GE Healthcare

Voluson E8

Ultra sound future

Product description

The Voluson® E8 is a premier imaging system delivering a new generation of image quality combined with groundbreaking diagnostic tools and its unique leading volume ultrasound technology.

Highlights

- Matrix array volume technology
- SonoVCAD – Sonography-based Volume Computer Aided Diagnosis
- High resolution transvaginal probe
- High resolution flat panel display
- Electrical height adjustment
- Floating user interface
- TruScan™ architecture
- On-board archive including preview and pre selection

Figure 1. Voluson E8 with Volume Ultrasound technology

General Specifications

Dimensions and Weight
- Height: 1290 mm (50.8 in)
  Adjustable: +200 mm (7.9 in)
- Width: 580 mm (22.8 in)
- Depth: 930 mm (36.6 in)
  Adjustable: +200 mm (7.9 in)
- Weight (no Peripherals):
  120 kg (265 lb)

Electrical Power
- Voltage: 100-130/220-240 Vac
- Frequency: 50/60 Hz
- Power: Max. 1000 VA with on-board Peripherals
- Thermal Output: 3446 BTU/h

Console Design
- 3 Active Probe Ports
  (plus 1 non-imaging port)
- Integrated HDD (160 GB)
- Integrated DVD+ R(W) / CD-R(W) drive
- On-board storage for Peripherals
- Wheels
  - Wheel diameter 150 mm
- Integrated locking mechanism that provides rolling lock
- Integrated cable management
- Front and rear handles

User Interface

Operator Keyboard
- Floating Keyboard:
  Rotation: adjustable +/- 40° from center
  Height adjustable + 200mm
- Full-sized, backlit alphanumeric keyboard
- Ergonomic hard key layout
- Interactive back-lighting
- Integrated recording keys for remote control of up to 4 Peripherals or DICOM devices

Touch Screen
- 10.4 in High Resolution color LCD screen
- Interactive dynamic software menu
- Brightness adjustable

Monitor
- 15'' LCD monitor
- High brightness with 350 cd/m²
- Tilt/Rotate Adjustable Monitor
  Tilt Angle: + 10°/- 90°
  Rotate Angle: 360°
- Digital brightness & contrast adjustment

System Overview

Applications
- Abdominal
- Obstetrical
- Gynecological
- Small parts
- Vascular / Peripheral
- Pediatric and Neonatal
- Urological
- Cardiology
- Neurology
- Orthopedic

Operating Modes
- B-Mode (2D)
- M-Mode (M)
- M-Color-Mode(MC)
- Color Flow Mode (C)
- Power Doppler Imaging (PD)
- Tissue Doppler Imaging (TD)
- HD-Flow Imaging (HD-Flow)
- PW Doppler with high PRF (PW)
- B-Flow (BF)
- Extended View (XTD View)
- Coded Contrast Imaging (Contrast Media)
- Volume Mode (3D/4D):
  - 3D Static
  - 4D Real Time
  - VCI-A, VCI-C
  - STIC /Color, Angio, HD-Flow, Contrast & B-Flow
  - 4D Biopsy

Scanning Methods
- Electronic Sector
- Electronic Convex
- Electronic Linear
- Mechanic Volume Sweep

Transducer Types
- Sector Phased Array
- Convex Array
- Microconvex Array
- Linear Array
- Volume probes `4D`:
  - Convex Array
  - Microconvex Array
  - Linear Array
  - 1.5D Convex array
  - 1.5D Linear array
  - 1.25D Convex Array
  - 1.25D Linear Array

System Standard Features
- State-of-the-art user interface with high resolution 10.4 inch LCD touch panel
- Automatic Tissue Optimization
- Tissue Doppler
- Coded Harmonic Imaging
- Coded Excitation (CE)
- HD-Flow
- XTD
- SRI III (Speckle reduction imaging)
- CrossXBeamCRI (Compound Resolution Imaging)
- Static 3D Mode:
  - B Mode only
  - B + Power Doppler Mode
  - B + CFM Doppler Mode
  - B + HD-Flow Mode
  - B + CRI
  - B + CRI + CFM
  - B + CRI + PD
  - B + CRI + HD-Flow
  - B + Contrast
  - B + B-Flow
- Focus&Frequency Composite (FFC)
- High Resolution Zoom
- Pan Zoom
- Steering
- Virtual Convex
- Beta-View
- Patient information database
- Image Archive on hard drive
- 3D/4D data compression (lossy/lossless)
- Inversion
- Real-time automatic Doppler calcs
- Measurement & Calculations including Worksheets/Report for :
  - OB
  - GYN
  - Vascular
  - Cardio
  - Abdominal
  - Small-Parts
  - Urology
  - Pediatrics
  - Ortho
  - Neurology
- Multigestational Calculations

System Options
- 4D Real Time
- VOCAL II
- VCI (Volume Contrast Imaging)
- SonoVCAD
- DICOM
- 4D – STIC:
  - STIC
  - STIC + Power Doppler Mode
  - STIC + CFM Doppler Mode
  - STIC + HD-Flow Mode
  - STIC + CRI
  - STIC + CRI + CFM
  - STIC + CRI + PD
  - STIC + CRI + HD-Flow
  - STIC + Contrast
  - STIC + B-Flow
- B-Flow
- T.U.I – Tomographic Ultrasound Imaging
- Coded Contrast Imaging
- Foot Switch, with programmable functionality

Peripheral Options
- Integrated printers:
  - B&W thermal printer
  - Color thermal printer
- DVD Recorder
- ECG Digital Module
- External Color PC desktop printer & connection kits

