E S A O T E

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MyLab

ADVANCED OPERATIONS

Doc # 29B06EN09

Introduction

This manual details the **MyLab** operations and describes the available optional packages.

This manual is composed of the following sections:

- Section 1: Software Keys (SK)
- Section 2: Calculations (CA)
- Section 3: Archiving (AR)
- Section 4: System Configuration (SC)
- Section 5: Special Probes and Needle Guides (SP)
- Section 6: Stress Echo (ST)
- Section 7: Contrast (CnTI)
- Section 8: Panoramic View (VPan)
- Section 9: 3D/4D
- Section 10: Xstrain (XS)

This table shows which sections apply to which systems:

	SK	*CA*	*AR*	*SC*	*ST*	*SP*	*CNTI*
MyLabFive	✓	✓	✓	✓	✓	✓	✓
MyLab20Plus	✓	✓	✓	✓	-	✓	-
MyLab40	✓	✓	✓	✓	✓	✓	✓

	VPan	***VN***	***3D4D***	***XS***	***Elaxto***	***LaGui***
MyLabFive	-	-	-	✓[1]	-	-
MyLab20Plus	✓	-	✓	-	-	-
MyLab40	✓	-	✓	-	-	-

The user's manual standard configuration includes the following sections:

- Software Keys
- Calculations
- Archiving
- System Configuration
- Special Probes and Needle Guides

All other sections can be ordered using the specific single codes.

In this manual control panel keys and software keys are indicated using the following graphical conventions:

Control panel keys — are indicated by **BLUE CAPITAL LETTERS.** Multifunction keys (e.g. **CLIP IMAGE** on MyLab25 Gold and MyLab30 Gold models) are indicated with the mention of one the functions only (i.e. **CLIP** in this example).

Software keys — are indicated by **BLACK CAPITAL LETTERS**

The confirmation key is always indicated throughout the manual as **ENTER**, while the menu context key as **UNDO**.

This manual revision refers to Release 12.0X of MyLabFive, MyLab20Plus and MyLab40 models.

WARNING

In this manual a **WARNING** pertains to possible injury to a patient/operator.

CAUTION

In this manual a **CAUTION** describes the precautions, which are necessary to protect the equipment..

[1] Only off-line with MyLabDesk.

Be sure to understand and observe each of the cautions and warnings.

Sorters Legenda

The below table lists the sections and their icons in sequential order:

Section	Sorter Icon
Software Keys	
Calculations	
Archiving	
System Configuration	
Stress Echo	
Special Probes and Needle Guides	
Contrast	
Panoramic View	
Virtual Navigator	
3D/4D	
XStrain	
Elastography	
Laser Guidance	

SOFTWARE KEYS SECTION

This section lists the software keys available in the various modes, in Freeze and for remote control of the video recorder. It also gives some tips on how to use the controls available to optimize image quality.

The section is organized as follows:

- Chapter 1: B-Mode

  This chapter lists the software keys available in B-Mode and explains how to use them to optimize the image.

- Chapter 2: M-Mode

  This chapter lists the software keys available in M-Mode.

- Chapter 3: Compass M-Mode

  This chapter lists the software keys available in Compass M-Mode.

- Chapter 4: Doppler

  This chapter lists the software keys available in PW and CW Doppler format and explains how to use the controls available to optimize image quality.

- Chapter 5: Color Flow Mapping (CFM) and Power Doppler (PWR D)

  This chapter lists the software keys available in Color Flow Mapping and explains how to use them.

- Chapter 6: Q-Mode

  This chapter lists the software keys available in Q-Mode and explains how to use them.

- Chapter 7: Freeze

  This chapter lists the software keys available in Freeze and explains how to use them.

- Chapter 8: Video Recorder

  This chapter lists the software keys available for remote control of the video recorder and explains how to use them.

- Chapter 9: Body Marks

  This chapter explains how Body Marks are organized and how to use them.

- Chapter 10: Annotations

  This chapter explains how to use the annotation function both by word and by sentence.

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Chapter 1

1 - B-Mode

This chapter lists the software keys available in B-Mode format and how best to use them to optimize the image quality.

Activation of B-Mode Format


B-Mode Cursor

The system functions automatically in B-Mode format each time a new exam is started. The 2D format can be redisplayed from any other mode using the **B-MODE** key.

Software Keys in B-Mode on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

There are different menu levels in Real Time 2D: the **NEXT/PREVIOUS** key scrolls the menu levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

Refer to next chapters for further details on Software Keys shown in italics

B-STEER	**FREQUENCY**	**SHARPNESS**
CLIP DUR	**GRAY MAP**	**SIZE**
COLORIZE	**MVIEW**	***SV SIZE***
DENSITY	**ORIENT**	**TEI**
DYN RANGE	**REVERSE**	**TPVIEW**
D STEER	**PERSIST**	***Θ ANGLE***
FOCUSES	**PLANE**	**X-VIEW**


Line Cursor

Keys in italics are displayed in 2D if the line cursor is active. If the system has a Clip license, the **CLIP DUR** key allows the user to change the clip duration in real time. When the duration of the clip is set to unlimited, its acquisition ends when the **CLIP** key is pressed.

Note

Depending upon the probes, Software Keys in B-Mode can also be used to manage the needle guide. See later in this manual.

Tips for 2D Scanning with MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

2D Format Optimization

The **ORIENT** key can be used to change the sector orientation (high/low), while the **REVERSE** key changes right/left or left/right orientation depending on the application.

- Use the **DEPTH** command to increase or decrease scanning depth.

When performing cardiac examinations, reduce the angle (**SIZE** software key) as much as possible to maximize scanning speed; the smaller the angle, the greater the number of images per second, providing a better view of rapidly moving structures, such as valves.

When the transrectal probe is active, the **PLANE** key selects the transducer (linear or convex) to be used.

The **B-STEER** (or alternatively the **STEER** key on **MyLabFive, MyLab25 Gold** and **MyLab30 Gold** models) and the **TPVIEW** keys are active when Linear Array probes are used. The first key steers the sector. **TPVIEW** activates the trapezoidal view, enlarging the probe's field of view.

To Enlarge 2D Area

The 2D can be enlarged; the enlargement factor is variable.

- Press **ZOOM** to display the ROI cursor
- Position the cursor on the area using the trackball
- If necessary, press **DEPTH** to adapt the ROI sizes
- Press **ZOOM** to activate the selected Zoom zone
- Press **B-MODE** to return to a normal 2D

The smaller the ROI, the greater the applied enlargement factor will be

2D Display Optimization

First of all, the gain must be properly adjusted in order to clearly display the structures being examined; then, fine optimizations can be performed interacting with the display commands or with the acoustic parameters of the probe.

Gain

General gain

The knob on the right side of the keyboard adjusts the gain within the entire sector: turn the knob in a clockwise/counter-clockwise direction to increase/decrease the gain. The **TGC** potentiometers adjust individual areas of the sector: move the cursors to the right to increase and to the left to decrease the gain.

In order to fully employ the dynamics of the system, Esaote recommends keeping the general gain at a relatively high level.

Automatic Gain icon

The **ADJUST** key automatically optimizes the image and adjusts both the general gain and the TGC re-distribution. The Automatic Gain activation is indicated on the screen by the corresponding icon and the parameter is labelled as "AG". To deactivate the Automatic Gain, either press the **ADJUST** key or change the preset.

View Commands

These commands are mainly "subjective" and patient-dependent.

Dynamic range and Sharpness

The **DYN RANGE** key allows tissue structures to be characterized, reacting to the compression of reflected echoes. Nine different levels (21 in cardiac applications) can be selected: the higher the selected value, the greater the contrast.

The **SHARPNESS** key accentuates the edges and the small differences in tissues. Three different levels can be selected: Low, Average and High.

DENSITY, available with linear and convex probes, optimizes image quality.

The **X-VIEW** key activates the X-View algorithm. This algorithm improves the image of the tissue edges in real-time, thus enhancing diagnostic accuracy by eliminating noise and movement artefacts. When **X-VIEW** is set to **C**, the **X SMOOTH**, **X DETAIL** e **X ENHANC** controls are displayed to allow algorithm customization.

Only with Linear probes on MyLabFive, MyLab25 and MyLab30CV. MView is not available on MyLab20Plus.

The **MVIEW** key is displayed when either a Linear or a Convex probe is used. To activate the MView mode, press the corresponding key: the B-Mode image will be the result of different bidimensional images acquired with different steering angles. Different MView values correspond both to different view lines and steering angles.

The system offers five gray scales, ranging from minimum to maximum contrast.

A chrominance scale can be selected using the **COLORIZE** key. The system has six different colorizations: Orange, Indigo, Magenta, Blue, Yellow and RGB.

The **PERSIST** key allows the persistence level applied to the Real Time view to be controlled; increasing persistence levels increases the perception of the image, but decreases the discrimination of moving structures.

Acoustic Parameters

The focal point in transmission is positioned according to the initial depth, in order to optimize the entire analysis area. The focal point can be changed to increase the

resolution and sensitivity of a specific area of the 2D; it is also possible to activate more than one focus in transmission and to increase resolution over a larger area.

The frame rate decreases if more than one focal point is active.

Note

Several focuses in transmission can be activated; in this case, the relative distance between focuses is pre-established. The trackball moves all active focuses simultaneously.

Focuses cursor

To change the number of active focuses, select the required option by pressing the **FOCUSES** software key.

A TEI licence is required in order to use this mode.

The **FREQUENCY** (FREQ on **MyLabFive, MyLab25 Gold** and **MyLab30 Gold** models) key allows the imaging frequency to quickly change (higher frequency to optimize resolution, lower frequency to increase penetration). **TEI** mode (**TEI PEN** for optimal penetration, **TEI RES** for higher resolution) can be activated on lower frequency probes by pressing the **TEI** key. This mode generally improves the brightness of the image by decreasing acoustic noise. Because of the non-linear response of tissues to ultrasound energy, **TEI may require higher acoustic emissions compared with conventional imaging; the use of this mode is recommended especially for patients with difficult acoustic windows.**

Note

Acoustic parameters and gain interact with one another; it may be necessary to review the adjustment of gain when an acoustic parameter changes.

SS

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change the transmitted power; use the minimum power compatible with a diagnostic level of the images. If there is insufficient sensitivity, make sure the gain, focal point and probe frequency have been set correctly before increasing the power.

Dual and Quad Formats

Depending on the active preset and the displayed menu, these keys activate the multiple display of two (Dual) or four (Quad) 2D and 2D+CFM images. In Dual, either simultaneous or different images can be displayed.

To set multiple formats, see the "System Configuration" section of this manual

Software Keys

By pressing any of the two ◨ and ◧ keys, the multiple display is activated. The displayed menu has three buttons for multiple formats; all other software keys are related to the active mode (2D or CFM).

DUAL
QUAD
SIMULT

DUAL and **QUAD** keys toggle from two to four image format. The **SIMULT** key activates the simultaneous display.

Press the **B-MODE** key to return to a full screen format.

Software Keys in B-Mode on MyLab60, MyLab70 and MyLab90 Models

There are several menu levels in Real Time 2D: the **NEXT/PREVIOUS** key scrolls the different levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

ANGLE	**DYN RANGE**	**PERSIST**
CLIP DUR	***D-STEER***	**SIZE**
COLORIZE	**ENHANC**	**SIZE-TP**
CVX/LNR	**FOCUSES**	***SV SIZE***
DENSITY	**GRAY M>>**	**SVIEW**
DYN COMPR	**MVIEW>>**	**XVIEW**

Line Cursor

The keys in italics are displayed in 2D if the line cursor is active. The **CLIP DUR** key allows the user to change the clip duration in real time.

Tips for 2D Scanning with MyLab60, MyLab70 and MyLab90 Models

2D Format Optimization

The **REVERSE** key can be used to change the sector orientation (high/low), while the **ORIENTATION** key changes right/left or left/right orientation depending on the application.

Use the **DEPTH/ZOOM** command to increase or decrease scanning depth.

The **SIZE** (active with Convex and Phased Array probes) software key reduces the scanning angle. Reduce the angle as much as possible to maximize scanning speed; the smaller the angle, the greater the number of images per second, providing a better view of rapidly moving structures.

When the transrectal probe is active, the **CVX/LNR** key selects the transducer (linear or convex) to be used.

SIZE-TP (active with Linear Array probes) changes the sector size. Pressing **SIZE-TP** activates the trapezoidal view, enlarging the probe's field of view.

WARNING

The trapezoidal view may generate artifacts on the sector sides, particularly when scanning cavities. Place the ROI in the middle of the scanning area.

2D Display Optimization

First of all, the gain must be properly adjusted in order to clearly display the structures being examined; then, fine optimizations can be performed interacting with the display commands or with the acoustic parameters of the probe.

Gain

General gain

The **B/M** knob adjusts the gain within the entire sector:

- Rotate the knob clockwise/counterclockwise to increase/decrease the gain.
- Press the knob to automatically adjust both the gain and the TGC.

In order to fully employ the dynamics of the system, Esaote recommends keeping the general gain at a relatively high level.

The **ADJUST** key activates the menu managing the automatic gain and the PBI (Pure Brilliant Imaging) functions. The following software keys are available:

PBI *(multifunction)*	**REFR PBI**
B/M	**B/M OFF**
PBI *(button)*	**TCG-ABS/TGC-REL**

B/M OFF disables the automatic gain; press the **B/M** knob to reactivate it. The software key **B/M** switches from automatic to manual gain adjustment (**X GAIN** value). When automatic gain is set, the field "**AG**" is displayed on the screen.

The button **PBI** enables/disables the PBI function which automatically optimizes the gray map, improving the B-Mode image contrast both in real time and in Freeze. By rotating the software key **PBI** the user changes the gray map optimization analysis:

Analysis	Action
LINEAR	Linear analysis of the image gray map distribution
AUTO	Automatic selection of the best distribution analysis
STATIST	Analysis of the image gray map distribution according to Rayleigh distribution

EYE	Analysis of the image gray map distribution considering the human eye sensitivity

Once all parameters have been set, press **REFR PBI** to update the image. When the PBI function is activated, the field "**PBI**" is displayed on the screen.

The **TGC** potentiometers affects different sector areas: move the cursors to the right to increase the gain, to the left to decrease it. The **TGC-ABS** key switches from absolute (**TCG-ABS**) to relative (**TCG-REL**) TGC management. In absolute mode all potentiometers affect the maximum probe scanning depth. In this condition the inactive TGC are not lighted. In relative mode all potentiometers affect the scanning depth under analysis. Whenever the scanning depth is changed, the TGC function is redestribuited. In relative mode the TGC are always lighted.

View Commands

These commands are mainly "subjective" and patient-dependent.

The **X-VIEW** key allows a real-time image enhancement of tissue margins and tissue resolution to increase diagnostic confidence, eliminating speckle and noise artefacts.

The **MVIEW** key is displayed when a Linear or Convex probe is used. To activate the MView mode, press the corresponding key: the B-Mode image will be the result of different bidimensional images acquired with different steering angles. The following software keys are available:

BORDER
COMBINE

BORDER selects the format (rectangular or trapezoidal). **COMBINE** selects the kind of mixing to compose the final image

The **ENHANC** key emphasizes the edge of the images. Up to 8 different levels can be selected: the higher the selected value, the clearer the edge.

The **SVIEW** key makes the image more homogenous.

Dynamic range and Sharpness

The **DYN RANGE** key allows tissue structures to be characterized, reacting to the compression of reflected echoes. Up to 24 different levels can be selected: the higher the selected value, the greater the contrast.

The **DENSITY** key, available with linear and convex probes, allows the image quality to be optimized.

DYN COMPR changes the dynamic compression improving image contrast.

Grey map

The **GRAY M>>** key offers seven different gray scales, ranging from minimum to maximum contrast: see next paragraph for further details.

A chrominance scale can be selected using the **COLORIZE** key. The system has eight different colorizations.

The **PERSIST** key allows the persistence level applied to the Real Time view to be controlled; increasing persistence levels increases the perception of the image, but decreases the discrimination of moving structures.

Acoustic Parameters

The focal point in transmission is positioned according to the initial depth, in order to optimize the entire analysis area. The focal point can be changed to increase the resolution and sensitivity of a specific area of the 2D; it is also possible to activate more than one focus in transmission and to increase resolution over a larger area.

The frame rate decreases if more than one focal point is active.

> ***Note***
>
> Several focuses in transmission can be activated; in this case, the relative distance between focuses is pre-established. The trackball moves all active focuses simultaneously.

Focuses cursor

To change the number of active focuses, select the required option by pressing the **FOCUSES** software key.

The **FREQ/TEI** key allows the imaging frequency to quickly change (higher frequency to optimize resolution, lower frequency to increase penetration). TEI mode can be activated by pressing the **FREQ/TEI** key. This mode generally improves the brightness of the image by decreasing acoustic noise. Because of the non-linear response of tissues to ultrasound energy, **TEI may require higher acoustic emissions compared with conventional imaging; the use of this mode is recommended especially for patients with difficult acoustic windows.**

> ***Note***
>
> Acoustic parameters and gain interact with one another; it may be necessary to review the adjustment of gain when an acoustic parameter changes.

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change the transmitted power; use the minimum power compatible with a diagnostic level of the images. If there is insufficient sensitivity, make sure the gain, focal point and probe frequency have been set correctly before increasing the power.

Additional Line Software Keys

The line cursor (**LINE** key) allows to select the sample volume for getting signal along the acoustic line.

Using the trackball the line can be moved inside the 2D image and the sample volume along the line.

The **D-STEER** key (active for linear probes only) modifies the slope of the line.

Use the **ANGLE** control to align the angle vector with the flow direction.

The **STEER-ANGLE** key allows the same controls of **D-STEER** and **ANGLE** keys.

The **SV SIZE** key allows the sizes of the sample volume to be changed.

Gray Map on MyLab60, MyLab70 and MyLab90 Models

By rotating the **GRAY M>>** key, the user selects the desired post-processing curve: the number displayed shows which curve is active.

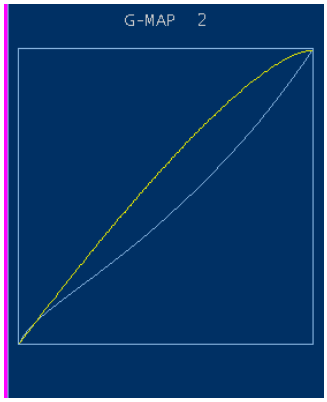
The selected curve can be modified in real-time to improve image quality.

When the **GRAY M>>** key is pressed in real-time, the system displays the software keys allowing curve adjustment:

GRAY M>>	**SLOPE**
REJECT	**PEAK**
SATUR	**CENTER**

The below figure is shown next to the real-time image.

The yellow line displays the trend of the active post-processing curve, indicated by the number shown on the top.



The curve trend is modified when changing the parameters and the real-time image is consequently updated.

The **CENTER** key moves the center of the curve to the left or to the right.; the **PEAK** key increases or decreases the curve peak while the **SLOPE** key changes the curve slope.

The **REJECT** and **SATUR** keys respectively modify the rejection and saturation values.

By rotating the **GRAY M>>** key, the user changes the curve shape: ten different curves are available. Pressing this key, the user exits the gray map configuration mode.

Refer to "System Configuration" section for information on how to save the user presets.

Modifications have to be saved as a new preset. The saved post-processing curve will be available in the user preset list.

Chapter 2

2 - M-Mode

This chapter lists the software keys available in M-Mode format and explains how to best use the controls available to optimize the image quality.

Activation of M-Mode Format


Line Cursor

- If necessary, press **LINE** to display the Doppler/M-Mode cursor.
- Position the cursor with the trackball on the relative B-Mode line.
- Press **M-MODE** to activate M-Mode analysis.
- Press **B-MODE** to return to 2D.

During the exam the **UPDATE** key freezes the trace acquisition and the reference 2D is temporarily re-activated.

Software Keys in M-Mode on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

There are more menu levels in M-Mode format in Real Time: the **NEXT/PREVIOUS** key scrolls the menu levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

B FORMAT	**GRAY MAP**
B-REF	**LINE**
COLORIZE	**PLEX**
CMM	**SHARPNESS**
DYN RANGE	**SWEEP**
FREQUENCY	**TEI**

Tips for M-Mode Scanning with MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

See the "System configuration" section for setting display formats

M-Mode Format Optimization

The reference 2D can be viewed by using the **B-REF** software key. During the exam, the **UPDATE** key freezes the trace and leaves the 2D reference in real time, making the B-Mode format software commands available.

The **B FORMAT** key allows to change the real time display format.

Depending on the settings the **PLEX** key activates and updates the reference 2D, while maintaining the trace in Real Time.

The **SWEEP** command can be used to change the scanning speed.

CMM is not available with MyLab20Plus.

The **CMM** key activates the Compass M-Mode: please refer to the next chapter for more details

M-Mode Display Optimization

The adjustments for this mode are the same as those for B-Mode. In order to obtain a good M-Mode trace, it is fundamental to optimize the 2D image from which the trace will then be sampled. Normally, further interactions are not necessary.

Software Keys in M-Mode on MyLab60, MyLab70 and MyLab90 Models

There is only one menu level in M-Mode in Real Time. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

B-REF
COLORIZE
DYN COMPR
DYN RANGE
GRAY M>>
LAYOUT
SWEEP
XMM

The **XMM** key improves the trace image quality.

Tips for M-Mode Scanning with MyLab60, MyLab70 and MyLab90 Models

See the "System configuration" section for setting display formats

M-Mode Format Optimization

The reference 2D can be viewed by using the **B-REF** software key. During the exam, the **UPDATE** key freezes the trace and leaves the 2D reference in real time, making the B-Mode format software commands available.

The **FORMAT** key allows to change the real time display format.

The **SWEEP** command can be used to change the scanning speed.

The **GRAY M>>** key changes the post-processing map. The gray map can be replaced with one of the six chromatic scales (**COLORIZE**) to improve contrast.

The **DYN RANGE** key affects the compression of the reflected echoes, increasing or decreasing spectrum filling.

The **DYN COMPR** key changes the dynamic compression improving the image contrast.

M-Mode Display Optimization

The adjustments for this mode are the same as those for B-Mode. In order to obtain a good M-Mode trace, it is fundamental to optimize the 2D image from which the trace will then be sampled. Normally, further interactions are not necessary.

Chapter 3

3 - Compass M-Mode

This chapter lists the software keys available in Compass M-Mode and explains the best use of the available controls to optimize the image quality.

Compass M-Mode

Compass M-Mode generates a special M-Mode display allowing the free positioning of the cursor line.

> **Note**
>
> Compass M-Mode requires a specific license.

For MyLabFive, MyLab40, MyLab25, MyLab30 and MyLab50 models

This modality is available in Cardiac applications with Phased Array (PA and TEE), with CA123 and in all applications available with all linear probes.

MyLab60, MyLab70 and MyLab90 models

This modality is available in every application with Phased Array (PA and TEE) and Convex Array (CA) probes.

Activation of Compass M-Mode

Line Cursor

- If necessary, press **LINE** to display the Doppler/M-Mode cursor.
- By using the trackball, place the cursor on the corresponding B-Mode line.
- Press **M-MODE** to activate M-Mode analysis.
- Press the **CMM** key to activate Compass M-Mode.

During the exam, the **UPDATE** key freezes the trace acquisition and the reference 2D is temporarily re-activated.

[1] Not available with MyLab20Plus.

Software Keys for MyLabFive, MyLab40, MyLab25, MyLab30 and MyLab50 Models

Upon mode activation, the following software keys (alphabetically sorted in the following list) are available :

B-FORMAT	***LINES***
CMM	**PLEX**
FREE	**TEI**
LINE	

Keys in italics are shown only when the Dual format is used.

The key **NEXT/PREVIOUS** gives access to the menu levels.

Tips for Compass M-Mode Scanning

The trackball allows to move the scanning line within the sector. The key **LINE** allows to freely orient the scanning line within the cursor. The corresponding trace is displayed in real time.

In Dual format the system allows to activate two independent scanning lines and simultaneously display two different traces in real time.

Procedure

- If necessary, select the Dual format by pressing **B FORMAT**.
- Activate the second scanning line by pressing **LINES**: the two different traces are displayed in real time on the right of the screen.
- The key **LINE** allows to position the active line as desired. The **ACTION** key switches among the two lines.
- The key **FREE** allows to independently orient each line.

Software Keys for MyLab60, MyLab70 and MyLab90 Models

Upon mode activation, the following software keys (alphabetically sorted in the following list) are available :

ANGLE	**FORMAT**
CMM	**FREE**
DENSITY	**LINES**

The key **NEXT/PREVIOUS** gives access to the menu levels.

Tips for Compass M-Mode Scanning

The trackball allows to move the scanning line within the sector. The key **ANGLE** allows to freely orient the scanning line within the cursor. The corresponding trace is displayed in real time.

In any format the system allows to activate up to three independent scanning lines and simultaneously display three different traces in real time.

Procedure

- Select the desired format by pressing **FORMAT**.
- Activate the further scanning line by pressing **LINES**: the different traces are displayed in real time on the screen.
- The key **ANGLE** allows to position the active line as desired. The **ACTION** key switches among the two lines.
- The key **FREE** allows to independently orient each line.

Chapter 4

4 - Doppler

This chapter lists the software keys available in PW and CW Doppler and explains how to use the controls available to optimize image quality.

Activation of Doppler Format

Cursor Line

- If necessary, press **LINE** to display the Doppler/M-Mode cursor.
- Position the line (CW) or the Sample Volume (PW) on the applicable area.
- Press **PW** to activate the Doppler PW or **CW** for the CW.
- Press **B-MODE** to return to the full screen 2D.

During the exam the **UPDATE** key freezes the trace acquisition and the reference 2D is temporarily re-activated.

Software Keys in Doppler on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

There are three menu levels in Doppler format in Real Time: the **NEXT/PREVIOUS** key scrolls the menu levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

The shown keys refer to PW Doppler: CW Doppler options are a submenu of these software keys.

ADM	**FILTER**	**SV SIZE**
BASEL	**FREQUENCY**	**SWEEP**
B FORMAT	**GRAY MAP**	**TRACE**
B-REF	**HPRF**	**TR MODE**
COLORIZE	**PLEX** or **TV**	**VELOCITY**
DYN RANGE	**REJECT**	***Θ ANGLE***
D-STEER	**REVERSE** or **SMART D**	

If the application defaults to angle correction Θ, the software key **Θ ANGLE** is displayed while the **D-STEER** key is shown when the probe allows the cursor orientation. The **PLEX** key can be replaced by the **TV**[1] key to activate Tissue Velocity Doppler (see the "System Configuration" section to set this key).

Refer to the "System Configuration" section for further details

When set, the **SMART D** key is displayed instead of the **REVERSE** key.

Refer to the "Calculations" section for further details on automatic measurements in Doppler

The **HPRF** key is displayed only in cardiac applications; the **TRACE** key is displayed in all other applications. This last key, together with the **TR MODE**, is used in automatic Doppler measurements.

Tips for Doppler Scanning with MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

Doppler Format Optimization

The **BASEL** software key moves the baseline up or down; the velocity scale can also be reversed to display receding flows above the baseline through the use of the **REVERSE** key.

If the application defaults to the correction-angle, use the **Θ ANGLE** control to align the angle vector with the flow direction. The **D-STEER** (or alternatively the **STEER** key on **MyLab25 Gold** and **MyLab30 Gold** models) key allows to orient the Doppler line.

When set, the **SMART D** key reverses the Doppler steering with reference to the vertical line.

See the "System Configuration" section for setting display formats

The **B-REF** software key is used to display the referenced 2D image. During the exam, the trace is frozen by pressing the **UPDATE** key, obtaining the 2D reference in Real Time with the B-mode format available software commands.

The **B FORMAT** key allows to change the real time display format.

The **PLEX** key updates or freezes the referenced 2D image, maintaining the trace in Real Time. When the **TV** key (if enabled) is pressed, the Tissue Velocity Doppler is activated.

The **SWEEP** command can be used to change the scanning speed.

---

[1] The TV mode is enabled only with PA230, PA240, PA122, TEE022, TEE122 and TEE132 probes in cardiac applications.

Doppler Optimization

The gain must first be optimized using the relative knob until a clear envelope of the spectral analysis is obtained; the wall filters must be set in order to eliminate wrong low-speed signals caused by moving structures. Interaction with other commands or the acoustic parameters further improves the spectrum quality.

The **ADJUST** key automatically optimizes the Doppler by adjusting general gain, baseline and velocity range.

Gain and Wall Filters

This knob affects the Doppler video and audio components. Usually, the CW Doppler requires larger filters (changed using the **FILTER** key) than the PW; the system stores this data independently.

> ***Note***
>
> The Doppler volume can be changed independently by using the **AUDIO** key.

Display Commands

The **VELOCITY** key increases or decreases the velocity scale (i.e. the Y axis). The **REJECT** key improves the spectral curve display: The user is recommended to use high values for intense Doppler flows and low values for weak flows.

The **GRAY MAP** key allows the post-processing map to be changed. The gray map can be replaced using one of the six chromatic scales (**COLORIZE**) to improve contrast.

The **DYN RANGE** key affects the compression of the reflected echoes, increasing or decreasing spectrum filling.

In PW Doppler, the **SV SIZE** key allows the sizes of the sample volume to be changed.

Acoustic Parameters

The **FREQUENCY** (**FREQ** key on **MyLab25 Gold** and **MyLab30 Gold** models) key allows the **Doppler frequency** to be changed: lower frequency increases penetration and Doppler increases the maximum measurable speed.

SS

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change transmitted power; the user is recommended to use the minimum power relative to the diagnostic level of the image. If there is insufficient sensitivity, make sure the gain, the sizes of the sample volume (PW) and the probe frequency have been correctly set before increasing the power.

Special Controls in PW

The **HPRF** key activates the Doppler HPRF, allowing to measure higher velocities than the ones detectable in PW, by using two sample volumes.

Software Keys in Doppler on MyLab60, MyLab70 and MyLab90 Models

Three menu levels are available in real time Doppler: the **NEXT/PREVIOUS** key scrolls the menu. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

The number of available keys may change depending on the selected probe and application.

ADM	**COLORIZE**	**GRAY M >>**
ADM>>	**DYN RANGE**	**HPRF**
ANGLE	**FILTER**	**SV SIZE**
AUDIO	**FORMAT**	**SWEEP**
B-REF	**FFT RES**	**TV**

Tips for Doppler Scanning with MyLab60, Mylab70 and MyLab90 Models

Doppler Format Optimization

The **PRF-BASELINE** moves the baseline up or down; the velocity scale can also be reversed to display receding flows above the baseline through the use of the **REVERSE** key.

If the application defaults to the correction-angle, use the **ANGLE** control (or **STEER-ANGLE**) to align the angle vector with the flow direction. The **STEER-ANGLE** key allows to orient the Doppler line.

See the "System Configuration" section for setting display formats

The **B-REF** software key is used to display the referenced 2D image. During scanning, the **UPDATE** key freezes the trace and re-activates the 2D reference; the **PLEX** key activates or freezes the 2D reference, maintaining the trace in Real Time.

The **FORMAT** key allows to change the real time display format.

The **SWEEP** command can be used to change the scanning speed.

The **TV**[2] key (if enabled) activates Tissue Velocity Doppler.

Refer to the "Calculations" section for further details on automatic measurements in Doppler

The **ADM** key (if enabled) activates Automatic Doppler Measurements.

Doppler Optimization

The gain must first be optimized using the relative knob until a clear envelope of the spectral analysis is obtained; the wall filters must be set in order to eliminate

[2] The TV mode is enabled only with PA230, PA240, PA122, PA023, TEE022, TEE122 and TEE132 probes in cardiac applications.

strong low-speed signals caused by moving structures. Interaction with other commands or the acoustic parameters further improves the spectrum quality.

Gain and Wall Filters

The **DOPPLER** knob adjusts the gain:

- Rotate the knob clockwise/counterclokwise to increase/decrease the gain;
- Press the knob to automatically ad just the gain

The **ADJUST** key activates the menu managing both the automatic Doppler gain and the PBI (Pure Brilliant Imaging) functions. The available software keys are:

PBI *(multifunction)*	**REFR PBI**
B/M	**B/M OFF**
DOPPLER	**TCG-ABS/TGC-REL**
PBI *(button)*	

Refer to Chaper 1 for details on the other keys

The **DOPPLER** software key selects the automatic control to be activated in Doppler. The automatic adjustment can be applied to gain (**X-GAIN** value), scale (**X SCALE** value), or both (**X G+S**) or set as inactive.

Usually, the CW Doppler requires larger filters (changed using the **FILTER** key) than the PW; the system stores this data independently.

> ***Note***
>
> The Doppler volume can be changed independently by using the **AUDIO** key.

Display Commands

The **GRAY M>>** key changes the post-processing map. The gray map can be replaced with one of the six chromatic scales (**COLORIZE**) to improve contrast.

The **DYN RANGE** key affects the compression of the reflected echoes, increasing or decreasing spectrum filling.

In PW Doppler, the **SV SIZE** key allows the sizes of the sample volume to be changed.

The higher is the **FFT RES** value, the more accurate and precise is the trace reconstruction.

WARNING

The Doppler analysis of some pathologies could require low RES FFT values. Set the RES FFT on the highest value compatible with the diagnostic level of the image.

Acoustic Parameters

The **FREQ-TEI** key allows the **Doppler frequency** to be changed: lower frequency increases penetration and Doppler increases the maximum measurable speed.

SS

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change transmitted power; the user is recommended to use the minimum power relative to the diagnostic level of the image. If there is insufficient sensitivity, make sure the gain, the sizes of the sample volume (PW) and the probe frequency have been correctly set before increasing the power.

Special Controls in PW

The **HPRF** key activates the Doppler HPRF, allowing to increase the available maximum PRF value (by rotating the **PRF-BASELINE** key clockwise) to measure higher velocities by using more sample volumes.

When the HPRF control is activated, by increasing the PRF the user displays more samples volumes on the screen. These volumes have to be positioned so that the resulting Doppler trace is not corrupted.

Note

Position the samples volumes so that only one of them finds itself in correspondence of the flow under exam and the other ones on fixed structures so that the Doppler signal is not ambiguous.

Chapter 5

5 - Color Flow Mapping (CFM) and Power Doppler (PWR D)

This chapter lists the software keys available in CFM and explains how they are used to optimize the image.

Activation of Color Flow Mapping Format

- Press **CFM**.
- Position the CFM ROI cursor on the applicable area.

CFM ROI Cursor

- To change the area of the color box, activate the CFM ROI cursor by pressing the **ACTION** key. Change the size of the area using the trackball. Press **ACTION** again to confirm.
- Press **CFM** to disable the CFM and return to the full screen 2D.

Once the CFM is active, the line cursor can be displayed and the user can move to Doppler/M-Mode.

MyLab60, MyLab70 and MyLab90 models

On a frozen image, the CFM box can be removed by pressing **CFM** (or **PWR D**).

Software Keys in CFM on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

There are different menu levels in the real time Color Flow Mapping mode: the **NEXT/PREVIOUS** key scrolls the menu levels Upon activation, the following software keys (alphabetically sorted in the following list) are available:

Multiple format soft keys are described in Chapter 1: "B-Mode"

2D CFM	**FILTER**	**SENSIT**
BASEL	**FREQUENCY**	**SIZE**
CLIP DUR	**PERSIST**	**SMOOTH**
COL MAP	**PLANE**	***SV SIZE***
CONCURR or **BIOPSY**	**PRF**	**TPVIEW**
DENSITY	**PWR D** or **TVM**	***Θ ANGLE***
D-STEER	**REVERSE**	

The keys **Θ ANGLE** and **D-STEER** are displayed when the Doppler/M-Mode cursor is active if the application provides the angle-correction factor, and when the probe allows the cursor orientation.

WARNING

When the steering is set to the maximum step, color dots could be displayed because of artefacts. Should this happen, reduce the steering by one step.

The Power Doppler key (**PWR D**) can be replaced by the **TVM**[1] key, to activate the Tissue Velocity Imaging mode (see "System Configuration" section).

The **SIZE** key is displayed only with PA and CA. probes, the **TP VIEW** key only with Linear probes. The **BIOPSY** key is displayed if the active probe can be equipped with a needle guide kit.

When the transrectal probe is active, the **PLANE** key selects the transducer (linear or convex) to be used.

The **CLIP DUR** key changes the clip duration in real-time.

Tips for Color Flow Mapping Scanning with MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

Optimization of the Color Flow Mapping Format

The **BASEL** software key is used to move the zero line up or down; and to reverse the color/flow direction control with the **REVERSE** key. The **CONCURR** key overlaps the 2D and CFM sectors. The **D-STEER** key (or alternatively the **STEER KEY** on **MyLab25 Gold** and **MyLab30 Gold** models) allows to change the steering of the color box..

The **2D CFM** key activates multiple views with 2D Real Time image on the left side of the screen and 2D CFM Real Time image on the right side.

[1] TVM is enabled only with the PA230, PA240, PA122, TEE022, TEE122 and TEE132 probes in cardiac applications.

The width of the ROI CFM and the B-Mode angle must be as small as possible in order to maximize the CFM frame rate:

> ***Note***
>
> The B-Mode angle (**SIZE** key) can be reduced to maximize the frame rate and to enlarge the analysis area using the **ZOOM** key.

The **TPVIEW** key activates the trapezoidal view, enlarging the CFM ROI.

Display Optimization

First of all the operator must adjust the gain, to optimize the display of the analysis area. The commands and the acoustic parameters controls allow then to further refine the signal. .

Gain

We recommend to adjust the gain to obtain the most useful signal level.

> ***Note***
>
> B-Mode gain must be properly adjusted in order to obtain a good CFM signal; excessive gain, may "mask" the flow.

View Commands

The **COLOR MAP** key allows a different CFM map to be selected: six different color maps are available (V1÷V6), plus two Velocity/Variance maps (VV1, VV2). The **PWR D** key enables the Power Doppler: three different view maps are available (**COLOR MAP** key: I1, CP1, CP2 and CP3).

The **TVM** key enables the Tissue Velocity Mode; four maps (**COLOR MAP** key: TVM1, TVM2, TVM3 and TVM4) are available.

The **PRF** and **DENSITY** keys affect Color "filling".

Control	CFM filling
PRF ⇧	⇩
PRF ⇩	⇧
DENSITY ⇧	⇧
DENSITY ⇩	⇩

Maximum PRF is proportional to the B-Mode depth

Color sensitivity can be adjusted using the **SENS** control. Two levels are available (High and Low). Flow continuity increases with high persistence levels and reduce the system's frame rate; the **PERSIST** option optimizes this parameter. **FILTER** can be used to reduce the artifacts caused by acoustic decoupling or moving structures. The **SMOOTH** key makes the flow representation homogenous.

Acoustic Parameters

Only one focal point is active in transmission in CFM, despite the B-Mode settings and is automatically positioned at the center of the ROI CFM. The CFM frequency can be changed using the **FREQUENCY** key (**FREQ** key on MyLabFive, **MyLab25 Gold** and **MyLab30 Gold** models); the higher frequency helps to show low speeds.

SS

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change transmitted power; use the minimum power compatible with a diagnostic level of the images. If there is insufficient sensitivity, the user should ensure that the gain, focus and probe frequencies have been set correctly before increasing the power.

Software Keys in CFM and PWR D on MyLab60, MyLab70 and MyLab90 Models

There are different menu levels in the real time Color Flow Mapping mode: the **NEXT/PREVIOUS** key scrolls the menu levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available:

ANGLE	**HD CFM**
CLIP DUR	**PERSIST**
COL MAP>>	**SIZE/SIZE TP**
DENSITY	**SMOOTH**
D-STEER	**SV SIZE**
FILTER	**TVM**

The **CLIP DUR** key changes the clip duration in real time.

Tips for CFM and PWR D Scanning with MyLab60, MyLab70 and MyLab90 Models

Optimization of the Color Flow Mapping and Power Doppler Format

The **REVERSE** key allows to reverse the color/flow direction.

The width of the ROI and the B-Mode angle must be as small as possible in order to maximize the frame rate.

The **SIZE** key (on Convex and Phased Array probes) or the **SIZE-TP** key (on Linear Array probes) reduce the scanning angle.

Note

The B-Mode angle (**SIZE** key) can be reduced to maximize the frame rate and to enlarge the analysis area using the **DEPTH-ZOOM** key.

Display Optimization

First of all the operator must adjust the gain, to optimize the display of the analysis area. The commands and the acoustic parameters controls allow then to further refine the signal. .

Gain

The user is recommended to adjust the gain to obtain the most useful signal level.

> ***Note***
>
> B-Mode gain must be properly adjusted in order to obtain a good CFM signal; excessive gain, may "mask" the flow.

View Commands

The **HD-CFM** key adjusts the color spatial resolution.

The **COL MAP>>** key allows to select a different color scale.

By rotating the **COL MAP>>** key, the user selects the desired scale: the displayed value shows which scale is active.

Color map

When pressing the **COL MAP>>** key in real-time, the software keys change to allow scale adjustment:

COL MAP>>
REJECT
TRANSP
WR PRIOR

By rotating the **COL MAP>>** key, the user changes the curve. By pressing this key, the user exits the color map configuration mode.

The **REJECT** key modifies the rejection values. The **TRANSP** key enables or disables transparency between color and B/W images: 1 means complete transparency, 3 means complete superposition, and 2 means an intermediate effect. The **WR PRIOR** (write priority) key assigns priority to the color codification and B/W scale.

The **ANGLE** key, displayed when the Doppler/M-Mode cursor is active, changes the angle corrction factor. The **D-STEER** (or **STEER-ANGLE**) key allows to modify the slope of the color box. The **ORIENTATION** key inverts both the Doppler line and the CFM ROI Steering.

WARNING

When the steering is set to maximum step, color dots could be displayed because of artifacts. Should this happens, reduce the steering by one step.

The **TVM**[2] key enables Tissue Velocity Mode; a different set of maps (**COL MAP>>**) is available.

The **PRF-BASELINE** and **DENSITY** keys affect Color "filling".

Control	CFM filling
PRF ⇧	⇩
PRF ⇩	⇧
DENSITY ⇧	⇧
DENSITY ⇩	⇩

Maximum PRF is proportional to the B-Mode depth

The **PERSIST** option optimizes this parameter. **FILTER** can be used to reduce the artifacts caused by acoustic decoupling or moving structures. The **SMOOTH** key makes the flow representation homogenous.

During scanning, the **UPDATE** key freezes the trace and re-activates the 2D reference; the **PLEX** key activates or freezes the 2D reference, maintaining the trace in Real Time.

Acoustic Parameters

Only one focal point is active in transmission in CFM, despite the B-Mode settings and is automatically positioned at the center of the ROI CFM. The CFM frequency can be changed using the **FREQ-TEI** key; the higher frequency helps to show low speeds.

Refer to the "Safety and Standards" manual for further information.

The POWER control is used to change transmitted power; use the minimum power compatible with a diagnostic level of the images. If there is insufficient sensitivity, the user should ensure that the gain, focus and probe frequencies have been set correctly before increasing the power.

[2] The TVM mode is enabled only with the PA230, PA240, PA122, PA023, TEE022, TEE122 and TEE132 probes in cardiac applications.

Chapter 6

6 - Q-Mode

This chapter lists the software keys available in Q-Mode (Color M-Mode) and explains how they are used to optimize the image.

Activation of Q-Mode Format

- If necessary, in CFM press **LINE** to display the Doppler/M-Mode cursor.
- Position the cursor on the desired B-Mode line.

Line Cursor

- Press **M-MODE** to activate the Q-Mode analysis.
- Press **B-MODE** to return to the full screen 2D.

During the exams the **UPDATE** key freezes the trace and re-activates the 2D acquisition.

Only on MyLab60, MyLab70 and MyLab90 models

Note

In Q-Mode the color map always refers to B-Mode..

Software Keys in Q-Mode on MyLabFive, MyLab40, MyLab25, MyLab30 and MyLab50 Models

There are different menu levels in the Q-Mode format: the **NEXT/PREVIOUS** key scrolls the different menu levels. Upon activation, the following software keys (alphabetically sorted in the following list) are available

BASELINE	**FREQUENCY**
B FORMAT	**PLEX**
B-REF	**PRF**
COL MAP	**REVERSE**
FILTER	

Tips for Q-Mode Scanning with MyLabFive, MyLab40, MyLab25, MyLab30 and MyLab50 Models

Refer to the "System Configuration" section for display format settings

Format Optimization

The **B-REF** software key is used to display the reference 2D image. During the exam, by pressing the **UPDATE** key, the user freezes the trace and gets a real time 2D reference with software commands normally available in B-Mode.

The **B FORMAT** key allows to change the real time display format.

The **PLEX** key updates or freezes the reference 2D image, keeping the trace in real time.

The **BASELINE** software key is used to move the baseline upwards or downwards, while **REVERSE** reverses the conventional association between color and flow direction..

Q-Mode Optimization

The **COLOR MAP** key allows a different CFM map to be selected among six different Velocity options (V1÷V6), plus two Velocity/Variance maps (VV1, VV2).

The **PRF** and **DENSITY** keys affect color "filling". **FILTER** can be used to reduce artifacts caused by acoustic decoupling or moving structures.

The CFM frequency can be changed using the **FREQUENCY** key; a higher frequency helps to show low speeds.

Software Keys in Q-Mode on MyLab60, Mylab70 and MyLab90 Models

Refer to the paragraph "Software Keys in CFM and PWR Doppler" for further information.

There is only one menu level in Q-Mode :

B-REF
SWEEP
FILTER
PERSIST
FORMAT

Note

In Q-Mode the **BASELINE** is disabled.

Chapter 7

7 - Freeze

This chapter lists the software keys available in freeze and explains how to use the keys.

Image Freeze

Memory scrolling cursor

The **FREEZE** key freezes the image. The system displays the memory scrolling bar, where the images acquired immediately prior to putting the system into freeze mode are temporarily saved.

Software Keys in Freeze on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50

There are more menu levels in freeze: the **NEXT/PREVIOUS** key activates the different levels. Upon Freeze activation, the following software keys (alphabetically sorted in the following list) are available:

BASELINE	***GRAY MAP***
BEGIN/END	**PLAY**
CINE	***Θ ANGLE***
COL MAP	**SPEED**
COLORIZE	

The **BASELINE** key (in italics) is active in CFM and Q-Mode.

The second level shown in 2D/trace modes is different than the one of CFM/Q-Mode formats. 2D and in trace modes (M-Mode and Doppler) show keys **GRAY MAP** and **COLORIZE**; in CFM and Q-Mode formats the **COL MAP** key is displayed.

Θ ANGLE (in italics) is available only if the application includes an angle correction factor.

Use of the Software Keys with MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

The **BEGIN/END** key is used to automatically position the user at the start or end of the sequence.

When the **PLAY** mode is active, the sequence of stored images is reviewed kinetically. The sequence can be reviewed at different speeds (**SPEED** key).

The **MODE** key displays the memory content (when enabled via **FULL**) or individual cardiac cycles, when the ECG is available, or seconds intervals, when it is not available. The trackball can be used to scroll the bar and view another cycle/interval. If the option **EXTRACT** has been selected, the user can extract from the archived material a sequence of any desired length, by selecting the initial and the final frame. Follow the screen instructions to extract the desired sequence.

The single cardiac cycles and the intervals selected with the **CINE MODE** key, can be archived by pressing **CLIP**.

The **BASELINE** key allows the user to move up and down the baseline in the displayed velocity scale.

GRAY MAP and **COLORIZE** keys, for 2D, M-Mode and Doppler formats, and the **COLOR MAP** key, for CFM format, allow a different post-processing map for selection: **MyLab** offers the same range of maps as those available in Real-Time.

Software Keys in Freeze on MyLab60, MyLab70 and MyLab90 Models

Upon Freeze activation, the following software keys (alphabetically sorted in the following list) are available:

CLIP DUR
PLAY
VELOCITY

A subset of the modality software keys is displayed: refer to the specific chapter for further details.

In Freeze, the clip is reviewed in cine mode by pressing the **PLAY** key or when the AUTOMATIC PLAY menu option is set. Clip can be reviewed with different velocities (**VELOCITY** key) and its duration can be changed by the **CLIP DUR** key. In cine mode move horizontally the trackball to change the display interval.

Chapter 8

8 - Video Recorder

This chapter lists the video recorder remote control software keys and explains how to use these keys.

Software Keys

Video recorder icon

The **VTR** key activates the video recorder management menu. The system displays the software keys used in managing the video recorder as follows:

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

PLAY
PAUSE
STOP
EJECT
FORWARD/REWIND

MyLab60, Mylab70 and MyLab90 Models

The **NEXT/PREVIOUS** key scrolls the different menu levels where the following software keys are available (below alphabetically sorted):

AUDIO	**PAUSE**
BRIGHTN	**PLAY**
CONTRAST	**REW**
EJECT	**SATUR**
FF	**STOP**

How to Use the Software Keys

The **PLAY** key actives the recording review, **STOP** interrupts the recording review and **PAUSE** suspends the recording review. Press **FORWARD** (or **FF**) to move the tape forward and **REWIND** (or **REW**) to move the tape back.

The **EJECT** key ejects the cassette from the video recorder.

MyLab60, MyLab70 and MyLab90 models

The **BRIGHTN**, **CONTAST** and **SATUR** keys respectively adjust the recorded image brightness, contrast and saturation. Rotate the knob clockwise/counterclokwise to increase/reduce the value.

The **AUDIO** key allows to change the Doppler volume.

Press any one of the mode keys or the **FREEZE** key to return to the real time menu

Chapter 9

9 - Body Marks

This chapter explains how body marks are organized and how to use them.

Body Marks

Body marks are schematic drawings of anatomical sections A vector overlays the mark to indicate the probe's position. The active body mark is displayed at the bottom left of the screen; on the right of the image the system displays the menu allowing body mark selection.

Body marks are organized in groups: each application has its specific set of body marks.

Body Marks Activation on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

By pressing the **MARK** key the system displays on the right of the image the list of the marks available with the application while the default mark is shown at the bottom left of the screen. Body marks can be activated both in real time, in Exam review and in Archive review.

Software Keys

The software keys menu is the following:

MARK
ARROW
CLEAR

The **MARK** key allows the user to scroll the body marks list displayed on the right side; the active mark keeps being displayed while the list is scrolled.

Selection Icon

To choose a different group of marks, select the selection icon using the **MARK** key and press **ENTER**. At the right of the image the system displays the list of available groups: with the **MARK** key scroll the list and press **ENTER** to confirm the selection.

The trackball moves the arrow on the mark, the **ARROW** key rotates it.

Once the icon has been selected and the arrow positioned, press the **MARK** key or **FREEZE** to activate the session.


Exit Icon

Select the Exit Icon or press **CLEAR** to exit without displaying any body mark

Body Marks Activation on MyLab60, MyLab70 and MyLab90 Models

By pressing the **MARK** key the system displays on the right of the image the list of the marks available with the application while the default mark is shown at the bottom left of the screen. Body marks can be activated both in real time, in Exam review and in Archive review.

Rotating the **MARK** key the user can scroll the body marks list displayed on the right side; the active mark keeps being displayed while the list is scrolled.

Pressing the **MARK** key the user confirm the selection and the arrow became active; the trackball moves the arrow on the mark and rotating the **MARK** key the user can rotate it.

Once the icon has been selected and the arrow positioned, press **FREEZE** to activate the session.


Selection Icon

To choose a different group of marks, select the selection icon using the **MARK** key and pressing it. At the right of the image the system displays the list of available groups: with the **MARK** key scroll the list and press **MARK** to confirm the selection.

