



GE Healthcare

Vivid E90

Version 206
Datasheet



Product Description

The Vivid™ E90 combines the proven breadth, quality, and performance of the Vivid product line with a new and innovative software image processing platform: cSound™. The Vivid E90 is GE Healthcare (GEHC) cardiovascular ultrasound's 2D leadership scanner.

The system is designed to excel in adult 2D cardiac imaging, as well as in the following clinical application areas: Fetal/Obstetrics, Abdominal (including renal, GYN), Thoracic/Pleural, Pediatric, Small Organ (breast, testes, thyroid), Neonatal Cephalic, Adult Cephalic, Cardiac (adult and pediatric), Peripheral Vascular, Musculo-skeletal Conventional, Musculoskeletal Superficial, Urology (including prostate), Transesophageal, Transvaginal, Transrectal, Interventional Guidance (including Biopsy, Vascular Access),

Intra-cardiac, Intra-luminal and Intraoperative (vascular).

Vivid E90 is delivered with 23.8" high-resolution, high-contrast HDU monitor or a 22" high-resolution, high-contrast OLED monitor for optimal spatial and dynamic resolution.

System Architecture

GE Healthcare (GEHC)'s exclusive, programmable, and flexible software beamforming technology, cSound, provides exceptional image quality and power compared to conventional hardware-based beamforming technology. cSound offers a software beamformer that adaptively corrects for ultrasound wave distortions caused by inhomogeneities of the speed of sound naturally present in the patient body (optional cSound Adapt), True Confocal Imaging without the limitation of focal zones or sacrifice of frame rate and spatial resolution, in addition to Adaptive Contrast Enhancement (ACE). Using both coherent and harmonic image processing, the system provides computational power, ease of imaging, workflow flexibility and product upgradeability.

The Vivid E90 is designed to excel in the following areas:

Exceptional image quality is enabled by the cSound platform taking advantage of advanced software image reconstruction and state of the art graphics computer technology. The Vivid E90 combines innovative software beamforming with image processing techniques such as auto-gain adjustments (CTO), spatial filtering (UD clarity and UD speckle reduce), and temporal

filtering (DDP) to deliver excellent cardiovascular ultrasound image quality.

Probe technology – The XDclear™ series of probes are designed to help deliver powerful and efficient sound waves, with high bandwidth and efficiency. XDclear probe technology provides impressive deep penetration and high sensitivity while maintaining high spatial resolution. The combination of Single Crystal, Acoustic Amplifier and Cool Stack technologies is the core technology of the XDclear series of probes.

Ease of Use features are designed to make the Vivid E90 a very productive cardiovascular ultrasound system. The addition of a high-resolution touch panel combined with the familiar user interface of the Vivid product line helps give both new and existing Vivid users an easy and effortless start to learning this new scanner.

Additional ease of use for the operator in 2D imaging is provided by the cSound technology delivering auto optimized excellent image quality with minimal manipulation along with automated tools like Auto EF 3.0 (also for DICOM) with AI-based View Recognition, Easy AutoEF, AFI 3.0 (also for DICOM) with AI-based View Recognition, AFI LA, Easy AFI LV, AFI RV, AFI Stress, Scan Assist Pro, QuickApps, Cardiac Auto Doppler, Myocardial Work, Blood Speckle Imaging, AI Auto Measure (Spectrum Recognition and Auto Measure – 2D).

Ergonomic features include a highly portable user-adaptable design with electronic adjustable height and keyboard, articulating and height adjustable monitor, and lightweight transducers

combining to make the Vivid E90 an ergonomic-friendly cardiovascular ultrasound system.

The cSound platform takes GE Healthcare (GEHC)'s **Raw Data** to a new level. For image processing and reconstruction, the Vivid E90 utilizes more than 100 times the data compared to its predecessor.

Additionally, the Vivid E90 uses an innovative data format technology that allows for advanced processing on archived images by applying many of the same scan controls and **advanced quantitative tools** as are available during the original exam.

General Specifications

Dimensions and Weight

- Width: 527 mm (min) / 564 mm (max) (20.7" min / 22.2" max)
(OLED and HDU monitor versions respectively)
- Depth: 844 mm (33.2 inch)
- Height: 1392 mm – 1714 mm (54.8 inch – 67.5 inch)
(up/down mechanism + monitor arm)
- Weight: 120 kg ± 10% (264 lbs ± 10%)

Electrical Power

- Nominal input voltage: 100-240 VAC, 50/60 Hz
- Typical power consumption: 500 W @ default cardiac preset with M5Sc
- Rated power consumption: 700 W

Operating System

- Windows® 10

Console Design

- Five active probe ports
- ECG port
- Integrated HDD
- Multiple USB ports (front/back)
- Integrated DVD-R multi drive (optional)
- On-board storage for B/W thermal printer
- Integrated speakers for premium sound

- Integrated locking mechanism that provides rolling lock and caster swivel lock
- Integrated cable management
- Easily accessible removable air filters for cleaning
- Front and rear handles
- Side storage trays
- Rear storage trays/baskets
- Hand rest

Eco Friendly Design

- Vivid E90 offers an inverted B&W background printing, helping to prevent waste of ink and paper
- eDelivery remote software update solution helps decrease use of hardware drivers and decrease our service field engineers carbon emission footprint.

User Interface

Operator Keyboard

- Floating keyboard adjustable in three dimensions:
 - Height
 - Rotation
 - Extension
- The control panel of the system can move freely in all directions; the vertical displacement of the panel is driven by a motor; the control buttons are located near the handles
- Touch keyboard with support for characters in 12 languages
- Drawer type, lit, A/N keyboard
- Support for European keyboard character sets (ISO 8859)
- Ergonomic hard key layout
- Interactive back lighting
- Integrated gel holders
- User-configurable probe holders
- Easy-to-learn user interface
- Dedicated rotary for overall gain for 2D-mode
- Dedicated gain rotary for M-mode, CFM or Doppler controlled by active mode

- Image manager on the touch screen for quick review of image clipboard contents and easy export of images and loops to DICOM® servers or media

Touch Screen

- 12.1" ultra-high-resolution, wide-screen format, color, multi-touch LCD screen
- Interactive user-configurable dynamic software menu
- Backlight adjustment
- Display of live ultrasound images on the touch screen (Image View)

Monitor

- 23.8" high-resolution, high-contrast HDU (LED) monitor or a 22" high-resolution, high-contrast OLED monitor for optimal spatial and dynamic resolution
- 256 shades of gray and 16.7 million simultaneous colors available
- Articulated monitor arm
- Monitor translation (independent of console):
 - 350 mm horizontal bidirectional
 - 150 mm vertical height adjustment
 - Swivel to any viewing direction
- Fold down and rotation lock mechanism for transportation
- Horizontal viewing angle wider than 170° with OLED monitor and 90° with HDU monitor
- Resolution: 1920 x 1080 px
- Manual digital brightness and contrast adjustment for optimal viewing in different ambient light conditions
- Tint and backlight adjustments
- Separate adjustment for external monitor brightness/contrast
- Separate selection for resolution and screen area output to external monitor

System Overview

Probe Presets

- Cardiac
- Stress (incl. Exercise, QStress and LVO Stress) (optional)
- Abdominal (incl. renal)

- Vascular (incl. carotid, LEA, LEV, UEA, UEV, aorto-iliac)
- Fetal heart
- Pediatric
- Neonatal
- Neonatal head
- Small parts
- Thyroid
- Breast
- Musculoskeletal conventional
- Musculoskeletal superficial
- Intraoperative (vascular)
- Transcranial
- Scrotal
- Urology (incl. pelvic)
- Transesophageal
- OB/GYN
- Coronary (part of QuickApps)
- Vascular Contrast (optional)¹
- Contrast Low MI (optional)¹
- LVO contrast (part of QuickApps)
- LVO Stress
- Lungs

Operating Modes

- 2D Tissue
- 2D Color Flow
- 2D Angio Flow
- Color M-mode
- Tissue Velocity M-mode
- Continuous Wave Doppler
- Tissue M-mode
- Pulsed Wave Doppler
- Anatomical M-mode
- Curved Anatomical M-mode
- Tissue Velocity Imaging
- Tissue Tracking
- Tissue Synchronization Imaging
- Strain Imaging
- Strain Rate Imaging
- Tissue Velocity Doppler
- Blood Flow Imaging

- Blood Speckle Imaging (BSI) (optional)
- Blood Flow Angio Flow Imaging
- B-flow
- 2D Stress (optional)
- 2D Virtual Apex Imaging
- Strain Elastography
- Bi-plane
- Tri-plane
- Bi- and Tri-plane with color
- Coded Phase Inversion and Power Modulation Contrast Imaging
- Compound Imaging
- Extended Field-of-view (LOGIQ™ View)

Scanning Methods

- Electronic sector
- Electronic volume
- Electronic convex
- Electronic linear
- CW pencil

Transducer Types

- Sector phased array
- Convex array
- Linear array
- Single crystal matrix array
- 2D matrix array

Peripheral Options

- Console protective cover

Internal peripherals

- USB B/W" video printer with control from system (optional)

External peripherals (optional)

- Direct streaming DVR (Sony® HVO-550MD)
- Network printers
 - USB inkjet printer
 - Color laser printer
 - Color video printer with control from system
- 16 GB encrypted memory stick
- Three-pedal configurable footswitch

- Optical isolation cable – DVI 104 fiber optic extender, required to connect the external monitors to the scanner

External outputs

- DVI-D and display port
- Ethernet – 10 Mbps, 100 Mbps, 1 Gbps
- Multiple USB 3.0 ports

Display Modes

- Live and stored display format: Extra-large, full size and split screen, both with thumbnails, for still and cine
- Instant-review screen displays 12 simultaneous loops/images for a quick study review
- Selectable display configuration of duplex and triplex modes: side-by-side or top-bottom during live, digital replay and clipboard image recall
- Single, dual, and quad-screen view
- Simultaneous capability
 - 2D+ PW/CW
 - 2D + CFM/TVI + PW
 - 2D + CFM + CW
 - 2D + CFM/Angio/TVI/SRI/TT/SI/TSI
 - 2D + M/AMM/CAMM
 - 2D+ CFM/Angio/TVI/SRI/TT/SI/TSI + M/AMM/CAMM
 - Real-time duplex or triplex mode
 - Compound + M/CFM/PW
 - 2D + bi-plane
 - 2D + bi-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM
 - 2D + tri-plane
 - 2D + tri-plane + CFM/TVI/SRI/TT/SI/TSI/AMM/CAMM (6VT only)
- Real-time dual view 2D + 2D and color/power angio
- Selectable alternating modes
 - 2D or Compound + PW
 - 2D + CW
 - 2D or Compound + CFM/PW
 - 2D + CFM + CW
- Multi-image (split/quad screen)

¹ GE Healthcare (GEHC)'s Vivid scanner is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use. The Contrast Low MI and Vascular/Abdominal Contrast options are not available in USA.

- Live and/or frozen
- Independent cine playback
- Timeline display
 - Independent 2D (or Compound) + PW/CW/M display
 - A choice of display formats with various sizes of 2D + PW/CW/M
- Top/bottom selectable format
- Side/side selectable format

Display Annotation

- Patient name: First, last and middle
- Patient ID
- Additional patient ID
- Age, sex, and birth date
- Hospital name
- Date format: Two types selectable – MM/DD/YY, DD/MM/YY
- Time format: Two types selectable – 24 hours, 12 hours
- Gestational age from LMP/EDD/GA
- Probe name
- Map names
- Probe orientation
- Depth scale marker
- Image depth
- Zoom depth
- B-mode
 - Gain
 - Imaging frequency
 - Frame averaging
 - Texture
- M-mode
 - Gain
 - Frequency
 - Time scale
- Doppler mode
 - Gain
 - Angle
 - Sample volume size and position
 - Wall filter
 - Velocity and/or frequency scale
 - Spectrum inversion
- Time scale
 - PRF
 - Doppler frequency
- Color Flow Doppler mode

- Frame rate
- Sample volume size
- Color scale
- Power
- Color baseline
- Color threshold marker
- Color gain
- Spectrum inversion
- Acoustic frame rate
- CINE gauge, image number/frame number
- Bodymarks: Multiple human anatomical structures
- Application/preset name
- Measurement results
- Operator message
- Displayed acoustic output
 - TIS: Thermal Index Soft Tissue
 - TIC: Thermal Index Cranial (Bone)
 - TIB: Thermal Index Bone
- MI: Mechanical Index
- Power output in dB
- Biopsy guideline and zone
- Heart rate
- Trackball-driven annotation arrows
- Active mode display
- Stress protocol parameters
- Parameter annotation follows ASE standard
- Free text with word library
- Scan plane position indicator and probe temperature are displayed with all TEE probes
- Image orientation marker

General System Parameters

System Setup

- Pre-programmable M&A and annotation categories
- User-programmable preset capability with administrator preset protection
- QuickApps: Factory and user programmable sub-preset feature that keeps 2D and geometry settings while adapting color flow or contrast parameters

- Factory default preset data, protected against modification
- User-defined annotations
- Body patterns
- Customized comment home position

CINE Memory/Image Memory

- 8 GB of RAM (1.0 GB used for cine memory)
 - >1400 seconds of data storage in 2D
 - >7700 seconds of data storage in Doppler
- Selectable cine sequence for cine review
- Measurements/calculations and annotations on cine playback
- Scrolling timeline memory
- Dual-image cine display
- Quad-image cine display
- CINE gauge and cine image number display
- CINE review loop
- CINE review speed

Image Storage

- On-board database of patient information from past exams
- User-selectable ECG and time gated acquisition available on touch panel during live
- User-selectable prospective or retrospective capture in config
- Storage formats:
 - DICOM compressed/uncompressed, single/multi-frame, with/without raw data, storage via clipboard and/or seamlessly directly to destination device
 - Transfer/ "Save As" JPEG, MPEG, AVI, DICOM, Raw DICOM formats
- Storage devices:
 - USB memory stick: 16 GB
 - CD-RW storage: 700 MB
 - DVD storage: -R (4.7 GB)
 - 1 TB SSD hard drive with 769 GB image storage
- Compare old images with current exam
- Reload of archived data sets

- Activation control of USB devices (for security)

Annotations

Body Marks

- Body mark icons for location and position of probe
- Easy selection of body marks from touch panel

Text Annotations

- Easy selection of text annotations from touch panel

Connectivity and DICOM

- USB wireless network interface kit (optional)
- Ethernet network connection
- DICOM 3.0
 - Verify
 - Print
 - Store
 - Modality workload
 - Storage commitment
 - Modality Performed Procedure Step (MPPS)
 - Media exchange
 - DICOM spooler
 - DICOM query/retrieve
- Structured reporting – compatible with adult cardiac, pediatric, and vascular
- Media store of structured reporting
- InSite™ ExC capability for remote service/access
- Support of two patients' IDs in DICOM
- Separate DICOM SR and image storage destinations
- Simultaneous transfer of DICOM to multiple destinations
- Support for multimodality DICOM import and review (with CT Fusion Live option)
- DICOM PDF Read
- DICOM /TLS (encryption)
- DICOM Implicit Encoding support

Patient Archive

EchoPAC™/Patient Archive

- Integrated EchoPAC functionality adds connectivity and image analysis capability to scanner
- Data format fully compatible with offline EchoPAC review/reporting stations of same or newer vintage
- Instant access to ultrasound raw data provided by the system
- Advanced post-processing analysis
- Three user levels help organizing data security requirements
- E-signoff compatibility, with clear indications in patient management screens and report screen that a report was signed off, and by whom and at what time. The signed off report and exam cannot be changed. The “Diagnosing Physician” field is automatically assigned to the user that did the sign-off

Image and Data Management

- Exceptional workflow with instant access data management
- DICOM 3.0 support – see DICOM conformance statement for details
- Support for transfer of the proprietary raw data files within the DICOM standard. With the use of the AI-based View Recognition this can be automated
- 2D, CFM or TVI data at maximum frame rate may be reviewed by scrolling or by running cine loops (can contain more than 900,000 [M5Sc, minimum width/depth, zoom] frames for imaging modes)
- Image clipboard for stamp-size storage and review of stored images and loops
- Built-in patient archive with images/loops, patient information, measurements, and reports
- DICOM-SR Standard structured reporting mechanism
- Structured findings report tools support efficient text entries with direct

editing of findings text, usability improvements, new configuration options and conclusion section

- User can enter normal values which are then compared to actual measurements
- Configurable HTML-based report function
- Report templates can be customized on board
- ASE-based default text modules (English), user-customizable
- Internal archive data can be exported to removable image storage through DICOM media
- Internal SSD hard disk – for storing programs, application defaults, ultrasound images and patient archive
- All data storage is based on ultrasound raw data, allowing to change gain, baseline, color maps, sweep speeds, etc., for recalled images and loops
- DICOM media – read/write images on DICOM format
- DICOM viewer embedded on media (optional and selectable in Config)
- Alphanumeric data can be exported in XML format
- JPEG export (“Save As”) for still frames
- AVI and MPEG export (“Save As”) for cine loops
- Ability to transfer Systole Only in stress to PACS
- Selectable raw data transfer to PACS including AI-based View Recognition for automatic view labelling

Tricefy® Uplink (optional)²

- Tricefy is a Cloud service
- Can serve as long-term archive
- Can be used to share complete examinations with colleagues for information exchange and for consultation
- Can be used to send images to patients

² Tricefy Uplink may not be available in all countries and regions. Consult with a GE Healthcare (GEHC) representative for more details.

App Launchpad³

- The App Launchpad is a tab available on the Archive screen – when selected, various applications (“Apps”) can be launched
- Only validated and released Apps are supported
- 3rd-party Apps can be purchased through an AppStore on a GE Healthcare (GEHC) website
- Consult with a GE Healthcare (GEHC) representative for more details

Raw Data Streaming (optional)

- Provides streaming of raw data out to 3rd-party devices designed to process this data

Remote Viewing (optional)

- Network based streaming of the screen of the Vivid console to a web-browser on a remote device connected to the same network

User Manual Available on Board

Available through touch-panel utility page when installed from below mentioned USB device. User manual and service manual are included on a USB memory device with each system. A printed user manual can be provided for those countries where this is required.

- User manual languages: English, French, German, Spanish, Italian, Portuguese (European and Brazilian), Swedish, Danish, Dutch, Norwegian, Japanese, Chinese, Polish, Finnish, Greek, Russian, Hungarian, Slovak, Romanian, Czech, Latvian, Lithuanian, Turkish, Estonian, Korean, Serbian, Bulgarian, Croatian, Indonesian, Kazakh, Ukraine

Scanning Parameters

- Unlimited number of effective channels
- Minimum field-of-view range (depth): 0–2 cm (zoom) (probe dependent)
- Maximum field-of-view range (depth): 0–50 cm (probe dependent)
- Width range: 10 – 120 degrees

- Continuous dynamic receive focus/continuous dynamic receive aperture
- Continuous dynamic transmit focus (True Confocal Imaging)
- Adjustable dynamic range, unlimited upper level
- Image reverse: Right/left
- Image rotation of 0°, 180°

Tissue Imaging

General

- Variable transmit frequencies for resolution/penetration optimization
- Display zoom with zoom area control
- High-Resolution (HR) Zoom – concentrates all image acquisition power into selected Region of Interest (ROI)
- Variable contour filtering – for edge enhancement
- Depth range up to 50 cm – probe specific
- Selectable grayscale parameters – gain, reject, DDP, clarity, dynamic range, and compress; can be adjusted in live, digital replay and image clipboard recall (probe dependent)
- Eight TGC (Time Gain Compensation) sliders for manual setting of gain by depth
- Automatically calculated TGC curves reduce operator interaction
- Automatically calculated lateral gain

2D Mode

- Sector tilt and width control
- Frame rate in excess of 6500 fps, depending on probe, settings, and applications
- Coded octave imaging with coded phase inversion – 3rd-generation harmonic tissue imaging providing improved lateral and contrast resolution over conventional fundamental imaging. Features help reduce noise, improve wall definition, and axial resolution, making it well suited for a wide variety of patient groups

- True Confocal Imaging (TCI) – ultra narrow focused two-way beam profile throughout the field-of-view, maintaining frame rate, no zone stitching, no multi-line acquisition artifacts and enhanced dynamic contrast resolution throughout field-of-view compared to conventional focal imaging
- cSound Adapt (optional) - image reconstruction technique that adaptively corrects for ultrasound wave distortions caused by inhomogeneities of the speed of sound naturally present in the patient body due to muscle, fat, cartilage, and bone
- Adaptive Contrast Enhancement (ACE) – emphasizing echoes from real structures while reducing noise/haze, resulting in enhanced signal-to-noise ratio
- Automatic tissue optimization – single keystroke optimizes immediately automatically and dynamically different grayscale settings with the goal of signal independent uniform gain and contrast distribution
- UD Clarity and UD Speckle Reduction Imaging – an advanced image processing technique to help reduce speckle in real-time examining the relative difference between neighboring pixel values and determining whether the grayscale variations have a sharp difference, follow a trend, or are random in nature
- HD imaging – real-time simultaneous acquisition at dual frequencies compounded to help reduce speckle and noise while enhancing resolution and contrast
- Texture imaging – a QuickApp that enhanced structures within the muscle through an edge detection type of ACE algorithm (**Note:** Do not use texture imaging if AFI or Auto EF will be used.)
- Hybrid filter – spatial filter that makes borders and structure smooth (built in, no user control)

³ App Launchpad may not be available in all countries and regions. Consult with a GE Healthcare (GEHC) representative for more details.