Display Modes

- Simultaneous Capability
  - B+PW
  - B+CFM, B+PD, B+TD, B+HD-Flow
  - B+M
  - B+3D, B+4D
  - B+CRI
  - B+SRI
  - B+CRI+SRI
  - BF+SRI
  - Contrast+SRI
  - B+CRI/3D+CRI
  - B+SRI/3D+SRI
  - B+CRI+SRI/3D+CRI+SRI
  - B+CRI/4D+CRI
  - B+SRI/4D+SRI
  - B+CRI+SRI/4D+CRI+SRI
  - B+CRI/STIC+CRI
  - B+SRI/STIC+SRI
  - B+CRI+SRI/STIC+CRI+SRI
  - B/B+CRI
  - B/B+SRI
  - B/B+SRI+CRI
  - B/CFM+CRI
  - B/CFM+SRI
  - B/CFM+CRI+SRI
  - B/PD+CRI
  - B/PD+SRI
  - B/PD+CRI+SRI
  - B/HD-Flow + CRI
  - B/HD-Flow +SRI
  - B/HD-Flow +CRI+SRI
- Real-time Triplex Mode
  - B/CFM/PW
  - B/PD/PW
  - B/HD-Flow/PW
- Selectable alternating Modes
  - B+PW
  - B/CFM+PW
  - B/PD+PW
  - B/HD-Flow+PW
  - B+CFM or PD or HD-Flow
- Multi-image (split, quad)
  - Live and/or frozen
  - split: B+B, B/CFM + B/CFM, or B/PD or B/TD or B/HD-Flow or BF+BF, Contrast + Contrast
  - split: B+B/CFM or PD or HD-Flow
  - split: B+PW or M
  - split: Frame Review / XTD-View
  - quad: B+B+B+B or BF or Contrast, B/CFM+B/CFM+B/CFM +B/CFM or B/PD or B/TD or B/HD-Flow
  - Independent Cine playback
  - Quad: A+B+C+3D or 4D
  - 3x3: T.U.I Overview + 8 parallel slices
  - Quad: T.U.I Overview + 3 parallel slices
  - Split: T.U.I Overview + 1 slice
- Zoom Read/Write (with or without overview image)
- Colorized Image
  - Colorized B
  - Colorized M
  - Colorized PW
  - Colorized 3D
- Time line display
  - Independent Dual B/PW Display
  - Display Formats
    Top/ Bottom selectable format (Size: 1/2:1/2; 1/3:2/3; 2/3:1/3)
    Left/Right selectable format (Size: 1/2:1/2; 1/3:2/3; 2/3:1/3)

Display Annotation

- Patient Name:
  - Last: max 32 characters
  - First: max 15 characters
  - Middle: max 15 characters
- ID: max 32 characters
- Accession #: max 16 characters
- Hospital Name: max 30 Characters
- Sonographer (up to 5 characters are displayed depending on font size)
- Gestational age (OB) or LMP (Gyn)
- Birth date (selectable)
- Date: 3 Types selectable
  - MM/DD/YYYY
  - DD/MM/YYYY
  - YYYY/MM/DD
- Time: 2 types selectable
  - 24 hours
  - 12 hours
- Probe Name
- Application Name
- Gray Scale bar
- Depth Scale
- Focal Zone Marker
- Frame Rate
- Zoom Start/Depth
- B-Mode
  - User program
  - Receiver Frequency
  - Acoustic Power
  - Gain
  - Dynamic Contrast
  - Gray Map
  - Edge Enhance
  - Persistence
  - SRI, CRI
  - Focal Zone Markers
  - Depth Scale Marker
  - Probe Orientation
- M-Mode
  - Gain
  - Dynamic Contrast
  - Edge Enhance
  - Reject
  - M-Cursor
  - Time Scale
- Doppler Mode
  - Acoustic Power
  - Gain
  - Angle
  - Sample Volume Depth and Width
  - Wall Filter
  - Velocity or Frequency Scale
  - Spectrum Inversion
  - Time Scale
  - PRF
  - HPRF
  - Doppler Frequency
- Color Flow Imaging Modes (CFM, PD, TD, HD-Flow)
  - Acoustic Power
  - Color Gain
  - Color Balance
  - Color Balance Marker
  - Quality
  - Wall Motion Filter
  - PRF
  - Color Map
  - Color Scale: 2 types
    Power and Symmetrical Velocity Imaging
  - Color Velocity Range
  - Spectrum Inversion
- 3D/4D Mode
  - 3D/4D Sub Program
  - Threshold
  - Quality
  - Volume Box Angle
  - Mix
  - Acquisition Mode
  - Compression
  - Orientation Markers
  - T.U.I.: slice distance (0.5-10mm)
  - T.U.I.: slice position in overview image
  - SonoVCAD
- TGC Curve
- Cine Frame Number
- Recorder Status
- Body Pattern: 111 types organized in 10 anatomical groups
- Measurement Results
- Displayed Acoustic Output
  - TIS: Thermal Index Soft Tissue
  - TIC: Thermal Index Cranial (Bone)
  - TIB: Thermal Index Bone
  - MI: Mechanical Index
- Power output (%)
- Biopsy Guide Line
- ECG Line
- Trackball function (Trackball and Trackball buttons)
- GE Logo
- Zoom overview image (zoom box position)

System Parameters

System Setup

- Pre-programmable Categories date format.
- User Programmable Preset Capability, User program etc.
- Languages: English, French, German, Spanish, Italian + additional languages loadable
- EUM Languages: English, German, Spanish, Portuguese, Italian, French, Mandarin Chinese, Japanese
- Up to 400 Programmable Annotations organized in 10 anatomical groups

