M9

Color Doppler Ultrasound System

Datasheet

Release 1.0

mindray

healthcare within reach

1 System Overview

1.1 Application

- Abdomen
- Cardiology
- Vascular
- Obstetrics
- Gynecology
- Small parts
- Urology
- Breast
- Pediatrics
- Nerve
- Critical Care
- Emergency Medicine

1.2 Transducer types

- Curved array
- Linear array
- Phased array
- Pencil

1.3 Imaging modes

- B-Mode
- THI and PSH™ (Phase Shift Harmonic Imaging)
- M-Mode/Color M-mode
- Free Xros M™ (Anatomical M-mode)
- Free Xros CM™ (Curved Anatomical M-mode)
- Color Doppler Imaging
- Power Doppler Imaging/Directional PDI
- Pulsed Wave Doppler
- Continuous Wave Doppler
- TDI
- UWN⁺ (Ultra-Wideband Non-linear Plus) Contrast Imaging™
- Tissue Tracking QA
- Stress Echo
- Elastography
- iScape™ View (Panoramic Imaging)

1.4 Standard features

- B-Mode
- THI and PSH™
- M-Mode
- Color Doppler Imaging
- Power Doppler Imaging and Directional PDI
- Pulsed Wave Doppler
- iBeam™ (Spatial Compound Imaging)
- iClear™ (Speckle Suppression Imaging)
- iTouch™ (Auto Image Optimization)
- Echo Boost™
- Zoom/iZoom (Full Screen Zoom)
- FCI (Frequency Compound Imaging)
- B steer
- ExFOV (Extended Field of View)
- HDR Flow (High Dynamic Range Flow)
- HR Flow™ (High Resolution Flow)
- Raw data processing
- 1 active probe port
- 128GB solid hard drive
- 2-USB
- HDMI
- Internal WIFI
- UltraAssist (Off-line software)
  - iStorage
- Built-in Battery
- Power adapter
- Control panel film with language

1.5 Optional features

- Continuous Wave Doppler
- Free Xros M™
- Free Xros CM™
- iScape™ View
- UWN⁺ Contrast Imaging™
- Contrast Imaging QA (Quantitative Analysis)IMT
- Elastography
- TDI (Include TVI, TVD, TVM, TEI)
- TDI QA (TDI Quantitative Analysis)
- TT QA (Tissue Tracking Quantitative Analysis)
- LVO(Left Ventricular Opacification)
- Stress Echo
- DICOM

- Clinical Measurement Package
- Smart OB™ (Auto OB measurement)
- Smart NT™ (Auto NT measurement)
- iWorks™ (Auto Workflow Protocol)
- iNeedle™ (Needle Visualization Enhancement)
- Moble Trolley: UMT-500, UMT-500Plus
- Audo/Video extend module: iDock51
- ECG function
- Barcode reader: DS6707-SR (2D Barcode), SYMBOL LS2208-SR (1D Barcode)
- Footswitch: 1-pedal/2-pedal/3-pedal
- External DVD R/W driver

1.6 Language support

- Software: English, Chinese, German, Spanish, French, Italian, Portuguese, Russian, Czech, Polish, Turkish, Norwegian, Serbian
- Keyboard input: English, Chinese, German, Spanish, French, Italian, Portuguese, Russian, Czech, Polish Icelandic, Norwegian, Swedish, Finnish, Turkish, Danish, Hungarian, Serbian
- Control panel overlay: Chinese, Italian, Portuguese, Spanish, German, Russian, French, Czech, Polish
- User manual: English, Chinese, German, Spanish, French, Italian, Portuguese, Russian

2 Physical Specification

2.1 Dimension and weight

- Width: 390mm
- Depth: 362mm
- Height: 59mm
- Weight: approx. 5.8kg (with batteries), 5kg (no accessories or batteries)

2.2 Monitor

- 15.6-inch high resolution color LED monitor
- Resolution: 1920×1080
- Automatic brightness adjustment
- Screen Saver
- Open angle adjustable: 0°-150° (The angle between the monitor and control panel)
- View angle (right/left): 89°

2.3 Handle

2.4 Probe port

- 1 port connect to a transducer or the probe extend module
- 1 pencil probe port

2.5 Electrical power

- AC adapter Input:
  - Voltage:100-240V~Frequency: 50/60 Hz
  - Power input: 2.0A max
- Battery: Lithium-Ion Battery Pack 14.8V ⎓ , 5800mAh (single battery)

2.6 Operating Environment

- Ambient temperature: 0-40 °C
- Relative humidity: 30%-85% (no condensation)
- Atmospheric pressure: 700hPa-1060hPa

2.7 Storage & Transportation Environment

- Ambient temperature: -20~55 °C
- Relative humidity: 20%-95% (no condensation)
- Atmospheric pressure: 700hPa-1060hPa

2.8 Alloy Enclosure

- Magnesium-alloy enclosure design

3 User Interface

3.1 Control panel

- Power/Battery Indicator
- Alphanumeric Keys
- Function Keys
- Ergonomic Soft Key Operation
- Backlit keys, ensuring accurate work in the dark room

