



Ultrasound for demanding applications

Philips HD9 ultrasound system specifications

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1 Introduction

Welcome to the world of Philips ultrasound – where simplicity and sophistication meet.

Philips HD9 ultrasound system combines outstanding image quality with exceptional workflow features and high reliability to meet the needs of busy practices. With the advanced capabilities to address a variety of applications, the HD9 is a versatile system whose focus on simplicity decreases the new system learning curve, while sophisticated features bring advanced functionality.

By design, the HD9 is configurable to meet your unique needs. Please refer to these specifications for system capabilities and contact your Philips account representative for a consultation on what configuration will best suite your practice.

Key advantages

- Outstanding clinical performance to aid in achieving confident diagnosis
- Extremely versatile with easy-to-use 3D and 4D capability
- Designed for optimal workflow and reliability in today's busy practices



1.1 Applications

Abdominal
Breast
Cardiology
Critical Care
Emergency medicine
Gynecological
Musculoskeletal
Neonatal
Obstetrical
Pediatric
Regional anesthesia
Small parts and superficial
Transcranial Doppler
Urology
Vascular

1.2 Standard features

2D Imaging
3D Freehand Imaging
Tissue aberration correction
Anatomical M-Mode
Harmonic imaging
Trapezoidal imaging
Color Flow imaging
CPA imaging
Directional CPA imaging
PW Doppler
HPRF PW Doppler
High Q Doppler analysis
TDI imaging
Speckle noise reduction
Spatial compounding

1.3 Optional features

3D/4D imaging
Live iSlice imaging
Trimester optimized STIC
Cardiac option—including CW Doppler, ECG and cardiac analysis

2 System overview

2.1 Architecture

- Digital broadband beamformer with dynamic focus, dynamic aperture and dynamic apodization
- Advanced high resolution A/D conversion
- 1,792 digitally processed channels
- 256 shades of gray, 8 bits
- True Color, 8 bits for each RGB component
- 2X Multi-line parallel processing
- Spatial compound imaging for linear transducers
- 170dB system dynamic range
- Speckle noise reduction provides advanced image processing

2.2 Imaging modes

2D

- One-button 2D and color flow optimization control
- Trapezoidal Imaging with linear transducers
- 2D iSCAN for automatic adjustment of imaging parameters
- Harmonic imaging with pulse inversion technology
- Philips High Definition write zoom
- Reconstructed read zoom
- Image orientation marker
- Cineloop review up to 5000 frames
- Up to 6 transmit focal zones
- Single, dual and quad image display capability with quad buffers
- Philips Chroma imaging with multiple maps

3D / 4D imaging

- 3D Freehand imaging available on all transducers
- Live iSlice imaging available on volume transducers
- Trimester optimized STIC imaging for the assessment of fetal hearts available on volume transducers
- Multiple 3D display formats available: MPR, 3D ROI, ROI 3D and Fixed 3D
- 3D manipulation and quantification tools include standard MPR viewing, iSlice viewing and analysis, VOCAL analysis for volume calculations, Volume CT and Oblique View for 3D data rendering, review, manipulation and quantification.

Color flow

- Color flow optimization control ensures quick adjustment of color Doppler characteristics
- Color Compare – simultaneously displays real-time color flow and grayscale images side-by-side
- Color Hold feature to enhance workflow
- Available on all imaging transducers
- Cineloop review in single, dual or quad formats
- 256 Color bins
- Trackball control region of interest: size and position
- Maps, filters, color sensitivity, line density, smoothing, gain and baseline optimized automatically by exam preset or is user selectable
- Velocity and Variance displays
- Color Power Angio
- Directional Color Power Angio

Tissue Doppler imaging

- Pulsed wave tissue Doppler spectral analysis of tissue motion
- Color Flow Tissue Doppler imaging for strain and strain rate assessment

Doppler

- Display annotation including Doppler mode, scale (velocity or frequency), pulse repetition frequency, wall filter setting, gain, acoustic output setting, sample volume size, angle correct
- Doppler iSCAN for one button adjustment of common Doppler parameters

Quality images for confident diagnosis

The HD9 provides the outstanding image quality for the Ob/Gyn office, as well as the versatility to meet the needs of all women's health applications.



