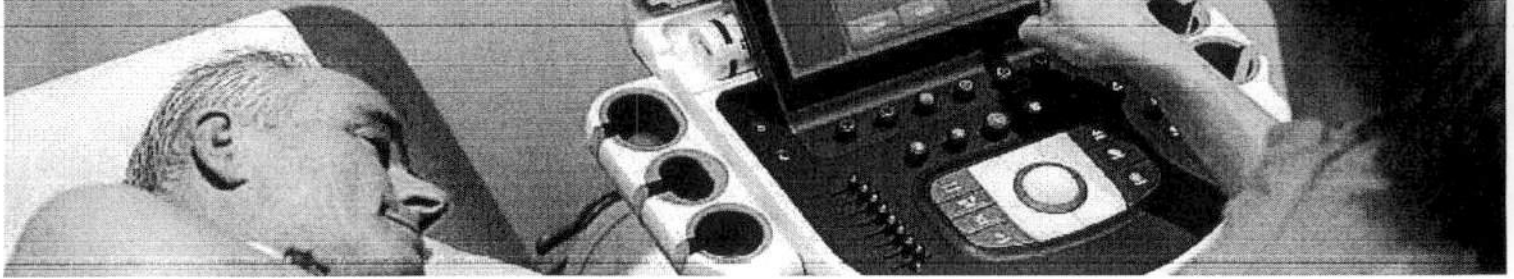
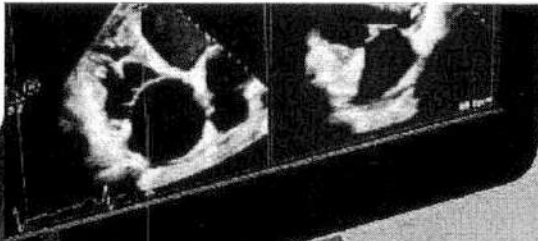


PHILIPS

Ultrasound

Affiniti CVx



Designed for **cardiology**.
Built for your everyday.

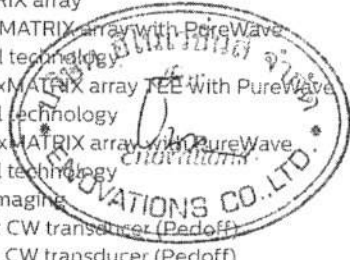
Affiniti CVx diagnostic ultrasound system specifications



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1. Introduction

You always go above and beyond to provide the best care to your patients. But you are expected to do so with less time, fewer resources and higher patient volume. The care you want to provide deserves tools that can set you ahead and help you stay ahead.

We designed Philips Affiniti CVx to give you the confident results you need, in the time you have. Engineered for efficiency and reliability and powered by Philips superb performance, it gets you diagnostic images you need, quickly – even on the most technically difficult patients. Its intuitive design and walk-up usability help you provide elegant, efficient care – every day.

1.1 Applications

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

2.1

54.6 cm (21.5 in) monitor articulates for easy viewing and folds down for transport

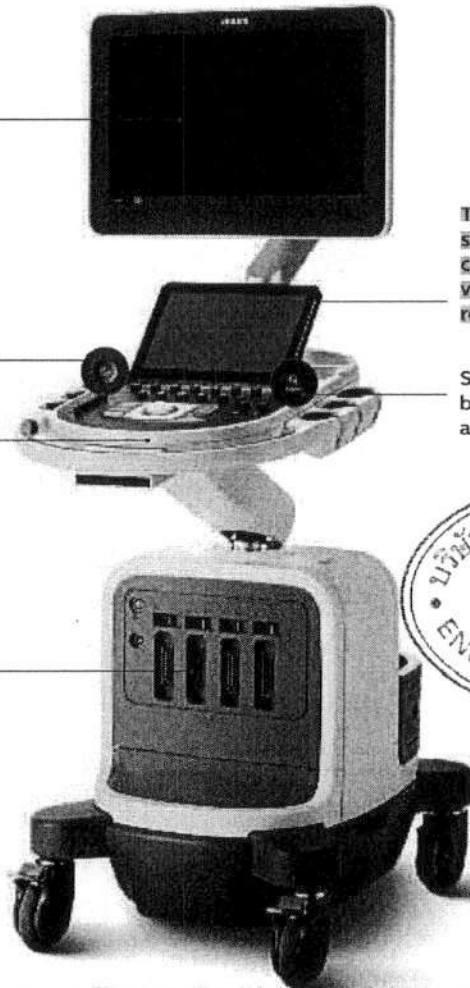
Goes to sleep in two seconds; back to full functionality in 20 seconds

