Changing the way you look at imaging

Philips Sparq ultrasound system specifications
Table of contents

<table>
<thead>
<tr>
<th>1</th>
<th>Introduction</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Applications</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td>1.2</td>
<td>Key advantages</td>
<td>3</td>
<td>5.2</td>
</tr>
</tbody>
</table>

2 | System overview                                                               | 4 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>System architecture</td>
<td>4</td>
</tr>
<tr>
<td>2.2</td>
<td>Imaging modes</td>
<td>4</td>
</tr>
<tr>
<td>2D grayscale</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>M-mode</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Anatomical M-mode</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Tissue Doppler imaging</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Pulsed wave Doppler</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Continuous wave Doppler</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Spectral Doppler</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Color Doppler</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Tissue harmonic imaging</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Color Power Angio imaging</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

3 | System controls                                                                | 7 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Advanced imaging controls</td>
<td>7</td>
</tr>
<tr>
<td>iSCAN image optimization</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>AutoSCAN image optimization</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>SonoCT real-time compound imaging</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Advanced XRES adaptive image processing</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Expanded field of view</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Active native data</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Live compare</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Needle Visualization</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Procedure guides</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Control panel and user interface</td>
<td>8</td>
</tr>
</tbody>
</table>

4 | Workflow                                                                       | 9 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Ergonomics</td>
<td>9</td>
</tr>
<tr>
<td>4.2</td>
<td>SmartExam system-guided protocols</td>
<td>9</td>
</tr>
<tr>
<td>4.3</td>
<td>Display annotation</td>
<td>9</td>
</tr>
<tr>
<td>4.4</td>
<td>Image presentation</td>
<td>10</td>
</tr>
<tr>
<td>4.5</td>
<td>Cineloop review</td>
<td>10</td>
</tr>
<tr>
<td>4.6</td>
<td>Utilization Reports</td>
<td>10</td>
</tr>
<tr>
<td>4.7</td>
<td>Connectivity</td>
<td>10</td>
</tr>
</tbody>
</table>

5 | Transducers                                                                    | 11 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Transducer selection</td>
<td>11</td>
</tr>
<tr>
<td>PureWave transducer technology for TEE imaging</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Curved arrays</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>C6-2 broadband curved array</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>C9-4v broadband curved array</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Linear array</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>L12-4 broadband linear array</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Sector arrays</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>S4-2 broadband sector array</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>X7-2t xMATRIX array with PureWave technology</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

6 | Measurements and analysis                                                      | 13 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Comprehensive measurement tools</td>
<td>13</td>
</tr>
<tr>
<td>6.2</td>
<td>Clinical option analysis packages</td>
<td>13</td>
</tr>
</tbody>
</table>

7 | Physical specifications                                                        | 14 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>System dimensions</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Power management</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Power requirements</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>ECG and physio</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Electrical safety standards</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Safety requirements</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

8 | Maintenance and services                                                       | 15 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
1. Introduction

The Philips Sparq Ultrasound system is a mobile ultrasound system equipped with a simple user interface that is designed for non-traditional ultrasound users. The control panel has a sealed, easy-to-clean tempered glass surface. To reduce unnecessary interaction with the system, the system controls dynamically change, showing only those keys and automation features that are compatible with the exam being performed. Sparq is simply a revolutionary solution with an intuitive design built around our customers’ workflow needs.

1.1 Applications

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen</td>
<td>Nerve</td>
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<tr>
<td>Cardiac</td>
<td>Lung</td>
</tr>
<tr>
<td>FAST</td>
<td>Musculoskeletal</td>
</tr>
<tr>
<td>Pelvic</td>
<td>Musculoskeletal</td>
</tr>
<tr>
<td>Vascular Access</td>
<td>Spine</td>
</tr>
<tr>
<td>Vascular Arterial</td>
<td>Superficial</td>
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<tr>
<td>Vascular Venous</td>
<td>Ocular</td>
</tr>
</tbody>
</table>

1.2 Key advantages

- Rapid reliable image quality in a simple easy to use format
- Imaging protocols to guide the user through procedures
- Barcode Scanner for quick patient data entry
- Support for critical care, emergency medicine, regional anesthesia and pain medicine environments
- Quick-clean easy-wipe surfaces for the most intense environments
- Flexible user interface
- Ergonomic and intuitive design
- Automation features
- Needle Visualization feature

The Sparq ultrasound system allows you to select imaging capabilities, transducers, and clinical analysis tools that support your exam needs. You can add supported capabilities at any time, and upgrade the system when upgrades become available.
2. **System overview**

Philips proprietary technologies provide the basis for Sparq's extensive range of imaging capabilities.