Measure Setup

- M&A Setup including Add, Delete, Edit and Reorder of measure items
- Application Setup including several parameters of Measurement, Doppler Trace and Calculation presets

- Global Setup including several parameters of Measurement, Cursor and Result window presets

Pre-Processing
- Write Zoom up to 8x
- B/M-Mode
  - Gain
  - TGC
  - Dynamic Range
  - Acoustic Output
  - Transmission Focus Position
  - Transmission Focus Number
  - Transmission Frequency
  - Edge Enhancement
  - Persistence Control
  - Line Density Control
  - Reject
  - Sweep Speed
  - M-Cursor position
- PW-Mode
  - Gain
  - Dynamic Range
  - Acoustic Output
  - Transmission Frequency
  - PRF
  - Wall Filter
  - Sample Volume Gate Length, Depth, Pos
  - Velocity Scale
  - Sweep Speed
- Color Flow Imaging Modes (CFM, PD, TD, HD-Flow)
  - Gain
  - Acoustic Output
  - PRF
  - Wall Motion Filter
  - Line density
  - Ensemble
  - Dynamic
  - Smooth (Rise and Fall)
  - Frequency
  - Balance
  - Line Filter
  - Quality
  - Artifact Suppression

Post-Processing
- Read Zoom: 0.8x - 3.4x Zoom (with HD-Zoom functionality up to 22x Zoom)
- B/M-Mode
  - Gray Map
  - Colorized B and M
  - Speckle Reduction Imaging (SRI III)
- PW Mode
  - Gray Map
  - Baseline Shift
  - Angle Correction
  - Colorized D
  - Scale (KHz, m/s, cm/s)
  - Trace
  - Invert
- Color Flow Imaging Modes (CFM, PD, TD, HD-Flow)
  - Color Map
  - Display Threshold
  - Display Mode (V, V-T,T,P,P-T) (CFM only)
  - Scale (CFM and HD-Flow)
  - Baseline
- B-Flow
  - Gray Map

Image Processing and Presentation

- Digital Beamformer
- 16896 system processing channel technology
- Displayed Imaging Depth: 0 – 30 cm
- Minimum Depth of Field: 0 – 1 cm (Zoom, probe dependent)
- Maximum Depth of Field: 0 – 30 cm (probe dependent)
- Transmission Focus
  - 1- 5 Focus Points selectable (probe and application dependent)
  - Focal Zone position, up to 7 steps
- Continuous Dynamic Receive Focus / Continuous Dynamic Receive Aperture
- 256 shades of gray
- 16,8 Mio Colors 24 bit
- Up to 180 dB Dynamic. Range adjustable by selecting 12 Dynamic Contrast Curves
- Image Reverse: Right/ Left
- Rotation: 0°, 180°

CINE Memory/Image Memory
- CINE Memory: up to 256 MB (up to 3000 2D images)
- Dual Image CINE Display
- Quad Image CINE Display
- CINE image number display
- CINE Review Loop
- CINE Review Speed: 4 speeds: 25/50/100/200%
- Length of CINE Sequence Review selectable (start/end image)
- Measurements/ Calculations & Annotations on CINE Playback

Image/Volume Storage
- On-board data storage software:
  - Image data stored as:
    - Raw Data file (proprietary format) or
    - DICOM file (Single- or Mulitframe)
  - Volume file:
    Format: proprietary
    Size: typically: 0.8 - 5MB (depending on probe and adjusted volume size)
  - Lossy and lossless compression available.
    Typical compression rates are 50% with lossless compression, 15% with lossy compression but maximum quality and 5% with lossy compression and reduced quality (approximate values).
  - Cine Review
  - Single Volume (raw data, conversion to Cartesian format)
  - Volume Cine (raw data)
  - 2D Raw Data (incl. Doppler and Motion Data)
  - 3D Movie
  - Measure Reports
  - Information from past exams
- Export functions:
  - Format:
    - BMP, TIFF or JPEG
    - Sequence of BMPs
    - AVI or Quicktime
    - Voluson Format (proprietary)
    - DICOM Format
    - Volumes/Raw Data
  - Export to: DVD+ R(W) / CD-R(W), Network, USB devices
- Backup function to DVD+ R(W) / CD-R(W), Network, USB devices
- AVI-Files and Quicktime-Files: conversion and export to: DVD+ R(W) / CD-R(W), Network, USB devices
- Compression available
- Hard Drive Data Storage: 100 GB
- Compare old images with current exam
- Reload of archived data sets

Connectivity
- Ethernet network connection
- USB for USB devices
- DICOM support (option)
  - Verify
  - Print
  - Store
  - Modality Worklist
  - Structured Reporting
  - Storage Commitment
  - MPPS (Modality performed procedure step)
  - Media Exchange
  - Off network / mobile storage queue

Scanning Parameters

B-Mode
- B Acoustic Power: 1-100%
- B Gain: +/-15dB range, 1dB steps
- Slide pots: +/- 15dB
- Dynamic Range: max.180 dB, 12 dynamic Contrast curves
- Persistence: 8 steps
- B Gray Scale Map: 12 maps
- B Edge Enhancement: 5 steps
- Line Filter: 3 steps
- Reject: range 0-255, step size 5,
- Frequency Selection: 3 steps (multi-frequency, wideband probes)
- Quality (Line Density): 3 steps
- Scanning Size (FOV or Angle Depending on probe)
- B Colorization: 6 chroma maps
- BetaView (Volume probes only)
- 3 Display Formats (60:40, 50:50, 40:60)