- Adjustable frequency/velocity display ranges
- Normal invert display around horizontal zero baseline
- Selectable pre and post processing maps
- User adjustable Doppler format settings including 2D/Doppler side-by-side or top/bottom
- Doppler review for retrospective analysis of Doppler data

Pulsed Wave Doppler

- Available on all imaging transducers
- Adjustable sample volume size
- Duplex mode - displays tissue movement and blood flow in 2D and PW Doppler simultaneously
- Triplex mode - displays tissue movement and blood flow in 2D, Color/CPA and PW Doppler simultaneously

Continuous Wave Doppler

- Steerable through entire 2D sector
- Duplex mode - displays tissue movement and blood flow in 2D and PW Doppler simultaneously
- Triplex mode - displays tissue movement and blood flow in 2D, Color/CPA and PW Doppler simultaneously

High PRF Pulsed Doppler

- Available on cardiac sector transducers only

M-mode

- Available with all imaging transducers
- Selectable sweeping rates
- Chroma colorization with multiple color maps
- M-mode review for retrospective analysis of M-mode data
- User adjustable M-mode format settings including 2D/M-mode side-by-side or top/bottom
- Color M-mode in cardiac applications integrates color Doppler information in an M-mode sweep display

Anatomical M-mode

- Anatomical M-mode uses the 2D image as basis for M-mode analysis at a user defined line independent of the transducer orientation
- Facilitates the placement of the M-line perpendicular to the anatomy of interest even in abnormally shaped or positioned hearts

3 System controls

3.1 Optimization controls

- 2D OPT signal processing available in fundamental and harmonic imaging
 - User selectable setting improves tissue contrast resolution and textural perception on a wide variety of patient sizes
- Color and Doppler OPT signal processing is available in color flow and spectral Doppler imaging modes
 - User selectable setting improves color and Doppler sensitivity in a wide variety of flow states
- Tissue aberration correction
 - Compensates for speed of sound variations in tissue providing sharper images across a wide variety of patient types
- iSCAN one-touch intelligent optimization
 - In 2D, one button automatic adjustment of TGC and receiver gain to achieve optimal uniformity and brightness of tissues in most exams
 - In Doppler, one button automatic adjustment of spectral information to maximize the displayed Doppler information
- Speckle Noise Reduction (SNR) control decreases speckle artifacts for increased image clarity

3.2 Control panel and user interface

- Philips common user experience provides readily accessible and logically grouped primary controls
- Easy-to-learn graphical user interface
- Primary controls logically grouped according to enhance the clinical workflow experience
- Imaging mode keys with independent gain controls 2D, Color, PW, CW, CPA, M-mode
- 2D imaging controls: 2D Opt, iSCAN, Depth, Single, Dual and Quad Formats, Freeze, Zoom, Focus, TGC
- Doppler / Color imaging controls: Color Opt, PW/CW Opt, iScan, Steer, Angle, Scale, Baseline, Power, Volume, Simultaneous
- Context specific secondary controls including dynamically configured quick keys and on-screen menus: Persistence, Dynamic Range, Image Width, Power, Pre and Post Processing Map, ECG, Chroma, Color Compare, Color Hold
- 4D imaging mode keys: 3D/4D mode, Reference Slice, X, Y and Z axis rotary controls
- Quantification Keys: Caliper, Calc, Report, Erase, Trackball, Select, Update
- Examination Management controls: Patient, Transducer, Review, Text, Brief Text, Quick Text, Body Marker, Acquire, Print1, Print2,
- Option Keys - Two user-configurable option keys located on control panel with assignable functions: Fetal Biometry, Print 1, Print 2, Biopsy, TDI Color, Simultaneous, High Q, EFW Measurement, EFW Result or specific OB measurement (BPD, HC, AC, FL, APTD, TTD, FTA, GS, CRL)
- Exam Specific Presets
 - Transducer dependent exam specific presets optimized for maximum imaging performance based on clinical applications
 - Five user configurable exam presets per each exam type offers the user complete flexibility to configure the system settings according to personal preference
- Online Help key
- Conveniently located alphanumeric keyboard mounted on sliding drawer for easy accessibility during clinical examinations
- User selectable software languages including English, German, French, Spanish, Italian, Russian, Portuguese (Brazilian), Simplified Chinese
- Trackball with Select, Enter and Update keys for easy navigation
- Integrated stereo speakers



Control at your fingertips

Relevant controls at your fingertips help make workflow simple and streamlined for all users, particularly those new to 3D/4D imaging.