### 2.1 System architecture
- Next generation all-digital compact broadband beamformer with pulse shaping capability
- High resolution A/D conversion with 170 dB full-time system dynamic range
- 20,000 digitally-processed channels
- Supports PureWave technology
- Multivariate harmonic imaging including pulse inversion processing
- One-touch 2D optimization with broadband frequency compounding
- SonoCT real-time beam-steered compound imaging
- Advanced XRES adaptive image processing
- Continuously variable steering in 2D, color Doppler, and Doppler modes
- iSCAN one-touch intelligent optimization for 2D and Doppler
- AutoSCAN—No touch continuous intelligent optimization for 2D
- Active native data manipulation
- Tissue specific imaging presets
- Gray shades: 256 levels (8 bit) in 2D, M-mode, and Doppler
- Simplicity Mode—one-touch simplified control panel
- Advanced Imaging Control—allows the flexibility to turn on advanced controls for imaging
- Built-in Philips Remote Services connectivity allows for rapid response to clinical questions and technical issues

### 2.2 Imaging modes
- 2D
- Color Doppler
- M-mode (real-time M-mode)
- Anatomical M-mode
- Color M-mode
- Color Power Angio (CPA) imaging
- Directional CPA
- Pulsed wave (PW) Doppler
- HPRF PW Doppler
- Continuous wave (CW) Doppler
- Invert and color invert
- Color compare mode
- Dual mode
- Duplex for simultaneous 2D and Doppler
- Triplex for simultaneous 2D, Doppler, and color or Color Power Angio
- 2D and flow optimization signal processing
- Intelligent Doppler—automatically maintains pre-selected 0/60 degree flow angle
- Live compare
- Tissue harmonic imaging (THI)
- High definition write zoom
- Trapezoidal imaging
- Pulse inversion harmonic imaging
- Adaptive Doppler
- Adaptive color Doppler
- Color tissue Doppler imaging
- Pulsed wave tissue Doppler imaging
- Active native data (allows manipulation of raw image data)
- SmartExam system-guided protocol capability
- NeedleVisualization—enhances viewing of the needle to assist the user in guiding the needle to the target anatomy

