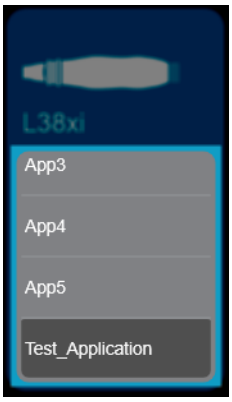
Transducers



Transducers are the highest level grouping for image acquisition settings. Saved settings are organized by transducer model.

Transducers are created by default in the Vevo Imaging System software. Users cannot delete or create new transducers.

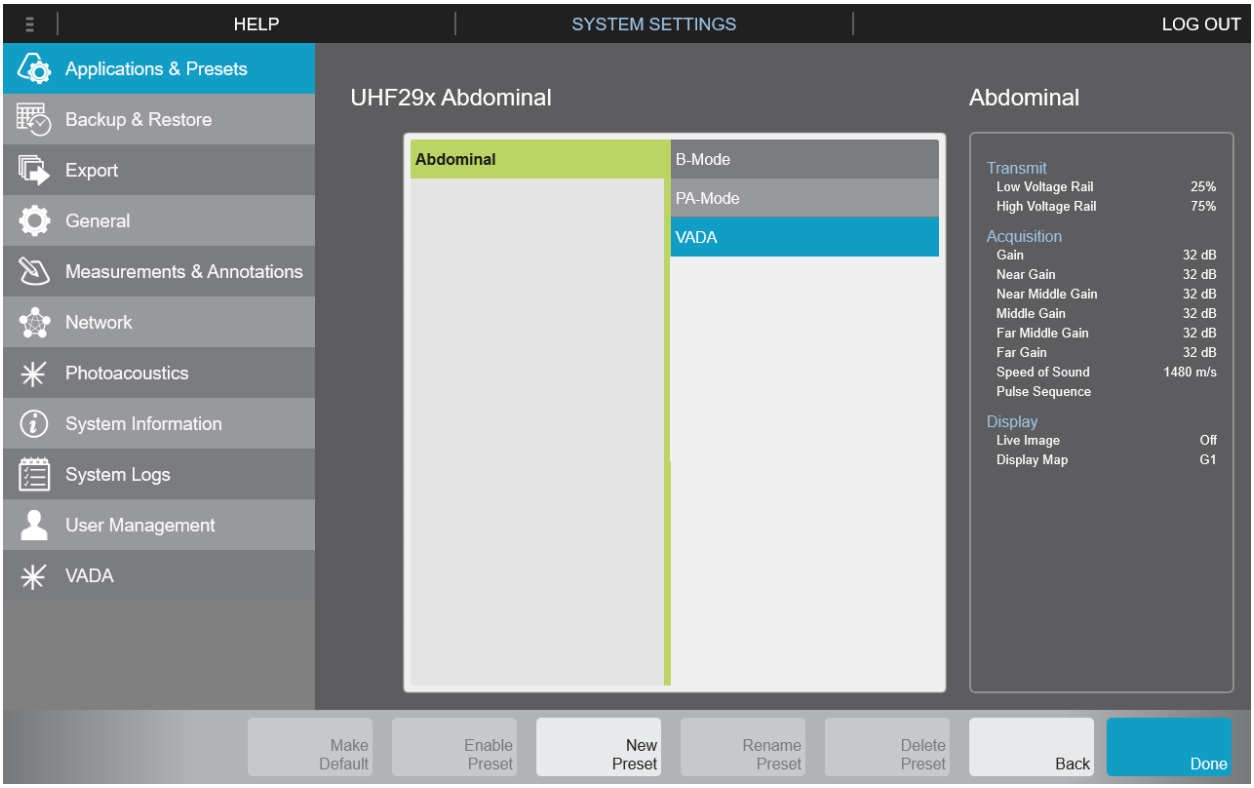
Applications



Applications are the second level of grouping for image acquisition settings. Each transducer can have multiple applications associated with it. Each transducer has one or more applications added by default, and users can create or delete their own applications.

Users may create an application for each use case for that transducer. For example, a user may create an application named "Mouse (abdominal)" for image acquisition settings that are specifically tuned to acquire a clear image of a mouse's abdomen.

Presets

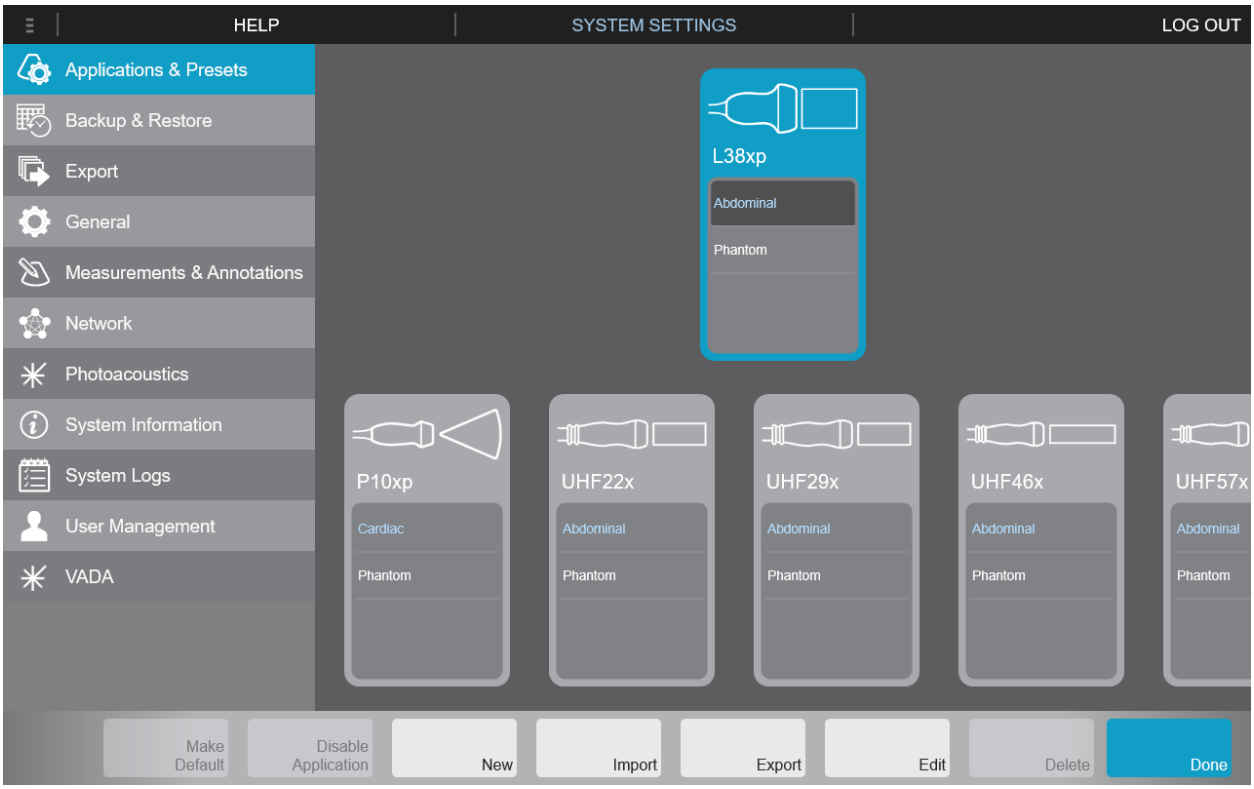


Presets are the lowest level grouping, and contain image acquisition settings. Users can create, edit and delete presets.

Each preset contains all image acquisition settings set for every imaging mode available on the system, at the time the preset was saved. For example, saving a preset in PA-Mode saves not only all PA-Mode image acquisition settings, but also any B-Mode and VADA Mode image acquisition settings that are currently set on the system.

Managing Applications

Applications are managed in the Applications and Presets tab of the System Settings menu.

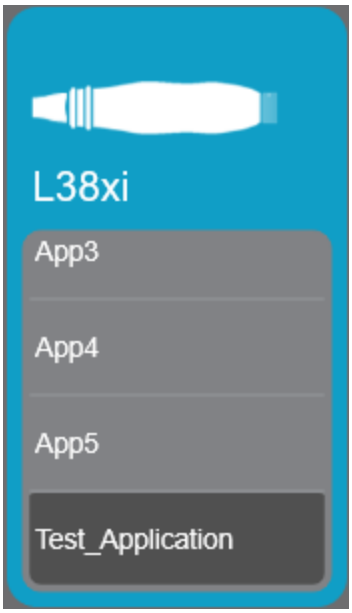


Once all changes are made, make sure to tap **Done** to save all changes.

Select a Transducer or Application

Tap a transducer to select it. The currently selected transducer is highlighted in blue.

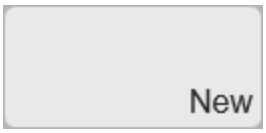
To select an application, tap the application from the list. The selected application is highlighted with a gray background.



Create a New Application

To create a new application:

1. Select a transducer.
2. Tap **New**.



Enable or Disable an Application

To enable or disable an application for a transducer:

1. Select a transducer.
2. In the list of applications for the selected transducer, tap the application to enable or disable.
3. Tap **Enable Application** to enable the transducer, or **Disable Application** to disable it.

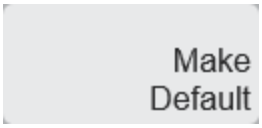
The button changes automatically between **Enable Application** and **Disable Application** depending on the status of the application selected.

Disabled applications are greyed out in the list of applications.

Make an Application Default

To set an application as default:

1. Select a transducer.
2. In the list of applications for the selected transducer, tap the application to make default.
3. Tap **Make Default**.



The default application is highlighted in blue text.

Edit an Application

To edit an application:

1. Select a transducer.
2. In the list of applications for the selected transducer, tap the application to edit.
3. Tap **Edit**.

Delete an Application

> **Note:** Only user-created applications can be deleted. Factory default applications cannot be deleted.

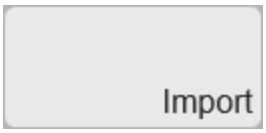
To delete an application:

1. Select a transducer.
2. In the list of applications for the selected transducer, tap the application to delete.
3. Tap **Delete**.

When a confirmation prompt appears, tap **Yes**.

Import an Application

1. Tap **Import**.



The Import Application menu appears.

2. In the Import Application menu, browse to the folder that contains the application and then select it. Application files are listed with the FUJIFILM VisualSonics icon.

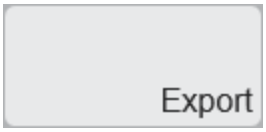
3. Tap **Import**.
   When a confirmation prompt appears, tap **Yes**.

> **Note:** The imported files will overwrite the files in their current location if the application being imported already exists for the selected transducer.

Once the import is complete, the imported application appears in the application list for the selected transducer.

Export an Application

1. Select a transducer.
2. In the list of applications for the selected transducer, tap the application to export.
3. Tap **Export**.



   The Export Application page appears.
4. In the Export Application page, select the folder where you want to export the application to.
5. (Optional) To add a subfolder, tap **New Folder**, name the folder and then tap **Done**.
6. Tap **Export**.

> **Note:** When exporting an application, only the custom presets are exported. Factory default presets are not exported.

Presets

Presets allow you to save a set of acquisition parameters that you have customized and then apply as required. You can create presets with mode settings while scanning.

Applications & Presets 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.
- create auto-selected groups of presets across modes.
- view the parameters associated with a mode preset.

Setting the Default Preset for a Mode

A default preset for a mode is the set of acquisition parameters that are used when a user begins scanning in that mode.