4 Workflow

Designed for today's busy practices, the HD9 combines ergonomic features with practical workflow capabilities for exam and department efficiencies.

4.1 Display annotation

- On-screen display of pertinent imaging parameters for complete examination documentation including transducer type, imaging preset, clinical option, depth, frame rate, dynamic range, image gain, acoustic power setting, color map, TGC curve, color gain, Doppler gain, patient demographic data and institution name.
- Patient demographic data may be turned off when generating images used for publication or presentation
- Thumbnail display of images associated with active examination
- 2D Opt settings displayed for easy user reference
- Icon display of Speckle Noise Reduction (SNR), Spatial compounding,
- Real-time display of Mechanical Index (MI)
- Real-time display of Thermal Index (TIb, Tic TIs)
- Quick text - facilitates text annotation at any point during an examination
- Brief Text – allows the user to automatically place system-defined and user-defined text phrases
- Text – places, moves, erases, modifies and appends predefined text labels, typed text and arrows.
- Body markers – displays body-part icon appropriate for the active clinical option and indicates the relative transducer position.
- Dual and quad format orientation marker to indicate active buffer window

4.2 Image presentation

- Single, dual and quad image presentation formats
- 2D/Scrolling formats – up/down, left right
- Depth to 30 cm (exam and transducer dependent)
- Multiple 3D and 4D display types
- User configurable post processing controls to optimize images according to personal preference

4.3 Exam management features

Internal storage

- Internal 90 GB hard drive for patient data
- Comprehensive patient database including images, patient data and measurement data
- Internal storage of single and multi-frame images
- Internal data storage in native image format to facilitate review, measurement and manipulation of images recalled from disk
- Relevant 2D post processing parameters available during review include gain, speckle noise reduction, post processing maps and all measurements and calculations
- Reconstruction and processing of 3D data sets recalled from storage include sculpt, chroma, render settings, available 2D and 3D display formats and other 3D manipulation tools.
- Backup and restore tools to protect valuable patient examination data including image data, measurement data and reports.

Data export

- Export image files to PC formats including BMP, JPG (Lossy), TIF, DICOM, AVI
- Serial open line transfer of measurement data in various data formats
- Examination report printing to supported printers directly from the system
- Patient demographic data may be hidden when generating images used for publication or presentation

4.4 Connectivity

- CD/DVD drive and two USB ports located above control panel facilitates study management
- Two USB and one Ethernet port located on back panel for network and external printer connection
- Supports multiple DICOM servers and printers
- Includes DICOM Store, print, storage commitment, directory service export, verification, modality worklist, performed procedure step, and OB structured report
- Refer to the DICOM Conformance Statement for specific information regarding DICOM functionality

5 Transducers



5.1 Transducer selection

- Electronic switching of up to four transducers
- Multiple user-selectable transmit focal zones; continuous dynamic receive focusing
- Biopsy guides available for most transducers

C9-4ec broadband curved array

- 9 to 4 MHz extended operating frequency range
- 10 mm radius of curvature, 150.3 degree field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Biopsy kit available

C8-5 broadband curved array

- 8 to 5 MHz extended operating frequency range
- 90° field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Biopsy kit available

C8-4v broadband curved array

- 8 to 4 MHz extended operating frequency range
- End-fire sector, 11 mm radius of curvature, 135° field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Biopsy kit available

C6-3 broadband curved array

- 6 to 3 MHz extended operating frequency range
- 50 mm curvature of radius
- 72° field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler

C5-2 broadband curved array

- 5 to 2 MHz extended operating frequency range
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Multi-angle biopsy kit available



The HD9 ultrasound system offers a full complement of transducer options that extend capabilities to meet a wide range of imaging needs.

