

**SPECIFICATIONS**  
for  
**Diagnostic Ultrasound System**  
**LISENDO 880 LE**

**MODEL: ALOKA LISENDO 880**

SPH-LISENDO880LE-V60-E01

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## **Basic Specifications**

### **Scanning Method**

- Electronic Convex
- Electronic Linear
- Electronic Phased Array Sector

### **Operating Modes**

- B-mode
- BiPlane-mode\*
- M-mode
- D: Spectral Doppler mode (PW, CW, HPRF-PW)
- Dual Gate Doppler mode
- Color Flow mode
- Power Doppler mode (Directional Power Doppler)
- eFLOW mode (Directional eFLOW)
- Cardiac 3D mode\*  
(3D Zoom, Active 3D, Wide Angle 3D)

\* Option: SOP-LISENDO880-129

### **Image Display Modes\*<sup>1</sup>**

- B: gray-scale imaging
- Dual B
- Quad B
- M
- B and M
- D
- B and D
- B(Color Flow)
- B(Power Doppler)
- B(eFLOW)
- Dual B(Color Flow)
- Quad B(Color Flow)
- Dual B(Power Doppler)
- Quad B(Power Doppler)
- Dual B(eFLOW)
- Quad B(eFLOW)
- M(Color Flow)
- M(Power Doppler)
- M(eFLOW)
- B(Color Flow) and M(Color Flow)
- B(Power Doppler) and M(Power Doppler)
- B(eFLOW) and M(eFLOW)
- B(Color Flow) and D
- B(Color Flow) and Dual
- B(Power Doppler) and D
- B(Power Doppler) and Dual
- B(eFLOW) and D
- B(eFLOW) and Dual
- B(Color Flow) and D simultaneous real-time display

(Triplex mode)

- B(Power Doppler) and D simultaneous real-time display (Triplex mode)
- B(eFLOW) and D simultaneous real-time display (Triplex mode)
- B and B(Color Flow) simultaneous real-time display (Dual Flow)
- B and B(Power Doppler) simultaneous real-time display (Dual CF)
- B and B(eFLOW) simultaneous real-time display (Dual Flow)
- Dynamic Slow-motion Display (Real-time image/Slow-motion image, side by side display)
- Real-time Biplane (Display real time image in 2 cross-sections in biplane probe.)\*<sup>2</sup>
- Panoramic View
- TDI (Tissue Doppler Imaging)
- Intermittent trigger mode
- Monitor mode (Monitor image/CHI mode image, side by side)
- Detective Flow Imaging (DFI)\*<sup>3</sup>
- Request function: In multi-mode display, it is possible to select one mode for full screen display.
- 3D Zoom mode (Color)\*<sup>2</sup>
- Active 3D mode (Color)\*<sup>2</sup>
- Wide Angle 3D mode (Color)\*<sup>2</sup>

\*<sup>1</sup> Probe dependent

\*<sup>2</sup> Option: SOP-LISENDO880-129

\*<sup>3</sup> Option: SOP-LISENDO880-105

### **Beam former**

- Transmission
    - CPWG (Compound Pulse Wave Generator)
    - Programmable waveform transmission
  - Reception
    - Multi processing high-speed digital beam former
    - 12-bit A/D converter (4096 gray levels)
    - A/D Sampling Frequency: 40 [MHz]
    - Parallel processing: Up to 20 directions
  - Transmission/Reception method of Harmonics:
    - FmT: Filter-method Tissue Harmonic Imaging  
THI mode image without reducing the frame rate.
    - WbT: Wide-band Tissue Harmonic Imaging  
THI mode image with higher resolution than FmT.
    - HdT: High Definition Tissue Harmonic Imaging (HdTHI)  
THI mode image with higher resolution than WbT.
- Reception frequency: 3.2-22.0 MHz\*

\*: 22.0 MHz can be achieved under below conditions.

- Probe: SML44
- Frequency: High
- Frequency Information: Receive
- Tissue Adaptive Technology:
  - Sound speed adjustment: 26 steps
  - Automated sound speed adjustment
- Focusing
  - Transmission
    - Multi-stage transmission focus of up to 4 stages out of 16 stages (probe dependent)
  - Reception: PixelFocus, eFocusing

## System Dynamic Range

320 dB

## System Processing Channels

7,072,000 Channels

## Frame rate

Max. 882 frames/sec\*

\* It is a measured value with the setting assuming the maximum value. This value may be exceeded depending on the conditions.

## Imaging

### B-mode

- Display Gray Scale: 256 levels
- Scanning area:
  - 25 to 100%, Continuously variable
- Line Density: Up to 8 steps
- HI Frame Rate
  - Improve frame rate by Multi Parallel Processing
- Zoom:
  - HI zoom(real-time image):
    - Minimum display of 5mm
  - PAN zoom(real-time and frozen image):
    - Minimum display of 5mm
- Frequency selection:
  - Fundamental:
    - Max. 5 frequencies(probe dependent)
  - Tissue harmonic:
    - Max. 5 frequencies(probe dependent)
- Depth range selections:
  - 0.75/1.0/1.5/2.0/2.5/3.0/3.5/4.0/4.5/5.0, 1 cm intervals from 5.0 to 24 cm, and 2 cm intervals from 24 cm to 40 cm(probe dependent)
- Longitudinal and lateral inversion
- Rotation by 90 degrees(probe dependent)

- Gain
  - 0 to 80 dB, 1 dB step, adjustable in real-time and frozen.
- Echo enhancement: 8 steps(Including OFF)
- Texture: 2 steps(Smooth/Sharp), not available in M-mode.
- Smooth/Enhance:
  - -8 to -1: Smoothing level
  - 0: OFF
  - 1 to 8: Edge enhancement level
- Persistence
  - 8 steps(Including OFF), 2 types(Manual/Auto)
- Time Gain Control(TGC): Gain versus depth curve control
  - 8 slide controls, TGC curve memory function
- TGC Enhancement: ON/OFF possible, working with CF
- Lateral Gain Control(LGC): Gain versus angle curve control.
  - 8 sectors(Sector probes only)
- Dynamic range
  - 40 to 90 dB, adjustable in real-time and frozen.
- Gray map: 10 types, adjustable in real-time and frozen.
- Auto Gain Control(AGC): 8 steps(Including OFF)
- Gamma Curve
  - 4 types(Linear, Window, Parabolic, S-curve), control points(Rejection, Center, Saturation), changeable in real-time and frozen.
- Compound
  - Possible by selected linear and convex sector probes.
- Trapezoidal Scanning
  - Possible by selected linear probes
- Beam Steer
  - Possible by selected linear probes
- HI REZ: Image filter that maintains the edges of structures while reducing speckle noise.
  - 8steps, ON/OFF possible
- HI REZ PLUS: ON/OFF possible
- Border Clear Filter(BCF): Image filter that enhance the edges of structures.
  - ON/OFF possible, only available when HI REZ is ON
- Acoustic Noise Reduction(ANR): It reduces artifacts.
  - OFF+9 steps, 2 types(A-B)
- Near-field Noise Reduction(NNR): It reduces artifacts and noises in the heart chamber or blood vessels.
  - OFF+3 steps(Low, Mid, High), 5 types(A-E)
  - Carving Imaging: OFF+9 types(combination of NNR type(C, D, E) and levels(Low, Mid, High))
- Low Echo Reduction: Suppresses the hypoechoic areas.
  - 0 to 70%, 2% step, adjustable in real-time and frozen

- Grayscale Enhancement: Sets the balance between low brightness and high brightness of grayscale.  
OFF+3 steps(Low, Mid, High)
- Auto-optimizer: Gain, TGC, LGC, sound velocity
- Needle Emphasis: Improves the visibility of the puncture needle echo.
- Wide Scanning: Display image with a wide field of view.
- Panoramic View: Display a panoramic image by moving the probe in a wide range.

### **M-mode**

- Sweep method: Moving bar
- Sweep speed  
7 steps(40.0, 50.0, 66.7, 100, 133.3, 200, 300 mm/sec)
- Gain  
B Gain $\pm$ 30dB, working with B Gain, adjustable in real-time and frozen.
- Dynamic Range  
40 to 90 dB, 1 dB step, adjustable in real-time and frozen.
- Auto Gain Control(AGC): 8 steps(Including OFF)
- Acoustic Noise Reduction(ANR): It reduces artifacts.  
Working with B mode.
- Low Echo Reduction: Suppresses the hypoechoic areas.  
0 to 70%, 2% step, adjustable in real-time and frozen.
- Grayscale Enhancement: Sets the balance between low brightness and high brightness of grayscale.  
OFF+3 steps(Low, Mid, High)
- Free Angular M(FAM): Displays an M mode image on any line of the B mode image.

