



PHILIPS

Ultrasound

EPIQ CVxi

Designed for cardiology. Built for better care.

Philips EPIQ CVxi diagnostic ultrasound system specifications

Contents

1	Introduction	4	4	Workflow	16
1.1	Applications	4	4.1	Ergonomics	16
2	System overview	5	4.2	Display annotation	17
2.1	System architecture	5	4.3	SmartExam protocols	17
2.2	Imaging formats	7	4.4	Stress echo	17
2.3	Imaging modes	7	4.5	QuickSAVE feature	18
	M-mode	8	4.6	Image presentation	18
	Color Doppler	8	4.7	Cineloop review	18
	Color Power Angio imaging (CPA)	8	4.8	Exam management features	18
	MicroFlow Imaging (MFI)	8	4.9	Rapid procedure setup	18
	MicroFlow Imaging (MFI) and MicroFlow			Connectivity	18
	Imaging HD (MFI-HD) on eL18-4 and C5-1			NetLink connectivity option	
	transducers	8		(standard on premium and high end)	19
	Spectral Doppler	9		Report	20
	Auto color and Auto Doppler	9		Core security features	20
	Steerable Continuous Wave (CW) Doppler	9		Government security option	20
	Tissue Doppler Imaging (TDI/TDI PW)	9		SafeGuard security option	20
	iRotate echo (X5-1, X7-2, X7-2t and X8-2t)	9		Security Plus option	20
	Live xPlane imaging	9		Configurable Federal Information Processing	
	Live 3D echo	9		Standard (FIPS) selection	20
	Live 3D and MultiVue/Multislice		5	Transducers	21
	Live 3D and MPR/iSlice imaging	10	5.1	Transducer selection	21
	Freehand 3D volume and MPR imaging	10		Compact transducers	21
	Panoramic imaging	10		PureWave crystal technology	21
	Contrast imaging – cardiovascular	11		xMATRIX technology	21
	Contrast imaging – general imaging	11		Curved array	22
	2D imaging	11		C5-1 broadband curved array with PureWave	
	Tissue Harmonic Imaging (THI)	11		crystal technology	22
3	System controls	12		C8-5 broadband curved array	22
3.1	Optimization controls	12		C9-2 broadband curved array with PureWave	
	2D grayscale imaging	12		crystal technology	22
	Next-generation SonoCT real-time			Linear array	22
	compound imaging	13		eL18-4 ultra-broadband linear array	
	Elevation compound imaging	13		with PureWave crystal technology	22
	Image Boost	13		eL18-4 EM ultra-broadband linear array	
	XRES adaptive image processing	13		with PureWave crystal technology	22
	Live volume imaging/Live 3D Echo (CV)	13		L12-3 broadband linear array	23
	Coded beamforming	14		L12-5 50 broadband linear array	23
	iSCAN intelligent optimization	14		L18-5 broadband linear array	23
	AutoSCAN intelligent optimization	14		L15-7i0 broadband compact linear array	23
	iOPTIMIZE intelligent optimization	14		Sector array	24
3.2	Control panel	14		S5-1 broadband sector array with PureWave	
3.3	Touchscreen	15		crystal technology	24
				S9-2 broadband sector array with PureWave	
				crystal technology	24
				S8-3 sector array	24

Adult and pediatric cardiac applications	24	Strain Quantification (SQ)	35
S12-4 sector array	24	HeartModel ^{A.1.}	35
S7-3t sector array TEE	24	Dynamic HeartModel ^{A.1.}	36
S8-3t sector array TEE	24	3D Auto LAA	36
xMATRIX array	24	TOMTEC 3D Auto RV	36
X5-1 xMATRIX array with PureWave crystal technology	24	TOMTEC 3D Auto MV	36
X6-1 xMATRIX array with PureWave crystal technology	25	TOMTEC AutoStrain LV	36
XL14-3 xMATRIX array with PureWave crystal technology	25	TOMTEC AutoStrain LA	37
X7-2 xMATRIX array with PureWave crystal technology	25	TOMTEC AutoStrain RV	37
X7-2t xMATRIX array TEE with PureWave crystal technology	25	7.3 High Q automatic Doppler analysis	37
X8-2t xMATRIX array TEE with PureWave crystal technology	25	7.4 Clinical option analysis packages	37
Non-imaging	25	8 Physical specifications	38
D2cwc CW transducer (Pedoff)	25	System dimensions	38
D5cwc CW transducer (Pedoff)	25	System cart	38
D2tcd PW transducer (Pedoff)	25	Sustainability	38
5.2 EPIQ CVxi transducers, features and presets	26	Monitor	38
6 Image fusion	30	Control panel	39
6.1 Enabling live cardiac fusion imaging when combined with EchoNavigator R3	30	Physio	39
6.2 “Plug and play” EchoNavigator connection	30	Peripherals	39
7 Measurements and analysis	31	Input/output ports	39
7.1 Measurement tools and general description	31	Power requirements and video parameters	39
7.2 Measurement tools and quantification	31	Electrical safety standards	39
QLAB quantification software	31	9 Maintenance and services	40
Cardiac 3D Quantification (3DQ)	31	Clinical education	40
Cardiac 3D Quantification Advanced (3DQ Advanced)	31	Philips Remote Connectivity	40
General Imaging 3D Quantification (GI 3DQ)	32	Warranty	40
Mitral Valve Navigator ^{A.1.} (MVN ^{A.1.})	32		
Automated Cardiac 2D Quantification ^{A.1.} (a2DQ ^{A.1.}) and a2DQ ^{A.1.} LA	33		
Automated Cardiac Motion 2D Quantification ^{A.1.} (aCMQ ^{A.1.})	33		
Cardiac Motion/Mechanics 2D Quantification for Stress (CMQ Stress)	34		
Intima Media Thickness (IMT) measurements	34		
MicroVascular Imaging (MVI)	34		
Region of Interest (ROI) Quantification	34		

1. Introduction

Today's interventional cardiology departments are under pressure to implement cutting-edge imaging solutions that will not compromise workflow efficiency, diagnosis, treatment or patient care. At Philips, we understand your challenges as well as your commitment to providing outstanding diagnosis and care, fast. We also believe that, through specialized, patient-centric care, we can improve both outcomes and experiences. There's always a way to make life better.

Philips EPIQ CVxi delivers the exceptional image quality you expect in a premium ultrasound system, along with efficiencies in procedure guidance driven by new interventional dedicated tools and a cardiology-focused interface.

1.1 Applications

- Abdominal
- Fetal echo
- Cerebrovascular
- Vascular (peripheral, cerebrovascular, temporal TCD and abdominal)
- Abdominal vascular
- Echocardiography (adult, pediatric, fetal)
- Stress echocardiography
- Transesophageal echocardiography (adult and pediatric)
- Surgical imaging
- Interventional imaging
- Contrast imaging
- Perioperative
- Epicardial echocardiography



2. System overview



2.1 System architecture

- Powerful Philips **n**SIGHT Imaging combines a proprietary massive parallel processing architecture and precision beamforming for real-time coherent beam reconstruction. Capable of processing multiple data streams for structural, functional and Live 3D imaging.
 - Built for 2D, Live xPlane, Live 3D, Live 3D zoom, xPlane Doppler*, Live full volume, up to 102° x 101°, high volume rate (HVR) imaging, Live 3D color, MPR (multiplanar reconstruction), electronic rotational echocardiography (iRotate) and panoramic imaging capability; true real-time volume image-forming capability with multiple rendering engines
 - Next-generation Live 3D PureWave xMATRIX transducers with microbeamforming and single ASIC beamforming architecture
 - Live 3D, high volume rate (HVR) imaging with over 9,200 imaging elements, allowing outstanding 2D and 3D imaging from the single ergonomic transducer, eliminating the need to change between 2D and specialty 3D transducers
 - Offers up to 7,071,744 total digital channels (xMATRIX configuration)
 - Offers up to 4,718,592 total digital channels (non-xMATRIX configuration)
 - XL14-3* xMATRIX for vascular imaging provides 56,000 elements all connected to a separate microchannel
- Next-generation ultra-low noise, wide dynamic range digital broadband acoustic beamforming with proprietary architecture
 - 3D volume scan conversion that processes 460 megavoxels per second and renders 2300 mega-ray cast samples per second
 - Capable of 3.0 TFLOP performance with cardiac TrueVue option†
 - Live full volumes with one-beat, two-beat, four-beat and six-beat options

* Tied with XL14-3 and X8-2t

** Currently not approved in all countries.

† Not available on all options.

- 320 dB maximum dynamic range
- Powerful distributed multi-core processing architecture capable of achieving 450 x 109 40-bit multiply-accumulates/second; includes three hard drives, 1 TB plus 240 GB SSD
 - Advanced pulse shaping, pulse coding and multivariant harmonics technologies incorporated
 - Support for transducer frequencies up to 20 MHz
 - Supports 1024 CUDA cores with cardiac TrueVue option*
- Optimized for high definition 21.5 inch OLED display
- Premium OLED display option available on some models, designed to support virtually any array configuration: sector, linear, curved, tightly curved, TEE and xMATRIX electronic volume arrays
- Operating system supports Windows 10 IoT Enterprise LTSB 2016
- Contrast echo with low MI, mid MI and LVO modes
 - Pulse inversion and Power modulation technology for low MI Imaging
 - Pulse inversion technology
- Live 3D color imaging
- iRotate imaging
 - Electronic rotation available with the X5-1, X7-2, X7-2t and X8-2t** transducers
 - Standard 2D views from the same apical or parasternal window without moving scanning hand
 - Part of a stress echo protocol for fast acquisitions and more consistent views between resting phase and stress phase
 - iRotate achieves frame rates up to 290 Hz
- Philips next-generation SonoCT real-time compound imaging
 - High-precision beam-steered image compounding that acquires more tissue information and reduces angle-generated artifacts
 - Up to nine lines of sight, obtained by steering the ultrasound beam, available on linear, curved and tightly curved arrays and mechanical volume arrays
 - WideSCAN capability to expand field of view during SonoCT imaging
 - Trapezoid capability
 - Elevation compound imaging on X5-1, X6-1, X7-2, X7-2t, X8-2t** and XL14-3** transducers, which compounds two or more lines of sight in the elevation dimension
- Philips next-generation XRES adaptive image processing for noise and artifact reduction that improves tissue and border definition
 - Performs 350 million calculations per frame of image data over 2800 frames per second
 - Operates in 2D and 2D/CFI/Doppler/TDI mixed modes over 2800 frames per second
 - Offers XRES capability in contrast imaging modes
 - Provides user-selectable levels of XRES adaptive processing for C5-1, C8-5, C9-2, L12-3, L12-5 50, L15-7io, eL18-4, L18-5, S5-1, S8-3, S8-3t, S9-2**, S12-4, X5-1, X7-2, X7-2t and X8-2t**
- Image Boost is an advanced image processing technique that suppresses unwanted clutter signals and boosts desired signals from myocardium and other cardiac structures
 - Available on X5-1 with TSPs adult echo and echo PEN
 - Available on X8-2t with TSPs adult echo and interventional (support selection of tissue or device option)
 - Functions with 2D, 2D behind color, Live xPlane and 2D behind Live xPlane color
 - Functions only with harmonics and elevation compounding both ON
- Philips adaptive broadband flow imaging
 - Doppler bandwidth that automatically adjusts for superb flow sensitivity and resolution
 - Advanced dynamic motion suppression algorithms that reduce flash artifacts
- Fully independent triplex multiple mode operation for extraordinary ease of use during Doppler procedures
- Auto Doppler flow optimization for carotid and arterial applications using linear array transducers
 - Automatically adjusts color box position and angle
 - Automatically adjusts PW sample volume placement and angle
 - Includes Auto Flow Tracking for automatic angle correction with sample volume movements
- Advanced stress echo applications
 - Stress protocols with up to 10 stages
 - Forty views per stage by five modes
- Multi-application SmartExam workflow protocols
 - Stress echo, echo, abdominal, OB and vascular applications
 - Step-by-step on-screen guidance during exam
 - Full user customization
 - Record function for creation of custom protocols
 - Automatic mode switching including 3D
- Fast system boot up: from OFF, approximately 150 seconds
- Two levels of transport mode: from sleep mode to on, approximately 20 seconds
 - Extended battery – 60 minutes before recharge required

Variable XRES is an extension of Philips exclusive XRES speckle noise reduction feature that allows the user to select progressive amounts of noise reduction, edge enhancement and textural smoothing. Available with specific transducers under certain tissue-specific presets, users have the option to select the imaging characteristics of their choice from crisp to smooth tissue textures, providing enhanced visualization of target anatomic structures.

* Not available on all options.

