About This Manual

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- The product is used in accordance with the instructions for use.

Documentation

SonoScape provides the documentation consisting of various manuals:

- The basic user manual describes the basic functions and operating procedures of the system.
- The advanced user manual (this manual) provides information about the measurements and calculations available in each mode.

Understand the meanings of the following items clearly before reading this manual.

Item	Meaning
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in malfunction or damage of the system.
	Indicates a potentially biological hazardous situation which, if not avoided, may result in disease transmission.
NOTE	Indicates precautions or recommendations that should be used in operating the system.

Item	Meaning
Boldfaced Word	Indicates controls on the control panel, or on-screen objects such as menu items or keys.
Click	Move the cursor to the controls on the display and press the confirm key on the control panel.
>	Select a menu item or a key following the path.

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1 General Instructions on Measurements

The ultrasound system can assist you with the diagnostic information for clinical diagnostic purposes provided by the measurement and calculation packages. The measurement display varies with the exam types and the imaging modes.

1.1 Intended Use

The ultrasound system is a general-purpose ultrasonic imaging instrument intended for use by a qualified physician for evaluation of Fetal, Abdominal, Pediatric, Small Organ (breast, testes, thyroid), Cephalic (neonatal and adult), Trans-rectal, Trans-vaginal, Peripheral Vascular, Cerebral Vascular, Musculo-skeletal (Conventional and Superficial), Cardiac (pediatric and adult), Trans-esoph.(Cardiac), Laparoscopic, OB/Gyn and Urology.

The ultrasound system also provides the measurement and calculation packages used for clinical diagnostic purposes.

Contraindication: The ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

Precautions must be considered in the use of any application. Otherwise, it may result in system damage or serious injury.

1.2 Measurement Accuracy

The measurements provided by the system do not define a specific physiologic or anatomic parameter. Rather, what is provided is a measurement of a physical property such as distance or velocity for evaluation by the clinician.

NOTE:

For each of the measurements available on the system, the measurement accuracy is only valid in the ranges shown below. The the following table is provided on the basis of actual system tests without acoustic beam considerations.

Table 1-1 Measurement Accuracy

Parameter	Value Range	Error Range
Display depth	Max 32.9cm	±3%
Distance	0-31.0cm	±3%
Area	Max. ≥855cm^2	±7%
Angle	0.04-179.31º	±3%
Circumference	200cm	±3%
Volume	Max. 25000cm^3	±10%
M-Mode time	2,4,6,8s	±1%
Heart Rate	8-1000 beats/min	±3%

Parameter	Value Range	Error Range
Velocity(PW)	0.04-2940 cm/s	Angle≤60°, ≤5%
Velocity(CW)	0.12-3795 cm/s	Angle≤60°, ≤5%
Strain Ratio	/	Depth≤6cm, ≤20%

1.3 Measurement Controls

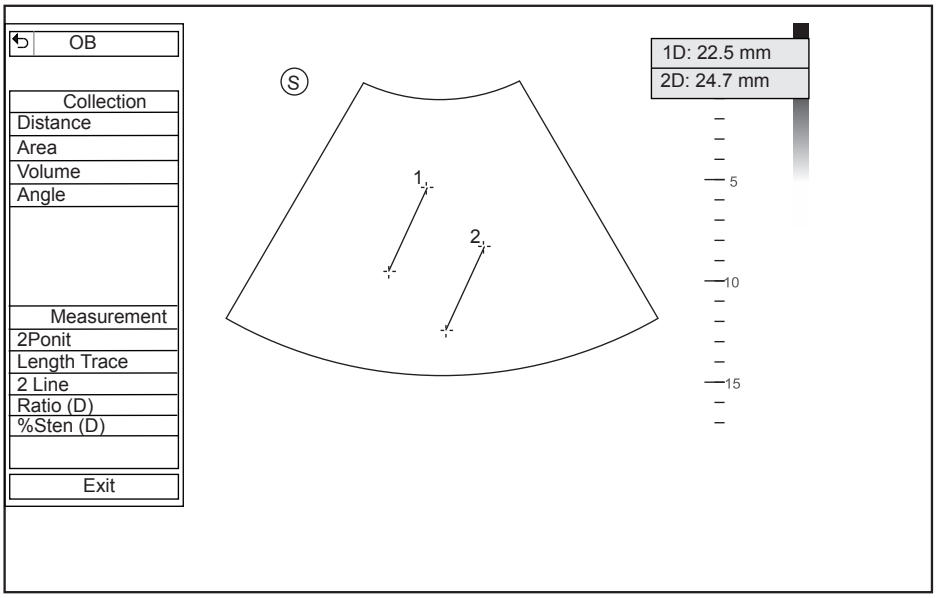

Figure 1-1 Measurement and Calculation Screen

You should be familiar with the following keys before performing a measurement. These keys on the control panel are described as follows:

Key	Description
Calc	Press to activate the application-specific measurement and calculation features.
Trackball	Use to select an item on the screen. Or, use to move the cursor when performing a measurement.
Confirm Key	Press to confirm the operation. Or, press to locate the cursor when performing a measurement.
Clear	Press to clear all measurement markers and calculation results from the screen.
Caliper	Press to activate the basic measurement and calculation features. ● Press it to perform a distance measurement in the 2D (B/CFM/DPI/TDI)/M/3D/4D mode. ● Or, press it to activate a velocity measurement in the PW/CW mode.
Update	● Press it to switch between measurement markers when performing a distance or ellipse measurement. ● Press it to undo the trace when performing the trace measurement.
Report	Press to preview the measurement report.

1.4 Measurement Menu

Basic measurements and application-specific measurements are provided by the system.

- Press the **Caliper** key on the control panel to display the basic measurement menu on the left side of the monitor and the touch screen respectively.
- Press the **Calc** key on the control panel to display the application-specific measurement menu on the left side of the monitor and the touch screen respectively. The Vascular Measurement menu (as shown in Figure 1-2) is taken as an example in the following description.

You can operate the measurement menu by using the following two ways,

- Use the trackball to move the cursor to the desired measurement item on the monitor and press the confirm key to confirm.
- Tap a desired measurement item on the touch screen to start the measurement.

NOTE:

Changes about the measurement menu displayed on the monitor and the touch screen are stayed synchronized when performing a measurement. Therefore, only operations performed on the touch screen are detailed in the following chapters.

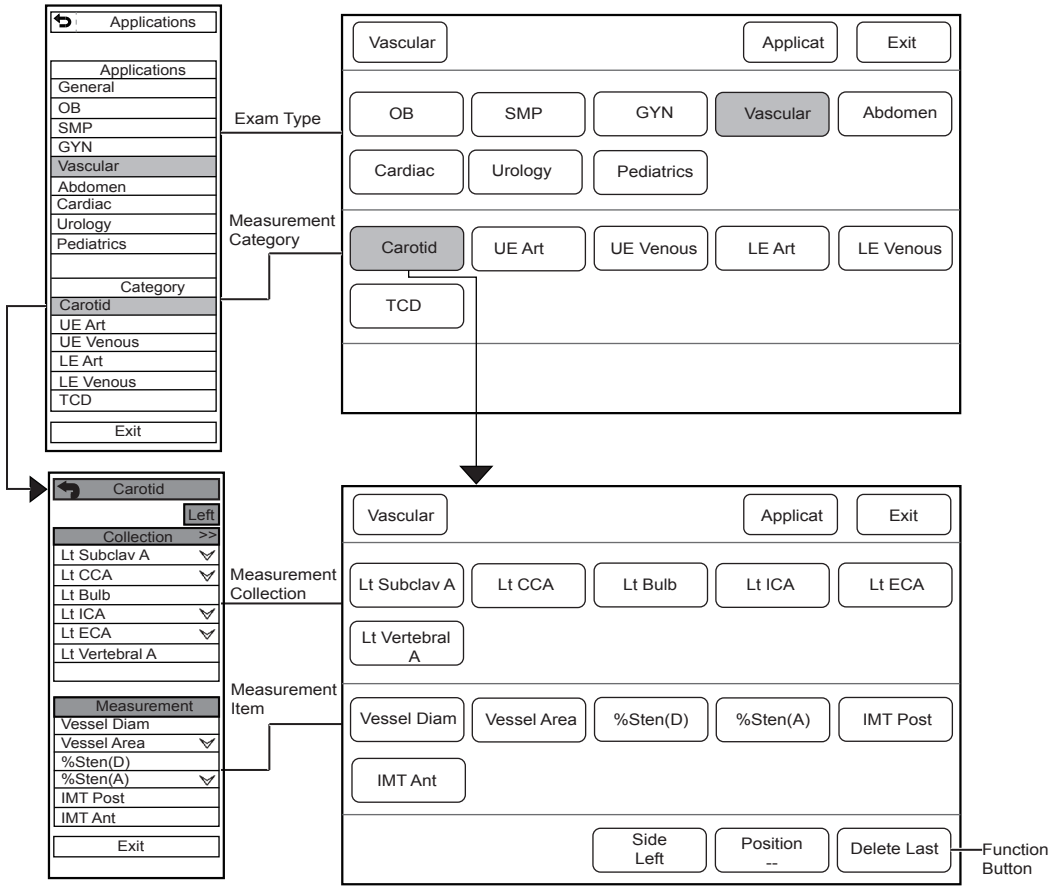

Figure 1-2 Measurement Menu

The measurement menu consists of five parts, including exam type, measurement category, measurement collection, measurement item and function button.

■ Exam Type

Exam types are listed under **Applications**.

Click ⮌ on the monitor or tap **Applicat** on the touch screen to choose the desired exam type.

■ **Measurement Category and Collection**

Measurement categories and collections are listed under the desired exam type.

Each measurement category includes one or more measurement collections.

■ **Measurement Item**

Click a measurement item to start the relevant measurement and calculation.

The number displayed on the right side of the measurement item indicates the measurement times you performed during the application-specific measurement.

■ **Function Button**

- Click **Left** on the monitor or tap **Side Left** on the touch screen to select the measurement part.
- Choose ⩔ besides the measurement collection > **Dist**, **Mid** or **Prox** on the monitor, or tap **Position** on the touch screen to select the measurement position.
- Choose ⩔ besides the measurement item > or tap **2D-Ellipse**, **2D-Dist** or etc. on the touch screen to select the measurement method.
- Click [>>] to turn the current menu to the next page.
- Click **Delete Last** on the touch screen to remove the last measurement marker and measurement result from the screen, meanwhile the measurement result will be removed from the measurement report.

This chapter only provides a general instruction on measurement and performances of the relevant measurement items are described in the following chapters.

1.5 Measured Result Box

The measurement results appears in the result box after you perform the measurement.

1.5.1 Moving A Result

In the frozen mode, press the **Update** key on the control panel, move the result box to a proper position by using the trackball and press the confirm key on the control panel.

1.5.2 Deleting A Result

Press the **Del** key on the key panel to remove the last measurement marker and measurement result from the screen, but the measurement result in the report will be kept.

1.5.3 Clearing All Results

Press the **Clear** key on the control panel to remove all measurement markers and results from the screen. However, the results still exist in the measurement report.

1.6 Measurement Presets

You should make the relevant measurement settings on **System Setting** > **Measure** menu. For details, refer to the basic user manual. The settings are recommended to be made as follows,

- Specify relevant measurement parameters and result positions
- Specify the measurement items of the auto trace and manual trace in spectral Doppler mode
- Specify the coefficient of the thyroid volume formula
- Define the shortcut keys for obstetric, gynecological or cardiac measurements
- Specify the measurement formula for obstetric measurements
- Add or delete measurement collections and items and reorder the list of them

NOTE:

Measurement presets should be made before you perform the measurement. Otherwise, they will not take effect.

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2 Basic Measurements and Calculations

Basic measurements and calculations mainly refer to the measurements of the ultrasonic image area, the operation of the measurement menu and measured result box. Generally, basic measurement results are not saved in the measurement report, but application-specific measurements are composed of the basic measurements. Basic measurement items and units vary with exam types. The obstetrics measurement is taken as an example in this chapter.

Basic measurements consist of measurement menus in four modes: B mode, M mode, color flow mode and Spectral Doppler mode. Some measurements in the Color Flow mode are performed the same as they are in the B mode. Therefore, operations related to these measurements in the color flow mode are not detailed in this chapter.

2.1 B-Mode Measurements

The basic measurement menu in the B mode is shown in the following figure.

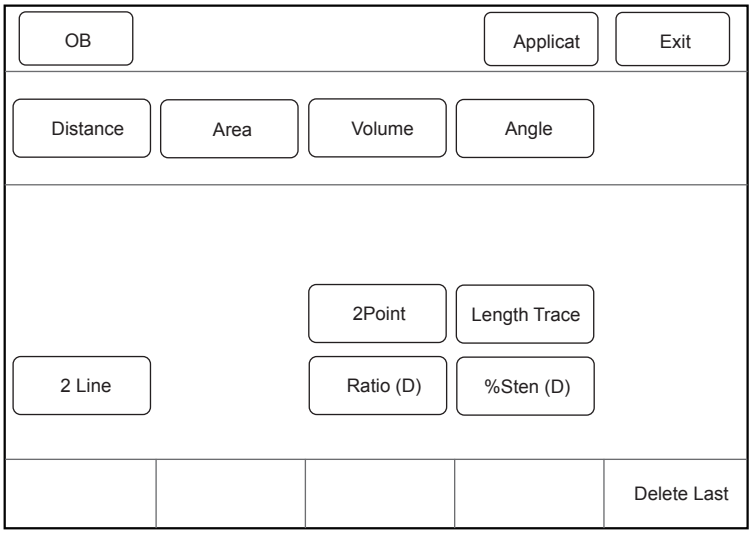


Figure 2-1 Basic Measurement Menu in the B Mode

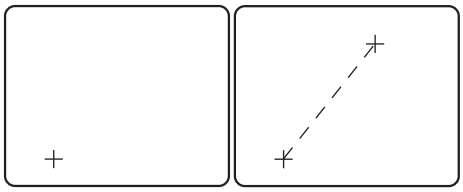
2.1.1 Distance Measurements

The distance measurements in the B mode includes two-point measurement, length trace measurement, two-line measurement, distance ratio measurement and %stenosis distance measurement.

2.1.1.1 Two-Point Measurement

The two-point measurement in the B mode is used to measure the distance between two points on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel and the system enters the two-point measurement screen by default and a marker appears on the screen.
2. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
3. Move the second marker to the desired position.

   Press the **Update** key on the control panel to adjust the fixed marker.
4. Press the confirm key to complete the measurement.
5. Repeat steps 2-4 to perform a new two-point measurement.

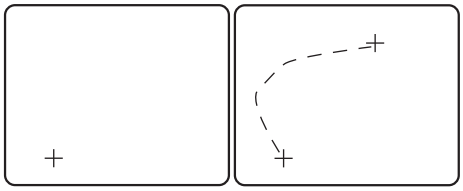
The measurement result is displayed as follows:

D: 19.9 mm

2.1.1.2 Length Trace Measurement

The length trace measurement in the B mode is used to measure the distance between two points on the image by using the trackball to trace a line along the target object.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Length Trace** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker along the target object by using the trackball.

   Press the **Update** key on the control panel to undo the trace.
5. Press the confirm key to complete the measurement.

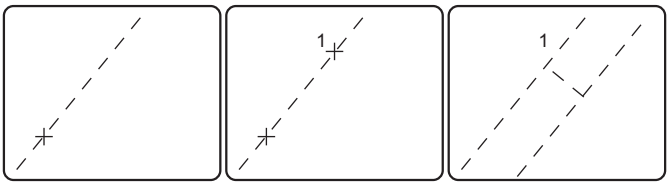
The measurement result is displayed as follows:

L: 30.5 mm

2.1.1.3 Two-Line Measurement

Two-line measurement in the B mode is used to measure the distance between two parallel lines on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **2 Line** and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm the first point of the first line and a second marker appears on the screen.
4. Move the second marker to the desired position to position the second point of the first line.

   Press the **Update** key on the control panel to adjust the two markers.
5. Press the confirm key to confirm the first line and the third marker appears on the screen.
6. Move the marker to the desired position by using the trackball and press the confirm key to confirm the second line.
7. Repeat steps 3-6 to perform a new measurement.

The measurement result is displayed as follows:

D: 4.84 mm

2.1.1.4 Distance Ratio Measurement

The distance ratio measurement in the B mode is used to measure two single distances and calculate their ratio.

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Ratio (D)** on the touch screen and a marker appears on the screen.
3. Move the trackball to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to complete the first distance measurement.
5. Repeat steps 3-4 to perform the second distance measurement and the system automatically calculates the ratio by using the following formula.

Calculation Item	Formula
Ratio	Ratio=D1/D2

Where,

- D1 is the first distance.
- D2 is the second distance.

The measurement results are displayed as follows:

D1: 15.1 mm D2: 13.3 mm D1/D2: 1.14

2.1.1.5 %Stenosis Distance

The %Stenosis distance measurement in the B mode is used to measure the outer and inner distances and the Stenosis%.

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **%Sten (D)** on the touch screen and a marker appears on the screen.
3. Move the trackball to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to complete the outer distance measurement.
5. Repeat steps 3-4 to perform the inner distance measurement and the system automatically calculates the Stenosis% by using the following formula.

Calculation Item	Formula
%Sten	%Sten=|D1-D2|/Max(D1,D2)

Where,

- D1 is the outer distance of the stenosis.
- D2 is the inner distance of the stenosis.

The measurement results are displayed as follows:

D1: 22.8 mm
D2: 17.2 mm
%Sten: 24.68 %

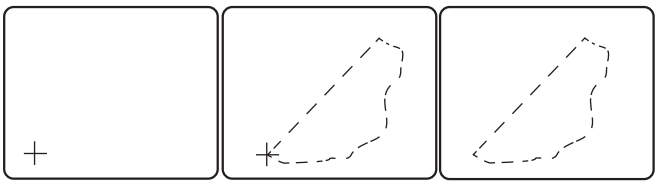
2.1.2 Area Measurements

Area measurements in the B mode include trace area measurement, point area measurement, ellipse area measurement, area ratio measurement and %stenosis area measurement.

2.1.2.1 Trace Area Measurement

The trace area measurement in the B mode is used to measure circumference and area by operating the trackball along a blocked area on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Area** key on the touch panel, the system starts the trace area measurement by default and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.

4. Move the second marker along the target object by using the trackball.

   Press the **Update** key on the control panel to undo the trace.
5. Press the confirm key to complete the measurement.

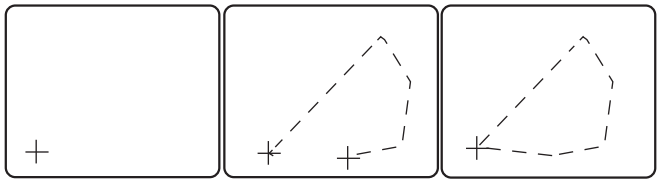
The measurement results are displayed as follows:

C: 28.5 mm
A : 0.36 cm^2

2.1.2.2 Point Area Measurement

The point area measurement in the B mode is used to measure circumference and area by positioning the points along a blocked area on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Area** > **Point** and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm the starting point and a second marker appears on the screen.
4. Move the second marker to the desired position along the target object by using the trackball and press the confirm key.
5. Repeat step 4 to position other points.

   Press the **Update** key on the control panel to delete the last point.
6. Press the confirm key to complete the measurement.

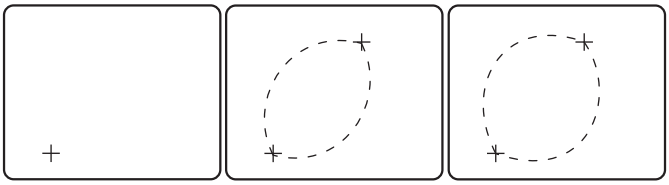
The measurement results are displayed as follows:

C: 28.5 mm
A: 0.36 cm^2

2.1.2.3 Ellipse Area Measurement

The ellipse area measurement in the B mode is used to measure circumference and area of a blocked area on the image

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Area** > **Ellipse** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.

4. Move the second marker along the target object by using the trackball.
5. Move the second marker to the desired position and press the confirm key to confirm. The two points fixed above define one axis of the ellipse to be measured.

   Press the **Update** key on the control panel to adjust the fixed points.
6. Adjust the other axis of the ellipse by using the trackball.

   Press the **Update** key to position the ellipse.
7. Press the confirm key to complete the measurement and the system automatically calculates the circumference and area by using the following formula.

Calculation Item	Formula
C	$C=\pi\sqrt{2\left[\left(\frac{D_1}{2}\right)^2+\left(\frac{D_2}{2}\right)^2\right]}$
A	$A=(\pi/4)\times D1\times D2$

Where,

- D1 is the first axis distance of ellipse.
- D2 is the second axis distance of ellipse.

The measurement results are displayed as follows:

D1: 10.6 mm
D2: 21.6mm
C: 44.3 mm
A: 1.80 cm²

2.1.2.4 Area Ratio Measurement

The area ratio measurement in the B mode is used to measure two ellipse areas and calculate their ratio.

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Area** > **A1/A2** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to confirm. The two points fixed above define one axis of the ellipse to be measured.

   Press the **Update** key on the control panel to adjust the fixed points.
5. Adjust the other axis of the ellipse by using the trackball.

   Press the **Update** key to position the ellipse.
6. Press the confirm key to complete the first area measurement.
7. Repeat steps 3-6 to perform the second area measurement and the system automatically calculates the ratio by using the following formula.

Calculation Item	Formula
A1	$A1=(\pi/4)\times D_{11}\times D_{12}$
A2	$A2=(\pi/4)\times D_{21}\times D_{22}$

Calculation Item	Formula
A1/A2	A1/A2= A1/A2

Where,

- D_{11} is the first axis distance of the first ellipse.
- D_{12} is the second axis distance of the first ellipse.
- D_{21} is the first axis distance of the second ellipse.
- D_{22} is the second axis distance of the second ellipse.

The measurement results are displayed as follows:

A1: 0.90 cm^2
A2: 0.57 cm^2
A1/A2: 1.57

2.1.2.5 %Stenosis Area

The %Stenosis area measurement in the B mode is used to measure inner and outer areas and the %Stenosis area. Ellipse and trace methods are provided for this measurement.

■ **Ellipse Method**

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Area** > **%Sten (A)** > **2D-Dbl. Ellipse** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to confirm. The two points fixed above define one axis of the ellipse to be measured.

   Press the **Update** key on the control panel to adjust the fixed points.
5. Adjust the other axis of the ellipse by using the trackball.

   Press the **Update** key to position the ellipse.
6. Press the confirm key to complete the outer area measurement.
7. Repeat steps 3-6 to perform the inner area measurement and the system automatically calculates the %Stenosis area by using the following formula.

Calculation Item	Formula
A1	$A1=(\pi/4)\times D_{11}\times D_{12}$
A2	$A2=(\pi/4)\times D_{21}\times D_{22}$
%Sten	%Sten=|A1-A2|/Max(A1,A2)

Where,

- D_{11} is the first axis distance of the first ellipse.
- D12 is the second axis distance of the first ellipse.
- D21 is the first axis distance of the second ellipse.
- D22 is the second axis distance of the second ellipse.

The measurement results are displayed as follows:

A1: 0.76 cm^2
A2: 0.72 cm^2
%Sten: 4.80 %

■ **Trace Method**

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Area** > **%Sten(A)** > **2D-Dbl. Trace** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker along the target object by using the trackball.

   Press the **Update** key on the control panel to undo the trace.
5. Press the confirm key to complete the outer area measurement.
6. Repeat steps 3-5 to perform the inner area measurement and the system automatically calculates the %Stenosis area.

