Data sheet

ACUSON Sequoia Ultrasound System

Crown Edition (v3.0*)

**siemens-healthineers.com/en-us/ultrasound/
new-era-ultrasound/acuson-sequoia**

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ACUSON Sequoia ultrasound system
Clarify with confidence

The ACUSON Sequoia delivers an ultra-premium ultrasound experience that combines innovations to the platform architecture and display technologies and a comprehensive portfolio of advanced transducer technologies and innovations designed to address clinical challenges.

Powered by BioAcoustic imaging that overcomes limitations to reduce variability, the ACUSON Sequoia delivers clinical excellence across ultrasound specialties to improve diagnostic accuracy, regardless of the indication.

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
  - High Pulsed Repetition Frequency
  - Pulse Wave Doppler Tissue Imaging (DTI)
- 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

24" Dual-layer LCD monitor by Barco
Crisp ultrasound without lifetime or quality issues

Integrated storage shelf
Large container allows for easy storage of accessories

Quiet operation
Less than a library

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

13.3" touch screen
Adjustable 30–60 degrees

User-designed control panel
Ergonomically designed for simplified workflow

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

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 can be modified from live and frozen images
  - 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

- 1.5 TB SSD Hard Drive with 1 TB dedicated to patient data
- Hard Drive Speed: up to 100,000 IOPS
- Physical channels: 384
- Digital processing channels: 11,404,800
- RAM Amount: 32 GB
- CPU: Intel® Core™ i7-7820EQ CPU @ 3.00GHz (Quad core)
- GPU: Nvidia Quadro P4000
- Beamformer A/D converter bits: 14 bit ADC
- Adjustable size and position of field of view
- Magnification in frozen, cine, or real time imaging
- Cine capture: up to 80,000 frames or 300 seconds
- Imaging Rate: Data acquisition rate of ultrasound sequences to support image formation of up to 35,714 Hz
- Acquired 2D-mode frame rates, depending on the transducer and imaging depth: up to 250 fps (frames per second)
- Imaging depth transducer dependent up to 55 cm
- Fundamental and harmonic transmit frequencies, transducer dependent
- System frequency range 1–21 MHz
- User-selectable transmit frequencies: up to 15.0 MHz
- Multi-line signal parallel processing
- Linear array transducer beam steering
- System dynamic range 383 dB
- Shades of gray: 256
- 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
- 8 depth gain compensation controls
- InFocus dynamic transmit focusing
- Doppler grayscale and colorization (tint) maps
- Persistence levels: up to 4
- Speed of sound, exam-dependent: up to 4
- Line density: up to 3
- UltraArt universal imaging: Off, 1 to 3
- Clarify: up to 5
- Maps: up to 9

- Tints: up to 15
- Overall gain, depth gain compensation, dynamic range, colorization (Tint) map, grayscale map, UltraArt Image Processing, zoom can be adjusted on real time or frozen images

Color features

- Gain in 0.5 dB increments: – 20 dB to 20 dB
- User-adjustable color region of interest (ROI), size, and position
- Independent controls for color gain, pulse repetition frequencies, invert, baseline, line density, persistence, priority, filter, and smoothing
- User-selectable transmit frequencies: up to 5 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 10,000 Hz
- 8 bit color
- Color velocity maps, exam-dependent: up to 10 – includes a velocity variance map
- Color Variance Map
- Dynamic multi-hertz imaging
  - Compatible transducers: 5C1 Supported studies: Abdomen, Abdomen-Difficult
  - Compatible transducers: 10L4 Supported studies: Arterial, Venous
- Color Maps, invert, priority, background (color only) can be adjusted on real-time or frozen images.

Power features

- Power gain in 0.5 dB 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 5
- 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
- Slow Flow State: applies smart filters and adaptive signal enhancement to image smaller low-flow vessels further into tissue.

- Directional power flow states: slow, low, general, high, and anatomy specific, for example, kidney or aorta
- Power Doppler maps, priority, background (color only), Directional Power can be adjusted on real-time and frozen images.