Elegant control panel, simplified for ease of use

3.8

Four transducer ports and one-handed transducer access

2.2



2.3

Tablet-like touchscreen supports easy navigation for commonly manipulated controls via flyout menu selections; reduces button presses

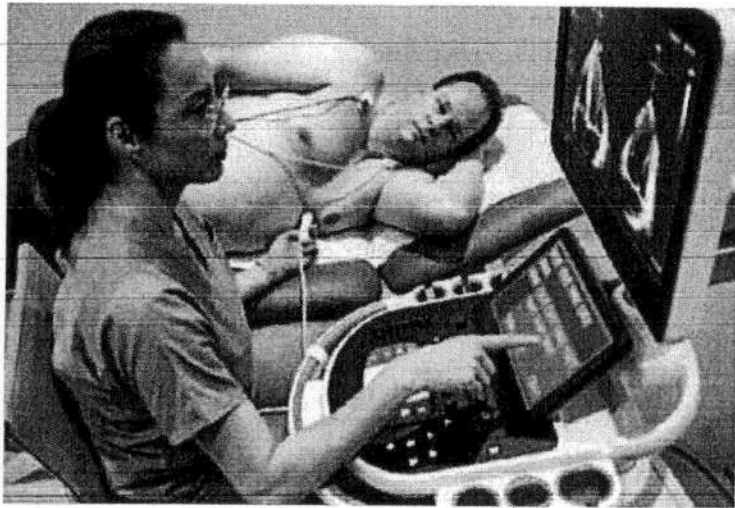
Service Request button for immediate access to Philips support



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2. System overview



2.1 System architecture

- 3.1 • Offers up to 4,718,592 total digital channels
- 3.2 • Next-generation ultra-low noise, wide dynamic range, 280 dB, digital broadband acoustic beamforming with proprietary architecture
- 3.3 • Powerful distributed multi-core processing architecture capable of achieving 225 x 109 40-bit Multiply-Accumulates/second
- 3.4 • Includes 512 GB hard drive support for transducer frequencies up to 22 MHz
 - Optimized for high definition 54.6 cm (21.5 in) LED display
 - Operating system supports Windows 10 IoT Enterprise LTSB 2016
 - Designed to support virtually any array configuration: xMATRIX, sector linear, curved, tightly curved and TEE
 - Contrast imaging uses both Pulse Inversion and power modulation technologies
- 3.5 • Supports depths from skin line (using zoom function) to 40 cm
 - 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
 - SonoCT capability available during contrast imaging modes

- Needle Visualization
 - Enhances the visibility of needles in the region of needle enhancement
 - Provides options for needle approach and various degrees of needle paths and angles
- 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.
- Philips XRES Pro features our next-generation high-resolution image processing that elevates tissue definition and image quality to new levels
 - Performs 350 million calculations per frame of image data over 1900 frames per second
 - Operates in 2D and 2D/CFI/Doppler/TDI mixed modes over 1900 frames per second
 - Offers XRES capability in contrast imaging modes
- Philips adaptive broadband flow imaging
- Doppler bandwidth that automatically adjusts for outstanding flow sensitivity and resolution
- Advanced dynamic motion suppression algorithms that reduce flash artifacts
- Fully independent triplex multiple mode operation for ease of use during Doppler procedures
- Auto Doppler flow optimization for carotid/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 ten stages
 - Forty views per stage by five modes
- Multi-application SmartExam workflow protocols
 - Stress echo, echo, abdominal, small parts, Ob/Gyn, 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 110 seconds
- Transport mode: from sleep mode to on, approximately 20 seconds
 - Transport mode lasts 40 minutes before recharge is needed