- Multiple-angle Compound Imaging – multiple co-planar images from different angles combined into a single image in real-time to help enhance border definition and contrast resolution, as well as reduce angular dependence of border or edge as compared to no-compound imaging
- Virtual convex allows a wider FOV and aims to enhance image quality on linear probes in particular
- Elevation compounding (built in, no user control – 4D probes only)
- LOGIQ view – provides the ability to construct and view a static 2D image with wider field-of-view of a given transducer. This allows viewing and measurements of anatomy that is larger than what would fit in a single image
- Virtual apex provides a wider field-of-view with phased array and TEE probes, effective at certain imaging views where a wide near field is preferred
- L/R and up/down invert, in live, digital replay or image clipboard recall
- Digital replay for retrospective review or automatic looping of images, allowing for adjustment of parameters such as gain, reject, Anatomical M-mode, persistence, and replay speed
- Data Dependent Processing (DDP) performs temporal processing which helps reduce random noise but leaves motion of significant tissue structures largely unaffected – can be adjusted even in digital replay
- 256 shades of gray
- Colorized 2D-mode, user-selectable in real-time, digital replay

Multi-Dimensional Mode

- Bi-plane scanning – two independent simultaneous scan planes where one of them can be rotated and tilted freely
- Bi-plane prepare mode for ease of obtaining biplane views from 4D render data sets

- Tri-plane – three independent simultaneous scan planes that can be rotated freely
- Both bi-plane and tri-plane scanning is possible in all color Doppler modes

M-mode

- Trackball steers M-mode line available with all imaging probes – max steering angle is probe dependent
- Simultaneous real-time 2D- and M-mode
- M-mode PRF 1 kHz – image data acquired is combined to give high-quality recording regardless of display scroll speed
- Digital replay for retrospective review of spectral data
- Several top-bottom formats, side-by-side format, and time-motion-only format – can be adjusted in live or digital replay
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display
- Horizontal scroll can be adjusted in live or digital replay

Anatomical M-mode

- M-mode cursor can be adjusted at any plane
- Curved Anatomical M-mode – free (curved) drawing of M-mode generated from the cursor independent from the axial plane
- Can be activated from live, digital replay or image clipboard recall
- Anatomical color and Tissue Velocity M-mode
- M&A capability

Color Doppler Imaging

General

- Steerable color Doppler available with all imaging probes – max steering angle is probe dependent
- Trackball-controlled ROI
- Removal of color map from the tissue during digital replay
- Digital replay for retrospective review of color or color M-mode data allowing for adjustment of parameters such as

encoding principle, color priority and color gain even on stored data

- PRF settings – user-selectable
- Advanced regression wall filter gives efficient suppression of wall clutter
- For each encoding principle, multiple color maps can be selected in live and digital replay – variance maps available
- More than 65,000 simultaneous colors processed, providing a smooth display two-dimensional color maps containing a multitude of color hues
- Simultaneous display of grayscale 2D and 2D with color flow
- Color invert – user-selectable in live and digital replay
- Variable color baseline – user-selectable in live and digital replay
- Multi-variate color priority function gives delineation of disturbed flows even across bright areas of the 2D-mode image
- Color Doppler frequency can be changed independently from 2D

Color Flow Imaging

- The cSound platform with its parallel beamformer architecture allows a combination of ultra-high frame rate and increased lateral resolution compared to previous generation GE Healthcare (GEHC) scanners
- Ultra-high digital signal processing power, maintaining high frame rates with large ROI's even for very low PRF settings
- Frame rate in excess of 450 fps, depending on probe and settings
- Variable ROI size in width and depth
- User-selectable radial and lateral averaging to help reduce statistical uncertainty in the color velocity and variance estimates
- Data Dependent Processing (DDP) performs temporal processing and display smoothing to help reduce loss of transient events of hemodynamic significance
- Digital replay for retrospective review or automatic looping of color images,

allowing for adjustment of parameters such as DDP, encoding principle, base-line shift, color maps, color priority and color gain even on frozen/recalled data

- Application-dependent, multi-variate motion discriminator helps reduce flash artifacts
- Dedicated coronary flow application
- Multiple-angle compound imaging in 2D mode is maintained while in color Doppler mode

Multi-Dimensional Color Mode

- Bi-plane and tri-plane scanning with all color Doppler and tissue velocity modes

Color Angio

- Angle-independent mode for visualization of small vessels with increased sensitivity compare to standard color flow of previous GE Healthcare (GEHC) products

Color M-mode

- Variable ROI length and position – user-selectable
- User-selectable radial averaging to help reduce statistical uncertainty in the color velocity and variance estimates
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display – can be adjusted during live, digital replay or image clipboard recall
- Real-time 2D image while in color M-mode
- Same controls and functions available as in standard 2D color Doppler

Anatomical Color M-mode

- GE Healthcare (GEHC)-patented, any plane color M-mode display derived from color Doppler cine loop
- Applicable to Tissue Velocity Imaging
- M&A capability

B-flow

- B-flow is a digital imaging technique that provides real-time visualization of vascular hemodynamics by directly visualizing blood reflectors and presenting this information in a grayscale display

- Use of GE Healthcare (GEHC)-patented techniques to boost blood echoes, and to help preferentially suppress non-moving tissue signals

- B-flow is available for most vascular and shared service applications

Blood Flow Imaging

- Combines color Doppler with grayscale speckle imaging
- Helps improve delineation of blood flow without bleeding into tissue or vessel wall

Blood Speckle Imaging (optional)

- Combines color Doppler with grayscale speckle imaging
- Reduces the aliasing experienced with regular color flow
- Visualizes blood flow patterns by a graphical representation of the trajectories of the blood cells
- Available for specific probes only
- Simple quantification tools available – Distance, Area, Time
- Export of the velocity fields available (for access to file format, contact GE Healthcare (GEHC))

Blood Flow Angio Imaging

- Combines angio with grayscale speckle imaging

Strain Elastography

- Visualization of relative tissue stiffness

Spectral Doppler

General

- Operates in PW, HPRF and CW modes
- Trackball steerable Doppler available with all imaging probes – max steering angle is probe dependent
- Selectable Doppler frequency for enhanced optimization
- High-quality, real-time duplex or triplex operation in all Doppler modes, CW, and PW, and for all velocity settings
- Frame rate control for optimized use of acquisition power between spectrum, 2D and color Doppler modes in duplex or triplex modes

- Very fast and flexible spectrum analysis with an equivalent DFT rate of 0.2 msec
- Automatic Spectrum Optimization (ASO) provides a single push, automatic, real-time optimization of PW or CW spectrum scale and baseline display
- Dynamic gain compensation for display of flows with varying signal strengths over the cardiac cycle to help improve ease of use
- Dynamic reject gives consistent suppression of background – user-selectable in real-time, digital replay or image clipboard recall
- Digital replay for retrospective review of spectral Doppler data
- Several top-bottom formats, side-by-side format, and time-motion-only format – can be adjusted in live or digital replay
- Selectable horizontal scroll speed: 1, 2, 3, 4, 6, 8, 12, 16 seconds across display – can be adjusted in live or digital replay
- Adjustable spectral Doppler display parameters: Gain, reject, compress, color maps – can be adjusted in live or digital replay
- User-adjustable baseline shift – in live, digital replay and image clipboard recall
- Automatic or adjustable velocity scale (depending on probe and setting)
- Wall filters with range 10-2000 Hz (velocity scale dependent)
- Angle correction with automatic adjustment of velocity scale – in live, digital replay and image clipboard recall
- Auto Doppler angle
- Stereo speakers mounted in the front panel
- Display annotations of frequency, mode, scales, Nyquist limit, wall filter setting, angle correction, acoustic power indices
- Compound in duplex

PW/HPRF Doppler

- Automatic HPRF Doppler maintains its sensitivity even for shallow depths and with high PRF's
- Digital velocity tracking Doppler employs processing in range and time for high-quality spectral displays
- Adjustable sample volume size of 1-16 mm (probe dependent)
- Maximum sample volume depth 30 cm
- PRF ranges from 900 to 15,500 Hz

CW Doppler

- Highly sensitive steerable CW available with all phased array
- PRF ranges from 900 to 60,000 Hz

Contrast Imaging

LV Contrast (included as a Preset or as a QuickApps)

- Enables contrast applications intended for imaging of the left ventricle
- LV contrast (4Vc-D, M5Sc-D, 6VT-D) enhances delineation of ultrasound contrast agents. The user can choose between two types of transmit techniques controlled by the Frequency rotary: Power Modulation and Pulse Inversion, each with different characteristics that may affect imaging performance depending on the type of microbubbles being used. A high MI Flash feature is available to rapidly destruct bubbles. Other controls are also available for image acquisition optimization. Imaging can be performed in live or with ECG triggering. If needed, the contrast intensity can be quantified using the QAnalysis package.
- LVO stress (M5Sc-D, 4Vc-D) provides enhanced delineation of the LV border when contrast is used as part of an exercise stress exam, preserving an adequately long continuous capture buffer length

Contrast Low MI (optional)⁴

- Contrast Low MI imaging is enabled by the Advanced Contrast option. Contrast Low MI is a preset that enables real-time continuous imaging of microbubbles using a low enough MI to generate return signals from the bubbles without destroying them. The user can choose between two types of transmit techniques controlled by the Frequency rotary: Power Modulation and Pulse Inversion, each with different characteristics that may affect imaging performance depending on the type of microbubbles being used.
- A high MI Flash feature is available to rapidly destruct bubbles. Other controls are also available for image acquisition optimization.
- Imaging can be performed in live or with ECG triggering.
- The contrast intensity can be quantified using the QAnalysis package.
- The option may not be available in all countries.

Vascular/Abdominal Contrast (optional)⁴

- Vascular contrast – enables contrast applications intended for vascular (9L-D) and abdominal (C1-6-D) contrast imaging. The option may not be available in all countries.
- Vascular contrast (9L-D) – coded phase inversion enables excellent detection and resolution of vascular contrast imaging

Tissue Velocity Imaging

Tissue Velocity Imaging Mode

- Myocardial Doppler imaging with color overlay on tissue image
- Tissue Doppler data can be acquired in background during regular 2D imaging
- The velocity of myocardial segments after entire heart cycle can be displayed in one single image

- Tissue color overlay can be removed to show just the 2D image, still retaining the tissue velocity information
- Quantitative profiles for TVI, Tissue Tracking, strain and strain rate can be derived
- Time markers for valve events derived from any TM mode help simplify understanding of signals in velocity traces or Curved Anatomical M-mode

Tissue Tracking Mode

- Real-time display of the time integral of TVI for quantitative display of myocardial systolic displacement
- Myocardial displacement is calculated and displayed as a color-coded overlay on the grayscale and M-mode image – different colors represent different displacement ranges

Tissue Synchronization Imaging Mode

- Parametric imaging which gives information about synchronicity of myocardial motion
- Myocardial segments colored according to time to peak velocity, green for early and red for late peak
- Waveform trace available to obtain quantitative time to peak measurement from TSI Image
- Available in live scanning, as well as an offline calculation derived from Tissue Doppler data
- Additional features in combination with multi-dimensional imaging option
- Simultaneous acquisition of tri-plane TSI images covering all standard in apical views
- Efficient segment specific TSI time measurements
- Immediate bulls-eye report
- Automatic calculated TSI synchrony indexes
- TSI surface mapping
- LV synchronization report template
- CRT programming protocol

⁴ GE Healthcare(GEHC)'s Vivid scanner is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use.

Strain/Strain Rate Mode

- Tissue deformation (strain) and rate of deformation (strain rate) are calculated and displayed as real-time, color-coded overlay on the 2D image
- Cine Compound calculates and displays cineloops generated from a temporal averaging of multiple consecutive heart cycles
- Anatomical M-mode and Curved Anatomical M-mode displays (SI and SRI)

Physiological Traces

- Integrated three-lead ECG module
- Automatic QRS complex detection
- External ECG lead input
- Up to three traces display simultaneously
- Internally generated respiratory trace using ECG leads
- ECG trigger
- ECG lead selection
- High-resolution display of the following traces: ECG, respiration, phono, and pressure/AUX
- Adjustable ECG QRS markers

Automatic Optimization

- Auto – dynamic optimization of B-mode image to improve contrast resolution, TGC and grayscale (soft or sharp, user-selectable)
- Auto-Spectral Optimize (ASO) – dynamic adjustments of baseline, and PRF (on live image) and angle correction

Protocol Features

Scan Assist Pro

- Customizable automations that assist the user through each step of the scan
- Helps enhance consistency and reduce keystrokes
- Supports selection of all modes, all measurements, and dual annotations
- Imaging attributes: Octave, Steer, Dual/Quad screen, Compound, LOGIQ View, Zoom, Depth, Scale and Baseline
- On-line or off-line protocol editor

- Image acquisition according to predefined protocol templates
- Various factory protocol templates
- User-configurable protocol templates

Pre-Post Compare

- Labelling of measurements and images acquired in different stages of an exam or procedure, allowing to compare measurements pre and post procedure.

Stress Echo (optional)

Supported Protocol Examinations

- 2D pharmacological stress echo
- 2D bicycle stress echo
- 2D continuous capture stress echo (treadmill stress echo)
- AFI Stress protocols (separate option) – acquire standard apical 2D views and quantify wall motion (longitudinal segmental and global strain) at all stress levels (**Note:** AFI and Stress options required separately.)
- Cardiac resynchronization therapy programming protocols

Protocol Examinations Features (enabled with stress option)

- Wall motion scoring: Analysis by wall motion in individual myocardial segments
- Show reference: Show a reference image from baseline or previous level during acquisition
- Smart stress: Automatically set up various scanning parameters (for instance geometry, frequency, gain, etc.) according to same projection on previous level
- Scan mode settings: Scan mode may be specified for individual views in the protocol
- Preview of store: Show running loops as preview before storing to the examination

Continuous Capture

- Continuously acquire large amounts of 2D image data, and selection of projection views for analysis afterwards
- The entire continuous capture recording may be kept in memory while it is

possible to store new images outside the protocol template, or the entire recording can be stored to file

- Selection of projection views on Scanner or EchoPAC when the entire recording is stored to file

Wall Motion Scoring

- As part of the measurement and analysis package one can access a wall motion assessment module, providing analysis/scoring of individual myocardial segments
- For use with all stress modalities

AFI Stress Echo

- Single or tri-plane acquisition of standard 2D apical views
- Analysis with dedicated AFI stress analysis tool
- Provides longitudinal strain values per segment, as well as globally
- Allows complete assessment at a glance by combining three longitudinal views into one comprehensive bullseye view
- Integrated into M&A package with specialized report templates
- Simplified workflow with adaptive ROI, quick tips, and combined display of traces from all segments

Cardiac Resynchronization Therapy (CRT) Programming Protocols

- CRT protocols require Stress option
- Tailored acquisition protocol for data needed for programming of AV and VV delays in biventricular pacemakers
- Image acquisition of a set of projection views with various scan mode settings
- Template editor
- User-configurable protocol templates
- Configure protocol name, number of levels and views, name of level and views and several other protocol settings (smart stress, show reference, scan mode, preview of store, timer handling, etc.)

Measurement and Analysis (M&A)

- Personalized measurement protocols allow individual set and order of M&A items
- Measurements can be labeled seamlessly by using protocols or post assignments
- Measurements assignable to protocol capability
- Parameter annotation follows ASE standard
- Seamless data storage and report creation
- User-assignable parameters
- Comprehensive set of cardiac measurements and calculations to help assess dimensions, flow properties and other functional parameters of the heart
- Comprehensive set of shared service measurements and calculations covering vascular, abdominal, obstetrics and other application areas
- Configuration package to set up a customized set and sequence of measurements to use, defining user-defined measurements and changing settings for the factory-defined measurements
- Stress echo support allowing wall motion scoring and automatic stress level labeling of measurements
- Support for measuring on DVR recordings and DICOM images
- Automatic Doppler trace functionality for use in non-cardiac applications in both live and replay
- Worksheet for review, edit and deletion of performed measurements
- Reporting support allowing a configurable set of measurements to be shown in the exam report
- DICOM SR export of measurement data
- AI Auto Measure 2D – the AI based Auto Measure 2D feature enables automated quantification of the most common distance measurements performed on parasternal LAX 2D images;

minimal user guidance is required, but manual editing capabilities are supported

- AI Auto Measure Spectrum Recognition – The AI based Spectrum Recognition feature enables automated recognition of the most common Doppler spectra and automatically starts the Auto Doppler measurement (where available). For those measurements not supported by Auto Doppler, the feature enables opening of the appropriate measurement folder for the recognized spectrum
- Cardiac Auto Doppler automatically provides Doppler measurement results for the most common parameters, with minimal user guidance

Automated Function Imaging (AFI 3.0) (optional)

- Third generation parametric imaging tool which gives quantitative data for global and segmental strain
- User-selectable endo or full wall global strain values displayed
- Allows comprehensive assessment at a glance by combining three longitudinal views into one comprehensive bulls-eye view
- Random sequence of analysis of the three apical views supported
- Ability to exit tool after one or two views completed
- Integrated into M&A package with specialized report templates
- Simplified workflow with fully automated ROI tracing (if configured), quick tips and combined display of traces from all segments
- ROI width editable by user
- **Peak Strain Dispersion (PSD)** (included in AFI and 2D Strain [EchoPAC]). Index, as well as bullseye displaying variability in time to peak longitudinal strain. The index is the standard deviation from the average (of all segments) over the whole heart cycle, while the bulls-eye displays the PSD in a color scheme where green color indicates normal contraction with a peak at or

around AVC, blue color indicates early contraction and yellow to red indicates late contraction

- Support for display of Ejection Fraction (EF) as part of this tool
- On-scanner automatic labelling of views during acquisition enabled by an intelligent algorithm called View Recognition, is used to simplify the AFI workflow eliminating the need to pick views
- AFI 3.0 supports analysis of DICOM images from 3rd-party scanners, in addition to analysis of Vivid raw data images

Easy AFI LV (optional)

- Automated one-click AFI LV analysis. Our AI-based Auto ROI detection algorithm allows users to complete the AFI workflow with no manual interaction apart from initiating the measurement tool and approving the results

AFI Stress

- Dedicated protocol and workflow integrating AFI as part of a stress exam (pharmacological, as well as exercise) – see Stress Echo (optional) section

AFI RV (optional)

- AFI RV is an automated parametric tool giving quantitative data for right ventricular longitudinal Global Strain, Free Wall Strain and Segmental Strain derived from raw data images of the apical 4-chamber RV focused view (TTE)
- In addition, the Tricuspid Annular Plane Systolic Excursion (TAPSE) is provided
- The 3-point click method is used for ROI selection.
- The tool supports ROI editing of both endo- and epicardial borders as well as selectable full wall/endocardial strain calculation
- Combined display of traces from all segments

AFI LA (optional)

- Parametric tool giving quantitative data from GE Healthcare (GEHC) raw data images for left atrial longitudinal global strain as well as LA volumes and

Emptying Fraction derived from the apical 4-chamber and 2-chamber views (TTE)

- The 3-point click method is used for ROI selection
- Full wall tracking is utilized

Myocardial Work (optional)

- Builds upon the results from AFI
- After adding the external blood cuff pressure and event timing for each AV/MV valve opening/closure a strain pressure curve, a work index and a work efficiency percentage is produced

Automated Ejection-Fraction

Calculation (Auto EF 3.0) (optional)

- Third generation automated 2D EF measurement tool based upon a 2D-speckle tracking algorithm
- Compared to the original version ROI editing is enhanced
- The tool is integrated into the M&A package with specialized report templates
- On-scanner automatic labeling of views during acquisition enabled by an intelligent algorithm called View Recognition, is used to simplify the Auto EF workflow eliminating the need to pick views
- Auto EF 3.0 supports analysis of DICOM images from 3rd-party scanners, in addition to analysis of Vivid raw data images

Easy AutoEF (optional)

- Automated one-click Ejection Fraction (EF) measurement. Our AI-based Auto ROI detection algorithm allows users to complete the Ejection Fraction (EF) measurement on loops acquired with or without ECG signal, and with no manual interaction apart from initiating the measurement tool and approving the results

Quantitative Analysis Package (Q-Analysis)

- Traces for velocity or derived parameters (strain rate, strain, displacement) inside defined regions of interest as function of time

- Contrast analysis with traces for gray-scale intensity or angio power inside defined regions of interest as function of time, including post processing ECG triggering and curve fitting for wash in/wash out analysis
- Curved Anatomical M-mode display allowing an M-mode along an arbitrary curve in a 2D image
- Sample-area points may be dynamically anchored to move with the tissue when running the cine loop
- Cine Compound displays cine loops generated from a temporal averaging of multiple consecutive heart cycles

Generic Measurements

- BSA (Body Surface Area)
- MaxPG (Maximum Pressure Gradient)
- MeanPG (Mean Pressure Gradient)
- % Stenosis (Stenosis Ratio)
- PI (Pulsatility Index)
- RI (Resistivity Index)
- HR (Heart Rate) – beats/minute
- A/B Ratio (Velocities Ratio)
- TAMAX (Time Averaged Maximum Velocity) – Trace method is Peak or Manual
- TAMIN (Time Averaged Minimum Velocity) – Trace method is Floor
- TAMEAN (Time Averaged Mean Velocity) – Trace method is Mean
- Volume
- Area (Spline)

Cardiac

Measurements/Calculations

- %FS (LV Fractional Shortening)
- %IVS Thck (IVS Fractional Shortening)
- %LVPW Thck (LV Posterior Wall Fractional Shortening)
- Ao Arch Diam (Aortic Arch Diameter)
- Ao asc (Ascending Aortic Diameter)
- Ao Desc Diam (Descending Aortic Diameter)
- Ao Isthmus (Aortic Isthmus)
- Ao Root Diam (Aortic Root Diameter)
- AR ERO (PISA: Regurgitant Orifice Area)
- AR Flow (PISA: Regurgitant Flow)

