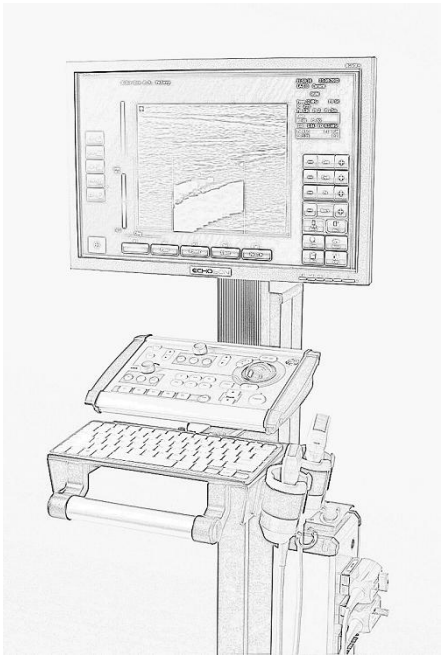
ECHOSON

Ultrasound scanner

SPINEL

(Touch Screen)

General Specifications



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CE 1011

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System overview

1. Display Modes

- B (2D) mode
- Multi-image : split(B/B) ; quad(4B) screen
- TM-mode , 2D+TM (real-time duplex)
- 2D+ PW (Pulsed Wave Doppler - real-time duplex)
- 2D+CF (Colour Flow Doppler)
- 2D+ PD (Power Flow Doppler)
- double : 2D / (2D+CF) ; 2D / (2D+PD)
- 2D+CF+PW (triplex mode)
- 2D+PD+PW (triplex mode)
- ZOOM : 2D , 2D+CF, 2D+PD
- Cine view

2. Application

Linear probe:
- Vascular
- General
- Small Part
- Musculoskeletal
- Urology

Rectal probes
- Endorectal
- Endoanal

Transrectal Bi-Plane probe
- Rectal long
- Rectal cross

Endovaginal micro-convex probe
- Endovaginal
- Gyn/Fertility
- General

Convex probes
- General
- Abdominal
- Musculoskeletal
- OB/GYN
- First Trimester

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3. Console Design

- Intuitive and simple user interface - twofold truly unique system:
  - Touch Screen - all functions accessible via Icon-based Graphical User Interface
  - Classic, functional Desktop plus Alphanumeric Keyboard on drawer system.
- Console providing left/right swivel adjustment
- Height adjustment of control panel

- Simultaneous connection of three electronic probes (optional -four probes: 3 electronic + 1 special)
- Trackball control
- System with one monitor (option - the second patient monitor)
- Integrated HDD
- Two USB 3.0 ports
- One USB 2.0 port
- Mini HDMI port
- Display port
- Ethernet LAN RJ45 connector
- DVD-R multi drive (optional)
- Integrated speakers (for Doppler mode)
- Probe and gel holders
- Footswitch (option)
- Backlit operating keys

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4. LED monitor

- 21,5" High-Definition colour LED
- Touch Screen – capacitive, fingers and thin gloves operate,
- Monitor complies with latest the standards: ENERGY STAR® and EPEAT® Silver.
- Full HD resolution: 1920 x 1080
- Vertical and horizontal viewing angle 178°
- Bright regulator function incorporated
- DVI_D (HDCP), HDMI connectors
- 16.77 million display colours
- Swivel to any viewing direction
- Adjustable

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5. Trolley

- Console providing left/right swivel adjustment
- Four swivel wheels with parking brake

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6. Display Annotation

- Menu touch keys
- Function touch keys
- Virtual on-screen keyboard for entering patient and user information
- Patient name (First and Last)
- Patient ID
- Age, gender and date of birth.
- Date and Time
- User (Hospital) name
- Application type

- Freeze indication
- Probe type and imaging frequency
- Frame rate
- Image orientation marker
- Dual and quad format orientation marker to indicate active window
- Depth scale marker
- Focus markers
- Image depth
- Gray and colour map
- Body markers: body- part icon with the marker relative probe position
- Cine image number/frame number
- Cine scrolling memory indication
- Measurement results
- Operation status message
- Text and arrows (places, moves, erases)
- Estimated Biopsy lines