2.2 Imaging formats

- 2D linear: WideSCAN with SonoCT
- 2D curved: WideSCAN with SonoCT
- 2D sector
- 2D virtual apex sector imaging with wide field of view
- 2D trapezoid
- Dual 2D
- Panoramic imaging
- Live 3D/4D volume
- Live 3D/4D zoom
- 3D full volume
- 2D, MPR and volume
- Dual volume for full volume, 3D zoom and iCrop
- MaxVue image format
 - Allows use of entire monitor viewing area for displaying image with a push of a button
 - Uses a high-definition resolution and an aspect ratio of 16:9

3.14

2.3 Imaging modes

- 3.14.1. **2D grayscale imaging with advanced pulse coding, pulse shaping and frequency compounding technologies**
- 3.14.2. **M-mode**
- 3.14.3. **M-mode color Doppler**
 - M-mode tissue Doppler
 - M-mode trapezoid
 - Anatomical M-mode
 - TDI M-mode
 - Tissue Doppler Imaging (TDI)
 - Adaptive Doppler
 - Adaptive Broadband Color Flow
- 3.14.11. **Color compare mode**
 - 3D imaging
 - 3D imaging with Color Doppler
 - Live xPlane imaging (simultaneous display of two live imaging planes)
- 3.14.4. **Tissue Harmonic Imaging (THI) with pulse inversion technology**
 - Multivariate Tissue Harmonic Imaging including pulse inversion technology
- 3.13. **Left ventricular opacification (LVO) with pulse inversion and power modulation technologies**
 - SonoCT beam-steered real-time compound imaging
 - Harmonic SonoCT imaging
- 3.10. **Up to five levels of XRES adaptive image processing technology**
 - Variable settings available to the user
- 3.11. **ISCAN intelligent scanning for one-button TGC and gain optimization (i.e., adaptive gain compensation – AGC)**
- 3.14.7. **AutoSCAN with adaptive gain compensation (AGC) for real-time frame-by-frame TGC optimization**
- 3.14.5. **Simultaneous 2D M-mode**
- 3.14.6. **Color Doppler**
- 3.14.7. **Color Power Angio imaging (CPA) and directional CPA**
 - High resolution option available in relevant clinical applications
- 3.14.8. **High-PRF pulsed wave (PW) Doppler**
- 3.14.9. **Duplex and simultaneous 2D/PW Doppler**
- 3.14.10. **Duplex continuous wave (CW) Doppler**

- Duplex 2D, CPA, color flow, PW Doppler
- Auto Doppler optimization: Auto PW Doppler, color Doppler, flow optimization for one-button angle correction and steering
- Independent triplex mode for simultaneous 2D, CPA, color flow, 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 (write zoom)** 3.14.12
- **Reconstructed zoom with pan (read zoom)**
- Panoramic imaging
- SonoCT panoramic imaging with XRES and harmonic modes
- Chroma imaging in 2D, 3D, QLAB MPR and iSlice, Panoramic, M-mode and Doppler modes

4

M-mode

- Available on all imaging transducers
- Anatomic M-mode available on all imaging transducers
- TDI M-mode available in cardiac applications
- **Selectable sweeping rates** 4.1
- 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)** 4.2
- Chroma colorization with multiple color maps
- Cineloop review for retrospective analysis of M-mode data 256 (8 bits) discrete gray levels