Needle Visualization significantly enhances the presentation of the needle without degrading the image of the surrounding tissue.
<table>
<thead>
<tr>
<th>2D grayscale</th>
<th>Anatomical M-mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Smart TGC: pre-defined TGC curves enhanced for consistently excellent imaging with reduced TGC adjustment</td>
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<tr>
<td>• High definition zoom concentrates all image processing power into a user-defined area of interest; possible to combine high definition zoom with pan zoom</td>
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<tr>
<td>• Cineloop image review</td>
<td></td>
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<tr>
<td>• Selectable 2D compression settings</td>
<td></td>
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<tr>
<td>• Sector size and steering control for sector and curved array image formats</td>
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<tr>
<td>• Split screen imaging layout with independent cineloop buffers</td>
<td></td>
</tr>
<tr>
<td>• Live compare</td>
<td></td>
</tr>
<tr>
<td>• Chroma imaging with multiple maps</td>
<td></td>
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<tr>
<td>• 256 (8 bits) discrete gray levels</td>
<td></td>
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<tr>
<td>• 2D acquisition frame rate up to 775 frames/sec (dependent on field-of-view, depth and angle)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>M-mode</th>
<th>Tissue Doppler imaging</th>
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<tbody>
<tr>
<td>• Available on all transducers and is real time</td>
<td></td>
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<tr>
<td>• Selectable sweeping rates</td>
<td></td>
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<tr>
<td>• Time markers: 0.2 and 1.0 seconds</td>
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<tr>
<td>• Acquisition zoom capability</td>
<td></td>
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<tr>
<td>• Selectable display format prospective or retrospective (1/3-2/3, 2/3-1/3, side by side, full screen)</td>
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<tr>
<td>• Chroma colorization with multiple color maps</td>
<td></td>
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<tr>
<td>• Cineloop review for retrospective analysis</td>
<td></td>
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<tr>
<td>• Available in all exams on sector array transducers</td>
<td></td>
</tr>
<tr>
<td>• Uses 2D image as a basis for M-mode analysis at a defined line, independent of transducer orientation</td>
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<tr>
<td>• Makes it easier to keep the M-mode line perpendicular to the anatomy, even in abnormally shaped or positioned hearts or other anatomy</td>
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<tr>
<td>• 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</td>
<td></td>
</tr>
<tr>
<td>• Anatomical M-mode trace can be generated or modified post Freeze</td>
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<tr>
<td>• Available on S4-2-Cardiac</td>
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<tr>
<td>• Allows high frame rate acquisition of tissue motion</td>
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<tr>
<td>• Color gain and TGC</td>
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</tr>
<tr>
<td>• 2 color maps</td>
<td></td>
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<tr>
<td>• Velocity (cm/s and m/sec supported)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pulsed wave Doppler</th>
<th>Continuous wave Doppler</th>
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</thead>
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<tr>
<td>• Available on all imaging transducers</td>
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</tr>
<tr>
<td>• Adjustable sample volume size: 0.8-24.6 mm (transducer dependent)</td>
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<tr>
<td>• Simultaneous or duplex mode of operation</td>
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<tr>
<td>• Simultaneous 2D, color Doppler or CPA, pulsed Doppler</td>
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<tr>
<td>• iSCAN optimization automatically adjusts scale, baseline and Doppler gain (in select transducers and presets)</td>
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<tr>
<td>• Available on cardiac sector array transducers</td>
<td></td>
</tr>
<tr>
<td>• Steerable through 90° sector</td>
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<tr>
<td>• Maximum velocity range: +/-20 m/sec (transducer dependent)</td>
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### 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
- Angle correction with automatic velocity scale adjustment
- Adjustable velocity display ranges
- Normal/invert display around horizontal zero line
- Selectable sweep speeds
- Selectable low-frequency signal filtering with adjustable wall filter settings
- Selectable grayscale curve for expanded display
- Selectable Chroma colorization maps
- Selectable display format prospective or retrospective (1/3-2/3, 2/3-1/3, side by side, full screen)
- Doppler review for retrospective analysis of Doppler data
- 256 (8 bits) discrete gray levels
- Post-processing in PW frozen mode includes map, baseline, sweep speed, invert, compress, reject, and Chroma

### Tissue harmonic imaging
- Second harmonic processing to reduce artifacts and enhance image clarity
- Multivariate pulsing including patented pulse inversion phase cancellation technology for increased detail resolution during harmonic imaging
- Available on all imaging transducers
- Extends high performance imaging capabilities to all patient body types
- Supports SonoCT (harmonic SonoCT) and XRES modes

### Color Power Angio imaging
- Highly sensitive mode for small vessel visualization
- Available on all imaging transducers
- Cineloop review
- Multiple color maps
- Individual controls for gain, PRF, baseline, filters, sensitivity, echo write priority and color invert
- Dynamic motion differentiation
- Adjustable CPA region of interest: size and position
- User-selectable persistence
- User-selectable blending
- Directional Color Power Angio (DCPA) mode

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To make scanning easy, Sparq is designed with an Intuitive Dynamic Interface that eliminates knobs or buttons.