- 8-segment TGC control
- Programmable keys, available for user-defined functions
- Trackball, speed adjustment
- Key Brightness adjustment
- Integrated speakers, audio volume adjustment

3.2 System boot-up

- Boot-up from complete shut-down in about 28 sec
- Boot-up from standby mode in about 7 sec
- Shut down in about 12 sec

3.3 Comments

- Supports text input and arrow
- Adjustable text size and arrow size and direction
- Supports home position
- Covers various application
- More than 800 comments items for versatile application
- User customizable

3.4 Bodymark

- More than 140 bodymarks for versatile application
- User customizable

3.5 Screen information* (presettable)

- Common info:
  - Mindray logo
  - Hospital name
  - Exam date
  - Exam time
  - Acoustic power
  - Mechanical index
  - Tissue thermal index
  - ID, Last name, First Name, Middle initial, Gender, Age
  - Probe model
  - ECG icon (when ECG connected)
  - Operator
  - TGC Curve
  - Focus position
  - Thumbnail
  - Imaging parameters
  - Help guidance
  - Dynamic Trackball indices

*Not all items are listed in this part, detail info please refer to user manual.

4 Imaging Parameters

4.1 Overview

- Digital beamformer
- Up to 82,944 channels
- 12-beam forming

4.2 B-mode

- Display formats: Single(B), Dual(B+B), Quad(4B)
- iClear™: Off; On, 1-7 steps
- iBeam™: Off; On, 1-3
- iTouch™: Auto optimization (TGC, Gain)
- Image quality: Pen/Gen/Res (depend on probe)
- B steer: available on linear transducers
- ExFOV: extended FOV available on convex and linear transducers
- Depth: 1.5-40cm (depend on transducer)
- Frame rate (max): 1000f/s
- Acoustic output power: 3.2%-100%
- TGC: 8 pods on control panel
- LGC: 4 segments on soft menu (4 levels of preset values)
- Dynamic range: 30-200, 5/step
- Gain: 0-100, 1/step
- Focus number: 1-4, adjustable
- Focus position: Max. 16, adjustable
- FOV (Field of View): on/off
- Line density: L/M/H/UH
- Persistence: 0-7, 8 steps
- Horizontal Scale: on/off
- L/R flip: Right/Left
- U/D flip: Up/Down
- Rotation: 0°, 90°, 180°, 270°
- TSI (Tissue Specific Imaging): general/muscle/fluid/fat

- Gray Map: 8 types
- Tint: on/off
- Tint map: off; 8 types
- Auto Merge: on/off

4.3 THI and PSH

- Available on all types of transducer(except CW2s and CW5s)
- Patent PSH™ technology, obtains purer harmonic, better contrast resolution, higher SNR, exceptional high frequency harmonic
- iClear™ available
- Image quality: HPen/HGen/HRes or HPen/ HPen-Gen/HGen/HRes (depends on probe)

4.4 M-mode

- Display formats: V2:3, V3:2, H2:3, V3:1,Full (V: vertical, H: horizontal, L: left, R: right)
- Color M-mode available (convex and phased probe only)
- Acoustic output power: 3.2%-100%
- Dynamic range: 30-180, 5/step
- Gain: 0-100, 1/step
- Speed: 6 levels
- M soften: 0-4, 5 steps
- Tint: on/off
- Tint map: off; 8 types
- Gray Map: 8 types
- Edge enhance: 0-3

4.5 Free Xros M (option)

- Display formats: V2:3, V3:2, H2:3, V3:1 (V: vertical, H: horizontal, L: left, R: right)
- Color Free Xros M available
- Up to 3 lines
- Speed: 6 levels
- Tint: on/off
- Tint map: off; 8 types
- Gray Map: 8 types

4.6 Free Xros CM (option)

- Only available on TDI
- Display formats: V2:3, V3:2, H2:3, V3:1, (V: vertical, H: horizontal, L: left, R: right)
- Acoustic output power: 3.2%-100%
- Gain: 0-100, 1/step
- Speed: 6 levels
- Tint: on/off
- Tint map: off; 8 types
- Gray Map: 8 types

4.7 Color Doppler Imaging

- Dual live: on/off
- HR Flow™: High Resolution Flow provides better image quality and flow sensitivity
- Image quality: Pen/Gen/Res
- Max velocity: 239cm/s
- Steer: max. 30 degrees (linear transducer)
- Max frame rate: 293f/s
- Acoustic output power: 3.2%-100%
- Gain: 0-100, 2/step
- ROI size/position: adjustable
- Scale: 30 levels
- Wall filter: 0-7, 8 steps
- PRF: max. 15.5kHz, min.0.1kHz
- Packet size: 0-3, 4 steps
- Flow state: L/M/H, 3 steps
- Smooth: 0-6, 7 steps
- B/C Align: on/off
- Priority: 0%-100%, 1%/step
- Color map: V0-V10, VV0-VV9, 21 types (Variance)
- Invert: on/off
- Persistence: 0-6, 7 steps
- Velocity tag: on/off
- Line density: L/M/H/UH, 4 steps