6

2D imaging

- 6.1. **Available with all imaging transducers**
- 6.2. **Adjustable sector width and position during live imaging**
- 6.2. **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 Presets (TSP)-dependent
 - Gray map 6.3
 - **Chroma imaging providing colorized luminance maps**
 - **Acquisition zoom (HS zoom), ability to position the zoom ROI anywhere within the image and change the height and width of the zoom ROI, for** 6.4
 - Display zoom and magnify on live or frozen images up to 16 times
 - Three levels of frame rate
 - Support of frame rates of up to 1900 frames per second
 - Tissue optimization
 - Contrast resolution enhancement
 - Tissue Harmonic Imaging
 - SonoCT imaging
 - Post-processing includes gain, dynamic range, up/down invert, right/left invert, zoom, gray map and Chroma map
 - 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 or trapezoid imaging
- Next-generation XRES technology
- 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 provides high quality images
- Multivariate pulsing including patented pulse inversion phase cancellation technology for increased detail resolution during harmonic imaging
- Available in all clinical applications
- Extends high performance imaging capabilities to all patient body types
- Support of SonoCT (Harmonic SonoCT) and XRES modes

- 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 exceptional sensitivity and color resolution
- Color Doppler PRF maximum 34 KHz, dependent on transducer and clinical application

Color Power Angio imaging (CPA)

- Automatically adapts transmit and receive bandwidth processing based on the color box position providing excellent sensitivity and color resolution
- Highly sensitive mode for small vessel visualization
- Available on all imaging transducers for general imaging and women's healthcare
- 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 eliminate 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, thirty-one angles on L12-3, L12-4 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 optimal sensitivity and color resolution
- CPA PRF maximum 34 KHz, dependent on transducer and clinical application

7

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 GI, WHC
- **Invert**

7.1

- **B/W suppress**
- **Color blending**
- **Color compare dual display (B/W on left, color on right)**
- **Color map**
- **Color persistence**
- **Color trapezoid**

- Flow optimization: GI, WHC
- Output power

7.2

- **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 $\pm 20^\circ$ steer angle on linear array transducers

7.3

- 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 reduce color motion artifacts
- 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, thirty-one angles on L12-3, L12-4 and L15-7io
- Trackball-controlled color Region of Interest: size and position



MicroFlow Imaging (MFI)

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

5

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
- Five selectable sweep speeds: Min, Slow, Medium, Fast and Max
- Selectable low-frequency signal filtering with adjustable wall filter settings
- Selectable grayscale curve for optimal display
- Selectable Chroma colorization maps

5.4 Selectable display format prospective or retrospective: 1/3-2/3, 1/2-1/2, 2/3-1/3, side-by-side, full screen —

- Steering available to up to 90° (+/- 45°), dependent on transducer and clinical application
- Doppler review for retrospective analysis of Doppler data
- 256 (8 bits) discrete gray levels

5.2 Post-processing includes gain, compress, invert, baseline, angle correct, Quick angle, display format, sweep speed, reject, Chroma map

5.1 Available on all imaging transducers

5.3 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
- PRF range between 200 Hz-34 KHz, depending on transducer and clinical application
- 50 dB or more gain available to the user, depending on clinical application
- 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

5.5

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, L12-4, L12-5 50, L18-5 and L15-7io in carotid/arterial vascular applications
- Auto Doppler is available on the curvilinear transducers C5-1, C6-2, 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)
- iSCAN optimization that automatically adjusts scale and baseline

Tissue Doppler Imaging (TDI/TDI PW)

- Available on all cardiac imaging transducers (except S7-3t)
- 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
- TDI M-mode and TDI-PW available, dependent on transducer and clinical application

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

- Ability to image in 2D and rotate the image without moving the transducer
- Home rotational key
- High frame rate rotational imaging

Live xPlane imaging

- Available on X5-1, X7-2t and X8-2t* xMATRIX transducers
- Simultaneous display of two live imaging planes
- Color and grayscale modes
- Lateral, rotational and elevation steering
- Live xPlane pulse Doppler (available on X8-2t*) allows precise placement of the Doppler sample volume using both longitudinal and transverse reference image

