# Table of Contents

## System Overview
- Formats  
- 2D-mode Features  
- Color Features  
- Power Features  
- Pulsed Wave Doppler Features  
- Continuous Wave Doppler Features  
- M-mode Features  
- 3D-mode Features  
- 4D-mode Features  
- Cybersecurity  
- Patient Data Encryption Option  
- System Operating Software

## Imaging Features
- Harmonics  
- InFocus Coherent Image Formation  
- Compounding  
- Auto TEQ (Tissue Equalization) Technology  
- UltraArt Universal Image Processing  
- Clarify Technology  
- Speed of Sound  
- Panoramic Imaging  
- Modality Compare  
- Biopsy  
- Clips  
- Protocols  
- DICOM
Measurements, Calculations, and Reports

General Functions

General 2D-mode Measurements and Calculations

General M-mode Measurements and Calculations

General Doppler Measurements and Calculations

Exam-specific Measurements and Calculations

eSieCalcs Software

Wireless Data Transfer

Storage and Archiving

Mobility

Maximum Physical Dimensions

User-Accessible Connections

Operator Control Panel

Monitor

Transducer Technology and Design Attributes

Accessories and Options

Language-Specific Operating System

Cardiac Imaging Option

Fusion Imaging Option

Fusion Imaging Accessories Option

Virtual Touch Strain Imaging Option

Virtual Touch Point Shear Wave Option

Virtual Touch Shear Wave Option

Contrast Agent Imaging Option

eSie OB Measurements Option

syngo Velocity Vector Imaging Option

Retractable Keyboard Option

Footswitch Option

Printer Options

Blu-ray/DVD/CD Combination Drive Option

Universal Video Converter Option

Physio Module Option

Transducer Options
Service Options

Connect Platforms 18
Flexible Service Solutions 18

Clinical Measurement Range and Accuracy 19
Possible Combinations with Other Equipment 19

System Requirements 19
Power Supply Requirements 19
Environmental Requirements 21
Ultrasound System 21

System Classifications 22
Standards Compliance 22
Quality Standards 22
Design Standards 22
Acoustic Output Standards 22
Radio and Telecommunications Standards 22

CE Declaration 23

EU Authorized Representative 23
**ACUSON Sequoia ultrasound system – See More. Know More. Do More.**

Experts agree that a conventional one-size-fits-all approach to patient care falls short of addressing the challenges of demanding caseloads, patient diversity and user variability.

Healthcare providers want advanced technologies and applications that intelligently respond to both patient- and user-specific needs. Tailoring diagnosis and therapies to each patient’s individual profile helps to improve clinical, operational and financial outcomes.

The ACUSON Sequoia ultrasound system uses BioAcoustic imaging to reduce the effects of ultrasound variability between users, patients and technology delivering greater clinical insights and precision medicine.

---

**System Overview**

You need a better, smarter system with the ability to scan more patients in less time all while delivering clearer results.

The ACUSON Sequoia is designed for the best-in-class image quality and boasts advanced hardware and components for greater depth and resolution.

---

**Operating Modes**

- 2D-mode
  - 2D-mode with Harmonics imaging
- Color flow Doppler
  - Color
  - Power
    - Directional Power
    - Slow Flow State
- Pulsed Wave Doppler
  - Pulsed Wave Doppler Tissue Imaging
  - High Pulsed Repetition Frequency Pulsed Wave Doppler
- Continuous Wave Doppler
  - Steerable Continuous Wave Doppler for phased array transducers
  - Auxiliary Continuous Wave Doppler for pencil transducers
- M-mode
  - M-mode with Harmonics imaging
  - Anatomical M-mode
22” OLED monitor
High resolution and dynamic display

15.6” touch display
Adjustable smart display

User-designed control panel
Ergonomically designed for simplified workflow

Integrated storage shelf
Allows easy storage of accessories

Compact Pinless Connector Ports
Easy access transducer connector ports and integrated storage shelf

Quiet operation
Less than a library

Mobility
Lightweight (125 kg) and small footprint design with integrated central locking break

Combined Modes
- 2D-mode with color
- 2D-mode with power
- 2D/Doppler
- 2D/Doppler with color
- 2D/Doppler with power
- 2D/M-mode
- 2D/M-mode with color
- 2D/Anatomical M-mode

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

- Adjustable size and position of field of view
- Magnification in frozen, cine, or real time imaging
- Cine capture: up to 350 seconds
- Acquired 2D-mode frame rates, depending on the transducer and imaging depth: up to 250 fps (frames per second)
- Fundamental and harmonic transmit frequencies, transducer dependent
- User-selectable transmit frequencies: up to 18.0 MHz
- Multi-line signal parallel processing
- Linear array transducer beam steering
- 2D/Doppler refresh, update, and triplex functions
- Gain in one decibel increments: -20 dB to 20 dB
- Dynamic range in one decibel increments: 10 dB to 80 dB
- 2D-mode with Harmonics imaging
- InFocus dynamic transmit focusing
- Doppler grayscale and colorization (tint) maps
- Persistence levels: up to 4
- Speed of sound: Up to 2
- Line density: up to 3
- UltraArt universal imaging: Off, 1 to 3
- Clarify: up to 5
- Maps: up to 7
- Tints: up to 10