The measurement results are displayed as follows:

A1: 0.27 cm^2
A2: 0.16 cm^2
%Sten: 38.22 %

2.1.3 Volume Measurements

Volume measurements in the B mode include three-distance measurement and ellipse+distance measurement.

2.1.3.1 Three-Distance Measurement

The Three-distance measurement is used to measure the volume of a cuboid shaped object by measuring the length, height and width.

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Volume** on the touch screen, the system starts the three-distance measurement by default and a marker appears on the screen.
3. Perform two distance measurements for the length and the width.
4. Rescan an image which is perpendicular to the previous image.
5. Perform a distance measurement for the height and the system automatically calculates the volume by using the following formula.

Calculation Item	Formula
V	$V= (1/6000)\times\pi\times D1\times D2\times D3$

Where,

- D1 is length.
- D2 is width.
- D3 is height.

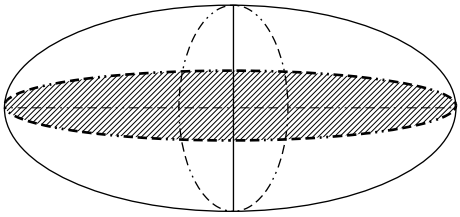
The measurement results are displayed as follows:

D1: 6.9 mm
D2: 9.7 mm
D3: 10.7 mm
V: 0.37 cm³

2.1.3.2 Ellipse+Distance Measurement

The ellipse+distance measurement in the B mode is used to measure the volume of an egg shaped object.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Volume > Ellipse+Dist** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to confirm. The two points fixed above define one axis of the ellipse.

   Press the **Update** key on the control panel to adjust the fixed points.
5. Adjust the other axis of the ellipse by using the trackball.

   Press the **Update** key to adjust the position of the ellipse.
6. Press the confirm key to confirm.
7. Rescan an image that is perpendicular to the previous image.
8. Perform a distance measurement for the height. The system automatically calculates the result by using the following formula.

Calculation Item	Formula
V	$V= (1/6)\times\pi\times D1\times D2\times D3$

Where,

- D1 is the first axis distance of ellipse.
- D2 is the second axis distance of ellipse.
- D3 is height of the object.

The measurement results are displayed as follows:

D1: 11.3 mm
D2: 12.4 mm
D3: 10.5 mm
V: 0.78 cm³

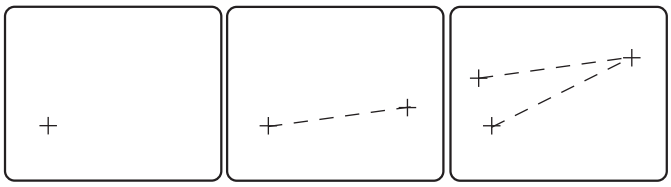
2.1.4 Angle Measurements

Angle measurement in the B mode include three-point angle measurement and two-line angle measurement.

2.1.4.1 Three-Point Angle Measurement

The three-point angle measurement in the B mode is used to measure the angle by setting three points on two intersected planes. The range of this angle is 0°-180°.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Angle** on the touch screen, the system starts the three-point angle measurement by default and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position by using the trackball, press the confirm key to confirm and a third marker appears on the screen.
5. Move the third marker to the desired position by using the trackball, press the confirm key to complete the measurement. The system automatically calculates the angle.

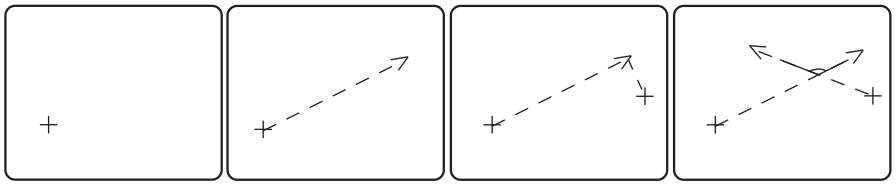
The measurement result is displayed as follows:

Angle: 37.01°

2.1.4.2 Two-Line Angle Measurement

The two-line angle measurement in the B mode is used to measure the angle between two lines on two intersected planes. The range of the angle is 0°-180°.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Angle** > **2Line** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key to confirm and a second marker appears on the screen.
4. Move the second marker to the desired positions.

   Press the **Update** key on the control panel to activate the fixed marker.
5. Press the confirm key to confirm the first line.
6. Repeat steps 3-5 to confirm the second line and the system automatically calculates the angle.

The measurement result is displayed as follows:

Angle: 37.01°

2.2 M-Mode Measurements

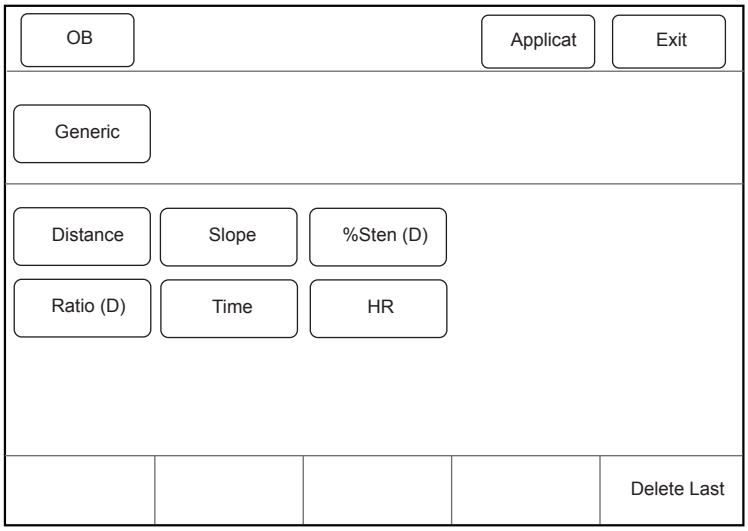
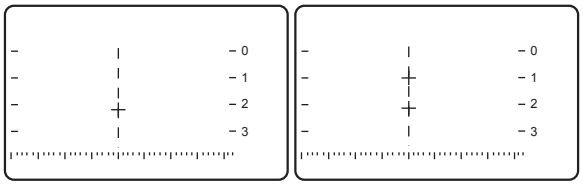


Figure 2-2 Basic Measurement Menu in the M Mode

2.2.1 Distance Measurement

The distance measurement in the M mode is used to measure the vertical distance between two points on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel, the system starts the distance measurement by default and a marker appears on the screen.
2. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
3. Move the second marker to the desired position by using the trackball and press the confirm key to confirm.

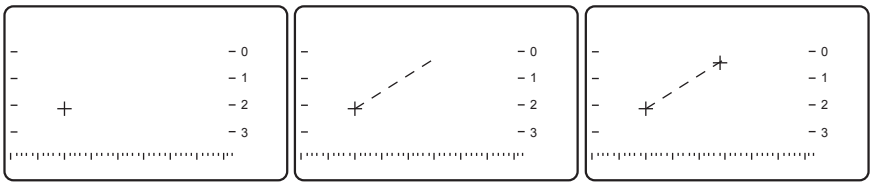
The measurement result is displayed as follows:

D: 7.51mm

2.2.2 Slope Measurement

The slope measurement in the M mode is used to measure the change in distance over time.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Slope** on the touch screen and a marker appears on the screen.

3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position by using the trackball and press the confirm key to confirm. The system automatically calculates the slope by using the following formula.

Calculation Item	Formula
V	V=(D/10)/(T/1000)

Where,

- D is distance.
- T is time.

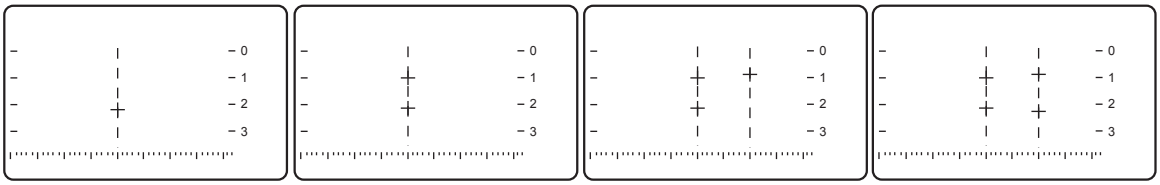
The measurement results are displayed as follows:

D: 12.46 mm
T: 500.00 ms
V: 2.49 cm/s

2.2.3 %Stenosis Distance Measurement

The %Stenosis distance measurement in the M mode is used to measure the vertically inner and outer distances and calculate the %Stenosis.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **%Sten (D)** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position by using the trackball and press the confirm key to complete the outer distance measurement.
5. Repeat steps 3-4 to perform the inner distance measurement and the system automatically calculates the %Stenosis by using the following formula.

Calculation Item	Formula
%Sten	%Sten=|D1-D2|/Max(D1,D2)

Where,

- D1 is the outer distance of the stenosis.
- D2 is the inner distance of the stenosis.

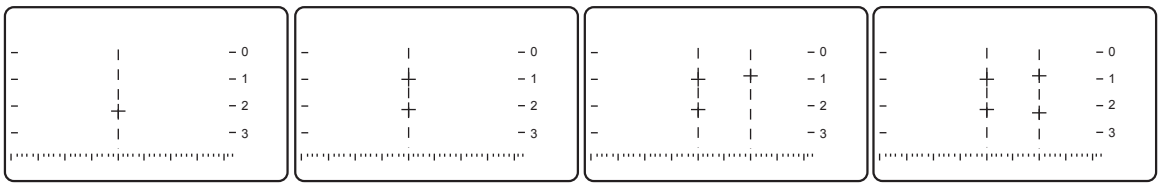
The measurement results are displayed as follows:

D1: 22.8 mm
D2: 17.2 mm
%Sten: 24.68 %

2.2.4 Distance Ratio Measurement

The distance ratio measurement in the M mode is used to measure two vertical distances between two points on the image and calculate their ratio.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Ratio (D)** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position and press the confirm key to complete the first distance measurement.
5. Repeat steps 3-4 to perform the second distance measurement and the system automatically calculate the ratio by using the following formula.

Calculation Item	Formula
Ratio	Ratio=D1/D2

Where,

- D1 is the first distance.
- D2 is the second distance.

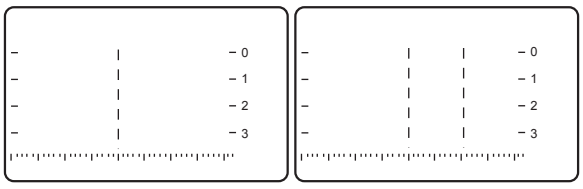
The measurement results are displayed as follows:

D1: 15.1 mm
D2: 13.3 mm
D1/D2: 1.14

2.2.5 Time Measurement

The time measurement in the M mode is used to measure the a horizontal time interval between two points on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Time** on the touch screen and a marker appears on the screen.

3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position by using the trackball and press the confirm key to complete the measurement.

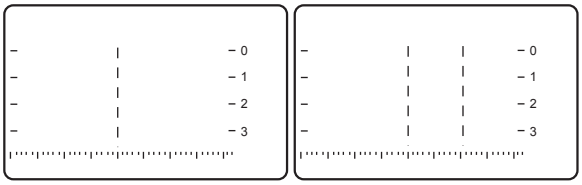
The measurement result is displayed as follows:

T: 1.46 s

2.2.6 Heart Rate Measurement

The heart rate measurement in the M mode is used to measure the time interval between heart cycles (the number of heart cycles is less than 10) and calculate the number of heartbeats per minute.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **HR** on the touch screen and a marker appears on the screen.
   You can tap **HR Cycles** on the touch screen to set the heart cycles.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position by using the trackball and press the confirm key to complete the measurement.

The measurement result is displayed as follows:

HR: 82 bpm

2.3 Color Flow-Mode Measurements

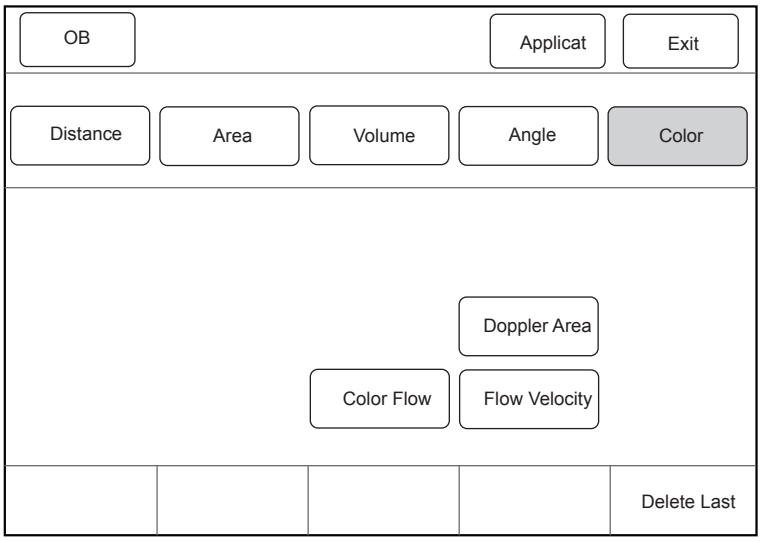


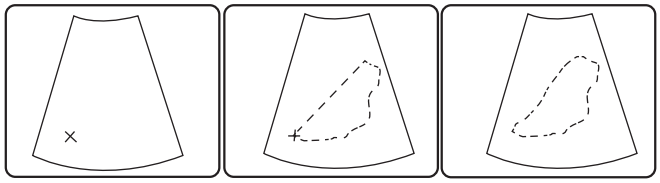
Figure 2-3 Basic Measurement Menu in the Color Flow Mode

General measurements in the color flow mode can be performed as those described in the B mode. Only the Doppler area measurement, color flow measurement and flow velocity measurement are described in this section. For other measurements, refer to Section 2.1 B-Mode Measurements.

2.3.1 Doppler Area Measurement

The Doppler area measurement in the color flow mode is used to measure the circumference and area of a closed object by operating the trackball along the target object.

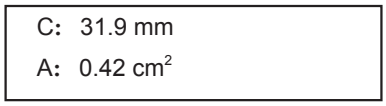
Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Color** on the touch screen and the system starts the Doppler area measurement by default and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker along the target object.

   Press the **Update** key on the control panel to undo the last trace.
5. Press the confirm key to complete the measurement.

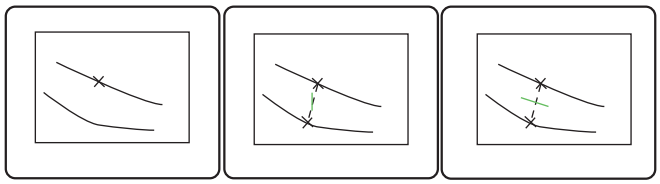
The measurement results are displayed as follows:



2.3.2 Color Flow Measurement

The color flow measurement in the color flow mode is used to estimate the blood flow volume calculated from the area.

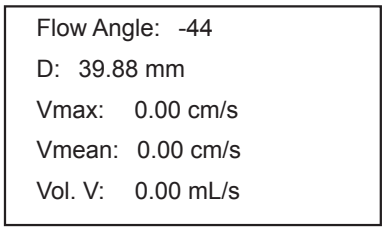
Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Color** > **Color Flow** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball and press the confirm key on the control panel to confirm. At this time, a drifting line appears on the screen, which is parallel to the ultrasound beam, anchored with a 0°angle.

   Rotate the **Angle** knob on the control panel to make the flow be in the same direction as the desired flow anchor. The range of the angle is -72° to 72°.
4. Press the confirm key to complete the measurement.

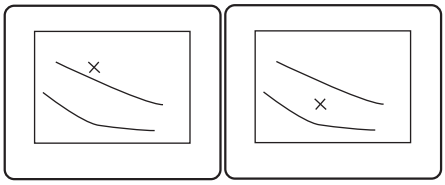
The measurement results are displayed as follows:



2.3.3 Flow Velocity Measurement

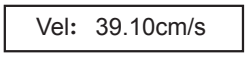
The flow velocity measurement in the color flow mode is used to measure the velocity of one point at the vascular.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Color** > **Flow Velocity** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position and press the confirm key on control panel to complete the measurement.

The measurement result is displayed as follows:



2.4 Spectral Doppler-Mode Measurements

Spectral Doppler-mode measurements are available in the PW/CW mode.

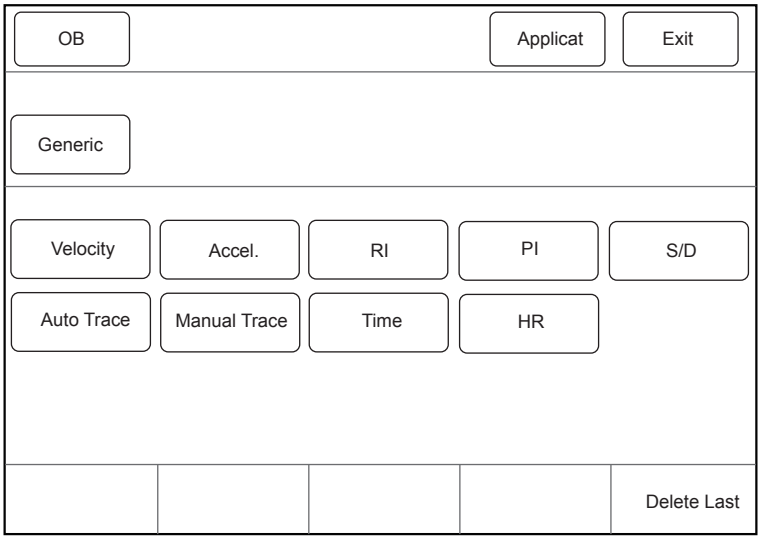
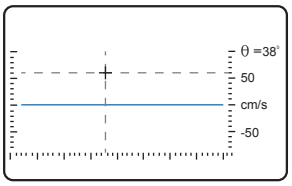


Figure 2-4 Basic Measurement Menu in the Spectral Doppler Mode

2.4.1 Velocity Measurement

The velocity measurement in the spectral Doppler mode is used to measure the velocity and Pressure Gradient (PG) of one point on the Doppler-mode image.

Follow the steps below to perform the measurement.



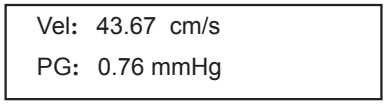
1. Press the **Caliper** key on the control panel.
2. Tap **Velocity** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball and press the confirm key on the control panel to complete the measurement.

Calculation Item	Formula
PG	$PG=4\times(Vel/100)^2$

Where,

- Vel is flow velocity.

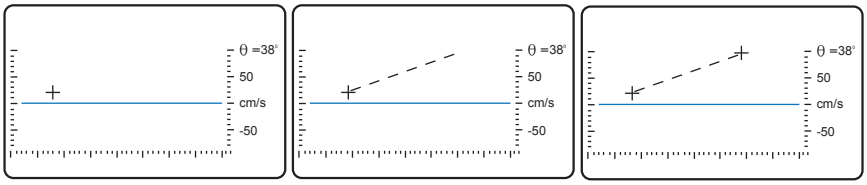
The measurement results are displayed as follows:



2.4.2 Acceleration Measurement

The acceleration measurement in the spectral Doppler mode is used to calculate the flow velocity difference in the time interval from two measured flow velocities.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Accel.** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel and a second marker appears.
4. Move the second marker to the desired position and press the confirm key to confirm. The system automatically calculates the acceleration by using the following formula.

Calculation Item	Formula
Accel	Accel=(Vel2-Vel1)/(T/1000)

Where,

- Vel1 is velocity of the start position.
- Vel2 is velocity of the end position.
- T is time.

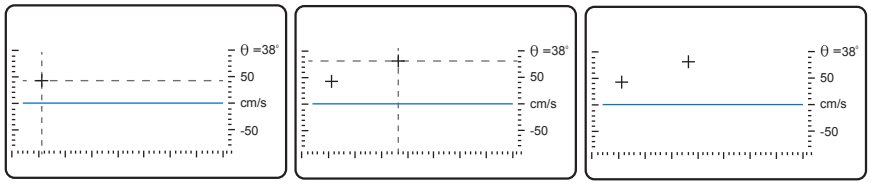
The measurement results are displayed as follows:

Vel1:	33.28 cm/s
Vel2:	65.16 cm/s
T:	85 ms
Accel:	375.16 cm/s^2

2.4.3 Resistivity Index Measurement

The resistivity index measurement in the spectral Doppler mode is used to measure the peak-systolic and end-diastolic velocities and calculate the resistivity index, the maximum pressure gradient and the ratio between the peak systole and end diastole.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **RI** on the touch screen and a marker appears on the screen.
3. Move the marker on the peak systole by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker on the end diastole and press the confirm key to complete the measurement. The system automatically calculates the result by using the following formula.

Calculation Item	Formula
RI	RI=(PS-ED)/PS

Where,

- PS is peak-systolic velocity.
- ED is end-diastolic velocity.

The measurement results are displayed as follows:

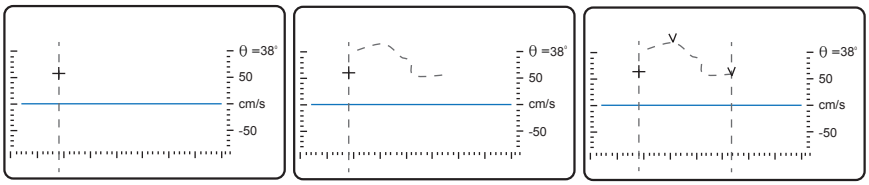
PS:	46.16 cm/s
ED:	86.09 cm/s
RI:	-0.86

2.4.4 Pulsatility Index Measurement

The pulsatility index measurement in the spectral Doppler mode is used to measure the peak-systolic and end-diastolic velocity and calculate the time averaged maximum velocity and the pulsatility index. Auto trace and manual trace methods are provided for this measurement.

■ Manual Trace

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **PI > D-Trace(M)** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to trace the waveform by using the trackball.

   You can retrace the waveform by using the trackball to go back the same way.
5. Press the confirm key to complete the measurement and the system automatically calculates the result by using the following formula.

Calculation Item	Formula
TAmax	TAmax=(∑Vpeakt)/T
PI	PI=(PS-ED)/TAmax

Where,

- PS is peak-systolic velocity.
- ED is end-diastolic velocity.

The measurement results are displayed as follows:

PS: 71.98 cm/s
ED: 66.49 cm/s
TAmax: 63.57 cm/s
PI: 0.03

■ **Auto Trace**

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **PI** > **D-Trace(A)** on the control panel and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to complete the measurement. The system automatically calculates the result by using the following formula.

Calculation Item	Formula
TAmax	TAmax=(∑Vpeakt)/T
PI	PI=(PS-ED)/TAmax

Where,

- PS is peak-systolic velocity.
- ED is end-diastolic velocity.

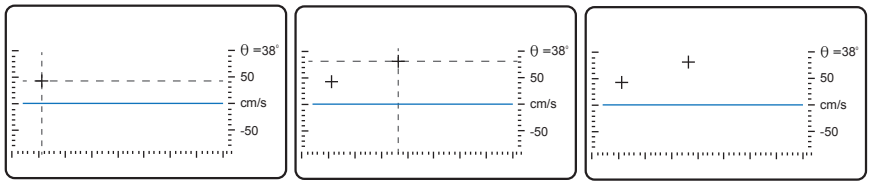
The measurement results are displayed as follows:

PS: 71.98 cm/s
ED: 66.49 cm/s
TAmax: 63.57 cm/s
PI: 0.03

2.4.5 S/D Ratio Measurement

The S/D ratio measurement in the spectral Doppler mode is used to measure the peak-systolic and end-diastolic velocities and calculate their ratio.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **S/D** on the touch screen and a marker appears on the screen.
3. Move the marker on the peak systole by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker on the end diastole and press the confirm key to complete the measurement. The system automatically calculates the result by using the following formula.