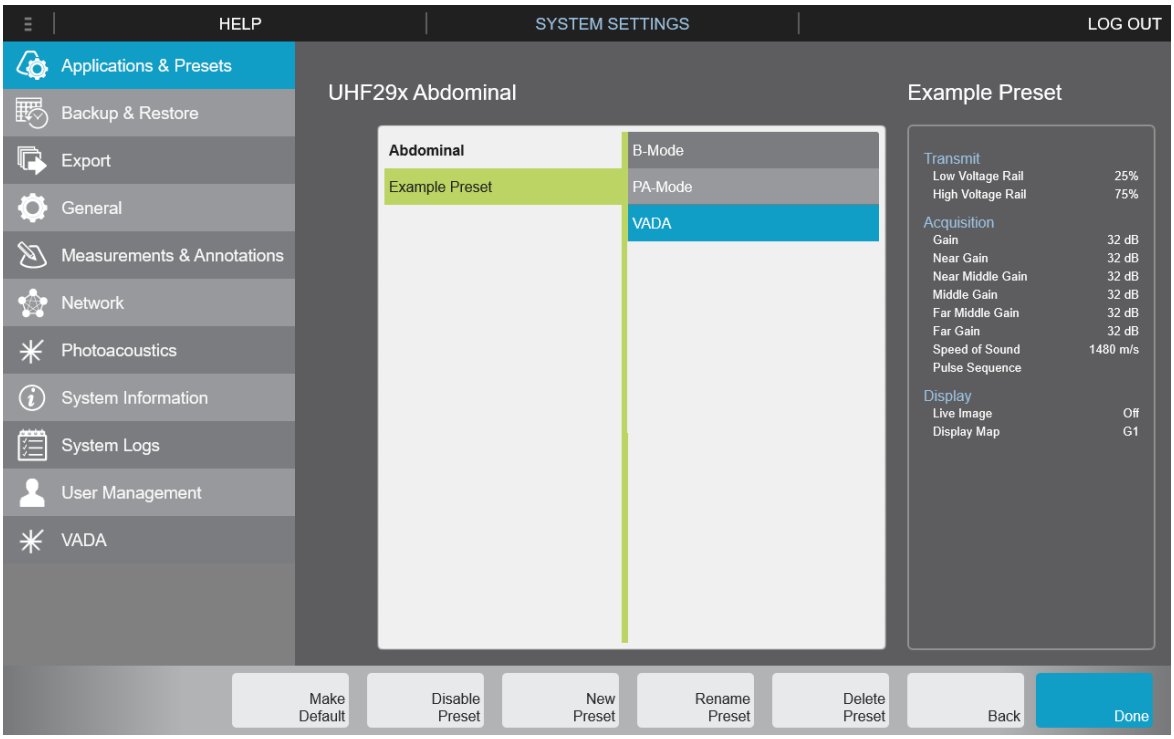
> **Note:** The default preset is indicated in bold for each mode.

To Set the Default Preset for a Mode

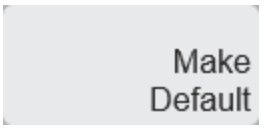
> **Note:** At any time during your edits, tap the **Back** button to save you changes and return to the Applications & Presets page.

1. On the Applications & Presets page, tap an application on the transducer.
2. Tap **Edit** to access the presets page for that application.

3. In the presets page, select the preset that you want to make default ("Example Preset" in the screenshot).



4. Tap **Make Default**.



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

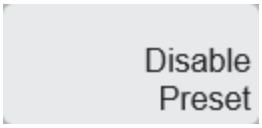
Enable or Disable Presets

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

To Disable a Preset

1. In the Applications & Settings menu, select a transducer application and tap **Edit** to open the list of presets for that application.

2. Select the preset you would like to disable.
3. Tap **Disable Preset**.

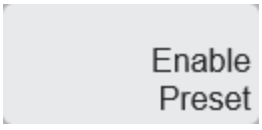


The preset is grayed out, indicating that it has been disabled.

To Enable a Preset

1. In the Applications & Settings menu, select a transducer application and tap **Edit** to open the list of presets for that application.

2. Select a disabled preset.
3. Tap **Enable Preset**.



The preset is enabled.

Creating a Preset

Every transducer application includes factory presets for each imaging mode. You can create custom presets that store your own settings.

Creating a custom preset from within the Applications & Presets menu allows you to add that preset to multiple groups.

You can also create a preset while scanning.

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

To Create a Custom Preset from Applications & Presets

> **Note:** At any time during your edits, tap the **Back** button to save your changes and return to the Applications & Presets page.

1. On the Applications & Presets page, tap the application on the transducer for which you want to create the preset.
2. Tap **Edit**.
3. 

4. In the Mode list, select the mode for which you want to create the preset.
5. Select the preset from the list that you want to copy.
6. Tap the **New Preset** button.
7. In the dialog, type the name for the preset. You also have the option of changing the preset you are copying.
8. Tap **Done** to save the preset.
9. 

To Create a Custom Preset During Scanning

The Save Preset button is used to save the parameters currently being used. This allows you to load these exact parameters later using the Presets button.

1. Begin scanning in the desired mode.
2. Adjust the controls to optimize your image.
3. Tap **Save Preset** to save the current settings as a preset.
4. 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.

Overwriting Precautions

Presets are saved in the system by preset name, and not by mode. Each preset contains settings for all modes at the time it was saved, regardless of the currently selected mode.

Therefore, it is possible to accidentally overwrite settings for a mode by saving a preset with the same name, even if the preset was saved while a different mode is active.

For example, if a user saves a preset in B-Mode named "My Preset", changes some settings in B-Mode, then saves another preset in PA-Mode that is also named "My Preset", all B-Mode settings that were set when the user saved the first time will be overwritten. The B-Mode settings for "My Preset" will then be whichever settings were set at the time the user saved the preset in PA-Mode, and not the settings saved when the user saved the preset in B-Mode.

To avoid overwriting settings in this way, be aware of the current settings in all modes (not just the currently selected mode) whenever you save a preset, or give presets different names for different modes.

Deleting a Preset

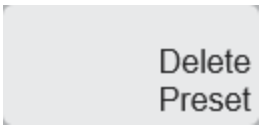
Users are only allowed to delete custom presets. You also can't delete a preset if it is the last remaining preset in a mode.

> **Note:** The **Delete Preset** button is disabled if the currently selected preset cannot be deleted.

To Delete a Preset

1. In the Applications & Settings menu, select a transducer application and tap **Edit** to open the list of presets for that application.

2. Select the preset you would like to disable.
3. Tap **Delete Preset**. When a confirmation dialogue appears, tap **Yes**.



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

Backup and Restore

This menu allows users to backup and restore all systems for all users at the time of backup. This includes:

- user profiles
- applications and presets
- measurement packages
- configurable preferences
- the active usage log mode state (enabled/disabled)

This function does not affect:

- Network settings
- Study data

> **Note:** For information about backing up studies, refer to Exporting Images from the Study Browser on page 279.

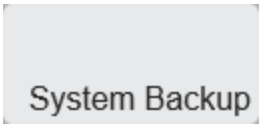
This function has the following access conditions:

- Only administrator users can restore, import, export or delete a backup.
- A Guest user cannot perform a system backup.

System Backup

To Create a Backup File

1. On the Backup & Restore page, tap **System Backup**.

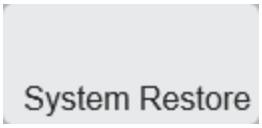


   The system creates a time-stamped backup file.
2. Tap **Done** to close the settings page.

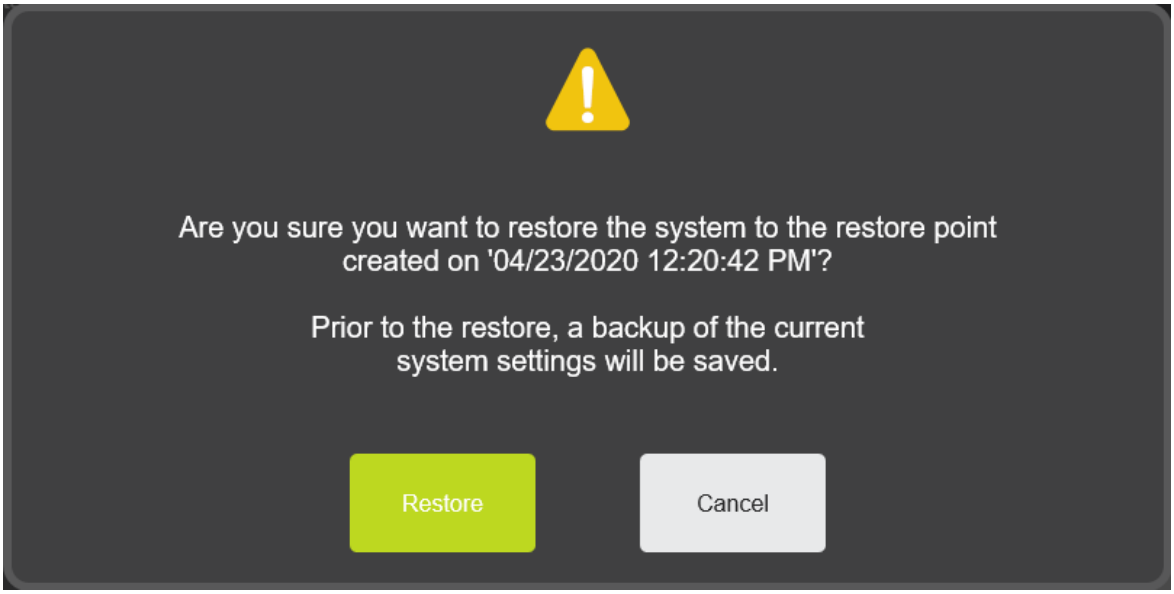
System Restore

To Restore from a Backup File

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

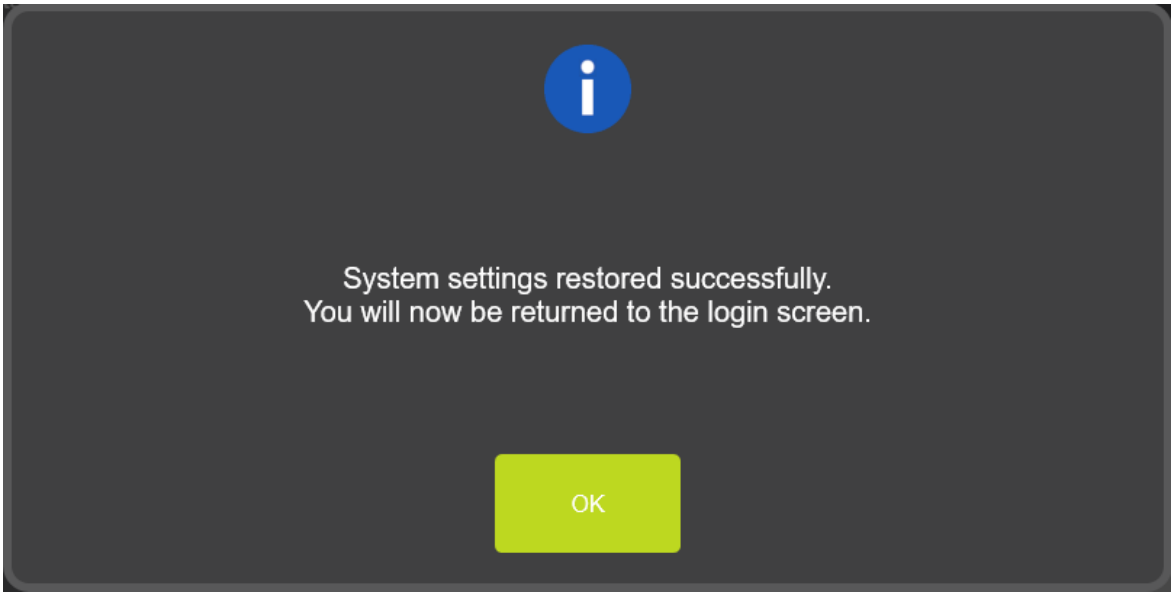


2. Confirm the system restore by tapping **Restore**.



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

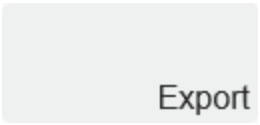
3. Tap **OK** on the confirmation dialog to return to the login page.