Color Features

- Gain in one decibel increments: -20 dB to 20 dB
- User-adjustable color region of interest (ROI), size, and position
- Independent controls for color gain, pulse repetition frequencies, invert, baseline, line density, persistence, priority, filter, and smoothing
- User-selectable transmit frequencies: up to 4 and Auto (Dynamic MultiHertz)
- Color On/Off invert and baseline shift functions
- User-selectable color flow states: low, general, high, and anatomy specific, for example, kidney or aorta
- Color adaptive wall filter
- Pulse repetition frequency range: 200 Hz to 12,500 Hz
- Color velocity maps: up to 7

Power Features

- Power gain in one decibel increments: -20 dB to 20 dB
- Independent controls for power gain, pulse repetition frequencies, invert, baseline, line density, persistence, priority, filter, smoothing, and directional display
- User-selectable transmit frequencies: up to 4
- User-selectable Power map selections: up to 5 and Auto (Dynamic MultiHertz)
- Persistence levels: up to 4
- Power smoothing levels: up to 4
- Pulse repetition frequency range: 200 Hz to 10,000 Hz
- Adaptive wall filter
- Directional power flow states: slow, low, general, high, and anatomy specific, for example, kidney or aorta

Pulsed Wave Doppler Features

- Fast Fourier Transformation (FFT) processing: up to 256 points
- FFT speed: up to 2,880 FFTs per second
- User-selectable transmit frequencies per transducer: up to 3
- Simultaneous 2D-mode and Doppler display and 2D/Doppler with color (Triplex)
- User-selectable 2D/Doppler refresh
- User-adjustable Doppler scale and baseline position controls
- User-adjustable Doppler UltraArt universal imaging and edge controls
- Angle correction in one degree increments: 0° to 89°
- Transmit frequencies: 1.25 MHz to 10 MHz
- Pulse repetition frequencies (PRF) and high pulse repetition frequency (HPRF) Doppler: 500 Hz to 37 KHz
- Wall filter selections: 40 Hz to 4375 Hz
- Adjustable Doppler gate size, depending on the transducer: 0.05 cm to 3.0 cm
- Doppler signal processing enables calculation of waveform statistics during real-time imaging
- Derived waveform Doppler trace function analyzes real-time or frozen Doppler spectrum for maximum velocity information. Waveform may be set to trace above baseline, below baseline, or both.
- Doppler cine control feature: stores up to 30 seconds of Doppler data
- Sweep speed selections: up to 12
- Gain in one decibel increments: -30 dB to 30 dB
- Dynamic range in five decibel increments: 10 dB to 80 dB
• Doppler gain, scale, baseline, spectral invert, sweep speed, wall filter, edge, UltraArt universal imaging, grayscale map, colorization (tint) map, flow angle correction, and dynamic range adjustment on real time or frozen images
• Adjustable audio volume with different levels and a mute control: up to 21 levels
• Optimization of scale, baseline, gain and/or dynamic range selected manually or upon entering freeze
• Pulsed wave Doppler tissue imaging available for all cardiac and fetal echo exams on vector and curved array transducers

Continuous Wave Doppler Features
• Fast Fourier Transformation (FFT) processing: up to 256 points
• FFT speed: up to 2,880 FFTs per second
• User-selectable transmit frequencies per transducer: up to 2
• Simultaneous 2D-mode and Doppler display
• User-selectable Doppler update mode
• User-adjustable Doppler scale and baseline position controls
• User-adjustable Doppler UltraArt universal imaging and edge controls
• Angle correction in one degree increments: 0° to 89°
• Flow angle correction on real time or frozen images, with velocity readout update
• Transmit frequencies: 1.8 MHz to 5 MHz
• Pulse repetition frequencies (PRF): 2,000 Hz to 50,000 Hz
• Wall filter selections: 40 Hz to 1,000 Hz
• Doppler cine control feature: up to 30 seconds of Doppler data can be stored
• Sweep speed selections: up to 10
• Gain in one decibel increments: -30 dB to 30 dB
• Dynamic range in five decibel increments: 10 dB to 80 dB
• Doppler gain, scale, baseline, spectral invert, sweep speed, wall filter, edge, UltraArt universal imaging, grayscale map, colorization (tint) map, flow angle correction, and dynamic range adjustment on real time or frozen images
• Adjustable audio volume with different levels and a mute control: up to 21 levels
• Automatic optimization of scale, baseline, gain and/or dynamic range selected manually or upon entering freeze

M-mode Features
• Independent controls for M-mode gain and sweep speed
• Dynamic range display in one decibel increments: 10 dB to 80 dB
• Gain in one decibel increments: -20 dB to 20 dB
• Sweep speed selections: 8 mm/s to 200 mm/s
• User-selectable transmit frequencies: up to 15.0 MHz
• User-selectable edge enhancement selections: up to 4
• Maps: up to 7
• Tints: up to 10
• Anatomical M-mode for the cardiac exam supports visualization of an M-mode sweep by rotating the M-mode cursor off axis