** Currently not approved in all countries.

2.2 Imaging formats

- 2D linear: WideSCAN with SonoCT
- 2D linear: Trapezoid with SonoCT
- 2D curved: WideSCAN with SonoCT
- 2D sector
- 2D virtual apex sector imaging with wide field of view
- 120° FOV imaging*
- Dual 2D
- Panoramic
- Live 3D volume
- Live 3D zoom
- 3D full volume
- 2D, MPR and volume
- Dual Volume for full volume, 3D Zoom and iCrop
- MaxVue imaging format for full-screen high-definition image display with the push of a button
 - 38% more viewing area
 - Additional 1,179,648 more pixel image data than standard displays

2.3 Imaging modes

- 2D grayscale imaging with advanced pulse coding, pulse shaping and frequency compounding technologies
- xMATRIX-based 2D elevation compounding
- Hyper2D Imaging for xMATRIX
- M-mode
- M-mode color Doppler
- M-mode tissue Doppler
- Anatomical M-mode
- Live 3D Echo (instantaneous volume rendering of cardiac anatomy)
- 3D imaging
- 3D imaging with color Doppler
- Live xPlane imaging (simultaneous display of two live imaging planes)
- Tissue Harmonic Imaging (THI) with pulse inversion technology
- Coded beamforming
- Image Boost is an advanced image processing technique that suppresses unwanted clutter signals and boosts desired signals from myocardium and other cardiac structures
 - Available on the X5-1 with TSPs adult echo and echo PEN
 - Functions with 2D, 2D behind color, Live xPlane and 2D behind Live xPlane color
 - Functions only with harmonics and elevation compounding both ON
- Multivariate Tissue Harmonic Imaging including pulse inversion technology and coded harmonics
- Left ventricular opacification (LVO) with pulse inversion and power modulation technologies
- Contrast detection technology using pulse inversion and power modulation imaging techniques

- 3D Contrast imaging on the X5-1
- SonoCT beam-steered real-time compound imaging
- Harmonic SonoCT imaging
- Up to five levels of XRES adaptive image processing technology
- 2D post-processing includes gain, dynamic range, up/down invert, right/left invert, zoom, gray map and Chroma map
- iSCAN intelligent scanning for one-button TGC and gain optimization
- iSCAN with adaptive gain compensation (AGC) for real-time user-initiated frame-by-frame TGC optimization
- AutoSCAN with adaptive gain compensation (AGC) for real-time frame-by-frame TGC optimization
- Simultaneous 2D M-mode
- Color Doppler
- Color Power Angio imaging (CPA) and directional CPA
- MicroFlow Imaging (MFI)
- MicroFlow Imaging HD (MFI-HD) – twice the resolution and sensitivity of standard MFI
- High PRF pulsed wave (PW) Doppler
- Duplex and simultaneous 2D/PW Doppler
- Duplex continuous wave (CW) Doppler
- Duplex color flow and CW Doppler
- Duplex 2D, color flow, PW Doppler
- Duplex 2D, CPA, PW Doppler
- Auto Doppler optimization: Auto PW Doppler, color Doppler, flow optimization for one-button angle correction and steering
- Tissue Doppler Imaging (TDI)
- Adaptive Doppler
- Adaptive Broadband Color Flow
- MicroCPA imaging
- Color Compare mode
- Independent triplex mode for simultaneous 2D, color flow, PW Doppler
- Independent triplex mode for simultaneous 2D, CPA, PW Doppler
- Dual imaging with:
 - Two work flow choices: single buffer or dual buffer
 - Mixed mode display with one image live while other is frozen, for example, 2D/2D, 2D/color, color/color, color/CPA
- High definition zoom with pan (write zoom)
- Reconstructed zoom with pan (read zoom)
- Panoramic imaging
- SonoCT panoramic imaging with XRES and harmonic modes
- 3D Panoramic imaging for full organ visualization
- Chroma imaging in 2D, 3D, QLAB MPR and iSlice, Panoramic, M-mode and Doppler modes
- Dynamic colorization in Live 3D mode on X5-1, X6-1, X7-2, X7-2t, X8-2t** and XL14-3**

*Available on S9-2 only.

** Currently not approved in all countries.

M-mode

- Available on all imaging transducers
- Selectable sweeping rates
- Time markers: 0.1 and 0.2 seconds
- Acquisition zoom capability
- Selectable display format prospective or retrospective (1/3-2/3, 1/2-1/2, 2/3-1/3, side by side, full screen)
- Chroma colorization with multiple color maps
- Cineloop review for retrospective analysis of M-mode data 256 (8 bits) discrete gray levels

Color Doppler

- Available on all imaging transducers
- Color gain
- Region of Interest (ROI)
- Freq Opt: fixed transmit/receive frequencies including adaptive flow
- Seventeen selectable baseline positions for CV; nine selectable baseline positions for vascular
- Baseline invert
- B/W suppress
- Color blending
- Color Doppler flow algorithms provide clear vessel delineation and temporal display
- MicroCPA feature for superb small vessel imaging
- MicroFlow Imaging (MFI)
- MicroFlow Imaging HD (MFI-HD) – twice the resolution and sensitivity of standard MFI
- Color compare dual display (B/W on left, color on right)
- Color map
- Color persistence
- Output power
- Magnify (range from 0.8X to 8X)
- Scale sector width and position on curved and phased array transducers
- Simultaneous mode during PW mode
- Smoothing
- Ability to steer between ± 3 steering angles on linear array transducers
- Variance
- Wall filter
- Write priority
- Zoom
- Cineloop review with full playback control
 - Advanced motion suppression with intelligent algorithms; adapts to various application types to selectively eliminate virtually all color motion artifact
- 256 color bins
- Post-processing includes baseline, color invert, color map, hide color, write priority, blend, variance and zoom
- Parallelogram steering on linear array transducers; three angles on L12-5 50 and L18-5, twenty-one angles on L12-3 and L15-7io
- Trackball-controlled color Region of Interest: size and position
- Maps, filters, color sensitivity, line density, smoothing, echo write priority, color persistence, gain and baseline optimized automatically by exam type or is user-selectable

- Velocity and variance displays
- Color invert in live and frozen imaging
- Frequency optimization control for spatial resolution and penetration optimization
- Color and 2D line density control
- Automatically adapts transmit and receive bandwidth processing based on the color box position, providing excellent sensitivity and color resolution

Color Power Angio imaging (CPA)

- Automatically adapts transmit and receive bandwidth processing based on the color box position providing excellent sensitivity and color resolution
- MicroCPA, a highly sensitive flow optimization method for small vessel visualization
- Available on all imaging transducers for abdominal and vascular imaging
- Cineloop review
- Multiple color maps
- Individual controls for gain, filters, sensitivity, echo write priority and color invert
- Adjustable CPA Region of Interest: size and position
- User-selectable persistence
- User-selectable blending on/off
- Cineloop review with full playback control
- Advanced motion suppression with intelligent algorithms; adapts to various application types to selectively reduce virtually all color motion artifact
- 256 color bins
- Post-processing includes hide CPA, write priority, invert, DCPA map, blend and zoom
- Parallelogram steering on linear array transducers; three angles on L12-5 50 and L18-5, twenty-one angles on L12-3 and L15-7io
- Trackball-controlled color Region of Interest: size and position
- Maps, filters, color sensitivity, line density, smoothing, echo write priority, color persistence, gain and baseline optimized automatically by exam type or is user-selectable
- Velocity and variance displays
- Color invert in live and frozen imaging
- Frequency optimization control for spatial resolution and penetration optimization
- Color and 2D line density control
- Automatically adapts transmit and receive bandwidth processing based on the color box position, providing excellent sensitivity and color resolution

MicroFlow Imaging (MFI)

- Highly sensitive imaging mode designed to detect slow and weak blood flow anatomy in tissue

MicroFlow Imaging (MFI) and MicroFlow Imaging HD (MFI-HD) on eL18-4 and C5-1 transducers

- Highly sensitive imaging mode designed to detect slow and weak blood flow anatomy in tissue
- Maintains high frame rate and 2D image quality while applying advanced artifact reduction techniques

Spectral Doppler

- Display annotations including Doppler mode, scale (cm/sec) Nyquist limit, wall filter setting, gain, acoustic output status, sample volume size, normal/inverted, angle correction, grayscale curve
- Ultra- high-resolution millisecond spectral FFT rate
- Angle correction with automatic velocity scale adjustment
- Adjustable velocity display ranges
- Nine position shifts (including 0)
- Normal/invert display around horizontal zero line
- Selectable sweep speeds
- Selectable low-frequency signal filtering with adjustable wall filter settings
- Selectable grayscale curve for excellent display
- Selectable Chroma colorization maps
- Selectable display format prospective or retrospective – 1/3-2/3, 1/2-1/2, 2/3-1/3, side by side, full screen
- Doppler review for retrospective analysis of Doppler data
- 256 (8 bits) discrete gray levels
- Post-processing includes invert, baseline, angle correct, Quick angle, display format, gain, sweep speed, reject, compress and Chroma map
- Post-processing in PW frozen mode includes map, baseline, invert and Chroma
- Available on all imaging transducers
- Adjustable sample volume size: 1.0-20 mm (transducer-dependent)
- Simultaneous or duplex mode of operation
- Simultaneous 2D, color Doppler, pulsed Doppler
- High-PRF capability in all modes including duplex, simultaneous duplex and triplex
- iSCAN optimization that automatically adjusts scale and baseline

Auto color and Auto Doppler

- In live imaging provides the following capabilities
 - Automatically adjusts color box position and angle
 - Automatically adjusts PW sample volume placement and angle
 - Includes Auto Flow Tracking for automatic angle correction with sample volume movements
 - Automatically adjusts PW scale and baseline
- When image is frozen and Doppler is active, automatically adjusts PW scale and baseline
- Auto color and Auto Doppler is available on the linear transducers, L12-3, L12-5 50, L18-5, and L15-7io in carotid and arterial vascular applications
- Auto Doppler is available on the curvilinear transducers C5-1, C8-5 and C9-2

Steerable Continuous Wave (CW) Doppler

- Available on all cardiac applications using sector transducers
- Steerable through 90° sector
- Maximum velocity range: 19 m/sec (transducer-dependent)

Tissue Doppler Imaging (TDI/TDI PW)

- Available on all cardiac imaging transducers (except S7-3t and S8-3t)
- Frame rate control: high frame rate acquisition of tissue motion (up to 240 fps)
- TDI gain, TGC- and LGC-compatible
- TDI Opt: optimized transmit and receive frequencies
- Eight maps

iRotate echo (X5-1, X7-2, X7-2t and X8-2t*)

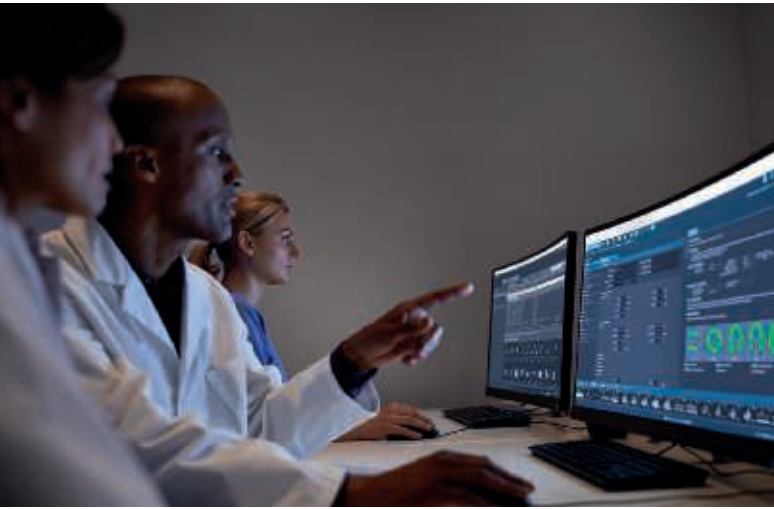
- Ability to image in 2D and rotate the image without moving the transducer
- Available in 2D, color and Live xPlane home rotational key
- High frame rate rotational imaging
- iRotate with stress echo acquire
- iRotate for contrast echo
- iRotate with color flow and CMQ speckle technology

Live xPlane imaging

- Available on X5-1, X6-1, X7-2, X7-2t, X8-2t* and XL14-3* xMATRIX transducers
- Simultaneous display of two live imaging planes
- Color and grayscale modes
- Live xPlane supports full lateral tilt and rotation of the elevation plane: available in 2D, color and Doppler mode
- Lateral, rotational and elevation steering
- Contrast and interventional modes
- Live xPlane pulse Doppler allows precise placement of the Doppler sample volume using both longitudinal and transverse reference images

Live 3D echo

- Available on X5-1, X7-2, X7-2t and X8-2t* xMATRIX transducers
- Live full volume imaging
- High volume rate imaging (HVR)
- ECG display
- Live one-beat, two-beat, four-beat and six-beat 3D volume imaging
- Long live volume loop acquire
- Beat-by-beat retrospective 3D loop selection
- Live 3D color flow imaging
- High volume rate (HVR) echo and color
- xMATRIX with LVO, hi MI and low MI, xMATRIX pulse inversion and power modulation
- Contrast and interventional modes
- Live 3D zoom and Live 3D zoom preview
- Live 3D zoom supports region of interest resize and reposition within the Live 3D mode
- One-beat focused volume
- Half clam shell
- Left and right clam shell switching
- Two volume viewing display
- Crop adjust with cropping
- QuickVue 3D volume cropping tools
- 3D color flow
- 3D color TrueVue rendering
- 3D Zoom: 2D and Color



- 3D Zoom: 2D and Color Preview
- Enhanced Live 3D dynamic colorization for enhanced 3D effect
- Full volume sweep
- Adjustable live volume angle control
- Volume rotation using 3D Rotate and Rotate-Z
- Dynamic colorization
- Adjustable vision preset control
- Adjustable center, back, front, volume imaging control
- Maximum 105° by 105° live volume imaging (mode-dependent)
- Support of volume rates up to 100 vps
- Cardiac TrueVue 3D color flow rendering displays 3D color flow in photorealistic rendering with virtual light placed anywhere in the 3D volume
- Cardiac TrueVue Glass 3D rendering displays photorealistic rendering with virtual light placed anywhere in the 3D volume to enhance surface rendering structures within the blood pool
- TouchVue – touchscreen manipulation of 3D volumes and light source placement

Live 3D and MultiVue/MultiSlice

- Supported on X5-1, X7-2t, X8-2t, X7-2 xMATRIX transducers
- MultiVue supports volume display with surface (tissue and color), photorealistic TrueVue and TrueVue Glass
- Multiple MPR layouts and up to 12 live MPR planes visualized (MultiSlice)
- Intuitive MPR alignment (single click on MPR and Live 3D) and adjustment
- Possibility to lock and unlock relative MPRs
- Viewline enable the possibility to overlay the MPRs on the 3D rendering
- Possibility to memorize MPR location for quick alignment

Live 3D and MPR/iSlice imaging

- Supported on X5-1, X6-1, X7-2, X7-2t, X8-2t* and XL14-3* xMATRIX transducers
- Volume display with surface rendering (transparency, brightness and lighting controls)
- Multiplanar reconstruction (MPR) and iSlice view display with QLAB software, including nine simultaneous views from 3D
- Specialized algorithms and maps that increase 3D display
- QuickVue cropping method for rapid access to anatomy of interest within the volume
- Cropping tools on volume views with image reference red, green and blue crop planes, arbitrary plane cropping and ROI-directed cropping with iCrop
- Two and three 2D reference planes optionally available Live 3D, full volume and 3D zoom imaging, live and review
- AutoView for one-button access to pre-defined volume cropping anatomic views, up to 3 independent views
- Supported XRES modes to reduce noise artifacts