Importing, Exporting and Deleting Backup Files

To Export a Backup File

1. Select a backup file and then tap **Export**.

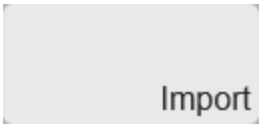


2. In the Export System Settings Backup page, browse and select the folder to which you want to export the file.
3. (Optional) To add a subfolder, tap **New Folder**, name the folder and then click **Done**.
4. Tap **Export**.

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

To Import a Backup File

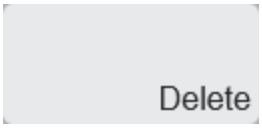
1. On the Backup & Restore page, tap **Import**.



2. In the Import System Settings Backup page, browse to the folder that contains the file and then select it. Backup files appear with the FUJIFILM VisualSonics symbol.
3. Tap **Import**.
4. Tap **Yes** to confirm the import operation.
   The imported files will overwrite the files in their current location
5. 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 settings page.

Export

Export allows you to define the content of your exported image files.

To Display the Export Page

1. Tap **More**, and then tap **System Settings**.

2. Tap the **Export** tab.

Export Options

To Define Export Options

1. Select one more of the following export options.

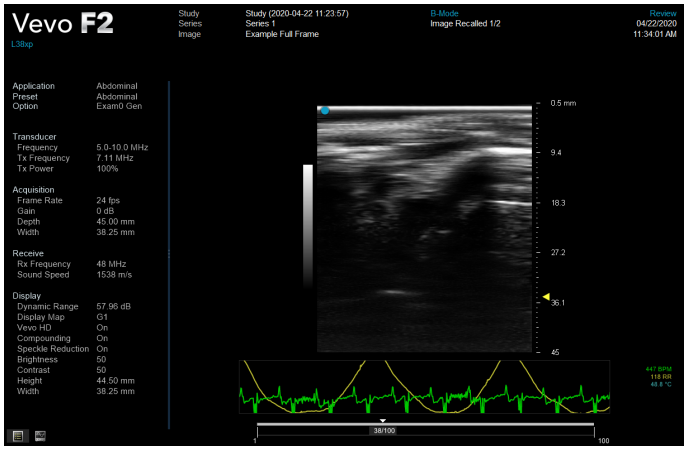
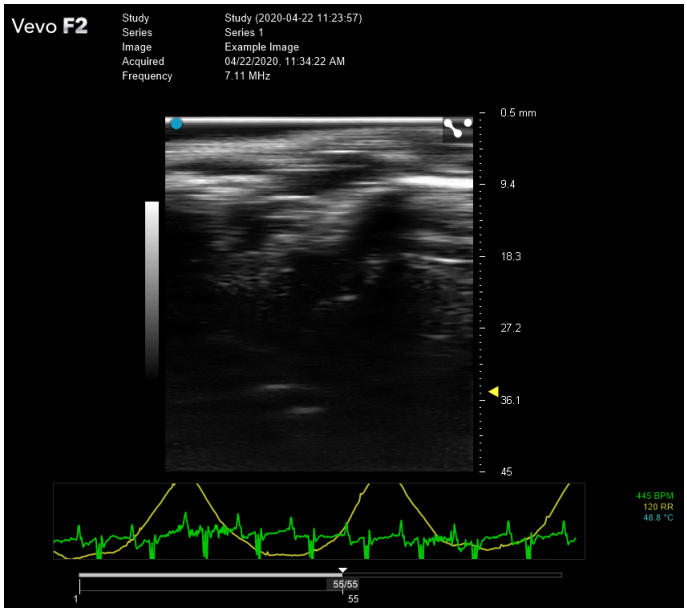
Option	Description
Hide measurements and annotations on exported images	Select this option to hide any measurements and annotations that have been added to the image on all exported images. The measurements and annotations are not deleted, just hidden from view on the exported image(s).
Hide physiology on exported images	Select this option to hide the physiology data on all exported images. The physiology data are not deleted, just hidden from display on the exported image(s).
Maintain data hierarchy	Select this option to maintain the tree structure of the exported data. If this option is not selected, files are exported to a single folder with all sub-directories removed.

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)	Smaller file size, provides good image quality.
Windows Media Video (*.wmv)	Smallest file size, provides good image quality.

3. Select the frame format. The following formats are available:
    - BMP (*.bmp)
    - JPEG (*.jpg)
    - PNG (*.png)
    - TIFF (*.tif)

For each format, there is a "full screen" version and an "image area" version.

Option	Description
Full Screen	The frame contains both the ultrasound image and all the information shown on the image display interface. 
Image Area	The frame contains a larger view of the ultrasound image, with less information from the image display interface. 

4. Select the compression level for your DICOM export file.

Option (*.dcm)	Description
Implicit VR Little Endian	Image pixel data are not compressed. The Tag type is determined by the context.
Explicit VR Little Endian	Image pixel data are not compressed. The Tag type is explicitly defined in the file.
JPEG Baseline	An image created using the JPEG compression algorithm that starts displaying the image as the data are made available, line by line.
RLE Lossless	Run Length Encoding. A lossless compression algorithm that provides decent compression ratios in specific types of image file types such as TIFF and PDF.

5. Select the Report options.

Option (*.dcm)	Description
Export Measurements	Export measurements in all reports.

6. Select the export options for the RAW/RF Data. For more information, refer to Export RF Data on page 106.
7. Tap **Done** to close the settings page.

General

Use the General tab to configure facility information and basic system settings.

> **Note:** Swipe upwards anywhere on the General page to see the settings on the lower part of the page.

To Select the General Tab

1. Tap **More**, and then tap **System Settings**.

2. Tap the **General** tab.

Institution

To Set Your Institution

Once set, the system displays the institution name in Reports and Image Area exports.

1. Tap the Institution text box and type the name of your institution.
2. Tap **Done** to save and apply the settings.

Startup

To Set Your Startup Preference

Specify what system state you prefer when you log in to the system.

1. Select either Home Screen, Study Browser, or Scanning.
2. Tap **Done** to save and apply the settings.

Date and Time

To Set the Date and Time

Enter the date and select your preferred format: DD\MM\YYYY, MM\DD\YYY or YYYY\MM\DD.

1. Enter the time and time zone values as required.
2. (Optional) Tap to uncheck (disable) automatic updates for Daylight Saving Time. By default, the system updates the internal clock automatically for daylight saving time.
3. (Optional) Tap to check (enable) the 24 hour time format.

> **Note:** Date and time settings can only be changed by an Administrator.

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

System Sounds

To Set System Sounds

1. Adjust the volume of system sounds by tapping and dragging the sliders.
    - Keyboard Tones. Enable if you want to hear a tone when the keyboard keys are tapped.

      > **Note:** You will hear the keyboard tone at the selected volume after your selection has been made.

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

      > **Note:** You will hear the saving tone at the selected volume after your selection has been made.

2. (Optional) Mute the system sounds by tapping the speaker icons;  to  to mute sounds, tap again to enable sounds.
3. Tap **Done** to save and apply the settings.

Display Brightness

To Set the Display Brightness

You can adjust the brightness of the image display or the control panel to compensate for the level of light in the room in which the system is located.

1. Drag the upper slider for the image display.
2. Drag the lower slider for the control panel.
3. Tap **Done** to save and apply the settings.

Foot Pedal Configuration

To Set the Foot Pedal Configuration

If you have a foot pedal, you can define the operation for each of the three pedals.

1. Tap the drop down to select the operation to assign to the selected pedal. Repeat this step for each foot pedal. The options include:
    - B-Mode
    - Name Image
    - New Series
    - Next Mode
    - Next Preset
    - Reset Preset
    - Save Clip
    - Save Frame
    - Scan/Freeze
    - Start/Stop
2. Tap **Done** to save and apply the settings.

> **Note:** Using Next Mode will switch to the next mode that is listed above the current mode according to the Scanning Mode buttons order on the left of the control panel.
>
> When switching to PA-Mode, using Next Mode once will evoke the mode "Start" state. To begin scanning, you must use Next Mode again.

Display Options

Display Advanced Mode Parameters

To toggle advanced mode parameters, select or clear the **Display Advanced Mode Parameters** check box.

When enabled, the image display shows additional parameters on the left side of the screen.

B-Mode shows the following parameters:

- Tx Frequency
- Receive:
  - Rx Frequency
  - Speed of Sound
- Compounding (if Vevo HD is enabled)
- Speckle Reduction (if Vevo HD is enabled)

PA-Mode shows the following parameters:

- Tx Frequency
- Receive:
  - Rx Frequency
  - Speed of Sound
- Box Depth
- Box Width
- Box Height

Measurements & Annotations

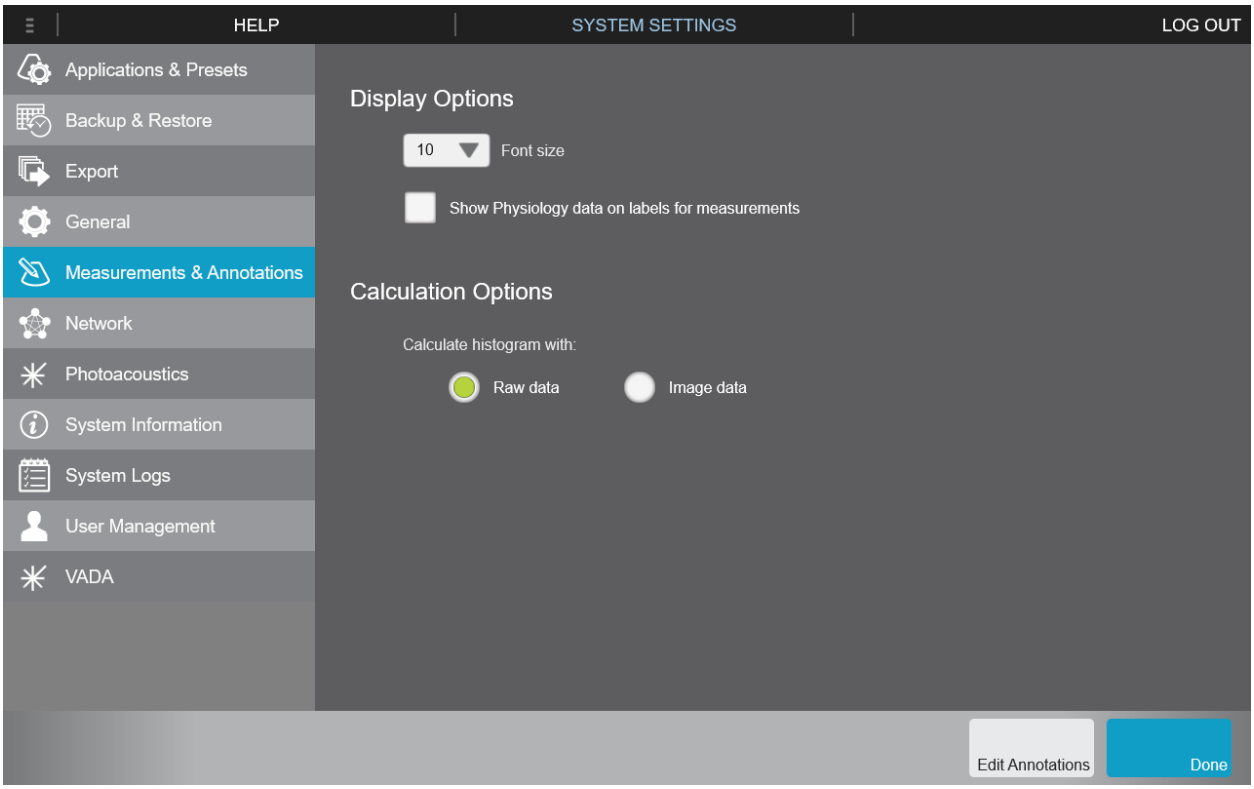
The Measurements & Annotations menu allows you to set the default settings when inserting measurements or annotations.