B mode:

- Gain B
- Gray map
- Post processing, filters, persistence
- Imaging depth
- Enlargement of an image (zoom) [in %]
- Dual format orientation marker to indicate active window

M mode:

- Gain M
- Time scale

Doppler mode:

- Gain PW and CF/PD
- PRF PW and CF/PD
- Angle SV
- Sample Volume depth
- Sample Volume width
- Velocity scale
- Speed sweep in PW
- Wall Filter
- Time scale
- Colour map
- Base line
- TIS: Thermal Index Soft Tissue

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7. System Setup

- User (Hospital) name
- Language selection
- Setting the Time and Date (two types selectable)
- Biopsy on/off
- Selecting Text size

- Selecting Cursor size
- User interface color customization possibility (4 sets and customize)
- Selecting a printer
- Colouring the B image
- Number of zone TGC
- Mode for special probe Bi-Plane 2PR
- Image FFT colour
- Auto switch AQ
- Doppler scale cm/kHz
- Storage destination (HDD,USB)
- Adjust the keyboard backlight brightness
- GA table set
- Programming shortcuts for alphanumeric keyboard
- Capture time (AVI)
- File format
- User settings (filters, post processing, persistence) for every application
- Internal database of patient data
- Customizable Anatomy Descriptions

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8. Dimensions and Weight

- 440 x 595 x 1230 mm
- Weight: ~25kg (with trolley and monitor)

9. Electrical Power

- Nominal input voltage: 100-240 VAC, 50/60 Hz
- Power consumption: ~120 VA

10. Environmental

- Operating temperature : 10°- 40 °C at 30% - 85% relative humidity
- Liquid Ingress Protection :
  - Scanner: IPX0 - (ordinary equipment without protection against ingress of water)
  - Probes: IPX1 - *dripping water (vertically falling drops) shall have no harmful effect*

11. Electrical safety standards:

- Medical Device Directive 93/42 EEC
- EMC Directive 89/336/EEC
- Electromagnetic Compatibility EN 60601-1-2
- Electrical Safety IEC 601
- Medical device **class IIa** comply with Medical Device Directive 93/42 EEC
- Scanner complies with requirements for **Class I** devices of EN/IEC 60601-1

12. Acoustic safety standards:

- Acoustic safety : EN 60601-2-37 : 2007

Declaration for ultrasound scanner SPINEL::

In all modes Mechanical Index MI don't exceed the value 1,0

Imaging

13. Imaging - B mode

- 256 shades of Gray, 8 bits
- Adjustment of total gain value (touch screen or by knob)
- Gain adjustment for 5 or 8 individual zones (Time Gain Compensation)
- Single, dual, and quad image display capability
- ESR - Enhanced Speckle Reduction
- Scanning angle: up to 360° (depends on the probe)
- Tissue harmonic imaging (THV)
- Multi-frequency ultrasound probes from 2 to 15 MHz
- Scanning depth range: from 1.5 to 31 cm (probe dependent)
- Controlling the number (1, 2, and 4) and position transmit focal zones.
- Digital dynamic receive focusing
- Frame rate in excess of 250 fps, depending on probe, settings and applications
- Image reverse L/R
- Image rotation of 90°,180°
- Colorized 2D-mode
- Automatic Optimization – single keystroke optimizes automatically settings
- Normal key - adjusted for the real time image
- Image filters – (5 levels).
- Image digital filters in Freeze mode (10 levels)
- Image post processing (Exp ;Lin; S)
- Correlation of images (Persist: P1...P4)
- Zoom the image (in/out adjustment from 40% to 800% ; 19 levels)
- Negative of image (Inverse)
- Background change
- Biopsy guide zone

14. Imaging - M mode

- Trackball steers M-mode line available with all imaging probes
- Adjustable gain M -mode
- Simultaneous real-time 2D- and M-mode
- Top-bottom formats and time-motion only format
- Selectable scroll speed (sweeping rates): 4, 5, 8, 16 seconds