Freehand 3D volume and MPR imaging

- Qualitative grayscale volume acquisition supported on all imaging transducers
- Volume display with surface rendering (transparency, brightness and lighting controls)
- Multiplanar view display
- Specialized algorithms and maps increase 3D display
- Trim tools on both volume and multiplanar reconstructed (MPR) views
- Supported by SonoCT and XRES modes to reduce noise artifacts
- Resize control that adjusts for different sweep speeds
- On-screen orientation markers

Panoramic imaging

- Real-time extended field-of-view composite imaging, acquired in fundamental or SonoCT mode
- Ability to acquire composite image in XRES mode
- Ability to back up and realign the image during acquisition
- Full zoom, pan, cineloop review and image rotation capabilities
- Auto fit of composite image
- Distance, curved-linear distance and area in review mode can be measured with distance marker displayed via skin-line ruler
- Ability to display or remove skin-line ruler
- Cineloop review that allows measurement on individual frames
- Scaling information included for connectivity prints allowing for measurements on a workstation
- Available on linear and curved array transducers

Contrast imaging – cardiovascular

- System optimized for left ventricular opacification and low MI imaging
- One-touch solution (one-button access in LVO preset) with settings for bolus and infusion
- 2D, Live xPlane, Live 3D Echo and full volume 3D
- X5-1 and S5-1 broad bandwidth pulse inversion and power modulation technologies for high sensitivity and high-resolution visualization of contrast agent at low MI
- LVO and low MI contrast on and off and contrast optimization choices and transmit power settings that can be saved with Gain Save feature for stress echo studies, reducing setup time for image acquisition at peak stress
- Low MI with flash
- Low MI with triggered replenishment imaging (TRI) that provides excellent 2D image quality on the S5-1 transducer
- X5-1 and X8-2t* with iRotational contrast imaging and iRotational stress contrast imaging
- X5-1 and X8-2t* with Live xPlane for contrast imaging
- X5-1 and X8-2t* with xMATRIX elevation compounding for contrast imaging
- X5-1 with triggered replenishment imaging
- X5-1 and X8-2t* with 3D contrast echo
- Supported on the S5-1, X5-1 and X8-2t* transducers

Contrast imaging – general imaging*

- System optimized for detecting contrast agent signatures as they are approved for use
- Contrast modes available on C5-1, C9-2, L12-3, L12-5, S5-1 and eL18-4 transducers
- Mid-MI contrast modes available on C5-1 and C9-2 transducers
- Pulse inversion contrast imaging available with SonoCT and XRES technologies
- Power modulation (PM), pulse inversion (PI) and flash contrast imaging modes
- Touchscreen display timer
- Advanced non-linear pulsing schemes with SonoCT and XRES for increased contrast sensitivity
- Contrast iSCAN capability for C5-1 and C9-2
- Low MI color flow contrast
- High frequency contrast capability
- Flash imaging
- Dual imaging mode for simultaneous fundamental and contrast displays
- ECG/timed triggering
- Long loop capture mode during contrast procedures (3-10 minutes)
- QLAB ROI

2D imaging

- Available with all imaging transducers
- Adjustable sector width and position during live imaging
- Ability to invert image left and right, top and bottom

- Receive gain
- LGC (lateral gain compensation) on cardiac sector transducers
- Selection between one and eight focal zones
- Dynamic range or echo compression, transducer and tissue-specific preset (TSP)-dependent
- Gray map
- Chroma imaging providing colorized luminance maps
- Acquisition zoom (HD zoom): ability to position the zoom ROI anywhere within the image, change the height and width of the zoom ROI and pan the position once zoomed
- Display zoom and magnify on live or frozen images up to 16 times
- Three levels of frame rate
- Support of frame rates of over 2800 frames per second
- Tissue optimization
- Contrast resolution enhancement
- Tissue Harmonic Imaging
- SonoCT imaging
- Hyper2D Imaging
- Live Compare imaging; side-by-side comparison of 2D images where the current live image is compared to a stored image from the same study or retrieved multimodality image
- WideSCAN imaging
- Trapezoid capability
- Next-generation XRES technology, including up to five selection levels on some transducers
- Image Boost is an advanced image processing technique that suppresses unwanted clutter signals and boosts desired signals from myocardium and other cardiac structures
 - Available on the X5-1 with TSPs adult echo and echo PEN
 - Functions with 2D, 2D behind color, Live xPlane and 2D behind Live xPlane color
 - Functions only with harmonics and elevation compounding both ON
- Persistence (frame averaging)
- Grayscale standard display
- AutoSCAN with adaptive gain compensation (AGC) for real-time line-by-line TGC optimization

Tissue Harmonic Imaging (THI)

- Provides second harmonic processing to reduce artifacts and improve image quality
- Multivariate pulsing including patented pulse inversion phase cancellation technology for increased detail resolution during harmonic imaging
- Available on all imaging transducers
- Extends high performance imaging capabilities to all patient body types
- Support of SonoCT (Harmonic SonoCT) and XRES modes
- Coded harmonics available with C5-1 in selected modes

*Currently not approved in all countries.

3. System controls

Philips common user experience provides readily accessible and logically grouped primary controls along with an easy-to-learn graphical user interface.

3.1 Optimization controls

2D grayscale imaging

- Smart TGC: pre-defined TGC curves optimized for consistently excellent imaging with minimal TGC adjustment
- Lateral gain compensation (LGC) and smart LGC for cardiac sector transducers
- Adjustable temporal resolution and spatial resolution with DRS control
- Depth: adjustment from 1.0 to 40 cm depending on transducer, exam and system configuration
- Selection between one and eight transmit focal zones
- 16-level digital reconstructed zoom with pan capability
- High definition zoom that concentrates all image processing power into a user-defined area of interest; including HD zoom pan
- Cineloop image review
- Selectable 2D compression settings
- Tissue aberration correction
- Sector size and steering control for sector and curved array image formats
- Selectable 2D line density with DRS control
- Dual imaging with either independent cineloop buffers or split-screen imaging
- Dual imaging with color compare
- Dual imaging with fundamental and contrast optimization
- Chroma imaging with multiple color maps
- 256 (8 bits) discrete gray levels
- 2D acquisition frame rate over 2800 frames/sec (dependent on field of view, depth and angle)



Next-generation SonoCT real-time compound imaging

- Available on all transducers except sector and xMATRIX arrays
- Virtually all clutter and artifacts eliminated
- Automatic selection of the number of steering angles based on the user-selected resolution/frame rate (Res/Speed) condition
- Up to nine lines of sight automatically adjusted via DRS control
- Operates in conjunction with Tissue Harmonic Imaging, volume modes, panoramic imaging and duplex Doppler
- Operates in conjunction with XRES
- Available in contrast modes
- Available with WideSCAN format during 2D imaging for extended field-of-view operation

Elevation compound imaging

- Available on X5-1, X6-1, X7-2, X7-2t, X8-2t* and XL14-3* transducers
- Reduces speckle and improves contrast resolution
- Operates with at least two lines of sight
- Operates in 2D in conjunction with fundamental imaging, Tissue Harmonic Imaging and duplex Doppler
- Operates in conjunction with XRES imaging
- Has no adverse impact on frame rates

Image Boost

- Image Boost is an advanced image processing technique that suppresses unwanted clutter signals and boosts desired signals from myocardium and other cardiac structures
 - Available on the X5-1 with TSPs adult echo and echo PEN and X8-2t* for adult echo and Interventional TSP
 - Functions with 2D, 2D behind color, Live xPlane and 2D behind Live xPlane color
 - Functions only with harmonics and elevation compounding both ON
 - Image Boost for X8-2t* includes a user selection for tissue processing or device processing for interrogation of implanted devices

XRES adaptive image processing

Variable XRES is an extension of Philips exclusive XRES speckle noise reduction feature that allows the user to select progressive amounts of noise reduction, edge enhancement and textural smoothing. Available with specific transducers under certain tissue-specific presets, users have the option to select the imaging characteristics of their choice from crisp to smooth tissue textures, providing enhanced visualization of target anatomic structures.

- Available on all imaging transducers
- Eliminates virtually all speckle noise and enhances border definition
- Available in all imaging modes including color flow and Doppler
- Available in contrast modes
- Operates in conjunction with SonoCT imaging

- Provides user up to five levels of variable XRES on C5-1, C8-5, C9-2, eL18-4, eL18-4 EM, L12-3, L12-3ERGO, L12-5 50 mm, L18-5, S5-1, S8-3, S8-3t, S9-2*, S12-4, X5-1, X6-1, X7-2, X7-2t, X8-2t* and XL14-3*
- Provides high-resolution algorithms for advanced speckle noise reduction, refined tissue pattern displays and fine border definition
- Provides high-speed processing that allows over 2800 frames-per-second displays

Live volume imaging/Live 3D Echo (CV)

- Grayscale imaging controls
- 3D Vision control
- Dynamic volume colorization
- Chroma colorization
- Reset orientation
- Up/down invert
- XRES technology, including variable selection on X5-1 and X7-2
- Auto View for pre-defined anatomic crop views
- Zoom
- Show/hide color
- Reset controls
- Rotate X, Y, Z
- QuickVue cropping
- Auto crop
- Plane/Manual crop
- Face crop
- MultiVue image alignment
- Auto View for pre-defined anatomic crop views
- Brightness
- Smoothing
- Reference images
- Post processing
- Left/right Invert
- Res/speed control
- Capture
- Compress
- Gain
- ECG
- ECG trigger
- Cineloop/Live volume imaging/Live 3D Echo
- Review/full volume
- Save volume in native or native loop
- Distance and area measurements on rendered volumes
- 2D optimization settings
- Tissue Harmonic Imaging
- Density
- 3D optimization settings
- Sector width
- Angle
- Elevation width control
- Lateral width control

- Lateral position control
- Elevation position control
- MPR Rotate
- MPR Tilt
- Laser line display orthogonal, colored lines overlay the rendered volume corresponding to the MPR slice views
- 3D volume: front, center, back
- 3D view control: up, down, left, right, front, back
- 3D home
- 3D swivel
- Magnify
- 3D LVO setting (available on X5-1 transducer)
- Rotation in either absolute or relative trackball motion
- Live 3D zoom mode with zoom preview
- 3D color optimization
- 3D size and position
- Independent trackball control of lateral and elevation sizing and positioning in live full volume and Live 3D color modes
- iSlice – automated cropping of 3D volume into four MPR views using standard or user-defined slicing protocols
- iCrop: two orthogonal MPR views with volume mode
 - Enables cropping during the exam or from review
 - Separates elevation and lateral rotation of cropping tools
 - Provides variable view directions and view direction color indicator
 - Allows prospective or retrospective long volume loop acquire
- Beat-by-beat 3D loop selection
- Review/full volume
- Calibrated 3D grid
- Generic distance and area measurements available on volume
- Distance and area measurements on MPRs
- Multiple 3D display layouts (volume, volume + 2 MPR, volume + 3 MPR)
- Dual volume display
- 3D color zoom
- 3D rotate and rotate-Z
- X-hair manipulation controls for MPR alignment
- Volume acquisition method (1, 2, 4 and 6 beat, HVR)

Coded beamforming

- Automatically enabled when ABD maximum penetration TSI is selected on C5-1 transducer
- Coded excitation using chirp transmit technology that improves penetration and recovers more tissue information for detailed resolution at extended depths
- Coded harmonics mode that reduces image-degrading artifacts while maintaining penetration qualities

iSCAN intelligent optimization

- One-touch image optimization
 - In 2D mode, one-button automatic adjustment of system gain and TGC to achieve balanced brightness of tissues

- Available in contrast imaging for selected transducers/applications
 - Independent settings based upon whether the contrast timer is active
- In Doppler mode, one-button automatic adjustment of:
 - Doppler PRF based on detected velocity
 - Doppler baseline based on detected flow direction
- Available on all imaging transducers
- Operates in conjunction with SonoCT and XRES imaging
- AutoSCAN continuous automatic optimization
- Adaptive gain compensation (AGC) dynamically adjusts (every pixel on every scan line) low level 2D echoes to reduce gain artifacts (shadows/through transmission) and improve image uniformity with 2D and 3D imaging

AutoSCAN intelligent optimization

- Continuous, real-time adjustment of system gain and TGC to achieve balanced brightness of tissues
 - When activated, applies gain balancing to all grayscale image data including 2D, X-plane, 3D, 4D and M-mode grayscale data
 - Every image frame has individually adjusted image brightness
 - Available from 2D touchscreen controls

iOPTIMIZE intelligent optimization

- Multiple technologies for one-button approach to automatically and instantly adjust system performance for different patient sizes, flow states and clinical requirements.
- **Tissue Specific Imaging** – adjusts over 7,500 parameters during transducer/application selection
 - **Patient optimization** – adjusts 2D performance to instantly adapt to different patient sizes
 - **Flow optimization** – adjusts broadband flow performance to instantly adapt to different flow states
 - **Dynamic resolution system (DRS)** – one control adjusts nearly 40 parameters simultaneously for user preference of spatial resolution or temporal resolution during clinical procedures
 - One control optimizes functions such as:
 - Line density
 - Persistence
 - Pulse inversion harmonics
 - Synthetic aperture
 - Number of lines of sight (SonoCT)
 - RF interpolation
 - Parallel beamforming

3.2 Control panel

- Easy-to-learn graphical user interface with reduced number of hard controls
- Primary controls concentrated in cluster around trackball
- Tri-state control panel lighting (active, available, and unavailable)



3.3 Touchscreen

- Ambient lighting control for exceptional image viewing in both light and dark environments
- Full color 12 inch capacitive touchscreen, complete with swipe, zoom, pan and rotate technologies
- Touch panel configurable and customizable to user-preferred control placement for maximum exam efficiency*
- Dual function mode switch and independent gain controls for 2D, CPA, M-mode, color, PW, CW Doppler, TDI and 3D
- Eight-slide pot control adjustment of TGC curve
- iSCAN control for 2D/Doppler automatic optimization
- High definition/pan zoom control
- Dual mode control
- Freeze control
- Two programmable acquire controls
- Pull-out alphanumeric backlit keyboard for text entry
- Widescreen touchscreen for dynamic presentation of controls
- Workflow-related controls (Patient, Review, Report, End Exam, Help) always present on touchscreen
- Direct selection of any attached transducer
- Automatic or manual selection of tissue-specific imaging parameters
- Tabbed layout and swipe capability for quick access to hidden controls
- Touchscreen control adjustment of LGC curve
- Touchscreen alphanumeric keyboard for text entry
- Touchscreen 3D display and manipulation with cardiac TrueVue volumes, including TrueVue Color and Cardiac TrueVue Glass
- User-configurable
- One-touch user interface specifically for XL14-3**

* Available on some models.