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**Color Doppler**
- Adaptive mode adjusts Doppler frequency and sensitivity based on color ROI placement within image available on all imaging transducers
- Cineloop review with full playback control
- Advanced motion suppression with intelligent algorithms; adapts to various application types to selectively eliminate virtually all color motion artifacts
- 256 color bins
- Track pad-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
- User selectable smoothing control
- User selectable persistence control
- Color/2D line density control

**Tissue harmonic imaging**
- Second harmonic processing to reduce artifacts and enhance image clarity
- Multivariate pulsing including patented pulse inversion phase cancellation technology for increased detail resolution during harmonic imaging
- Available on all imaging transducers
- Extends high performance imaging capabilities to all patient body types
- Supports SonoCT (harmonic SonoCT) and XRES modes

**Color Power Angio imaging**
- Highly sensitive mode for small vessel visualization
- Available on all imaging transducers
- Cineloop review
- Multiple color maps
- Individual controls for gain, PRF, baseline, filters, sensitivity, echo write priority and color invert
- Dynamic motion differentiation
- Adjustable CPA region of interest: size and position
- User-selectable persistence
- User-selectable blending
- Directional Color Power Angio (DCPA) mode
3. System controls

The Sparq has simple but advanced system controls to help you acquire the best possible data on your patients, including many one-button optimization controls that adjust thousands of system parameters.

3.1 Advanced imaging controls

**iSCAN image optimization**
- One-touch image optimization
- In 2D mode, one button automatic adjustment of TGC and receiver gain to achieve enhanced uniformity and brightness of tissues
- In Doppler mode, one button automatic adjustment of:
  - Doppler PRF based on detected velocity
  - Gain to achieve enhanced brightness of spectral waveform (in selected transducers and presets)
- Available on all imaging transducers
- Operates in conjunction with SonoCT and XRES imaging

**AutoSCAN image optimization**
- No-Touch Continuous intelligent optimization
- In 2D mode (no interaction by user) automatic and continual adjustment of TGC and receiver gain to achieve enhanced uniformity and brightness of tissues

**SonoCT real-time compound imaging**
- Available on all curved transducers and linear array
- Eliminates virtually all clutter and artifact
- Automatic selection of the number of steering angles (up to 7) based on the user-selected resolution/frame rate (Res/Speed) condition
- Operates in conjunction with tissue harmonic imaging, volume modes, imaging, and duplex Doppler
- Operates in conjunction with XRES imaging

**Advanced XRES adaptive image processing**
- Available on all imaging transducers
- Eliminates virtually all speckle noise and enhances border definition

**Expanded field of view**
- Trapezoidal imaging
  - Expands field of view on linear array transducers up to 15° in vascular, general imaging, nerve, musculoskeletal, superficial, ocular, and lung applications

**Active native data**
- 2D image controls that can be changed in review include: gain (overall gain, TGC), compress, gray map, Chroma map, orientation (L/R, U/D), display zoom/pan, XRES
- PW and CW Doppler controls that can be changed include: gain, baseline, invert, angle correct, angle 60/0/60, sweep speed, grayscale and Chroma maps (compress and reject), PW trace (High Q controls), display format
- Color image controls that can be changed in review include: gain, baseline, color map, invert, write priority, smoothing, suppress, variance, directional Color Power Angio
- Physio controls that can be changed: sweep speed, position, gain
- Can be acquired in prospective and retrospective direction
- Images are acquired at acoustic data frame rate
- Available in cineloop and quick review

**Live compare**
- Allows recall of current or previous exam image data for direct side-by-side comparison with current image data

**Needle Visualization**
- Allows a view of the needle during procedures
- Enhances viewing of the needle to assist the user in guiding the needle to the target anatomy

**Procedure guides**
- Transducer centerline and onscreen centerline provides visual guidance for out of plane needle guidance procedures
- Onscreen gridline provides a visual target size and distance estimation for needle guidance procedures
- Depth markers allows a visual measure of the depth of the image and anatomy (.5 to 5 cm increments dependent on depth)
3.2 Control panel and user interface