- AR PHT (AV Insuf. Pressure Half Time)
- AR Rad (PISA: Radius of Aliased Point)
- AR RF (Regurgitant Fraction over the Aortic Valve)
- AR RV (PISA: Regurgitant Volume Flow)
- AR Vel (PISA: Aliased Velocity)
- AR Vmax (Aortic Insuf. Peak Velocity)
- AR VTI (Aortic Insuf. Velocity Time Integral)
- ARed max PG (Aortic Insuf. End-Diastole Pressure Gradient)
- ARed Vmax (Aortic Insuf. End-Diastolic Velocity)
- AV Acc Slope (Aortic Valve Flow Acceleration)
- AV Acc Time (Aortic Valve Acceleration Time)
- AV AccT/ET (AV Acceleration to Ejection Time Ratio)
- AV EOAI (VTI) (Aortic Valve Effective Orifice Area Index by Continuity Equation VTI)
- AV EOAI Vmax (Aortic Valve Effective Orifice Area Index by Continuity Equation Peak V)
- AV CO (Cardiac Output by Aortic Flow)
- AV Cusp (Aortic Valve Cusp Separation, 2D)
- AV Dec Time (Aortic Valve Deceleration Time)
- AV Diam (Aortic Diameter, 2D)
- AV max PG (Aortic Valve Peak Pressure Gradient)
- AV Mean PG (Aortic Valve Mean Pressure Gradient)
- AV SV (Stroke Volume by Aortic Flow)
- AV Vmax (Aortic Valve Peak Velocity)
- AV Vmean (AV Mean Velocity)
- AV VTI (Aortic Valve Velocity Time Integral)
- AVA (Vmax) (AV Area by Continuity Equation by Peak V)
- AVA (VTI) (AV Area by Continuity Equation VTI)
- AVA Planimetry (Aortic Valve Area)
- AVET (Aortic Valve Ejection Time)

- CO (Teich) (Cardiac Output, M-mode, Teicholtz)
- D-E Excursion (MV Anterior Leaflet Excursion)
- EDV (Cube) (Left Ventricle Volume, Diastolic, 2D, Cubic)
- EF (A-L A2C) (Ejection Fraction 2CH, Single Plane, Area-Length)
- E-F Slope (Mitral Valve E-F Slope)
- EPSS (E-Point-to-Septum Separation, M-mode)
- ERO (Effective Regurgitant Orifice)
- ESV (Cube) (Left Ventricle Volume, Systolic, 2D, Cubic)
- HR (Heart Rate, 2D, Teicholtz)
- IVC (Inferior Vena Cava)
- IVCT (Isovolumic Contraction Time)
- IVRT (Isovolumic Relaxation Time)
- IVSd (Interventricular Septum Thickness, Diastolic, 2D)
- VSs (Interventricular Septum Thickness, Systolic, 2D)
- LA Diam (Left Atrium Diameter, 2D)
- LA Major (Left Atrium Major)
- LA Minor (Left Atrium Minor)
- LA/Ao (LA Diameter to AoRoot Diameter Ratio, 2D)
- LAAd (A2C) (Left Atrium Area, Apical 2C)
- LAEDV (A-L) (LA End Diastolic Volume, Area-Length)
- LAEDV Index (A-L) (LA End Diastolic Volume Index, Area-Length)
- LAESV (A-L) (LA End Systolic Volume, Area-Length)
- LAESV Index (A-L) (LA End Systolic Volume Index, Area-Length)
- LAEDV MOD (LA End Diastolic Volume MOD)
- LAESV MOD (LA End Systolic Volume MOD)
- LIMP (Left Index of Myocardial Performance)
- LA (s) (Left Ventricular Area, Systolic, 2CH)
- LVAd (A2C) (Left Ventricular Area, Diastolic, 2CH)
- LVAd (sax) (LV area, SAX, Diastolic)
- LVAend (d) (LV Endocardial Area, SAX)
- LVAepi (d) (LV Epicardial Area, SAX)
- LVAs (A4C) (Left Ventricular Area, Systolic, 4CH)
- LVAs (sax) (LV area, SAX, Systolic)
- LVd Mass (LV Mass, Diastolic, 2D)
- LVd Mass (LV Mass, Diastolic, M-mode)
- LVd Mass Index (LV Mass Index, Diastolic, 2D)
- LVEDV (A-L A2C) (LV Volume, Diastolic, 2CH, Area-Length)
- LVESV (A-L A2C) (LV Volume, Systolic, 2CH, Area-Length)
- LVET (Left Ventricle Ejection Time)
- LVIDd (LV Internal Dimension, Diastolic, 2D)
- LVIDs (LV Internal Dimension, Systolic, 2D)
- LVLd (apical) (Left Ventricular Length, Diastolic, 2D)
- LVLs (apical) (Left Ventricular Length, Systolic, 2D)
- LVOT Area (Left Ventricle Outflow Tract Area)
- LVOT CO (Cardiac Output by Aortic Flow)
- LVOT Diam (Left Ventricular Outflow Tract Diameter)
- LVOT max PG (LVOT Peak Pressure Gradient)
- LVOT Mean PG (LVOT Mean Pressure Gradient)
- LVOT SI (Stroke Volume Index by Aortic Flow)
- LVOT SV (Stroke Volume by Aortic Flow)
- LVOT Vmax (LVOT Peak Velocity)
- LVOT Vmean (LVOT Mean Velocity)
- LVOT VTI (LVOT Velocity Time Integral)
- LVPWd (Left Ventricular Posterior Wall Thickness, Diastolic, 2D)
- LVPWs (Left Ventricular Posterior Wall Thickness, Systolic, 2D)
- LVs Mass (LV Mass, Systolic, 2D)
- LVs Mass Index (LV Mass Index, Systolic, 2D)
- LAAd (A2C) (Left Atrium Area, Apical 2C)
- MCO (Mitral Valve closure to Opening)
- MP Area (Mitral Valve Prosthesis)
- MR Acc Time (MV Regurg. Flow Acceleration)
- MR ERO (PISA: Regurgitant Orifice Area)
- MR Flow (PISA: Regurgitant Flow)
- MR max PG (Mitral Regurg. Peak Pressure Gradient)
- MR Rad (PISA: Radius of Aliased Point)
- MR RF (Regurgitant fraction over the Mitral Valve)
- MR RV (PISA: Regurgitant Volume Flow)
- MR Vel (PISA: Aliased Velocity)
- MR Vmax (Mitral Regurg. Peak Velocity)
- MR Vmean (Mitral Regurg. Mean Velocity)
- MR VTI (Mitral Regurg. Velocity Time Integral)
- MV A Dur (Mitral Valve A-Wave Duration)
- MV A Velocity (MV Velocity Peak A)
- MV Acc Slope (Mitral Valve Flow Acceleration)
- MV Acc Time (Mitral Valve Acceleration Time)
- MV Acc/Dec Time (MV: Acc.Time/Decel.Time Ratio)
- MV Ann Diam (Mitral Valve Annulus Diameter, 2D)
- MV CO (Cardiac Output by Mitral Flow)
- MV Dec Slope (Mitral Valve Flow Deceleration)
- MV Dec Time (Mitral Valve Deceleration Time)
- MV E Velocity (MV Velocity Peak E)
- MV E/A Ratio (Mitral Valve E-Peak to A-Peak Ratio)
- MV max PG (Mitral Valve Peak Pressure Gradient)
- MV Mean PG (Mitral Valve Mean Pressure Gradient)
- MV PHT (Mitral Valve Pressure Half Time)

- MV Reg Frac (Mitral Valve Regurgitant Fraction)
- MV SI (Stroke Volume Index by Mitral Flow)
- MV SV (Stroke Volume by Mitral Flow)
- MV Time to Peak (Mitral Valve Time to Peak)
- MV Vmax (Mitral Valve Peak Velocity)
- MV Vmean (MV Mean Velocity)
- MV VTI (Mitral Valve Velocity Time Integral)
- MVA (Mitral Valve Area)
- MVA By PHT (Mitral Valve Area According to PHT)
- MVA by plan (Mitral Valve Area, 2D)
- MVET (Mitral Valve Ejection Time)
- P Vein A (Pulmonary Vein Velocity Peak A) – reverse
- P Vein A Dur (Pulmonary Vein A-Wave Duration)
- P Vein D (Pulmonary Vein End-Diastolic Peak Velocity)
- P Vein S (Pulmonary Vein Systolic Peak Velocity)
- PAEDP (Pulmonary Artery Diastolic Pressure)
- PE(d) (Pericard Effusion, M-mode)
- PEs (Pericard Effusion, 2D)
- PR max PG (Pulmonic Insuf. Peak Pressure Gradient)
- PR Mean PG (Pulmonic Insuf. Mean Pressure Gradient)
- PR PHT (Pulmonic Insuf. Pressure Half Time)
- PR Vmax (Pulmonic Insuf. Peak Velocity)
- PR VTI (Pulmonic Insuf. Velocity Time Integral)
- PRend max PG (Pulmonic Insuf. End-Diastole Pressure Gradient)
- PRend Vmax (Pulmonic Insuf. End-Diastolic Velocity)
- Pulmonic Diam (Pulmonary Artery Diameter, 2D)
- PV Acc Slope (Pulmonic Valve Flow Acceleration)
- PV Acc Time (Pulmonic Valve Acceleration Time)
- PV Acc Time/ET Ratio (PV Acceleration to Ejection Time Ratio)
- PV Ann Diam (Pulmonic Valve Annulus Diameter, 2D)
- PV Ann Area (Pulmonic Valve Area)
- PV CO (Cardiac Output by Pulmonic Flow)
- PV max PG (Pulmonic Valve Peak Pressure Gradient)
- PV Mean PG (Pulmonic Valve Mean Pressure Gradient)
- PV SV (Stroke Volume by Pulmonic Flow)
- PV Vmax (Pulmonary Artery Peak Velocity)
- PV Vmean (PV Mean Velocity)
- PV VTI (Pulmonic Valve Velocity Time Integral)
- PVA (VTI) (Pulmonary Artery Velocity Time Integral)
- PVein S/D Ratio (Pulmonary Vein SD Ratio)
- PVET (Pulmonic Valve Ejection Time)
- PVPEP (Pulmonic Valve Pre-Ejection Period)
- PVPEP/ET Ratio (PV Pre-Ejection to Ejection Time Ratio)
- Qp/Qs (Pulmonic-to-Systemic Flow Ratio)
- RA Major (Right Atrium Major, 2D)
- RA Minor (Right Atrium Minor, 2D)
- RAA (d) (Right Atrium Area, 2D, Diastole)
- RAA (s) (Right Atrium Area, 2D, Systole)
- RAEDV A2C (Right Atrium End Diastolic Volume, Apical 2 Chamber)
- RAESV A-L (RA End Systole Volume [A-L])
- RALd (Right Atrium Length, Diastole)
- RALs (RA Length, Systole)
- RIMP (Right Index of Myocardial Performance)
- RJA (A4C) (Regurgitant Jet Area)
- RJA/LAA (Regurgitant Jet Area ratio RJA/LAA)
- RV Major (Right Ventricle Major)
- RV Minor (Right Ventricle Minor)
- RVAWd (Right Ventricle Wall Thickness, Diastolic, 2D)
- RVAWs (Right Ventricle Wall Thickness, Systolic, 2D)
- RVET (Right Ventricle Ejection Time)
- RVIDd (Right Ventricle Diameter, Diastolic, 2D)
- RVIDs (Right Ventricle Diameter, Systolic, 2D)
- RVOT Area (Right Ventricle Outflow Tract Area)
- RVOT Diam (RV Output Tract Diameter, 2D)
- RVOT Diam (RV Output Tract Diameter, M-Mode)
- RVOT max PG (RVOT Peak Pressure Gradient)
- RVOT Mean PG (RVOT Mean Pressure Gradient)
- RVOT SI (LV Stroke Volume Index by Pulmonic Flow)
- RVOT SV (Stroke Volume by Pulmonic Flow)
- RVOT Vmax (RVOT Peak Velocity)
- RVOT Vmean (RVOT Mean Velocity)
- RVOT VTI (RVOT Velocity Time Integral)
- RVSP (Right Ventricle Systolic Pressure)
- RVWd (Right Ventricle Wall Thickness, Diastolic, M-mode)
- RVWs (Right Ventricle Wall Thickness, Systolic, M-mode)
- RAA (d) (Right Atrium Area, 2D, Diastole)
- RAA (s) (Right Atrium Area, 2D, Systole)
- SI (A-L A2C) (LV Stroke Index, Single Plane, 2CH, Area-Length)
- SI (A-L A4C) (LV Stroke Index, Single Plane, 4CH, Area-Length)
- SI (Bi-plane) (LV Stroke Index, Bi-Plane, MOD)
- SI (bullet) (LV Stroke Index, Bi-Plane, Bullet)
- SI (MOD A2C) (LV Stroke Index, Single Plane, 2CH, MOD)

- SI (MOD A4C) (LV Stroke Index, Single Plane, 4CH, MOD)
 - SI (Teich) (LV Stroke Index, Teicholtz, 2D)
 - SI (Teich) (LV Stroke Index, Teicholtz, M-mode)
 - SV (A-L A2C) (LV Stroke Volume, Single Plane, 2CH, Area-Length)
 - SV (A-L A4C) (LV Stroke Volume, Single Plane, 4CH, Area-Length)
 - SV (Bi-plane) (LV Stroke Volume, Bi-plane, MOD)
 - SV (bullet) (LV Stroke Volume, Bi-plane, Bullet)
 - SV (MOD A2C) (LV Stroke Volume, Single-plane, 2CH, MOD) – Simpson
 - SV (MOD A4C) (LV Stroke Volume, Single-plane, 4CH, MOD) – Simpson
 - SV (Cube) (LV Stroke Volume, 2D, Cubic)
 - SV (Cube) LV Stroke Volume, M-mode, Cubic)
 - SV (Teich) (LV Stroke Volume, 2D, Teicholtz)
 - SV (Teich) LV Stroke Volume, M-mode, Teicholtz)
 - Systemic Diam (Systemic Vein Diameter, 2D)
 - Systemic Vmax (Systemic Vein Peak Velocity)
 - Systemic VTI (Systemic Vein Velocity Time Integral)
 - TCO (Tricuspid Valve Closure to Opening)
 - TR max PG (Tricuspid Regurg. Peak Pressure Gradient)
 - TR Mean PG (Tricuspid Regurg. Mean Pressure Gradient)
 - TR Vmax (Tricuspid Regurg. Peak Velocity)
 - TR Vmean (Tricuspid Regurg. Mean Velocity)
 - TR VTI (Tricuspid Regurgitation Velocity Time Integral)
 - TV A dur (Tricuspid Valve A-Wave Duration)
 - TV A Velocity (Tricuspid Valve A Velocity)
 - TV Acc Time (Tricuspid Valve Time to Peak)
 - TV Ann Area (Tricuspid Valve Area)
 - TV Ann Diam (Tricuspid Valve Annulus Diameter, 2D)
 - TV Area (Tricuspid Valve Area, 2D)
 - TV CO (Cardiac Output by Tricuspid Flow)
 - TV Dec Slope (Tricuspid Valve Flow Deceleration)
 - TV E Velocity (Tricuspid Valve E Velocity)
 - TV E/A Ratio (Tricuspid Valve E-Peak to A-Peak Ratio)
 - TV max PG (Tricuspid Valve Peak Pressure Gradient)
 - TV Mean PG (Tricuspid Valve Mean Pressure Gradient)
 - TV PHT (Tricuspid Valve Pressure Half Time)
 - TV SV (Stroke Volume by Tricuspid Flow)
 - TV Vmean (TV Mean Velocity)
 - TV VTI (Tricuspid Valve Velocity Time Integral)
 - VSD max PG (VSD Peak Pressure Gradient)
 - VSD Vmax (VSD Peak Velocity)
- Please refer to the Reference Manual for the full list of measurements and calculations for all applications.

Z-Scores

- Support for five sets of user-selectable Z score publications⁵ covering the most common pediatric dimension measurements

Vascular

Measurements/Calculations

- RT ECA (Right External Carotid Artery Velocity)
- RT CCA (Right Common Carotid Artery Velocity)
- RT BIFURC (Right Carotid Bifurcation Velocity)
- RT ICA (Right Internal Carotid Artery Velocity)
- RT ICA/CCA (Right Internal Carotid Artery Velocity/Common Carotid Artery Velocity Ratio)
- LT ECA, LT CCA, LT BIFURC, LT ICA, LT ICA/CCA (same as above, for Left Carotid Artery)
- A/B Ratio (Velocities Ratio)
- % Stenosis (Stenosis Ratio)
- S/D Ratio (Systolic Velocity/Diastolic Velocities Ratio)
- PI (Pulsatility Index)
- RI (Resistivity Index)
- HR (Heart Rate) – beats/minute

⁵ Michael D. Pettersen, MD; Wei Du, PhD; Mary Ellen Skeens, MS; and Richard A. Humes, MD; Detroit, Michigan; and Andover, Massachusetts. Regression Equations for Calculation of Z Scores of Cardiac Structures in a Large Cohort of Healthy Infants, Children, and Adolescents: An Echocardiographic Study. *Journal of the American Society of Echocardiography*. Pettersen et al. 923 Volume 21 Number 8.

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Intima Media Thickness (IMT)

- Automatic measurements of carotid artery Intima-Media Thickness (IMT) on any acquired frame
- On-board IMT package facilitates non-interrupted workflow – fully integrated with M&A, worksheet, archiving and reporting functions
- Algorithm provides robust, quick, reliable measurements which can be stored to the on-board archive for review and reporting
- IMT measurement can be made from frozen images or images retrieved from archive
- IMT package supports measurements of different regions of the intima in the carotid vessel (e.g., Lt./Rt./CCA/ICA etc.)
- Frame for IMT measurement can be selected in relation to the ECG waveform

OB/GYN Application Module

- OB package for fetal growth analysis containing more than 100 biometry tables
- Dedicated OB/GYN reports
- Fetal graphical growth charts
- Growth percentiles
- Multi-gestational calculations (up to four)
- Programmable OB tables
- Expanded worksheets
- User-selectable fetal growth parameters based on European, American, or Asian methods charts
- GYN package for ovary and uterus measurements and reporting

OB Measurements/Calculations

- Gestational age by:
 - GS (Gestational Sac)
 - CRL (Crown Rump Length)
 - FL (Femur Length)
 - BPD (Biparietal Diameter)
 - AC (Abdominal Circumference)
 - HC (Head Circumference)
 - APTD x TTD (Anterior/Posterior Trunk Diameter by Transverse Trunk Diameter)
 - LV (Length of Vertebra)

- FTA (Fetal Trunk Cross-sectional Area)
- HL (Humerus Length)
- BD (Binocular Distance)
- FT (Foot Length)
- OFD (Occipital Frontal Diameter)
- TAD (Transverse Abdominal Diameter)
- TCD (Transverse Cerebellum Diameter)
- THD (Thorax Transverse Diameter)
- TIB (Tibia Length)
- ULNA (Ulna Length)
- Estimated Fetal Weight (EFW) by:
 - AC, BPD
 - AC, BPD, FL
 - AC, BPD, FL, HC
 - AC, FL
 - AC, FL, HC
 - AC, HC
 - EFW
- Calculations and Ratios
 - FL/BPD
 - FL/AC
 - FL/HC
 - HC/AC
 - CI (Cephalic Index)
 - AFI (Amniotic Fluid Index)
 - CTAR (Cardio-Thoracic Area Ratio)
- Measurements/calculations by: ASUM, ASUM 2001, Berkowitz, Bertagnoli, Brenner, Campbell, CFEF, Chitty, Eik-Nes, Ericksen, Goldstein, Hadlock, Hansmann, Hellman, Hill, Hohler, Jeanty, JSUM, Kurtz, Mayden, Mercer, Merz, Moore, Nelson, Osaka University, Paris, Rempen, Robinson, Shepard, Shepard/Warsoff, Tokyo University, Tokyo/Shinozuka, Yarkoni
- Fetal graphical trending
- Growth percentiles
- Multi-gestational calculations (4)
- Fetal qualitative description (anatomical survey)
- Fetal environmental description (biophysical profile)
- Programmable OB tables
- Over 20 selectable OB calculations

- Expanded worksheets

GYN Measurements/Calculations

- Right ovary length, width, height
- Left ovary length, width, height
- Uterus length, width, height
- Cervix length, trace
- Ovarian volume
- ENDO (endometrial thickness)
- Ovarian RI
- Uterine RI
- Follicular measurements
- Summary reports

Abdominal

Measurements/Calculations

- Splenic index
- Liver volume, mass, cyst
- Pancreas
- CBD
- GB wall, length
- Aorta prox, mid, dist
- Aorta iliac
- Spleen volume
- Bladder, post void bladder volume
- Renal
- Cortex thickness
- Mesenteric (CA, SMA, IMA)

Safety Conformance

The Vivid E90 is built to meet the requirements of:

- IEC60601-2-37
- IEC60601-1
- IEC60601-1-2
- IEC60601-1-6
- IEC 62366
- IEC 62304
- ANSI/AAMI ES60601-1
- CAN/CSA-C22.2 No. 60601-1
- IEC 62359
- Regulation (EU) 2017/745 of the European Parliament and of the Council on Medical Devices (MDR) (CE Mark)
- Directive 2011/65/EU on the restriction of use of certain hazardous substances

- The Vivid E90 ultrasound unit is a Class I device, type CF, according to IEC60601-1
- The Vivid E90 ultrasound unit meets the EMC requirements in EN55011, Class A

Privacy & Security

Virus Protection

To reduce virus vulnerability, Vivid E90 is configured with a minimal set of open ports and with all network services not actively used by the system closed down. This helps to significantly reduce the risk of a virus attack on Vivid E90.

GE Healthcare (GEHC) is continuously judging the need for additional actions to reduce vulnerability of equipment; this includes vulnerability scanning of our products and evaluation of new security patches for the 3rd-party technology used. Microsoft® (and other) security patches that address serious issues with Vivid E90 will be made available to customers after GE Healthcare (GEHC) verification of those patches.