** Currently not approved in all countries.

4. Workflow



EPIQ CVxi combines a complete range of premium imaging technologies with superb sophisticated ergonomics, dynamic adaptive software and ease of use to help keep busy departments on schedule.

4.1 Ergonomics

- Advanced control panel design with fewer, clustered controls and easily accessed mode keys to reduce reach
- Tri-state lighting that provides immediate feedback of active, available and unavailable controls
- Widescreen touchscreen allows more controls to be available at a time
- Touchscreen controls are grouped for quick recognition
- Touchscreen supports easy navigation for commonly manipulated controls via flyout menu selections, reduces button presses
- Touch panel configurable and customizable to user preferred control placement for maximum exam efficiency
- Many touchscreen controls can also be accessed from the main display, allowing user to maintain consistent visual focus
- Independent adjustment of height, rotation and lateral movement of monitor and control panel, allowing improved user posture and increasing comfort during exams (meets industry standards recommendation for the prevention of WRMSD)
- Highly mobile cart with single pedal brake operation facilitating portable exams and positioning in confined- space environments

4.2 Display annotation

- On-screen annotation of all pertinent imaging parameters for complete documentation, including transducer type and frequency, active clinical options and optimized presets, display depth, TGC curve, grayscale, color map, frame rate, compression map value, color gain, color image mode, hospital name and patient demographic data
- User-selectable display of patient birth date, patient gender, institution name, system name and user
- Fixed-position title area for consistent annotation
- Patient name, ID, birth date, gender, and system date that can be turned off (hidden) for generating still images for publication
- Additional patient information can be displayed on demand
- Sector steering icon
- Scan plane orientation marker
- User-selectable depth scale display
- Real-time display of mechanical index (MI)
- Real-time display of thermal index (TIb, TIc, TIs)
- Multiple trackball-driven annotation arrows
- Pre-defined annotations and body markers (application-specific and user-selectable), with two body markers supported in dual imaging format
- Doppler baseline invert in live and frozen imaging
- Compression changes available live or scrolling loop
- Post-processing of 2D gain, compression or dynamic range, and zoom after acquisition on single-frame images
- TGC curve (On/Auto/Off display)
- TGC values (On/Off display)
- Tool Tips provides a brief description of the abbreviated on-screen image parameters
- Trackball icon displaying functions assigned to trackball buttons
- Informative trackball arbitration prompts
- Thumbnail display of images printed/stored
- On-screen selection and display of calculations
- On-screen selection and editing of protocols
- Calculations results and analysis labels
- Graphical tabs that allow navigation to other analysis features
- Network and connectivity icons to allow instant feedback about network and printer conditions
- Icons to display status of and/or allow access to the following functions: print job status, media read/write status, battery level, wireless connectivity, remote service, microphone, HIPAA status indicator icon, iSCAN status, acquisition status, physio status
- Cineloop frame number display
- Cineloop bar with trim markers
- Prompt region for display of informational text and icons
- Trackball icon displaying functions assigned to trackball buttons
- Contrast specification
- Protocol procedure list with status

4.3 SmartExam protocols

- On-screen selection and editing of protocols
- Exam guide with on-screen display
- Required views based on exam type
- SmartExam customization
 - Creates a protocol as the user performs an exam
 - Saves all annotation, body markers and labeled measurements defined in each view
 - Records modes used to capture each view
 - Captures the acquisition method (print, capture, 3D data set) in each individual view
 - Provides user ability to pause and resume recording process if needed
 - Allows user to edit views before finalizing the new protocol
- Fully customizable protocol capability for any clinical application supported on the system with flexibility to conduct the examination protocol in any sequence
- Preset protocols including but not limited to abdominal, vascular and cardiac exams based on industry and accreditation guidelines
- Automatic launching of annotation and body marker icon on required views
- Ability to automatically launch modes (2D, 3D, color modes, Doppler, dual, color compare) defined in a SmartExam
- Ability to pause and resume SmartExam function at any time
- System analysis capabilities supported in all defined protocols

4.4 Stress echo

- Acquisition of echocardiography single frame or loops of the left ventricle in any imaging mode including 2D, color and spectral Doppler
- Gain Save that adjusts automatically to different views and automatically saves your preferred control settings, such as gain, depth, ROI, position and many other parameters
 - For each view while acquiring resting images
 - At immediate post-exercise, automatic retrieval of saved settings for each view
 - Different gain profiles for parasternal LAX and SAX views, AP4 and AP2 views allowed
- Length of acquired images that is user-adjustable between 1 and 180 seconds
- Ability to acquire routine cardiac images in timed and R-R interval clip (varies with selected compression ratio and available system memory)
- For timed acquisition, the ability to start acquisition on the R-wave if the ECG is active and an R-wave is present
- Your preferred control settings automatically saved – such as MI (mechanical index), gain and depth for each view while acquiring resting images
- Live Compare
- Ability to defer selection by stage

- Default stress protocols
 - Factory-provided non-editable default protocols:
 - Two-stage exercise stress
 - Four-stage pharmacological stress
 - Three-stage exercise stress (bicycle)
 - Four-stage quantitative: wall motion and contrast
- Default protocols that may be used as the basis for user-defined versions
 - Support between 1 and 10 stages
 - Support user-defined stage names
 - Support between 1 and 40 views per stage
 - Support user-defined view names
 - Prompt for a particular stage and view
 - Assign stage and view names
 - Set clip length for each image or group of images
 - Set the number of cycles/beats for each image
 - Define prospective, retrospective, or multi-cycle/full disclosure acquisition
 - Define the capture format of each image or group of images
 - Define the default replay mode for each protocol
 - Set mode acquisition for each view
 - Support for up to five modes
 - Save user-defined protocols within a preset
 - Save user-defined protocols to removable media for import onto separate systems at the same software level
 - Modify protocols during use
 - Add stages at any point after the current stage
- CMQ stress
 - Pre and post data curves
 - Pre and post bull's-eye maps
 - Pre and post strain comparisons

4.5 QuickSAVE feature

- The system provides the ability to quickly save preferred system settings as individual exam types
- Over 40 QuickSAVE exams can be created per transducer
- Saved parameters include virtually all imaging parameters as well as color box size
- QuickSAVE exams can be copied to USB/DVD and transferred to other systems of like configuration

4.6 Image presentation

- Up/down
- Left/right
- Multiple duplex image formats (1/3-2/3, 1/2-1/2, 2/3-1/3, 50/50 and full screen)
- Depth from 1 cm to 40 cm (transducer-dependent)
- MaxVue image display, high-definition full-screen imaging viewing

4.7 Cineloop review

- Acquisition, storage in local memory, and display in real-time and duplex modes of up to 2,200 frames of 2D and color images or up to 64 seconds of pulsed wave Doppler data and M-mode for retrospective review and image selection, or up to 48 seconds CW for retrospective review and image selection
- Prospective or retrospective loop acquire “accept” prior to store or clip store
- Trackball control of image selection
- Variable playback speed
- 3D iCrop from cineloop review
- 3D iSlice from cineloop review
- Trim capability of 2D data
- Capture of over 20 seconds of Live 3D imaging per loop
- Available in all imaging modes plus:
 - Panoramic imaging
 - 3D panoramic imaging
 - 3D imaging
 - Independent control of 2D image or spectral data in duplex mode
 - Simultaneous control of 2D and spectral data in simultaneous mode
- On-screen display of current 2D frame number
- Many controls available in cineloop review for post-processing such as 2D gain, dynamic range/compress, XRES, magnify zoom

4.8 Exam management features

- Internal storage
- Data export
- Temporary ID feature
 - One-click start of exam from patient data entry screen with system-provided information
 - Storage of images that were created without a patient name with a temporary identification

Rapid procedure setup

- With a single selection, choose transducer, preset, study type, study description and optionally gender
- Procedure definitions are built-in for built-in study types
- Additional procedure definitions may be added by the user
- Procedure may be automatically selected based on modality worklist scheduled procedure information

4.9 Connectivity

Standard connectivity features

- Digital image acquisition and on-board patient exam storage
 - Direct digital storage of B/W and color loops to internal hard disk drives
 - Combined 1 TB storage capacity
 - Storage capacity of approximately 350 patient exams (assuming 40 images, 6 seconds of clips and reports per exam)

- Fully integrated user interface
 - User-configurable “auto delete” capability
 - On-screen recall, measurement and text editing
 - Exam directory
 - Append exam
 - To existing study
 - To new study using existing patient information
 - Data types
 - 2D, M-mode, Doppler spectral frame acquisition
 - 2D clip acquisition up to 2,200 frames per clip
 - Scrolling M-mode, Doppler acquisition
 - Cartesian volume acquisition: 3D, 4D, STIC, 3D panoramic
 - Cardiac temporal volume acquisition: Live 3D, full volume 3D
 - 3D clips: volume render views and MPR views
 - Q-Apps frames and clips
 - Image fusion frames and clips
 - Printing
 - Local print to on-board or off-board video printers
 - Page report print
 - DICOM grayscale or color print
 - Media storage and retrieval
 - Export DICOM Image and structured report export to removable media
 - Export PC format image export to removable media
 - Supported media
 - Read and write (single session) to CD (CD-R)
 - DVD read-only (DVD+R)
 - DVD read + write (single session) (DVD+RW, CD-R and DVD-R)
 - USB storage (flash memory or hard drives)
 - DICOM image import
 - Ultrasound images
 - Multimodality images (CT/MRI/X-Ray/Mammography/PET)
 - OB trending data
 - Export OB trending information via USB storage device
 - Import OB trending information via USB storage device
 - RS-232 serial storage
 - Export of report data to off-line analysis computer programs
 - Basic networking connectivity
 - Wired gigabit Ethernet
 - Wireless networking
 - 2x2 second-generation IEEE802.11ac Wave 2 wireless adapter
 - Dual bands (2.4GHz and 5GHz)
 - Supported data rates
 - 802.11ac 6.5-867 Mbps
 - 802.11n 6.5-300 Mbps
 - 802.11g 6-54 Mbps
 - 802.11b 1-11 Mbps
 - 802.11a 6-54 Mbps
 - Features include:
 - MU-MIMO with 2 spatial streams transmit beamforming
 - Fast channel switch (1 ms within band and 2 ms across bands)
 - High-density modulation (up to 256-QAM)
 - Low-density parity check (LDPC)
 - Maximum ratio combining (MRC)
 - Rx space time block code (STBC)
 - Offloading for minimal host utilization at 802.11ac speeds
 - Compliant with IEEE802.11 d, e, j and i amendments
 - Wireless security
 - WPA2 Personal
 - WPA2 Enterprise EAP-TLS, PEAP/MS-CHAPv2, PEAP/EAP-TLS
 - Network addressing
 - IPV4 addressing: static or DHCP for system address, static or hostnames (DNS lookup) for server addresses
 - IPV6 addressing: link local, router advertisement, and stateful DHCP for system address, hostnames or server addresses
 - Collaboration Live
 - Video two-way video streaming
 - Audio two-way audio
 - Text two-way instant message
 - Remote visual asset display JPEG, PNG, MP4, OBJ
 - Screen-sharing web RTC
 - Webcam universal USB driver
 - Headset universal USB driver
- NetLink connectivity option (standard on premium and high end)**
- Supported DICOM services
 - Image storage
 - Structured Report (SR) storage includes vascular, adult echo, pediatric echo, fetal echo and congenital cardiology
 - Modality Worklist with automatic patient demographic entry
 - Modality performed procedure step (MPPS)
 - Storage commitment push model
 - Query/retrieve of ultrasound images (study-root)
 - Image and structured report export to network storage servers
 - Send images after each Print/Acquire
 - Send images at End Exam (batch send)
 - Send images and report on-demand during exam
 - Send images or exams manually
 - Send to up to 5 storage SCPs concurrently (at End Exam or after each Print/Acquire)
 - Independently configurable destinations for each acquisition control (e.g., Acquire1, Acquire2, Save 3D, etc.)

- DICOM compression options
 - Uncompressed (Explicit VR Little Endian, Implicit VR Little Endian)
 - JPEG lossy compression (loops) with configurable quality factor 60-100
 - RLE lossless compression
 - JPEG lossless compression (frames)
- Other DICOM export options
 - Monochrome or true color
 - Configurable image size/loop export 640 x 480 or 800 x 600 or 1,024 x 768
 - Secure DICOM configurable
 - Grayscale mapping choices
 - DICOM Grayscale Standard Display Function (GSDF)
 - 50 additional grayscale curves, user-selectable
 - Export optimization tool to aid user in evaluating PACS display monitor calibration and in selecting which grayscale curve to use for exported images
 - Native data attached to DICOM ultrasound images (lossless compressed)
 - 2D native data types: tissue, flow, tissue Doppler, spectral Doppler and M-mode
 - 3D volume data including crop, resize, gain, compression, automated border tracking, color baseline, 3D vision control, colorize, color suppress, B/W suppress, XRES and 3D quantification
 - Ultrasound region calibration (standard for ultrasound images)
 - Pixel spacing attribute for measurement calibration (optional)
 - DICOM query/retrieve of other modality images (CT/MRI/X-ray/PET)
 - De-identification feature
 - Send images to PACS and media without identifying information burned into the image
 - Images exported to media may optionally have patient information removed from DICOM attributes or PC format names
 - All pages sent to DICOM printer have patient identification overlay – not configurable
- All pages sent to local printers are configurable to include or exclude patient identification overlay
- DICOM mapping for user-defined measurements and calculations
- Support of the export of user-defined measurements, calculations and OB authors with standard DICOM structure reporting for:
 - Adult echo – TCD
 - Pediatric echo – Abdominal
 - Fetal echo – Vascular

Report

- Report templates per clinical exam
- User-configurable report
- Off-cart report configuration tool available
- On-cart report configuration

Core security features

- Internet firewall protection
- OS hardening
- Media export security

Government security option

Option fully removes the capability for creating or configuring remote service functionality.

