Improve your image on every level

Philips ClearVue 550 ultrasound system specifications

Not yet available in the U.S.

PHILIPS

sense and simplicity

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1. Introduction

The sophisticated ClearVue 550 offers advances in imaging, ergonomics, and workflow that provide excellent value in ultrasound imaging. Featuring Philips Active Array technology, the ClearVue 550 integrates key imaging technologies into the transducer to enable exceptional imaging performance in a lightweight, affordable platform.

Key advantages

- Proprietary Philips Active Array technology for superb images to enhance diagnostic confidence
- Lightweight, energy efficient system with intuitive user interface for improved ease of use
- Smart, modular design for improved reliability and serviceability

1.1 Applications

- Abdominal
- Small parts and superficial
- Pediatric
  - Head
  - Hips
- Musculoskeletal
- Urology and prostate
- Obstetrical
- Gynecological and fertility
- Vascular
  - Cerebrovascular
  - Peripheral vascular
- Transcranial Doppler
- Cardiac
  - Adult
  - Pediatric

2. System overview

2.1 System architecture

- All-digital broadband beamformer
- Microfine 2D focusing with dynamic focal tuning
- 170 dB full time input dynamic range
- 32,768 digitally-processed channels
- Continuously variable steering in 2D, color, and Doppler modes
- Gray shades: 256 (8 bits) in 2D, M-mode, and Doppler spectral analysis
- Acquisition frame rate: greater than 1128 frames per second in high frame rate mode (dependent on transducer, field of view, depth, and angle)

2.2 Imaging modes

- Philips Microfine 2D focusing
- Philips Color Power Angio (CPA)
- Directional Color Power Angio
- M-mode
- Anatomical M-mode
- Color M-mode
- Pulsed wave Doppler
- High PRF pulsed wave Doppler
- Continuous wave Doppler
- Freehand 3D
- Color compare mode
- Dual mode
- Duplex for simultaneous 2D and Doppler
- Triplex mode for simultaneous 2D, Doppler, and color or CPA
- 2D optimization signal processing
- Tissue Harmonic Imaging (THI)
- Intelligent Doppler
- Reconstructed zoom with pan (read zoom)
- Philips high-definition zoom (write zoom)
- Panoramic
- Trapezoidal
- Adaptive Doppler
- Adaptive color Doppler

Active Array technology integrates key imaging technologies into the transducer for superb imaging performance in a lightweight cart.

2D mode

- SonoCT real-time compound imaging
- XRES adaptive image processing
- Microfine 2D focusing
- Frame rate selection
- 16-level digital reconstructed zoom with pan
- Variable level high-definition zoom
- Image orientation marker
- Cineloop image review (up to 1,200 B/W frames)
- Persistence, adjustable in real time and cineloop review
- Selectable compression curves
- Sector size and steering control
- Selectable line density
- Up to eight transmit focal zones plus separation control
- Dual imaging (single and two buffer)
- Philips Chroma imaging with multiple color maps

M-mode

- Available with all imaging transducers
- Selectable sweeping rates
- Time markers: 0.1 and 0.2 seconds
- Chroma colorization with multiple color maps
- Selectable display format (small over large, large over small, side-by-side)
- M-mode review for retrospective analysis of M-mode data
- Full-screen M-mode display facilitates diagnoses by enabling easier, more accurate caliper placement
- Color M-mode on the S4-1, C5-2, and C9-4v transducers

Anatomical M-mode

- Uses 2D image as a basis for M-mode analysis at a defined line, independent of transducer orientation
- Makes it easier to keep the M-mode line perpendicular to the anatomy, even in abnormally shaped or positioned hearts
- Provides data on direction, position, and timing of any single echo received from any point of the tissue for M-mode analysis in any direction, for examining cardiac chamber diameters, LV regional wall motion, and location of accessory pathways
- Anatomical M-mode trace can be generated or modified post freeze
- Anatomical M-mode on all sector transducers

Doppler

- Display annotation including Doppler mode, scale (cm/sec or kHz), pulse repetition frequency, wall filter setting, gain, acoustic output status, sample volume size, normal or inverted, angle correction, grayscale curve
- Adaptive Doppler – boosts weak signals to improve spectrum visibility and enhances pulsed-wave audio signals for precise flow assessment
- Intelligent Doppler imaging – automatically maintains optimal angle-to-flow to assist in delivering accurate and consistent Doppler velocity measurements (available with vascular and general imaging application packages on linear transducers only)
- Automatic spectral invert
- Adjustable frequency and velocity display ranges
- Eight-position zero baseline shift
- Normal and invert display around horizontal zero line
- Selectable sweep speeds
- Selectable grayscale curve for optimal display
- Selectable display format (small over large, large over small, side-by-side)
- Full-screen Doppler display which improves diagnoses by enabling easy, accurate caliper placement
- Doppler review for retrospective analysis of Doppler data