Whitelisting

- Whitelisting is enabled to prevent non-listed applications from running
- To improve protection against potentially harmful software

User Policies

- Secure and advanced user password and login scheme according to user's password requirements

LDAP

- Users can log in to the system by using the same user credentials as used for domain connected computers

Disc Encryption

- Optional encryption of the scanner's E drive containing patient identifiable data

User Management

- Last login information

- Customer configurable login banner
- Manually invoke screen log (WIN+L)

Microsoft OS Patches

- OS vulnerability patches are distributed as part of regular SW maintenance releases during the life cycle of the product.

Service / Life cycle Offerings

Insite™ Express Connection (ExC)

- Enables Remote Service and Training
- Easy, flexible, and secure connectivity configuration. The "Contact GE Healthcare (GEHC)" on-screen button directly generates a real-time service request to the GE Healthcare (GEHC) online engineering or application specialist. It takes a snapshot (e.g., error logs, setup files) of the system at the time of the service request to enable analysis of problem before customer contact
- Virtual Console Observation (VCO) enables the customer to allow desktop screens to be viewed and controlled remotely over the encrypted tunnel to enable real-time training, device configuration
- Operation of Insite Express Connection is dependent on the infrastructure being available – check with your local GE Healthcare (GEHC) service representative
- File transfer enables the customer (biomed or clinician) to directly transfer system information (e.g., system logs, images, parametric data) to GE Healthcare (GEHC) product engineering teams (no patient data transferred)
- Software reload provides remote application reconstruction and recovery capabilities in the event of system corruption

Smart Service Interface (SSI) (optional)

- A suite of GE Healthcare (GEHC) proprietary service tools, designed for expert Healthcare Technology Management Professionals who want to streamline troubleshooting and diagnostics on their GE Healthcare (GEHC) Vivid systems
- Provides an intelligent visual dashboard with drill-down capability to rapidly assess equipment status and health
- Can drive productivity by quickly isolating specific issues and decreasing overall system downtime
- SSI is available for licensed qualified users; please contact your local sales representative for more information

eDelivery (optional)⁶

- eDelivery facilitates download of software patches for service purpose (e.g., security patches)
- It is also an enabler for the ability to download apps from the AppStore

Digital Expert (optional)⁶

- Enables the user to connect remotely to a GE Healthcare (GEHC) Clinical Specialist to receive application related training and help

Imaging Insights

- Support of Imaging Insights offering by providing system utilization data

Probe Check (optional)⁷

- Automated transducer element check and reporting of potential image quality impacts



⁶ eDelivery and Digital Expert may not be available in all countries and regions. Consult with a GE Healthcare (GEHC) representative for more details.







⁷ Probe Check is offered as a standard feature in USA to comply with FDA requirements. It may be available in other regions. Consult with a GE Healthcare (GEHC) representative for more details







Transducers



Name	M5Sc-D	6S-D	12S-D	9L-D	11L-D	L8-18i-D
Catalog#	H44901AE	H45021RR	H45021RT	H40442LM	H40432LN	H40452LL
Description	XDclear™ Single Crystal Active Matrix Phased Array Transducer	Phased Array Transducer	Phased Array Transducer	Linear Array Transducer	Linear Array Transducer	Intraoperative Linear Array Transducer
Number of elements	240	96	96	192	192	168
Foot Print	18 x 27 mm	17 x 24 mm	13 x 18 mm	14 x 53 mm	13 x 47 mm	11 x 35 mm
Max. Bandwidth	1 - 5 MHz	2 - 8 MHz	3 - 12 MHz	2 - 10 MHz	4 - 12 MHz	5 - 18 MHz
Field of View	120°	115°	105°	45 mm	39mm	25mm
Depth of Field	30 cm	16 cm	12 cm	16 cm	8 cm	10 cm
Biopsy Guide Available	Multi-angle disposable with a reusa- ble bracket	N/A	N/A	Multi-angle disposable with a reusa- ble bracket	Multi-angle disposable with a reusa- ble bracket	N/A
Application						
Fetal/Obstetrics	+	+				
Abdominal [1]	+	+	+	+		
Thoracic/Pleural	+	+		+	+	
Pediatric	+	+	+	+	+	+
Small Organ[2]				+	+	+
Neonatal Cephalic		+	+			+
Adult Cephalic	+					
Cardiac[3]	+	+	+			
Peripheral Vascular	+			+	+	+
Musculo-skeletal Conventional				+	+	+
Musculo-skeletal Superficial				+	+	+
Urology[4]	+					
Transesophageal						
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						+
<i>Interventional Guidance:</i>						
Tissue Biopsy	+			+	+	+
Vascular Access (IV, PICC)				+	+	

Transducers						
	ML6-15-D	C1-6-D	C2-9-D	8C⁺	iC5-9-D	C3-10-D
Catalog#	H40452LG	H40472LT	H40462LN	H40412LJ	H40442LK	H40482LB
Description	Active Matrix Wide Band Linear Array Transducer	XDclear Single Crystal Curved Array Transducer	XDclear Single Crystal Curved Array Transducer	Curved Array Transducer	Tightly Convex Array Transducer	XDclear Single Crystal Tightly Curved Array Transducer
Number of elements	1008	192	192	128	192	192
Foot Print	16 x 61 mm	16 x 70 mm	14 x 51 mm	12 x 22 mm	17 x 21 mm	12 x 22 mm
Max. Bandwidth	4 - 15 MHz	1 - 6 MHz	2 - 9 MHz	4 - 8 MHz	3 - 9 MHz	3 - 10 MHz
Field of View	50 mm	70°	65°	128°	128°	95°
Depth of Field	8 cm	50 cm	30 cm	30 cm	30 cm	14 cm
Biopsy Guide Available	Ultra-Prol™ In-Plane Ultra-sound Needle Guides Multi-Angle	Multi-angle disposable with a reusable bracket	Multi-angle disposable with a reusable bracket	N/A	Single angle, disposable	N/A
Application						
Fetal/Obstetrics		+	+		+	
Abdominal [1]		+	+	+		+
Thoracic/Pleural		+				
Pediatric		+	+	+		+
Small Organ[2]	+					
Neonatal Cephalic						+
Adult Cephalic						
Cardiac[3]						
Peripheral Vascular	+	+	+	+		+
Musculo-skeletal Conventional	+			+		+
Musculo-skeletal Superficial						+
Urology[4]		+	+		+	
Transesophageal						
Transvaginal					+	
Transrectal					+	
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						
<i>Interventional Guidance:</i>						
Tissue Biopsy	+	+	+		+	+
Vascular Access (IV, PICC)	+		+		+	+

<h1>Transducers</h1>						
	P2D	P6D	4V-D*	4Vc-D	6Vc-D	6VT-D**
Catalog#	H4830JE	H4830JG	H4001BT	H40482LS	H44901AQ	H45581BJ
Description	Pencil Transducer	Pencil Transducer	Active Matrix 4D Volume Phased Array Transducer	XDclear Single Crystal Active Matrix 4D Volume Phased Array Transducer	Active Matrix 4D Volume Phased Array Transducer	TEE Active Matrix 4D Volume Phased Array Transducer
Number of elements	2	2	2640	6000	2500	2500
Foot Print	N/A	N/A	24x21 mm	18x29 mm	16x20 mm	Tip(LxWxH) 45x14x13 mm
Max. Bandwidth	2 MHz	7 MHz	1 - 4 MHz	1 - 6 MHz	2 - 8 MHz	3 - 8 MHz
Field of View	N/A	N/A	90°	90°	115°	90°
Depth of Field	N/A	N/A	30 cm	30 cm	20 cm	20 cm
Biopsy Guide Available	N/A	N/A	N/A	Multi-angle disposable with a reusable bracket	N/A	N/A
Application						
Fetal/Obstetrics			+	+	+	
Abdominal [1]			+	+	+	
Thoracic/Pleural				+	+	
Pediatric			+	+	+	
Small Organ[2]						
Neonatal Cephalic					+	
Adult Cephalic			+	+		
Cardiac[3]	+	+	+	+	+	+
Peripheral Vascular	+	+				
Musculo-skeletal Conventional						
Musculo-skeletal Superficial						
Urology[4]			+	+		
Transesophageal						+
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						
Intraoperative (Vascular)						
<i>Interventional Guidance:</i>						
Tissue Biopsy				+		
Vascular Access (IV, PICC)						

Transducers						
	Name	6Tc/6Tc-RS***	9T/9T-RS***	9VT-D	10T-D	NUVISION™ Connector Cable ****
Catalog#	H45551ZD H45551ZE	H45531YM	H45581CS	H44901AH	Distributed by Biosense Webster, Inc.	Distributed by Biosense Webster, Inc.
Description	TEE Phased Array Transducer	TEE Phased Array Transducer	TEE Active Matrix 4D Volume Phased Array Transducer	TEE Phased Array Transducer	Connector Cable	Intra Cardiac Active Matrix Phased Array 4D Volume Catheter
Number of elements	64	44	2048	32	N/A	840
Foot Print	Tip(LxWxH) 45x14x12 mm	Tip(LxWxH) 35x11x8 mm	Tip(LxWxH) 35x11x9 mm	Tip(LxWxH) 16x8x6 mm	N/A	10F
Max. Bandwidth	3 - 8 MHz	3 - 10 MHz	3 - 8 MHz	3 - 10 MHz	N/A	4 - 10 MHz
Field of View	90°	90°	90°	90°	N/A	90°
Depth of Field	20 cm	14 cm	18 cm	18 cm	N/A	20 cm
Biopsy Guide Available	N/A	N/A	N/A	N/A	N/A	N/A
Application						
Fetal/Obstetrics						
Abdominal [1]						
Thoracic/Pleural						
Pediatric						
Small Organ[2]						
Neonatal Cephalic						
Adult Cephalic						
Cardiac[3]	+	+	+	+		
Peripheral Vascular						
Musculo-skeletal Conventional						
Musculo-skeletal Superficial						
Urology[4]						
Transesophageal	+	+	+	+		
Transvaginal						
Transrectal						
Intra-cardiac and Intra-luminal						+
Intraoperative (Vascular)						
<i>Interventional Guidance:</i>						
Tissue Biopsy						
Vascular Access (IV, PICC)						

- [1] Abdominal including renal, GYN
- [2] Small Organ including breast, testes, thyroid
- [3] Cardiac including Adult and Pediatric
- [4] Urology including prostate

NOTE:

* 4V-D and 8C probes are supported but are not available for sale.

** 6VT-D with catalog #H45561TA is also supported

*** 6Tc-RS and 9T-RS are only supported via a legacy probe adapter that is not available for sale anymore.

**** Not available in all countries. Please contact Biosence Webster, Inc. for availability

Product may not be available in all countries and regions. Full product technical specification is available upon request. Contact a GE Healthcare Representative for more information. Please visit www.gehealthcare.com/promotional-locations.

Data subject to change.

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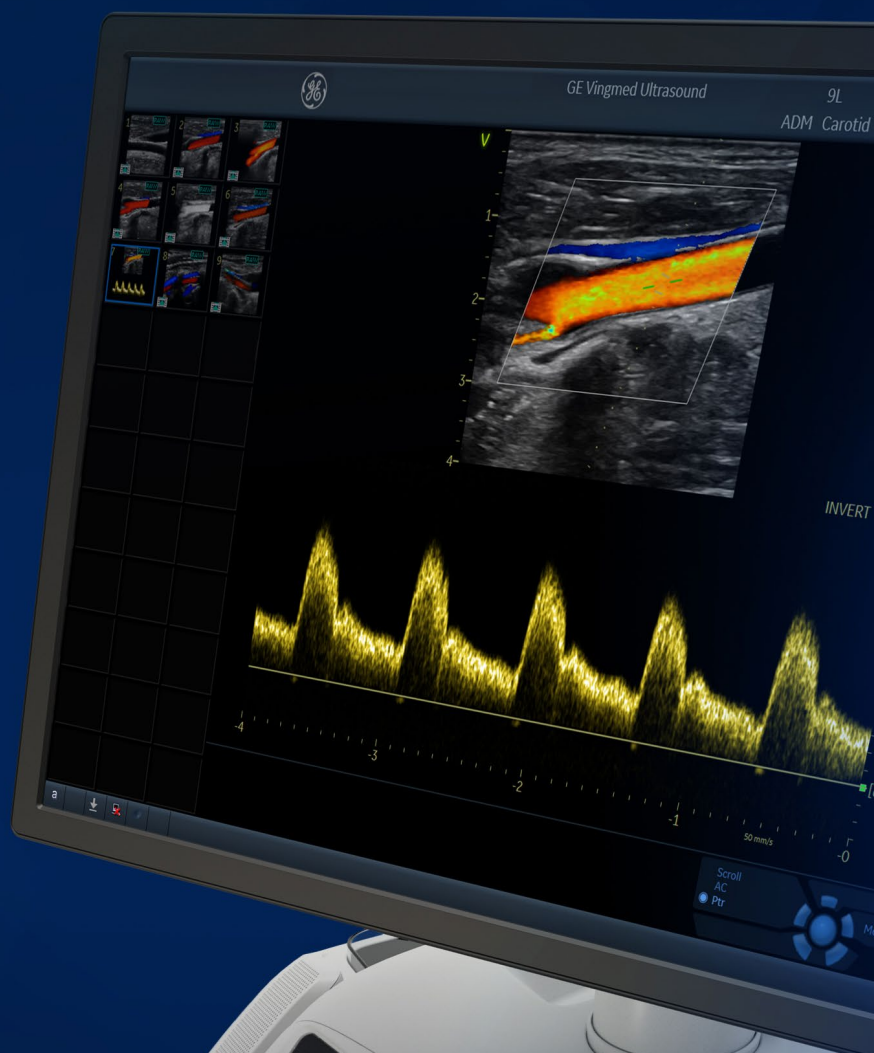




Vivid™ E90 Ultra Edition

Cardiovascular Ultrasound Probe guide

Vivid E90 Ultra Edition offers a broad range of probes to help achieve extraordinary images for cardiac, vascular, abdominal, pediatric, neonatal, fetal heart, obstetric, gynecologic, urological, transcranial and small parts applications.



vivid








gehealthcare.com/vivid



	Applications	Description	Footprint	Biopsy Guide	Bandwidth	Field of View	Depth of Field
Sector							
 M5Sc-D	Cardiac, Pediatric Abdomen, Fetal Heart, Transcranial, Coronary, Stress, Contrast Low MI [†] (optional), LVO Stress, LVO Contrast [†]	XDclear™ Active Matrix Single Crystal Phased Array Transducer	18 x 27 mm	Multi-angle disposable with a reusable bracket	1.4 - 4.6 MHz	120°	30 cm
 6S-D	Pediatric, Cardiac, Coronary, Neonatal Head, Abdominal, Fetal Heart, Neonatal	Phased Array Transducer	17 x 24 mm		2.4 - 8.0 MHz	115°	16 cm
 12S-D	Pediatric, Cardiac, Coronary, Neonatal Head, Neonatal, Abdominal	Phased Array Transducer	13 x 18 mm		4.0 - 12.0 MHz	105°	12 cm
Linear							
 9L-D	Vascular, Musculoskeletal, Thyroid, Contrast [†] (optional), Abdominal	Linear Array Transducer	14 x 53 mm	Multi-angle disposable with a reusable bracket	2.4 - 10.0 MHz	45 mm	16 cm
 11L-D	Vascular, Breast, Small Parts, Musculoskeletal, Thyroid, Scrotal	Linear Array Transducer	13 x 47 mm	Multi-angle disposable with a reusable bracket	4.0 - 12.0 MHz	39 mm	8 cm
 L8-18i-D	Vascular, Small Parts, Musculoskeletal	Linear Array Transducer	11 x 35 mm		5.0 - 18.0 MHz	25 mm	10 cm
 ML6-15-D	Vascular, Small Parts, Breast, Thyroid, Musculoskeletal, Scrotal	Matrix Linear Array Transducer	16 x 61 mm	Multi-angle disposable with a reusable bracket	4.5 - 15.0 MHz	50 mm	8 cm

[†] GE Healthcare's Vivid Ultra Edition E-series is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use. Advanced contrast features are only enabled on systems for delivery in countries or regions where the agents are approved for use or for investigational or research use.










	Applications	Description	Footprint	Biopsy Guide	Bandwidth	Field of View	Depth of Field
Convex							
 C1-6-D	Abdomen, OB/GYN, Urology, Vascular, Fetal Heart, Contrast [†] (optional)	XDclear Curved Array Transducer	16 x 70 mm	Multi-angle disposable with a reusable bracket	1.4 - 6.0 MHz	70°	50 cm
 C2-9-D	Abdomen, OB/GYN, Urology, Fetal Heart	XDclear Curved Array Transducer	14 x 51 mm	Multi-angle disposable with a reusable bracket	2.3 - 8.4 MHz	65°	30 cm
 8C*	Abdomen, Vascular, Musculoskeletal	Tightly Curved Array Transducer	12 x 22 mm	N/A	4.0 - 8.0 MHz	128°	30 cm
 iC5-9-D	OB/GYN, Urology, Fetal Heart	Tightly Curved Array Transducer	17 x 21 mm	Single-angle disposable bracket	3.3 - 8.6 MHz	128°	30 cm
 C3-10-D	Neonatal Head, Musculoskeletal, Vascular, Abdomen	XDclear Tightly Curved Array Transducer	12 x 22 mm	N/A	3.0 - 10.0 MHz	95°	14 cm
Doppler							
 P2D	Cardiac	Pencil Transducer			2.0 MHz		
 P6D	Vascular	Pencil Transducer			6.3 MHz		

*Supported, not for sale.

[†] GE Healthcare's Vivid Ultra Edition E-series is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use. Advanced contrast features are only enabled on systems for delivery in countries or regions where the agents are approved for use or for investigational or research use.



	Applications	Description	Footprint	Biopsy Guide	Bandwidth	Field of View	Depth of Field
Volume							
 4V-D* [§]	Cardiac, LVO Contrast [†] , Stress, Fetal Heart, Coronary, LVO Stress, Pediatrics	Active Matrix 4D Volume Phased Array Transducer	24 x 21 mm		1.5 - 4.0 MHz	90°	30 cm
 4Vc-D [§]	Cardiac, LVO Contrast [†] , Stress, Fetal Heart, Coronary, LVO Stress, Pediatric, Abdominal, Transcranial, Contrast Low MI [†] (optional)	XDclear Active Matrix 4D Volume Phased Array Transducer	29 x 18 mm	Multi-angle disposable with a reusable bracket	1.4 - 5.2 MHz	90°	30 cm
 6Vc-D	Cardiac, Pediatric, Infant, Neonatal, Fetal Heart, Abdominal, Coronary, Neonatal Head, Preterm	Active Matrix 4D Volume Phased Array Transducer	16 x 20 mm		2.4 - 8.0 MHz	115°	20 cm
Transesophageal[†]							
 6VT-D [§]	Cardiac, LVO Contrast [†] , Coronary	Active Matrix 4D Volume TEE Transducer	Tip 14 x 13 mm Length 45 mm		3.0 - 8.0 MHz	90°	20 cm
 6Tc [‡]	Cardiac, Coronary	TEE Transducer	Tip 12 x 14 mm Length 45 mm		3.0 - 8.0 MHz	90°	20 cm
 9T [‡]	Cardiac (Adult and Pediatric)	TEE Transducer	Tip 11 x 8 mm Length 35 mm		3.0 - 10.0 MHz	90°	14 cm
 10T-D	Cardiac (Adult and Pediatric/ Neonatal)	TEE Transducer	Tip 8 x 6 mm Length 16 mm		3.3 - 10.0 MHz	90°	18 cm

*Supported, not for sale

[†]GE Healthcare's Vivid Ultra Edition E-series is designed for compatibility with commercially available contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is approved for use. Advanced contrast features are only enabled on systems for delivery in countries or regions where the agents are approved for use or for investigational or research use.

[‡] 6Tc-RS, 9T-RS are supported via RS transducer adapter.

[§]The option "Biplane/Triplane Enable" is required to run these probes in Multiplane mode. 4D is not supported unless the 4D option is enabled.

Veterinary Use

If you are going to use the device for veterinary use or for research use on rodents, then the options and product features listed below are offered. Please disregard these features if your device will be for human use, as devices sold for human use must be used for humans only.

The following probes support imaging of rodents enabled by a Rodent option.

- L8-18i-D
- 12S-D
- 11L-D
- ML6-15-D

Dedicated labelling is required when using systems for animal scanning. A veterinary kit is provided for this purpose.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world. GE (NYSE: GE) works on things that matter - great people and technologies taking on tough challenges. From medical imaging, software & IT, patient monitoring and diagnostics to drug discovery, biopharmaceutical manufacturing technologies and performance improvement solutions, GE Healthcare helps medical professionals deliver great healthcare to their patients.