### **Spectral Doppler Mode**

- Display: Power spectrum
- Real-time Doppler Auto Trace
- Doppler methods:
  - PW(Pulsed Wave) Doppler
  - HPRF(High Pulse Repetition Frequency) PW Doppler
  - Dual Gate Doppler
  - CW(Continuous Wave) Doppler
  - TD(Tissue Doppler)-PW
- Reference frequencies (probe dependent):  
Maximum 3 frequencies
  - PW: 1.5, 1.9, 2.0, 2.1, 2.5, 3.0, 3.3, 3.5, 3.8, 4.0, 4.4, 5.2, 6.0, 6.3 MHz
  - CW: 1.7, 1.8, 2.0, 2.1, 2.5, 3.0, 3.3, 3.8, 5.0 MHz
- Pulse repetition frequency
  - PW: 0.05 to 40 kHz

- Analysis rate
  - CW: 1.1 to 40 kHz
- Max. velocity range:
  - PW/HPRF:  $\pm$ 1.26 cm/sec to  $\pm$ 802.08 cm/sec
  - CW:  $\pm$ 25.07 cm/sec to  $\pm$ 1600 cm/sec
- Base line shift: Adjustable in real-time and frozen.
- Steerable CW: Possible with selected probes.
- Beam Steer  
-30 to 30 degrees(probe dependent), 5 degrees step, possible with linear probes.
- Spectrum inversion
- Angle correction  
0 to 80 degrees, adjustable in real-time and frozen.  
Auto angle correction
- Sample Volume  
Size: 0.5 to 20 mm(0.5 mm,1.0 mm step)  
Display depth of the sample volume
- Wall filter: 12 steps, 1/16 of PRF is Max.
- Gain  
0 to 60 dB, ON/OFF possible, adjustable in real-time and frozen.
- Low Echo Reduction: Suppresses the hypoechoic areas.  
0 to 30%, 2% step
- Grayscale Enhancement: Sets the balance between low brightness and high brightness of grayscale.  
OFF+3 levels(Low, Mid, High)
- Echo Enh.: OFF+2 levels(Low,High)
- Dop. Gamma: Changes the Doppler waveform contrast, and the level of gamma adjustment.  
8 levels, adjustable in real-time and frozen.
- Auto Optimizer: Automatically adjusts image.  
Gain, PRF, baseline, Angle Correction, position of sample volume
- Audio output: 2 channels

### **Color Doppler Mode**

- Flow area: 25 to 100%, 5% step
- Beam Steer  
-30 to 30 degrees(probe dependent), 5 degrees step, possible with linear probes
- Line Density  
8 levels, adjustable independently with B mode.
- Gain: 128 levels
- Texture: 2 levels(Smooth/Sharp)
- Glossy Level: OFF+4 levels
- HI Frame Rate: Improve frame rate by Multi Parallel Processing.
- Auto Optimizer: Automatically adjusts image.

- Gain, position of ROI
- iVascular  
Automatically identifies the long-axis blood vessels in an image, and sets the position of the flow area, the position and size of the sample volume, the blood flow direction, and the angle of the ultrasound beam(angle correction).

#### Color Flow(CF) mode

Displays the orientation and velocity in color on the tomographic image, based on the Doppler signal obtained from the blood flow.

- Display patterns:  
Velocity(derived from mean Doppler frequency shift),  
Velocity + variance, Variance, Velocity + intensity,  
Velocity + variance + intensity
- Max. velocity range  
 $\pm 0.63\text{cm/sec}$  to  $\pm 458.33\text{cm/sec}$
- Reference frequency(probe dependent)  
1.9, 2.0, 2.1, 2.5, 3.2, 3.3, 3.5, 4.0, 4.4, 5.2, 6.0, 6.3 MHz
- Pulse repetition frequency: 0.03 to 19.8 kHz
- Gradation:
  - Velocity:  $\pm 127$  levels(red and blue)
  - Variance: 64 levels(green)
- Invert Color Map
- Smoothing: 5 steps, adjustable in real-time and frozen.
- Persistence Level: 8 steps(Including OFF)
- Wall Filter: 6 steps
- Wall Motion Reduction(WMR)  
OFF + 3 steps(Low, Middle, High), 2 methods
- Packet Size: 3 levels(Large, Middle, Small)
- Baseline Shift: Up to double velocity( $\pm 64$  steps)
- Color Map: 15 kinds
- TGC Enhancement  
ON/OFF possible, working with B mode
- Display superimposed color image
  - Accumu. Imaging: ON/OFF possible, in real-time.
  - Capture Imaging: ON/OFF possible, in frozen.

#### Power Doppler(PD) mode

Displays color on the image according to the intensity of the color Doppler signal. It is sensitive to slow blood flows.

- Display patterns: PD, Directional PD
- Gradation: 256 levels
- Color Map: 15 kinds
- Non-display of B/W image: Possible in ROI
- Smoothing: 5 steps, adjustable in real-time and frozen.
- Wall Filter: 6 steps
- Wall Motion Reduction(WMR)

OFF + 3 steps(Low, Middle, High), 2 methods

#### High Resolution Power Doppler(eFLOW) mode

Displays in the Power Doppler mode in high-resolution.

- Display patterns: eFLOW, Directional eFLOW
- Pulse repetition frequency: 0.03 to 19.8 kHz
- Gradation: 256 levels( $\pm 127$  levels for directional)
- Color Map: 15 kinds
- Smoothing: 5 steps, adjustable in real-time and frozen.
- Wall Filter: 6 steps
- Wall Motion Reduction(WMR)  
OFF + 3 steps(Low, Middle, High), 2 methods

#### **Cine Memory**

- Cine search and loop display (in B mode):  
ECG time phase display is possible
- Capacity
  - B mode: Max. 63,500 frames.
  - M/D mode: Max. Approx. 900 seconds.

#### **Physiological Signal Display**

- Displayed information:  
ECG, PCG\*<sup>1</sup>, Pulse\*<sup>2</sup>, Breathing waveform
- ECG synchronized display: Available for one phase
- Detect regular pulse from arrhythmia(RRp/RRpp)
  - Automated jumping to most optimized R-R Phase
  - Reducing Filter for Tachy or Bradycardia
  - Display value for each R-R interval time
- Display position:  
Continuously variable(both in B and M modes)
- Bar graph display for breathing waveform
- 3 type electrocardiogram(I, II, III)
- Automated detection end diastole and end systole phase.
- Automated split as end diastole(left) and end systole(right)

\*1 Option: MA-300(Not available in EU)

\*2 Option: TY-307A(Not available in EU)

#### **Tissue Doppler Imaging(TDI)**

- Switching Color Doppler and Tissue Doppler during exam is possible.

#### **Dual Gate Doppler**

This is a function which displays Doppler Spectrums of two different sample points simultaneously.

- Supported combinations are PW/PW, TDI/TDI, and PW/TDI\*.
- Automated sample gate setting for each gate.

\*: It is possible to measure E/e' immediately(approx. 5 seconds) by

recognition of imaging view and placement of sample volumes automatically in addition to detect stable heart beats with R-R Navigation.

### **Automated Intima-Media Thickness(IMT) Measurement**

It is possible to automatically extract max, min, average and SD of IMT by simply setting ROI(region of interest) on a long-axis view of the vessel.

- The thicknesses at 3 points, i.e., the point at max IMT, and the points at 1cm on the right and left of the max IMT, can be automatically detected and averaged.

### **2D Tissue Tracking(2DTT)**

It is an application for evaluating the thickness and movements of the myocardium.

- Analysis
  - Free use  
Analyzes the changes in distance between any two points and angular variation from the initial time phase.
  - SAX  
Analyzes differences in thickness between various regions of the myocardium, as well as angular variation with the center of gravity point, based on left ventricular short axis images.
  - Apex-S\*  
Calculates the Longitudinal Strain and Transverse Strain of each region of the left ventricle based on the apex image. The global strain of the endocardium trace is also calculated.
  - Apex-V\*  
Calculates the volume, ejection fraction, center of gravity and velocity of volume change of the right and left ventricles and atrium based on the apex image.
- View
  - SAX  
SAX, Basal SAX, Mid SAX, Apical SAX
  - APEX-S, -V  
4ch, 4ch Inv, 2ch, 2ch Inv, 3ch, 3ch Inv
- Graph Type
  - Line Graph: Displays analysis results for each ROI chronologically in line graphs.
  - Color Graph: Displays a list the analysis results for each ROI into the colors corresponding to the color bar.
  - Line & Color Graph: Displays Line Graph and Color

Graph up and down.

