TE7/TE7T/TE7S/TE7 Pro/TE7 Super/TE5/TE5T/TE5S/TE5 Pro/TE5 Super

Diagnostic Ultrasound System

Operator's Manual

[Advanced Volume]

Content

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Preface

This manual details the procedures for operating the TE7/TE7T/TE7S/TE7 Pro/TE7 Super/TE5/TE5T/TE5S/TE5 Pro/TE5 Super Diagnostic Ultrasound System. Carefully read and understand the manual before using the system to ensure its safe and correct operation.

NOTE: When operating the system, refer to the following manuals:

- Operator's Manual (Basic Volume)
- Acoustic output data

Depending on the software version, the preset settings, optional configuration and the actual interfaces may appear differently from those shown in this manual.

NOTE: The functions described in this manual are not provided for all systems sold in all regions. The functions available depend on the specific system purchased.

All the menus and screenshots in this manual take the system in full configuration as an example.

Safety Precautions

1. Meanings of Signal Words

In this manual, the signal words **⚠Danger**, **⚠WARNING**, **⚠CAUTION** and **NOTE** are used regarding safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
⚠Danger	**Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.**
⚠WARNING	**Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.**
⚠CAUTION	**Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.**
NOTE	Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

2. Meaning of Safety Symbols

Symbol	Description
⚠	General warning, caution, risk of danger.

3. Safety Precautions

Please observe the following precautions to ensure patient and operator safety when using this system.

⚠CAUTION:

1. **Select the proper patient image and measurement tools. Only qualified professionals can decide the appropriate measurements and results.**
2. **Confine measurement calipers to the actual Region of Interest (ROI). Measurements that extend beyond the ROI will be incorrect.**
3. **Before examining a new patient, it is necessary to tap [End] to end the current scan and delete the patient information and data. Failure to do so will result in new patient data being combined with the previous patient's data.**
4. **When the system is turned OFF or [End] is tapped, all unsaved data are lost.**
5. **Changing modes during a measurement will delete the Basic Measurement data.**
6. **Tap [Freeze] to unfreeze the image during a measurement will clear the Basic Measurement data.**
7. **Tap [Clear All] will clear the measurement caliper and all data in the result window, such as comments and body marks.**

8. **In dual-B imaging mode, the measurement results of the merged image can be inaccurate. Therefore, the results are provided for reference only, not for confirming diagnoses.**
9. **Ensure that measurement data correctly corresponds to the fetus during the Obstetric Measurement.**
10. **Fully understand the functionality of this system by referring to the *Operator's Manual - Basic Volume*.**
11. **When the result of auto trace does not match the image exactly, perform the measurement manually.**

1 Overview

1.1 Basic Operations and Buttons

Basic Measurement Procedures

1. Tap [End] to end the last exam.
2. Tap [Patient] and enter the patient information,

   This includes patient ID, name, height, weight, etc. Enter manually for a new patient or load from iStation or Worklist for an anonymous patient.

   The patient information entered is used for measurement data storage, analysis and exam report. For more details, see “Exam Preparation → Patient Information” in the Operator's Manual [Basic Volume].
3. Tap [Probe] and select a proper exam mode.

   For more details, see “Exam Preparation” in the Operator's Manual [Basic Volume].
4. Measurement preset.

   To preset measurement parameters, obstetric formula, basic/advanced measurement packages, etc., see “2 Measurement Preset” for details.
5. Tap [Measure] to start measurement.
6. Select an item from the measurement menu to start.

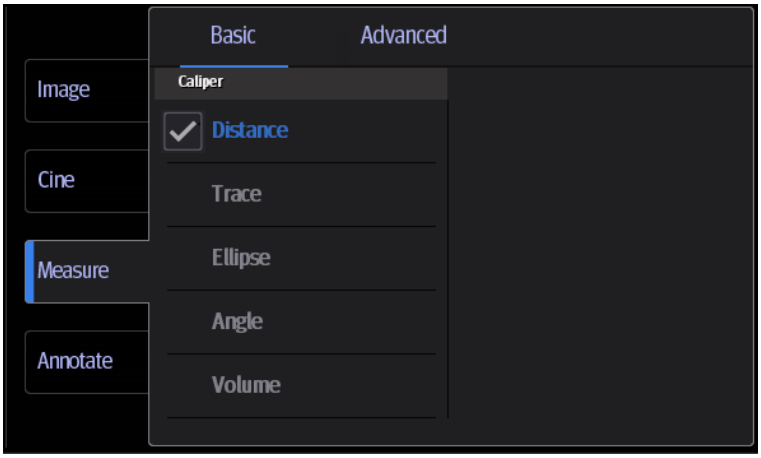
   For basic and advanced measurement items (tools), see chapter “3 Basic Measurement” of the specified advanced measurements for details.
7. Tap [Report] to view the exam report.

   For report editing and browsing, see “1.7 Report.”

1.2 Measurement Menu

The Basic and Advanced measurement menus are different. For more information on the measurement menu, see “3 Basic Measurement Basic Measurement” and the specified advanced measurement chapters.

The measurement menus are shown in the following figures:



1.2.1 Measurement Location

The location widgets are used to select the measurement locations.

- Side (Left/Right): belongs to items (e.g., kidney) that contain measurements of left/right side parameters respectively.
- Location (Prox./Mid./Dist.): belongs to items (e.g., vascular) that contain measurements of Proximal, Middle or Distal parameters.

Tip:	The location widgets are applicable only in the advanced measurements.

1.2.2 Measurement Tool

There are two types of measurement tools.

- Basic tools: the measurement tools for Basic Measurements which are general and have no specific clinical definitions. Examples include “Distance” and “Area”.
- Advanced tools: the measurement tools for Advanced Measurement. These items are classified and combined in clinical advanced packages according to the exam mode. For example, HC (head circumference) in the Obstetric measurements is one of the advanced tools.

To Activate the Measurement Tool

The procedure is as follows:

1. Select the tool: Tap the screen to select the item and tap again to confirm.

   For 2D+M and 2D+Doppler combined imaging modes, the measurement items will be classified according to the imaging modes.

   Tap the imaging mode from the measurement menu, then select and perform the corresponding measurement item.

2. After finishing the measurement, perform other necessary operations.

Select Measurement Method Online

Some measurement tools have multiple methods to select.

1. Select item in the menu.
2. Tap the box on the right side of the item to select the method, as shown in the following figure.

Other Features

Features	Descriptions
Current measurement tool/item	Highlighted in blue.

Features	Descriptions
Measured item	A performed advanced item/tool is marked with a "√." (If all items in a submenu (extended menu) of a study are already performed, this study will be marked as measured.) NOTE: Tap on "√" ahead of the measured item/tool, and tap [Delete] from the menu popped up, the measure caliper and results in the result window and report will be cleared.

1.3 Measurement, Calculation and Study

There are three kinds of measurement items.

Measurement

Results of measurements are directly obtained via the measurement tools, which are indicated by " " in the preset screen ([Presets] -> [Measure]).

For example, "Distance" in the 2D general measurement or "HC" in the OB measurement.

Calculation

Results of calculations are automatically derived by the system using other measured or calculated values as parameters, they are indicated by " " in the preset screen ([Presets] -> [Measure]).

For example, EFW (Estimated Fetal Weight) in the OB measurement.

If all measurements related to a calculation tool are completed, the system will automatically calculate the result. If some measurement tools are performed again, the system will automatically update the calculation result using the latest measurement results.

Study

A group of measurements and/or calculations for a specific clinical advanced, which are indicated by "" in the preset screen ([Presets] -> [Measure]).

For example, AFI in the OB measurement.

1.4 Measurement Caliper

A measurement caliper is a graphic consisting of several points and a straight line or curve drawn on the ultrasound image.

Fixed/Active End

The ends of calipers can be active or fixed. The active end is called a Cursor.

Caliper Color

An active caliper appears green, while a fixed one appears white in the system default preset.

Caliper End Symbols

8 symbols are used as caliper ends, as shown in the figure below.

These symbols display in calipers as well as in the results window to identify different measurements.

NOTE:	You can preset the cursor type in [Setup] -> [System] -> [Measure], see “2.2 Measurement Parameters Preset” for more information.

1.5 Results Window

The measurement window displays the conducted measurement’s result and the engaging measurement in real time.

1.5.1 Results Display

The latest results are displayed in the results window in time sequence.

When viewing the results:

- If the results window is full, the oldest value will be replaced according to the “first in, first out” rule.

  A maximum of 8 results can be displayed in the results window.
- To identify the measurement results, symbols or numbers are used in the numerical results window.
- To delete the last measurement result, tap [Clear Item], the measurement result, the corresponding caliper and data will be cleared.

The results displayed can be the following:

- No result displays when a measurement item/tool is activated but without fixing the start point.
- The result displays as digits when the value obtained is within the clinical range.
- The result displays as “?” when it is out of the ultrasonic range.

1.5.2 Moving the Results Window

To move the results window,

1. Tap on the results window title and the border of the result window will change to white.
2. Drag the results window to the desired position and release the cursor.

1.6 Cross-window Measurement

For linear probing, cross-window measurement is available in dual-B mode when the left and right windows are imaging with the same probe, depth and invert mode.

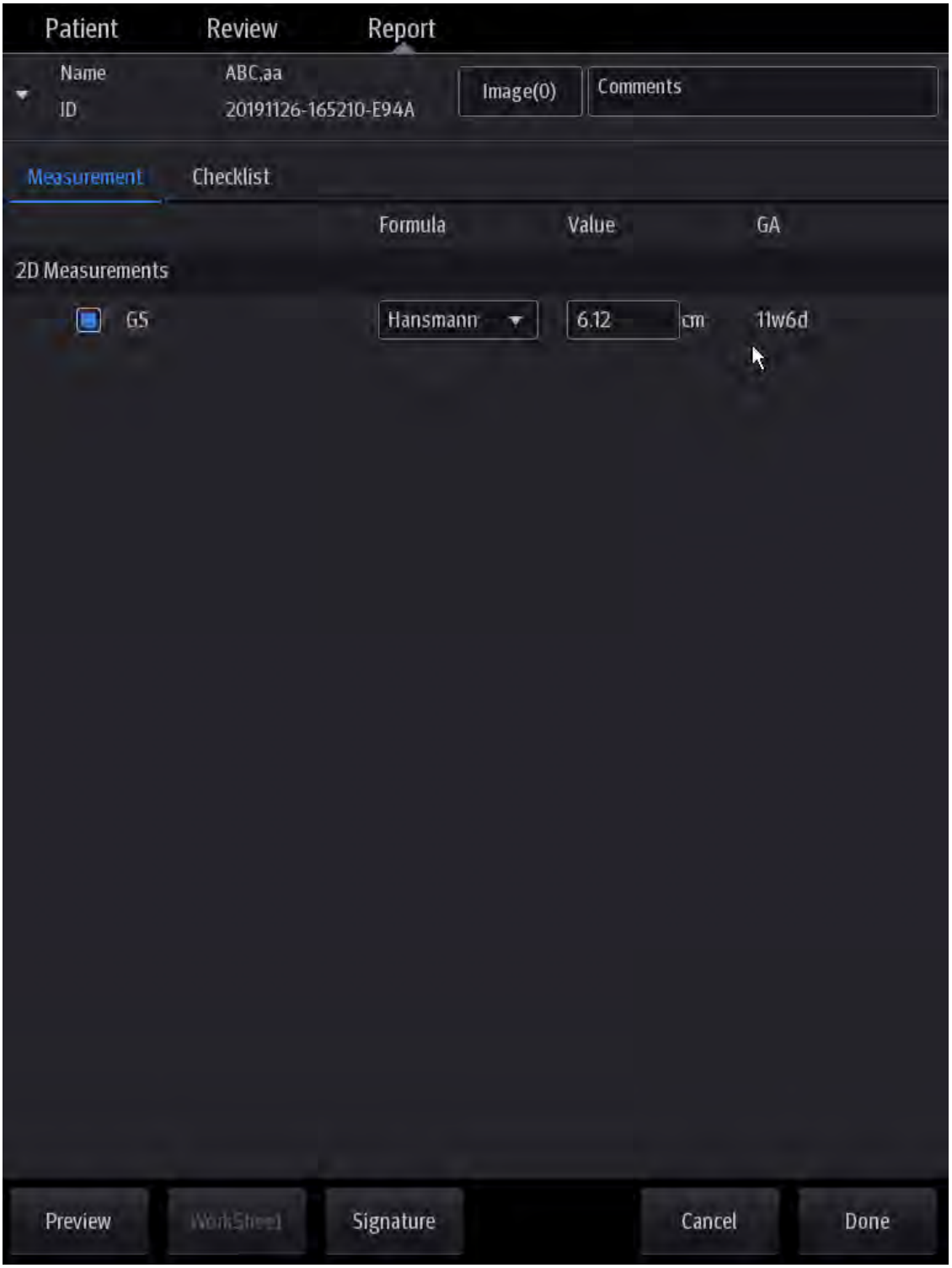
1.7 Report

The report records measurement results, which are automatically saved by the system after each measurement.

- Tap [Report] to enter the report dialog box.
- The default report of the current exam appears.
- After viewing, Tap [Cancel] or [Done] to exit the report page.

1.7.1 Viewing Reports

Items on the report page are described as follows:



- Each measurement contains one measured value.
- The report only displays results of tools that are displayed in the report template by default and are completed, as shown in the figure above.
- Drag the page downward if the report has more than one page.

1.7.2 Editing Reports

Editing Measurement Data

⚠CAUTION:	**Input appropriate data when editing the measurement values, otherwise misdiagnosis may occur.**

- The measurement values in the text boxes are editable. Move the cursor to the text box and tap on the screen to type on the popped up keyboard.
- The modified value(s) is/are underlined.
- For result values used to calculate GA (Gestational Age) and SD (Standard Deviation), the formula used in this calculation can be selected from [Formula]. The GA and SD values will update with the formula change.

NOTE:	1.	Only measurement values are editable while calculation values are not.
	2.	After a measurement value is modified, the corresponding calculation value will be updated automatically.

Entering Ultrasound Remarks

In the [Comments] box, enter the corresponding information.

Selecting Images

Images saved for the current exam can be added to the report.

1. Tap [Image] on the report page to bring up the following dialog box.

2. Select the image by tap on the check box at the upper left corner of the image.
3. Tap [Done] to confirm.

Analyzing Report Data

You can preset and edit anatomy information in the OB report.

1. Tap [Checklist].
2. Select or enter anatomy descriptions.

Tip:	Descriptions of [Fetus Score] can only be selected from the drop-down list.

Drag the page downward to see more measurement values.

3. Tap [Done] to confirm. Analysis information displays after the measurement values in the report.

Signature

Fill in the signature after completing the report.

1. Tap [Signature]. Draw the signature information on the touch screen. Tap [OK] to save the information.
2. Print or preview the report to view the signature information.

1.7.3 Printing Reports

Tap [Preview] on the report page to preview. On the preview page, you can:

Print report:	Tap [Print].
Select ultrasound image layout:	Select from the drag-down list. Options: 1/Row, 2/Row, 3/Row, 4/Row,
Comments/ Ultrasound Image/ Checklist	Tap the checkbox to select if the comments/ ultrasound image/ checklist are included when printing the report.
Export report:	Tap [Export] and select driver, path and file type, input file name. You can also create, delete or rename the folder.
Print setting	Tap [Print Setting], and tick the checkbox before “Show all fetus data in one report”, and the report chooses and prints the multi-fetus data simultaneously.
Save image:	Save the report as image for the non-anonymous patient (patient with ID). You can view the saved images by tapping [Review] or [iStation] from the main screen.
Exit the preview:	Tap [Back] to return to the report page.

2 Measurement Preset

2.1 Basic Preset Procedures

The basic measurement preset procedures are as follows:

1. Tap icon  on the upper right corner and select [Setup] to enter the Setup:
2. Preset the measurement parameters.

   Enter [Setup] -> [System] -> [Measure] to preset the measurement ruler, etc. See “2.2 Measurement Parameters Preset” for details.
3. Preset the Obstetric formula.

   Enter [Setup] -> [System] -> [OB].

   Preset the GA (Fetal Gestational Age) and the Fetal Weight. See “2.3 Obstetric Preset” for details.
4. Exit the setup for the settings to take effect.

   Select [Save] in the [Setup] menu to exit.

NOTE: The settings are only brought into effect by tapping [Save] to exit the [Setup] menu.