- Easy-to-learn graphical user interface
- Ergocentric design of primary controls readily accessible and logically grouped
- Intuitive Dynamic Interface – active and available controls adjust as the user interacts with the control panel
- Automatic ambient lighting sensing for superb image viewing in both light and dark environments
- 3-slide pot control adjustment of TGC curve
- iSCAN control for 2D/Doppler/color Doppler automatic optimization
- AutoSCAN control for 2D continuous and automatic optimization
- High definition/pan zoom control
- Freeze control
- Programmable print control
- Acquisition and print of still images
- Acquisition of loop images (maximum loop time is 180 seconds and maximum loop beats is 20)
- Transducer selection and tissue specific imaging control
- Full Reports, Quick Reports and review controls
- Protocol selection control
- Sealed, easy to clean, tempered glass surface
- Ability to lock the control panel
- Barcode scanner allows easy entry of patient data
- Exam Dashboard is an easy and intuitive tool to manage the exam from beginning to end
- Simplicity Mode, a one-touch solution that allows the user to turn off pre-determined controls that are not needed for that exam
- Sleep Mode allows the user to save battery power when not in use (instant on from Sleep Mode)
- Optional On-Line Support Request feature provides rapid response to clinical questions and technical issues
- Optional Proactive Monitoring helps prevent unscheduled downtime

Simplicity Mode can be turned on or off to present the ultrasound functions that you use most often.
4. Workflow

The Sparq system fits seamlessly into your workflow, whether it is used for critical care, emergency medicine, regional anesthesia or pain medicine. With easy-to-use tools and a streamlined user interface designed for these types of exams and procedures, Sparq can scan whenever and wherever you need it.

4.1 Ergonomics
• Ergonomic features built to provide a high degree of mobility and speed in your environment
  – Philips user experience control panel with central track pad and easy-access mode keys
  – Dynamic Response Controls allows immediate feedback of active and available controls in all modes
  – High-resolution LCD display with wide viewing angle and automatic ambient light compensation
  – Quick keys
  – System-guided exam protocol capability

4.2 SmartExam system-guided protocols
• Exam guide with on-screen display
• Required views based on exam type
• Fully customizable protocol capability for clinical applications supported on the system with flexibility to conduct the examination protocol in any sequence
• Preset protocols:
  – Adult Echo
  – Abdominal
  – GYN
  – Lower Extremity
• Exams based on industry and accreditation guidelines
• Automatic launching of annotation and body marker icon on required views
• Automatic launching of calculations
• Ability to pause and resume SmartExam function at any time
• System analysis capabilities supported in all defined protocols
• Custom protocol transfer between Sparq systems

4.3 Display annotation
• On-screen annotation of all pertinent imaging parameters for complete documentation, including transducer type and frequency, active clinical options and enhanced 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 or user ID, institution name and performed by
• Annotation data and patient name can be turned off (hidden) for generating images used in publication and presentation
• Scan plane orientation marker
• User selectable depth scale display
• Real-time display of mechanical index (MI)
• Real-time display of thermal index (Tlb, Tlc, Tls)
• Multiple track pad-driven annotation arrows
• Pre-defined annotation for labeling of image, supported in single and dual imaging formats
• Pre-defined body markers, supported in single and dual imaging formats
• Doppler baseline invert in live and frozen imaging
• TGC curve (user-selectable On/Off display)
• TGC values (On/Off display)
• Tool tips provide a brief description of the abbreviated on-screen image parameters
• Informative track pad arbitration prompts
• Thumbnail display of images printed/stored
• Calculations results and analysis labels
• User-friendly menus that allow navigation to other analysis features
• Network and connectivity icons to allow instant feedback about network and printer conditions
• Cineloop frame display
• Cineloop bar with trim markers
• Prompt region for informational message display
• Protocol procedure list with status
4.4 Image presentation
• Up/down
• Left/right
• Multiple duplex image formats
  (1/3-2/3, 2/3-1/3, 50/50 and full screen)
• Depth from 1 cm to 30 cm (transducer dependent)

4.5 Cineloop review
• Acquisition, storage, and display in real time and duplex modes of up to three minutes in quick review of 2D and color images
• Dual imaging available

4.6 Utilization Reports
• Optional Utilization Reports provide data to help manage ultrasound assets
  – Track system and transducer usage
  – Summarize data about exam types, and duration
  – Provide data to help with credentialing and privileging
  – Identify referrals by exam type