- Bull's eye: When the view is assigned, the analysis results for each ROI are displayed with color and numerical values in a Bull's-eye image.
- Measurements
  - Point to Point: Measures the difference between two points on a graph.
  - Time to Peak: Measures various values of any three time phases and the difference between them.
  - 3 point: Measures various values of any three time phases and the difference between them.
  - Distance: Measures the distance between any two points on an image.

\*: It is possible to perform fully automatic measurements using 2D tracking method such as Global Longitudinal Strain or SAX radial strain and ejection fraction measurements by a single click operation in combination with multiple settings.

### **Stress Echo analysis**

It is an examination in which the heart is subjected to stress through exercise or drugs, for example, in order to check for abnormalities of myocardium.

Stress Echo involves acquiring images before and after the application of stress, displaying the images alongside each other, synchronizing the heartbeats and looping the playback. This permits periodic evaluation of images. Stress echo report can be created using the scoring function.

- Image display modes in which image acquisition is possible: B, Each Flow modes
- Methods for acquiring images
  - Temp acquisition: Acquire a preset heart rate. This method allows you to acquire color images.
  - Conti acquisition: Continuous acquisition. This method cannot acquire color images.
- Protocol: Skip Stage/Skip View is possible during exam.
  - Exercise stress protocols:
    - Exercise Stress Echo
    - Treadmill Exercise
    - Bicycle Exercise
  - Pharmacological stress protocols:
    - DSE
    - High-Dose DSE
    - Low-Dose DSE
    - Arbutamine
    - Dipyridamole
  - User's protocol:
    - The user can make a protocol within 8 views X 12

stages in 1 exam.

- Full disclosure: Max. 2,481 seconds(Depends on probes and various settings)  
2,481 seconds can be achieved under below conditions.
  - Probe: S121(Adult Heart)
  - Protocol: Conti. only(1Stage/1View)
  - Frequency: 30Hz
  - Scan Area: Minimum
  - Line Density: Minimum
- Automatic labeling: Possible(Auto ON/OFF is also possible)
- Comparing images
  - Shuffle Stage: Displays the same view of each stage for comparison.
  - Shuffle View: Displays the different views of the same stage for comparison.
  - Compare: Lines up the same view of any stage left/right for comparison.
- Loop speed: Adjustable
- Scoring: Possible
- Report
  - Chart display: Display scoring results in a list.
  - Schema(Shuffle View) display: Display scoring results by a schema(list of the same Stage).

### **Tissue Doppler Imaging(TDI) analysis**

It performs velocity analysis of the data acquired in the TDI mode.

- B-mode
  - Temporal VP: Displays a graph of the motion velocity distribution in the area specified in the myocardium.
  - Regional VP: Displays a graph of the motion velocity distribution on a trace line arbitrarily specified in the myocardium.
  - Strain Rate: Displays a graph of the Strain Rate time variations in a graph.
  - Strain: Displays a graph of the Strain time variations in a graph.
  - Myocardial Thickness: The changes in myocardial thickness in the time direction of the designated endocardium and epicardium movement within the myocardium are automatically traced and displayed in a graph. The Strain in that area can also be displayed.
- Output as a CSV file: Possible

### **Contrast Harmonic Imaging(CHI)**

It is a function that displays images more visibly by dying

them with an ultrasound contrast agent.

Settings ideal for Low, Mid, and High acoustic pressure are selectable for each contrast agents.

- CHI Method for CHI mode:
  - Wide-band Contrast Harmonic Imaging (WbC): The Pulse Inversion method enables retrieval of echoes from the ultrasound contrast agent across a broad spectrum and display them in CHI mode at a high level of sensitivity.
  - Tissue Reduction Contrast Harmonic Imaging (TrC): The Amplitude Modulation method makes it possible to reduce signals from tissue to get clearer CHI mode images.
- CHI Mode image:
  - CHI-B/W: Displays signals from the ultrasound contrast agent as black-and-white images.
  - CHI-Color: Displays signals from the ultrasound contrast agent as color images.
  - CHI-eFLOW: Displays signals from the ultrasound contrast agent on power Doppler images.
- Tx Mode:
  - Monitor Mode: Displays the monitor image and CHI mode image side by side.
  - Flash: This mode sends high acoustic pressure transmissions at set intervals to destroy the ultrasound contrast agent.
  - One-shot: This mode sends and receives a single shot of an ultrasound signal at high acoustic pressure in response to a manual operation.
- Frame Rate Limit  
Limits the frame rate to prevent ultrasound waves from breaking down the contrast agent.
- Overlay display  
Body motion compensation by Motion Compensated Mode is possible.

### **Contrast Harmonic Imaging(CHI) analysis**

It is a function that lets you display the data collected in CHI mode as a Time Intensity Curve or analyze it in the form of Subtraction images.

- Analysis
  - Time Intensity Curve(TIC)  
Displaying a graph of the temporal changes in the average(or median, maximum, or mode) intensity of the region of interest(ROI).
  - Types of graph:
    - By ROI: Displays graphs for all frames in chronological order.

- By Frame Number: Displays a graph for each frame number in a unit.
- Inflow Time Mapping(ITM)
  - This function focuses on the difference between ultrasound contrast agent inflow times and colorizes changes in brightness across the entire range of the moving image.
- Subtraction
  - Display subtraction images that represent the difference between frames.
- Measurement
  - Point to Point: Measures the difference between two points on a graph.
  - SD: Measures the analysis data for the specified time phase(Time, Max, Average, Medium, Mode, or SD).
  - Wash-in: Measures the rise time of the graph from the minimum and maximum values.
  - Wash-out: Measures the fall time of the graph from the minimum and maximum values.
  - Fitting: Displays an approximated curve based on the start and end points, and measures the degree of increase in the signal strength.
  - FWHM(Full Width at Half Maximum): Calculates the time it takes to reach -6 dB or -3 dB from the maximum value of the graph, and measures the time width between the intersection points on either side of the maximum value.
  - Distance: Measures the distance between any two points on an image.
  - Inflow Time Mapping(ITM) Measurement: Measures the number and proportion of color pixels at each time interval in an ITM image.
  - Area Under the Curve(AUC) Measurement: Measures the area under the curve for a section on the graph.
- Output as a CSV file: Possible

## **EyeballEF**

Selection of apical four-chamber view(A4C) and apical two-chamber view(A2C) and tracing endocardium surface automatically, and measure heart volume, ejection fraction(EF), and Global Longitudinal Strain(GLS) using M. Simpson method.

- Revising Items:
  - Specifying a cross section
  - Setting heartbeat analysis
  - Tracing an end-diastolic image
  - Specifying an end systolic frame
  - Tracing an end-diastolic image

## **Protocol Assistant**

This function ensures that all measurements and image saving are performed without fail by carrying out examinations with the protocol that has been registered in advance.

- Protocol registration: 128 kinds can be registered.
- Suspend protocol function
- Create and edit protocol on the system
- Register and edit reference image
- Import/Export protocol

## **Manual**

It is applicable to browse instruction manual on this system.