2.2 Measurement Parameters Preset

Basic operation steps are as follows:

1. Tap  on the right upper corner to enter [Setup].
2. Select [System] -> [Measure] to preset the following parameters:

You can preset:

Tools	Descriptions
Cursor Type	Type of cursor displayed on the measurement caliper and results window. Value options: ■ Number: the cursor always displays as “+” while different measurements are marked with numbers. ■ Symbols: the cursor displays sequentially in 8 symbols to identify different measurements.
Cursor Size	The size of the cursor. Value options: Large, Medium, Small.

Tools	Descriptions
Heartbeat	The number of cardiac cycles in the heart rate calculation. (In heart rate measurement, the number of cardiac cycles should match the preset number.)
Cursor Line Display	If unselected, the connecting line between the measuring ends will be hidden after measurement.
Ellipse CrossLine Display	If unseleted, the measuring axis within the ellipse area will be hidden after measurement.
Follicle Method	3 distances/2 distances/1 distance

3. Tap [Save] to confirm.

2.3 Obstetric Preset

Basic procedures:

1. Tap icon  on the upper right corner and select [Setup] to enter [Setup].
2. Select [System] -> [OB].
   You can preset the Fetal Gestational Age (GA) and Fetal Weight (EFW) formulae.
   See “2.3.2 Obstetric Preset Operations” for details.
3. After setting, tap [Save] to exit the page.

2.3.1 Obstetric Formula

The obstetric formulae are used in the GA and EFW calculations.

GA Formulae

GA will be automatically calculated after the corresponding measurements are completed. The system will recalculate the GA after new measurements are completed.

Tip:	For more information about the GA, see “5 Obstetrics.”

The GA formulae are shown in the table below:

Note: “/” means no formula provided for the item.

Tools	GA
EFW/EFW2	Hadlock Tokyo
GS	Rempen Tokyo Hansmann China

Tools	GA
CRL	Hadlock Tokyo Jeanty Nelson Robinson Rempen Hansmann China ASUM RobinsonBMUS Verburg
BPD	Hadlock Tokyo Jeanty Kurtz Hansmann Merz Rempen ChittyOI Osaka China Nicolaides ASUM Verburg(O-O)
HC	Hadlock Jeanty Hansmann ChittyPL ChittyDer Nicolaides ASUM
AC	Hadlock Jeanty Merz Nicolaides ASUM CFEF Hansmann Chitty

Tools	GA
FL	Hadlock Tokyo Jeanty Hohler Merz Hansmann Warda Chitty Osaka China Nicolaides ASUM
OFD	Hansmann Nicolaides ASUM
FTA	OSAKA
THD	Hansmann
HUM	Jeanty ASUM
TCD	Hill Nicolaides
Mean Sac Diam	Daya Hellman

Fetal Weight Formulae

EFW is a calculation item. If all tools required for the EFW formula have been performed, EFW will be obtained automatically. The system will recalculate the EFW after new measurements are completed.

The Fetal Weight formulae are shown in the following table:

Formulae	Descriptions	Units	
		EFW	Item
Hadlock (AC, FL)	EFW = 10 ^ (1.304 + (0.05281*AC) + (0.1938*FL) - (0.004*AC*FL))	g	cm
	SD = 0.154*EFW SD Type = ±2SD	g	g
Hadlock (AC, FL, BPD)	EFW = 10 ^ (1.335 - (0.0034*AC*FL) + (0.0316*BPD) + (0.0457*AC) + (0.1623*FL))	g	cm
	SD = 0.146*EFW SD Type = ±2SD	g	g
Hadlock (AC, FL, HC)	EFW = 10 ^ (1.326 - (0.00326*AC*FL) + (0.0107*HC) + (0.0438*AC) + (0.158*FL))	g	cm
	SD = 0.148*EFW SD Type = ±2SD	g	g

Formulae	Descriptions	Units	
Hadlock (AC, BPD)	EFW = 10^ (1.1134 + 0.05845*AC -0.000604* (AC^2) - 0.007365* (BPD^2) + 0.000595* (BPD*AC) + 0.1694*BPD)	g	cm
Hadlock (AC, FL, HC, BPD)	EFW = 10 ^ (1.3596 - (0.00386*AC*FL) + (0.0064*HC) + (0.00061*BPD*AC) + (0.0424*AC) + (0.174*FL))	g	cm
	SD = 0.146*EFW SD Type = ±2SD	g	g
Shepard (AC, BPD)	EFW (Kg) = 10 ^ (-1.7492 + (0.166*BPD) + (0.046*AC) - (2.646*AC*BPD/1000))	g	cm
	SD = 0.202*EFW SD Type = ±2SD	g	g
Merz1 (AC, BPD)	EFW = -3200.40479 + (157.07186*AC) + (15.90391*(BPD^2))	g	cm
Merz2 (AC)	EFW = 0.1*(AC^3)	g	cm
Hansmann (BPD, THD)	EFW = (-1.05775*BPD) + (0.0930707*(BPD^2)) + (0.649145*THD) - (0.020562*(THD^2)) + 0.515263	g	cm
Tokyo (BPD, APTD, TTD, FL)	EFW = (1.07*(BPD^3)) + (3.42*APTD*TTD*FL)	g	cm
Osaka (FL, BPD, FTA)	EFW = (1.25674*(BPD^3)) + (3.50665*FTA*FL) + 6.3	g	cm
Campbell (AC)	EFW (Kg) = EXP (-4.564+(0.282*AC) - (0.00331* (AC^2)))	g	cm

Weight Percentile for Age

The Clinical Percentile (CP) and Ultrasound Percentile (UP) is calculated and displayed in the report in the following format according to the formula selected for EFW calculation.

- CP(Calc Method)(Formula) ××.×× %: Where Calc Method may be LMP, PRV, IVF, BBT, DOC and EDD.
- UP(Calc Method)(Formula) ××.×× %: Where Calc Method is AUA

■ Clinical Percentile (CP)

Find the average value and calculate the threshold range in the formula (to calculate EFW) in the FG table according to the clinical GA (obtained in patient information such as LMP, IVF).

If the actual EFW value is in the following range, keep calculating. If not, the CP will not be displayed.

Average EFW x1.25 > EFW > average EFW x0.75

E.g. EFW-GP(LMP) is the EFW Clinical Percentile calculated from the LMP obtained from the patient information.

■ Ultrasound Percentile (UP)

This has the same calculation method as CP except for using the ultrasound GA instead of clinical GA.

E.g. EFW-GP(AUA) is the EFW Clinical Percentile calculated from the AUA.

2.3.2 Obstetric Preset Operations

2.3.2.1 Basic Procedures

Basic procedures in the OB preset are as follows:

1. Enter the [Setup] -> [System] -> [OB] page.

2. Set the default formula.
   (1) On the [Fetal Gestational Age] or [Fetal Weight] page, select an OB Item in the left column.
   (2) Select a formula in the right column.
   On the [Fetal Gestational Age] page, select whether to display the SD or EDD in the obstetric result.
3. Set the fetal weight display.
   a) Enter the [Fetal Weight] page.
   b) Tap [Fetal Weight Unit].
   Select Metric, English or English & Metric from the drop-down list.
   c) Select the formula for calculating the weight percentile.
   Select the formula from the drop-down list of [EFW-GP].
4. Tap [Save] to confirm.

2.4 Measurement Preset

Basic Procedures:

1. Tap icon  on the right upper corner and select [Setup] to enter the [Setup].
2. Select [Presets]-> [Measure] in the [Setup] menu.
3. Tap [Caliper] and [Measure] to preset the basic measurement and advanced measurement.
   For details, see “2.4.1 General Basic Measurement Preset” and “2.4.2 Advanced Measurement Preset.”
4. Tap [Save] to confirm.

2.4.1 General Basic Measurement Preset

1. Select [Presets] -> [Measure] -> [Caliper] to bring up the page displayed in the following figure.

2. Select the Exam Mode.

   [Available Items]: basic measurement tools configured by the system in the current exam mode which are available but not assigned yet.

   [Selected Items]: displays the tools to be added to the menu.

3. Add/Remove the item.

   To add the item(s), select one or more items from the left column, hold until the items become “floating” and attached with the cursor, then drag them to the right column.

   To remove the item(s), operate similarly with adding item(s) except to drag the item from right to left.

4. Set the default item.

   Select an item from the [Selected Items], then tap [Default]. The item is marked with a √.

   The default item is activated automatically when entering this general measurement menu.

5. Adjust the item position.

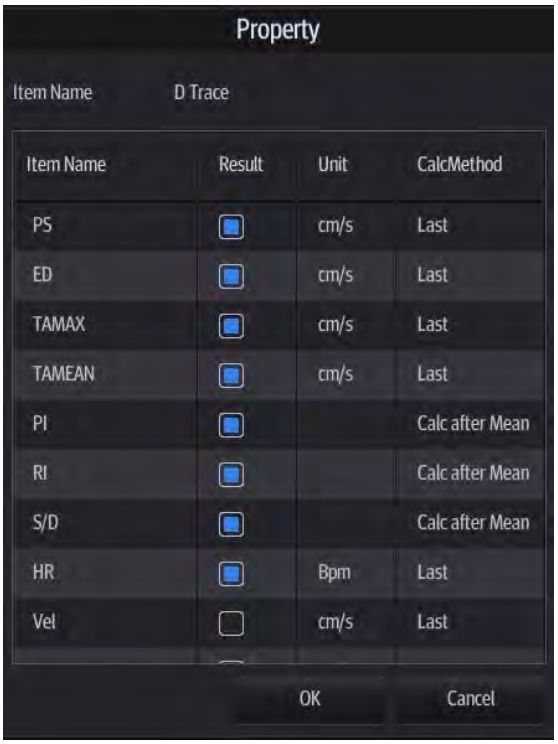
   Select an item from the right column, hold and drag it to adjust the sequence in the menu.

6. Modify the property of a measurement item.

   The following takes D trace as an example to show how to set the property of a measurement tool.

   (1) Enter the [Measure] → [Caliper] page.

   (2) Select [D Trace] from the [Selected Items] and tap [Property] to bring up the following dialog box.



Descriptions of the attributes are shown in the following table.

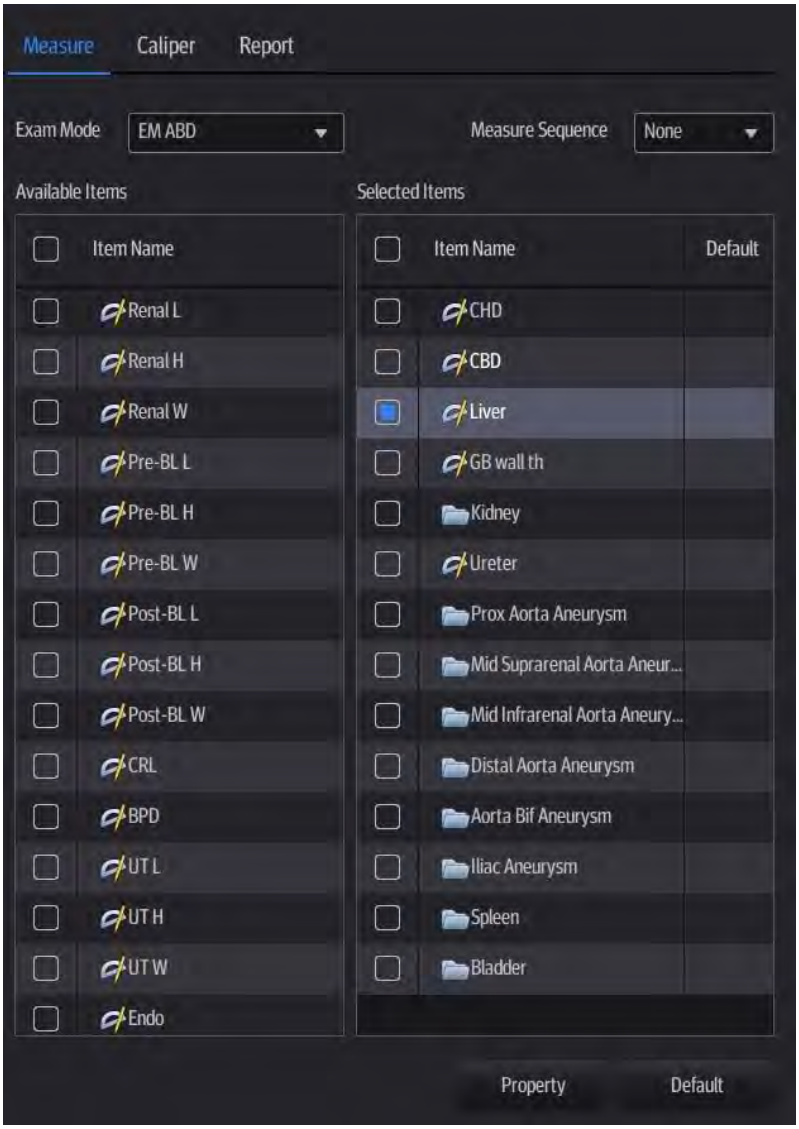
Attributes	Descriptions
Item Name & Result	Results obtained from D trace are listed. The selected items will be displayed in the results window after measurement. If PV is selected, other results become deselected (except the temporary result “velocity”).
Unit	Select the measurement unit shown in result windown and report. Tap “Unit” column of each item to select.
Meas. Method	Select the calculation method for the tool. The selected calculation tool influences only the final result on the report. Tap “CalcMethod” column of each item to select.

(3) Tap [OK] to confirm the setting.

7. Select the measurement sequence.
   - [Repeat]: after the current measurement is completed, the system automatically activates the current tool again.
   - [Next]: after the current measurement is completed, the system automatically activates the next tool in the menu.
   - [None]: after the current measurement is completed, the cursor returns to the end point of the caliper.
8. Tap [Save] to confirm.

2.4.2 Advanced Measurement Preset

1. Select [Presets] -> [Measure] -> [Measure], as shown in the figure below.



2. Select the exam mode..
3. Preset the measurement menu.

   The operations of adding, removing and setting default items are the same with the basic items.

   For details on measurement tool property settings, see “2.4.1 General Basic Measurement Preset”.
4. Select the measurement sequence.
   - [Repeat]: after the current measurement is completed, the system automatically activates the current tool again.
   - [Next]: after the current measurement is completed, the system automatically activates the next tool in the menu.
   - [None]: after the current measurement is completed, the cursor returns to the end point of the caliper.
5. Tap [Save] to confirm.

2.4.3 Setting Default Report Template

1. Select [Presets] -> [Measure] -> [Report].
2. Select the exam mode.
3. Select the report from the report template list.
4. Tap [Default].
5. Tap [Save] to comfirm.

3 Basic Measurement

There are 2D (B/Color/Power), M and Doppler (PW/CW) basic measurement tools.

3.1 Basic Measurement Procedures

1. Start the exam.
2. Select the imaging mode, then scan the image.
3. Tap [Measure] to enter the measurement menu. Item available in current exam mode are displayed.
4. Select an item from the basic measurement menu to start the measurement.

   The following icon appears on the screen:

   Operations for the icon as follows:

   - Drag and hold the hand icon to move the cursor to the desired point.
   - Tap the arrows around the hand icon to fine-tune the cursor position.

3.2 Basic Measurement Tools

3.2.1 Depth

Function: On 2D image,

- Sectoral surface probe: the depth is the distance from the center of the sector to the cursor.
- Convex array or linear array probe: the depth is the distance from the transducer surface to the measuring cursor in the direction of the ultrasonic wave.

1. Tap [Depth] in the measurement menu.
2. Move the cursor to the desired point.
3. Tap the hand icon to set the measurement point and the result displays in the results window.

3.2.2 Distance

Function: On 2D/M image, measures the distance between two points on the image.

■ On 2D image

1. Tap [Distance] in the measurement menu.
2. Move the cursor to the starting point.
3. Tap the hand icon to set the starting point.
4. Move the cursor to the end point. Then

   Tap [Clear Item] / [Clear All] to cancel setting the starting point. Or

Tap [Update] to switch between the fixed end and the active end of the caliper. Or,

Tap the arrows around the hand icon to fine-tune the cursor position.

5. Tap the hand icon to set the end point.

- On M image

1. Tap [Distance] in the measurement menu.
2. Move the cursor to the starting point and tap the hand icon.
3. Move the cursor to the end point. The cursor can then only be moved in a vertical direction. Then

   Tap [Update] to switch between the fixed end and active end of the caliper. Or

   Tap [Clear Item] / [Clear All] to cancel setting the starting point. Or,

   Tap the arrows around the hand icon to fine-tune the cursor position.
4. Tap the hand icon to set the end point.