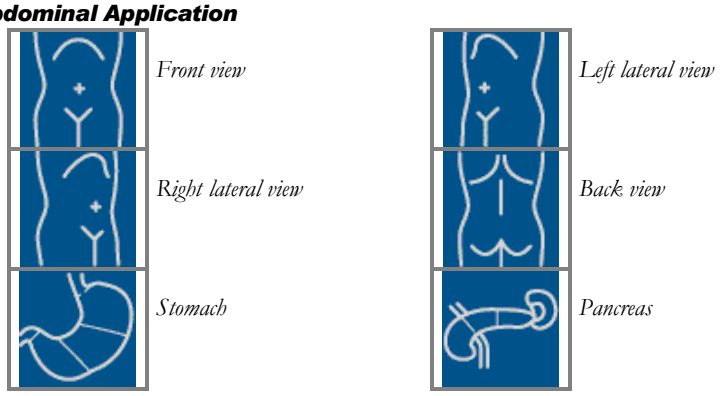

Exit Icon

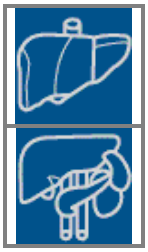
Select the Exit Icon to exit without displaying any body mark

Application Body Marks


Abdominal Application Mark

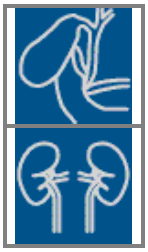
Abdominal Application





Liver

Generic

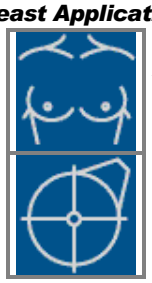


Bladder

Kidney

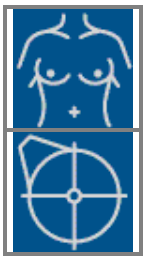
Breast Application Mark

Breast Application



Man

Left breast

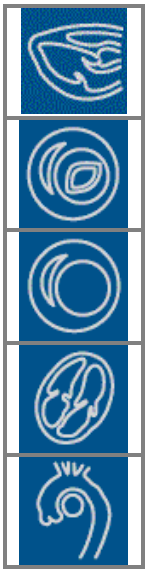


Woman

Right breast

Cardiac Application Mark

Cardiac and Pediatric Cardiac Applications



Parasternal long axis

Parasternal short axis - Mitral

Parasternal short axis

Apical four chambers

Aorta

Parasternal short axis- Aorta

Parasternal short axis - Papillary

Apical five chambers

Apical two chambers

Generic

Gynaecology Application Mark

Gynaecology Application

Lower abdomen

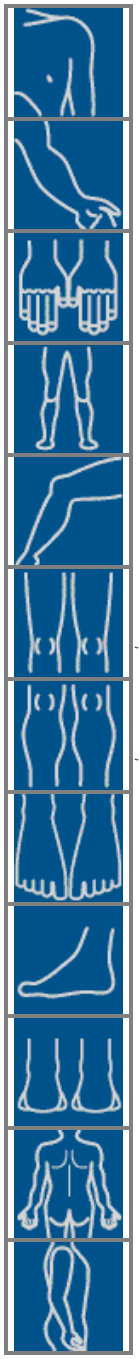
Uterus – transversal section

Uterus – axial section

Uterus – longitudinal section

Musculoskeletal Application Mark

Musculoskeletal Application



Left shoulder

Left arm

Hands – back

Inferior limbs –front view

Inferior limbs – left lateral view

Inferior limbs – upper section – front view

Inferior limbs – lower section – front view

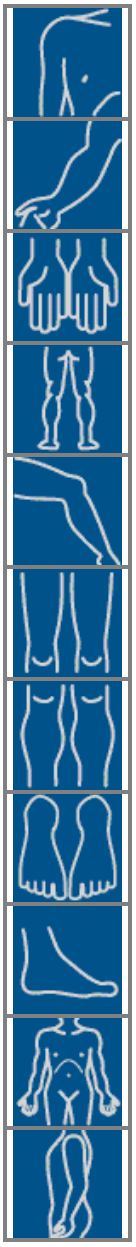
Feet

Foot – left lateral view

Heels

Trunk –back view

Trunk –left lateral view



Right shoulder

Right arm

Hand - breadth

Inferior limbs – back view

Inferior limbs – right lateral view

Inferior limbs – upper section – back view

Inferior limbs – lower section – back view

Feet - sole

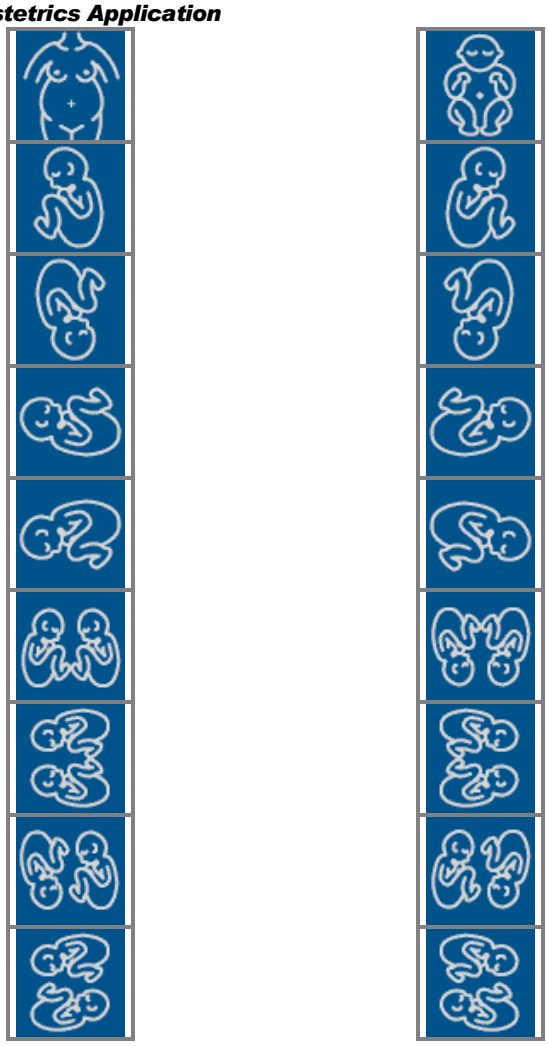
Foot – right lateral view

Trunk –front view

Trunk –left lateral view

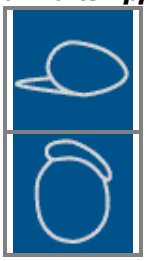
Obstetrics Application Mark

Obstetrics Application



Small Part Application Mark

Small Parts Application



Testicle– lateral section

Testicle – right epididymis

Testicle – left epididymis

Thyroid Application Mark

Thyroid Application

Neck – front view

Neck – right lateral view

Neck –left lateral view

Thyroid

Urology Application Mark

Urology Application

Prostate – axial section

Prostate– lateral section

Testicle – lateral section

Testicle – right epididymis

Prostate – transverse section

Penis

Testicle – left epididymis

Vascular Application Mark

Vascular Application

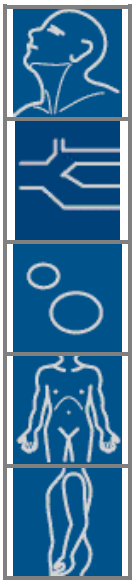
Neck

Neck –right lateral view

Right carotid – longitudinal section

Right carotid – transverse section

Trunk –back view



Neck –left lateral view

Left carotid – longitudinal section

Left carotid – transverse section

Trunk –front view

Trunk –left lateral view

Trunk –right lateral view

Right arm

Hands- breadth

Inferior limbs – back view

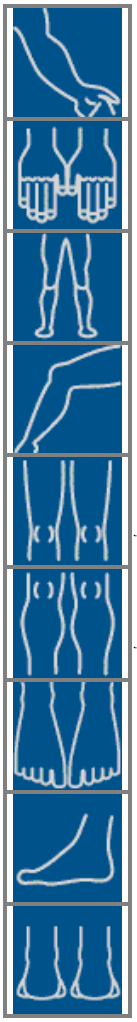
Inferior limbs – right lateral view

Inferior limbs – upper section – back view

Inferior limbs – lower section – back view

Feet – sole

Foot - right lateral view



Left arm

Hands – back

Inferior limbs – front view

Inferior limbs – left lateral view

Inferior limbs – upper section – front view

Inferior limbs– lower section – front view

Feet – back

Foot – left lateral view

Heels

Chapter 10

10 - Annotations

Refer to the "System Configuration" section for glossary configuration

This chapter explains how to use the free text annotation function and how to activate and use the glossary available in the annotation session.

Free Text on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

If any of the alphanumeric keys is pressed during the exam, this automatically activates the input of text. The trackball is used to position the text and the **ENTER** key confirms. The **CLEAR** key cancels the text without exiting while the **CLEAR ALL** key cancels the text and resumes real time.

CLEAR ALL
CLEAR

Annotation Activation on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

The **ANNOT** key allows the user to work with a configurable glossary: The key can be pressed both in real time and Exam review and Archive review. The following software keys are displayed:

WRD/SENT	***4° TERM***
DEL LAST	**ARROW**
1° TERM	**CLEAR ALL**
2° TERM	**CLEAR**
3° TERM	

The ***TERM*** keys are displayed when the glossary by sentence is active. Annotations are saved both on single frames and on clips. The key **WRD/SENT** alternatively activates the by word and by sentence glossary associated to the application.

Refer to the "System Configuration" section for further information

The trackball positions both the text and the annotation cursor., the **ENTER** key confirms text entry. To switch between text entry and cursor control press **ACTION**. If the "First cursor action: move" field in the Glossary option is checked, the trackball moves the cursor.

Glossary by Word

On the right of the image the system displays the list of the available words. To select a word follow this procedure.

Procedure

- Scroll the list through the trackball and select the desired word (highlighted in yellow).
- Press **ENTER** to confirm. The selected word will be displayed on the screen.
- The word can be modified: press the **ACTION** key to activate the text entry.
- Place the word using the trackball.
- Press **ENTER** again to confirm.

The procedure can be repeated several times. As explained for the free text, the **CLEAR** key cancels the text without exiting while the **CLEAR ALL** key cancels and exits from the annotation session.

The **UNDO** key cancels the last operation..

The annotation session is closed by pressing the **ANNOT** key. The text is automatically erased as soon as real time is resumed.

Glossary by Sentence

Refer to the "System Configuration" section for glossary configuration

On the screen the system displays the sentence which the system automatically composes using the first word of the lists associated to the glossary of the active application. The list of the available words for the first term of the sentence is displayed on the right of the image. The four terms composing the sentence are displayed on the software keys, one key for each term: scroll the keys to select the desired words.

Procedure

- Scroll the lists using the ***TERM*** keys and select the desired words (highlighted in yellow). The sentence is automatically updated as the lists are scrolled.
- Place the sentence on the screen using the trackball.
- The sentence can be modified: press the **ACTION** key to activate text entry.
- Press **ENTER** to confirm.

The **UNDO** and **ANNOT** keys close the annotation session. If the "Delete when unfrozen" field in the "Glossary" option (**MENU** key) is checked, the text is automatically erased as soon as real time is resumed.

Refer to the "System Configuration" section for further information

If the "Enable shortcut through function keys" field in the Glossary option is checked, the F7-F10 keys (alphanumeric keyboard) directly activate the by Sentence annotation function. F7 changes the first word of the sentence, the F8 the second one and so on.

The procedure can be repeated several times. As explained for the free text, the **CLEAR** key cancels the text without exiting while the **CLEAR ALL** key cancels and exits from the annotation session. The **DEL LAST** key deletes last entered word or sentence.

The **ARROW** key displays an arrow on the screen. Position it using the trackball and rotate it with the same key. Press **ENTER** to confirm.

Annotations on MyLab60, MyLab70 and MyLab90 Models

If any of the alphanumeric keys is pressed during the exam, this automatically activates the input of text. The trackball is used to position the text and the **ENTER** key confirms.

Refer to the "System Configuration" section for further information

The trackball positions both the text and the annotation cursor., the **ENTER** key confirms text entry. To switch between text entry and cursor control press **ACTION**. If the "First cursor action: move" field in the Glossary option is checked, the trackball moves the cursor.

While writing, the glossary automatically suggests some words.

The **ANNOT** key allows the user to work with a configurable glossary: The key can be pressed both in real time and Exam review and Archive review.

Glossary by Word

On the right of the image the system displays the list of the available words. To select a word follow this procedure.

Procedure

- Scroll the list through the trackball and select the desired word (highlighted in yellow).

- Press **ENTER** to confirm. The selected word will be displayed on the screen
- The word can be modified: press the **ACTION** key to activate text entry.
- Place the word using the trackball.
- Press **ENTER** again to confirm.

The procedure can be repeated several times.

The word is shown on the bottom left side of the screen. To position the word in another area of the screen, activate it by pressing **ACTION**, move it on the desired area and press **Ctrl** + **Home** . The following word will be shown in the selected area.

The annotation session is closed by pressing the **ANNOT** key. If the option "Delete when unfrozen" in the Glossary Menu is selected, the text is automatically erased as soon as real time is resumed.

CLEAR cancels the selected text without exiting, **DEL LAST** deletes last entered word or sentence. While **CLEAR ALL** cancels and exits the annotation session. Press **WRD/SENT** to switch between the By word and By sentence modality.

The **ARROW** key displays an arrow on the screen. Position it using the trackball and rotate it with the same key. Press **ENTER** to confirm.

Glossary by Sentence

Refer to the "System Configuration" section for glossary configuration

On the screen the system displays the sentence which the system automatically composes using the first word of the lists associated to the glossary of the active application. The list of the available words for the first term of the sentence is displayed on the right of the image. The four terms composing the sentence are displayed on the software keys, one key for each term: scroll the keys to select the sentence words

1° TERM	**CLEAR ALL**
2° TERM	**CLEAR**
3° TERM	**WRD/SENT**
4° TERM	**DEL LAST**
ARROW	

Procedure

- Scroll the lists using the ***TERM*** keys and select the desired words (highlighted in yellow). The sentence is automatically updated as the lists are scrolled.
- Place the sentence on the screen using the trackball.
- The sentence can be modified: press the **ACTION** key to activate text entry.
- Press **ENTER** to confirm.

The procedure can be repeated several times.

Refer to the "System Configuration" section for further information

If the "Enable shortcut through function keys" field in the Glossary option is checked, the F7-F10 keys (alphanumeric keyboard) directly activate the by Sentence annotation function. F7 changes the first word of the sentence, the F8 the second one and so on.

CLEAR cancels the selected text without exiting, **DEL LAST** deletes last entered word or sentence. While **CLEAR ALL** cancels and exits the annotation session. Press **WRD/SENT** to switch between the Byby word and By sentence modality.

Deletion

Cancelling the Text

Pressing **POINTER** the following Software Key menu is displayed:

CLEAR SEL
CLEAR TXT
CLEAR MSR

Using the trackball select a word by placing the cursor on it and by pressing **ENTER**. Once highlighted the word delete it by pressing **CLEAR SEL**.

CLEAR TXT deletes all the text on the screen and **CLEAR MSR** deletes all the measurements.

CALCULATIONS SECTION

Refer to the "Getting Started" manual for the applications available in each **MyLab** *model.*

This section explains how to use the calculations packages offered by **MyLab**. The section is organized as follows:

- Chapter 1: General Information and Generic Measurements

  This chapter provides general information about the proper manner in which to take a measurement and lists the generic measurements available in each application.

- Chapter 2: Doppler Automatic Measurements

  This chapter explains how to activate automatic Doppler tracings and which automatic measures are calculated.

- Chapter 3: Advanced Calculations

  This chapter explains how to access and use the **MyLab** advanced calculations packages.

- Chapter 4: Accuracy

  This chapter provides the accuracy of measurements taken with **MyLab**.

- Chapter 5: Cardiac Calculations

  This chapter lists all the measurements, formulas and accuracies available in the Cardiac and Pediatric-cardiac calculations packages.

- Chapter 6: Vascular Calculations

  This chapter lists measurements, formulas and accuracies in the Vascular calculation packages.

- Chapter 7: QIMT Calculation

  This chapter explains how to use the automatic QIMT calculation.

- Chapter 8: QAS Calculation

  This chapter explains how to use the automatic QAS calculation.

- Chapter 9: Adult Cephalic Calculations

This chapter lists measurements available in the Adult Cephalic applications.

- Chapter 10: General Imaging and Pediatric Calculations

  This chapter lists measurements available with General Imaging and Pediatric licences.

- Chapter 11: Urology Calculations

  This chapter lists measurements and formulas available in the urologic package.

- Chapter 12: Obstetrics Calculations

  This chapter lists measurements and formulas available in the obstetrical package.

- Chapter 13: Gynaecology Calculations

  This chapter lists measurements and formulas available in the gynaecological package.

- Chapter 14: The **MyLab** report

  This chapter explains how the report is organized and the best use of the report.

- Chapter 15: The Obstetrical Report

  This chapter explains how the obstetrical report is organized and the best use of the report.

- Appendix A : Obstetrical Tables

  This chapter lists the tables used in the obstetrical application.

- Appendix B : Bibliographic References for Fetal Weight Index

  This chapter lists the bibliographic references for the Fetal Weight Index.

- Appendix C : Bibliographic References for QIMT and Framingham Score

  This chapter lists the bibliographic references for the QIMT calculation and the Framingham score.

- Appendix D : Bibliographic References for QAS

  This chapter lists the bibliographic references for the QAS calculation.

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Chapter 1

1 - General Information and Generic Measurements

Refer to "Getting Started" manual for applications available on ***MyLab*** *model.*

This chapter provides general information about the correct way to take a measurement. This chapter also lists the generic measurements available in the various applications and how to use them. Generic measurements enable the user to quickly take measurements such as distance, area, time and velocity.

General Information

Measurements can be taken on frozen, stored and archived images. The available measurements are displayed at the right of the image. Messages displayed on the screen, guide the operator through the phases, and assist in taking the measurement. The results are displayed at the left of the image.

Clips are compressed for digital storage. Compressed files involve a minimal loss of information (see specifications). Image features, if compared to the original, may not be optimal for the reporting functions.

WARNING

This symbol is displayed on the screen when the image features, compared to the original one, may not be optimal for the reporting functions.

To select the views and the positioning of the cursors, Esaote urges the operator to act according to current medical practice and to the instructions of specialists in this subject.

Note

Always enlarge the format to maximize the structure/signal to be measured.

If possible, use the full screen formats for M-Mode and Doppler measurements.

The system cannot be used to measure images with ambiguous calibrations. An error message is shown on such images when the measurement is made.

Diagnosis Based on Measurements

MyLab calculation packages have to be used by qualified personnel as a diagnostical tool. The diagnosis has not to be based on the measurements only, but these are to be integrated with other clinical data.

All formulas of **MyLab** advanced calculation packages refer to a number of clinical bibliographic references that are listed for each application in the corresponding chapters of this section. Users are kindly encouraged to consult the original references to draw their conclusions on clinical consistency of the measurements.

> ***Note***
>
> The user is responsible for customized measurements and calculations.

Activating Generic Measurements

When in freeze mode, the **+...+** key activates the generic measurements menu. The system displays the list of available measurements at the right of the screen, which are automatically identified according to the active mode and application.

Software Keys

Depending on **MyLab** model, the displayed generic measurements menu are:

On MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

ADD TO RP	**SWAP AXIS**
EXPAND	**ROTATE**
MEASURE	**PAN**
CLEAR	**BACK TR**
CLEAR ALL	

On MyLab60, Mylab70 and MyLab90 models

ADD TO RP	**MEASURE**
BACK TR	**PAN**
CLEAR	**ROTATE**
CLEAR ALL	**SWAP CALIPER**
EXPAND	**SWAP AXIS**

> ***Note***
>
> The **EXPAND** key is not used in generic measurements. Its function is described in the next chapter.

How to Take Measurements

The **MEASURE** software key is used to quickly select the measurement required (the trackball can also be used). The measurement displayed in yellow is then operative.

Following the instructions on the screen, position the cursors with the trackball and confirm the position by pressing **ENTER**. The **UNDO** key can be used to re-start a measurement before it has been confirmed. The **Back Space** key erases the dotted line, point by point. When measuring profiles, the trackball or **BACKTR** deletes a point at a time if moved in the opposite direction.

When available the **SWAP CALIPERS** (only on **MyLab60**, **MyLab70** and **MyLab90** models) and **SWAP AXIS OPTIONS** allow to respectively swap the caliper or the axis linked to the trackball. **PAN** allows the user to move the traced area within the sector.

The value being measured is displayed in real time at the left of the image.

Selective Clearing of a Measurement

- Activate the trackball as a pointer by pressing the **POINTER** key.
- Position the pointer on the measurement to be cleared (the measurement is displayed in yellow).
- Press the **CLEAR** key to clear the measurement.
- Press **POINTER** again to return to the measurements menu.

The **CLEAR ALL** key cancels all the measurement cursors and the values displayed in the measurements field from the screen.

The **ADD TO RP** key adds the generic measure to the exam report: after this key is pressed, the system asks to rename the measure. The renamed measure will then be available both in the report and in its preview.

MyLab60, MyLab70 and MyLab90 Models

By pressing the **POINTER** key the following Software Key menu is displayed:

CLEAR SEL
CLEAR TXT
CLEAR MSR

Using the trackball select a measure and delete it by pressing **CLEAR SEL**. **CLEAR TXT** deletes all the text on the screen and **CLEAR MSR** deletes all the measurements.

Flow Measurements

A flow measurement is structured into two stages.

Performing a Measurement

- Acquire a Doppler trace and press **FREEZE**.
- Press **+…+** to activate the calculations menu.
- Select the desired flow measure and press **ENTER**.
- Follow the instructions displayed on the screen to trace the velocity profile.
- Press **B-MODE** and acquire a B-Mode image.
- Press **FREEZE** and then **+…+** to activate the calculation menu again.
- Follow the instructions displayed on the screen to end measurements.

Generic Measurements in Cardiology

The tables below list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measurement	Displayed results
Distance	Distance	Distance	Distance
Tr-Area	Area (Profile)	Profile	Area, Perimeter
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2

M-Mode

Parameter	Calculation	Measurement	Displayed results
Distance	Distance	Distance	Distance
HR	Heart rate	Time	R-R interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity

Doppler

Parameter	Calculation	Measurement	Displayed results
Time	Time	Time	Time
Velocity	Velocity	Velocity	Instantaneous velocity, Instantaneous gradient
HR	Heart rate	Time	R-R interval, Heart rate
C-FVI	FVI	Spectral envelope	FVI, Mean and peak velocity, Mean and peak gradient
Slope	Slope	Slope	Acceleration, PHT

Generic Vascular Measurements

The vascular application requires a specific license. The license activates Vascular and Adult Cephalic applications. The tables below list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
% Diam	Diameter reduction	Two distances	Two distances, Δ Distance/Distance1
Vx-Length	Length (approximately straight)	More distances	Global distance
Tr-Length	Length (Profile)	Distance	Distance
A-Area	Area (Ellipse)	Distance, Area	Area, Perimeter
Vx--Area	Area (approximately straighta)	More distances	Area, Perimeter
Tr-Area	Area (Profile)	Profile	Area, Perimeter
A-Ratio	Areas ratio	Two	Two areas, Area1/Area2
% Area	Reduction area	Due areas (on Profile)	Two areas, Δ Aree/Area1
El-Volume	Volume (Ellipse)	Distance, Area	Area, Volume
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
Bi-Volume	Volume(Axes)	Three distances	Three distances, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2

M-Mode

Parameter	Calculation	Measurement	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
HR	Heart rate	Distance	R-R Interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2

Doppler

Parameter	Calculation	Measurement	Displayed results
Time	Time	Time	Time
% Time	Time ratio	Two tempi	Two times, Time1/Time2
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2
HR	Heart rate	Time	R-R interval, Heart rate
SVel/DVel	Systolic and Diastolic Velocities ratio	Two velocities	Systolic velocity, Diastolic velocity, Systolic velocity/Diastolic velocity
FVI	Vascular FVI	Spectral envelope	FVI, Minimum, mean and maximum velocity
PI	Pulsatility index	Spectral envelope	FVI, Minimum, mean and maximum velocity, Pulsatility and resistive index
RI	Resistive index	Two velocities	Two velocities, Resistive index
Tr-Flow	Flow (Profile)	Velocity, Profile	Mean velocity, Area, Volume
El-Flow	Flow (Ellipse)	Velocity, Profile	Mean velocity, Area, Volume
D-Flow	Flow (Diameter)	Velocity, Distance	Mean velocity, Area, Volume
Slope	Slope	Distance	Acceleration, PHT

Generic General Imaging and Pediatric Measurements

The General Imaging and Pediatric licenses enable measurements of the abdominal, breast, thyroid, small parts, musculo-skeletal and pediatric applications.

The tables list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
% Diam	Diameter reduction	Two distances	Two distances, Δ Distance/Distance1
Vx-Length	Length (approximately straight)	More distances	Global distance
Tr-Length	Length (Profile)	Distance	Distance
A-Area	Area (Ellipse)	Distance, Area	Area, Perimeter
Vx--Area	Area (approximately straighta)	More distances	Area, Perimeter
Tr-Area	Area (Profile)	Profile	Area, Perimeter
A-Ratio	Areas ratio	Two	Two areas, Area1/Area2
% Area	Reduction area	Due areas (on Profile)	Two areas, Δ Aree/Area1
El-Volume	Volume (Ellipse)	Distance, Area	Area, Volume
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
Bi-Volume	Volume(Axes)	Three distances	Three distances, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2
Hip Angle (only in Pediatric)	Angles	Three distances	Two angles

M-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
HR	Heart rate	Distance	R-R Interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2

Doppler

Parameter	Calculation	Measure	Displayed results
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2
HR	Heart rate	Time	R-R interval, Heart rate
SVel/DVel	Velocity ratio	Two velocities	Systolic velocity, Diastolic velocity, Systolic velocity/Diastolic velocity
FVI	Vascular FVI	Spectral envelope	FVI, Minimum, mean and maximum velocity
PI	Pulsatility index	Spectral envelope	FVI, Minimum, mean and maximum velocity, Pulsatility and resistive index
RI	Resistive index	Two velocities	Two velocities, Resistive index
Tr-Flow	Flow (Profile)	Velocity, Profile	Mean velocity, Area, Volume
El-Flow	Flow (Ellipse)	Velocity, Profile	Mean velocity, Area, Volume
D-Flow	Flow (Diameter)	Velocity, Distance	Mean velocity, Area, Volume
Slope	Slope	Distance	Acceleration, PHT

Generic Urology Measurements

The Urology application requires a specific license. The tables list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
% Diam	Diameter reduction	Two distances	Two distances, Δ Distance/Distance1
Vx-Length	Length (approximately straight)	More distances	Global distance
Tr-Length	Length (Profile)	Distance	Distance
A-Ellipse	Area (Ellipse)	Distance, Area	Area, Perimeter
Vx--Area	Area (approximately straighta)	More distances	Area, Perimeter
Tr-Area	Area (Profile)	Profile	Area, Perimeter
A-Ratio	Areas ratio	Two	Two areas, Area1/Area2
% Area	Reduction area	Due areas (on Profile)	Two areas, Δ Aree/Area1
El-Volume	Volume (Ellipse)	Distance, Area	Area, Volume
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
Bi-Volume	Volume(Axes)	Three distances	Three distances, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2

M-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
HR	Heart rate	Distance	R-R Interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2

Doppler

Parameter	Calculation	Measure	Displayed results
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2
HR	Heart rate	Time	R-R interval, Heart rate
FVI	Vascular FVI	Spectral envelope	FVI, Minimum, mean and maximum velocity
PI	Pulsatility index	Spectral envelope	FVI, Minimum, mean and maximum velocity, Pulsatility and resistive index
RI	Resistive index	Two velocities	Two velocities, Resistive index
Tr-Flow	Flow (Profile)	Velocity, Profile	Mean velocity, Area, Volume
El-Flow	Flow (Ellipse)	Velocity, Profile	Mean velocity, Area, Volume
D-Flow	Flow (Diameter)	Velocity, Distance	Mean velocity, Area, Volume

Generic OB-Fetal Measurements

The OB-Fetal application, together with the Gynaecology application, requires the OB-Gyn license. The tables list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Vx-Length	Length (approximately straight)	More distances	Global distance
Tr-Length	Length (Profile)	Distance	Distance
A-Ellipse	Area (Ellipse)	Distance, Area	Area, Perimeter
Vx--Area	Area (approximately straighta)	More distances	Area, Perimeter
Tr-Area	Area (Profile)	Profile	Area, Perimeter
A-Ratio	Areas ratio	Two	Two areas, Area1/Area2
El-Volume	Volume (Ellipse)	Distance, Area	Area, Volume
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
Bi-Volume	Volume(Axes)	Three distances	Three distances, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2

M-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
HR	Heart rate	Distance	R-R Interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2

Doppler

Parameter	Calculation	Measure	Displayed results
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
Velocity	Velocity	Velocity	Distance, Time, Velocity
C-Velocity	Velocity	Velocity	Velocity, Instantaneous Gradient
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2
HR	Heart rate	Time	R-R interval, Heart rate
C-FVI	FVI	Spectral envelope	FVI, Mean and peak velocity, Mean and peak gradient
FVI	Vascular VI	Spectral envelope	FVI, Minimum, mean and maximum velocity
PI	Pulsatility index	Spectral envelope	FVI, Minimum, mean and maximum velocity, Pulsatility and resistive index
RI	Resistive index	Two velocities	Two velocities, Resistive index
Tr-Flow	Flow (Profile)	Velocity, Profile	Mean velocity, Area, Volume
El-Flow	Flow (Ellipse)	Velocity, Profile	Mean velocity, Area, Volume
D-Flow	Flow (Diameter)	Velocity, Distance	Mean velocity, Area, Volume

Generic Gynaecologic Measurements

The Gynaecology application, together with the Obstetrics application, requires the OB-Gyn license. The tables list the measurements available in each mode.

B-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
% Diam	Diameter reduction	Two distances	Two distances, Δ Distance/Distance1
Vx-Length	Length (approximately straight)	More distances	Global distance
Tr-Length	Length (Profile)	Distance	Distance
A-Ellipse	Area (Ellipse)	Distance, Area	Area, Perimeter
Vx--Area	Area (approximately straighta)	More distances	Area, Perimeter
Tr-Area	Area (Profile)	Profile	Area, Perimeter
A-Ratio	Areas ratio	Two	Two areas, Area1/Area2
% Area	Reduction area	Due areas (on Profile)	Two areas, Δ Aree/Area1
El-Volume	Volume (Ellipse)	Distance, Area	Area, Volume
Tr-Volume	Volume (Profile)	Profile, Distance	Area, Distance, Volume
Bi-Volume	Volume(Axes)	Three distances	Three distances, Volume
E_Ratio	Area ratio	Two areas (ellipse based)	Two areas, Area1/Area2

M-Mode

Parameter	Calculation	Measure	Displayed results
Distance	Distance	Distance	Distance
D-Ratio	Distance ratio	Two distances	Two distances, Distance1/Distance2
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
HR	Heart rate	Distance	R-R Interval, Heart rate
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2

Doppler

Parameter	Calculation	Measure	Displayed results
Time	Time	Time	Time
% Time	Time ratio	Two Times	Two times, Time1/Time2
Velocity	Velocity	Velocity	Distance, Time, Velocity
% Veloc	Velocity ratio	Two velocities	Two velocities, Velocity1/Velocity2
HR	Heart rate	Time	R-R interval, Heart rate
FVI	Vascular FVI	Spectral envelope	FVI, Minimum, mean and maximum velocity
PI	Pulsatility index	Spectral envelope	FVI, Minimum, mean and maximum velocity, Pulsatility and resistive index
RI	Resistive index	Two velocities	Two velocities, Resistive index
Tr-Flow	Flow (Profile)	Velocity, Profile	Mean velocity, Area, Volume
El-Flow	Flow (Ellipse)	Velocity, Profile	Mean velocity, Area, Volume
D-Flow	Flow (Diameter)	Velocity, Distance	Mean velocity, Area, Volume

Chapter 2

2 - Automatic Doppler Measurements

This chapter explains how to activate automatic Doppler tracings and which automatic measures are calculated.

Activation of Automatic Doppler Tracings

Automatic Doppler tracings automatically detect the Doppler spectrum profile every heart cycle. The heart cycle is automatically detected by the system.

> **Note**
>
> Automatic Doppler tracings are available only in non-cardiac applications.

The profile of the detected Doppler spectrum can be based both on the trace peak values and on the trace mean values. Automatic measurements are made on the detected profile and displayed on the screen; measurements are updated every heart cycle.

> **Note**
>
> Automatic Doppler measurements represent just an immediate method to get a general idea of the importance of the pathology under examination.: For a precise pathology evaluation we recommend to use the application calculation package.

Activation

Automatic Doppler tracings can be activated in real-time both in PW and CW Doppler. Press the **ADM** key to activate the automatic Doppler detection (**ADM>> SETUP** menu on **MyLab60**, **MyLab70** and **MyLab90** models); the system will show keys **TRACE** and **TR MODE**, which are used for automatic Doppler measurements.

On MyLabFive, MyLab20Plus, MyLab25, MyLab30, MyLab40 and MyLab50 models

ADM	**TRACE**
B-REF	**TR MODE**
FREQUENCY	**REVERSE**
B FORMAT	**PLEX**
DIN RANGE	

On MyLab60, MyLab70 and MyLab90 models

ADM>> SETUP
TRACE
TR MODE
AVERAGE
ADM

For additional information, please refer to the "Software Keys" section.

Automatic Doppler Measurements

Once activated, the Doppler profile is displayed in yellow, overlaid on the spectrum itself. The **MODE TR** key allows to set whether to detect the profile on peak (**PEAK**) or on mean frequency values (**MEAN**); the **TRACE** key selects whether to detect anterograde velocities only (**POS**), retrograde velocities only (**NEG**) or the whole velocity profile (**FULL**).

On **MyLab60**, **MyLab70** and **MyLab90** models the **AVERAGE** key displays the average of the detected profile.

The automatic measurements are displayed on the left of the screen and are updated every heart cycle (automatic measurements do not populate the report).

Note

For a correct diagnostic evaluation, it is recommended to use the angle correction factor, in order to obtain the right flow alignment.

Make sure that the profile of the automatically detected Doppler flow (yellow line) corresponds to the real profile.

The system automatically calculates the following parameters:

Parameter	
FVI	FVI
SVp	Systolic peak velocity
EDV	End diastolic velocity
Vmn	Mean velocity
Vrev	Retrograde velocity
PI	Pulsatility index
RI	Resistive index
Vs/Vd	Systolic velocity/Diastolic velocity

Any adjustment performed on the velocity scale orientation, on the display format and on the angle correction will automatically re-calculate the parameters.

Freeze and Archive

In Freeze the Doppler sequence can be seen either in cine mode, if the **PLAY** key is active, or by scrolling the single frame. The displayed parameters values refer to the last detected heart cycle.

Automatic Doppler tracing and measurements are automatically saved with the image

> ***Note***
>
> Automatic Doppler measurements are not available in exam review and archive review.

Formulas and Bibliographic References

Formula	Measure unit	Derived parameters
FVI = $\Sigma V_i * \Delta T$	-	-
V_i: Instant Velocity		
ΔT: Time interval		
Accuracy: ± 8%		

Formula	Measure unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow goes through the baseline*	-	-
VP: Peak velocity		
VD: Telediastolic Velocity		
VR: Reverse Velocity		
VM: Mean Velocity		
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formula	Measure unit	Derived parameters
RI = *(VP - VD) / VP Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VP Applicable when the flow goes through the baseline*	-	-
VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity		
Accuracy: ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Chapter 3

3 - Advanced Calculations

This chapter explains how to activate advanced calculations and how such packages are structured.

Activation of Advanced Calculations

In freeze mode, the **MEASURE** key activates the advanced calculations menu. The system displays the list of available measurements on the right side of the screen, which are automatically identified according to the active mode and application.

Software Keys

The Advanced Calculations menu has one level only:

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

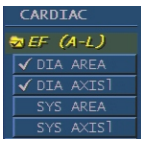
EXPAND	**SWAP AXIS**
MEASURE	**ROTATE**
CLEAR	**PAN**
CLEAR ALL	

MyLab60, MyLab70 and MyLab90 models

MEASURE	**EXPAND**
SWAP AXIS	**CLEAR**
SWAP CALIPER	**CLEAR ALL**
BACK TR	

MyLab Advanced Calculation packages are fully configurable: the "System Configuration" section in this manual explains how to access the calculations configuration menu and how to set calculations.

How to Take Measurements



Measurements are organized in groups (identified by the  symbol), which correspond to specific anatomic structures. The **MEASURE** software key is used to quickly select the required measurement (the trackball can also be used). The group displayed in yellow is then operative.

To display the measurements included in a group, activate the group and press **EXPAND**. The measurements taken are marked with the ✓ symbol.

To Select a Measurement

- Freeze the image and press **MEASURE**.
- Select the desired group using the trackball (the selected group is displayed in yellow).
- To use the entire sequence of measurements displayed in the group, press **ENTER** on the selected group.
- To take a specific measurement, press **EXPAND**, select the required measurement with the trackball and press **ENTER**.

The system displays, at the bottom of the screen, the image with the instructions to perform the selected measurement. The trackball is used to place the measurement cursors, while the **ENTER** key is used to confirm positioning when prompted. The **UNDO** key restarts a measurement before confirming it. The **Back Space** key clears the dotted line point by point. On contour measurements the trackball moved backwards or the **BACKTR** key clears the dotted line point by point.

When available the **SWAP CALIPERS** (only on **MyLab60**, **MyLab70** and **MyLab90** models) and **SWAP AXIS** options allow to respectively swap the caliper or the axis linked to the trackball. **ROTATE** allows to rotate areas. **PAN** allows the user to move the traced area within the sector

Multi-modality measurements (for instance 2D and Doppler) can be performed on Dual and Split formats. On a dual format with linear probes, measurements can be taken on both images, e.g. a distance measurement can be activated by positioning the first cursor on one image and the last cursor on the other image. This measurement can be performed only when images are acquired at the same depth, with the same orientation, without steering and zoom.

WARNING

Before performing measurements on the two frames of a Dual format, check that the whole image (i.e. both side by side frames) is consistent with the structure under exam. If necessary, reacquire both images.

The value that is being measured is displayed in Real Time at the left of the image.

Refer to "System Configuration" section for information on how to set the average on measurements

If the measurements average is activated, the symbol ✓is replaced by a number. This number indicates how many measurements have been performed and are therefore available for average computation. The average can't be based on more than last three measurements.

To cancel a measurement that has not yet been confirmed or to cancel any one measurement, use the same instructions as those supplied for generic measurements. Otherwise place the cursor on the group or on the single parameter to be recalculated and press **ENTER**: the system automatically prompts instructions to repeat the measure.

See further in this section for further details on the ***MyLab*** *report*

The Report Key

This key can be pressed at any time to display the calculation results. When pressing this key, the available measurement results are displayed in the image area.

Chapter 4

4 - Measurements Accuracy

This chapter addresses measurements accuracy.

Table A reports each measurement accuracy as a function of the scales (Column **ACCURACY**) and the worst case values (Column **%**).

TABLE A

Mode	Calculation	Accuracy	%
2D	Distance(mm)	±[1.5%xDepth(mm)+0.1]mm	±5
	Perimeter (mm)	±[6%xDepth(mm)+1]mm	±5
	Area(mm^2)	±[1.5%(D_1+D_2) Depth(mm)+ [0.025%xDepth(mm)^2+1]mm^2	±8
M-Mode full screen	Distance(mm)	±[1%xDepth(mm)+0.1]mm	±3
	Time(s)	±[1%xTime(s)+0.005]s	±3
M-Mode split and dual screen	Distance(mm)	±[1.6%xDepth(mm)+0.1]mm	±5
	Time(s)	±[1%xTime(s)+0.005]s	±3
Doppler full screen	Inst.velocity(m/s)	±[2%xVR(m/s)+0.01]m/s	±6
	Time(s)	±[1%xTime(s)+0.005]s	±3
Doppler split and dual screen	Inst.velocity(m/s)	±[2.5%xVR(m/s)+0.01]m/s	±8
	Time	±[1%xTime(s)+0.005]s	±3

Where VR is the Doppler velocity range.

On QUAD formats the measurement accuracy could be reduced up to the half in comparison with the same measure done on the same image displayed in full screen.

Note

If angle correction is used, a 0.1% of computation error must be added to the accuracy of the Doppler measurements.

Worst case values are calculated with the following assumptions:

- Measurement values equal to one third of the analysis depth (ex.: with a depth of 18 cm., a distance measurement of 6 cm.).
- Ultrasound speed to be constant at 1540 m/s.

Derived Data

Derived data accuracy can be calculated through the law of error propagation; worst case accuracy, based on the above mentioned assumptions, are reported together with the formulas in the following chapters.

To minimize the measurement uncertainty:

- Optimize image quality.
- Whenever possible, use the zoom function for maximum resolution.
- Optimize the probe alignment with the Doppler flow.

Chapter 5

5 - Cardiac Calculations[1]

Refer to "Getting Started" manual for applications available on ***MyLab*** *model.*

This chapter addresses the measurements available for cardiac applications with the relative bibliographic references.

Cardiac applications icons

Cardiac	Pediatric Cardiac
	

In the list below, the icons indicate in which application the measurements group is available. The formulas without bibliographic references are universally accepted mathematic equations.

Application Data

In the patient data section, the following parameters can also be entered:

Parameter	
HEIGHT	In cm or in feet
WEIGHT	In kg or in pounds

In the cardiac applications the system automatically calculates the Body Surface Area (BSA), based on the following formulas:

$$BSA\ (Cardiac) = H^{0.725} * W^{0.425} * 71.84 / 10000$$

$$BSA\ (Pediatric\ Cardiac) = H^{0.3964} * W^{0.5378} * 242.65/10000$$

Where the height is in cm and the weight in kg.

Please refer to the "System Configuration" section in this manual for information on how to configure the Cardiac calculations package.

[1] Not available with MyLab20Plus.

Cardiac Calculations in B-Mode

Ejection Fraction (Simpson-Biplane)

EF (SIMP SI-B)
 ***and*** 

The Simpson method requires that measurements be taken on two cardiac views(Apical four chambers, A4C; Apical two chambers, A2C). The parameters that can be measured are:

Parameter		Abbreviation	Measurement
4CAd	4C Diastolic area	4CAd	Profile, Distance
4CAs	4C Sysytolic area	4CAs	Profile, Distance
2CAd	2C Diastolic area	2CAd	Profile, Distance
2CAs	2C Systolic area	2CAs	Profile, Distance

Since the Simpson method requires measurements on two different cardiac views, it is recommended that you use a Dual 2D so that both views are available. The group parameters are measured in four phases.

Performing the Measurements

- Acquire a B-Mode image and press **FREEZE**.
- If necessary, scroll memories to select the end-diastolic A4C image and press **MEASURE** to activate the menu.
- Select the "EF (SI-B)" group and press **ENTER**.
- Follow the instructions on the screen to trace the diastolic profile and the LV long axis.
- Use the trackball to select the end-systolic image in A4C and press **MEASURE**.
- Follow the instructions on the screen to complete the measurements.
- Repeat the phases in A2C.

If an A2C image has not been stored, it is possible to return to Real Time with **B-MODE** to complete the acquisition. Freeze the image and press **MEASURE** to complete the measurement.

These parameters are automatically calculated once the measurements have been taken:

Parameter	
LVVd	LV diastolic volume
LVVs	LV systolic volume
EF	Ejection fraction
LVVId	LV diastolic volume index
LVVIs	LV systolic volume index
SV	Stroke volume
SI	Stroke index
HR	Heart rate
CO	Cardiac output
CI	Cardiac index

LV: Left ventricle

Ejection Fraction (Simpson-Single Plane)

EF (SI-S)
 ***and*** 

The Simpson Single Plane method requires that measurements be taken on one cardiac view (Apical four chambers, A4C). The following parameters can be measured:

Parameter		Abbreviation	Measurement
4CAd	4C Diastolic area	4CAd	Profile, Distance
4CAs	4C Sysytolic area	4CAs	Profile, Distance

The group parameters are measured in two phases.

Performing the Measurements

- Acquire a B-Mode image and press **FREEZE**.
- If necessary, scroll memories to select the end diastolic A4C image and press **MEASURE** to activate the menu.
- Select the "EF (SI-S)" group and press **ENTER**.
- Follow the instructions on the screen to trace the diastolic profile and the LV long axis.
- Use the trackball to select the end systolic image in A4C and press **MEASURE**.
- Follow the instructions on the screen to complete the measurements.

These parameters are automatically calculated once the measurements have been taken:

Parameter	
LVVd	LV diastolic volume
LVVs	LV systolic volume
EF	Ejection fraction
LVVId	LV diastolic volume index
LVVIs	LV systolic volume index
SV	Stroke volume
SI	Stroke index
HR	Heart rate
CO	Cardiac output
CI	Cardiac index

LV: Left ventricle

Ejection Fraction (Area-Length)

EF (A-L)


The ejection fraction measurement taken using the Area-Length method requires the measurement of diastolic and systolic parameters. The images must be from the same cardiac cycle. The following parameters can be measured:

Parameter		Abbreviation	Measurement
DIA AREA	LV diastolic area	LVAd	Profile
DIA AXISl	LV diastolic axis	LVLd	Distance
SYS AREA	LV systolic area	LVAs	Profile
SYS AXISl	LV systolic axis	LVLs	Distance

LV: Left ventricle

Ejection Fraction can be calculated on a single-frame 2D or on a Dual 2D image. The Dual 2D (particularly in simultaneous mode) is recommended. The group parameters are measured in two phases.

Performing the easurements

- Acquire a cardiac cycle and press **FREEZE**.
- If necessary, scroll memories to select the tele-diastolic image and press **MEASURE** to activate the menu.
- Select the "EF (A-L)" group and press **ENTER**.
- Follow the instructions on the screen to trace the diastolic profile and the Ls long axis.
- Use the trackball to select the tele-systolic image and press **MEASURE**.
- Follow the instructions on the screen to complete the measurements.

If an entire cardiac cycle has not been stored, it is possible to return to Real Time with **B-MODE** to complete the acquisition. Freeze the image and press **MEASURE** to complete the measurement.

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
LVVd	LV diastolic volume
LVVs	LV systolic volume
EF	Ejection fraction
LVVId	LV diastolic volume index
LVVIs	LV systolic volume index
SV	Stroke volume
SI	Stroke Index
HR	Heart rate
CO	Cardiac output
CI	Cardiac Index

LV: Left ventricle

Fractional Shortening

FAC  ***and*** 

The images must be from the same cardiac cycle. The following parameters can be measured:

Parameter		Abbreviation	Measurement
DIA AREA	LV diastolic area	LVAd	Profile
SYS AREA	LV systolic area	LVAs	Profile

LV: Left ventricle

Fractional Shortening can be measured on a single-frame or on a Dual 2D format, the latter display (in simultaneous mode) is recommended to display side-by-side a systolic and diastolic frame of the same cardiac cycle. The group parameters are measured in two phases.

Performing the Measurements

- Acquire a cardiac cycle and press **FREEZE**.
- If necessary, scroll memories to select the tele-diastolic image and press **MEASURE** to activate the menu.
- Select the "FS" group and press **ENTER**.
- Follow the instructions on the screen to trace the diastolic profile and the Ls long axis.
- Use the trackball to select the tele-systolic image and press **MEASURE**.
- Follow the instructions on the screen to complete the measurements.

If an entire cardiac cycle has not been stored, it is possible to return to Real Time with **B-MODE** to complete the acquisition. Freeze the image and press **MEASURE** to complete the measurement.

Fractional area change (FAC) is automatically obtained once the measurements have been taken:

Left Ventricle

LV

This measurement requires an entire cardiac cycle be acquired. The group includes the following:

Parameter		Abbreviation	Measurement
IVS dia	Intraventricular septum - Diastole	IVSd	Distance
LVD dia	LV diameter - Diastole	LVDd	Distance
PW dia	Postirior wall -Diastole	PWd	Distance
LVD sys	LV Diameter-Systole	LVDs	Distance
MV T AREA	Mitral valve tenting area	MVTAs	Area
MV COAPTD	Mitral valve coaptation depth	MVCD	Distance

LV: Left ventricle

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
EF	Ejection fraction *
FS	Fractional shortening
LVM	LV Mass

LV: Left ventricle

Note*

The ejection fraction is calculated using the Teichholz formula for the M-Mode. The use of this formula in B-Mode is not supported by any bibliographic reference but it is based on widely clinical practice.

Left Ventricle Outflow Tract

OUTFLOW TRACT

 ***and*** 

This group includes the following measurements:

Parameter		Abbreviation	Measurement
LVOT DIAM	LV outflow tract diameter	LVOT	Distance
LVOT AREA	Outflow tract area	LVOA	Profile

LV: Left ventricle

The **area** (OTA) of the outflow tract is obtained once the measurement is completed.

Aorta and Left Atrium

AORTA/LA

 ***and*** 

This group includes the following measurements:

Parameter		Abbreviation	Measure-ment
AO DIAM	Aortic diameter	AOD	Distance
AO PLAN	Aortic planimetry	AVA	Profile
AO OPENIN	Aortic valve opening	AVO	Distance
SIN VAL D	Sinus valve diameter	SValD	Distance
SIN TUB D	Sinotubular iunction diameter	STJD	Distance
AS AO D	Ascending aorta diameter	AAOD	Distance
AO ARC D	Aortic arch diameter	AOARD	Distance
AS AO IE	Ascending aorta inner edge	AAOID	Distance
LA DIAM	Left atrium diameter	LAD	Distance

The aortic **area** (AOA) and the **Left atrium/Aorta** ratio (LA/AO) are obtained once the measurement is completed.

Right Ventricle

RV

 ***and*** 

This group allows to measure biometric characteristics of the right ventricle and its volume. The group includes the following measurements:

Parameter		Abbreviation	Measurement
BS RVDd	Basal RV diameter - Diastole	BRVDd	Distance
MID RVDd	Midium RV diameter - Diastole	MRVDd	Distance
RV LAX Dd	Maximum RV axis in 4AC - Diastole	RVLDd	Distance
RVAREAd	RV area - Diastole	RVAd	Profile
RVAREAs	RV area - Systole	RVAs	Profile
RV DIAM d	RV diameter - Diastole	RVDd	Distance
RV AREA	RV area (for volume calculation)	RVA	Profile
RV AXIS	RV Long Axis	RVld	Distance

RV: right ventricle

Performing the Measurements

The volume calculation requires the measurement of the area of the right ventricle in Apical-four chambers (A4C) and of the right outflow tract. To measure them follow the below procedure.

- Acquire a cardiac cycle and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "RV" group and press **ENTER**.

- Measure the RV diameter.
- With the trackball select the A4C view and press **MEASURE**.
- Measure the area of the right ventricle.
- Display the outflow tract.
- Press **MEASURE** to reactivate the menu and complete the measurements.

If an entire cardiac cycle has not been stored, it is possible to return to Real Time with **B-MODE** to complete the acquisition. Freeze the image and press **MEASURE** to complete the measurement.

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
RV FAC	RV fractional area change
RVV	RV volume

RV: Right ventricle

RVOT and Pulmonary Artery

RVOT/PA


This group includes the following measurement::

Parameter		Abbreviation	Measurement
PA DIAM	Pulmonary artery diameter	PAD	Distance
PVA DIAM	Pulmonary valve annulus diameter	PVAD	Distance
RVOT DIAM	RVOT diameter	RVOTD	Distance

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
PAA	Pulmonary artery area
PVA	Pulmonary valve area
RVOTA	RVOT area

Mitral

MITRAL


This group includes the following measurements:

Parameter		Abbreviation	Measurement
ANN DIAM	Mitral annulus diameter	MAN	Distance
ANN AREA	Mitral annulus area	MAA	Profile
MIT AREA	Mitral area	MVA	Profile

Left Atrium Volume (Simpson Single plane)

LAV(S)

 ***and*** 

This group includes the following measurement:

Parameter		Abbreviation	Measurement
LAA 4C S	Left atrium area	LA4C	Profile
LAL (S)	Left atrium length	LAL	Distance
LA DIAM	Left atrium diameter	LAD	Distance

The group parameters are measured in two phases.

Performing the Measurements

- Acquire a B-Mode image and press **FREEZE**.
- If necessary, scroll memories to select the end diastolic A4C image and press **MEASURE** to activate the menu.
- Select the "LAV S" group and press **ENTER**.
- Follow the instructions on the screen to trace the area and the LA long axis.
- Use the trackball to select the end systolic image in A4C and press **MEASURE**.
- Follow the instructions on the screen to complete the measurements.

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
LAV (S)	LA volume (Single Plane)
LAVIs	LA volume index

LA: Left atrium

Left Atrium Volume (Biplane)

LAV (BIP)

 ***and*** 

This group includes the following measurement:

Parameter		Abbreviation	Measurement
LA AREA4C	Left atrium area – 4AC	LA4C	Profile
LA AREA2C	Left atrium area – 2AC	LA2C	Profile
LA LENGTH	Left atrium length	LAL	Distance
LA DIAM	Left atrium diameter	LAD	Distance

The group parameters are measured in two phases.

Performing the Measurements

- Acquire a cardiac cycle and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "LAV (BIP)" group and press **ENTER**.
- Measure the area of the left atrium in 4AC.
- Scroll the memory using the trackball to select the 2AC view.
- Press **MEASURE** to reactivate the menu and complete the measurements.

If a 2AC cardiac cycle has not been stored, it is possible to return to Real Time with **B-MODE** to complete the acquisition. Freeze the image and press **MEASURE** to complete the measurement.

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
LAVIs	LA volume index
LAV (BIP)	LA volume (biplane)

LA: Left atrium

Further Calculation Groups

INF VCAV

 ***and***

Inferior Vena Cava

This group includes the following measurements:

Parameter		Abbreviation	Measurement
IVC Dmax	Inferior Vena Cava - Maximum diameter	IVCmx	Distance
IVC Dmin	Inferior Vena Cava - Minimum diameter	IVCmi	Distance

The following parameters are automatically calculated once the measurements have been taken:

Parameter	
VCDi	Indexed IVC Size
IVCCI	IVC Collapsibility Index

RA VOL (SI-S)

 ***and***

Right Atrium (Simpson - Single Plane)

This group includes the following measurements:

Parameter		Abbreviation	Measurement
RAA (S-S)	Right atrium area	RAA	Profile
RAL (S-S)	Right atrium length	RAL	Distance

The **volume** (RAV) of the right atrium is obtained once the measurement is completed.

RA VOL (A-L)

 ***and***

Right Atrium (Area-Length)

This group includes the following measurements:

Parameter		Abbreviation	Measurement
RAA (A-L)	Right atrium area	RAA	Profile
RAL (A-L)	Right atrium length	RAL	Distance

The **volume** (RAV) of the right atrium is obtained once the measurement is completed.

The groups of the following table, belonging to the B-Mode package, are described in the "Cardiac calculations in Doppler" paragraph, since their measurement requires acquisition of cardiac flows.

Parameter	
PISA (MITRAL)	Mitral regurgitation (PISA)
PISA (AORTA)	Aortic regurgitation (PISA)
CO-AORTA	Cardiac output - aorta
AO AREA	Aortic area
CO-AORTA	Cardiac Output-LVOT
CO-PULMON	Cardiac output-pulm
Qp/Qs	Qp/Qs

Cardiac Calculations in M-Mode

Left Ventricle

LV  ***and***

The following parameters can be measured:

Parameter		Abbreviation	Measurement
RV DIAM d	RV Diameter-diastolic	RVDd	Distance
IVS dia	IV Septum-diastolic	IVSd	Distance
LV DIAM d	LV Diameter-diastolic	LVDd	Distance
PW dia	Post wall-diastolic	PWd	Distance
IVS sys	IV Septum-systolic	IVSs	Distance
LVD sys	LV Diameter.systolic	LVDs	Distance
PW sys	Post wall-systolic	PWs	Distance
SEPT-PW D	Septum-Posterior Wall disatnce	SPWD	Distance

LV: Left ventricle
RV: Right ventricle

The following parameters are automatically calculated once the measurements are complete:

Parameter	
EF	Ejection fraction
FS	Fractional shortening
LVVd	Diastolic volume
LVVs	Systolic volume
SV	Stroke volume
SI	Stroke index
HR	Heart rate
CO	Cardiac output
CI	Cardiac index
S%	Septum thickening
PW%	Post wall thickening
LVM	Left ventricle mass
LVMI	Left ventricle mass index

Aorta and Left Atrium

AORTA/LA 

This group is composed of the following measurements:

Parameter		Abbreviation	Measurement
AO DIAM	Aortic diameter	AOD	Distance
LA	Left atrium	LA	Distance
AO OPENIN	Aortic valve opening	AVO	Distance
EJECT TIM	Ejection time	ET	Time
R-R INT	R-R Interval	R-R	Time
AO COAPT	AO Coaptation Line	AOC	Distance

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
LA/AD	Left atrium/aortic diameter
EXC IND	AO Excentricity index

Mitral

MITRAL 

The following parameters can be measured:

Parameter		Abbreviation	Measurement
E SEPTUM	E Septum	ESD	Distance
EF Slope	EF Slope	EFS	Slope
MAPSE	Displacement of the mitral annulus	MAPSE	Distance

Tricuspid

TRICUSPID 

The following parameter can be measured:

Parameter		Abbreviation	Measurement
TAPSE	Displacement of the tricuspid annulus	TAPSE	Distance

Valve Event Markers

VLV EV M 

The following parameters can be measured:

Parameter		Abbreviation	Measurement
MV OPENIN	Mitral valve - Opening	MVO	Distance
MV CLOSUR	Mitral valve - Closure	MVC	Distance
AV OPENIN	Aortic valve - Opening	AVO	Distance
AV CLOSUR	Aortic valve- Closure	AVC	Distance

Cardiac Calculations in Doppler

Mitral

MITRAL 

This group includes the following parameters:

Parameter		Abbreviation	Measurement
MIT FVI	Mitral flow profile	MFVI	Profile
PEAK V-E	Mitral Peak Vel E Wave	MEVp	Velocity

PEAK V-A	Mitral Peak Vel A Wave	MAVp	Velocity
PHT MIT	PHT	PHTM	Slope
E ACC TIM	Mitral E Wave Acc Time	MEAT	Time
E DEC TIM	Mitral E Wave Dec Time	MEDT	Time
ISOV REL	Mitral Isov Relax Time	MIRT	Time
M ISOVCTR	Mitral Isov Contraction Time	MICT	Time
A DUR	A Wave Duration	A	Time
EJECT TIM	Ejection Time	ET	Time

Once the measurements are complete the following parameters are automatically calculated:

Parameter	
MEGp	Mit Peak Grad (E)
MAGp	Mit Peak Grad (A)
Vmn	Mean Velocity
Gmn	Mean Gradient
MVA	Mitral Area
E/A	Mit peak Vel E Wave/Mit peak Vel A Wave
MPI	Miocardiac Performance Index

Mitral Regurgitation

MIT REG

This group includes the following parameter:

Parameter		Abbreviation	Measurement
REG VEL	Regurgitation velocity	MVrg	Velocity
dP/dt	dP/dt	dP/dt	Tme

Once the measurements are complete, the **regurgitation gradient** (MGrg) is calculated automatically.