Pulsed wave (PW) Doppler

- Available on all imaging transducers
- Adjustable sample volume size: 0.8 – 28.3 mm
- Displays tissue movement and blood flow in 2D and PW Doppler simultaneously
- Triplex mode – displays tissue movement and blood flow in 2D, color or CPA, and PW Doppler simultaneously
- High-PRF capability in all modes including Duplex and Triplex

Continuous wave (CW) Doppler

- Available on cardiac sector transducers only
- Steerable through 80°
- Maximum velocity range: 46.9 m/sec

Color Doppler

- Available on all imaging transducers
- Adaptive color automatically optimizes color or Color Power Angio frequencies, ensuring excellent sensitivity and color penetration
- Color compare – simultaneously displays real-time Color Power Angio, color Doppler, and grayscale images side-by-side
- Automatic color invert – automatically inverts color maps to maintain selected color coding when the linear steering angle passes through vertical
- Cineloop review
- Chroma 2D colorization with multiple color maps
- 256 color bins
- Continuously variable color steering
- 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 preset or is user selectable
- Velocity and variance displays
- Color and 2D line density control
- Selection of color bar display units

Tissue Harmonic Imaging (THI)

- Available on the S4-1, C5-2, and L12-4 transducers
- System processing of second harmonic frequencies (nonlinear energy) in tissue
- Extends high performance imaging capabilities to all patient body types
- Image display virtually free of artifacts

Color Power Angio imaging (CPA)

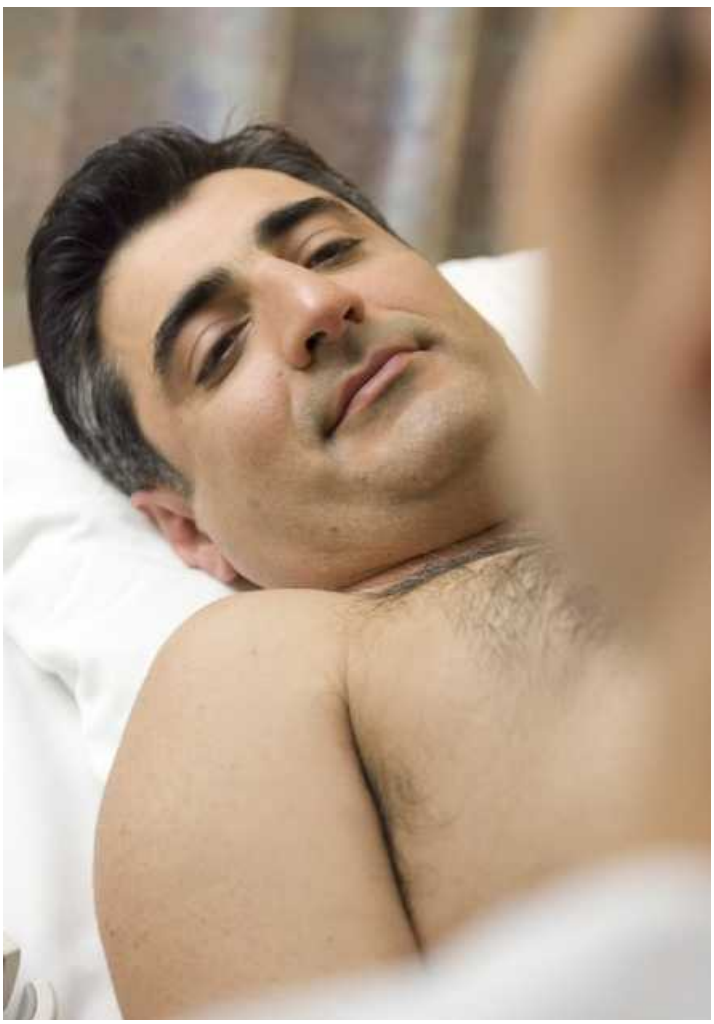
- Available on all imaging transducers
- Highly sensitive mode for small vessel visualization
- Fully user-configurable
- Cineloop review
- User-definable presets
- Multiple maps
- Directional CPA
- Individual controls for gain, filters, sensitivity, echo write priority, and color invert
- Adjustable CPA region of interest: size and position
- User-selectable persistence
- User-selectable blend levels
- TGC control
- Write priority