V7-3

- 7 to 3 MHz extended operating frequency range
- 84° field of view
- Supports 2D, 3D and 4D imaging including Color Flow, PW Doppler, M-mode and CPA
- Biopsy kit available

V9-4v

- 9 to 4 MHz extended operating frequency range
- 150° field of view
- Supports 2D, 3D and 4D imaging including Color Flow, PW Doppler, M-mode and CPA
- Biopsy kit available

L12-5 50 mm broadband linear

- 12 to 5 MHz extended operating frequency range
- 50 mm field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Trapezoidal imaging
- Biopsy kit available

L9-3 broadband linear array

- 9 to 3 MHz extended operating frequency range
- 46 mm field of view
- Supports 2D, freehand 3D, M-mode, Color Flow, CPA, and PW Doppler
- Trapezoidal imaging

S4-2 broadband sector

- 4 to 2 MHz extended operating frequency range
- Supports 2D, Color Flow, PW and CW Doppler, Tissue Harmonic Imaging, Color Power Angio imaging







D2cwc CW transducer (Pedoff)







- Dedicated 2 MHz continuous wave Doppler

D5cwc CW transducer (Pedoff)

- Dedicated 5 MHz continuous wave Doppler

5.2 Transducer application guide

Transducers						
Transducer	C9-4ec	C8-5	C8-4v	C6-3	C5-2	V7-3
Type of Array	2D Convex	2D Convex	2D Convex	2D Convex	2D Convex	3D Convex
Application						
Abdomen		●		●	●	●
Gynecology	●		●	●	●	●
Obstetrics	●	●	●	●	●	●
Urology	●					
Cardiac						
Vascular		●				
TCD						
Small parts						
Pediatric/Neonatal		●		●		
Musculoskeletal						

					
V9-4v	L12-5 50 mm	L9-3	S4-2	D2cwc	D5cwc
3D Convex	2D Linear	2D Linear	2D Phased	Doppler	Doppler
			●		
●			●		
●	●	●	●		
●			●		
			●	●	●
	●	●			●
			●		
	●	●			
	●	●	●		
	●	●			

6 Measurements and analysis

6.1 Measurement tools

- 2D distance with line trace, angle, percent stenosis diameter
- 2D area (ellipse or trace) with circumference, percent stenosis area
- 2D volume with 3 distance volume, 1 distance volume, distance and ellipse, ellipse, method of disks
- Doppler with Doppler velocity, Doppler A/B, Doppler trace (manual, limited and auto), Doppler resistive index, Doppler pulsatility index, Doppler gradient
- M-mode with distance, time, slope

6.2 High Q automatic Doppler analysis

- Peak systolic velocity
- End diastolic velocity
- Time averaged peak velocity
- Resistive index
- Pulsatility index
- Systole/Diastole ratio
- Time averaged mean velocity

6.3 Clinical option analysis packages

Obstetrics	Fetal biometry – GS, CRL, YS, BPD, HC, OFD, APD, TAD, AC, FTA, FL, SL, APTD, TTD, ThC
	Fetal long bones – humerus, ulna, tibia, radius, fibula, clavicle, vertebral
	Other fetal – foot, ear, middle phalanx, renal, pelvis
	Fetal cranium - cerebellum, cisterna magna, nuchal fold, nuchal translucency, outer ocular diameter, internal ocular diameter, nasal bone, lateral ventricles, hemispheric width
	Amniotic fluid index
	Cardiac/Thoracic area ratio
	Umbilical artery
	MCA
	Uterine artery
	Placental artery
	Fetal carotids
	Fetal aorta
	Ductus venosus
	Volume flow
	PLI
	Umbilical artery
	MCA
	Fetal heart rate by M-mode and Doppler

Gynecology	Measurements include: volume, length, height, width
	Uterus – also includes endometrial thickness, cervix volume, cervix length, cervix height, cervix width, Doppler velocity and trace
	Cyst
	Ovary –also includes Doppler velocity, Doppler trace
	Follicle
	Mass
	Endometrial Polyp
	Ovarian Mass
	Uterine Tumor
	Cervical Tumor
Radiology	Ectopic –also includes Doppler velocity, Doppler trace, fetal heart rate
	General
	Celiac artery
	Splenic artery
	Hepatic artery
	SMA
	IMA
	IVC
	Renal artery
	Arcuate artery
Measurements include: vessel area, vessel distance, percent stenosis area, percent stenosis distance, PSV, EDV, Doppler velocity, Doppler trace	