SafeGuard security option

Configurable option for enabling state of the art computer whitelisting protection against virus or malware for maximum system protection.

- Malware protection
- In-memory protection

Security Plus option

Configurable option to provide up-to-date security features for system and patient data protection.

- Configurable access levels
- Hard drive encryption
- Local and remote (LDAP) user management
- Custom-configurable password policies
- Custom-configurable login/legal banner
- Audit log export

Configurable Federal Information Processing Standard (FIPS) selection

Configurable option to provide up-to-date security features while fully hardening the system for patient data protection. Option also fully removes the capability for creating or configuring any VPN functionality.

- Antivirus protection
- Malware protection
- In-memory protection
- USB/DVD protection
- Internet firewall protection
- OS security
- Custom-configurable password

5. Transducers



5.1 Transducer selection

- Electronic switching of transducers using four universal connectors
- Dedicated (Pedoff) continuous wave Doppler connector is available
- Automatic parameter optimization of each transducer for exam type through Tissue Specific Imaging (TSI) software
- If two transducers are connected that both support the same TSI the system supports instantaneous switching between transducers while maintaining current depth parameter if possible
- User-customizable imaging presets for each transducer
- Automatic dynamic receive focal optimization
- Transmission of focal characteristics automatically controlled through TSI, iFOCUS and DRS functions

Compact transducers

- Ergonomic designs with lightweight super flexible cables
- Fully contained pin-less style direct electrical contact points

- Advanced low-loss lens technology for better penetration with less artifacts
- Breakthrough broadband frequency response
- Support for very high frequencies
- Advanced micro-electronics in linear, curved, tightly curved, sector and xMATRIX configurations
- High-precision automated volume transducers

PureWave crystal technology

- Available on the S5-1, S9-2*, eL18-4, eL18-4 EM, X5-1, X6-1, X7-2, X7-2t, X8-2t*, XL14-3*, C5-1, C9-2 and C10-3v transducers
- Breakthrough crystal technology that allows enhanced acoustic efficiency and bandwidth

xMATRIX technology

- Available on the X5-1, X6-1, X7-2, X7-2t, X8-2t* and XL14-3* transducers
- Unique array configuration of fully sampled elements that allows 2D, Live xPlane and volume imaging

* Currently not approved in all countries.

Curved array

C5-1 broadband curved array with PureWave crystal technology

- 5 to 1 MHz extended operating frequency range
- 111° field of view (wide scan-enabled)
- High density curved array with 160 elements
- 2D, steerable pulsed wave, High PRF and color Doppler, and Color Power Angio (CPA), directional CPA, SonoCT, variable XRES, contrast imaging, multivariate harmonic imaging, M-mode and MicroFlow Imaging
- General purpose abdominal applications
- Discreet TSI for deep abdominal, obstetrica and gynecology penetration enables:
 - Tissue aberration correction
 - Coded beamforming with chirp transmit and coded harmonics
- Interventional applications
- Supports biopsy guide capabilities

C8-5 broadband curved array

- 8 to 5 MHz extended operating frequency range
- 122° field of view (wide scan-enabled)
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), directional CPA, SonoCT, variable XRES imaging, harmonic imaging, M-mode and MicroFlow Imaging

C9-2 broadband curved array with PureWave crystal technology

- 9 to 2 MHz extended operating frequency range
- 102° field of view (wide scan-enabled)
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), directional CPA, SonoCT, variable XRES, contrast imaging, harmonic imaging, M-mode and MicroFlow Imaging
- Supports biopsy guide capabilities (4 angle)

Linear array

eL18-4 ultra-broadband linear array with PureWave crystal technology

- Ultra-broadband PureWave array generates frequencies from 2 to 22 MHz
- Multi-row array with fine elevation focusing
- Optimized diagnostic operating bandwidth 18–4 MHz
- Fine pitch, 1920 active elements
- Steerable pulsed wave and color Doppler, Color Power Angio (CPA), SonoCT, variable XRES, harmonic imaging, 2D, M-mode, MicroFlow Imaging and Directional CPA
- High-resolution superficial imaging for vascular applications
- MicroFlow Imaging support
- Needle visualization support
- Auto Doppler flow optimization
- Contrast mode
- Panoramic Imaging
- High frame rates available
- Precision biopsy support compatible with CIVCO Verza Guidance System¹

eL18-4 EM ultra-broadband linear array with PureWave crystal technology

- Ultra-broadband PureWave array generates frequencies from 2 to 22 MHz
- Multi-row array with fine elevation focusing
- Optimized diagnostic operating bandwidth 18–4 MHz
- Fine pitch, 1920 active elements
- Steerable pulsed wave and color Doppler, Color Power Angio (CPA), SonoCT, variable XRES, harmonic imaging, 2D, M-mode, MicroFlow Imaging and Directional CPA
- High-resolution superficial imaging for vascular applications
- MicroFlow Imaging support
- Needle visualization support
- Auto Doppler flow optimization
- Contrast mode
- Panoramic Imaging
- High frame rates available
- Precision biopsy support compatible with CIVCO Verza Guidance System¹

L12-3 broadband linear array

- 12 to 3 MHz extended operating frequency range
- Fine angle steering of color and pulsed wave Doppler
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), SonoCT, variable XRES, harmonic imaging, M-mode, MicroFlow Imaging and Directional CPA
- Vascular (carotid, surgical, arterial and venous) and superficial imaging applications
- Cerebrovascular (carotids, vertebrals), peripheral vascular (venous, arterial), internal mammary vessels, and musculoskeletal imaging
- Surgical applications
- Auto Doppler flow optimization
- Supports biopsy guide capabilities

L12-5 50 broadband linear array

- 12 to 5 MHz extended operating frequency range
- Fine pitch, 256 element, high-resolution linear array
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), SonoCT, variable XRES, contrast imaging, harmonic imaging, M-mode and Directional CPA
- High frame rates available
- Panoramic imaging
- High-resolution vascular applications
- Pediatric applications
- Auto Doppler flow optimization
- Supports biopsy guide capabilities

L18-5 broadband linear array

- 18 to 5 MHz extended operating frequency range
- Ultra-fine pitch, 288 element, high-resolution linear array
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), SonoCT, panoramic, variable XRES, harmonic imaging, M-mode and Directional CPA
- High-resolution superficial applications including small parts, breast, vascular and musculoskeletal imaging
- Auto Doppler flow optimization
- Supports biopsy guide capabilities

L15-7io broadband compact linear array

- 15 to 7 MHz extended operating frequency range
- Fine angle steering of color and pulsed wave Doppler
- Unique lens design allowing high-resolution imaging at transducer surface
- 2D, steerable pulsed wave and color Doppler, Color Power Angio (CPA), panoramic and XRES imaging, M-mode and Directional CPA
- High-resolution intraoperative and vascular applications
- Auto Doppler flow optimization



Sector array

S5-1 broadband sector array with PureWave crystal technology

- 5 to 1 MHz extended operating frequency range
- Phased array, 80 elements
- 2D, CW, steerable pulsed wave, High PRF and color Doppler, tissue Doppler, variable XRES, AutoSCAN/iSCAN, harmonic imaging, M-mode and M-mode tissue Doppler
- Adult echo, pediatric echo and TCD applications
- Contrast applications

S9-2* broadband sector array with PureWave crystal technology

- 9 to 2 MHz extended operating frequency range
- Phased array, 128 elements
- 2D, steerable PW Doppler, CW Doppler, High PRF Doppler, color Doppler, tissue Doppler, advanced variable XRES and harmonic imaging
- Adult and pediatric cardiac applications and fetal echo application
- 120° FOV

S8-3 sector array

- 8 to 3 MHz extended operating frequency range
- Phased array, 96 elements
- 2D, steerable PW Doppler, CW Doppler, High PRF Doppler, color Doppler, tissue Doppler, advanced variable XRES, harmonic imaging, M-mode and M-mode tissue Doppler

Adult and pediatric cardiac applications

S12-4 sector array

- 12-4 MHz extended operating frequency range
- Phased array, 96 elements
- 2D, steerable PW Doppler, CW Doppler, High PRF Doppler, color Doppler, tissue Doppler, advanced variable XRES, harmonic imaging, M-mode and M-mode tissue Doppler
- Pediatric and adult cardiac applications, neonatal head applications

S7-3t sector array TEE

- 7 to 3 MHz extended operating frequency range
- Transesophageal sector array with 48 elements
- Manually rotatable array from 0 to 180°
- 2D, steerable PW Doppler, CW Doppler, color Doppler, XRES, harmonic imaging and M-mode
- Pediatric and adult TEE applications: patients > 3.5 kg (7.7 lb)
- Physical dimensions:
 - Tip: 10.7 x 8 x 27 mm (0.42 x 0.31 x 1.1 in)
 - Shaft: 7.4 mm (0.29 in) diameter, 70 cm (27.6 in) L

S8-3t sector array TEE

- 8 to 3 MHz extended operating frequency range
- Transesophageal sector array with 32 elements
- Manually rotatable array from 0 to 180°
- 2D, steerable PW Doppler, CW Doppler, color Doppler, XRES, harmonic imaging and M-mode
- Pediatric and adult TEE applications: patients > 2.5 kb (5.5 lb)
- Physical dimensions:
 - Tip: 7.5 x 5.5 x 18.5 mm (0.3 x 0.2 x 0.7 in), WHL
 - Shaft: 5.2 mm (0.2 in) diameter, 88 cm (34.6 in) L

xMATRIX array

X5-1 xMATRIX array with PureWave crystal technology

- 5 to 1 MHz extended operating frequency range
- 3,040 elements with microbeamforming
- iRotate – rotatable scan angle from 0 to 360°
- 2D, Live 3D volume, high volume rate (HVR), one-beat, two-beat, four-beat, six-beat, Live volume, color flow, Live 3D color, PW, CW, M-mode, color M-mode, contrast hi MI, contrast low MI, pulse inversion, flash imaging, high 2D frame rate mode, TDI, TDI PW, TDI M-mode, CMQ quantification, Live xPlane imaging and Image Boost
- 3D color zoom, 3D color zoom preview, high volume rate (HVR) color and two-volume view display
- Ergonomic xMATRIX handle with lightweight cable
- Shorter length for easy apical fit
- 2D and Live 3D Echo solution with all modes
- Extended cable length
- Single ASIC architecture
- Adult, contrast LVO, pediatric CHD, contrast low MI, cardiology coronary, adult general and echo PEN
- Physical dimensions:
 - Dimensions: 9.2 x 3.9 x 2.9 cm (3.6 x 1.5 x 1.1 in) LWD with a shallow waist and push ridges for superb scanning comfort; the shortened 3D length helps to fit into the bed for apical views
 - Lens: 1.7 x 2.3 cm (0.67 x 0.9 in)
- Green label approved transducer (environmental improvement measure)

X6-1 xMATRIX array with PureWave crystal technology

- 6 to 1 MHz extended operating frequency range
- Fully sampled matrix phased array with 9,212 elements
- 2D modes including 2D, M-mode, color Doppler, Color Power Angio including directional CPA, pulsed Doppler, elevation compounding, biplane (Live xPlane) with color, CPA, triggered full volume with color, advanced variable XRES, contrast imaging and harmonic imaging
- Auto-heart rate detection for triggered full volume fetal echo in grayscale and color
- Dynamic focusing over range in both lateral and elevation dimensions
- General purpose fetal echo and fetal heart applications
- Supports biopsy guide capabilities

XL14-3* xMATRIX array with PureWave crystal technology

- 14 to 3 MHz extended operating frequency range
- Fully sampled matrix linear array with 56,320 elements
- 2D modes including 2D, color Doppler, Color Power Angio (CPA), 3D with color and CPA, 4D high volume color, Live xPlane, Live xPlane pulsed Doppler, 3D panoramic, advanced variable XRES, XRES Pro, harmonic imaging and 3D/4D vessel cast presentation
- Multi-dimensional focusing for ultra-thin slice imaging
- Vascular, musculoskeletal and thyroid applications
- Supports biopsy guide capabilities

X7-2 xMATRIX array with PureWave crystal technology

- 7 to 2 MHz extended operating frequency range
- Fully sampled matrix phased array with 2,500 elements
- Triple-high line density in live volume and full volume modes
- 2D, biplane (Live xPlane), triggered full volume, Live 3D Echo, elevation compounding imaging, 2D, biplane and 3D imaging color Doppler, pulsed Doppler, XRES, harmonic imaging and M-mode

X7-2t xMATRIX array TEE with PureWave crystal technology

- 7 to 2 MHz extended operating frequency range
- Fully sampled matrix phased array with 2,500 elements
- Triple-high line density in live volume and full volume modes
- Adult TEE applications: patients > 30 kg (66 lb)

- Physical dimensions:
 - Tip: 1.7 x 3.8 cm (0.7 x 1.5 in) WxL
 - Shaft: 1 cm (0.4 in) diameter, 1 m (39.4 in) L
 - Electronically rotatable array from 0 to 180°
 - Electrocautery suppression
 - 2D, advanced XRES, harmonic imaging, M-mode, color M-mode, color flow, PW Doppler, CW Doppler, TDI, TDI PW, Live xPlane imaging, Live 3D Echo, Live 3D zoom, 3D zoom color, 3D zoom color preview, two-volume view, triggered full volume and triggered 3D color volume