3D grayscale imaging

- Available on all imaging transducers
- Available with all applications
- Provides a qualitative volume and multiplanar displays of 3D data set
- Individual controls for manipulating the on-screen 3D rendering and display options

Expanded field of view

- Panoramic imaging – ability to perform point-to-point distance measurement, extended field of view composite imaging, and full zoom, pan, cineloop review, and image rotation capabilities
- Trapezoidal imaging – expands field of view on linear array transducers up to 21° on each side in vascular and general imaging applications



The ClearVue 550 supports a wide range of applications, including abdominal, Ob/Gyn, vascular, cardiac, small parts, musculoskeletal, urology, pediatric, and TCD.

3. System controls

The ClearVue 550's sleek and intuitive control panel puts the features and functions you use most often right at your fingertips.

3.1 Optimization controls

2D Opt signal processing with 2X multi-line parallel processing and frequency compounding

- Improves tissue contrast resolution and textural perception
- Sharpens lateral beam profile for finer dot size
- Reduces speckle artifacts for increased image clarity
- 2D Opt key with up to three settings for patient-specific optimization in 2D and color Doppler

SonoCT real time compound imaging

- High precision beam-steered image compounding for acquisition of more tissue image information and reduction of angle generated artifacts
- Multiple beam-steered lines of sight
- Available on C5-2, C9-4v, L12-4
- Operates in conjunction with Tissue Harmonic Imaging and duplex Doppler
- Operates in conjunction with XRES imaging

XRES adaptive image procession

- Enhances images without altering the image resolution
- Improves contrast resolution, reduces artifacts, improves visibility of tissue texture patterns, and improves border definition and continuity
- Available in 2D, Color Power Angio, M-mode, dual imaging, CW Doppler, zoom, post-Freeze, and when capturing loops
- Applied to grayscale data of 2D images

iSCAN intelligent optimization

- In 2D mode, automatic adjustment of TGC and receiver gain to achieve optimal uniformity and brightness of tissues
- In PW Doppler mode, one-button optimization of spectral tracing to improve productivity
- In color mode, automatic adjustment of receiver gain to improve color fillings

3.2 Control panel and user interface

- Easy-to-learn graphical user interface
- Primary controls readily accessible and logically grouped
- Commonly used secondary controls located on soft keys for quick access; soft key functions change dynamically based on the currently active mode, preset, or system function
- Other secondary controls accessible through on-screen menus
- Alphanumeric QWERTY keyboard with globalization key for conversion to local language (English, French, German, Italian, and Spanish)
- User selectable keyboard input language (Roman, Japanese, Simplified Chinese, Russian, and Portuguese)
- Trackball with Select and Enter keys for easy system navigation
- Integrated stereo speakers
- Imaging mode keys: 2D, Color Power Angio, M-mode, color Doppler, continuous wave Doppler (CW), pulsed wave Doppler (PW)
- 2D image controls: depth, dual, freeze, zoom, and focus
- Image enhancement controls: THI, dynamic range, gain, persistence, post-processing map, and smooth
- Patient specific optimization keys: 2D Opt, transducer (transducer select), THI, and iSCAN
- Quantitative controls: caliper, calc, erase, trackball
- Doppler or color controls: angle and steer, spectral, scale, baseline, gain, power, volume, duplex, and triplex
- Image acquisition keys: acquire and print, supporting external print
- Annotation controls: text, erase, arrow, and body marker
- Function keys: patient, preset, setup, end exam, physio, hide ID, and protocol
- Online help key
- Optional online support request feature* provides faster response to clinical questions and technical issues
- Optional proactive monitoring* helps prevent unscheduled downtime
- Lateral gain compensation (LGC) soft keys
- Time gain compensation (TGC) slide pot controls
- Review and report keys

4. Workflow

4.1 Display annotation

- On-screen display of all pertinent imaging parameters for complete documentation, including: transducer type and frequency range, active clinical options and optimized presets, display depth, TGC curve, LGC curve, grayscale, color map, frame rate, dynamic range, compression and contrast enhancement, color gain, color image mode, and hospital and patient demographic data
- Displayed data can be turned off for generating images used in publication and presentation
- Sector width and steering markers
- 2D Opt setting and iSCAN icons
- Real-time display of Mechanical Index (MI)
- Real-time display of Thermal Index (TIb, TIc, TIs)
- Quick text – allows easy annotation at any time during an exam
- Text – places, moves, erases, modifies or appends predefined text labels, typed text, and arrows
- Body markers – displays body-part icons appropriate for the active preset and indicates relative transducer position
  - Body marker location and type can be saved to user defined preset
  - Icons selectable via trackball scroll and soft keys
- Dual orientation marker to indicate the active buffer for two-buffer dual display