M-Mode
- M Acoustic Power: 1-100%
- M Gain: +/-15dB range, 1dB steps
- Slide pots: +/- 15dB
- Dynamic Range: max.180 dB, 12 Dynamic Contrast curves
- M Gray Scale Map: 12 maps
- M Edge Enhancement: 5 steps
- M Sweep Speed: 4 types
- M Colorization: 6 chroma maps
- M Reject: range 0-255, step size 5,

M-Color Flow Mode
- Acoustic MCFM Power: 1-100%
- Frequency range: 1-15Mhz (Depending on the probe, 3 steps high, mid, low)
- MCFM Color Maps: 8 maps
- CFM Gain: +/-15dB range, 1 dB steps
- CFM Velocity Scale Range: PRF: 100Hz to 13kHz
- Wall Filter: 8 – 3000 Hz
- Ensemble (color shots per line) 8-16, step size 1
- Gentle color filter
- Smooth filter:
  - Rise: 12 steps
  - Fall: 12 steps
- CFM Spectrum Inversion
- CFM Baseline Shift: 17 steps
- Pre-settable and independently adjustable B-, M and MCFM Gain
- CFM Threshold: 1 – 255 steps
- Balance: 25 – 225, step size 5
- Artifact suppression: on/off
- Color Display Mode:
  V (Velocity)
  V-T (Velocity + Turbulence)
  V-P (Velocity + Power)
  T (Turbulence)
  P-T (Power + Turbulence)
- Real-time Triplex Mode: B + M +MCFM in any depth

Spectral Doppler Mode (PW)
- Acoustic Power: 1-100%
- Transmit Frequency Range:
  - PW: 1 – 15Mhz
- Gain: +15/-25dB range, 1dB steps
- Displayed Dynamic Range: 10 – 40 dB, 2 dB steps
- Gray Scale Map: 12 maps
- PW Wall Filter: 70 – 500Hz, 7 steps, PRF dependent
- Colorization: 6 chroma maps
- PW PRF: 1.3 – 22.0 kHz
- PW: Velocity Scale Range (Depending on the probe Frequency)
  - 2MHz, 0°, max. zero shift range: 1cm/s - 8m/s
  - 2MHz, 60°, max. zero shift range: 1cm/s - 16m/s
- PW Sweep Speed:
  - Time Resolution: Simplex 2.2, 3.3, 4.4, 6.6,10 msec Duplex/Triplex 4.4, 6.6,10 msec.
- Sample Volume Length: (.7mm, 1-10 (steps 1mm), 15mm)
- Spectrum Analyzer (FFT):
  - max: 256 channels
  - 255 amplitude levels
- Angle Correction: ± 0-85°, 1° step Available before Freeze and after Freeze
- Steered Linear: 0° - 25° (Depending on probe)
- Spectrum Inversion
- Baseline Shift: +/- 8 steps from center
- Doppler Auto Trace

Color Flow Mode
- Acoustic Power: 1-100%
- Frequency range: 1-15Mhz (Depending on the probe, 3 steps high, mid, low)
- Color Map: 8 maps
- CFM Gain: +/-15dB range, 0.2 dB steps
- CFM Velocity Scale Range: PRF: 100Hz to 11kHz
  - less than +/- 0.3 cm/s
  - max: +/- 5.5 m/s
- Wall Filter: 8 – 3000 Hz, 7 steps
- Ensemble (color shots per line) 7-31, step size 1
- Line Density: 10 steps
- Gentle color filter
- Line Filter: 8 steps
- Smooth filter:
  - Rise: 12 steps
  - Fall: 12 steps
- CFM Window Size:
  max: same as B-image size
- Maximum Steer-able Angle +/- 25 ° (probe dependent)
- CFM Spectrum Inversion
- CFM Baseline Shift: 17 steps
- Pre-settable and independently adjustable B-Mode Gain in B/CFM-Mode
- CFM Threshold: 1 – 255 steps
- Balance: 25 – 225, step size 5
- Artifact suppression: on/off
- Color Display Mode:
  V (Velocity)
  V-T (Velocity + Turbulence)
  V-P (Velocity + Power)
  T (Turbulence)
  P-T (Power + Turbulence)
- Real-time Triplex Mode: B + CFM/PW in any depth
- 3 Scales (kHz, cm/s, m/s)

Power Doppler Imaging (PD)
- Acoustic Power: 1-100%
- Frequency range: 1-15Mhz (Depending on the probe, 3 steps high, mid, low)
- PD Color Maps: 8 maps
- Gain: +/-15dB range, 0.2 dB steps
- Velocity Scale Range:
- PRF: 100Hz to 11kHz
- Wall Filter: 8 – 3000 Hz, 7 steps
- Ensemble (color shots per line)
- 7-31, step size 1
- Line Density: 10 steps
- Gentle color filter
- Line Filter: 8 steps
- Smooth filter:
- Rise: 12 steps
- Fall: 12 steps
- PD Window size:
- max.: same as B-image size
- Maximum Steer-able Angle
- +/- 25 ° (probe dependent
- Pre-settable and independently adjustable B-Mode Gain in B/PD-Mode
- PD Threshold: 0 – 255 steps
- Artifact suppression: on/off
- Balance: 25 – 225, step size 5
- Real-time Triplex Mode: B + PD/PW in any depth