Mitral regurgitation (PISA)

PISA-MIT

This group includes the following parameters:

Parameter		Abbreviation	Measurement
MIT ALIAS	Mitral aliasing velocity	MVal	-
REG GRAD	Mitral reg radius	MGrg	Distance
MREG PROF	Regurgitation profile	MrgP	Profile

The flow in CFM must be acquired to take this measurement.

Taking the Measurements

- Acquire a mitral regurgitation CFM flow and press **FREEZE**.
- Scroll the memory to find the desired image, press **MEASURE** to activate the menu.
- Select "PISA - MIT" and press **ENTER**.
- If necessary, use the **ZERO** key to move the zero line in the flow direction and press **MEASURE**.
- Insert the aliasing velocity and press **OK**.
- Follow the instructions on the screen to measure the radius (i.e. the distance between the aliasing region and the orifice).
- Press **FREEZE**.

- Acquire a CW trace of a mitral regurgitation and press **FREEZE**.
- Press **MEASURE**.
- Follow the instructions on the screen to measure the regurgitation profile.

Once the measurements are complete the following parameters are calculated automatically:

Parameter	
MVrg	Regurgitation velocity
MREG	Mitral regurgitation flow
MrgO	Effective regurgitation orefice
MVOL	Regurgitation volume

Mitral TV

MITRAL TV


This group includes the following parameters:

Parameter		Abbreviation	Measurement
PEAK V-E'	Peak velocity - E' wave	ME' P	Velocity
PEAK V-A'	Peak velocity - A' wave	MA' P	Velocity
ISOV REL	Isovol Relax Time	MIRT	Time
M ISOVCTR	Isovol Contraction Time	MICT	Time
T ON 4CS	Time to Onset – 4AC Septum	TO4S	Time
T ON 4CLW	Time to Onset – 4AC Posterior Wall	TO4L	Time
T PE 4CS	Time to Peak – 4AC Septum	TP4S	Time
T PE 4CLW	Time to Peak – 4AC Lateral Wall	TP4L	Time
T ON 2CAW	Time to Onset – 2AC Anterior Wall	TO2A	Time
T ON 2CIW	Time to Onset – 2AC Inferior Wall	TO2I	Time
T PE 2AW	Time to Peak – 2AC Anterior Wall	TP2A	Time
T PE 2CIW	Time to Peak – 2AC Inferior Wall	TP2I	Time
EJECT TIM	Ejection Time	ET	Time

Once the measurements are complete the following parameters are automatically calculated:

Parameter	
E'/A'	Peak velocity E' wave/ Peak velocity A' wave
E/E'	Peak velocity E wave/ Peak velocity E' wave (if E velocity is available)
MPI	Miocardiac Peformance Index

Aorta

AORTA


This group includes the following parameters:

Parameter	Abbreviation	Measurement

AO FLOW	Aortic flow	AFVI	Profile
AO VEL	Aortic velocity	AVp	Velocity
DIA VEL	Aortic diastolic velocity	AVd	
ACC TIME	Acceleration time	AAT	Time
EJECT TIME	Ejection time	ET	Time
AO PREEJE	Aorta Pre-ejection time	APEJ	Time
PU PREEJE	Pulmonary Pre-ejection time	PPEJ	Time

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
Vmn	Mean velocity
Gmn	Mean gradient
Gp	Peak gradient
IVMD	Intraventricluar Mechanical Delay

Aortic Area

AO EFF A  ***and***

This measurement requires a CW trace for the aortic flow, a trace for the LVOT flow and B-Mode image for measuring the diameter. This group includes the following parameters:

Parameter		Abbreviation	Measurement
AO FLOW	Aortic Flow Profile	AFVI	Profile
AO VEL	Aortic Peak Velocity	AVp	Velocity
LVOT FLOW	LVOT flow profile	OFVI	Profile
LVOT VEL	LVOT Peak Veloity	OVp	Velocity
LVOT DIAM	LVOT diameter	LVOD	Distance

The group parameters are measured in three phases.

Performing the Measurements

- Acquire the aortic flow and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "AO EFF AREA" group and press **ENTER**.
- Follow the instructions on the screen for measuring the velocity integral.
- Press **PW** to return to Real Time and acquire the left ventricle outflow.
- Press **FREEZE** and then **MEASURE** to activate the menu.
- Follow the instructions on the screen to measure the velocity integral of the left ventricle.
- Press **B-MODE** to return to Real Time and acquire the left ventricle image.
- Press **FREEZE** and then **MEASURE** to reactivate the menu and to complete the measurements

Once the measurements are complete, the following parameters are calculated automatically:

Parameter

OTA	Outflow tract area
AVA	Aortic effective valve area
AMVA	Aortic maximal valve area

Aortic Regurgitation

AO REG

This group includes the following parameters:

Parameter		Abbreviation	Measurement
REG PHT	AO regurge PHT	PHT	Slope

Descending Aorta

DESC AO

This group includes the following parameters:

Parameter		Abbreviation	Measurement
SYS Vpeak	DA Systolic Peak Velocity	DAGp	Velocity
PDA	Patent ductus artery	PDA	Velocity

Once the measurements are complete, the **Peak gradient** (DAGp) is calculated automatically.

PISA (Aorta)

PISA-AO

This measurement requires the acquisition of a CW trace and a flow in CFM. This group includes the following parameters:

Parameter		Abbreviation	Measurement
AO ALIAS	AO Aliasing velocity	AVAL	-
REG RAD	AO Regurgitation Radius	AREG	Distance
REG PROF	AO Regugitation Profile	APRO	Profile

The group parameters are measured in two phases.

Performing the Measurements

- Acquire a CW trace of aortic regurgitation and press **FREEZE**.
- Press **MEASURE** to activate the menu, select "PISA (AORTA)" and press **ENTER**.
- Follow the screen instructions to measure the regurgitation profile.
- Press **B-MODE** to return to Real Time
- Press **CFM** to display the flow in CFM.
- If necessary, use the **BASE** key to move the zero line in the direction of the flow and press **FREEZE**.
- Display the required frame and press **MEASURE** to reactivate the menu.
- Insert the aliasing velocity and press **OK**.
- Follow the instructions on the screen to measure the radius (i.e. the distance between the aliasing region and the orifice).

Then the following parameters are calculated automatically:

Parameter	
ARVp	Peak velocity
AREG	Regurgitation flow
AOR	AO regurgitation orifice
REG VOL	AO regurgitation volume

LVOT Flow

LVOT FLOW


This group includes the following parameters:

Parameter		Abbreviation	Measurement
LVOT FLOW	LVOT flow profile	OFVI	Profile
LVOT VEL	LVOT peak velocity	OVp	Velocity

Once the measurements are complete, the following parameters are calculated:

Parameter	
Vmn	Mean velocity
Gmn	Mean gradient
Gp	Peak gradient

Tricuspid

TRICUSPID


This group includes the following parameters:

Parameter		Abbreviation	Measurement
TRIC FVI	Tricusp flow profile	TFVI	Profile
PEAK V-E	Tricuspid Velocity E Wave	TEVp	Velocity
PEAL V-A	Tricuspid Velocity A Wave	TAVp	Velocity

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
PEAK GR E	Tricuspid Peak Gradient (E)
PEAK GR A	Tricuspid Peak Gradient (A)
TRIC Vmn	Tricuspid Mean Velocity
TRIC Gmn	Tricuspid Mean Gradient
E/A	Tricuspid Velocity E Wave/ Tricuspid Velocity A Wave

Tricuspid Regurgitation

TRIC REG


This group includes the following parameters:

Parameter		Abbreviation	Measurement
REG VEL	Tric reg velocity	TRV	Velocity

Once the measurements are complete, the following parameters are calculated:

Parameter	
TFG	Tricuspid Flow Gradient
RVPs	RV Systolic Pressure

Pulmonary Veins

PULM VEINS  ***and***

This group includes the following parameters:

Parameter		Abbreviation	Measure-ment
PV SYS V	PV systolic velocity	PVVs	Velocity
DIAST VEL	PV diastolic velocity	PVVd	Velocity
REV ATR V	Reverse arterial velocity	RAV	Velocity
A DUR	A Wave Duration	A	Time

Once the measurements are complete, the **LV/RV ratio** is calculated automatically.

Pulmonary Artery

PULM ART  ***and***

This group includes the following parameters:

Parameter		Abbreviation	Measure-ment
PULM FLOW	Pulm flow profile	PFVI	Profile
PULM Vp	Pulm peak velocity	PVp	Velocity
PU PREEJE	Pulmonary pre-ejection time	PPEJ	Time
AO PREEJE	Aortic pre-ejection time	APEJ	Time

The group requires to enter the pressure gradient (5, 10 or 15): refer further in this chapter for pressure formula.

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
PULM Vmn	Mean velocity
PULM Gmn	Mean gradient
PULM Gp	Peak gradient
PAP	Pulm artery pressure
PAT	Pulmonary acceleration time
IVMD	Intraventricular mechanioal delay

Pulmonary Regurgitation

PULM REG 

This group includes the following parameters:

Parameter		Abbreviation	Measure-ment
REG PHT	Pulm reg PHT	PHT	Slope
PDIAS VEL	Pulm protodiast velocity	PVpd	Velocity
EDIAS VEL	Pulm telediast velocity	PVtd	Velocity

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
PDIAS GR	Pulm protodiast gradient
TDIAS GR	Pulm telediast gradient

Cardiac Output - LVOT

CO-LVOT  ***and*** 

This measurement requires the acquisition of a Doppler trace and a B-Mode image. This group includes the following parameters:

Parameter		Abbreviation	Measurement
LVOT FLOW	LVOT flow profile	OFVI	Profile
R-R INT	R-R interval	R-R	Time
LVOT DIAM	LVOT diameter	LVOD	Distance

The parameters of this group are measured in two phases.

Performing the Measurements

- Acquire a Doppler trace and press **FREEZE**.
- Press **MEASURE** to activate the menu, select "CO-LVOT" and press **ENTER**.
- Follow the instructions on the screen to measure the regurgitation profile and the R-R interval.
- Press **B-MODE** to return to Real Time.
- Acquire a B-Mode image and press **FREEZE**.
- Display the required frame then press **MEASURE** to reactivate the menu.
- Follow the instructions on the screen to complete the measurements.

The following parameters are calculated automatically:

Parameter	
HR	Heart rate
OTA	LVOT area
SV	Stroke volume
SI	Stroke index
CO	Cardiac output
CI	Cardiac index

Cardiac Output - Aorta

CO-AORTA  ***and*** 

This measurement requires the acquisition of a Doppler trace and a B-Mode image. This group includes the following parameters:

Parameter		Abbreviation	Measurement
AO FLOW	Aortic flow profile	AFVI	Profile
R-R INT	R-R interval	R-R	Time
AO DIAM	AO diameter	AOD	Distance

The parameters of this group are measured in two phases.

Performing the Measurements

- Acquire a Doppler trace and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "CO-AORTA" group and press **ENTER**.

- Follow the instructions on the screen to measure the regurgitation profile and the R-R INT.
- Press **B-MODE** to return to Real Time.
- Acquire a B-Mode image and press **FREEZE**.
- Display the required frame then press **MEASURE** to reactivate the menu.
- Follow the instructions on the screen to complete the measurements.

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
HR	Heart rate
AOA	Aorta area
SV	Stroke volume
SI	Stroke index
CO	Cardiac output
CI	Cardiac index

Cardiac Output - Pulmonary

CO-PULM  ***and*** 

This measurement requires the acquisition of a Doppler trace and a B-Mode image. This group includes the following parameters:

Parameter		Abbreviation	Measurement
PULM FLOW	Pulmonary flow profile	PFVI	Profile
R-R INT	R-R interval	R-R	Time
PA DIAM	Pulmonary diameter	PAD	Distance

The group parameters are measured in two phases.

Performing the Measurements

- Acquire a Doppler trace and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "CO-PULM" group and press **ENTER**.
- Follow the instructions on the screen to measure the regurgitation profile and the R-R INT.
- Press **B MODE** to return to Real Time.
- Acquire a B-Mode image and press **FREEZE**.
- Display the required frame then **MEASURE** to reactivate the menu.
- Follow the instructions on the screen to complete the measurements.

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
HR	Heart rate
PAA	Pulmonary area
SV	Stroke volume
SI	Stroke index
CO	Cardiac output
CI	Cardiac index

Qp/Qs

Qp/Qs and 

Qp/Qs is the ratio between the pulmonary stroke volume and the stroke volume measured in correspondence with the left ventricle outflow tract (LVOT). This measurement requires the acquisition of a Doppler trace and a B-Mode image. This group includes the following parameters:

Parameter		Abbreviation	Measurement
PULM FLOW	Pulmonary Flow Profile	PFVI	Profile
R-R INT	R-R Interval	R-R	Time
PA DIAM	Pulmonary diameter	PAD	Distance
LVOT FLOW	LVOT Flow Profile	OFVI	Profile
R-R INT	R-R Interval	R-R	Time
LVOT DIAM	LVOT Diameter	LVOD	Distance

The group parameters are measured in four phases.

Performing the Measurements

- Acquire a Doppler trace and press **FREEZE**.
- Press **MEASURE** to activate the menu, select the "Qp/Qs" group and press **ENTER**.
- Follow the instructions on the screen to measure the flow profile and the R-R INT.
- Press **B-MODE** to return to Real Time.
- Acquire a B-Mode image and press **FREEZE**.
- Display the required frame then press **MEASURE** to reactivate the menu.
- Measure the pulmonary diameter.
- Press **PW** to return to Real Time and acquire a PW trace.
- Press **FREEZE** and then **MEASURE** to reactivate the menu.
- Follow the instructions on the screen to measure the flow profile and the R-R INT.
- Press **B-MODE** to return to Real Time.
- Acquire a B-Mode image and press **FREEZE**.
- Display the required frame then press **MEASURE** to reactivate the menu.
- Follow the instructions on the screen to complete the measurements.

Once the measurements are complete, the following parameters are calculated automatically:

Parameter	
HR	Two heart rates
PAA and LVOA	Pulmonary area and LVOT area
SV	Pulmonary cardiac stroke volume and LVOT
CO	Pulmonary cardiac output and LVOT
Qp/Qs	Pulmonary stroke volume /LVOT stroke volume

Valves Event Markers

VLV EV M

The following parameters can be measured:

Parameter		Abbreviation	Measurement
MV OPENIN	Mitral valve - Opening	MVO	Time
MV CLOSUR	Mitral valve - Closure	MVC	Time
AO OPENIN	Aortic valve - Opening	AVO	Time
AO CLOSUR	Aortic valve- Closure	AVC	Time

Bibliographic References and Formulas in B-Mode

LV Volume Simpson - Biplane Formula	Measure unit	Derived parameters
Volume=(π/4) * (h/20) * Σ_{1-20} d $_h$ D_h h: Long axis d_h: A2C diameter D_h: A4C diameter	ml	-
Accuracy: ± 15%		
Schiller N.B., ..., Two-Dimensional Echocardiographic Determination of Ventricular Volume, Systolic Function and Mass. In: *Summary and Discussion of the 1989 Recommendations of the American Society of Echocardiography*		

LV/LA/RA Volume Simpson - Single plane Formula	Measure unit	Derived parameters
Volume=(π/4) * (h/20) * Σ_{1-20} D_h^2 h: Long axis D_h: A4C diameter	ml	-
Accuracy: ± 15%		

LV Volume: A.J.Camm, T.F.Luscher..,"The ESC Textbook of Cardiovascular Medicine", 2008, pag.53-53
LA and RA Volume: Lang R, Bierig M, Devereux R,.. Recommendations for chamber quantification: a report from the American Society of Echocardiography's Guidelines and Standards Committee and the Chamber Quantification Writing Group, developed in conjunction with the European Association of Echocardiography, a branch of the European Society of Cardiology In: *J Amer. Soc. Echocardiography*, 2005, Vol.18; N.12; pp1440-1463

LV /RA Volume (A-L) **Formula**	**Measure unit**	**Derived parameters**
Volume= $8 * A^2 / (3 * \pi * D)$ A: Area D: Long axis	ml	-
Accuracy: ± 21%		
Schiller N.B., ..., Two-Dimensional Echocardiographic Determination of Ventricular Volume, Systolic Function and Mass. In: *Summary and Discussion of the 1989 Recommendations of the American Society of Echocardiography*		

LV Diastolic/Systolic and LA Systolic Volume Index **Formula**	**Measure unit**	**Derived parameters**
Index = A/BSA A: LV diastolic volume or LV systolic volume or LA systolic volume	-	-
Lang R, Bierig M, Devereux R,.. Recommendations for chamber quantification: a report from the American Society of Echocardiography's Guidelines and Standards Committee and the Chamber Quantification Writing Group, developed in conjunction with the European Association of Echocardiography, a branch of the European Society of Cardiology In: *J Amer. Soc. Echocardiography*, 2005, Vol.18; N.12; pp1440-1463		

Ejection Fraction (Simpson and A-L) **Formula**	**Measure unit**	**Derived parameters**
EF = (A-B)*100/A A: LV diastolic volume B: LV systolic volume	-	-
Accuracy: ± 42%		
Feigenbaum H., Echocardiography, 4th Ed., Lea & Febiger, Philadelphia, 1986, pp. 153-155.		

Stroke Volume **Formula**	**Measure unit**	**Derived parameters**
SV = A - B A: LV diastolic volume B: LV systolic volume	ml	-
Accuracy: ± 42%		

Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 605

Stroke Index Formula	Measure unit	Derived parameters
SI = A/B A: Stroke volume B: BSA	-	-

Oh J, Seward J, Tajik A The echo manual-Second edition, Lippincott Williams &Wilkins

Cardiac Output Formula	Measure unit	Derived parameters
CO = (A – B) * HR A: LV diastolic volume B: LV systolic volume	l/min	-

Accuracy: ± 45%

Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 605

Cardiac Index Formula	Measure unit	Derived parameters
CI = A/B A: Cardiac output B: BSA	-	-

Oh J, Seward J, Tajik A The echo manual-Second edition, Lippincott Williams &Wilkins

LV/RV Fractional Shortening Formula	Measure unit	Derived parameters
FAC = (A-B)*100/A A: LV/RV diastolic area B: LV/RV systolic area	-	-

Accuracy: ± 16%

Diameter Fractional Shortening Formula	Measure unit	Derived parameters
FS = (A - B)*100/A A: LV diastolic diameter B: LV systolic diameter	-	-

Accuracy: ± 10%

Quinones M.A., Gaasch W.H., Alexander J.K., "Echocardiographic Assessment of Left Ventricular Function with Special Reference to Normal Velocities". In: Circulation, 1974 , 50, p. 42.

Ejection Fraction (LV Group) Formula	Measure unit	Derived parameters
EF = (A - B)*100/A	-	A: [7 * D ^{3}] / [2.4 + D] D: LV Diameter in diastole B: [7 * D ^{3}] / [2.4 + D] D: LV Diameter in systole

LV Mass Formula	Measure unit	Derived parameters
LVM = 0.8 * $\{1.04[(A + B + C)^3 - A^3]\}$ + 0.6 A: LV internal diameter – Diastole B: Post wall - Diastole C : Intraventricular septum - Diastole	g	-
Accuracy: ± 15%		
Lang R, Bierig M, Devereux R,.. Recommendations for chamber quantification: a report from the American Society of Echocardiography's Guidelines and Standards Committee and the Chamber Quantification Writing Group, developed in conjunction with the European Association of Echocardiography, a branch of the European Society of Cardiology In: J Amer. Soc. Echocardiography, 2005, Vol.18; N.12; pp1440-1463.		

Outflow Tract Area Formula	Measure unit	Derived parameters
OTA=Π * $(D/2)^2$ D: Outflow tract diameter	cm^2	-

Aortic Valve Opening Formula	Measure unit	Derived parameters
AAO=Π * $(D/2)^2$ D: Aortic diameter	cm^2	-

LA/AO Ratio Formula	Measure unit	Derived parameters
Ratio = A/B A: Left atrium diameter B: Aortic diameter	-	-

RV Volume Formula	Measure unit	Derived parameters
RVV = A * D*2/3 A: RV Area D: RV long axis	ml	-
Accuracy: ± 21%		

Pulmonary Artery/RVOT Area Formula	Measure unit	Derived parameters
Area =Π * (D/2)^2 D: Pulmonary artery/RVOT Artery diameter	cm^2	-

LA Volume Formula	Measure unit	Derived parameters
LAV= (0.85 * A * B)/C A: Left atrium area – 4AC B: Left atrium area – 2AC C: Left atrium length	ml	-
Accuracy: ± 24%		
Oh J, Seward J, Tajik A The echo manual-Second edition, Lippincott Williams &Wilkins		

Bibliographic References and Formulas in M-Mode

LV Ejection Fraction Formula	Measure unit	Derived parameters
EF = (A-B)*100/A	-	A=(7 * D^3)/(2,4 * D) D: LV diastolic diameter (cm) B=(7 * D^3)/(2,4 * D) D: LV systolic diameter (cm)
Accuracy: ± 30%		
Teichholz L.E., ... , Problems in Echocardiographic Volume Determinations: Echocardiographic/Angiographic Correlations in the Presence or Absence of Asynergy. In: American Journal of Cardiology, 37, January 1976.1986, pp. 153-155.		

LV Volume Formula	Measure unit	Derived parameters
Volume = 8 * D^3 / (2,4 + D) D: Left ventricle diameter	ml	-

Accuracy: ± 15%
Teichholz L.E., ... , Problems in Echocardiographic Volume Determinations: Echocardiographic/Angiographic Correlations in the Presence or Absence of Asynergy. In: *American Journal of Cardiology*, 37, January 1976.1986, pp. 153-155.

Stroke Volume Formula	**Measure unit**	**Derived parameters**
SV = A - B A: LV diastolic volume B: LV systolic volume	ml	-
Accuracy: ± 42%		
G Kronik, J Slany, „Comparative Value of Eight M-Mode Echocardiographic Formulas for Determining Left Ventricular Stroke Volume" *Circulation* 1979;60;1308-1316		

Stroke Index Formula	**Measure unit**	**Derived parameters**
SI = A/B A: Stroke volume B: BSA	-	-
G Kronik, J Slany , … „Comparative Value of Eight M-Mode Echocardiographic Formulas for Determining Left Ventricular Stroke Volume" Circulation 1979;60;1308-1316		

Cardiac Output Formula	**Measure unit**	**Derived parameters**
CO = (A – B) * HR A: LV diastolic volume B: LV systolic volume	l/min	-
Accuracy: ± 45%		
G. de Simone,R, B. Devereux … „Stroke Volume and Cardiac Output in Normotensive Children and Adults: Assessment of Relations With Body Size and Impact of Overweight", *Circulation*. 1997;95:1837-1843		

Cardiac Index Formula	**Measure unit**	**Derived parameters**
CI = A/B A: Cardiac output B: BSA	-	-
G. de Simone,R, B. Devereux … „Stroke Volume and Cardiac Output in Normotensive Children and Adults: Assessment of Relations With Body Size and Impact of Overweight", *Circulation*. 1997;95:1837-1843		

LV Fractional Shortening Formula	Measure unit	Derived parameters
FS = (A - B)*100/A A: LV diastolic diameter B: LV systolic diameter	-	-
Accuracy: ± 10%		
Feigenbaum H., Echocardiography, 4th Edition, Lea & Febiger, Philadelphia, 1986, pp. 153-155.		

Septum Thickening Formula	Measure unit	Derived parameters
S% = (A - B)*100/B A: systolic interventricular septum B: diastolic interventricular septum	-	-
Accuracy: ± 10%		
Feigenbaum H., Echocardiography, 4th Ed., Lea & Febiger, Philadelphia, 1986, pp. 153-155.		

Posterior Wall Thickening Formula	Measure unit	Derived parameters
PW% = (A - B)*100/B A: systolic posterior wall B: diastolic posterior wall	-	-
Accuracy: ± 10%		
Feigenbaum H., Echocardiography, 4th Ed., Lea & Febiger, Philadelphia, 1986, pp. 153-155.		

LV Mass Formula	Measure unit	Derived parameters
$LVM=1.04[(A+B+C)^3 – B^3] – 13.6$ A: diastolic interventricular septum B: LV diastolic diameter C: diastolic posterior wall	g	-
Accuracy: ± 15%		
Devereux R.B., Reichek N., ..., Echocardiographic Determination of Left Ventricular Mass in Man - Anatomic Validation of the Method. In: Circulation, n.55, 1977, pp. 613-8		

LV Mass Index Formula	Measure unit	Derived parameters
LVMI=LVM/BSA LVM: LV Mass BSA: Body Surface Area	-	-

Accuracy: ± 15%
Devereux R.B., Reichek N., ..., Echocardiographic Determination of Left Ventricular Mass in Man - Anatomic Validation of the Method. In: Circulation, n.55, 1977, pp. 613-8

LA/Aorta Diameter Formula	Measure unit	Derived parameters
LA/AD =A/B A: Left Atrium B: Aortic diameter	-	-
Accuracy: ± 10%		

Excentricity Index Formula	Measure unit	Derived parameters
EXC IND =A/B A: Aortic diameter B: Aortic coaptation line	-	-
Accuracy: ±10%		
Nanda N.C., Gramiak R.: Evaluation of Bicuspid Valves by Two-Dimensional Echocardiography. In: American J. Cardiol. 1987, 11 p.372		

Bibliographic References and Formulas in Doppler

Peak Gradient Formula	Measure unit	Derived parameters
Gp = 4*V^2 V: Peak velocity	mmHg	-
Accuracy: ± 16%		
Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 605		

Mean Velocity Formula	Measure unit	Derived parameters
Vmn = FVI/t	m/s	t=flow duration
Accuracy: ± 11%		

Mean Gradient Formula	Measure unit	Derived parameters
Gmn = 4 * ($V1^2$ + $V2^2$ + -------- + Vn^2)/n Vi: Instant velocities	mmHg	-

Accuracy: ± 11%
Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 605

PHT **Formula**	**Measure unit**	**Derived parameters**
PHT = V_{Max} * (1 - 0.707)/Slope	ms	-
Accuracy: ± 28%		
Hatle L., Angelsen B., Noninvasive Assessment of Atrioventricular Pressure Half-Time by Doppler Ultrasound. In: Circulation 60, n.5, 1979, pp. 1096-1104		

Mitral Valve Area **Formula**	**Measure unit**	**Derived parameters**
MVA = 220/PHT	cm^2	-
Accuracy: ± 28%		
Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 605		

E Wave/A WAve **Formula**	**Measure unit**	**Derived parameters**
E/A=A/B	-	-
A: E wave peak velocity		
B: A wave peak velocity		
Accuracy: ± 10%		

Miocardiac Performance Index **Formula**	**Measure unit**	**Derived parameters**
MPI = (A+B)/C	-	-
A: Isovolumetric Contraction Time		
B: Isovolumetric Relax Time		
C: Ejection Time		
Accuracy: ± 6%		
C.Bruch, A.Schmermund .."TEI-index in patients with mid-to-moderate congestive heart failure", In: Eu. H.J. 2000, n.21 pp.1888-1895		

dP/dt Ratio **Formula**	**Measure unit**	**Derived parameters**
dP/dt = 32/t	mmHg/s	-
t: time elapsed between –1m/s to –3m/s velocity values		
Accuracy: ± 3%		

Bargiggia GS, Bertucci C,…, Anew method for estimating left ventricular dP/dt by continuous wave Doppler echocardiography. Validation studies at cardiac catheterisation, In: Circulation 1989; 80; 1287-1292

Regurgitation Flow (PISA) Formula	**Measure unit**	**Derived parameters**
REG = 6.28 * R^2 * V R: Radius V: Aliasing velocity	ml/s	-
Accuracy: ± 14%		
Bargiggia G.S., Tronconi L., Sahn D.J. …, A New Method for Quantitation of Mitral Regurgitation Based on Color Flow Doppler Imaging of Flow Convergence Proximal to Regurgitant Orifice. In: Circulation, 1991, 84: pp. 1481-1489		

Effective Regurgitation Orefice (PISA) Formula	**Measure unit**	**Derived parameters**
O = 6.28 * R^2 * V1 / V2 R: Radius V1: Aliasing velocity V2: Regurgitation peak velocity	ml	-
Accuracy: ± 22%		
Oh J, Seward J, Tajik A The echo manual-Second edition, Lippincott Williams &Wilkins		

Mitral Regurgitation Volume (PISA) Formula	**Measure unit**	**Derived parameters**
MVOL = 6.28 * R^2 * V / 3.25 R: Radius V: Aliasing velocity	ml	-
Accuracy: ± 14%		
Rossi A., Dujardin K.S., …, Rapid Estimation of Regurgitant Volume by the Proximal Isolvelocity Surface Area Method in Mitral Regurgitation: Can Continuous-Wave Doppler Echocardiography Be Omitted? In: Journal of the American Society of Echocardiography. Volume 11, Number 2, pp. 138-148.		

Aortic Regurgitation Volume (PISA) Formula	**Measure unit**	**Derived parameters**
REG VOL = 6.28 * R^2 * V1 * FVI / V2 R: R Radius V1: aliasing velocity FVI: flow velocity integral	ml	-

V2: Regurge peak velocity

Accuracy: ± 30%

Shiota T., Jones M., Yamada I., …, Effective Regurgitant orifice Area by the Color Doppler Flow Convergence Method for Evaluating the Severity of Chronic Aortic Regurgitation. An Animal Study. In: Circulation, 1996; 93; pp. 594-602.

E' Wave/A' Wave Formula	**Measure unit**	**Derived parameters**
E'/A' =A/B	-	-
A: Peak velocity E' wave		
B: Peak velocity A' wave		
Accuracy: ± 16%		

E Wave/E' Wave Formula	**Measure unit**	**Derived parameters**
E/E' =A/B	-	-
A: Peak velocity E wave		
B: Peak velocity E' wave		
Accuracy: ± 16%		

Intraventricular Mechanical Delay Formula	**Measure unit**	**Derived parameters**
IMD =A-B	ms	-
A: Aorta Pre-ejection time		
B: Pulmonary Pre-ejection time		
Accuracy: ± 9%		

F.Knebel, R.K.Reibeis.., "Tissue Doppler Echocardiography and Biventricular Pacing Heart Failure: Patient Selection, Procedural Guidance, Follow up, quantification of Success", IN: Card Ultr 2004, n.2-17

Effective Aortic Valve Area Formula	**Measure unit**	**Derived parameters**
AVA = A*FVI1/FVI2	cm^2	$A=\Pi*(D/2)^2$
A: LVOT area		D: LVOT diameter
FVI1: LVOT flow velocity integral		
FVI2: aortic tract flow velocity integral		
Accuracy: ± 28%		

Huntsman L., Stewart D., ..., Noninvasive Doppler Determination of Cardiac Output in Man, In: Circulation 67, n. 3, March 1983

Maximal Aortic Valve Area Formula	Measure unit	Derived parameters
AMVA = A*V1/V2	cm^2	$A=\Pi*(D/2)^2$
A: LVOT area		D: LVOT diameter
V1: Aortic Peak velocity in LVOT		
V2: Aortic Peak velocity		
Accuracy: ± 22%		
Zaghbi WA, Farmer KL,…, Accurate non-invasive quantification of stenotic aortic valve area by Doppler echocardiography, In:Circulation 1986; 73; 452-459		

Systolic Pressure Formula	Measure unit	Derived parameters
$Ps = 4*V^2 + 10$ [Set pressure gradient]	mmHg	-
V: regurge velocity		
Accuracy: ± 16%		
Currie P.J., ..., Continuous Wave Doppler Determination of Left Ventricular Pressure: a Simultaneous Doppler Catheterization Study in 127 Patients. In: J. Amer. College Cardiol. 1985, 6, p.750		

Systolic Velocity/Diastolic Velocity Formula	Measure unit	Derived parameters
VS/VD = A/B	-	-
A: systolic velocity		
B: diastolic velocity		
Accuracy: ± 10%		

Heart Rate Formula	Measure unit	Derived parameters
HR = 60/T	bpm	-
T: R-R interval		
Accuracy: ± 3%		

Stroke Volume Formula	Measure unit	Derived parameters
SV = A * FVI	ml	$A=\Pi*(D/2)^2$
A: Area		D: Diameter
FVI: Flow velocity		
Accuracy: ± 19%		
Huntsman L., Stewart D., ..., Noninvasive Doppler Determination of Cardiac Output in Man, In: Circulation 67, n. 3, March 1983		

Stroke Index Formula	Measure unit	Derived parameters
SI = A/B A: Stroke Volume B: BSA	-	-
Accuracy: ± 19%		
Huntsman L., Stewart D., ..., Noninvasive Doppler Determination of Cardiac Output in Man, In: Circulation 67, n. 3, March 1983; Skjaerpe T, Hegrenaes L.…., Non invasive estimation of valve area in patients with aortic stenosis by Doppler ultrasound and two-dimensional echocardiography, In: Circulation 1985; 72; 810-818		

Cardiac Output Formula	Measure unit	Derived parameters
CO = A*FVI*HR A: Area FVI: Flow velocity integral HR: heart rate	l/min	$A=\Pi*(D/2)^2$ D: Diameter
Accuracy: ± 21%		
Huntsman L., Stewart D., ..., Noninvasive Doppler Determination of Cardiac Output in Man, In: Circulation 67, n. 3, March 1983		

Cardiac Index Formula	Measure unit	Derived parameters
CI = A/B A: Cardiac Output B: BSA	-	-
Accuracy: ± 19%		
Huntsman L., Stewart D., ..., Noninvasive Doppler Determination of Cardiac Output in Man, In: Circulation 67, n. 3, March 1983; Skjaerpe T, Hegrenaes L.…., Non invasive estimation of valve area in patients with aortic stenosis by Doppler ultrasound and two-dimensional echocardiography, In: Circulation 1985; 72; 810-818		

Qp/Qs Ratio Formula	Measure unit	Derived parameters
Qp/Qs = A/B A: Pulmonary artery stroke volume B: LVOT stroke volume	-	-
Accuracy: ± 42%		
Sanders S.P., …, Measurement of Systemic and Pulmonary Blood Flow and Qp/Qs Ratio using Doppler and Two-Dimensional Echocardiography. In: Am. J. Cardiol. 1983, 51, p.952		

Chapter 6

6 - Vascular Calculations

Icon for Vascular application

Refer to "Getting Started" manual for applications available on ***MyLab*** *model.*

This chapter lists the measurements available for vascular applications with the relative bibliographic references. The formulas without bibliographic references are universally accepted mathematic equations.

This package is available only if the system has a vascular license.

Vascular measurements are organized in multilevel groups. The first level defines the main anatomical structure; the second lists the measurements, which can be performed in the various districts of the structure. Bilateral measurements are then grouped on the right (indicated by R labels) and the left (indicated as L): the **SIDE** key selects the desired side.

The following lists contain the labels which are shown without the side indication. When sides are applicable, the label on the screen will correspond to one of the lists below + the "R" or "L" character, according to the active side.

Please refer to the "System Configuration" section in this manual for information on how to configure the vascular calculation package.

Vascular calculations in B-Mode

CAROTID STENOSIS Group

CAR STEN

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
CCA ST D	Common Carotid Artery Stenosis Diameter
ICA ST D	Internal Carotid Artery Stenosis Diameter
ECA ST D	External Carotid Artery Stenosis Diameter
CCA ST A	Common Carotid Artery Stenosis Area
ICA ST A	Internal Carotid Artery Stenosis Area
ECA ST A	External Carotid Artery Stenosis Area

In each "Diameter" subgroup true and residual diameters are measured, while each "Area" subgroup includes the measurement of areas by contour.

Once measurements have been completed, the system automatically computes the vessel diameter and area % reduction (%ST).

AORTA group

AORTA

This group includes the following measurement sub-groups:

Subgroup	
AO PRO D	Aorta proximal diameter
AO DISY D	Aorta distal diameter
AO DS L	Aorta dilation segment length
AO DS W	Aorta dilation segment width

In each "Diameter" subgroup systolic and diastolic diameters are measured.

Intima Media Thickness (IMT) group

CCA IMT

The distance between Intima and Media-Avventitia in Common Carotid artery is automatically estimated on frozen and archived images. This measurement can be activated on **MyLab60**, **MyLab70** and **MyLab90** models with LA523 and LA522 probes and with the following settings:

Parameter	
Depth	≤ 44 mm
Colour	Inactive
Frequency	Fundamental (no TEI, no CnTI)
Persistence	0
Steering	Inactive
Trapezoidal	Inactive
Zoom	Inactive

A warning message is displayed whenever one of these settings is not applied. The preset "IMT Carotid" automatically sets all these parameters to quickly activate the IMT measure.

> **Note**
>
> If the system is equipped with a QIMT license (see next chapter for further information), the automatic calculation of the Intima-Media thickness is available only through the QIMT package.

This group is bilateral and includes the following measurement group.

Group	
MN IMT	Mean value of Intima Media distance

Performing Measurements

- Select the "IMT Carotid" preset.
- Acquire a 2D image showing an Intima-Media distance which can be seen for at least 20 mm from the carotid bulb.
- Press **FREEZE**.
- Select an end diastolic frame showing the intima .
- Press the **MEASURE** key and select the "CCA IMT" group from the menu.

- Position the ROI using the trackball (it is recommended to place the ROI left side at 10 mm from the bulb).
- Rotate the **SWAP** key and dimension the ROI with the trackball: the ROI size is displayed on the left side of the image.
- The blue and orange lines within the ROI respectively indicate the Intima and the Media-Adventitia. The parts not automatically detected by the algorithm are not displayed and are not therefore considered for the mean value estimation. The displayed cross indicates where the maximum Intima-Media distance is located.

The maximun (**IMX**) and mean values (**IMN**) are automatically calculated.

Note

The IMT automatic calculation provides a quick estimation of the pathology under exam. It is recommended to compare the obtained estimations with the measurements directly performed on the structures under exam.

Vascular Calculations in Doppler

CAROTID VELOCITIES Group

CAR VEL

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
CCA PRO	Proximal Common Carotid
CCA PRFV	Proximal Common Carotid Flow
CCA MID	Middle Common Carotid
CCA MIFV	Middle Common Carotid Flow
CCA DIS	Distal Common Carotid
CCA DIFV	Distal Common Carotid flow
BULB	Bulb
BULB FVI	Bulb Flow
ECA	External Carotid
ECA FVI	External Carotid Flow
ICA PRO	Proximal Internal Carotid
ICA PRFV	Proximal Internal Carotid Flow
ICA MID	Middle Internal Carotid
ICA MIFV	Middle Internal Carotid Flow
ICA DIS	Distal Internal Carotid
ICA DIFV	Distal Internal Carotid Flow
VA	Vertebral Artery
VA FVI	Vertebral Artery Flow
SA	Subclavian Artery
SA FVI	Subclavian Artery Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Refer to "System Configuration" section for further details on the Vascular report

When the velocities of the internal and common carotids are available, their ratio is automatically calculated.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

LOWER LIMBS VEINS group

L LIMBS

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
CAVA RT	Cava vein reflux time
CIV RT	Common iliac vein reflux time
EIV RT	External iliac vein reflux time
IIV RT	Internal iliac vein reflux time
CFV RT	Common femoral vein reflux time
SFV RT	Superficial femoral vein reflux time
PFV RT	Profundal femoral vein reflux time
PV RT	Popliteal vein reflux time
GV RT	Gemellary vein reflux time
ATV RT	Anterior tibial vein reflux time
PTV RT	Posterior tibial vein reflux time
SFAN RT	Saphenous- femoral anastomosis reflux time
SPAN RT	Saphenous- popliteal anastomosis reflux time
GSC RT	Great saphenous vein reflux time
SSC RT	Short saphenous vein reflux time
HUNT RT	Hunterian reflux time
BOYD RT	Boyd reflux time
COCK RT	Cockett reflux time
SUPERF	Time
DEEP	Time

Each subgroup includes the measurement of reflux time, vessel width and thickness.

ABDOMEN Group

ABDOMEN

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
CIA PRO	Proximal Common Iliac Artery
CIA PRFV	Proximal Common Iliac Artery Flow
CIA MID	Middle Common Iliac Artery

Subgroup	
CIA MIFV	Middle Common Iliac Artery Flow
CIA DIS	Distal Common Iliac Artery
CIA DIFV	Distal Common Iliac Artery Flow
EIA PRO	Proximal External Iliac Artery
EIA PRFV	Proximal External Iliac Artery Flow
EIA MID	Middle External Iliac Artery
EIA MIFV	Middle External Iliac Artery Flow
EIA DIS	Distal External Iliac Artery
EIA DIFV	Distal External Iliac Artery Flow
IA BIF	Iliac Artery Bifurcation
IA BIF FV	Iliac Artery Bifurcation Flow
IIA PRO	Proximal Internal Iliac Artery
IIA PRFV	Proximal Internal Iliac Artery Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

LOWER LIMBS group

L LIMBS

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
CFA PRO	Proximal Common Femoral Artery
CFA PROFV	Proximal Common Femoral Artery Flow
CFA MID	Middle Common Femoral Artery
CFA MIFV	Middle Common Femoral Artery Flow
CFA DIS	Distal Common Femoral Artery
CFA DIFV	Distal Common Femoral Artery Flow
PFA	Profundal Femoral Artery
PFA FV	Profundal Femoral Artery Flow
SFA PRO	Proximal Superficial Femoral Artery
SFA PRFV	Proximal Superficial Femoral Artery Flow
SFA MID	Middle Superficial Femoral Artery
SFA MIFV	Middle Superficial Femoral Artery Flow
SFA DIS	Distal Superficial Femoral Artery
SFA DIFV	Distal Superficial Femoral Artery Flow
AKPA	Above Knee Popliteal Artery

Subgroup	
AKP FV	Above Knee Popliteal Artery Flow
BKPA	Belwo Knee Popliteal Artery
BKP FV	Bleow Knee Popliteal Artery Flow
PTA PRO	Proximal Posterior Tibial Artery
PTA PRFV	Proximal Posterior Tibial Artery Flow
PTA MID	Middle Posterior Tibial Artery
PTA DIFV	Middle Posterior Tibial Artery Flow
PTA DIS	Proximal Posterior Tibial Artery
PTA DIFV	Proximal Posterior Tibial Artery Flow
ATA PRO	Proximal Anterior Tibial Artery
ATA PRFV	Proximal Anterior Tibial Artery Flow
ATA MID	Middle Anterior Tibial Artery
ATA MIFV	Middle Anterior Tibial Artery Flow
ATA DIS	Distal Anterior Tibial Artery
ATA DIFV	Distal Anterior Tibial Artery Flow
PeA PRO	Proximal Peroneal Artery
PeA PRFV	Proximal Peroneal Artery Flow
PeA MID	Middle Peroneal Artery
PeA MIFV	Middle Peroneal Artery Flow
PeA DIS	Distal Peroneal Artery
PeA DIFV	Distal Peroneal Artery Flow
DPA	Dorsalis Pedis Artery
DPA FV	Dorsalis Pedis Artery Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

UPPER LIMBS group

U LIMBS

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
SCA PRO	Proximal Superior Cerebella Artery
SCA PRFV	Proximal Superior Cerebella Artery Flow
SCA MID	Middle Superior Cerebella Artery
SCA MIFV	Middle Superior Cerebella Artery Flow
SCA DIS	Distal Superior Cerebella Artery

Subgroup	
SCA DIFV	Distal Superior Cerebella Artery Flow
AA	Axillary Artery
AA FV	Axillary Artery flow
BA PRO	Proximal Brachial Artery
BA PRFV	Proximal Brachial Artery Flow
BA MID	Middle Brachial Artery
BA MIFV	Middle Brachial Artery Flow
BA DIS	Distal Brachial Artery
BA DISV	Distal Brachial Artery Flow
RA PRO	Proximal Radial Artery
RA PRFV	Proximal Radial Artery flow
RA MID	Middle Radial Artery
RA MIFV	Middle Radial Artery Flow
RA DIS	Distal Radial Artery
RA DIFV	Distal Radial Artery Flow
UA PRO	Proximal Ulnar Artery
UA PRFV	Proximal Ulnar Artery Flow
UA DIS	Distal Ulnar Artery
UA DIFV	Distal Ulnar Artery
PALM A	Palmar Arch Artery
PalA FV	Palmar Arch Artery
DigA	Digital Artery
DigA FV	Digital Artery Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

AORTA group

AORTA

This group includes the following measurement sub-groups:

Subgroup	
AO PRO	Proximal Aorta
AO PRFV	Proximal Aorta Flow
AO MID	Middle Aorta
AO MIFV	Middle Aorta Flow
AO DIS	Distal Aorta

Subgroup	
AO DIFV	Distal Aorta flwo
PP SMA	Post Prandial Superior Mesenteric Artery
PPSMA FV	Post Prandial Superior Mesenteric Artery Flow
PP CELIAC	Post Prandial Celiac
PPCEL FV	Post Prandial Celiac Flow
SMA PRO	Proximal Superior Mesenteric Artery
SMA PRFV	Proximal Superior Mesenteric Artery Flow
SMA MID	Middle Superior Mesenteric Artery
SMA MIFV	Middle Superior Mesenteric Artery Flow
SMA DIS	Distal Superior Mesenteric Artery
SMA DIFV	Distal Superior Mesenteric Artery Flow
CEL TRIP	Celiac Tripod
CELTR FV	Celiac Tripod Flow
INF MES A	Inferior Mesenteric Artery
IMA FV	Inferior Mesenteric Artery Flow
SA PRO	Proximal Subclavian Artery
SA PRFV	Proximal Subclavian Artery Flow
SA MID	Middle Subclavian Artery
SA MIFV	Middle Subclavian Artery Flow
SA DIS	Distal Subclavian Artery
SA DIFV	Distal Subclavian Artery Flow
HA	Hepatic Artery
HA FV	Hepatic Artery Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Refer to "System Configuration" section for further details on the Vascular report

When the velocities of the Superior Mesenteric Artery and of the Aorta are available, their ratio is automatically calculated.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

ARTERIAL GRAFT group

ART GRA

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
A A VE	Inflow Arterial Vessel
AV FVI	Inflow Arterial Vessel Flow
A AN PR	Arterial Anastomosis Proximal
AAN PFV	Arterial Anastomosis Proximal Flow
A GR PR	Proximal Graft
AGR PRFV	Proximal Graft Flow
A GR MI	Middle Graft
AGR MIFV	Middle Graft Flow
A GR DI	Distal Graft
AGR DIFV	Distal Graft Flow
A AN DI	Distal Arterial Anastomosis
AAN DFV	Distal Arterial Anastomosis Flow
A OU VE	Outflow Arterial Vessel
VV FVI	Outflow Arterial Vessel Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

DIALYSIS GRAFT group

DIA GRA

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
D A VE	Inflow Arterial Vessel
AV FVI	Inflow Arterial Vessel Flow
D AN PR	Proximal Arterial Anastomosis
AAN PFV	Proximal Arterial Anastomosis FLow
D GR PR	Proximal Graft
AGR PRFV	Proximal Graft Flow
D GR MI	Middle Graft
AGR MIFV	Middle Graft Flow
D GR DI	Distal Graft
AGR DIFV	Distal Graft Flow
D AN DI	Distal Arterial Anastomosis

Subgroup	
AAN DFV	Distal Arterial Anastomosis Flow
PUN1	Puncture 1
PUN1 FV	Puncture 1 Flow
PUN2	Puncture 2
PUN2 FV	Puncture 2 Flow
PUN3	Puncture 3
PUN3 FV	Puncture 3 Flow
VEN VES	Venous Vessel
VV FVI	Venous Vessel Flow
VEN JUN	Venous Junction
VJU FV	Venous Junction Flow

The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts; all other subgroups include the measurement of end-diastolic and end-systolic velocities.

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

RENAL ARTERY group

RA

This group is bilateral and includes the following measurement sub-groups:

Subgroup	
AORTA	Aorta
AO FVI	Aorta Flow
REN OST	Renal Artery Ostium
RA OSFV	Renal Artery Ostium Flow
REN PRO	Proximal Renal Artery
RA PRFV	Proximal Renal Artery Flow
REN MID	Middle Renal Artery
RA MIFV	Middle Renal Artery Flow
REN DIS	Distal Renal Artery
RA DIFV	Distal Renal Artery Flow
SEGM1 U	Upper Arterial Segment 1
S1UP FV	Upper ArterialSegment 1 Flow
SEGM2 U	Upper Arterial Segment 2
S2UP FV	Upper ArterialSegment 21 Flow
SEGM1 L	Lower Arterial Segment 1

Subgroup	
S1LP FV	Lower ArterialSegment 1 Flow
SEGM2 L	Lower Arterial Segment 2
S2LP FV	Lower ArterialSegment 2 Flow
HIL AT	Hilar acceleration time

The four groups "Arterial Segment" include measurement of end-diastolic velocity and raising time: once these measures are completed, the acceleration is automatically calculated. The "**HIL AT**" group includes measurement of the Hilar acceleration time. The "Flow" subgroups include the flow measurement (by drawing the contour) of the single vessel districts

Once all flow measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
PI	Pulsatility Index
RI	Resistance Index
Vp	Peak velocities
Vmn	Mean Velocity
Vrev	Reverse velocity
DV	Diastolic velocity
Gp	Peak Gradient
Gmn	Mean Gradient
A	Acceleration
AT	Acceleration Time
SV/DV	Systolic velocity/Diastolic velocity
DV/SV	Diastolic velocity/Systolic velocity

Formulas and Bibliographic References in B-Mode

Formula	Measure unit	Derived parameters
%ST = 100 * [1 - (D1/ D0)] D1: Residual Diameter D0: True Diameter	-	-
Accuracy: ± 10%		
W. Robert Felix Jr., Noninvasive Diagnosis of Peripheral Vascular Disease, Raven Press, p. 121		

Formula	Measure unit	Derived parameters
%ST = 100 * [1 - (A1/A0)] A1: Residual Area A0: True Area	-	-
Accuracy: ± 16%		
W. Robert Felix Jr., Noninvasive Diagnosis of Peripheral Vascular Disease, Raven Press, p. 121		

IMT Bibiographic Reference

Francesco Faita, Vincenzo Gemignani, Elisabetta Bianchini, Chiara Giannarelli, and Marcello Demi , Real-time measurement system for the evaluation of the Intima Media Thickness with a new edge detector, IEEE International Conference of the Engineering in Medicine and Biology Society, New York City, USA, 30 august- 3 september 2006, pagg 715-718

Formulas and Bibliographic References in Doppler

Formula	Measure unit	Derived parameters
$FVI = \Sigma V_i * \Delta T$	-	-
V_i: Instant Velocity		
ΔT: Time interval		
Accuracy: ± 8%		

Formula	Measure unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity		
VD: Telediastolic Velocity		
VR: Reverse Velocity		
VM: Mean Velocity		
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formula	Measure unit	Derived parameters
RI = *(VP - VD) / VP Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VP Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity		
VD: Telediastolic Velocity		
VR: Reverse Velocity		
VM: Mean Velocity		
Accuracy: ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formula	Measure unit	Derived parameters
$G = 4 * V_i^2$	-	-
V_i: Instant Velocity		
Accuracy: ± 16%		
Weyman A., Principles and Practice of Echocardiography, Lea & Febiger, 1994, p. 516		

Formula	Measure unit	Derived parameters
$FS = V_{MT} * AREA$	-	$AREA = \pi * (D/2)^2$
V_{MT}: Time Average Velocity		D: Vessel diameter
Accuracy: ± 21%		
Nichols W., O'Rourke M., McDonald's Blood Flow in Arteries, Edward Arnold London, p. 204		

Chapter 7

7 - Automatic QIMT Calculation

QIMT Icon

This chapter explains how to activate and use the QIMT (Quality Intima Media Thickness) calculation. The QIMT calculation automatically measures the thickness between the intima and the media on the image in real time using the radio frequency reception signal. The calculated value is compared with reference tables for the estimation of the expected age of the patient.

Refer to the "Getting Started" manual to find out which **MyLab** *models have a QIMT licence*

Enabling the calculation requires a specific licence in systems where the vascular application is available.

Activating the QIMT Calculation

The automatic QIMT calculation can be activated from the vascular application with the LA522, LA523 and LA332 probes.

Procedure

- Enter the patient's data, and in particular specify gender and date of birth.

Note

The estimate of the expected age can be calculated only when both these pieces of information have been entered.

- Select the vascular application and, if necessary, the probe.
- Select the reference table in the "QIMT Table" field.
- Press OK to enter real time mode.
- Press the **TOOLS** key and select the QIMT icon.

Note

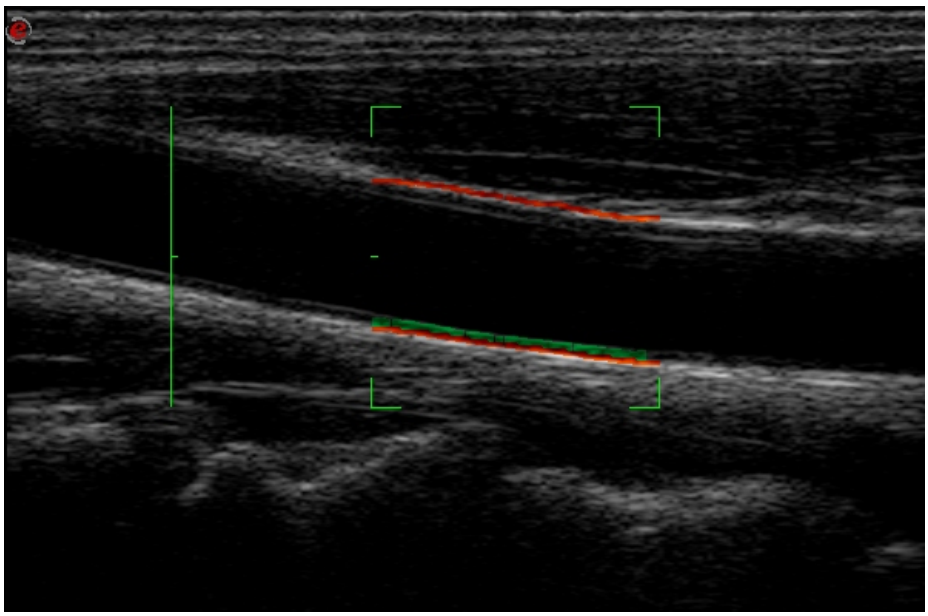
The QIMT calculation cannot be activated when the biopsy is selected or if one of the following modes is active: 3D/4D, CnTi or VPan.

Screen Layout and Automatic Measurements

Once the automatic QIMT calculation is activated, the system automatically moves to the standard B-Mode presentation (with TEI, XView and steering deactivated). Use the controls available to optimise the image within the ROI. The Zoom function is active in QIMT.

> ***Note***
>
> Adjust the controls so that the structure under examination is well defined.

On the 2D image, the ROI cursor (the area of interest) and a reference line (on the left) are superimposed, as shown in the figure below.



The position of the ROI cursor and the line (which is bound to the cursor) can be changed with the trackball. The **ACTION** key allows the dimensions to be changed.