Calculation Item	Formula
S/D	S/D= PS/ED

Where,

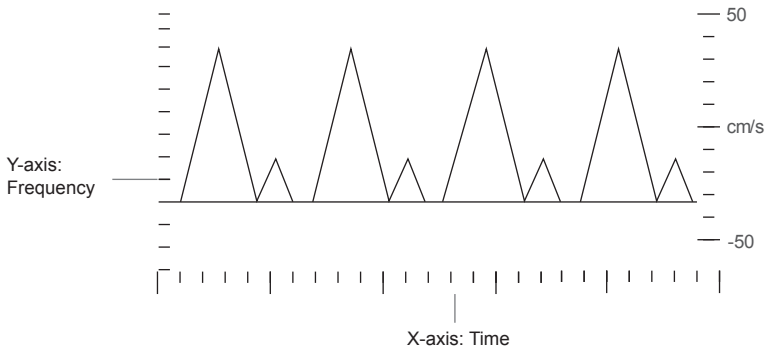
- PS is peak-systolic velocity.
- ED is end-diastolic velocity.

The measurement results are displayed as follows:

PS: 50.53 cm/s
ED: 21.83 cm/s
S/D: 2.31

2.4.6 Auto Trace Measurement

The auto trace measurement in the spectral Doppler mode is used to measure the velocity, Pressure Gradient (PG) or other indexes for clinical diagnosis purposes while the system automatically traces one or more Doppler waveforms.



Follow the following step to perform the measurement.

Press the **Caliper** key on the control panel, tap **Auto Trace** on the touch screen and the system automatically completes all measurements. Press the confirm key on the control panel to confirm.

The measurement results are displayed as follows:

PS: 24.48 cm/s
ED: 10.01 cm/s
RI: 0.59
PI: 1.09
S/D: 2.44
AT: 295.00 ms
DT: 255.00 ms
TAmax: 13.31 cm/s
TAmean: 6.65 cm/s
PG: 2.73 mmHg
MG: 2.30 mmHg
VTI: 22.35 cm
HR: 109 bpm

2.4.7 Manual Trace Measurement

The manual trace measurement in the spectral Doppler mode is used to measure the velocity, Pressure Gradient (PG) or other indexes for clinical diagnosis purposes by tracing one or more Doppler waveforms.

Follow the following steps to perform the measurement.

1. Press the **Caliper** key on the control panel.
2. Tap **Manual Trace** on the touch screen and a marker appears on the screen.
3. Move the marker on the minimum end diastole by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to trace the waveform by using the trackball and then a peak is automatically marked by the system.

   You can retrace the waveform by using the trackball to go back the same way.
5. Move the second marker on the minimum diastole which is one cardiac circle adjacent to the first marker by using the trackball and press the confirm key to complete the measurement.

Calculation Item	Formula
S/D	S/D=PS/ED
PI	PI=(PS-ED)/TAmax
RI	RI=(PS-ED)/PS
TAmax	TAmax=∑Vpv
TAmean	TAmean=∑Vmv
PG	$PG=4\times(PS/100)^2$
MG	$\int_{T_a}^{T_b} 4(V(t))^2 dt/(T_b - T_a)$
HR	HR=60/T
VTI	VTI=∑Vpv

Where,

- PS is peak-systolic velocity.
- ED is end-diastolic velocity.
- TAmax is time averaged maximum velocity.
- T is time.

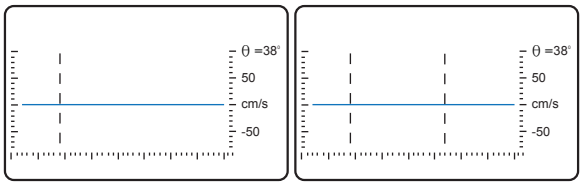
The measurement results are displayed as follows:

PS: 24.48 cm/s
ED: 10.01 cm/s
RI: 0.59
PI: 1.09
S/D: 2.44
AT: 295.00 ms
DT: 255.00 ms
TAmax: 13.31 cm/s
TAmean: 6.65 cm/s
PG: 2.73 mmHg
MG: 2.30 mmHg
VTI: 22.35 cm
HR: 109 bpm

2.4.8 Time Measurement

The time measurement in the spectral Doppler mode is used to measure the horizontal time interval between two points on the image.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **Time** on the touch screen and a marker appears on the screen.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to complete the measurement.

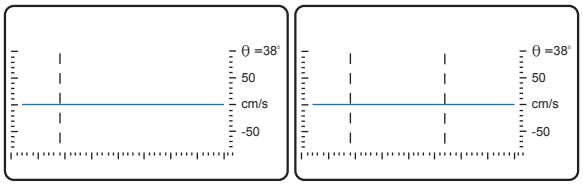
The measurement result is displayed as follows:

T: 1.46 s

2.4.9 Heart Rate Measurement

The heart rate measurement in the spectral Doppler mode is used to measure the time interval between cardiac cycles (the number of cardiac cycles is less than 10) and calculate the number of heartbeats per minute.

Follow the following steps to perform the measurement.



1. Press the **Caliper** key on the control panel.
2. Tap **HR** on the touch screen and a marker appears on the screen.

   You can select the left or right part of **HR Cycles** key to set the heart cycles.
3. Move the marker to the desired position by using the trackball, press the confirm key on the control panel to confirm and a second marker appears on the screen.
4. Move the second marker to the desired position and press the confirm key to complete the measurement.

The measurement result is displayed as follows:

HR: 82 bpm

2.5 Elastography Imaging Measurements

General measurements of distance, area, volume and angle measurements in the elastography imaging can be performed the same way as they are in the B mode. For details, refer to Section 2.1 B-Mode Measurements. For the strain ratio measurement, refer to Section 8.4 Elastography Imaging Measurements.

Follow the following steps to perform the measurement.

1. Select L741 and small parts as the desired probe and exam type, the system automatically enters the real-time B mode.
2. Press the **Elasto** key on the control panel to enter the elastography imaging.
3. Press the **Caliper** key on the control panel to display the measurement menu.
4. Tap **Strain Ratio > Ref 1/ROI 1** to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Strain Ratio	Ref 1/ROI 1 Ref 2/ROI 2 Ref 3/ROI 3	1. Tap **2D-Dbl. Trace** or **2D-Dbl. Ellipse** to set the measurement method. 2. Select the normal tissue (defined as A) and then select the target lesion (defined as B) paralleled to A by using the trace or ellipse method. 3. The system automatically calculates the strain ratio between A and B. The accuracy of strain ratio is 25%. For details about 2D-Double Ellipse and 2D-Double Trace method, refer to Section 2.1.2.5 %Stenosis Area.

2.6 Contrast Imaging Measurements

General measurements in the contrast imaging can be performed the same way as they are in the B mode. For details, refer to Section 2.1 B-Mode Measurements.

2.7 3D/4D Imaging Measurements

General measurements in the frozen 3D/4D mode can be performed the same way as they are in the B mode. For details, refer to Section 2.1 B-Mode Measurements.

3 Vascular Measurements and Calculations

Vascular measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode and the spectral Doppler mode (PW/CW).

3.1 2D Mode Measurements

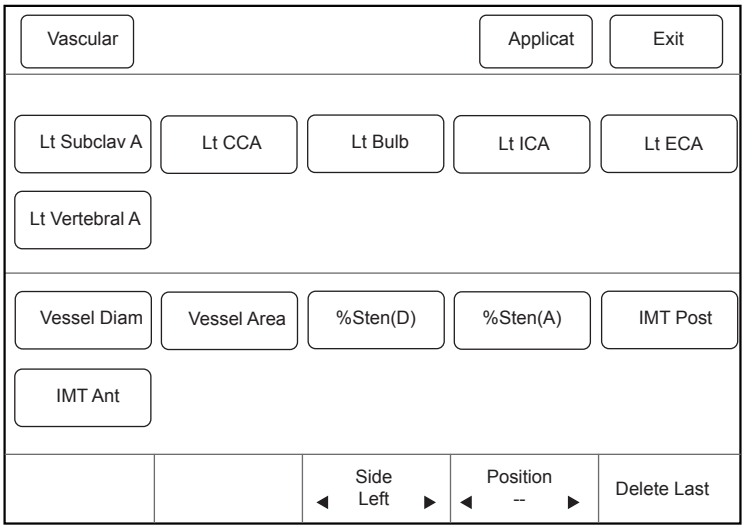


Figure 3-1 Vascular Measurement Menu in the 2D Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat > Vascular** and then tap a measurement category, such as **Carotid**.
3. Tap a measurement collection, such as **Lt Subclav A**.
4. Tap a measurement item to start the measurement.

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Carotid	Lt(Rt) Subclav A	Vessel Diam Vessel Area %Sten(D) %Sten(A) IMT Post IMT Ant	● For the vessel diameter measurement, refer to Section 2.1.1.1 Two-Point Measurement. ● For the vessel area measurement, refer to Section 2.1.2.1 Trace Area Measurement and Section 2.1.2.3 Ellipse Area Measurement. ● For %Stenosis diameter measurement, refer to Section 2.1.1.5 %Stenosis Distance. ● For %Stenosis area measurement, refer to Section 2.1.2.5 %Stenosis Area. ● For IMT Post or IMT Ant measurement, follow the following steps: 1. Tap **IMT Post** or **IMT Ant** under one measurement collection and a marker appears on the screen. 2. Move the marker to the desired position, press the confirm key to confirm and a second marker appears on the screen. 3. Move the second marker to the desired position and press the confirm key to confirm the ROI. The system automatically calculates the results.
	Lt(Rt) CCA		
	Lt(Rt) Bulb		
	Lt(Rt) ICA		
	Lt(Rt) ECA		
	Lt(Rt) Vertebral A		
UE Art	Lt(Rt) Innom A		
	Lt(Rt) Subclav A		
	Lt(Rt) Axill A		
	Lt(Rt) Brach A		
	Lt(Rt) Rad A		
	Lt(Rt) Ulnar A		
	Lt(Rt) Sup Palm A		
	Lt(Rt) Deep Palm A		
UE Vein	Lt(Rt) Innom V		
	Lt(Rt) Subclav V		
	Lt(Rt) Int Jugular V		
	Lt(Rt) Axill V		
	Lt(Rt) Ceph V		
	Lt(Rt) Basilic V		

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
UE Venous	Lt(Rt) Brach V	Vessel Diam Vessel Area %Sten(D) %Sten(A) IMT Post IMT Ant	● For the vessel diameter measurement, refer to Section 2.1.1.1 Two-Point Measurement. ● For the vessel area measurement, refer to Section 2.1.2.1 Trace Area Measurement and Section 2.1.2.3 Ellipse Area Measurement. ● For %Stenosis diameter measurement, refer to Section 2.1.1.5 %Stenosis Distance. ● For %Stenosis area measurement, refer to Section 2.1.2.5 %Stenosis Area. ● For IMT Post or IMT Ant measurement, follow the following steps: 1. Tap IMT Post or IMT Ant under one measurement collection and a marker appears on the screen. 2. Move the marker to the desired position, press the confirm key to confirm and a second marker appears on the screen. 3. Move the second marker to the desired position and press the confirm key to confirm the ROI. The system automatically calculates the results.
	Lt(Rt) Med Cub V		
	Lt(Rt) Rad V		
	Lt(Rt) Ulnar V		
LE Art	Lt(Rt) Com Iliac A		
	Lt(Rt) Ext Iliac A		
	Lt(Rt) Int Iliac A		
	Lt(Rt) Com Fem A		
	Lt(Rt) SFA		
	Lt(Rt) PFA		
	Lt(Rt) Popl A		
	Lt(Rt) Ant Tib A		
	Lt(Rt) Post Tib A		
	Lt(Rt) Peron A		
	Lt(Rt) Dors Ped A		
LE Vein	Lt(Rt) IVC		
	Lt(Rt) Com Iliac V		
	Lt(Rt) Ext Iliac V		
	Lt(Rt) Int Iliac V		
	Lt(Rt) Com Fem V		
	Lt(Rt) SFV		

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
LE Vein	Lt(Rt) PFV Lt(Rt) Popl V Lt(Rt) Ant Tib V Lt(Rt) Post Tib V Lt(Rt) Peron V Lt(Rt) GSV Thigh Lt(Rt) GSV Calf Lt(Rt) LSV	Vessel Diam Vessel Area %Sten(D) %Sten(A) IMT Post IMT Ant	● For the vessel diameter measurement, refer to Section 2.1.1.1 Two-Point Measurement. ● For the vessel area measurement, refer to Section 2.1.2.1 Trace Area Measurement and Section 2.1.2.3 Ellipse Area Measurement. ● For %Stenosis diameter measurement, refer to Section 2.1.1.5 %Stenosis Distance. ● For %Stenosis area measurement, refer to Section 2.1.2.5 %Stenosis Area. ● For IMT Post or IMT Ant measurement, follow the following steps: 1. Tap IMT Post or IMT Ant under one measurement collection and a marker appears on the screen. 2. Move the marker to the desired position, press the confirm key to confirm and a second marker appears on the screen. 3. Move the second marker to the desired position and press the confirm key to confirm the ROI. The system automatically calculates the results.

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
TCD	Lt MCA	Vessel Diam Vessel Area %Sten(D) %Sten(A) IMT Post IMT Ant	● For the vessel diameter measurement, refer to Section 2.1.1.1 Two-Point Measurement. ● For the vessel area measurement, refer to Section 2.1.2.1 Trace Area Measurement and Section 2.1.2.3 Ellipse Area Measurement. ● For %Stenosis diameter measurement, refer to Section 2.1.1.5 %Stenosis Distance. ● For %Stenosis area measurement, refer to Section 2.1.2.5 %Stenosis Area. ● For IMT Post or IMT Ant measurement, follow the following steps: 1. Tap **IMT Post** or **IMT Ant** under one measurement collection and a marker appears on the screen. 2. Move the marker to the desired position, press the confirm key to confirm and a second marker appears on the screen. 3. Move the second marker to the desired position and press the confirm key to confirm the ROI. The system automatically calculates the results.
	Lt ACA		
	Lt AComA		
	Lt PCA		
	Lt PComA		
	Lt ICA		
	Lt Siphon		
	Lt Ophthaimic A		
	Lt Vertebral A		
	Bas A		

3.2 M-Mode Measurement

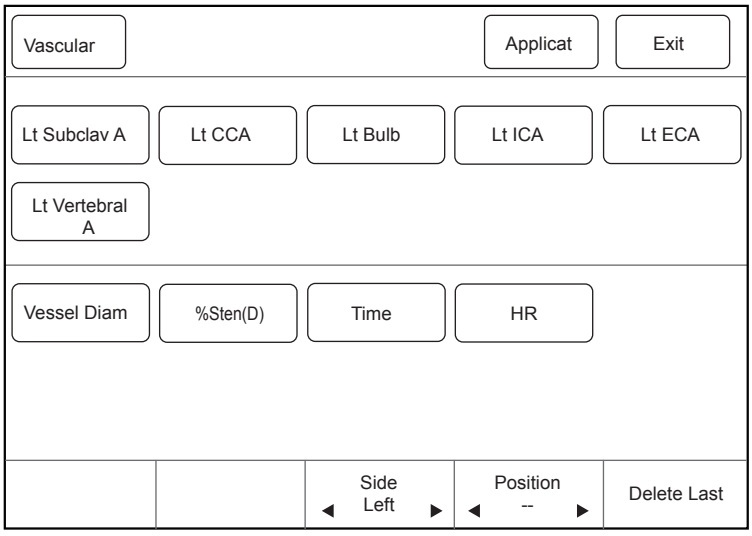


Figure 3-2 Vascular Measurement in the M-Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat > Vascular** on the touch screen and tap a measurement category, such as **Carotid**.
3. Tap a measurement collection, such as **Lt Subclav A**.
4. Tap a measurement item to start the measurement.

Measurement categories and measurement collections in the M mode are the same as those in the 2D mode, therefore, they are not detailed in this section. Measurement items of each measurement collection are as shown below.

Measurement Item	Measurement Method
Vessel Diam	Refer to Section 2.2.1 Distance Measurement
%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
Time	Refer to Section 2.2.5 Time Measurement
HR	Refer to Section 2.2.6 Heart Rate Measurement

3.3 Spectral Doppler-Mode Measurements

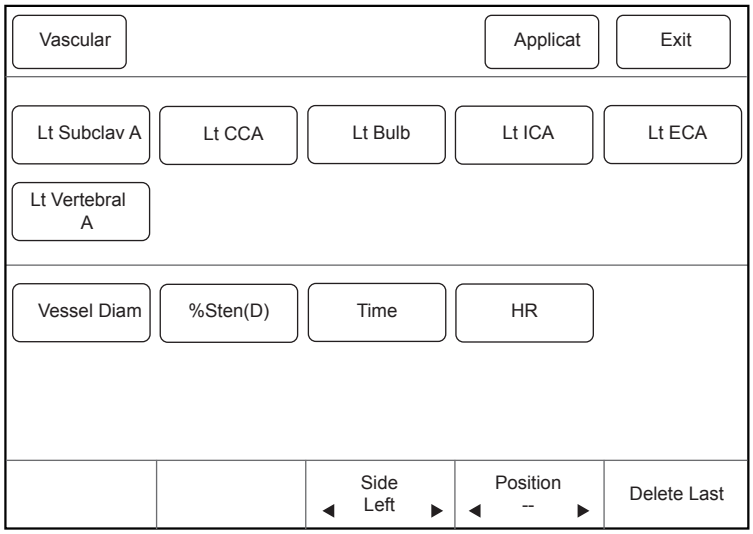


Figure 3-3 Vascular Measurement Menu in the Spectral Doppler Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat > Vascular** on the touch screen and tap a measurement category, such as **Carotid**.
3. Tap a measurement collection, such as **Lt Subclav A**.
4. Tap a measurement item to start the measurement.

Measurement categories and measurement collections in the PW/CW mode are the same as those in the 2D mode, therefore, they are not detailed in this section. Measurement items of each measurement collection are as shown below.

Measurement Item	Measurement Method
PS	Refer to Section 2.4.1 Velocity Measurement
ED	
RI	Refer to Section 2.4.3 Resistivity Index Measurement
PI	Refer to Section 2.4.4 Pulsatility Index Measurement
PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
HR	Refer to Section 2.4.9 Heart Rate Measurement
Volume Flow	Refer to Section 2.4.6 Auto Trace Measurement and Section 2.4.7 Manual Trace Measurement

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4 Obstetrics Measurements and Calculations

Obstetrics measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode and the spectral Doppler mode (PW/CW).

4.1 2D-Mode Measurements

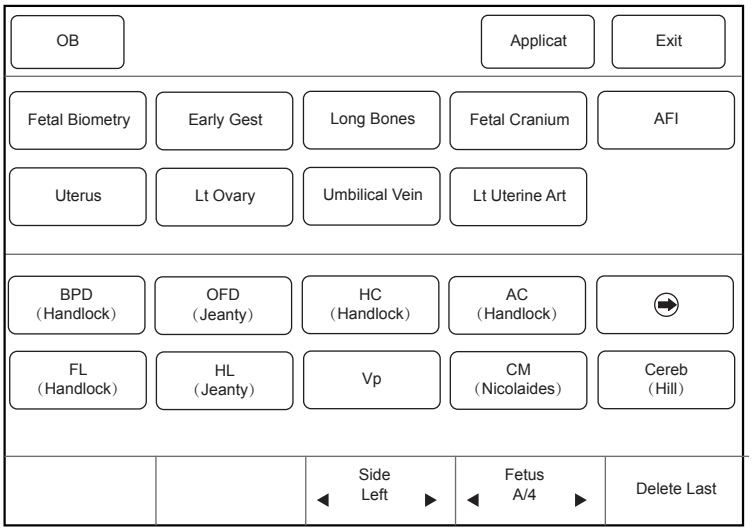


Figure 4-1 Obstetrics Measurement Menu in the 2D Mode

4.1.1 General Measurements

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat > OB** on the touch screen and tap a measurement category, such as **Fetal Biometry**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Fetal Biometry	BPD	Refer to Section 2.1.1.1 Two-Point Measurement
	OFD	
	HC	• For 2D-Trace method, refer to Section 2.1.2.1 Trace Area Measurement. • For 2D-Ellipse method, refer to Section 2.1.2.3 Ellipse Area Measurement.
	AC	
	Vp	Refer to Section 2.1.1.1 Two-Point Measurement
	Cereb	
	FL	
	HL	
	CM(Nicolaides)	
	APAD(Merz)	
	TAD(CFEF)	
	TTD(Hansmann)	
Early Gest	CRL	Refer to Section 2.1.1.1 Two-Point Measurement
	GS	• 2D-Dist method is used to perform one distance measurement. • 2D-Triple Dist method is used to perform three-distance measurement. For distance measurement, refer to Section 2.1.1.1 Two-Point Measurement.
	YS	Refer to Section 2.1.1.1 Two-Point Measurement.
	BPD	
	FL	
	NT	Refer to Section 2.1.1.1 Two-Point Measurement.
Long Bones	HL	Refer to Section 2.1.1.1 Two-Point Measurement
	RAD	
	Ulna	
	TIB	
	FIB	
	Clav.	

Measurement Collection	Measurement Item	Measurement Method
Fetal Cranium	Cereb	Refer to Section 2.1.1.1 Two-Point Measurement.
	CM	
	Va	
	Vp	
	BOD	
	IOD	
	HEM	
	c.s.p	
	NF	
	NT	Refer to Section 2.1.1.1 Two-Point Measurement.
AFI	Q1	Refer to Section 4.1.5 AFI
	Q2	
	Q3	
	Q4	
Uterus	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Height	
	Width	
	Endo.Thickn.	
	Cervix Length	• For 2D-Dist method, refer to Section 2.1.1.1 Two-Point Measurement. • For 2D-Trace method, refer to Section 2.1.1.2 Length Trace Measurement.
Lt(Rt) Ovary	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Height	
	Width	
Umbilical Vein	Diam	
Lt(Rt) Uterine Art		

4.1.2 Multiple Fetus Measurement

If **Fetus** is set to **2**, **3** or **4** in the OB tab of the **New Patient** screen, you can perform measurements and report multiple fetus developments.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat > OB** on the touch screen, the measurement menu is displayed.
3. Tap the left or right part of **Fetus** to identify the fetus to be examined, such as **B/4**.
4. Perform the measurement.
5. If necessary, repeat steps 3-4 to perform the measurement for other fetuses.

NOTE:

- Four fetuses at most can be examined and reported at a time.
- After you change to the next fetus (from **B/4** to **A/4** for example), any measurements you performed are recorded and reported for that fetus.
- Any measurement data related to maternal tissues (such as uterus, ovary uterus artery and so on) are recorded and reported to all fetuses. While, measurement data related to a single fetus (such as AFI, umbilical cord or other organs) are only recorded and reported for that fetus.
- If you have any active measurement or calculation that is not completed when you change to another fetus, the system cancels the measurement or calculation.

4.1.3 EFW

Estimated Fetal Weight (EFW) is calculated from the obstetrics measurements you performed.

Multiple EFW formulas are available for the EFW measurement. You can choose **System Setting**> **Measure** > **Application** > **Fetal Weight** to select the EFW method and perform all relevant measurements. For example, set the Estimation to BPD/AC/FL(Hadlock2) and perform measurements of BPD, AC and FL to obtain the EFW value.

The system automatically calculates the EFW value and displays it in the measured result box after all the required measurements are completed. If part of measurements are performed for a second time, the system automatically calculates the EFW value in accordance with the new measurements.

4.1.4 GA and EDD

Gestational Age (GA) and Expected Date of Deliver (EDD) can be calculated in the following ways.

■ **Calculated by Last Menstrual Period (LMP) or In-vitro Fertilization (IVF)**

- If Date is set to LMP in the OB tab of the New Patient screen, the system automatically calculates EDD and GA and displays the results in the measurement report. The formula is shown below.