HD-Flow
- Acoustic Power: 1-100%
- Frequency range: 1-15Mhz (Depending on the probe, 3 steps high, mid, low)
- HD Color Map: 8 maps
- HD Gain: +/-15dB range, 0.2 dB steps
- HD Velocity Scale Range: PRF: 100Hz to 11kHz
  - less than +/- 0.3 cm/s
  - max: +/- 5.5 m/s
- Wall Filter: 8 – 3000 Hz, 7 steps
- Ensemble (color shots per line)
- 7-31, step size 1
- Line Density: 10 steps
- Line Filter: 8 steps
- Smooth filter:
- Rise: 12 steps
- Fall: 12 steps
- HD Window Size:
- max: same as B-image size
- Maximum Steer-able Angle
- +/- 25 ° (probe dependent)
- HD Spectrum Inversion
- HD Baseline Shift: 17 steps
- Pre-settable and independently adjustable B-Mode Gain in B/HD-Mode
- HD Threshold: 1 – 255 steps
- Balance: 25 – 225, step size 5
- Artifact suppression: on/off
- Real-time Triplex Mode: B + HD-Flow/PW in any depth

Tissue Doppler Imaging (TD)
- Acoustic Power: 1-100%
- Frequency range: 1-15Mhz (Depending on probe, 3 steps high, mid, low)
- TD Color Maps: 4 maps
- Gain: +/-15dB range, 1 dB steps
- Velocity Scale Range: PRF: 100Hz to 11kHz
- Wall Filter: 8 – 3000 Hz, 7 steps
- Ensemble (color shots per line)
- 7-31, step size 1
- Line Density: 10 steps

- Gentle color filter
- Line Filter: 8 steps
- Smooth filter:
- Rise: 12 steps
- Fall: 12 steps
- TD Window size:
- Max: same as B-image size
- CFM Spectrum Inversion
- Pre-settable and independently adjustable B-Mode Gain in B/TD-Mode
- TD Threshold: 1 – 255 steps
- Balance: 25 – 225, step size 5
- Real-time Triplex Mode: B + TD/PW in any depth

Auto Optimization
- Available in:
  - B-Mode
  - PW Doppler

Coded Excitation (CE)
- Available on the following probes:
  - M6C-D
  - RAB4-8P
  - RIC6-12-D
  - RIC5-9-D

Coded Harmonic Imaging
- Harmonic Imaging
- Available on all probes

Compound Resolution Imaging (CRI)
- CRI
- 1-8 steps selectable
- Available on all probes

Focus Frequency Composite (FFC)
- Available on the following probes:
  - M6C-D
  - 4C-D
  - RAB2-5-D
  - RAB4-8-D
  - RIC6-12-D
  - RIC5-9-D

Speckle Reduction Imaging (SRI III)
- 1-12 steps selectable
- Available on all probes

Volume Mode (3D/4D)
- Acquisition Modes:
  - 3D Static: B-Mode (incl. CRI)
  - 3D B-Flow (optional)
  - 3D Angio: B/Power Doppler (incl. CRI)
  - 3D CFM: B/Color Doppler (incl. CRI)
  - 3D HD-Flow: B/HD-Flow (incl. CRI)
  - 3D Contrast: B/Contrast
  - 4D Real Time: (optional)
  - 4D Biopsy (optional)
  - VCI-A, VCI-C (optional)
  - STIC: Fetal Cardio (optional) (incl. CRI)
  - STIC Angio: B/Power Doppler (optional) (incl. CRI)
  - STIC CFM: B/Color Doppler (optional) (incl. CRI)
  - STIC HD-Flow: B/HD-Flow (optional) (incl. CRI)
  - STIC B-Flow (optional)
- Visualization Modes:
  - 3D Rendering (diverse surface and intensity projection modes)
  - Sectional Planes (3 Section planes perpendicular to each other)
  - Niche: 3DStatic only
  - VOCAL II (optional): semi-auto/ manual segmentation tool (segmentation using touch screen), (3D Static only) + Threshold Volume: measure volume below and above a threshold
  - T.U.I.(optional): Tomographic Ultrasound Imaging (overview image + parallel slices)
  - VCI Static (optional): 3D Static only (Sectional planes with VCI)
  - SonoVCAD Heart (optional): Sonography-based Volume Computer Aided Diagnosis
- Render Mode: Surface texture, Surface Smooth, max-, min- and X-ray (average intensity projection), Gradient, Inversion, Glass Body, Mix Mode of two render Modes
- 3D Movie
- Curved render start
- SRI post-processing for A, B and C-Plane and rendered image
- MagiCut: 3D/4D Cut tool
- Display Format:
  - Quad: A-/B-/C-Plane/3D
  - Dual: A-Plane/3D
  - Dual: A-Plane/VCI
  - Single: 3D or A- or B- or C-Plane
  - TUI 3x3: Overview image + 8 slices
  - TUI Quad: Overview image + 3 slices
  - TUI Dual: Overview image + 1 slice
  - TUI Single: slice
- 4D Volume Frames/sec max: 40
- 4D Volume Cine: 128 Volumes

Virtual Convex
- Provides a convex field of view for all linear transducers
  - SP10-16-D
  - RSP6-16-D

Measurements / Calculations

Generic B-Mode and 3D
- Distance
  - Distance (Point to Point)
  - Distance (Line to Line)
  - 2D Trace (Trace Length)
  - Stenosis (% Dist)
  - 2D Trace (Point Length)
- Area/Circumference
  - Ellipse
  - Trace (Line)
  - Trace (Point)
  - Stenosis (% Area)
  - Area 2 Dist.
- Volume: following Methods:
  - 1 Distance
  - 1 Ellipse
  - 1 Dist. + Ellipse
  - 3 Distance
  - Planimetric Volume (3D only)
- Angle:
  - Angle (3 Point)
  - Angle (2 Line)