4.7 Connectivity
• 5 USB ports on control panel –1 on the front of system, 4 on the rear of the system
• 320 GB hard drive space
• Internal slot-load DVD RW drive
• DICOM print, store, and storage commitment
• DICOM structured reporting for cardiac, obstetrics, and vascular
• Performed procedure step (PPS)
• Modality worklist
• DICOM reader saved onto media
• Export data as PC-compatible or DICOM files
• Ethernet at 1000 Mb/second
• Wireless “B and G” networking
• USB to serial converter adapter
• Support for optional small B/W and color printers
  (external only)
5. Transducers

The Sparq ultrasound system offers a wide complement of transducers, designed and optimized for an extensive range of exams in emergency medicine, critical care, regional anesthesia, and pain medicine environments.

5.1 Transducer selection
- Automatic parameter optimization of each transducer for exam type through Tissue Specific Imaging (TSI) software
- User-customizable imaging exams for each transducer
- Continuous dynamic receive focusing on all imaging transducers

5.2 PureWave transducer technology for TEE imaging
- Proprietary combination of PureWave crystal, impedance matching layers, backing materials, micro-electronics and cable design
- Achieves breakthrough acoustic broadband response and twice the efficiency of conventional technology for superb image quality and Doppler performance
- Designed for multivariate harmonic imaging capabilities including pulse inversion and coded pulse sequencing
- Available in the TEE xMATRIX array transducer

Curved arrays

C6-2 broadband curved array
- 128 elements
- 6 to 2 MHz extended operating frequency range
- 70° field of view
- 2D, steerable PW Doppler, High PRF and color Doppler, and Color Power Angio, SonoCT, advanced XRES, and multivariate harmonic imaging
- General purpose abdominal, pelvic (includes obstetrical and gynecological), trauma, and regional anesthesia applications
- Supports 4 angle disposable Ultra-Pro II gauges 8.5, 14-25 GA (19 GA not available)

C9-4v broadband curved array
- 128 elements
- End-fire sector, 10 mm radius of curvature, 150° field-of-view
- Steerable pulsed wave, High PRF, and color Doppler, Color Power Angio, SonoCT, advanced XRES, and multivariate harmonic imaging
- Endovaginal applications
- Supports disposable biopsy guide (16-18 gauge) and reusable stainless steel biopsy guide (16-18 gauge) and disposable quick release biopsy guide (10, 14 and 16-18 gauge)

Linear array

L12-4 broadband linear array
- Fine pitch, high resolution linear array, 128 elements
- 12 to 4 MHz extended operating frequency range
- 2D, steerable PW, High PRF, and color Doppler, Color Power Angio, M-mode, SonoCT, advanced XRES, and multivariate harmonic imaging
- Regional anesthesia, vascular, superficial, musculoskeletal, lung, and trauma applications
- Supports disposable infinite angle (gauges 14, 18, 20, 21/22, 25) and a disposable AccuSite guide (gauges 18, 20 and 21 supported)

Sector arrays

S4-2 broadband sector array
- Sector array, 80 elements
- 4 to 2 MHz extended operating frequency range
- 2D, steerable PW Doppler, CW Doppler, High PRF Doppler, color Doppler, Color Power Angio, Tissue Doppler, M-mode, advanced XRES and multivariate harmonic imaging
- Adult cardiac, general purpose abdominal and trauma
- Supports reusable 3-angle plastic biopsy guide (14-23 gauge) and 3-angle stainless steel biopsy guide (14-23 gauge)

X7-2t xMATRIX array with PureWave technology
- xMATRIX array TEE with 2,500 elements
- 7 to 2 MHz extended operating frequency
- 2D, color flow, PW Doppler, CW Doppler, M-mode, and advanced XRES
- Harmonic imaging
- Electrocautery suppression
- Electronically rotating image plane from 0 to 180°
- Adult transesophageal applications
- Optional adapter for use on iE33 systems
5.3 Transducer application guide