For more information about inserting measurements and annotations, refer to Measurements on page 111 and Annotations on page 106

To open the Measurements & Annotations menu:

1. Tap **More**, and then tap **System Settings**.

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



Measurements and Annotations menu

Once in the Measurements and Annotations menu, you can set display options and calculation options.

Once all changes are made, tap **Done** to save your changes.

Display Options

- **Default Font Size**: This drop-down list determines the default font size used when inserting measurements and annotations.
- **Show Physiology data on labels for measurements**: This check box determines whether physiology data is showed by default on measurements.

Calculation Options

- **Calculate histogram with**: This determines how the histogram is calculated when viewing graph data. It has two settings:
    - **Raw Data**: Calculates the histogram using the original image data acquired by the transducer.

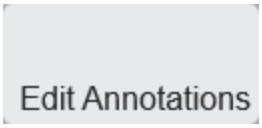
- **Image Data**: Calculates the histogram using the original image data, combined with any image adjustments made by the user. For example, if the brightness value was adjusted, the histogram is calculated using the original image data, with the modified brightness taken into account.

Edit Annotations

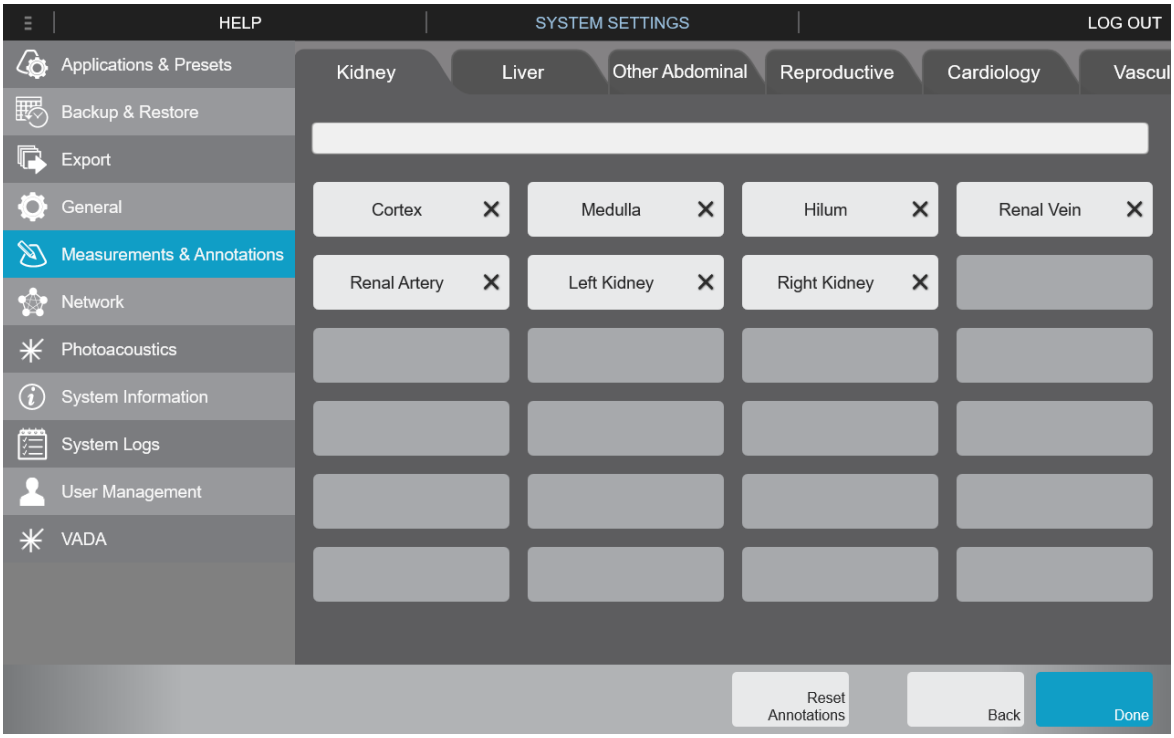
To Edit Annotations

You can customize the available annotation labels that can be placed on an acquired image.

1. In the Measurements & Annotations page, tap **Edit Annotations**.



This opens the Edit Annotations menu:



2. To edit a label, tap the label and update it as required.
3. To add a new annotation, tap any empty label and enter the text for the new label.
4. To delete a label, tap the X symbol next to any label.
5. Tap **Done** to close the page and return to your imaging session.

Network

On the Network page, you can specify the network connectivity settings.

> **Note:** Swipe upwards anywhere on the Network page to see the settings on the lower part of the page.

To Display the Network Page

1. Tap **More**, and then tap **System Settings**.

2. Tap the **Network** tab.

> **Note:** Network connectivity settings can only be changed by administrator users.

Changing Network Settings

To Change the Computer Name

The Computer Name is set by default but can be changed.

1. On the Network settings page, tap the **Computer Name** field and enter the computer name.
2. Tap **Done** to close the page and restart the system.

To Change the Workgroup

1. On the Network page, tap the **Workgoup** field and enter the workgroup name.
2. Tap **Done** to close the page and restart the system.

To Change the IP Address

1. On the Network page, do one of the following:
   - Tap **Obtain IP Address Automatically**. This is the default setting.
   - Tap **Use the following IP Address** and then enter the IP Address, the Subnet Mask and Default Gateway.
2. Tap **Done** to close the page and restart the system.

To Change the DNS Settings

1. On the Network page, do one of the following:
   - Tap **Obtain DNS server address automatically**. This is the default setting.
   - Tap **Use the following DNS Server Address** and then enter the IP address of the Preferred DNS Server and the Alternate Server.
2. Tap **Done** to close the page and restart the system.

> **Note:** The **Done** button is only enabled after entering valid DNS settings.

Configuring Network Drives

Use the Network Maps section to connect to external drives on your organization's network.

A network drive is a file folder located on a remote system that has been configured for sharing over a network. It functions as a shortcut link to the remote location.

When you map a remote location, it appears as a lettered drive on your system, such as C: or D:. Your mapped drive can only connect to the remote location when your system is connected to the network.

> **Note:** These settings can only be changed by administrator users.

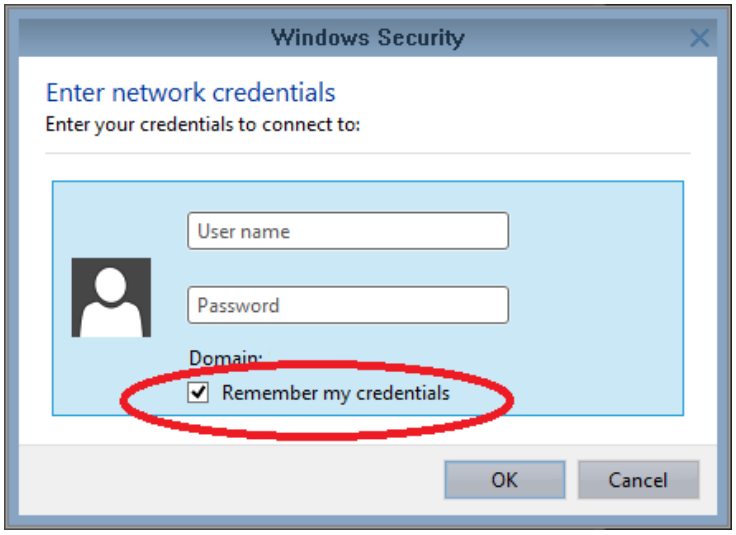
To Map a Network Drive

1. On the Network page, in the Network Maps section, tap **Map Drive**. The Add Network Map page appears and loads the network structure into the network directory list.
2. Select the network location you want to map and do one of the following:
   - In the **Add Network Map** page, on the left side, in the Explorer area, expand the network and select the folder or drive you want to map.
   - Enter the Network Location in the text field. You must enter this name exactly.

3. In the **Specify the drive letter for the new network map** drop-down menu, select the letter you want to assign to the mapped location.

> **Note:** The drive will be available to all users.

4. (Optional) Specify the behavior for the connection to the mapped drive.
   By default, the system clears the Network maps each time you log off. Choosing **Preserve network map on log out** attempts to reconnect any mapped drives the next time you log on. If you do not want this to happen (for example, if you want the mapped drive to be active only for your current session), clear the checkbox.

> **Note:** If you have to enter credentials to connect to the drive, you also must select the 'remember' checkbox on the Windows credentials panel to permanently map the drive. If you do not select the 'remember' checkbox, you may have to delete the drive and map the drive again.
>
> 
>

> **Note:** If you need to enter network credentials to connect to the selected drive, you will require a physical keyboard. Connect the keyboard via a USB port.

5. Tap **OK**. The mapped drive appears on the Network preferences tab in the Network Maps list.

To Delete a Mapped Network Drive

1. On the Network page, scroll to the bottom of the page. In the Network Maps list, select the mapping that you want to delete and tap Delete Drive.
2. Tap **Done** to close the page and return to your imaging session.

Photoacoustics

Use the Photoacoustics settings to define PA-Mode acquisition settings for PA-Mode.

To Display the Photoacoustics Page

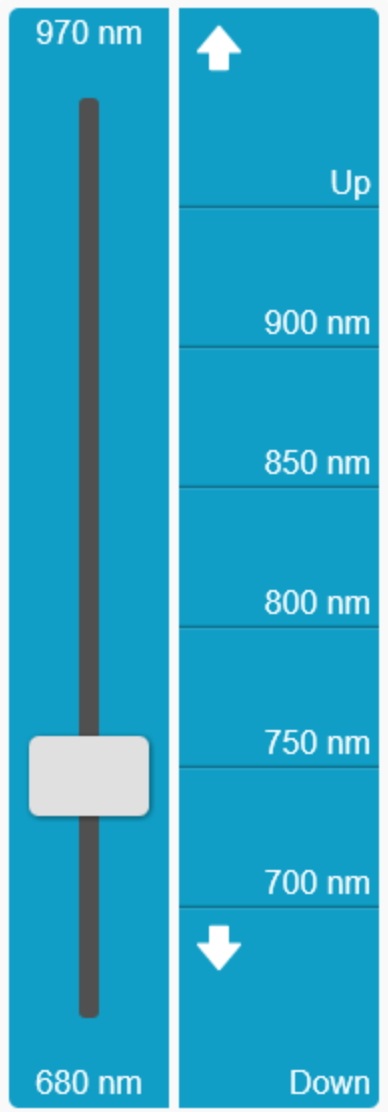
1. Tap **More**, and then tap **System Settings**.