  GA = current date - LMP
  EDD = LMP + 280 days
- If Date is set to IVF in the OB tab of the New Patient screen, the system automatically calculates EDD and GA and displays the results in the measurement report. The formula is shown below.

  GA = current date - LMP + 14 days
  EDD = LMP + 266 days

■ **Calculated by measurement results**

- You can choose **System Setting**> **Measure** > **Application** > **CUA** to select the CUA method and perform all relevant measurements. For example, set the CUA method to BPD,AC and perform the measurements of BPD and AC to obtain the CUA value.

  The system automatically calculates the Composite Ultrasound Age (CUA) and EDD and displays the results in the measurement report after you perform all the required measurements.
- You can choose **System Setting**> **Measure** > **Application** > **New Table** to select the formula for each method and perform all the relevant measurements.

  The system automatically calculates GA and EDD, uses the obtained the GA and EDD values to calculate the average value of CUA and EDD and then displays the results in the measurement report after you perform each required measurements.

■ **Calculated by EFW**

You can choose **System Setting**> **Measure** > **Application** > **Age by EFW** to select the method and perform all the relevant measurements.

The system automatically calculates EFW, uses the EFW value to calculate the GA and EDD and then displays the results in the measurement report after you perform all the required measurements.

The values of GA and EDD calculated above may be slightly different, therefore, you should make a diagnosis with a clinical analysis.

4.1.5 AFI

Amniotic Fluid Index (AFI) requires four measurements for the deepest amniotic fluid volume in the four quadrants of the uterine cavity divided by the pregnancy line and the horizontal line of the umbilicus. The system adds these four measurements together to calculate AFI.

AFI is calculated using the following formula,

$$AFI = \sum_{i=1}^{4} AFI_{Di}$$

AFI_{Di} is measured at the Di depth.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **OB** > **AFI** > **Q1** on the touch screen to perform a distance measurement for the first quadrant and the AFI value is displayed in the measured result box.
3. Rescan to obtain the image for the second quadrant.
4. Tap **Q2** to perform a distance measurement for the second quadrant and the AFI value is displayed in the measured result box.
5. Repeat steps 3-4 to perform a distance measurement for the third and fourth quadrants respectively and the final AFI value is displayed.

You can also perform four distance measurements for four quadrants in the quad display mode one time.

4.2 M-Mode Measurement

Figure 4-2 Obstetrics Measurement Menu in the M Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap a measurement collection and then a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
General	Distance	Refer to Section 2.2.1 Distance Measurement
	Slope	Refer to Section 2.2.2 Slope Measurement
	Time	Refer to Section 2.2.5 Time Measurement
	HR	Refer to Section 2.2.6 Heart Rate Measurement
	%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
FHR	FHR	Refer to Section 2.2.6 Heart Rate Measurement
	Atrial FHR	

4.3 Spectral Doppler-Mode Measurements

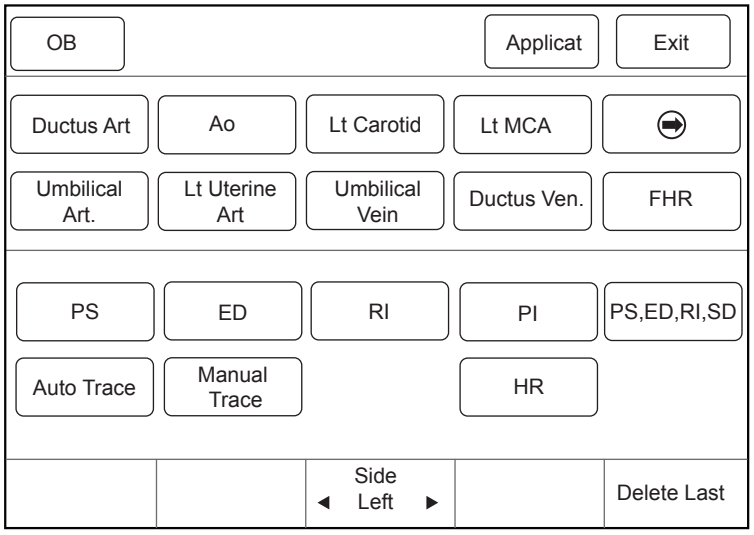


Figure 4-3 Obstetrics Measurement Menu in the Spectral Doppler Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **OB** on the touch screen.
3. Tap a measurement collection, such as **Ductus Art**.
4. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Ductus Art Ao Lt(Rt) Carotid Lt(Rt) MCA Umbilical Art. SMA Celiac.A.	PS	Refer to Section 2.4.1 Velocity Measurement
	ED	
	RI	Refer to Section 2.4.3 Resistivity Index Measurement
	PI	Refer to Section 2.4.4 Pulsatility Index Measurement
	PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
	Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
	Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
Lt(Rt) Uterine Art.	PS	Refer to Section 2.4.1 Velocity Measurement
	ED	
	RI	Refer to Section 2.4.3 Resistivity Index Measurement
	PI	Refer to Section 2.4.4 Pulsatility Index Measurement
	PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
	Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
	Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
	Volume Flow	Refer to Section 2.4.6 Auto Trace Measurement and Section 2.4.7 Manual Trace Measurement
Umbilical Vein	Volume Flow	Refer to Section 2.4.6 Auto Trace Measurement and Section 2.4.7 Manual Trace Measurement
	TAmax (Time Averaged Maximum Velocity)	Refer to Section 2.4.1 Velocity Measurement
Ductus Ven.	S (Ventricular Systole Peak Velocity)	
	D (Ventricular Diastole Peak Velocity)	
	a (Lowest Velocity during Atrial Systole)	
	S.a. PLI (Preload Index)	Refer to Section 2.4.7 Manual Trace Measurement
	PVIV (Peak Velocity Index Vein)	Refer to Section 2.4.5 S/D Ratio Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
FHR	FHR	Refer to Section 2.4.9 Heart Rate Measurement

Measurement Collection	Measurement Item	Measurement Method
IVC	S (Ventricular Systole Peak Velocity)	Refer to Section 2.4.1 Velocity Measurement
	D (Ventricular Diastole Peak Velocity)	
	S.a. PLI (Preload Index)	Refer to Section 2.4.7 Manual Trace Measurement
	PVIV (Peak Velocity Index Vein)	Refer to Section 2.4.5 S/D Ratio Measurement

5 Gynecology Measurements and Calculations

Gynecology measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode and the spectral Doppler mode (PW/CW).

5.1 2D-Mode Measurements

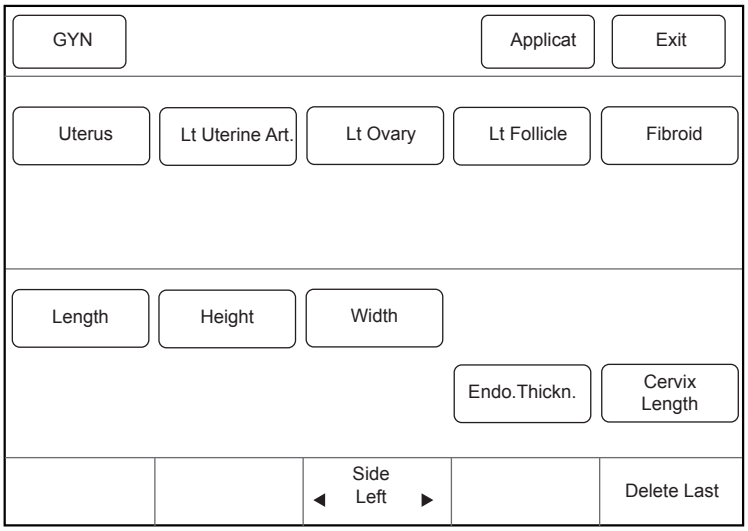


Figure 5-1 Gynecology Measurement Menu in the 2D Mode

5.1.1 Uterus Measurement

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **GYN > Uterus** on the touch screen.
3. Tap a measurement item, such as **Length**, to start the measurement.

Measurement Item	Measurement Method
Length	Refer to Section 2.1.1.1 Two-Point Measurement
Height	
Width	
Endo.Thickn.	
Cervix Length	• For 2D-Dist method, refer to 2.1.1.1 Two-Point Measurement. • For 2D-Trace method, refer to Section 2.1.1.2 Length Trace Measurement.

5.1.2 Uterus Artery Measurement

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **GYN > Lt Uterine A** on the touch screen.
3. Tap **Diam** to start the measurement.

Measurement Item	Measurement Method
Diam	Refer to Section 2.1.1.1 Two-Point Measurement

5.1.3 Ovary Volume Measurement

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **GYN > Lt Ovary** on the touch screen.
3. Perform three distance measurements for the length, height and width, and the system automatically calculates the volume.

5.1.4 Follicle Measurement

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **GYN** > **Lt Follicle** on the touch screen.
3. Tap **Follicle** and set the measurement method, such as **2D-Dist**, **2D-Dbl. Dist**, **2D-Triple Dist** and **2D-Ellipse+Dist**.
4. Perform the measurement and the system automatically calculates the average value and volume.
   - For **2D-Dist** method, perform one distance measurement.
   - For **2D-Double Dist** method, perform two distance measurements.
   - For **2D-Triple Dist** method, perform three distance measurements.
   - For **2D-Ellipse+Dist** method, perform ellipse+distance measurements.

5.1.5 Fibroid Measurement

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **GYN** > **Fibroid** on the touch screen.
3. Tap **Fibroid** and set the measurement method, such as **2D-Dist**, **2D-Dbl. Dist** and **2D-Triple Dist**.
4. Perform the measurement and the system automatically calculates the average value and volume.
   - For **2D-Dist** method, perform one distance measurement.
   - For **2D-Double Dist** method, perform two distance measurements.
   - For **2D-Triple Dist** method, perform three distance measurements.

5.2 M-Mode Measurements

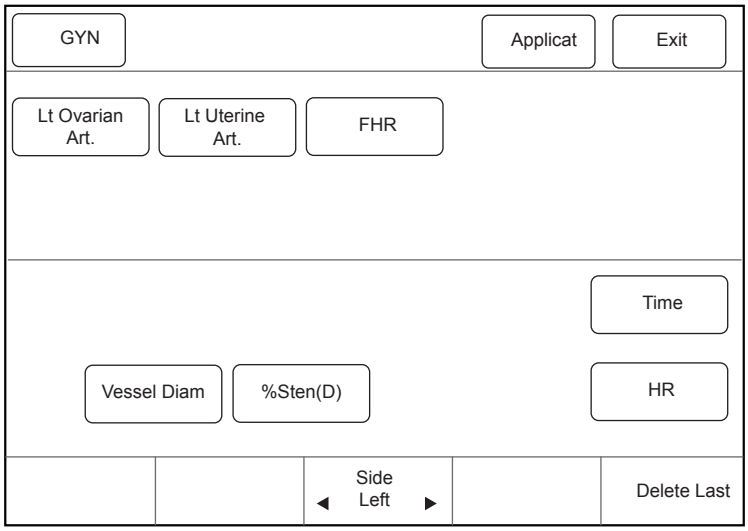


Figure 5-2 Gynecology Measurement Menu in the M Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **GYN** on the touch screen.
3. Tap a measurement collection, such as **Lt Ovarian Art.**.
4. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Ovarian Art. Lt(Rt) Uterine Art.	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
	%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
	Time	Refer to Section 2.2.5 Time Measurement
	HR	Refer to Section 2.2.6 Heart Rate Measurement
FHR	FHR	Refer to Section 2.2.6 Heart Rate Measurement
	Atrial FHR	

5.3 Spectral Doppler-Mode Measurements

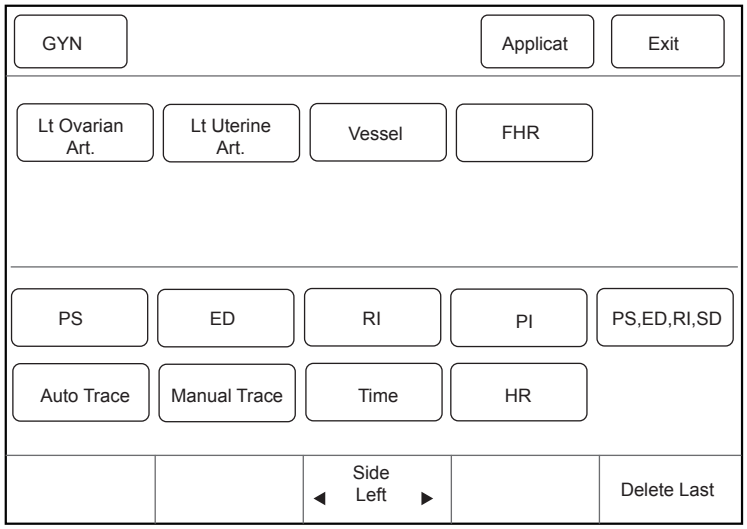


Figure 5-3 Gynecology Measurement Menu in the Spectral Doppler Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Calc** > **Applicat** > **GYN** on the touch screen.
3. Tap a measurement collection, such as **Lt Ovarian Art.**.
4. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Ovarian Art. Lt(Rt) Uterine Art. Vessel	PS	Refer to Section 2.4.1 Velocity Measurement
	ED	
	RI	Refer to Section 2.4.3 Resistivity Index Measurement
	PI	Refer to Section 2.4.4 Pulsatility Index Measurement
	Time	Refer to Section 2.4.8 Time Measurement
	PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
	Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
	Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
FHR	FHR	Refer to Section 2.4.9 Heart Rate Measurement

6 Abdomen Measurements and Calculations

Abdomen measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode and the spectral Doppler mode (PW/CW).

6.1 2D-Mode Measurements

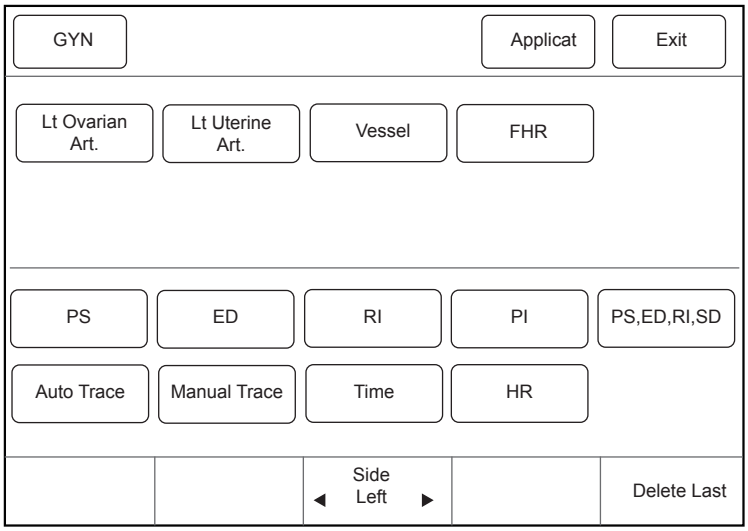


Figure 6-1 Abdomen Measurement Menu in the 2D Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **Abdomen** on the touch screen and tap a measurement collection, such as **Liver**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Liver Spleen Lt(Rt) Kidney Bladder	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Height	
	Width	
Port.V.	Portal V.Diam.	Refer to Section 2.1.1.1 Two-Point Measurement
	Flow Diam.	

Measurement Collection	Measurement Item	Measurement Method
Gallbladder	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Width	
	Wall	
	CBD	
Pancreas	Duct.	Refer to Section 2.1.1.1 Two-Point Measurement
	Head	
	Body	
	Tail	
Lt(Rt) Renal A Aorta	Vessel Area	Refer to Section 2.1.2.3 Ellipse Area Measurement
	%Sten(A)	Refer to Section 2.1.2.5 %Stenosis Area
	Vessel Diam.	Refer to Section 2.1.1.1 Two-Point Measurement
	%Sten(D).	Refer to Section 2.1.1.5 %Stenosis Distance
	Flow Diam	Refer to Section 2.1.1.1 Two-Point Measurement

6.2 M-Mode Measurements

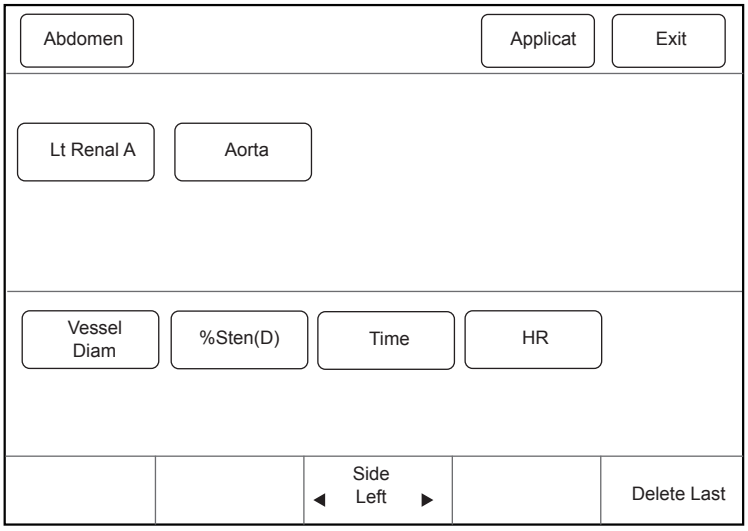


Figure 6-2 Abdomen Measurement Menu in the M Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Abdomen** on the touch screen and tap a measurement collection, such as **Lt Renal A**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Renal A Aorta	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
	%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
	Time	Refer to Section 2.2.5 Time Measurement
	HR	Refer to Section 2.2.6 Heart Rate Measurement

6.3 Spectral Doppler-Mode Measurements

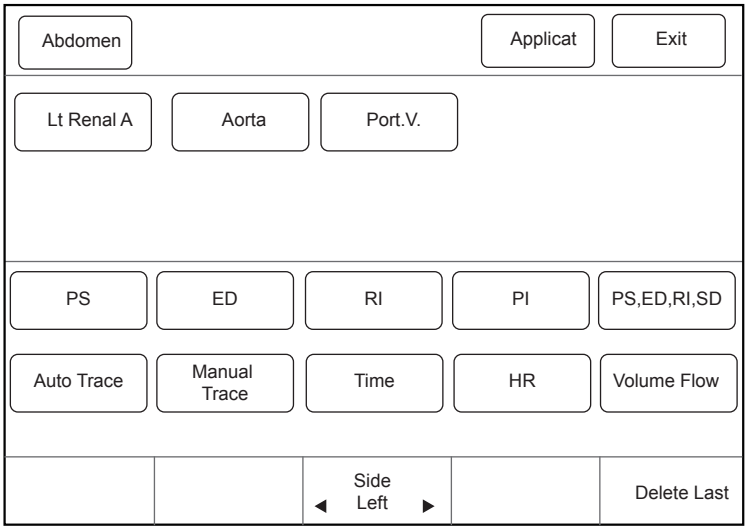


Figure 6-3 Abdomen Measurement Menu in the Spectral Doppler Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Abdomen** on the touch screen and tap a measurement collection, such as **Lt Renal A**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Renal A Aorta	PS	Refer to Section 2.4.1 Velocity Measurement
	ED	
	RI	Refer to Section 2.4.3 Resistivity Index Measurement
	PI	Refer to Section 2.4.4 Pulsatility Index Measurement
	PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
	Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
	Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
	Time	Refer to Section 2.4.8 Time Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
	Volume Flow	Refer to Section 2.4.6 Auto Trace Measurement and Section 2.4.7 Manual Trace Measurement
Port.V.	Vel.	Refer to Section 2.4.1 Velocity Measurement
	Time	Refer to Section 2.4.8 Time Measurement

7 Cardiology Measurements and Calculations

Cardiology measurements and calculations are available in the B mode, the M mode, the color flow mode and the spectral Doppler mode (PW/CW).

7.1 B-Mode Measurements

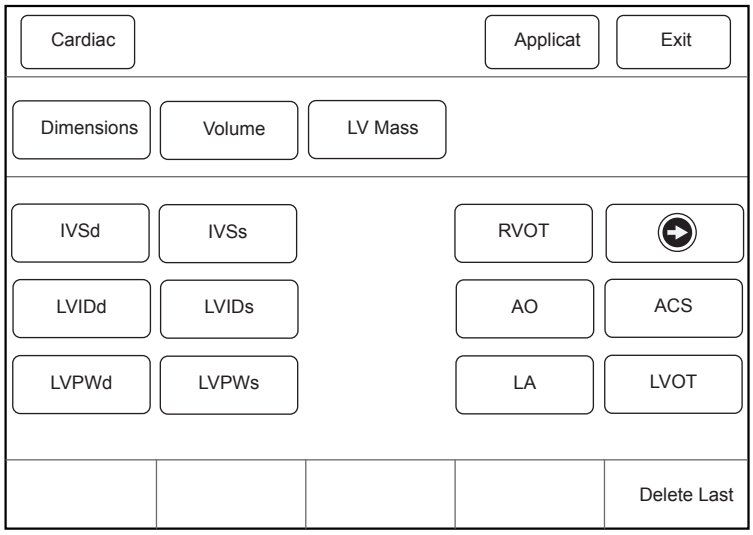


Figure 7-1 Cardiology Measurement Menu in the B Mode

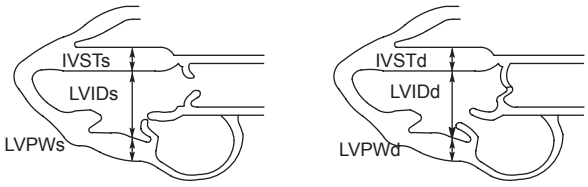
7.1.1 Left Ventricle

The left ventricle can be evaluated in the B mode by using the following methods.

- Teichholz
- Simpson
- Area-Length (A-L)

7.1.1.1 Teichholz

This measurement method calculates the LV volume by using the following figure.



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat > Cardiac** on the touch screen.
3. Tap **Dimensions** > **IVSd** or tap **Volume** > a measurement item under **Teichlozs (LV)** to perform the measurements one by one.

Measurement Item	Description	Measurement Method
IVSd	Interventricular Septum Diastolic Thickness	Refer to Section 2.1.1.1 Two-Point Measurement
LVIDd	Left Ventricular Internal End Diastolic Dimension	
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness	
IVSs	Interventricular Septum Systolic Thickness	
LVIDs	Left Ventricular Internal End Systolic Dimension	
LVPWs	Left Ventricular Posterior Wall Systolic Thickness	

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
EDV	Left Ventricular End Diastolic Volume (ml)	$EDV = \frac{7 \times LVIDd^3}{2.4 + LVIDd}$
ESV	Left Ventricular End Systolic Volume (ml)	$ESV = \frac{7 \times LVIDs^3}{2.4 + LVIDs}$
SV	Stroke Volume (mL)	SV = EDV-ESV
FS	Fractional shortening	FS=(LVIDd-LVIDs)/LVIDd
CO	Cardiac Output (Umin)	CO = SV×HR
CI	Cardiac Index	CI = CO/BSA
EF	Ejection Fraction	EF = SV/EDV
SI	Stroke Index	SI = SV/BSA
IVS%	Interventricular Septum % Thickening	IVS%=(IVSs-IVSd)/IVSd
LVPW%	Left Ventricular Posterior Wall % Thickening	LVPW%=(LVPWs-LVPWd)/LVPWd
IVS/LVPW	Interventricular Septum/LV posterior wall thickness	IVS/LVPW=IVSd/LVPWd
LVM	Left Ventricular Mass	LVM=0.8×1.04×[(IVSd+LVIDd+LVPWd)^3-LVIDd^3]+0.6

Calculation Item	Description	Formula
LVMI	Left Ventricular Mass Index	LVMI=LVM/BSA

7.1.1.2 Simpson Method

This measurement method calculates the LV volume by using the orthogonal apical four- and two-chamber views.