15. Imaging - PW mode

- Trackball steerable Doppler available with all imaging probes
- Doppler frequency : 3,125 or 6,250 MHz (probe dependent)
- Real-time duplex operation for all velocity settings and for all electronics probes
- Frame rate control for optimized use of acquisition power between spectrum and 2D
- Selectable horizontal scroll speed: 4,5, 8, 16 seconds across display
- Adjustable spectral Doppler gain and power
- PRF settings from 0.75 to 9.0 kHz
- Wall Filter (5 level – min 0,025 x PRF ...max 0,20 x PRF)
- Adjustable sample Volume (SV) size
- Spectral invert
- Automatic Doppler trace
- Adjustable velocity scale and baseline.
- Left/right steer on all linear transducers
- Angle correction with automatic adjustment of velocity scale (0..89°)
- Stereo speakers and volume of Doppler sound control
- Doppler colorization maps
- PW image post processing
- Real-time display of Thermal Index (TI)
- Display annotations of frequency, SV setting, angle correction, acoustic power indices

16. Imaging - CF/PD mode

- Steerable colour Doppler available with all imaging electronics probes
- Simultaneous display of gray scale 2D and 2D with colour flow
- Doppler frequency : 3,125 or 6,250 MHz (probe dependent)
- True colour, 8bits for each RGB component
- Zoom the colour image (200%)
- Colour scale reversing
- Colour map
- Trackball-controlled ROI
- Variable ROI size in width and depth
- PRF settings from 0,5 to 9,0 KHz
- Adjustable colour Doppler gain and power
- Colour Doppler persistence
- Real-time display of Thermal Index (TI)
- Small flow filter
- Changing the priority and reject level
- Changing colour image resolution (line density)
- Display annotations of frequency, gain setting, acoustic power indices
- Left/right steer on all linear transducers

Measurement

17. Measurements - 2D-Mode

- Multiple cursor sets on frozen and cine playback images
- Distance measurement -: nine (9) independent pairs of cursor
- Angle (four measurements)
- Volume, area and circumference
    - ✓ Ellipse method
    - ✓ Trace (contour) method
    - ✓ 3 - axis method

2D-Mode special measurements:

- Thyroid gland volume with 3-axis method
- Bladder volume with 3–axis method
- Differential of the volume Vm
- % Stenosis (diameter or area)
- %FS (LV Fractional Shortening)
- Predicted PSA (pPSA) and density PSDA (with ellipse and axial method)
- Thickness lateral abdominal muscles measurement

All measurements can be stored on the General REPORT page

Obstetrical measurements

- First Trimester assessment and measurements (Early Obstetrics) :
    - ✓ the Nuchal Translucency (NT),
    - ✓ the Nasal Bone (NB),
    - ✓ the Facial Angle (FA)
    - ✓ Ductus Venosus waveform (DV)
    - ✓ Fetal Tricuspid Valve flow (TV).
- Obstetrical generic measurements:
    - ✓ GA and EDD using BPD, CRL, FL, GS, AC, HC (factory preset and a user-modifiable table ; the mean of three measurements)
    - ✓ HC/AC, FL/BPD and FL/AC relationships
    - ✓ Foetus weight EFBW (AC /BPD and AC/FL)
    - ✓ GA and EDD based on LMP
    - ✓ NT (Nuchal Translucency), NB (Nasal Bone), YS (Yolk Sac)
    - ✓ Determination of Amniotic Fluid Index AFI

All measurements can be stored on the REPORT pages: OB and First Trimester

18. Measurement - M Mode

- HR (Heart Rate) – beats/min
- Distances, time, speed
- Dynamic parameters of left ventricle

    - diastolic volume EDV
    - systolic volume ESV
    - ejection volume SV
    - ejection fraction EF
    - cardiac output CO
- Measuring single-dimension parameters
    - AOD- aortic annulus
    - LA - left atrium
    - IVS- interventricular septum
    - RVEDD- right ventricle
    - DEAmpl- mitral valve leaflets spreading amplitude