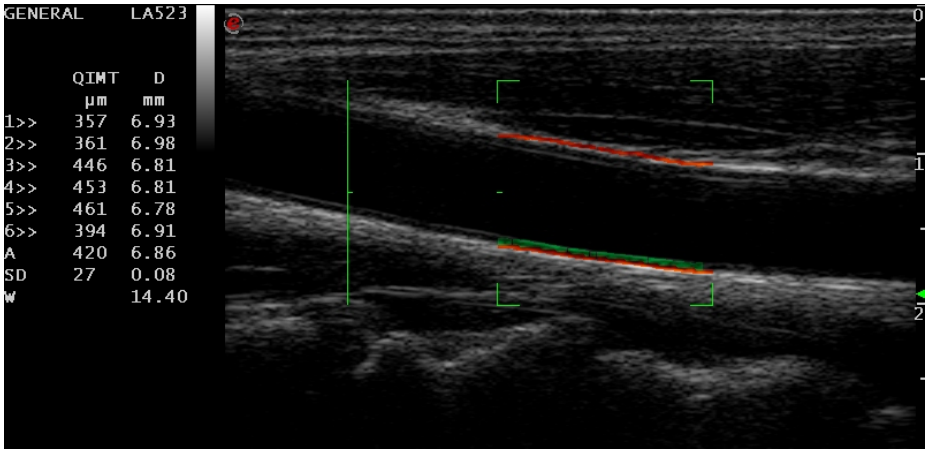
The fixed distance between the vertical line and the ROI can be set by the user: the "Tools Settings" option in the system menu (**MENU** key) allows to configure the distance of the line from the ROI as well as the ROI width.

The reference on the line must be positioned at the centre of the vessel. The green line inside the ROI represents the intima and the orange line represents the adventitia. Points that are not detected are not displayed.

The "Tools settings" option (**MENU** key) allows the user to define which measures are to be displayed. If the display of the average is set, the system shows the vessels dimensions, the QIMT and the relevant standard deviations. If it is not set, the first

column (QIMT) gives the QIMT data, and the second (D) the data for the vessel under examination. The rows of the table contain six (6) successive measurements, continuously updated, their average (M) and standard deviation and the width of the ROI cursor.

On the left of the image the system shows the table with the data from the automatic measurements



The **IMAGE** key saves the screen image with the related measurements, the **CLIP** key saves the clip.

The QIMT algorithm works fine on normal patients for all ages. The automatic detection and real time feedback helps to get the best possible measurements. However, there might be cases in which the algorithm could be unable to track the intima-media thickness. For instance, it could be sometimes difficult to distinguish an enlarged IMT from an initial plaque. In all these situations, it is recommended to check the results of the automatic tracking and to discard them, if theu are not satisfactory.

In Freeze, the **ADD LEFT/RIGHT** key adds the frozen measurements to the examination report. If several measurements are sent to the report, the latest one overwrites the previous one.

Note

The QIMT calculation gives a rapid estimate of the thickness between intima and adventitia. It is recommended to compare the estimates obtained with a direct measurement of the structure under examination.

To exit from the QIMT calculation, press **TOOLS** again and then select the QIMT icon.

Chapter 8

8 - Automatic QAS Calculation

Only on MyLab60, MyLab70 and MyLab90 Models

This chapter explains how to activate and use the QAS (Quality Arterial Stiffness) calculation. The QAS calculation automatically measures the modification of the arterial diameter between the systolic and diastolic phases. The vessel stiffness is calculated starting from this value and from the brachial pressure values

Refer to the "Getting Started" manual to find out which **MyLab** *models have a QAS licence*

Enabling the calculation requires a specific licence in systems where the vascular application is available.

Activating the QAS Calculation

QAS Icon

The automatic QAS calculation can be activated from the vascular application with the LA522, LA523 and LA332 probes.

Procedure

- Enter the patient's data, and in particular specify the systolic and diastolic brachial pressure.
- Select the vascular application and, if necessary, the probe.
- Press OK to enter real time mode.
- Press the **TOOLS** key and select the QAS icon.

Note

The QAS calculation cannot be activated when the biopsy is selected or if one of the following modes is active: 3D/4D, CnTi or VPan.

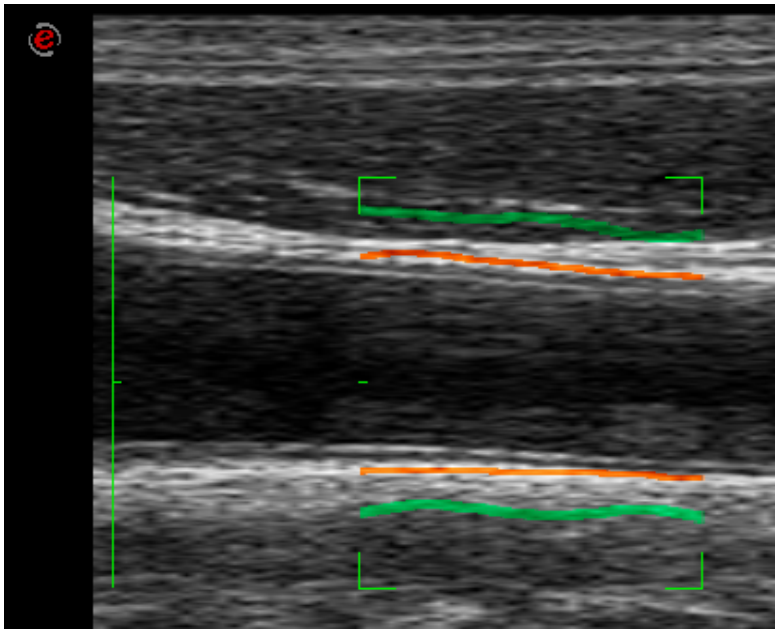
Screen Layout and Automatic Measurements

Once the automatic QAS calculation is activated, the system automatically moves to the standard B-Mode presentation (with TEI, MView, XView, TP View and steering deactivated).

Use the available controls to optimise the image within the ROI. The Zoom function is active in QAS.

> ***Note***
>
> Adjust the controls so that the structure under examination is well defined.

On the 2D image, the ROI cursor (the area of interest) and a reference line (on the left) are superimposed, as shown in the figure below.



The position of the ROI cursor and the line (which is bound to the cursor) can be changed with the trackball. The **ACTION** key allows the dimensions to be changed.

The reference on the line must be positioned at the centre of the vessel. The reference line has to be positioned on the carotid bifurcation when measuring it.

The red line inside the ROI represents the arterial diastolic diameter, the blue line represents the arterial distension: the **AMPLIF** key increases or decreases its amplitude.

The distension curve over time is shown in blue below the ultrasound image. The **GAIN** key changes the distension amplitude.

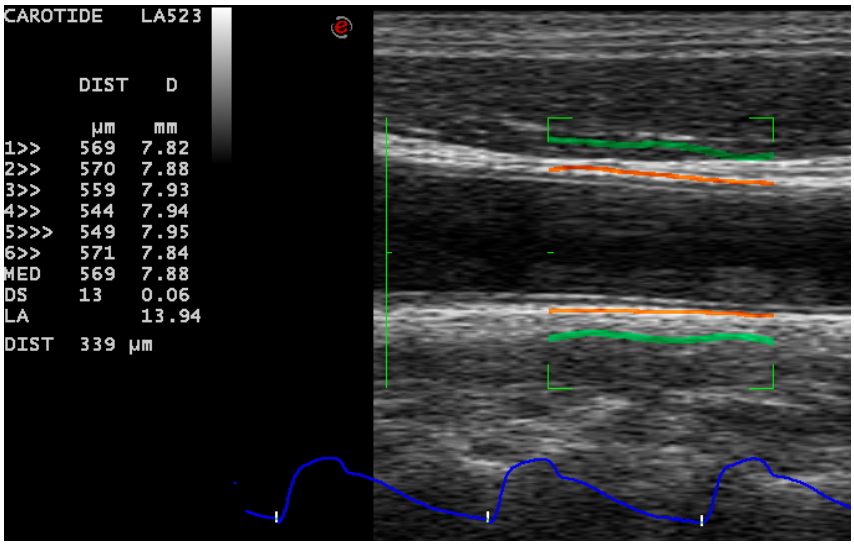
The system cyclically computes six (6) successive measurements of both the arterial distension and diameter. The "Tools settings" option (**MENU** key) allows the user to define which measures are to be displayed.

If the display of the only average is set, the system shows the ROI size, the arterial diameter and distension and the relevant standard deviations. Otherwise, on the left of the image the system shows the table with the results of the automatic measures. The first column (DIST) indicates the distension, the second (D) the arterial diameter. The rows of the table contain the six (6) successive measurements, continuously updated, their average (AVG) and standard deviation (SD) and the width of the ROI cursor.

The vessel distension and diameter are measured several times on each cardiac cycle. The average is calculated for each cardiac cycle.

In Freeze, the arterial distension curve can be scrolled using the trackball: the displayed distension value refers to the instantaneous value while the other parameters refer to the measurements performed in the previous cardiac cycle.

On the left of the image the system shows the table with the results of the automatic measurements



The **IMAGE** key saves the screen image with the related measurements.

The QAS algorithm works correctly on normal patients thanks to the automatic detection in real time. However, there might be cases in which the algorithm could be unable to track the distension.

In Freeze, the **ADD LEFT/RIGHT** key adds the frozen measurements and the distension curve to the examination report. If several measurements are sent to the report, the most recent overwrites the previous one.

If the ALWAYS REQUIRE PRESSURE DATA field has been checked in the QAS settings ("Tools settings" option of the **MENU** key), the system automatically asks to enter these data before sending the measurements to the report. Enter the data and press OK to confirm.

To exit the QAS calculation, press **TOOLS** again and then select the QAS icon.

Chapter 9

9 - Adult Cephalic Calculations

*Refer to Getting Started manual for applications available on **MyLab** models.*

This chapter lists the measurements available with the Adult Cephalic application, available with the Vascular licence.

Application icon

Adult Cephalic


Bilateral measurements are then grouped on the right (indicated by R labels) and the left (indicated as L): the **SIDE** key selects the desired side. The following lists contain the labels which are shown without the side indication. When sides are applicable, the label on the screen will correspond to one of the lists below + the "R" or "L" character, according to the active side.

The user can measure distances in B-Mode and flows in Doppler. For details on how to set measurement descriptions and labels, read the "Application Measurements" chapter in the "System Configuration" section of this manual.

Calculations in B-Mode

Temporal First Segment Group

TEMP 1

This group is bilateral and includes the following measurements:

Parameter		Label	Measure
MCA 1	Middle Cerebral Artery – Segment 1	MC1	Distance
MCA 2	Middle Cerebral Artery – Segment 2	MC2	Distance
ACA	Anterior Cerebral Artery	ACD	Distance
PCA 1	Posterior Cerebral Artery – Segment 1	PC1	Distance
PCA 2	Posterior Cerebral Artery – Segment 2	PC2	Distance

Temporal Second Segment Group

TEMP 2

This group is bilateral (with the exception of Basilar and Anterior Communicant arteries) and includes the following measurements:

Parameter		Label	Measure
BASILAR	Basilar Artery	BASD	Distance
ACoA	Anterior Communicant Artery	ACoD	Distance
BIF	Bifurcation	BID	Distance
TERM IC	Terminal Internal Cerebral Artery	TIC	Distance
VA	Vertebral Artery	VAD	Distance
PCoA	Posterior Communicant Artery	PCD	Distance

Mandibular Group

MANDIB

This group is bilateral and includes the following measurements:

Parameter		Label	Measure
ICA DIS	Internal Carotid Artery - Distal	IDP	Distance
C5	C5 distance	C5D	Distance
C6	C6 distance	C6D	Distance

Calculations in Doppler

Temporal First Segment Group

TEMP 1

This group is bilateral and includes the following sub-groups:

Subgroup	
MCA 1	Middle Cerebral Artery – Segment 1
MCA 2	Middle Cerebral Artery – Segment 2
ACA	Anterior Cerebral Artery
PCA 1	Posterior Cerebral Artery – Segment 1
PCA 2	Posterior Cerebral Artery – Segment 2

Each subgroup includes the following measurements:

Parameter		Label	Meas.
FVI	Flow Profile	FVI	Contour
Vp	Peak velocity	Vp	Velocity
D	Depth	D	Distance

Once all measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
Vmn	Mean velocity
EDV	End diastolic velocity
PI	Pulsatility Index
RI	Resistance Index
AT	Acceleration time

Temporal Second Segment Group

TEMP 2

This group is bilateral (with the exception of Basilar and Anterior Communicant arteries) and includes the following sub-groups:

Subgroup	
BASILAR	Basilar Artery
ACoA	Anterior Communicant Artery
BIF	Bifurcation
TERM IC	Terminal Internal Cerebral Artery
VA	Vertebral Artery
PCoA	Posterior Communicant Artery

Each subgroup includes the following measurements:

Parameter		Label	Meas.
FVI	Flow Profile	FVI	Contour
Vp	Peak velocity	Vp	Velocity
D	Depth	D	Distance

Once all measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
Vmn	Mean velocity
EDV	End diastolic velocity
PI	Pulsatility Index
RI	Resistance Index
AT	Acceleration time

Mandibular Group

MANDIB

This group is bilateral and includes the following sub-groups:

Subgroup	
ICA DIS	Internal Carotid Artery - Distal
C5	C5 velocity
C6	C6 velocity

Each subgroup includes the following measurements:

Parameter		Label	Meas.
FVI	Flow Profile	FVI	Contour
Vp	Peak velocity	Vp	Velocity
D	Depth	D	Distance

Once all measurements have been completed, the system automatically computes the parameters listed in the table below.

Parameter	
Vmn	Mean velocity
EDV	End diastolic velocity
PI	Pulsatility Index
RI	Resistance Index
AT	Acceleration time

Formulas and Bibliographic References

Formula	Measure unit	Derived parameters
FVI = $\Sigma V_i * \Delta T$	-	-
V_i: Instant Velocity		
ΔT: Time interval		
Accuracy: ± 8%		

Formula	Measure unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity		
VD: Enddiastolic Velocity		
VR: Reverse Velocity		
VM: Mean Velocity		
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formula	Measure unit	Derived parameters
RI = *(VP - VD) / VP Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VP Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity		
VD: Enddiastolic Velocity		
VR: Reverse Velocity		
VM: Mean Velocity		
Accuracy: ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Chapter 10

10 - General Imaging and Pediatric Calculations

Refer to "Getting Started" manual for applications available on ***MyLab*** *model.*

This chapter lists the measurements available with the General Imaging and Pediatric licenses. The following applications are activated by this license:

Application icons

Abdominal	Breast	Musculo-skeletal	Small Part	Thyroid	Pediatric
					

General Imaging Calculation Packages

In each application, the user can measure distances in B-Mode and velocities in Doppler. For details on how to set measurement descriptions and labels, read the "Application Measurements" section contained in the "System Configuration" section of this manual.

B-Mode

In each application this package allows measurement of up to 18 different distances.

Subgroup	Parameter		Label	Measure
DIST n	DIST n	Distance	D n	Distance

Doppler

In each application this package allows to measure up to 18 different velocities.

Subgroup	Parameter		Label	Measure
VEL n	VEL n	Velocity	V n	Velocity

Pediatric Calculation Packages

The user can measure the hip angle in B-Mode and velocities in Doppler. Bilateral measurements are then grouped on the right (indicated by R labels) and the left (indicated as L): the **SIDE** key selects the desired side. The following lists contain the labels which are shown without the side indication. When sides are applicable, the label on the screen will correspond to one of the lists below + the "R" or "L" character, according to the active side.

For details on how to set measurement descriptions and labels, read the "Application Measurements" section contained in the "System Configuration" section of this manual.

B-Mode

This package allows the following measurements:

Parameter		Label	Measure
HIP BASE	Hip Base	HIP B	Distance
α	Alfa angle	α	Angle
β	Beta angle	β	Angle

Doppler

This package allows to measure up to 18 different velocities.

Parameter		Label	Measure
VEL n	Velocity	V n	Velocity

Thyroid Calculation Packages

The user can measure the volumes in B-Mode.

For details on how to set measurement descriptions and labels, read the "Application Measurements" chapter contained in the "System Configuration" section of this manual.

Thyroid Group

THYROID

This package allows the following measurements:

Subgroup	
R LOBE	Right lobe volume
L LOBE	Left lobe volume
IST AP TH	Isthmus Anterior Posterior Thickness

The "LOBE" subgroups include the volume calculation using the anterior-posterior, traverse and sagittal distances.

Nodules Group

NODULES

This package allows the following measurements:

Subgroup	
NOD 1	Nodule 1 Volume
NOD 2	Nodule 2 Volume
NOD 3	Nodule 3 Volume
NOD 4	Nodule 4 Volume

The "NOD" subgroups include the volume calculation using the anterior-posterior, traverse and sagittal distances.

Parathyroid Glands roup

PARATHYROID

This package allows the following measurements:

Subgroup	
PTH GL 1	Parathyroid Gland 1 Volume
PTH GL 2	Parathyroid Gland 2 Volume
PTH GL 3	Parathyroid Gland 3 Volume
PTH GL 4	Parathyroid Gland 4 Volume

The "PTH GL" subgroups include the volume calculation using the anterior-posterior, traverse and sagittal distances.

Lymph NodesGorup

LYMPH NODES

This package allows the following measurements:

Subgroup	
LYM NOD 1	Lymph Node 1 Volume
LYM NOD 2	Lymph Node 2 Volume
LYM NOD 3	Lymph Node 3 Volume
LYM NOD 4	Lymph Node 4 Volume

The "LYM NOD" subgroups include the volume calculation using the anterior-posterior, traverse and sagittal distances. The ratio between the anterior-posterior and trasverse distances (**AP/TR** value) is calculated as well.

Formula for Volume Calculation

Formula	Measure Unit	Derived Parameter
Vol. = D0*D1*D2*π/6 D0: Fisrt Diameter D1: Second Diameter D2: Third Diameter	cm^3	-
Accuracy = 15%		

Chapter 11

11 - Urology Calculations

Refer to "Getting Started" manual for applications available on MyLab unit.

This chapter lists which measurements are available with the Urology license, with the relative bibliographic references. The formulas without bibliographic references are universally accepted mathematic equations.

Application Icon

Urology


The Urology application has only B-Mode measurements, organized in three groups: Bladder volume, Whole Gland volume and Transitional Zone volume

Application Data

The Prostate Specific Antigen (PSA) can be input together with the patient data. Please refer to the "System Configuration" section in this manual for information on how to configure the Urology calculations package.

Urology Measurements in B-Mode

Bladder Volume Group

BLAD VOL

The group contains the following measurements:

Parameter		Label	Measure
BL DIAM 1	Diameter	BD1	Distance
BL DIAM 2	Diameter	BD2	Distance
BL DIAM 3	Diameter	BD3	Distance

Once measurements have been completed, the system automatically computes the bladder volume (B V).

Formulas and Bibliographic References

Formulas	Measured unit	Derived Parameter
Vol. = D0*D1*D2*π/6 D0: First diameter D1: Second diameter D2: Third diameter	cm^3	-
Accuracy= 15%		
Griffiths, et al., Measuring Bladder Volume and Residual Urine; The Journal of Urology, Vol. 136, 808-812, 1986		

Whole Gland Group

WHG VOL

The group contains the following measurements:

Parameter		Label	Measure
WG DIAM 1	Diameter	D1	Distance
WG DIAM 2	Diameter	D2	Distance
WG DIAM 3	Diameter	D3	Distance

Once measurements have been completed, the system automatically computes the gland volume (WGV),the predicted PSA level based on whole gland volume and the PSA density.

Formulas and Bibliographic References

Formulas	Measure unit	Derived parameter
Vol. = D0*D1*D2*π/6 D0: First diameter D1: Second diameter D2: Third diameter	cm^3	-
Accuracy= 15%		
Peter J, Littrup, M.D., et al., Determination of Prostate Volume with Transrectal US for Cancer Screening; Radiology, Vol. 179, 49-53, 1991		

Formulas	Measure unit	Derived parameter
PSA Denisty = PSA/Vol. D0: First diameter D1: Second diameter D2: Third diameter	ng/ml	Vol. = D0*D1*D2*π/6
Accuracy= 15%		
Fred Lee, M.D., et al., Predicted Prostate Specific Antigen Results Using Transrectal Ultrasound Gland Volume; Cancer Supplement, Vol. 70, No. 1, July 1992 Mitchell C. Benson, et al., Prostate Specific Antigen Density: A means of Distinguishing Benign Prostatic Hypertrophy and Prostate Cancer; The Journal of Urology, Vol. 147, 815-816, March 1992 Mitchell C. Benson, et al., The Use of Prostate Specific Antigen Density to Enhance the Predictive Value of Intermediate Levels of Serum Prostate Specific Antigen; The Journal of Urology, Vol. 147, 817-821, March 1992		

Formulas	Measure unit	Derived parameter
Predicted PSA = Vol. * WFG D0: First diameter D1: Second diameter D2: Third diameter WGF: Correction factor WG	ng	Vol. = D0*D1*D2*π/6
Accuracy= 15%		
Fred Lee, M.D., et al., Predicted Prostate Specific Antigen Results Using Transrectal Ultrasound Gland Volume; Cancer Supplement, Vol. 70, No. 1, July 1992 Mitchell C. Benson, et al., Prostate Specific Antigen Density: A means of Distinguishing Benign Prostatic Hypertrophy and Prostate Cancer; The Journal of Urology, Vol. 147, 815-816, March 1992 Mitchell C. Benson, et al., The Use of Prostate Specific Antigen Density to Enhance the Predictive Value of Intermediate Levels of Serum Prostate Specific Antigen; The Journal of Urology, Vol. 147, 817-821, March 1992		

Transitional Zone Group

TZ P VOL

The group contains the following measurements:

Parameter		Label	Measure
TZ DIAM 1	Diameter	DA	Distance
TZ DIAM 2	Diameter	DB	Distance
TZ DIAM 3	Diameter	DC	Distance

Once measurements have been completed, the system automatically computes the transitional zone volume (**TZV**) and the predicted PSA based on the transitional zone volume.

Formulas and Bibliographic References

Formulas	Measure unit	Derived parameter
Vol. = D0*D1*D2*π/6 D0: First diameter D1: Second diameter D2: Third diameter	cm^3	-
Accuracy= 15%		
Peter J, Littrup, M.D., et al., Determination of Prostate Volume with Transrectal US for Cancer Screening; Radiology, Vol. 179, 49-53, 1991		

Formulas	Measure unit	Derived parameter
Predicted PSA = Vol. * TZF	ng	Vol. = D0*D1*D2*π/6
D0: First diameter		
D1: Second diameter		
D2: Third diameter		
TZF: Correction factor TZ		
Accuracy= 15%		
Fred Lee, M.D., et al., Predicted Prostate Specific Antigen Results Using Transrectal Ultrasound Gland Volume; Cancer Supplement, Vol. 70, No. 1, July 1992 Mitchell C. Benson, et al., Prostate Specific Antigen Density: A means of Distinguishing Benign Prostatic Hypertrophy and Prostate Cancer; The Journal of Urology, Vol. 147, 815-816, March 1992 Mitchell C. Benson, et al., The Use of Prostate Specific Antigen Density to Enhance the Predictive Value of Intermediate Levels of Serum Prostate Specific Antigen; The Journal of Urology, Vol. 147, 817-821, March 1992		

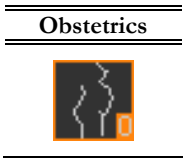
Chapter 12

12 - Obstetrics Calculations

Refer to "Getting Started" manual for applications available on MyLab model

This chapter lists which measurements are available in the Obstetrics application, with the relative bibliographic references. The Obstetrics calculation package is available, together with the Gynaecology calculation package, with the OB-Gyn license.

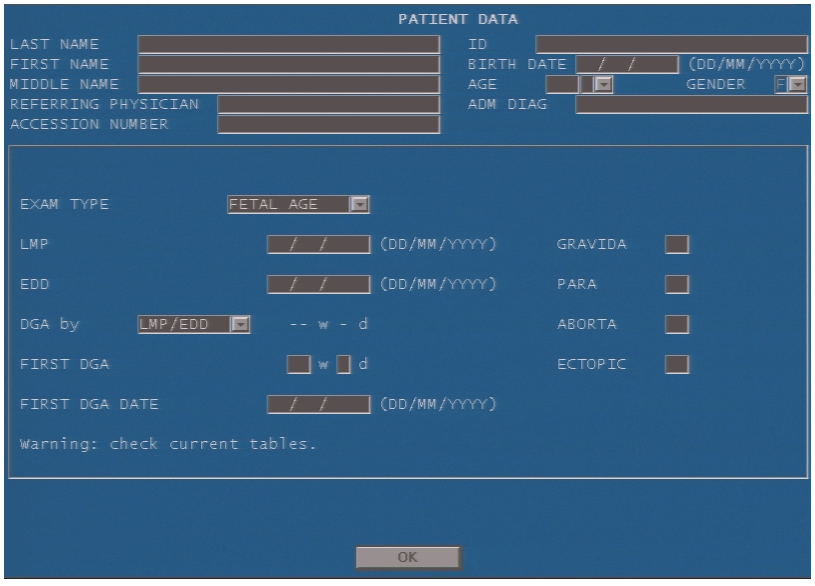
Application Icon



Measurements can be performed on more than one and up to four different fetuses. The **FETUS** key allows the user to associate the measurements to different fetuses.

Obstetrics Application Data

Once activated the application, the system displays the following menu:



As indicated by the initial warning message, check which bibliographic references are set for the computation of the gestational age and the gestational growth before starting the exam.

On MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

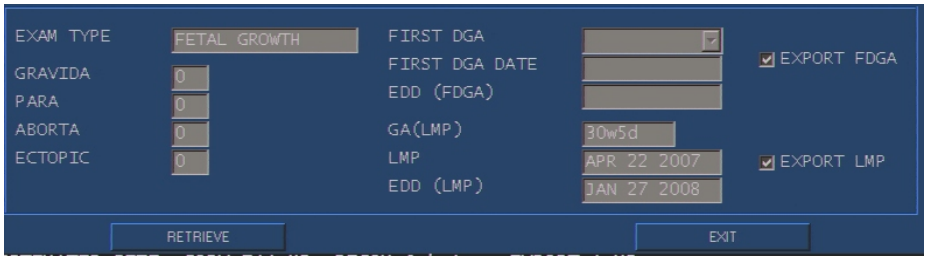
To check the measurements settings, access real time and press the **REPORT** key: the **CONFIG** key opens the configuration menu for obstetrics application

The following data can be inserted together with the patient data:

Field	
EXAM TYPE	Gestational age or gestational growth.
LMP	Last menstruation (initial date of the last menstruation). Once input, the system automatically calculates the expected delivery date (EDD)
GRAVIDA	Numbers of pregnancies.
EDD	Expected delivery date. EDD can be estimated from LMP or directly inpu by the physician.
PARA	Number of births.
DGA by	Diagnostic gestational age. This field defines whether DGA is estimated from LMP/EDD or from first DGA.
ABORTA	Number of aborta
FIRST DGA	Diagnostic gestational age estimated at the first exam
ECTOPIC	Ectopic pregnancies.
FIRST DGA DATE	Date when the first DGA has been estimated

To display the data correlated to other parameters (for istance DGA based on LMP), input the parameter (LMP), place the cursor on the correlated field (DGA by) and press **ENTER**: the system automatically updates the field.

The **EXAM LIST** key accesses the archived exams so that previous exam data can be retrieved. Once the desired exam has been selected, the system shows the patient data Press the **RETRIEVE** key to copy the data in the Start Exam page.



Refer to the "System Configuration" section for further details

Formulas and Bibliographic References

Equations to calculate the fetal age and the expected delivery date.

- From LMP

EDD = LMP (date) + 280 days or 290 days (depending on the setting)

DGA = Exam Date– LMP (date)

- From DGA

DGA = Exam date – First DGA Date + First DGA

EDD = Exam Date + 280 days (or 290 days depending on the setting) – First DGA

Obstetrics Calculations in B-Mode

Fetal Age

Refer to "System Configuration" section for customization of obstetrics calculations

Once Fetal Age is selected, the following parameters can be measured:

Parameter		Label	Measure
BPD	Biparietal Diameter	BPD	Distance
AC	Abdominal Circumference	AC	Circumference
HC	Head Circumference	HC	Circumference
FL	Femur Length	FL	Distance
TAD	Trunk Diameter - transverse	TAD	Distance
APAD	Trunk Diameter – antero-posterior	APAD	Distance
GS	Gestational Sac Diameter	GS	Distance
CRL	Crown-Rump Length	CRL	Distance
OFD	Occipital-Frontal Diameter	OFD	Distance
TL	Tibia Length	TL	Distance
HL	Humerus Length	HL	Distance
UL	Ulna Length	UL	Distance
APTD x TTD	APTD x TTD	APxT	2*Distance
HC DER	Derived head circumference	HC*	-
AC DER	Derived abdominal circumference	AC*	-
FTA	Fetal trunk section area	FTA	Circumference
FoL	Foot Length	FoL	Distance
LV	Vertebra Length	LV	Distance
MAD	Sac amniotic diameter – maximum	MAD	Distance
TCD	Transverse Cerebellar Diameter	TCD	Distance
AFI	Amniotic Fluid Index (group with four quadrants to be measured)	AFI	4*Distance
NUCHAL	Nuchal translucence	NT	Distance

Note

Derived head circumference is calculated starting from BPD and OFD parameters; the derived abdominal circumference is calculated starting from APAD e TAD. In both cases the circumference is drawn on an ellipse having the two measured parameters as axes.: for this reason the two parameters has to be orthogonal.

Note

In Nuchal translucency the symbols ">" and "<" are used as measurement calipers.

For further details see the obstetrics report

Every time a parameter is measured (with the exception of the amniotic index), the gestational age is automatically calculated.

Refer to "System Configuration" section to configure the obstetric measurements

Formulas and Bibliographic References

The gestational age can be estimated basing on different bibliographic references that can be selected in the obstetrics measurement configuration menu. **MyLab** provides the following references:

Parameter	Bibliography
BPD	Campbell, Hadlock 82, Hadlock 84, Hansmann, Jeanty 84, Nicolaides, Rempen, Todai 96, Osaka U, JSUM 2001, Bessis
AC	Hadlock 84, Hansmann, Nicolaides, Todai 96, JSUM 2001
HC	Campbell, Hadlock 84, Hansmann, Jeanty 84, Merz 88, Nicolaides
FL	Campbell, Hadlock 84, Hansmann 85, Jeanty 84, O'Brien 81, Todai 96, Osaka U, JSUM 2001, Merz 88, Bessis
TAD	Hansmann
TAD and APAD (see below preocedure)	Eriksen
GS	Hansmann 85, Rempen,, Todai
CRL	Rempen, Todai, Osaka U, JSUM 2001, Hadlock, Hansmann 85, Jeanty 84
OFD	Hansmann 85, Merz 88
TL	Jeanty 84
HL	Jeanty 84, Osaka U
UL	Jeanty 84
APTD x TTD	Todai 96
FTA	Osaka U
FoL	Mercer 87
LV	Todai
MAD	Rempen
TCD	Hill 83, Goldstein 87

Procedure to measure TAD and APAD according to Eriksen

The measurement of the trunk diameter according to Eriksen uses the average between the transverse trunk diameter and the antero-posterior trunk diameter..

When Eriksen reference is set to measure TAD and APAD, follow this procedure:

Procedure

- Press the **MENU** key, select the "Application Measurements" option and then "OB-FETAL".
- Check that the average is enabled in the B-Mode page; if necessary enable it
- Acquire the image, press **FREEZE** and then **MEASURE**.

- Select either the TAD or APAD parameter.
- Measure the selected diameter (e.g. TAD).
- Select the same parameter again (TAD, following this example).
- Measure the other trunk diameter (APAD, following this example).

The resulting measurement is the average of both diameters.

See Appendix A for the gestational age tables.

Fetal Growth

Once Fetal Growth is selected, the following parameters can be measured:

Parameter		Label	Measure
BPD	Biparietal Diameter	BPD	Distance
AC	Abdominal Circumference	AC	Circumference (on elliptic base)
HC	Head Circumference	HC	Circumference (on elliptic base)
FL	Femur Length	FL	Distance
OFD	Occipital-Frontal Diameter	OFD	Distance
CRL	Crown-Rump Length	CRL	Distance
TCD	Transverse Cerebellar Diameter	TCD	Distance
TL	Tibia Length	TL	Distance
APTD x TTD	APTD x TTD	APTD x TTD	2*Distance
HC DER	Derived head circumference	HC*	-
FTA	Fetal trunk section area	FTA	Circumference
FoL	Foot Length	FoL	Distance
GS	Gestational Sac Diameter	GS	Distance
HL	Humerus Length	HL	Distance
RL	Radio Length	RL	Distance
TAD	Trunk Diameter - transverse	TAD	Distance
UL	Ulna Length	UL	Distance
AFI	Amniotic Fluid Index (group with four quadrants to be measured)	AFI	4*Distance
NUCHAL	Nuchal translucence	NT	Distance
NBL	Nose Bone Length	NBL	Distance
EL	Ear Length	EL	Distance
CIST MAGN	Cisterna Magna	CM	Distance
LAT VENTR	Lateral Ventricle	LATV	Distance
FIBULA L	Fibula Length	FIB	Distance
INTEROC D	Interocular Distance	IOD	Distance
BINOC D	Binocular Distance	BOD	Distance

For further details see the obstetrics report

Every time a parameter is measured (with the exception of the amniotic index), it is combined with the 50 centile.

Note

In Nuchal translucency the symbols ">" and "<" are used as measurement calipers.

Formulas and Bibliographic References

Refer to "System Configuration" section for configuring the obstetric measurements.

As for the gestational age, the fetal growth can be estimated basing on different bibliographic references, that can be selected in the obstetrics measurement configuration menu. **MyLab** provides the following references:

Parameter	Bibliography
BPD	Merz 88, JSUM 2001, Osaka U, Todai 96, Chitty (O-I), Nicolaides, Chitty(O-O), Hadlock 84, CFEF
AC	Merz 88, JSUM 2001, Todai 96, Chitty, Nicolaides, Hadlock 84, CFEF
HC	Merz 88, Tamura 95, Nicolaides, Chitty, Hadlock 84, CFEF
FL	Merz 88, Nicolaides, Chitty, Todai 96, Osaka U, JSUM 2001, Hadlock 84, CFEF
OFD	Merz 88, Chitty, Jeanty
CRL	Hadlock84, Hansmann 85, JSUM 2001, Osaka U, Robinson75
TCD	Goldstein 87
TL	Merz 88
APTD x TTD	Todai96
FTA	Osaka U
FoL	Mercer
GS	Nyberg 87
HL	Jeanty/Romero, Osaka U
RL	Merz 88
TAD	Eriksen, CFEF
UL	Merz 88, Jeanty
NBL	Guis-Ville
EL	Lettieri
CM	Nicolaides
LATV	Pretorius
FIB	Merz
IOD	Merz, Bernaschek
BOD	Merz, Bernaschek

See Appendix A for the gestional growth tables.

Other Parameters

Both in gestational age and in gestational growth, **MyLab** automatically calculates the following parameters, if previously set.

Parameters	
IC	Cephalic Index (BPD/OFD)
FL/BPD	
BPD/FL	
FL/AC	
HC/AC	
EFW	Estimated Fetal Weight
NT	Nuchal Translucence

Both in fetal age and fetal growth the gynaecologic calculation package is available: refer to the specific chapter for further information.

Refer to "System Configuration" section to configure the obstetric measurements.

Formulas and Bibliographic References

The estimate of the fetal weight can be based on the following parameters:

Parameters	Bibliography
AC, FL	Hadlock 1
AC, FL, HC	Hadlock 2
AC, FL, BPD	Hadlock 3
AC, FL, HC, BPD	Hadlock 4
BPD, AC	Shepard 82
AC, BPD	Warsof
BPD, TTD	Hansmann
BPD, AD, FL	Persson1
BPD, AD	Persson2
BPD, AC	Taiwan

The estimated fetal weight can be displayed in grams or grams and pound.

Hadlock 1

Formula	Measurement unit
$EFW = 10^{(A + B * AC + C * FL + D * AC * FL)}$ A = 1.304 B = 0.005281 C = 0.01938	mm

Hadlock, Harrist, Carpenter, Dete, Park, Sonographic estimation of Fetal Weight, *Radiology*, 150:535-540, 1984; Hadlock, Harrist, Deter, Sonographic detection of abnormal fetal growth patterns, *Obstetrics and Gynecology*, 27/2, 343:351, June 1984

Hadlock 2

Formula	Measurement unit
$EFW = 10^{(A + B * AC + C * FL + D * HC + * E * AC * FL)}$ A = 1.326 B = 0.00438 C = 0.0158 D = 0.00107 E = - 0.0000326	mm

Hadlock, Harrist, Carpenter, Dete, Park, Sonographic estimation of Fetal Weight, *Radiology*, 150:535-540, 1984; Hadlock, Harrist, Deter, Sonographic detection of abnormal fetal growth patterns, *Obstetrics and Gynecology*, 27/2, 343:351, June 1984

Hadlock 3

Formula	Measurement unit
$EFW = 10^{(A + B * AC + C * FL + D * BPD + * E * AC * FL)}$ A = 1.335	mm

B =0.00457

C = 0.01623

D = 0.00316

E = - 0.000034

Hadlock, Harrist, Carpenter, Dete, Park, Sonographic estimation of Fetal Weight, *Radiology*, 150:535-540, 1984; Hadlock, Harrist, Deter, Sonographic detection of abnormal fetal growth patterns, *Obstetrics and Gynecology*, 27/2, 343:351, June 1984

Hadlock 4

Formula	Measurement unit
EFW = $10^{(A + B * AC + C * FL + D * HC + * E * AC * FL + F * AC * BPD)}$	mm

A = 1.3596

B = 0.00424

C = 0.0174

D = 0.00064

E = - 0.0000386

F = 0.0000061

Hadlock, Harrist, Carpenter, Dete, Park, Sonographic estimation of Fetal Weight, *Radiology*, 150:535-540, 1984; Hadlock, Harrist, Deter, Sonographic detection of abnormal fetal growth patterns, *Obstetrics and Gynecology*, 27/2, 343:351, June 1984

Shepard 82

Formula	Measurement unit
EFW (in gr.) = $1000 * 10^{(A+B * BPD + C * AC + D * BPD * AC)}$	cm

A = -1.7492

B = 0.166

C = 0.046

D = -0.002646

Shephard, ..., An Evaluation of Two Equations for Predicting Fetal Weight by Ultrasound, *American Journal of Obstetrics and Gynecology*, 142, n.1, 1982, pp. 47-54

Warsof

Formula	Measurement unit
EFW (in gr.) = $1000 * 10^{(A + B * BPD + C * AC + D* BPD * BPD * AC)}$	cm

A = -1.599

B = 0.144

C = 0.032

D = -0.000111

Shephard, ..., An Evaluation of Two Equations for Predicting Fetal Weight by Ultrasound, *American Journal of Obstetrics and Gynecology*, 142, n.1, 1982, pp. 47-54

Hansmann

Formula	Measurement unit
EFW (in gr.) = 1000 *(A –(B * BPD) + (C * BPD^2) + (D * TTD) – (E * TTD^2))	cm
A = 0.515263	
B = 1.05775	
C = 0.0930707	
D = 0.649145	
E = 0.020562	

Hansmann,.., Ultrasound Diagnosis in Obstetrics and Gynecology, Springer-Verlag, New York 1986

Persson1

Formula	Measurement unit
EFW (in gr.) =BPD^A * AD^B * FL^C * 10^D	mm
A = 0.972	
B = 1.743	
C = 0.367	
D = -2.646	

Persson, ..., Intra-Uterine Weight Curves Obtained by Ultrasound, *Acta Obstet Gynecol Scand*, 65, 1986, pp. 169-173

Persson2

Formula	Measurement unit
EFW (in gr.) =BPD^A * AD^B * 10^C	mm
A = 1.321	
B = 1.833	
C = -2.83	

Persson, ..., Intra-Uterine Weight Curves Obtained by Ultrasound, *Acta Obstet Gynecol Scand*, 65, 1986, pp. 169-173

Taiwan

Formula	Measurement unit
Log EFW (in gr.) $=A*10^{3}*AC*BPD - B*10^{-4}*AC^{2}*BPD + C*10^{-5}*AC^{3} + D*10^{-2}*BPD + E$ A = 5.6541 B = 1.5515 C = 1.9782 D = 5.2594 E = 2.1315	gr

FJ Hsieh, FM Chang..."Computer-assisted analysis for prediction of fetal weight by ultrasound-comparison of biparietal diameter (BD), abdominal circumference (AC) and Femure length(FL)" *J Formosan Med Ass* , 1987, 86; 957-964

Obstetrics Measurements in M-Mode

Refer to "System Configuration" section to configure the obstetric measurements.

The system measures the fetal heart rate, averaging it on more cycles. The calculation is available both in fetal age and fetal growth.

Obstetrics Measurements in Doppler

Both in fetal age and in fetal growth the following parameters, divided in two sections (Doppler – Fetus + Doppler – Mother), can be measured:

- Fetal Doppler

Parameter		Label	Measure
MCA	Middle cerebral artery - Flow	MCA	Contour
UMB ART	Umbilical artery - Flow	UmbA	Contour
AORTA	Aorta - Flow	AO	Contour
TRICUSPID	Tricuspid - Flow	TRIC	Contour
MITRAL	Mitral - Flow	MIT	Contour
PA ARTERY	Pulmonary artery - Flow	PA	Contour
R RA	Right renal artery - Flow	R RA	Contour
L RA	Left renal artery - Flow	L RA	Contour
FETAL HR	Fetal heart rate	F HR	Distance

The heart beat is automatically calculated in all groups.

- Mother Doppler

Parameter		Label	Measure
R UTERINE	Right uterine artery - Flow	R UA	Contour
L UTERINE	Left uterine artery - Flow	L UA	Contour

With the exception of the fetal heart rate, once measurements have been completed, the system automatically computes the following parameters.

Parameter	
Vp	Systolic velocity - peak
DV	Diastolic velocity - peak
Vmn	Mean velocity
PI	Pulstility index
RI	Resistive index
S/D	S/D

Formulas and Bibliographic References

Formulas	Measurement unit	Derived parameters
FVI = $\Sigma V_i * \Delta T$ V_i: Instant velocity ΔT: Time interval	-	-
Accuracy: ± 8%		

Formulas	Measurement unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline* VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity	-	-
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formulas	Measurement unit	Derived parameters
RI = *(VP - VD) / VP Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VP Applicable when the flow doesn't go through the baseline* VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity	-	-
Accuracy ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Chapter 13

13 - Gynaecology Calculations

*Refer to Getting Started manual for applications available on **MyLab** model.*

This chapter lists which measurements are available in Gynaecology application, with the relative bibliographic references. The Gynaecology calculation package is available, together with the Obstetrics calculation package, with the OB-Gyn license.

Application Icon

Gynaecology


Application Data

The following parameters can be entered together with patient data:

Parameter	
LMP	Last menstruation (initial date of the last menstruation). Once input, the system automatically calculates the cycle's day
POST MENO-PAUSE	If in menopause

The bilateral measurements are then grouped on the right (indicated by R labels) and the left (indicated as L). In the below table the labels are provided without any lateral indication. When applicable, add the character "R" or "L" to the label.

Gynaecology Calculations in B-Mode

The gynaecology calculations are organized in multilevel groups. The first level defines the main anatomical structure; the second lists the measurements which can be performed in the various districts of the structure.

UTERUS Group

UTERUS

The groups have the following subgroups:

Subgroup	
UTERUS V	Uterus volume
ENDOMETR	Endometrium
CERVIX L	Cervix length

Each subgroup contains the following measurements:

Subgroup	Parameter		Label	Measure
UTERUS V	L	Length	L	Distance
	H	Height	H	Distance
	W	Width	W	Distance
ENDOMTER	END	Endometrium length	END	Distance
CERVIX L	CER	Cervix length	L CERV	Distance

Once measurements of the Uterus V group have been completed, the system automatically computes the **uterus volume** (UTV).

Formula and Bibliographic References

Formula	Measurement unit	Derived parameter
V. UT = 4/3 π * L/2 * H/2 * W/2 L: Length H: Heigth W: Width	cm^3	-
Accuracy = 15%		
Barry B. Goldberg, Alfred B. Kurtz Atlas of Ultrasound Measurements, Year Book Medical Publisher, 1990, p 192-194		

UTERUS MASS

UTERUS MASS Group

The groups has the following subgroups:

SUBGROUP	
FIBROMA 1	Uterus mass 1
FIBROMA 2	Uterus mass 2
FIBROMA 3	Uterus mass 3
FIBROMA 4	Uterus mass 4

Each subgroup contains the following measurements:

Subgroup	Parameter		Label	Measure
FIBROMA	L	Length	L	Distance
	H	Height	A	Distance
	W	Width	La	Distance

Once measurements have been completed, the system automatically computes the **fibroma volume** (VOL).

Formula and Bibliographic References

Formula	Measurement unit	Derived parameter
V = 4/3 π * L/2 * H/2 * W/2 L: Length H: Heigth W: Width	cm^3	-
Accuracy = 15%		
Barry B. Goldberg, Alfred B. Kurtz Atlas of Ultrasound Measurements, Year Book Medical Publisher, 1990, p 192-194		

OVARY Group

L OVARY and R OVARY

The groups has the following subgroups:

Subgroup	
L OVARY	Left ovary
L FOLLICL	Left follicle
R OVARY	Right ovary
R FOLLICL	Right follicle

Each subgroup contains the following measurements:

Subgroup	Parameter		Label	Measure
OVARY	L	Length	L	Distance
	H	Height	H	Distance
	W	Width	W	Distance
FOLLICL	L A	Length A	L A	Distance
	L B	Length B	L B	Distance
	L C	Length C	L C	Distance
	L D	Length D	L D	Distance
	L E	Length E	L E	Distance
	L F	Length F	L F	Distance
	L G	Length G	L G	Distance
	L H	Length H	L H	Distance
	L I	Length I	L I	Distance
	L J	Length J	L J	Distance
	L K	Length K	L K	Distance
	L L	Length L	L L	Distance
	L M	Length M	L M	Distance
	L N	Length N	L N	Distance

Once measurements of the OVARY group have been completed, the system automatically computes the **ovary volume** (OV).

Formula and Bibliographic References

Formula	Measurement unit	Derived parameter
V = 4/3 π * L/2 * H/2 * W/2 L: Length H: Heigth W: Width	cm^3	-
Accuracy = 15%		
Barry B. Goldberg, Alfred B. Kurtz Atlas of Ultrasound Measurements, Year Book Medical Publisher, 1990, p 192-194		

OVARY MASS Group

L OV MASS and R OV MASS

The groups has the following subgroups:

Subgroup	
MASS 1	Ovary mass 1
MASS 2	Ovary mass 2
MASS 3	Ovary mass 3
MASS 4	Ovary mass 4

Each subgroup contains the following measurements:

Subgroup	Parameter		Label	Measure
MASS	L	Length	L	Distance
	H	Height	H	Distance
	W	Width	W	Distance

Once measurements have been completed, the system automatically computes the **mass volume** (VOL).

Formula and Bibliographic References

Formula	Measurement unit	Derived parameter
V = 4/3 π * L/2 * H/2 * W/2 L: Length H: Heigth W: Width	cm^3	-
Accuracy = 15%		
Barry B. Goldberg, Alfred B. Kurtz Atlas of Ultrasound Measurements, Year Book Medical Publisher, 1990, p 192-194		

BLADDER Group

BLAD VOL

The group contains the following measurements:

Parameter		Label	Measure
B DIAM1	Diameter	BD1	Distance
B DIAM2	Diameter	BD2	Distance
B DIAM3	Diameter	BD3	Distance

Once measurements have been completed, the system automatically computes the Bladder volume (**BV**).

Formula and Bibliographic References

Formula	Measurement unit	Derived parameter
Vol. = D0*D1*D2*π/6 D0: First diameter D1: Second diameter D2: Third diameter	cm^3	-
Accuracy = 15%		
Griffiths, et al., Measuring Bladder Volume and Residual Urine; The Journal of Urology, Vol. 136, 808-812, 1986		

Gynecology Calculations in Doppler

UTERINE ARTERY Group

L UTERINE and R UTERINE

The groups contains the following measurements:

Parameter		Label	Measure
UA FVI	Flow	UF	Contour
UA Vpea	Peak velocity	UVp	Velocity
UA EDV	End diastolic velocity	UDV	Velocity

Once measurements have been completed, the system automatically computes the following parameters:

Parameter	
Umn	Mean velocity
UPI	Pulsatility index
URI	Resistite index
U S/D	S/D

Formulas and Bibliographic References

Formulas	Measurement unit	Derived parameters
FVI = $\Sigma V_i * \Delta T$ V_i: Instant velocity ΔT: Time interval	-	-
Accuracy: ± 8%		

Formulas	Measurement unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity		
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formulas	Measurement unit	Derived parameters
RI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline*	-	-
VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity		
Accuracy: ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

OVARY Group

L OVARY and R OVARY

The groups contains the following measurements:

Parameter		Label	Measure
OA FVI	Flow	FVI O	Contour
OA Vpea	Peak velocity	VpO	Velocità
OA EDV	End diastolic velocity	TDO	Velocity

Once measurements have been completed, the system automatically computes the following parameters:

Parameter	
Omn	Mean velocity
OPI	Pulsatility index
ORI	Resistite index
O S/D	S/D

Formulas and Bibliographic References

Formulas	Measurement unit	Derived parameters
FVI = $\Sigma V_i * \Delta T$ V_i: Instant velocity ΔT: Time interval	-	-
Accuracy: ± 8%		

Formulas	Measurement unit	Derived parameters
PI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
PI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline* VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity	-	-
Accuracy: ± 27%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Formulas	Measurement unit	Derived parameters
RI = *(VP - VD) / VM Applicable when the flow doesn't go through the baseline*	-	-
RI = *(VP - VR) / VM Applicable when the flow doesn't go through the baseline* VP: Peak velocity VD: Telediastolic Velocity VR: Reverse Velocity VM: Mean Velocity	-	-
Accuracy: ± 16%		
Bardelli, Cominotto, Carretta, High Blood Pressure & Cardiovascular Prevention. *The Official Journal of the Italian Society of Hypertension*, 6: 48-63 1997		

Chapter 14

14 - MyLab Report

Refer to Getting Started manual for applications available on ***MyLab*** *models.*

This chapter explains the structure of the **MyLab** report and its use.

The Report Key

The **REPORT** key can be pressed at any time to display in the image area the available measurements results.

Softkeys

There's only one level of software keys: here they are, alphabetically sorted:

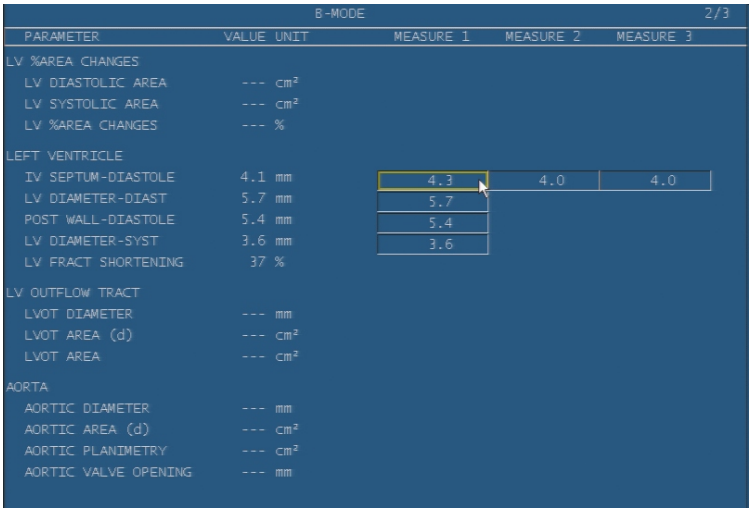
Software keys

CLEAR
MEASURE
PAGE
PREVIEW
SCROLL

The **SCROLL** software key is used to quickly scroll through the possible measurements, while **MEASURE** can be used to toggle through modes (ex. Doppler calculations in cardiac application) or through groups of measurements (ex in vascular application) . If the average is enabled (for further details read the "System Configuration" section of this manual), the report shows the average value in the first column and the values of the individual measurements in the following columns.

To delete measurements, place the cursor on the desired field (a frame will appear around it) and press the **CLEAR** key.

In the shown example the intraventricular septum has been measured three times, the final value is the average of the three measures



When the average is enabled, some measures can be excluded for the average computation. Place the cursor on the measure to be excluded and press **ENTER**: the value is displayed on dark background and the average is automatically recalculated. Repeat the operation to include the measure again.

PAGE allows to toggle between the measurements page, the text insertion page and the page with the images attached to the report.

The **APPL** key toggles between the application measurements and the saved generic measurements.

See the "System Configuration" section to set the observations and report format

The text insertion page is organized in fields allowing insertion of comments.

The  icon allows access to the available observations. Place the cursor on the icon and press **ENTER**: the system will show the available text sequences. Place the cursor on the desired observation and press **ENTER** to confirm.

If additional text must be inserted, place the cursor on the  icon and press **ENTER**. A window will be displayed, where comments may be entered with the alphanumeric keyboard. To close this window, click the icon again.

The images attached to the report can be deleted (**DELETE** key) ore moved from one position to another (**MOVE** key).

The **PREVIEW** key allows viewing the report in print preview. If the system is configured with a PC printer, press the corresponding key to activate printing of the report. The system allows to select the desired print format for images enclosed to the exam report. To exit the report menu, press **REPORT** again.

Note

Vascular and thyroid reports related to software version < 3 on MyLab60, MyLab70 and MyLab 90 models and to software version < 7 on MyLab25, MyLab30 and MyLab50 models can be reviewed but not modified.

End of the Report

Every exam is combined into a report containing the patient data and all measurements performed during the exam. If the same parameter is measured more times, the reports contains the last measure. At the end of the exam the report is automatically closed. The report status is indicated in the header bar.

A new report is created when the exam is reviewed from the archive. The new report has the same patient data and contains the measurements performed in archive review.

To review the data of the first report, press the **PREVIEW** key. The system displays the following menu:

Software Keys

END REP
NEXT/PREVIOUS
PREVIEW
SCROLL

The **SCROLL** key scrolls inside the report; the **NEXT/PREVIOUS** key scroll among different reports.

The status of the new report stays open when exiting from archive review. This means that the report is updated with new measurements whenever the same exam is reviewed from the archive. If a parameter is measured more times, the new value is overwritten. The report is closed only when the **END REP** key is pressed: the status in the bar is automatically updated.

The Vascular Report

The vascular report is like the other reports, except in the "Carotid Velocity", "Aorta" and "Lower Limbs" measurement groups.