2. Tap the Photoacoustics tab.

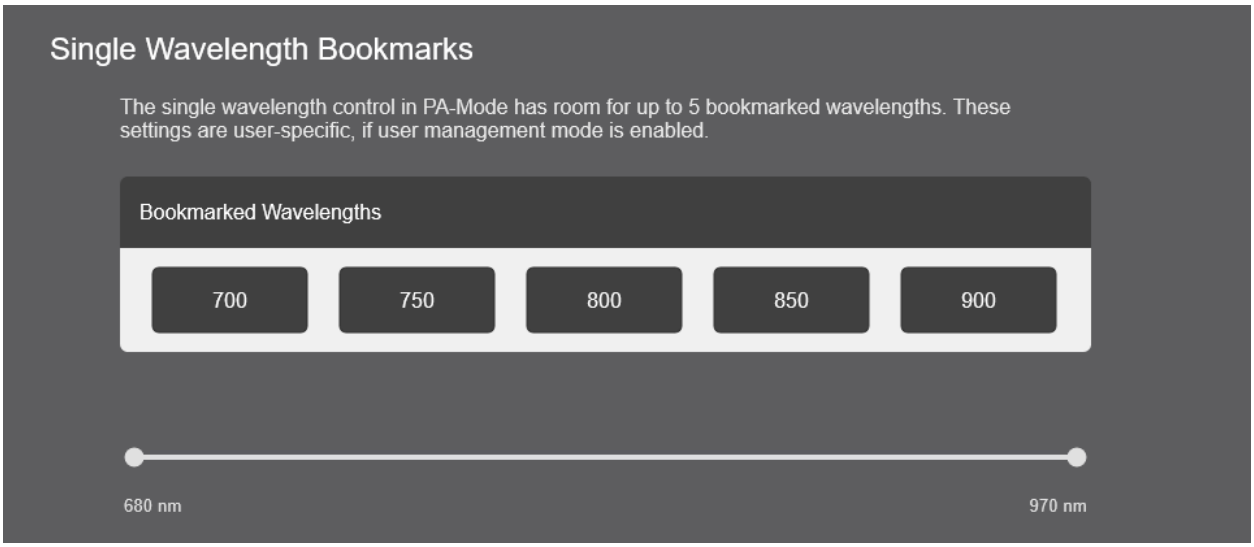
Single Wavelength Bookmarks

The single wavelength control for PA-Mode (Single) allows for five bookmarked wavelengths. These bookmarks are specific to each user.

> **Note:** When switching between the fiber ports, the bookmarks will be disabled if they fall outside the current wavelength range.



PA-Mode (Single) wavelength flyout from the mode window

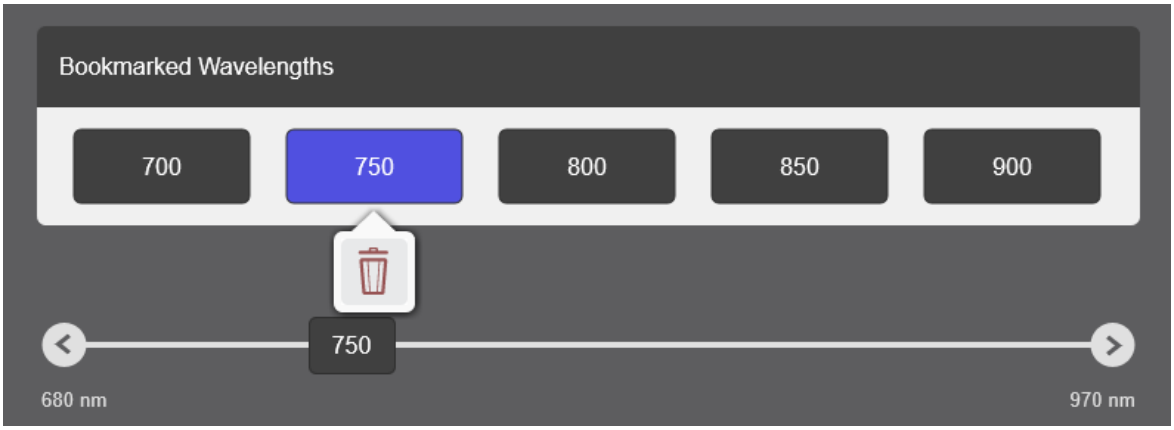


PA-Mode (Single) wavelength bookmarks from System Settings

To Delete a Bookmarked Wavelength

> **Note:** If you switch from the Signal port (680-970 nm) that had five bookmarks to the Idler port (1200-2000 nm) and you want to add a bookmark, you must delete an existing bookmark first.

1. Go to the Photoacoustics page in System Settings.
2. Tap the bookmarked wavelength you want to delete.

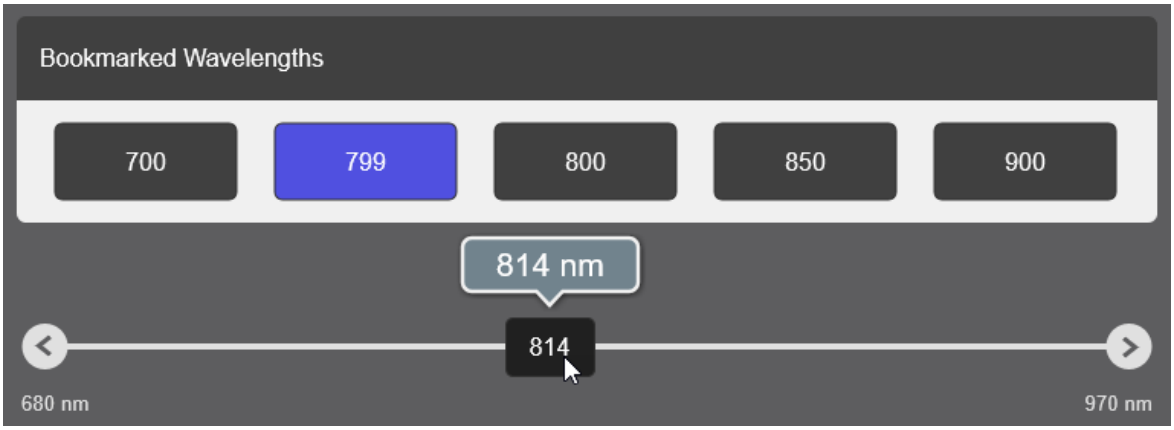


3. Tap the garbage icon.

The wavelength is removed from the bookmarked wavelengths list and the button is marked as empty.

To Add or Modify a Bookmarked Wavelength

1. Tap a button listed in the bookmarked wavelengths list. A control on the wavelength range will become active.
2. Use the slider to select the new wavelength.



The empty button is replaced with your selected wavelength, and will be available on the single wavelength button in the mode window.

System Information

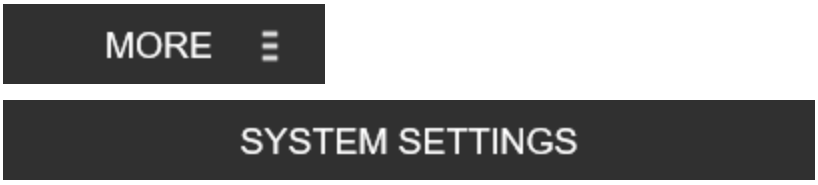
The System Information page displays system hardware and software versions and licensed features information.

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

> **Note:** Drag upwards anywhere on the System Information page to see the settings on the lower part of the page.

To Display the System Information Page

1. Tap **More**, and then tap **System Settings**.



2. Tap the **System Information** tab.

System Logs

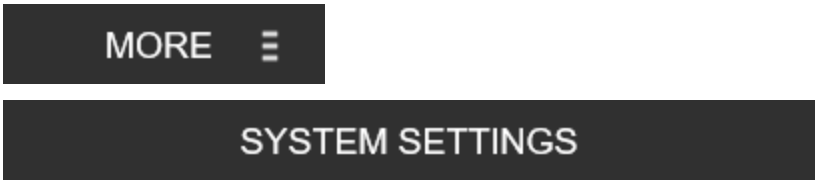
On the System Logs page, you can view the following logs:

- All – Displays every type of log file.
- Error – Logs that are usually generated when a system error occurs (Error logs include a dump file).
- Exit – Logs that contain all the information for an acquisition session, including when the system is powered on to when the system is powered off.
- Terminate – Logs that are usually generated when a critical system error occurs (Terminate logs include a dump file).

The log files are text files that you can open in a text-editing application (for example, Notepad). You can export the logs to a USB memory stick or network drive.

To Display the System Logs Page

1. Tap **More**, and then tap **System Settings**.

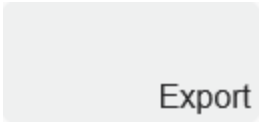


2. Tap **System Logs**.

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 as the system connector could break.

1. Select the type of log files to export.
2. Connect a USB memory stick.
3. On the System Logs page, select the specific files to export.
4. Tap **Export**.



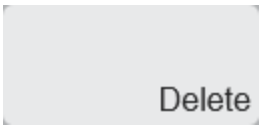
5. In the Export System Log page, browse to and select the folder to which you want to export the file.
6. (Optional) To add a subfolder, tap **New Folder** and name the folder.
7. Tap **Done**.

You can safely remove the USB memory stick.

To Delete Log Files

> **Note:** Only a user with administrator privileges can delete log files.

1. On the System Logs page, select the log file that you want to delete.
2. Tap **Delete** to delete the selected files.



3. Tap **Yes** to confirm the deletion.
4. Tap **Done** to close the settings page.

User Management

The User Management page is used to configure and customize each user profile on the system. You can configure the placement of controls on the control panel for each user, as well as applications and presets, and other system settings.

For more information about customizing controls, refer to Customizing the Control Panel on page 140.

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 61.
2. Create User accounts: After creating the initial administrator account, the administrator can add more user accounts. See Managing User Accounts on the next page.
3. Ability to use Usage Log: Upon adding user accounts, you can use the Usage Log feature (if licensed). See Usage Log.

> **Note:** Only an administrative user can add new user accounts.

To Open the User Management Settings Page

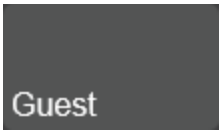
1. Tap **More**, and then tap **System Settings**.

2. Tap the **User Management** tab.

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. Any user can access the Guest account using the **Guest** button on the login screen.

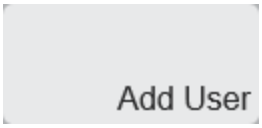


- Standard user: When you are creating a new user account, you can optionally select administrative privileges for the account. User accounts that are not defined as administrators have access to all of the imaging and review functionality and can take advantage of the customization and data privacy features of the system. Features, such as creating new user accounts, configuring network 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 new users, changing access permission of studies, upgrading the system software, etc. Users with an administrative account can also view all of the data on the system, regardless of the other user's privacy settings.

Add a New User

> **Note:** Only administrator users can add a new user to the system.

1. In the System Settings menu, open the **User Management** page.
2. Tap **Add User**.



3. Tap the **Name** field and enter the user name.
4. (Optional) Check the **Administrator** checkbox 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 at any time. See Change a User Password on page 325.
6. (Optional) Choose another user account from which to copy the settings. This includes control placement as well as custom applications and application presets.
7. (Optional) Assign the user to a group. If a group has been defined, select the group from the list. If you want to create a new group, tap New and enter the group name.

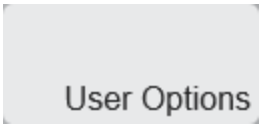
> **Note:** You can assign users to groups at any time using the user settings. See To Assign Users to a Group on the next page.