- On-board operation manual



## **Data Management**

### **Image data**

- Format
  - Multiple-frame(moving) image
    - DICOM(Raw, MJPEG)
    - PC Format(WMV, AVI, MP4)
  - Single-frame(still) image
    - DICOM(Non-compressed, RLE, RGB(Plane/Pixel), JPEG)
    - PC Format(Tiff, Bmp, JPEG)
- Image acquisition mode
  - Real-time multi-frame image acquisition
    - Raw, Image, RAW and Image at the same time
    - Post ECG: Max. 10 cardiac cycles(R-R)
    - Pre ECG: Max. 10 cardiac cycles(R-R)
    - Post Time: Max. 90 seconds
    - Pre Time: Max. 16 seconds
  - Manual:
    - Raw data: Max. 150 seconds
    - Image data: Max. 180 seconds
  - Cine loop high-speed data transfer(Raw, Image)
    - It is possible to selectively store data of arbitrary section in the Cine Memory.
  - Simultaneous output to multiple media
    - It is possible to output still image data to multiple of storage media include network and printers at the touch of a button.
- Image data management tool
  - Image viewer
    - Compatible with DICOM and PC-format images
    - Simultaneous display of stored and real-time images is possible(Compare mode)
    - Thumbnail display of stored images(1-36 images)
    - Check mark is put on a transferred image
    - Image zoom, rotation, inversion
    - Protect stored images
    - 1:1 replay(main unit HDD or DICOM storage data)
    - DVD-RAM
    - CD-R
    - USB memory
    - USB HDD
    - Re-storing to media, transfer
    - Adjustment is possible on the reconstructed Raw-data image (Gain, Dynamic Range, Gamma Curve, and Color Map in CF mode)

### **Measurement data**

It is possible to store measurement data in the main unit

hard disk

### **Patient data**

- Displayed information\*
  - Patient information
    - ID(up to 64 characters), Name(up to 64 characters, including middle name), Birthdate, Sex, Age, Height, Weight, Occupation
  - Study information
    - Procedure ID, Accession, Study ID, Study Description, Referring physician, Reporting Phys, Sonographer

\*: Conforms to DICOM 3.0 standard

### **Data storage**

- Main unit hard disk
  - Capacity: Approx. 1TB
- USB memory
- USB HDD
- CD-R
- DVD-RAM
- DVD-R
- Network interface(DICOM format)
  - 10 BASE/T or 100 BASE/TX, automatically switched

### **DICOM network communication**

- Conformity to DICOM service class:
  - Ultrasound image storage SCU
  - Ultrasound multi-image storage SCU
  - Storage media FSC/FSR
  - Print management SCU
  - Modality worklist management SCU
  - Modality performed procedure step(MPPS) SCU(For details, please refer to the DICOM Conformance Statement issued by FUJIFILM Healthcare Corporation.)
- Storage
  - Possible to store patient information directly to DICOM file server.
- Print
  - Possible to printout images with DICOM compatible printer directly.
- Work list management
  - Retrieval of patient and reservation information from hospital information system(HIS)
  - NOTE: The HIS needs to be compatible with DICOM standard supplement 10. The HIS network and the DICOM network need to be linked.
- Router setting

- 
- Compatible with SR(Structured Report) for OB, cardiology, vascular and abdominal measurements\*<sup>1</sup>
  - Query/Retrieve\*<sup>2</sup>
  - Compatible with ED(Evidence Documents)
  - Profile
  - Integrated Healthcare Enterprise(IHE)
    - SWF(Scheduled Workflow)
    - PDI(Portable Data for Imaging)
    - ED(Evidence Documents in Radiology/Cardiology domain)
    - Echocardiography Workflow
    - CT(Consistent Time)

\*1 Option: SOP-LISENDO880-21

\*2 Option: SOP-LISENDO880-59

### **Security measures**

- User authentication function is available.
  - 3 Types of user authority can be set.
  - It is possible to set whether password is necessary or not at the start of operation.
- Audit logs
  - Accesses related to user management and patient data are recorded as audit log data.
  - Handling of these logs is limited to users with Level 1 access.

### **Teaching file**

Possible to create teaching file.

## **Measurements and Analysis**

### **Basic measurements**

#### B mode

- Distance measurement: Distance, Dist-trace
- Area and Circumference measurement: Area/Circum
- Volume measurement: Volume1, Volume2
- Angle measurement: Angle
- Histogram measurement: Histogram
- Measurement of Congenital Dislocation of the Hip Joint:
- Hip J Angle
- General purpose index measurement: B.Index

#### M mode

- Distance measurement: M.Length
- Time measurement: Time
- Heart rate measurement: Heart Rate
- Velocity measurement: M.VEL.
- General purpose index measurement: M.Index

#### D mode

- Time measurement: Time
- Heart rate measurement: Heart Rate
- Blood flow velocity measurement: D.VEL1, D.VEL2
- Acceleration (deceleration) measurement: ACCEL
- Resistance index measurement: RI
- Pressure half-time measurement: P1/2T
- Dop.Caliper measurement: D.Caliper1, D.Caliper2
- Measurement of mean velocity and mean pressure gradient\*1: Mean VEL.
- Pulsatility index measurement\*1: PI
- Stenosis flow measurement\*1: Steno Flow
- Regurgitant flow measurement\*1: Regurg Flow
- Dop.Trace measurement\*1: D.Trace1, D.Trace2
- General purpose index measurement\*1: D.Index

#### B/D mode

- Blood flow volume measurement \*1: F.Volume, SV/CO

#### CF mode

- Blood flow volume measurement: Flow Profile\*2

\*1: Auto trace is possible.

\*2 Option: SOP-LISENDO880-7

### **Application measurements**

#### **Abdominal measurements**

##### B mode

- Gallbladder measurement: Gallbladder
- Gallbladder wall thickness measurement: GB Wall-T
- Common bile duct measurement: CBD

- Liver measurement: Liver
- Pancreas measurement: Pancreas
- Pancreatic duct measurement: P-Duct
- Renal measurement: Renal Volume
- Spleen measurement: Spleen
- Space-occupying lesion measurement: SOL
- Blood vessel diameter measurement  
Aorta Diam, PV Diam
- Stenosis percentage measurement  
%STENO-Diam, %STENO-Area

##### D mode

- Artery measurement  
A-Ao, CA, CHA, SA, SMA, IMA, CIA, HA, Prandial SMA
- Renal artery measurement\*  
Renal-A, RA hilum, Seg.A Upp, Seg.A Mid, Seg.A Low
- Portal vein measurement: Main PV, Rt.PV, Lt.PV
- Shunt blood vessel measurement  
Pre Shunt PV, Prox Shunt, Mid Shunt, Distal Shunt

##### B/D mode

- Blood flow volume measurement  
FV(Artery) Abdom, FV(Vein) Abdom

\*: Auto trace is possible.

### **Cardiology measurements**

#### B mode

- L Cardiology measurements  
M.Simpson\*1, GLS(3P)\*2, Area-Length\*1, Pombo\*2, Teichholz\*2, Gibson\*2, Bullet, Simpson, BP-Ellipse, EyeballEF
- Valve area measurement: AVA, MVA
- Aortic valve measurement: AV(2D)
- Pulmonary valve annulus diameter measurement  
PV Annulus
- TAVI/TAVR measurement: TAVI/TAVR
- Right ventricular diameter measurement  
RV Dimension, RV(2D)
- Left atrial diameter/aortic diameter measurement  
LA/AO
- Myocardial wall thickness ratio measurement: Ratio
- Left ventricular myocardial mass measurement  
LV Mass(AL), LV Mass T-E, LV Mass Pedi, LV Mass Pedi Simpson\*2
- Inferior vena cava diameter measurement: IVC
- Left atrial/right ventricle volume measurement\*1  
LA Vol., RA Vol.
- Right ventricular function measurement\*2: FAC

### M mode

- Left ventricular function measurement\*<sup>3</sup>  
Pombo, Teichholz, Gibson
- Mitral valve measurement: Mitral Valve, MV(M)
- Tricuspid valve measurement: Tricuspid Valve
- Pulmonary valve measurement: Pulmonary Valve
- Left atrial diameter/aortic diameter measurement\*<sup>2</sup>  
LA/AO
- Inferior vena cava diameter measurement: IVC
- Asynchrony measurement: IntralV.Async.
- Measurement of tricuspid annular plane systolic excursion(TAPSE)  
TAPSE
- Right ventricular measurement: RV(M)

### D mode

- Left ventricular ejection flow measurement\*<sup>4</sup>  
LVOT Flow, LVOT
- Aortic valve blood flow measurement \*<sup>4</sup>: AS Flow, AV
- Aortic valve regurgitation flow measurement\*<sup>4</sup>  
AR Flow, AR
- Right ventricular ejection flow measurement\*<sup>4</sup>  
RVOT Flow
- Pulmonary stenosis flow measurement\*<sup>4</sup>  
PS Flow, PVA, PV, PA
- Pulmonary valve regurgitant flow measurement\*<sup>4</sup>  
PR Flow, PR
- Left ventricular inflow measurement\*<sup>4</sup>  
Trans M Flow, MV, MV Valsalva
- Mitral annulus diameter measurement: MV Annulus
- Mitral stenosis flow measurement\*<sup>4</sup>: MS Flow
- Mitral regurgitant flow measurement\*<sup>4</sup>: MR Flow
- Tricuspid annulus diameter measurement: TV Annulus
- Tricuspid inflow measurement: TV, TV Valsalva
- Tricuspid stenosis flow measurement\*<sup>4</sup>  
TS Flow, TVA(VTI), TVA(pV)
- Tricuspid valve regurgitant flow measurement\*<sup>4</sup>  
TR Flow
- Pulmonary vein flow measurement: PV Flow
- PISA measurement  
AR Vol. PISA, MR Vol. PISA, PR Vol. PISA, TR Vol. PISA
- TDI PW measurement\*<sup>4</sup>  
TDI PW MW, TDI PW1, TDI PW2, M Annulus(m), M Annulus(l), M Annulus(s), T Annulus(s), T Annulus(l)
- MPI measurement: LV MPI, RV MPI, RV MPI(Tissue)
- Aorta measurement\*<sup>2</sup>  
Ascending Ao Doppler, Descending Ao Doppler,  
Transverse Ao Doppler, Abdominal Ao Doppler