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Ultra Edition is not a product name, it refers to the 2020 release of the Vivid portfolio

JB80426XX

Vivid E90 Ultra Edition 2022

EMEA Product Tree

Release E



26/August/2022

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System Overview

Probes:

- 4Vc-D
- 6Vc-D
- M5Sc-D
- 6S-D
- 12S-D
- 9L-D
- 11L-D
- ML6-15-D
- L8-18i-D
- C1-6-D
- C2-9-D
- C3-10-D

Probes:

- 8C
supported but not offered with R6
- IC5-9-D
- 6VT-D
- 6Tc / 6Tc-RS (with adapter)
supported but not offered with R6
- 10T-D
- 9T
- 4D ICE Connector (delivered by Bisoense Webster™)
- P2D
- P6D

Software Options:

- Stress
- AFI 3.0
- Easy AFI LV
- AFI RV, AFI LA
- Auto EF 3.0
- Easy Auto EF
- Myocardial Work
- BSI
- AI Auto Measure
- Adv. Contrast Imaging
- Vascular Contrast
- Rodent
- 4D ICE enable
- Vivid E90 4D option
- DICOM viewer
- Tricefy

Hardware Options:

- Universal Power Supply (UPS)
- UPS support kit
- USB Footswitch
- WIFI kit
- DVDRW drive
- Digital Video Stream Recorder

ECG Options:

- ECG cable and adaptor
- Adapt. for press. transd.
- Heart sound microphone

Connectivity Options:

- Streaming
- Tricefy Connect
- Remote Viewing

Printers:

- BW Printer Kit
- Color video printer
- Network Printer

Accessories:

- Biopsy kits
- TEE bite guards and protections
- TEE bite hole indicator
- Storage Box
- USB Memory
- Vet kits / labels



Base system

Item Number	Description	Description/Comments
H45611PL	Vivid E90 Ultra Edition 2022 with HDU display and eDelivery	Included Standard Features (see table next page) Must order a Destination Set, ecg cable and a Language Kit (unless English is used) Only for countries where eDelivery is enabled
H45611PQ	Vivid E90 Ultra Edition 2022 with HDU display (without eDelivery)	Included Standard Features (see table next page) Must order a Destination Set, ecg cable and a Language Kit (unless English is used) Only for countries where eDelivery is NOT enabled
H45611PH	Vivid E90 Ultra Edition 2022 with OLED display and eDelivery	Included Standard Features (see table next page) Must order a Destination Set, ecg cable and a Language Kit (unless English is used) Only for countries where eDelivery is enabled
H45611PW	Vivid E90 Ultra Edition 2022 with OLED display (without eDelivery)	Included Standard Features (see table next page) Must order a Destination Set, ecg cable and a Language Kit (unless English is used) Only for countries where eDelivery is NOT enabled

Standard Features:

22" wide screen OLED or 24" high contrast LCD monitor or 24" High-Definition Ultrasound Display

Biplane and Triplane imaging

Scan Assist (2D stress (option)/CRT protocols)

Scan Assist Pro (protocol driven exams)

UD Imaging

True Confocal Imaging, incl. 2. generation ACE

Virtual Apex Imaging

HD and CPI imaging

LVO Contrast included as QuickApps

Standard Features:

AMM/Curved AMM

TVI/Tissue Tracking

Auto Optimization

Compound

Extended Field of View (LogiqView)

Q-Analysis: QTVI/ QContrast

Advanced Vascular (BTI/BFI/Speckle Reduce)

Heart Failure Report

Advanced QScan

Z-Scores for pediatrics

Standard Features:

DICOM Connectivity Pack
(SR (cardiac/pediatric/vascular),
Modality Worklist/Print/Storage, Media support)

Connectivity Config & Diagnostics

EchoPAC Suite compatibility

EchoPAC/Patient Archive

- Report Designer/Statement
- Engine/Normal Values/E-Sign-off commun.

6VT-D support

Cardiac Auto Doppler

Virtual Convex

QuickApps

Standard Features:

LDAP, encrypted storage and more secure password policy

Enhanced DICOM SR, faster image store, xfer of systole only, selective raw data

Windows 10 with White listingStrain Elastography

cSound Adapt

Scan Assist Pro

Pre-Post Compare

IMT

Spline Tool Measurement

Image View



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Appendix

Manuals and Documentation

Manuals - Mandatory

HCAT	Description	Description/Comments
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Manuals - Optional

HCAT	Description	Description/Comments
H48542LD	AIUM Booklet	
H45611QD	Vivid E95/E90/E80 Ultra Edition R6 UM – Eng	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QF	Vivid E95/E90/E80 Ultra Edition R6 UM – Fre	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QG	Vivid E95/90/80 Ultra Edition R6 UM – Ger	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QE	Vivid E95/E90/E80 Ultra Edition R6 UM – Esp	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QM	Vivid E95/E90/E80 Ultra Edition R6 UM – Rus	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QC	Vivid E95/E90/E80 Ultra Edition R6 UM – Dan	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QL	Vivid E95/E90/E80 Ultra Edition R6 UM – Rom	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QB	Vivid E95/E90/E80 Ultra Edition R6 UM – Cro	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QN	Vivid E95/E90/E80 Ultra Edition R6 UM – Serb	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QQ	Vivid E95/E90/E80 Ultra Edition R6 UM – Ukr	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QJ	Vivid E95/90/80 Ultra Edition R6 UM - Kaz	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QP	Vivid E95 E90 E80 Ultra Edition R6 UM - Swe	Paper user manual. Only order if paper manual is required at time of system delivery.
H45611QK	Vivid E95 E90 E80 Ultra Edition R6 UM – Nor	Paper user manual. Only order if paper manual is required at time of system delivery.
H45581GG	UM Veterinary - English	Only order if vet kit is ordered.



Manuals and Documentation

Manuals – Optional (continue)

HCAT	Description	Description/Comments
H45531RA	TEE Probes User Manual Eng,Fre,Ger,Chi	Only if TEE probe is sold with the system
H45531RD	TEE Probes User Manual Italian	Only if TEE probe is sold with the system
H45531RE	TEE Probes User Manual Spanish	Only if TEE probe is sold with the system
H45581AN	TEE Probes User Manual Port, Europe	Only if TEE probe is sold with the system
H45531RJ	TEE Probes User Manual Swedish	Only if TEE probe is sold with the system
H45531RK	TEE Probes User Manual Norwegian	Only if TEE probe is sold with the system
H45531RL	TEE Probes User Manual Danish	Only if TEE probe is sold with the system
H45531RM	TEE Probes User Manual Polish	Only if TEE probe is sold with the system
H45531RN	TEE Probes User Manual Finnish	Only if TEE probe is sold with the system
H45531RP	TEE Probes User Manual Greek	Only if TEE probe is sold with the system
H45531RQ	TEE Probes User Manual Russian	Only if TEE probe is sold with the system
H45531RR	TEE Probes User Manual Dutch	Only if TEE probe is sold with the system
H45541PL	TEE Probes User Manual Hungarian	Only if TEE probe is sold with the system



Manuals and Documentation

Manuals – Optional (continue)

HCAT	Description	Description/Comments
H45541PM	TEE Probes User Manual Slovakian	Only if TEE probe is sold with the system
H45541PN	TEE Probes User Manual Romanian	Only if TEE probe is sold with the system
H45541PP	TEE Probes User Manual Czech	Only if TEE probe is sold with the system
H45541PQ	TEE Probes User Manual Latvian	Only if TEE probe is sold with the system
H45541PR	TEE Probes User Manual Lithuanian	Only if TEE probe is sold with the system
H45541PT	TEE Probes User Manual Estonian	Only if TEE probe is sold with the system
H45551ZQ	TEE Probes User Manual Serbian	Only if TEE probe is sold with the system
H45551ZR	TEE Probes User Manual Bulgarian	Only if TEE probe is sold with the system
H45561RH	TEE probes User manual Croatian	Only if TEE probe is sold with the system
H45581PT	TEE Probes User Manual Slovenian	Only if TEE probe is sold with the system
H45581PL	TEE Probes User Manual Ukraine	Only if TEE probe is sold with the system
H45541PS	TEE Probes User Manual Turkish	Only if TEE probe is sold with the system
H45601HS	TEE Probes User Manual Kazak.	Only if TEE probe is sold with the system



Manuals and Documentation

Manuals – Optional (continue)

HCAT	Description	Description/Comments
H45601FB	10T-D Probe User Manual - English	Only if 10T probe is sold with the system
H45601FA	10T-D Probe User Manual - Norwegian	Only if 10T probe is sold with the system
H45601FD	10T-D Probe User Manual - French	Only if 10T probe is sold with the system
H45601FE	10T-D Probe User Manual - German	Only if 10T probe is sold with the system
H45601FF	10T-D Probe User Manual - Italian	Only if 10T probe is sold with the system
H45601FG	10T-D Probe User Manual - Spanish	Only if 10T probe is sold with the system
H45601FK	10T-D Probe User Manual - Swedish	Only if 10T probe is sold with the system
H45601FL	10T-D Probe User Manual - Danish	Only if 10T probe is sold with the system
H45601FM	10T-D Probe User Manual - Polish	Only if 10T probe is sold with the system
H45601FN	10T-D Probe User Manual - Finnish	Only if 10T probe is sold with the system
H45601FP	10T-D Probe User Manual - Greek	Only if 10T probe is sold with the system
H45601FR	10T-D Probe User Manual - Russian	Only if 10T probe is sold with the system
H45601FS	10T-D Probe User Manual - Dutch	Only if 10T probe is sold with the system
H45601FT	10T-D Probe User Manual - Hungarian	Only if 10T probe is sold with the system



Manuals and Documentation

Manuals – Optional (continue)

HCAT	Description	Description/Comments
H45601FW	10T-D Probe User Manual - Slovakian	Only if 10T probe is sold with the system
H45601FY	10T-D Probe User Manual - Romanian	Only if 10T probe is sold with the system
H45601FZ	10T-D Probe User Manual - Czech	Only if 10T probe is sold with the system
H45601HA	10T-D Probe User Manual - Latvian	Only if 10T probe is sold with the system
H45601HB	10T-D Probe User Manual - Lithuanian	Only if 10T probe is sold with the system
H45601HD	10T-D Probe User Manual - Estonian	Only if 10T probe is sold with the system
H45601HF	10T-D Probe User Manual - Serbian	Only if 10T probe is sold with the system
H45601HG	10T-D Probe User Manual - Bulgarian	Only if 10T probe is sold with the system
H45601HH	10T-D Probe User Manual - Slovenian	Only if 10T probe is sold with the system
H45601HK	10T-D Probe User Manual - Croatian	Only if 10T probe is sold with the system
H45601HL	10T-D Probe User Manual - Portuguese Eu	Only if 10T probe is sold with the system
H45601HM	10T-D Probe User Manual - Ukrainian	Only if 10T probe is sold with the system
H45601HN	10T-D Probe User Manual - Kazakh	Only if 10T probe is sold with the system
H45601HC	10T-D Probes User Manual Turkish	Only if 10T probe is sold with the system



Keyboards

Keyboards and Key Cap Language Kits

HCAT	Description	Description/Comments
H45601ST	Language Assembly v2, Ger.	
H45601SS	Language Assembly v2, Fre.	
H45601SW	Language Assembly v2, Ita.	
H45601SU	Language Assembly v2, Spa.	
H45601SV	Language Assembly v2, Por.	
H45601SX	Language Assembly v2, Swe.	
H45601SY	Language Assembly v2, Nor.	
H45601SZ	Language Assembly v2, Fin.	
H45601TA	Language Assembly v2, Den.	



Power cords and Destination Sets

Mandatory

HCAT	Description	Description/Comments
H45611RB	Country Kit, Std. EU	
H45611RD	Country Kit, Switzerland	
H45611RF	Country Kit, UK	
H45611RX	Country Kit, Denmark Hospital	With red cable, Hospital Plug
H45611RY	Country Kit, Denmark Standard	With gray cable, Standard Plug
H45611RJ	Country Kit, South Africa	



Power cords and Destination Sets

Optional

HCAT	Description	Description/Comments
H45591CT	Power Cable EU	Only for external peripherals
H45591AT	Power Cable UK	Only for external peripherals
H45591AP	Power Cable Denmark	Medical grade power cable (red), only for external peripherals
H45591CS	Power Cable SUI	Only for external peripherals
H45591AS	Power Cable Israel	Only for external peripherals
H45601SR	Power Cable India, South Africa	Only for external peripherals



Probes

HCAT	Description	Description/Comments
4D XDClear electronic Sector Phased Array adult		
H40482LS	4Vc-D	
4D e4D wideband electronic Sector Phased Array pediatric		
H44901AQ	6Vc-D	
2D XDClear Sector Phased Array		
H44901AE	M5Sc-D	
2D Sector Phased Array		
H45021RR	6S-D	
H45021RT	12S-D	
2D XDClear Linear Array		
H40452LG	ML6-15-D	
2D Linear Array		
H40442LM	9L-D	
H40432LN	11L-D	
H40452LL	L8-18i-D	Intraoperative probe



Probes (continue)

HCAT	Description	Description/Comments
2D XDclear Curved Array		
H40472LT	C1-6-D	
H40462LN	C2-9-D	
H40482LB	C3-10-D	
2D Endocavity		
H40442LK	iC5-9-D	
Doppler pencil probes		
H4830JE	P2D	
H4830JG	P6D	



TEE Probes

HCAT	Description	Description/Comments
TEE adult probes		
H45581BJ	6VT-D	
TEE pediatric probes		
H45521DY	9T	
H44901AH	10T-D	

TEE accessories

HCAT	Description	Description/Comments
H45521CB	TEE Clip-On Bite Guard Adult OR	Supporting adult TEE investigation used for patients under general anaesthesia during surgery.
H45521CK	Adult TEE Scanhead Protection Cover	Cover scanhead for protection during transportation
H45521JG	TEE Conventional Bite Guard Pediatric	Conventional Bite Guard supporting adult TEE investigation.
H45541RN	Pediatric TEE Scanhead Protection Cover	Supporting adult TEE investigation used for patients under general anaesthesia during surgery.
H45551NM	TEE Storage Rack	For storage of Adult and Pediatric TEE probes, wall mounted. Store disinfected probes, ready for next use.
H45531HS	Bite Hole Indicator	



Biopsy Guides

HCAT	Description	Description/Comments
Biopsy Options 4D Sector Phased Array		
H40482LP	4Vc-D Multi Angle Biopsy kit	
Biopsy Options 2D Sector Phased Array		
H45561FC	M5Sc-RS Biopsy Kit	Civco Ref. # 442-180
Biopsy Options 2D Linear Array		
H40432LC	11L Biopsy kit	Civco Part # 742-335
H4906BK	9L Bio Guide Starter Kit	Civco Part # 742-335
H40432LJ	ML6-15 Biopsy Starter Kit	Civco Ref. # 442-172
Biopsy Options 2D Curved Array		
H4913BB	C1-6-D Biopsy Bracket	Civco Ref. # 442-213
H4913BA	C2-9-D Bipsy Bracket	Civco Ref. # 442-210
Biopsy Options 2D Endocavity		
E8385MJ	iC5-9-D Needle guide	Civco Ref.# 134-125



Software

HCAT	Description	OAC	Description/Comments
H45561NC	Stress	X	If H45601WG AFI 3.0 is enabled in addition, AFI Stress is also enabled
H45601WG	AFI 3.0	X	TTE AFI, TriPlane AFI, TEE AFI – including EF parameter, Easy AFI
H45611MP	Easy AFI LV	X	Requires H45601WG AFI 3.0
H45601TT	AFI RV	X	right ventricular longitudinal Global Strain, Free Wall Strain and Segmental Strain, TV TAPSE
H45601TU	AFI LA	X	left atrial longitudinal global strain, LA volumes, LA EF
H45601YK	Auto EF 3.0	X	
H45611MM	Easy AutoEF	X	Requires H45601YK Auto EF 3.0
H45591AG	Myocardial Work	X	Requires H45601WG AFI 3.0
H45591AF	Blood Speckle Imaging (BSI)	X	
H45601TX	AI Auto Measure	X	
H45571GY	Adv. Contrast Imaging	X	Enables contrast low MI
H45561MZ	Vascular Contrast	X	Vascular and abdominal contrast on 9L-D and C1-6-D
H45581EJ	DICOM viewer on media	X	
H45581EM	Vivid E90 4D option	X	Vivid E90 4D option provides the same 4D functionality as available on an original Vivid E95 4D system. 4D Options can be selected from E95 when enabled
H45611HW	Auto EF 3.0 and AFI 3.0 bundle	X	Contains AutoEF 3.0 and AFI 3.0
H45611YL	Easy AFI and EF bundle	X	Contains Auto EF 3.0 , Easy Auto EF , AFI 3.0 and Easy AFI LV
H45611YN	Vivid E90 / 95 Ultra Edition 2022 2D quantification bundle	X	Stress, Auto EF 3.0, AFI 3.0, AI Auto Measure, Myocardial Work, Adv. Contrast Imaging
H45601TV	4D ICE	X	Enable option only. <u>DOES NOT REQUIRE 4D OPTION</u> NUVISION Connector cable and NUVISION Ultrasound Catheter need to be ordered separately from Biosense Webster [™]



Hardware Options

HCAT	Description	Description/Comments
H45611JF	UPS 220-240V 50/60Hz	Uninterruptable power supply, requires H45611LU only available for Germany, France, Greece, Italy at the moment
H45611LU	E-Series UPS Support Kit	Required to operate the UPS H45611JF
H46732LF	Tripedal footswitch	
H45601RT	Vivid Exx DVD Option ComExpress	DVD-R writer
H45581AF	Adapter for Pressure Xducer	
H45571GB	Adapter for MA-300 Heart Sound microphone	



ECG and Connectivity

HCAT	Description	OAC	Description/Comments
ECG Options			
H45601SD	ECG cable, adult, IEC		Cable only, requires lead set
H45601SE	ECG lead set, adult, IEC		Used together with H45601SD
H45601SG	ECG cable, neo, IEC		3.6 m. Used together with neonatal leads H45601SJ
H45571RK	Lead/electr neo IEC 600		
H45601SK	Adapter, ECG 3-lead		ECG Cable Adapter, Multi-link 3-lead DIN adapter Adapter to use adult ECG cable H45601SD with neonatal ECG leads/electrodes H45571RK.
H45521AL	External ECG Cable		Set of various cables and connectors to enable connection of ECG from stress treadmills and ECG monitors to our Vivid scanner
Connectivity Options			
H45611MR	Remote Viewing	X	Network based streaming of the screen to a web-browser on a remote dev. (PC, MAC or pad)
H45061GW	Tricify connectivity	X	
H45601GT	Streaming E-series	X	2D and 4D streaming of ultrasound data to an external display via secure network connection
H45591HS	WiFi Kit		Wireless external G type USB adapter with extension cable and hardware for rear panel mounting



Printer and Other Peripherals

HCAT	Description	Description/Comments
Printers		
H45611QY	Vivid E-series BW printer, DC version	Black & White "video printer", with USB interface, for printing of images. UP-D898MD requires H45541MK „Installation for printers“ only if not ordered with system (field upgrade)
H45541MJ	Color Laser Printer 220V	Color Laser printer (HP Laserjet Pro 400 - M451dn) for printing of reports, 220V version peripheral power cable required requires H45541MK „Installation for printers“ only if not ordered with system (field upgrade)
H45541MH	Color Laser Printer 110V	Color Laser printer (HP Laserjet Pro 400 - M451dn) for printing of reports, 110V version peripheral power cable required requires H45541MK „Installation for printers“ only if not ordered with system (field upgrade)
H45561AA	Color Video Printer	Color "video printer", with USB interface, for printing of images. Comes with EU type and UK type power cord. Other power cord must be ordered separately! requires H45541MK „Installation for printers“ only if not ordered with system (field upgrade)
H45541MK	Installation for printers	Installation software, drivers and manuals for the offered printers for field installation
Printer Paper		
Peripherals/Accessories		
H45581EL	External Digital Video Stream Recorder	External DVD recorder Peripheral power cable required
H45551NJ	Protective Cover Vivid Expert	
H45581NA	USB Memory Key 32GB	



VNAV

Not available



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Upgrades

HCAT	Description	Description/Comments
H45611QT	Vivid E90 E80 v203 to v206 UPG <i>with eDelivery</i>	This upgrade includes the software and hardware required to upgrade a Vivid E90 or E80 v203 to a Vivid E90 or E80 v206. Including eDelivery. Only for countries where eDelivery is enabled
H45611QX	Vivid E90 E80 v203 to v206 UPG	This upgrade includes the software and hardware required to upgrade a Vivid E90 or E80 v203 to a Vivid E90 or E80 v206
H45611QR	Vivid E95 E90 E80 v204 to v206 UPG <i>with eDelivery</i>	This upgrade includes the software and hardware required to upgrade a Vivid E95, E90, or E80 v204 to v206. Including eDelivery. Only for countries where eDelivery is enabled
H45611PZ	Vivid E95 E90 E80 v204 to v206 UPG	This upgrade includes the software and hardware required to upgrade a Vivid E95, E90, or E80 v204 to v206.



Veterinary Use

HCAT	Description	OAC	Description/Comments
	For vet use please continue using Vivid E90 204 version		



Revision History

Revision	Date	Author	Description/Comments
Draft	June 22, 2022	Christian Berger	Initial Release
Rev. A	July 14, 2022	Christian Berger	
Rev. B	July 25, 2022	Christian Berger	Removed H45591AM MVA to 4D Auto MVQ conv and H45591AN RV Volume to 4D Auto RVQ conv , changed DICOM viewer from H45581EJ to H48532BS
Rev. C	July 28, 2022	Christian Berger	Removed vet options due to MDR regulatory
Rev. D	August 22, 2022	Christian Berger	Added software bundle H45611YN
Rev. E	August 26, 2022	Christian Berger	Added H45611YL,Easy Auto EF 3.0 and Easy AFI 3.0 bundle



Appendix A





YOUR PATIENTS RELY ON **YOU**.
YOU CAN RELY ON **US**.

Vivid™ E90


ULTRA EDITION




gehealthcare.com


TODAY'S CHALLENGES

Increasing demand, coupled with limited cardiology staff, results in additional workload challenges for the entire medical community.


 **17 MILLION**
people died from CVDs
in 2019¹

 **1 in 4**
cardiologists state they
are burned out²

 **>10%**
increase in IHS alone by
2030³

 **20%**
of sonographers are leaving
the profession or taking
premature retirement⁴

 **108 MILLION**
annual echo exams
performed globally⁵

 **x2**
Shortage of health workers is
set to double⁶



YOUR PATIENTS RELY ON YOU.
YOU CAN RELY ON US.