4.8 Power Doppler Imaging

- Dual live: on/off
- HR Flow™: High Resolution Flow provides better image quality and sensitivity
- Support directional power doppler
- Image quality: Pen/Gen/Res
- Acoustic output power: 3.2%-100%
- Dynamic range: 10-70, 5/step
- Gain: 0-100, 2/step

- ROI size/position: adjustable
- Steer: max. 30 degrees (linear transducers)
- Scale: 30 steps
- Wall filter: 0-7, 8 steps
- PRF: max. 15.5kHz, min.0.1kHz
- Packet size: 0-3, 4 steps
- Flow state: L/M/H
- Smooth: 0-6, 7 steps
- B/C align: on/off
- Priority: 0%-100%, 1%/step
- Color map: 4 types
- Directional color map: 4 types
- Persistence: 7 steps
- Line density: L/M/H/UH

4.9 PW/CW-Mode

- Display formats: V2:3, V3:2, H2:3, V3:1, Full (V: vertical, H: horizontal, L: Left)
- iTouch™: on/off, auto optimization (Baseline, PRF)
- Image quality: Pen, Gen, Res
- PW velocity: max. 921cm/s
- CW velocity: max. 3841cm/s
- Sample volume size: 0.5-20mm (PW only), 0.5-5mm/step
- Sample gate depth: adjustable
- Scale: max. 3841cm/s
- Baseline: -4~4, 9 steps
- PW Steer: max. 30 degrees (linear transducer)
- Volume: 0%-100%, 2%/step
- PW PRF: max. 24kHz, min. 0.7kHz
- CW PRF: max. 100kHz, min. 0.7kHz
- Gain: 0-100, 2/step
- Dynamic range: 24-72, 2/step
- Sweep speed: 6 levels
- Wall filter: 0-6, 7 steps
- Invert: on/off
- Auto invert: on/off
- Angle: -89°~89°, 1/step
- Quick angle: 0°, -60°, 60°
- Tint: on/off
- Tint map: off, 8 types
- HPRF: on/off
- Time/frequency resolution: 0-4, 5 steps
- Auto calc: on/off
- Auto calc cycle: 1-5, 1/step
- Trace area: above, below, all
- Trace Sensitive: 0-5, 6 steps
- Trace Smooth: 0-4, 5 steps
- Duplex/Triplex: on/off (both supporting PW & CW duplex/triplex)

4.10 Tissue Velocity/Energy Imaging (included in TDI option)

- Available on phased array transducer
- Dual live: side by side displays B and B+TVI
- Max frame rate: 1553f/s
- PRF: max. 15.2kHz, min. 0.3kHz
- Acoustic output power: 3.2%-100%
- Gain: 0-100, 2/step
- Dynamic range: 10-70, 5/step (TEI only)
- ROI size/position: adjustable
- Scale: max. 30 steps, 5.0-150cm/s
- Baseline: -8~8, 17 steps (TVI only)
- Wall filter: 0-7, 8 steps
- Packet size: 0-3, 4 steps
- Flow state: L/M/H, 3 steps
- Smooth: 0-6, 7 steps
- B/C Align: on/off
- Priority: 0%-100%, 1%/step
- Map: 10 types
- Invert: on/off (TVI only)
- Persistence: 0-6, 7 steps
- Line density: L/M/H/UH, 4 steps

4.11 Tissue Velocity Doppler(included in TDI option)

- Available on phased array transducer
- Display formats: V2:3, V3:2, H2:3, V3:1, Full (V: vertical, H: horizontal, L: left, R: right)
- Sample volume size: 0.5-20mm , 12 steps

- Sample gate depth: adjustable
- Scale: max. 368.75 cm/s
- Baseline: -4~4, 9 steps
- Volume: 0%-100%, 2%/step
- PRF: max. 24.0kHz, min. 0.7kHz
- Gain: 0-100, 2/step
- Dynamic range: 24-72, 2/step
- Speed: 6 levels
- Wall filter: 0-6, 7 steps
- Invert: on/off
- Angle correction: -89°~89°, 1/step
- Quick angle: 0°, -60°, 60°
- Gray map: 10types
- Tint: on/off
- Tint map: Off; 8 types
- Time/frequency resolution: 0-4, 5 steps

4.12 Tissue Velocity Motion (included in TDI option)

- Display formats: V2:3, V3:2, V 3:1, H2:3, FULL (V: vertical, H: horizontal)
- Acoustic output power: 3.2%-100%
- Gain: 0-100, 2/step
- M sweep speeds: 6 steps
- M soften: 5 steps
- Gray Map: 8 types
- Edge enhancement: 4 steps

4.13 iScape™ View (option)

- Panoramic imaging
- Available on all transducers
- Acquisition method: B mode and Power mode
- Imaging length: 100cm
- Tint map: off; 8 types
- Rotation: 0°~355°

4.14 Zoom

- iZoom™
  - Full screen zoom
  - Normal image, Zoom standard area, Zoom image area, 3 steps
- Spot zoom (write zoom) 0.8-10x
- Pan zoom (read zoom) 0.8-10x