Generic M-Mode
- Distance (Point to Point)
- Time
- Slope
- HR
- Stenosis (% Dist)

Generic Doppler Measurements / Calculations
- Auto & Manual Trace: PS (Peak Systole) ED (End Diastole) MD (Min. Diastole) PS/ED (Ratio) PI (Pulsatility Index) RI (Resistance Index) TAmax (Time avg. max. Velocity) TAmean(Time avg. mean Velocity) VTI (Velocity Time Integral) Heart Rate
- Single Measurements:
  - Velocity
  - Acceleration,
  - RI,
  - PI,
  - PS/ED,
  - Time,
  - HR
- PG (Pressure Gradient)
  -PG mean
  -PG max

Real-time Doppler Auto Measurements / Calculations
- PS (Peak Systole)
- ED (End Diastole)
- PD (Peak Diastole)
- MnV (Mean Velocity)
- VTI (Velocity Time Integral)
- RI (Resistance Index)
- PI (Pulsatility Index)
- S/D (Ratio)
- HR (Heart Rate)

Obstetrics Measurements / Calculations
- Gestational Age by:
  – AC (Abdominal Circumference)

- – APTD (Anterior Posterior
- – Thoracic Diameter
- – APTDxTTD
- – BOD (Binocular Distance)
- – BPD (Biparietal Diameter)
- – CEREB (Cerebellum)
- – CLAV (Clavicula)
- – CRL (Crown Rump Length)
- – EFW (Estimated Fetal Weight)
- – FIB (Fibula)
- – FL (Femur Length)
- – FTA (Fetal Trunk Area)
- – GS (Gestational Sac)
- – HC (Head Circumference)
- – HL (Humerus Length)
- – LV (Length of Vertebra)
- – MAD (Middle Abdomen Diameter)
- – OFD (Occipital Frontal Diameter)
- – RAD (Radius)
- – TAD (Transverse Abdominal Diameter)
- – TCD (Transverse Cerebellar Diameter)
- – TIB (Tibia Length)
- – TTD (Transverse Thoracic Diameter)
- – ULNA (Ulna Length)

- Gestational Growth by:
  - – AC (Abdominal Circumference)
  - – APAD (Anterior Posterior Abdomen Diameter)
  - – APTD (Anterior Thoracic Diameter
  - – APTDxTTD
  - – BOD (Binocular Distance)
  - – BPD (Biparietal Diameter)
  - – CEREB (Cerebellum)
  - – CLAV (Clavicle)
  - – CM (Cisterna Magna)
  - – CRL (Crown Rump Length)
  - – DV S/a, PLI, PVIV, PI (Ductus Venosus)
  - – EFW (Estimated Fetal Weight)
  - – FIB (Fibula)
  - – FTA (Fetal Trunk Area)
  - – FL (Femur Length)
  - – GS (Gestational Sac)
  - – HC (Head Circumference)
  - – HL (Humerus Length)
  - – LV (Length of Vertebra)
  - – MAD (Middle Abdomen Diameter)
  - – MCA RI, PI
  - – NBL (Nasal Bone Length)
  - – OFD (Occipital Frontal Diameter)
  - – RAD (Radius)
  - – TAD (Transverse Abdomen Diameter)
  - – TCD (Transverse Cerebellar Diameter)
  - – TIB (Tibia Length)
  - – TTD (Transverse Thoracic Diameter)
  - – ULNA (Ulna Length)
  - – UmbArt RI, PI (Umbilical Artery)
  - – UtArt RI, PI (Uterine Artery)
- Use measurement results from other systems for fetal trending (past exam)
- Estimated Fetal Weight (EFW) by:
  - – AC
  - – AC, BPD
  - – AC, BPD, FL
  - – AC, BPD, FL, HC
  - – AC, FL
  - – AC, FL, HC
  - – BPD, FTA, FL
  - – BPD, MAD, FL
  - – BPD, TTD
  - – BPD, APTD, TTD, FL
  - – BPD, APTD, TTD, LV
- Calculations and Ratios
  - – FL/BPD
  - – FL/AC
  - – FL/HC
  - – HC/AC
  - – CC/TC
  - – CI (BPD/OFD) (Cephalic Index)
  - – Va/Hem, Vp/Hem
  - – AFI (Amniotic Fluid Index)
- Tables / Calculations by: ASUM, Bahlman, Baschat, Brenner, Bunduki, Campbell, Crequat, Chitty, Daya, Doubilet, Eik-Nes, Goldstein, Hadlock, Hansmann, Hellman, Hill, Hobbins, Hohler, Holländer, Jeanty, Johnsen, JSUM, Kurmanavicius, Kurtz, Lessoway, Mari, Marsal, Merz, Nelson, Nicolaides, O'Brien, Okai, Osaka, Persson, Persutte, Rempen, Robinson, Sabbagha, Schild, Shephard, Shinozuka, Sonek, Tokyo University, Warda, Williams, Yarkoni
- Programmable OB Tables
- Programmable OB Formuals
- OB Report including:
  - Measure results (Calc)
  - Measure results (Generic)
  - Fetal Qualitative Description (Anatomical survey)
  - Fetal Environmental Description (Biophysical profile)
  - Fetal Graphical Trending
  - Fetal Compare