4.2 Image presentation

- Up or down
- Left or right
- Multiple duplex image formats (small over large, large over small, side-by-side)
- Depth to 30 cm (exam and transducer specific)

4.3 Cineloop review

- Acquisition, storage in memory, and display in real-time and duplex modes of up to 1,200 frames of 2D and color images for retrospective review and image selection
- Single frames of Doppler data and M-mode images can be archived to print or electronic media
- Supports two-buffer dual imaging mode of up to 600 frames per buffer
- Trackball control of frame-by-frame image selection
- Variable playback speed
- Trim capability
- Functions in 2D and Tissue Harmonic Imaging, M-mode, PW Doppler, CW Doppler, color Doppler, and Color Power Angio imaging modes

4.4 Exam documentation

- Peripherals
  - Digital B/W thermal printer (USB input)
  - Support of a range of plain paper printers
- Input and output ports
  - Three USB ports. Uses include connecting the optional footswitch, supporting data transfer, and supporting qualified plain paper printers
  - Black and white composite video output
  - S-video output
  - VGA output
  - LAN connector – used with DICOM networking and Philips Remote Services*
- Optional Utilization Reports* provide data to help manage ultrasound assets, track usage, summarize data about exam types, duration, and referrals

Advanced system automation streamlines your workflow and improves exam consistency, so you can focus more on your patients.

4.5 Connectivity

- Three USB ports
- 320 GB hard drive space
- DVD/CD write and read capabilities
- Philips Remote Services connectivity* allows for virtual on-site visits for both clinical and technical support in order to provide faster resolution to issues and questions
- Direct digital storage of system configuration backup, including user-defined presets and OB trending data, to USB or DVD/CD
- Direct digital storage of single frame color and B/W images to internal hard disk, USB flash, and CD/DVD
- Direct digital storage of B/W and color loops to internal hard disk, USB flash, and CD/DVD
- Integrated multi-session CD/DVD allows storage of multiple individual studies to a single disk at different times rather than requiring single batch mode storage
- Supports 4.7 GB DVD
- Ability to export AVI clips and BMP images to USB flash for PC viewing
- Fully-integrated interface
- Extensive image management capability, including thumbnail image review, cineloop editing, and user-configurable patient reporting
- Study manager allows user to digitally acquire, review, and edit complete patient studies
- Exam directory
- Delete and replace recalled image capability
- Multiple study archive formats (palette color, RGB, YBR)
- DICOM 3.0 print and store service class user
- Multiple DICOM servers
- Multiple DICOM presets
- DICOM structured reporting for vascular, cardiac, and Ob/Gyn
- Configurable print
- User may select images to print from all acquired images
- 10BaseT or 100BaseT Ethernet output
- Site configurable IP address, port, and AE title
- Modality performed procedure step (Mpps)
- Modality worklist
  - Works in conjunction with radiology and cardiology information systems
  - Automatic entry of patient demographics
- Study reports available as DICOM images
- System can use lossy JPG image format with user configurable compression ratio

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

5. Transducers

ClearVue 550 introduces Active Array technology with a new type of transducer that integrates imaging circuitry from the system into the transducer for superb imaging performance in a small, lightweight product. The system supports a full range of transducers for a variety of applications such as abdominal, Ob/Gyn, vascular, and cardiac.

Transducer presets help leverage transducer strengths, and four transducer connectors allow users to quickly switch transducers when needed.

5.1 Transducer selection

- Electronic switching of up to four imaging transducers
- System supports up to four transducers to meet a wide range of clinical needs
- Multiple user-selectable transmit focal zones; up to eight focal zones on selected transducers
- Continuous dynamic receive focusing on all transducers

Sector array

S4-1 broadband sector array

- 4 to 1 MHz extended operating frequency range
- High-resolution imaging for abdominal, cardiac, and Ob/Gyn applications
- Supports 2D, M-mode, color, PW and CW Doppler, Tissue Harmonic Imaging, and Color Power Angio imaging
- Biopsy kit available