8. Set the sharing option for study data. When a user creates a study, they have three options for how they can share their data. See Working with Studies on page 265. The option can be changed for each study at the time of creation.
9. Tap **Done** to create the user account. You are then directed to the User List page.

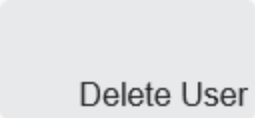
To Delete a User

> **Note:** Only a user with administrative privileges can delete user accounts; Administrators cannot delete their own account while they are logged in and they cannot delete the Guest account.

1. Open the User Management page.
2. In the User List, select the user you want to delete.
3. Tap **User Options**.



4. Tap **Delete User**.



5. Enter your password to confirm deletion of the user account. The user account is deleted and you are returned to the User List.

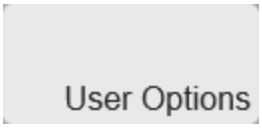
To Assign Users to a Group

Groups allow you to manage user accounts more efficiently. You can assign permissions or access to a group of user accounts rather than having to update each user account individually.

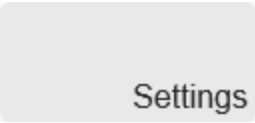
> **Note:** The Guest account cannot be assigned to a group.

> **Note:** Only a user with administrative privileges can create groups and assign user accounts to groups.

1. Open the User Management page.
2. In the User List, select the user you want to assign to a group.
3. Tap **User Options**.



4. Tap **Settings**.



5. Select a previously created group from the Group list or tap **New** to create a new group.
6. Tap **Done** to add the user account to the group.

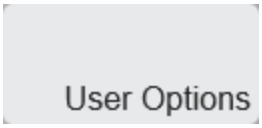
7. Repeat for each user you want to assign to a group.

Modify User Settings

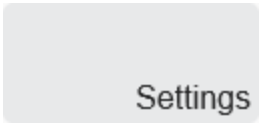
> **Note:** A user with administrative privileges cannot remove their own administrator status while they are using the account.

> **Note:** Only a user with administrative privileges can modify user accounts. Standard users can only change the default sharing setting for their own account.

1. Open the User Management page.
2. In the User List, select the user you want to modify.
3. Tap **User Options**.



4. Tap **Settings**.



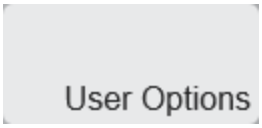
5. From this page you can:
   - change the group.
   - change the default sharing for new studies.
   - change the administrator status of a user.
   - disable a user so they cannot log in.
6. After making the desired changes, tap **Done** to update the user account.

Change a User Password

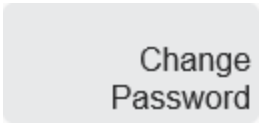
Administrators can change the passwords of other users. Standard users can only change their own password.

To change a user password:

1. Open the User Management page.
2. In the User List, select the user account for which you want change the password.
3. Tap **User Options**.



4. Tap **Change Password**.



5. In the **Your Password** field, enter the password of the current user.
    - If you are an administrator changing the password of another user, enter your administrator password.
    - If you are a standard user changing your own password, enter your password.
6. In the **New Password** field, enter the new password for the user.
7. In the **Confirm New Password** field, repeat the new password for the user.
8. Tap **Done**.

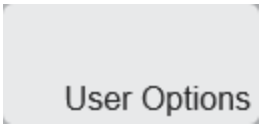
To Restore a User

Restores both the user and the user's button configuration.

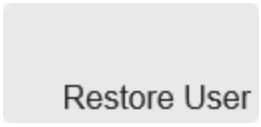
> **Note:** Restore User affects button placement and any user specific system settings. Data and custom presets are not affected when restoring a user's account settings.

> **Note:** Users without administrative privileges (i.e standard user account) can only restore their own settings.

1. Open the User Management page.
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 is displayed.



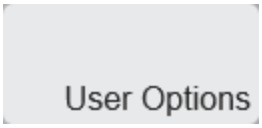
5. Tap **Restore**. A message is displayed confirming the settings have been restored, and you are returned to the login page.

To Restore Buttons

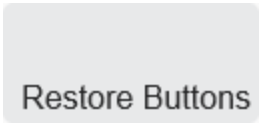
Restores the original default button configuration for any selected user.

> **Note:** Only users with administrative privileges can restore buttons.

1. Open the User Management page.
2. In the User List, select the user account for which you want to restore buttons.
3. Tap **User Options**.



4. Tap **Restore Buttons**. A confirmation dialog is displayed.



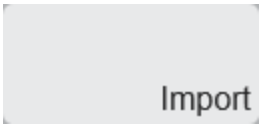
5. Tap **Restore**. A message is displayed confirming the buttons have been restored, and you are returned to the log in page.

Importing and Exporting Users

User accounts can be imported and exported as user files.

To Import a User Account

1. Open the User Management page and tap **Import**.



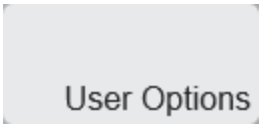
2. On the Import User page, navigate to the location and select the User file.
3. Tap **Import**.
4. The user account is added to the User List.

> **Note:** If you import a user with the same name as an existing user account, you have the option to overwrite the current settings.

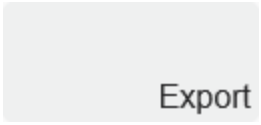
To Export a User Account

> **Note:** Users without administrative privileges (standard user account) can only export their own settings.

1. Open the User Management page.
2. In the User List, select the user account to export.
3. Tap **User Options**.



4. Tap **Export**.



5. Complete the export from the Export User page.

To Enable or Disable Guest account

> **Note:** Only a user with administrative privileges can enable or disable the Guest account.

1. Open the User Management page and uncheck/check the **Enable Guest Account** option below the User List to disable/enable the Guest account.
2. Tap **Done**. The next time you view the log in page, the **Guest** button will be displayed if enabled, and not if it is disabled.

VADA

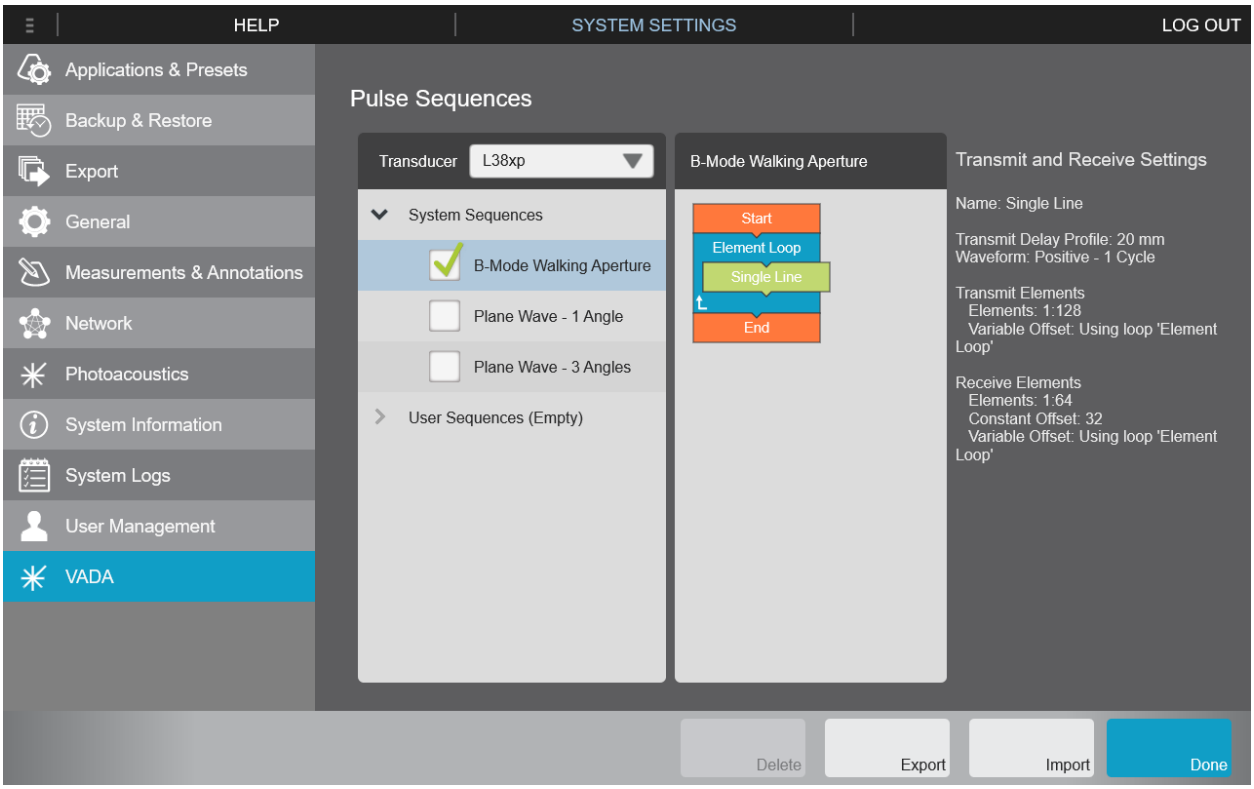
The VADA section of the System Settings menu is where you import and export pulse sequence profiles for VADA Mode.

To open the VADA menu:

1. Tap **More**, and then tap **System Settings**.

2. In the System Settings menu, tap **VADA**.

Navigation



VADA tab

The VADA menu lists pulse sequences, organized by transducer. Use the **Transducer** drop-down list to select a transducer.

- The left column lists the pulse sequences available for the currently selected transducer. Each pulse sequence has a check box, which is used to select which sequences to export.
- The right column is a visual representation of the currently selected pulse sequence. This column is identical to the view found in the Pulse Sequences tab in VADA Mode, though this column cannot be edited.
- If you tap any part of a pulse sequence in the right column, details about the selected piece appear on the far right side of the screen.

Import/Export/Delete Pulse Sequences

To Import Pulse Sequences

1. Open the VADA system settings menu.
2. Tap the **Transducer** drop-down list and select the desired transducer.
3. Tap **Import**.
4. In the Import VADA Database menu that appears, navigate to and select the pulse sequence file to

import.

5. Tap **Import**.

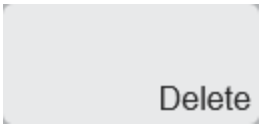
If the unique identifier of the pulse sequence already exists on the system (and they are not identical), a merge panel appears, indicating which profiles have conflicts. Tap on an item in the merge conflict list will show both the existing and the importing profile. Each item can be individually selected to overwrite or keep both, or this can be done globally for all conflicting items..

To Export Pulse Sequences

1. Open the VADA system settings menu.
2. Tap the **Transducer** drop-down list and select the desired transducer.
3. In the list of pulse sequences, select the checkboxes for the pulse sequences you want to export.
4. Tap **Export**.
5. In the flyout menu that appears, tap the appropriate export option:
   - To export only the pulse sequences you selected in Step 3, tap **Export Selected**.
   - To export all pulse sequences for the selected transducer, tap **Export All**.
6. In the menu that appears, select the desired destination folder and then tap **Export**

To Delete Pulse Sequences

1. Open the VADA system settings menu.
2. Select the pulse sequence to delete.
   Only the selected pulse sequence is deleted. Pulse sequences selected through their check box are unaffected.
3. Tap **Delete**.



Reference

This section contains supplementary information, including:

- System specifications
- Safety and licensing information
- Customer support information

Imaging Guides

For imaging guides, refer to the FUJIFILM VisualSonics Learning Hub:

https://www.visualsonics.com/learning-hub-online-video-training-our-users

Vevo F2 Imaging System Specifications

This section lists the environmental, physical, and electrical specifications of the Vevo F2 Imaging System.