3D-mode Features
• Acquires three-dimensional images and maximizes resolution for assessing structures
• User-adjustable region of interest and volume of interest during setup (ROI/VOI), for size, position and curve (VOI only) and position
• Available in combination with 2D-mode
• Requires the compatible transducers: 9VE4
• Supported studies: Gynecology
• Sweep speed quality selections: up to 3
• Layouts: 1-up, 2-up, 3-up and 4-up
• Sweep angle selections in increments of 10°: 20° to 140°, 145°
• VR Rotation: X (M knob), Y (PW/CW knob), and Z (C knob)
• VR Fixed rotation: 0°, 90°, 180° and 270°
• VR Flip: Up/Down, Front/Back, Left/Right, Down/Up, Back/Front, and Right/Left
• VR Reset: All, Curve and Orientation
• Volume slice selection using 3D/4D knob
• MPR Maps: A to G
• MPR Tints: 1 to 10
• MPR DR: 10 to 80 (increments of 1)
• VR Tints: 1 to 7
• VR Contrast Settings: 25 to 95 (increments of 1)
• VR Brightness Settings: -100 to 100 (increments of 1)
• VR Smooth: 0 to 3
• VR Threshold: 0 to 255 (increments of 1)
• VR Opacity: 0 to 86 (increments of 2)
• VR Rendering methods: surface, maximum intensity projection, minimum intensity projection
• Curved VOI allows the straight line of the render direction to be adjusted to contour the shape of the view plane of the Volume of Interest.
• Inversion mode allows rendering of anechoic structures to appear echogenic and echogenic structures to appear anechoic, thereby enhancing the visualization of internal surfaces.
• MultiSlice function allows the user to select range, slice spacing and display format for viewing each slice in review. The MultiSlice function supports up to 17 slices at once.
• Volume Editing tools are provided to support visualization: line, open spline, and closed spline tools.
• Images of volume objects are available for review on the system and to export to other devices for the purposes of documentation.
• Freeze during 3D imaging, stops the volume acquisition and displays a partial volume.

4D-mode Features
• Acquires and enables simultaneous viewing of three-dimensional images in real-time for assessing motion.
• User-adjustable region of interest and volume of interest during setup (ROI/VOI), for size, position and curve (VOI only).
• Available in combination with 2D-mode
• Requires the compatible transducers: 9VE4
• Supported studies: Gynecology
• Sweep speed quality selections: up to 3
• Layouts: 1-up, 2-up, 3-up and 4-up
• Sweep angle selections in increments of 10°: 20° to 80°
• VR Rotation: X (M knob), Y (PW/CW knob), and Z (C knob)
• VR Fixed rotation: 0°, 90°, 180° and 270°
• VR Flip: Up/Down, Front/Back, Left/Right, Down/Up, Back/Front, and Right/Left
• VR Reset: All, Curve and Orientation
• VR slice selection using 3D/4D knob
• MPR Maps: A to G
• MPR Tints: 1 to 10
• MPR DR: 10 to 80 (increments of 1)
• VR Tints: 1 to 7
• VR Contrast Settings: 25 to 95 (increments of 1)
• VR Brightness Settings: -100 to 100 (increments of 1)
• VR Smooth: 0 to 3
• VR Threshold: 0 to 255 (increments of 1)
• VR Opacity: 0 to 86 (increments of 2)
• VR Rendering methods: surface, maximum intensity projection, minimum intensity projection
• Volume Editing tools are provided to support visualization: line, open spline, and closed spline tools.
• Clips stored of volume objects are available for review on the system and to export to other devices for the purposes of documentation.
• Cine capture: up to 10 seconds
• Cine Prospective Capture: 1–10 sec
• Cine Retrospective Capture: 1–5 sec
• Acquire higher resolution 3D volume by pressing 3D button on touchscreen.
• Freeze during 4D imaging, pauses the volume acquisition for review and editing of volumes in cine.

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

Patient Data Encryption Option
• Data storage encryption
  - Protects patient information and system settings stored on the ultrasound system by preventing unauthorized access
  - Includes a USB storage device with the recovery key for recovering encrypted data

System Operating Software
• Windows-based operating software
• Multi-language capability
• User-modifiable configuration settings, including libraries of annotations and body markers
• User-defined exam, transducer, and image parameter settings
• Supports DICOM file format
• Supports PC file format
• Compatible with remote update handling for remote application support and remote troubleshooting
**Imaging Features**

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

**InFocus Coherent Image Formation**
InFocus coherent image formation focuses the image at all depths and exploits high beamformer output capacity, which increases image uniformity. More information is harvested from the usual transmit sequence, using massive overlapping multibeam groups rather than individual or close parallel beam lines as in conventional systems. This secondary beamforming enabled with InFocus, physics-based delay, phase and amplitude corrections can be made across transmit events to significantly sharpen the image and improve spatial resolution beyond what is typical for a given transducer frequency.

**Compounding**
Compounding uses electronic beam steering of a transducer array to acquire multiple overlapping scans from varying angles.

**Auto TEQ (Tissue Equalization) Technology**
- Optimizes the overall field of view (FOV) image brightness uniformity by changing the depth gain compensation and overall gain
- Supports 2D-mode and Pulsed Wave Doppler
- Auto Tissue Equalization Optimization continuously applies the TEQ technology to a 2D-mode image

**UltraArt Universal Image Processing**
Reduces speckle and enhances contrast to provide a realistic tissue presentation and patient-specific processing that adapts to differences in tissue.