Live 3D echo

- Available on X7-2t and X8-2t* xMATRIX transducer
- 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 volume loop acquire in Live 3D
- Beat-by-beat retrospective 3D loop selection
- Live 3D color flow imaging
- High volume rate (HVR) echo and color
- 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
- 3D color flow
- 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 90 vps

Live 3D and MultiVue/multislice imaging

- Supported on X7-2t and X8-2t xMATRIX transducers
 - MultiVue supports volume display with 3D rendering
 - 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 enables the possibility to overlay the MPRs on the 3D rendering
 - Possibility to memorize MPR location for quick alignment

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 help 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 (not available on endovaginal transducers)

Contrast imaging – cardiovascular

- System optimized for left ventricular opacification
- One-touch solution (one-button access in Adult Echo preset) with settings for bolus and infusion
- S5-1 broadbandwidth pulse inversion and power modulation technologies for high sensitivity

- LVO 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
- Supported on the X5-1, S5-1 and S4-2 transducers

Contrast imaging – general imaging

- System optimized for detecting contrast agent signatures as they are approved for use
- Contrast modes available on C5-1, C6-2, C9-2, L12-3, L12-4 and L12-5 transducers
- Up to 10 Chroma maps for enhanced contrast imaging
- Mid-MI contrast modes available on C5-1, C9-2 transducers
- Pulse modulation contrast imaging available with SonoCT and XRES technologies
- Touchscreen display timer
- Advanced non-linear pulsing schemes with XRES for increased contrast sensitivity
- High frequency contrast capability
- Flash imaging
- Dual imaging mode for simultaneous fundamental and contrast displays
- Dual imaging contrast mode supports simultaneous mirrored calipers duplicating measurements on both the fundamental and contrast displays
- ECG/timed triggering
- Long loop capture mode during contrast procedures (3-10 minutes)
- QLAB ROI and MVI display

Interventional imaging

- TSP available on selected transducers for excellent performance during interventional and biopsy procedures
- Biopsy guide selection menus
- Contrast and interventional modes
- Support of multiple biopsy angles on S5-1, C5-1, C6-2, C9-2, L12-3 and L12-4



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
 - 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 and possible to combine high definition zoom with pan zoom
 - 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
- 3.7 **2D acquisition frame rate up to 1900 frames/sec** (dependent on field of view, depth and angle)

Next-generation SonoCT real-time compound imaging

- Available on all transducers except sector
- Reduced clutter and artifacts
- 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

XRES adaptive image processing

- Available on all imaging transducers
- Reduces 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 high resolution algorithms for advanced speckle noise reduction, refined tissue pattern displays, and fine border definition
- Provides high speed processing that allows up to 1900 frames-per-second displays
- Five different levels available, dependent on transducer and clinical application
- XRES Pro next-generation image processing available, dependent on transducer and clinical application

Tissue aberration correction (TAC)

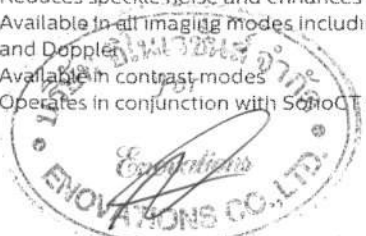
- Automatically enabled when ABD maximum penetration TSP is selected on C5-1 transducer
 - Corrects for speed of sound disturbances due to excessive adipose layer on obese patients
 - Corrects for speed of sound disturbances in fatty tissue

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 and 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 enhance 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, 3D and M-mode grayscale data
 - Every image frame has individually adjusted image brightness
 - Available from 2D touchscreen controls



3.9

IOPTIMIZE intelligent optimization

Multiple technologies for one-button approach to automatically and immediately adjust system performance for different patient sizes, flow states, and clinical requirements.