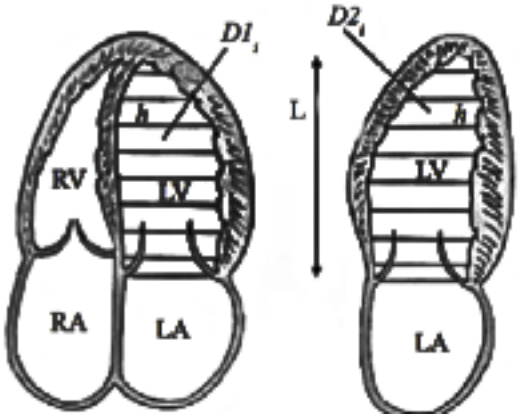


Figure 7-2 Four- and Two- Chamber

- L: the larger LV longitudinal axis length between the four-chamber view and the two-chamber view.
- D1i: the diameter of the i-th disk of the four-chamber view.
- D2i: the diameter of the i-th disk of the two-chamber view.
- n: the total number of disks.
- h: the height of the i-th disk.

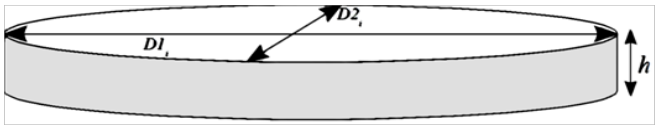


Figure 7-3 i-th Disk

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Volume** on the touch screen.
3. Tap a measurement item under **Simp(LV)** to start the measurement.

Measurement Item	Description	Measurement Method
A2Cd	Two Chamber View at End Diastole	**Auto Trace** 1. Use the trackball to position cursor to one side of the circumference of endocardium, press the confirm key to confirm. 2. Use the trackball to position cursor to the other side of the circumference of endocardium, press the confirm key to confirm. 3. Use the trackball to position the cursor to the apical and press the confirm key. The system automatically displays the longitudinal axis and you can use the trackball to adjust it. 4. Press the confirm key to complete the measurement. Manual Trace 1. Use the trackball to trace the circumference of endocardium, you can press the **Update** key to modify the anchor. 2. Press the confirm key to confirm. The system automatically displays the longitudinal axis and you can use the trackball to adjust it. 3. Press the confirm key to complete the measurement.
A2Cs	Two Chamber View at End Systole	
A4Cd	Four Chamber View at End Diastole	
A4Cs	Four Chamber View at End Systole	

After you complete A2Cd, A2Cs, A4Cd and A4Cs measurements, the system automatically calculates the following items in accordance with the measurement results.

If you only complete part of the measurements, only the completed measurement items are calculated.

Calculation Item	Description	Formula
EDV (A4C)	Left Ventricular End Diastolic Volume (ml)	EDV(A4C) = (π/4)×h×∑(A4Cd×A4Cd)
EDV (A2C)		EDV(A2C) = (π/4)×h×∑(A2Cd×A2Cd)
EDV (BP)		EDV(BP) = (π/4)×h×∑(A4Cd×A2Cd)
ESV (A4C)	Left Ventricular End Systolic Volume (ml)	ESV(A4C) = (π/4)×h×∑(A4Cs×A4Cs)
ESV (A2C)		ESV(A2C) = (π/4)×h×∑(A2Cs×A2Cs)
ESV (BP)		ESV(BP) = (π/4)×h×∑(A4Cs×A2Cs)
SV (A4C)	Stroke Volume (ml)	SV(A4C) = EDV(A4C)-ESV(A4C)
SV (A2C)		SV(A2C) = EDV(A2C)-ESV(A2C)
SV (BP)		SV(BP) = EDV(BP)-ESV(BP)
CO (A4C)	Cardiac Output (Umin)	CO(A4C) = SV(A4C)×HR
CO (A2C)		CO(A2C) = SV(A2C)×HR
CO (BP)		CO(BP) = SV(BP)×HR

Calculation Item	Description	Formula
EF (A4C)	Ejection Fraction	EF(A4C) = SV(A4C)/EDV(A4C)
EF (A2C)		EF(A2C) = SV(A2C)/EDV(A2C)
EF (BP)		EF(BP) = SV(BP)/EDV(BP)
SI (A4C)	Stroke Volume Index	SI (A4C) = SV(A4C)/BSA
SI (A2C)		SI(A2C) = SV(A2C)/BSA
SI (BP)		SI (BP) = SV(BP)/BSA
CI (A4C)	Cardiac Index	CI(A4C) = CO(A4C)/BSA
CI (A2C)		CI(A2C) = CO(A2C)/BSA
CI (BP)		CI(BP) = CO(BP)/BSA

7.1.1.3 Area/Length Method

This measurement method calculates the LV volume by measuring the ellipse covering the longitudinal axis of the left ventricle.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Volume** on the touch screen.
3. Tap a measurement item under **A-L(LV)** to start the measurement.

Measurement Item	Description	Measurement Method
LVd	Left Ventricular Dimension at End Diastole	1. Use the trackball to trace the circumference of the left ventricle. You can press the **Update** key on control panel to delete the trace and draw the trace again by using the trackball. 2. Press the confirm key to confirm. The system automatically displays the longitudinal axis and you can use the trackball to adjust it. 3. Press the confirm key to complete the measurement.
LVs	Left Ventricular Dimension at End Systole	

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
EDV	Left Ventricular End Diastolic Volume (ml)	$EDV=(8/3)\times(LVd\ Area^2/(LVd\ Length\times\pi))$
ESV	Left Ventricular End Systolic Volume (ml)	$ESV=(8/3)\times(LVs\ Area^2/(LVs\ Length\times\pi))$
SV	Stroke Volume (mL)	SV = EDV-ESV
CO	Cardiac Output (Umin)	CO = SV×HR
EF	Ejection Fraction	EF = SV/EDV

Calculation Item	Description	Formula
SI	Stroke Volume Index	SI = SV/BSA
CI	Cardiac Index	CI = CO/BSA

7.1.2 Left Atria Volume

Left atria volume can be measured by using the Simpson method, i.e. using the orthogonal apical four- and two-chamber views.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Select **Applicat** > **Cardiac** > **Volume** on the control panel.
3. Select a measurement item under **Simp(LA)** to start the measurement.

Measurement Item	Description	Measurement Method
A2Cs	Two Chamber View at End Systole	1. Use the trackball to trace the circumference of the endocardium. You can press the **Update** key on control panel to delete the trace and draw the trace again by using the trackball. 2. Press the confirm key to confirm. The system automatically displays the longitudinal axis and you can use the trackball to adjust it. 3. Press the confirm key to complete the measurement.
A4Cs	Four Chamber View at End Systole	

After you complete A2Cs and A4Cs measurements, the system automatically calculates the following items in accordance with the measurement results.

If you only complete part of the measurements, only the completed measurement items are calculated.

Calculation Item	Description	Formula
LA ESV (A4C)	Left Atria End Systolic Volume (ml)	LA ESV(A4C) = (π/4) × h × ∑ (A4Cs × A4Cs)
LA ESV (A2C)		LA ESV(A2C) = (π/4) × h × ∑ (A2Cs × A2Cs)
LA ESV (BP)		LA ESV(BP) = (π/4)×h×∑(A4Cs×A2Cs)

7.1.3 Right Atria Volume

Right atria volume can be measured by using Simpson method, i.e. using the apical four-chamber views.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Volume** on the touch screen.
3. Tap **A4Cs** under **Simp(RA)** to start the measurement.

Measurement Item	Description	Measurement Method
A4Cs	Four Chamber View at End Systole	1. Use the trackball to trace the circumference of the endocardium. You can press the **Update** key on control panel to delete the trace and draw the trace again by using the trackball. 2. Press the confirm key to confirm. The system automatically displays the longitudinal axis and you can use the trackball to adjust it. 3. Press the confirm key to complete the measurement.

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
RA ESV (A4C)	Right Atria End Systolic Volume (ml)	RA ESV(A4C)=(π/4)×h×∑(A4Cs×A4Cs)

7.1.4 Right Ventricle

Measurements of RV anterior wall thickness at the end diastole (RVAWd) and RV internal dimension at the end systole (RVIDd) are available in the B mode.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **RVAWd** or **RVIDd** to perform the distance measurement.

7.1.5 Left Atria Diameter/Aortic Root Diameter

Measurements of LA, AO and their ratio are available in the B mode.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **AO** or **LA** to perform the distance measurement.

The system automatically calculates their ratio after you perform AO and LA measurements.

7.1.6 Left/Right Ventricular Outflow Tract Diameter

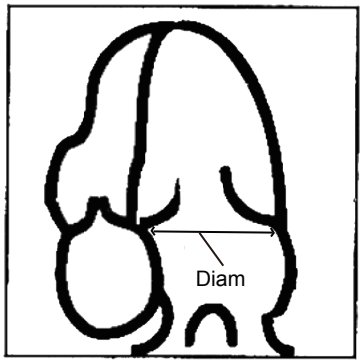
LVOT and RVOT measurements are available in the B mode.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **LVOT** or **RVOT** to perform the distance measurement.

7.1.7 Mitral Valve Diameter

Measurements of Mitral Valve Diameter, Mitral Valve Cusp Separation, E-Point-to-Septum Separation and Mitral Valve Area are all available in the B mode. The Mitral valve diameter can be measured by using the following figure.



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **MV Diam**, **MCS**, **EPSS** or **MVA** to start the measurement.

Measurement Item	Description	Measurement Method
MV Diam	Mitral Valve Diameter	Refer to Section 2.1.1.1 Two-Point Measurement
MCS	Mitral Valve Cusp Separation	
EPSS	Distance between Point E and the Interventricular Septum	
MVA	Mitral Valve Area	Refer to Section 2.1.2.1 Trace Area Measurement

7.1.8 Aortic Valve

Measurements of Aortic Valve Cusp Separation and Aortic Valve Area are available in the B mode.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **ACS** or **AVA** to start the measurement.

Measurement Item	Description	Measurement Method
ACS	Aortic Valve Cusp Separation	Refer to Section 2.1.1.1 Two-Point Measurement
AVA	Aortic Valve Area	Refer to Section 2.1.2.1 Trace Area Measurement

7.1.9 Main Pulmonary Artery Diameter

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **MPA** to perform the distance measurement.

7.1.10 Tricuspid Valve Diameter

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **TV Diam** to perform the distance measurement.

7.1.11 Pulmonary Valve Diameter

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **Dimensions** on the touch screen.
3. Tap **PV Diam** to perform the distance measurement.

7.1.12 Left Ventricle Mass

The left ventricle mass can be evaluated in the B mode by using the following methods.

- Area-Length (A-L)
- Cube
- Truncated Ellipsoid (T-E)

7.1.12.1 Area-Length Method

This measurement method calculates the LV mass by measuring LVAd Sa Ep, LVAd Sa En and LVLd Apical.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **LV Mass** on the touch screen.
3. Tap **LVAd Sa Ep**, **LVAd Sa En** or **LVLd Apical** to start the measurement one by one.

Measurement Item	Description	Measurement Method
LVAd Sa Ep	Left Ventricular Epicardial Area at Papillary Muscle Level at End Diastole in Short-axis View	Refer to Section 2.1.2.1 Trace Area Measurement
LVAd Sa En	Left Ventricular Endocardial Area at Papillary Muscle Level at End Diastole in Short-axis View	
LVLd Apical	Left Ventricular Long Axis Length at End Diastole in Apical View	Refer to Section 2.1.1.1 Two-Point Measurement

The system automatically calculates the LV mass and LVMI using the following formulas and displays the results in the measured result box.

- LVM=1.05×[(5/6)×A_1×(LVLd Apical+t)-(5/6)×A_2×(LVLd Apical)]
  - A_1=LVAd Sa Ep
  - A_2=LVAd Sa En
  - $t=(A1/\pi)^{1/2}-(A2/\pi)^{1/2}$
- LVMI=LVM/BSA

7.1.12.2 Cube

This measurement method calculates the LV mass by measuring IVSd, LVIDd and LVPWd.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **LV Mass** on the touch screen.
3. Tap **IVSd**, **LVIDd** or **LVPWd** to start the measurement one by one.

Measurement Item	Description	Measurement Method
IVSd	Interventricular Septum Diastolic Thickness	Refer to Section 2.1.1.1 Two-Point Measurement
LVIDd	Left Ventricular Internal End Diastolic Dimension	
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness	

The system automatically calculates the LV mass and LVMI using the following formulas and display the results in the measured result box.

- $LVM=0.8\times1.04\times[(IVSd+LVIDd+LVPWd)^3-LVIDd^3]+0.6$
- $LVMI=LVM/BSA$

7.1.12.3 Truncated Ellipsoid Method

This measurement method calculates the LV mass by measuring LVAd Sa Ep, LVAd Sa En, a and d.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **LV Mass** on the touch screen.
3. Tap **LVAd Sa Ep**, **LVAd Sa En**, **a** or **d** to start the measurement.

Measurement Item	Description	Measurement Method
LVAd Sa Ep	Left Ventricular Epicardial Area at Papillary Muscle Level at End Diastole in Short-axis View	Refer to Section 2.1.2.1 Trace Area Measurement
LVAd Sa En	Left Ventricular Endocardial Area at Papillary Muscle Level at End Diastole in Short-axis View	
a	Semi-major Axis from Widest Minor Axis Radius to Apex	Refer to Section 2.1.1.1 Two-Point Measurement
d	Truncated Semi-major Axis from Widest Minor Axis Radius to Mitral Annulus Plane	

The system automatically calculates the LV mass and LVMI using the following formulas and display the results in the measured result box.

- $LVM=1.05\times[(b+t)^2\times[(2/3)\times(a+t)+d-d^3/3(a+t)^2]-b^2[(2/3)\times a+d-d^3/3a^2]$
  - A_1=LVAd Sa Ep
  - A_2=LVAd Sa En
  - $b=(A_2/\pi)^{1/2}$
  - $t=(A_1/\pi)^{1/2}-b$
- $LVMI=LVM/BSA$

7.2 Color Flow-Mode Measurements

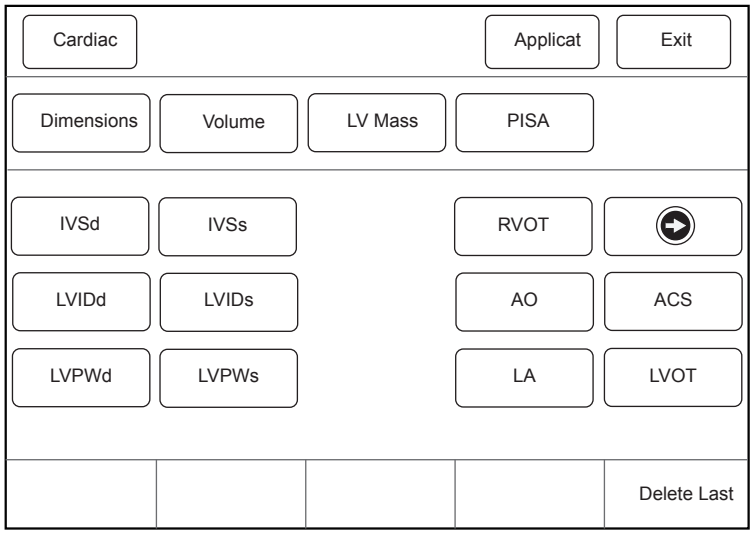


Figure 7-4 Cardiology Measurement Menu in the Color Flow Mode

Only the measurements of the PISA Radius at the mitral valve, tricuspid valve, aortic valve and pulmonary valve are described in this section. Other measurements in the color flow mode can be performed the same way as they are in the B mode. For details, refer to Section 7.1 B-Mode Measurements.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the B mode.
2. Tap **Applicat** > **Cardiac** > **PISA** on the touch screen.
3. Tap a measurement item to start the measurement.

Measurement Item	Description	Measurement Method
MR Rad	Mitral Valve Stenosis Radius	Refer to Section 2.1.1.1 Two-Point Measurement
AR Rad	Aortic Valve Stenosis Radius	
TR Rad	Tricuspid Valve Stenosis Radius	
MS Rad	Mitral Valve Stenosis Radius	

NOTE:

To obtain PISA results, you should perform measurements of the PISA Radius at the mitral valve, tricuspid valve, aortic valve and pulmonary valve in the color flow mode and then perform the regurgitation velocity time integral at the mitral valve, tricuspid valve, aortic valve and pulmonary valve in the spectral Doppler mode.

7.3 M-Mode Measurements

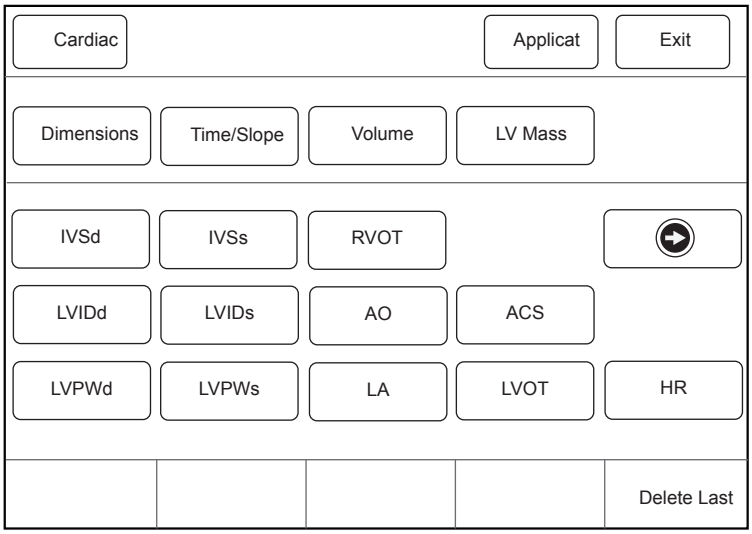


Figure 7-5 Cardiology Measurement Menu in the M Mode

Only the measurements of the left ventricle evaluation, left ventricle mass and left/right ventricle TEI index are described in this section. Other measurements (as shown in the following table) can be performed the same way as basic measurements described in the M mode, as shown in the following table.

Measurement Collection	Measurement Item	Description	Measurement Method
Dimensions	RVOT	Right Ventricular Outflow Tract	Refer to Section 2.2.1 Distance Measurement
	LVOT	Left Ventricular Outflow Tract	
	AO	Aortic Root Diameter	
	LA	Left Atria Diameter	
	ACS	Aortic Valve Cusp Separation	
	HR	Heat Rate	Refer to Section 2.2.6 Heart Rate Measurement
	RVAWd	Right Ventricular Anterior Wall Diastolic Thickness	Refer to Section 2.2.1 Distance Measurement
	RVIDd	Right Ventricular Internal End Diastolic Dimension	
	EPSS	Distance between Point E and the Interventricular Septum	
	MCS	Mitral Valve Cusp Separation	

Measurement Collection	Measurement Item	Description	Measurement Method
Time/Slope	LVPEP	Left Ventricular Pre-ejection Period	Refer to Section 2.2.5 Time Measurement
	RVPEP	Right Ventricular Pre-ejection Period	
	MV DE	Mitral Valve DE Wave Amplitude	Refer to Section 2.2.1 Distance Measurement
	MV E-F Slope	Mitral Valve E-F Slope	Refer to Section 2.2.2 Slope Measurement
	MV E Amp	Mitral Valve E-wave Amplitude	Refer to Section 2.2.1 Distance Measurement
	MV A Amp	Mitral Valve A-wave Amplitude	

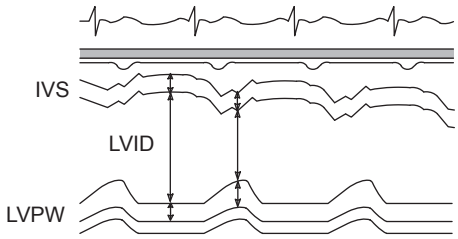
7.3.1 Left Ventricle Evaluation

The left ventricle can be evaluated in the M mode by using the following methods.

- Cube
- Teichholz

7.3.1.1 Cube

This measurement method approximates the LV volume by measuring a cube.



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Cardiac** > **Volume** on the touch screen.
3. Tap a measurement item under **Cube (LV)** to perform the measurement one by one.

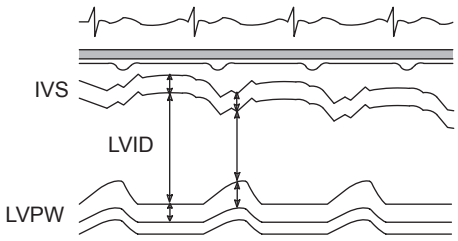
Measurement Item	Description	Measurement Method
IVSd	Interventricular Septum Diastolic Thickness	Refer to Section 2.2.1 Distance Measurement
LVIDd	Left Ventricular Internal End Diastolic Dimension	
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness	
IVSs	Interventricular Septum Systolic Thickness	
LVIDs	Left Ventricular Internal End Systolic Dimension	
LVPWs	Left Ventricular Posterior Wall Systolic Thickness	

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
EDV	Left Ventricular End Diastolic Volume (ml)	EDV=LVIDd^3
ESV	Left Ventricular End Systolic Volume (ml)	ESV=LVIDds^3
SV	Stroke Volume (mL)	SV = EDV-ESV
CO	Cardiac Output (Umin)	CO = SV×HR
EF	Ejection Fraction	EF = SV/EDV
SI	Stroke Volume Index	SI = SV/BSA
CI	Cardiac Index	CI = CO/BSA
FS	Fractional Shortening	FS= (LVIDd-LVIDs) /LVIDd
IVS%	Interventricular Septum % Thickening	IVS%= (IVSs-IVSd) /IVSd ×100%
LVPW%	Left Ventricular Posterior Wall % Thickening	LVPW%= (LVPWs-LVPWd) /IVPWd ×100%
IVS/LVPW	Interventricular Septum/LV posterior wall thickness	IVS/LVPW=IVSd/LVPWd
LVM	Left Ventricular Mass	LVM=0.8×1.04×[(IVSd+LVIDd+LVPWd)^3-LVIDd^3]+0.6
LVMI	Left Ventricular Mass Index	LVMI=LVM/BSA

7.3.1.2 Teichholz

This measurement method approximates the LV volume by measuring a cube.



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Cardiac** on the touch screen.
3. Tap **Volume**> a measurement item under **Teichlozs (LV)** or tap **Dimensions** > **IVSd** to perform the measurement one by one.

Measurement Item	Description	Measurement Method
IVSd	Interventricular Septum Diastolic Thickness	Refer to Section 2.2.1 Distance Measurement
LVIDd	Left Ventricular Internal End Diastolic Dimension	
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness	
IVSs	Interventricular Septum Systolic Thickness	
LVIDs	Left Ventricular Internal End Systolic Dimension	
LVPWs	Left Ventricular Posterior Wall Systolic Thickness	

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
EDV	Left Ventricular End Diastolic Volume (ml)	$EDV = \frac{7 \times LVIDd^3}{2.4 + LVIDd}$
ESV	Left Ventricular End Systolic Volume (ml)	$ESV = \frac{7 \times LVIDs^3}{2.4 + LVIDs}$
SV	Stroke Volume (mL)	SV = EDV-ESV
CO	Cardiac Output (Umin)	CO = SV×HR
EF	Ejection Fraction	EF = SV/EDV
SI	Stroke Volume Index	SI = SV/BSA
CI	Cardiac Index	CI = CO/BSA
FS	Fractional Shortening	FS= (LVIDd-LVIDs) /LVIDd
IVS%	Interventricular Septum % Thickening	IVS%= (IVSs-IVSd) /IVSd ×100%
LVPW%	Left Ventricular Posterior Wall % Thickening	LVPW%= (LVPWs-LVPWd) /IVPWd ×100%
IVS/LVPW	Interventricular Septum/LV posterior wall thickness	IVS/LVPW=IVSd/LVPWd
LVM	Left Ventricular Mass	LVM=0.8×1.04×[(IVSd+LVIDd+LVPWd)^3-LVIDd^3]+0.6
LVMI	Left Ventricular Mass Index	LVMI=LVM/BSA

7.3.1.3 Left Ventricle Mass

The left ventricle mass can be evaluated by measuring IVSd, LVIDd and LVPWd.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Cardiac** > **LV Mass** on the touch screen.