Transducers

<table>
<thead>
<tr>
<th>Transducer</th>
<th>S4-2</th>
<th>C6-2</th>
<th>L12-4</th>
<th>C9-4v</th>
<th>X7-2c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of array</td>
<td>Sector</td>
<td>Curved</td>
<td>Linear</td>
<td>Curved</td>
<td>xMATRIX</td>
</tr>
<tr>
<td>Number of elements</td>
<td>80</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>2500</td>
</tr>
<tr>
<td>Scanplane aperture</td>
<td>20.3 mm</td>
<td>38.4 mm</td>
<td>proprietary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field of view</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadband frequency range</td>
<td>4–2 MHz</td>
<td>6–2 MHz</td>
<td>12–4 MHz</td>
<td>9–4 MHz</td>
<td>7–2 MHz</td>
</tr>
<tr>
<td>PureWave crystal technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exam

| | TEE | Cardiac | Abdomen | FAST | Nerve 0–4 | Nerve 4–6 | Nerve 6+ | Lung | Ocular | Musculoskeletal | Musculoskeletal Superficial | Spine | Vascular Access | Vascular Arterial | Vascular Venous | Pelvic (includes OB) | Superficial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |
6. Measurements and analysis

6.1 Comprehensive measurement tools

- Analysis packages for cardiac, pelvic, vascular, abdominal, general, superficial, trauma, ocular, CV access and PV access
- 2D distance
- 2D circumference and area by ellipse, continuous trace, trace by points
- M-mode distance, time, and slope measurements
- Manual Doppler distance for time and velocity
- Manual Doppler trace
- Trace erase by backing up the track pad
- Trace erase segmentally using the erase control
- Time and slope measurements in Doppler and M-mode
- High Q automatic Doppler analysis
- Volume flow rate
- 2D volume
- Heart rate (directly measure from M-mode and Doppler traces)
- Trackpad-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
- Simpson's trace methods: traditional trace or three-point adjustable border
- 2D all points guided workflow
- M-mode all points guided workflow
- PISA methods with automatic aliasing velocity acquisition
- Body surface index calculations
- User-friendly powerful equation editing wizard
- Units and precision set independently for all measurement and calculations
- Cardiac TDI measurement package
- User-adjustable results box position
- Export measurement and analysis package to CD or DVD and import onto other Sparq ultrasound systems
- Ability to add images to the long report

6.2 Clinical option analysis packages

- Cardiac analysis
  - Volume by area/length method
  - M-mode ejection fraction
    (via Teichholz or cubed method)
  - Novel three-point adjustable Simpson's template
  - Simpson's biplane and single plane volume and ejection fraction
  - Area, length, volume, and ejection fraction
  - LV mass
  - 2D all points
  - M-mode all points
  - Peak velocity
  - Maximum and mean pressure gradients
  - Pressure half-time
  - E/A ratio
  - D/E slope
  - Continuity equation
  - Diastolic function
  - Cardiac output
  - Acceleration time
  - Heart rate
- Pelvic analysis
  - Includes pelvic and OB
  - CRL
  - BPD
  - HC
  - AC
  - FL
  - Cervix
  - EMM
  - Fetal HR
  - Ovarian volumes
  - Uterine volumes
  - Bladder volumes
- Access to all abdominal measurements
  (including kidney volumes, GB, CBD, aorta, spleen, and bladder volumes)
- Access to all vascular measurements (upper an lower extremity arterial and venous as well as carotid)
- Trauma (includes abdominal and cardiac measurements)
### 7. Physical specifications