**Clarify Technology**
Clarify can decrease artifacts in the 2D-mode image, resulting in an improved view of anatomical structures. Decreased artifacts can enhance definition of both tissue and vessel walls by increasing contrast resolution and improving boundary detection. Clarify uses flow information to eliminate noise and reverberation from vessels.

**Speed of Sound**
- Optimizes the 2D image by adjusting the speed of sound
- Available only with the following exams: Breast, MSK, Abdomen Difficult

**Panoramic Imaging**
- Panoramic images may be created up to 60 cm in length and up to 360° when the depth is less than the radius of the target area being scanned.
- Cine display of frame-by-frame review of individual data frames within the panoramic image
- Reverse during acquisition
- Zoom and pan capabilities
- Compatible with UltraArt universal imaging tissue contrast enhancement technology
- Color Panoramic imaging is a combination of real-time panorama imaging and real-time power mode acquisition. All power information is preserved during image acquisition, and the peak of the signal is saved for the color panoramic image.

**Modality Compare**
- Displays images from a previous exam side-by-side with images from the current exam
- Supported modalities for previous exams
  - Mammography
  - Computed tomography
  - Magnetic resonance imaging
  - Ultrasound
Biopsy
Available for transducers compatible with needle guide attachments.
*Please see transducer flyer for additional information.*

Clips
- Prospective capture of motion image data
- Retrospective capture of motion image data
- Acoustic Rate Capture
- Variable clip length (1 to 300 seconds)
- Clip formats
  - Compressed JPEG Lossy
  - Uncompressed Clips
  - AVI and JPEG
  - DICOM
- Supports storing of individual images within clips

Protocols
A protocol is a predefined checklist that guides you through a clinical workflow.
- Define protocol views that include an image or clip with measurements and annotations
- Change the sequence of views during a protocol
- Pause and resume a protocol
- Activate a clinical application program during a protocol
- Create new protocols or modify existing protocols
- Import or export protocols using a USB storage device

DICOM
DICOM 3.0 standard.

Measurements, Calculations, and Reports
The measurement function is available during a patient exam or with stored images. Each measurement label supports up to 5 measurements. The ultrasound system copies only the five most recently labeled measurements to the report.

General Functions
- 2D-mode and M-mode have unlimited sets of measurement markers per image for distance measurements
- Doppler has unlimited sets of measurement markers per image for velocity measurements
- Label then measure or measure then label workflow for individual labels
- Customizable reports
- Institution logo, export to PDF

General 2D-mode Measurements and Calculations
- Distance
- Depth
- Angle
- Circumference (using a trace or ellipse measurement tool)
- Area (using an ellipse or trace measurement tool)
- Volume and stenosis
- Volume flow (using an area or diameter measurement tool with a Doppler measurement)
- Ratio calculations (using two area, two distance measurements)
- Pediatric Hip
- Trans Cranial Doppler (TCD)

Trans Cranial Doppler
- Supports pediatric and adult use cases

Pediatric Hip
- Supports alpha angle, alpha and beta angle, femoral head coverage
- Sonometer report option

General M-mode Measurements and Calculations
- Distance/depth
- Heart rate
- Slope
- Time
General Doppler Measurements and Calculations

- Measurements on a frozen or cine image including velocity
- Heart rate
- Heart cycle
- Systolic/diastolic ratio
- Resistive index
- Pulsatility index
- Time averaged velocity
- Time averaged mean velocity
- Time averaged maximum velocity
- Acceleration
- Time
- Doppler statistics (system-generated waveform trace) for real-time and cine display of Doppler spectral measurements and calculations, including PS, ED, S/D, PI, RI, TAMx, TAMn
- Ratio calculations (two velocity measurements)

Exam-specific Measurements and Calculations

- The measurement function is arranged by exam type and is available for use with all exam types. All exam types support the following measurement and report features.
  - All general measurements and calculations
  - Exam-specific patient report (editable)

eSieCalcs Software

- Provides area, volume, diameter and length measurements using a border detection algorithm on a user-defined region of interest
- Can be used wherever manual trace is available

Wireless Data Transfer

Enable wireless capabilities on the ultrasound system.

Storage and Archiving

The ultrasound system supports data storage and review of completed ultrasound studies, including static images, dynamic clips, measurements, calculations, and reports.

Maximum Physical Dimensions

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>60 cm (23.62 in)</td>
</tr>
<tr>
<td>Height</td>
<td>120 cm to 175 cm (47.24 in to 68.90 in)</td>
</tr>
<tr>
<td>Depth</td>
<td>94 cm to 108 cm (37.01 in to 42.52 in)</td>
</tr>
<tr>
<td>Minimum depth for storage</td>
<td>108 cm (42.52 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>125 kg (276 lbs)</td>
</tr>
<tr>
<td>Not to exceed</td>
<td>155 kg (342 lbs)</td>
</tr>
</tbody>
</table>

The weight of the system is based on the system unpacked and ready for connecting transducers and using in a patient examination. The weight includes documentation devices, such as printers, installed on the system.
Mobility

Hibernate decreases the time to power on and off the ultrasound system. The system is ready for use in approximately 30 seconds.