All measurements can be stored on the M- REPORT page

19. Measurement – PW Mode

- automatic measures (auto trace) :
    - PSV (Peak Systolic Velocity)
    - EDV (End Diastolic Velocity)
    - TAM (Time Averaged Mean peak velocities)
    - RI (Resistive Index)
    - PI (Pulsatility Index)
    - S/D (Peak Systolic to end Diastolic)
    - Area selection for automatic measurement
- two independent measurements of: velocity (v) and time (t), acceleration (A)
- distance measurement in 2D presentation
- Doppler gradient MaxPG (Maximum Pressure Gradient)
- Doppler gradient MeanPG (Mean Pressure Gradient)
- Mitral valve area MVA
- PI (Pulsatility Index)
- RI (Resistive Index)
- HR (Heart Rate) – beats/minute
- A/B Ratio (Velocities Ratio)
- E/A - Mitral valve coefficient
- S/D Ratio (Peak Systolic to end Diastolic)
- TV (Tricuspid value) and DV (Ductus venosus) for foetal measurements
- Doppler angle correction after measurement
- All measurements can be stored on the D- REPORT page

Memory

20. Cine memory

- Internal data storage in native format to facilitate review, measurement and manipulation of images recalled from memory
- In 2D and CF/PD mode – last 1530 frames
- In M and PW mode – up 80 sec (max time is scroll speed dependent)
- CINE review loop
- CINE gauge and cine image number display
- Measurements/calculations and annotations on cine playback
- Clip capture from cine review: the images stored in the cinema memory can be used to create a video file in the *.avi* format.
- Selectable Cine Sequence for AVI file create

21. Image Storage

- Internal hard drive image storage: ~128 GB -(optional 250 GB or more)
- Internal storage of single and multi-frame images
- Patients and study folders
- Editable .txt file with a description of survey data
- Managing the stored files:
    - Displaying
    - Printing
    - Deleting files
    - Exporting to external memory
    - Importing from external memory
- Thumbnails for archived images.
- Storage formats:
    - BMP (24bit) format (~5,9 MB one file).
    - JPG format (~0,2 MB one file).
    - AVI format
    - DCM - DICOM format
- Storage devices:
    - Hard drive image storage: ~128 GB (optional 250 GB or more)
    - USB memory stick
    - DVD–R/RW and CD-R/RW drive (optional)

22. DICOM Connectivity (option)

- DICOM (*Digital Imaging and Communications in Medicine)* is an optional data-transfer feature that allows the SPINEL scanner to connect over a Local Area Network (LAN) to PACs archives, to remote printers and to Worklist servers

- Images in DICOM format can send from SPINEL ultrasound system to selected memory or, using an Ethernet or wirelessly connection, to PACs server or to DICOM printer.
- Service class offered by the interface SPINEL- DICOM (SCU):
    - *Verify* Communications - to ensure that any particular device is properly connected before communication begins
    - *Store* - the SPINEL SCU can send the images to a PACs (Picture Archiving and Communication System) server for review and archival
    - *Print* – sending images to be printed on a DICOM printer
    - *Modality Worklist Management* **-** using the work-list you can import patient data from Hospital Information System.
- The SPINEL scanner provides configuration pages (DICOM Setup) for setting up DICOM devices for network connectivity.

23. Multifrequency probes

- Multi-frequency ultrasound probes from 2 to 15 MHz:
- Scanning depth: 1.5 - 31 cm (depends on the probe)
- Scanning angle: up to 360° (depends on the probe)

- Linear **LA510** 40mm : 5 MHz to 12 MHz
- Convex **CA255** (R60) : 2 MHz to 5,0 MHz
- Micro-convex **CA409** (R20) :4 MHz to 9,5 MHz
- Convex **CA305** (R20) : 2,5 MHz to 6,0 MHz
- Micro-convex endovaginal **CV-580** (R13): 5MHz to 10 MHz
- Anorectal **R-510** (360°): 5MHz do 12MHz
- Endorectal bi-plane **2R-575** (90°/120°): 5 MHz to 10 MHz