3. Tap **IVSd**, **LVIDd** or **LVPWd** to start the measurement.

Measurement Item	Description	Measurement Method
IVSd	Interventricular Septum Diastolic Thickness	Refer to Section 2.2.1 Distance Measurement
LVIDd	Left Ventricular Internal End Diastolic Dimension	
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness	

The system automatically calculates the following items in accordance with the measurement results.

Calculation Item	Description	Formula
LVM(Cube)	Left Ventricle Mass (Cube)	LVM(Cube)=0.8×1.04×[(IVSd+LVIDd+LVPWd)3-LVIDd3]+0.6
LVMI(Cube)	Left Ventricle Mass Index (Cube)	LVMI(Cube)=LVM(Cube)/BSA

7.3.2 TEI Index Calculation

In the M mode, the left ventricle TEI index can be evaluated by measuring MV C-O Dur and LVET (b), and the right ventricle TEI index can be evaluated by measuring TV C-O Dur and RVET (b).

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Cardiac** > **Time/Slope** on the touch screen.
3. Tap a measurement item under **LV TEI** or **RV TEI** to start the measurement.

Measurement Item	Description	Measurement Method
MV C-O Dur (a)	Mitral Valve Close-Open Duration	Refer to Section 2.2.5 Time Measurement
LVET (b)	Left Ventricular Ejection Time	
TV C-O Dur (a)	Tricuspid Valve Close-Open Duration	
RVET (b)	Right Ventricular Ejection Time	

The system automatically calculates the following item in accordance with the measurement results.

Calculation Item	Description	Formula
LV TEI	Left Ventricle TEI Index	LV TEI=(MV C-O Dur (a) - LVET (b)) /LVET (b)
RV TEI	Right Ventricle TEI Index	RV TEI=(TV C-O Dur (a) - RVET (b)) /RVET (b)

7.4 Spectral Doppler-Mode Measurements

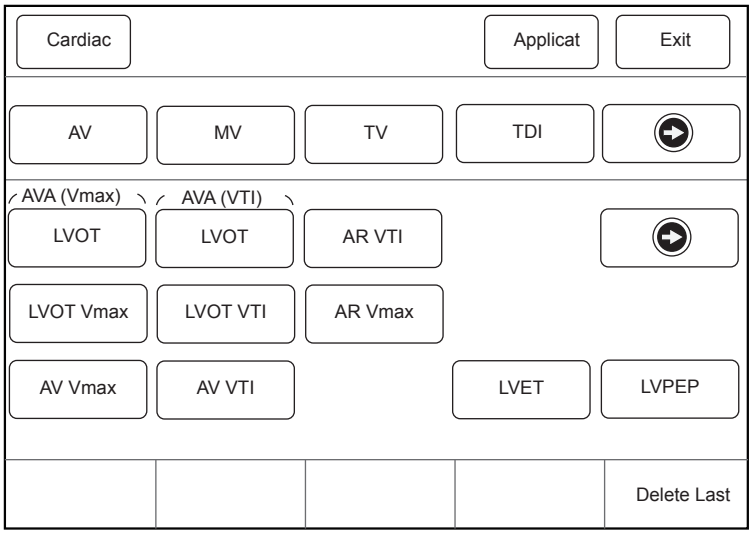
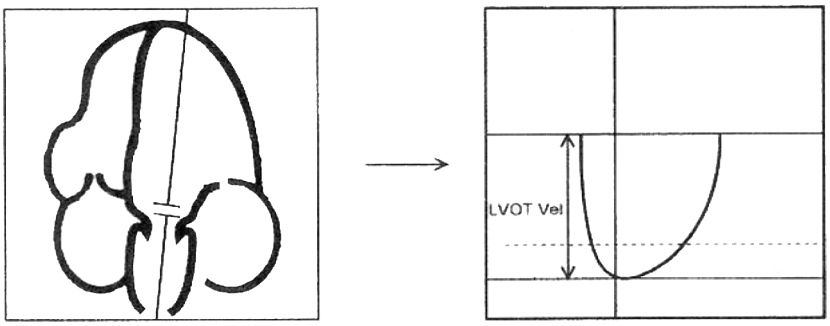


Figure 7-6 Cardiology Measurement Menu in the Spectral Doppler Mode

7.4.1 Aortic Valve

The flow velocity measurement for the aortic valve evaluation can be performed in the spectral Doppler mode by using the following figure.



(PW Doppler)

Follow the following steps to perform the measurement.

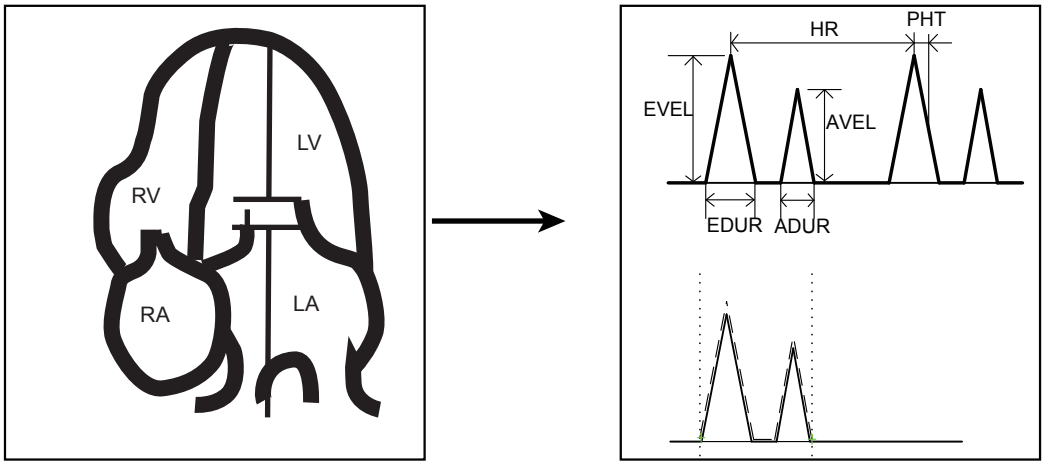
1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Cardiac** > **AV** on the touch screen.
3. Tap a measurement item to start the measurement.

Measurement Item		Description	Measurement Method
AVA(Vmax)	LVOT	Left Ventricular Outflow Tract	• Perform the LVOT measurements in the 2D/M mode. For details, refer to Section 7.1.6 Left/Right Ventricular Outflow Tract Diameter or Section 7.3 M-Mode Measurements. • Perform the LVOT Vmax and AV Vmax measurements in the PW/CW mode. For details, refer to Section 2.4.1 Velocity Measurement. The system automatically displays the AVA result after you complete all measurements.
	LVOT Vmax	Left Ventricular Outflow Tract Maximum Velocity	
	AV Vmax	Aortic Valve Maximum Velocity	
AVA(VTI)	LVOT	Left Ventricular Outflow Tract	• Perform the LVOT measurement in the 2D/M mode. For details, refer to Section 7.1.6 Left/Right Ventricular Outflow Tract Diameter or Section 7.3 M-Mode Measurements. • Perform the LVOT VTI and AV VTI measurements in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the AVA result after you complete all measurements.
	LVOT VTI	Left Ventricular Outflow Tract Velocity Time Integral	
	AV VTI	Aortic Valve Velocity Time Integral	
PISA-AR	AR Rad	Aortic Valve Stenosis Radius	• Perform the AR Rad measurement in the color flow mode. For details, refer to Section 7.2 Color Flow-Mode Measurements. • Perform the AR VTI measurement in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the PISA results after you complete all measurements.
	AR VTI	Aortic Valve Regurgitation Velocity Time Integral	
AR VTI		Aortic Valve Regurgitation Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
AR Vmax		Aortic Valve Regurgitation Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement

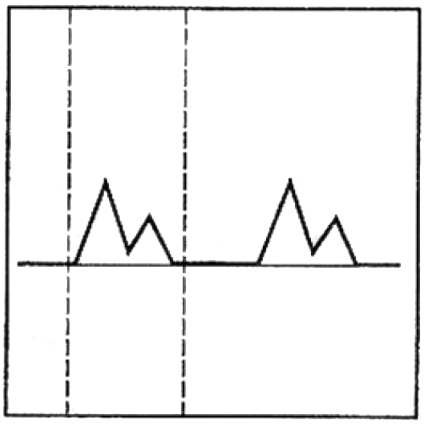
Measurement Item	Description	Measurement Method
LVET	Left Ventricular Ejection Time	Refer to Section 2.4.8 Time Measurement
LVPEP	Left Ventricular Pre-ejection Period	
IVCT	Left Ventricular Isovolumic Contraction Time	
IVRT	Left Ventricular Isovolumic Relaxation Time	
AR DecT	Aortic Valve Regurgitation Deceleration Time	
AR PHT	Aortic Valve Regurgitation Pressure Half Time	1. Use the trackball to move the cursor to the desired position, press the confirm key on the control panel and the system displays a dotted line. 2. Use the trackball to move the cursor to the desired position on the dotted line, press the confirm key and the system automatically calculates the pressure half time.
AV Vmax	Aortic Valve Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
AV VTI	Aortic Valve Regurgitation Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
HR	Heart Rate	Refer to Section 2.4.9 Heart Rate Measurement

7.4.2 Mitral Valve

Measurements of E-wave velocity, A-wave velocity, E Duration, A Duration, PHT, PISA for mitral valve can be performed in the spectral Doppler mode by using the following figure.



Perform the mitral valve velocity trace measurement by using the following figure.



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Cardiac** > **MV** on the touch screen.
3. Tap a measurement item to perform the measurement.

Measurement Item	Description	Measurement Method
MV E Vel	Mitral Valve E-wave Peak Velocity	Refer to Section 2.4.1 Velocity Measurement
MV A Vel	Mitral Valve A-wave Peak Velocity	
MV E Dur	Mitral Valve E-wave Duration	Refer to Section 2.4.8 Time Measurement
MV A Dur	Mitral Valve A-wave Duration	
MVA(PHT)	Mitral Valve Area Pressure Half Time	1. Use the trackball to move the cursor to the desired position, press the confirm key on the control panel and the system displays a dotted line. 2. Use the trackball to move the cursor on the desired position of the dotted line, press the confirm key and the system automatically calculates the pressure half time.
MV DecT	Mitral Valve Deceleration Time	Refer to Section 2.4.8 Time Measurement
MR Vmax	Mitral Valve Regurgitation Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
MR VTI	Mitral Valve Regurgitation Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement

Measurement Item		Description	Measurement Method
MVA(VTI)	LVOT	Left Ventricular Outflow Tract	• Perform the LVOT measurement in the 2D/M mode. For details, refer to Section 7.1.6 Left/Right Ventricular Outflow Tract Diameter or Section 7.3 M-Mode Measurements. • Perform the LVOT VTI and MV VTI measurements in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the MVA result after you complete all measurements.
	LVOT VTI	Left Ventricular Outflow Tract Velocity Time Integral	
	MV VTI	Mitral Valve Area Velocity Time Integral	
LV TEI	MV C-O Dur (a)	Mitral Valve Close-Open Duration	Refer to Section 2.4.8 Time Measurement
	LVET (b)	Left Ventricular Ejection Time	
PISA-MR	MR Rad	Mitral Valve Stenosis Radius	• Perform the MR Rad measurement in the color flow mode. For details, refer to Section 7.2 Color Flow-Mode Measurements. • Perform the MR VTI measurement in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the PISA results after you complete all measurements.
	MR VTI	Mitral Valve Regurgitation Velocity Time Integral	
PISA-MS	MS Rad	Mitral Valve Stenosis Radius	• Perform the MS Rad measurement in the color flow mode. For details, refer to Section 7.2 Color Flow-Mode Measurements. • Perform the MS VTI measurement in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the PISA results after you complete all measurements.
	MS VTI	Mitral Valve Regurgitation Velocity Time Integral	

7.4.3 Mitral Valve Motion

The mitral valve motion can be evaluated by measuring Sa Medial, Ea Medial, Aa Medial, Sa Lateral, Ea Lateral and Aa Lateral in the PW/CW mode.

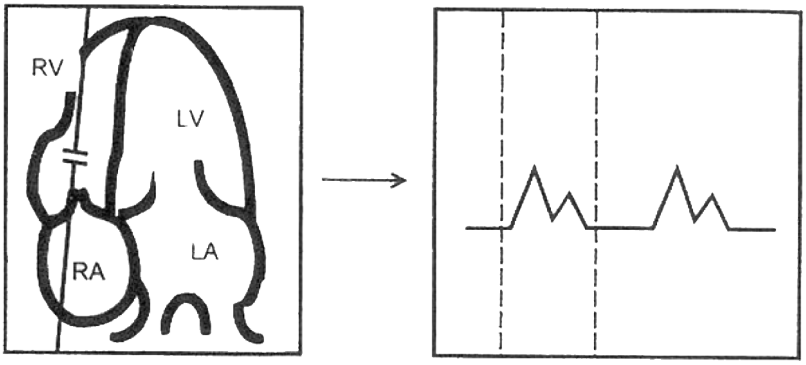
Follow the following steps to perform the measurement.

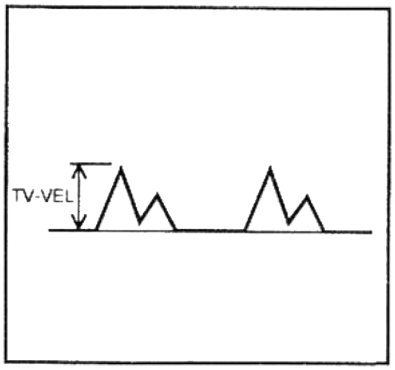
1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Cardiac** > **TDI** on the touch screen.
3. Tap a measurement item to perform the measurement.

Measurement Item	Description	Measurement Method
Sa Medial	Mitral Valve Medial Systolic Motion	Refer to Section 2.4.1 Velocity Measurement
Ea Medial	Mitral Valve Medial Early Diastolic Motion	
Aa Medial	Mitral Valve Medial Late Diastolic Motion	
Sa Lateral	Mitral Valve Lateral Systolic Motion	
Ea Lateral	Mitral Valve Lateral Early Diastolic Motion	
Aa Lateral	Mitral Valve Lateral Late Diastolic Motion	Refer to Section 2.4.1 Velocity Measurement

7.4.4 Tricuspid Valve

The flow velocity measurement for tricuspid valve evaluation can be performed in the spectral Doppler mode by using the following figure.





Follow the following steps to perform the measurement.

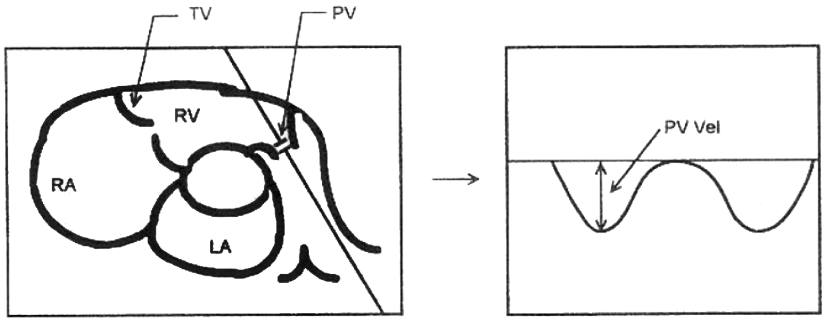
1. Press the **Calc** key on the control panel in the PW/CW mode.

2. Tap **Applicat** > **Cardiac** > **TV** on the touch screen.
3. Tap a measurement item to perform the measurement.

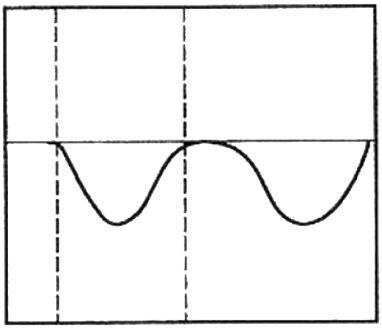
Measurement Item		Description	Measurement Method
TV E Vel		Tricuspid Valve E-wave Peak Velocity	Refer to Section 2.4.1 Velocity Measurement
TV A Vel		Tricuspid Valve A-wave Peak Velocity	
TV VTI		Tricuspid Valve Maximum Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
TV Vmax		Tricuspid Valve Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
RVSP	TR Vmax	Tricuspid Valve Regurgitation Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
	RAP	Right Atria Systolic Pressure	• Select **RAP** and input manually or select the desired RAP value in the pop-up dialog box. • Or, input manually the RAP value on the **Cardiac** tab of the **New Patient** screen.
PISA-TR	TR Rad	Tricuspid Valve Stenosis Radius	• Perform the TR Rad measurement in the color flow mode. For details, refer to Section 7.2 Color Flow-Mode Measurements. • Perform the TR VTI measurement in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the PISA results after you complete all measurements.
	TR VTI	Tricuspid Valve Regurgitation Velocity Time Integral	
RV TEI	TV C-O Dur (a)	Tricuspid Valve Close-Open Duration	Refer to Section 2.4.8 Time Measurement
	RVET (b)	Right Ventricular Ejection Time	

7.4.5 Pulmonary Valve

The flow velocity measurement for pulmonary valve evaluation can be performed in the spectral Doppler mode by using the following figure.



(PW Doppler)



Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Cardiac** > **PV** on the touch screen.
3. Tap a measurement item to perform the measurement.

Measurement Item	Description	Measurement Method
PR Vmax	Pulmonary Valve Regurgitation Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
PR VTI	Pulmonary Valve Regurgitation Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
PV AccT	Pulmonary Valve Acceleration Time	Refer to Section 2.4.8 Time Measurement
MPA Vmax	Main Pulmonary Artery Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
RPA Vmax	Right Pulmonary Artery Maximum Velocity	
LPA Vmax	Left Pulmonary Artery Maximum Velocity	Refer to Section 2.4.1 Velocity Measurement
RVET	Right Ventricular Ejection Time	Refer to Section 2.4.8 Time Measurement
RVPEP	Right Ventricular Pre-ejection Period	
HR-PV	Heart Rate-Pulmonary Valve	Refer to Section 2.4.9 Heart Rate Measurement

Measurement Item		Description	Measurement Method
PAEDP	PR Ved	Pulmonary Regurgitation Velocity End Diastole	Refer to Section 2.4.1 Velocity Measurement
	RAP	Right Atria Systolic Pressure	• Tap **RAP** and input manually or select the desired RAP value in the pop-up dialog box. • Input manually the RAP value on the **New Patient** screen - **Cardiac** tab.
PVA(Vmax)	RVOT	Right Ventricular Outflow Tract	• Perform the RVOT measurement in the 2D/M mode. For details, refer to Section 7.1.6 Left/ Right Ventricular Outflow Tract Diameter or Section 7.3 M-Mode Measurements. • Perform the RVOT Vmax and PV Vmax measurements in the PW/CW mode. For details, refer to Section 2.4.1 Velocity Measurement. The system automatically displays the PVA value after you complete all measurements.
	RVOT Vmax	Right Ventricular Outflow Tract Maximum Velocity	
	PV Vmax	Pulmonary Valve Maximum Velocity	
PVA(VTI)	RVOT	Right Ventricular Outflow Tract	• Perform the RVOT measurement in the 2D/M mode. For details, refer to Section 7.1.6 Left/ Right Ventricular Outflow Tract Diameter or Section 7.3 M-Mode Measurements. • Perform the RVOT VTI and PV VTI measurements in the PW/CW mode. For details, refer to Section 2.4.7 Manual Trace Measurement. The system automatically displays the PVA value after you complete all measurements.
	RVOT VTI	Right Ventricular Outflow Tract Velocity Time Integral	
	PV VTI	Pulmonary Valve Velocity Time Integral	

7.4.6 Pulmonary and Hepatic Veins

Measurements of Pulm S Vel, Pulm A Vel, Pulm D Vel, Hep S Vel, Hep A Vel and Hep D Vel are available in the PW/CW mode.

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Cardiac** > **Pulm-Hep Vein** on the touch screen.
3. Tap a measurement item to start the measurement.

Measurement Item	Description	Measurement Method
Pulm S Vel	Pulmonary Vein S-wave Flow Velocity	Refer to Section 2.4.1 Velocity Measurement
Pulm S VTI	Pulmonary Vein S-wave Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
Pulm A Vel	Pulmonary Vein A-wave Flow Velocity	Refer to Section 2.4.1 Velocity Measurement
Pulm D Vel	Pulmonary Vein D-wave Flow Velocity	
Pulm D VTI	Pulmonary Vein D-wave Velocity Time Integral	Refer to Section 2.4.7 Manual Trace Measurement
Pulm A Dur	Pulmonary Vein A-wave Duration	Refer to Section 2.4.8 Time Measurement
Pulm DecT	Pulmonary Vein Deceleration Time	
Hep S Vel	Hepatic Vein S-wave Flow Velocity	Refer to Section 2.4.1 Velocity Measurement
Hep D Vel	Hepatic Vein D-wave Flow Velocity	
Hep A Vel	Hepatic Vein A-wave Flow Velocity	
Hep A Dur	Hepatic Vein A-wave Duration	Refer to Section 2.4.8 Time Measurement

8 Small Parts Measurements and Calculations

Small parts measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode, the spectral Doppler mode (PW/CW) and the elastography imaging.

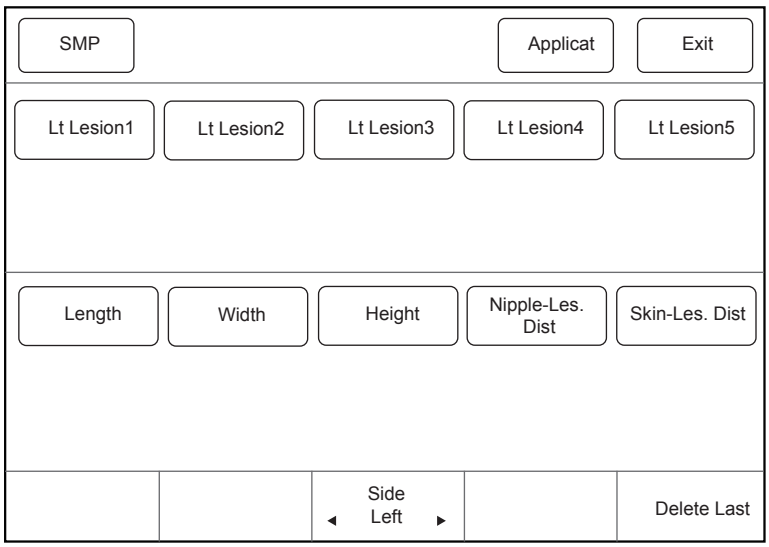


Figure 8-1 Small Parts Measurement Menu

8.1 2D-Mode Measurements

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **SMP** on the touch screen and tap a measurement category, such as **Breast**.
3. Tap a measurement collection, such as **Lt Lesion1**.
4. Tap a measurement item to start the measurement.