- Compact and lightweight industrial design
- Steering handle for portability and maneuvering
- Rear handle for repositioning the ultrasound system
- Four locking swivel wheels
- Transducer holders and cable management
- Tilt down monitor
- Locking arm for monitor
- Locking control panel

User-Accessible Connections

- USB ports on the right side of the monitor for importing and exporting protocols and exams, archiving, and serviceability (quantity 2)
- USB ports on the left side of touch screen for importing and exporting protocols and exams, archiving, and serviceability (quantity 2)
- USB ports on the input/output panel for peripheral devices (quantity 4)
- DC power sockets on the input/output panel for on-board peripherals (quantity 2)
- DC power sockets on each side, the control panel for the gel warmer (quantity 2)

Operator Control Panel

- Backlit controls and keys
- Control panel adjustment for standing and sitting positions
  - Left/right swivel: ± 90°
  - Range of height: 74 cm to 97 cm (29.13 in to 38.18 in)
- Control panel text available in: English, German, French, Spanish, Italian
- Control panel layout supports ambidextrous operation
- Touch screen
  - 39.624 cm (15.6 inch) diagonal widescreen
  - Full high-definition video
  - Variable tilt angle: 30° to 50°
  - Touch screen for use with gloved hands
- Gel warmer

Monitor

- Full high-definition video display
  - 54.61 cm to 55.88 cm (21.5 in to 22 in) diagonal
  - 16:9 widescreen format
  - 1920 × 1080 resolution
  - 1024 × 768 image screen capture for images and reports
- Organic light-emitting diode (OLED) technology
  - High contrast ratio
  - Uniformity across a range of environmental lighting and viewing angles
  - Reduced glare in all working environments
• Adjustable position for optimal viewing
  - Height: 139 cm to 173 cm (55 in to 68 in)
  - Tilt: + 90° forward and - 15° backward
  - Swivel: ± 45° left and right
  - Lateral adjustment using the adjustable arms: ± 360° around the system
• Transport position
  - Monitor folded down
  - Locks secure the top and bottom adjustable arms in the center position

Transducer Technology and Design Attributes
For detailed transducer information please refer to the ACUSON Sequoia Transducer Flyer.
• Lightweight, ergonomic transducer design
• Touch screen and gesture transducer selection
• Four array transducer ports
• Auxiliary continuous wave transducer port (option)
• Compact-pinless connectors
• Integrated storage shelf for transducer connectors
• Transducer holders for all transducer designs and gel bottle storage

Language-Specific Operating System
Includes the operating and general imaging system software and system user and reference manuals.
• English Language Operating System
• International English Language Operating System
• German Language Operating System
• French Language Operating System
• Spanish Language Operating System
• Italian Language Operating System

Cardiac Imaging Option
• Cardiac imaging
• Pulsed Wave DTI (Doppler tissue imaging) capability
• Continuous Wave (CW) capabilities
• Cardiac measurements and reports
• Compatible transducers: 5V1, 8V3, 10V4, CW2

Fusion Imaging Option
• Fusion imaging aligns reference data with a real-time ultrasound image for diagnosis and interventional procedures
• Supported reference data: computed tomography, magnetic resonance imaging
• Compatible transducers: 4V1, 5C1, DAX Supported studies: Abdomen, General
• Compatible transducers: 10L4 Supported studies: Musculoskeletal, General
• Fusion supports the following components
  - Ascension Technologies Corporation driveBAY 2 electromagnetic tracking system
  - Ascension Technologies Corporation Mid-range Transmitter (for the driveBAY 2)
  - GCX pole to support mid-range transmitter
  - CIVCO General Purpose 8 mm sensors

Note: For information on the installation, care, and operation of hardware components, refer to the manufacturer’s operating instructions that accompanied the device.

Fusion Imaging Accessories Option
• CIVCO eTrax Needle Sensor Starter Kit
• Transducer-specific tracking brackets with needle guides

Accessories and Options
The Siemens Healthineers-authorized accessories and options for your ultrasound system are listed in this chapter. The available options depend on the licenses purchased for your ultrasound system.
Virtual Touch Strain Imaging Option

- Provides a qualitative representation of relative tissue stiffness for the region of interest
- Strain Ratio provides a quantifiable method to compare the relative stiffness of tissue within two user-selectable regions of interest
- Compatible transducers: 10L4, 14L5, 18L6
  Supported studies: Breast, Thyroid, General
- Compatible transducers: 9EC4
  Supported studies: Prostate, General

Virtual Touch Point Shear Wave Option

- Measures tissue shear velocity (Vs) and elasticity (E) for a selected region of interest using acoustic radiation force impulse (ARFI) technology of diagnostic ultrasound to induce tissue displacement.
- Provides measurement labels for sites, lesions, and liver segments
- Compatible transducers: 5C1, DAX, 4V1
  Supported studies: Abdomen
- Compatible transducers: 10L4
  Supported studies: Abdomen