4.15 Elastography (option)

- Available on all linear transducers
- Support strain ratio measurement
- Unique shell analysis function
- Stress compensation technology reduces deeper tissue artifacts, obtains more uniform stress throughout whole field
- Stress indicator: supports frame by frame stress indication
- Display format: Dual live, Single E
- Elasto Map: 6 types
- Smooth: 6 steps
- Invert: on/off
- Opacity: 6 steps

4.16 UWN+ Contrast Imaging™* (option)

- Ultra Wideband Non-linear Plus contrast imaging technology, which provides exceptional contrast agent detecting capability, not only extracts second harmonic, but also non-linear fundamental signals
- Supports Low MI contrast imaging
- Micro Flow Enhancement (MFE) available
- Available for C5-1s
- Available for Abdomen, Ped-ABD, ABC-Difficult
- Timer1: on/off
- Timer2: on/off
- Pro capture: captures prospective image less than 480s
- Retro capture: captures retrospective image less than 120s
- Dual live: side by side displays tissue image and contrast image
- MFE: on/off
- Destruct: instantly destroy contrast bubbles
- iClear: off; 7 steps
- Mix: mix contrast image with tissue image
- Mix map: 7 types, available when Mix mode is active
- Persistence: 8 steps
- MFE period: 0.1s, 0.2s, 0.4s, 0.6s, 0.8s,

1.0s, MAX

- Dynamic range: 30-180, 5/step
- Gray map: 8 types; inactive when Mix mode is in use
- Tint map: off; 10 types
- Supports U/D Flip and L/R Flip
- Rotation: 90 degrees/step
- HImgPos: transpose position of contrast and tissue image
- Line density: L/M/H/UH
- DestructAP: -43.4~0 dB
- Destruct time: 500-2000 ms

*The M9 is designed for compatibility with commercially available ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast related product features are enabled only on systems for delivery to an authorized country or region of use. Mindray medical systems makes no claims concerning the safety or effectiveness of contrast agents.

4.17 Stress Echo(option)

- Available on cardiac sector transducers
- 14 factory protocols
- User-defined protocols
- ECG triggered acquisition, display, selection, comparison, evaluation and archiving of multiple cardiac loops during various stages of a stress echo examination
- ASE 16 (with score 4-7), ASE 17 (with score 4-7)
- Customized stages: up to 6 views per stage, and up to 12 stages per study
- View: standard views (PSLA, PSAX, A4C, A2C), and customized views
- Image acquisition
  - R-wave trigger
  - Acquire mode: Manual ROI or full screen
  - Ability to acquire frames or clips in B-mode, LVO
- Image selection
  - Attach the images with view annotation label (PSLA, PSAX, A4C, A2C, and customized views)
- Review
  - Automatically adjust to the number of images user defined
- Wall Motion Scoring
  - ASE 16 (with score 4-7), or ASE 17 (with score 4-7)
  - Graphical display of scoring (Normal, Hyperkinetic, Severely Hyperkinetic, Akinetic, Dyskinetic)
- LV volume measurement
  - Measurement of LV Volume in all phases of cardiac cycle
- Report
  - Reporting for both Wall Motion Scoring and LV volume measurement

4.18 LVO(option)

- Available on SP5-1s
- Dedicated left ventricle contrast imaging tool

4.19 iBeam™

- Spatial compound imaging
- 9 angles maximum
- Available on all convex and linear transducers

4.20 iTouch™

- Auto image optimization
- B-mode: gain, TGC
- Color: gain
- Power: gain
- PW: gain, scale, PRF, WF

- Contrast imaging: gain

4.21 Echo Boost™
- Only for cardiac exams
- Improve the homogeneity of cardiac images through the whole field of view
- Better contrast resolution of myocardium tissue layers
- Better noise control in cardiac chambers and muscles

4.22 B steer
- Only for linear transducers

4.23 ExFov
- Extended field of view
- Available for all convex and linear transducers

4.24 Zoom
- Zoom: Spot zoom (write zoom) up to 10x, Pan zoom (read zoom) 0.8x-10x
- iZoom: convertible 3 steps ;normal image, zoom standard area, zoom only image area

4.25 QSave
- Quick save image parameter setting after image adjustment done
- Support Save, Save as, Restore

4.26 TDI QA (option)
- Dedicated quantification tool for TDI velocity, strain, strain rate analysis
- Ellipse ROI, Standard ROI
- Up to 8 of ROI
- Delete all
- Delete current
- ROI tracking: tracking ROI along with cardiac movement
- Smooth: 1-7, 1/step
- X scale: 1-5,1/step
- Std.Height: 1.5-50 mm
- Std.Width: 1.5-50 mm
- Std.Angle: -89-90 degrees
- Export: export current data as CSV format file