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Breast	Lt(Rt) Lesion1	Nipple-Les. Dist Skin-Les. Dist Length Width Height	Refer to Section 2.1.1.1 Two-Point Measurement
	Lt(Rt) Lesion2		
	Lt(Rt) Lesion3		
	Lt(Rt) Lesion4		
	Lt(Rt) Lesion5		

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Thyroid	Lt(Rt) Thyroid	Length Height	Refer to Section 2.1.1.1 Two-Point Measurement
Thyroid	Lt(Rt) Thyroid	Width	Refer to Section 2.1.1.1 Two-Point Measurement
	Lt(Rt) Sup. Par Thyroid	Length Height Width	
	Lt(Rt) Inf. Par Thyroid		
	Thyroid Ist.	Ist. AP	
	Lt(Rt) STA	Vessel Diam	
	Lt(Rt) ITA		
Testicle	Lt(Rt) Testicle	Length Height Width	Refer to Section 2.1.1.1 Two-Point Measurement

8.2 M-Mode Measurements

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **SMP** on the touch screen and tap a measurement category, such as **Breast**.
3. Tap a measurement collection, such as **Vessel**.
4. Tap a measurement item to start the measurement.

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Breast	Vessel	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
		%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
		Time	Refer to Section 2.2.5 Time Measurement
		HR	Refer to Section 2.2.6 Heart Rate Measurement
Thyroid	Lt(Rt) STA Lt(Rt) ITA	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
		Time	Refer to Section 2.2.5 Time Measurement
		HR	Refer to Section 2.2.6 Heart Rate Measurement

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Testicle	Lt(Rt) Vessel	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
		Time	Refer to Section 2.2.5 Time Measurement
		HR	Refer to Section 2.2.6 Heart Rate Measurement

8.3 Spectral Doppler-Mode Measurements

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **SMP** on the touch screen and tap a measurement category, such as **Breast**.
3. Tap a measurement collection, such as **Vessel**.
4. Tap a measurement item to start the measurement.

Measurement Category	Measurement Collection	Measurement Item	Measurement Method
Breast	Vessel	PS ED RI PI PS,ED,RI,SD Auto Trace Manual Trace Time HR	• For PS and ED method, refer to Section 2.4.1 Velocity Measurement. • For RI method, refer to Section 2.4.3 Resistivity Index Measurement. • For PI method, refer to Section 2.4.4 Pulsatility Index Measurement. • For PS,ED,RI,SD method, refer to Section 2.4.3 Resistivity Index Measurement. • For auto trace method, refer to Section 2.4.6 Auto Trace Measurement. • For manual trace method, refer to Section 2.4.7 Manual Trace Measurement. • For time method, refer to Section 2.4.8 Time Measurement. • For heart rate method, refer to Section 2.4.9 Heart Rate Measurement.
Thyroid	Lt(Rt) STA		
	Lt(Rt) ITA		
Testicle	Lt(Rt) Vessel		

8.4 Elastography Imaging Measurements

Application-specific measurements in the elastography imaging can be performed the same way as they are in the 2D mode. For details, refer to Section 8.1 2D-Mode Measurements.

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9 Urology Measurements and Calculations

Urology measurements and calculations are available in the 2D mode (B/CFM/PDI/TDI), the M mode and the spectral Doppler mode (PW/CW).

9.1 2D-Mode Measurements

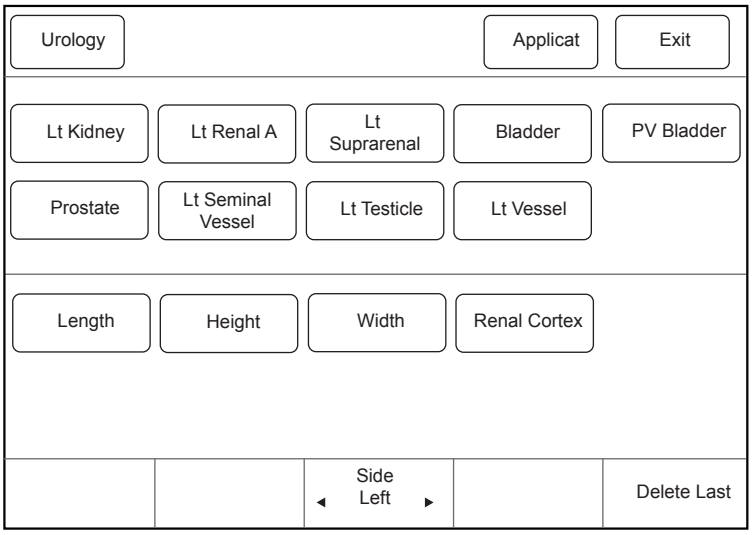

Figure 9-1 Urology Measurement Menu in the 2D Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **Urology** on the touch screen panel and tap a measurement collection, such as **Lt Kidney**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Kidney	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Height	
	Width	
	Renal Cortex	

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Renal A Lt(Rt) Vessel	Vessel Diam	Refer to Section 2.1.1.1 Two-Point Measurement
	Vessel Area	• For 2D-Trace method, refer to Section 2.1.2.1 Trace Area Measurement. • For 2D-Ellipse method, refer to Section 2.1.2.3 Ellipse Area Measurement.
	%Sten(D)	Refer to Section 2.1.1.5 %Stenosis Distance
	%Sten(A)	Refer to Section 2.1.2.5 %Stenosis Area
Lt(Rt) Suprarenal Bladder PV Bladder Prostate Lt Seminal Vessel Lt(Rt) Testicle	Length	Refer to Section 2.1.1.1 Two-Point Measurement
	Height	
	Width	

9.2 M-Mode Measurements

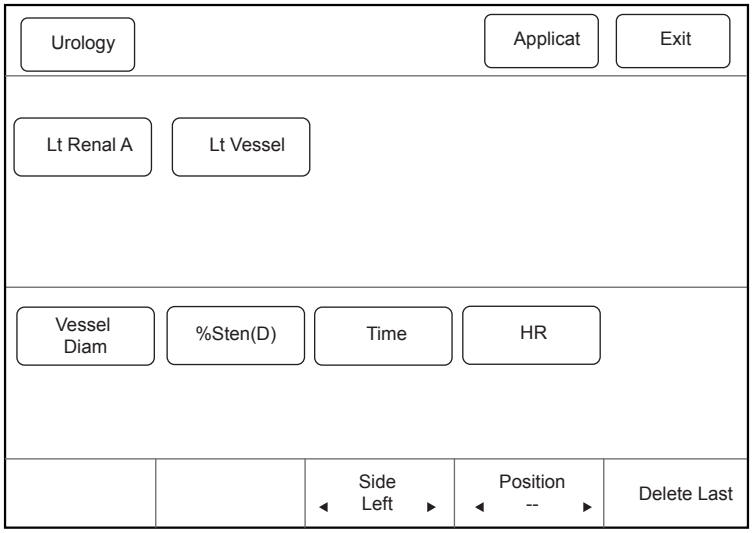

Figure 9-2 Urology Measurement Menu in the M Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the M mode.
2. Tap **Applicat** > **Urology** on the touch screen and tap a measurement collection, such as **Lt Renal A**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Renal A Lt(R) Vessel	Vessel Diam	Refer to Section 2.2.1 Distance Measurement
	%Sten(D)	Refer to Section 2.2.3 %Stenosis Distance Measurement
	Time	Refer to Section 2.2.5 Time Measurement
	HR	Refer to Section 2.2.6 Heart Rate Measurement

9.3 Spectral-Doppler Mode Measurements

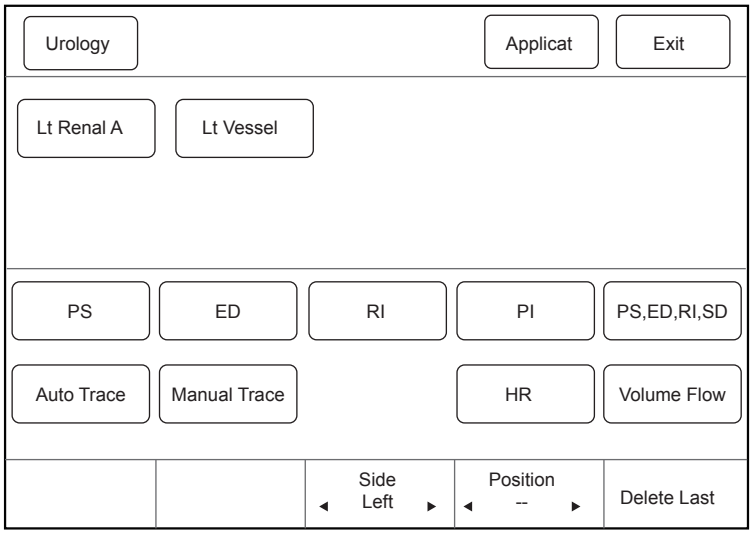

Figure 9-3 Urology Measurement Menu in the Spectral Doppler Mode

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the PW/CW mode.
2. Tap **Applicat** > **Urology** on the touch screen and tap a measurement collection, such as **Lt Renal A**.
3. Tap a measurement item to start the measurement.

Measurement Collection	Measurement Item	Measurement Method
Lt(Rt) Renal A Lt(Rt) Vessel	PS	Refer to Section 2.4.1 Velocity Measurement
	ED	
	RI	Refer to Section 2.4.3 Resistivity Index Measurement
	PI	Refer to Section 2.4.4 Pulsatility Index Measurement
	PS,ED,RI,SD	Refer to Section 2.4.3 Resistivity Index Measurement
	Auto Trace	Refer to Section 2.4.6 Auto Trace Measurement
	Manual Trace	Refer to Section 2.4.7 Manual Trace Measurement
	HR	Refer to Section 2.4.9 Heart Rate Measurement
	Volume Flow	Refer to Section 2.4.6 Auto Trace Measurement and Section 2.4.7 Manual Trace Measurement

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10 Pediatrics Measurements and Calculations

Pediatrics measurements and calculations for an infant's hip are available in the 2D mode (B/CFM/PDI/TDI).

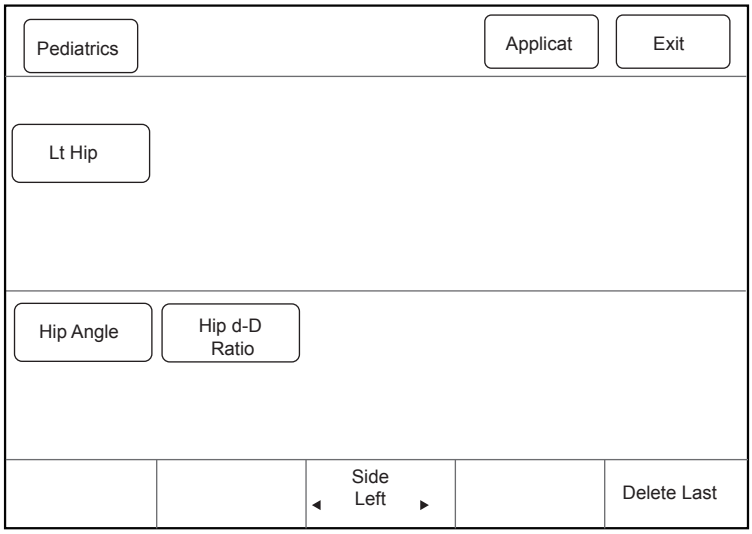


Figure 10-1 Pediatrics Measurement Menu

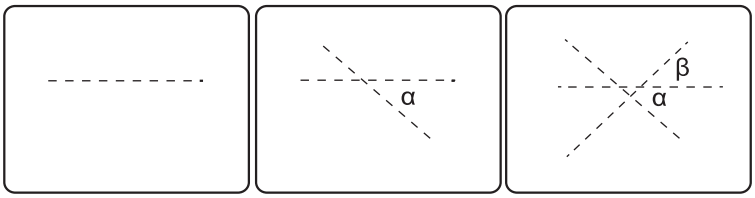
10.1 Hip Joint Angle

Hip joint angle can be evaluated in the 2D mode by using the following methods.

- 2D-Semi Auto
- 2D-3Dist

10.1.1 2D-Semi Auto

Follow the following steps to perform the measurement.

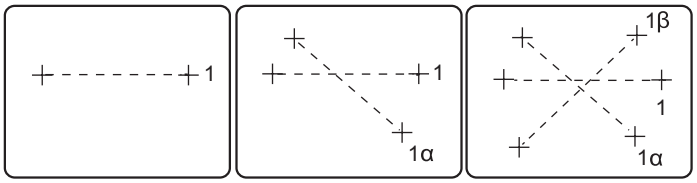


1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat > Pediatrics** on touch screen.
3. Select the desired hip joint, such as **Lt Hip**, tap **Hip Angle** and set the measurement method to **2D-Semi Auto**, a dotted line appears on the screen.
4. Move the line to the desired position by using the trackball and rotate the **Angle** knob on the control panel to adjust the angle of the line.

5. Press the confirm key on the control panel to confirm and a second dotted line appears.
6. Move the second line to the desired position and rotate the **Angle** knob to adjust the angle of the second line.
7. Press the confirm key to confirm and a third dotted line appears.
8. Move the third line to the desired position and rotate the **Angle** knob to adjust the angle.
9. Press the confirm key to complete the measurement and the system automatically calculates the result.

10.1.2 2D-3Dist

Follow the following steps to perform the measurement.



1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat > Pediatrics** on touch screen.
3. Select the desired hip joint, such as **Lt Hip**, tap **Hip Angle** and set the measurement method to **2D-3Dist**.
4. Move the marker to the desired position by using the trackball and press the confirm key on the control panel to confirm. The second marker appears on the screen.
5. Move the second marker to the desired position.

   Press the **Update** key ont the control panel to activate the fixed marker.
6. Press the confirm key on the control panel to confirm the first line.
7. Repeat steps 4-6 to confirm the second line and the third line to complete the measurement and the system automatically calculates the result.

10.2 d-D Ratio

Follow the following steps to perform the measurement.

1. Press the **Calc** key on the control panel in the 2D mode.
2. Tap **Applicat** > **Pediatrics** > **Lt Hip** on touch screen.
3. Tap **Hip d-D Ratio**, a dotted line appears on the screen.
4. Move the line to the desired position by using the trackball and rotate the **Angle** knob on the control panel to adjust the angle. Press the confirm key on the control panel to confirm and a second dotted line appears.
5. Move the second line to the desired position, press the confirm key and a third dotted line appears.
6. Move the third line to the desired position, press the confirm key to complete the measurement and the system automatically calculates the result.

11 Measurement Reports

Measurement reports record all of measurement results. Each of the measurement and calculation packages produces an individual measurement report.

The measurement report contains the patient information, measurement results, diagnosis results and so on. Two categories of measurement report are provided in the ultrasound system.

- General Measurement Report: Only the patient information and customized comments are provided, no measurement results are provided. You can make comments on the report and print it.
- Application-Specific Measurement Report: The measurement results are provided in the report.

NOTE:

All measurement results displayed in the report are automatically calculated by the system.

An obstetrical report is taken as an example in the following sections to describe the operations on the measurement report.

11.1 Reviewing the Report

11.1.1 Reviewing the Current Report

You can press the **Report** key on the control panel to review the current report when performing a measurement.

Click a tab for the exam type to view the measurement report. A tab with an asterisk indicates that measurements are performed for this exam type.

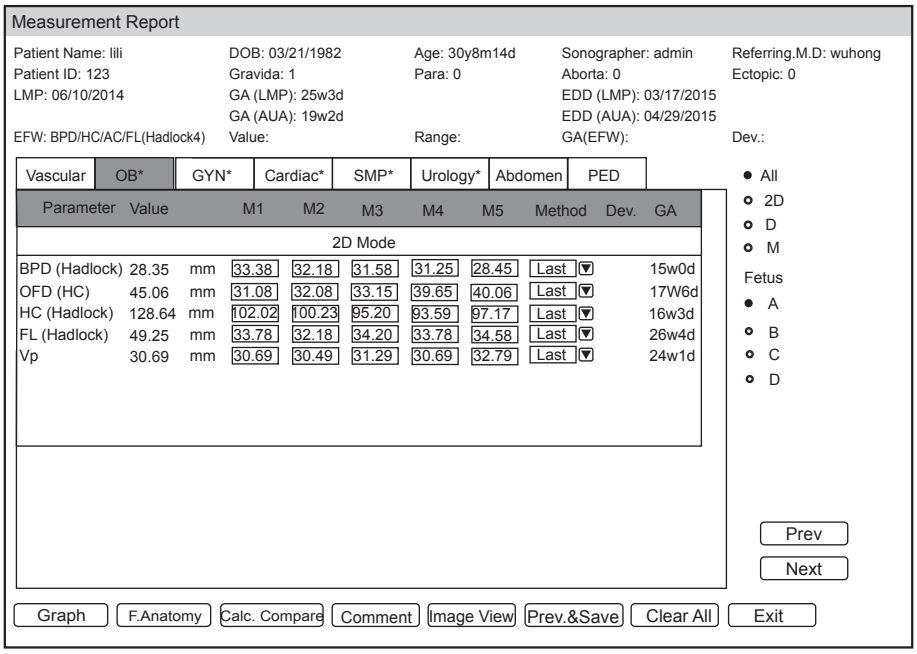


Figure 11-1 Measurement Report Screen

NOTE:

Only the last five measurement values (M1-M5) for each measurement item are saved in the report.

- If the report displays more than one page, click **Prev** or **Next** to turn it to the previous or next page.
- Click **Exit** to quit the screen.

You can also perform the following operations on the **Measurement Report** screen.

- Move the cursor on a measurement value by using the trackball, press the confirm key and edit this value.
- Select a measurement value (such as **M1: 30.69** besides **Vp**), press the **Del** key on the key panel to delete it from the report. Thereafter, the deleted value will be replaced by the following value (such as **M2 30.49** besides **Vp**) of the same item.
- Select the calculation method (such as **Average**, **Last**, **Maximum** and **Minimum**) from the **Method** drop-down list to change the value in the **Value** list.
- Select the desired imaging mode on the right side of the screen to view the relevant report. You can also view multiple fetus developments on the obstetrical report.
- Click **Prev. & Save** to save and preview the report.
- Click **Clear All** to remove all the measurement items and calculation results from the screen.
- Click **Image View** to add or remove the images.
- Click **Comment** and type the diagnostic information in the pop-up text box to make comments on the report.
- Press the **Save (**  **)** key on the control panel to save the current screenshot.

11.1.2 Reviewing an Archived Report

You can review an archived report by performing the following steps.

1. Select patient information.
   - If no exam is performed, press the **Review** key on the control panel to enter the **Patient Exam List** screen.
   - If an exam is being performed, choose the **Patient** key > **Patient List** > **Patient Review** and select the desired patient information.
2. Click **View** > **Exam Review** > **View Image** to enter the **View Image** screen.
3. Move the cursor on a thumbnail by using the trackball and double click the confirm key to enter the basic screen.
4. Press the **Report** key to enter the **Measurement Report** screen.
   For detailed operations about the report, refer to Section 11.1.1 Reviewing the Current Report.

11.2 Obstetrical Reports

11.2.1 Fetal Growth Curves

Fetal growth curves allow you to assess fetal growth compared to a normal growth curve.

Follow the following steps to view fetal growth curves.

1. Click **Graph** on the **Measurement Report** screen and the system displays a singe fetal growth curve graph.

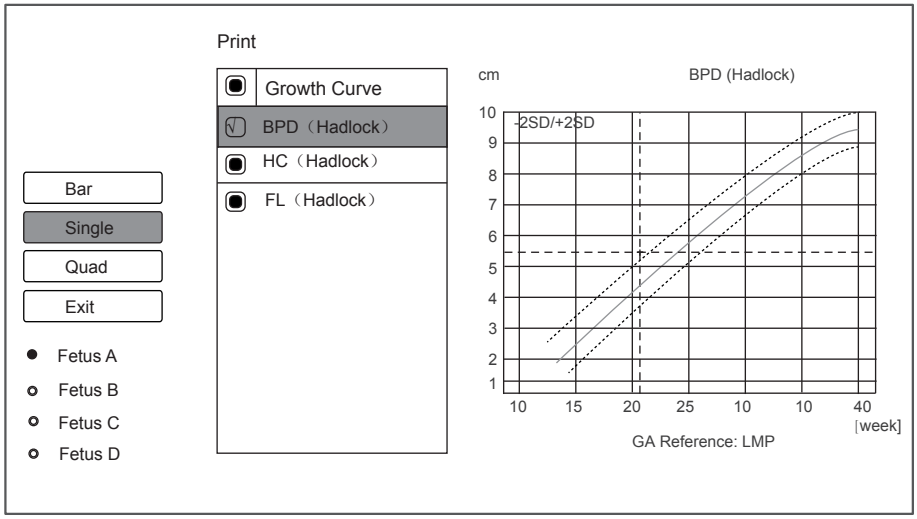


Figure 11-2 Fetal Growth Curves

Click **Quad** to display four graphs at the same time.

2. Select the desired fetus on the left side of the screen.
3. Select the desired measurement item and the corresponding fetal growth curve is displayed on the screen, as shown in Figure 11-2.

   Repeat the above steps to review other fetal growth curves and add them to the report.

As the above figure shows, the x-axis indicates the gestation age, and the y-axis indicates the measurement results. The intermediate curve indicates the median or average value for the fetus growth and the range between two curves indicates the normal growth range for the fetus growth..

The intersection of the dotted line indicates the calculated gestation age after you enter the date in the **LMP** or **IVF** textbox of the **New Patient** screen. You can evaluate the fetus growth in accordance with the intersection.

11.2.2 Fetal Growth Bar

The fetal growth bar shows current exam measurements and the normal growth range based on the gestational age.

Follow the following steps to view the growth bar.

1. Click **Growth** > **Bar** on the **OB Measurement Report** screen to enter the following screen.

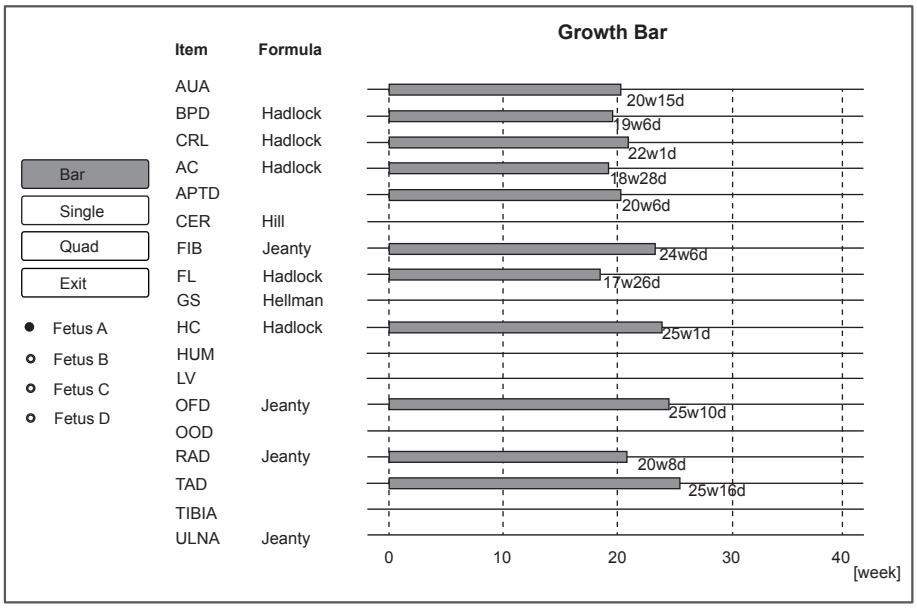


Figure 11-3 Fetal Profile

2. Select the desired fetus and the corresponding growth bar displays on the screen.

11.2.3 Fetus Compare

You can click **Calc. Compare** on the **OB Measurement Report** screen to view multiple fetuses.

The multiple fetuses report allows you to access the development of multiple fetuses. As the following figure shows, **AUA** is calculated by all measured items for the desired fetuses.