3.2.3 Angle

Function: On B/C image, measures the angle of two crossing planes on the image and the range is: 0°-180°.

1. Tap [Angle] in the measurement menu.
2. Set two line segments as described in “3.2.2 Distance.”

   The angle appears in the results window after setting the line segments.

3.2.4 Area & Circumference

Function: On 2D image, measures the area and circumference of a closed region on the image. Four measurement methods are available:

- Ellipse: fix an ellipse region by two equal-cut perpendicular axes.
- Trace: fix a closed region by free tracing.

3.2.4.1 Ellipse

1. Tap [Ellipse] in the measurement menu.
2. Move the cursor to an area of interest.
3. Tap the hand icon to set the starting point of the first axis of the ellipse.
4. Move the cursor to position the end point of the first axis of the ellipse. Then

   Tap [Update] to switch between the fixed end and the active end of the first axis. Or

   Tap [Clear Item] / [Clear All] to clear all calipers.

   Tap the arrows around the hand icon to fine-tune the cursor position.
5. Tap the hand icon to set the end point of the first axis of the ellipse. The second axis appears on the screen.
6. Select and drag the hand icon to increase or decrease the ellipse from the fixed axis and trace the area of interest as closely as possible.

   Tap [Update] to return to the step before setting the first axis. Or,

   Tap [Clear Item] / [Clear All] to clear all calipers. Or,

   Tap the arrows around the hand icon to fine-tune the cursor position.
7. Tap the hand icon to anchor the ellipse region. The measurement result will be displayed in the results window.

3.2.4.2 Trace

1. Tap [Trace] in the measurement menu.
2. Move the cursor to an area of interest.
3. Tap the hand icon to fix the starting point.
4. Move the cursor along the target to trace the outline of the target.

   To modify the line, you can drag the hand icon to move the cursor backward along the trace line.
5. Tap the hand icon and the trace line will be closed with a straight line connecting the start and end points. The trace will also be closed when the cursor is very near to the starting point.

3.2.5 Volume

Function: On B/C image, calculates the volume of the target object by the method of 3-distance.

For calculating the object's volume with 3 axes of two images scanned in the plane perpendicular to each other in B mode. The calculation formula is as follows:

$$Volume(cm^3)=\frac{\pi}{6}\times D1(cm)\times D2(cm)\times D3(cm)$$

Where D1, D2 and D3 are the length of three axes of the target object.

1. Tap [Volume] from the measurement menu.
2. Here D1, D2 and D3 are the lengths of three axes of the target object.

   See “3.2.2 Distance” for detailed procedures.

   Generally D1, D2 and D3 should belong to different scanning planes.

3.2.6 Ratio (D)

Function: On 2D image, measures the lengths of two line segments and then calculates their ratio.

1. Tap [Ratio (D)] in the measurement menu.
2. Measure the length of the two line segments, see “3.2.2 Distance” for detailed procedures.

   The results display in the results window after the measurement of the second line is completed.

3.2.7 Ratio (A)

Function: On 2D image, measures the area of two closed regions and then calculates their ratio. The methods are Ellipse, Trace, Cross and Spline.

1. Tap [Ratio (A)] in the measurement menu.
2. Measure the area of the two closed regions; you may select different measurement methods for each region.

See “3.2.4 Area” for the Ellipse and Trace methods.

Spline

1. Select [Spline] in the menu.
2. Move the cursor to an area of interest.
3. Tap the hand icon to set the first reference point of the spline.
4. Tap and hold the hand icon to move the cursor along the area of interest and tap the hand icon to anchor the second reference point.

5. Continue to move and a spline defined by three points of the first and second reference points and the active cursor appears on the screen.
6. Move the cursor along the edge of the target and set more reference points (12 at most) to make the spline approach the target region as closely as possible.
7. Tap the hand icon twice to anchor the last reference point. The spline is fixed and the results display in the results window.

Cross

1. Select [Cross] in the menu.
2. Move the cursor to an area of interest.
3. Tap the hand icon to fix the starting point of the first axis.
4. Tap and hold the hand icon to move the cursor to position the end point of the first axis and then

   Tap [Update] to switch between the start point and the end point of the first axis. Or,

   Tap [Clear All] to clear all calipers. Or,

   Tap the arrows around the hand icon to fine-tune the cursor position.
5. Tap the hand icon to set the end point of the first axis. The second axis (perpendicular to the first axis) of the cross appears on the screen.
6. Move the cursor and tap the hand icon to fix the starting point of the second axis.
7. Move the cursor to the end point of the second axis. Then

   Tap [Update] to switch between the start point and the end point of the first axis. Or

   Tap [Clear All] to clear all calipers. Or,

   Tap the arrows around the hand icon to fine-tune the cursor position.
8. Tap the hand icon to set the end point of the second axis and fix the region. The results appear in the result window.

3.2.8 Smart Trace

Function: helps the operator to trace the contour of the target by automatically recognizing the margin of the target and measures the lengths of major axis and minor axis, area and circumference of the closed region.

Tip:	Smart Trace should be performed on frozen images.

1. After the image is frozen, tap [Smart Trace] in the measurement menu.
2. Move the cursor to an area of interest.
3. Tap the hand icon to fix the starting point.
4. Move the cursor along the target to trace the outline of the target.

   During tracing, you can move the cursor backwards to delete latest tracing. Or, you can tap the hand icon to fix the traced contour.

   The faster the cursor moving speed, the bigger the cursor, and the lager the recognized area.
5. Tap the hand icon twice and the trace line will be closed with a straight line connecting the start and end points. The trace will also be closed when the cursor is very near to the starting point.

3.2.9 Time

Function: On M/Doppler image, measures the time interval between two points on the M Mode image.

1. Tap [Time] in the measurement menu.
2. Move the cursor of the dotted lines to the measurement starting point and tap the hand icon.
3. Move the cursor to the measurement end point. The cursor can only be moved in a horizontal direction. Then

   Tap [Update] to switch between the fixed end and active end of the caliper. Or,

   Tap [Clear All] to clear all calipers. Or,

   Tap the arrows around the hand icon to fine-tune the cursor position.
4. Tap the hand icon to set the end point.

3.2.10 Slope

Function: On M image, measures the distance and time between two points on the M Mode image and calculates the slope between the two points.

1. Tap [Slope] in the measurement menu. Two dotted lines perpendicular to each other appear on the screen.
2. Move the cursor of the dotted lines to the measurement starting point and tap the hand icon.
3. Move the cursor to the measurement end point. The cursor is connected to the starting point by a dashed line. Then

   Tap [Update] to switch between the fixed end and active end of the caliper. Or

   Tap [Clear All] to clear all calipers.
4. Tap the hand icon to set the end point.

3.2.11 HR

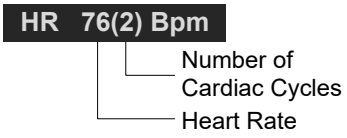
Function: On M/Doppler image, measures the time interval of n (n≤8) cardiac cycles on the M Mode image and calculates the heart rate.

The number of cardiac cycles “n” can be preset in the [System] -> [Measure] preset page. See “2.2 Measurement Parameters Preset” for details.

⚠CAUTION:	**During the measurement, the number of cardiac cycles between the measurement start and end points must be exactly the same as preset ([Preset] -> [System] -> [Measure]). Otherwise, misdiagnosis may occur.**

1. Tap [HR] in the measurement menu. The cursor appears in the center of the screen.
2. Select n cardiac cycles.

   The HR result in the results window displays the measured heart rate value and the preset number of cardiac cycles, as shown in the figure below.



3.2.12 Velocity

Function: On Doppler image, measures the velocity, pressure gradient and correction angle of a certain point on the Doppler spectrum.

1. Tap [Velocity] in the measurement menu.
2. Move the cursor to the point to be measured for velocity.
3. Tap the hand icon to fix it and the result displays in the results window.

3.2.13 Acceleration

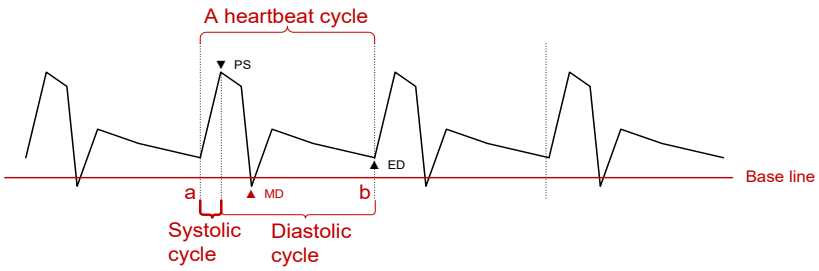
Function: measures the velocities of two points and their time interval on the Doppler image, and calculates the acceleration, pressure gradient, velocity difference and correction angle.

1. Tap [Acceleration] in the measurement menu.
2. Move the cursor to the first point to be measured for velocity.
3. Tap the hand icon to fix the first point.
4. Move the cursor to the second point to be measured for velocity.
5. Tap the hand icon to fix the second point. The results display in the results window.

3.2.14 D Trace

Function: On Doppler image, measures clinical indices using spectral Doppler tracing. Measurement methods available are Trace, Auto, Spline, Vel. (Velocity) and 2 PT (Two Points).

A sketch of a Doppler spectrum is shown below:



NOTE: The heartbeat of the traced spectrum should be equal to that preset, otherwise the obtained HR (Heart Rate) will be incorrect. See “2.2 Measurement Parameters Preset” for the relevant preset.

■ Operations (with the method of Trace):

1. Tap [D Trace] in the measurement menu.
2. Move the cursor to the starting point to be measured and tap the hand icon to fix the point.
3. Drag the hand icon to move the cursor around the object.
   Move the cursor right: draw a trace line overlapping the spectrum as much as possible.
   Move the cursor left to correct the trace line already drawn.
4. Trace the end point to be measured and tap the hand icon to fix the point.

Result parameters

The results obtained from D trace are:

Parameters	Descriptions	
PS	Peak Systolic Velocity	The highest velocity of the red blood cells crossing the sample volume.
ED	End-Diastolic Velocity	Measures the blood velocity at the end of the cardiac cycle.

Parameters	Descriptions	
Average velocity	/	The average flow velocity in the whole traced Doppler spectrum. ■ TAMAX (Time Averaged Maximum Velocity): $TAMAX(cm/s)=\int_{Ta}^{Tb}V(t)dt\Big/(T_b-T_a)$ Where V(t) is the maximum velocity ■ TAMEAN (Time Averaged Mean Velocity): Obtained by auto-spectrum calculation. $TAMEAN(cm/s)=\int_{Ta}^{Tb}V(t)dt\Big/(T_b-T_a)$ Where V(t) is the mean velocity.
HR	Heart Rate	Calculates the heart rate per minute by measuring the time interval of one cardiac cycle.
S/D	/	PS/ED. S/D (No unit) = PS (m/s) / ED (m/s)
PI	Pulsatility Index	Pulsatility index. PI (No unit) = |(PS (m/s) – ED (m/s)) / TAMAX (m/s)|
RI	Resistive Index	Resistance index. RI (No unit) = |(PS (m/s) – ED (m/s)) / PS (m/s)|
θ	/	The correction angle is the spectrum angle during measurement, which is a result obtained from a non D trace measurement tool and is usually displayed together with the spectral measurement results.

NOTE:

In the formulae above, T means time, the unit is s; V means the velocity at each point during T, the unit is cm/s; a is the traced starting point, while b is the traced end point.

Measurement Method

The measurement method varies according to the result selected.

■ Velocity

Function: measures the velocity and obtain correction angle of a certain point on the Doppler spectrum in the report.

The operations are similar to the Time measurement in M Mode. See “3.2.12 Velocity” for details.

■ 2 PT

Function: measures the velocity, pressure gradient and correction angle between two points on the Doppler spectrum.

1. Select [2 PT] method in the measurement menu.
2. Move the cursor to the starting point to be measured and tap the hand icon to fix the point.
3. Move the cursor to the end point to be measured and tap the hand icon to fix the point.

■ Spline

1. Select [Spline] method from the measurement menu.
2. Move the cursor to the starting point to be measured and tap the hand icon to fix the point.
3. Move the cursor along the edge of the desired region. Continue to fix the second, third, etc., point (50 points at most) of the spectrum.

4. Tap the hand icon twice to anchor the last reference point. Or
   the measurement ends automatically when there are 50 reference points.

- Auto
  1. Move the cursor to the starting point to be traced and tap the hand icon to fix the point.
  2. Move the cursor to the end point of the spectrum to be traced.
  3. The system traces the spectrum between the starting and the end point.
- Auto-Spectrum Calculation

Beside the results listed in table above, you can also obtain results by auto calculation in the following table:

Parameters	Descriptions	
MD	Min-Diastolic Velocity	Minimum absolute Velocity in the diastolic cycle.
Vel.	/	Flow velocity
PPG	Peak Pressure Gradient	The corresponding pressure gradient of the peak systolic velocity. PPG (mmHg) = 4 × PS (m/s)^2
Average Pressure Gradient	/	The average pressure gradient in the whole traced Doppler spectrum. ■ MPG: Maximum Pressure Gradient. $\mathrm{MPG}(mmHg)=\int_{Ta}^{Tb}4(V(t))^2\,dt\Big/(T_b-T_a)$ Where V(t) is the peak systolic velocity. ■ MMPG: Mean velocity Mean Pressure Gradient. (Obtained during auto-spectrum calculation.) $\mathrm{MMPG}(mmHg)=\int_{Ta}^{Tb}4(V(t))^2\,dt\Big/(T_b-T_a)$ ■ Where V(t) is the mean systolic velocity.
VTI	Velocity-Time Integral	Velocity-time integral. The integral of the product of Doppler instantaneous velocity and the total time interval. $VTI(m)=\int_{T_a}^{T_b}V(t)dt$
AT	Acceleration Time	The time of the blood velocity accelerating from the end of diastole to the systolic peak. This is usually the time interval between the end of the first cardiac cycle and the peak of the next cardiac cycle. Choose the first peak when two peaks exist in the systolic cycle.
DT	Deceleration Time	Deceleration Time.
D/S	/	ED/PS. D/S (No unit) = ED (m/s) / PS (m/s)
PV	Peak Velocity	The peak velocity in systolic or diastolic cycles (with no difference), which is the highest velocity of the red blood cells that cross the sample volume. It can be used to examine the venous vessel.

Parameters	Descriptions
NOTE: In the formulae above, T means time, the unit is s; V means the velocity at each point during T, the unit is cm/s; a is the traced starting point, while b is the traced end point.	

- Tap [Auto Calc.] in the PW image menu to activate it. The system traces automatically and displays the results on the screen.
- Tap [Auto Calc Param] in the [Auto Calc] tab. You can select the parameters to be calculated and displayed.
- Tap [Auto Cardiac Cycle] in the [Auto Calc] image menu. You can select the cycle number to be calculated.

3.2.15 D Trace (Car)

Function: On Cardiology Doppler image, measures clinical indices using spectral Doppler tracing. Measurement methods available are Auto, Spline, Vel. (Velocity) and 2 PT (Two Points).

See “3.13 D Trace” for the measurement operations.

- Results
  - Vmax
  - PGmax
  - Vmean
  - PGmean
  - VTI
  - θ (correction angle)

3.2.16 PS/ED

Function: On Doppler image, measures the Peak Systolic (PS) velocity and End Diastolic (ED) velocity on the Doppler spectrum, and calculates their resistance index (RI), S/D and correction angle.

1. Tap [PS/ED] in the measurement menu.
2. Move the cursor to the Systolic Peak and tap the hand icon to fix the point.
3. Move the cursor to the Diastolic End and tap the hand icon to fix the point.

3.2.17 Volume Flow

Function: measures blood flow through a vascular cross section per unit time.

1. Tap on [Volume Flow] in the measurement menu.
   - Click [Vas Area] to select the method for calculating the area: dist. or trace.
   - Click [PW Scope] to select the scope to be traced.
2. Measure the vascular area.
3. Click [TAMEAN] or [TAMAX] to calculate the volume flow.