4.27 TT QA (option)
- Tissue tracking quantitative analysis
- Mandatory ECG connection before TT QA cine acquisition
- Six views for analysis: ALAX, A4C, A2C, PSAXB, PSAXM, PSAXAP
- Reload: reload cine again for new study
- Edit: modify trace points
- Start tracking
- Accept & compute: start tracking myocardium movement when user accept trace result
- Display effect: 0/1; at 0, tracking in velocity vector arrow; at 1, tracking in dots
- Trace method: 3 point or manual for ALAX, A4C, A2C; manual for PSAXB, PSAXM, PSAXAP
- Bull's eye: trace result in bull's eye model
- LGC: available
- Valve's open and close time index: MVC, MVC', AVC, AVO, MVO
- Data export: export data in CSV file
- Cycle: ECG triggered cardiac cycle recognition for analysis; cycle from 1-10, 1/step
- Auto play: stop, X1/10, X1/5, X1/4, X1/3, X1/2, X1, X2, X3
- Thickness: 1-30mm, 1mm/step; adjust trace thickness
- Track point: 20-40, 1/step
- Parameter: Volume, Speed, Displacement, L Strain, L Strain R, T Strain, T Strain R, Area, R Strain, R Strain R, C Strain, C Strain R
- Smooth: 0-4, 1/step

4.28 Contrast Imaging QA (option)
- Support Time-Intensity Curve analysis
- Table display: display data in table
- Freehand ROI: manually deploy ROI on the cine
- Up to 8 ROIs
- Delete all

- Delete current
- Fit curve
- Raw curve
- Motion tracking: Reduce the effect of tissue movement
- XScale: 5 steps

4.29 iNeedle™ (option)

- Needle visualization enhancement
- Best angle indicator
- Available on all linear transducers
- Needle steer: -50, -40, -30, -20, 20, 30, 40, 50 degrees

5 Cine Review and Post Processing

5.1 Cine review

- Available in all modes
- Frame by frame manual cineloop review or auto playback with variable speed
- Independent cine review in 2D Dual and Quad mode one by one
- Maximum cine memory is up to 38037 frames or 335.8s (depend on the mode)
- Retrospective storage (1-120s, or 1-120 cycles, pre-settable) and prospective storage (1-480s, or 1-390cycles, pre-settable)
- Frame compare: compare different frames for one cine in dual format
- Cine compare: compare two or more than two cines in dual or quad format
- Jump to first and jump to last: one keystroke review the first or last frame
- Start point and end point: selectable

5.2 Raw data processing

- B-mode:
  iClear™
  Zoom
  TGC
  LGC
  HScale
  Dual live
  Auto merge
  iTouch brighness
  Gain
  Dynamic range
  Gray map
  Tint map
  Flip
  Rotation
- M-mode:
  Speed
  Dynamic range,
  Gain,
  Gray map,
  Tint map,
  Edge enhancement
- Color:
  Gain
  Invert
  Smooth
  Baseline
  Color map
  Priority
  Velocity tag
- PW:
  Baseline
  Wall filter
  Speed
  Angel correction
  Quick angel
  Invert
  Audio
  T/F Res
  Dynamic range
  Gray map
  Tint map

6 Measurement/Analysis and Report*

6.1 Generic measurements

- 2D-mode
  - Depth
  - Distance

- Area: Ellipse, Trace, Spline, Cross
- Trace Length
- Double Distance
- Parallel
- Volume :3-Distance, Ellipse, Ellipse + Distance)
- Length Ratio
- Area Ratio
- IMT
- B Histogram
- B Profile
- Volume Flow
- Color Velocity

• M-mode
- Distance
- Time
- Slope
- Heart Rate
- Velocity

• Doppler mode
- D Velocity
- Time
- Heart Rate
- Acceleration
- D Trace
- PS/ED
- Volume Flow

• Automatic Doppler Spectrum Analysis
- Heart cycle pre-settable (1, 2, 3, 4, 5)
- Automatic real-time and retrospective tracing
- User configurable display of items
- Support PI, RI, TAMAX, TAMEAN, Volume Flow calculations
- Appropriate factory setting according to applications

6.2 Clinical option measurement package

• Abdominal
- Liver
- Common Hepatic Duct
- Portal Vein Diameter
- Gall Bladder: Length, Height, Wall Thickness
- Common Bile Duct
- Pancreas: Head, Body, Tail, Duct
- Spleen
- Left/Right Kidney: Length, Width, Height, Volume, Cortical Thickness
- Left/Right Adrenal Gland: Length, Width, Height
- Abdominal Aorta Diameter
- Abdominal Aorta Bifurcate Diameter
- Iliac Diameter
- Bladder: Length, Width, Height, Volume, micturition volume
- Common Hepatic Artery
- Hepatic Artery
- Portal Vein, Main Portal Vein
- Hepatic Vein, Left Hepatic Vein, Middle Hepatic Vein, Right Hepatic Vein
- Splenic Artery
- Splenic Vein
- Left/Right Renal Artery, Main Renal Artery, Renal Artery Origin, Arcuate Artery, Segmental Artery, Interlobar Artery, Renal Vein
- Abdominal Aorta
- Celiac Axis
- Superior Mesenteric Artery
- Inferior Vena Cava
- Superior Mesenteric Vein

• Gynecology
- Cervix: Length, Width, Width
- Uterus: Length, Width, Height, Volume, Uterus body, Endometrium Thickness
- UT-L/CX-L
- Ovary: Length, Width, Height, Volume
- Follicle: Length, Width, Height, Average Diameter, Volume