Virtual Touch Shear Wave Option

- Uses acoustic radiation force impulse (ARFI) technology of diagnostic ultrasound to induce tissue displacement
- Qualitatively depicts shear velocity for a selected region of interest on a 2D image
- Provides quantitative measurements of shear velocity (Vs) and elasticity (E) for selected points within the region of interest
- Compatible transducers: 5C1, DAX
  Supported studies: Abdomen, General
- Compatible transducers: 10L4
  Supported studies: Breast, Thyroid, MSK, General
- Compatible transducers: 18L6
  Supported studies: Breast, Thyroid, General

Contrast Agent Imaging Option*

- Supports the following contrast agent destruction techniques: Burst, Flash Sequencing
- Compatible transducers: 7L2, 10L4, 14L5, 18L6, DAX, 5C1, 9C3, 18H6, 11M3, 4V1, 5V1, 8V3, 10V4, 9EC4, 9VE4
- VueBox Support
  - Requires clips acquired during contrast agent imaging and stored in DICOM format
  - Supports compatibility with the VueBox software application from Bracco. The software is used to perform qualitative and quantitative analysis of linear data. For information regarding the software application, refer to the manufacturer’s instructions.
  - Compatible transducers: 7L2, 10L4, 14L5, 18L6, DAX, 5C1, 9C3, 18H6, 11M3, 4V1, 5V1, 8V3, 10V4, 9EC4, 9VE4

eSie OB Measurements Option

- Provides system-generated measurements of crown rump length, biparietal diameter, head circumference, abdominal circumference, femur length, humerus length, and occipital frontal diameter
- Supports biparietal diameter outer-to-outer or outer-to-inner measurements

syngo Velocity Vector Imaging Option

- Tracks and estimates tissue velocity and other motion and deformation parameters at selected points on a user-defined outline of a structure
- Assists analysis of rotation, displacement, and radial strain of the left ventricle
- Assists evaluation of fetal or adult cardiac contraction by analyzing the systolic and diastolic ventricular strain and rotation

Retractable Keyboard Option

- Language-specific alphanumeric keyboard available in: English, German, French, Spanish, Italian, Danish, Swedish/Finnish and Norwegian

*At the time of publication, the United States Food and Drug Administration has cleared ultrasound contrast agents only for use in left ventricular opacification (LVO), liver, and vesicoureteral reflux (VUR). Check the current regulations for the country where you are using this ultrasound system for contrast agent clearance.
Footswitch Option
- Configurable three-pedal footswitch
- Attaches to a USB port on the ultrasound system

Printer Options
- Integrated black and white printer assembly, UP-D711MD, Sony
- External black and white printer, UP-X898MD, Sony
- External color printer, UP-D25MD, Sony

Blu-ray/DVD/CD Combination Drive Option
- Recordable disc drive for storage, review, and archival of patient and image data
- Compatible only with Blu-ray disc (BD) or medical-grade digital video disc (DVD) media
- Disk media
  - The combination drive supports the following media: BD R, BD-RW, DVD-R, DVD RW, DVD+RW, DVD+R
  - The following media brands are recommended for use with the combination drive: Panasonic, TDK, Maxell

Universal Video Converter Option*
Converts digital video signals from the ultrasound system to analog video signals to support an external display device. Includes the following cables:
- DVI cable
- Power cable

Physio Module Option
- Includes the ECG function, which contains the ECG cable and leads
  - ECG leads, standard U.S.A.
  - ECG leads, standard European
- Includes both ECG and Respiratory trace from the ECG leads. An Aux cable is available as an option to import signals from a 3rd-party device.

Transducer Options
Refer to the following table to identify transducers compatible with your ultrasound system.

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transducers, Curved Array</td>
<td>• 9C3</td>
</tr>
<tr>
<td></td>
<td>• 5C1</td>
</tr>
<tr>
<td></td>
<td>• DAX</td>
</tr>
<tr>
<td>Transducers, Linear Array</td>
<td>• 18H6</td>
</tr>
<tr>
<td></td>
<td>• 18L6</td>
</tr>
<tr>
<td></td>
<td>• 14L5</td>
</tr>
<tr>
<td></td>
<td>• 7L2</td>
</tr>
<tr>
<td></td>
<td>• 10L4</td>
</tr>
<tr>
<td>Transducers, Phased Array</td>
<td>• 10V4</td>
</tr>
<tr>
<td></td>
<td>• 8V3</td>
</tr>
<tr>
<td></td>
<td>• 5V1</td>
</tr>
<tr>
<td></td>
<td>• 4V1</td>
</tr>
<tr>
<td>Transducers, Micro-convex</td>
<td>• 11M3</td>
</tr>
<tr>
<td>Transducers, Endocavity</td>
<td>• 9EC4</td>
</tr>
<tr>
<td></td>
<td>• 9VE4</td>
</tr>
<tr>
<td>Transducers, Continuous Wave (CW)</td>
<td>• CW5</td>
</tr>
</tbody>
</table>
|                                              | • CW2 (dependent on cardiac imaging option)
| Transducer Accessories                       | (Reusable bracket and disposable needle guides) |
|                                              | • Verza Guidance System               |
|                                              | - Biopsy and needle guide set, 7L2    |
|                                              | - Biopsy and Fusion needle guide set, 10L4 |
|                                              | - Biopsy and Fusion needle guide set, 5C1 |
|                                              | - Biopsy and Fusion needle guide set, DAX |
|                                              | - Biopsy needle guide set, 14L5       |
|                                              | • In-plane ultrasound needle guide, Ultra-Pro II |
|                                              | - Fusion needle guide set, 4V1        |
|                                              | - Biopsy needle guide set, 18L6       |
|                                              | - Biopsy needle guide set, 9C3        |
|                                              | • Reusable endocavity needle guide, 9EC4 |
|                                              | • Disposable endocavity needle guide, 9EC4 |