- Blood Flow Measurement of a Defect Hole for Congenital Heart Disease\*<sup>2</sup>: ASD, VSD, PDA, PFO
- Coronary measurement\*<sup>4</sup>  
prox LAD(Rest), prox LAD(Peak), distal LAD(Rest),  
distal LAD(Peak), RCA(Rest), RCA(Peak), LCX(Rest),  
LCX(Peak), Graft(Rest), Graft(Peak),  
Coronary1,2,3(Rest)(Peak), Coronary Stenosis
- Asynchrony measurement  
AV Async., InterV.Async., TDI PW Time to Onset, TDI  
PW Time to Peak

### CF mode

- M TDI measurement  
M TDI mFS, M TDI WT(LVPW), M TDI MT(IVS)

\*1: Auto or Full Auto measurement is possible.

\*2: Auto measurement is possible.

\*3: Caliper Mark Auto Shift is possible.

\*4: Auto trace is possible.

## **Vascular measurements**

### B mode

- Carotid Artery:
  - Stenosis measurement  
Carotid %STENO-D, Carotid %STENO-A
  - mean-IMT measurement: mean-IMT, CmeanIMT\*<sup>1</sup>
  - Max-IMT measurement  
max-IMT, IMT-Cmax, IMT-Imax, IMT-Bmax
  - IMT Automatic measurement:  
CCA\_IMT, ICA\_IMT, ECA\_IMT, BIF\_IMT
  - IMT-C10 measurement: IMT-C10, IMT-C10 Auto\*<sup>1</sup>
- Upper Ext Artery:
  - Stenosis measurement  
Upper %STENO-D, Upper %STENO-A
- Lower Ext Artery:
  - Stenosis measurement  
Lower %STENO-D, Lower %STENO-A

### D mode

- Carotid artery blood flow measurement  
CCA proximal, CCA mid, CCA distal, ICA, ECA, BIFUR,  
VERT
- Upper extremity artery blood flow measurement  
ScA, AA, BA, DBA, BasA, RA, UA, SPA
- Lower extremity artery blood flow measurement  
CIA, EIA, IIA, CFA, DFA, SFA, PopA, PerA, ATA, PTA,  
DPA
- Transit time of vessel flow(TVF) measurement\*<sup>2</sup>  
TVF\_CFA, TVF\_POP, TVF\_ATA, TVF\_PTA, TVF\_PA

- Upper extremity venous blood flow measurement  
IJV, ScV, CV, AV, BV, DBV, BasV, RV, UV
- Lower extremity venous blood flow measurement  
CIV, EIV, IIV, CFV, DFV, SFV, GSV, PopV, PerV, LSV, ATV, PTV

- Transcranial artery blood flow measurement  
ACA, MCA, PCA, BA, VA, TICA, ACoA, PCoA

\*1: IMT Auto measurement is possible.

\*2 Option: SOP-LISENDO880-47, PEU-LISENDO880

## Small parts measurements

### B mode

- Lesion measurement(for breast use): Lesion(Breast)
- Aspect ratio measurement: D/W ratio
- Papilla-tumor distance measurement: NT dist
- Thyroid gland volume measurement: Thyroid Volume
- Thyroid isthmus thickness measurement  
Isthmus Thickness

### D mode

- Artery measurement(for mammary blood flow)
- Artery measurement(for thyroid blood flow)

## Obstetric measurements

### B mode

- Gestational age measurement: GA
- Fetal wight measurement: FW
- Ratio measurement: Fetus Ratio
- Amniotic fluid index measurement  
AFI\*, AF Pocket, AFV, MVP
- Cardiothoracic ratio measurement: CTAR, CTR
- Cervical length measurement: Cervix

### M mode

- Left ventricular function measurement: LV Function
- Fetal heart rate measurement: FHR, PreHR, PstHR

### D mode

- Blood flow measurement  
Umbilical Artery, MCA, Uterine Artery, Descending Aorta, Renal Artery
- Left(right) ventricular ejection flow measurement:  
LVOT Flow, RVOT Flow
- Preload index measurement: PLI
- Ductus venosus measurement: Ductus Venosus
- Fetal heart rate measurement: FHR, PreHR, PstHR

### Others

- Supports multiple pregnancy examination
- \*: Caliper Mark Auto Shift is possible.

## Gynecology measurements

### B mode

- Uterus measurement: Uterus
- Endometrial thickness measurement: Endom-T
- Cervix measurement: Cervix
- Ovarian measurement: Ovary
- Follicular measurement: Follicles
- Follicle volume measurement: Follicles Volume
- Bladder measurement: Bladder Volume

### D mode

- Uterine artery measurement: Uterine Artery
- Ovarian artery measurement: Ovarian Artery

## Urological measurements

### B mode

- Prostate measurement: PSA Volume, PRS Slice Vol.
- Seminal vesicle measurement: Seminal Vesicles
- Bladder measurement: Bladder Volume
- Testicular measurement: Testis Volume
- Renal measurement: Renal Volume
- Cortical measurement: Cortex Thickness
- Adrenal measurement: Adrenal

### D mode

- Arterial blood flow measurement: Renal Artery

## Report functions

- Measurement report
  - Abdominal measurement report
  - Cardiac function measurement report  
Advance Cardiac Report\* functions can be added.
    - Complies with the ASE guidelines.
    - Check and edit the measurement results on the Worksheet screen.
    - Confirm revisions of measurement results, enter findings, prepare reports on the Report screen.
  - Vascular measurement report
  - Small parts measurement report
  - Obstetric measurement report
  - Gynecology measurement report
  - Urological measurement report
- Recall past measurement reports.
- Plot examination data history on the report.

- 
- Direct printout of each report with an optional PC printer.
  - Output of measurement values in CSV file is possible.
- \* Option: SOP-LISENDO880-70

### **Others**

- Playback measurement
- Assign measuring functions to the alphabet keys on the keyboard.
- User's Calculation: Combine basic measurement functions such as distance, area and flow velocity to create index calculation formulas for measurement packages.  
It is possible to create measurement packages that contain a total of 30 calculations per application.
- Reserved Word: Measurement parameter names for application measurements, or user-registered measurement names that can be used in User's Calculation.  
60 reserved words can be registered for each application.
- Font size of measurement result  
3 kinds(x1, x1.2, x1.4)

## **Optional Functions**

### **PC printer**

It is possible to printout Abdomen, cardiology, vascular, small parts, OB/GYN, and urology report screens including ultrasound images directly with an external PC printer.

### **Cardiac 3D(4D)\***

Cardiac 3D(4D) function provides the capability to display Cardiology 3D image and to display dual image(reference image and biplane image) simultaneously by using TTE and TEE 2D array probe.

- Scanning rate: Up to 999 volumes/sec
- Biplane Mode(Color)
- 3D Zoom Mode(Color)
- Active 3D Mode(Color)
- Wide Angle 3D Mode(Color)
- Live 1,2,3,4,5,6 beat 3D volume imaging
- Live 1,2,3,4,5,6,7 beat 3D color volume imaging
- It is possible to display 3 arbitrary sections simultaneously.
- MPR(Multi-planar Reconstruction)
- Auto Rotation
- 2 click cropping operation
- 3D Cropping
- Display Layout(Single, Dual, Quad, MSI)
- Multi slice Image
- Function to change 3D Imaging Parameter
- Change MPR View to operate by drag
- Density(Both Lateral and Elevation)
- Performance mode(Function to control the frame rate and volume rate to adjust the temperature at the probe tip.)
- Change Plane Angle to observe arbitrary cross-section.

\* Option: SOP-LISENDO880-129

### **iEF\***

iEF calculates Biplane EF with full automated ED/ES frame detecting and full automated A2C and A4C contour tracing of biplane images acquired from a transthoracic 2D matrix probe.