Patient care isn't just a job for you. It's a calling. A mission.

Of late, that mission has changed. Increased workloads, fewer skilled staff and increased demands on your time, resources and expertise are now the norm.

Getting the right images under this pressure is challenging.

But this isn't just a job for you and you have no intention of sacrificing quality in your practice when so much is at stake.

The Vivid E90 Ultra Edition* cardiovascular ultrasound system has been updated to meet today's challenges. To allow further improved image quality in both 2D and 4D as well as reduce tedious tasks and inter-operator variability, from the simple to the most complex cases.

Because your patients rely on you, you can rely on us.

PIONEERING INNOVATION

YOUR EXPERTISE. OUR INNOVATIONS.

Building on a history of advancements of cardiac patient care, GE has been a true pioneer introducing breakthrough technologies, such as Color Doppler systems (1986) and 2D and AFI Speckle Tracking (2005).

Discover the latest leading innovative technologies that continue to push the technical capabilities of the Vivid Ultra Edition* system for the benefit of you and your patient.

2015

- cSound™
- FlexiSlice
- 2-Click Crop
- HDLive

2016

- Cardiac Auto Doppler
- 4D Auto MVQ

2017

- Vmax
- 4Vc-D probe

2018

- AutoEF 2.0
- AFI 2.0 with AI Based View Recognition
- 4D Markers
- 4D Auto LAQ
- AutoEF 2.0

2020

- FlexiLight
- HD Color
- 6Vc-D probe
- 4D ICE**



UPGRADE NOW!

VIVID E90 ULTRA EDITION

Achieve clinical excellence

Designed to provide you with uncompromised image quality, advanced visualization capabilities and easy measurements – while helping reduce tedious tasks and inter-observer variability.

LATEST INNOVATIONS



cSound ADAPT⁷

Adaptively corrects for ultrasound wave distortions caused by inhomogeneities of the speed of sound naturally present in the patient body

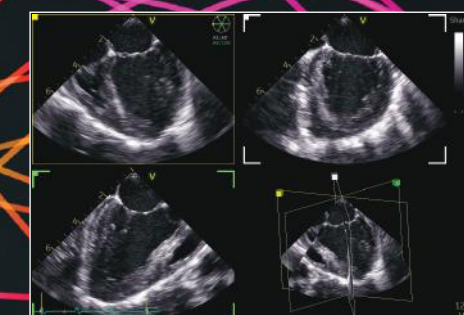
Optimizes IQ
100x per second⁷



Easy AutoEF⁸ & Easy AFI LV

Strain and Ejection Fraction measurements with automatic region of interest

Only 1 Click In 15 seconds
(on average)⁹



9VT-D probe¹⁰

Mini 4D trans-esophageal echocardiography (TEE) probe

Most Compact
mini 4D TEE-probe¹⁰

MODERN ERGONOMICS

Adjustable to each operator and each sitting position

- Articulating monitor arm
- Single-hand push for up/down and left-right adjustment

Excellent operator interface

- 23.8" HDU monitor
- Intuitive 12" LCD touch screen
- Adjustable floating keyboard
- Low noise cooling

Easy to maneuver

- Ergonomic, easy to push handle

YOUR VISION. OUR SUPERB IMAGES.

With the renowned superb image quality from cSound™, now Vivid Ultra Edition goes a step further with the launch of cSound ADAPT for the 4Vc-D probe.



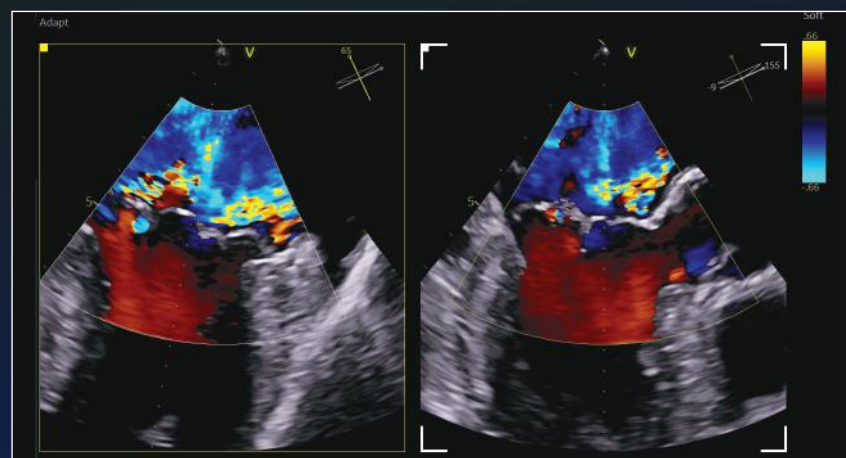
cSound Adapt optimizes
IMAGE QUALITY
OVER 100 TIMES PER SECOND

Ultrasound waves are distorted by different patients' habitus. Inhomogeneities in body structure (made of very different speed-of-sounds, such as bone or tissue) cause **image quality degradation.**

cSound ADAPT was built and verified on **40.000** frames of channel data recordings.

3.5x
more graphics processing power¹²

Color Flow – Even better image quality!



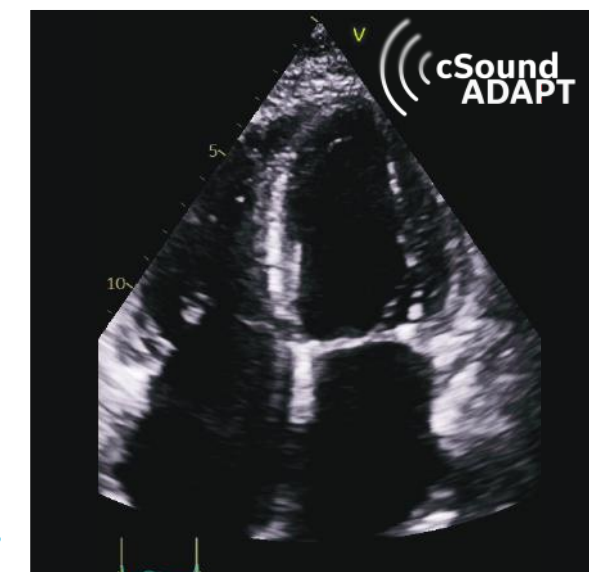
10-15% of echo exams result in sub-optimal images¹¹

With the objective of improving the scanning experience on hard-to-scan patients, cSound ADAPT was developed to correct ultrasound aberrations that may degrade image quality. cSound™ ADAPT tackles the challenge of ultrasound wave distortions, you will enjoy improved image contrast and resolution – optimized in real time, at over 100 times per second⁷, in every patient.

Image captured **without** cSound ADAPT



Image captured **with** cSound ADAPT



cSound rectifies image distortions for **enhanced image quality.**

“The GE 4Vc-D probe with cSound ADAPT sharpens images, increasing contrast resolution and improving diagnostic confidence. In our use we experienced that the imaging enhancements reduced non diagnostic images, improved productivity and workload by reducing scan time and improving ergonomics.”

– **Lill Merete Skretteberg Lindøe**
Echo technician
Oslo University Hospital, Norway

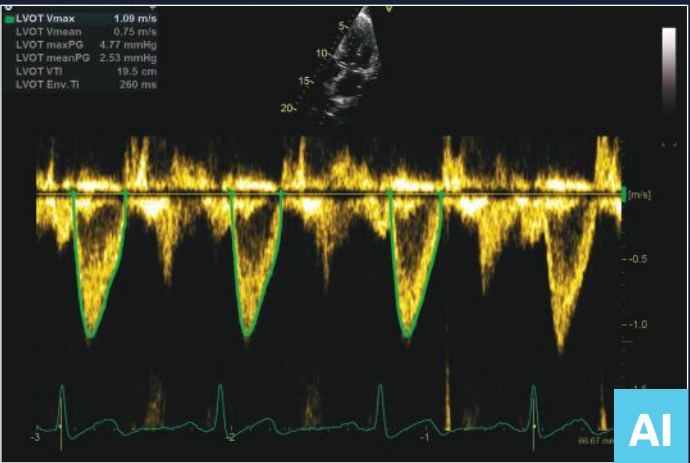
YOUR TIME. OUR WORKFLOW TOOLS.

Vivid E90 Ultra Edition introduces the latest AI-based technology to help reduce tedious tasks and improve workflow efficiency.

AI Auto Measure 2D

With the power of AI, a full set of reproducible measurements will instantly appear on the screen.


 **80%**
Less clicks¹³



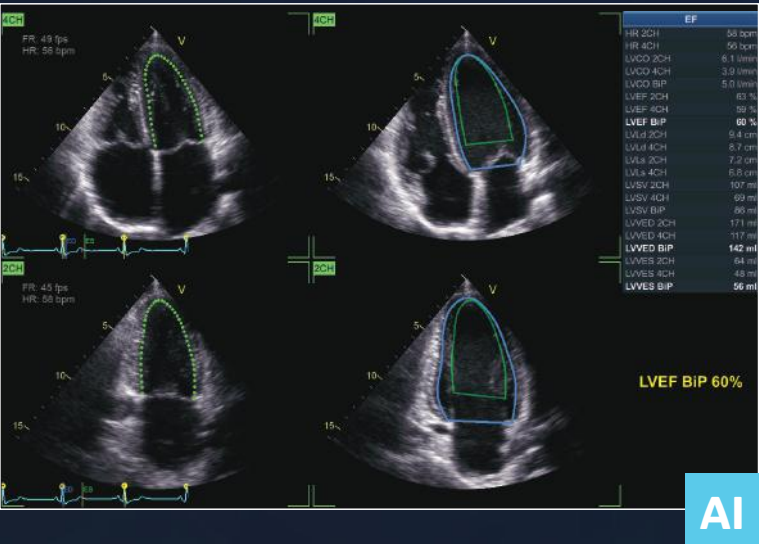
Cardiac Auto Doppler with AI Auto Measure Spectrum Recognition

With the power of AI, a wide range of Doppler measurements can be completed with 2 clicks: Freeze – Measure. A Doppler trace and full set of associated measurements will instantly appear on the screen.


 **Up to 93% fewer keystrokes**¹⁴

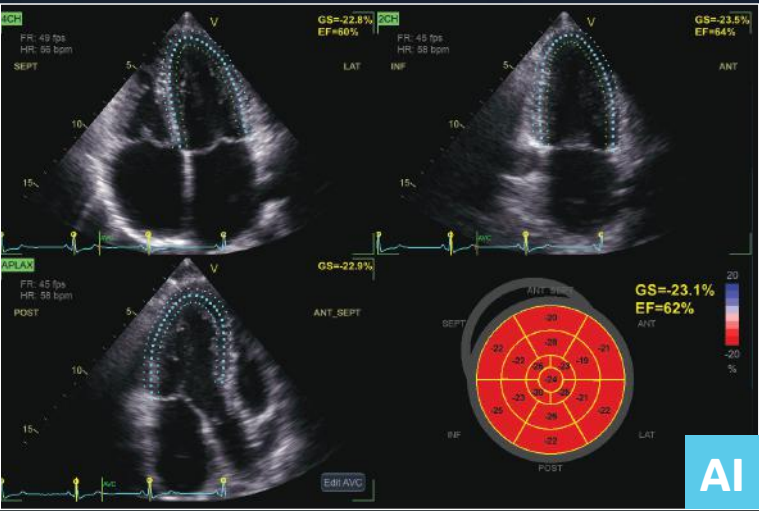
 **35%** of cardiac sonographers miss work due to pain¹⁵

LATEST INNOVATIONS




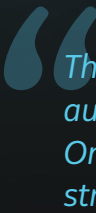
Easy AutoEF
Our AI-based Auto ROI detection algorithm allows users to complete ejection fraction, with no manual interaction apart from initiating the tool and approving the results.

 **EF results in just 1 click**



Easy AFI LV with view recognition
Our AI-based global and segmental strain measurements require no manual interaction apart from initiating the tool and approving the results. Additionally, you will be able to view EF measurements.

 **EF and strain results in 15 seconds** (on average)

 *The new Easy AFI LV speeds up strain measurements and simultaneously provides an automated LV ejection fraction measurement. Once good standard views are acquired, the GE strain algorithm enables incredibly robust strain measurements!*

– Prof. Erwan Donal
Cardiologist
University Hospital Center, Rennes, France

YOUR MOST CHALLENGING PATIENTS. OUR RELENTLESS SUPPORT.

The smallest cardiac patients can pose the biggest care challenges with difficult to diagnose, severe conditions. To help clearly visualize small anatomies, Vivid E90 brings you the latest in 4D breakthrough TEE and TTE technologies.



Vivid E90 Ultra Edition, with the 12S-D, 6S-D, 6Vc-D probes, was built to address all your pediatric needs.



The new 9VT-D probe has become an essential tool for any Tertiary Paediatric Cardiology Department.

Its revolutionary design combines high quality imaging for any paediatric patient from neonates to teenagers, both in 2D and 3D, and the most advanced and user friendly real time 4D tools that help users obtain clinically meaningful images.

The new 9VT-D probe is an essential tool to ensure an optimal result for paediatric patients during cardiac interventional procedures, both in Cath lab and EP lab, and during any complex cardiac surgery intervention as it offers perfect real time visualization of any cardiac structure."

- Dr. Ferrán Rosés i Noguer
Head of Pediatric Cardiology
Vall d'Hebron Hospital - Barcelona, Spain

⇒ **10%**

of pediatric echo diagnostic are driven by misleading anatomy or physiology¹⁵

Introducing, 9VT-D probe!

4D TEE probe designed for a broad range of pediatric and interventional procedures and for patients as small as 5 kg.

- All 2D, 4D, Color and Doppler modes
- Cardiac, Pediatric and Coronary applications
- Scan depths down to 18 cm



Most Compact

mini 4D TEE-probe

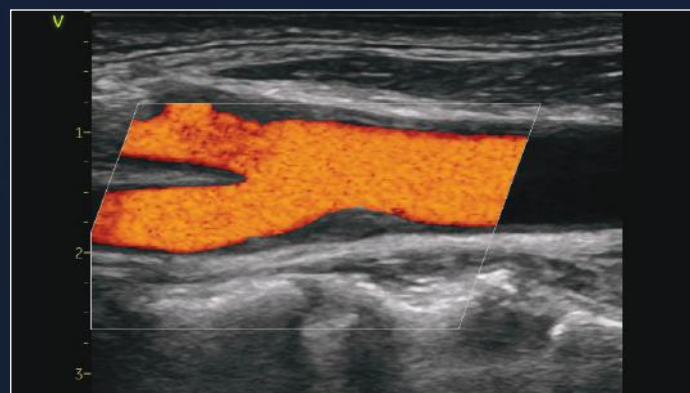
1ST

4D TEE probe designed for small children¹⁰



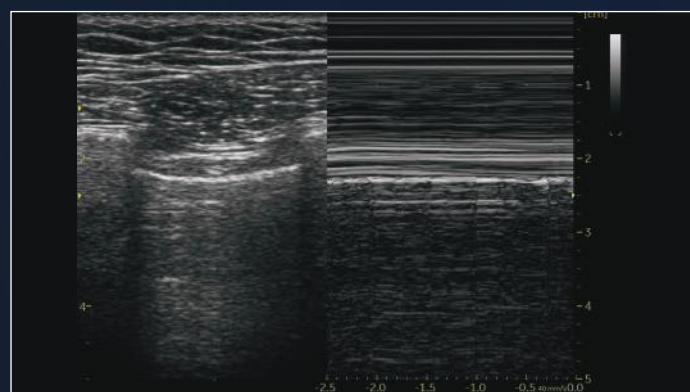
BEYOND CARDIOLOGY.

The demand for multi-purpose, cost efficient ultrasound systems with uncompromised image quality is growing. Your Vivid E90 Ultra Edition will exceed your expectations across a wide range of applications.



Blood Flow Imaging

Combines color Doppler with grayscale speckle imaging to help improve delineation of blood flow without bleeding into vessel wall.



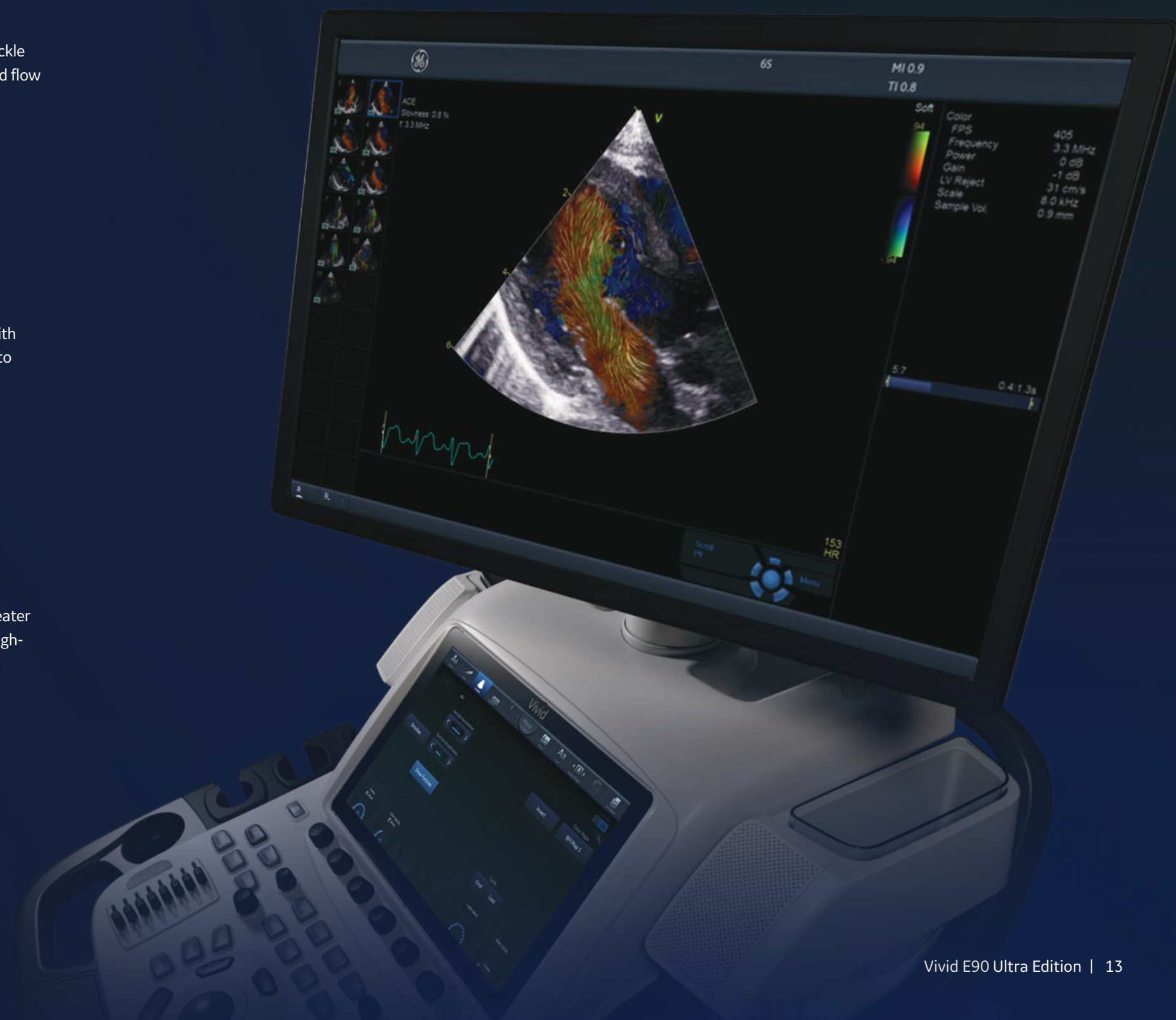
Lung Assessment

Bedside lung assessment is made easier with dedicated FAST and lung presets that help to quickly optimize images.



Abdominal diagnosis

Visualize tissues and flow patterns with greater details thanks to Vivid E90 Ultra Edition's high-resolution imaging.



YOUR FLEET. OUR SOLUTION.

Patient care doesn't end when the exam is over. Upgrade to EchoPAC™ to optimize your patient time and your post-processing time.



FAST WORKFLOW

- Fully integrated workflow with the EchoPAC Plug-in, DICOM® SR transfers to reporting systems, accelerated data transfers in clinical and research operations
- Featuring Open4D to assess & quantify 3D volumes from multivendor equipment fleets

For 3 dimensional system vendor agnostics analysis



EchoPAC exists as **EchoPAC Software Only** and **EchoPAC Plug-in**

EchoPAC Plug-in is available for:

- GE Healthcare Centricity™ Cardio Enterprise with Intelligent Reporting (IR)
- GE Healthcare ViewPoint™ 6 with EchoPAC Suite¹⁶
- As a Plug-in to third party PACS.



STATE-OF-THE-ART ACCURACY

- Full access to all Vivid scanner tools:
- From the most used AI-Powered ones on routine measurements: Easy AFI LV, Easy AutoEF and Auto Doppler Spectrum Recognition
 - To the most advanced ones: Myocardial Work is a unique tool using less load dependent parameters than strain alone

Interested in Myocardial Work?

Learn more on the publicly available Webinar on the Vivid Club website

COMFORTABLE EXPERIENCE

- Familiar Vivid user interface, faster staff ramp-up
- Analyzing and reporting from the ergonomic comfort of a workstation
- More focus on patient at acquisition

Maximize your entire fleet return on investment

- Transcend your machine performance: regardless of vendor, regardless of machine age, get all the latest Vivid tools
- Save time: get EchoPAC to free-up scanner time and perform your daily analysis off-line including LV quantifications doppler and function assessment

I am amazed by the measurements you can perform on EchoPAC after the patient has left!"