Item		Description	Method or formula
Vas Area	Dist.	Obtain the area by measuring the vascular diameter.	Vas. Area = π × Vas Diam (cm)^2/ 4
	Trace	Obtain the area using the trace method.	Area in 2D General Measurements
TAMEAN		Vol Flow(Area) - TAMEAN	Vol Flow(A) (ml/min) = |Vas TAMEAN (cm/s)| × Vas. Area (cm^2) × 60 (s) Vas. TAMEAN - Time Averaged Mean Velocity, obtained from the Vas. Trace measurement.
TAMAX		Vol Flow(Area) - TAMAX	Vol Flow(A) (ml/min) = |Vas TAMAX (cm/s)| × Vas Area (cm^2) × 60 (s) Vas. TAMAX - Time Averaged Maximum Velocity, obtained from the Vas. Trace measurement.

3.2.18 IMT

Tip: The IMT should be performed on frozen images.

IMT is not available in TE5.

IMT (Intima-Media Thickness) measures the distance between LI (Lumen-Intima) and MA (Media-Adventia). For details, see “7.4.3 Study Tool Operations IMT.”

3.3 References

3Dist Volume: Emamian, S.A., et al., “Kidney Dimensions at Sonography: Correlation With Age, Sex, and Habitus in 665 Adult Volunteers,” American Journal of Radiology, January, 1993, 160:83-86.

HR (M general measurement): Dorland’s Illustrated Medical Dictionary, ed. 27, W. B. Sanders Co., Philadelphia,1988, p. 1425.

PG: Powis, R., Schwartz, R. Practical Doppler Ultrasound for the Clinician. Williams & Wilkins, Baltimore, Maryland, 1991, p. 162.

PPG: Yoganathan, Ajit P., et al., “Review of Hydrodynamic Principles for the Cardiologist: Applications to the Study of Blood Flow and Jets by Imaging Techniques,” Journal of the American College of Cardiology, 1988, Vol. 12, pp. 1344-1353

MPG: Yoganathan, Ajit P., et al., “Review of Hydrodynamic Principles for the Cardiologist: Applications to the Study of Blood Flow and Jets by Imaging Techniques,” Journal of the American College of Cardiology, 1988, Vol. 12, pp. 1344-1353

VTI: Degroff, C. G. Doppler Echocardiography. Third Edition. Lippincott-Raven, Philadelphia, 1999, p. 102-103

RI: Burns, P.N., “The Physical Principles of Doppler and Spectral Analysis,” Journal of Clinical Ultrasound, November/December 1987, Vol. 15, No. 9, p. 586

PI: Burns, Peter N., “The Physical Principles of Doppler and Spectral Analysis,” Journal of Clinical Ultrasound, November/December 1987, Vol. 15, No. 9, p. 585

S/D: Ameriso S, et al., “Pulseless Transcranial Doppler Finding in Takayasu’s Arteritis,” J Clin Ultrasound, September 1990; 18:592-6

D/S: Ameriso S, et al., “Pulseless Transcranial Doppler Finding in Takayasu’s Arteritis,” J Clin Ultrasound, September 1990; 18:592-6

4 Abdomen

The abdomen measurement tools are applied in but not limited to the following exam modes:

- Adult ABD
- EM ABD
- EM AAA

4.1 Abdomen Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

4.2 Basic Abdomen Measurement Procedures

1. Tap [Patient] and register the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurements.
3. Select the measurement tool in the menu to start the measurement.

   See section “4.3 Abdomen Measurement Tools” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “4.5 Abdomen Exam Report” for details.

4.3 Abdomen Measurement Tools

NOTE: The measurement tools mentioned below are configured in the system. The advanced measurement packages provided in this system are generally different combinations of measurement tools.

Measurement, calculation and study measurement items in 2D and Doppler mode (no M mode measurement items) are listed below:

■ Measurement items

Tools	Descriptions	Methods in Basic Measurement
Liver	/	Distance
CBD	Common bile duct	
CHD	Common hepatic duct	
GB L	Gallbladder Length	
GB H	Gallbladder Height	
GB wall th.	Gallbladder wall thickness	
Prox Aorta Diam	Prox Abdominal Aorta Diameter	
Mid Sup Aorta Diam	Mid Suprarenal Abdominal Aorta Diameter	
Mid Inf Aorta Diam	Mid Infrarenal Abdominal Aorta Diameter	
Distal Aorta Diam	Distal Abdominal Aorta Diameter	
Aorta Bif Diam	Aorta Bifurcate Diameter	
Iliac Diam	Iliac Diameter	
Ureter	Ureter Diameter	
Pleural L	Pleural Length	
Pleural H	Pleural Height	
Pleural W	Pleural Width	
UQ L	Upper Quadrant Length	
UQ H	Upper Quadrant Height	
UQ W	Upper Quadrant Width	
Pelvis L	Pelvis Length	
Pelvis H	Pelvis Height	
Pelvis W	Pelvis Width	
Pericardial Sac L	Pericardial Sac Length	
Pericardial Sac H	Pericardial Sac Height	
Pericardial Sac W	Pericardial Sac Width	
Prox ABD Aorta	/	D Trace
Mid Sup ABD Aorta	Mid Suprarenal ABD Aorta	

Tools	Descriptions	Methods in Basic Measurement
Mid Inf ABD Aorta	Mid Infrarenal ABD Aorta	
Distal ABD Aorta	/	
IVC	Inferior Vena Cava	Velocity

■ Study items

Tools	Measurement items included	Methods or formulae
Spleen	Spleen L, Spleen H, Spleen W	Distance
Prox Aorta Aneurysm	Prox Aorta Aneurysm L Prox Aorta Aneurysm H Prox Aorta Aneurysm W	
Mid suprarenal Aorta Aneurysm	Mid suprarenal Aorta Aneurysm L Mid suprarenal Aorta Aneurysm H Mid suprarenal Aorta Aneurysm W	
Mid Infrarenal Aorta Aneurysm	Mid Infrarenal Aorta Aneurysm L Mid Infrarenal Aorta Aneurysm H Mid Infrarenal Aorta Aneurysm W	
Distal Aorta Aneurysm	Distal Aorta Aneurysm L Distal Aorta Aneurysm H Distal Aorta Aneurysm W	
Aorta Bif Aneurysm	Aorta Bif Aneurysm L Aorta Bif Aneurysm H Aorta Bif Aneurysm W	
Lliac Aneurysm	Lliac Aneurysm L Lliac Aneurysm H Lliac Aneurysm W	
Kidney	Renal L, Renal H, Renal W, Cortex	Same as Kidney in 9.4.3
Bladder	Pre-BL L, Pre-BL H, Pre-BL W Post-BL L, Post-BL H, Post-BL W	Same as Bladder in 9.4.3
Pleural	Pleural L, Pleural H, Pleural W	Use Distance to measure the 3 distances and calculates the Volume.
UQ (Upper Quadrant)	UQ L, UQ H, UQ W	
Pelvis	Pelvis L, Pelvis H, Pelvis W	
Pericardial Sac	Pericardial Sac L, Pericardial Sac H, Pericardial Sac W	

4.4 Abdomen Measurement Operations

Tip:
1. See the table in “4 Abdomen Measurement Tools” above for measurement tools and methods.
2. For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study”.

1. Select the item/tool in the measurement menu.
2. Perform the measurement referring to the methods in the table above.

4.5 Abdomen Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

5 Obstetrics

Obstetric measurements are used to estimate the GA and EDD and calculate the growth indices, including the EFW.

The obstetric measurement tools are applied in but not limited to the following exam modes:

- OB1
- OB2/3
- EM OB

5.1 Obstetric Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

⚠CAUTION:	**Ensure the system date is correct, otherwise the GA and EDD calculated will be wrong.**

5.2 Basic Measurement Procedures

1. Tap [Patient] and register the patient information.

   The clinical GA is calculated when the corresponding data is entered on this page. See “5.3.1 Clinical GA” for details.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurements.
3. Select the measurement tool from the menu to start the measurement.

   See the table in “5.4 Obstetric Measurement Tools” below for measurement tools.

   See section “5.5 Obstetric Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “5.6 Obstetric Exam Report” for details.

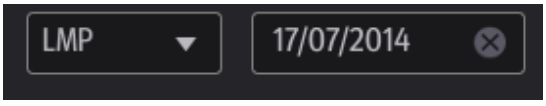
5.3 GA

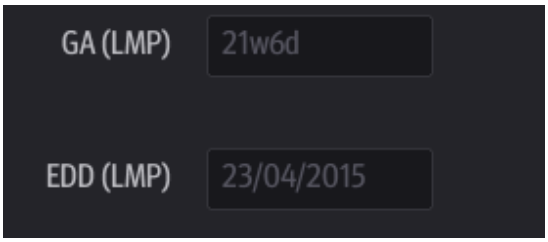
5.3.1 Clinical GA

The GA (Gestational Age) and EDD (Estimated Delivery Date) are calculated according to clinical parameters.

1. Tap [Patient] and register the patient information.

   The system automatically calculates the GA and EDD after entering the relative information.





The calculation methods are listed as follows:

- LMP: enter the LMP, the system will calculate the GA and EDD.
- DOC: enter the DOC, the system will calculate the GA and EDD.
- IVF: after you enter IVF, the system will calculate the GA and EDD.
- PRV: enter the date and GA of the last exam, the system will calculate a new GA and EDD.
- BBT: after you enter BBT, the system will calculate the GA and EDD.
- EDD: enter the EDD, the system will calculate the GA and LMP.

2. The clinical GA is shown at the top of the obstetric report.

Tip:	The latest EDD and GA calculation is considered as the final value if more than one EDD and GA calculations are valid.

5.3.2 Ultrasound GA

The ultrasound GA and ultrasound EDD are calculated according to the parameters obtained in the measurements.

- GA in OB Items
- AUA (Average Ultrasound Age)

GA in OB Items

The GA in the OB items is calculated from the related GA tables/formulae. It is independent from the clinical GA.

1. You can preset the GA formulae and whether to display the EDD or not in [System] -> [OB]. See “2.3 Obstetric Preset” for details.
2. The GA and other measurement values display in the results window after a measurement.

   If the Diagnostic GA exceeds the threshold, an OOR (out of range) displays in the results window and this result is not recorded in the report.
3. The GA of an OB item displays to the right of the item measurements.
4. For result values used to calculate GA (Gestational Age) and EDD (Estimated Date of Delivery), the formula used in this calculation can be selected from [Formula].

AUA

AUA is the average of the valid GAs that are calculated according to the biparietal diameter (BPD), head circumference (HC), abdomen circumference (AC), femur length (FL), crown rump length (CRL), etc.

1. All valid values of all the above items will be included in the AUA calculation in the system default method.
2. Touch the checkboxes to the right of the related items to select whether to include the item in the AUA calculation or not. The AUA value varies according to the selection.

5.4 Obstetric Measurement Tools

The system supports the following 2D/M/Doppler obstetric measurements.

■ Measurement items

Tools	Descriptions	Methods in Basic Measurement
CRL	Crown Rump Length	Distance,Trace and Spline.
GS	Gestational Sac Diameter	Distance
TCD	Cerebellum Diameter	Distance
BPD	Biparietal Diameter	Distance
HC[1]	Head Circumference	Ellipse, Trace, Cross and Spline
AC	Abdominal Circumference	
FL	Femur Length	Distance
HUM	Humerus Length	
APTD	Anteroposterior trunk diameter	
TTD	Transverse trunk diameter	
FTA	Fetal Trunk Cross-sectional Area	Area
THD	Thoracic Diameter	Distance

[1] Head Circumference: in the HC measurement, if the measurement cursor of BPD appears on the screen, then the measurement starting point will be automatically positioned at the measurement cursor starting point of the last BPD. If you use “Ellipse” to measure the HC, the measurement cursor of the last BPD will be the first axis of the ellipse in the default status.

Tools	Descriptions	Methods in Basic Measurement
Sac Diam1	Gestational Sac Diameter 1	
Sac Diam2	Gestational Sac Diameter 2	
Sac Diam3	Gestational Sac Diameter 3	
AF1	Amniotic Fluid 1	
AF2	Amniotic Fluid 2	
AF3	Amniotic Fluid 3	
AF4	Amniotic Fluid 4	
Cervix L	Cervical Length	Distance, Trace and Spline
UT L	Uterine Length	
Umb A	Umbilical Artery	2PT, Manual, Spline, Auto
UT H	Uterine Height	Distance in 2D Basic Measurements
UT W	Uterine Width	
Endo.	Endometrium Thickness	
UT A	Uterine Artery	2PT, Manual, Spline, Auto
Ovarian A	Ovarian Artery	
Ovarian V	Ovarian Vein	Velocity
FHR	Fetal Heart Rate	Heart Rate

■ Calculation and study items

Type	Tools	Measurement items	Methods or formulae
Calculation	TCD/AC	TCD and AC	Measures the TCD, and calculates the ratio of TCD/AC
	Mean Sac Diam	Sac Diam1, Sac Diam2, Sac Diam3	Measures three diameters by Distance method and calculates the average value
	EFW	Estimated Fetal Weight 1	EFW is calculated by the default EFW formula, based on multiple measured parameters. See “2.3.1 Obstetric Formula.” The formula can be reselected in the OB report.
	EFW2	Estimated Fetal Weight 2	
Study	AFI	AF1, AF2, AF3, AF4	Measures in Distance method and calculates AFI
	Uterus	UT L, UT H, UT W, Endo	Distance in Basic Measurement
	Ovary	Ovary L, Ovary H, Ovary W	

5.5 Obstetric Measurement Operations

Operations of measurement, calculation and study are described using examples.

Tip: 1. See the table in “5.4 Obstetric Measurement Tools” above for measurement tools and methods.

2. For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

5.5.1 Measurement Tool Operations

Take the HC measurement as an example.

1. Select the [HC] item/tool in the measurement menu.

   See “Select Measurement Method Online” for details on how to select a method online.
2. Measure the area according to the Area method in 2D Basic Measurements.

   The measurement results and GA calculation display in the results window.

   You can preset whether to display the EDD or not in [Setup] -> [System] ->[OB] -> [Fetal Gestational Age].

For more details about GA, see “5.3 GA.”

5.5.2 Calculation Tool Operations

Take the EFW measurement as an example.

1. Select the [EFW] item/tool in the measurement menu.
2. Measure the FL and AC (for example).

   The second measurement is activated automatically when the first one is completed. The results display in the results window after measurement.

5.5.3 Study Tool Operations

The operation of the AFI measurement is as follows:

1. Tap [AFI] in the measurement menu. Enter the submenu.
2. Measure the maximum AFs of the four amniotic fluid pockets of pregnant woman. The AFI is calculated automatically.

5.6 Obstetric Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

5.6.1 Fetal Biophysical Profile

Fetal Biophysical Profile means to first obtain a few indices related to fetal growth through experiment or measurement and then evaluate the hazardous situation that the fetus is facing by grading these indices respectively.

1. Tap [Checklist] on the OB report page, the fetus Score is listed after the fetal analysis.

   The scoring criteria the system provides are based on the Vintzileos formula, as shown in the table below.

Fetal growth index	Score 0	Score 2	Observation time	Remarks
FHR	<2, or Reactive FHR ≤15 bpm	Reactive FHR ≥ 15 bpm, duration ≥ 15s, ≥ 2 times	30 minutes	The score(s) can be manually entered into the system.
FM	≥ 2 fetal movements	FM ≥ 3 times (continuous movement is deemed as 1 time)	30 minutes	
FBM	No FBM or duration ≤ 30s	FBM ≥ 1 times; duration ≥ 30s	30 minutes	
FT	Limbs stretch, no bend, fingers loose	Limbs and spine stretch/bend ≥ 1 times	/	
AF	No AF, or AF volume < 2 × 2 cm	One or more AF volumes ≥ 2 × 2 cm	/	

Fetal scoring results criteria:

Total scores	Growth condition
8-10	Normal, chronic asphyxia risk low
4-6	Chronic asphyxia risk suspicious
0-2	Chronic asphyxia risk high

2. The scores of each index as well as the total score will be appended to the report.

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6 Cardiology

The cardiac measurement tools are applied in but not limited to the following exam modes:

- Adult Cardiac
- Cardiac Diff
- LVO
- EM Cardiac
- TEE

6.1 Cardiac Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

6.2 Basic Cardiac Measurement Procedures

1. Tap [Patient] and enter the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurement.
3. Select the measurement tool from the menu to start the measurement.

   See the table in “6.3 Cardiac Measurement Tools” for measurement tools.

   See section “6.3 Cardiac Measurement Tools” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “6.5 Cardiac Exam Report” for details.