• Obstetrics
- Early OB: GS, YS, CRL, BPD, FL, NT, Amniotic Fluid

- 2nd- 3rd Trimester: BPD, HC, OFD, FL, AC, AF, NF, PL Thickness, TAD, APAD, TCD, Cisterna Magna, HW, OOD, IOD, Orbit, HUM, Ulna, RAD, Tibia, FIB, CLAV, Vertebrae, MP, Foot, Ear, APTD, TTD, FTA, THD, HrtC, TC, Umb VD, F-Kidney, Mat Kidney, Cervix L(Trace available)
- Fetal Heart: LVIDd, LVIDs, LV Diam, LA Diam, RVIDd, RVIDs, RV Diam, RA Diam, IVSd, IVSs, IVS, LV Area, RV Area, RA Area, Ao Diam, MPA Diam, LVOT Diam, RVOT Diam,
- Gestational Age
- Fetal Growth
- Fetal Trend Graph
- Estimated Fetal Weight
- Multi-gestational Calculations
- Fetal Biophysical Profile
- User definable OB tables
- Z-score

• Cardiology
- LV Function: Teichholz, Cube, Gibson, Simpson Single-plane, Simpson Bi-plane, Modified Simpson, Bullet, S-P Ellipse, B-P Ellipse
- Auto LV: auto measurement in Simpson method
- LV Mass: Area-Length Method, Truncated-Ellipsoid Method, Cube Method
- Atrial Volume: LA Vol(A-L), LA Vol(Simpson), RA Vol(Simpson)
- LVIMP
- LV TEI, RV TEI
- Qp/Qs
- PISA MR, AR, TR, PR
- MVA(VTI), AVA(VTI)
- MV medial/lateral (TDI)

• Urology
- Prostate: Length, Width, Height, Volume
- PPSA, PSAD
- Ureter Diameter
- Bladder: Length, Width, Height, Volume, micturition volume
- Left/Right Kidney: Length, Width, Height, Volume, Cortical Thickness
- Left/Right Adrenal Gland: Length, Width, Height
- Left/Right Testis: Length, Width, Height
- Left/Right Seminal Vesicle: Length, Width, Height

• Vascular
- Carotid: CCA, ECA, ICA, Bulb, Vert A, Subclav A
- Upper Extremity Artery: Subclav A, Axill A, Brachial A, Radial A, Ulnar A, Innom A
- Upper Extremity Vein: Cephalic V, Basilic V, Ulnar V, Radial V
- Lower Extremity Artery: CFA, SFA, Pop A, TP Trunk A, Peroneal A, P.TIb A, A.Tib A, Dors. Ped A,
- Lower Extremity Vein: C.Iliac V, Ex.Iliac V, Femoral V, Saph V, Pop V, TP Trunk V, Sural V, Soleal V, Peroneal V, P.Tib V, A.Tib V
- TCD (Transcranial Doppler): ACA, MCA, PCA, Basilar, A Comb.A, P Comb.A, Vertebral A, Basilar A

• Small Parts
- Thyroid: Length, Height, Width, Volume
- Isthmus Height
- Testis: Length, Height, Width
- Mass: Length, Height, Width, Nip. Distance, Skin Distance
- Superior Thyroid Artery
- Inferior Thyroid Artery

• Orthopedics
- Hip
- d/D

6.3 Report

• Specific report template by application

- User-defined report template
- Editable value in report
- Images selectable
- Able to Export as PDF/RTF file

6.4 IMT

- Intima-Media Thickness Measurement
- Automatic detection of IMT when ROI is set
- Support CCA, ICA, ECA, Bulb IMT
- Near wall and far wall detection
- Angle selectable
- Support IMT growth curve

6.5 Smart OB™

- Auto measurement for OB, a special tool for easy OB scan, and greatly reduce time and increase productivity
- Support BPD, HC, OFD, FL, AC
- Better get GA before start auto AC
- Measurement result can be modified by user

6.6 Smart NT

- NT auto measurement
- Auto detection of NT inside ROI

6.7 iStorage (included in UltraAssist)

- Data transfer

6.8 iReport (embedded in M9)

- User-defined report template software

* Not all measurements are listed in this part; For more detailed information please refer to User Manual

7 Exam Storage and Management

7.1 Exam storage

- 128GB hard drive. More than 76GB internal hard drive reserved for patient data storage
- Capable of storage up to approximately 109875 single frames (FRM format)
- Storage area
  - Pre-settable: image area, standard area, full-screen
  - Image area: 1000*790
  - Standard area:1200*910
  - Full-screen: 1920*1080

7.2 Exam management

- iStation™ workstation dedicated for patient exam management
- Patient exam query/retrieve
- Support review of current and past exam
- New exam, Active exam, Continue exam functions, End exam are available
- Support measurements and calculations on archived exam and images
- Export image as BMP/JPG/TIFF/DCM/FRM format (FRM: system format)
- Export cine as DCM/AVI/CIN format (CIN: system format)
- Support backup/send to USB devices, DVD-RW media