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 (PRF) Doppler: 100 Hz to 35,714 Hz
- Wall filter selections: 1 Hz to 4,375 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
- Auto Spectral: automatic optimization of scale, baseline, gain and dynamic range upon entering freeze
- Pulsed wave Doppler Tissue Imaging (DTI) 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 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
- Automatic optimization of scale, baseline, gain and/or dynamic range selected manually or upon entering freeze

M-mode features

- Independent controls for M-mode gain and sweep speed
- Dynamic range display in one decibel increments: 10 dB to 80 dB
- Gain in one decibel increments: – 20 dB to 20 dB
- Sweep speed selections: 8 mm/s to 200 mm/s
- User-selectable transmit frequencies: up to 15.0 MHz
- User-selectable edge enhancement selections: up to 4
- Maps: up to 9

- Tints: up to 15
- Anatomical M-mode for the cardiac exam supports visualization of an M-mode sweep by rotating the M-mode cursor off axis

Volume Imaging Features

- Description: Acquires and enables static or real time viewing of three-dimensional images for assessing structures
- Exam types supported: Abdomen, Cardiac, Obstetric, Gynecology
- Transducer supported: 7VC2, 9VE4, Z6T
- Max volume rate: up to 250 volumes per second

Mechanical Volume Arrays

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 or 2D-mode with color

  Note: 2D-mode with color is only available for the following transducers: 7VC2
- Requires the compatible transducers: 7VC2 Supported studies: Abdomen, Obstetric
- 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:
  - 7VC2: 20° to 85° in increments of 5°
  - 9VE4: 20° to 145° in increments of 10°, 145° maximum
- 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, Vascular (minimum intensity projection), Skeletal (maximum intensity projection), LightSource
- 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.
- Multi-Slice function allows the user to select range, slice spacing and display format for viewing each slice in review. The Multi-Slice 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.
- FlexPlane function to create slices of a reference image for review of anatomy.
  - You can draw up to three orthogonal or non-orthogonal slices using a line, trace, or spline on the reference image. As you draw on the reference image, an image extends in the active slice.
  - You can change the thickness of the slice to emphasize internal structures and tissue.
- MPR: Gain, dynamic range, grayscale map, colorization map (tint), rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, Slice thickness, FlexPlane editing, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes.
- VR: Gain, threshold, opacity, smooth, brightness, contrast, colorization map (tint) rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, slice thickness, FlexPlane
- editing, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes.

4D-mode features

- Acquires and enables simultaneous viewing of three-dimensional images in real-time with up to 18 volumes per second 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: 7VC2 Supported studies: Abdomen, Obstetric,

- 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:
  - 7VC2: 20° to 85° in increments of 5°
  - 9VE4: 20° to 80° in increments of 10°

- 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, Vascular (minimum intensity projection), Skeletal (maximum intensity projection), LightSource

- 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.

- FlexPlane surface enhances visualization of the volume with a surface of varying opacity.

- Vascular enhances visualization of the volume with the minimum intensity projection, for example, for viewing vascular structures.

- Skeletal enhances visualization of the volume with the maximum intensity projection, for example, for viewing skeletal structures.

- LightSource Rendering enhances visualization of the volume dataset by enabling a light source which can be manipulated by the user to improve visualization of anatomy

- Animation defines the range, direction, and speed of animation to view the volume.

- MPR: Gain, dynamic range, grayscale map, colorization map (tint), rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, Slice thickness, FlexPlane editing, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes.

- VR: Gain, threshold, opacity, smooth, brightness, contrast, colorization map (tint) rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, slice thickness, FlexPlane editing, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes.

Matrix Volume Arrays

4D mode features

- Acquires and enables simultaneous viewing of three-dimensional images in real-time with up to 250 volumes per second for assessing motion.

- User-adjustable region of interest.

- Requires the compatible transducers: Z6T

- Supported studies: Cardiac

- Biplane

- Line Density selections: Low, Mid, High

- Layouts: 10 layouts: 2 : 4-up, 2 : 3-up and 4 : 1-up, Single V and Dual V layouts

- VR Rotation: X (M-mode knob), Y (PW-CW knob), and Z (Color knob, only when image is frozen)

- Color 4D
  - Scale and Baseline controls
  - CROI Size: Lateral, Elevational, Axial
  - CROI Position: Lateral, Elevational, Axial
  - Filters: 1-4
  - Smooth: 1-4
  - Line Density: 1-3
  - Priority: 1-4
  - Color Volume Enhance: 0-3
  - MPR Maps: A-J
  - VR Maps: A-J
  - Biplane
- MPR Maps: A to G
- MPR Tints: 1 to 11
- DR: 10 to 90 dB (increments of 1)
- VR Maps: A to G
- VR Tints: 1 to 10
- VR labeling: labeling tools allow for structure identification within the volume
- 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 or 1-8 beats
- Cine Retrospective Capture: 1– 5 sec or 1-5 beats
- Acquire higher resolution 4D volume by pressing 4D zoom button on touchscreen
- MPR: Gain, dynamic range, grayscale map, colorization map (tint), rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, Slice thickness, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes
- VR: Gain, threshold, opacity, smooth, brightness, contrast, colorization map (tint) rotation and visualization in X, Y, Z axis, rendering modes, inversion mode, multi-slice editing, slice thickness, volume editing (removal tools), animation can be adjusted in real time, on frozen images, and saved volumes
- MPR Thickness: 0-20 mm