6.3 Cardiac Measurement Tools

The system supports the following cardiac measurements:

NOTE: The heartbeat of the traced spectrum in VTI measurement should be equal to that preset, otherwise the obtained HR (Heart Rate) will be incorrect. See “2.2 Measurement Parameters Preset” for the relevant preset.

■ Measurement items

Tools	Descriptions	Methods in basic measurement
Ao Diam (2D/M)	Aorta Diameter	Distance
LA Diam (2D/M)	Left Atrium Diameter	
ACS (2D/M)	Aortic Valve Cusp Separation	
LVOT Diam	Left Ventricular Outflow Tract Diameter	
RVAWd (2D/M)	Right Ventricular Anterior wall thickness at end-diastole	
RVDd (2D/M)	Right Ventricular Diameter at end-diastole	
IVSd (2D/M)	Interventricular Septal Thickness at end-diastole	
LVIDd(2D/M)	Left Ventricular Internal Diameter at end-diastole	
LVPWd (2D/M)	Left Ventricular Posterior wall thickness at end-diastole	
RVAWs (2D/M)	Right Ventricular Anterior wall thickness at end-systole	
RVDs (2D/M)	Right Ventricular Diameter at end-systole	
IVSs (2D/M)	Interventricular Septal Thickness at end-systole	
LVIDs (2D/M)	Left Ventricular Internal Diameter at end-systole	
LVPWs (2D/M)	Left Ventricular Posterior wall thickness at end-systole	
Rt DT(Insp) (2D/M)	Right Diaphragm Thickening Inspiration	
Rt DT(Expir) (2D/M)	Right Diaphragm Thickening Expiration	
Lt DT(Insp) (2D/M)	Left Diaphragm Thickening Inspiration	
Lt DT(Expir) (2D/M)	Left Diaphragm Thickening Expiration	
RDE(QB) (M)	Right Diaphragm Excursion Quiet Breathing	
RDE(DB) (M)	Right Diaphragm Excursion Deep Breathing	
LDE(DB) (M)	Left Diaphragm Excursion Deep Breathing	

Tools	Descriptions	Methods in basic measurement
LDE(QB) (M)	Left Diaphragm Excursion Quiet Breathing	Distance
Rt DT(Insp M)	Right Diaphragm Thickening Inspiration	
Rt DT(Expir M)	Right Diaphragm Thickening Expiration	
Lt DT(Insp M)	Left Diaphragm Thickening Inspiration	
Lt DT(Expir M)	Left Diaphragm Thickening Expiration	
IVC Diam.(Insp.)	Inferior Vena Cava Inspiration Diameter	The system automatic calculates IVC Depth(Expir M), IVC Depth(Insp M), IVC Diam(Expir M), IVC Diam(Insp M), SVC Depth(Insp), SVC Diam(Insp), SVC Depth(Expir), SVC Diam(Expir), IVC-CI, IVC-DI, SVC-CI, SVC-DI value. *1
IVC Diam.(Expir.)	Inferior Vena Cava Expiration Diameter	
SVC Diam.(Insp.)	Superior Vena Cava Inspiration Diameter	
SVC Diam.(Expir.)	Superior Vena Cava Expiration Diameter	
LV Area(d)	Left Ventricular area at end-diastole	The system automatic calculates FAC value. FAC=((LV Area(d)- LV Area(s))/ LV Area(d))*100%
LV Area(s)	Left Ventricular area at end-systole	
RV Area(d)	Right Ventricular area at end-diastole	The system automatic calculates RV FAC value. RV FAC=((RV Area(d)- RV Area(s))/ RV Area(d)）*100%
RV Area(s)	Right Ventricular area at end-systole	
IVC Time	Inferior Vena Cava Time	Time
MV VTI	Mitral Valve Velocity-Time Integral	2PT, Spline, Manual, Auto
MR VTI	Mitral Valve Regurgitation Velocity-Time Integral	
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	
AV VTI	Aorta Valve Velocity-Time Integral	
AV AccT	Aorta Valve Acceleration Time	Time in Doppler General Measurements
AV DecT	Aorta Valve Deceleration Time	
AR DecT	Aortic Valve Regurgitation Deceleration Time	Velocity
TV VTI	Tricuspid Valve Velocity-Time Integral	2PT, Spline, Manual, Auto
RVOT VTI	Right Ventricular Outflow Tract Velocity-Time Integral	
PV VTI	Pulmonary Valve Velocity-Time Integral	
TV AccT	Tricuspid Valve Acceleration Time	Acceleration in Doppler General Measurements
TV DecT	Tricuspid Valve Deceleration Time	
PV AccT	Pulmonary Valve Acceleration Time	Acceleration in Doppler General Measurements
PV DecT	Pulmonary Valve Deceleration Time	

Tools	Descriptions	Methods in basic measurement
PR Ved	Pulmonary Valve Regurgitation Velocity at end-Diastole	Velocity
RAP	Right Atrium Pressure	Input (0-50)
HR (2D/M)	Heart Rate	Measure manually or input
LA Area	Left Atrium Area	Trace
RA Area	Right Atrium Area	
MV EPSS (2D/M)	Distance between point E and Interventricular Septum when mitral valve is fully open	Distance
LVAd apical	Left Ventricular Long-axis Area at End-diastole in apical view	S-P Ellipse
LVAs apical	Left Ventricular Long-axis Area at end-systole in apical view	
MV E Vel	Mitral Valve E-wave Velocity	Velocity
MV A Vel	Mitral Valve A-wave Velocity	
MV AccT	Mitral Valve Acceleration Time	/
MV DecT	Mitral Valve Deceleration Time	/
IVRT	Mitral Valve Isovolumic Relaxation Time	Time
MAPSE	Mitral Annular Plane Systolic Excursion	Time in M General Measurements
TAPSE	Tricuspid Annular Plane Systolic Excursion	Distance
MV Ea(lateral)	Mitral Valve lateral Early diastolic motion	Measure MV E Vel item to get E/Ea result. D Vel. in Doppler General Measurements *2
MV Ea(medial)	Mitral Valve medial Early diastolic motion	Measure MV E Vel item to get E/Ea result. D Vel. in Doppler General Measurements *3
MV Aa(medial)	Mitral Valve medial Late diastolic motion	D Vel. in Doppler General Measurements
MV Sa(medial)	Mitral Valve medial Systolic motion	
MV Aa(lateral)	Mitral Valve lateral Late diastolic motion	
MV Sa(lateral)	Mitral Valve lateral Systolic motion	
TV E Vel	Tricuspid Valve E-wave Flow Velocity	
TV A Vel	Tricuspid Valve A-wave Flow Velocity	
MV PHT	Mitral Valve Pressure Half Time	Time in Doppler General Measurements
TV PHT	Tricuspid Valve Pressure Half Time	

Tools	Descriptions	Methods in basic measurement
MV ARa(medial)	Mitral Valve medial Acceleration Rate	Acceleration in Doppler General Measurements
MV DRa(medial)	Mitral Valve medial Deceleration Rate	
MV ARa(lateral)	Mitral Valve lateral Acceleration Rate	
MV DRa(lateral)	Mitral Valve lateral Deceleration Rate	
AutoEF	Automatic measuring of the diastolic and systolic sectional planes	See “Measurement Tool Operations”.

*1 means:

IVC-CI = |IVC Diam(Expir M) - IVC Diam(Insp M)| / Max (IVC Diam(Expir M), IVC Diam(Insp M))

IVC-DI = |IVC Diam(Expir M) - IVC Diam(Insp M)| / Min (IVC Diam(Expir M), IVC Diam(Insp M))

SVC-CI = |SVC Diam(Expir) - SVC Diam(Insp)| / Max (SVC Diam(Expir), SVC Diam(Insp))

SVC-DI = |SVC Diam(Expir) - SVC Diam(Insp)| / Min (SVC Diam(Expir), SVC Diam(Insp))

*2 means:

$$E/Ea(lateral)(Nounit)=\frac{\mathrm{MVE\ Vel}(cm/s)}{Ea(lateral)(cm/s)}$$

*3 means:

$$E/Ea(medial+lateral)(Nounit)=\frac{\mathrm{MVE\ Vel}(cm/s)}{\left(Ea(medial)(cm/s)+Ea(lateral)(cm/s)\right)/2}$$

■ Calculation items

Tools	Measurements included	Methods in basic measurement or formulae
LA/Ao(2D)	Left Atrium Diameter Aorta Diameter	LA Diam. (cm)/Ao. Diam. (cm)
LA/Ao(M)		
MV E/A	Mitral Valve E-Vel. Mitral Valve A-Vel.	MV E Vel. (cm/s)/MV A Vel. (cm/s)
MVA(PHT)	Mitral Valve Orifice Area (PHT)	MVA(PHT) (cm^2) = 220 / MV PHT (ms)
TV E/A	Tricuspid Valve E-Vel./A-Vel.	TV E/A=TV E Vel(cm/s)/TV A Vel(cm/s)
TVA(PHT)	Tricuspid Valve Orifice Area (PHT)	TVA(PHT)=220/TV PHT(cm^2)
IVC-CI	IVC Diam.(Insp.) IVC Diam.(Expir.)	*1
IVC-DI		*2

*1 means:

$$\left|\mathrm{IVC\ Diam.(Insp.)}-\mathrm{IVC\ Diam.(Expir.)}\right| \Big/ \mathrm{Max(IVC\ Diam.(Insp.),IVC\ Diam.(Expir.))} \times 100\%$$

*2 means:

$$|\text{IVC Diam. (Insp.)} - \text{IVC Diam. (Expir.)}| \Big/ \text{Min}(\text{IVC Diam. (Insp.)}, \text{IVC Diam. (Expir.)}) \times 100\%$$

■ Study items

See section 6.4.3.

6.4 Cardiac Measurement Operations

Tip:	1.	See the table in “6.3 Cardiac Measurement Tools” above for measurement tools and methods.
	2.	For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

6.4.1 Measurement Tool Operations

1. Tap the item/tool in the measurement menu.
2. Perform the measurement referring to the methods in the table above.

AutoEF

Function: Measure the diastole and diastole planes automatically.

■ Measure items

Item	Description
LVLd (A2C)	Left ventricular long-axis length at end diastole (A2C)
LVAd (A2C)	Left ventricular long-axis area at end diastole (A2C)
LVLs (A2C)	Left ventricular long-axis length at end systole (A2C)
LVAs (A2C)	Left ventricular long-axis area at end systole (A2C)
LVLd (A4C)	Left ventricular long-axis length at end diastole (A4C)
LVAd (A4C)	Left ventricular long-axis area at end diastole (A4C)
LVLs (A4C)	Left ventricular long-axis length at end systole (A4C)
LVAs (A4C)	Left ventricular long-axis area at end systole (A4C)

■ Measurement Result

Item	Description
EDV (A2C/A4C/BP)	End-diastolic Left Ventricular Volume
EDV Index (A2C/A4C/BP)	End-diastolic Left Ventricular Volume Index
ESV (A2C/A4C/BP)	End-systolic Left Ventricular Volume
ESV Index A2C/A4C/BP)	End-systolic Left Ventricular Volume Index
SV (A2C/A4C/BP)	Stroke Volume
SI (A2C/A4C/BP)	SV Index
EF (A2C/A4C/BP)	Ejection Fraction
CO (A2C/A4C/BP)	Cardiac Output

Item	Description
CI (A2C/A4C/BP)	Cardiac output index

■ Operation

1. Select the [AutoEF] in the measure menu.
2. In apical two-chamber view, measure the following parameters:
   Left ventricular endocardium at end-diastolic, the EDV(A2C) is obtained automatically.
   Left ventricular endocardium at end-systolic, the ESV(A2C) is obtained automatically.
3. In apical four-chamber view, measure the following parameters:
   Left ventricular endocardium at end-diastolic, the EDV(A4C) is obtained automatically.
   Left ventricular endocardium at end-systolic, the ESV(A4C) is obtained automatically.
4. If the height and weight have already been entered, the SV, EF, SI, EDV Index and ESV Index are calculated. ECG obtains the HR automatically. If ECG is not connected, it should start HR on the menu.
5. Select the HR source: ECG or entered.
   The CO and CI are calculated automatically using the entered height and weight values.

6.4.2 Calculation Tool Operations

1. Tap item/tool in the measurement menu.
2. The system calculates and displays the results after the measurement items have been completed.

6.4.3 Study Tool Operations

6.4.3.1 LV (2D/M)

This studies estimates the Left Ventricular (LV) diastolic and systolic capabilities using a series of clinical indices measured on the B or M image. It includes two studies LV(2D) in 2D mode and LV(M) in mode.

■ Study items

Measurements items		Methods in basic measurement
IVSd (2D/M)	Interventricular Septal Thickness at end-diastole	Distance
LVIDd (2D/M)	Left Ventricular Internal Diameter at end-diastole	
LVPWd (2D/M)	Left Ventricular Posterior wall thickness at end-diastole	
IVSs (2D/M)	Interventricular Septal Thickness at end-systole	
LVIDs (2D/M)	Left Ventricular Internal Diameter at end-systole	
LVPWs (2D/M)	Left Ventricular Posterior Wall Thickness at End Systole	
RVDd (2D/M)	Right Ventricular Diameter at end-diastole	

Measurements items		Methods in basic measurement
RVAWd (2D/M)	Right Ventricular Anterior wall thickness at end-diastole	
HR	Hear Rate	HR(2D): Input HR(M): Input or measure The input range should within 0-999.

The system provides an automatic measurement experience by defining the above tools in a sequence: RVAW → RVD → IVS → LVID → LVPW. As those indexes are arranged along the long-axis of the left ventricle, you can simply finish the measurement by cliking only 6 times.

■ Results

Results	Descriptions	Formulae
EDV(Teich)	End-diastolic Left Ventricular Volume	$EDV(Teich)(ml)=\frac{7\times LVIDd(cm)^3}{2.4+LVIDd(cm)}$
EDV Index(Teich)	End-diastolic Left Ventricular Volume Index	EDV Index=EDV/BSA
ESV(Teich)	End-systolic Left Ventricular Volume	$ESV(Teich)(ml)=\frac{7\times LVIDs(cm)^3}{2.4+LVIDs(cm)}$
ESV Index(Teich)	End-systolic Left Ventricular Volume Index	ESV Index=ESV/BSA
SV(Teich)	Stroke Volume	SV(ml) = EDV(ml)-ESV(ml)
EF(Teich)	Ejection Fraction	EF(No unit) = SV(ml)/EDV(ml)
SI(Teich)	SV Index	SI(No unit) = SV(ml)/ Body Surface Area (m^2)
CO(Teich)	Cardiac Output	CO(l/min) = SV(ml)×HR(bpm)/1000
CI(Teich)	Cardiac output index	CI(No unit) = CO(l/min)/Body Surface Area (m^2)

■ Operating Procedures

1. Tap [LV (2D)] in the advanced measurement menu.
2. At end-diastole in 2D or M mode, measure LVIDd.
   The LVIDd and EDV value are obtained.
3. At end-systole in 2D or M mode, measure LVIDs
   The LVIDs and ESV value are obtained.
   The system calculates the SV and EF.
4. Obtain HR (input HR in 2D mode, input or manually measure HR in M mode).
   The CO value is obtained.
   If the height and weight have already been entered, the SI, CI EDV Index and ESV Index are calculated.

6.4.3.2 CO (LVOT)

■ Study items

Measurements items		Methods in basic measurement
LVOT Diam.	Left Ventricular Outflow Tract Diameter	Distsance
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	D Trace (2PT, Spline, Manual, Auto)
AV HR	Heart Rate	Measure or input (0-999)

■ Results

Results	Descriptions	Formulae
LVOT Area	Left Ventricular Outflow Tract Area	Get from LVOT Diam measurement
LVOT Vmax	Left Ventricular Outflow Tract Maximum Velocity	Get from LVOT VTI measurement
LVOT SV	Left Ventricular Outflow Tract SV	
LVOT SI	Left Ventricular Outflow Tract SI	
LVOT VTI	Left Ventricular Outflow Tract Velocity-Time Integral	
LVOT PGmax	Left Ventricular Outflow Tract Maximum Pressure Gradient	
LVOT Vmean	Left Ventricular Outflow Tract Average Velocity	
LVOT PGmean	Left Ventricular Outflow Tract Minimum Pressure Gradient	
LVOT CO	Left Ventricular Outflow Tract CO	
LVOT CI	Left Ventricular Outflow Tract CI	

■ Operating Procedures

1. Tap [CO (LVOT)] in the advanced measurement menu.
2. Measure LVOT Diam.
   The LVOT Area is then calculated.
3. Measure LVOT VTI
   The following values are obtained
   LVOT Vmax
   LVOT SV
   LVOT VTI
   LVOT PGmax
   LVOT Vmean
   LVOT PGmean
4. Input or meaure HR manually.