7.3 iWorks™ (option)

- Auto workflow protocol
- Templates are user configurable
- Functions: pause, stop, replace, repeat, skip, insert single step, return and continue, steps in thumbnail, iNSert™ another template
- iWorks setup mode: B/Dual/B+Color/B+ PW/B+Color+PW/B+CW/B+Color+C W/ B+M
- iWorks setup annotation: support up to 2 annotations, location and font size are configurable
- iWorks setup bodymark: select existing library, and probe indicator is pre-settable
- iWorks setup measurement: select existing measurement library

- Template import and export are available

8 Connectivity

8.1 Ethernet Network Connection

- Wired connection
- Wireless connection: Wireless Ethernet adapter(option)

8.2 DICOM 3.0

- DICOM Basic (option)
  - Verify (SCU, SCP)
  - Print
  - Store
  - Storage Commitment
  - Media Exchange
- DICOM Worklist (option)
- DICOM Query/Retrieve (option)
- DICOM Modality Performed Procedure Step - MPPS (option)
- DICOM OB/GYN structure report (option)
- DICOM Cardiac structure report (option)
- DICOM Vascular structure report (option)
- DICOM Breast structure report (option)

8.3 iStorage (included in UltraAssist)

- Direct network storage tool between ultrasound system and personal computer

9 Probes

9.1 Curved array

- C5-1s
  - Application: Adult Abdomen, Gynecology, Obstetrics
  - Bandwidth: 1.4-5.1 MHz (-20dB)
  - Number of Elements: 128
  - FOV (max): 61°
  - Extended FOV: 101°
  - Convex Radius: 60mm
  - Physical Footprint: 76.5mm× 28mm
  - Footprint: 64.9mm × 16.2mm
  - B-mode Frequencies: 1.3-3.2, 1.9-4.6, 2.3-5.7 MHz
  - Harmonic Frequencies: 3.5, 4.0, 5.0, 6.0 MHz
  - Doppler Frequencies: 2.0, 2.5 MHz
  - Biopsy Guide: NGB-022, available, multi angle, reusable
- V11-3Ws
  - Application: Gynecology, Obstetrics, Urology
  - Bandwidth: 3-11.2 MHz (-20dB)
  - Number of Elements: 160
  - FOV (max): 173°
  - Extended FOV: 180°
  - Convex Radius: 11 mm
  - Physical Footprint: 24.9mm ×21.8mm
  - Footprint: 24mm×9mm
  - B-mode Frequencies: 2.6-6.5, 3.2-7.9, 4.7-12.8MHz
  - Harmonic Frequencies: 7.0, 8.0, 9.0MHz
  - Doppler Frequencies: 4.4, 5.0MHz
  - Biopsy Guide: NGB-004, available, single angle, reusable
- C11-3s
  - Application: Abdomen, Pediatrics, Transcranial, Vascular, Small parts, Musculoskeletal
  - Bandwidth: 3-11.2MHz (-20dB)
  - Number of Elements: 128
  - FOV (max): 100°
  - Extended FOV: 121°
  - Convex Radius: 15mm
  - Physical Footprint: 32.8mm×25mm
  - Footprint: 27.4mm×8.4mm
  - B-mode Frequencies: 2.6-6.5, 3.2-7.9, 4.7-12.8MHz
  - Harmonic Frequencies: 7.0, 8.0, 9.0MHz
  - Doppler Frequencies: 4.4, 5.0MHz
  - Biopsy Guide: NGB-018, available, multi angle, reusable

9.2 Linear array

- L12-4s
  - Application: Small parts, Vascular, Pediatrics, Superficial, Musculoskeletal, Neurology
  - Bandwidth: 3-13MHz (-20dB)
  - Number of Elements: 192
  - Field of View (max): 38mm
  - Steered Angle: ±6°/±12° (B Steer), ±10°/±20°/±30° (Color/PW Steer)
  - Physical Footprint: 45.7mm×10.9mm
  - Footprint: 44.2mm×8.5mm
  - B-mode Frequencies: 4.4-9.6, 5.4-11.5, 6.6-13.5MHz
  - Harmonic Frequencies: 8.0, 9.0, 10.0MHz
  - Doppler Frequencies: 4.4, 5.0, 5.7MHz
  - Biopsy Guide: available, multi angle, reusable
- L14-6Ns
  - Application: Small parts, Vascular, Pediatrics, Superficial, Musculoskeletal, Neurology
  - Bandwidth: 3.5-16 MHz (-20dB)
  - Number of Elements: 192
  - Field of View (max): 38mm
  - Steered Angle: ±6°/±12° (B Steer), ±10°/±20°/±30° (Color/PW Steer)
  - Physical Footprint: 45.7mm×10.9mm
  - Footprint: 44.2mm×8.5mm
  - B-mode Frequencies: 5.4-11.6, 6.0-12.6, 6.6-13.5MHz
  - Harmonic Frequencies: 8.0, 10.0, 12.0MHz
  - Doppler Frequencies: 5.0, 5.7, 6.6MHz
  - Biopsy Guide: NGB-007, available, multi-angle, resuable