Vascular carotid	Common carotid artery
	Carotid bulb
	Internal carotid artery
	External carotid artery
	Subclavian artery
	Vertebral artery
	Measurements include: IMT, vessel area, vessel distance, percent stenosis area, percent stenosis distance, PSV, EDV, Doppler velocity, Doppler trace
	Volume flow
	Heart rate
Vascular upper extremity arterial	Subclavian artery
	Axillary artery
	Brachial artery
	Radial artery
	Ulnar artery
	Superior palmar arch
	Metatarsal artery
	Digital artery
	Measurements include: IMT, vessel area, vessel distance, percent stenosis area, percent stenosis distance, PSV, EDV, Doppler velocity, Doppler trace
	Heart rate
Vascular lower extremity arterial	Circumflex iliac artery
	Internal iliac artery
	External iliac artery
	Common femoral artery
	Superficial femoral artery
	Deep femoral artery
	Popliteal artery
	Anterior tibial artery
	Posterior tibial artery
	Peroneal artery
	Dorsalis pedis artery
	Medial plantar artery
	Lateral plantar artery
	Metatarsal artery

	Digital artery
	Measurements include: IMT, vessel area, vessel distance, percent stenosis area, percent stenosis distance, PSV, EDV, Doppler velocity, Doppler trace
	Volume flow
	Heart rate
Vascular lower extremity venous	Femoral vein
	Greater saphenous vein
	Popliteal vein
	Small saphenous vein
	Medial plantar vein
	Lateral plantar vein
	Metatarsal vein
	Digital vein
	Measurements include: vessel distance, Doppler velocity, Doppler trace, time
Urology	Bladder volume
	Prostate volume
	Transition zone volume
	Renal volume
Cardiology	Left ventricle – 2D and M-mode
	Left ventricular volumes – Simpson, area length, bullet
	Right Ventricle – 2D and M-mode
	Left atrium
	Right atrium
	Valves – 2D and M-mode, Doppler
	LV Mass – 2D and M-mode
	PISA
	Qp:Qs
	Tei index

7 Physical specifications

Power requirements	Power	800VA
	Frequency	50 to 60 Hz
	Voltage	100V to 240V AC
	Power cords available for electrical standards worldwide	
Physical dimensions	Depth	35.4 in/88.5 cm
	Width	20.4 in/51 cm
	Height	51 in/127.8 cm
	Ground clearance	4.5 in/11.4 cm
	Wheel base	23.5 in/59.6 cm
	Wheels	4.9 in/12.4 cm
	Weight	222 lb/101 kg

Monitor

- 17" high resolution TFT LCD display
- Articulating arm providing up/down and left/right adjustments up to 360 degrees swivel
- Monitor swivel up/down and left/right adjustment

Cart

- Control panel providing left/right swivel adjustment
- 4 swivel casters, front caster steering and brake locks.

Footswitch

- Two pedal, user-configurable footswitch allows Acquire, Freeze, Update, Record, Print, Volume Start
- Two user-configurable control panel option keys

Physio

- One three-lead ECG input (range 20 bpm - 240 bpm)
- 6 pin AAMI standard connector
- User configurable ECG triggering (Trig1 and Trig2)

Exam documentation

Peripherals

- NTSC VCR
- PAL VCR
- Digital video recorder
- Digital black and white video printer
- Uninterruptible power supply (US and Canada only)
- System supports a range of plain paper printers
- System supports up to two cart mounted peripheral devices

Input/output ports

- DVI video
- Composite Color video
- S-video
- Audio output
- Microphone input
- Print trigger
- Printer video
- Footswitch
- Ethernet (10/100/1000 Mb/s)
- USB 2.0
- Serial port to support data transfer

Electrical safety standards

- CSA 22.2 No. 601.1
- IEC 60601-1
- UL 60601-1
- EN 60601-1

Environmental

- Operating temperature: 0° - 40° C at 15% - 95% relative humidity
- Storage temperature (non-operating): -34° - +65° C

Maintenance and serviceability

Remote services network connectivity with standard internet connection

Localization options

	Software	Training and User Documentation	Online help	Acoustic output tables
English	●	●	●	●
German	●	●	●	●
French	●	●	●	●
Spanish	●	●	●	●
Italian	●	●	●	●
Russian	●	●	●	
Portuguese		●		
Portuguese (Brazilian)	●		●	
Simplified Chinese	●	●	●	
Traditional Chinese		●		
Czech		●		
Danish		●		
Finnish		●		
Greek		●		
Hungarian		●		
Japanese		●		●
Dutch		●		
Norwegian		●		
Polish		●		
Romanian		●		
Swedish		●		
Turkish		●		

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