\* Option: SOP-LISENDO880-120, SOP-LISENDO880-129

### **4D LV-Analysis\***

Additional features to 4D LV-Function

- Polar plot with parametric display for all parameters.
- Dynamic(amplitude) and static(time to peak) parametric display for all parameters.
- Global LV twist and LV torsion calculation

- Automated workflow allows analysis can be started without user interaction.
- Displacement and strain analysis
  - Longitudinal, circumferential and radial component analysis
  - Principal tangential strain and 3D displacement analysis
  - Segmental peak, time to peak and global average values in result table
  - Segmental parameter over time chart display
- Rotation and twist analysis
  - Twist, Rotation Base, Rotation Apex
  - Segmental parameter over time chart display

\* Option: SOP-LISENDO880-112

This option is manufactured by TOMTEC Imaging System GmbH

### **4D RV-Function\***

- Semi-Automated quantification of the Right Ventricle
  - Fast and easy Workflow
  - Automatic contour proposal - no laborious contour drawing
  - RV surface model
- 4D Review and Analysis
  - Real-time interactive 4D model(Beutel) display of ventricle
  - Display of 2D ultrasound slices(SAX and LAX) with Beutel contours as overlay
  - Graph displays for global volumes over time
  - Display of result window with derived parameters
- Measurements
  - Global volumes over time
  - Calculation of EDV, ESV, EF, SV
  - Right ventricular longitudinal strain(RVLS)
    - free wall
    - septum
  - Additional 2D measurements
    - TAPSE
    - FAC
    - RVDd base(RVD1)
    - RVDd mid(RVD2)
    - RVLd(RVD3)

\* Option: SOP-LISENDO880-113

This option is manufactured by TOMTEC Imaging System GmbH

### **4D MV-Assessment\***

- Semi-Automated Annulus and Leaflet Detection
  - Fast and easy Workflow
  - Semi automatic annulus detection

- Automatic and dynamic MV model generation via object segmentation
- Automatic measurements for annulus, leaflets and coaptation
- Morphological and functional analysis views
- Analysis screen for 4D presentation of tissue and annular structures
- Transparency rendering to display all objects within tissue
- Definition and display of surgical and ventricular view orientations
- Display of B/W tissue and Doppler color information in all views
- Adjustable cut plane(D'Art)
- Color texture on leaflet models that represents their topology
- 4D Reconstruction Mode
  - Real-time rendering
  - Interactive 4D cube for data presentation and manipulation
  - 4D rendering of B/W tissue and color Doppler data
  - 3D visualization of automatic measurements
  - Hybrid 4D display of measurements and grayscale data
  - Interactive display settings for optimum display
  - Separate settings for threshold and transparency
  - Generic manual measurements
- Further general features
  - On-screen help
  - Planimetry layout for individual MPR adjustment
  - Carpentier segmentation labels on leaflet surface
- Measurements
  - Manual measurements such as distance, angle, curve and area
  - Static and dynamic annular measurements
  - Static and dynamic leaflet measurements
  - Static and dynamic coaptation measurements

\* Option: SOP-LISENDO880-114

This option is manufactured by TOMTEC Imaging System GmbH

### Vector Flow Mapping Analysis (VFM)\*<sup>1</sup>

It is an application that performs quantitative analysis on data about the blood flow in a heart chamber or blood vessel based on the color Doppler information.

- VFM Cardiac: This function analyzes the blood flow images captured by using the sector probe and the apex approach.
  - Display of the blood velocity distribution on the

- scanned section(2D Velocity Distribution)
- Vorticity display(Vorticity Line, Vorticity)
- Streamline display
- Circulation display(Circulation)
- Local-line velocity distribution display(Local-line Velocity Distribution)
- Borderline velocity profile display(Velocity Profile)
- Energy loss display(Energy Loss)
- Displaying pathlines(Pathline)
- Displaying a wavefront(Wavefront)
- Flow quantity(Flow Display)
- Flow quantity curve(Time Flow Curve Display)
- Wall shear stress
- Displaying relative pressure gradient(Relative Pressure)\*<sup>2</sup>
- VFM Vascular: This function analyzes the blood vessel images that are captured by using the linear probe.
  - Display of the blood velocity distribution on the scanned section(2D Velocity Distribution)
  - Wall shear stress

\*<sup>1</sup> Option: SOP-LISENDO880-64

\*<sup>2</sup> Option: SOP-LISENDO880-77

### eTRACKING\*

It is a function to calculate arteriosclerosis indices such as the pressure-distortion elastic constant( $E_p$ ) and the stiffness parameter( $\beta$ ), which indicate the elastic characteristics of the blood vessel based on the blood vessel diameter and blood pressure values of the carotid artery.

- Stiffness parameter( $\beta$ ) analysis results:
    - $\beta$ : Stiffness parameter
    - $E_p$ : Pressure-distortion elastic constant
    - AC: Arterial compliance
    - AI: Augmentation Index
    - PWV $\beta$ : Regional pulse wave velocity
    - DATmax: Maximum Distension Acceleration Time
  - Output as a CSV file: Possible
  - Blood pressure value is necessary for this examination.
- \* Option: SOP-LISENDO880-11

### Flow Mediated Dilatation(FMD) analysis\*

It is used for the functional assessment of vessels before organic changes, such as vessel wall thickening and plaque formation, are manifested.

In an FMD test, blood flow volume is increased noninvasively, and changes in blood flow velocity and vessel diameter are recorded precisely for long periods of



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time.

Echo Tracking technology is used to capture and record changes in the state of the vessel at three stages such as baseline, during a vascularization and dilatation after the cuff deflation, to assess FMD.

- Output as a CSV file: Possible
- Blood pressure value is necessary for this examination.

\* Option: SOP-LISENDO880-16(includes eTRACKING software.)

### **Wave Intensity(WI)\***

Wave Intensity (WI) has been proposed as an indicator to allow simple determination, based on the forms of the blood pressure waveforms and velocity waveforms at any point in the arterial system, of which is predominant, the forward-traveling wave heading from the heart to the periphery, or the backward-traveling wave returning from the periphery to the heart.

- Wave Intensity analysis:
  - Wave Intensity: Wave Intensity index value
  - Arterial Stiffness: Index values for assessing the hardness of the blood vessel
  - Diameter: Distension waveform
  - Flow Velocity: Blood flow velocity measurement value
- Output as a CSV file: Possible
- Blood pressure value is necessary for this examination.

\* Option: SOP-LISENDO880-34(includes eTRACKING software.)

### **Detective Flow Imaging(DFI)\***

Removes motion artifacts from the feature amount of movement obtained by analyzing the received signals in the ROI, and displays images in colors that vary according to the signal intensity. Blood flow is displayed at a high frame rate and is little affected by body movement.

\* Option: SOP-LISENDO880-105

## **General Specifications**

### **Acoustic Power**

- 0 to 100%

### **Preset Function**

- 100 kinds(Max. 10 kinds per each probe)
- Preset contents storable in USB memory
- Quick Scanning Selector(Q.S.S.)
  - Image modifying parameters (e.g. Gain, frequency, depth) of your choice can be registered. (Up to 4 sets per preset)
  - These parameters can immediately be registered and selected by touch panel during examinations.
- Preset is booted up in conjunction with ID information (BodyParts or etc.)

### **Characters and graphic displays**

- Character input area
  - ID, name, age, sex, retained text
  - (Can be corrected after exam.)
- Input is possible with virtual keyboard on LCD panel
- Automatic Annotation Labeling
  - 800 words(User registration is possible. 10 classes.)
- Body mark:
  - 38 kinds are available per each region.
  - 6 regions+1 user is able to register.
  - Probe mark: 4 kinds
  - Display position: changeable
  - Fetus mark
  - Rotatable(Only single horizontal fetus marks)
- Assist line display

### **Menu control**

- 10.4-inch color TFT LCD touch panel

### **Active Probe Ports**

- For electronic scanning probes: 6 (4 active, 2 parking)
- For independent probes\*: 1

\*Option: EU-9187B

### **Input/Output Signals**

- Data Input/Output
  - USB2.0: 5 channels
  - (Main unit 2+ Operation Panel 3)
  - USB3.0: 1 channel
- Digital Video Input/Output

#### Input

- DVI-D digital:

Resolution: WXGA++(1600x900)

#### Output

- DVI-D digital
    - Resolution: WXGA++(1600x900)
  - Digital video with HDMI connector\*
    - Resolution: FHD(1920x1080), XGA(1024x768), VGA(640x480)
  - \* Option: EU-9205
  - Analog Video Input/Output
- #### Input
- Y/C: 1 channel
- #### Output
- Color composite (BNC): 1 channel
  - Y/C: 1 channel
  - Network: LAN(Wired, Wireless)
  - Others
    - Audio (L/R): 2 channels (Output 1, Input 1)

### **Storage**

- SSD
- HDD

### **Viewing Monitor**

- 22 inch Organic EL monitor(OLED)
  - Resolution: FHD(1920 x 1080)
- Tilt and swivel are possible.
- Height adjustment and swivel together with operation panel.