*Not available in all countries.
Service Options

Connect Platforms

• Smart Remote Service (SRS)
  Speeds problem resolution; anticipates potential problems; allows for remote SW upgrade without impacting workflow

• eSieLink remote assistance technology
  - Remote support on system monitor for faster resolution of questions/problems; eliminates need for on-site visit from Siemens Healthineers specialist
  - Requires using the phone number provided by your Siemens Healthineers representative to initiate remote assistance. The representative guides you through the setup of each communication session.
  - Includes a headset, camera, and camera attachment

• LifeNet
  Web-based dashboard for fleet management of all Siemens Healthineers systems

• teamply
  Make fast, well-informed decisions and optimize workflow by connecting to teamply to compare your performance data to benchmarks and collaborating with healthcare professionals world-wide

• PEPconnect/PEPconnections
  Create and manage individual education plans to meet unique needs

Flexible Service Solutions

• Equipment Performance
  - Planned Maintenance
  - Corrective Maintenance
  - On-site Clinical Application Support

• Rapid Response
  - Remote Support

• Education Excellence
  - Clinical Education
  - Optimize Equipment Use
  - Technical Education

• Asset Evolution
  - Equipment Evolution
  - Equipment IT Security
Clinical Measurement Range and Accuracy

The system assumes a speed of sound of 1,540 m/sec for all measurements.

<table>
<thead>
<tr>
<th>Direct Measurement</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>0 cm to 36 cm</td>
<td>3% of the distance or 1.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Does not apply to trace tool. Distance tolerance using trace tool is user-dependent.</td>
</tr>
<tr>
<td>Distance using extended field of view</td>
<td>0 cm to 60 cm</td>
<td>Linear transducer: 5% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Curved transducer: 8% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound.</td>
</tr>
<tr>
<td>Trace Area</td>
<td>0 cm² to 560 cm²</td>
<td>6% of the area or 1.5 cm²; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.</td>
</tr>
<tr>
<td>Time</td>
<td>0 sec to 9.4 sec</td>
<td>Better than ±1% of the sweep speed or ±10 msec, whichever is greater.</td>
</tr>
<tr>
<td>Velocity</td>
<td>10 cm/sec to 600 cm/sec</td>
<td>10% of the velocity or 5 cm/sec; whichever is greater using a calibrated flow phantom.</td>
</tr>
</tbody>
</table>

System Requirements

Power Supply Requirements

<table>
<thead>
<tr>
<th>Mains Voltage</th>
<th>100 V ~ to 240 V ~</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Current</td>
<td>5.4 to 13.0 amps</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 to 60 Hz</td>
</tr>
<tr>
<td>Noise Level</td>
<td>35 to 38 dB</td>
</tr>
</tbody>
</table>

Possible Combinations with Other Equipment

Only the peripheral devices listed in this chapter are approved for use with the ultrasound system. Any use of other devices with the system will be at the user’s risk and may void the system warranty.

On-board peripheral devices must be installed by an authorized Siemens Healthineers representative or approved third party. Check with your sales representative.
### Input and Output Signals for Audio, Video, and Data Transmission Connections

<table>
<thead>
<tr>
<th>Port</th>
<th>Location</th>
<th>Example of Connection</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ-45</td>
<td>On rear panel</td>
<td>Ethernet RJ45, 10BaseT/100BaseT/1000BaseT</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>USB-A (four ports)</td>
<td>Input/output panel</td>
<td>Printer, Fusion electronics unit, footswitch, Blu-ray/DVD/CD combination drive</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>DisplayPort</td>
<td>Input/output panel</td>
<td>External monitor</td>
<td>Input</td>
</tr>
<tr>
<td>USB-A (two ports)</td>
<td>Left side of the touch screen</td>
<td>USB storage device, headset and camera for virtual communication with a Siemens service representative</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>USB-A (two ports)</td>
<td>Right side of the monitor</td>
<td>USB storage device, headset and camera for virtual communication with a Siemens service representative</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>ECG connector</td>
<td>Physio panel</td>
<td>ECG leads</td>
<td>Input</td>
</tr>
<tr>
<td>Aux connector</td>
<td>Physio panel</td>
<td>ECG external DC input</td>
<td>Bi-directional</td>
</tr>
</tbody>
</table>

### Wireless Network Connections

The ultrasound system supports the following options for connection to wireless networks.