X8-2t* xMATRIX array TEE with PureWave crystal technology

- 8 to 2 MHz extended operating frequency range
- Fully sampled matrix phased array with 2,500 elements
- Triple-high line density in live volume and full volume modes
- User programmable button can be configured for freeze/iSCAN/ or acquire controls
- Adult TEE applications: patients > 30 kg (66 lb)
- Physical dimensions:
 - Tip: 1.7 x 3.8 cm (0.7 x 1.5 in) WxL
 - Shaft: 1 cm (0.4 in) diameter, 1 m (39.4 in) L
 - Electronically rotatable array from 0 to 180°
 - Electrocautery suppression
 - 2D, advanced XRES, harmonic imaging, M-mode, contrast LVO, color M-mode, color flow, PW Doppler, CW Doppler, Live xPlane Doppler mode, TDI, TDI PW, Live xPlane imaging, Live 3D Echo, Live 3D zoom, 3D zoom color, 3D zoom color preview, two-volume view, triggered full volume and triggered 3D color volume, Image Boost for tissue or device selection

Non-imaging

D2cwc CW transducer (Pedoff)

- Dedicated 2 MHz continuous wave Doppler
- Adult cardiology applications

D5cwc CW transducer (Pedoff)

- Dedicated 5 MHz continuous wave Doppler
- Deep venous and arterial applications

D2tcd PW transducer (Pedoff)

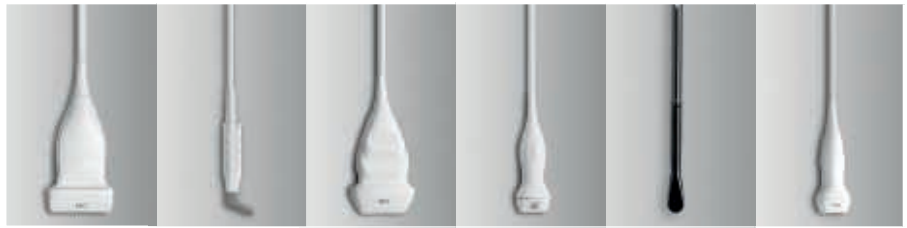
- Dedicated 2 MHz pulsed wave Doppler
- Transcranial Doppler applications

5.2 EPIQ CVxi transducers, features and presets



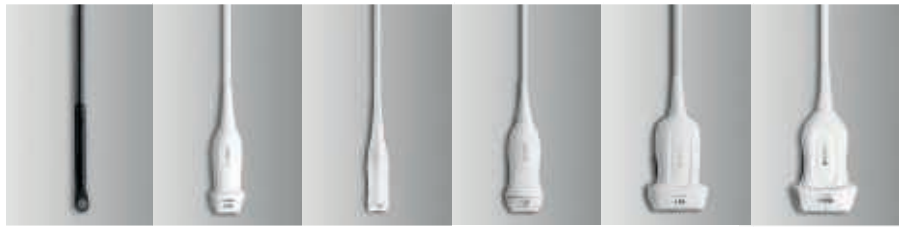
Transducer		C5-1	C8-5	C9-2	eL18-4	eL18-4 EM	L12-3
Type of array		Curved	Tightly curved	Curved	Linear	Linear	Linear
Number of elements		160	128	192	1920	1920	160
Scanplane aperture		55.5 mm	15.36 mm	53.76 mm	50 mm	50 mm	38 mm
Field of view		111°	122°	102°			NA
Volume field of view							
Broadband frequency range		5-1 MHz	8-5 MHz	9-2 MHz	22-2 MHz	22-2 MHz	12-3 MHz
Features							
PureWave		•		•	•	•	
xMATRIX							
Number of BX angles		4/5	1	4/5	INF/3/5	INF/3/5	3/5
HPRF		•		•	•	•	
Variable XRES		•	•	•	•	•	•
Image Boost							
MicroCPA		•	•	•	•	•	•
2D Opt Inheritance		•		•	•	•	•
Pan zoom		•	•	•	•	•	•
Contrast		•		•	•	•	
Image fusion							
Compatible Affiniti 50			•				•
Compatible Affiniti 70		•	•	•	•	•	•
Compatible CX50		•	•				•
Preset							
Abdominal	Bowel	•		•			
	General	•		•			
	Resolution	•		•			
	Penetration	•					
	Renal	•		•			
	User (China only)	•					
	Vascular	•					
	Intervention						
Obstetrics	General (1,2)						
	Early fetal echo			•			
	OB fetal echo	•		•			
Pediatrics	OB fetal heart	•		•			
	Abdomen		•	•			
	Hip						
Vascular	Neonatal head		•				
	Arterial		•		•	•	•
	Carotid		•		•	•	•
	Superficial						
	Surgical						
	Venous		•	•	•	•	•
	Intraoperative						
Cardiac	TCD						
	Adult echo						
	Echo penetration						
	Adult general (China only)						
	Pediatric (echo)						
	Cardiac epiaortic						
Epicardiac							

INF = Infinite Angles



Transducer		L12-5 50	L15-7io	L18-5	S5-1	S7-3t	S8-3
Type of array		Linear	Linear	Linear	Sector	Sector	Sector
Number of elements		256	128	288	80	48	96
Scanplane aperture		50 mm	23 mm	38.9 mm	20.3 mm	5 mm	15.4 mm
Field of view		NA	NA	NA	90°	90°	90°
Volume field of view							
Broadband frequency range		12-5 MHz	15-7 MHz	18-5 MHz	5-1 MHz	7-3 MHz	8-3 MHz
Features							
PureWave					•		
xMATRIX							
Number of BX angles		INF/5		INF/5	3		
HPRF					•		•
Variable XRES		•		•	•	•	•
Image Boost							
MicroCPA		•		•	•		•
2D Opt Inheritance					•	•	•
Pan zoom		•	•	•	•	•	•
Contrast		•			•		
Image fusion							
Compatible Affiniti 50		•	•	•	•	•	•
Compatible Affiniti 70		•	•	•	•	•	•
Compatible CX50		•	•		•	•	•
Preset							
Abdominal	Bowel						
	General				•		
	Resolution						
	Penetration						
	Renal						
	User (China only)						
	Vascular						
Obstetrics	Intervention						
	General (1.2)						
	Early fetal echo						
Pediatrics	OB fetal echo						
	OB fetal heart						
Vascular	Abdomen						
	Hip						
	Neonatal head						
Cardiac	Arterial	•		•			
	Carotid	•		•			
	Superficial		•				
	Surgical						
	Venous	•		•			
	Intraoperative		•				
	TCD				•		
Cardiac	Adult echo				•	•	•
	Echo penetration				•		
	Adult general (China only)				•		
	Pediatric (echo)				•	•	•
	Cardiac epiaortic		•				
	Epicardiac		•				

INF = Infinite Angles



Transducer	S8-3t	S9-2*	S12-4	X5-1	X6-1	XL14-3*	
Type of array	Sector	Sector	Sector	xMATRIX	xMATRIX	xMATRIX	
Number of elements	32	128	96	3040	9212	>56,000	
Scanplane aperture	4.76 mm	25.36 mm	9.78 mm	Proprietary	Proprietary	Proprietary	
Field of view	90°	120°	90°	90°	100°		
Volume field of view				98° x 98°	90° x 90°	90° x 90°	
Broadband frequency range	8-3 MHz	9-2 MHz	12-4 MHz	5-1 MHz	6-1 MHz	3-14 MHz	
Features							
PureWave				•	•	•	
xMATRIX				•	•	•	
Number of BX angles				3	3	3	
HPRF		•	•	•	•	•	
XRES Pro						•	
Variable XRES	•	•	•	•	•		
Image Boost				•			
MicroCPA		•	•			•	
2D Opt Inheritance	•	•	•	•	•	•	
Pan zoom	•	•	•	•	•	•	
Contrast				•	•		
Image fusion							
Compatible Affiniti 50			•				
Compatible Affiniti 70	•		•	•			
Compatible CX50			•				
Preset							
Abdominal	Bowel						
	General						
	Resolution						
	Penetration						
	Renal						
	User (China only)						
	Vascular				•		
Obstetrics	Intervention						
	General (1.2)						
	Early fetal echo				•		
Pediatrics	OB fetal echo				•		
	OB fetal heart				•		
Small parts	Abdomen						
	Hip						
Musculoskeletal	Neonatal head		•				
	Thyroid						
Vascular	General						
	Arterial						
	Carotid					•	
	Superficial						
	Surgical						
	Venous						
	Intraoperative						
	TCD						
	Cardiac	Adult echo	•	•	•	•	
		Echo penetration				•	
Adult general (China only)							
Pediatric (echo)		•	•	•	•		
Cardiac epiaortic							
Epicardiac							



Transducer		X7-2	X7-2t	X8-2t*	D2cwc	D5cwc	D2tcd
Type of array		xMATRIX	xMATRIX	xMATRIX			
Number of elements		2500	2500	2500			
Scanplane aperture			Proprietary	Proprietary			
Field of view		90°	90°	90°			
Volume field of view		86° x 86°	98° x 98°	105° x 105°			
Broadband frequency range		7-2 MHz	7-2 MHz	8-2 MHz			
Features							
PureWave		•	•	•			
xMATRIX		•	•	•			
Number of BX angles							
HPRF		•					
Variable XRES		•	•	•			
Image Boost				•			
MicroCPA							
2D Opt Inheritance		•	•	•			
Pan zoom		•	•	•			
Contrast				•			
Image fusion			•	•			
Compatible Affiniti 50			•		•	•	•
Compatible Affiniti 70			•		•	•	•
Compatible CX50			•	•	•	•	
Preset							
Abdominal	Bowel						
	General						
	Resolution						
	Penetration						
	Renal						
	User (China only)						
	Vascular						
	Intervention						
	General (1.2)						
	General (1.2)						
Obstetrics	Early fetal echo						
	OB fetal echo						
	OB fetal heart						
Pediatrics	Abdomen						
	Hip						
	Neonatal head						
Vascular	Arterial					•	
	Carotid						
	Superficial						
	Surgical						
	Venous					•	
	Intraoperative						
	TCD						•
Cardiac	Adult echo	•	•	•	•		
	Echo penetration						
	Adult general (China only)						
	Pediatric (echo)	•			•		
	Cardiac epiaortic						
	Epicardiac						

*Currently not approved in all countries.

6. Image fusion



6.1 Enabling live cardiac fusion imaging when combined with EchoNavigator R3

EPIQ CVxi enables the visualization and the control of EchoNavigator R3 fusion imaging directly from the ultrasound platform. The solution automatically uses SmartFusion to fuse live TEE and live fluoroscopic images in real time.

- EchoNavigator R3 fusion imaging is tightly integrated in the cath lab and has a specific workflow to intuitively guide your procedures
 - Real-time EchoNavigator R3 fusion of live 2D or 3D echo with live X-ray imaging by automatic registration and tracking
 - Integrated workspot that can display and operate from the EPIQ CVxi monitor and console, multiple views of Live 3D TEE, segment heart structures, fluoroscopy, EchoNavigator R3 fusion, and can localize the echo target on fluoroscopy
- Intuitively and quickly guide your device in the 3D space
- TEE transducer position and orientation are automatically tracked in the X-ray image, allowing the echo and X-ray images to move in sync when the C-arm is repositioned
- Markers and models from Anatomical Intelligence from the echo image automatically appear on the X-ray for context and guidance

- The TEE cone field of view is also displayed as an outline for additional reference
- Up to three different echo views of anatomical structures can be shown simultaneously to deepen understanding of soft tissue anatomy and device location for a clearer impression of the spatial relationship between the catheter and the soft tissue around it
- Switching views of anatomical structures in the echo data can be performed tableside as required

6.2 “Plug and play” EchoNavigator connection

EPIQ CVxi enables a Philips proprietary single-cable connection with a new dedicated and fully integrated connection box. The innovative box solution, when connected to the Philips SmartCable (part of Philips IGT-S Catalog), enables an intuitive plug and play integration for the EPIQ CVxi and the Philips EchoNavigator R3.

7. Measurements and analysis

7.1 Measurement tools and general description

- 2D distance
- 2D circumference/area by ellipse, continuous trace, trace by points
- Auto conversion of distance to ellipse
- 2D curved-linear distance
- 2D angle: intersection of two lines
- 3D: ellipse and distance on 2 MPR views
- 3D: stacked contours on one MPR
- M-mode distance (depth, time, slope)
- Manual Doppler distance
- Manual Doppler trace
- Time/slope measurements in Doppler and M-mode
- Auto conversion of distance to ellipse
- 2D trace by points
- 2D distance (micro calipers)
- 2D Simpsons
- Generic angle
- Distance volume
- Distance and ellipse volume
- Diameter percent reduction
- Area percent reduction
- Hip angle
- Ratio
- Size compare
- High Q automatic Doppler analysis (general imaging only)
 - Doppler values including PI, RI, S/D indices
- Volume flow
- 2D volume (two volume methods)
- Heart rate
- Trackball-controlled electronic measurement calipers: eight sets
- User-defined protocols, measurements and equations
- On-the-fly measurement labels
- Fully editable results data sheet
- Integrated patient exam report
- Delete last measurement
- Embed image and graphs in report
- Doppler peak velocity
- Doppler two calipers tool
- Doppler continue trace
- Doppler trace by points
- Cardiac dP/dt
- Volume flow
- Color aliasing velocity
- Manual data entry
- RA pressure
- 3D stacked ellipses
- 3D auto stacked contours

7.2 Measurement tools and quantification

QLAB quantification software

Cardiac 3D Quantification (3DQ)

- On-cart and off-cart access
- Customize capabilities via optional plug-ins
- Capable of performing 2D measurements from 3D volume and 3D color volume multiplanar reconstruction (MPR) views
- Review and quantification of Live 3D, 3D zoom, 3D full volume and color full volume files
- 3D image controls: 3D vision map, 3D single or dynamic colorization, 3D color render, 3D color suppress control
- Multiplanar reconstruction (MPR) views
 - 3D slice plane
 - Parallel plane
 - Unlimited MPR manipulation
 - Plane rotation, tilt, movement controls to reduce left ventricle foreshortening
- 3D annotation
- 3D spatial reference icon
- Cardiac 3D measurements, 3D quantification from MPR views includes the following measurements
 - Distance
 - Area
 - Biplane LV volume (Simpson's)
 - Biplane LV ejection fraction
 - Biplane LV mass