Environmental Specifications

Ensure that the Vevo F2 Imaging System operating environment is free of fumes, dirt, and electrical interference.

Specifications	Value
Temperature	10º to 40º C (50º to 104º F)
Relative humidity	15% to 80% non-condensing
Altitude	Up to 2000 m

Physical Dimensions

Specifications	Value
Height (with monitor folded)	122 cm (48 in)
Width	54 cm (21 in)
Depth	68 cm (27 in)
Weight	95.44 kg (210 lbs)

Ensure that sufficient clearance is available around the system for adequate airflow and cooling. Do not block the air vents or air filters.

Electrical Specifications

FUJIFILM VisualSonics manufactures the Vevo F2 Imaging System to operate with AC line voltages of 100 V, 120 V, and 240 V. The electrical configuration of the system is noted on the safety label.

- 100 V~, 50/60 Hz, 6 A
- 120 V~, 50/60 Hz, 5 A
- 240 V~, 50/60 Hz, 2.5 A

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 VisualSonics with the Vevo LAZR-X laser cart.

Fuse Specifications

The Vevo F2 is protected by a series of replaceable fuses. If a fuse blows, it must be replaced by a FUJIFILM VisualSonics service technician.

Fuses are to be approved to IEC 60127.

100 V / 120 V System Configurations	
Specifications	**Value**
Rated Current	6.3 A
Rated Voltage	250 V
Characteristic	Time delay blow
Breaking capacity current AC	1.5 kA

240 V System Configuration	
Specifications	**Value**
Rated Current	4 A
Rated Voltage	250 V

240 V System Configuration	
Specifications	**Value**
Characteristic	Time delay blow
Breaking capacity current AC	1.5 kA

Vevo LAZR-X Laser Cart Specifications

This section lists the environmental, physical, and electrical specifications of the Vevo LAZR-X laser cart.

Environmental Specifications

The Vevo LAZR-X laser cart has been tested for temperatures in the range of 18-28º C (64.4-82.4ºF).

The operating environment should be free of fumes, dirt, and electrical interference.

Physical Dimensions

Specifications	Value
Height	78.5 cm (30.9 in)
Width	29.5 cm (11.6 in)
Depth	56.3 cm (22.2 in) not including handle 63.4 cm (25 in) including handle
Weight	79.4 kg (175 lbs)

Ensure that sufficient clearance is available around the system for adequate airflow and cooling. Do not block the air vents or air filters.

Electrical Specifications

- 100 V~, 50/60 Hz, 18 A
- 120 V~, 50/60 Hz, 15 A
- 200-240 V~, 50/60 Hz, 8 A

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 VisualSonics with the Vevo F2 Imaging System: 10 A rating for 100 V/120 V/240 V supply voltage

Laser Emission Classification

The LAZR-X is a Class 4 Laser.

Vevo LAZR-X Laser Cart Specification

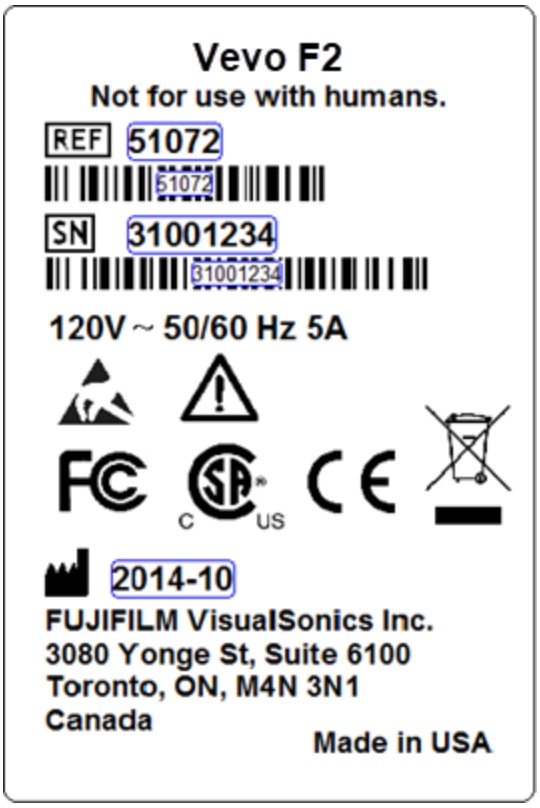
Description		Specifications
Repetition rate		20 Hz
Signal	Tuning range	680 - 970 nm
	Energy	≥ 50 mJ @ 750 nm ≥ 36 mJ @ 680 - 970 nm
	Pulse-pulse stability	≤ 5% RMS
	Pulse width	≤ 10 ns
Idler	Tuning range	1200 - 2000 nm
	Energy	≥ 10 mJ @ 1200 - 2000 nm
	Pulse width	≤ 10 ns

Label Information

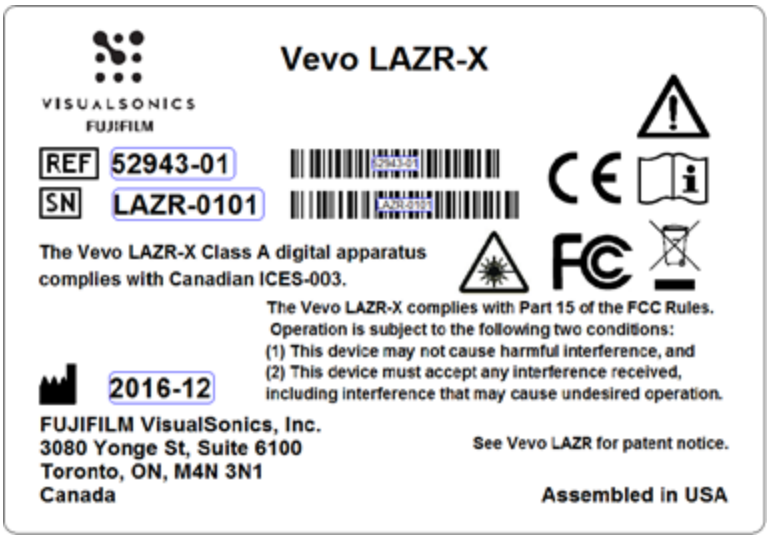
Both the Vevo F2 Imaging System and the Vevo LAZR-X laser cart feature labels that contain key information about the device.

System Labels

The Vevo F2 has a system label located on top of the system enclosure.



The Vevo LAZR-X laser cart has a system label located on top of the laser cart.



System Label Symbols

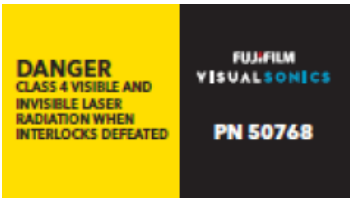
> **Note:** Some symbols only appear on either the Vevo F2 or the Vevo LAZR-X laser cart.

Symbol	Description
	Conformité Européenne. Product meets the safety requirements of the European Union.
	Proof of product compliance (electrical, gas and other safety standards) to North American safety standards.
	Device authorized under the FCC Declaration of Conformity procedure.
	European Union WEEE (Waste Electrical and Electronic Equipment) Directive. Identifies the directive on waste electrical and electronic equipment.
	Catalog number.
	Serial number.
	Manufacturer.
	Caution. Consult the user guide for details.
	Read usage instructions. This symbol instructs the user to consult the instructions of the device for information on how to properly use it. This refers to the Vevo LAZR-X Getting Started Guide and this user guide.
	Laser radiation warning. Indicates that there is a danger of laser radiation when performing certain operations, and when the danger of exposure is at its greatest. Also used when optical hazards are present.

Vevo LAZR-X Laser Cart Labels

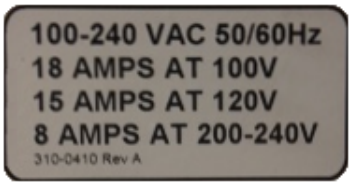
The Vevo LAZR-X laser cart features the following labels in addition to the system label.

Safety Labels

Label	Location
	Laser radiation warning. Indicates that there is a danger of laser radiation when performing certain operations, and when the danger of exposure is at its greatest. Also used when optical hazards are present. Located on the transducer fiber optic ferrule, which is below the fiber ports at the front of the laser cart.
	Indicates the presence of high voltage, which may pose a danger to the user or equipment. Make sure to disconnect the power supply before servicing the system. Located on the side panel and also to the right of the AC plug connector.
	Located on the top panel.
	Possible laser radiation exposure warning. Located on the front of the laser below the fiber ports.
	Laser defeater warning label. When the laser defeater is plugged into the delivery interlock on the laser cart, visible and invisible laser radiation is emitted.

Additional Labels

Label	Description
	OEM label. Includes the address, model number, part number, serial number, CDRH declaration of conformity and the date/country of manufacture.

Label	Description
	Voltage rating. Located below the AC power cord connector on the back of the laser.

Safety Information

Please read all safety information before using the Vevo F2 Imaging System, the laser cart, or any supporting equipment.

This equipment is intended to be used by qualified research scientists only.

Vevo F2 Imaging System Safety

General

- THIS EQUIPMENT IS NOT APPROVED FOR USE ON HUMANS. The Vevo F2 Imaging System has been designed and tested for use on laboratory research animals. This equipment must not be used on any living human being.
- Do not use the system if it exhibits erratic or inconsistent behavior. Such behavior may indicate a system failure.
- Where available, always use the lowest power settings necessary to obtain diagnostically acceptable images.
  High levels of transmitted ultrasound energy can damage tissue. Never tamper with or alter the Vevo F2 Imaging System in any way to increase the acoustic power level.
- Use ONLY compatible transducers with the Vevo F2 Imaging System. Using other transducers may affect safety and system performance.
- Do not modify the Vevo F2 Imaging System. Changes or modifications not expressly approved by FUJIFILM VisualSonics could void the user's authority to operate the equipment.

Physical Hazards

- FUJIFILM VisualSonics recommends that the Vevo F2 Imaging System be pushed by one person from behind and guided by another person in front, using the handles. Please use caution when going up or down ramps. Keep the system upright during transport.
  Ensure that the castors are locked when the Vevo F2 Imaging System is not being transported.
  Never lift the system using the handles
- Watch out for pinching from the adjustable monitors. Both the control panel and image display monitors can be adjusted. When moving the system or adjusting these monitors, take care near these moving parts to ensure safety.
- The Vevo F2 Imaging System is both delicate and heavy.

Careless moving and rough handling can damage the system and cause injury to others. Never use the system if there is damage to the cart, cables or accessories.
Do not position the cart and its accessories in a way that makes it difficult to disconnect the plug from the socket.
To avoid possible injury from an unexpected image display collapse during system transport, collapse the image display before system transport. For instructions about how to do this, refer to Moving the System or Laser on page 70.

- Watch out for strained or twisted cables. Some the optional accessories have long cables.

Electrical Hazards

- Before connecting the Vevo F2 Imaging System to the mains, verify that the specified voltage on the safety label matches the power source voltage.
  An incorrect power source voltage could cause an electrical hazard, and could cause serious damage to the equipment.
- Before connecting the Vevo F2 Imaging System to the mains, always check that the mains cable is undamaged.
- Do not remove any panels from the Vevo F2 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 Imaging System electronics or to the transducers should be made only by qualified FUJIFILM VisualSonics Technical Support Representatives.
- 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 F2 Imaging System for any reason.
- Ensure that all power sources, whether a UPC or a wall outlet, are properly grounded or earthed.
- Disconnect the system from the power source before cleaning the system or performing any maintenance operations.
- Connection of equipment not authorized by FUJIFILM VisualSonics to the Vevo F2 Imaging System isolation transformer could result in an electrical hazard.
- Do not immerse the transducer in coupling medium beyond the lowest ring on the transducer housing.
  The housing of the transducer is not watertight. If the transducer is immersed beyond the lowest ring on the transducer housing, the electrical safety features may be compromised.
- DO NOT spray or drip any liquid onto the system as this could affect reliable operation and electrical safety.
- Before connecting the system ensure 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.