9.3 Phased array

- SP5-1s
  - Application: Adult Cardiac, Transcranial, Adult Abdomen
  - Bandwidth: 1.1-4.4MHz (-20dB)
  - Number of Elements: 80
  - Field of View (max): 90°
  - Physical Footprint: 38.2mm×30.5mm
  - Footprint: 23.4mm×15.2mm
  - B-mode Frequencies: 1.0-3.5, 2.0-4.0, 2.5-5.0MHz
  - Harmonic Frequencies: 3.0, 3.4, 3.8MHz
  - Doppler Frequencies: 2.0, 2.3, 2.5MHz; TDI 3.0, 3.8MHz
  - CW Frequency: 2MHz
  - Biopsy Guide: NGB-011, available, multi angle, reusable
- P10-4s
  - Application: Neonatal Cardiac, Transcranial
  - Bandwidth: 2.9-10.5MHz (-20dB)
  - Number of Elements: 96
  - Field of View (max): 90°
  - Physical Footprint: 15.1mm×10.2mm
  - Footprint: 15.0mm×9.1mm
  - B-mode Frequencies: 3.2-6.8, 3.8-10.2, 4.6-11.4MHz
  - Harmonic Frequencies: 7.5, 8.0, 9.0MHz
  - Doppler Frequencies: 4.0, 5.0, 5.7MHz; TDI 5.7, 6.2MHz
  - CW Frequency: 5MHz
  - Biopsy Guide: not available
- P7-3Ts
  - Application: Transesophageal Echo
  - Bandwidth: 1.9-8.2MHz (-20dB);
  - Number of Elements: 64
  - Field of View (max): 90°
  - Physical Footprint: 14mm×12mm
  - Footprint: 14mm×12mm
  - B-mode Frequencies: 2.3-5.4, 2.8-6.4, 3.3-7.2MHz
  - Harmonic Frequencies: 6.0, 6.5, 7.0MHz

- Doppler Frequencies: 2.7, 3.3, 4.0MHz; TDI 5.0, 6.2
- CW Frequency: 2.5MHz
- Biopsy Guide: not available

9.4 CW probe

- CW2s
  - Application: Transcranial, Cardiac, Pediatrics
  - Number of Elements: 2
  - CW Frequency: 2.0MHz
  - Biopsy Guide: not available
- CW5s
  - Application: Vascular
  - Number of Elements: 2
  - CW Frequency: 5.0MHz
  - Biopsy Guide: not available

10 Peripheral Devices and Accessories (Option)

10.1 Probe extend module:PEM-51
One extend three probe ports

10.2 Black/white digital video printer

- SONY UP-D897
- MITSUBISHI P95DW-N

10.3 Color digital video printer

- SONY UP-D25MD

10.4 Digital graph/text printer

- HP Deskjet 1050 J410 series
- HP OfficeJet 7000 wide format
- HP OfficeJet Pro 8100

10.5 Footswitch

- USB port: 971-SWNOM (2-pedal/3-pedal)
- USB port: FS-81-SP (1-pedal)
- Support User-definable functions (Freeze, Save, Print)

10.6 Built-in Battery for Main Unit

- Replaceable and rechargeable lithium battery
- Full battery lasts more than 24h in standby mode
- Empty battery recharged to full in 4h
- Continuous work time: about 1.5 hour in B mode

10.7 Mobile Trolley

- UMT-500
  - External DVD R/W Storage
  - Platform Height: 809-1059mm adjustable
- UMT-500Plus
  - Power supply module
  - External DVD R/W Storage
  - Platform Height: 809-1059mm adjustable
  - Built-in battery for trolley, continuous work time: about 2h in B mode

10.8 Barcode reader

- 1-D barcode reader: SYMBOL LS2208
- 2-D barcode reader: SYMBOL DS6707

11 System Inputs and Outputs

11.1 I/O Port

- USB3.0: 2 ports
- ECG: 1 port
- HDMI: 1 port

11.2 Video/Audio Extend port

- Video/Audio Extend module iDock51 (option)
  - S-Video Output: 1 port
  - VGA: 1 port
  - Audio Output: 1 port

12 Safety and Conformance

12.1 Quality standards

- ISO 9001
- ISO 13485

12.2 Design standards

- CSA C22.2 No. 601-1
- EN 60601-1 and IEC 60601-1
- EN 60601-1-2 and IEC 60601-1-2
- EN 60601-1-6 and IEC 60601-1-6
- EN 60601-2-37 and IEC60601-2-37

- EN 62304 and IEC 62304
- EN 62366 and IEC 62366
- EN ISO 17664 and ISO 17664

12.3 CE declaration

M9/M9CV system is fully in conformance with the Council Directive 93/42/EEC Concerning Medical Devices, as amended by 2007/47/EC. The number adjacent to the CE marking (0123) is the number of the EU-notified body that certified meeting the requirements of Annex II of the Directive.

NOTICE:

Not all features or specifications described in this document may be available in all probes and/or modes.

Mindray reserves the right to make changes in specifications and features shown herein, or discontinue the product at any time without notice or obligation.

Contact Mindray Representative for the most current information