– Dr. Lamin E.S. Jaiteh
Consultant Cardiologist & Lecturer in Cardiology
Department of Internal Medicine
Edward Francis Small Teaching Hospital/School of Medicine & Allied Health Sciences, University of the Gambia

YOUR SKILLS. OUR SUPPORT.

In the core echo lab and even beyond cardiology, smart applications support your know-how.

The Ultra Edition applications highlighted in **bold** are referent to our latest release.

FLOW QUANTIFICATION

Ultra Edition

Cardiac Auto Doppler

AI

AI Auto Measure Spectrum Recognition

AI

BSI

CHAMBER QUANTIFICATION

Ultra Edition

AI Auto Measure 2D

AI

AutoEF on DICOM

AI

Easy AutoEF

AFI FUNCTIONAL IMAGING

Ultra Edition

AFI Stress

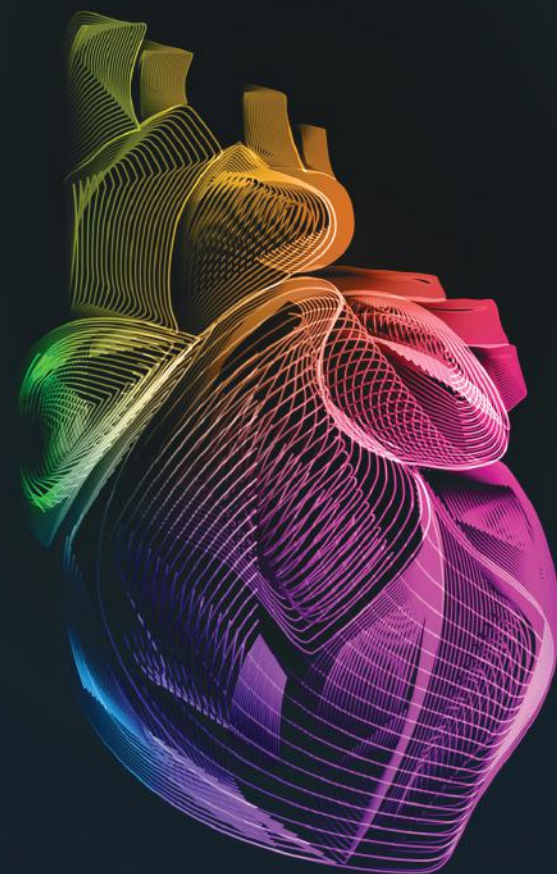
MyoCardial Work

Easy AFI LV

AI

AFI RV

AFI LA



YOUR COMMUNITY. OUR COLLABORATION.

Vivid is much more than just a system. Make the most of your Vivid experience with our community resources and learning opportunities.

www.gehealthcare.com

On our website you will find content available to the general public with top industry Key Opinion Leaders, Learning Academy on Strain including Whitepapers and Case Studies.



Vivid Talks

Our "Meet the Expert" sessions (Vivid Talks) on wide-ranging subjects from EchoLab to interventional.



Strain Learning Academy

Our Learning Academy is dedicated to supporting the industry in advancing strain measurement adoption.

60%
of all strain measurement clinical research publications has been done on a GE device.¹⁷

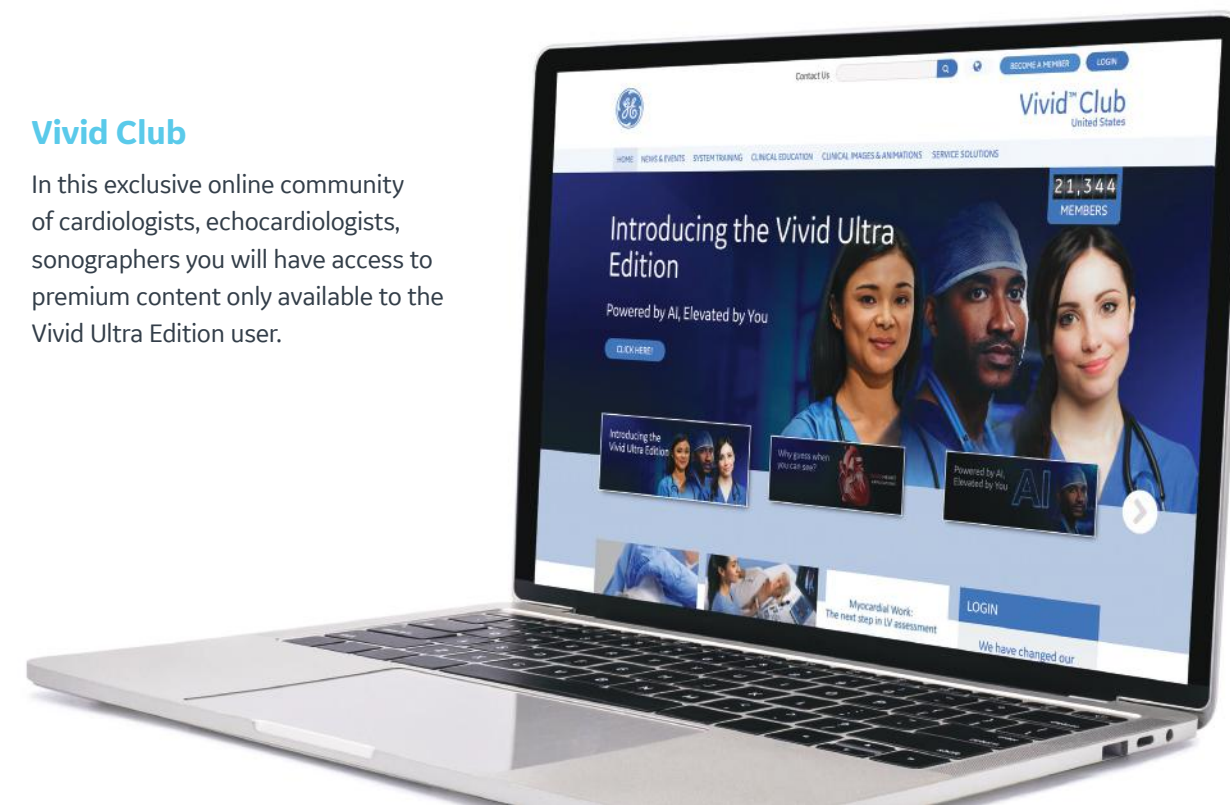


Whitepapers & Case Studies

The latest Whitepapers and Case Studies presented by the field experts.

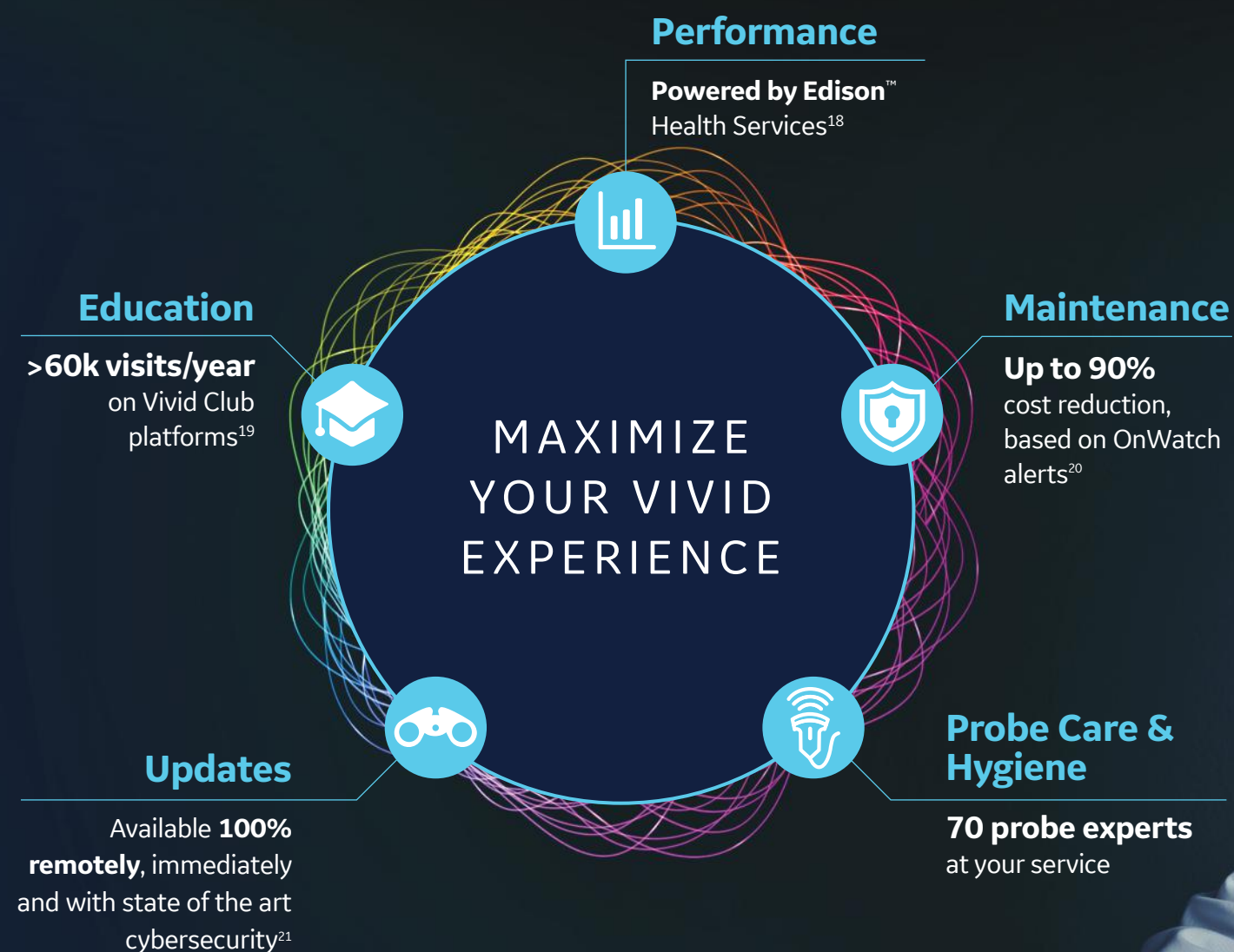
Vivid Club

In this exclusive online community of cardiologists, echocardiologists, sonographers you will have access to premium content only available to the Vivid Ultra Edition user.



OUTPERFORM TODAY. PREPARE FOR TOMORROW.

Maximize the Vivid lifecycle experience while minimizing your total cost of ownership.



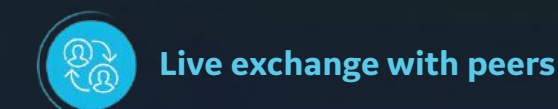
“The implementation of Imaging Insights/Ultrasound Excellence in my biomedical unit for the cardiology and gynecology departments ultrasound equipment has opened the door to better utilization of my systems and distribution of activity, all of which has allowed me to improve our operational efficiencies, cost investment and service to patients.”

– Mrs Valérie Boissart
Head of Biomedical Engineering Department
Luxembourg Hospital Center



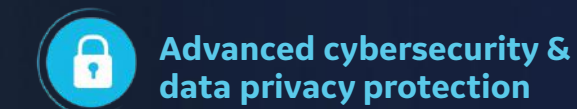
DIGITAL EXPERT/STAR**

Digital Expert (and STAR) provide an interactive, real-time, flexible & convenient way to get education and support.²²



SONODEFENSE

SonoDefense is GE Healthcare's six-layer strategic approach to cybersecurity and patient data privacy for ultrasound.



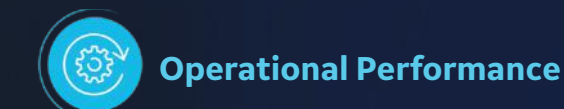
AUTOMATED, REMOTE SW DOWNLOADS

Get automated software updates along with safety patches enabled by remote software download. Your system stays up-to-date, making it more reliable.



IMAGING INSIGHTS

Imaging Insights is an Edison™ application that combines analytics and coaching to help ultrasound management teams to optimize clinical and operational performance.



About GE Healthcare:

GE Healthcare is the \$18 billion healthcare business of GE (NYSE: GE). As a leading global medical technology and digital solutions innovator, GE Healthcare enables clinicians to make faster, more informed decisions through intelligent devices, data analytics, applications and services, supported by its Edison intelligence platform. With over 100 years of healthcare industry experience and around 50,000 employees globally, the company operates at the center of an ecosystem working toward precision health, digitizing healthcare, helping drive productivity and improve outcomes for patients, providers, health systems and researchers around the world.

Follow us on Facebook, LinkedIn, Twitter, and Insights for the latest news, or visit our website www.gehealthcare.com for more information.

References:

* Ultra Edition is not a product name, it refers to the 2022 release of the Vivid portfolio

** Only available in the US

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3. Moien AB Khan et.al. | Global Epidemiology of Ischemic Heart Disease: Results from the Global Burden of Disease Study | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7384703/>
4. Stephanie David | Importance of Sonographers Reporting Work-Related Musculoskeletal Injury: A Qualitative View | JDMS 21:234–237 May/June 2005 <https://journals.sagepub.com/doi/pdf/10.1177/8756479305274463>
5. Source: Healthcare Infrastructure and Procedural Volume for Ultrasound Imaging, Frost & Sullivan, 2018. Approx. 108.12 million echo exams are performed annually; Calculation based on 26% total global prevalence of CVD cases (422 million) undergoing echo exam; extrapolated from US study indicating roughly 26% of total prevalent CVD cases underwent echo exams percentage value validated from reports. https://www.prb.org/wp-content/uploads/2015/12/2015-world-population-data-sheet_eng.pdf
6. World Health Organization | A universal truth: no health without a workforce. Nov 2013. <https://www.bmj.com/content/347/bmj.f6804>
7. cSound ADAPT: Continuous beamforming optimization, adapting to patient anatomy and probe position whitepaper - JB20851XX.
cSound Adapt is exclusively available for Vivid E95 and Vivid E90
8. Easy AutoEF is restricted for use with adult TTE on GE Healthcare raw B-mode data loops of the LV. Easy AutoEF does not support left ventricles with septal bulge
9. Time to strain measurement result may vary with heart rate, frame rate and Vivid system. Verification of performance done by GEHC clinical application specialists using Vivid system (DOC2739637))
10. The content herein refers to 2022 release of Vivid portfolio. 9VT-D probe is exclusively available for E95 and E90. Vivid. Ultra Edition is released as of 25th August 2022
11. Kurt M, Shaikh K, Peterson L, et al. Impact on contrast echocardiography on evaluation of ventricular function & clinical management in a large prospective cohort. J Am Coll Cardiol. 2009; 53(9):802-810
12. 3,5 times more processing power claim refers to the 2022 release of the Vivid portfolio. This Graphic Processing Unit is exclusively available for Vivid E95 and E90
13. The Role of AI in Streamlining Echocardiography Quantification White Paper, Kristin McLeod and Jurica Sprem - JB20789XX
14. Based on results of time and motion study conducted by GE "JB49055XX - Cardiac Auto Doppler"; study results indicated time savings related productivity increase up to ~8 on an annual basis for a facility per sonographer
15. Oscar J. Benavidez et.al. | Diagnostic Errors in Pediatric Echocardiography Development of Taxonomy and Identification of Risk Factors | <https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.107.758532>
16. EchoPAC Suite is the marketing name for EchoPAC Plug-in
17. Whitepaper "AFI - strain imaging from research to clinical routine"- JB16411XX
18. Imaging Insights is an Edison™ application
19. GE internal data - Website analytics from January 2021 to December 2021
20. GE internal data
21. Based on Software e-Delivery Software installed
22. Digital Expert is only offered in the USA. Digital Expert is not a functionality provided by Vivid systems. Digital Expert is separate from Vivid systems and is for education and training purposed only



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JB21090XX



YOUR PATIENTS RELY ON **YOU.**
YOU CAN RELY ON **US.**

Vivid[™] in the EchoLab

U L T R A E D I T I O N



TODAY'S CHALLENGES

 **17 MILLION**

people died from CVDs in 2019¹

 **1 in 4**

cardiologists state they are burned out²

 **>10%**

increase in Ischemic Heart Disease (IHD) alone by 2030³

 **20%**

of sonographers are leaving the profession or taking premature retirement⁴

 **~108 MILLION**

annual echo exams performed globally⁵

 **x2**

Shortage of health workers is **set to double**⁶

CARDIOLOGY STAFF WORKLOAD PRESSURE IS AT AN ALL TIME HIGH.

As the incidence of cardiac heart disease and global population's access to healthcare increases, there has never been a bigger demand of healthcare workers.

However, the repetitive scanning movements associated with an increasing number of echo exams performed as well as an exodus of the healthcare profession, not replaced with enough new cardiology staff has meant an additional burden on the current heart teams.

DISCOVER THE IMAGE QUALITY AND AUTOMATION IMPROVEMENTS IN THE LATEST

Vivid Ultra Edition*



RELY ON US FOR BREAKTHROUGH IMAGE QUALITY DEVELOPMENT

With the renowned superb image quality from cSound™, now Vivid Ultra Edition goes a step further with the launch of cSound ADAPT for the 4Vc-D probe.



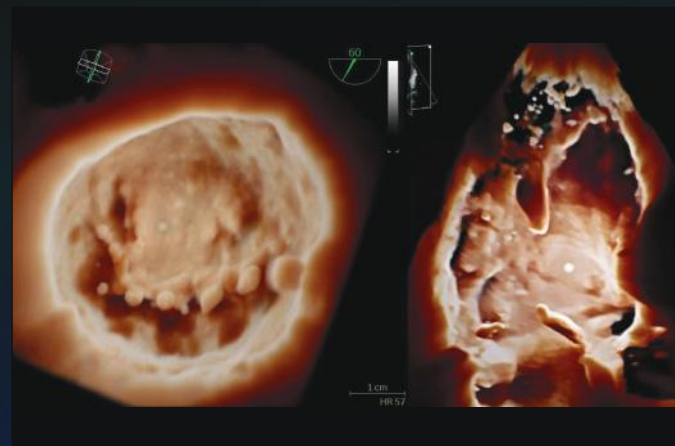
Ultrasound waves are distorted by different patients' habitus. Inhomogeneities in body structure (made of very different speed-of-sounds, such as bone or tissue) cause **image quality degradation.**

cSound ADAPT was built and verified on **40,000** frames of channel data recordings.

RELY ON US FOR RELENTLESS SEARCH FOR IMAGE QUALITY IMPROVEMENTS



more graphics processing power⁹



FlexiLight

Rendering technique for photo-realistic light-source based illumination of heart structures, providing comprehensive visualization of cardiac structures.

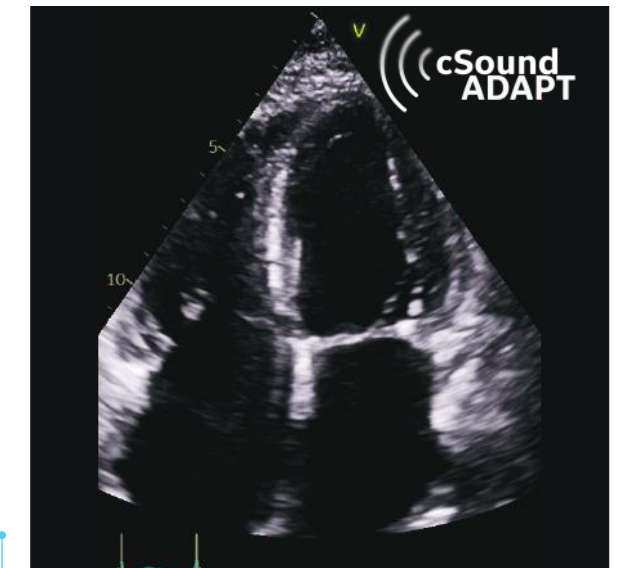
10-15% of echo exams result in sub-optimal images⁷

With the objective of improving the scanning experience on hard-to-scan patients, cSound ADAPT⁸ was developed to correct ultrasound aberrations that may degrade image quality. cSound™ ADAPT tackles the challenge of ultrasound wave distortions, you will enjoy improved image contrast and resolution – optimized in real time, at over 100 times per second, in every patient⁸.

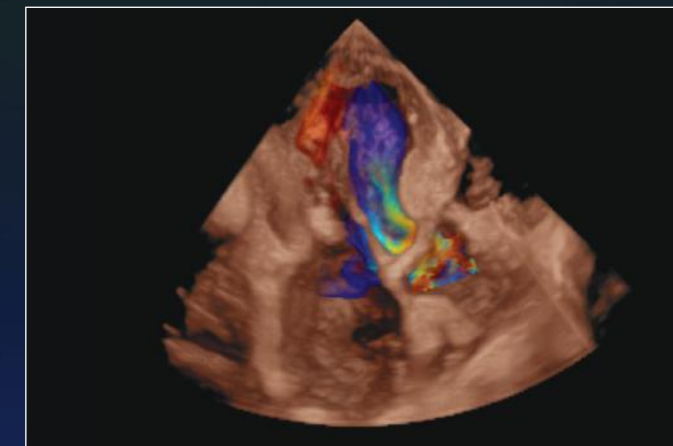
Image captured **without** cSound ADAPT



Image captured **with** cSound ADAPT

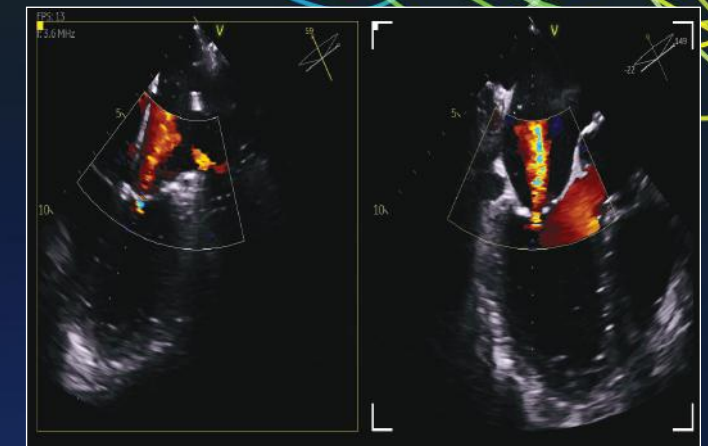


cSound rectifies image distortions for **enhanced image quality.**



HD Color

New 4D color flow rendering technique for semi-transparent visualization of origin and size of high velocity jets, enhancing spatial resolution between flow and surrounding structures.