The LVOT CO is obtained.

If the height and weight have already been entered, the LVOT SI and LVOT CI are calculated.

6.4.3.3 RVSP

The RVSP measures the right ventricular systolic pressure.

■ Study Items

Tools	Descriptions	Operations
TR Vmax	Tricuspid Valve Regurgitation Maximum Velocity	D Vel. in Doppler Basic Measurements
RAP	Right Atrium Pressure	Input (0-50)

■ Study Results

Except for the values in the upper table, the following results can be obtained in this study:

Tools	Descriptions	Formulae
TR PGmax	Tricuspid Valve Regurgitation Pressure Gradient	TR PGmax (mmHg) = 4 × TR Vmax (m/s)^2
RVSP	Right Ventricular Systolic Pressure	$\mathrm{RVSP(mmHg)} = RAP(mmHg) + 4 \times (TRV\max(m/s))^2$

■ Operating Procedures

1. Tap [RVSP] in the measurement menu.
2. Measure the TR Vmax in Doppler mode.
   The TR PGmax is calculated.
3. Tap [RAP] and input the value(0-50) and
4. Tap [OK] after inputting RAP.
   RVSP is calculated.

6.4.3.4 PAEDP

The PAEDP measures the pulmonary artery end diastolic pressure.

■ Study items

Measurements items		Methods in basic measurement
PR Ved	Pulmonary Valve Regurgitation Velocity at end-Diastole	Velocity
RAP	Right Atrium Pressure	Input (0-50)

■ Results

Except for the values in the upper table, the following results can be obtained in this study:

Results	Descriptions	Formulae
PR PGed	Pulmonary Valve Regurgitation Pressure Gradient at end-Diastole	Get from PR Ved measurement
PAEDP	Pulmonary Pressure at end-Diastole	$\mathrm{PAEDP(mmHg)} = RAP(mmHg) + 4 \times (PRVed(m/s))^2$

■ Operating Procedures

See the table above for methods and formulae for the measurement items.

6.4.3.5 Simpson

You may select to measure single plane (A2C or A4C) only or both planes (A2C and A4C) to study.

■ Study Items

Tools	Descriptions	Operations
A2Cd	Left ventricular long-axis length at end diastole in A2C view	Simpson measurement (Trace/Spline/Auto)
A2Cs	Left ventricular long-axis length at end systole in A2C view	
A4Cd	Left ventricular long-axis length at end diastole in A4C view	
A4Cs	Left ventricular long-axis length at end systole in A4C view	
HR	Heart Rate	Entered directly

■ Study Results

Tools	Descriptions	Formulae
EDV(A2C/A4C)	End-diastolic Left Ventricular Volume (A2C/A4C)	$\mathrm{EDV}(ml)=\pi\times\frac{\mathrm{LVLd\ apical}(cm)}{20}\times\sum_{i=1}^{20}r_i^{\,2}(cm)$ LVLd apical: Left Ventricular Long-axis Length at End-diastole in apical view, i.e. the long-axis length obtained in measurement. r_i : Radii obtained from diastolic measurement
EDV (BP)	End-diastolic Left Ventricular Volume (BP)	*1
ESV(A2C/A4C)	End-systolic Left Ventricular Volume (A2C/A4C)	$\mathrm{ESV}(ml)=\pi\times\frac{\mathrm{LVLs\ apical}(cm)}{20}\times\sum_{i=1}^{20}r_i^{\,2}(cm)$ LVLs apical: Left Ventricular Long-axis Length at End-systole in apical view, i.e. the long-axis length obtained in measurement. r_i : Radii obtained from systolic measurement
ESV (BP)	End-systolic Left Ventricular Volume (BP)	*2
EDV Index (A2C/A4C/BP)	End-diastolic Left Ventricular Volume Index (A2C/A4C/BP)	EDV Index=EDV/BSA
ESV Index (A2C/A4C/BP)	End-systolic Left Ventricular Volume Index (A2C/A4C/BP)	ESV Index=ESV/BSA
SV	Stroke Volume	See table in “6.4.3.1 LV (2D/M)”

Tools	Descriptions	Formulae
CO	Cardiac Output	
EF	Ejection Fraction	
SI	SV Index	
CI	CO Index	

*1 means:

$$\mathrm{EDV}(ml)=\pi\times{MAX\left\{LVLd_{2i}(cm),LVLd_{4i}(cm)\right\}}\Big/{20}\times\sum_{i=1}^{20}(r_{2i}(cm)\times r_{4i}(cm))$$

*2 means:

$$\mathrm{ESV}(ml)=\pi\times{MAX\left\{LVLs_{2i}(cm),LVLs_{4i}(cm)\right\}}\Big/{20}\times\sum_{i=1}^{20}(r_{2i}(cm)\times r_{4i}(cm))$$

Calculate the LV volume on the apical 2-chamber view image:

$$\mathrm{EDV2}(ml)=\pi\times{LVLd_{2i}(cm)}\Big/{20}\times\sum_{i=1}^{20}{r_{2i}}^{2}(cm)$$

$$\mathrm{ESV2}(ml)=\pi\times{LVLs_{2i}(cm)}\Big/{20}\times\sum_{i=1}^{20}{r_{2i}}^{2}(cm)$$

Calculate the LV volume on the apical 4-chamber view image:

$$\mathrm{EDV4}(ml)=\pi\times{LVLd_{4i}(cm)}\Big/{20}\times\sum_{i=1}^{20}{r_{4i}}^{2}(cm)$$

$$\mathrm{ESV4}(ml)=\pi\times{LVLs_{4i}(cm)}\Big/{20}\times\sum_{i=1}^{20}{r_{4i}}^{2}(cm)$$

Where

$LVLd_{2i}$ – Left ventricular long-axis length at end diastole at apical two-chamber view, which is the long-axis length obtained by EDV(A2C) measurement

$LVLd_{4i}$ – Left ventricular long-axis length at end diastole at apical four-chamber view, which is the long-axis length obtained by EDV(A4C) measurement

$LVLs_{2i}$ – Left ventricular long-axis length at end systole at apical two-chamber view, which is the long-axis length obtained by ESV(A2C) measurement

$LVLs_{4i}$ – Left ventricular long-axis length at end systole at apical four-chamber view, which is the long-axis length obtained by ESV(A4C) measurement

r_{2i} – Radii obtained by EDV(A2C) or ESV(A2C) at apical two-chamber view

r_{4i} – Radii obtained by EDV(A4C) or ESV(A4C) at apical four-chamber view

(1) Simpson single plane measurement (measure apical A2C or A4C only)

■ Operating Procedures

1. Select [Simpson] from the menu.
2. Measure the endocardium.

   Measure the left ventricular endocardium at end-diastolic and set the long axis, the EDV is obtained.

Measure the left ventricular endocardium at end-systolic and set the long axis, the ESV is obtained.

The system calculates the SV and EF.

If the height and weight have already been entered, the SI, EDV Index and ESV Index are calculated.

3. Enter HR value.

   The CO and CI are calculated automatically using the entered height and weight values.

■ Measurement Methods

The endocardium can be measured using trace, spline or auto, tap items on the menu to select the method.

- Trace

Trace the endocardium along the edge of the target area using a method similar to the “Trace” method in basic measurements, then set the long axis.

- Spline

Set reference points (up to 12) along the edge of the endocardium using a method similar to the “Spline” method in basic measurements, then set the long axis.

- Auto

(1) Set points A and B on the touch screen, where

   ➤ A: Left ventricular interventricular septal and mitral valve junction;

   ➤ B: Left ventricular wall and mitral valve junction;

(2) After setting A and B, the cursor will be automatically displayed at point D (where is considered as the apical part by system detecting). After point D is set, the long axis (line segment CD) and the line that traces the endocardium are displayed. Where

   ➤ C: Midpoint of A and B.

   ➤ D: Apical part of left ventricle.

   You can:

- Adjust the long axis

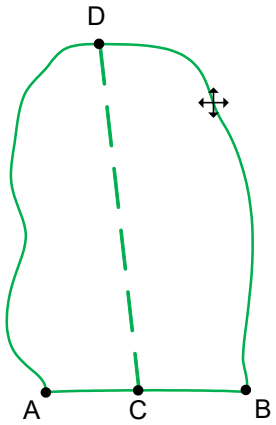
   a) Place the cursor on the long axis (which turns yellow), then tap on the touch screen.

   b) Adjust point D (with point C unchanged) after the cursor changes to ✣.

- Adjust the trace line

   a) Place the cursor on the trace line (which turns yellow), and tap on the touch screen.

   b) Place the cursor along the endocardium edge to adjust the line after the cursor changes to ✣.



(3) Tap the hand icon to confirm the adjustment.

(2) Simpson Bi-plane measurement

⚠CAUTION: When using Simpson to measure LV function, be sure to keep the apical four-chamber view and apical two-chamber view perpendicular. Otherwise the measurement result will be incorrect.

- Operating Procedures

1. Select [Simpson] in the measurement menu.
2. In apical two-chamber view, measure the following parameters:
   Left ventricular endocardium at end-diastolic and set the long axis, the EDV(A2C) is obtained
   Left ventricular endocardium at end-systolic and set the long axis, the ESV(A2C) is obtained
3. In apical four-chamber view, measure the following parameters:
   Left ventricular endocardium at end-diastolic and set the long axis, the EDV(A4C) is obtained
   Left ventricular endocardium at end-systolic and set the long axis, the ESV(A4C) is obtained
4. If the height and weight have already been entered, the SV, EF, SI, EDV Index and ESV Index are calculated.
5. Enter HR value.

The CO and CI are calculated automatically using the entered height and weight values.

Mod.Simpson

- Study Items

Tools	Descriptions	Operations
LVLd apical	Left Ventricular Long-axis Length at End-diastole in apical view	Distance in 2D General Measurements
LVLs apical	Left Ventricular Long-axis Length at End-systole in apical view	
LVAd sax MV	Left Ventricular Area at Mitral Valve level at End-diastole in Short-axis view	Area in 2D General Measurements
LVAs sax MV	Left Ventricular Area at Mitral Valve level at End-systole in Short-axis view	
LVAd sax PM	Left Ventricular Area at Papillary Muscle level at end-diastole in short axis view	
LVAs sax PM	Left Ventricular Area at Papillary Muscle level at end-systole in short axis view	
HR	Heart Rate	Enter directly

■ Study Results

Tools	Descriptions	Formulae
EDV(Mod.Simpson)	End-diastolic Left Ventricular Volume	*1
ESV(Mod.Simpson)	End-systolic Left Ventricular Volume	*2
EDV Index(Mod.Simpson)	End-diastolic Left Ventricular Volume Index	EDV Index=EDV/BSA
ESV Index(Mod.Simpson)	End-systolic Left Ventricular Volume Index	ESV Index=ESV/BSA
SV(Mod.Simpson)	Stroke Volume	See table in “6.4.3.1 LV (2D/M)”
CO(Mod.Simpson)	Cardiac Output	
EF(Mod.Simpson)	Ejection Fraction	
SI(Mod.Simpson)	SV Index	
CI(Mod.Simpson)	CO Index	

*1 means:

$$EDV[mL] = \frac{\text{LVLd apical}[cm]}{9} \times \left(\frac{4 \times \text{LVAd sax MV}[cm^2] + 2 \times \text{LVAd sax PM}[cm^2] + \sqrt{\text{LVAd sax MV}[cm^2] \times \text{LVAd sax PM}[cm^2]}}{} \right)$$

*2 means:

$$ESV[mL] = \frac{\text{LVLs apical}[cm]}{9} \times \left(\frac{4 \times \text{LVAs sax MV}[cm^2] + 2 \times \text{LVAs sax PM}[cm^2] + \sqrt{\text{LVAs sax MV}[cm^2] \times \text{LVAs sax PM}[cm^2]}}{} \right)$$

■ Operating Procedures

1. Select [Mod.Simpson] in the measurement menu.
2. In apical long-axis view, measure the following parameters:
   At end diastole: LVLd apical
   At end systole: LVLs apical
3. In short-axis view at mitral valve level, measure the following parameters:
   At end diastole: LVAd sax MV
   At end systole: LVAs sax MV
4. In short-axis view at papillary muscle level, measure the following parameters:
   At end diastole: LVAd sax PM, the EDV is calculated
   At end systole: LVAs sax PM, the ESV is calculated

   The system calculates the SV and EF.

   If the height and weight have already been entered, the SI, EDV Index and ESV Index are calculated.
5. Enter HR value.

   The CO and CI are calculated automatically using the entered height and weight values.

6.5 Cardiac Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

6.6 References

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Ejection Fraction (EF):

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Stroke Volume Index (SI):

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MV E/A:

- Maron, Barry J., et al., “Noninvasive Assessment of Left Ventricular Diastolic Function by Pulsed Doppler Echocardiography in Patients with Hypertrophic Cardiomyopathy,” Journal of the American College of Cardiology, 1987, Vol. 10, pp. 733-742.

Mitral valve area:

- Goldberg, Barry B., Kurtz, Alfred B., Atlas of Ultrasound Measurements, Year Book Medical Publishers, Inc., 1990, p. 65.
- Stamm, R. Brad, et al., “Quantification of Pressure Gradients Across Stenotic Valves by Doppler Ultrasound,” J Am Coll Cardiol, 1983, Vol. 2, No. 4,pp. 707-718.

RVSP(Right Ventricular Systolic Pressure):

- Stevenson, J.G., “Comparison of Several Noninvasive Methods for Estimation of Pulmonary Artery Pressure,” Journal of the American Society of Echocardiography, June 1989, Vol. 2, pp. 157-171.
- Yock, Paul G. and Popp, Richard L., “Noninvasive Estimation of Right Ventricular Systolic Pressure by Doppler Ultrasound in Patients with Tricuspid Regurgitation,” Circulation, 1984, Vol. 70, No. 4, pp. 657-662.

IVC-CI, IVC-DI

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7 Vascular

The vascular measurement tools are applied in but not limited to the following exam modes:

- Vascular
- Carotid
- EM Vascular
- TCI

7.1 Vascular Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

7.2 Basic Vascular Measurement Procedures

1. Tap [Patient] and enter the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurement.
3. Tapvmeasurement tool from the menu to start the measurement.

   See the table in “7.3 Vascular Measurement Tools” below for measurement tools.

   See section “7.4 Vascular Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “7.5 Vascular Exam Report” for details.

7.3 Vascular Measurement Tools

Vascular measurements are mainly used for carotid, cerebral, upper and lower extremity vessels.

The system supports the following 2D and Doppler vascular measurements.

■ Measurement items

Tools	Descriptions	Methods in basic measurement
CCA	Common Carotid Artery	2PT, Manual, Spline, Auto
Bulb	Bulbillate	
ICA	Internal Carotid Artery	
ECA	External Carotid Artery	
Vert. A	Vertebral Artery	
C.Iliac V	Common Iliac Vein	Velocity
Ex.Iliac V	External Iliac Vein	
Saph. V	Great Saphenous Vein	

Tools	Descriptions	Methods in basic measurement
Pop. V	Popliteal Vein	
TP Trunk V	Tibial Peroneal Trunk Vein	
Peroneal V	Peroneal Vein	
P.Tib. V	Posterior Tibial Vein	
A.Tib. V	Anterior Tibial Vein	
IVC	Inferior Vena Cava	
ACA	Anterior Cerebral Artery	2PT, Manual, Spline, Auto
MCA	Middle Cerebral Artery	
PCA	Posterior Cerebral Artery	
AComA	Ant.communicating br.	
PComA	Post.communicating br.	
BA	Basilar Artery	
Ba V	Basilar Vein	Velocity
IIV	Internal Iliac Vein	
CFV	Common Femoral Vein	
SFV	Superficial Femoral Vein	
DFV	Deep Femoral Vein	
CCA IMT	Common Carotid Artery IMT	ROI measurement in IMT
Bulb IMT	Bulbillate IMT	
ICA IMT	Internal Carotid Artery IMT	
ECA IMT	External Carotid Artery IMT	

■ Calculation and Study items

Types	Tools	Descriptions	Methods or formulae
Calculation	Stenosis D	Stenosis Diameter	Stenosis D (No unit) = (Normal Diam. (cm) – Resid Diam. (cm)) / Normal Diam. (cm) × 100% Stenosis D (No unit) = | (D1-D2) / MAX (D1, D2)|*100% Where D1 and D2 refer to the measured vascular diameter, and MAX (D1, D2) represents the larger value of the two.
	Stenosis A	Stenosis Area	Stenosis A (No unit) = | (A1-A2) / MAX (A1, A2) |*100% Where A1 and A2 refer to the measured vascular area, and MAX (A1, A2) represents the larger value of the two.
	ICA/CCA	/	See below

Types	Tools	Descriptions	Methods or formulae
Study	Stenosis A	/	Stenosis (No unit) = |(A1-A2)/ MAX(A1,A2)|*100% Where A1 and A2 refer to the measured vascular area, and MAX (A1, A2) represents the larger value of the two. You may select different method for the two area measurement.
	IMT	Intima-Media Thickness	See below

7.4 Vascular Measurement Operations

Tip:
1. See the table in “7.3 Vascular Measurement Tools” above for measurement tools and methods.
2. For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

7.4.1 Measurement Tool Operations

1. Tap item/tool in the measurement menu.
2. Perform the measurement referring to the methods in the table above.

7.4.2 Calculation Tool Operations

Stenosis D

Function: measures the Normal Diam. and Resid. Diam., calculates the Stenosis D.