### **Safety Regulation**

- IEC 60601-1 Ed.3.0: 2005, IEC 60601-1 Ed.3.1: 2012
- Class I, Type BF

### **Environmental Requirements**

- In Operation
  - Temperature: +10 to +40 degrees C
  - Relative Humidity: 30 to 75 %(non condensing)
  - Atmospheric pressure: 700 to 1060 hPa
  - Altitude: Up to 3000 m
- In Storage/Transportation
  - Temperature: -10 to +50 degrees C
  - (0 to +50 degrees C for mechanical probes)
  - Relative Humidity: 10 to 90 %(non condensing)
  - Atmospheric pressure: 700 to 1060 hPa

### **Power Requirement**

- 100 to 120/ 200 to 240 V  $\pm 10$  %, 50 or 60 Hz,  
Max. 1300 VA(with optional recorders connected)

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Max. 900 VA(main unit only)

- Shut down tool

Hibernation \*

\*: The condition is saved even if the power is unplugged.

### **Dimensions**

- 55 cm(W) × 90 cm(D) ×122 to 169.5 cm(H)

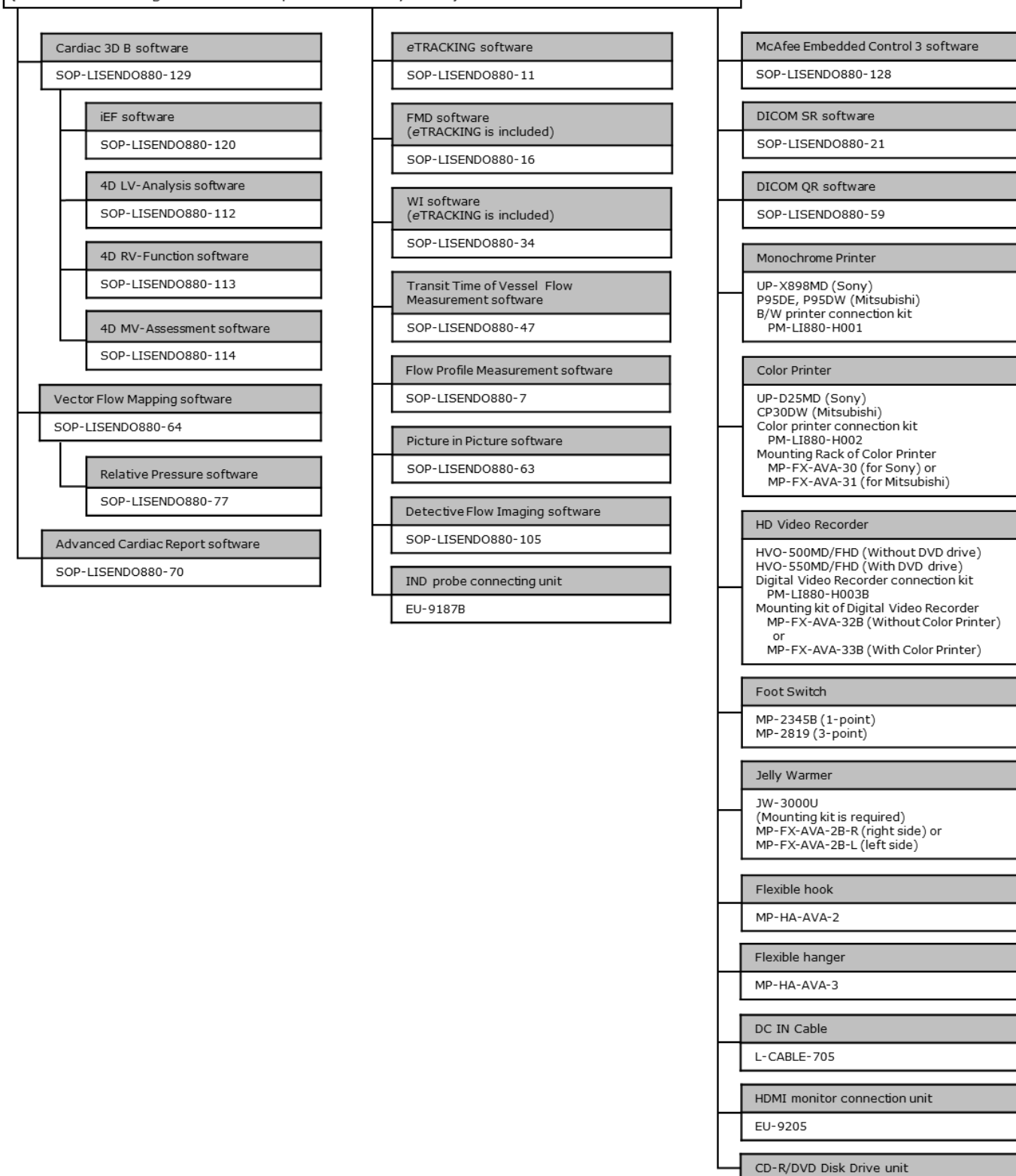
### **Weight**

- Main unit only: 145 kg±10%
- Main unit and all optional equipment: 163 kg±10%

## System Configuration

LISENDO 880LE main unit

(includes a viewing monitor and Alphanumeric keyboard)



## OPTIONAL PROBES

### Electronic convex sector probes

Application (description)	Model	Frequency range (MHz)	Scanning angle (degrees)	Optional accessories
Abdominal	C251	5.0-1.0	70	Bracket 644-082, 644-083(CIVCO)*1*2
Abdominal	C252	6.0-1.0	70	Bracket 644-082, 644-083(CIVCO)*1*2
Abdominal	C35	8.0-2.0	70	Bracket 644-082, 644-083(CIVCO)*1*2
Abdominal	C42	8.0-4.0	80	Needle Guide Bracket EZU-PA532 Bracket 644-077, 644-078(CIVCO)*1*2
Intraoperative	C42K	10.0-4.0	65	Puncture Adapter MP-2458 Bracket 614-068, 614-100(CIVCO)*1*2
Abdominal	C421	12.0-3.0	100*	Verza Bracket 644-098, 644-099(CIVCO)*1*2 Waterproof Case WP-001

\*When Wide Scanning is ON

### Electronic linear probes

Application (description)	Model	Frequency range (MHz)	Scanning width (mm)	Optional accessories
Small Organ	L34	7.0-3.0	38	Coupler EZU-PA3C1H Bracket 644-079, 644-080(CIVCO)*1*2
Small Organ	L35	9.0-2.0	45	CIVCO Verza Needle Guide 610-1500-24(CIVCO)*2 No Bracket for puncture (Verza Needle Guide can be attached directly)
Peripheral Vessel	L441	12.0-2.0	38	Bracket 644-075, 644-076(CIVCO)*1*2
Intraoperative	L53K	15.0-3.0	25	Waterproof Case WP-001
Small Organ	L64	18.0-5.0	38	Needle Guide Bracket EZU-PA7L3*1

## Electronic phased array sector probes

Application (description)	Model	Frequency range (MHz)	Scanning angle* (degrees)	Optional accessories
Cardiac Pediatric	S31	9.0-2.0	100	-
Neonatal Cardiology	S42	14.0-3.0	100	-
Cardiac, TEE	S3ESL1	9.0-2.0	100	Mouthpiece(Standard) SP-7901 Waterproof Case WP-001
Cardiac Adult, TEE	S3ESEL	8.0-2.0	100	Mouthpiece(Standard) SP-7901
Cardiac, TEE	S3ESCLS	8.0-2.0	100	Mouthpiece(Standard) MP-2787
Cardiac Adult	S121	5.0-1.0	120	-

\*When Wide Scanning is ON

## CMUT(linear probes)

Application (description)	Model	Frequency range (MHz)	Scanning width (mm)	Optional accessories
Peripheral Vessel	SML44	22.0-2.0	38	-

## Matrix 3D(4D) Probes\*

\***SOP-LISEND0880-129** is necessary

Application (description)	Model	Frequency range (MHz)	Scanning angle (degrees)	Optional accessories
Cardiac Adult, TEE	MXS2ESLL	10.0-1.0	90	-
Cardiac Adult, TEE	MXS2ESLL1	10.0-1.0	90	-
Cardiac Adult, TTE	MXS1	5.0-1.0	90	-

## Independent CW Doppler Probes\*

\* Independent probe connection unit **EU-9187B** is necessary.