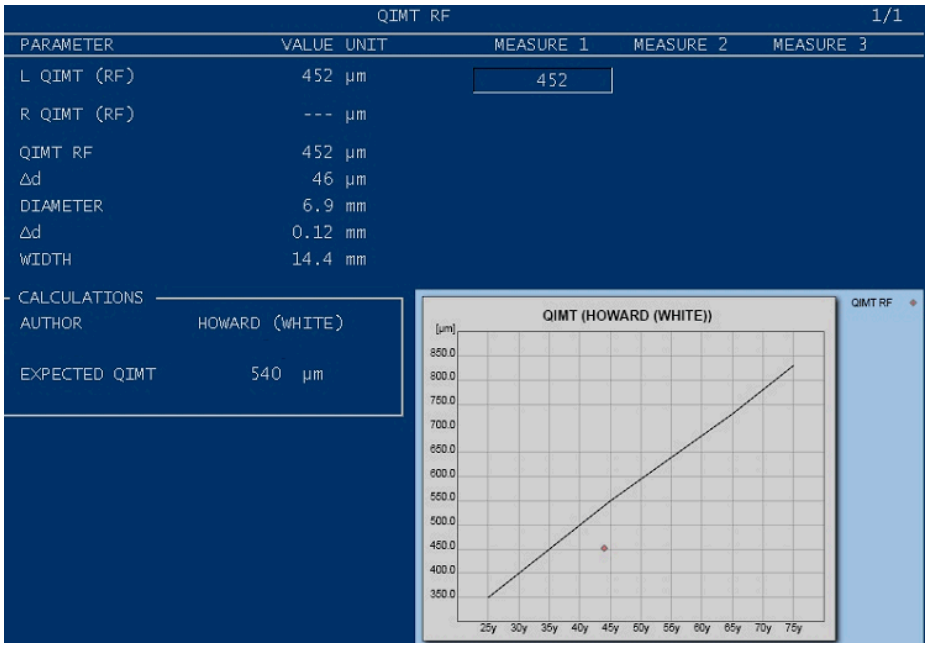
In the "Carotid Velocity" and "Aorta" groups velocity ratios are calculated. These ratios can be directly configured in the Report.

In the "Lower Limbs" group the report, besides displaying the single measurements and the average (if enabled), also allows insertion of an evaluation of the vessel status:

Status	Evaluation
PATENCY	Yes, No, Partial
COMPRESSIBILITY	Yes, No, Partial
REFLUX	Light, Moderate, Severe
THROMBUS	Yes, No, Partial

The QIMT Report

The vascular report has a further specific page dedicated to eventually enclosed QIMT automatic measurements. The page contains the average and standard deviation of both the QIMT and the vessel under measurement. The page also reports the expected QIMT based on the patient age and the related QIMT graphics.



Press the **TREND** key to compare different exams. The system lists all archived exams related to the same patient. If necessary, select the exams to be added and deselect the ones not to be retrieved and press OK to confirm.

Press again the **TREND** key to compare the exams: the graph automatically reports all exams data. Each point is labelled with the exam date and the QIMT value.

The **QIMT CHD** key activates the page dedicated to the Coronary Heart Disease risk, based on the Framingham score. The "Age" field reports the patient age: it can be edited if the age hasn't been already entered in the Start End page. The trackball can be used to enter total cholesterol, HDL cholesterol, systolic and

diastolic pressures and to indicate whether the patient is diabetic and smoker. Make sure that the patient gender has been specified in the Start End page.

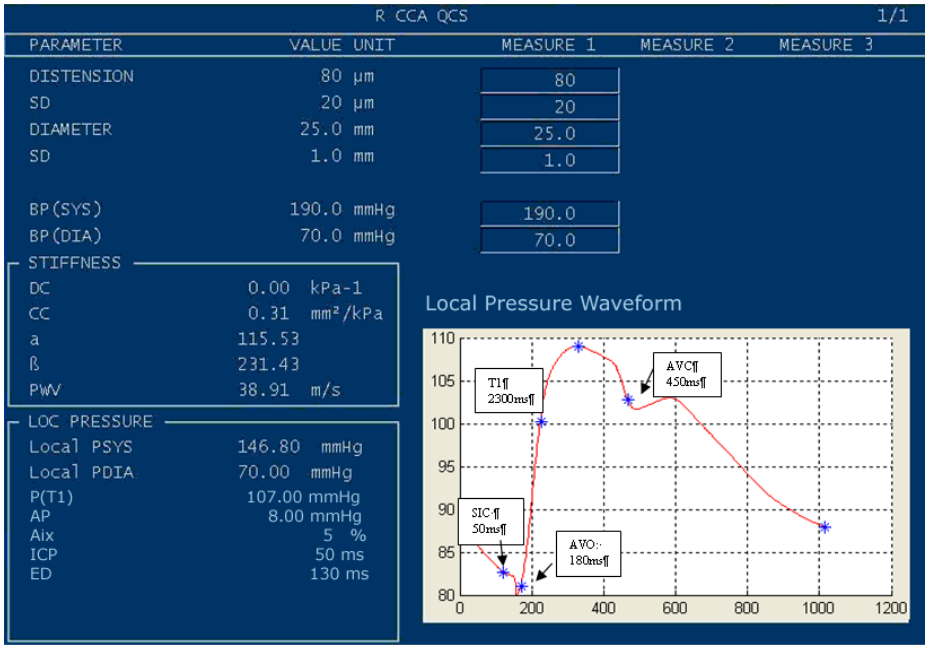
Appendix C contains the bibliographic references and tables

Press the EVALUATE key to estimate the risk score based on the Framingham study.

The QAS Report

The vascular report includes an additional specific page dedicated to eventual QAS automatic measurements. The page contains the average and standard deviation of both the distension and the diastolic diameter of the vessel under measurement. The page also reports the input brachial systolic and diastolic pressure values.

Two separate pages are available for left and right Common Carotid Artery



The appendix D contains the bibliographic references

The following parameters are automatically calculated by the system:

- Distensibility Coefficient (DC)
- Compliance Coefficient (CC)
- Alfa Stiffness (α)
- Beta Stiffness (β)
- Pulse Wave Velocity (PW V)
- Local Blood Pressure – Systolic (LPs)
- Local Blood Pressure – Diastolic (LPd)
- Pressure at T1 (P(T1))
- Augmented Pressure (AP)

- Augmentation Index (AIx)
- Isovolumic Contraction Period (ICP)
- Ejection Duration (ED)

The QAS report also includes the Local Pressure Waveform. This waveform is obtained by transforming the last six cycles of the distension curve over time in one pressure curve over time.

On the Local Pressure Waveform the following points are indicated:

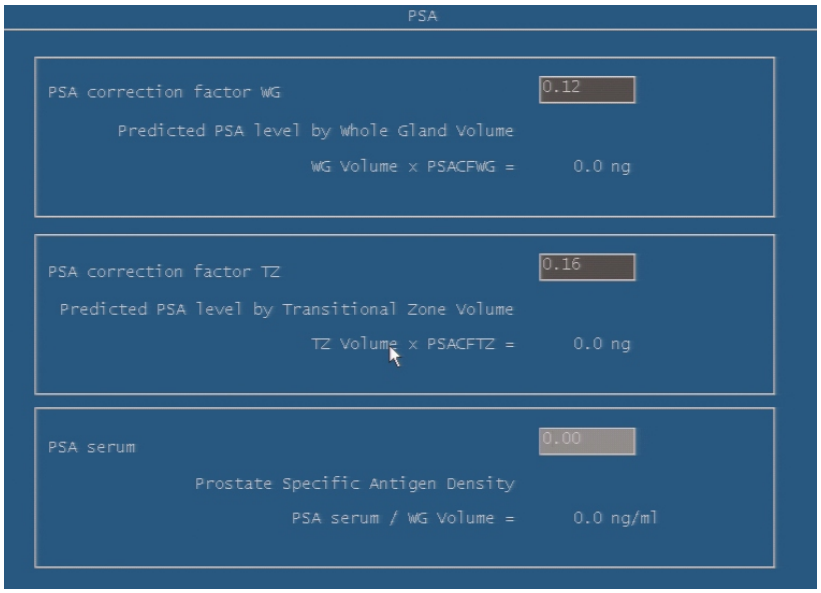
- Start of Isovolumic Contraction (SIC)
- Aortic Valve Opening (AVO)
- Inflection Point (T1)
- Aortic Valve Closure (AVC)

The Urology Report

The Prostate Specific Antigen (PSA) is input in the Start Exam page.

The measurements are organized in two sections: the section of the performed measurements and the PSA section. The WG factor and the TZ factor can be assigned in the PSA section: These factors allows the estimation of the PSA starting from the gland volume and form the transitional zone volume. The predicted PSA are displayed in this section together with the PSA density.

The TZ and WG default values are 0,12 e 0,16 respectively.



The Gynaecology Report

Refer to "System Configuration" section for the evaluation settings

The report, besides displaying the single measurements, also allows insertion of an evaluation and notes of the structures under exam. The following evaluations are available along the report measurements:

Page	Parameter	Evaluation
UTERUS VOLUME	Uterus position	Median, L Lateroflexed, R Lateroflexed,
	Uterus version	Normoflexed, Retroflexed
FIBROMA	Mass kind	Fibroma, Adenomyosis, Pendometrial polyp, Sarcoma
	Characteristics	Intramural, Subserous, Submucous, Pediculate, Intracavitary, Intramural-subserous, Intramurae-submucous, Subserous -submucous
	Site	Anterior, Posterior, L Lateral, R Lateral, Fundus, Istmic
OVARY VOLUME	Corpus luteum	Yes, No
MASS	Characteristics	Unilocular, Unilocular-solid, Multilocular, Multilocular-solid, Solid

Thyroid Report

The report, besides displaying the single measurements, also allows insertion of an evaluation and notes of the structures under exam. The following evaluations are available with the report measurements:

Group	Parameter	Evaluation
R/L LOBE	Echotexture	Homogeneous, Heterogeneous
	Other	*Free text*
NODULES n	Location	Right Upper, Right Mid, Right Lower, Left Upper, Left Mid, Left Lower, Isthmus
	%	Solid, < 25% Cystic, 25%-75% Cystic, > 75% Cystic
	Echogenicity	Hipo, Iso, Hyper, Complex
	Vascularity	Polar Artery, Avascolar, Increased Vascolarity
PARATHYROID GLAND n	Location	Right Superior, Right Inferior, Left Superior, Left Inferior
	Echogenicity	Hipo, Iso, Hyper, Complex
	Vascularity	Polar Artery
LYMPH NODE n	Location	IA, IB, IIA, IIB, III; IV, VA, VB, VI, VII
	Echogenicity	Hypo, Iso, Hyper, Complex
	Vascularity	Avascular, Peripheral, Increased intranod vascularity
	Margins	Smooth, Irregular, Infiltrating
	Shape	Oval, Round
	Hilar line	Absent, Normal, Thickened

Chapter 15

15 - Obstetrics Report

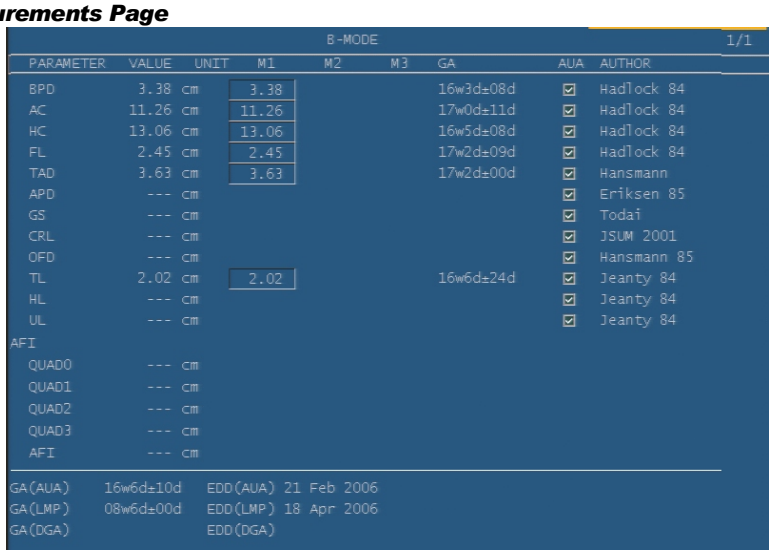
This chapter explains how the **MyLab** obstetrical report is organized and to use it.

Report Organisation

The obstetrical report includes different pages: the measurements page, containing the performed measurements in the different sections, the graphics page, the biophysical profile page, the observation page, the fetal weight index page, the text insertion page and the page showing images attached to the report. The **FETUS** key selects the various features and displays the pertaining pages.

> **Note**
>
> Whenever a custom parameter and/or table and an Esaote parameter/table have identical names, the extension @ is added to the custom parameter/table name to avoid any misunderstanding. The extension @ is displayed both in the report and in the print preview

Measurements Page



The measurements page is organized in different sections: the B-Mode section, the gynaecological calculation section, the calculations section, the M-Mode section and the Doppler section (both fetal and mother).

In the B-Mode section, the first columns report the list of measurable parameters and the corresponding measurements. When in fetal age, the last columns report the gestational age based on the bibliographic references indicated in the last column; the AUA column includes, when crossed, the parameter for the computation of the average ultrasound age. When in fetal growth, the last columns report the percentage rank values and the bibliographic references.

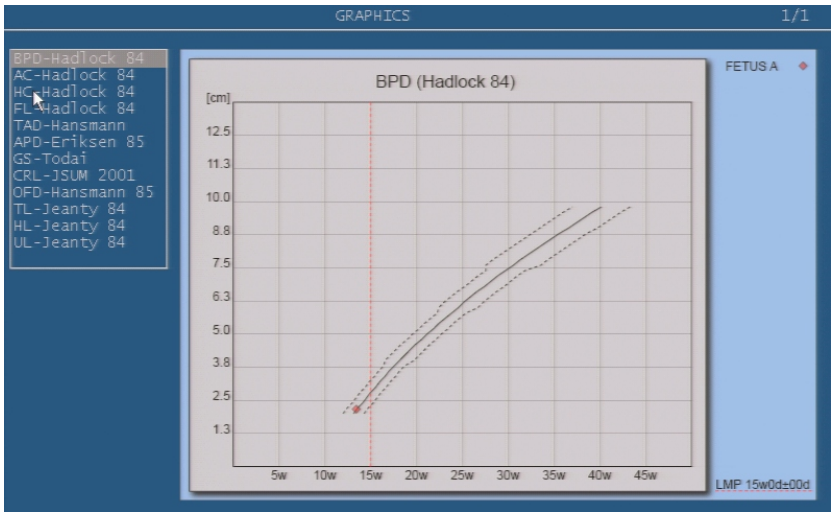
The gestational age, calculated from LMP or from DGA (when available) is displayed at the bottom. When in fetal age, the system displays the average ultrasound age (as an average of the calculated gestational age) and the expected delivery date estimated from the AUA.

The **SINGLE/COMPAR** key compares the data of the different fetuses in one graphic when twins are under exam.

Select a measure with the cursor and press the **CLEAR** key to delete it.

Measurements Graphics Page

The performed measurements are displayed on a graph.



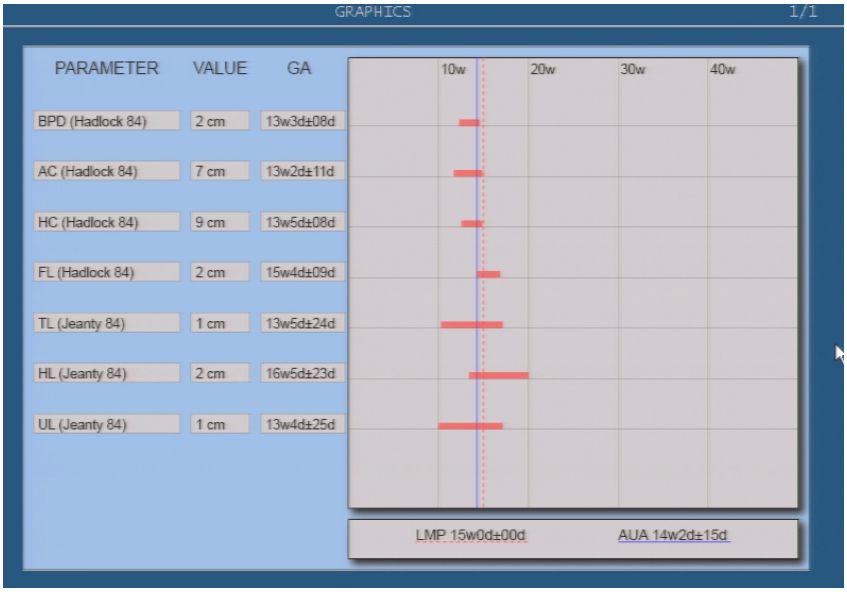
The figure shows the gestional age calculated from the BPD measure with Hadlock 84 as bibliographic reference

The left list indicates which parameters can be displayed and their bibliographic references: the performed measurements are signed by the √ symbol. Place the cursor on the desired parameter and press **ENTER** to select a different one. The graphics and the displayed values are automatically updated.

The weeks are displayed in the X axis and the selected parameter is in the Y axis, displayed as indicated in the legenda shown in the upper left part of the screen. The continuous line indicates the reference average value, the dotted lines the standard deviation (or the centiles when in fetal growth). The dotted vertical line represents the gestational age, indicated in the legenda shown in the lower right

part of the screen; the gestational age is calculated starting from the set parameter (LMP or FDGA).

When in fetal age, the measured values can be displayed on a curvilinear graph or on a bar graph (**BAR/CURVE** key)



In this case all measured parameters are represented, all related both to the estimated gestational age (dotted vertical line) and to the average ultrasound age, displayed as a continuous vertical line.

The **SINGLE/COMPAR** key compares the data of the different fetuses in one graphic, in case of exams on twins.

Fetal Trend

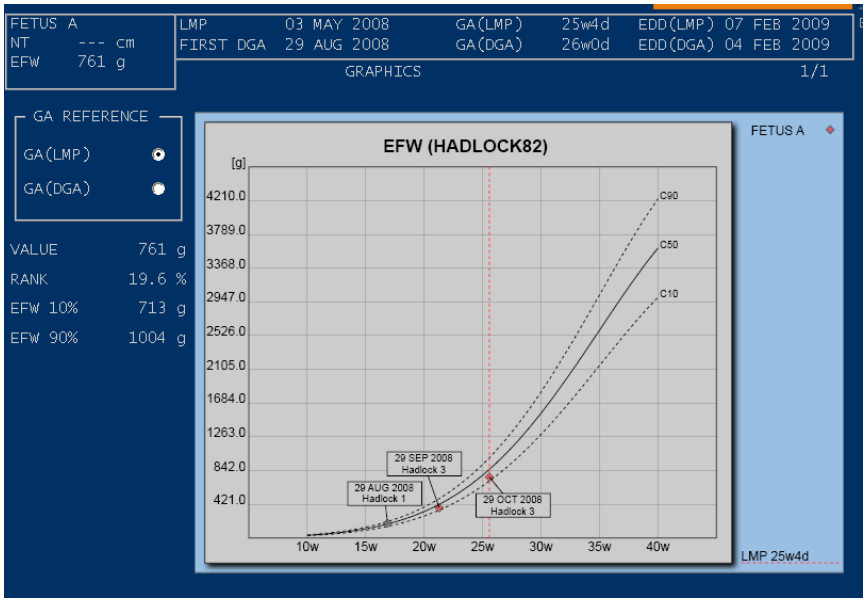
If the archive contains previous exams of the same gestation, these can be retrieved and reviewed.

The **EXAM LIST** key, displayed in the Graphics Page, lists all the archived exams of the same patient. The exams related of the same gestation are checked. If necessary, check other exams to be added or uncheck the undesired ones and press OK to retrieve their data.

The **TREND** key compares the data of the different exams: these data are reported in the graphics of the performed measurements. The data on the graphic are marked with the exam date (E letter) and the last modification date (M letter).

Graphic Page of the Estimated Fetal Weight (EFW)

If the exam is in fetal growth and the estimated fetal weight (EFW) is set, the related graph is available in a specific page (**EFW** key).



The figure shows the estimated fetal weight graph based on the Hadlock 82 reference: "*In Utero Analysis of Fetal Growth: A Sonographic Weight Standard*" - *Frank P. Hadlock (MD), Ronald B. Harrist (PhD), Juan Martinez-Poyer (MD)* - *Radiology 1991; 181:129-133.*

The left list indicates the measured parameters and the set configurations.

The weeks are displayed in the X axis and the weight in grams in the Y axis. The continuous line indicates the reference average value, the dotted lines the centiles. The dotted vertical line represents the estimated fetal weight as shown on the left side.

The **SINGLE/COMPAR** key compares the data of the different fetuses in one graphic , in case of exams on twins.

Fetal Trend

If the archive contains previous exams of the same gestation, these can be retrieved and reviewed.

The **EXAM LIST** key lists all the archived exams of the same patient. The "Formula" column indicates the formula used to estimate the fetal weight in each archived exam. If necessary, check other exams to be added or uncheck the undesired ones and press OK to retrieve their data.

The **TREND** key compares the data of the different exams: these data are reported in the graphics of the performed measurements. The data on the graphic are marked with the exam date and the used formula. Different colours are used to distinguish the current exam from the previous ones, when on the latter a different formula has been used:

- Red is used both for the current exam and for the archived exams using the same EFW formula.
- Grey is used for archived exams based on a different EFW formula.

Refer to the "System Configuration" section for obstetrics measurements configuration

Biophysical Profile Page

The biophysical profile allows the user to gives a numeric evaluation of the following fetal characteristics:

- Fetal breathing movements
- Fetal movements
- Fetal tone
- Fetal reactivity
- Qualitative AFV (amniotic fluid volume) assessment

The evaluation can be based either on the Manning method or on the Vintzileos method.

Observations Page

The page allows the user to assess the status and the look of the anatomy, both of the fetus and of the mother. The assessments considers:

- Fetal anatomy
- Fetal presentation
- Fetal heart rate
- Maternal anatomy
- Placental grade
- Placental location

Fetal Weight Index Page

The Fetal Weight Index (FWI) algorithm provides an analysis of ultrasound data to obtain an accurate estimation of the fetal weight in relation to gestational age and four commonly used echobiometric parameters: biparietal diameter (BPD), fetal head and abdominal circumferences (HC and AC) and femur length (FL).

When these parameters are measured and the EVALUATE button in the FWI page is pressed, the FWI algorithm estimates the weight of the fetus using a mathematical model based on a multivariate Gaussian probability model designed by the Artificial Neural Networks (ANNs). In addition to the estimated weight, the FWI algorithm provides an estimate of the echobiometric parameters and the measurement error for each of them (CONFIDENCE LEVEL column).

Specifically, any discrepancy between fetal parameters is highlighted so that the suspected incorrect measurements may be repeated and corrected in real time by the user, thus minimizing human errors and enhancing the estimation accuracy bu only re-measuring the same parameters used in the original estimate.

The FWI page allows to input as additional parameters the qualitative AFV assessment and the number of fetuses to better fit the real situation.

Use of the Report

The **REPORT** key displays the measurements results.

Software Keys

The software keys are on one level only (here alphabetically sorted) :

Software Keys

CONFIG
FETUS
MEASURE
PAGE
PREVIEW
SCROLL
SINGLE

The **MEASURE** key toggles through the different sections and the **SCROLL** key scrolls through the different measurements.

The **PAGE** key toggles through the different report pages..

Refer to the "System Configuration" section for obstetrics measurements configuration

The **CONFIG** key opens the obstetrics measurements configuration menu: different bibliographic references can be set for the gestational age, for the fetal growth and the fetal weight. The report is automatically updated. The configuration can be changed in exam review and in archive review.

Refer to the previous chapter for the report organization

PREVIEW allows the user to display the report printing preview and to eventually close the report. The graphics are always enclosed in the printout.

Press **REPORT** to exit from the report.

Appendix A

Appendix A - Reference Tables in Obstetrics

Fetal Age

In the following pages the tables used in the Obstetrics application are listed together with their reference bibliography.

Parameter	Bibliography
BPD	Campbell, Hadlock 84, Hadlock 82, Hansmann, Jeanty 84, Nicolaides, Rempen, Todai 96, Osaka U, JSUM 2001, Bessis
AC	Hadlock 84, Hansmann, Nicolaides, Todai 96, JSUM 2001
HC	Campbell, Hadlock 84, Hansmann, Jeanty 84, Nicolaides, Merz 88
FL	Campbell, Hadlock 84, Hansmann 85, Jeanty 84, O'Brien 81, Todai 96, Osaka U, JSUM 2001, Merz 88, Bessis
TAD	Hansmann
TAD and APAD*	Eriksen
GS	Hansmann 85, Rempen, Todai
CRL	Rempen, Todai, Osaka U, JSUM 2001, Hadlock, Hansmann 85, Jeanty 84
OFD	Hansmann 85, Marz 88
TL	Jeanty 84
HL	Jeanty 84, Osaka U
UL	Jeanty 84
APTD x TTD	Todai96
FTA	Osaka U
FoL	Mercer 87
LV	Todai
MAD	Rempen
TCD	Hill 83, Goldstein 87

* Carefully read the chapter on Obstetrics calculations to measure the trunk diameters according to Eriksen

BPD – Campbell

Millimeters	Days	SD (-)	SD (+)
23,0	91	-1	6
28,0	98	7	7
32,0	105	7	7
36,0	112	7	7
40,0	119	7	7
44,0	126	7	7
47,0	133	7	7
51,0	140	7	7
54,0	147	7	7
58,0	154	8	8
61,0	161	8	8
64,0	168	8	8
67,0	175	9	9
70,0	182	10	9
73,0	189	11	9
75,0	196	12	10
78,0	203	12	10
80,0	210	13	10
83,0	217	14	11
85,0	224	14	13
87,0	231	15	13
89,0	238	17	14
91,0	245	18	18
93,0	252	19	20
95,0	259	20	24
97,0	266	20	-1
99,0	273	20	-1
100,0	280	21	-1
102,0	287	21	-1

Bibliographic reference: Department of obstetrics and gynaecology King's college school of medicine and dentistry Denmark Hill, London: 17-9-1991

BPD – Hadlock 84

GA (W+D) = 9.,54 + 1,482 * [BPD] + 0,1676 * [BPD]^2

Measure Unit: mm

Measurement Range : 17mm ÷ 94mm

Standard Deviation

GA (W)	±2SD (W)
12 ÷ 18	±1,19
18 ÷ 24	±1,73
24 ÷ 30	±2,18
30 ÷ 36	±3,08
36 ÷ 42	±3,20

Bibliographic reference: "Estimating Fetal age: Computer- assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

BPD – Hadlock 82

Millimeter	Week	Day	±SD
20	12	1	6
21	12	4	6
22	12	6	6
23	13	1	6
24	13	2	6
25	13	4	6
26	13	6	6
27	14	1	6
28	14	4	6
29	14	5	6
30	15	0	6
31	15	2	6
32	15	4	6
33	15	6	6
34	16	1	6
35	16	4	6
36	16	6	6
37	17	1	6
38	17	3	6
39	17	5	6
40	18	0	10
41	18	2	10
42	18	4	10
43	18	6	10
44	19	1	10
45	19	4	10
46	19	6	10
47	20	1	10
48	20	4	10
49	20	6	10
50	21	1	10
51	21	4	10
52	21	6	10
53	22	1	10
54	22	4	10
55	22	6	10
56	23	1	10
57	23	4	10
58	23	6	10
59	24	1	9
60	24	4	9
61	25	0	9
62	25	2	9
63	25	5	9
64	26	1	9
65	26	3	9
66	26	6	9

Millimeter	Week	Day	±SD
67	27	1	9
68	27	4	9
69	28	0	9
70	28	2	9
71	28	5	9
72	29	1	9
73	29	4	9
74	29	6	9
75	30	3	14
76	30	6	14
77	31	1	14
78	31	4	14
79	32	0	14
80	32	4	14
81	32	6	14
82	33	2	14
83	33	6	14
84	34	1	14
85	34	5	14
86	35	1	14
87	35	4	14
88	36	1	25
89	36	4	25
90	37	0	25
91	37	4	25
92	38	0	25
93	38	4	25
94	38	6	25
95	39	3	25
96	39	6	25
97	40	4	25
98	41	0	25
99	41	4	25
100	42	0	25

Bibliographic reference: Fetal Biparietal Diameter: A critical revaluation to menstrual age by means of real time ultrasound, *Journal of Ultrasound medicine*, 1:97 – 104 April 1982

BPD – Hansmann

GA (W+D) = 3,565691 + 6,942194 * [BPD] –1,896854 * $[BPD]^2$ + 0,4028942 * $[BPD]^3$ -0,403642 * $[BPD]^4$ + 0,015878 * $[BPD]^5$

Measure Unit: mm

Measurement Range : 20 ÷ 100 mm

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

BPD – Jeanty 84

GA (W+D) = 5,52573 + 3,82932 * [BPD] –0,774910 * $[BPD]^2$ + 0,946081 * $[BPD]^3$ -0,073637 * $[BPD]^4$ + 0,002514 * $[BPD]^5$

Measure Unit: mm

Measurement Range : 28 ÷ 95 mm

Bibliographic reference: Obstetrical ultrasound, McGraw Hill, 1984

BPD – Nicolaides

Millimiters	Days	Variance	GA
10,8	70	9	9W6D±9D
15,1	77	9	11W0D±8D
16,1	79	9	11W2D±9D
19,3	84	9	12W0D±9D
23,4	91	9	13W0D±9D
27,4	98	9	14W0D±8D
31,4	105	9	15W0D±8D
35,2	112	10	16W0D±10D
38,9	119	10	17WOD±9D
42,6	126	10	18W0D±10D
46,1	133	10	19W0D±10D
49,5	140	11	20W0D±10D
52,9	147	11	21W0D±11D
56,1	154	11	21W6D±10D
59,3	161	12	23W0D±12D
62,4	168	12	23W6D±11D
65,3	175	12	24W6D±12D
68,2	182	13	25W6D±13D
71,0	189	13	27W0D±13D
73,6	196	14	28W0D±13D
76,2	203	14	29W0D±14D
78,7	210	15	30W0D±15D
81,1	217	16	31W0D±16D
83,4	224	17	31W6D±17D
85,6	231	18	33W0D±18D
87,7	238	18	34W0D±18D
89,7	245	18	35W0D±18D
91,6	252	20	36W0D±19D
93,4	259	20	36W6D±20D
95,1	266	22	37W6D±22D
95,7	269	23	38W2D±23D
96,7	273	23	39W0D±23D
98,3	280	23	39W6D±22D
99,7	287	23	41W0D±23D
101,0	294	23	42W0D±23D

Bibliographic reference: Nederlandse vereninging voor obstetrie en gynaecologie: Nota echoscopie gynaecologie/verloskunde, 1993

BPD – Rempen

Millimiters	Days	Variance (±)
3,0	48	8
4,0	50	8
5,0	52	8
6,0	54	8
7,0	56	8
8,0	58	8
9,0	60	8
10,0	62	8
11,0	64	8
12,0	66	8
13,0	68	8
14,0	70	8
15,0	72	8
16,0	74	8
17,0	76	8
18,0	78	8
19,0	80	8
20,0	82	8
21,0	84	8
22,0	86	8
23,0	88	8
24,0	90	8
25,0	92	8
26,0	94	8
27,0	96	8

Bibliographic reference: Der Frauenartz, 32, 4/1991 Bld. 425 & 430. Dr.med. Andreas Rempen Universitates-Frauenlinik D-8700 Wuerzburg

BPD – Todai 96

Millimeter	GA
13,0	10W1D±4D
15,0	10W5D±4D
17,0	11W2D±4D
19,0	11W6D±4D
21,0	12W3D±4D
23,0	13W1D±5D
25,0	13W5D±5D
27,0	14W2D±5D
29,0	14W6D±5D
31,0	15W3D±5D
33,0	16W0D±5D
35,0	16W4D±5D
37,0	17W1D±6D
39,0	17W6D±6D
41,0	18W3D±6D
43,0	19W0D±6D
45,0	19W4D±6D
47,0	20W2D±7D
49,0	20W6D±7D
51,0	21W3D±7D
53,0	22W1D±8D
55,0	22W5D±8D
57,0	23W3D±8D
59,0	24W1D±8D
61,0	24W5D±9D
63,0	25W3D±9D
65,0	26W1D±9D
67,0	26W6D±10D
69,0	27W4D±10D
71,0	28W3D±10D
73,0	29W1D±11D
75,0	30W0D±11D
77,0	30W6D±12D
79,0	31W5D±12D
81,0	32W5D±12D
83,0	33W5D±13D
85,0	34W6D±13D
87,0	36W0D±14D
89,0	37W4D±14D

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", Jpn J Med Ultrasonics, Vol.23 No.12; 877-888, 1996

BPD – Osaka U

Millimeter	GA	Millimeter	GA
13,3	10W0D±0D	66,7	26W0D±0D
15,5	10W4D±0D	68,4	26W4D±0D
17,7	11W1D±0D	69,9	27W1D±0D
19,9	11W5D±0D	71,5	27W5D±0D
22,0	12W2D±0D	73,0	28W2D±0D
24,1	12W6D±0D	74,5	28W6D±0D
26,2	13W3D±0D	76,0	29W3D±0D
28,2	14W0D±0D	77,4	30W0D±0D
30,3	14W4D±0D	78,8	30W4D±0D
32,3	15W1D±0D	80,2	31W1D±0D
34,2	15W5D±0D	81,5	31W5D±0D
36,2	16W2D±0D	82,7	32W2D±0D
38,1	16W6D±0D	84,0	32W6D±0D
40,1	17W3D±0D	85,1	33W3D±0D
42,0	18W0D±0D	86,2	34W0D±0D
43,9	18W4D±0D	87,3	34W4D±0D
45,7	19W1D±0D	88,3	35W1D±0D
47,6	19W5D±0D	89,2	35W5D±0D
49,4	20W2D±0D	90,0	36W2D±0D
51,2	20W6D±0D	90,8	36W6D±0D
53,0	21W3D±0D	91,5	37W3D±0D
54,8	22W0D±0D	92,1	38W0D±0D
56,6	22W4D±0D	92,7	38W4D±0D
58,3	23W1D±0D	93,1	39W1D±0D
60,0	23W5D±0D	93,5	39W5D±0D
61,7	24W2D±0D	93,6	40W0D±0D
63,4	24W6D±0D		
65,1	25W3D±0D		

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

BPD – JSUM 2001

Millimeter	GA	Millimeter	GA
13,0	10W1D±4D	53,0	22W1D±8D
14,0	10W3D±4D	54,0	22W3D±8D
15,0	10W5D±4D	55,0	22W5D±8D
17,0	11W2D±4D	57,0	23W3D±8D
18,0	11W4D±4D	58,0	23W5D±8D
19,0	11W6D±4D	59,0	24W1D±8D
21,0	12W3D±4D	61,0	24W5D±9D
22,0	12W6D±4D	62,0	25W1D±9D
23,0	13W1D±5D	63,0	25W3D±9D
25,0	13W5D±5D	65,0	26W1D±9D
26,0	14W0D±5D	66,0	26W3D±10D
27,0	14W2D±5D	67,0	26W6D±10D
29,0	14W6D±5D	69,0	27W4D±10D
30,0	15W1D±5D	70,0	28W0D±10D
31,0	15W3D±5D	71,0	28W3D±10D
33,0	16W0D±5D	73,0	29W1D±11D
34,0	16W2D±5D	74,0	29W4D±11D
35,0	16W4D±5D	75,0	30W0D±11D
37,0	17W1D±6D	77,0	30W6D±12D
38,0	17W4D±6D	78,0	31W2D±12D
39,0	17W4D±6D	79,0	31W5D±12D
41,0	18W3D±6D	81,0	32W5D±12D
42,0	18W5D±6D	82,0	33W1D±13D
43,0	19W0D±6D	83,0	33W5D±13D
45,0	19W4D±6D	85,0	34W6D±13D
46,0	20W0D±7D	86,0	35W3D±14D
57,0	20W2D±7D	87,0	36W0D±14D
49,0	20W6D±7D	89,0	37W4D±14D
50,0	21W1D±7D	90,0	38W3D±15D
51,0	21W3D±7D		

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

BPD – Bessis

Millimeters	Days	Variance	GA
19,0	81	5	11W4D±5D
23,5	91	5	13W0D±5D
36,5	119	5	17W0D±5D
49,0	147	7	21W0D±7D
60,5	175	9	25W0D±9D
72,0	203	12	29W0D±12D
81,5	231	18	33W0D±18D
87,5	259	31	37W0D±31D
97,0	279	31	39W6D±31D

Bibliographic Reference: Institut national de la santé et del la recherche médicale (INSERM) France

AC – Hadlock 84

GA(W+D) = 8,14 + 0,753 * [AC] + 0,0036 * [AC]^2

Measure Unit: mm

Measurement range : 46 ÷ 353 mm

Standard Deviation:

GA (W)	±2SD (W)
12 ÷ 18	±1,66
18 ÷ 24	±2,06
24 ÷ 30	±2,18
30 ÷ 36	±2,96
36 ÷ 42	±3,04

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

AC- Hansmann

Millimiters	GA(W)
53,0	11
63,0	12
75,0	13
85,0	14
97,0	15
107,0	16
116,0	17
126,0	18
135,0	19
145,0	20
155,0	21
165,0	22
173,0	23
183,0	24
191,0	25
202,0	26
211,0	27
222,0	28
230,0	29
240,0	30
249,0	31
258,0	32
268,0	33
277,0	34
287,0	35
296,0	36
306,0	37
315,0	38
320,0	39

Bibliographic reference: Ultrashalldiagnostik in Geurtshilfe und Gynakologie: Lehrbuch u. Atlas Springer-Verslag ISBN 3-350-11429-9

AC-Nicolaides

Millimiters	Days	Variance	GA
60,0	70	7	10W0D±7D
67,0	77	7	11W0D±7D
74,0	84	8	12W0D±8D
81,0	91	8	13W0D±8D
89,0	98	8	14W0D±8D
97,0	105	8	15W0D±8D
106,0	112	9	16W0D±9D
115,0	119	9	17W0D±9D
125,0	126	9	18W0D±9D
135,0	133	9	19W0D±9D
145,0	140	10	20W0D±10D
156,0	147	10	21W0D±10D
167,0	154	11	22W0D±11D
178,0	161	11	23W0D±11D
189,0	168	12	24W0D±12D
201,0	175	13	25W0D±13D
212,0	182	14	26W0D±14D
224,0	189	15	27W0D±15D
235,0	196	16	28W0D±16D
246,0	203	17	29W0D±17D
257,0	210	18	30W0D±18D
267,0	217	19	31W0D±19D
277,0	224	21	32W0D±21D
287,0	231	28	33W0D±28D
295,0	238	30	34W0D±30D
304,0	245	32	35W0D±32D
311,0	252	34	36W0D±34D
318,0	259	36	37W0D±36D
324,0	266	37	38W0D±37D
328,0	273	38	39W0D±38D
332,0	280	39	40W0D±39D
335,0	287	44	41W0D±44D
337,0	294	50	42W0D±50D

Bibliographic reference: Nederlandse vereninging voor obstetrie en gynaecologie: Nota echoscopie gynaecologie/verloskunde, 1993

AC - Todai 96

Millimeter	GA	Millimeter	GA
100,0	15W3D±8D	220,0	27W3D±12D
105,0	16W0D±8D	225,0	28W0D±12D
110,0	16W4D±8D	230,0	28W4D±12D
115,0	17W0D±8D	235,0	29W0D±12D
120,0	17W4D±9D	240,0	29W4D±13D
125,0	18W0D±9D	245,0	30W1D±13D
130,0	18W4D±9D	250,0	30W5D±13D
135,0	19W0D±9D	255,0	31W2D±13D
140,0	19W4D±9D	260,0	31W6D±13D
145,0	20W0D±9D	265,0	32W3D±13D
150,0	20W3D±10D	270,0	33W1D±13D
155,0	21W0D±10D	275,0	33W5D±14D
160,0	21W3D±10D	280,0	34W2D±14D
165,0	22W0D±10D	285,0	35W0D±14D
170,0	22W3D±10D	290,0	35W4D±14D
175,0	22W6D±10D	295,0	36W2D±14D
180,0	23W3D±11D	300,0	36W6D±14D
185,0	23W6D±11D	305,0	37W5D±14D
190,0	24W3D±11D	310,0	38W2D±15D
195,0	24W6D±11D	315,0	39W0D±15D
200,0	25W3D±11D	320,0	39W6D±15D
205,0	25W6D±11D	325,0	40W4D±15D
210,0	26W3D±12D	330,0	41W2D±15D
215,0	27W0D±12D		

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

AC – JSUM 2001

Millimeter	GA	Millimeter	GA
100,0	15W3D±8D	250,0	30W5D±13D
105,0	16W0D±8D	255,0	31W2D±13D
110,0	16W4D±8D	260,0	31W6D±13D
115,0	17W0D±8D	265,0	32W3D±13D
120,0	17W4D±9D	270,0	33W1D±13D
125,0	18W0D±9D	275,0	33W5D±14D
130,0	18W4D±9D	280,0	34W2D±14D
135,0	19W0D±9D	285,0	35W0D±14D
140,0	19W4D±9D	290,0	35W4D±14D
145,0	20W0D±9D	295,0	36W2D±14D
150,0	20W3D±10D	300,0	37W0D±14D
155,0	21W0D±10D	305,0	37W5D±14D
160,0	21W3D±10D	310,0	38W2D±15D
165,0	22W0D±10D	315,0	39W0D±15D
170,0	22W3D±10D	320,0	39W6D±15D
175,0	22W6D±10D	325,0	40W4D±15D
180,0	23W3D±11D		
185,0	23W6D±11D		
190,0	24W3D±11D		
195,0	24W6D±11D		
200,0	25W3D±11D		
205,0	25W6D±11D		
210,0	26W3D±12D		
215,0	27W0D±12D		
220,0	27W3D±12D		
225,0	28W0D±12D		
230,0	28W4D±12D		
235,0	29W0D±12D		
240,0	29W4D±13D		
245,0	30W1D±13D		

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

HC – Campbell

Millimiters	Days	SD(-)	SD(+)
115,0	98	-1	11
126,0	105	-1	11
136,0	112	13	11
146,0	119	14	12
159,0	126	14	13
169,0	133	14	14
180,0	140	14	14
190,0	147	14	17
200,0	154	14	17
212,0	161	15	18
222,0	168	17	18
232,0	175	18	19
244,0	182	18	19
255,0	189	18	19
266,0	196	18	20
278,0	203	19	21
288,0	210	19	23
298,0	217	22	27
307,0	224	23	31
314,0	231	25	35
321,0	238	25	42
326,0	245	30	-1
332,0	252	31	-1
336,0	259	34	-1
340,0	266	35	-1
342,0	273	40	-1
345,0	280	43	-1

Bibliographic reference: Department of obstetrics and gynaecology King's college school of medicine and dentistry Denmark Hill, London: 17-9-1991

HC – Hadlock

GA (W+D) = 8,96 + 0,54 * [HC] + 0,0003 $[HC]^3$

Measure Unit: mm

Measurement range : 68 ÷ 346 mm

Standard Deviation

GA (W)	±2SD (W)
12 ÷ 18	±1,19
18 ÷ 24	±1,48
24 ÷ 30	±2,06
30 ÷ 36	±2,98
36 ÷ 42	±2,70

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

HC – Hansmann

GA (W+D) = - 49,92573 + 139,30929 * [HC] – 120,3719 * $[HC]^2$ + 54,7131 * $[HC]^3$ – 12,36631 * $[HC]^4$ + 1,120251 * $[HC]^5$

Measure Unit: mm

Measurement range: 140 ÷ 350 mm

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

HC – Jeanty 84

GA (W+D) = 8,817808 + 0,550455 * [HC] – 0,00001829 * $[HC]^2$ + 0,0002846 * $[HC]^3$

Measure Unit: mm

Measurement range : 80 ÷ 360 mm

Bibliographic reference: Obstetrical ultrasound, McGraw Hill, 1984

HC – Nicolaides

Millimiters	Days	Variance	GA
32,0	70	7	10W0D±7D
48,0	77	7	11W0D±7D
49,0	77	7	11W0D±7D
64,0	84	7	12W0D±7D
79,0	91	8	13W0D±8D
94,0	98	8	14W0D±8D
109,0	105	8	15W0D±8D
123,0	112	8	16W0D±8D
136,0	119	9	17W0D±9D
150,0	126	9	18W0D±9D
163,0	133	9	19W0D±9D
175,0	140	9	20W0D±9D
187,0	147	9	21W0D±9D
199,0	154	10	22W0D±10D
210,0	161	10	23W0D±10D
221,0	168	10	24W0D±10D
232,0	175	11	25W0D±11D
242,0	182	11	26W0D±11D
252,0	189	12	27W0D±12D
261,0	196	13	28W0D±13D
270,0	203	13	29W0D±13D
278,0	210	14	30W0D±14D
286,0	217	15	31W0D±15D
294,0	224	16	32W0D±16D
301,0	231	17	33W0D±17D
308,0	238	18	34W0D±18D
315,0	245	19	35W0D±19D
321,0	252	20	36W0D±20D
326,0	259	22	37W0D±22D
332,0	266	24	38W0D±24D
333,0	267	25	38W1D±25D
337,0	273	26	39W0D±26D
341,0	280	27	40W0D±27D
345,0	287	28	41W0D±28D
349,0	294	28	42W0D±28D

Bibliographic reference: Nederlandse vereninging voor obstetrie en gynaecologie: Nota echoscopie gynaecologie/verloskunde, 1993

HC –Merz88

Millimeters	Days	Variance (-)	Variance (+)
83,0	91	0	7
97,0	98	6	7
111,0	105	7	8
124,0	112	8	8
137,0	119	8	8
150,0	126	8	8
163,0	133	8	9
175,0	140	8	9
188,0	147	8	10
199,0	154	9	10
211,0	161	9	10
222,0	168	9	11
233,0	175	10	11
244,0	182	10	12
254,0	189	11	12
264,0	196	11	13
274,0	203	12	13
283,0	210	13	14
292,0	217	13	15
301,0	224	13	16
309,0	231	14	16
317,0	238	15	18
325,0	245	16	18
332,0	252	17	20
339,0	259	18	21
346,0	266	18	0
352,0	273	19	0
358,0	280	20	0

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

FL – Campbell

GA (W+D) = 7,920067 + 4,397133 * [FL] – 0,560659 * $[FL]^2$ + 0,090984 * $[FL]^3$ – 0,002513 * $[FL]^4$

Measure Unit: mm

Measurement range : 10 ÷ 75,4 mm

FL – Hadlock 84

GA (W+D) = 10,35 + 2,46 * [FL] + 0,17 * [FL]^2

Measure Unit: mm

Measurement range : 7 ÷ 82 mm

Standard Deviation

GA (W)	±2SD (W)
12 ÷ 18	±1,38
18 ÷ 24	±1,80
24 ÷ 30	±2,08
30 ÷ 36	±2,96
36 ÷ 42	±3,12

Bibliographic reference: "Estimating Fetal Age: Computer- assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

FL – Hansmann 85

GA (W+D) = 10,85929 + 3,639269 * [FL] – 0,6200159 * $[FL]^2$ + 0,239227 * $[FL]^3$ – 0,0338586 * $[FL]^4$ + 0,0018145 * $[FL]^5$

Measure Unit: mm

Measurement range : 20 ÷ 75 mm

SD = 1,50599 – 0,1308938 * [FL] + 0,0086599 * $[FL]^2$ – 0,000113 * $[FL]^3$

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

FL – Jeanty 84

Millimeter	GA(W+D)		
	5%	50%	95%
10,0	10+3	12+4	14+6
11,0	10+5	12+6	15+1
12,0	11+1	13+2	15+4
13,0	11+3	13+4	15+6
14,0	11+5	13+6	16+1
15,0	12	14+1	16+3
16,0	12+3	14+4	16+6
17,0	12+5	14+6	17+1
18,0	13	15+1	17+3
19,0	13+3	15+4	17+6
20,0	13+5	15+6	18+1
21,0	14+1	16+2	18+4
22,0	14+3	16+4	18+6
23,0	14+5	16+6	19+1
24,0	15+1	17+2	19+4
25,0	15+3	17+4	19+6
26,0	15+6	18	20+1
27,0	16+1	18+2	20+4
28,0	16+4	18+5	20+6
29,0	16+6	19	21+1
30,0	17+1	19+3	21+4
31,0	17+4	19+6	22
32,0	17+6	20+1	22+2
33,0	18+2	20+4	22+5
34,0	18+5	20+6	23+1
35,0	19	21+1	23+3
36,0	19+3	21+4	23+6
37,0	19+6	22	24+1
38,0	20+1	22+3	24+4
39,0	20+4	22+5	24+6
40,0	20+6	23+1	25+2
41,0	21+2	23+4	25+5
42,0	21+5	23+6	26+1
43,0	22+1	24+2	26+4
44,0	22+4	24+5	26+6
45,0	22+6	25	27+1
46,0	23+1	25+3	27+4
47,0	23+4	25+6	28
48,0	24	26+1	28+3
49,0	24+3	26+4	28+6
50,0	24+6	27	29+1
51,0	25+1	27+3	29+4
52,0	25+4	27+6	30
53,0	26	28+1	30+3
54,0	26+3	28+4	30+6
55,0	26+6	29+1	31+2

Millimeter	GA(W+D)		
	5%	50%	95%
56,0	27+2	29+4	31+5
57,0	27+5	29+6	32+1
58,0	28+1	30+2	32+4
59,0	28+4	30+5	32+6
60,0	28+6	31+1	33+2
61,0	29+3	31+4	33+6
62,0	29+6	32	34+1
63,0	30+1	32+3	34+4
64,0	30+5	32+6	35+1
65,0	31+1	33+2	35+4
66,0	31+4	33+5	35+6
67,0	32	34+1	36+3
68,0	32+3	34+4	36+6
69,0	32+6	35	37+1
70,0	33+2	35+4	37+5
71,0	33+5	35+6	38+1
72,0	34+1	36+3	38+4
73,0	34+4	36+6	39
74,0	35+1	37+2	39+4
75,0	35+4	37+5	39+6
76,0	36	38+1	40+3
77,0	36+3	38+4	40+6
78,0	36+6	39+1	41+2
79,0	37+2	39+4	41+5
80,0	37+6	40	42+1

Bibliographic reference: "Estimation of Gestational Age from Measurements of Fetal Long Bones." *J Ultrasound Med* 3;75-79, February 1984

FL - O'Brien 81

GA (W+D) = 5,184726 + 9,844899 * [FL] – 3,99398 * $[FL]^2$ + 1,041302 * $[FL]^3$ - 0,116949 * $[FL]^4$ + 0,004815 * $[FL]^5$

Measure Unit: mm

Measurement range: 10 ÷ 80 mm

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

FL – Todai 96

Millimeter	GA
20,0	16W1D±6D
22,0	16W6D±6D
24,0	17W3D±7D
26,0	18W1D±7D
28,0	18W6D±7D
30,0	19W4D±8D
32,0	20W2D±8D
34,0	21W1D±8D
36,0	21W6D±8D
38,0	22W5D±9D
40,0	23W3D±9D
42,0	24W3D±9D
44,0	25W3D±9D
46,0	26W2D±10D
48,0	27W2D±10D
50,0	28W2D±10D
52,0	29W2D±11D
54,0	30W2D±11D
56,0	31W2D±11D
58,0	32W3D±11D
60,0	33W3D±12D
62,0	34W4D±12D
64,0	35W5D±12D
66,0	37W0D±12D
68,0	38W1D±13D
70,0	39W3D±13D

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

FL – Osaka U

Millimeter	GA	Millimeter	GA
9,4	13W0D±0D	51,0	28W3D±0D
11,2	13W4D±0D	52,2	29W0D±0D
13,0	14W1D±0D	53,4	29W4D±0D
14,8	14W5D±0D	54,6	30W1D±0D
16,6	15W2D±0D	55,7	30W5D±0D
18,3	15W6D±0D	56,9	31W2D±0D
20,1	16W3D±0D	58,0	31W6D±0D
21,8	17W0D±0D	59,0	32W3D±0D
23,4	17W4D±0D	60,1	33W0D±0D
25,1	18W1D±0D	61,1	33W4D±0D
26,7	18W5D±0D	62,1	34W1D±0D
28,3	19W2D±0D	63,1	34W5D±0D
29,9	19W6D±0D	64,1	35W2D±0D
31,5	20W2D±0D	65,0	35W6D±0D
33,0	21W0D±0D	66,0	36W3D±0D
34,6	21W4D±0D	66,9	37W0D±0D
36,1	22W1D±0D	67,7	37W4D±0D
37,5	22W5D±0D	68,6	38W1D±0D
39,0	23W2D±0D	69,4	38W5D±0D
40,4	23W6D±0D	70,2	39W2D±0D
41,8	24W3D±0D	71,0	39W5D±0D
43,2	25W0D±0D	71,2	40W0D±0D
44,5	25W4D±0D		
45,9	26W1D±0D		
47,2	26W5D±0D		
48,5	27W2D±0D		
49,7	27W6D±0D		

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

FL – JSUM 2001

Millimeter	GA	Millimeter	GA
20,0	16W1D±6D	46,0	26W2D±10D
21,0	16W3D±6D	47,0	26W5D±10D
22,0	16W6D±6D	48,0	27W2D±10D
23,0	17W1D±7D	49,0	27W5D±10D
24,0	17W3D±7D	50,0	28W2D±10D
25,0	17W6D±7D	51,0	28W5D±10D
26,0	18W1D±7D	52,0	29W2D±11D
27,0	18W3D±7D	53,0	29W5D±11D
28,0	18W6D±7D	54,0	30W2D±11D
29,0	19W1D±7D	55,0	30W5D±11D
30,0	19W4D±8D	56,0	31W2D±11D
31,0	20W0D±8D	57,0	31W6D±11D
32,0	20W2D±8D	58,0	32W3D±11D
33,0	20W5D±8D	59,0	33W0D±12D
34,0	21W1D±8D	60,0	33W3D±12D
35,0	21W3D±8D	61,0	34W0D±12D
36,0	21W6D±8D	62,0	34W4D±12D
37,0	22W2D±9D	63,0	35W1D±12D
38,0	22W5D±9D	64,0	35W5D±12D
39,0	23W1D±9D	65,0	36W2D±12D
40,0	23W4D±9D	66,0	37W0D±12D
41,0	24W0D±9D	67,0	37W4D±13D
42,0	24W3D±9D	68,0	38W1D±13D
43,0	24W6D±9D	69,0	38W5D±13D
44,0	25W3D±9D	70,0	39W3D±13D
45,0	25W6D±10D		

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

FL - Merz 88

Millimeters	Days	Variance (-)	Variance (+)
10,0	91	0	9
13,0	98	0	9
16,0	105	9	9
19,0	112	9	9
22,0	119	9	9
25,0	126	9	9
28,0	133	9	9
31,0	140	9	9
34,0	147	12	10
37,0	154	12	12
39,0	161	12	12
42,0	168	14	14
45,0	175	12	12
47,0	182	12	14
50,0	189	14	12
52,0	196	14	14
55,0	203	14	14
57,0	210	14	14
59,0	217	16	14
62,0	224	14	18
64,0	231	14	18
66,0	238	16	18
68,0	245	18	18
70,0	252	18	18
72,0	259	18	21
74,0	266	21	0
76,0	273	21	0
77,0	280	21	0

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

FL – Bessis

Millimeters	GA(W)	+/-
10,4	13	1
22,2	17	1,1
33,7	21	1,2
44,5	25	1,4
54,2	29	1,6
64,2	33	2,1
69,0	37	2,9
73,4	41	4

Bibliographic Reference: Institut national de la santé et del la recherche médicale (INSERM) France

TAD – Hansmann

Millimeter	GA(W)
17	11
20	12
24	13
27	14
31	15
34	16
37	17
40	18
44	19
47	20
51	21
53	22
56	23
59	24
62	25
65	26
69	27
72	28
74	29
78	30
81	31
83	32
86	33
89	34
92	35
94	36
97	37
99	38
101	39

Bibliographic reference: Ultrashalldiagnostik in Geurtshilfe und Gynakologie: Lehrbuch u. Atlas Springer-Verslag ISBN 3-350-11429-9