Electromagnetic interference

- The Vevo F2 Imaging System should never be used where safety could be affected by the malfunction of medical devices.
  The Vevo F2 Imaging System is designed for use in preclinical laboratories and is not cleared for use with or in the vicinity of active medical devices. High levels of electromagnetic energy may interfere with the operation of the Vevo F2 Imaging System. Furthermore, the Vevo F2 Imaging System could affect the safe operation of sensitive medical devices.
- The Vevo F2 Imaging System system has been found to temporarily lose touch screen functionality during 430 kHz~2 MHz common-mode noise injection on the AC mains. FUJIFILM VisualSonics recognizes the 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 IEC 61326-1:2012, Table 1.
- To avoid the risk of increased electromagnetic emissions or decreased immunity, use only accessories and peripherals recommended by FUJIFILM VisualSonics. Connection of accessories and peripherals not recommended by FUJIFILM VisualSonics could cause your ultrasound system to malfunction, or cause other medical electrical devices in the area to malfunction.
- The use of accessories, transducers and cables other than those specified (with the exception of transducers and cables sold by FUJIFILM VisualSonics as replacement parts for internal components) may result in increased emissions or decreased immunity of the Vevo F2 Imaging System.
- DO NOT situate the Vevo F2 Imaging System close to large clinical magnets, as the magnetic fields may affect performance and cause distortions in the acquired image.

Chemicals

- If any part of the Vevo F2 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 F2 Imaging System until the device is declared completely free of harmful contamination.

Radiation

- 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.

HDMI Video Output

- FUJIFILM VisualSonics recommends against using a monitor other than the image display provided by FUJIFILM VisualSonics. Only the images presented on the image display are validated for the intended use of the device.
- For added protection, use an isolation transformer between the connecting device and AC power.

Ergonomics

- The height of the Vevo F2 Imaging System is not adjustable. Users who find standing at the system uncomfortable may require an adjustable chair or stool.
- Users may find hand-scanning with a transducer uncomfortable when used for long periods of time. Users are advised to use the transducer mounting system if they experience discomfort.

Laser Safety

General

- The Vevo LAZR-X laser cart uses a Class 4 laser, which is the highest and most dangerous classification. When working with the laser, take precautions to minimize possible exposure to both direct and reflected beams.
- Do not alter the laser for any reason. Maintenance on the laser should only be performed by a FUJIFILM VisualSonics Service Technician. If you modify the laser, you assume the risk that is associated with a Class 4 laser.
- Do not use the laser in a manner not specified by the manufacturer or by this manual.
- For a complete listing of laser safety standards, FUJIFILM VisualSonics recommends reading the *American National Standard for the Safe Use of Lasers* and implement necessary precautions (ANSI Z136.1-1986). Contact the Laser Institute of America for more information.

Laser Safety

- Always wear laser protective eyewear of sufficient optical density and suitable wavelength to protect the eyes from the maximum energy produced. Direct eye contact with the laser beam can cause permanent eye damage.
    - Diffuse and specular reflections from the main beam can cause severe eye and skin damage. Infrared radiation can pass easily through the cornea into the retina, where it can cause instant and permanent damage, or even blindness. Even small doses of exposure to scattered radiation can be harmful.
    - Laser Safety Officers (LSOs) can use the following information to provide the required eye protection:

Wavelength (nm)	Nominal Optical Diameter (µm)	Maximum Permissible Exposure	Nominal Ocular Hazard Distance
1064	6.1	50 mJ/m^2	15.17 km
532	6.8	41.1 J/m^2	210 m

- Be sure that the light from the flashlamp is obscured from the eye, as it causes damage if viewed directly.
- Mark the imaging room well with warning signs when the laser is operating, and provide interlocks for all doors.
- The laser must be stored and used in a locked area that can only be accessed by authorized personnel.

- Keep all unnecessary personnel out of the work area.
- Keep all reflective surfaces (such as rings, watch bands, metal pencils, etc.) away from the work area.
- Keep all flammable/volatile materials and containers away (which the laser could ignite) from the work area.
- Operate lasers under the supervision of qualified personnel only. When not in use, shut down the laser completely.
- Keep the laser firing area well lit so that the pupils of worker's eyes will naturally constrict. This reduces the amount of light entering the eye, reducing the potential for eye damage.
- Place a fire-resistant background behind the target area.
- Coat the area surrounding the laser with a material that absorbs any scattered radiation that might occur.
- Never leave the laser running unattended.
- Never track individuals, vehicular traffic, aircraft or any airborne objects by means of laser radiation.

Electrical Safety

- To prevent electrical shock, ensure that the capacitors are completely discharged and the power is turned off before performing any cleaning or disinfecting to the laser. Electric shock and burns resulting from input power or capacitor discharge can cause serious injury or death.
- Be aware that high voltages are present in the laser heads once AC power is turned on.
- Ensure the ambient temperature around the laser (which may be higher than the room temperature) is within the limit specified for the laser.
- Ensure there is sufficient airflow around the laser.
- Ensure electrical circuits are not overloaded; consider the nameplate rating of all the connected equipment, and make sure you have overcurrent protection.
- Ensure the equipment is properly grounded.
- Do not place objects on top of the laser.

Safety Features

Dangerous laser radiation and high voltage is present when the Vevo LAZR-X laser cart is active. There are covers that need to be in place to protect the operator from stray radiation and electrical high voltages. These safety features should not be defeated except by trained Service Technicians in a controlled environment.

Interlocks

The laser has interlock switches which stop it from firing when:

- the laser head (rod) temperature is too high
- the laser head cover is open
- the cooling water flow is too low
- the external interlock (if installed) is open

All interlocks must be OK before the laser will fire. If any interlock is tripped, including the external interlock, the amber INTERLOCK LED will turn on, and the laser will stop firing. The interlock must be reset before the laser can be restarted.

You may also wire the laser so that opening a door to the laser imaging room (or opening any other switch) will shut off the laser.

Laser Covers

The LAZR-X laser has a safety cover over the optics area. This cover must be in place during operation.

Shutters

An intracavity safety shutter interrupts the beam and prevents lasing when the laser is not in use.

There is also a shutter at each of the two fiber ports to block the laser when a fiber is not plugged in. Never try to open the shutters if a fiber is not plugged in.

Beam Dumps

There is a beam dump at each side of the laser. They must be in place to block invisible and visible laser radiation.

Safety Labels

The following table describes the safety symbols that appear on the laser.

Symbol	Publication	Description
	IEC 60417 - 5007	On (supply).
	IEC 60417 - 5008	Off (supply).
	EN 61010-1:2010 EN 61000-4-5 EN 61000-4-6 EN 61000-4-11	Indicates the presence of high voltage which may pose a danger to the user or equipment. disconnect the power supply before servicing the system.
	IEC 60825-1	Class 4 lasers are hazardous under both intrabeam and diffuse reflection viewing conditions. They may cause also skin injuries and are potential fire hazards.
	IEC 60825-1	Caution, possible laser radiation exposure.

Symbol	Publication	Description
	ISO 7000 - 1641	Caution, consult accompanying documents.
	WEEE directive 2012/19/EU	European Union WEEE (Waste Electrical and Electronic Equipment) Directive. Identifies the directive on waste electrical and electronic equipment.

Compliance Information

Vevo F2 Imaging System

Compliance

The Vevo F2 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 F2 Class A digital apparatus complies with Canadian ICES-003.

Products Tested

The following equipment has been tested:

- Vevo F2 Imaging System
- FUJIFILM VisualSonics transducers:
- - UHF71x
  - UHF57x
  - UHF46x
  - UHF29x
  - UHF22x
  - L38
  - P10
- 3-Step Foot Pedal

Electrical Safety Testing

The Vevo F2 Imaging System complies with the following laboratory equipment standards related to electrical safety as follows:

- CAN/CSA-C22.2 No. 61010-1-12
- EN 61010-1:2010 (3rd Edition)
- ANSI/ISA-61010-1 (82.02.01)
- UL 61010-1 (3rd Edition)

Electromagnetic Compatibility

The Vevo F2 Imaging System complies with electromagnetic compatibility (EMC) limits as per the following standards:

- IEC 61326-1:2012 / EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - electromagnetic compatibility
- 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
- ICES-003:2004 – Digital Apparatus, Spectrum Management and Telecommunications Policy
- Interference-Causing Equipment Standard (Canada)
- FCC Part 15 Subpart B:2012

Vevo LAZR-X laser cart

In addition to all above regulations, the Vevo LAZR-X laser cart is compliant with the following:

Government and Industry Regulations

The Vevo LAZR-X laser cart has been designed to meet 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated 06/24/07 published by the U.S. Department of Health & Human Services Center for Devices & Radiological Health, and EN 60825-1: (current Edition) Safety of Laser Products - Part 1.

CDRH Declaration of Conformity

The Vevo LAZR-X laser cart has been designed to meet 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated 07/26/01 the radiation safety product report has been filed with CDRH. An accession number will be provided to the end user upon request.

Electrical Safety Testing

The Vevo LAZR-X laser cart complies with the following Class 4 laser device and laboratory standards related to electrical safety as follows:

- EN 61010-1:2010 (General requirements)
- EN 60825-1 (Safety of laser products - Equipment classification and requirements)
- EN 61326-1:2013 (EMC General requirements)
- EN 61000-3-2 (Harmonics)
- EN 61000-3-3 (Flicker)
- EN 61000-4-2 (ESD)
- EN 61000-4-3 (RF Immunity)
- EN 61000-4-4 (EFT)
- EN 61000-4-5 (Surge)
- EN 61000-4-6 (Conducted Immunity)
- EN 61000-4-11 (Voltage Dips and Interruptions)

Contact and Legal Information

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Document Information

Vevo F2 Imaging System User Manual

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Support

After contacting FUJIFILM VisualSonics Technical Support, you may be asked to participate in a remote assistance session with support personnel. See Start Remote Help Session below for details.

For more complex problems, FUJIFILM VisualSonics Technical Support may:

- Send a Technical Support Representative to the location to evaluate the problem.
- Request that the equipment be transported to the FUJIFILM VisualSonics service department.

Start Remote Help Session

When speaking with FUJIFILM VisualSonics Technical Support, you may be asked to start a remote help session.

To start a remote support session:

1. Open the SonoSite support portal.
    - Plug a USB keyboard into the Vevo F2 and press **Ctrl + F1**. The SonoSite support portal (itsupport.sonosite.com) and a virtual keyboard appears.
2. In the **Session Key** field, enter the session ID provided by FUJIFILM VisualSonics support.
   The remote assistance software download automatically starts.
3. When the remote assistance software download is complete, run it.
   If necessary, complete any browser security confirmation messages that appear.
4. When prompted to allow screen sharing, click **Allow shared control of your computer**.
   The FUJIFILM VisualSonics representative now has access to your Vevo F2 system.
5. Allow the remote service session to complete. Follow any instructions given by the FUJIFILM VisualSonics representative.

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VISUALSONICS

Part 53188

Revision 1.2