<table>
<thead>
<tr>
<th>Network standard</th>
<th>· 802.11a</th>
<th>· 802.11b</th>
<th>· 802.11ac</th>
<th>· 802.11g</th>
<th>· 802.11n</th>
<th>· Wired Network DHCP (RFC2131), as implemented by Windows 10 MAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency bandwidth</td>
<td>· 2.4 GHz</td>
<td>· 5 GHz</td>
<td></td>
<td></td>
<td></td>
<td>· WIFI Network DHCP (RFC2131), as implemented by Windows 10 MAB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authentication</th>
<th>· WPA</th>
<th>· WPA2</th>
<th>· WPA PSK</th>
<th>· WPA2 PSK</th>
<th>· Open</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Encryption</th>
<th>· None</th>
<th>· TKIP</th>
<th>· AES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Extensible Authentication Protocol (EAP)</th>
<th>· PEAPv0 (PEAP-MSHCAPv2)</th>
<th>· TLS</th>
</tr>
</thead>
</table>
Environmental Requirements

Electromagnetic Compatibility (EMC) Note: Operating the ultrasound imaging system in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations may lead to interference visible on the monitor screen. However, the device has been designed and tested to withstand such interference and will not be permanently damaged.

### Ultrasound System

<table>
<thead>
<tr>
<th></th>
<th>During Operation</th>
<th>During Storage or Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric pressure</td>
<td>700 hPa to 1060 hPa</td>
<td>500 hPa to 1060 hPa</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>20% to 80%, non condensing</td>
<td>10% to 95%, non condensing</td>
</tr>
<tr>
<td>Temperature</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>System without a printer</td>
<td>+10°C to +40°C</td>
<td>-10°C to +60°C</td>
</tr>
<tr>
<td>System with a printer</td>
<td>+10°C to +35°C</td>
<td>-10°C to +60°C</td>
</tr>
</tbody>
</table>

*Note: Print media, for example, printer paper, is excluded from the environmental requirements. Refer to the ranges included on the manufacturer’s label.*

### Transducers

<table>
<thead>
<tr>
<th></th>
<th>During Operation</th>
<th>During Storage or Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric pressure</td>
<td>700 hPa to 1060 hPa</td>
<td>500 hPa to 1060 hPa</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>10% to 80%, non condensing</td>
<td>10% to 95%, non condensing</td>
</tr>
<tr>
<td>Temperature</td>
<td>+10°C to +40°C</td>
<td>-10°C to +50°C</td>
</tr>
</tbody>
</table>

*Note: Needle guides are excluded from the environmental requirements. Refer to the ranges included on the manufacturer’s label.*
System Classifications

- Type of protection against electrical shock: Class I, external powered
- Degree of protection against electrical shock:
  - Type BF applied part for endocavity, linear, curved, and phased array transducers
  - Type B applied part for Fusion transducer sensors and needle tracking sensors
  - Type CF defibrillation-proof applied part for ECG
- Degree of protection against harmful ingress of water: Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide:
  Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
- Mode of operation: Continuous operation
- Ingress protection levels:
  - Transducers: IPX8
  - Footswitch: IPX8

Standards Compliance

The diagnostic ultrasound system is in compliance with the following standards, including all applicable amendments at the time of product release.

Quality Standards

- FDA QSR 21 CFR Part 820
- EN ISO 13485 and ISO 13485
- ISO 9001

Design Standards

- ANSI/AAMI ES 60601-1
- CSA C22.2 No. 601.1
- EN 60601-1 and IEC 60601-1
- EN 60601-1-2 and IEC 60601-1-2 (Class A)
- EN 60601-1-6 and IEC 60601-1-6
- EN 60601-2-18 and IEC 60601-2-18
- EN 60601-2-37 and IEC 60601-2-37
- EN 62304 and IEC 62304
- EN 62366 and IEC 62366
- EN ISO 14971 and ISO 14971

Acoustic Output Standards

- IEC 62359, Test Methods for the Determination of Thermal and Mechanical Indices Related to Medical Diagnostic Ultrasonic Fields
- AIUM/NEMA UD-2, Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment
- AIUM/NEMA UD-3, Standard for Real Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment

Radio and Telecommunications Standards

- CFR 47 FCC Part 15.247
- CFR 47 FCC Part 15.107
- CFR 47 FCC Part 15.109
- ETSI EN 300 328
- ETSI EN 301 489-1
- ETSI EN 301 489-17
- ETSI EN 301 893
CE Declaration


The CE marking applies only to Medical Devices which have been put on the market according to the above mentioned EU Regulation and EU Directive.

Unauthorized changes to this product are not covered by the CE mark and the related Declaration of Conformity.

EU Authorized Representative

Siemens Healthcare GmbH
Henkestr. 127, 91052 Erlangen, Germany
Phone: +49 9131 84-0

Siemens Healthineers reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Healthineers Sales Representative for the most current information.
The products/features mentioned in this document may not be commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.

ACUSON Sequoia, Advanced SieClear, Auto TEQ, Clarify, Dynamic MultiHertz, Dynamic TCE, eSieCrypt, eSieImage, eSie Left Heart, eSieLink, eSie Measure, eSieScan, eSie Touch, MultiHertz, UltraArt and Virtual Touch are trademarks of Siemens Medical Solutions USA, Inc.

syngo® is a registered trademark owned by Siemens Healthcare GmbH.

eTrax is a trademark of CIVCO.

CIVCO is a trademark of CIVCO Medical Solutions.

Sony is a registered trademark of Sony Corporation.