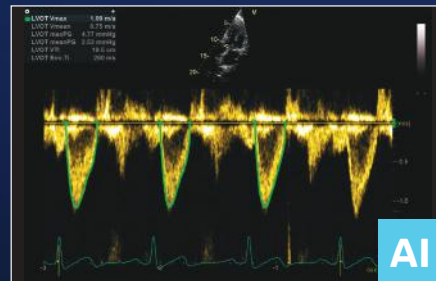


Color Flow

The improved graphics processing power enables improved spatial and temporal resolution for uncompromised color flow.

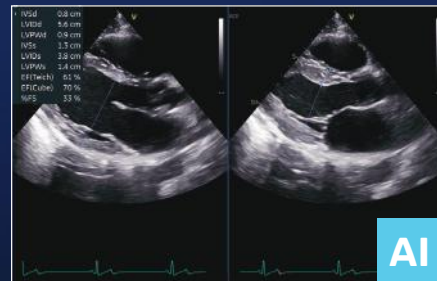
RELY ON ROBUST ARTIFICIAL INTELLIGENCE TO IMPROVE WORKFLOW

With a range of automated measurements including chamber, flow and strain quantification, the Vivid Ultra Edition brings you further automation to **reduce cumbersome multi-click tasks**.



Cardiac Auto Doppler

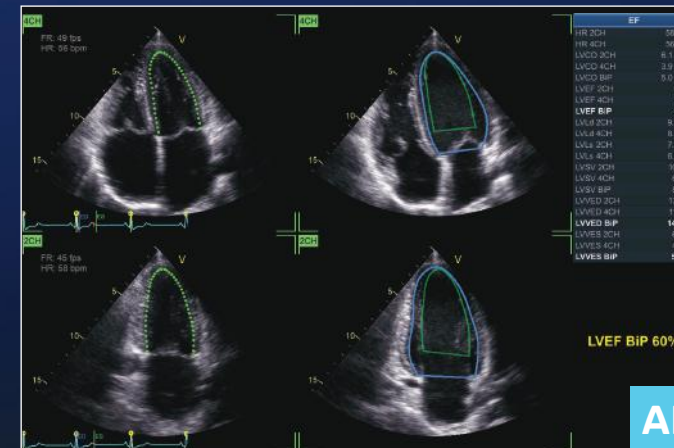
Semi-automatic cardiac auto doppler measurements. And with AI Auto Measure Spectrum Recognition" you can select the appropriate spectrum automation.



AI Auto Measure 2D

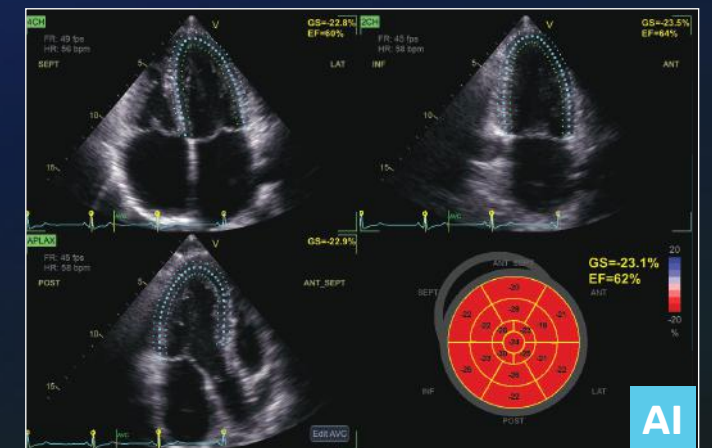
Semi-automatic LV dimension measurements (2D Calipers).

35% of cardiac sonographers miss work due to pain¹⁰



Easy AutoEF¹¹

Biplane left ventricular ejection fraction, in one single click. With AI-based Auto ROI detection algorithm, Easy Auto EF saves time and decreases intra- and inter-observer variability. Also, if no ECG signal is available, requires minimal additional user interaction.



Easy AFI LV

AFI LV analysis in one single click. Our AI-based Auto ROI detection algorithm allows users to complete the AFI workflow with minimal manual interaction to save time and decrease intra- and inter-observer variability.

Strain and EF measurements results in 15 seconds (on average)¹²

RELY ON US TO SUPPORT YOUR TEAM'S TRAINING



Vivid systems come with a variety of education offerings, including:

In-person training

- Onsite Application Trainings (at installation)
- Vivid Live Instructor Led Class (2-day training)¹³

Virtual learning at:

- Vivid Learning Academy - available to all on the Vivid website
- Vivid Club - exclusive digital content for Vivid users
- Digital Expert – an innovative platform providing interactive and real-time education and support, including clinician-to-clinician communication¹²

ECHOPAC™ – POST PROCESSING & REPORTING

Fast workflow

Fully integrated and featuring Open4D to assess & quantify 3D volumes from multivendor equipment fleets

Comfortable experience

Familiar interface with ergonomic comfort

State-of-the-art accuracy

Full access to all Vivid tools – from AI-simplified routine measurements to the most advanced ones (MyoCardial Work)

RELY ON US TO KEEP DRIVING STRAIN MEASUREMENT ADOPTION

The Vivid experience includes:

- Built-in continuous research findings in the field of strain
- Dedicated resources (such as the Strain Learning Academy) developed with Key Opinion Leaders to drive strain knowledge and adoption



60% of research publications in strain use GE Healthcare technology.¹⁵



Upgrade your ultrasound experience with **EchoPAC** today.

About GE Healthcare:

GE Healthcare is the \$18 billion healthcare business of GE (NYSE: GE). As a leading global medical technology and digital solutions innovator, GE Healthcare enables clinicians to make faster, more informed decisions through intelligent devices, data analytics, applications and services, supported by its Edison intelligence platform. With over 100 years of healthcare industry experience and around 50,000 employees globally, the company operates at the center of an ecosystem working toward precision health, digitizing healthcare, helping drive productivity and improve outcomes for patients, providers, health systems and researchers around the world.

Follow us on Facebook, LinkedIn, Twitter, and Insights for the latest news, or visit our website www.gehealthcare.com for more information.

References:

* Ultra Edition is not a product name, it refers to the 2022 release of the Vivid portfolio.

1. World Health Organisation | [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))
2. Laxmi S. Mehta et.al. | Clinician Well-Being: Addressing Global Needs for Improvements in the Health Care Field | Journal Of The American College Of Cardiology Vol. 78, No. 7, 2021
3. Moien AB Khan et.al. | Global Epidemiology of Ischemic Heart Disease: Results from the Global Burden of Disease Study | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7384703/>
4. Stephanie David | Importance of Sonographers Reporting Work-Related Musculoskeletal Injury: A Qualitative View | JDMS 21:234-237 May/June 2005 <https://journals.sagepub.com/doi/pdf/10.1177/8756479305274463>
5. Source: Healthcare Infrastructure and Procedural Volume for Ultrasound Imaging, Frost & Sullivan, 2018. Approx. 108.12 million echo exams are performed annually; Calculation based on 26% total global prevalence of CVD cases (422 million) undergoing echo exam; extrapolated from US study indicating roughly 26% of total prevalent CVD cases underwent echo exams percentage value validated from reports. https://www.prb.org/wp-content/uploads/2015/12/2015-world-population-data-sheet_eng.pdf
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9. 3.5 times more processing power claim refers to the 2022 release of the Vivid portfolio. This Graphic Processing Unit is exclusively available for Vivid E95.
10. Nicholas M. Orme et.al. | Echocardiography 2016 | <https://onlinelibrary.wiley.com/doi/10.1111/echo.13344>
12. Easy AutoEF is restricted for use with adult TTE on GE Healthcare raw B-mode data loops of the LV. Easy Auto EF does not support left ventricles with septal bulge.
13. Time to strain measurement result may vary with heart rate, frame rate and Vivid system. Verification of performance done by GEHC clinical application specialists using Vivid system (DOC2739637)
14. Not available in all markets. Please refer to your GE sales representative
15. Digital Expert is only offered in the USA. Digital Expert is not a functionality provided by Vivid systems. Digital Expert is separate from Vivid systems and is for education and training purposed only
16. Whitepaper "AFI - strain imaging from research to clinical routine" - JB16411XX



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JB20772XX



EU Quality Management System Certificate (MDR)

Pursuant to Regulation (EU) 2017/745 on Medical Devices, Annex IX Chapters I and III
(Class IIa and Class IIb Devices)

No. G10 023782 0130 Rev. 02

Manufacturer:

GE Vingmed Ultrasound A/S

Strandpromenaden 45
3191 Horten
NORWAY

SRN Manufacturer:

NO-MF-000000553

The Certification Body of TÜV SÜD Product Service GmbH certifies that the manufacturer has established, documented and implemented a quality management system as described in Article 10 (9) of the Regulation (EU) 2017/745 on medical devices. Details on device categories covered by the quality management system are described on the following page(s).

The Report referenced below summarises the result of the assessment and includes reference to relevant CS, harmonized standards and test reports. The conformity assessment has been carried out according to Annex IX Chapter I and III of this regulation with a positive result.

The quality management system assessment was accompanied by the assessment of technical documentation for devices selected on a representative basis.

The certified quality management system is subject to periodical surveillance by TÜV SÜD Product Service GmbH. The surveillance assessment shall also include an assessment of the technical documentation for the device or devices concerned on the basis of further representative samples. All applicable requirements of the testing and certification regulation of TÜV SÜD Group have to be complied with.

For details and certificate validity see: www.tuvsud.com/ps-cert?q=cert:G10 023782 0130 Rev. 02

Report No.:

713237573

Preceding Certificate No.:

G10 023782 0130 Rev. 01

Valid from:

2022-08-25

Valid until:

2027-08-24

Date of Initial Issuance:

2021-11-12

Christoph Dicks

Head of Certification/Notified Body

Issue date: 2022-08-25



EU Quality Management System Certificate (MDR)

Pursuant to Regulation (EU) 2017/745 on Medical Devices, Annex IX Chapters I and III
(Class IIa and Class IIb Devices)

No. G10 023782 0130 Rev. 02

Classification: IIa
Device Group: Z110401 - ULTRASOUND SCANNERS
Intended Purpose: -

Classification: IIa
Device Group: Z110402 - ULTRASOUND PROBES
Intended Purpose: -

Classification: IIa
Device Group: Z11040192 - ULTRASOUND SCANNERS - MEDICAL DEVICE SOFTWARE
Intended Purpose: -

The validity of this certificate depends on conditions and/or is limited to the following: - none -

Revision History:	Rev.	Dated	Report
	00	2021-11-12	713179289
	01	2022-03-09	713236231



EU DECLARATION OF CONFORMITY

Following the provisions of the medical devices regulation 2017/745.

We:

Manufacturer

GE Vingmed Ultrasound AS
Strandpromenaden 45
3191 Horten, Norway
Single Registration Number (SRN): NO-MF-000000553

Declare under our sole responsibility that the devices:

Vivid E80 v206, Vivid E90 v206, Vivid E95 v206, Vivid E v203 v204 to v206 UPG

Basic UDI-DI: 8406821BUG00253HB

Identification number: GD000100, GD000110, GD000120, GD200145

Intended Purpose: The Vivid E80, Vivid E90, Vivid E95, Vivid E v203 v204 to v206 UPG are general-purpose ultrasound systems or version upgrade kits for general-purpose ultrasound systems, specialized for use in cardiac imaging. Intended for ultrasound imaging, measurement, display and analysis of the human body and fluid.

GMDN Code: 40763

GMDN Description: Ultrasound system, imaging, cardiovascular.

EMDN Code: Z11040102

Class: IIa

Classification rule (Annex VIII): Rule 10 (Active MD for Diagnosis).

To which this declaration relates is in conformity with the requirements of the medical devices regulation 2017/745 that apply to it, and with the requirements of the directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), and the directive 2014/53/EU on the radio equipment (RED)

This conformity is based on the following elements:

- Technical Documentation reference: **DOC2491176**, of the product to which this declaration relates.
- EC certificate **G10 023782 0130**
 - Conformity assessment procedure followed: Annex IX excluding Chapter II
 - Delivered by **TÜV SÜD Product Service GmbH**, identification number: 0123

SIGNATURE:

Date of issue: 02-September-2022

Place of issue: Horten

Name: Jan Tore Thollefsen

Function: Sr. Regulatory Affairs Manager

Signature:

This EC declaration of conformity supersedes the previous declaration for Vivid E95, Vivid E90 and Vivid E80 version v206 dated August 31, 2022.

**ADDENDUM TO EC DECLARATION OF CONFORMITY for Vivid E95, Vivid E90, Vivid E80 (v206)**

Commercial Device Name w. version ^[1]	Device Part # ^[2]	GEHC Cat # ^[3]	Description
Vivid E95 v206	GD000100	H45611PP	Vivid E95 v206 with HDU
		H45611PK	Vivid E95 v206 with HDU eD
		H45611PV	Vivid E95 v206 with OLED
		H45611PG	Vivid E95 v206 with OLED eD
Vivid E90 v206	GD000110	H45611PQ	Vivid E90 v206 with HDU
		H45611PL	Vivid E90 v206 with HDU eD
		H45611PW	Vivid E90 v206 with OLED
		H45611PH	Vivid E90 v206 with OLED eD
Vivid E80 v206	GD000120	H45611PR	Vivid E80 v206 with HDU
		H45611PM	Vivid E80 v206 with HDU eD
		H45611PX	Vivid E80 v206 with OLED
		H45611PJ	Vivid E80 v206 with OLED eD
Vivid E v203 v204 to v206 UPG	GD200145	H45611PZ	Vivid E95 E90 E80 v204 to v206 UPG
		H45611QR	Vivid E95 E90 E80 v204 to v206 UPG with eD
		H45611QW	Vivid E95 v203 to v206 UPG
		H45611QS	Vivid E95 v203 to v206 UPG with eD
		H45611QX	Vivid E90 E80 v203 to v206 UPG
		H45611QT	Vivid E90 E80 v203 to v206 UPG with eD

OPTIONS CONSOLS	GEHC Cat # ^[3]
Easy AutoEF	H45611MM
Easy AFI LV	H45611MP
Remote Viewing	H45611MR
Vascular Contrast	H45561MZ
Probe Check	H45611MS
Adv. Contrast Imaging	H45571GY
AFI 3.0	H45601WG
AFI RV	H45601TT
AFI LA	H45601TU
AI Auto Measure	H45601TX
4D Strain and LV Mass	H45561NB
4D Auto AVQ	H45581CL
Stress	H45561NC
Auto EF 3.0	H45601YK
4D Auto TVQ	H45601TW
HDlive, HDcolor and FlexiLight	H45601TZ
4D Auto MVQ	H45591AD
4D Auto RVQ	H45591AE
DICOM viewer	H48532BS
Blood Speckle Imaging (BSI)	H45591AF
Myocardial Work	H45591AG
CT Fusion	H45601GN
4D Markers E-series	H45601GP
4D Auto LAQ	H45601GR
Streaming E-series	H45601GT

Notes used in the table :

1. Commercial Device Name is usually affixed to the device(s) in the form of a product identification or rating label under the symbol "REF")
2. Device Part # identifies the device(s) in the manufacturer's design, manufacturing, and service documentation.
3. GEHC Cat # identifies the device(s) in the manufacturer's catalog and is usually included on commercial documents like sale contract, order processing documents and shipping documents.

Horten, 02-September-2022


Jan Tore Thollesen
Sr. Regulatory Affairs Manager



PROBES w. Accessories ^[2]	TYPE ^[3]	GEHC Cat # ^[4]
4V-D	BF	H4001BT
4Vc-D	BF	H40482LS
6Vc-D	BF	H44901AQ
M5Sc-D	BF	H44901AE
6S-D	BF	H45021RR
12S-D	CF	H45021RT
9L-D	BF	H40442LM
11L-D	BF	H40432LN
ML6-15-D	BF	H40452LG
C1-6-D	BF	H40472LT
C2-9-D	BF	H40462LN
8C	BF	H40412LJ
iC5-9-D	BF	H40442LK
C3-10-D	BF	H40482LB
L8-18I-D	BF	H40452LL
6Tc	BF	H45551ZD
6Tc-RS ^[4]	BF	H45551ZE
6VT-D	BF	H45581BJ
9VT-D	BF	H45581CS
9T	BF	H45521DY
9T-RS ^[4]	BF	H45531YM
10T-D	BF	H44901AH
P2D	BF	H4830JE
P6D	BF	H4830JG
TEE Storage Rack	N/A	H45551NM
TEE PROBE ADAPTER FOR 6T-RS/9T-RS	N/A	H45541PX
TEE Scan head Protection Cover	N/A	H45521CK
Ped TEE Scan head Protection Cover	N/A	H45541RN
TEE Clip-On Bite Guard Adult OR	N/A	H45521CB
TEE Conventional Bite Guard Ped.	N/A	H45521JG
Bite Hole Indicator	N/A	H45531HS
4Vc-D Multi Angle Biopsy kit	N/A	H40482LP
C1-6-D Biopsy bracket	N/A	H4913BB
C2-9-D Biopsy bracket	N/A	H4913BA
iC5-9-D Needle guide	N/A	E8385MJ
9L Biopsy guide starter kit	N/A	H4906BK
12L-RS / 11L-D Multi biopsy guide	N/A	H40432LC
M5Sc-D Biopsy kit	N/A	H45561FC
ML6-15 Biopsy kit	N/A	H40432LJ

Notes used in the table:

1. GEHC Cat # identifies the device(s) in the manufacturer's catalog and is usually included on commercial documents like sale contract, order processing documents and shipping documents.
2. Probes and accessories may carry the CE-mark and, when applicable, the Notified Body number corresponding to the EC Declaration under which the products are CE-marked by their manufacturer. GE Vingmed Ultrasound AS has verified the mutual compatibility of the devices in combination with Vivid E95/E90/E80 in accordance with the manufacturers' instructions and included relevant information to users with the Vivid E95/E90/E80 instructions for use. This activity was subject to appropriate methods of internal monitoring, verification, and validation.
3. Type identifies the degree of protection against electric shock for each probe, as labeled on the probe itself.
4. The probes 6Tc-RS and 9T-RS can only be used on Vivid E95/E90/E80 when used together with the TEE Probe Adapter -RS, H45541PX. The adapter itself is not an applied part.

Horten, 02-September-2022



Jan Tore Thollesen
Sr. Regulatory Affairs Manager



I/O ^[1]	GEHC Cat # ^[2]	
ECG cable, adult, AHA	H45571PY / H45601SB	
ECG lead set, adult, AHA	H45571PZ / H45601SC	
ECG cable, adult, IEC	H45571RA / H45601SD	
ECG lead set, adult, IEC	H45571RB / H45601SE	
ECG cable, neo, AHA	H45571RD / H45601SF	
ECG cable, neo, IEC	H45571RE / H45601SG	
Lead/electr neo AHA 600	H45571RJ / H45601SH	
Lead/electr neo IEC 600	H45571RK / H45601SJ	
Adapter, ECG 3-lead	H45571RL / H45601SK	
Adapter for Pressure Xducer	H45581AF	
Adapter for MA-300 Heart Sound microphone	H45571GB	
ACCESSORIES ^[3]	GEHC Cat # ^[2]	
View-X	H45591AK	
B&W printer, digital with USB	H45601RU	
Vivid E-series BW printer, DC version	H45611QY	
Color Laser Printer 220V	H45541MJ	
Color Video Printer	H45561AA	
Installation for printers	H45541MK	
ECG Cable set	H45521AL	
Tripedal footswitch	H46732LF	
USB Memory Key 32GB	H45581NA	
External Digital Video Stream Recorder	H45581EL	
Protective Cover Vivid Expert	H45551NJ	
Spectacle Casing	H45551MJ	
Anacrome 3D glasses	H45551MK	
Anacrome 3D glasses Clip-On Flips	H45551ML	
Vivid Exx DVD Option ComExpress	H45601RT	
Wireless USB Adapter	H45591HS	
WiFi Kit Japan	H45601SN	
UPS 220-240V 50/60Hz	H45611JF	
UPS Support Kit	H45611LU	
UPGRADES ^[4]	Device Part # ^[1]	GEHC Cat # ^[2]
Vivid E80 4D Option	GC200426	H45581NY
Vivid E90 4D Option		H45581EM
Vivid E95 4D Option		H45601ZH
Vivid E80/E90/E80 v206 Software eDelivery	N/A	H45601YPED

Notes used in the table:

1. Device Part # identifies the device(s) in the manufacturer's design, manufacturing, and service documentation.
2. GEHC Cat # identifies the device(s) in the manufacturer's catalog and is usually included on commercial documents like sale contract, order processing documents and shipping documents.
3. I/O and Accessories may carry the CE-mark and, when applicable, the Notified Body number corresponding to the EC Declaration under which the products are CE-marked by their manufacturer. GE Vingmed Ultrasound AS has verified the mutual compatibility of the devices in combination with Vivid E95/E90/E80 in accordance with the manufacturers' instructions and included relevant information to users with the Vivid E95/E90/E80 instructions for use. This activity was subject to appropriate methods of internal monitoring, verification, and validation.
4. UPGRADES are items available for aftermarket sales. An upgrade may include and enable functionality which is identified as being "Not available" for the initial production and sale of the same model.

Horten, 02-September-2022


Jan Tore Thollesen
Sr. Regulatory Affairs Manager

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