TAD and APAD – Eriksen 85

Millimeter	Days	2 SD
22,7	92	4,53
26,41	99	4,71
30,09	106	4,81
33,73	113	5,11
37,34	120	5,32
40,91	127	5,54
44,46	134	5,79
47,97	141	6,06
51,44	148	6,29
54,89	155	6,58
58,3	162	6,87
61,69	169	7,19
65,05	175	7,52
68,36	183	7,87
71,66	190	8,25
74,92	197	8,63
78,16	204	9,06
81,37	211	9,5
84,55	218	9,97
87,7	225	10,47
90,83	232	11,00
93,92	239	11,56
97	246	12,16
100,05	253	12,8
103,07	260	13,47
106,07	267	14,19
109,04	274	14,96
111,99	281	15,77

Carefully read the Obstetric Calculation chapter to correctly measure the trunk diameters with Eriksen

Bibliographic reference: Eriksen PS, Sechor NJ, Weis-Bentzen M, "Normal growth of the fetal biparietal diameter and the abdominal diameter in a longitudinal study: an evaluation of the two parameters in predicting fetal weight", Acta Obstet Gynecal Scan, 64:65-70, 1985

GS - Hansmann 85

GA (W+D) = 4,296023 + 1,608366 * [GS] – 0,0657597 * $[GS]^2$ + 0,0058421 * $[GS]^3$

Measure Unit: mm

Measurement range: 10 ÷ 68 mm

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

GS – Rempen

Millimeter	Days	Variance	Millimeter	Days	Variance
2,0	34	±10D	42,0	68	±10D
3,0	35	±10D	43,0	69	±10D
4,0	36	±10D	44,0	69	±10D
5,0	37	±10D	45,0	70	±10D
6,0	37	±10D	46,0	71	±10D
7,0	38	±10D	47,0	72	±10D
8,0	39	±10D	48,0	73	±10D
9,0	40	±10D	49,0	74	±10D
10,0	40	±10D	50,0	75	±10D
11,0	41	±10D	51,0	76	±10D
12,0	42	±10D	52,0	77	±10D
13,0	43	±10D	53,0	78	±10D
14,0	44	±10D	54,0	79	±10D
15,0	44	±10D	55,0	80	±10D
16,0	45	±10D	56,0	81	±10D
17,0	46	±10D	57,0	82	±10D
18,0	47	±10D	58,0	83	±10D
19,0	48	±10D	59,0	84	±10D
20,0	48	±10D	60,0	85	±10D
21,0	49	±10D	61,0	86	±10D
22,0	50	±10D	62,0	87	±10D
23,0	51	±10D	63,0	88	±10D
24,0	52	±10D	64,0	89	±10D
25,0	53	±10D	65,0	90	±10D
26,0	53	±10D	66,0	91	±10D
27,0	54	±10D	67,0	92	±10D
28,0	55	±10D	68,0	93	±10D
29,0	56	±10D	69,0	94	±10D
30,0	57	±10D	70,0	95	±10D
31,0	58	±10D	71,0	96	±10D
32,0	59	±10D	72,0	98	±10D
33,0	59	±10D	73,0	99	±10D
34,0	60	±10D			
35,0	61	±10D			
36,0	62	±10D			
37,0	63	±10D			
38,0	64	±10D			
39,0	65	±10D			
40,0	66	±10D			

Bibliographic reference: Der Frauenarzt, 32, 4/1991 Bld. 425 & 430. Dr.med. Andreas Rempen Universitäts-Frauenklinik D-8700 Würzburg

GS – Todai

Millimiters	GA
10,0	4W0D±7D
16,0	5W0D±8D
22,0	6W0D±11D
27,0	7W0D±12D
34,0	8W0D±13D
41,0	9W0D±14D
48,0	10W0D±15D
57,0	11W0D±16D

Bibliographic reference: Takashi Okai et al., "Approach to new perinatal control by comprehensive analysis of fetal data", *Journal of Japan OB/GY Society*, Vol.38, n.8, 1209-1217, 1986

CRL – Rempen

Millimeter	Days	Variance	Millimeter	Days	Variance
2,0	42	±6D	41,0	75	±6D
3,0	43	±6D	42,0	76	±6D
4,0	44	±6D	43,0	77	±6D
5,0	45	±6D	44,0	77	±6D
6,0	46	±6D	45,0	78	±6D
7,0	47	±6D	46,0	79	±6D
8,0	48	±6D	47,0	79	±6D
9,0	49	±6D	48,0	80	±6D
10,0	50	±6D	49,0	81	±6D
11,0	51	±6D	50,0	81	±6D
12,0	52	±6D	51,0	82	±6D
13,0	53	±6D	52,0	82	±6D
14,0	54	±6D	53,0	83	±6D
15,0	55	±6D	54,0	84	±6D
16,0	55	±6D	55,0	84	±6D
17,0	56	±6D	56,0	85	±6D
18,0	57	±6D	57,0	85	±6D
19,0	58	±6D	58,0	86	±6D
20,0	59	±6D	59,0	87	±6D
21,0	60	±6D	60,0	87	±6D
22,0	61	±6D	61,0	88	±6D
23,0	61	±6D	62,0	88	±6D
24,0	62	±6D	63,0	89	±6D
25,0	63	±6D	64,0	89	±6D
26,0	64	±6D	65,0	90	±6D
27,0	65	±6D	66,0	90	±6D
28,0	66	±6D	67,0	91	±6D
29,0	66	±6D	68,0	91	±6D
30,0	67	±6D	69,0	92	±6D
31,0	68	±6D	70,0	92	±6D
32,0	69	±6D	71,0	93	±6D
33,0	69	±6D	72,0	93	±6D
34,0	70	±6D	73,0	94	±6D
35,0	71	±6D	74,0	94	±6D
36,0	72	±6D	75,0	95	±6D
37,0	72	±6D	76,0	95	±6D
38,0	73	±6D	77,0	95	±6D
39,0	74	±6D	78,0	96	±6D
40,0	75	±6D			

Bibliographic reference: Ärztliche Fragen, "Biometrie in der Frühgravidität" (i. Trimenon): 425-430, 1991

CRL – Todai

Millimiters	GA
15,0	8W0D±7D
19,0	9W0D±7D
27,0	10W0D±7D
36,0	11W0D±7D
46,0	12W0D±7D
57,0	13W0D±7D
72,0	14W0D±8D

Bibliographic reference: Takashi Okai et al., "Approach to new perinatal control by comprehensive analysis of fetal data", *Journal of Japan OB/GY Society*, Vol.38, n.8, 1209-1217, 1986

CRL – Osaka U

Millimeter	GA
8,7	7W0D±0D
9,1	7W1D±0D
9,6	7W2D±0D
10,2	7W3D±0D
10,8	7W4D±0D
11,5	7W5D±0D
12,2	7W6D±0D
13,0	8W0D±0D
13,9	8W1D±0D
14,9	8W2D±0D
15,9	8W3D±0D
16,9	8W4D±0D
18,0	8W5D±0D
19,2	8W6D±0D
20,4	9W0D±0D
21,6	9W1D±0D
22,9	9W2D±0D
24,3	9W3D±0D
25,7	9W4D±0D
27,1	9W5D±0D
28,5	9W6D±0D
30,0	10W0D±0D
31,5	10W1D±0D
33,1	10W2D±0D
34,7	10W3D±0D
36,3	10W4D±0D
37,9	10W5D±0D
39,5	10W6D±0D
41,2	11W0D±0D
42,8	11W1D±0D
44,5	11W2D±0D
46,3	11W3D±0D
47,9	11W4D±0D
49,6	11W5D±0D
51,3	11W6D±0D
53,0	12W0D±0D
54,8	12W1D±0D
56,5	12W2D±0D
58,2	12W3D±0D
59,9	12W4D±0D
61,6	12W5D±0D
63,2	12W6D±0D

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

CRL – JSUM 2001

Millimiters	GA
13,0	8W0D±7D
14,0	8W1D±7D
15,0	8W2D±6D
16,0	8W3D±6D
17,0	8W4D±6D
18,0	8W5D±6D
19,0	8W6D±6D
20,0	9W0D±6D
21,0	9W1D±6D
22,0	9W2D±6D
23,0	9W2D±6D
24,0	9W3D±6D
25,0	9W4D±6D
26,0	9W5D±6D
27,0	9W6D±6D
28,0	10W0D±5D
29,0	10W0D±6D
30,0	10W1D±6D
31,0	10W2D±5D
32,0	10W3D±5D
33,0	10W3D±6D
34,0	10W4D±5D
35,0	10W5D±5D
36,0	10W5D±5D
37,0	10W6D±5D
38,0	11W0D±5D
39,0	11W0D±5D
40,0	11W1D±5D
41,0	11W2D±4D
42,0	11W2D±5D
43,0	11W3D±4D

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

CRL – Hadlock

GA (W+D) = $e^{1,684969 + 0,315646 * [CRL] - 0,049306 * [CRL]2 + 0,04057 * [CRL]3 - 0,000120456 * [CRL]4}$

Measure Unit: mm

Measurement range: 2 ÷ 121 mm

Bibliographic reference: Hadlock FP et al "Fetal Crown-Rump length: Re-evaluation of relation to menstrual age (5-18 weeks) with high-resolution real time US", *Radiology*, 182:501-505

CRL – Hansmann 85

Millimiters	Days	Variance	GA
6,0	42	6	6W0D±6D
8,0	46	6	6W4D±6D
10,0	48	7	6W6D±7D
12,0	51	7	7W2D±7D
15,0	55	7	7W6D±7D
17,0	58	7	8W2D±7D
20,0	62	7	8W6D±7D
24,0	65	8	9W2D±8D
28,0	69	8	9W6D±8D
32,0	72	8	10W2D±8D
36,0	76	8	10W6D±8D
40,0	78	8	11W1D±8D
44,0	81	8	11W4D±8D
48,0	83	9	11W6D±9D
52,0	85	9	12W1D±9D
56,0	88	9	12W4D±9D
60,0	90	9	12W6D±9D
66,0	92	10	13W1D±10D
73,0	95	10	13W4D±10D
80,0	98	11	14W0D±11D
86,0	102	12	14W4D±12D
90,0	104	12	14W6D±12D
93,0	105	12	15W0D±12D
96,0	107	12	15W2D±12D
100,0	109	12	15W4D±12D
103,0	111	13	15W6D±13D
106,0	113	13	16W1D±13D
110,0	116	14	16W4D±14D
113,0	118	14	16W6D±14D
116,0	120	14	17W1D±14D
120,0	123	14	17W4D±14D
123,0	125	14	17W6D±14D
126,0	127	15	18W1D±15D
130,0	132	15	18W6D±15D
133,0	133	15	19W0D±15D
136,0	137	16	19W4D±16D
140,0	139	16	19W6D±16D
143,0	142	16	20W2D±16D
146,0	146	16	20W6D±16D
150,0	149	16	21W2D±16D

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

CRL – Jeanty 84

GA (W+D) = 5,279715 + 2,273903 * [CRL] – 0,310971 * [CRL]^2 + 0,0231365 * [CRL]^3

Measure Unit: mm

Measurement range: 5 ÷ 54 mm

Bibliographic reference: Obstetrical ultrasound, McGraw Hill, 1984

OFD – Hansmann 85

Millimiters	Days	Variance	GA
34,0	95	8	13W4D±8D
38,0	102	8	14W4D±8D
42,0	109	8	15W4D±8D
46,0	116	8	16W4D±8D
48,0	119	8	17W0D±8D
50,0	123	9	17W4D±9D
52,0	128	9	18W2D±9D
54,0	130	9	18W4D±9D
56,0	135	9	19W2D±9D
58,0	139	9	19W6D±9D
60,0	140	10	20W0D±10D
62,0	144	10	20W4D±10D
64,0	147	10	21W0D±10D
66,0	151	10	21W4D±10D
68,0	153	10	21W6D±10D
70,0	158	10	22W4D±10D
72,0	160	12	22W6D±12D
74,0	163	12	23W2D±12D
76,0	167	12	23W6D±12D
78,0	168	14	24W0D±14D
80,0	172	14	24W4D±14D
82,0	175	14	25W0D±14D
84,0	179	14	25W4D±14D
86,0	182	14	26W0D±14D
88,0	188	14	26W6D±14D
90,0	191	16	27W2D±16D
92,0	195	16	27W6D±16D
94,0	200	18	28W4D±18D
96,0	205	18	29W2D±18D
98,0	209	20	29W6D±20D
100,0	214	20	30W4D±20D
102,0	219	22	31W2D±22D
104,0	224	22	32W0D±22D
106,0	231	20	33W0D±20D
108,0	238	20	34W0D±20D
110,0	245	20	35W0D±20D
112,0	256	20	36W4D±20D
114,0	266	20	38W0D±20D
115,0	273	20	39W0D±20D
116,0	280	20	40W0D±20D

OFD – Merz 88

Millimeters	Days	Variance (-)	Variance (+)
26,0	91	0	7
31,0	98	7	7
36,0	105	7	7
41,0	112	8	8
45,0	119	8	9
50,0	126	7	8
54,0	133	8	9
59,0	140	9	9
63,0	147	10	10
67,0	154	10	10
71,0	161	10	10
75,0	168	10	12
79,0	175	10	14
82,0	182	12	12
85,0	189	14	14
89,0	196	12	14
92,0	203	12	16
95,0	210	16	16
97,0	217	16	18
100,0	224	16	21
103,0	231	18	21
105,0	238	19	24
107,0	245	19	24
109,0	252	21	24
111,0	259	21	0
113,0	266	24	0
115,0	273	24	0
117,0	280	24	0

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

TL – Jeanty 84

Millimeter	GA(W+D)		
	5%	50%	95%
10,0	10+4	13+3	16+2
11,0	10+6	13+5	15+4
12,0	11+1	14+1	17
13,0	11+4	14+3	17+2
14,0	11+6	14+6	17+5
15,0	12+1	15+1	18
16,0	12+4	15+4	18+3
17,0	13	15+6	18+6
18,0	13+2	16+1	19+1
19,0	13+5	16+4	19+4
20,0	14+1	17	19+6
21,0	14+4	17+3	20+2
22,0	14+6	17+6	20+5
23,0	15+1	18+1	21+1
24,0	15+4	18+4	21+3
25,0	16	18+6	21+6
26,0	16+3	19+2	22+1
27,0	16+6	19+5	22+4
28,0	17+1	20+1	23
29,0	17+4	20+4	23+4
30,0	18+1	21	23+6
31,0	18+4	21+3	24+2
32,0	18+6	21+6	24+5
33,0	19+2	22+1	25+1
34,0	19+5	22+4	25+4
35,0	20+1	23+1	26
36,0	20+4	23+4	26+3
37,0	21	23+6	26+6
38,0	21+4	24+3	27+2
39,0	21+6	24+6	27+5
40,0	22+3	25+2	28+1
41,0	22+6	25+5	28+4
42,0	23+2	26+1	29+1
43,0	23+5	26+4	29+4
44,0	24+1	27+1	30
45,0	24+4	27+4	30+4
46,0	25+1	28	30+6
47,0	25+4	28+4	31+3
48,0	26+1	29	31+6
49,0	26+4	29+3	32+2
50,0	27	29+6	32+6
51,0	27+4	30+3	33+2
52,0	28	30+6	33+6
53,0	28+4	31+3	34+2
54,0	29	31+6	34+6
55,0	29+4	32+3	35+2

Millimeter	GA(W+D)		
	5%	50%	95%
56,0	30	32+6	35+6
57,0	30+4	33+3	36+2
58,0	31	33+6	36+6
59,0	31+4	34+3	37+2
60,0	32	34+6	37+6
61,0	32+4	35+3	38+2
62,0	33	35+6	38+6
63,0	33+4	36+4	39+3
64,0	34+1	37	39+6
65,0	34+4	37+4	40+3
66,0	35+1	38	41
67,0	35+5	38+4	41+4
68,0	36+1	39+1	42
69,0	36+6	39+5	42+4

Bibliographic reference: "Estimation of Gestational Age from Measurements of Fetal Long Bones." *J Ultrasound Med* 3;75-79, February 1984

HL – Jeanty 84

Millimeter	GA(W+D)		
	5%	50%	95%
10,0	9+6	12+4	15+2
11,0	10+1	12+6	15+4
12,0	10+3	13+1	15+6
13,0	10+6	13+4	16+1
14,0	11+1	13+6	16+4
15,0	11+3	14+1	16+6
16,0	11+6	14+4	17+2
17,0	12+1	14+6	17+4
18,0	12+4	15+1	18
19,0	12+6	15+4	18+2
20,0	13+1	15+6	18+5
21,0	13+4	16+2	19+1
22,0	13+6	16+5	19+3
23,0	14+2	17+1	19+6
24,0	14+5	17+3	20+1
25,0	15+1	17+6	20+4
26,0	15+4	18+1	21
27,0	15+6	18+4	21+3
28,0	16+2	19	21+6
29,0	16+5	19+3	22+1
30,0	17+1	19+6	22+4
31,0	17+4	20+2	23
32,0	18	20+5	23+4
33,0	18+3	21+1	23+6
34,0	18+6	21+4	24+2
35,0	19+2	22	24+6
36,0	19+5	22+4	25+1
37,0	20+1	22+6	25+5
38,0	20+4	23+3	26+1
39,0	21+1	23+6	26+4
40,0	21+4	24+2	27+1
41,0	22	24+6	27+4
42,0	22+4	25+2	28
43,0	23	25+5	28+4
44,0	23+4	26+1	29
45,0	24	26+5	29+4
46,0	24+4	27+1	30
47,0	25	27+5	30+4
48,0	25+4	28+1	31
49,0	26	28+6	31+4
50,0	26+4	29+2	32
51,0	27+1	29+6	32+4
52,0	27+4	30+2	33+1
53,0	28+1	30+6	33+4
54,0	28+5	31+3	34+1
55,0	29+1	32	34+5

Millimeter	GA(W+D)		
	5%	50%	95%
56,0	29+6	32+4	35+2
57,0	30+2	33+1	35+6
58,0	30+6	33+4	36+3
59,0	31+3	34+1	36+6
60,0	32	34+6	37+4
61,0	32+4	35+2	38+1
62,0	33+1	35+6	38+5
63,0	33+6	36+4	39+2
64,0	34+3	37+1	39+6
65,0	35	37+5	40+4
66,0	35+4	38+2	41+1
67,0	36+1	38+6	41+5
68,0	36+6	39+4	42+2
69,0	37+3	401+1	42+6

Bibliographic reference: "Estimation of Gestational Age from Measurements of Fetal Long Bones." *J Ultrasound Med* 3;75-79, February 1984

HL – Osaka U

Millimeter	GA	Millimeter	GA
10,1	12W6D±0D	46,8	28W3D±0D
11,8	13W4D±0D	47,8	29W0D±0D
13,5	14W1D±0D	48,7	20W4D±0D
15,1	14W5D±0D	49,7	30W1D±0D
16,7	15W2D±0D	50,6	30W5D±0D
18,3	15W6D±0D	51,5	31W2D±0D
19,9	16W3D±0D	52,3	31W6D±0D
21,5	17W0D±0D	53,1	32W3D±0D
23,0	17W4D±0D	53,9	33W0D±0D
24,5	18W1D±0D	54,7	33W4D±0D
25,9	18W5D±0D	55,5	34W1D±0D
27,4	19W2D±0D	56,2	34W5D±0D
28,8	19W6D±0D	56,9	35W2D±0D
30,2	20W3D±0D	57,6	35W6D±0D
31,5	21W0D±0D	58,2	36W3D±0D
32,9	21W4D±0D	58,8	37W0D±0D
34,2	22W1D±0D	59,4	37W4D±0D
35,4	22W5D±0D	60,0	38W1D±0D
36,7	23W2D±0D	60,5	38W5D±0D
37,9	23W6D±0D	61,0	39W2D±0D
39,1	24W3D±0D	61,5	39W6D±0D
40,3	25W0D±0D	61,6	40W0D±0D
41,4	25W4D±0D		
42,6	26W1D±0D		
43,7	26W5D±0D		
44,7	27W2D±0D		
45,8	27W6D±0D		

Bibliographic reference: "Image diagnosis of fetal growth", Obstetrical and Gynaecological practice (in Japanese), 1988, 37(10):1459-70, Nobuaki Mitsuda et al

UL – Jeanty 84

Millimeter	GA(W+D)		
	5%	50%	95%
10,0	10+1	13+1	16+1
11,0	10+4	13+4	16+4
12,0	10+6	13+6	16+6
13,0	11+1	14+1	17+2
14,0	11+4	14+4	17+5
15,0	11+6	15	18
16,0	12+2	15+3	18+3
17,0	12+5	15+5	18+6
18,0	13+1	16+1	19+1
19,0	13+4	16+4	19+4
20,0	13+6	16+6	20
21,0	14+2	17+2	20+3
22,0	14+5	17+5	20+6
23,0	15+1	18+1	21+1
24,0	15+4	18+4	21+4
25,0	16	19	22+1
26,0	16+3	19+3	22+4
27,0	16+6	19+6	22+4
28,0	17+2	20+2	23+3
29,0	17+5	20+6	23+6
30,0	18+1	2+1	24+2
31,0	18+4	21+5	24+6
32,0	19+1	22+1	25+1
33,0	19+4	22+5	25+5
34,0	20+1	23+1	26+1
35,0	20+4	24+4	26+5
36,0	21+1	24+1	27+1
37,0	21+4	24+4	27+5
38,0	22+1	25+1	28+1
39,0	22+4	25+4	28+5
40,0	23+1	26+1	29+1
41,0	23+4	26+5	29+5
42,0	24+1	27+1	30+2
43,0	24+5	27+5	30+6
44,0	25+1	28+2	31+2
45,0	25+6	28+6	31+6
46,0	26+2	29+3	32+3
47,0	26+6	29+6	33
48,0	27+3	30+4	33+4
49,0	28	31+1	34+1
50,0	28+4	31+4	34+5
51,0	29+1	32+1	35+2
52,0	29+5	32+6	35+6
53,0	30+2	33+3	36+3
54,0	30+6	34	37
55,0	31+4	34+4	37+5

Millimeter	GA(W+D)		
	5%	50%	95%
56,0	32+1	35+1	38+2
57,0	32+6	35+6	38+6
58,0	33+3	36+3	39+4
59,0	34	37+1	40+1
60,0	34+4	37+5	40+6
61,0	35+2	38+2	41+3
62,0	35+6	39	42
63,0	36+4	39+4	42+5
64,0	37+1	40+2	43+2

Bibliographic reference: "Estimation of Gestational Age from Measurements of Fetal Long Bones." *J Ultrasound Med* 3;75-79, February 1984

APTD x TD – Todai 96

Centimeter^2	GA
10,0	16W1D±8D
12,0	17W0D±8D
14,0	17W6D±8D
16,0	18W4D±8D
18,0	19W3D±8D
20,0	20W1D±8D
22,0	20W6D±9D
24,0	21W4D±9D
26,0	22W2D±9D
28,0	22W6D±9D
30,0	23W4D±9D
32,0	24W1D±10D
34,0	24W5D±10D
36,0	25W3D±10D
38,0	25W6D±10D
40,0	26W3D±11D
42,0	27W0D±11D
44,0	27W3D±11D
46,0	28W0D±12D
48,0	28W4D±12D
50,0	29W0D±12D
52,0	29W3D±13D
54,0	30W0D±13D
56,0	30W3D±13D
58,0	31W0D±14D
60,0	31W3D±14D
62,0	31W6D±14D
64,0	32W3D±15D
66,0	32W6D±15D
68,0	33W3D±15D
70,0	33W6D±16D
72,0	34W2D±16D
74,0	34W6D±17D
76,0	35W3D±17D
78,0	35W6D±17D
80,0	36W3D±18D
82,0	37W0D±18D
84,0	37W4D±18D
86,0	38W1D±18D
88,0	38W5D±19D
90,0	39W2D±19D

Bibliographic reference: Norio Shinotsuka et al. Creation of reference data in ultrasound measurement, *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

FTA – Osaka U

Centimeter^2	GA	Centimeter^2	GA
5,6	14W0D±0D	46,6	28W6D±0D
6,5	14W4D±0D	48,7	29W3D±0D
7,6	15W1D±0D	50,8	30W0D±0D
8,7	15W5D±0D	52,9	30W4D±0D
9,8	16W2D±0D	55,0	31W1D±0D
11,0	16W6D±0D	57,2	31W5D±0D
12,2	17W3D±0D	59,4	32W2D±0D
13,5	18W0D±0D	61,5	32W6D±0D
14,8	18W4D±0D	63,7	33W3D±0D
16,2	19W1D±0D	65,8	34W0D±0D
17,6	19W5D±0D	67,9	34W4D±0D
19,1	20W2D±0D	70,1	35W1D±0D
20,6	20W6D±0D	72,2	35W5D±0D
22,2	21W3D±0D	74,2	36W2D±0D
23,8	22W0D±0D	76,2	35W6D±0D
25,5	22W4D±0D	78,2	37W3D±0D
27,2	23W1D±0D	80,2	38W0D±0D
29,0	23W5D±0D	82,1	38W4D±0D
30,8	24W2D±0D	83,9	39W1D±0D
32,6	24W6D±0D	85,7	39W5D±0D
34,5	25W3D±0D	86,6	40W0D±0D
36,5	26W0D±0D		
38,4	26W4D±0D		
40,4	27W1D±0D		
42,4	27W5D±0D		
44,5	28W2D±0D		

Bibliographic reference: Fetal growth chart using the ultrasonographic tecnique, Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

FoL – Mercer 87

Millimeter	GA(W) Predicted		
	-2SD	Value	+2SD
10	11,5	12,5	13,5
12	12,1	13,1	14,2
14	12,7	13,8	14,9
16	13,3	14,4	15,5
18	13,9	15,1	16,3
20	14,5	15,7	17
22	15,1	16,4	17,7
24	15,7	17,1	18,4
26	16,3	17,7	19,1
28	16,9	18,4	19,9
30	17,6	19,1	20,6
32	18,2	19,8	21,4
34	18,9	20,5	22,1
36	19,5	21,2	22,9
38	20,2	21,9	23,7
40	20,8	22,7	24,5
42	21,5	23,4	25,2
44	22,2	24,1	26
46	22,9	24,9	26,8
48	23,6	25,6	27,6
50	24,3	26,4	28,4
52	24,9	27,1	29,3
54	25,7	27,9	30,1
56	26,4	28,4	30,9
58	27,1	29,4	31,8
60	27,8	30,2	32,6
62	28,5	31	33,5
64	29,3	31,8	34,3
66	30	32,6	35,2
68	30,7	33,4	36,1
70	31,5	34,2	36,9
72	32,2	35	37,8
74	33	35,9	38,7
76	33,8	36,8	39,6
78	34,5	37,5	40,5
80	35,3	38,4	41,4
82	36,1	39,2	42,4
84	36,9	40,1	43,3
86	37,7	41	44,2

Bibliographic reference: "Fetal foot length as a predictor of gestional age", *Am J Obstet Gynaecol*, 156, 350-5, p. 1987

LV – Todai

Millimiters	GA
37,0	21W0D±7D
40,0	22W0D±9D
44,0	23W0D±11D
47,0	24W0D±12D
50,0	25W0D±14D
54,0	26W0D±17D
57,0	27W0D±19D
59,0	28W0D±21D
62,0	29W0D±24D
64,0	30W0D±25D
67,0	31W0D±28D
69,0	32W0D±31D
71,0	33W0D±34D
73,0	34W0D±35D
75,0	35W0D±38D
77,0	36W0D±40D
78,0	37W0D±42D
79,0	38W0D±44D
80,0	39W0D±46D
81,0	40W0D±48D

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

MAD – Rempen

Millimeters	Days	Variance (-)	Variance (+)
7,0	49	9	8
8,0	49	8	9
9,0	50	8	9
10,0	51	9	8
11,0	52	9	8
12,0	52	8	9
13,0	53	8	9
14,0	54	9	9
15,0	55	9	8
16,0	56	9	8
17,0	56	8	9
18,0	57	9	9
19,0	58	9	8
20,0	59	9	8
21,0	59	8	9
22,0	60	9	9
23,0	61	9	8
24,0	61	8	9
25,0	62	8	9
26,0	63	9	8
27,0	64	9	8
28,0	64	8	9
29,0	65	9	9
30,0	66	9	8
31,0	66	8	9
32,0	67	8	9
33,0	68	9	8
34,0	69	9	8
35,0	69	8	9
36,0	70	9	8
37,0	71	9	8
38,0	71	8	9
39,0	72	9	8
40,0	73	9	8
41,0	73	8	9
42,0	74	9	8
43,0	74	8	9
44,0	75	8	9
45,0	76	9	8
46,0	76	8	8
47,0	77	9	9

Bibliographic reference: Zeitschrift für Geburtshilfe und Perinatologie Heft 4 Band 195, Juli/August 1991, Dr.med Andreas Rempen, Universitäts-Frauenklinik D-8700 Würzburg

TCD – Hill 83

Millimiters	Days	Variance	GA
15,0	110	7	15W5D±7D
16,0	115	7	16W3D±7D
17,0	120	7	17W1D±7D
18,0	125	7	17W6D±7D
19,0	130	13	18W4D±13D
20,0	135	13	19W2D±13D
21,0	144	13	20W4D±13D
22,0	145	13	20W5D±13D
23,0	150	13	21W3D±13D
24,0	154	13	22W0D±13D
25,0	159	14	22W5D±14D
26,0	164	14	23W3D±14D
27,0	169	14	24W1D±14D
28,0	174	14	24W6D±14D
29,0	178	14	25W3D±14D
30,0	183	14	26W1D±14D
31,0	188	16	26W6D±16D
32,0	192	16	27W3D±16D
33,0	196	16	28W0D±16D
34,0	201	16	28W5D±16D
35,0	205	16	29W2D±16D
36,0	210	16	30W0D±16D
37,0	214	22	30W4D±22D
38,0	218	22	31W1D±22D
39,0	222	22	31W5D±22D
40,0	226	22	32W2D±22D
41,0	229	22	32W5D±22D
42,0	233	22	33W2D±22D
43,0	237	22	33W6D±22D
44,0	240	22	34W2D±22D
45,0	241	22	34W3D±22D
46,0	247	22	35W2D±22D
47,0	249	22	35W4D±22D
48,0	252	22	36W0D±22D
49,0	255	22	36W3D±22D
50,0	257	22	36W5D±22D
51,0	260	22	37W1D±22D
52,0	262	22	37W3D±22D
53,0	266	22	38W0D±22D
54,0	268	22	38W2D±22D

TCD – Goldstein 87

GA (W+D) = 6,329 + 0,4807 * [TCD] + 0,01484 * [TCD]^2 – 0,0002474 * [TCD]^3

Measure Unit: mm

Measurement range: 14 ÷ 52 mm

Bibliographic reference: "Cerebellar measurements with ultrasonography in the evaluation of fetal growth and development", *Am J Obstet Gynecol*, 1987, 156:1065-1069, Goldstein I et al

TCD – Bernaschek

Millimeters	Days	Variance (-)	Variance (+)
15,0	91	-1	7
16,0	98	7	7
17,0	105	14	7
18,0	112	14	7
19,0	119	14	14
20,0	126	14	14
21,0	133	21	14
22,0	140	14	14
23,0	147	21	7
25,0	154	14	10
26,0	161	14	14
28,0	168	14	18
30,0	175	14	21
31,0	182	18	21
33,0	189	18	24
34,0	196	28	18
35,0	203	28	18
36,0	210	21	12
38,0	217	21	-1
41,0	224	-1	-1

Fetal Growth

In the following pages the tables used in the Obstetrics application are listed together with their reference bibliography.

Parameter	Bibliography
BPD	Merz 88, JSUM 2001, Osaka U, Todai 96, Chitty (O-I), Nicolaides, Chitty(O-O), Hadlock 84, CFEF
AC	Merz 88, JSUM 2001, Todai 96, Chitty, Nicolaides, Hadlock 84, CFEF
HC	Merz 88, Tamura 95, Nicolaides, Chitty, Hadlock 84, CFEF
FL	Merz 88, Nicolaides, Chitty, Todai 96, Osaka U, JSUM 2001, Hadlock 84, CFEF
OFD	Merz 88, Chitty, Jeanty
CRL	Hadlock84, Hansmann 85, JSUM 2001, Osaka U, Robinson
TCD	Goldstein 87
TL	Merz 88
APTD x TTD	Todai 96
FTA	Osaka U
FoL	Mercer
GS	Nyberg 87
HL	Jeanty/Romero, Osaka U
RL	Merz 88
TAD	Eriksen, CFEF
UL	Merz 88, Jeanty
NBL	Guis-Ville
EL	Lettieri
CM	Nicolaides
LATV	Pretorius
FIB	Merz
IOD	Merz, Bernaschek
BD	Merz, Bernaschek

BPD – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	17,0	22,0	26,0
14W0D	98	21,0	26,0	30,0
15W0D	105	25,0	30,0	34,0
16W0D	112	29,0	33,0	38,0
17W0D	119	32,0	37,0	42,0
18W0D	126	35,0	41,0	46,0
19W0D	133	39,0	44,0	50,0
20W0D	140	43,0	48,0	53,0
21W0D	147	46,0	51,0	57,0
22W0D	154	50,0	55,0	60,0
23W0D	161	53,0	58,0	63,0
24W0D	168	56,0	61,0	67,0
25W0D	175	59,0	64,0	70,0
26W0D	182	62,0	67,0	73,0
27W0D	189	65,0	70,0	76,0
28W0D	196	67,0	73,0	79,0
29W0D	203	70,0	76,0	81,0
30W0D	210	72,0	78,0	84,0
31W0D	217	75,0	81,0	87,0
32W0D	224	77,0	83,0	89,0
33W0D	231	79,0	85,0	91,0
34W0D	238	81,0	88,0	94,0
35W0D	245	83,0	90,0	96,0
36W0D	252	85,0	92,0	98,0
37W0D	259	87,0	94,0	100,0
38W0D	266	89,0	95,0	102,0
39W0D	273	91,0	97,0	103,0
40W0D	280	92,0	99,0	105,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

BPD – JSUM 2001

Weeks	Min	Med	Max
10W0D	9,1	12,6	16,0
11W0D	12,4	15,9	19,5
12W0D	15,7	19,3	22,9
13W0D	19,0	22,7	26,4
14W0D	22,4	26,1	29,9
15W0D	25,7	29,5	33,4
16W0D	29,0	32,9	36,9
17W0D	32,3	36,3	40,3
18W0D	35,6	39,6	43,7
19W0D	38,8	43,0	47,1
20W0D	42,0	46,2	50,5
21W0D	45,1	49,5	53,8
22W0D	48,2	52,6	57,1
23W0D	51,2	55,7	60,3
24W0D	54,2	58,8	63,4
25W0D	57,1	61,7	66,4
26W0D	59,8	64,6	69,4
27W0D	62,5	67,4	72,2
28W0D	65,1	70,1	75,0
29W0D	67,6	72,6	77,7
30W0D	70,0	75,1	80,2
31W0D	72,2	77,4	82,6
32W0D	74,3	79,6	84,9
33W0D	76,3	81,7	87,0
34W0D	78,1	83,6	89,0
35W0D	79,8	85,3	90,8
36W0D	81,3	86,9	92,5
37W0D	82,6	88,3	94,0
38W0D	83,8	89,6	95,3
39W0D	84,8	90,6	96,5
40W0D	85,6	91,5	97,4
41W0D	86,1	92,2	98,2
42W0D	86,5	92,6	98,7

Measue unit: mm; Variance: ±1,5SD

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

BPD – Osaka U

Weeks	Min	Med	Max
10W0D	11,4	13,3	15,2
10W4D	13,6	15,5	17,4
11W1D	15,7	17,7	19,7
11W5D	17,8	19,9	22,0
12W2D	19,9	22,0	24,1
12W6D	21,9	24,1	26,3
13W3D	24,0	26,2	28,4
14W0D	25,9	28,2	30,5
14W4D	27,9	30,3	32,7
15W1D	29,9	32,3	34,7
15W5D	31,7	34,2	36,7
16W2D	33,7	36,2	38,7
16W6D	35,5	38,1	40,7
17W3D	37,5	40,1	42,7
18W0D	39,3	42,0	44,7
18W4D	41,2	43,9	46,6
19W1D	42,9	45,7	48,5
19W5D	44,9	47,6	50,4
20W2D	46,5	49,4	52,3
20W6D	48,3	51,2	54,1
21W3D	50,0	53,0	56,0
22W0D	51,8	54,8	57,8
22W4D	53,5	56,6	59,7
23W1D	55,2	58,3	61,4
23W5D	56,9	60,0	63,1
24W2D	58,5	61,7	64,9
24W6D	60,2	63,4	66,6
25W3D	61,8	65,1	68,4
26W0D	63,4	66,7	70,0
26W4D	65,1	68,4	71,7
27W1D	66,5	69,9	73,3
27W5D	68,1	71,5	74,9
28W2D	69,6	73,0	76,4
28W6D	71,0	74,5	78,0
29W3D	72,5	76,0	79,5
30W0D	73,9	77,4	80,9
30W4D	75,2	78,8	82,4
31W1D	76,6	80,2	83,8
31W5D	77,9	81,5	85,1
32W2D	79,1	82,7	86,3
32W6D	80,3	84,0	87,7
33W3D	81,4	85,1	88,8
34W0D	82,5	86,2	89,9
34W4D	83,6	87,3	91,0
35W1D	84,5	88,3	92,1
35W5D	85,4	89,2	93,0
36W2D	86,2	90,0	93,8

Weeks	Min	Med	Max
36W6D	87,0	90,8	94,6
37W3D	87,7	91,5	95,3
38W0D	88,3	92,1	95,9
38W4D	88,8	92,7	96,6
39W1D	89,2	93,1	97,0
39W5D	89,6	93,5	97,4
40W0D	89,7	93,6	97,5

Measure Unit: mm; Variance: ±1SD

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

BPD – Todai 96

Weeks	Min	Med	Max
10W3D	10,5	14,3	18,1
11W3D	13,7	17,6	21,5
12W3D	17,0	21,0	25,0
13W3D	20,4	24,4	28,5
14W3D	23,7	27,8	32,0
15W3D	27,0	31,2	35,5
16W3D	30,3	34,6	39,0
17W3D	33,5	38,0	42,4
18W3D	36,8	41,3	45,8
19W3D	40,0	44,6	49,2
20W3D	43,2	47,9	52,6
21W3D	46,3	51,1	55,9
22W3D	49,3	54,2	59,1
23W3D	52,3	57,3	62,3
24W3D	55,2	60,3	65,3
25W3D	58,0	63,2	68,3
26W3D	60,8	66,0	71,3
27W3D	63,4	68,7	74,1
28W3D	65,9	71,4	76,8
29W3D	68,3	73,9	79,4
30W3D	70,6	76,3	81,9
31W3D	72,8	78,5	84,2
32W3D	74,8	80,6	86,5
33W3D	76,7	82,6	88,5
34W3D	78,5	84,5	90,4
35W3D	80,1	86,1	92,2
36W3D	81,5	87,6	93,8
37W3D	82,7	89,0	95,2
38W3D	83,8	90,1	96,5
39W3D	84,6	91,1	97,5
40W3D	85,3	91,8	98,4
41W3D	85,8	92,4	99,0
42W3D	86,0	92,8	99,5

Measure Unit: mm; Variance: ±1,64SD

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

BPD – Chitty (O-I)

Weeks	Days	C 10	C 50	C 90
12W0D	84	15,7	18,3	20,9
13W0D	91	19,3	22,0	24,7
14W0D	98	22,8	25,6	28,4
15W0D	105	26,4	29,9	32,2
16W0D	112	29,9	32,8	35,8
17W0D	119	33,3	36,3	39,4
18W0D	126	36,6	39,8	43,0
19W0D	133	40,0	43,2	46,4
20W0D	140	43,2	46,5	49,9
21W0D	147	46,4	49,8	53,2
22W0D	154	49,5	53,0	56,5
23W0D	161	52,5	56,1	59,7
24W0D	168	55,5	59,2	62,9
25W0D	175	58,4	62,1	65,9
26W0D	182	61,2	65,0	68,9
27W0D	189	63,9	67,8	71,8
28W0D	196	66,5	70,5	74,6
29W0D	203	69,0	73,1	77,3
30W0D	210	71,5	75,7	79,9
31W0D	217	73,8	78,1	82,4
32W0D	224	76,0	80,4	84,8
33W0D	231	78,1	82,6	87,1
34W0D	238	80,2	84,7	89,3
35W0D	245	82,1	86,7	91,4
36W0D	252	83,8	88,6	93,3
37W0D	259	85,5	90,3	95,2
38W0D	266	87,0	92,0	96,9
39W0D	273	88,5	93,5	98,5
40W0D	280	89,7	94,8	99,9
41W0D	287	90,9	96,1	101,2
42W0D	294	91,9	97,2	102,4

C10/C50/C90: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

BPD – Chitty (O-O)

Weeks	Days	C 10	C 50	C 90
12W0D	84	16,8	19,7	22,5
13W0D	91	20,6	23,5	26,5
14W0D	98	24,3	27,3	30,3
15W0D	105	28,0	31,0	34,1
16W0D	112	31,6	34,7	37,9
17W0D	119	35,1	38,3	41,6
18W0D	126	38,6	41,9	45,2
19W0D	133	42,0	45,4	48,8
20W0D	140	45,4	48,8	52,3
21W0D	147	48,6	52,2	55,7
22W0D	154	51,9	55,5	59,1
23W0D	161	55,0	58,7	62,3
24W0D	168	58,0	61,8	65,5
25W0D	175	61,0	64,8	68,6
26W0D	182	63,8	67,8	71,7
27W0D	189	66,6	70,6	74,6
28W0D	196	69,3	73,4	77,4
29W0D	203	71,9	76,0	80,1
30W0D	210	74,3	78,6	82,8
31W0D	217	76,7	81,0	85,3
32W0D	224	79,0	83,3	87,7
33W0D	231	81,1	85,5	90,0
34W0D	238	83,1	87,6	92,1
35W0D	245	85,0	89,6	94,2
36W0D	252	86,8	91,5	96,1
37W0D	259	88,4	93,2	97,9
38W0D	266	89,9	94,8	99,6
39W0D	273	91,3	96,2	101,1
40W0D	280	92,6	97,5	102,5
41W0D	287	93,6	98,7	103,7
42W0D	294	94,6	99,7	104,8

C10/C50/C90: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

BPD - Nicolaides

Weeks	Days	C 5	C 50	C 95
10W0D	70	5,5	10,8	16,1
11W0D	77	9,8	15,1	20,4
12W0D	84	14,0	19,3	24,6
13W0D	91	18,1	23,4	28,7
14W0D	98	22,2	27,4	32,7
15W0D	105	26,1	31,4	36,6
16W0D	112	29,9	35,2	40,5
17W0D	119	33,7	38,9	44,2
18W0D	126	37,3	42,6	47,8
19W0D	133	40,8	46,1	51,4
20W0D	140	44,3	49,5	54,8
21W0D	147	47,6	52,9	58,2
22W0D	154	50,9	56,1	61,4
23W0D	161	54,0	59,3	64,6
24W0D	168	57,1	62,4	67,6
25W0D	175	60,1	65,3	70,6
26W0D	182	62,9	68,2	73,5
27W0D	189	65,7	71,2	76,2
28W0D	196	68,4	73,6	78,9
29W0D	203	71,0	76,2	81,5
30W0D	210	73,4	78,7	84,0
31W0D	217	75,8	81,1	86,4
32W0D	224	78,1	83,4	88,6
33W0D	231	80,3	85,6	90,8
34W0D	238	82,4	87,7	92,9
35W0D	245	84,4	89,7	94,9
36W0D	252	86,3	91,6	96,9
37W0D	259	88,1	93,4	98,7
38W0D	266	89,9	95,1	100,4
39W0D	273	91,5	96,7	102,0
40W0D	280	93,0	98,3	103,6
41W0D	287	94,4	99,7	105,0
42W0D	294	95,7	101,0	106,3

C5/C50/C95: mm

Bibliographic reference: Nederlandse vereninging voor obstetrie en gynaecologie: Nota echoscopie gynaecologie/verloskunde, 1993

BPD – Hadlock 84

BPD (cm) = -3,08 + 0,41 * [GA] – 0,000061 * [GA]^3

Measurement range: 12 ÷ 40 Weeks

Standard Deviation: 0,3 cm

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

BPD – CFEF

Weeks	Days	C3	C50	C97
11W0D	77	12,08	15,36	18,63
12W0D	84	15,81	19,40	22,92
13W0D	91	19,47	23,30	27,12
14W0D	98	23,05	27,14	31,23
15W0D	105	26,56	30,89	35,23
16W0D	112	29,97	34,53	39,08
17W0D	119	33,32	38,12	42,87
18W0D	126	36,55	41,58	46,56
19W0D	133	39,76	45,00	50,18
20W0D	140	42,85	48,22	53,64
21W0D	147	45,86	51,43	57,00
22W0D	154	48,79	54,53	60,30
23W0D	161	51,63	57,51	63,45
24W0D	168	54,38	60,42	66,50
25W0D	175	57,04	63,25	69,42
26W0D	182	59,62	65,94	72,27
27W0D	189	62,12	68,55	75,00
28W0D	196	64,50	71,03	77,60
29W0D	203	66,84	73,50	80,09
30W0D	210	69,07	75,80	82,52
31W0D	217	71,22	78,00	84,80
32W0D	224	73,30	80,16	87,00
33W0D	231	75,24	82,14	89,04
34W0D	238	77,14	84,07	91,00
35W0D	245	78,94	85,90	92,83
36W0D	252	80,64	87,61	94,56
37W0D	259	82,27	89,24	96,19
38W0D	266	83,78	90,70	97,66
39W0D	273	85,22	92,10	99,05
40W0D	280	86,57	93,45	100,31
41W0D	287	87,00	94,00	101,00

C3/C50/C97: mm

Bibliographic refrence: *Gynecol Obstet Fertil*, June 2000, 28(6), 435-445; http://cfef.org/archives/communication/biometrie2000/selectframe.html

AC – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	45,0	63,0	82,0
14W0D	98	55,0	74,0	92,0
15W0D	105	64,0	84,0	103,0
16W0D	112	74,0	94,0	114,0
17W0D	119	84,0	104,0	125,0
18W0D	126	94,0	115,0	136,0
19W0D	133	104,0	125,0	146,0
20W0D	140	113,0	135,0	157,0
21W0D	147	123,0	146,0	168,0
22W0D	154	133,0	156,0	179,0
23W0D	161	143,0	166,0	189,0
24W0D	168	153,0	176,0	200,0
25W0D	175	163,0	187,0	211,0
26W0D	182	172,0	197,0	221,0
27W0D	189	182,0	207,0	232,0
28W0D	196	192,0	217,0	243,0
29W0D	203	202,0	228,0	254,0
30W0D	210	212,0	238,0	264,0
31W0D	217	222,0	248,0	275,0
32W0D	224	232,0	259,0	286,0
33W0D	231	242,0	269,0	296,0
34W0D	238	251,0	279,0	307,0
35W0D	245	261,0	289,0	318,0
36W0D	252	271,0	300,0	328,0
37W0D	259	281,0	310,0	339,0
38W0D	266	291,0	320,0	350,0
39W0D	273	301,0	331,0	360,0
40W0D	280	311,0	341,0	371,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

AC – JSUM 2001

Weeks	Min	Med	Max
16W0D	90,0	104,0	118,0
17W0D	99,0	114,0	129,0
18W0D	109,0	125,0	140,0
19W0D	118,0	135,0	151,0
20W0D	128,0	145,0	162,0
21W0D	137,0	155,0	173,0
22W0D	147,0	165,0	184,0
23W0D	156,0	175,0	195,0
24W0D	165,0	185,0	205,0
25W0D	174,0	195,0	216,0
26W0D	183,0	205,0	226,0
27W0D	192,0	214,0	236,0
28W0D	201,0	224,0	247,0
29W0D	209,0	233,0	256,0
30W0D	218,0	242,0	266,0
31W0D	226,0	251,0	276,0
32W0D	234,0	259,0	285,0
33W0D	242,0	268,0	294,0
34W0D	249,0	276,0	303,0
35W0D	256,0	284,0	312,0
36W0D	263,0	292,0	320,0
37W0D	270,0	299,0	328,0
38W0D	276,0	306,0	336,0
39W0D	282,0	313,0	343,0
40W0D	288,0	319,0	351,0
41W0D	293,0	325,0	357,0
42W0D	296,0	331,0	364,0

Measure Unit: mm; Variance: ±1,5 SD

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

AC – Todai 96

Weeks	Min	Med	Max
16W3D	93,0	109,0	125,0
17W3D	103,0	120,0	136,0
18W3D	112,0	130,0	147,0
19W3D	122,0	140,0	158,0
20W3D	131,0	151,0	169,0
21W3D	140,0	161,0	180,0
22W3D	150,0	171,0	191,0
23W3D	159,0	181,0	202,0
24W3D	168,0	191,0	212,0
25W3D	177,0	201,0	223,0
26W3D	186,0	210,0	233,0
27W3D	195,0	220,0	244,0
28W3D	203,0	229,0	254,0
29W3D	211,0	238,0	264,0
30W3D	220,0	247,0	273,0
31W3D	228,0	256,0	283,0
32W3D	235,0	265,0	292,0
33W3D	243,0	273,0	301,0
34W3D	250,0	281,0	310,0
35W3D	257,0	289,0	319,0
36W3D	264,0	297,0	327,0
37W3D	270,0	304,0	335,0
38W3D	276,0	311,0	343,0
39W3D	282,0	318,0	350,0
40W3D	288,0	324,0	357,0
41W3D	293,0	330,0	364,0
42W3D	297,0	336,0	370,0

Measure Unit : mm; Variance: ±1,64 SD

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

AC - Chitty

Weeks	Days	C 10	C 50	C 90
12W0D	84	50,5	55,8	61,1
13W0D	91	61,3	67,4	73,4
14W0D	98	72,0	78,9	85,4
15W0D	105	82,7	90,3	97,9
16W0D	112	93,3	101,6	110,0
17W0D	119	103,8	112,9	122,1
18W0D	126	114,2	124,1	134,0
19W0D	133	124,5	135,2	145,9
20W0D	140	134,8	146,2	157,7
21W0D	147	144,9	157,1	169,4
22W0D	154	155,0	168,0	181,0
23W0D	161	164,9	178,7	192,5
24W0D	168	174,8	189,3	203,8
25W0D	175	184,5	199,8	215,1
26W0D	182	194,1	210,2	226,3
27W0D	189	203,6	220,4	237,3
28W0D	196	212,9	230,6	248,2
29W0D	203	222,2	240,5	258,9
30W0D	210	231,2	250,4	269,6
31W0D	217	240,2	260,1	280,1
32W0D	224	249,0	269,7	290,4
33W0D	231	257,6	279,1	300,6
34W0D	238	266,1	288,4	310,6
35W0D	245	274,4	297,5	320,5
36W0D	252	282,6	306,4	330,2
37W0D	259	290,6	315,4	339,7
38W0D	266	298,4	323,7	349,1
39W0D	273	306,0	332,1	358,2
40W0D	280	313,5	340,4	367,2
41W0D	287	320,8	348,4	376,0
42W0D	294	327,8	356,2	384,6

C10/C50/C90: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

AC – Nicolaides

Weeks	Days	C 5	C 50	C 95
10W0D	70	54,0	60,0	67,0
11W0D	77	60,0	67,0	74,0
12W0D	84	66,0	74,0	82,0
13W0D	91	73,0	81,0	90,0
14W0D	98	80,0	89,0	99,0
15W0D	105	88,0	97,0	108,0
16W0D	112	95,0	106,0	118,0
17W0D	119	104,0	115,0	128,0
18W0D	126	112,0	125,0	139,0
19W0D	133	122,0	135,0	150,0
20W0D	140	131,0	145,0	161,0
21W0D	147	141,0	156,0	173,0
22W0D	154	150,0	167,0	185,0
23W0D	161	161,0	178,0	198,0
24W0D	168	171,0	189,0	210,0
25W0D	175	181,0	201,0	223,0
26W0D	182	191,0	212,0	236,0
27W0D	189	202,0	224,0	248,0
28W0D	196	212,0	235,0	261,0
29W0D	203	222,0	246,0	273,0
30W0D	210	231,0	257,0	285,0
31W0D	217	241,0	267,0	297,0
32W0D	224	250,0	277,0	308,0
33W0D	231	258,0	287,0	318,0
34W0D	238	266,0	295,0	328,0
35W0D	245	274,0	304,0	337,0
36W0D	252	280,0	311,0	345,0
37W0D	259	286,0	318,0	353,0
38W0D	266	291,0	324,0	359,0
39W0D	273	296,0	328,0	365,0
40W0D	280	299,0	332,0	369,0
41W0D	287	302,0	335,0	372,0
42W0D	294	303,0	337,0	374,0

C5/C50/C95: mm

Bibliographic reference: Nederlandse vereninging voor obstetrie en gynaecologie: Nota echoscopie gynaecologie/verloskunde, 1993

AC – Hadlock 84

AC (cm) = -13,3 + 1,61 * [GA] – 0,00998 * $[GA]^2$

Measurement range: 12 ÷ 40 Weeks

Standard Deviation: 1,34 cm

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

AC – CFEF

Weeks	Days	C3	C50	C97
15W0D	105	80,70	95,00	108,80
16W0D	112	91,30	106,40	121,60
17W0D	119	101,70	118,00	134,00
18W0D	126	111,80	129,20	146,60
19W0D	133	122,00	140,40	158,80
20W0D	140	132,00	151,40	171,00
21W0D	147	141,60	162,30	183,00
22W0D	154	151,40	173,00	194,70
23W0D	161	160,90	183,60	206,30
24W0D	168	170,20	194,00	218,00
25W0D	175	179,30	204,40	229,30
26W0D	182	188,40	214,50	240,60
27W0D	189	197,30	224,50	251,60
28W0D	196	206,20	234,40	262,60
29W0D	203	214,70	244,00	273,30
30W0D	210	223,20	253,60	283,70
31W0D	217	231,60	263,00	294,40
32W0D	224	239,70	272,20	304,60
33W0D	231	247,80	281,20	314,80
34W0D	238	255,60	290,20	324,80
35W0D	245	263,20	298,80	334,50
36W0D	252	271,00	307,40	344,30
37W0D	259	278,30	316,00	353,80
38W0D	266	285,60	324,70	363,00
39W0D	273	292,70	332,40	372,20
40W0D	280	298,00	339,00	380,00

C3/C50/C97: mm

Bibliographic reference: *Gynecol Obstet Fertil*, June 2000, 28(6), 435-445; http://cfef.org/archives/communication/biometrie2000/selectframe.html

HC – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	70,0	83,0	97,0
14W0D	98	84,0	97,0	111,0
15W0D	105	97,0	111,0	125,0
16W0D	112	110,0	124,0	139,0
17W0D	119	123,0	137,0	152,0
18W0D	126	136,0	150,0	165,0
19W0D	133	149,0	163,0	178,0
20W0D	140	161,0	175,0	191,0
21W0D	147	173,0	188,0	204,0
22W0D	154	184,0	199,0	216,0
23W0D	161	196,0	211,0	227,0
24W0D	168	207,0	222,0	239,0
25W0D	175	218,0	233,0	250,0
26W0D	182	228,0	244,0	261,0
27W0D	189	238,0	254,0	271,0
28W0D	196	248,0	264,0	282,0
29W0D	203	257,0	274,0	291,0
30W0D	210	266,0	283,0	301,0
31W0D	217	275,0	292,0	310,0
32W0D	224	284,0	301,0	319,0
33W0D	231	292,0	309,0	327,0
34W0D	238	300,0	317,0	336,0
35W0D	245	307,0	325,0	343,0
36W0D	252	314,0	332,0	351,0
37W0D	259	321,0	339,0	358,0
38W0D	266	328,0	346,0	365,0
39W0D	273	334,0	352,0	372,0
40W0D	280	340,0	358,0	378,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