1. Tap [Stenosis D] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure the Normal(D) and Resid(D).

   The Stenosis D is calculated automatically.

Stenosis A

Function: measures the Normal Area and Resid. Area, calculates the Stenosis A.

1. Tap [Stenosis A] in the measurement menu.
2. Use the Area measurement method in 2D Basic Measurements to measure the Normal(A) and Resid(A).

   The Stenosis A is calculated automatically.

ICA/CCA

Function: measures the flow velocity ratio between ICA and CCA to calculate the stenosis.

1. Tap [ICA/CCA] in the measurement menu.
2. Measure the PS value of the ICA and CCA using the 2 PT method in D trace, and the system calculates the stenosis.

   ICA value adopts the latest value that used in an ICA/CCA calculation.

   CCA adopts the distal PS value.

7.4.3 Study Tool Operations

1. Tap item/tool in the measurement menu.
2. Perform the measurement referring to the methods in the table above.

IMT

IMT is not available in TE5.

NOTE:	1.	The IMT function is unavailable on the product not configured with IMT.
	2.	The IMT measurement is available on frozen (or history) linear array images only.

Function: IMT (Intima-Media Thickness) measures the distance between LI (Lumen-Intima) and MA (Media-Adventia).

The IMT values at 4 positions: CCA (Common Carotid Artery), ICA (Internal Carotid Artery), ECA (External Carotid Artery) and Bulb (Bulbillate) need to be measured here.

1. Select [IMT] in the measurement menu and enter the IMT measurement.
2. Select the side (Left/Right), angle and vessel wall (Near/Far).
3. Select an item such as [ICC, IMT], and the ROI box displays on the screen.

   It appears as  when Near is selected

   It appears as  when Far is selected

Tip	Make sure that you select the correct vessel wall (Near/Far) before the IMT measurement. Otherwise the intima may be recognized incorrectly due to different algorithms that are applied in near/far wall recognition.

4. Move the ROI box to the desired position, then tap the hand icon. Two auto trace lines appear in the box.

   While the ROI box is green, you can:

   - Trace manually
     a) Drag the hand icon to move the cursor to a target trace line. The trace line turns yellow. Tap the hand icon to confirm.
     b) Tap along the interface of the vessel. Tap the hand icon to confirm the trace after re-adjusting.
   - Tap [Clear All] to clear all measurement calipers on the screen.

5. Tap the hand icon to confirm the adjustment result after the manual trace is complete. The results are recorded in the IMT report.

   The system calculates:

   ➢ IMT Max.

- IMT Min.
- IMT Mean
- IMT SD
- IMT ROI Length
- IMT Measure Length
- IMT Quality Index

The Quality Index indicates the reliability of one measurement. Manual trace or re-scan of an image with clear endocardium edges is recommended if the Quality Index value is small.

Tip: To achieve a good trace result, try to place the ROI box parallel with the vessel and adjust the box size to reduce unwanted interference.

For multiple measurements on the same side, vessel and angle, the system calculates the following parameters in the report:

- Average Mean IMT
- Average Max. IMT
- Standard deviation

It also provides the Composite Mean IMT, which is an overall mean value of all IMT mean values derived from the measured items.

7.5 Vascular Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

An IMT report is applied to the record results in the hIMT measurements, where selecting patient conditions (smoker/non-smoker, diabetic/not diabetic, etc.) and modifying the result data are available.

7.6 References

Stenosis D: Honda, Nobuo, et al., “Echo-Doppler Velocimeter in the Diagnosis of Hypertensive Patients: The Renal Artery Doppler Technique,” Ultrasound in Medicine and Biology, 1986, Vol. 12(12), pp. 945-952.

Stenosis A: Jacobs, Norman M., et al., “Duplex Carotid Sonography: Criteria for Stenosis, Accuracy, and Pitfalls,” Radiology, 1985, 154:385-391.

8 Gynecology

The gynecology measurement tools are applied in but not limited to the following exam modes:

- GYN

8.1 Gynecology Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

8.2 Basic Gynecology Measurement Procedures

1. Tap [Patient], and register the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurement.
3. Tap measurement tool from the menu to start the measurement.

   See the table in “8.3 Gynecology Measurement Tools” below for measurement tools.

   See section “8.4 Gynecology Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “8.5 Gynecology Exam Report” for details.

8.3 Gynecology Measurement Tools

The system supports the following gynecology measurements.

- Measurement items

Tools	Descriptions	Methods in basic measurement
UT H	Uterine Height	Distance
UT W	Uterine Width	
UT L	Uterine Length	Distance, Trace and Spline
Cervix L	Uterine Cervix Length	
Cervix H	Uterine Cervix Height	Distance
Cervix W	Uterine Cervix Width	
Endo	Endometrium Thickness	
Ovary L	Ovary Length	
Ovary H	Ovary Height	
Ovary W	Ovary Width	

Tools	Descriptions	Methods in basic measurement
Follicle1~16 L	Follicle 1~16 Length	
Follicle1~16 W	Follicle 1~16 Width	
Follicle1~16 H	Follicle1~16 Height	
Ovarian A	Ovarian Artery	2PT, Spline, Manual, Auto
Ut A	Uterine Artery	
Ovarian V	Ovarian Vein	Velocity

■ Calculation and Study items

Types	Tools	Descriptions	Methods or formulae
Calculation	Ovary Vol.	Ovary Volume	See below
	UT Vol.	UT Volume	
	Uterus SUM	/	
	UT-L/ CX-L	/	
	Follicle 1-16	/	
Study	Uterus	/	
	Ovary	/	
	Follicle 1~16	/	
	Follicle	/	
	Ovary	/	

8.4 Gynecology Measurement Operations

Tip:
1. See the table in “8.3 Gynecology Measurement Tools” above for measurement tools and methods.
2. For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

8.4.1 Measurement Tool Operations

All items are measured using the Distance method except for UT L and Cervix L which support the Distance, Trace and Spline methods.

8.4.2 Calculation Tool Operations

Ovary Vol.

Function: measures the Ovary L, Ovary H and Ovary W, calculates the Ovary Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Ovary Vol.] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the Ovary L, Ovary H and Ovary W. The Ovary Vol. is calculated automatically.

UT Vol

Function: measures the UT L, UT H and UT W, calculates the UT Vol.

1. Tap [UT Vol.] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the UT L, UT H and UT W. The UT Vol. is calculated automatically.

UT SUM

Function: measures the UT L, UT H and UT W, calculates Uterus SUM.

Uterus SUM (cm) = UT L (cm) + UT H (cm) + UT W (cm)

1. Tap [Uterus SUM] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the UT L, UT H and UT W. The Uterus SUM are calculated automatically.

UT-L/ CX-L

Function: measures the UT L and Cervix L, calculates the ratio UT-L/CX-L.

UT-L/CX-L (No unit) = UT L (cm) / Cervix L (cm)

1. Tap [UT-L/CX-L] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the UT L and Cervix L. The system calculates the UT-L/CX-L.

8.4.3 Study Tool Operations

Uterus

Function: measures the UT L, UT H, UT W and Endo, calculates the UT Vol., UT SUM and UT-L/CX-L.

1. Tap [Uterus] in the measurement menu.
2. Measure the UT L, UT H, UT W and Endo.

   The UT Vol. and UT SUM are calculated automatically.

   If the Cervix L has been measured, the system also calculates the UT-L/CX-L.

Ovary

Function: measures the Ovary L, Ovary H and Ovary W, calculates the Ovary Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Ovary] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the Ovary L, Ovary H and Ovary W. The Ovary Vol. is calculated automatically.

Follicle 1~16

Function: measures the length, width and height of the follicle using the Distance method and calculates the length, width and height averages as well as the follicle volume.

Results	Method	Formulae
Average Diameter	2-distance	$\text{Average Diam} = {(Length + Width)}/{2}$
	3-distance	$\text{Average Diam} = {(Length + Width + Height)}/{3}$
Follicle Volume	1-distance	$\text{Vol} = \frac{\pi}{6}(Length)^3$

Results	Method	Formulae
	2-distance	$\mathrm{Vol} = \frac{\pi}{6}(Length)^2 \times Width$
	3-distance	$\mathrm{Vol} = \frac{\pi}{6} length \times Width \times Height$

Up to 16 follicles can be measured. Specify the follicle serial numbers before measuring a follicle.

NOTE: needs to be measured on the left and right sides respectively.

Take Follicle1 as an example. The measurements of other items are similar.

1. Tap [Follicle1] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure Follicle1 L, Follicle1 W and Follicle1 H.

   The system automatically calculates the average value of Follicle1 L, Follicle1 W and Follicle1 H as well as the volume of Follicle1.

   The calculation methods of the follicle diameter and volume can be preset via [Setup] -> [System] -> [Measure].

8.5 Gynecology Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

8.6 References

Uterus SUM: Feng Kui, Sun Yanling, Li Hezhou. Ultrasonic diagnosis of adenomyosis. Journal of Henan Medical University, 1995; 30 (2).

UT-L/ CX-L: Ji Jindi, et al. Ultrasonographic study of the intersex problems and the internal genitalia abnormalities. Journal of China medical ultrasound. 1996, Volume 12, No8 P40.

9 Urology

The urology measurement tools are applied in but not limited to the following exam modes:

- Urology
- Testical

9.1 Urology Exam Preparations

Make the following preparations before performing a urology exam:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

9.2 Basic Urology Measurement Procedures

1. Tap [Patient] and register the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurements.
3. Tapmeasurement tool from the menu to start the measurement.

   See the table in “9.3 Urology Measurement Tools” below for measurement tools.

   See section “9.4 Urology Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “9.5 Urology Exam Report” for details.

9.3 Urology Measurement Tools

■ Measurement Items

Tools	Descriptions	Method in basic measurement
Renal L	Renal Length	Distance
Renal H	Renal Height	
Renal W	Renal Width	
Cortex	Renal Cortical Thickness	
Prostate L	Prostate Length	
Prostate H	Prostate Height	
Prostate W	Prostate Width	
Testicular L	Testicular Length	
Testicular H	Testicular Height	
Testicular W	Testicular Width	
Pre-BL L	Pre-void Bladder Length	

Tools	Descriptions	Method in basic measurement
Pre-BL H	Pre-void Bladder Height	
Pre-BL W	Pre-void Bladder Width	
Post-BL L	Post-void Bladder Length	
Post-BL H	Post-void Bladder Height	
Post-BL W	Post-void Bladder Width	
Epididymis L	Epididymis Length	
Epididymis W	Epididymis Width	
Epididymis H	Epididymis Height	
Scrotal Wall Thickness	/	
Testicular A	Testicular Aorta	2PT, Manual, Spline, Auto
Testicular V	Testicular Vein	Velocity
Epididymis A	Epididymis Aorta	2PT, Manual, Spline, Auto
Epididymis V	Epididymis Vein	Velocity

■ Calculation and study items

Types	Tools	Descriptions	Methods or formulae
Calculation	Renal Vol.	Renal Volume	See below
	Prostate Vol.	Prostate Volume	
	Testicular Vol.	Testicular Volume	
	Pre-BL Vol.	Pre-void Bladder Volume	
	Post-BL Vol.	Post-void Bladder Volume	
	Mictur. Vol.	Micturated Volume	
Study	Kidney	/	See below
	Prostate	/	
	Testis	/	
	Bladder	/	
	Epididymis	/	

9.4 Urology Measurement Operations

Tip:
1. See the table in “9.3 Urology Measurement Tools” above for measurement tools and methods.
2. For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

9.4.1 Measurement Tool Operations

All Urology measurement tool operations are the same as the Distance measurement of 2D Basic Measurements.

The measurement procedures are as follows, taking the Prostate L measurement as an example:

1. Tap [Prostate L] in the measurement menu.
2. Use the Distance tool in 2D Basic Measurements to measure the Prostate L.

9.4.2 Calculation Tool Operations

Renal Vol.

Function: measures the Renal L, Renal H and Renal W, calculates the Renal Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Renal Vol] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure the Renal L, Renal H and Renal W. The Renal Vol. is calculated automatically.

Prostate Vol.

Function: measures the Prostate L, Prostate H and Prostate W, calculates the Prostate Vol. and PPSA. If [Serum PSA] in [Patient Info] -> [URO] has been entered, PSAD (Prostate Special Antigen Density) will also be calculated.

$$\text{PPSA (ng/ml)} = \text{PPSA Coefficient (ng/ml}^2\text{)} \times \text{Prostate Vol (ml)}$$

$$\text{PSAD (ng/ml}^2\text{)} = \text{Serum PSA (ng/ml)} / \text{Prostate Vol. (ml)}$$

Here, the PPSA Coefficient and Serum PSA are entered in the [Patient Info] → [URO] dialog box. The default value of the PPSA Coefficient is 0.12.

1. Tap [Prostate Vol.] in the measurement menu.
2. Use the Distance method in Basic Measurements to measure the Prostate L, Prostate H and Prostate W.

   The system calculates the Prostate Vol. and PPSA.

   The PSAD displays if the PSA value is entered.

Testiscular Vol.

Function: measures the Testis L, Testis H and Testis W, calculates the Testis Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Testiscular Vol.] in the measurement menu.
2. Use the Distance measurement method in Basic Measurements to measure the Testis L, Testis H and Testis W. The Testis Vol. is calculated automatically.

Pre-BL Vol.

Function: measures the Pre-BL L, Pre-BL H and Pre-BL W, calculates the Pre-BL Vol.

1. Tap [Pre-BL Vol] in the measurement menu.
2. Use the Distance method in Basic Measurements to measure the Pre-BL L, Pre-BL H and Pre-BL W. The Pre-BL Vol. is calculated automatically. The Mictur.Vol is displayed in the report if the Post-BL Vol is measured.

Post-BL Vol.

Function: measures the Post-BL L, Post-BL H and Post-BL W, calculates the Post-BL Vol.

1. Tap [Post-BL Vol] in the measurement menu.
2. Use the Distance method in Basic Measurements to measure Post-BL L, Post-BL H and Post-BL W. The Post-BL Vol is calculated automatically. The Mictur.Vol is displayed in the report if the Pre-BL Vol is measured.

Mictur. Vol.

Function: measures the Pre-BL Vol and Post-BL Vol, calculates the Mictur.Vol.

1. Tap [Mictur.Vol] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the Pre-BL L, Pre-BL H and Pre-BL W. The Pre-BL Vol. is calculated automatically and displayed in the report.
3. Use the Distance method in 2D Basic Measurements to measure Post-BL L, Post-BL H and Post-BL W. The Post-BL Vol. and Mictur.Vol. are calculated automatically, the Post-BL Vol. is displayed in the report.

9.4.3 Study Tool Operations

Kidney

Function: measures the Renal L, Renal H and Renal W, calculates the Renal Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Kidney] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure the Renal L, Renal H and Renal W. The Renal Vol. is calculated automatically.
3. Use the method of Distance measurement of 2D Basic Measurements to measure Cortex.