- Mitral Valve button: rotates and positions MPR C and syncs VR to MPR C
- Multislice: function allows the user to select range, slice spacing and display format for viewing each slice in review or live.
  - Slice range: 1–17 slices, distance: 0.5–50 mm, and position of slices: Covering FOV, Direction: General, parasternal, and apical C
- Auto TEQ available
- MPR/VR tools
  - Cut plane on/off
  - MPR lines on VR: on/off
  - Slice Sync: on/off
  - 3D Caliper
  - MPR lock
- Free Plane: Position plane, and retain crop and undo crop is available after retain crop is active

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 10 version 1809 long support 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

User-programmable system parameter settings

- Supports up to 100 user programmable image presets

Harmonics

- Phase Inversion (PI)
- Alternating Phase Line (APL) Harmonic Imaging
- 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

With InFocus Coherent Image Formation and electronic beam steering (Compounding), the system supports a Compounding Factor of up to 80.

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

Auto Flash Color Artifact Suppression

Proprietary technology to detect and prevent motion artifacts and reduce noise, simultaneously enhance color sensitivity

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. Can be performed in real-time or on frozen images. Available in B-mode, PW and Contrast modes.

Wide Field of View (FOV)

Enables instant Field of View (FOV) expansion for extended visualization and measurement of anatomy in B-mode.

- Compatible with 5C1 transducer

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 (SoS)

- Exam-dependent: up to 4
- 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
- Advanced image formation to improve the display of the needle
  - Available on 10L4, 15L4, 18L6 transducers

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

Zoom

- Magnification: up to 11.5x zoom with up to 36 steps
- Supports magnification in frozen, cine, or real time imaging

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

Auto IMT

- Supports automated Carotid intima-media thickness measurement
- Used as a tool for communicating with patients about the relative state of their cardiovascular system

120 to 175 cm (47.24 to 68.90 in)

60 cm (23.62 in)

108 cm (42.52 in)

Maximum physical dimensions

Width	60 cm (23.62 in)
Height	120 cm to 175 cm (47.24 in to 68.90 in)
Depth	94 cm to 108 cm (37.01 in to 42.52 in) Minimum depth for storage: 108 cm (42.52 in)
Weight	125 kg (276 lbs) Not to exceed 155 kg (342 lbs) 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.
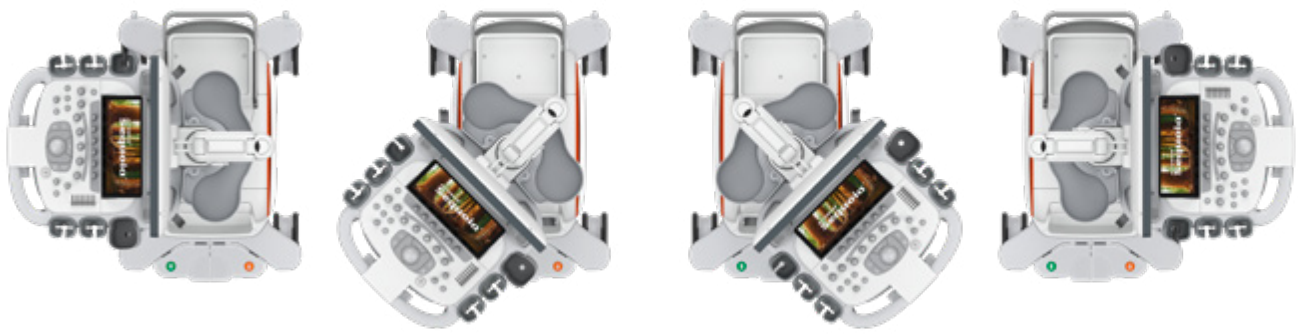
Pediatric hip

- 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)

Auto Calcs software

- AI-powered semi-automated measurement tool which provides the area, volume, diameter and length from 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.