- **Tissue Specific Presets** – adjusts over 7,500 parameters during transducer/application selection
- **Patient optimization** – adjusts 2D performance to immediately adapt to different patient sizes
- **Flow optimization** – adjusts broadband flow performance to immediately 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)
- Ambient lighting control for exceptional image viewing in both light and dark environments
- Full-color 12-inch capacitive touchscreen, complete with swipe technology, enables easy navigation of controls and system interaction
- Dual function mode switch and independent gain controls for 2D, CPA, M-mode, Color, PW, CW Doppler, TDI and 3D

3.6 **Eight-side pot control adjustment of TGC curve**

- iSCAN control for 2D/Doppler automatic optimization
- High definition/pan zoom control
- Dual mode control
- Freeze control
- Three programmable acquire controls



3.3 Touchscreen

- Widescreen touchscreen for dynamic presentation of controls via flyout menu selections; reduces button presses
- 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 Presets parameters
- Tabbed layout and swipe capability for quick access to hidden controls
- Touchscreen control adjustment of LGC and TGC curve with simultaneous display of image on touchscreen to enhance ergonomics and reduce user steps
- Touchscreen alphanumeric keyboard for text entry
- TouchVue manipulation and icon-driven 3D workflow on touchscreen simplify 3D data navigation



4. Workflow

The Affiniti CVx ultrasound system features innovative Philips technologies that combine for outstanding performance and efficient workflow.



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
- 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 enhanced user posture, increasing comfort during exams (meets industry standards recommendation for the prevention of WRMSD)
- Highly mobile cart that facilitates 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 for endocavitary transducers
- Scan plane orientation marker
- User-selectable depth scale display
- Real-time display of mechanical index (MI)

- Real-time display of thermal index (Tib, Tlc, Tls)
- 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
- Annotations editable and movable in Review
- Configurable label control for quick access to labels and body markers
- Doppler baseline invert in live and frozen imaging
- Compression changes available live or scrolling loop
- 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 immediate 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

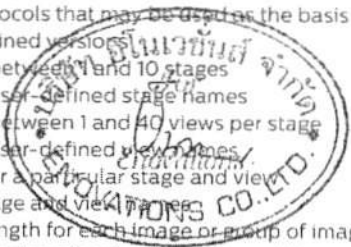
4.3 SmartExam protocols

- 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 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, cardiac and Ob/Gyn 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
- Flexibility for automatic or manual advance of views
- Quick access tool bar for protocol navigation
- 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 include:
 - 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
- Pre and post data curves
- Pre and post bull's-eye maps
- Pre and post strain comparisons
- aBiometry Assist^{AI} utilizes anatomical intelligence technology for automatic measurements of the most commonly used fetal biometry parameters BPD, OFD, HC, AC and FL

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**
- Factory default exam types can be hidden, allowing only display of the QuickSAVE exam types

2.5

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)
- MaxVue image format
 - Allows use of entire monitor viewing area for displaying image with a push of a button
 - Uses a high-definition resolution and an aspect ratio of 16:9
- Depth from 1 cm to 40 cm (transducer-dependent)

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, up to 64 seconds of 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
- Trim capability of 2D data
- Available in all imaging modes plus:
 - 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
 - Patient identification via bar code reader