HC – Tamura

Weeks	Days	C 10	C 50	C 90
18W0D	126	140,0	160,0	175,0
19W0D	133	150,0	170,0	180,0
20W0D	140	160,0	180,0	190,0
21W0D	147	170,0	190,0	200,0
22W0D	154	180,0	200,0	210,0
23W0D	161	195,0	210,0	220,0
24W0D	168	210,0	220,0	230,0
25W0D	175	220,0	230,0	240,0
26W0D	182	230,0	240,0	250,0
27W0D	189	240,0	260,0	270,0
28W0D	196	255,0	270,0	280,0
29W0D	203	265,0	280,0	295,0
30W0D	210	270,0	285,0	305,0
31W0D	217	270,0	290,0	310,0
32W0D	224	275,0	290,0	315,0
33W0D	231	280,0	295,0	320,0
34W0D	238	285,0	305,0	325,0
35W0D	245	295,0	315,0	330,0
36W0D	252	300,0	320,0	340,0
37W0D	259	305,0	325,0	350,0
38W0D	266	305,0	325,0	350,0
39W0D	273	310,0	330,0	350,0
40W0D	280	315,0	335,0	355,0
41W0D	287	320,0	340,0	360,0

C10/C50/C90: mm

Bibliographic reference: "Ultrasonic fetal head circumference: comparison of direct versus calculated measurements", In Sabbagha, R.E. (ed.) Diagnostic Ultrasound applied to Obstetricxs and Gynecology, 2nd edn., p.116, 1995

HC – Nicolaides

Weeks	Days	C 5	C 50	C 95
10W0D	70	15,0	32,0	49,0
11W0D	77	31,0	48,0	65,0
12W0D	84	47,0	64,0	81,0
13W0D	91	62,0	79,0	96,0
14W0D	98	77,0	94,0	111,0
15W0D	105	92,0	109,0	125,0
16W0D	112	106,0	123,0	139,0
17W0D	119	120,0	136,0	153,0
18W0D	126	133,0	150,0	166,0
19W0D	133	146,0	163,0	179,0
20W0D	140	159,0	175,0	192,0
21W0D	147	171,0	187,0	204,0
22W0D	154	182,0	199,0	216,0
23W0D	161	194,0	210,0	227,0
24W0D	168	205,0	221,0	238,0
25W0D	175	215,0	232,0	248,0
26W0D	182	225,0	242,0	259,0
27W0D	189	235,0	252,0	268,0
28W0D	196	244,0	261,0	278,0
29W0D	203	253,0	270,0	286,0
30W0D	210	262,0	278,0	295,0
31W0D	217	270,0	286,0	303,0
32W0D	224	277,0	294,0	311,0
33W0D	231	285,0	301,0	318,0
34W0D	238	292,0	308,0	325,0
35W0D	245	298,0	315,0	331,0
36W0D	252	304,0	321,0	337,0
37W0D	259	310,0	326,0	343,0
38W0D	266	315,0	332,0	348,0
39W0D	273	320,0	337,0	353,0
40W0D	280	324,0	341,0	358,0
41W0D	287	328,0	345,0	362,0
42W0D	294	332,0	349,0	366,0

5/C50/C95: mm

HC – Chitty

Weeks	Days	C 3	C 50	C 97
12W0D	84	55,5	68,1	80,8
13W0D	91	69,1	82,2	95,2
14W0D	98	82,6	96,0	109,5
15W0D	105	95,8	109,7	123,6
16W0D	112	108,8	123,1	137,5
17W0D	119	121,6	136,4	151,2
18W0D	126	134,1	149,3	164,6
19W0D	133	146,4	162,0	177,7
20W0D	140	158,4	174,5	190,6
21W0D	147	170,1	186,6	203,2
22W0D	154	181,5	198,5	215,5
23W0D	161	192,6	210,0	227,4
24W0D	168	203,4	221,2	239,1
25W0D	175	213,8	232,1	250,4
26W0D	182	223,8	242,6	261,3
27W0D	189	233,5	252,7	271,9
28W0D	196	242,9	262,5	282,1
29W0D	203	251,8	271,8	291,9
30W0D	210	260,3	280,7	301,2
31W0D	217	268,3	289,2	310,2
32W0D	224	275,9	297,3	318,7
33W0D	231	283,1	304,9	326,7
34W0D	238	289,8	312,0	334,3
35W0D	245	296,0	318,7	341,3
36W0D	252	301,7	324,8	347,9
37W0D	259	306,9	330,4	354,0
38W0D	266	311,5	335,5	359,5
39W0D	273	315,6	340,0	364,5
40W0D	280	319,2	344,0	368,9
41W0D	287	322,1	347,4	372,7
42W0D	294	324,5	350,3	376,0

C3/C50/C97: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

HC – Hadlock 84

HC (cm) = -11,48 + 1,56 * [GA] – 0,0002548 * $[GA]^3$

Measurement range: 12 ÷ 40 Weeks

Standard Deviation: 1 cm

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

HC – CFEF

Weeks	Days	C3	C50	C97
16W0D	112	105,80	120,86	136,11
17W0D	119	118,67	134,49	150,39
18W0D	126	131,08	147,55	164,11
19W0D	133	143,00	160,29	177,48
20W0D	140	154,53	172,47	190,54
21W0D	147	165,41	184,21	203,09
22W0D	154	176,12	195,74	215,15
23W0D	161	186,32	206,64	226,76
24W0D	168	196,19	217,18	238,00
25W0D	175	205,50	227,32	248,81
26W0D	182	214,44	236,72	259,23
27W0D	189	222,87	246,00	269,13
28W0D	196	231,00	254,77	278,57
29W0D	203	238,40	263,00	287,56
30W0D	210	245,86	270,84	296,00
31W0D	217	252,54	278,33	304,27
32W0D	224	258,86	285,29	312,00
33W0D	231	264,62	292,00	319,10
34W0D	238	270,14	298,10	325,91
35W0D	245	275,33	303,62	332,16
36W0D	252	279,79	308,81	338,00
37W0D	259	283,90	313,52	343,34
38W0D	266	287,63	317,88	348,29
39W0D	273	290,88	321,86	352,67
40W0D	280	293,00	324,00	356,00

C3/C50/C97: mm

Bibliographic reference: *Gynecol Obstet Fertil*, June 2000, 28(6), 435-445; http://cfef.org/archives/communication/biometrie2000/selectframe.html

FL – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	6,0	10,0	14,0
14W0D	98	9,0	13,0	17,0
15W0D	105	12,0	16,0	20,0
16W0D	112	15,0	19,0	23,0
17W0D	119	18,0	22,0	26,0
18W0D	126	21,0	25,0	29,0
19W0D	133	24,0	28,0	32,0
20W0D	140	27,0	31,0	35,0
21W0D	147	29,0	34,0	38,0
22W0D	154	32,0	37,0	41,0
23W0D	161	35,0	39,0	44,0
24W0D	168	37,0	42,0	47,0
25W0D	175	40,0	45,0	49,0
26W0D	182	43,0	47,0	52,0
27W0D	189	45,0	50,0	54,0
28W0D	196	47,0	52,0	57,0
29W0D	203	50,0	55,0	59,0
30W0D	210	52,0	57,0	62,0
31W0D	217	54,0	59,0	64,0
32W0D	224	57,0	62,0	67,0
33W0D	231	59,0	64,0	69,0
34W0D	238	61,0	66,0	71,0
35W0D	245	63,0	68,0	73,0
36W0D	252	65,0	70,0	75,0
37W0D	259	67,0	72,0	77,0
38W0D	266	68,0	74,0	79,0
39W0D	273	70,0	76,0	81,0
40W0D	280	72,0	77,0	83,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

FL – Nicolaides

Weeks	Days	C 5	C 50	C 95
12W0D	84	2,4	6,9	11,3
13W0D	91	5,9	10,3	14,8
14W0D	98	9,3	13,7	18,2
15W0D	105	12,6	17,0	21,5
16W0D	112	15,9	20,3	24,7
17W0D	119	19,0	23,4	27,8
18W0D	126	22,1	26,5	30,9
19W0D	133	25,0	29,4	33,8
20W0D	140	27,9	32,3	36,7
21W0D	147	30,8	35,2	39,5
22W0D	154	33,5	37,9	42,3
23W0D	161	36,1	40,5	44,9
24W0D	168	38,7	43,1	47,5
25W0D	175	41,2	45,6	50,0
26W0D	182	43,6	48,0	52,4
27W0D	189	45,9	50,3	54,7
28W0D	196	48,1	52,5	56,9
29W0D	203	50,3	54,7	59,1
30W0D	210	52,4	56,8	61,2
31W0D	217	54,4	58,8	63,2
32W0D	224	56,3	60,7	65,1
33W0D	231	58,1	62,5	66,9
34W0D	238	59,8	64,2	68,6
35W0D	245	61,5	65,9	70,3
36W0D	252	63,1	67,5	71,9
37W0D	259	64,6	69,0	73,4
38W0D	266	66,0	70,4	74,8
39W0D	273	67,3	71,7	76,1
40W0D	280	68,6	73,0	77,4
41W0D	287	69,7	74,1	78,6
42W0D	294	70,8	75,2	79,7

C5/C50/C95: mm

FL – Chitty

Weeks	Days	C 10	C 50	C 90
12W0D	84	5,5	7,7	10,0
13W0D	91	8,6	10,9	13,3
14W0D	98	11,7	14,1	16,5
15W0D	105	14,7	17,2	19,7
16W0D	112	17,7	20,3	22,8
17W0D	119	20,7	23,3	25,9
18W0D	126	23,6	26,3	29,0
19W0D	133	26,4	29,2	32,0
20W0D	140	29,2	32,1	34,9
21W0D	147	32,0	34,9	37,8
22W0D	154	34,6	37,6	40,6
23W0D	161	37,2	40,3	43,1
24W0D	168	39,8	42,9	46,1
25W0D	175	42,3	45,5	48,7
26W0D	182	44,7	48,0	51,3
27W0D	189	47,0	50,4	53,8
28W0D	196	49,3	52,7	56,2
29W0D	203	51,4	55,0	58,5
30W0D	210	53,5	57,1	60,7
31W0D	217	55,5	59,2	62,9
32W0D	224	57,4	61,2	64,9
33W0D	231	59,3	63,1	66,9
34W0D	238	61,0	64,9	68,8
35W0D	245	62,6	66,6	70,6
36W0D	252	64,2	68,2	72,3
37W0D	259	65,6	69,7	73,8
38W0D	266	66,9	71,1	75,3
39W0D	273	68,1	72,4	76,7
40W0D	280	69,2	73,6	77,9
41W0D	287	70,2	74,6	79,0
42W0D	294	71,1	75,6	80,1

C10/C50/C90: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

FL – Todai 96

Wettimane	Min	Med	Max
16W3D	17,1	21,4	25,8
17W3D	19,6	24,0	28,4
18W3D	22,1	26,5	31,0
19W3D	24,6	29,1	33,6
20W3D	27,1	31,6	36,2
21W3D	29,5	34,1	38,8
22W3D	31,9	36,6	41,3
23W3D	34,3	39,1	43,8
24W3D	36,7	41,5	46,3
25W3D	39,0	43,9	48,7
26W3D	41,3	46,2	51,1
27W3D	43,5	48,4	53,4
28W3D	45,6	50,6	55,7
29W3D	47,7	52,8	57,9
30W3D	49,7	54,8	60,0
31W3D	51,6	56,8	62,0
32W3D	53,5	58,7	64,0
33W3D	55,2	60,5	65,8
34W3D	56,9	62,2	67,6
35W3D	58,4	63,8	69,2
36W3D	59,9	65,3	70,8
37W3D	61,2	66,7	72,2
38W3D	62,4	68,0	73,6
39W3D	63,5	69,1	74,7
40W3D	64,4	70,1	75,8
41W3D	65,3	71,0	76,7
42W3D	65,9	71,7	77,5

Measure Unit: mm; Variance: ±1,64 SD

Bibliographic reference: Norio Shinotsuka et al. "Creation of reference data in ultrasound measurement", *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

FL - Osaka U

Weeks	Min	Med	Max
13W0D	7,3	9,3	11,5
13W4D	9,1	11,2	13,3
14W1D	10,8	13,0	15,2
14W5D	12,6	14,8	17,0
15W2D	14,4	16,6	18,8
15W6D	16,1	18,3	20,5
16W3D	17,8	20,1	22,4
17W0D	19,5	21,8	24,1
17W4D	21,1	23,4	25,7
18W1D	22,8	25,1	27,4
18W5D	24,4	26,7	29,0
19W2D	25,9	28,3	30,7
19W6D	27,5	29,9	32,3
20W3D	29,1	31,5	33,9
21W0D	30,6	33,0	35,4
21W4D	32,1	34,6	37,1
22W1D	33,6	36,1	38,6
22W5D	35,0	37,5	40,0
23W2D	36,5	39,0	41,5
23W6D	37,9	40,4	42,9
24W3D	39,2	41,8	44,4
25W0D	40,6	43,2	45,8
25W4D	41,9	44,5	47,1
26W1D	43,3	45,9	48,5
26W5D	44,5	47,2	49,9
27W2D	45,8	48,5	51,2
27W6D	47,0	49,7	52,4
28W3D	48,3	51,0	53,7
29W0D	49,5	52,2	54,9
29W4D	50,6	53,4	56,2
30W1D	51,8	54,6	57,4
30W5D	52,9	55,7	58,5
31W2D	54,1	56,9	59,7
31W6D	55,1	58,0	60,9
32W3D	56,1	59,0	61,9
33W0D	57,2	60,1	63,0
33W4D	58,2	61,1	64,0
34W1D	59,2	62,1	65,0
34W5D	60,1	63,1	66,1
35W2D	61,1	64,1	67,1
35W6D	62,0	65,0	68,0
36W3D	63,0	66,0	69,0
37W0D	63,8	66,9	70,0
37W4D	64,6	67,7	70,8
38W1D	65,5	68,6	71,7
38W5D	66,3	69,4	72,5
39W2D	67,1	70,2	73,3

Weeks	Min	Med	Max
39W6D	67,8	71,0	74,2
40W0D	68,0	71,2	74,4

Measure Unit: mm; Variance: ±1,00 SD

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

FL – JSUM 2001

Weeks	Min	Med	Max
16W0D	16,2	20,1	24,1
17W0D	18,7	22,7	26,7
18W0D	21,2	25,3	29,3
19W0D	23,7	27,8	31,9
20W0D	26,2	30,4	34,5
21W0D	28,7	32,9	37,1
22W0D	31,1	35,4	39,7
23W0D	33,5	37,9	42,2
24W0D	35,9	40,3	44,7
25W0D	38,3	42,7	47,1
26W0D	40,6	45,0	49,5
27W0D	42,8	47,3	51,8
28W0D	45,0	49,6	54,1
29W0D	47,1	51,7	56,3
30W0D	49,2	53,8	58,5
31W0D	51,1	55,8	60,6
32W0D	53,0	57,8	62,5
33W0D	54,8	59,6	64,4
34W0D	56,5	61,4	66,3
35W0D	58,1	63,0	68,0
36W0D	59,6	64,6	69,6
37W0D	61,0	66,0	71,1
38W0D	62,3	67,4	72,4
39W0D	63,4	68,6	73,7
40W0D	64,5	69,6	74,8
41W0D	65,4	70,6	75,8
42W0D	66,1	71,4	76,7

Measure Unit: mm; Variance: ±1,5 SD

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

FL – Hadlock 84

FL (cm) = -3,91 + 0,427 * [GA] – 0,0034 * $[GA]^2$

Measurement range: 12 ÷ 40 Weeks

Standard Deviation: 0,3 cm

Bibliographic reference: "Estimating Fetal Age: Computer-assisted analysis of multiple fetal growth parameters" *Radiology*, 152 (n.2) 499

FL – CFEF

Weeks	Days	C3	C50	C97
12W0D	84	2,76	6,33	10,00
13W0D	91	6,09	9,88	13,65
14W0D	98	9,40	13,33	17,27
15W0D	105	12,56	16,66	20,77
16W0D	112	15,70	19,95	24,18
17W0D	119	18,74	23,12	27,53
18W0D	126	21,69	26,23	30,80
19W0D	133	24,59	29,25	33,91
20W0D	140	27,42	32,23	37,03
21W0D	147	30,12	35,05	40,00
22W0D	154	32,83	37,87	42,91
23W0D	161	35,34	40,50	45,71
24W0D	168	37,89	43,16	48,42
25W0D	175	40,33	45,69	51,08
26W0D	182	42,66	48,17	53,62
27W0D	189	44,95	50,53	56,09
28W0D	196	47,13	52,80	58,45
29W0D	203	49,22	54,94	60,72
30W0D	210	51,30	57,13	62,92
31W0D	217	53,26	59,15	65,04
32W0D	224	55,12	61,11	67,07
33W0D	231	56,96	63,00	69,03
34W0D	238	58,69	64,76	70,84
35W0D	245	60,33	66,47	72,63
36W0D	252	61,90	68,13	74,30
37W0D	259	63,40	69,63	75,89
38W0D	266	64,81	71,11	77,41
39W0D	273	66,16	72,48	78,84
40W0D	280	67,42	73,79	80,17
41W0D	287	68,00	74,00	81,00

C3/C50/C97: mm

Bibliographic reference: *Gynecol Obstet Fertil*, June 2000, 28(6), 435-445; http://cfef.org/archives/communication/biometrie2000/selectframe.html

OFD – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	21,0	26,0	31,0
14W0D	98	26,0	31,0	36,0
15W0D	105	31,0	36,0	41,0
16W0D	112	35,0	41,0	46,0
17W0D	119	40,0	45,0	51,0
18W0D	126	45,0	50,0	55,0
19W0D	133	49,0	54,0	60,0
20W0D	140	53,0	59,0	64,0
21W0D	147	57,0	63,0	69,0
22W0D	154	61,0	67,0	73,0
23W0D	161	65,0	71,0	77,0
24W0D	168	69,0	75,0	81,0
25W0D	175	73,0	79,0	85,0
26W0D	182	76,0	82,0	88,0
27W0D	189	79,0	85,0	92,0
28W0D	196	83,0	89,0	95,0
29W0D	203	86,0	92,0	98,0
30W0D	210	88,0	95,0	101,0
31W0D	217	91,0	97,0	104,0
32W0D	224	94,0	100,0	107,0
33W0D	231	96,0	103,0	109,0
34W0D	238	98,0	105,0	112,0
35W0D	245	101,0	107,0	114,0
36W0D	252	103,0	109,0	116,0
37W0D	259	105,0	111,0	118,0
38W0D	266	106,0	113,0	120,0
39W0D	273	108,0	115,0	122,0
40W0D	280	110,0	117,0	124,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

OFD – Chitty

Weeks	Days	C 10	C 50	C 90
12W0D	84	19,5	23,4	27,4
13W0D	91	24,7	28,6	32,4
14W0D	98	29,8	33,6	37,4
15W0D	105	34,8	38,6	42,4
16W0D	112	39,7	43,5	47,3
17W0D	119	44,5	48,3	52,1
18W0D	126	49,2	53,0	56,8
19W0D	133	53,7	57,6	61,5
20W0D	140	58,2	62,1	66,0
21W0D	147	62,5	66,5	70,5
22W0D	154	66,7	70,8	74,9
23W0D	161	70,7	74,9	79,2
24W0D	168	74,6	79,0	83,3
25W0D	175	78,4	82,9	87,4
26W0D	182	82,0	86,6	91,3
27W0D	189	85,4	90,3	95,1
28W0D	196	88,7	93,7	98,8
29W0D	203	91,8	97,4	102,4
30W0D	210	94,7	100,2	105,8
31W0D	217	97,4	103,2	109,0
32W0D	224	100,0	106,1	112,1
33W0D	231	102,3	108,7	115,1
34W0D	238	104,5	111,2	117,9
35W0D	245	106,4	113,5	120,5
36W0D	252	108,2	115,6	122,9
37W0D	259	109,7	117,5	125,2
38W0D	266	111,0	119,1	127,3
39W0D	273	112,1	120,6	129,2
40W0D	280	112,9	121,9	130,9
41W0D	287	113,5	123,0	132,4
42W0D	294	113,9	123,8	133,6

C10/C50/C90: mm

Bibliographic reference: British journal of Obstetrics and Gynaecology, January 1994, Vol. 101 p. 29-135, Altman DG

OFD – Jeanty

Weeks	Days	C5	C50	C95
11W0D	77	11,00	18,00	25,00
12W0D	84	16,00	23,00	30,00
13W0D	91	20,00	27,00	34,00
14W0D	98	24,00	31,00	38,00
15W0D	105	29,00	36,00	43,00
16W0D	112	33,00	40,00	47,00
17W0D	119	37,00	44,00	51,00
18W0D	126	41,00	48,00	55,00
19W0D	133	46,00	53,00	60,00
20W0D	140	50,00	57,00	64,00
21W0D	147	54,00	61,00	68,00
22W0D	154	58,00	65,00	72,00
23W0D	161	62,00	69,00	76,00
24W0D	168	65,00	72,00	79,00
25W0D	175	69,00	76,00	83,00
26W0D	182	73,00	80,00	87,00
27W0D	189	76,00	83,00	90,00
28W0D	196	80,00	87,00	94,00
29W0D	203	83,00	90,00	97,00
30W0D	210	86,00	93,00	100,00
31W0D	217	89,00	96,00	103,00
32W0D	224	92,00	99,00	106,00
33W0D	231	95,00	102,00	108,00
34W0D	238	97,00	104,00	111,00
35W0D	245	99,00	106,00	113,00
36W0D	252	102,00	109,00	116,00
37W0D	259	104,00	111,00	118,00
38W0D	266	105,00	112,00	119,00
39W0D	273	107,00	114,00	121,00
40W0D	280	108,00	115,00	122,00
41W0D	287	109,00	116,00	123,00
42W0D	294	110,00	117,00	124,00

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

CRL – Hadlock 84

CRL (cm) = $e^{-0,6983 + 1,4498 * [GA] - 0,078345 * [GA]2 + 0,001501 * [GA]3}$

Measurement range: 5 ÷ 18 Weeks

Bibliographic reference: Hadlock FP et al Fetal Crown-Rump length: Re-evaluation of relation to menstrual age (5-18 weeks) with high-resolution real time US, *Radiology*, 182:501-505

CRL – Hansmann 85

Weeks	Days	C 3	C 50	C 97
7W1D	50	2,3	7,0	11,5
7W3D	52	3,2	8,3	13,4
7W5D	54	3,9	9,6	15,2
7W7D	56	4,7	10,8	16,9
8W2D	58	5,4	12,1	18,7
8W4D	60	6,2	13,3	20,5
8W6D	62	7,0	14,7	22,4
9W1D	64	8,0	16,2	24,4
9W5D	68	10,3	19,6	28,8
10W2D	72	13,3	23,6	33,9
10W6D	76	17,0	28,3	39,6
11W4D	81	22,7	35,3	47,9
12W2D	86	29,3	43,2	57,1
12W6D	90	35,3	50,2	65,1
13W4D	95	43,2	59,4	75,5
14W2D	100	51,3	68,8	86,3
14W6D	104	57,8	76,3	94,8
15W4D	109	65,6	85,4	105,2
16W2D	114	72,8	93,9	115,0
16W6D	118	78,0	100,1	122,2
17W4D	123	83,6	107,0	130,4
18W2D	128	88,3	113,0	137,7
18W6D	132	91,5	117,2	142,9
19W4D	137	94,8	121,9	148,9
20W1D	141	97,5	125,5	153,6
20W5D	145	100,3	129,4	158,5
21W1D	148	102,9	132,8	162,6

C3/C50/C97: mm

Bibliographic reference: Ultrasound diagnosis in Obstetrics and Gynaecology Springer – Verlag 1985

CRL – JSUM 2001

Weeks	Min	Med	Max
7W0D	6,6	10,1	15,0
7W2D	7,3	10,5	15,7
7W4D	8,1	11,3	16,0
7W6D	9,0	12,5	17,0
8W1D	10,2	14,0	18,4
8W3D	11,6	15,8	20,4
8W5D	13,1	17,8	22,7
9W0D	14,9	20,0	25,4
9W2D	16,7	22,5	28,3
9W4D	18,7	25,0	31,4
9W6D	20,9	27,6	34,6
10W1D	23,1	30,3	37,8
10W3D	25,4	33,1	41,0
10W5D	27,9	35,8	44,1
11W0D	30,4	38,4	47,0
11W2D	32,9	40,9	49,6
11W4D	35,5	43,3	51,9

Measure Unit: mm; Variance: 10%, 50%, 90%

Bibliographic reference: J Med Ultrasound, Vol.28 No.5, 2001

CRL – Osaka U

Weeks	Min	Med	Max
7W0D	7,1	8,7	10,3
7W1D	7,4	9,1	10,8
7W2D	7,7	9,6	11,5
7W3D	8,2	10,2	12,2
7W4D	8,6	10,8	13,0
7W5D	9,2	11,5	13,8
7W6D	9,7	12,2	14,7
8W0D	10,4	13,0	15,6
8W1D	11,1	13,9	16,7
8W2D	12,0	14,9	17,8
8W3D	12,8	15,9	19,0
8W4D	13,7	16,9	20,1
8W5D	14,6	18,0	21,4
8W6D	15,7	19,2	22,7
9W0D	16,7	20,4	24,1
9W1D	17,8	21,6	25,4
9W2D	18,9	22,9	26,9
9W3D	20,2	24,3	28,4
9W4D	21,4	25,7	30,0
9W5D	22,6	27,1	31,6
9W6D	23,9	28,5	33,1
10W0D	25,2	30,0	34,8
10W1D	26,6	31,5	36,4
10W2D	28,0	33,1	38,2
10W3D	29,5	34,7	39,9
10W4D	30,9	36,3	41,7
10W5D	32,4	37,9	43,4
10W6D	33,6	39,5	45,2
11W0D	35,4	41,2	47,0
11W1D	36,8	42,8	48,8
11W2D	38,4	44,5	50,6
11W3D	39,9	46,2	52,5
11W4D	41,5	47,9	54,3
11W5D	43,0	49,6	56,2
11W6D	44,5	51,3	58,0
12W0D	46,1	53,0	59,9
12W1D	47,8	54,8	61,8
12W2D	49,3	56,5	63,7
12W3D	50,9	58,2	65,5
12W4D	52,4	59,9	67,4
12W5D	54,0	61,6	69,2
12W6D	55,4	63,2	71,0

Unità misura: mm; Varianza: ±1,00 SD

Bibliographic reference: "Fetal growth chart using the ultrasonographic tecnique", Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

CRL – Robinson

Weeks	Mean	2SD
6W2D	6,70	2,90
6W3D	7,40	3,10
6W4D	8,00	3,20
6W5D	8,70	3,40
6W6D	9,50	3,50
7W0D	10,20	3,70
7W1D	11,00	3,80
7W2D	11,80	3,90
7W3D	12,60	4,10
7W4D	13,50	4,20
7W5D	14,40	4,40
7W6D	15,30	4,50
8W0D	16,30	4,60
8W1D	17,30	4,80
8W2D	18,30	4,90
8W3D	19,30	5,10
8W4D	20,40	5,20
8W5D	21,50	5,30
8W6D	22,60	5,50
9W0D	23,80	5,60
9W1D	25,00	5,80
9W2D	26,20	5,90
9W3D	27,40	6,00
9W4D	28,70	6,20
9W5D	30,00	6,30
9W6D	31,30	6,50
10W0D	32,70	6,60
10W1D	34,00	6,70
10W2D	35,50	6,90
10W3D	36,90	7,00
10W4D	38,40	7,20
10W5D	39,90	7,30
10W6D	41,40	7,40
11W0D	43,00	7,60
11W1D	44,60	7,70
11W2D	46,20	7,90
11W3D	47,80	8,00
11W4D	49,50	8,10
11W5D	51,20	8,30
11W6D	52,90	8,40
12W0D	54,70	8,60
12W1D	56,50	8,70
12W2D	58,30	8,80
12W3D	60,10	9,00
12W4D	62,00	9,10
12W5D	63,90	9,30
12W6D	65,90	9,40

Weeks	Mean	2SD
13W0D	67,80	9,50
13W1D	69,80	9,70
13W2D	71,80	9,80
13W3D	73,90	10,00
13W4D	76,00	10,10
13W5D	78,10	10,20
13W6D	80,20	10,40
14W0D	82,40	10,50

Measure Unit: mm

Bibliographic reference: A Critical Evaluation of Sonar "Crown-Rump Length" Measurements, *British J of Obstetrics and Gynaecology*, September 1975 Vol 82 pp 702-710

TCD – Goldstein 87

Weeks	Days	C 10	C 50	C 90
15W0D	105	10,0	14,0	16,0
16W0D	112	14,0	16,0	17,0
17W0D	119	16,0	17,0	18,0
18W0D	126	17,0	18,0	19,0
19W0D	133	18,0	19,0	22,0
20W0D	140	18,0	20,0	22,0
21W0D	147	19,0	22,0	24,0
22W0D	154	21,0	23,0	24,0
23W0D	161	22,0	24,0	26,0
24W0D	168	22,0	25,0	28,0
25W0D	175	23,0	28,0	29,0
26W0D	182	25,0	29,0	32,0
27W0D	189	26,0	30,0	32,0
28W0D	196	27,0	31,0	34,0
29W0D	203	29,0	34,0	38,0
30W0D	210	31,0	35,0	40,0
31W0D	217	32,0	38,0	43,0
32W0D	224	33,0	38,0	42,0
33W0D	231	32,0	40,0	44,0
34W0D	238	33,0	40,0	44,0
35W0D	245	31,0	41,0	47,0
36W0D	252	36,0	43,0	55,0
37W0D	259	37,0	45,0	55,0
38W0D	266	40,0	49,0	55,0
39W0D	273	52,0	52,0	55,0

C10/C50/C90: mm

Bibliographic reference: "Cerebellar measurements with ultrasonography in the evaluation of fetal growth and development", *Am J Obstet Gynecol*, 1987, 156:1065-1069, Goldstein I et al

TL – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	5,0	8,0	12,0
14W0D	98	8,0	11,0	14,0
15W0D	105	10,0	14,0	17,0
16W0D	112	13,0	17,0	20,0
17W0D	119	16,0	19,0	23,0
18W0D	126	18,0	22,0	26,0
19W0D	133	21,0	25,0	28,0
20W0D	140	23,0	27,0	31,0
21W0D	147	26,0	30,0	33,0
22W0D	154	28,0	32,0	36,0
23W0D	161	31,0	35,0	38,0
24W0D	168	33,0	37,0	41,0
25W0D	175	35,0	39,0	43,0
26W0D	182	37,0	41,0	45,0
27W0D	189	39,0	43,0	48,0
28W0D	196	41,0	46,0	50,0
29W0D	203	43,0	48,0	52,0
30W0D	210	45,0	49,0	54,0
31W0D	217	47,0	51,0	56,0
32W0D	224	49,0	53,0	57,0
33W0D	231	50,0	55,0	59,0
34W0D	238	52,0	57,0	61,0
35W0D	245	54,0	58,0	63,0
36W0D	252	55,0	60,0	64,0
37W0D	259	57,0	61,0	66,0
38W0D	266	58,0	62,0	67,0
39W0D	273	59,0	64,0	68,0
40W0D	280	60,0	65,0	70,0

C5/C50/C95: mm

Bibliographic reference: Ultrasound in Gynaecology and Obstetrics textbook and atlas 312, 326-336. Werner G. & Ilan E.T., 1991

APTD x TTD – Todai 96

Weeks	Min	Med	Max
16W3D	7,00	11,20	15,50
17W3D	8,70	13,30	18,00
18W3D	10,50	15,60	20,70
19W3D	12,50	18,10	23,60
20W3D	14,70	20,80	26,80
21W3D	17,10	23,60	30,20
22W3D	19,60	26,70	33,80
23W3D	22,20	29,90	37,50
24W3D	25,00	33,20	41,50
25W3D	27,90	36,70	45,60
26W3D	30,90	40,30	49,80
27W3D	33,90	44,10	54,20
28W3D	37,10	47,90	58,70
29W3D	40,30	51,80	63,30
30W3D	43,50	55,70	68,00
31W3D	46,80	59,70	72,70
32W3D	50,00	63,80	77,60
33W3D	53,30	67,80	82,40
34W3D	56,60	71,90	87,30
35W3D	59,70	75,90	92,20
36W3D	62,80	79,90	97,00
37W3D	65,90	83,90	101,90
38W3D	68,80	87,70	106,70
39W3D	71,60	91,50	111,40
40W3D	74,30	95,10	116,00
41W3D	76,80	98,60	120,50
42W3D	79,10	102,00	124,80

Measure Unit: cm^2; Variance: ±1,64 SD

Bibliographic reference: Norio Shinotsuka et al. Creation of reference data in ultrasound measurement, *Jpn J Med Ultrasonics*, Vol.23 No.12; 877-888, 1996

FTA – Osaka U

Weeks	Min	Med	Max
14W0D	4,40	5,60	6,80
14W4D	5,20	6,50	7,80
15W1D	6,20	7,60	9,00
15W5D	7,20	8,70	10,20
16W2D	8,20	9,80	11,40
16W6D	9,20	11,00	12,80
17W3D	10,30	12,20	14,10
18W0D	11,50	13,50	15,50
18W4D	12,60	14,80	17,00
19W1D	13,90	16,20	18,50
19W5D	15,10	17,60	20,10
20W2D	16,50	19,10	21,70
20W6D	17,80	20,60	23,40
21W3D	19,30	22,20	25,10
22W0D	20,70	23,80	26,90
22W4D	22,20	25,50	28,80
23W1D	23,80	27,20	30,60
23W5D	25,40	29,00	32,60
24W2D	27,00	30,80	34,60
24W6D	28,60	32,60	36,60
25W3D	30,30	34,50	38,70
26W0D	32,10	36,50	40,90
26W4D	33,50	38,40	43,00
27W1D	35,60	40,40	45,20
27W5D	37,40	42,40	47,40
28W2D	39,30	44,50	49,70
28W6D	41,20	46,60	52,00
29W3D	43,10	48,70	54,30
30W0D	45,00	50,80	56,60
30W4D	46,80	52,90	59,00
31W1D	48,70	55,00	61,30
31W5D	50,70	57,20	63,70
32W2D	52,60	59,40	66,20
32W6D	54,50	61,50	68,50
33W3D	56,40	63,70	71,00
34W0D	58,30	65,80	73,30
34W4D	60,10	67,90	75,70
35W1D	62,10	70,10	78,10
35W5D	63,90	72,20	80,50
36W2D	65,60	74,20	82,80
36W6D	67,40	76,20	85,00
37W3D	69,10	78,20	87,30
38W0D	70,80	80,20	89,50
38W4D	72,40	82,10	91,80
39W1D	73,90	83,90	93,90
39W5D	75,40	85,70	96,00
40W0D	76,20	86,60	97,00

Measure Unit: cm^2; Variance: ±1,00 SD

Bibliographic reference: Fetal growth chart using the ultrasonographic tecnique, Keiichi Kurachi, Mineo Aoki Department of Obstetrics and Gynaecology, Osaka University Medical school Rev.3 (September 1983)

FoL – Mercer

Weeks	Days	-2SD	Predicted Value	2SD
12W0D	84	7,0	8,0	9,0
13W0D	91	10,0	11,0	12,0
14W0D	98	13,0	15,0	16,0
15W0D	105	16,0	18,0	20,0
16W0D	112	19,0	21,0	23,0
17W0D	119	22,0	24,0	27,0
18W0D	126	24,0	27,0	30,0
19W0D	133	27,0	30,0	34,0
20W0D	140	30,0	33,0	37,0
21W0D	147	32,0	36,0	40,0
22W0D	154	35,0	39,0	43,0
23W0D	161	37,0	42,0	46,0
24W0D	168	40,0	45,0	50,0
25W0D	175	42,0	47,0	53,0
26W0D	182	45,0	50,0	55,0
27W0D	189	47,0	53,0	58,0
28W0D	196	49,0	55,0	61,0
29W0D	203	51,0	58,0	64,0
30W0D	210	54,0	60,0	67,0
31W0D	217	56,0	62,0	68,0
32W0D	224	58,0	65,0	72,0
33W0D	231	60,0	67,0	74,0
34W0D	238	62,0	69,0	77,0
35W0D	245	64,0	71,0	79,0
36W0D	252	66,0	74,0	82,0
37W0D	259	67,0	76,0	84,0
38W0D	266	69,0	78,0	86,0
39W0D	273	71,0	80,0	88,0
40W0D	280	72,0	81,0	90,0

Bibliographic reference: "Fetal foot length as a predictor of gestional age", *Am J Obstet Gynaecol*, 156, 350-5, 1987

GS – Nyberg 87

Weeks	Days	C 5	C 50	C 95
4W6D	34	0,5	5,0	7,9
5W0D	35	1,8	5,0	9,2
5W1D	36	3,1	7,0	10,5
5W2D	37	4,3	8,0	11,7
5W3D	38	5,6	9,0	13,0
5W4D	39	6,9	11,0	14,3
5W6D	41	8,2	12,0	15,6
6W0D	42	9,4	13,0	16,8
6W1D	43	10,7	14,0	18,1
6W2D	44	12,0	16,0	19,4
6W3D	45	13,3	17,0	20,7
6W4D	46	14,5	18,0	21,9
6W6D	48	15,8	20,0	23,2
7W0D	49	17,1	21,0	24,5
7W1D	50	18,3	22,0	25,8
7W2D	51	19,6	23,0	27,0
7W3D	52	20,9	25,0	28,3
7W5D	54	22,2	26,0	29,6
7W6D	55	23,4	27,0	30,9
8W0D	56	24,7	28,0	32,1
8W1D	57	26,0	30,0	33,4
8W2D	58	27,3	31,0	34,7
8W3D	59	28,5	32,0	35,9
8W5D	61	29,8	34,0	37,2
8W6D	62	31,1	35,0	38,5
9W0D	63	32,4	36,0	39,8
9W1D	64	33,6	37,0	41,0
9W2D	65	34,9	39,0	42,3
9W4D	67	36,2	40,0	43,6
9W5D	68	37,5	41,0	44,9
9W6D	69	38,7	42,0	46,1
10W0D	70	40,0	44,0	47,4
10W1D	71	41,3	45,0	487
10W2D	72	42,6	46,0	50,0
10W4D	74	43,8	48,0	51,2
10W5D	75	45,1	49,0	52,5
10W6D	76	46,4	50,0	53,8
11W0D	77	47,6	51,0	55,1
11W1D	78	48,9	53,0	56,3
11W3D	80	50,2	54,0	57,6

C5/C50/C95: mm

HL – Jeanty/Romero

Weeks	Days	C 5	C 50	C 95
13W0D	91	6,0	11,0	16,0
14W0D	98	9,0	14,0	19,0
15W0D	105	12,0	17,0	22,0
16W0D	112	15,0	20,0	25,0
17W0D	119	18,0	22,0	27,0
18W0D	126	20,0	25,0	30,0
19W0D	133	23,0	28,0	33,0
20W0D	140	25,0	30,0	35,0
21W0D	147	28,0	33,0	38,0
22W0D	154	30,0	35,0	40,0
23W0D	161	33,0	38,0	42,0
24W0D	168	35,0	40,0	45,0
25W0D	175	37,0	42,0	47,0
26W0D	182	39,0	44,0	49,0
27W0D	189	41,0	46,0	51,0
28W0D	196	43,0	48,0	53,0
29W0D	203	45,0	50,0	55,0
30W0D	210	47,0	51,0	56,0
31W0D	217	48,0	53,0	58,0
32W0D	224	50,0	55,0	60,0
33W0D	231	51,0	56,0	61,0
34W0D	238	53,0	58,0	63,0
35W0D	245	54,0	59,0	64,0
36W0D	252	56,0	61,0	65,0
37W0D	259	57,0	62,0	67,0
38W0D	266	59,0	63,0	68,0
39W0D	273	60,0	65,0	70,0
40W0D	280	61,0	66,0	71,0

C5/C50/C95: mm

Bibliographic reference: *Journal of ultrasound in medicine*, 3:75, 1984

HL – Osaka U

Weeks	Min	Med	Max
13W0D	8,1	10,1	12,1
13W4D	9,8	11,8	13,8
14W1D	11,4	13,5	15,6
14W5D	13,0	15,1	17,2
15W2D	14,6	16,7	18,8
15W6D	16,2	18,3	20,4
16W3D	17,8	19,9	22,0
17W0D	19,3	21,5	23,7
17W4D	20,8	23,0	25,2
18W1D	22,3	24,5	26,7
18W5D	23,7	25,9	28,1
19W2D	25,2	27,4	29,6
19W6D	26,5	28,8	31,1
20W3D	27,9	30,2	32,5
21W0D	29,2	31,5	33,8
21W4D	30,6	32,9	35,2
22W1D	31,9	34,2	36,5
22W5D	33,1	35,4	37,7
23W2D	34,3	36,7	39,1
23W6D	35,5	37,9	40,3
24W3D	36,7	39,1	41,5
25W0D	37,9	40,3	42,7
25W4D	39,0	41,4	43,8
26W1D	40,1	42,6	45,1
26W5D	41,2	43,7	46,2
27W2D	42,2	44,7	47,0
27W6D	43,3	45,8	48,3
28W3D	44,3	46,8	49,3
29W0D	45,2	47,8	50,4
30W1D	47,1	49,7	52,3
30W5D	48,0	50,6	53,2
31W2D	48,9	51,5	54,1
31W6D	49,7	52,3	54,9
32W3D	50,4	53,1	55,8
33W0D	51,2	53,9	56,6
33W4D	52,0	54,7	57,4
34W1D	52,8	55,5	58,2
34W5D	53,5	56,2	58,9
35W2D	54,1	56,9	59,7
35W6D	54,8	57,6	60,0
36W3D	55,4	58,2	61,0
37W0D	56,0	58,8	61,6
37W4D	56,6	59,4	62,2
38W1D	57,1	60,0	62,9
38W5D	57,6	60,5	63,4
39W2D	58,1	61,0	63,9
39W6D	58,6	61,5	64,4

Weeks	Min	Med	Max
40W0D	58,7	61,6	64,5

Measure Unit: mm; Variance: ±1,00 SD

Bibliographic reference: "Image diagnosis of fetal growth", Obstetrical and Gynaecological practice (in Japanese), 1988, 37(10):1459-70, Nobuaki Mitsuda et al

RL – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	3,0	6,0	10,0
14W0D	98	5,0	9,0	12,0
15W0D	105	8,0	11,0	15,0
16W0D	112	10,0	14,0	18,0
17W0D	119	13,0	16,0	20,0
18W0D	126	15,0	19,0	23,0
19W0D	133	17,0	21,0	25,0
20W0D	140	20,0	24,0	27,0
21W0D	147	22,0	26,0	30,0
22W0D	154	24,0	28,0	32,0
23W0D	161	26,0	30,0	34,0
24W0D	168	28,0	32,0	36,0
25W0D	175	30,0	34,0	38,0
26W0D	182	32,0	36,0	40,0
27W0D	189	33,0	37,0	42,0
28W0D	196	35,0	39,0	43,0
29W0D	203	36,0	41,0	45,0
30W0D	210	38,0	42,0	47,0
31W0D	217	39,0	44,0	48,0
32W0D	224	40,0	45,0	49,0
33W0D	231	42,0	46,0	51,0
34W0D	238	43,0	47,0	52,0
35W0D	245	44,0	48,0	53,0
36W0D	252	45,0	49,0	54,0
37W0D	259	45,0	50,0	55,0
38W0D	266	46,0	51,0	56,0
39W0D	273	47,0	52,0	57,0
40W0D	280	48,0	53,0	57,0

C5/C50/C95: mm

Bibliographic reference: Sonographische diagnostik in Gynäkologie und Geburtshilfe: Lehrbuch und atlas (Stuttgart, New York: George Thieme) 1988

TAD – Eriksen

TAD (cm) = -29,525 + 0,6043653 * [GA] – 0,000418794* $[GA]^2$ + 0.000000214518 * $[GA]^3$

GA in days

Measurement range: 92 ÷ 281 days

Bibliographic reference: Eriksen PS, Sechor NJ, Weis-Bentzen M, Normal growth of the fetal biparietal diameter and the abdominal diameter in a longitudinal study: an evaluation of the two parameters in predicting fetal weight, Acta Obstet Gynecal Scan, 64:65-70, 1985

TAD - CFEF

Weeks	Days	C3	C50	C97
11W0D	77	9,68	13,50	17,25
12W0D	84	12,68	17,00	21,46
13W0D	91	15,60	20,56	25,51
14W0D	98	18,69	24,00	29,56
15W0D	105	21,76	27,69	33,61
16W0D	112	25,00	31,21	37,48
17W0D	119	28,23	34,70	41,39
18W0D	126	31,54	38,31	45,14
19W0D	133	34,78	41,69	48,59
20W0D	140	38,16	45,21	52,20
21W0D	147	41,14	48,34	55,63
22W0D	154	44,21	51,57	59,08
23W0D	161	47,00	54,72	62,46
24W0D	168	49,77	57,88	66,00
25W0D	175	52,54	61,00	69,44
26W0D	182	55,17	64,00	72,89
27W0D	189	57,72	67,11	76,42
28W0D	196	60,43	70,27	79,87
29W0D	203	63,13	73,27	83,33
30W0D	210	65,80	76,17	86,75
31W0D	217	68,35	79,25	90,13
32W0D	224	70,90	82,10	93,36
33W0D	231	73,08	84,78	96,64
34W0D	238	75,25	87,55	99,86
35W0D	245	77,00	90,00	103,00
36W0D	252	78,48	92,36	106,31
37W0D	259	79,79	94,81	109,67
38W0D	266	80,92	97,00	113,29
39W0D	273	81,85	99,33	117,00
40W0D	280	82,58	101,64	120,70
41W0D	287	82,80	103,00	123,00

C3/C50/C97: mm

Bibliographic reference: *Gynecol Obstet Fertil*, June 2000, 28(6), 435-445; http://cfef.org/archives/communication/biometrie2000/selectframe.html

UL – Merz 88

Weeks	Days	C 5	C 50	C 95
13W0D	91	4,0	7,0	10,0
14W0D	98	7,0	10,0	13,0
15W0D	105	10,0	13,0	16,0
16W0D	112	12,0	16,0	19,0
17W0D	119	15,0	19,0	22,0
18W0D	126	18,0	21,0	25,0
19W0D	133	20,0	24,0	27,0
20W0D	140	23,0	27,0	30,0
21W0D	147	25,0	29,0	33,0
22W0D	154	28,0	31,0	35,0
23W0D	161	30,0	34,0	37,0
24W0D	168	32,0	36,0	40,0
25W0D	175	34,0	38,0	42,0
26W0D	182	36,0	40,0	44,0
27W0D	189	38,0	42,0	46,0
28W0D	196	40,0	44,0	48,0
29W0D	203	42,0	46,0	50,0
30W0D	210	44,0	48,0	52,0
31W0D	217	45,0	49,0	53,0
32W0D	224	47,0	51,0	55,0
33W0D	231	48,0	52,0	56,0
34W0D	238	49,0	53,0	58,0
35W0D	245	50,0	55,0	59,0
36W0D	252	52,0	56,0	60,0
37W0D	259	53,0	57,0	61,0
38W0D	266	54,0	58,0	62,0
39W0D	273	55,0	59,0	63,0
40W0D	280	56,0	60,0	64,0

C5/C50/C95: mm

Bibliographic reference: Sonographische Diagnostik in Gynäkologie und Geburtshilfe: Lehrbuch und Atlas (Stuttgart, New York: George Thieme) 1988

UL – Jeanty

Weeks	Days	C5	C50	C95
13W0D	91	5,00	10,00	15,00
14W0D	98	8,00	13,00	18,00
15W0D	105	11,00	16,00	21,00
16W0D	112	13,00	18,00	23,00
17W0D	119	16,00	21,00	26,00
18W0D	126	19,00	24,00	29,00
19W0D	133	21,00	26,00	31,00
20W0D	140	24,00	29,00	34,00
21W0D	147	26,00	31,00	36,00
22W0D	154	28,00	33,00	38,00
23W0D	161	31,00	36,00	41,00
24W0D	168	33,00	38,00	43,00
25W0D	175	35,00	40,00	45,00
26W0D	182	37,00	42,00	47,00
27W0D	189	39,00	44,00	49,00
28W0D	196	41,00	46,00	51,00
29W0D	203	43,00	48,00	53,00
30W0D	210	44,00	49,00	54,00
31W0D	217	46,00	51,00	56,00
32W0D	224	48,00	53,00	58,00
33W0D	231	49,00	54,00	59,00
34W0D	238	51,00	56,00	61,00
35W0D	245	52,00	57,00	62,00
36W0D	252	53,00	58,00	63,00
37W0D	259	55,00	60,00	65,00
38W0D	266	56,00	61,00	66,00
39W0D	273	57,00	62,00	67,00
40W0D	280	58,00	63,00	68,00

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale,* July 2000, Jean-Marie Bourgeois

NBL – Guis-Ville

Weeks	Days	-2Sd	Med	2SD
14W0D	98	3,32	4,18	5,04
16W0D	112	3,08	5,21	7,33
18W0D	126	5,00	6,30	7,61
20W0D	140	5,71	7,62	9,52
22W0D	154	6,03	8,23	10,43
24W0D	168	6,76	9,36	11,96
26W0D	182	7,19	9,74	12,29
28W0D	196	7,80	10,72	13,63
30W0D	210	8,32	11,34	14,37
32W0D	224	7,99	11,58	15,17
34W0D	238	7,54	12,28	17,02

Measure Unit: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

EL – Lettieri

Weeks	Days	C10	C50	C90
14W0D	98	6,00	7,00	8,00
15W0D	105	7,00	8,00	10,00
16W0D	112	8,00	9,00	11,00
17W0D	119	9,00	11,00	12,00
18W0D	126	10,00	12,00	14,00
19W0D	133	11,00	13,00	15,00
20W0D	140	12,00	14,00	17,00
21W0D	147	13,00	16,00	18,00
22W0D	154	15,00	17,00	19,00
23W0D	161	16,00	18,00	21,00
24W0D	168	17,00	19,00	22,00
25W0D	175	18,00	21,00	23,00
26W0D	182	19,00	22,00	24,00
27W0D	189	20,00	23,00	25,00
28W0D	196	21,00	24,00	27,00
29W0D	203	21,00	24,50	28,00
30W0D	210	22,00	25,00	29,00
31W0D	217	23,00	26,00	30,00
32W0D	224	24,00	27,00	31,00
33W0D	231	24,00	27,50	31,00
34W0D	238	25,00	28,00	32,50
35W0D	245	25,00	28,00	33,00
36W0D	252	26,00	29,00	34,00
37W0D	259	26,00	30,00	35,00
38W0D	266	27,00	31,00	36,00
39W0D	273	28,00	32,00	37,00
40W0D	280	28,00	32,50	38,00

C10/C50/C90: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

CM - Nicolaides

Weeks	Days	C5	C50	C95
14W0D	98	1,90	3,50	5,30
15W0D	105	2,10	3,80	5,70
16W0D	112	2,40	4,10	6,00
17W0D	119	2,60	4,30	6,30
18W0D	126	2,80	4,60	6,60
19W0D	133	3,10	4,90	6,90
20W0D	140	3,30	5,10	7,20
21W0D	147	3,50	5,40	7,50
22W0D	154	3,70	5,60	7,70
23W0D	161	3,90	5,80	8,00
24W0D	168	4,10	6,00	8,20
25W0D	175	4,30	6,20	8,50
26W0D	182	4,40	6,40	8,70
27W0D	189	4,60	6,60	8,90
28W0D	196	4,70	6,80	9,10
29W0D	203	4,90	6,90	9,30
30W0D	210	5,00	7,00	9,40
31W0D	217	5,10	7,20	9,60
32W0D	224	5,20	7,30	9,70
33W0D	231	5,30	7,40	9,80
34W0D	238	5,30	7,50	9,90
35W0D	245	5,40	7,50	10,00
36W0D	252	5,40	7,60	10,00
37W0D	259	5,40	7,60	10,10
38W0D	266	5,50	7,60	10,10
39W0D	273	5,50	7,60	10,10

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

LATV – Pretorius

Weeks	Days	-2SD	Med	2SD
15W0D	105	6,00	8,00	10,00
16W0D	112	7,00	9,00	11,00
17W0D	119	8,00	9,00	10,00
18W0D	126	8,00	9,00	10,00
19W0D	133	7,00	9,00	11,00
20W0D	140	7,00	9,00	11,00
21W0D	147	7,00	9,00	11,00
22W0D	154	7,00	9,00	11,00
23W0D	161	7,00	8,00	9,00
24W0D	168	8,00	9,00	10,00
25W0D	175	8,00	9,00	10,00

Measure Unit: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

FIB – Merz

Weeks	Days	C5	C50	C95
13W0D	91	4,00	7,00	10,00
14W0D	98	7,00	10,00	12,00
15W0D	105	9,00	12,00	15,00
16W0D	112	12,00	15,00	18,00
17W0D	119	15,00	18,00	21,00
18W0D	126	18,00	21,00	24,00
19W0D	133	20,00	23,00	26,00
20W0D	140	23,00	26,00	29,00
21W0D	147	25,00	28,00	32,00
22W0D	154	28,00	31,00	34,00
23W0D	161	30,00	33,00	37,00
24W0D	168	32,00	36,00	39,00
25W0D	175	35,00	38,00	41,00
26W0D	182	37,00	40,00	44,00
27W0D	189	39,00	42,00	46,00
28W0D	196	41,00	44,00	48,00
29W0D	203	43,00	46,00	50,00
30W0D	210	44,00	48,00	52,00
31W0D	217	46,00	50,00	53,00
32W0D	224	48,00	51,00	55,00
33W0D	231	49,00	53,00	57,00
34W0D	238	51,00	54,00	58,00
35W0D	245	52,00	56,00	60,00
36W0D	252	53,00	57,00	61,00
37W0D	259	55,00	59,00	62,00
38W0D	266	56,00	60,00	64,00
39W0D	273	57,00	61,00	65,00
40W0D	280	58,00	62,00	66,00

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

IOD – Merz

Weeks	Days	C5	C50	C95
12W0D	84	3,50	5,80	8,20
13W0D	91	4,80	7,10	9,50
14W0D	98	5,70	8,10	10,40
15W0D	105	6,50	8,90	11,20
16W0D	112	7,30	9,60	12,00
17W0D	119	8,00	10,30	12,70
18W0D	126	8,60	11,00	13,30
19W0D	133	9,30	11,60	14,00
20W0D	140	9,90	12,20	14,60
21W0D	147	10,50	12,80	15,20
22W0D	154	11,10	13,40	15,80
23W0D	161	11,60	14,00	16,30
24W0D	168	12,20	14,50	16,90
25W0D	175	12,70	15,00	17,40
26W0D	182	13,20	15,60	17,90
27W0D	189	13,70	16,10	18,40
28W0D	196	14,20	16,60	18,90
29W0D	203	14,70	17,00	19,40
30W0D	210	15,20	17,50	19,90
31W0D	217	15,60	18,00	20,30
32W0D	224	16,10	18,40	20,80
33W0D	231	16,50	18,90	21,20
34W0D	238	17,00	19,30	21,70
35W0D	245	17,40	19,70	22,10
36W0D	252	17,80	20,10	22,50
37W0D	259	18,20	20,50	22,90
38W0D	266	18,60	20,90	23,30
39W0D	273	19,00	21,30	23,70
40W0D	280	19,30	21,70	24,00
41W0D	287	19,70	22,00	24,40

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

IOD – Bernaschek

Weeks	Days	C5	C50	C95
12W0D	84	7,00	8,67	10,00
13W0D	91	7,00	9,20	11,00
14W0D	98	9,00	10,20	12,00
15W0D	105	9,00	10,33	12,00
16W0D	112	9,00	11,41	14,00
17W0D	119	11,00	12,43	14,00
18W0D	126	11,00	12,98	16,00
19W0D	133	11,00	13,15	16,00
20W0D	140	12,00	14,30	17,00
21W0D	147	12,00	14,29	17,00
22W0D	154	13,00	14,82	17,00
23W0D	161	13,00	15,09	18,00
24W0D	168	14,00	16,18	18,00
25W0D	175	13,00	16,34	20,00
26W0D	182	14,00	16,61	19,00
27W0D	189	14,00	16,90	20,00
28W0D	196	15,00	17,63	21,00
29W0D	203	15,00	18,34	22,00
30W0D	210	15,00	18,59	21,00
31W0D	217	17,00	18,88	21,00
32W0D	224	15,00	19,00	22,00
33W0D	231	16,00	19,83	22,00
34W0D	238	19,00	22,00	25,00
35W0D	245	18,00	20,00	21,00
36W0D	252	20,00	21,33	24,00

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

BD – Merz

Weeks	Days	C5	C50	C95
12W0D	84	5,80	10,70	15,50
13W0D	91	10,60	15,40	20,30
14W0D	98	13,80	18,60	23,50
15W0D	105	16,60	21,40	26,20
16W0D	112	19,00	23,90	28,70
17W0D	119	21,30	26,20	31,00
18W0D	126	23,50	28,30	33,10
19W0D	133	25,50	30,30	35,10
20W0D	140	27,40	32,20	37,10
21W0D	147	29,20	34,10	38,90
22W0D	154	31,00	35,80	40,60
23W0D	161	32,70	37,50	42,30
24W0D	168	34,20	39,10	43,90
25W0D	175	35,80	40,60	45,40
26W0D	182	37,20	42,10	46,90
27W0D	189	38,60	43,50	48,30
28W0D	196	40,00	44,80	49,60
29W0D	203	41,30	46,10	50,90
30W0D	210	42,50	47,30	52,10
31W0D	217	43,70	48,50	53,30
32W0D	224	44,80	49,60	54,40
33W0D	231	45,90	50,70	55,50
34W0D	238	46,90	51,70	56,50
35W0D	245	47,80	52,60	57,50
36W0D	252	48,70	53,50	58,40
37W0D	259	49,50	54,40	59,20
38W0D	266	50,30	55,10	59,90
39W0D	273	51,00	55,80	60,60
40W0D	280	51,60	56,40	61,20
41W0D	287	52,10	56,90	61,70

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

BD – Bernaschek

Weeks	Days	C5	C50	C95
12W0D	84	17,00	19,33	24,00
13W0D	91	19,00	21,33	24,00
14W0D	98	21,00	23,93	27,00
15W0D	105	23,00	25,81	29,00
16W0D	112	24,00	27,69	31,00
17W0D	119	26,00	29,88	33,00
18W0D	126	29,00	32,06	35,00
19W0D	133	31,00	33,87	37,00
20W0D	140	32,00	35,69	40,00
21W0D	147	33,00	36,90	41,00
22W0D	154	35,00	38,70	43,00
23W0D	161	37,00	40,54	44,00
24W0D	168	39,00	42,14	46,00
25W0D	175	40,00	43,71	48,00
26W0D	182	40,00	44,67	49,00
27W0D	189	43,00	46,44	50,00
28W0D	196	43,00	45,17	51,00
29W0D	203	41,00	47,69	52,00
30W0D	210	45,00	50,06	53,00
31W0D	217	45,00	51,00	56,00
32W0D	224	47,00	52,33	57,00
33W0D	231	47,00	53,00	56,00
35W0D	245	54,00	57,60	58,00
36W0D	252	58,00	58,33	59,00

C5/C50/C95: mm

Bibliographic reference: *Biometrie fœtale*, July 2000, Jean-Marie Bourgeois

Appendix B

Appendix B - Bibliographic References for Fetal Weight Index

- F. M. Severi, G. Cevenini, C. Bocchi, P. Florio, L. Cobellis, P. Barbini, F. Petraglia; *"A new methodological approach for ultrasound estimation of fetal weight"*. Journal of the Society for Gynecologic Investigation, Volume10, Number 2 (Supplement), February 2003.
- F. M. Severi, C. Bocchi, P. Florio, E. Ignacchiti, C. Ferretti, J. Calciolari, F. Petraglia; *"Effect of gestational age on the accuracy of ultrasonographic estimation of fetal weight"*. Journal of the Society for Gynecologic Investigation, Volume11, Number 2 (Supplement), February 2004
- F. M. Severi, C. Bocchi, P. Florio, H. Valensise, A. Ghidini, F. Petraglia; *"Ultrasonographic prediction of fetal macrosomia revisited"*. Journal of the Society for Gynecologic Investigation, Volume12, Number 2 (Supplement), February 2005.
- M. M. Donma, O. Donma, S. Sonmez; *"Prediction of birth weight by ultrasound in Turkish population. Which formula should be used in Turkey to estimate fetal weight?"*. Ultrasound in Med. & Biol., Vol. 31, No. 12, pp. 1577-1581, 2005.
- C. Bocchi, F. M. Severi, F. Calonaci, A. Dell'Anna, C. Voltolini, E. Ignacchiti, M. Torricelli, F. Petraglia; *"Abdominal circumference and estimation fetal weight to identify fetal growth restriction: a large cohort study"*. Journal of the Society for Gynecologic Investigation, Volume13, Number 2 (Supplement), February 2006.
- F. M. Severi, C. Bocchi, G. Cevenini, F. Calonaci, C. Voltolini, G. Filardi, P. Barbini, F. Petraglia; *"Artificial neural network can improve the accuracy of ultrasonographic fetal biometry"*. Journal of the Society for Gynecologic Investigation, Volume13, Number 2 (Supplement), February 2006.