- Supports append, pause, resume, and discontinue exam options to support clinical care interruptions without the need to end the DICOM study

Hibernate

- Decreases the time to power on and off the ultrasound system.
- Boot-up from Hibernate mode in as few as 23 seconds
- Hibernate in as few as 10 seconds
- Cold boot: 2 minutes, 10 seconds

Mobility

- Compact and lightweight industrial design
- Steering handle for portability and maneuvering
- Rear handle for repositioning the ultrasound system
- Central steering and locking break
- 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
- LCD Touch Screen
  - 33.782 cm (13.3 inch) diagonal widescreen
  - Full high-definition video
  - 1,920 × 1,080 pixels resolution
  - Variable tilt angle: 30° to 60°
  - Touch screen for use with gloved hands
- Gel warmer

Monitor

- Barco full high-definition video display
  - 24-inch high dynamic range color dual layer LCD display
  - 16:9 widescreen format
  - HD resolution at 1,920 × 1,080 pixels
  - 1024 × 768 image screen capture for images and reports
  - Shades of color: 16,000,000 (24 bit)
  - Maximum white luminance: 320 Cd/m²
  - Monitor contrast ratio: 200,000:1
  - ± 89° angle of view
- Adjustable position for optimal viewing
  - Height: at least 30 cm
  - Multi-directional articulating arm: Lateral adjustment ± 360° around the system
  - Swivel: ± 45° left and right
  - Tilt: up to 90° forward and up to 15° backward
- Monitor Performance Optimization
  - Integrated sensor with for luminance stabilization, luminance tracking and auto calibration functionality
  - Supports QAWeb for monitor quality assurance and reporting, calibration and asset management
- Monitor outputs: Linear Gamma, DICOM GSDF Dark Room, DICOM GSDF Office, DICOM GSDF OR
- 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

Accessories and options

The Siemens Healthineers-authorized accessories and options for your ultrasound system are listed in this section. The available options depend on the licenses purchased for your ultrasound system.

Language-specific operating system

Includes the operating and general imaging system software and system user and reference manuals.

- English Language Operating System
- International English Language Operating System
- German Language Operating System
- French Language Operating System
- Spanish Language Operating System
- Italian Language Operating System

Retractable keyboard (Option)

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

Footswitch (Option)

- Configurable three-pedal footswitch
- Attaches to a USB port on the ultrasound system

Printer Options

- Integrated black and white printer assembly, Model: UP-D898DC, Sony
- External black and white printer, UP-X898MD, Sony
- External color printer, UP-D25MD, Sony

Optical 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[1] (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

Auto Doppler (Option)

Auto Doppler offers workflow automation tools by updating the imaging parameters including color box position and steering angle, PW gate position, steering angle, and angle correction. Auto Doppler algorithm analyzes flow signal, selects the largest vessel with appropriate flow direction, and automatically adjusts the following imaging parameters:

- Color box position: centered to the selected vessel
- Color box steering angle: steered along the selected vessel
- PW gate position: placed in the center of the selected vessel
- PW gate angle correction: aligned to the centerline of the flow object
- PW gate steering angle: steered to get 60-degree angle correction (or smallest angle probe can provide)

Auto OB Measurements (Option)

- AI-powered 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

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[1] Not commercially available in all countries. Contact your local representative regarding local availability.

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
- Compatible transducers: 10L4
  Supported studies: Musculoskeletal
- 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 supports 12, 14, 16, and 18-gauge needles
- Transducer-specific tracking brackets with needle guides

Strain Elastography – SE (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, 15L4, 18L6
  Supported studies: Breast, Thyroid
- Compatible transducers: 9EC4
  Supported studies: Prostate

2D Shear Wave Elastography – 2D SWE (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
- Dual SWE display format to demonstrate two different maps on the screen simultaneously
- Compatible transducers: 5C1, DAX, 9C2
  Supported studies: Abdomen
- Compatible transducers: 10L4
  Supported studies: Breast, Thyroid, MSK
- Compatible transducers: 18L6, 15L4
  Supported studies: Breast, Thyroid

Point Shear Wave Elastography – pSWE (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, 9C2
  Supported studies: Abdomen
- Compatible transducers: 10L4
  Supported studies: Abdomen

Automatic Point Shear Wave Elastography – Auto pSWE (Option)

(Requires the Virtual Touch Point Shear Wave Elastography option)