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

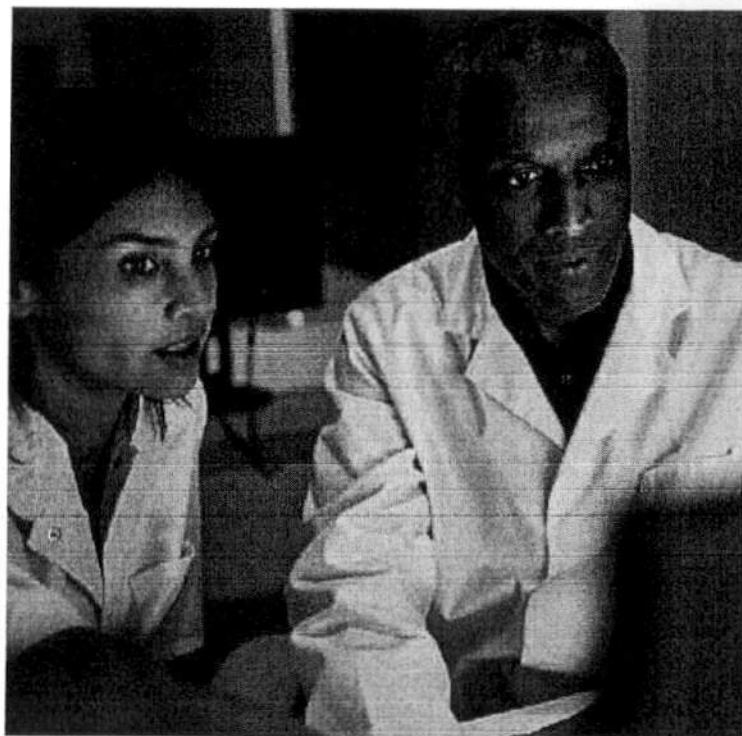
4.9 Connectivity

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 512 GB storage capacity
 - Storage capacity of approximately 350 patient exams (assuming 40 images, 6 seconds of clips/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 2,300 frames per clip
 - Scrolling M-mode, Doppler acquisition
 - Cardiac temporal volume acquisition, live 3D, full volume 3D
 - 3D clips: volume render views and MPR views
 - Q-Apps frames and clips
- Printing
 - Local print to on-board or off-board video printers
 - Printing of images in configurable N-up format to local plain paper 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
 - Export PDF report 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)
 - USB storage (flash memory or hard drives)
 - Export PC format images and loops to network share
 - Export PDF report to network share
 - 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
 - Export and import of trending data is compatible with iU22
- 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 (2.4 GHz and 5 GHz)
 - 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 two 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/IPv4 addressing: static or DHCP for system address, static or hostnames (DNS lookup) for server addresses
 - IPv6 addressing: link local, router discovery, or DHCP for system address, host names for server addresses
 - Network addressing
 - IPv4 addressing: static or DHCP for system address, static or hostnames (DNS lookup) for server addresses
 - IPv6 addressing: link local, router discovery, or DHCP for system address, host names for server addresses

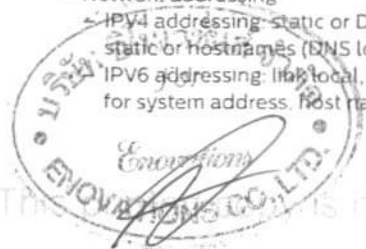


NetLink connectivity option

3.12

Supported DICOM services

- Image storage
- Structured Report (SR) storage includes Ob/Gyn, vascular, adult echo, pediatric echo, fetal echo, congenital cardiology
- Modality Worklist with automatic patient demographic entry
- Modality Performed Procedure Step (MPPS)
- Storage commitment push mode
- 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 of 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 16-bit 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)
 - 25 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, 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/mammography/PET)
- De-identification feature
- Send images to PACS and media without identifying information burned in to 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, calculations and OB authors
- Support of the export of user-defined measurements, calculations with standard DICOM structure reporting for:
 - Adult echo – Vascular – Pediatric echo
 - Fetal echo – Abdominal – TCD

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

Report

- Report templates per clinical exam
- User-configurable report
- Off-cart report configuration tool available
- On-cart report configuration
- Video two-way video streaming
 - Audio two-way audio
 - Text two-way instant message
 - Remote visual asset display JPEG, PNG, MP4, OB 17
 - Screen sharing Web RTC
 - Webcam Universal USB driver
 - Headset Universal USB driver

Collaboration Live option

- Provides ultrasound system users with the ability to communicate and collaborate with colleagues or with Philips technical and clinical support personnel in a non-diagnostic way, directly from the ultrasound system
 - Video two-way video streaming
 - Audio two-way audio
 - Text two-way instant message
 - Remote visual asset display JPEG, PNG, MP4, OBJ 17
 - Screen-sharing Web RTC
 - Webcam universal USB driver
 - Headset universal USB driver

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