Gynecology

Measurements / Calculations

- Right/Left Ovary Length, Width, Height, Volume
- Right/Left Kidney Length, Width, Height, Volume
- Uterus Length, Width, Height, Volume
- ENDO (Endometrial thickness)
- Cervix Length
- Follicular measurements (12)
- Ovarian Artery
- Uterine Artery
- Vessel
- Summary Reports
- Possibility to add OB measurements to Gyn application

Vascular

Measurements/Calculations

- CCA (Common Carotid Artery)
- ICA (Internal Carotid Artery)
- ECA (External Carotid Artery)
- Vertebral Artery
- Subclavia
- Bulb
- Vessels
- Summary Reports

Neurology

Measurements/Calculations

- ACA (Anterior Cerebral Artery)
- MCA (Middle Cerebral Artery)
- PCA (Posterior Cerebral Artery)
- Basilar Artery
- A-Com. A (Anterior Common Artery)
- P-Com. A (Posterior Common Artery)
- CCA (Common Carotid Artery)
- ICA (Internal Carotid Artery)
- Vertebral Artery
- Vessels
- Summary Reports

Cardiology

Measurements / Calculations

- 2D Mode:
  - Simpson (Single & Bi-Plane)
  - Volume (Area Length)
  - LV-Mass (Epi & Endo Area, LV Length)
  - LV (RVD, IVS, LVD, LVPW)
  - LVOT Diameter
  - RVOT Diameter
  - MV (Dist A, B, Area, PISA
  - TV (Diameter)
  - AV/LA (Ao & LA Diam.)
  - PV (Diameter)
- M Mode:
  - LV (IVS, LVD, LVPW, RVD)
  - AV/LA (Ao Diam, LA Diam, AV Sep., AoRoot Ampl.)
  - MV (D-E, E-F Slope, A-C Intervall, E-EPSS, E-S Dist.)
  - HR (Heart Rate)
- Spectral Doppler Mode:
  - MV (Mitral Valve)
  - AV (Aortic Valve)
  - TV (Tricuspid Valve)

- PV (Pulmonary Valve)
- LVOT & RVOT-Doppler (Left & Right Ventricle Outflow Tract)
- Pulmonic Veins
- PAP (Pulmonary Artery Pressure measurement)
- HR (Heart Rate)
- R-R Interval

- CFM Mode:
  - PISA-Radius
  - PISA-Alias Velocity

- Additional Calculations
  - Diast. Vol.(Bi)
  - Syst.Vol.(Bi)
  - Stroke Volume
  - Cardiac Output
  - Eject. Fraction
  - Fract. Shortening FS
  - Myocardial Thickness
  - LA/Ao, Ratio, E/A
  - Peak Gradient, Peak Gradient Acceleration
  - Mean Gradient, Mean Gradient Acceleration
  - VTI, TVA, PG, PHT, MVA, AVA, ERO, etc

Abdominal
Measurements/Calculations
- 2D Mode:
  - Liver
  - Gallbladder
  - Pancreas
  - Spleen
  - Left/Right Kidney
  - Renal Artery
  - Aorta
  - Portal Vein
  - Vessel
- M Mode:
  - Renal Artery
  - Aorta
  - Vessel
- Spectral Doppler Mode:
  - Renal Artery
  - Aorta
  - Vessel
  - Portal Vein
- Summary Reports

Small Parts
Measurements/Calculations
- Thyroid
- Testicle
- Vessel
- Summary Reports

Urology
Measurements/Calculations
- Bladder
- Prostate
- Testicle
- Left/Right Kidney
- Renal Artery
- Vessel
- Summary Reports including PSAD, PPSA(1), PPSA(2) calculation

Pediatric
Measurements/Calculations
- Hip Joint

Probes

- 4C-D Wide Band Convex Probe
  - Applications: Abdomen, OB, GYN
  - Maximum Band Width (-20dB): 1.5 - 4.6 MHz
  - Number of Elements: 128
  - Convex Radius: 60 mm
  - FOV: 58°
  - Foot Print: 60.8 x 13 mm
  - Doppler Transmission
    -Low Freq.: 2,00 MHz
    -Mid Freq.: 2,92 MHz
    -High Freq.: 3,33 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 2.32 MHz
    -Normal: 2.22 MHz
    -Penetration: 2.00 MHz
  - Biopsy Guide available: 4C, Multi-Angle, disposable with reusable bracket

- M6C Wide Band Convex Probe (1.25D Array)
  - Applications: Abdomen, OB, GYN, Pediatrics
  - Maximum Band Width (-20dB): 2.14-6.10 MHz
  - Number of Elements per row: 192
  - Number of rows: 5
  - Convex Radius: 50 mm
  - FOV: 60°
  - Foot Print: 55x18mm
  - Doppler Transmission
    -Low Freq.: 2,78 MHz
    -Mid Freq.: 3,45 MHz
    -High Freq.: 4,01 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 3,04 MHz
    -Normal: 2,78 MHz
    -Penetration: 2,44 MHz
  - Biopsy Guide available: M7C, Multi-Angle, disposable with reusable bracket

- SP10-16-D Wide Band Linear Probe
  - Applications: Small Parts, Peripherals. Vascular, Pediatrics, Ortho
  - Maximum Band Width (-20dB): 4.5 – 16.5 MHz
  - Number of Elements: 192
  - FOV: 33.7 mm
  - Foot Print: 38 x 5.0 mm
  - Doppler Transmission
    -Low Freq.: 7,70 MHz
    -Mid Freq.: 8,34 MHz
    -High Freq.: 9,10 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 6,45 MHz
    -Normal: 5,70 MHz
    -Penetration: 5,27 MHz
  - Steered Angle: Max. 25°
  - Biopsy Guide available: PEC64