- Simultaneously acquires a series of multiple point shear wave elastography (pSWE) measurements within individual regions of interest
- Measurements per label: up to 15
- Compatible transducers: DAX, 9C2
- Supported studies: Abdomen

Ultrasound-Derived Fat Fraction – UDFF (Option)

(Requires the Virtual Touch Auto pSWE option)

- Measures tissue in a selected region of interest and calculates the ultrasound-derived fat fraction (UDFF) index for assessing fatty liver disease
- Measurements per label: up to 20
- Compatible transducers: DAX, 9C2, 5C1
- Supported studies: Abdomen

Virtual Workstation (Option)

- Provides remote access to your facilities applications such as PACs, Worklist, EMR directly from the ultrasound system
- Includes connection options for a web browser connection or a remote desktop session

Contrast Agent Imaging[1] (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*, 9C2, 10EV3*, 15L4*, 7VC2

  Note: Transducers indicated with an asterisk (*) are not compatible with contrast agent imaging in the United States of America.

- 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, 9C2, 7VC2, 15L4, 9VE4, 10EV3

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

Cardiac Imaging (Option)

- Cardiac imaging
- Pulsed Wave DTI (Doppler tissue imaging) capability
- Supports from 500 and up to 25,000 Hz
- Continuous Wave (CW) capabilities
- Cardiac measurements and reports
- Includes Physio module
- Compatible transducers: 5V1, 8V3, 10V4, CW2, Z6T

Stress Echo (Option)

- Provides tools for ECG-triggered acquisition, display, selection, comparison, evaluation and archiving of multiple cardiac loops during various stages of a stress echo examination
- Supports parameter memory by view for enhanced workflow

AI Measure (Option)

- Enables AI-powered semi-automated measurements for routine echo exams to reduce keystrokes required to complete cardiac measurements
- Supports cardiac measurements for B-mode, M-mode, Continuous Wave, Pulsed Wave, and Pulsed Wave Doppler Tissue Imaging (DTI)

2D Heart+ AI (Option)

- Supports AI-powered semi-automated assessment of ejection fraction
- Supports AI-powered semi-automated assessment of global and regional myocardial muscle and motion mechanics including Global Longitudinal Strain
- Compatible with or without contrast agent imaging
- Compatible with or without ECG leads

Cardiac Volume Imaging (Option)

- Enables 4D TEE imaging functions for Z6T Transesophageal Echo (TEE) matrix transducer
- Includes labeling tools to allow for structure identification within the volume

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[1] 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.

Transducer Options

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

Options	Description
Transducers, Curved Array	• 9C3 • 9C2 • 5C1 • 7VC2 • DAX
Transducers, Linear Array	• 18H6 • 18L6 • 15L4 • 14L5 • 10L4 • 7L2
Transducers, Phased Array	• 10V4 • 8V3 • 5V1 • 4V1
Transducers, Micro-convex	• 11M3
Transducers, Endocavity	• 10EV3 • 9EC4 • 9VE4
Transducers, Continuous Wave (CW)	CW5, CW2 (dependent on cardiac imaging option)
Transducer, Volume Transesophageal (TEE)	Z6T (Matrix array)

Transducer Accessories
(Reusable bracket and disposable needle guides)
	• Verza Guidance System
	  - Biopsy and needle guide set, 7L2, 9C2, 14L5, 15L4
	  - Biopsy and Fusion needle guide set, DAX, 5C1, 10L4
	• Needle guides
	  - 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, 10EV3
	  - Disposable endocavity needle guide, 9EC4, 9VE4, 10EV3

Service solutions

Connect platforms

- Kinectus™ remote service

  Powered by Amazon Web Services, the new remote connectivity solution enables quicker resolution via remote technical support and remote application support, faster updates through on-demand and automatic updates; all with a secure connection.

  Always connected. Always advancing. Always ahead.

- teamplay Fleet

  Streamlines your Siemens Healthineers fleet management and optimizes your asset performance holistically, 24/7 and from any device.

- PEPconnect/PEPconnections
  - Engage in learning activities and earn credits at any time and on any device for a personalized learning experience with PEPconnect and PEPconnections.
  - Access a workforce education management plan as well as analytics and progress report tracking.