Cardiac 3D Quantification Advanced (3DQ Advanced)

- Left ventricle global and regional volume and timing analyses with no geometric assumption
- Comprehensive report page with AHA/ASE 17-segment bull's-eye plots and numeric values
- Image quality index using dedicated color scale for 3D volume quality control
- Display and manipulation of dynamic 3D rendering and left ventricular (LV) true volumes of Live 3D data sets
- Displays of 3D or dynamic 3D renderings in grayscale, single colorization or dynamic colorization
- Multiplanar reconstruction (MPR) views
- Option to flip LV apical two-chamber display and corresponding septal, anterior, lateral, inferior (SALI) sequence
- iSlice display-compatible
- Measurements of LV endocardial true 3D volumes, LV ejection fraction and stroke volume using semi-automated 3D border detection
- Computation of regional volumes based on AHA/ASE 17-segment LV model
- Edit mode that adds flexibility for excellent 3D border tracking in four dimensions

- Display of global LV volume waveforms, all 17 regional volume waveforms, or a subset of user-selected regional volume waveforms
- Display of dyskinetic segments and corresponding volume waveforms in specific color and format
- Display of regional end-diastolic normalized regional volume waveforms
- User-selectable waveforms: single, by wall, by level (ring) modes
- Bull's-eye visualization of all 17 regional segments or the user-defined and user-selected regional segments
- Global and regional reports that provide 3D LV global values and regional timing indices from all or a subset of 17 regional segments and bull's eye-based parametric imaging display
 - 3D true volume-based EDV, ESV, stroke volume and EF
 - Standard deviation and maximal difference of time to minimum systolic volume (Tmsv) based on all or a subset of 17 regional segments
 - Tmsv values displayed in time (msec) or normalized to the R-R interval (%)
 - Bull's eye showing the user-selected segments for time to minimum systolic volume (Tmsv) calculation
 - LV timing and radial excursion parametric images in bull's-eye format using effective color-coded scales
 - Parametric imaging supporting AHA/ASE 17-segment overlay on the bull's eye for direct and rapid visualization
 - Parametric imaging that provides a radial excursion threshold slider for selective visualization of LV segments in the timing parametric display
 - Measurement data exported in Excel or DICOM SR formats

General Imaging 3D Quantification (GI 3DQ)

- Access to 3D viewing controls
- Simple annotation
- Linear distance measurements
 - Polygon, free-form polygon, spline, free-form spline, rectangle measurements
- Curved distance measurements
- Ellipse measurements
- Area measurements
- Auto area measurements semi-automated tool to simplify measurement of hypoechoic structures
- Angle measurements
- 3D measurement tools
 - Stacked contour measurements
 - Auto-stacked contour measurements semi-automated tool to simplify volume measurements of hypoechoic structures
 - Auto-volume tool
 - 3D distance/curved iSlice
 - Stacked ellipsoid measurements
 - Ellipsoidal measurements

- Calculation of the following color indices using the 2D and 3D measurement tools
 - Vascularization index (VI)
 - Flow index (FI)
 - Vascularization flow index (VFI)
 - Pixel intensity index (PII) and echo histogram display
- Support of the display of 3D orientation labels (when enabled)
 - Trending capability (available only on stand-alone PC)
- Display of timer (when enabled)

Mitral Valve Navigator^{A.I.} (MVN^{A.I.})*

- 3D assessment of mitral valve anatomy and associated structures
- Review and quantification of Live 3D and full volume data sets from X7-2t and X8-2t** xMATRIX transducers (Live 3D TEE)
- Task-driven workflow provides user direction and guidance illustrations
- Automated ES selection
- Automated 3D annulus segmentation and leaflet surface
- Associated 2D, 3D, and projected measurements and calculations sorted by group
 - Annulus
 - Leaflet
 - Aortic-Mitral
 - Coaptation
 - Papillary
- 3D image controls
 - 3D vision map
 - 3D single or dynamic colorization
 - Auto-view
 - Absolute and relative rotation
 - Three 3D render modes: volume, slices, model
- Multiplanar reconstruction (MPR) views
 - 3D slice plane
 - Unlimited MPR manipulation
 - Slice thickness
 - MPR smooth
- 3D mitral labels
- 3D mitral model
 - model displays: tenting surface, leaflet surface, minimum surface
 - Enhanced coaptation line tracing
 - Leaflet discontinuity traces
 - Leaflet segmentation
 - Up to 53 measurements overlay
 - Exposed and coapted leaflet length and surfaces
 - Continuous display during loop playback
- Mitral valve 3D measurements and 2D/3D quantification from model view include the following measurements

– Distances	– Volumes
– Curve distances	– Angles
– Areas	– Ratio
– Projected areas	

* A.I. refers to Anatomical Intelligence.

** Currently not approved in all countries.

- Measurement and calculation definition and overlay on 3D model
- Comprehensive reporting
- Data exported in Excel or DICOM SR formats
- Measurement data exported in Excel or DICOM SR formats

Automated Cardiac 2D Quantification^{A.I.} (a2DQ^{A.I.})* and a2DQ^{A.I.} LA**

- Left ventricle and left atrial global volume analysis from 2D and biplane images
- Quantification of native and non-native images
- Quantification of non-ECG images
- Automated border detection for cardiac chambers and vessel cavities
- Computation of area, LV volumes and advanced parameters for LV systolic and diastolic function including fractional area change (FAC), ejection fraction (EF), peak ejection rate (PER), peak rapid filling rate (PRFR) and atrial filling fraction (AFF)
- Computation of LA area, volumes and advanced parameters including fractional area change (FAC) and ejection fraction (EF)
- Single-plane volume measurements based on Simpson's Single Plane Method of Disks (MOD)
- Biplane volume measurements based on Simpson's Biplane Method of Disks (MOD)
- Automated Tissue Motion Annular Displacement (aTMAD)
 - Mitral valve and other valve annular motion tracking over time
 - Computation of valve annular displacement curves over time
 - Color Kinesis overlay to visualize valve annular plane motion parametrically
 - Measurement data exported in Excel or DICOM SR formats
 - Simplified workflow with SmartExam

Automated Cardiac Motion 2D Quantification^{A.I.} (aCMQ^{A.I.})*

- Automated Region of Interest for selected anatomical views
- Objective assessment of left ventricle global function and regional wall motion, deformation and timing using the next generation of 2D speckle tracking technology
- File compatibility
 - Quantification of 2D native and non-native ultrasound DICOM images
 - Quantification of non-ECG images
- Available methods with dedicated preferences settings
 - Global workflow
- Latest generation of 2D speckle tracking technology
- Auto ROI can be set either on ED or ES frame

- Automated border detection for cardiac chambers and vessel cavities
- Auto aortic valve closure time detection
- Smooth color transitioned bull's-eye presentation
 - Multiple cardiac view/images capable
 - 18 or 17 left ventricle segmentation templates (three apical views and three short-axis view templates)
 - Easy-to-edit template position and shape
 - Intuitive step-by-step user interface
 - Tracking quality control by right clicking the segment to remove the poorly tracked segment
 - User-editable post LV segments display consistent display with corresponding waveform and reported values beat-to-beat selection
- Display
 - Border (hide or show)
 - Image ROI overlay (hide or show)
 - Cardiac phases (overlay of AVO, AVC, MVO and MVC mechanical events auto-imported from ultrasound cart analysis via DICOM SR or manual entry)
 - Four-up display
- 2D speckle parameters
 - Volume/EF and area/FAC
 - Longitudinal strain and strain rate
 - Circumferential strain and strain rate
 - Radial and transversal displacement
 - Radial fractional shortening
 - Radial velocity
 - Speed (absolute angle independent velocity)
 - Regional rotation and rotation velocity
 - Global rotation (SAX)
 - Endo-Epi mural torsion and local rotation
- Measurement and calculations
 - Selectable GLS measurement points: peak, peak-systolic and end-systolic
 - Time-to-peak and peak values
 - Timing caliper
 - Global result display one view and global result display
 - Results display in 18 or 17 LV segment bull's-eye plot format and numerical table
 - Layer-specific (endo, mid and epi) longitudinal strain per view and global longitudinal strain
 - Circumferential strain per view and global circumferential strain
 - User-defined workflow for specific local strain analysis
- Up to 18 dedicated colors to help differentiate each cord and corresponding waveform
- Up to three waveform auto peak detections to report time-to-peak and peak values
- Simplified workflow with SmartExam
- Measurement data exported in Excel or DICOM SR formats

* A.I. refers to Anatomical Intelligence.

** Currently not approved in all countries.

Cardiac Motion/Mechanics 2D Quantification for Stress (CMQ Stress)

Designed to help objectify stress echo exam interpretation, CMQ Stress employs a user interface specifically designed for stress echo exams and around stress echo practitioners.

- Automated Region of Interest for selected anatomical views
- Objective assessment of left ventricle global function and regional wall motion, deformation and timing using the next generation of 2D speckle tracking technology
- File compatibility
 - Display and quantification of 2D native ultrasound DICOM stress echo images
- Global workflow
 - Latest generation of 2D speckle tracking technology
 - Semi-automated border detection for cardiac chambers and vessel cavities
 - Auto aortic valve closure time detection
 - Smooth color transited bull's-eye presentation
 - Multiple cardiac view/images capable
 - 18 or 17 left ventricle segmentation templates (three apical views and three short-axis view templates)
 - Easy-to-edit template position and shape
 - Intuitive step-by-step user interface
 - Tracking quality tool editable threshold helps to display various quality tracking
 - User-editable post LV segments display consistent display with corresponding waveform and reported values beat-to-beat selection
- Display
 - Border (hide or show)
 - Image ROI overlay (hide or show)
 - Cardiac phases (overlay of AVO, AVC, MVO, MVC mechanical events auto-imported from ultrasound cart analysis via DICOM SR or manual entry)
- 2D speckle parameters
 - Volume/EF and area/FAC
 - Longitudinal strain and strain rate
 - Circumferential strain and strain rate
 - Radial and transversal displacement
 - Radial fractional shortening
 - Radial velocity
 - Speed (absolute angle independent velocity)
 - Regional rotation and rotation velocity
 - Global rotation (SAX)
 - Endo-Epi mural torsion and local rotation
- Measurement and calculations
 - Waveform auto peak or systolic peak detection to report time to peak and peak values
 - Timing calipers
 - Global result display one view and global result display
 - Results display in 18 or 17 LV segment bull's-eye plot format and numerical table
 - Longitudinal strain per view and global longitudinal strain
 - Circumferential strain per view and global circumferential strain
 - User-defined workflow for specific local strain analysis

- Up to 18 dedicated colors to help differentiate each cord and corresponding waveform
- Up to three waveform auto peak detections to report time-to-peak and peak values
- Measurement data exported in Excel formats

Intima Media Thickness (IMT) measurements

- Automated measurements of intima media thickness (IMT) in carotids and other superficial vessels
- Automated measurement technique on user-selected frames
- Selector chart to record location and side of vessel from where IMT is measured
- Report of the IMT values in mean millimeters and standard deviation
- Quick optimization for thin or thick intima media complexes
- User-adjustable Region of Interest
- User-defined measurement capability
- Persistent storage of up to ten measurements with image files for future reference
- Measurement data exported in Excel or DICOM SR formats

Region of Interest (ROI) Quantification

- Vascular, general radiology and cardiac images
- Trending capability (available only on stand-alone PC)
- Up to ten user-defined regions
- Thumbnail display of frames for easy trimming
- Pixel intensity index (PII) and echo histogram display, supported data types: echo, velocity or power (angio)
- Custom tools to auto trim relative to ECG trigger on cardiac and other triggered files for quantification of specific parts of cardiac cycle
- Region shaping tools
 - Polygon
 - Free-form polygon
 - Spline
 - Free-form spline
 - Rectangle
 - Square 5 mm
- Single frame tools
 - Angle
 - Annotation
 - Curved distance
 - Distance
 - Ellipse
 - Live xPlane ROI combination
- Auto area for semi-automated quantification of hypoechoic structures
- Adjustable ROI dynamic tool
- Motion compensation algorithm selectable in Preferences menu
- Data display selection
 - Log
 - Linear
- Data display smoothing option
- Mean, median and standard deviation calculation
- Time-intensity curves



- Curve fitting tools
 - Gamma-variate (wash-in and wash-out)
 - One minus exponential
 - Linear
 - Log normal WI
 - Log normal WIWO
 - LDRW WIWO
- Graphic results with dB, intensity or velocity/frequency, time to peak, “A” value, area under curve, and peak intensity (when a gamma variate curve has been applied) for each frame
- Calculation of the following color indices using the 2D measurement tools
 - Vascularization index (VI)
 - Flow index (FI)
 - Vascularization flow index (VFI)

Strain Quantification (SQ)**

- Used in the evaluation of regional myocardial function
- Measures the myocardial velocity from color TDI data set and derives the displacement, strain and strain rate along user-defined M-lines
- Includes ability to overlay opening and closing of aortic and mitral valves on SQ curves to display left ventricle mechanical events
- User-selectable waveform display that makes SQ curves easier to read
- Capable of drawing up to four M-lines at a time
- Point of Interest (POI) tool that obtains values from any point on the M-mode display
- M-mode (hide or display) control
- User-defined and automatic (using speckle tracking algorithms) M-line motion compensation to follow myocardial motion

- Able to present TDI results in two display formats
 - Anatomical M-mode display
 - Graph display
- User-selectable waveforms for exceptional sub-region visualization
- Curve processing modes
- Cardiac mechanical timing reference overlay
- TDI velocity, displacement, strain and strain rate timing measurements with dedicated time calipers and labels
- Automatic subdivision of M-line into a customizable number of sub-regions
- Averages up to 20 cardiac beat cycles in both M-mode and graph displays
- Measurement data exported in Excel format

HeartModel^{A.I.*}

Philips HeartModel^{A.I.} brings robust 3D quantification to everyday clinical practice. This anatomically intelligent premier cardiac application automatically detects, segments and quantifies the left ventricle (LV) and left atrium (LA) from a Live 3D volume. HeartModel^{A.I.} provides automated 2D views and reproducible quantification across users and over time, with the workflow efficiency to facilitate faster exams for the robust measurement of cardiac function necessary for management of patients with chronic disease.