Application	Model	Frequency range (MHz)	Optional accessories
Cardiac Adult	UST-2265-2	2.0	-
Cardiac Adult	UST-2266-5	5.0	-

\*1: Needle Guide Kit(CIVCO) is necessary.

\*2: CIVCO products are manufactured and sold by CIVCO Medical Solutions. It does not suggest that CIVCO products describe in this specification are commercially available in all countries and regions.

## Probes and available functions

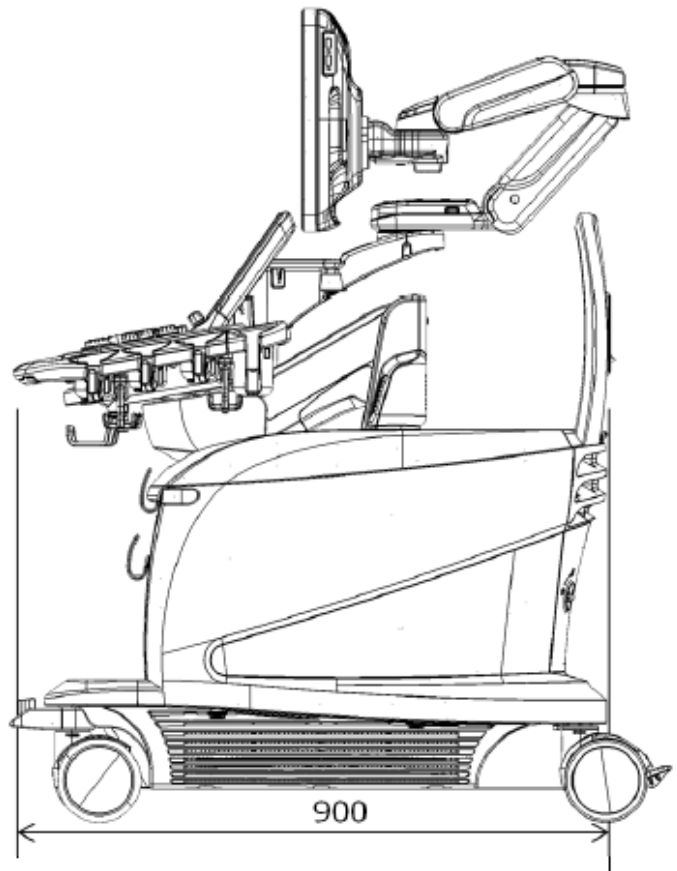
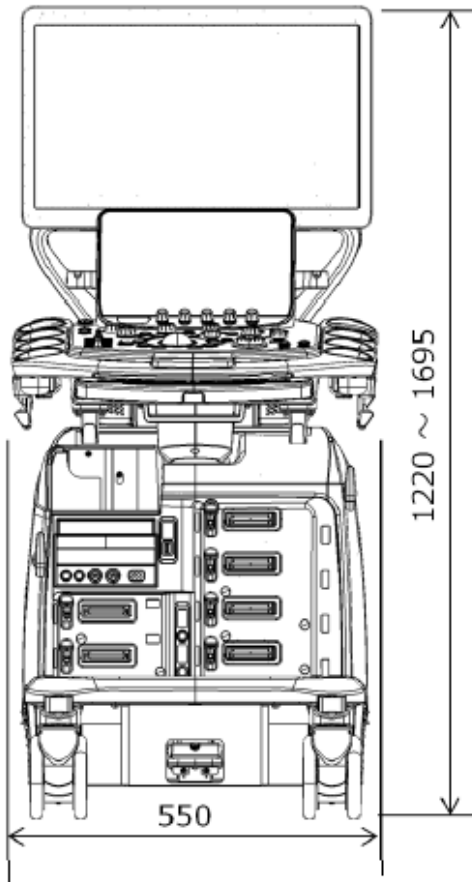
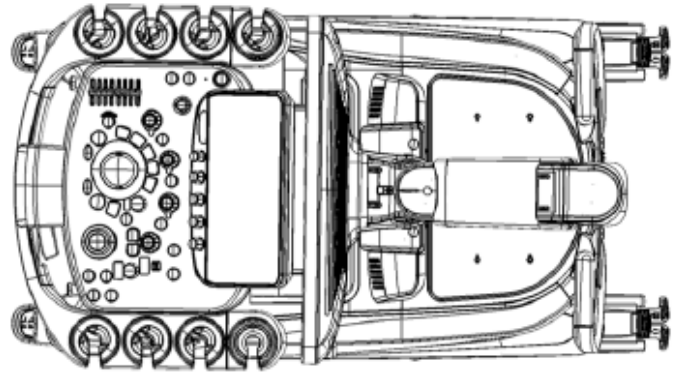
### Basic Functions

	Compound	Trapezoid	Wide Scanning	B steer	eFocusing	Acoustic Noise Reduction	Near-field Noise Reduction	Real-time Biplane	FAM	TGC Enh(B)	TGC Enh(Color)	TDI mode	HI Frame(B)	HI Frame(Color)	Puncture Guide Line	Needle Emphasis	CW mode	Assist Line	THI(Fmt)	THI(WbT)	THI(HdT)	Dual Gate Doppler
C251	✓				✓	✓	✓		✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
C252	✓				✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
C35	✓				✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
C42	✓				✓	✓	✓		✓						✓	✓	✓		✓	✓	✓	✓
C42K	✓				✓	✓	✓		✓						✓	✓					✓	✓
C421	✓		✓		✓	✓	✓		✓						✓	✓	✓		✓	✓	✓	✓
L34	✓	✓		✓	✓	✓	✓		✓	✓					✓	✓	✓			✓	✓	✓
L35	✓	✓		✓	✓	✓	✓		✓	✓	✓				✓	✓	✓	✓		✓	✓	✓
L441	✓	✓		✓	✓	✓	✓		✓		✓			✓	✓	✓	✓			✓	✓	✓
L53K	✓	✓		✓	✓	✓	✓		✓											✓	✓	✓
L64	✓	✓		✓	✓	✓	✓		✓		✓				✓	✓	✓	✓		✓	✓	✓
SML44	✓	✓		✓	✓	✓	✓		✓		✓							✓		✓	✓	✓
S31			✓			✓	✓		✓			✓		✓			✓		✓			✓
S42			✓			✓	✓		✓			✓		✓			✓		✓			✓
S3ESL1			✓			✓	✓		✓			✓		✓			✓					✓
S3ESEL			✓			✓	✓		✓			✓		✓			✓					✓
S3ESCLS			✓			✓	✓		✓			✓		✓			✓					✓
S121			✓		✓	✓	✓		✓			✓	✓	✓			✓		✓	✓		✓
MXS2ESLL						✓	✓	✓	✓			✓	✓				✓					
MXS2ESLL1					✓	✓	✓	✓	✓			✓	✓	✓			✓					
MXS1					✓	✓	✓	✓	✓			✓	✓	✓			✓		✓			✓
UST-2265-2																	✓					
UST-2266-5																	✓					

## Optional Functions

	CHI(Low)	CHI(Mid)	CHI(High)	Panoramic	Cardiac 3D	Stress echo	eTRACKING	FMD	Wave Intensity	VFM Cardiac	VFM Vascular	CHI-eFLOW	DFI mode
C251	✓	✓	✓	✓								✓	✓
C252	✓	✓	✓	✓								✓	✓
C35	✓	✓		✓									✓
C42				✓									
C42K													
C421	✓	✓		✓									✓
L34	✓	✓		✓			✓	✓	✓				
L35	✓	✓		✓								✓	✓
L441	✓	✓		✓			✓	✓	✓		✓		✓
L53K													
L64				✓			✓	✓	✓				✓
SML44				✓			✓	✓	✓				✓
S31						✓				✓			
S42						✓				✓			
S3ESL1										✓			
S3ESEL										✓			
S3ESCLS										✓			
S121	✓					✓				✓			
MXS2ESLL					✓					✓			
MXS2ESLL1					✓					✓			
MXS1					✓	✓				✓			
UST-2265-2													
UST-2266-5													





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- The specifications may be different depending on configuration, probe, setting parameter and they are subject to change without notice.
  - The standard components and optional items differ depending on the country.  
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