Service offerings

- Planned Maintenance (PM)
- Reactive Maintenance (RM)
- Parts and Transducer Coverage
- Remote Technical Support
- Remote Application Support
- Software Updates (remote or on-site)
- TechUp 18 software upgrades
  Provide eligible customers with feature enhancements to existing software licenses and new features from software base configuration, available at least once every 18 months.
- Customer Education
  - Online Tutorials
  - Classroom Courses
  - Tailored Clinical Workshops
  - Technical Education for BioMed engineers
- Extended Warranty
  - Local flexible extended warranty for direct sales
  - Factory 2- or 4-year extended warranty for business partners

Clinical measurement range and accuracy

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

Direct measurement	Range	Accuracy
Distance	0 cm to 40 cm	3% of the distance or 1.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Does not apply to trace tool. Distance tolerance using trace tool is user-dependent.
Distance using extended field of view	0 cm to 27.5 cm	Linear transducer: 5% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound. Curved transducer: 8% of the distance or 2.5 mm; whichever is greater assuming 1,540 m/sec speed of sound.
Trace Area	0 cm^2 to 1170 cm^2	6% of the area or 1.5 cm^2; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Trace Distance	0 cm to 139 cm	5% of the distance or 6 mm; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Trace Circumference	0 cm to 139 cm	5% of the circumference or 6 mm; whichever is greater, assuming minimal operator error in tracing the desired object and assuming 1,540 m/sec speed of sound.
Time	0 sec to 9.0 sec	Better than ± 1% of the sweep speed or ± 10 msec, whichever is greater.
Velocity	1 cm/sec to 2000 cm/sec	10% of the velocity or 5 cm/sec; whichever is greater using a calibrated flow phantom.

System requirements

Power supply requirements

Mains Voltage	100 V ~ to 240 V ~
Maximum Current	5.4 to 13.0 amps
Frequency	50 to 60 Hz
Noise Level	35 to 38 dB

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

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

Wireless network connections

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

Network standard	• 802.11a
	• 802.11b
	• 802.11ac
	• 802.11g
	• 802.11n
		• Wired Network
		  DHCP (RFC2131), as implemented by Windows 10
		  MAB
		• WIFI Network
		  DHCP (RFC2131), as implemented by Windows 10
		  MAB

Frequency bandwidth	• 2.4 GHz • 5 GHz	
Authentication	• WPA • WPA2 • WPA PSK • WPA2 PSK • Open	
Encryption	• None • TKIP • AES	
Extensible Authentication Protocol (EAP)	• PEAPv0 (PEAP-MSHCAPv2) • TLS	

Environmental requirements

Electromagnetic Compatibility (EMC) Note: Operating the ultrasound imaging system in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations 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	During Operation	During Storage or Transportation
Atmospheric pressure	700 hPa to 1060 hPa	500 hPa to 1060 hPa
Relative humidity	20% to 80%, non condensing	10% to 95%, non condensing
Temperature	–	–
System without a printer	+10°C to +40°C	-20°C to +60°C
System with a printer	+10°C to +35°C	-10°C to +60°C

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

Transducers	During Operation	During Storage or Transportation
Atmospheric pressure	–	–
All transducers, except 7VC2, 9VE4	700 hPa to 1060 hPa	500 hPa to 1060 hPa
7VC2, 9VE4	700 hPa to 1060 hPa	700 hPa to 1060 hPa
Relative humidity	–	–
All transducers, except 7VC2, 9VE4	10% to 80%, non condensing	10% to 95%, non condensing
7VC2, 9VE4	10% to 80%, non condensing	10% to 90%, non condensing
Temperature	–	–
All transducers, except 7VC2, 9VE4, Z6T	+10°C to +40°C	-10°C to +50°C
7VC2, 9VE4	+20°C to +40°C	-5°C to +50°C
Z6T	+10°C to +35°C	-10°C to +50°C

*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 BF defibrillation-proof applied part for ECG connections on the physio module
  - Type CF defibrillation-proof applied part for ECG connections on the physio module
- Degree of protection against harmful ingress of water:
  Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide:
  Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
- Mode of operation:
  Continuous operation
- Ingress protection levels:
  - Transducers: IPX8
  - Footswitch: IPX8

Standards compliance

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

Quality standards

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

Design standards

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

Acoustic output standards

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

Radio and telecommunications standards

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

CE declaration

This device bears a CE mark in accordance with the provisions of EU Regulation 2017/745 of April 5, 2017 concerning medical devices and the Council Directive 2011/65/EU of June 08, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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

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* At the time of data sheet finalization, the ACUSON Sequoia version 3.0 is pending shipment. Available based on country registration approval. Please consult with your local Siemens Healthineers representative.

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