Prostate

Function: measures the Prostate L, Prostate H and Prostate W, calculates the Prostate Vol. and PPSA. If [Serum PSA] in [Patient Info] → [URO] has been entered, PSAD (Prostate Special Antigen Density) will also be calculated.

$$\text{PPSA (ng/ml)} = \text{PPSA Coefficient (ng/ml}^2\text{)} \times \text{Prostate Vol (ml)}$$

$$\text{PSAD (ng/ml}^2\text{)} = \text{Serum PSA (ng/ml)} / \text{Prostate Vol. (ml)}$$

Here, the PPSA Coefficient and Serum PSA are entered in the [Patient Info] → [URO] dialog box. The default value of the PPSA Coefficient is 0.12.

1. Tap [Prostate] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the Prostate L, Prostate H and Prostate W.

   The system calculates the Prostate Vol. and PPSA.

   The PSAD displays in the report if the PSA value is entered.

Testis

Function: measures the Testis L, Testis H and Testis W, calculates the Testis Vol.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Testis] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure the Testis L, Testis H and Testis W. The Testis Vol. is calculated automatically.

Bladder

Function: measures the Pre-BL L, Pre-BL H, Pre-BL W, Post-BL L, Post-BL H and Post-BL W, calculates the Pre-BL Vol., Post-BL Vol and Mictur.Vol.

1. Tap [Bladder] in the measurement menu.
2. Use the Distance method in 2D Basic Measurements to measure the Pre-BL L, Pre-BL H and Pre-BL W. The Pre-BL Vol. is calculated automatically.
3. Use the Distance method in 2D Basic Measurements to measure Post-BL L, Post-BL H and Post-BL W. The Post-BL Vol. and Mictur.Vol. are calculated automatically.

Epididymis

Function: measures the Epididymis L, Epididymis H and Epididymis W.

NOTE: needs to be measured on the left and right sides respectively.

1. Tap [Epididymis] in the measurement menu.
2. Use the Distance measurement method in 2D Basic Measurements to measure Epididymis L, Epididymis H and Epididymis W.

9.5 Urology Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

9.6 References

PPSA: Peter J. Littrup M.D., Fed LeE. M.D., Curtis Mettin. P.D. Prostate Cancer Screening: Current Trends and Future Implications. CA-A CANCER JOURNAL FOR CLINICIANS, Jul/Aug 1992, Vol.42, No.4.

PSAD: MITCHELL C. BENSON, IHN SEONG, CARL A. OLSSON, J., McMahon, WILLIAM H.COONER. The Use of Prostate Specific Antigen Density to Enhance the Predictive Value of the Intermediate Levels of Serum Prostate Specific Antigen. THE JOURNAL OF UROLOGY, 1992, Vol.147, p817-821

10 Small Parts

The small parts measurement tools are applied in but not limited to the following exam modes:

- Thyroid
- Breast
- Testicle
- Superficial
- MSK

10.1 Small Parts Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

10.2 Basic Small Parts Measurement Procedures

1. Tap [Patient] and register the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurements.
3. Tap measurement tool in the menu to start the measurement.

   See the table in “10.3 Small Parts Measurement Tools” below for measurement tools.

   See section “10.4 Small Parts Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “10.5 Small Parts Exam Report” for details.

10.3 Small Parts Measurement Tools

The system supports the following small parts measurements.

■ Measurement items

Tools	Descriptions	Methods or formulae
Thyroid L	Thyroid Length	Distance
Thyroid H	Thyroid Height	
Thyroid W	Thyroid Width	
Isthmus H	Isthmus height	
Testicular L	Testicular Length	
Testicular H	Testicular Height	
Testicular W	Testicular Width	

Tools	Descriptions	Methods or formulae
Testis L	Testicular Length	
Testis H	Testicular Height	
Testis W	Testicular Width	
Breast Mass1~10 L	Breast Mass Length	
Breast Mass1~10 H	Breast Mass Height	
Breast Mass1~10 W	Breast Mass Width	
Nip.-Mass 1~10 Dist.	Distance between nipple and mass	
Skin-Mass 1~10 Dist.	Distance between skin and mass	
Thyroid Mass1~3 d1	Thyroid Mass diameter	
Thyroid Mass1~3 d2		
Thyroid Mass1~3 d3		
Epididymis L	Epididymis Length	
Epididymis W	Epididymis Width	
Epididymis H	Epididymis Height	
Scrotal Wall	Scrotal Wall Thickness	
Testicular A	Testicular Aorta	D Trace
Testicular V	Testicular Vein	Velocity
Epididymis A	Epididymis Aorta	D Trace
Epididymis V	Epididymis Vein	Velocity

■ Calculation and study items

Types	Tools	Descriptions	Methods or formulae
Calculation	Thyroid Vol.	Thyroid Volume	Thyroid Vol. (cm^3) = k × Thyroid L (cm) × Thyroid H (cm) × Thyroid W (cm) Where k= 0.479 or 0.523
	Testicular Vol.	Testicular Volume	See Testicular Vol. in chapter “9.4.2 Calculation Tool Operations”
Study	Thyroid	/	Same formulae as in the Thyroid Vol. calculation
	Testis	/	See Testis in chapter “9.4.3 Study Tool Operations”
	Breast Mass1~10	/	Volume (3 Dist.)
	Thyroid Mass1~3	/	
	Thyroid Cyst1~3	/	
	Epididymis	/	See Epididymis in chapter “9.4.3 Study Tool Operations”

10.4 Small Parts Measurement Operations

Tip:	1.	See table “10.3 Small Parts Measurement Tools” above for measurement tools and methods.
	2.	For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”

10.4.1 Measurement Tool Operations

Take the measurement “Thyroid L” for example. The measurement procedure is as follows:

1. Tap [Thyroid L] in the measurement menu.
2. Use the Distance tool in 2D Basic Measurements to measure the Thyroid L. The value displays in the results window and exam report.

10.4.2 Calculation Tool Operations

Thyroid Vol.

Function: measures Thyroid L, Thyroid H and Thyroid W respectively, and calculates Thyroid Vol.

Tip:	Needs to be measured on the left and right sides respectively.

1. Tap [Thyroid Vol.] in the measurement menu.
2. Use the Distance tool in 2D Basic Measurements to measure the Thyroid L, Thyroid H and Thyroid W.

   Two Thyroid Vols are calculated automatically.

10.4.3 Study Tool Operations

Thyroid

Function: measures Thyroid L, Thyroid H and Thyroid W respectively, and calculates Thyroid Vol. See “10.3 Small Parts Measurement Tools” for calculation formulae.

Tip:	Needs to be measured on the left and right sides respectively.

1. Tap [Thyroid] in the measurement menu.
2. Use the Distance tool in 2D Basic Measurements to measure the Thyroid L, Thyroid H and Thyroid W. The Thyroid Vol. is calculated automatically.

Mass

Function: measures the Mass L, Mass W and Mass H to calculate the Mass Volume, as well as measuring the Nip.-Mass Dist. and Skin-Mass Dist. Up to 10 masses can be measured.

Taking Mass1 as an example, the procedure is as follows:

1. Tap [Mass1] in the measurement menu.

   When measureing breast masses, select left or right side from the sub-menu.
2. Use the Distance tool in Basic Measurement to measure Mass1 L, Mass1 W and Mass1 H.
3. Use the Distance tool in Basic Measurement to measure the Nip.-Mass Dist. and Skin-Mass Dist.

   The measurements and the calculated Mass Volume are recorded in the report.

Thyroid Cyst

Function: measures the Thyroid Cyst L, Thyroid Cyst H and Thyroid Cyst W to calculate the Thyroid Cyst Volume. Up to 3 cysts can be measured.

Taking Mass1 as an example, the procedure is as follows:

1. Select [Thyroid Cyst 1] in the measurement menu.
   Select left or right side from the sub-menu.
2. Measure Thyroid Cyst L, Thyroid Cyst W and Thyroid Cyst H by Distance method.
   The system calculates the Thyroid Cyst Volume and the values are recorded in the report.

Testis

The same as “Testis” in “9 Urology.”

Epididymis

The same as “Epididymis” in “9 Urology.”

10.5 Small Parts Exam Report

During or after a measurement, Tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

10.6 References

Thyroid Vol: (k= 0.479) Volumetrie der Schilddruesenlappn mittels Realtime-Sonographie; J Brunn, U. Block, G. Ruf, et al.; Dtsch.med. Wschr.106 (1981), 1338-1340.)

Thyroid Vol: (k=0.523) Gomez J.M., Gomea N., et al. Determinants of thyroid volume as measured by ultrasonography in healthy adults randomly selected. Clin Endocrinol(Oxf), 2000;53:629-634)

11 Pediatrics

The HIP (Hip Joint Angle) measurement is used in pediatric Pediatrics. Such measurement provides early diagnosis for infant hip joint dislocation.

11.1 Pediatrics Exam Preparations

Make the following preparations before measuring:

1. Confirm that the current probe is appropriate.
2. Check that the current system date is correct.
3. Switch to the correct exam mode.

11.2 Basic Pediatrics Measurement Procedures

1. Tap [Patient] and enter the patient information.
2. Tap [Measure] and select [Advanced] to enter the Advanced Measurement.
3. Tapvmeasurement tool from the menu to start the measurement.

   See the table in “11.3 Pediatrics Measurement Tools” below for measurement tools.

   See section “11.4 HIP Measurement Operations” and steps in “3 Basic Measurement” for measurement methods.
4. Tap [Report] to view the exam report. See “11.5 Pediatrics Exam Report” for details.

11.3 Pediatrics Measurement Tools

NOTE: The measurement tools mentioned below are configured in the system. The application measurement packages provided in this system are generally different combinations of measurement tools. For more information about package preset, see “2.4.2 Advanced Measurement Preset.”

HIP

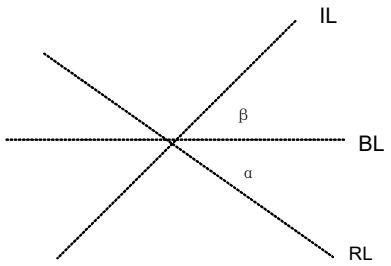
The HIP calculation assists in assessing the development of the infant hip. In this calculation, three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are calculated and displayed.

The three lines are:

- The baseline (BL), connecting the osseous acetabular convexity to the point where the joint capsule and the perichondrium unite with the ilium.
- The roof line (RL), connecting the lower edge of the ilium to the osseous acetabular convexity.
- The inclination line (IL), connecting the osseous acetabular convexity to the acetabular labrum.

The angles are:

- α: the angle between BL and RL.
- β: the angle between BL and IL



Dislocation type can be determined using the Graf method, as described in the following table.

Tpye		α	Bony roof	Superior bony rim	β	Cartilaginous roof	Age (Weeks)
I	Ia	≥60°	good	angular/slightly rounded (“blunt”)	≤55°	covers the femoral head	any age
	Ib	≥60°	good	angular/slightly rounded (“blunt”)	>55°	covers the femoral head	any age
II	IIa	[50°,60°)	adequate (satisfactory)	rounded	any angle	covers the femoral head	[0,6]
	IIa(+)	[55°,60°)	adequate (satisfactory)	rounded	any angle	covers the femoral head	(6,12]
	IIa(-)	[50°,55°)	deficient	rounded	any angle	covers the femoral head	(6,12]

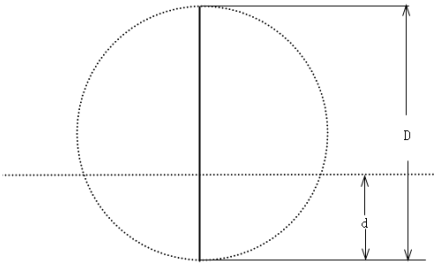
Tpye		α	Bony roof	Superior bony rim	β	Cartilaginous roof	Age (Weeks)
	IIb	[50°,60°)	deficient	rounded	any angle	covers the femoral head	>12
	IIc	[43°,50°)	severely deficient	rounded to flattened	≤77°	covers the femoral head	any age
D		[43°,50°)	severely deficient	rounded to flattened	>77°	pressed shift	any age
III	IIIa	≤42°	poor	flattened	no measure	pressed upwards-without structural alteration (devoid of echoes) proximal perichondrium goes up to the contour of the iliac wall	any age
	IIIb	≤42°	poor	flattened	no measure	pressed upwards-with structural alteration (they are echogenic) proximal perichondrium goes up to the contour of the iliac wall	any age
IV		≤42°	poor	flattened	no measure	pressed downwards (horizontal or mulded proximal perichondrium	any age

HIP-Graf

The measurement items, results and procedures are the same as “HIP.”

d/D

Measures the distance between the baseline and bottom line of the osseous acetabular and the maximum width of the hip to estimate the hip osseous acetabular coverage.



1. Select [d/D] in the measurement menu.
2. The system measures hip width first: Tap to anchor the starting point of the maximum width of the hip (D) and drag the caliper to anchor the end point. A line with a circular fulcrum appears on the measured hip then.
3. Tap and drag the line to determine the relative position of the osseous acetabular so that the distance between the osseous acetabular roof and bottom (d) is measured.
4. The system calculates the d/D.

11.4 HIP Measurement Operations

Tip:	1.	For the definitions of measurement, calculation and study, see “1.3 Measurement, Calculation and Study.”
	2.	A measurement tool can be activated by clicking the item in the measurement menu. It is described as “Select/Click ... in the measurement menu” in the following procedures.

1. In B mode, select [HIP] from the measurement menu.

   A line appears, and there is a circular fulcrum on the line.
2. Tap and drag the circle to the position of the hip joint. Then rotate the line to fix the baseline(BL).

   If the image rotates, the baseline will rotate accordingly.
3. Tap the screen outside the circle to confirm and the second line displays.
4. Use the method for adjusting the first line to anchor the roof line (RL) and tap the screen outside the circle to fix the RL.
5. Use the same method to fix the third line inclination line (IL). Angles of α and β come out.

   If the patient's age is entered, the dislocation type is also displayed.

After the measurement is completed, if the image rotates, the measurement caliper rotates accordingly.

11.5 Pediatrics Exam Report

During or after a measurement, tap [Report] to browse the report.

For details about report browsing, printing and exporting, etc., see “1.7 Report.”

11.6 References

Graf R., “Sonographic diagnosis of hip dysplasia. Principles, sources of error and consequences” Ultraschall Med. 1987 Feb;8(1):2-8

Schuler P., “Principles of sonographic examination of the hip” Ultraschall Med. 1987 Feb;8(1):9-1

Graf, R. “Fundamentals of Sonographic Diagnosis of Infant Hop Dysplasia.” Journal Pediatric Pediatrics, Vol. 4, No. 6:735-740,1984.

Graf, R. Guide to Sonography of the Infant Hip. Georg Thieme Verlag, Stuttgart and New York, 1987.

Morin, C., Harcke, H., MacEwen, G. “The Infant Hip: Real-Time US Assessment of Acetabular Development.” Radiology, 177:673-677, December 1985.

12 Emergency&Critical

The following optional emergency exam modes are available in the current system:

- EM ABD
- EM FAST
- EM OB
- EM Vascular
- EM Superficial
- EM AAA
- EM Cardiac

12.1 Basic Measurement Procedures

1. Check the system time, current probe and exam mode are correct.
2. Tap [Patient] and register the patient information.
3. Scan the desired ultrasound views and save the images.
4. Tap [Measure] and select [Advanced] to enter the Advanced Measurements.
5. Tap item/tool to start the measurement.
6. Tap [Report] to view and export the measurement report.

12.2 EM Measurement Tools

The commonly used measurement tools are contained in the EM package corresponding to each EM exam mode.

NOTE:
1. Measurement tools in each EM package depend on the specific measurement data preset for each ultrasound system.
2. For detailed descriptions of the measurement items, see the corresponding advanced chapter.

12.3 EM Exam Report

During or after a measurement, Tap [Report] to browse the report.

Each EM exam mode has its corresponding EM report. For details about report browsing, printing and exporting, etc., see “1.7 Report.”

13 Nerve

13.1 Basic Measurement Procedures

1. Check if the system time, current probe and exam mode are correct.
2. Tap [Patient] to register patient information.
3. Scan the desired ultrasonic views and save image(s).
4. Tap [Measure] to enter the measurement menu.
5. Tap item/tool to start the measurement.
6. Tap [Report] to view the measurement report.

13.2 Nerve Measurement Tools

There are only basic measurement tools in the Nerve package.

13.3 Nerve Exam Report

During or after a measurement, Tap [Report] to browse the report.
For details about report browsing, printing and exporting etc, see "1.7 Report".

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