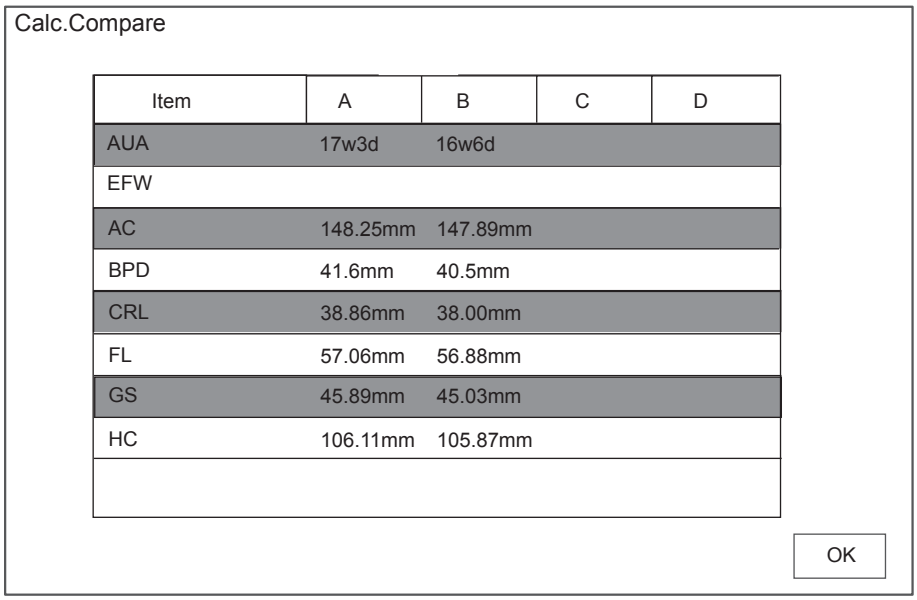


Figure 11-4 Fetus Compare

11.2.4 Anatomical Survey

The anatomical survey provides a checklist that indicates which anatomy was imaged and its status and evaluation for fetus biophysics and cardiovascular.

Follow the following steps to edit the fetus descriptions.

1. Click **F. Anatomy** on the **OB Measurement Report** screen to enter the **Fetus Anatomy** screen.

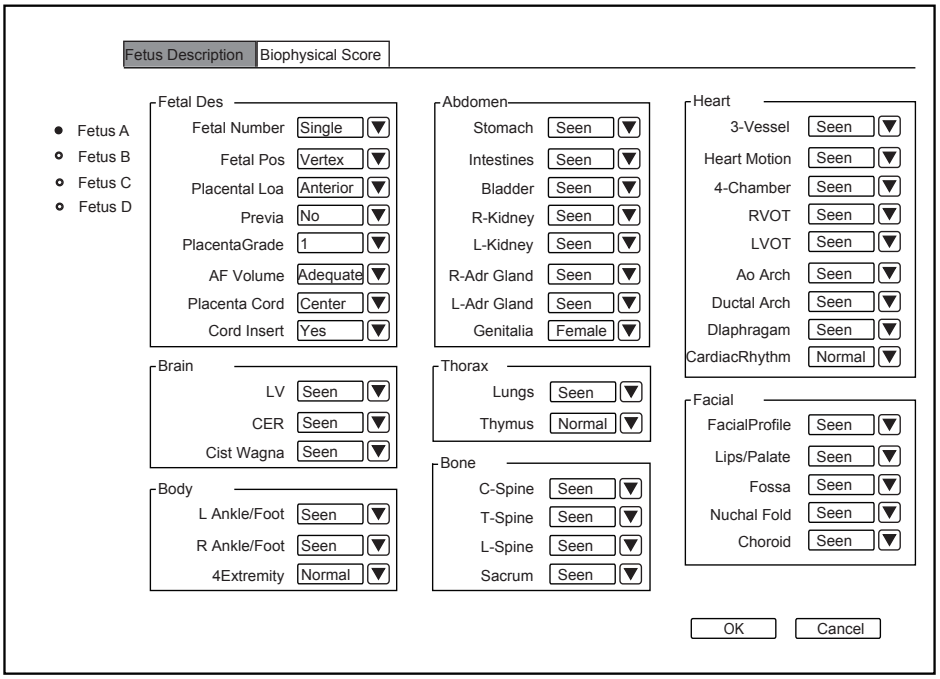
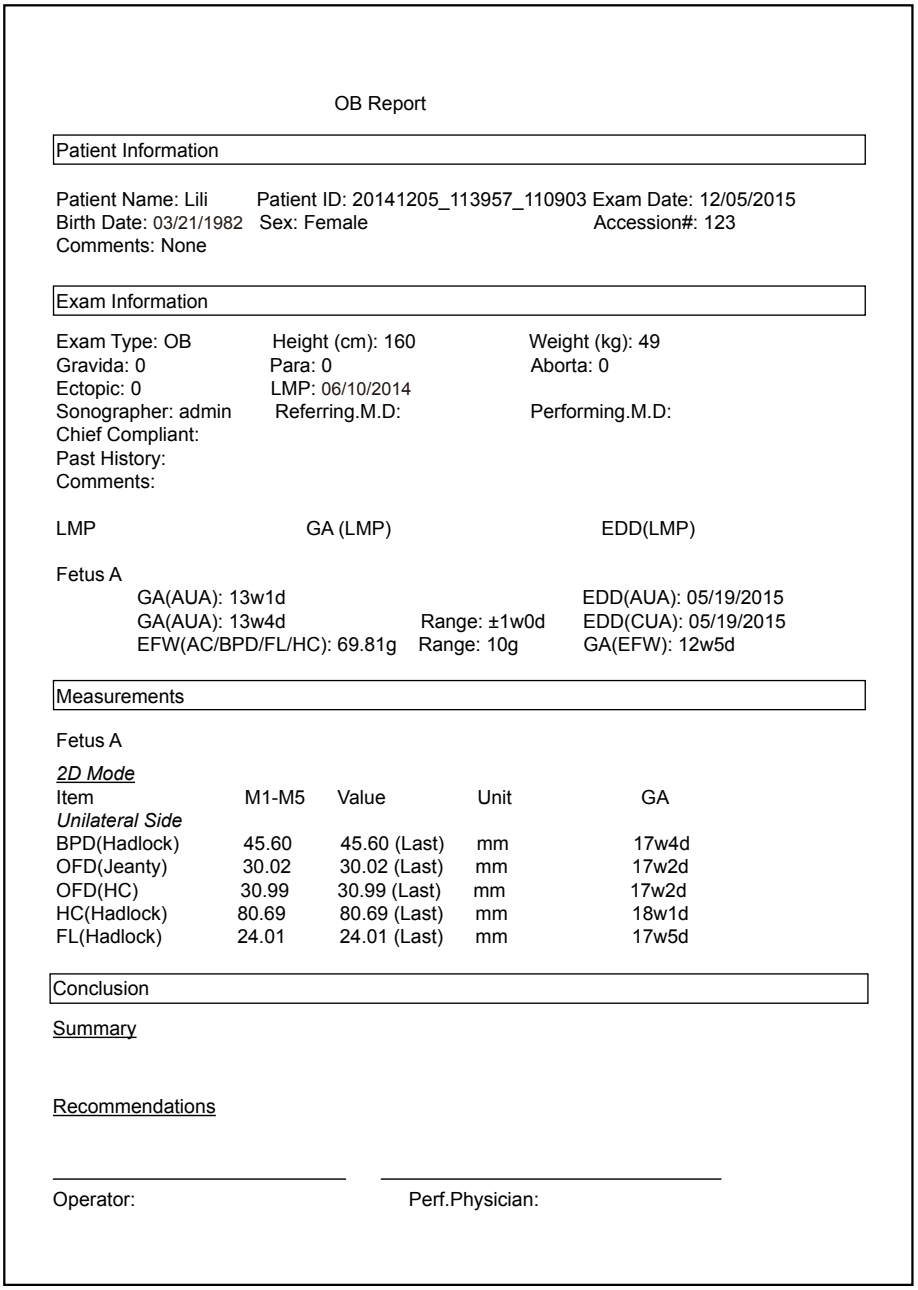


Figure 11-5 Fetus Anatomy

2. Select an option from the drop-down lists by using the trackball and press the confirm key to make settings for the desired item.

11.3 Previewing and Printing the Report

You can click **Prev.&Save** on the **Measurement Report** screen to preview the report.



OB Report

Patient Information

Patient Name: Lili Patient ID: 20141205_113957_110903 Exam Date: 12/05/2015
Birth Date: 03/21/1982 Sex: Female Accession#: 123
Comments: None

Exam Information

Exam Type: OB Height (cm): 160 Weight (kg): 49
Gravida: 0 Para: 0 Aborta: 0
Ectopic: 0 LMP: 06/10/2014
Sonographer: admin Referring.M.D: Performing.M.D:
Chief Compliant:
Past History:
Comments:

LMP GA (LMP) EDD(LMP)

Fetus A
GA(AUA): 13w1d EDD(AUA): 05/19/2015
GA(AUA): 13w4d Range: ±1w0d EDD(CUA): 05/19/2015
EFW(AC/BPD/FL/HC): 69.81g Range: 10g GA(EFW): 12w5d

Measurements

Fetus A

2D Mode

Item	M1-M5	Value	Unit	GA
Unilateral Side				
BPD(Hadlock)	45.60	45.60 (Last)	mm	17w4d
OFD(Jeanty)	30.02	30.02 (Last)	mm	17w2d
OFD(HC)	30.99	30.99 (Last)	mm	17w2d
HC(Hadlock)	80.69	80.69 (Last)	mm	18w1d
FL(Hadlock)	24.01	24.01 (Last)	mm	17w5d

Conclusion

Summary

Recommendations

Operator: Perf.Physician:

- Press the **Print** key on the control panel to print out the report.
- Press the **Freeze** key on the control panel to exit the preview screen and return to the **Measurement Report** screen.

Appendix Clinical Measurement and Calculation Item

A

Abbreviation	Description
%Sten(A)	Area Reduction in %
%Sten(D)	Distance Reduction in %
a	Lowest Velocity during Atrial Systole
a	Semi-major Axis from Widest Minor Axis Radius to Apex
A2Cd	Two Chamber View at End Diastole
A2Cs	Two Chamber View at End Systole
A4Cd	Four Chamber View at End Diastole
A4Cs	Four Chamber View at End Systole
Aa lateral	Mitral Valve Lateral Late Diastolic Motion
Aa Medial	Mitral Valve Medial Late Diastolic Motion
Aborta	Times of Abortions
AC	Abdominal Circumference
Accel.	Acceleration
AFI	Amniotic Fluid Index
Ant	Anterior
Ant Tib A	Anterior Tibial Artery
Ant Tib V	Anterior Tibial Vein
Ao	Aorta
AO	Aortic Root Diameter
Aorta	Aorta
AR DecT	Aortic Valve Regurgitation Deceleration Time
AR PHT	Aortic Valve Regurgitation Pressure Half Time
AR Rad	Aortic Valve Stenosis Radius
AR Vmax	Aortic Valve Regurgitation Maximum Velocity
AR VTI	Aortic Valve Reversed Flow Velocity Time Integral
Art.	Artery
ACS	Aortic Valve Cusp Separation
AUA	Average Ultrasound Age

Abbreviation	Description
AV Vmax	Aortic Valve Maximum Velocity
AV VTI	Aortic Valve Velocity Time Integral
AVA	Aortic Valve Area
AVA(VTI)	Aortic Valve Orifice Area (Velocity Time Integral)
Axill A	Axillary Artery
Axill V	Axillary Vein

B

Abbreviation	Description
Basilic V	Basilic Vein
Bladder	Bladder
BOD	Binocular Distance
BPD	Biparietal Diameter
Brach A	Brachial Artery
Brach V	Brachial Vein
Bulb	Carotid Artery Bulb

C

Abbreviation	Description
c.s.p	Cavum Septum Pellucidum
Carotid	Carotid Artery
CCA	Common Carotid Artery
Celiac.A.	Celiac Artery
Ceph V	Cephalic Vein
Cereb	Transverse Cerebellar Diameter
CI	Cephalic Index
CI	Cardiac Index
Clav.	Clavicle
CM	Cisterna Magna
CO	Cardiac Output
Com	Common
Com Fem A	Common Femoral Artery

Abbreviation	Description
Com Fem V	Common Femoral Vein
Com Iliac A	Common Iliac Artery
Com Iliac V	Common Iliac Vein
CRL	Crown-Rump Length
CUA	Composite Ultrasound Age

D

Abbreviation	Description
D	Ventricular Diastole Peak Velocity
d	Truncated Semi-major Axis from Widest Minor Axis Radius to Mitral Annulus Plane
Deep Palm A	Deep Palmar Artery
Dist	Distance
Dors Ped A	Dorsal Pedal Artery
Ductus Art	Ductus Artery

E

Abbreviation	Description
E/E'(lateral)	Mitral Valve E-wave Peak Velocity to Mitral Valve Lateral Early Diastolic Motion
Ea lateral	Mitral Valve Lateral Early Diastolic Motion
Ea Medial	Mitral Valve Medial Early Diastolic Motion
Ea/Aa(Medial)	Mitral Valve Medial Early Diastolic Motion to Mitral Valve Medial Late Diastolic Motion
ECA	External Carotid Artery
Ectopic	Times of Ectopic Pregnancies
ED	End-Diastolic Velocity
EDD	Estimated Day of Delivery
EDV	Left Ventricular End Diastolic Volume
EF	Left Ventricular Ejection Fraction
EFW	Estimated Fetal Weight
Endo.Thickn.(Endo)	Endometrial Thickness
EPSS	Distance between Point E and the Interventricular Septum
ESV	Left Ventricular End Systolic Volume

Abbreviation	Description
Ext	External
Ext Iliac A	External Iliac Artery
Ext Iliac V	External Iliac Vein

F

Abbreviation	Description
FHR	Fetal Heart Rate
FIB	Fibula Length
FL	Femur Length
FS	Left Ventricular Fractional Shortening

G

Abbreviation	Description
GA	Gestational Age
Gallbladder	Gallbladder
GP	Growth Percentile
Gravida	Times of Pregnancies
GS	Gestational Sac
GSV (Calf)	Great Saphenous Vein (Calf)
GSV (Thigh)	Great Saphenous Vein (Thigh)

H

Abbreviation	Description
HC	Head Circumference
HEM	Hemisphere
Hep A Dur	Hepatic Vein A-wave Duration
Hep A Vel	Hepatic Vein A-wave Flow Velocity
Hep D Vel	Hepatic Vein D-wave Flow Velocity
Hep S Vel	Hepatic Vein S-wave Flow Velocity
Hip	Hip
HL	Humerus Length
HR	Heart Rate

Abbreviation	Description
HR-LV	Heart Rate - Left Ventricular

I

Abbreviation	Description
ICA	Internal Carotid Artery
Inf	Inferior
Inf. ParThyroid	Inferior Parathyroid Gland
Innom A	Innominate Artery
Innom V	Innominate Vein
Int	Internal
Int Iliac A	Internal Iliac Artery
Int Iliac V	Internal Iliac Vein
Int Jugular V	Internal Jugular Vein
IOD	Inner Ocular Distance
ITA	Inferior Thyroid Artery
IVC	Inferior Vena Cava
IVCT	Left Ventricular Isovolumetric Contraction Time
IVRT	Left Ventricular Isovolumetric Relaxation Time
IVS%	Interventricular Septum % Thickening
IVSd	Interventricular Septum Diastolic Thickness
IVSs	Interventricular Septum Systolic Thickness

K

Abbreviation	Description
Kidney	Kidney

L

Abbreviation	Description
LA	Left Atria Diameter
LA/AO	Left Atria to Aortic Root Ratio
LE Art	Lower Extremity Artery
LE Vein	Lower Extremity Vein

Abbreviation	Description
Lesion	Lesion
Liver	Liver
LMP	Last Menstrual Period
LPA Vmax	Left Pulmonary Valve Maximum Velocity
LSV	Lower Saphenous Vein
Lt	Left
LV Tei	Left Ventricular Tei Index
LVAd Sax Endo	Left Ventricular Endocardial Area at Papillary Muscle Level at End Diastole in Short-axis View
LVAd Sax Epi	Left Ventricular Epicardial Area at Papillary Muscle Level at End Diastole in Short-axis View
LVd	Left Ventricular Dimension at End Diastole
LVET	Left Ventricular Ejection Time
LVIDd	Left Ventricular Internal End Diastolic Dimension
LVIDs	Left Ventricular Internal End Systolic Dimension
LVLd Apical	Left Ventricular Long Axis Length at End Diastole in Apical View
LVM	Left Ventricular Mass
LVOT	Left Ventricular Outflow Tract
LVOT Vmax	Left Ventricular Outflow Tract Maximum Velocity
LVOT VTI	Left Ventricular Outflow Tract Velocity Time Integral
LVPEP	Left Ventricular Pre-ejection Period
LVPW%	Left Ventricular Posterior Wall % Thickening
LVPWd	Left Ventricular Posterior Wall Diastolic Thickness
LVPWs	Left Ventricular Posterior Wall Systolic Thickness
LVs	Left Ventricular Dimension at End Systole

M

Abbreviation	Description
MCA	Middle Cephalic Artery
MCS	Mitral Valve Cusp Separation
Med Cub V	Median Cubital Vein
Mid	Middle
MPA	Main Pulmonary Valve Diameter

Abbreviation	Description
MPA Vmax	Main Pulmonary Valve Maximum Velocity
MR dP/dt	Mitral Valve Regurgitation dP/dt derived from Mitral Valve Regurgitation Velocity
MR ERO	Mitral Valve Regurgitant Orifice Area
MR Flow Rate	Peak Instantaneous Flow Rate
MR Rad	Mitral Valve Stenosis Radius
MR Vmax	Mitral Valve Regurgitation Maximum Velocity
MR Volume	Mitral Valve Regurgitant Flow
MR VTI	Mitral Valve Regurgitation Velocity Time Integral
MS Rad	Mitral Valve Stenosis Radius
MS VTI	Mitral Valve Stenosis Velocity Time Integral
MV A Amp	Mitral Valve A-wave Amplitude
MV A Dur	Mitral Valve A-wave Duration
MV A Vel	Mitral Valve A-wave Peak Velocity
MV C-O Dur	Mitral Valve Close-Open Duration
MV DE	Mitral Valve DE Wave Amplitude
MV DecT	Mitral Valve Deceleration Time
MV Diam	Mitral Valve Diameter
MV E Amp	Mitral Valve E-wave Amplitude
MV E Dur	Mitral Valve E-wave Duration
MV E Vel	Mitral Valve E-wave Peak Velocity
MV E-F Slope	Mitral Valve E-F Slope
MV VTI	Mitral Valve Velocity Time Integral
MVA	Mitral Valve Area
MVA(PHT)	Mitral Valve Area (Pressure Half Time)
MVA(VTI)	Mitral Valve Orifice Area (Velocity Time Integral)

N

Abbreviation	Description
NF	Neck Fold
Nipple-Les. D	Nipple-Lesion Distance
NT	Nuchal Translucency

O

Abbreviation	Description
OFD	Occipital Frontal Diameter

P

Abbreviation	Description
PAEDP	Pulmonary Artery at End Diastole Period
Pancreas	Pancreas
Para	Times of Live Births
Peron A	Peroneal Artery
Peron V	Peroneal Vein
PFA	Profunda Femoral Artery
PFV	Profunda Femoral Vein
PI	Pulsatility Index
PLI	Preload Index
Popl A	Popliteal Artery
Popl V	Popliteal Vein
Port.V.	Portal Vein
Post	Posterior
Post Tib A	Posterior Tibial Artery
Post Tib V	Posterior Tibial Vein
PR Vmax	Pulmonary Valve Regurgitation Maximum Velocity
PR VTI	Pulmonary Valve Regurgitation Velocity Time Integral
PRI	PR Interval
Prof	Profunda
Prostate	Prostate
Prox	Proximal
PS	Peak Systolic Velocity
Pulm A Dur	Pulmonary Vein A-wave Duration
Pulm A Vel	Pulmonary Vein A-wave Flow Velocity
Pulm D Vel	Pulmonary Vein D-wave Flow Velocity
Pulm D VTI	Pulmonary Vein D-wave Velocity Time Integral

Abbreviation	Description
Pulm DecT	Pulmonary Vein Deceleration Time
Pulm S Vel	Pulmonary Vein S-wave Flow Velocity
Pulm S VTI	Pulmonary Vein S-wave Velocity Time Integral
PV AccT	Pulmonary Valve Acceleration Time
PV Diam	Pulmonary Valve Diameter
PV Vmax	Pulmonary Valve Maximum Velocity
PV VTI	Pulmonary Valve Velocity Time Integral
PVIV	Peak Velocity Index Vein

R

Abbreviation	Description
RAD	Radius Length
Rad A	Radial Artery
Rad V	Radial Vein
RAP	Right Atrium Systolic Pressure
Ratio(A)	Ratio(Area)
Ratio(D)	Ratio(Distance)
Renal A	Renal Artery
Renal Cortex	Renal Cortex
RI	Resistivity Index
RPA Vmax	Right Pulmonary Artery Maximum Velocity
Rt	Right
RV Tei	Right Ventricular Tei Index
RVAWd	Right Ventricular Anterior Wall Diastolic Thickness
RVET	Right Ventricular Ejection Time
RVIDd	Right Ventricular Internal End Diastole Dimension
RVOT	Right Ventricular Outflow Tract
RVOT Vmax	Right Ventricular Outflow Tract Maximum Velocity
RVOT VTI	Right Ventricular Outflow Tract Velocity Time Integral
RVPEP	Right Ventricular Pre-ejection Period
RVSP	Right Ventricular Peak Systolic Pressure

S

Abbreviation	Description
S	Ventricular Systole Peak Velocity
Sa lateral	Mitral Valve Lateral Systolic Motion
Sa Medial	Mitral Valve Medial Systolic Motion
SD (S/D)	Systolic to Diastolic Velocity Ratio
SFA	Superficial Femoral Artery
SFV	Superficial Femoral Vein
SI	Stroke Index
Skin-Les. D	Skin-Lesion Distance
SMA	Superior Mesenteric Artery
Spleen	Spleen
STA	Superior Thyroid Artery
Subclav A	Subclavian Artery
Subclav V	Subclavian Vein
Sup	Superior
Sup	Superficial
Sup Palm A	Superficial Palmar Artery
Sup. ParThyroid	Superior Parathyroid
Suprarenal	Suprarenal
SV	Stroke Volume

T

Abbreviation	**Description**
TAmax	Time Averaged Maximum Velocity
Testicle	Testicle
Thyroid	Thyroid
Thyroid Ist.	Thyroid Isthmus
TIB	Tibia Length
TR Fraction	Tricuspid Valve Regurgitant Fraction
TR Rad	Tricuspid Valve Stenosis Radius
TR Vmax	Tricuspid Valve Regurgitation Maximum Velocity

Abbreviation	Description
TR VTI	Tricuspid Valve Regurgitation Velocity Time Integral
TV A Vel	Tricuspid Valve A-wave Velocity
TV C-O Dur	Tricuspid Valve Close-Open Duration
TV Diam	Tricuspid Valve Diameter
TV E Vel	Tricuspid Valve E-wave Peak Velocity
TV E/A	Tricuspid Valve E to A Ratio
TV Vmax	Tricuspid Valve Maximum Velocity
TV VTI	Tricuspid Valve Velocity Time Integral

U

Abbreviation	Description
UE Art	Upper Extremity Artery
UE Vein	Upper Extremity Vein
Ulna	Ulna Length
Ulnar A	Ulnar Artery
Ulnar V	Ulnar Vein

V

Abbreviation	Description
Va	Anterior Horn of Lateral Ventricle
Vertebral A	Vertebral Artery
Vessel	Vessel
Vp	Posterior Horn of Lateral Ventricle
VTI	Velocity Time Integral