#### System dimensions
<table>
<thead>
<tr>
<th>Feature</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>146 lbs/66.2 kg</td>
</tr>
<tr>
<td>Width</td>
<td>21 in/53.3 cm</td>
</tr>
<tr>
<td>Depth including handle</td>
<td>25 in/63.5 cm</td>
</tr>
<tr>
<td>Height adjustable</td>
<td>43.75 in/111 cm to 32.5 in/82.6 cm</td>
</tr>
<tr>
<td>Display</td>
<td>17 in/43.2 cm high-resolution display with wide viewing angle – 5:4 aspect ratio</td>
</tr>
<tr>
<td>Vertical articulation</td>
<td>9 in/22.9 cm</td>
</tr>
<tr>
<td>Monitor vertical adjustment</td>
<td>6.75 in/17.1 cm</td>
</tr>
<tr>
<td>Arm reach to the side</td>
<td>12 in/30.5 cm from the widest point of the cart or 22.25 in/56.5 cm from the center out</td>
</tr>
<tr>
<td>Laptop style</td>
<td>Alphanumeric QWERTY keyboard</td>
</tr>
<tr>
<td>Footswitch</td>
<td>USB</td>
</tr>
<tr>
<td>Surface</td>
<td>Sealed glass</td>
</tr>
<tr>
<td>Handle</td>
<td>360° for easy maneuvering of cart</td>
</tr>
<tr>
<td>Casters</td>
<td>5 in; front casters provide total locking (directional and rotational) engaged by foot pedals</td>
</tr>
<tr>
<td>Storage</td>
<td>Top mounted storage bin</td>
</tr>
<tr>
<td>Transducer holders</td>
<td>Accommodate 6 transducers</td>
</tr>
<tr>
<td>Input power</td>
<td>To B/W and color printers (external only)</td>
</tr>
<tr>
<td>USB</td>
<td>1 front</td>
</tr>
<tr>
<td>USB, VGA, LAN</td>
<td>4 USB back</td>
</tr>
</tbody>
</table>

#### Power management
- 4 internal lithium ion polymer batteries
- Fully charged battery yields approximately 2.5 hours of continuous use battery life under continuous use without AC
- Quick-charge battery technology
- Advanced battery/AC monitoring circuitry includes on-screen graphics, and low battery warning
- Suspend mode for instantaneous boot-up between exams

### Power requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>100-240 V, 50/60 Hz, 250 VA</td>
</tr>
<tr>
<td>System with peripherals</td>
<td>100-240 V, 50/60 Hz, 500 VA</td>
</tr>
</tbody>
</table>

#### Environmental
- Heat dissipation 700-1100 BTUs/hour (fully loaded)
- Operation range 10°C–40°C operating in 15–95% relative humidity

#### ECG and physio
- One three-lead ECG input
- One external ECG input
- Two physio input channels (1V, p-p)
- Selectable ECG triggered skipping between 1 and 20
- Respiration, Phono, and Pulse

#### Electrical safety standards
- CSA C22.2 No. 601.1
- IEC 60601-1
- UL 60601-1
- EN 60601-1

#### Safety requirements
- Electromechanical standards met
  - C22.2 No. 601.1, Canadian Standards Association, Standard for Medical Electrical Equipment
  - JIS T 0601-1, Japanese Standard for Medical Electrical Equipment
  - EN 60601-1, European Norm, Safety of Medical Electrical Equipment
  - EN 60601-1-2 European Norm, Collateral Standard: Electromagnetic compatibility
  - EN 60601-2-37 European Norm, Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment
  - Japanese Ministry of Health, Labor and Welfare
  - UL 60601-1 Underwriters Laboratories Standard for Medical Electrical Equipment
- Agency approvals (pending)
  - Canadian Standards Association (CSA)
  - CE Mark in accordance with the European Medical Device Directive issued by British Standards Institute (BSI)
  - Japanese Ministry of Health, Labor and Welfare
8. Maintenance and services

**Maintenance**
- Easy customer access to air filter for cleaning
- System designed for easy replacement of key components by your facility's biomedical engineers
- Optional service agreements to
  - Contain risk
  - Increase uptime
  - Access Philips best-in-class service

**Services**
- 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, provides fast resolution to issues and questions
  - Remote clinical education
  - Remote log file transfer decreases downtime by allowing rapid diagnosis of problems by call center personnel
  - Online Support Request
    - Simplifies support engagement
    - Provides fast response to clinical questions and technical issues
  - User can enter request directly on 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

**Philips SmartPath** assures you easy access to solutions and innovations for the full life of your ultrasound system, so you can boost your clinical and operational potential and achieve your organizational goals.

- **Optimize** your system's performance both now and in the future with regular and ongoing updates, including functionality improvements and remote technical support.
- **Enhance** your equipment with regular technology upgrades, and take advantage of the newest features and capabilities.
- **Transform** your investment at the end of your system's life by transitioning seamlessly to a next-generation solution or refurbished option.

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