- RAB2-5-D Wide Band Convex Volume Probe
  - Applications: Abdomen, OB, GYN
  - Maximum Band Width (-20dB): 2 – 5 MHz
  - Number of Elements: 192
  - Convex Radius: 40,5 mm
  - Volume Sweep Radius: 20,15mm
  - FOV: 80° (B), 85° x 80° (Volume scan)
  - Foot Print: 53,2 x 40,6
  - Doppler Transmission
    -Low Freq.: 2,38 MHz
    -Mid Freq.: 2,95 MHz
    -High Freq.: 3,33 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 2,13 MHz
    -Normal: 2,00 MHz
    -Penetration: 2,00 MHz
  - Biopsy Guide Available: PEC74, Single-Angle, Reusable

- RAB4-8-D Wide Band Convex Volume Probe
  - Applications: Abdomen, OB, GYN, Pediatric, Urology
  - Maximum Band Width (-20dB): 4 – 8,5 MHz
  - Number of Elements: 192
  - Convex Radius: 41.6 mm
  - Volume Sweep Radius: 19,95 mm
  - FOV: 70° (B), 85° x 70° (Volume scan)
  - Foot Print: 53,2 x 40,6 mm
  - Doppler Transmission
    -Low Freq.: 3,04 MHz
    -Mid Freq.: 3,45 MHz
    -High Freq.: 4,01 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 3,23 MHz
    -Normal: 2,78 MHz
    -Penetration: 2,57 MHz
  - Biopsy Guide Available: PEC74, Single-Angle, Reusable

- RIC5-9-D Wide Band Convex Volume Probe
  - Applications: OB, GYN, Urology
  - Band Width (-20dB): 3.7–9.3MHz
  - Number of Elements: 192
  - Convex Radius: 11.6 mm
  - Volume Sweep Radius: 11.6 mm
  - FOV: 146° (B), 146°*90° (Volume scan)
  - Foot Print: 32 x 27 mm
  - Doppler Transmission
    -Low Freq.: 5,26 MHz
    -Mid Freq.: 5,88 MHz
    -High Freq.: 6,66 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 4,30 MHz
    -Normal: 4,30 MHz
    -Penetration: 3,84 MHz
  - Biopsy Guide Available: PEC63, Single-Angle, Reusable

- RIC6-12-D Wide Band Convex Volume Probe
  - Applications: OB, GYN, Urology
  - Band Width(-20dB):9MHz
  - Number of Elements: 256
  - Convex Radius: 11.7 mm
  - Volume Sweep Radius: 11.7 mm
  - FOV: 151° (B), 151*120° (Volume scan)
  - Foot Print: 29,95 (B) x 27,68 (V) mm
  - Doppler Transmission
    -Low Freq.: 6,67 MHz
    -Mid Freq.: 7,15 MHz
    -High Freq.: 8,34 MHz
  - Harmonic Transm. Frequency:
    -Resolution: 5,89 MHz
    -Normal: 5,89 MHz
    -Penetration: 5,56 MHz
  - Biopsy Guide Available: PEC63, Single-Angle, Reusable

- RSP6-16-D Wide Band Linear Volume Probe
  - Applications: Small Parts, Peripherals. Vascular, Pediatrics, Ortho
  - Maximum Band Width (-20dB): 5.6 – 18.4 MHz
  - Number of Elements: 192
  - Volume Sweep Radius: 33 mm
  - FOV: 37.4 mm (B); 37.4 mm * 29° (Volume scan)
  - Foot Print: 38.4 x 44.5 mm
  - Doppler Transm. Frequency.:
    -Low Freq.: 6,26 MHz
    -Mid Freq.: 7,15 MHz
    -High Freq.: 8,34 MHz
  - Harmonic Frequency:
    -Resolution: 6,67 MHz
    -Normal: 6,26 MHz
    -Penetration: 5,89 MHz
  - Biopsy Guide Available: PEC75, Single-Angle, Reusable

External Inputs and Outputs

Connectivity on rear panel (direct access)
- VGA Out
- Footswitch via USB
- Network (RJ45)
- USB (2x)
- RS 232 (Optional, USB to RS232 converter

Connectivity behind rear panel (access after opening):
- Video Out
  - RGB
  - S-Video (VTR)
- Video In:
  - S-Video
- Audio Out
  - Left/right
- Audio In
  - Left/right
- USB (6x external, 5x internal for Dongles, etc)
- Parallel Port
- Remote BW Printer via USB
- Remote Color Printer via USB
- Remote VCR (RS232) via USB
  External microphone via USB

Safety Conformance

The Voluson E8 is:
- Listed to UL 60601-1 by a Nationally Recognized Test Lab
- Certified to CSA 22.2, 60601.1 by an SCC accredited Test Lab
- CB-Test report by National Certification Body
- CE Marked to Council Directive 93/42/EEC on Medical Devices
- Conforms to the following standards for safety:
  - EN 60601-1 Electrical medical equipment
  - EN 60601-1-1 Electrical medical equipment
  - EN 60601-1-2 Electromagnetic compatibility
  - EN 60601-1-4 Programmable medical systems
  - EN 60601-2-37 Particular requirements for the safety of ultrasound medical diagnostic and monitoring equipment
  - IEC 601157 Declaration of acoustic output
  - ISO 10993 Biological evaluation of medical devices
  - NEMA UD3 Acoustic output display (MI, TIS, TIB, TIC)
  - WEEE (Waste Electrical and Electronic Equipment)