Curved arrays

C5-2 broadband curved array

- 5 to 2 MHz extended operating frequency range
- High-resolution imaging for abdominal and Ob/Gyn applications
- Supports 2D, M-mode, color, PW Doppler, Tissue Harmonic Imaging, and Color Power Angio imaging
- Multi-angle biopsy kit available

C9-4v broadband curved array

- 9 to 4 MHz extended operating frequency range
- End-fire sector, 11 mm radius of curvature, 150° field of view
- Supports 2D, M-mode, color, PW Doppler, and Color Power Angio imaging
- Endovaginal applications
- Biopsy kit available

Linear array

L12-4 broadband linear array

- 12 to 4 MHz extended operating frequency range
- 21° of trapezoidal imaging
- High-resolution imaging for superficial applications including vascular, small parts, and musculoskeletal
- Supports 2D, color, Tissue Harmonic Imaging, PW Doppler, and Color Power Angio imaging
- Multi-angle biopsy kit available

5.2 Transducer application guide

Transducer				
Transducer	**S4-1**	**C5-2**	**C9-4v**	**L12-4**
Type of array	Sector	Curved	Curved	Linear
Application				
Abdominal 0-4 cm	●	●		●
Abdominal 5-10 cm	●	●		●
Abdominal > 11 cm	●	●		
Gyn vaginal 8-10 cm (max. depth)			●	
Gyn transabdominal < 10 cm	●	●		
Gyn transabdominal > 11 cm	●	●		
OB vaginal 6-8 cm (max. depth)			●	
OB 1st trimester 10-12 cm (max.)	●	●		
OB 2nd trimester 12-18 cm (max.)	●	●		
OB 3rd trimester 15-20 cm (max.)	●	●		
OB nuchal translucency		●		
Pediatrics/neonatal abdominal small	●	●		
Pediatrics abdominal large	●	●		
Pediatric hips				●
Pediatrics cephalic	●			
Vascular 0-3 cm				●
Vascular 3-8 cm		●		●
Cardiac < 50 lb/22.7 kg	●			
Cardiac > 50 lb/22.7 kg	●			
Breast				●
Transcranial Doppler	●			
Small parts < 3 cm				●
Small parts > 3 cm				●
Musculoskeletal				●
Prostate		●	●	
Biopsy guides	Reusable & disposable	Reusable & disposable	Reusable & disposable	Reusable

6. Measurement and analysis

6.1 Measurement tools

- 2D distance
- 2D circumference or area by ellipse, continuous trace, trace by points
- 2D curved-linear distance
- M-mode distance (depth, time, slope)
- Manual Doppler distance
- Manual Doppler trace
- Automatic Doppler trace - traces frozen spectral display to calculate and display user-selected measurements in most presets
- Time and slope measurements in Doppler and M-mode
  - Ao dec time
  - MV dec time
  - PA dec time
  - PA acc time
- Doppler values containing PI, RI, S/D indices
- 2D volume
- 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
- Moveable results box can be moved to any corner of the screen
- User-defined measurements
- User-defined calculations
- User-defined fetal growth tables

6.2 High Q automatic Doppler analysis

- Automatic real-time and retrospective tracing of:
  - Instantaneous peak velocity (or frequency)
  - Instantaneous intensity weighted mean velocity (or frequency)
  - User-configurable display of values
  - Adjustable goal posts to within a single heart cycle, allowing quantification of any portion of the cycle (for example systole only)
- Vascular
  - Automatic real-time display of:
    - Time-averaged mean velocity (or frequency)
    - Resistive index
    - Pulsatility index
    - Systolic/diastolic ratio and diastolic/systolic ratio
    - Acceleration/deceleration times
- Cardiology
  - Automatic real-time display of:
    - Peak velocity
    - Peak gradient
  - Display of:
    - Cardiac output
    - VTI
    - Mean velocity – mean gradient

6.3 Clinical option analysis packages

- Comprehensive measurements, calculations, and application-specific reports with embedded images, including expanded cardiac, vascular, Ob/Gyn, and general imaging capabilities for thorough exam documentation

General imaging analysis

- General abdominal
- Small parts
- Pediatric general
- Musculoskeletal

Ob/Gyn and fertility analysis

- Fetal biometry
- Biophysical profile
- Amniotic fluid index
- Early gestation
- Fetal long bones
- Fetal cranium
- Nuchal thickness
- Other OB measurements:
  - 2D echo
  - Fetal heart M-mode
  - Fetal Doppler
  - Echo Doppler
  - User-defined fetal growth tables
- OB calculations and tables are user-definable
- OB trending data for up to ten studies per patient
- Gynecology and fertility
  - Uterus
  - Right and left ovary
  - Right and left follicles