- HeartModel^{A.I.} automatically segments the heart chambers within a 3D volume
- HeartModel^{A.I.} displays the routine 2D apical and short axis views at end-diastole and end-systole for adult hearts
- HeartModel^{A.I.} finds the shape of the heart chambers and displays the chamber border in ASE/ESE views for the user to accept, reject or edit
- Users can adjust the automated border where desired for the end-diastolic (ED) and end-systolic (ES) cardiac phases; edit capabilities include a global or regional edit function

* A.I. refers to Anatomical Intelligence.

** Currently not approved in all countries.

The following results are exported in DICOM SR and .xls formats:

- End diastolic LV length
- End-systolic LV length
- End diastolic LV volume
- End-systolic LV volume
- End-systolic LA volume
- LV ejection fraction
- Heart rate
- Stroke volume
- Default ES and ED border settings
- Current ES and ED border settings

Dynamic HeartModel^{A.I.*}

- Provides full cycle cardiac quantification
- Shows moving contours for left ventricle (LV) and left atrium (LA) volumes
- Offers measurement of LV mass, cardiac index, complete LA volumes and index
- A multi-beat analysis allows the user to analyze different beats and average the results with the same acquisition

3D Auto LAA

3D Auto LAA helps to quickly get left atrial appendage-related measurement from a 3D TEE data set.

- Requires proper MPR/MultiVue alignment before getting measurement
- Provides automatic measurements of LAA landing zone/ostium: minimum and maximum axis, perimeter and area
- Measurements are editable using global or local editing
- Ability to quantify with and without EKG signal
- Possibility to change MPR/MultiVue layout

TOMTEC 3D Auto RV

The RV quantification tool for clinical routine work, pulmonary hypertension and right-sided heart failure, 3D Auto RV allows complete evaluation of the RV and combines 3D and 2D values including EDV, EDVi, ESV, ESVi, EF and SV, RVLS, TA PSE and FAC. 3D Auto RV helps

to overcome the RV complexity by calculating standard values based on a 3D surface model. A detailed and easy-to-follow workflow allows users to adapt the proposed contour quickly and easily.

- Increase your diagnostic confidence by visualizing the complex RV shape in 3D
- Calculate RV data based on a complex 3D surface model
- Validated model of the RV
- Display model in combination with 2D planes for a better control
- Automated 2D measurements with every 3D analysis available for DICOM SR and .txt formats
- 3D measurement results: RV EDV, EDVi, ESV, ESVi, EF and SV
- 2D measurement results: TAPSE, Distances and FAC
- Additional strain values: RVLS free wall and septum

HeartModel^{A.I.}, Dynamic HeartModel^{A.I.} and TOMTEC's 3D Auto RV require the use of the HeartModel^{A.I.} acquisition mode on the X5-1 transducer.

TOMTEC 3D Auto MV

3D Auto MV helps to analyze the complex anatomy of the mitral valve in 3D as well as its dynamic mechanics during systole. The mitral valve anatomy and topology are visualized with a comprehensive static and dynamic model.

- Mitral valve analysis based on Live 3D echo data
 - Streamlined workflow with automated mitral valve orientation with annulus and leaflet detection
 - Manual review and the possibility to edit the automated model proposal
 - Comprehensive automatic measurements for annulus, leaflets and coaptation
 - Advanced edit options for definition and quantification of open coaptation regions
 - Automatic calculation of annular and leaflet dimensions
 - Definition and display of "Surgical View"
 - Dynamic tracking of MV structures through systolic phase
 - Export of automatically generated measurements
- Export of results to DICOM SR and .txt formats arranged in measurements groups
 - Annulus
 - Leaflets
 - Coaptation
 - Miscellaneous
 - Manual measurements
 - Dynamic measurements

Supports export of the MV model in .stl or .obj format

TOMTEC AutoStrain LV

- Provides automated 2D longitudinal strain quantification
- Objective assessment of left ventricle global function and regional wall motion deformation and timing using TOMTEC 2D speckle tracking technology
- One-button-push global longitudinal strain
- Automated view recognition and labeling with manual correction
- Automated contour detection and placement
- Image orientation selection
- Editing contour on ED and ES
- Manual three-point ROI workflow
- Ability to analyze images with or without ECG
- Ability to analyze non-native data images
- Fast speckle tracking on three apical images at once
- Peak longitudinal strain for each apical view and global average
- Automated R-AVC with manual correction
- 18 segments peak-systolic longitudinal strain bull's-eye display
- 18 segments end-systolic longitudinal strain bull's-eye display

- 18 segments time-to-peak longitudinal strain bull's-eye display
- 18 segments waveform display for three apical views
- 6 segments waveform display for each apical view
- Ability to de-select segments
- Highlighted global strain and strain rate curve display
- Measurement data exported in Report and DICOM SR

TOMTEC AutoStrain LA

AutoStrain LA allows fast and easy assessment of LA deformation analysis using 2D speckle tracking according to the Strain Task Force standardization consensus report.

- Measurements exported to DICOM SR and .txt export
 - LA reservoir strain (ED reference/preA reference)
 - LA conduit strain (ED reference/preA reference)
 - LA contraction strain (ED reference/preA reference)

TOMTEC AutoStrain RV

AutoStrain RV allows fast and easy assessment of RV deformation analysis using 2D speckle tracking according to the Strain Task Force standardization consensus report.

- Measurements exported to DICOM SR
 - RV free wall strain longitudinal
 - RV global 4-chamber strain longitudinal
- Additional results available on the UI and as .txt export
 - Segmental peak-systolic or end-systolic longitudinal strain of three free wall segments

7.3 High Q automatic Doppler analysis

- Automatic real-time and retrospective tracing of:
 - Instantaneous peak velocity
 - Instantaneous intensity weighted mean velocity
- Automatic real-time display of (user-selectable up to six):
 - Volume flow
 - Time-averaged peak velocity
 - Time-averaged mean velocity
 - Resistive index
 - Pulsatility index
 - Systolic/diastolic ratio
 - Acceleration/deceleration times
 - Illustrated High Q

7.4 Clinical option analysis packages

- Cardiac analysis
 - Left atrium
 - Right atrium
 - Right ventricle
 - Left ventricle
 - TAVI (transcatheter aortic valve implantation)
 - Valve stenosis
 - Prosthetic aortic valve

- Prosthetic mitral valve
- TAPSE (tricuspid annular plane systolic excursion)
- MAPSE (mitral annular plane systolic excursion)
- PCWP (pulmonary capillary wedge pressure or pulmonary artery occlusion pressure)
- Stress echo measurements in various stages
- MPI (or TEI index)
- Volume by area/length method
- M-mode ejection fraction (via Teichholz or cubed method)
- Novel three-point adjustable Simpson's template
- Simpson's biplane and single plane volume and ejection fraction
- Area, length, volume and ejection fraction
- LV mass
- 2D all points
- M-mode all points
- Peak velocity
- Maximum and mean pressure gradients
- Pressure half time
- E/A ratio
- D/E slope
- Continuity equation
- Diastolic function
- Cardiac output
- Acceleration time
- Heart rate
- Vascular analysis
 - Right and left carotid artery protocols
 - ICA/CCA ratio
 - Bilateral lower extremity arterial and venous labels
 - Bilateral upper extremity arterial and venous labels
 - Percent diameter and area reduction
 - Vascular graft measurement package
 - User comments
 - High Q automatic Doppler analysis
- OB analysis
 - Fetal echo application
 - Fetal biometry (up to quintuplets)
 - Biophysical profile
 - Amniotic fluid index
 - Early gestation
 - Fetal long bones
 - Fetal cranium
 - Other OB measurements
 - 2D echo
 - Fetal heart M-mode
 - Fetal Doppler
 - Fetal echo
- Abdominal vascular
 - Labels for all major abdominal arteries and veins
 - Left and right segmentation for kidneys

8. Physical specifications



- Mobility through high-quality, shock-absorbing casters with foot pedal controls for:
 - 4-wheel swivel
 - 2-wheel swivel lock
 - 2-wheel brakes
- Integrated footrests
- Transducer connector and OEM bay illumination for easy visibility in scanning rooms
- Digitally enhanced two-speaker high-fidelity stereo output with rear-mounted subwoofer
- On-board storage tray behind control panel touchscreen and in rear bay left and right storage drawers
- Universal peripheral bay that provides easy access for up to two on-board hardcopy or documentation devices
- Built-in A/C line conditioner that provides isolation from voltage fluctuations and electrical noise interference
- Three high-capacity fans with automatic speed adjustment to optimize cooling efficiency with minimal audible noise

Sustainability

The EPIQ CVxi achieved a significant reduction in power consumption and system weight.* Power consumption was reduced by 25% using a new simplified product architecture and a higher efficiency power supply. Product weight was reduced by 29% for a reduction of over 40 kg.

Energy

- On mode: 554 W
- Off mode: 6 W
- Ready to scan/standby mode: 230 W
- Energy usage/year*: 2052.75 kWh
- Power for battery charging: 24 W

Packaging

- Total weight: 59.37 kg
- Cardboard/paper: 14.49 kg
- Ferro metal: 0.55 kg
- Wood: 41.52 kg
- Certified wood: 100% SFI

Substances

- RoHS-2-compliant

Eco passport

- Philips Green Product

System dimensions

Width	60.6 cm/23.9 in
Height	146-171.5 cm/57.5-67.5 in
Depth	109.2 cm/43 in
Weight	104.3 kg/230 lb without peripheral devices

System cart

- State-of-the-art ergonomic design for comfort and convenience
- Easy maneuverability and mobility
 - Wheel-lock and monitor adjustments that facilitate bedside exams
- Independent height adjustment of control panel and display monitor
- Easily accessed transducer connector ports, USB, and DVD media drive, if equipped
- Transducer and gel bottle holders

Monitor

- Flat panel OLED display monitor
 - 54.9 cm/21.6 in wide format OLED display
 - High contrast ratio >22,550:1
 - Color gamut 108% Adobe RGB >1 billion colors
 - Maximum luminance 235 cd/m²
 - Flicker free technology
 - >178° viewing angle up/down and left/right
 - Mounted on fully articulating extension arm
 - Four-way articulation with 87.6 cm/34.5 in lateral and 17.8 cm/7 in vertical adjustment range
 - Nearly infinite positioning adjustments: height, swivel and tilt

Control panel

- Articulation facilitates nearly infinite positioning adjustments for excellent scanning ergonomics: height, swivel and tilt
 - Up and down 25.4 cm/10 in
 - Rotates 180° from center
 - Complete freedom for side-to-side slide movement, infinite positions
 - Operates on battery for adjustment during mobile exams
 - Retractable, backlit alphanumeric keyboard
 - Palm rest

Physio

- One three-lead ECG input
 - Gain, sweep rate and display position controls
 - Automatic heart rate calculation and display
 - Fault condition display
 - Cineloop locator displayed on one ECG input from an ECG source like stress ECG or ECG monitor

Peripherals

- The system supports up to two on-board peripheral devices (excluding report printers)
 - Video-recording peripherals, operated via system user interface
 - DVD recorder (cart-dependent)
 - Small format digital color printer (USB)
 - Small format digital B/W printer (USB)
 - Image fusion
- Support for large format external color printer
- Support for various Hewlett-Packard and Epson brand color and monochrome report printers (USB, externally mounted)

Input/output ports

- Export of measurement and analysis data to off-line reporting software packages (USB)
- Display port video export available for either full screen resolution of 1920x1080 (1080p) or display area 1024x768

Power requirements and video parameters

- 100V-240 V, 50 Hz/60 Hz – PAL/NTSC
- Integrated A/C line conditioning and battery back-up system
- Power consumption: <600 VA depending on system configuration

Electrical safety standards

- Electromechanical Safety Standards met
 - CAN/CSA 22.2 No. 60601-1, Medical Electrical Equipment: general requirements for basic safety and essential performance
 - IEC 60601-1, Medical Electrical Equipment: general requirements for basic safety and essential performance
 - IEC 60601-1-2, Collateral Standard, Electromagnetic compatibility – requirements and tests
 - IEC 60601-2-37, Particular Requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment
 - ANSI/AAMI ES60601-1, Medical Electrical Equipment: general requirements for basic safety and essential performance
- Electromechanical Safety Standards met (EU Only)
 - EN60601-2-37, Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment
- Agency approvals
 - Canadian Standards Association (CSA)
 - CE Mark in accordance with the European Medical Device Directive issued by British Standards Institute (BSI)

9. Maintenance and services

Maintenance

- Flexible service agreements to meet varied customer needs and budgets
- Centralized technical and clinical support
- On-site support
- Modular design for rapid repairs
- Easy customer access to trackball and air filter for cleaning
- Remote log file transfer
- On-cart software maintenance tools
 - Optimization
 - Maintenance
 - Repair
 - Configuration management
- Comprehensive diagnostics
 - Hardware
 - Software
 - Network
 - On-cart electronic transducer testing
- First responder access to diagnostics and utilities
- Spare parts availability for seven years from end of production



Services

Clinical education*

- Webinars
- Symposiums
- On-site
- Classroom
- Remote

Philips Remote Connectivity*

- iSSL and encryption
- Patient de-identify
- Security
- Remote Desktop
 - Remote technical support
 - Remote clinical support
 - Remote clinical education
- On-cart remote support request
- Proactive monitoring with alerting capability
 - Monitors key system parameters
 - Voltage
 - Temp
 - Fan speeds
 - Error conditions
 - Local alert handling and response

Warranty

- Philips standard product warranty

* Service agreement required for access to Philips Remote Services. Access to the Internet required. Not all remote features available in all countries; contact your Philips representative for details.

CIVCO Verza Guidance System is a trademark of CIVCO Medical Solutions.