Cardiac analysis

- Volume by area or length method
- M-mode analysis
- Peak and mean gradients
- Pressure half time
- Continuity equation
- Diastolic function
- Cardiac output
- Qp:Qs ratio
- dP/dt
- Pulmonary vein analysis
- Valvular analysis
  - Proximal isovelocity surface area (PISA)
  - E/A ratio
- Ventricle analysis
  - Ejection fraction (via Teichholz or cubed method)
  - Simpson's biplane and single plane
  - LV mass
  - IVRT

Vascular analysis

- Abdominal vascular
- Cerebrovascular
- Transcranial vasculature protocols
- Right and left, lower and upper extremity protocols
- Optional tools: percent diameter area reduction
  - Automated finding codes and user comments

7. Physical specifications

Physical dimensions

Depth	23.0 in/58.4 cm
Height	53.6 – 59.8 in/136.1 – 151.9 cm
Control panel height (non-adjustable)	33.0 in/83.7 cm
Width	20.5 in/52 cm
Weight	115 lb /52 kg (with printer)

High mobility cart

- Easy maneuverability
- Wrap around handles for portability
- Four-wheel swivel ability
- Two-wheel lock brake
- Lightweight cart frame
- User replaceable acquisition-module and printer
- Built-in A/C line conditioner provides isolation from voltage fluctuation and electrical noise interference
- Internal low noise fan

Control panel

- Facing towards user at 10° incline
- Fixed height
- Simplified interface through in-context back-lighting

Display

- 17-inch (338 x 270 mm) high-resolution color monitor
- Mounted on fully articulating arm with tilt and swivel
  - Tilt: -60°/+90° (fully flat)
  - Swivel: +/-90°
- From home position display lifts +6.0 inches
- SXGA resolution (1280 x 1024) 60 Hz, non-interlaced RGB
- System output: SXGA (1280 x 1024) 60 Hz non-interlaced RGB
- 0.264 mm dot pitch
- Brightness control, automatic backlight stability (BLS) control (BLS ensures quick warm-up and consistent light output over operational life)
- In-plane switching (IPS) panel for superior viewing angle and grayscale reproduction

Footswitch

- Three pedals
- Allows freeze, acquire, and print functions

ECG and physio

- One three-lead ECG input
- Selectable ECG triggered skipping between 1 and 20 beats

Localization options

Software

English, French, German, Italian, Japanese, Portuguese, Russian, Spanish, and Simplified Chinese

Training and user documentation

Chinese (Simplified and Traditional), Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Norwegian, Polish, Portuguese, Romanian, Russian, Slovak, Spanish, Swedish, and Turkish

Online help

English, French, German, Italian, Japanese, Russian, Spanish, Portuguese, and Simplified Chinese

Power requirements

Power	450VA
Power consumed	300VA
Frequency	50 to 60 Hz
Voltage	100 to 240 VAC

Power cords

- Available for electrical standards worldwide

Electrical safety standards

- CSA C22.2 No. 601.1
- IEC 60601-1
- UL 60601-1
- EN 60601-1

Environmental

Temperature	
System	10-40° C at 15-80% relative humidity (non-condensing)
Printer	10-40° C at 15-80% relative humidity (non-condensing)
Heat dissipation	<700 BTUs/hour (fully loaded)

8. Philips services

Maintenance

- Proven reliable platform
- Optional service agreements to:
  - Contain risk
  - Maximize uptime
  - Access Philips best-in-class service

Service

- Clinical applications support available
- Philips Remote Services connectivity* allows for many advanced service features, including:
  - Virtual on-site visits for both clinical and technical support in order to provide faster resolution to issues and questions
  - Remote clinical education
  - Remote log file transfer minimizes downtime by allowing faster diagnosis of problems by call center personnel
- On-line support request
  - Simplifies support engagement
  - Provides faster response to clinical questions and technical issues
  - User can enter request directly on the ultrasound system
- Proactive Monitoring
  - Helps prevent unscheduled downtime
  - Monitors key system parameters
  - Sends an alert to Philips call center so action can be taken before system operation is affected
- Optional Utilization Reports provide data to help manage the site's ultrasound assets
  - System and transducer usage information
  - Data on number and types of studies, as well as study duration
  - Provides data for staff credentials and accreditation
  - Helps identify opportunities for outreach and referral communications

Lightweight and small in size, the ClearVue 550 is easy to maneuver and is a perfect fit in small spaces.

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