Appendix C

Appendix C - Bibliographic References for QIMT Calculations and Framingham Score

Howard Tables

Normal values in common carotid.

Black Population

Age	Black women (µm)	Black men (µm)
25	390	440
35	490	540
45	**590**	**640**
55	**680**	**740**
65	**760**	**870**
75	860	970

White Population

Age	White women (µm)	White men (µm)
25	350	400*
35	450	500*
45	**550**	**610**
55	**640**	**700**
65	**730**	**800**
75	830	900*

* Extrapolated values

- George Howard , *"Carotid artery intimal-medial thickness distribution in general populations as evaluated by B-Mode ultrasound",* Stroke 1993;24;1297-1304

Framingham Score Risk

Age Table

Age	Men	Women
30-34	-1	-9
35-39	0	-4
40-44	1	0
45-49	2	3
50-54	3	6
55-59	4	7
60-64	5	8
65-69	6	8
70-74	7	8

Total Cholesterol table

(mg/dl)	Men	Women
<160	-3	-2
160-199	0	0
200-239	1	1
240-279	2	1
>=280	3	3

HDL Cholesterol Table

(mg/dl)	Men	Women
<35	2	5
35-44	1	2
45-49	0	1
50-59	0	0
>=60	-2	-3

Pressure Table – Men

	Diastolic				
Systolic	<80	80-84	85-89	90-99	>=100
<120	0	0	1	2	3
120-129	0	0	1	2	3
130-139	1	1	1	2	3
140-159	2	2	2	2	3
>=160	3	3	3	3	3

Pressure Table – Women

Systolic	Diastolic				
	<80	80-84	85-89	90-99	>=100
<120	-3	0	0	2	3
120-129	0	0	0	2	3
130-139	0	0	0	2	3
140-159	2	2	2	2	3
>=160	3	3	3	3	3

Diabetes Table

	Men	Women
No	0	0
Yes	2	4

Smokers Table

	Men	Women
No	0	0
Yes	2	2

Extimated 10 years CHD Risk

Men		Women	
Total	Risk%	Total	Risk%
<-1	2%	<=-2	1%
0	3%	-1	2%
1	3%	0	2%
2	4%	1	2%
3	5%	2	3%
5	7%	3	3%
5	8%	4	4%
6	10%	5	4%
7	13%	6	5%
8	16%	7	6%
9	20%	8	7%
10	25%	9	8%
11	31%	10	10%
12	37%	11	11%
13	45%	12	13%
>=14	>=53%	13	15%
		13	15%
		14	18%
		15	20%
		16	24%
		>=17	>=27%

Average 10 Years CHD Risk

Age	Risk% (Men)	Risk% (Women)
30-34	3%	<1%
35-39	5%	<1%
40-44	7%	2%
45-49	11%	5%
50-54	14%	8%
55-59	16%	12%
60-64	21%	12%
65-69	25%	13%
70-74	30%	14%

Low 10 Years CHD Risk

Age	Risk% (Men)	Risk% (Women)
30-34	2%	<1%
35-39	3%	1%
40-44	4%	2%
45-49	4%	3%
50-54	6%	5%
55-59	7%	7%
60-64	9%	8%
65-69	11%	8%
70-74	14%	8%

Please refer to www.framinghamheartstudy.org

Bibliographic Reference

Peter W.F. Wilson, Ralph B. D'Agostino.. "Prediction of Coronary Heart Disease Using Risk Factor Categories, *Circulation* 1998; 97; 1837-1847

Appendix D

Appendix D - Bibliographic References for QAS Calculations

Distensibility Coefficient	Measure unit	Derived parameters
$DC = \frac{\Delta A}{A \cdot \Delta p} = \frac{2 \cdot D \cdot \Delta D + \Delta D^2}{D^2 \cdot \Delta p}$	kPa^{-1}	-
A: Diastolic area ΔA: Change of area in systole D: Diastolic diameter ΔD: Change of diameter in systole Δp: Local pulse pressure		
Meinders J.M., Hoeks A.P.G., Simultaneous assessment of diameter and pressure waveforms in the carotid artery, *Ultrasound Med Biol 2004; 30: 147-154.* (Meinders, Hoeks, 2004)		

Compliance Coefficient	Measure unit	Derived parameters
$CC = \frac{\Delta A}{\Delta p} = \frac{\pi \cdot \left(2 \cdot D \cdot \Delta D + \Delta D^2\right)}{4 \cdot \Delta p}$	mm^2kPa^{-1}	-
ΔA: Change of area in systole D: Diastolic diameter ΔD: Change of diameter in systole Δp: Local pulse pressure		
Meinders J.M., Hoeks A.P.G., Simultaneous assessment of diameter and pressure waveforms in the carotid artery, *Ultrasound Med Biol 2004; 30: 147-154.* (Meinders, Hoeks, 2004)		

Alfa Stiffness	Measure unit	Derived parameters

$\alpha = \frac{A \cdot \ln(p_s / p_d)}{\Delta A} = \frac{D^2 \cdot \ln(p_s / p_d)}{2 \cdot D \cdot \Delta D + \Delta D^2}$	-	-

A: Diastolic area

ΔA: Change of area in systole

D: Diastolic diameter

ΔD: Change of diameter in systole

Ps: Systolic pressure

Pd: Diastolic pressure

Meinders J.M., Hoeks A.P.G., Simultaneous assessment of diameter and pressure waveforms in the carotid artery, *Ultrasound Med Biol 2004; 30: 147-154.* (Meinders, Hoeks, 2004)

Beta Stiffness	Measure unit	Derived parameters
$\beta = \frac{D \cdot \ln(p_s / p_d)}{\Delta D}$	-	-

D: Diastolic diameter

ΔD: Change of diameter in systole

Ps: Systolic pressure

Pd: Diastolic pressure

D Vinereanu, W Nicolaides, L Boden, N Payne, C Jones, A Fraser, Conduit arterial stiffness is associated with impaired left ventricular sub-endocardial function, *Heart, 2003 April; 89(4): 449-450*

Pulse Wave Velocity	Measure unit	Derived parameters
$PWV = \frac{1}{\sqrt{\rho \cdot DC}} = \sqrt{\frac{D^2 \cdot \Delta p}{\rho \cdot (2 \cdot D \cdot \Delta D + \Delta D^2)}}$	ms^{-1}	-

D: Diastolic diameter

ΔD: Change of diameter in systole

DC: Distensibility coefficient

Δp: Local pulse pressure

ρ: Blood density

Meinders J.M., Hoeks A.P.G., Simultaneous assessment of diameter and pressure waveforms in the carotid artery, *Ultrasound Med Biol 2004; 30: 147-154.* (Meinders, Hoeks, 2004)

Augmented Pressure	Measure unit	Derived parameters
AP=Loc Psys – P(T1)	mmHg	-

Loc Psys: Local pressure - systolic

P(T1): Pressure at T1

Augmentation Index	Measure unit	Derived parameters
AIx=[AP/(Loc Psys – Loc Pdia)]*100	-	**-**
AP: Augmented pressure		
Loc Psys: Local pressure - systolic		
Loc Pdia: Local pressure - diastolic		

Isovolumic Contraction Period	Measure unit	Derived parameters
ICP= AVC-AVO	ms	**-**
AVC: Aortic Valve Closure		
AVO: Aortic Valve Opening		

Ejection Duration	Measure unit	Derived parameters
ED= AVO-SIC	ms	**-**
AVO: Aortic Valve Opening		
SIC: Start of Isovolumic Contraction		

ARCHIVING SECTION

This section explains how to use the archiving services and is organized as follows:

- Chapter 1: Digital Archiving

  This chapter describes the digital archiving characteristics and how exams are archived.

- Chapter 2: Review of Archived Exams

  This chapter explains how to review archived exams.

- Chapter 3: Archive Menu

  This chapter explains how to use the menus of the Archive icons.

- Chapter 4: MyLabDesk

  This chapter explains what MyLabDesk is how to use it.

- Appendix A: MyLabDesk PC Requirements, Calculation Packages and Advanced Tools

  This chapter details the suggested characteristics for the MyLabDesk PC and the available calculations packages and advanced tools.

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Chapter 1

1 - Digital Archiving

This chapter describes the digital archiving characteristics and how to archive exams.

Characteristics

Refer to the "System Configuration" section for further information on exporting settings

The system is equipped with an internal hard disk (local archive) onto which exams can be archived. Data can also be stored on the external supports, listed below.

Data can be archived both in native format and in DICOM®[1] format (for systems equipped with a Dicom licence) and exported as BMP, PNG, JPEG and AVI files (codec Microsoft® MPEG-4 V2 or MS-Video1 compatible). Exported data cannot be reviewed by the system.

Archive Icons

The icons identifying the archiving media are displayed on the left side of the header bar.

Hard Disk	Burner	USB medium	Network	DICOM
				

When inactive, icons are displayed in grey. The icon marked with an "X" indicates that there are problems in the management of that specific archiving medium.

While data is being saved, the icon corresponding to the destination medium is surrounded by a yellow flashing frame. The frame disappears once the operation is over.

[1] DICOM is a trademark of NEMA (National Electrical Manufacturers Association); Microsoft is a trademark of Microsoft Corporation.

Refer to next chapters for further details on how to check each operation status

Note

Do not switch the system off or remove the archiving medium while saving; this could cause damages to data or to the hard disk.

Before removing the archiving medium check the operation status : the medium can be removed only when the operation shows a "Completed" status.

Archiving Exams

During the exam, still images and clips (in 2D and CFM formats) are saved into the system's hard disk. Still images can be saved with full (BMP format) or compressed resolution (PNG and JPEG formats); clips are compressed into JPEG format, with a minimum loss of information at a maximum frame rate of 25 images. The system menu allows to set the clips duration.

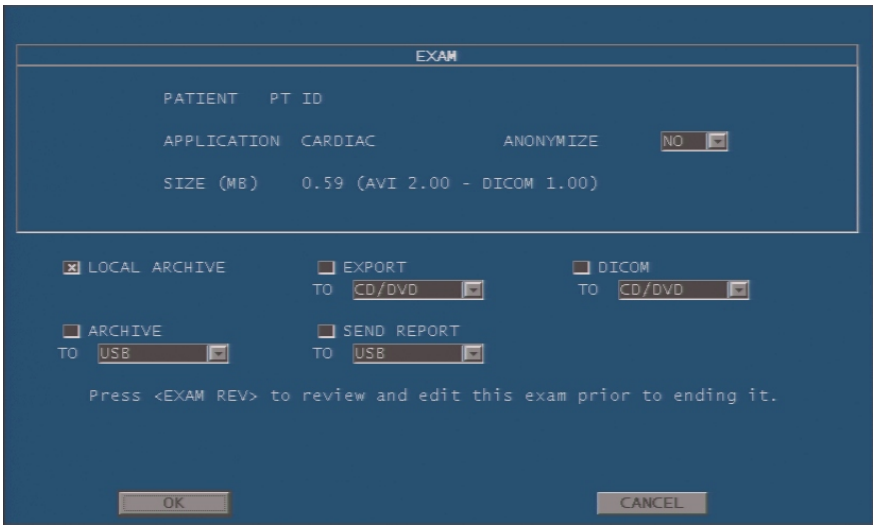
Data are archived at the end of the exam by pressing the **START END** key.

Note

When the system is switched on, the system archives the last exam performed, if the machine was switched off without first closing the exam underway.

If the "Auto Save" option of the archive has not been set (see the "System Configuration" section for further information), the system displays the following window:

The window displayed at the end of the exam may differ among MyLab models



Each time the archived data size reaches 5GB, the system displays at start up the following message:

The alert threshold of the archive has been exceeded.
It is highly recommended to backup the data.

The message indicates the used internal disk space. If the option "Remind me later" is checked, the same message will be displayed at next start up.

The "Size (MB)" field shows the estimated size of the data in DICOM format. The size of the single frames and clips are shown in brackets

The **EXAM REV** key enables reviewing of the stored images and sequences and deletion of any files that are not required.

Before archiving, the patient's data can be made anonymous. The exam can be archived, exported and the corresponding report can be simultaneously saved on an external support in XML format. The following media can be selected for archiving and exporting operations:

Medium	Archiving	Exportation
Hard disk (DB)	Yes	No
CD (R and RW)	Yes	Yes
DVD (+R, -R, singlelayer)	Yes	Yes
USB medium	Yes	Yes
Network Directory	Yes	Yes
Dicom Storage SCU Server	Yes	No

Selection can be made using either the drop-down menus or the **ARCHIVE**, **EXPORT**, **DICOM** and **SEND REP** keys.

When the exam is archived on CD or DVD in DICOM format, the Biopacs Lite[2] viewer is automatically stored in the CD or DVD, allowing the user to review the exams on any PC.

CAUTION

The system is equipped with several USB ports. Insert only one USB medium in either of the ports during data archiving or exporting.

The exported exams are organized in folders: every exam is contained in a specific folder together with its images, clips and report.

If no option is selected, all stored data is deleted.

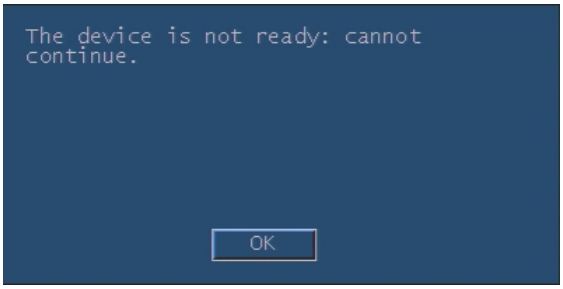
Press OK to start the procedure. Instruction messages will open if there are any user or system errors. Archiving is always carried out in "background": therefore real time can be reactivated almost immediately. While data is being transferred, the icon is surrounded by a yellow flashing frame: when the frame disappears the archiving procedure has finished.

[2] Biopacs Lite is a DICOM viewer developed by Esaote

Archiving Media

Writable CDs (CD R)

Clean disks must be used. If the CD contains data, the system will not allow it to be written on and displays the following message:



Insert an empty disk and press OK to continue.

Rewritable CDs (CD RW)

Rewritable CDs can be used to archive data as long as they are empty. Read the following chapters for instructions on how to delete data from rewritable CDs.

Double Layers DVDs

Double Layers DVDs are not supported by **MyLab** systems.

Writable DVDs

Clean disks must be used. If the DVD contains data, the system will not allow it to be written

USB Keys

USB keys are managed in multi-session: data can be added to those already containing data.

Chapter 2

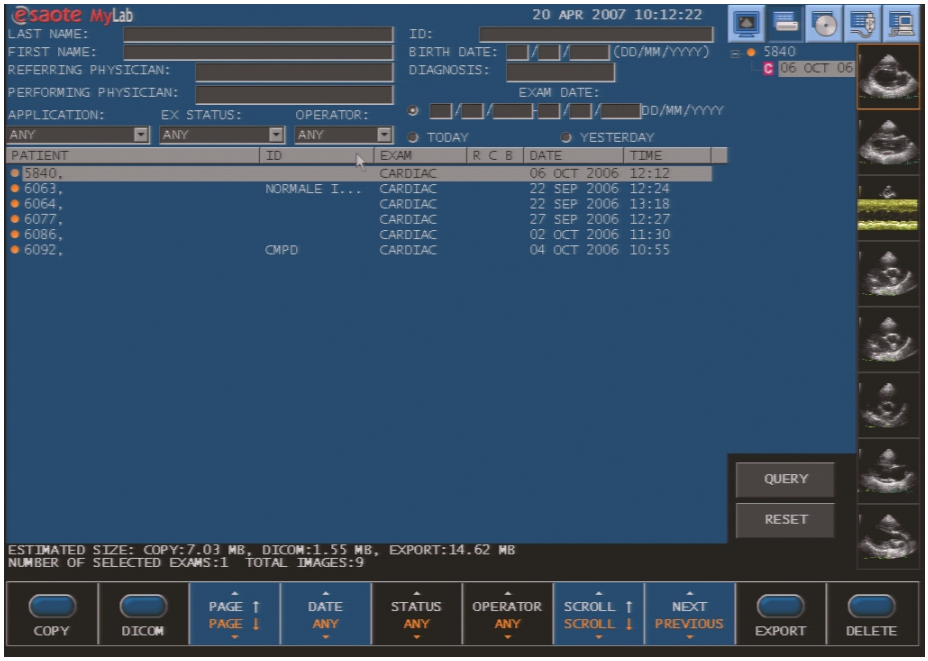
2 - How to Review Archived Exams

This chapter explains how to review archived exams.

Access to the Archive

Images can be reloaded for each patient and a specific exam can be reviewed. Specific measurements can be taken and saved on the reloaded images.

The **ARCHIVE REV** key displays the following window (depending on the single **MyLab** model, thumbnails can be displayed on the right or on the bottom of the screen):



Exams Archive Icon

The following icons are displayed in the header bar when the system accesses the archive:

Local Archive	Archive Display	Media Archive	USB Archive	Network Archive
				

The selected archive is displayed on a dark background, available archives on a blue background. Icons displayed in grey are not active. To activate the archive, position the trackball on the desired icon and press **ENTER**.

If the selected archive corresponds to a software version which is older than the one installed, **MyLab** displays the following message:

The target archive version is older than the current one: if you continue other units may not be able to open the archive.
Alternatively, the archive can be opened in read-only mode, in which case modifications will not be stored.

The CONTINUE key confirms the access to the archive, OPEN AS READ-ONLY accesses archive in read-only mode. The CANCEL key does not open the archive.

Exam Archive Software Keys

Depending on the **MyLab** model, the Exam Archive menu displays the following keys, listed in alphabetic order:

COPY	**OPERATOR**
DATE	**PAGE**
DICOM	**SCROLL**
DELETE	**SEND REP**
EXPORT	**STATUS**

How to Select an Exam

Archived exams are listed in alphabetic order. Files contain the following data:

A print-out can be made of the list of displayed exams.

- The patient's name
- The exam number (ID)
- The type of application (cardiology, vascular..)
- The exam date and time

The exams to be reviewed can be selectively chosen, by setting search criteria such as patient's name, date of birth or exam date.

*The **RESET** key deletes the set search criteria*

- Use the trackball and the alphanumeric keyboard to input the search criteria.
- Position the pointer on SEARCH and press **ENTER** to activate the search.

> ***Note***
>
> Using the **DATE** key is a quick way to select current exams or exams of the previous day.

A list of exams satisfying the set criteria appears on the screen at the end of the search. If the list is longer than one page, the user can scroll down the entire list using the **PAGE** key. To display the required exam, use either the **SCROLL** key or the trackball. To select more than one exam, position the cursor, using the trackball, and press the Ctrl and **ENTER** keys simultaneously.

The **DICOM** key allows archiving of data in Dicom format; the **EXPORT** key transfers data in the set formats (BMP, PNG or JPEG for single frames and AVI for clips). Data can be made anonymous in both cases. The **SEND REP** key saves the report in XML format on a selectable external medium.

Refer to next chapter to import the exams in the local archive

The **COPY** key allows the user both to copy the selected exams in native format on an external support and to import exams previously copied on external supports into the local archive. The copied exams are marked with an X on the "C" column of the local exams list. To review the copied database, select it by clicking on the relevant icon, displayed on the right upper side of the screen: the list of the copied exams will be displayed on the screen.

Before transferring or copying the selected exams, **MyLab** estimates the files dimension. The displayed estimation allows the user to check whether there's enough room on the destination medium. If the soft key is pressed before the estimation is completed, the system displays the following message:

The system hasn't completed yet size estimation. Do you want to continue?

Whenever a copy of the archive is done, the MyLabDesk utility can be saved on the same support ("Copy MyLab Desk Set Up" option to be checked): next chapter describes how to install and use this utility.

Deleting an Exam

Using the trackball, select the exam and press the **DELETE** key to delete one or more archived exams.

How to Review an Archived Exam


Archive Display icon

Once the exam(s) to be reviewed are selected, position the pointer on the Archive Display icon and press **ENTER**. The system displays the list of selected exams on the right side of the screen. The system automatically shows the first exam, showing its relative thumbnails.

Archive Review Software Keys

Depending on the single MyLab model, the menu includes the following software keys in different orders. Here they are alphabetically sorted:

ATTACH	**EXPORT**
BEGIN/END	**PAGE**
CINE	**PLAY**
DELETE	**SCROLL**
EXAM	**SPEED**

The **EXAM** and **SCROLL** keys respectively scroll the list of exams and thumbnails. If the selected exam has more than eight stored images or clips, the **PAGE** key allows the user to scroll the thumbnails: when pressing this key the system skips to the next eight thumbnails. Alternatively, the trackball can be used.

The selected image or sequence is presented on the screen. Clips are are played in motion: The **PLAY** key de-activates the kinetic presentation and allows the sequence to be scrolled image-by-image, using the trackball. The **BEGIN** and **END** keys position the scroll memory cursor at the begin or end of the selected image or sequence. The sequence can reviewed at different speeds (use the **SPEED** key).

The key **ATTACH** attaches the selected image to the report: in this case the letter "A" is displayed in the bottom left part of the screen, whenever the user reviews an image attached to the report.

When in archive review, both still frames and clips can be saved following the same procedures used in real time and Freeze.

Note

The ⚠ symbol is shown on the screen when compressed data is displayed and indicates that the image features - if compared to the original – may not be optimal for the reporting functions.

The **REPORT** key can be pressed at any time to display the archived report.

See the "Calculations" section for taking measurements.

The **+...+** key activates general measurements while the **MEASURE** key activates the specific calculations package. If saved, the measurements taken are stored on the image itself.

Reloaded images can be printed.

How to Delete an Image

To delete a stored image or sequence, select the image or sequence with the trackball and press the **DELETE** key.

The **EXPORT** key allows the image or sequence to be exported onto an external support that is selected from a special window.

To speed up copying, exporting and deleting operations, **MyLab** allows the multiple selection of images and clips. For multiple selection, place the cursor on the desired thumbnail and press the **ENTER** key twice: on the upper left side box in the thumbnail a checked sign indicates the selection.; alternatively press **ENTER** while keeping pressed the **Ctrl** key of the alphanumeric keyboard. The thumbnail can be also selected by placing the cursor on the upper left side box and by pressing **ENTER**. Press the **⇑Shift** key for multiple selection of consecutive images. Place the cursor on the first thumbnail and press **ENTER**; then place the cursor on the last thumbnail and press **ENTER** again: all images located between the first and the last thumbnail will be automatically selected.

Alternatively place the cursor exactly on the box and press **ENTER**.

Visual Comparison[1]

Comparison Icon

Saved images and clips can be compared both with each other (in exam review and in archive review) and with archived images and clips. In the last case, up to two different exams can be compared.

Procedure

- Select the desired exams and press the **ENTER** key when in archive revision.
- Place the cursor on the Display icon to display the exams.
- Press the **ENTER** key.
- Place the cursor on the Comparison icon (the icon is not active when more than two exams are selected) and press the **ENTER** key.

Display Organization

The selected image or clip of the first exam is displayed on the left side of the image area. The related patient data are displayed above. The right side of the image area is black.

The functional buttons are displayed on the right top side of the screen. In archive review, below the buttons there are two columns with the exams thumbnails: the

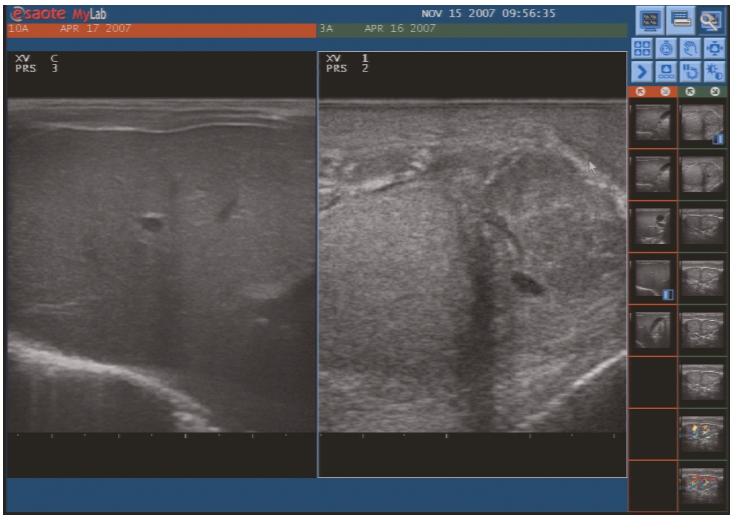
[1] Not available with MyLabFive.

arrows on the columns allow to scroll the thumbnails. In exam review there is one column with the relevant exam thumbnails.

Markers of 2x1format

To display the desired image or clip, place the cursor on the relevant thumbnail and press the **ENTER** key. Move the cursor on the image area and press **ENTER** again. The thumbnails of the displayed image and clip are identified by markers.

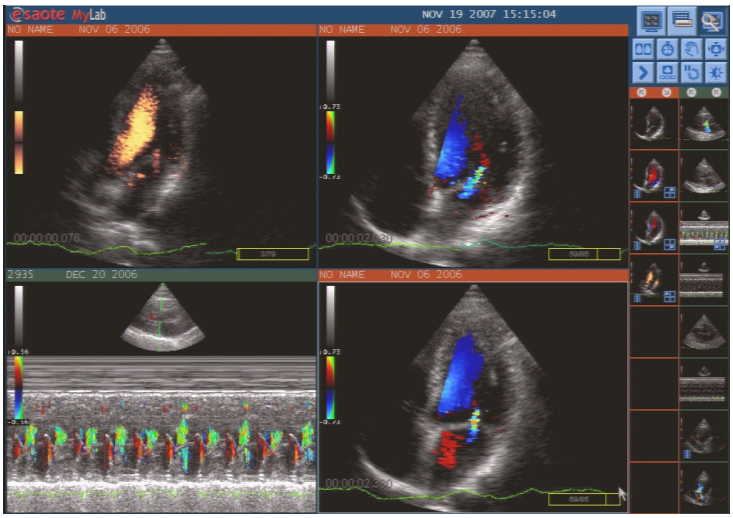
Comparison between two exams in archive review



2x2 Format Button

Either two (2x1 format) or four (2x2 format) images and clips can be simultaneously displayed in the imaging area. Select the desired format by pressing the relevant format button.

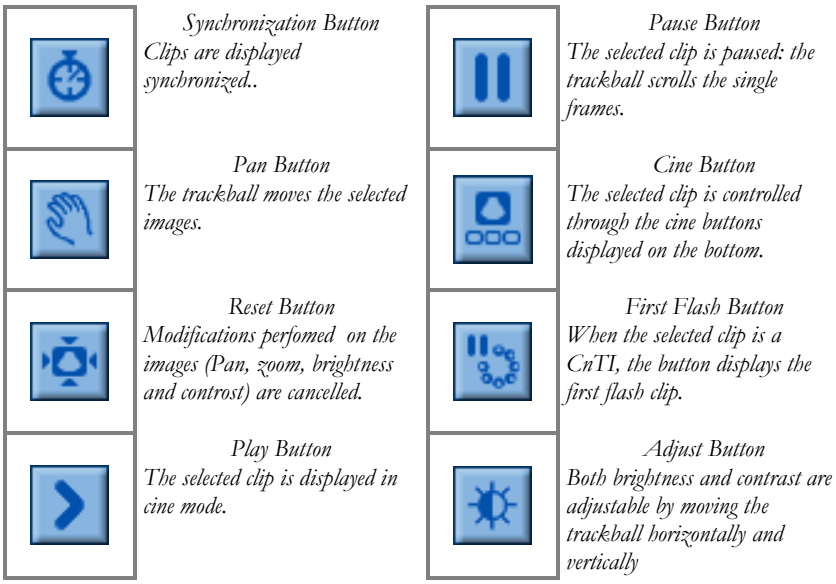
2x1 Format Button



The selected image/clip is highlighted by a frame: the ◧ and ◨ keys activate respectively the previous and the next displayed image/clip.

For multiple selection with the trackball, place the cursor on the various image/clips and press the **Ctrl** and **ENTER** keys at the same time.

The **ZOOM** (or **DEPTH/ZOOM**, depending on the model) key activates the zoom function on the selected images: use the trackball to adjust the enlargement factor



Synchronization Button
Clips are displayed synchronized..

Pan Button
The trackball moves the selected images.

Reset Button
Modifications perfomed on the images (Pan, zoom, brightness and controst) are cancelled.

Play Button
The selected clip is displayed in cine mode.

Pause Button
The selected clip is paused: the trackball scrolls the single frames.

Cine Button
The selected clip is controlled through the cine buttons displayed on the bottom.

First Flash Button
When the selected clip is a CnTI, the button displays the first flash clip.

Adjust Button
Both brightness and contrast are adjustable by moving the trackball horizontally and vertically

Generic measures on single frames can be done on the 2x1 format (**+...+** key): the trackball moves the cursor from one image to the other.

Multiview Display[2]

Multiview Icon

Images and clips of the same exam can be simultaneously displayed on the screen both in exam review and in archive review. The multiview formats vary from the minimum 2x2 up to the maximum 4x4.

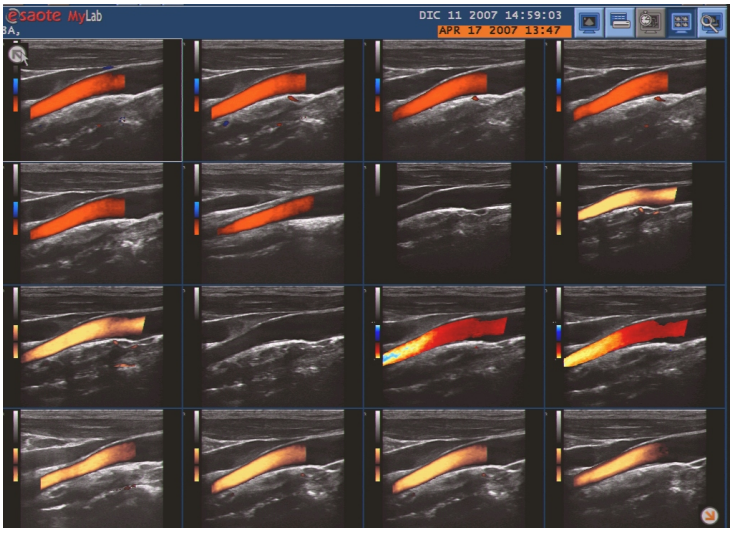
Procedure

- Select the exam if in archive review.
- Place the cursor on the Display icon to display the exams.
- Press **ENTER** to display the exam.
- Place the cursor on the multiview icon.
- Press the **ENTER** key.

Clips are displayed in cine mode in a multiview format.

[2] Not available with MyLabFive.

Use the displayed arrows to scroll all the images.



In the multiview display, two images/clips can be compared.

Procedure

- Select the two images/clips by using the **Ctrl** and **ENTER** keys.
- Press the Comparison icon.

End of Archive Review

The **ARCHIVE REV**, **B-MODE** or **FREEZE** keys close the archive review session and reactivate Real Time. The review session can also be closed by pressing the **START END** key, which will close all the opened exams before starting a new patient.

Chapter 3

3 - Archive Menu

This chapter explains how to use the archive icon dialogue windows.

Hard Disk

The **POINTER** key enables the user to change the trackball operation from standard to mouse mode.


Hard disk icon

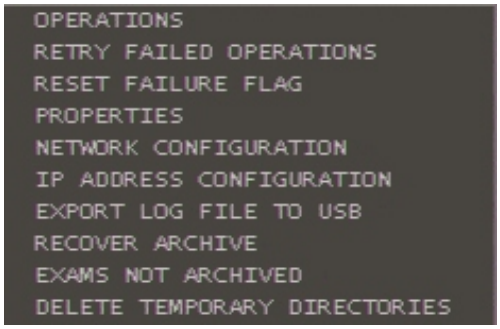
When the trackball works as a pointer, by positioning the pointer on the specific icon the user automatically displays the space still available in memory. The same icon graphically indicates the free space available in the internal hard disk as shown in the table below:

More than 60% of free space	Between 20% and 60% of free space	Less than 20% of free space
		

Note

When the free space is between 20 and 60% and, in any case, when it is lower than 20%, make a copy of the archive and then delete all copied exams to free space on the hard disk.

To display the menu, position the pointer on the icon and press the **UNDO** key. The Hard Disk menu options may differ in Freeze, Exam Review and Archive Review. When all options are displayed the menu is the following:



To select one of the items on the menu, position the pointer on the option and press **ENTER**.

Operations

The dialogue window displays the list of exams (in the Details column), the operation status (completed, in progress or failed), the date and time of the operation and the type of operation.

The dialogue window shows which operations have failed. The operations can then be repeated (RETRY), interrupted (ABORT), deleted (DELETE) or checked (DETAILS). Position the trackball on the failed exam; press **ENTER** to select it (use the **Ctrl** key for multiple selections).

Retry Failed Operations

The system automatically repeats all failed operations. Position the cursor on the option and press **ENTER** to repeat or delete.

Reset Failure Flag

This option is used to eliminate icon bar without having to repeat or delete failed operations.

Properties

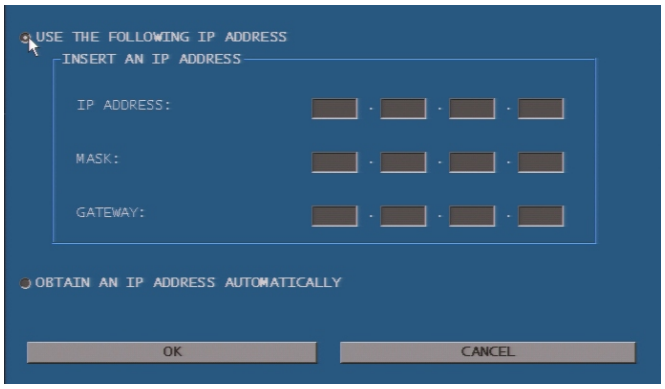
This option displays the system's name and IP address, the amount of space still available in the system's memory, the whole disk space and the unit AETitle.

Network Configuration

This option is for the exclusive use of Esaote Service personnel.

IP Address Configuration

This option allows the user to set the network or to modify some parameters. In this window the user can define a dynamic or static addressing. In this latter case the user can set or modify the IP address, the subnet mask and the gateway address.



Only on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50

Export log files to USB

This option allows the user to save the log files onto a USB key. To save the log files, insert a USB key into one of the two connectors and activate the procedure.

Recover Archive

The system has been designed to preserve as much data integrity as possible. This procedure allows rebuilding of the archive, if the hard disk is corrupted.

WARNING

Do not switch the unit off while executing this procedure. The hard disk could be permanently damaged.

Contact Esaote Service for assistance with this procedure.

Exams Not Archived

This option shows the list of exams that have been performed and not archived into the local database. From this window, the user can select the exams to be saved onto the local hard disk.

> ***Note***
>
> The available memory size for the exams, which have not been archived, depends upon the archive size. When the memory is full, the list is updated by deleting the oldest exams. Typically, about 100 exams can be kept on this list.

Delete Temporary Directories

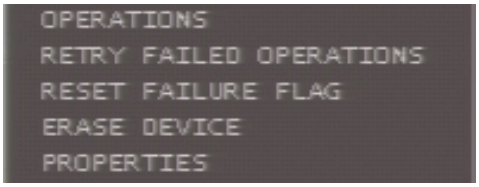
Temporary directories are automatically created to be used as extra memory for archiving operations such as Dicom conversion or exams copies. When the archiving operations are particularly slow, the temporary directories can be deleted to improve the performances.

> ***Note***
>
> To avoid dealing with a slow archive, make periodical copies of it and free some space in the internal hard disk by deleting the copied exams.

Burner

Burner icon

Position the pointer on the icon and press the **UNDO** key. The system displays the following menu:



To select one of the items on the menu, position the pointer on the option and press **ENTER**.

Operations

This option displays the operations status. The dialogue window displays the list of exams (in the Details column), the operation status (if completed, underway or failed), the date and time of the operation and the type of operation (DICOM or Export). This window can be displayed by positioning the pointer on icon and pressing the **ENTER** key.

Failed operation

When one or more operations have been unsuccessful, the icon is marked with an "X". The dialogue window shows which operations have failed. The operations can then be repeated (RETRY), interrupted (ABORT), deleted (DELETE) or checked (DETAILS). Position the trackball on the failed exam; press **ENTER** to select it (use the **Ctrl** key for multiple selections) to select the option.

Retry Failed Operations

The system automatically repeats all failed operations. Position the cursor on the option and press **ENTER** to repeat or delete.

Reset Failure Flag

This option is used to eliminate the bar from the icon without having to repeat or delete failed operations.

Erase Device

This option is used to delete data stored on rewritable CDs. Insert the CD in the burner, select the item from the menu and press **ENTER** to begin the procedure.

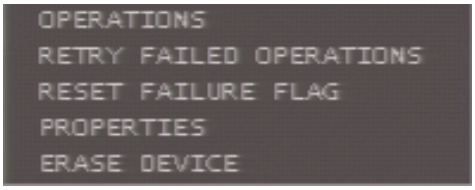
Properties

This option indicates the size of the disk inserted into the burner.

USB Medium

USB medium icon

Position the pointer on the icon and press the **UNDO** key. The system displays the following menu:



Properties

This option indicates the size of the inserted medium and the amount of still free space on it.For all other options the same instructions as those given for the burner also apply.

Network

Network Icon

Position the pointer on the icon and press the **UNDO** key. The system displays the menu having the following options: Operations, Retry Failed Operations, Reset Failure Flag and Properties.

Properties

The option allows the user to select the desired network directory and to check its status, its size and its free space.

For all other options the same instructions as those given for the burner also apply.

DICOM Functions

DICOM Icon

Position the pointer on the icon and press the **UNDO** key. The system displays the following menu:

See the "System Configuration" section for DICOM configuration

The same instructions as those given for the burner also apply to this option.

Show Storage Commitment Summary

The option allows to check the operation status. The window displays the ppatient's list, the operation status (completed, in progress or failed), the date and time of the operation. This window can be displayed by positioning the pointer on the icon and by pressing the **ENTER** key

The operations can then be deleted (DELETE) or checked (DETAILS). Position the trackball on the failed exam; press **ENTER** to select it.

Remote Archives

Remote Archive Icon

Remote archives can be browsed by placing the cursor on the icon and by pressing the **UNDO** key. The network directories, configured through the specific menu options, are immediately available (refer to the "System Configuration" section for further details).

The BROWSE option browses all archives mapped in the network.

Chapter 4

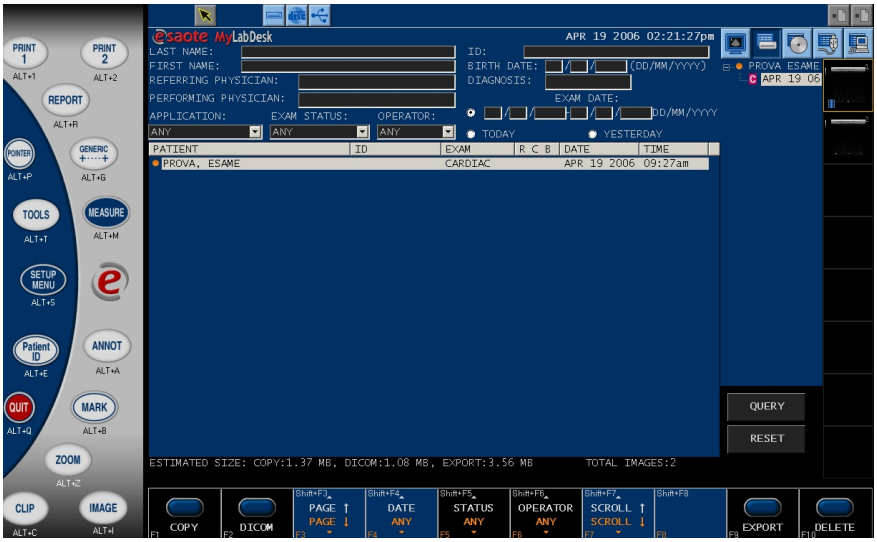
4 - MyLabDesk

This chapter explains how to install and use the **MyLabDesk** utility.

MyLabDesk Description

MyLabDesk, once installed on a PC[1], reproduces the **MyLab** working environment: its working procedures are equivalent to what has been described for **MyLab**.

The screen layout is similar to the ***MyLab*** *one: archive and peripherals icons are on the header, software keys on the footer, thumbnails on the right side of the screen and the* ***MyLabDesk*** *control panel on the left side*



MyLabDesk offers the **MyLab** major features for exam management: exams can be archived, copied and imported in native format; patient data can be modified; measurements, annotations, body marks can be activated; images and reports can be printed and advanced tools such as Stress Echo can be activated.

> **Note**
>
> The PC mouse works as a cursor in **MyLabDesk**. The left and right keys are named **ENTER** and **UNDO**, as in the **MyLab** manuals.

[1] Appendix A lists the PC characteristics and the available advanced calculations and tools.

MyLabDesk Installation

MyLabDesk Set Up is organized in two folders: the "Archive" folder, containing copied exams, and the "MyLabDeskSetUp" folder with the installation files.

> ***Note***
>
> **MyLabDesk** installation is reserved to users with an Administrator profile.

Refer to the Appendix A for the PC characteristics

Insert the medium containing the set up in the PC, select the "MyLabDeskSetUp" folder out of the File Management utility, copy the folder into a local disk and run the setup.exe file. The installation is guided by a wizard: follow the given instructions to successfully complete the installation.

Once the installation is over, the desktop will include the **MyLabDesk** icon

To copy the exam archive into the PC, follow the following procedure:

- Run **MyLabDesk** by double clicking on its icon.
- Select the icon of the source medium (CD/DVD, USB, Network) and press **ENTER**.

Media Archive	USB Archive	Network Archive
		

- The system lists all exams available in the medium: using the cursor select the exams to be locally imported.
- Press the **COPY** key and select "Local Archive"
- Press OK to start.

> ***Note***
>
> **MyLab** operative system is set on Greenwich time zone (GMT). For this reason if an archived exam is reviewed with the **MyLabDesk**, the exam list presents the exam with the time zone set in the PC, even if it the local time had been correctly adjusted on **MyLab** with the "General" option of the **MENU** key.

Refer to the next paragraphs for further information.

Language

MyLabDesk is available in the following languages: Italian, English, French, German and Spanish. The default language is English.

How to use MyLabDesk

With the exception of the **SETUPMENU**, ∈ and **QUIT** keys, **MyLabDesk** keys work as the corresponding **MyLab** commands: **ANNOT** activates the annotation menu, **IMAGE** saves single frames etc.

Short Cut Keys

In some cases the cursor is controlled by the active function (e.g. when tracing distances, area or profiles in the measurements environment, or selecting words in the Annotations function..). In these situations the short cut keys can be used to activate software and control panel keys.

Below each control panel key there's the indication of the correspondent short cut (ALT + *1*). Each software key has two short cuts (Fn and SHIFT + Fn) while each software button has only one (Fn).

Right click to interrupt the active operation and free the cursor.

Complex Measurements

Some measurements of the cardiac calculations package require the selection of a different view or a different modality. Before starting complex measurements, make sure that the available images allow to complete them. Measurements are system guided: operating instructions are given on the lower part of the screen.

Procedure

- Select the desired image.
- Press the **MEASURE** key and select the group.
- Follow the instructions to perform the first set of measurements.
- When requested, select the next image.
- Press **MEASURE** again to proceed with measurements.
- Repeat the procedure to complete measurements.

Setup Menu Key

This key displays the **MyLabDesk** configuration menu. The menu allows the user to configure:

- Reports
- Application Measurements
- Generic Measurements
- Glossary

- Peripherals
- Network Directory
- DICOM Configuration
- Export Settings
- Tools Preset
- General Configuration
- Image Review Configuration

DICOM Configuration

The menu includes three folders: General, Quality and Report. The first folder allows to assign the AE Title and set the forwarding modalities of stress eco views. Images characteristics and report forwarding modalities are defined in the other two folders.

General Configuration

The menu allows the user to set language, date and time format, height and weight format and center ID. The same menu allows the user to select the environment.

> ***Note***
>
> The **ENVIRONMENT** key displayed in archive review switches from one environment to another.

Image Review Configuration

Brightness and contrast of the images displayed on screen can be adjusted through this option.

Refer to the "System Configuration" section for further details on the single options.

QUIT and e Keys

e displays the **MyLabDesk** version and **QUIT** closes the program.

Navigation

All **MylabDesk** features are available both on local exams and on the ones archived on external media. Select the pertaining icon to access the remote archives.

The **COPY** key copies into a local folder exams archived in native format on external media.

Appendix A

Appendix A - PC Requirements, Calculations Packages and Advanced Tools of MyLabDesk

PC Requirements

The suggested PC configuration includes the following requirements:

- Windows® XP (Home or Professional) or Windows Vista™
- CPU Pentium IV 1.5 GHz MHz or higher
- HD: at least 2 GB of free space
- RAM: minimum 512 MB, suggested 2 GB
- Video board minimum 128 MB supporting 32 bit true color
- Video resolution: minimum 1024 x 768 (128MB video board suggested), suggested 1280 x 1024 (512MB video board suggested)

Control Panel Icon

With a 1280 x 768 video resolution, the control panel is minimized. To maximize it and be able to access its commands, place the cursor on the icon and press **ENTER**.

Minimizing icon

The minimizing icon reduces **MyLabDesk** to icon

> ***Note***
>
> **MyLabDesk** installation can only be performed by users with an Administrator profile.

To check the active user profile, access the "User Account" utility in the PC Control Panel.

Calculations Packages and Advanced Tools

All **MyLab** advanced calculations packages are available with **MyLabDesk**.

Note

PISA - MIT and PISA - AO groups (Cardiac applications) are not available on **MyLabDesk**.

Measurements performed on applications included in the General Imaging license (with the exception of the Thyroid application) can be automatically imported only from reports with a "Closed" status.

The 3D/4D exams can be reviewed by **MyLabDesk** only if the PC is equipped with the following video board:

PC Bus	Video board
AGP8 bus	ATI Radeon 9600SE, ATI Radeon 9550, ATI Radeon x1550
PCI Express bus	ATI Radeon x1950 pro, ATI Radeon HD 2600 Pro, ATI Radeon HD 3650 Pro

The QIMT, QAS and Framingham reports can be displayed by **MyLabDesk**.

Notes

Some PC configurations do not allow the use of the Adjust Button displayed in visual comparison while in exam review and archive review (refer to Chapter 2 of this section for further information).
The DICOM Media class is supported only for USB media and network directories.

SYSTEM CONFIGURATION SECTION

This section explains the options available in the System Configuration menu. The System Configuration menu may differ among **MyLab** models: this section explains all available options. The section is organized as follows:

- Chapter 1: System Menu

  This chapter explains how to access the System Menu and the options available in "Tools settings" and "Footswitch".

- Chapter 2: General Preset

  This chapter lists the parameters that are available in the General Preset option of the system menu and explains how to configure them.

- Chapter 3: Application Preset

  This option allows to modify and save both the gray map selected in the active application and the settings of the XView parameters.

- Chapter 4: User Preset

  This chapter lists the parameters that are available in the User Preset option and explains how to configure them.

- Chapter 5: Report Customization

  This chapter lists the report configuration menus and explains how to use them.

- Chapter 6: Application Measurements

  This chapter explains how to customize the calculation packages of each application.

- Chapter 7: Generic Measurements Configuration.

  This chapter explains how to configure the generic measurements available in each application.

- Chapter 8: Glossary

  This chapter explains how to set the glossary used during annotations.

- Chapter 9: Peripherals

  This chapter explains how to set the peripheral units.

- Chapter 10: Network Directory

  This chapter explains how to configure the network directories that can be used as archive.

- Chapter 11: DICOM Configuration

  This chapter explains how to configure **MyLab** for the connection to DICOM functions and how to set DICOM printers.

- Chapter 12: Export Settings

  This chapter explains which configurations can be set to export single frames and clips.

- Chapter 13: Save and Load Presets

  This chapter explains how to save and load the preset configurations.

- Chapter 14: Security

  This chapter explains how to set the list of users allowed to access the system and describes the virus protection policy

- Chapter 15: Licenses and System Configuration

  This chapter explains how to use the Licences and System Configuration options.

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Chapter 1

1 - System Menu

This chapter explains how to access the system menu. The "Tools Settings" and "Footswitch" options are also explained in this chapter.

> **Note**
>
> Main menu options may differ among **MyLab** models.

System Menu

The **MENU** key is used to access the system menu. The system displays all the available options.

Some menu options are arranged in groups (identified by the symbol). To display the options included in a group, position the cursor on the group and press the **ENTER** key.

- Select the option with the trackball.
- Press **ENTER** to continue.

The various menus allow different parameters to be set (the following chapters explain the individual options). The new parameters will be operative at next exam or upon next system switching on: once the modifications are saved, a message will indicate it accordingly.

Setting Parameters

- Position the trackball on the field to be changed and press **ENTER** to confirm.
- Use the alphanumeric keyboard to input the characters.
- Select the option from the Windows menu and press **ENTER** to confirm.
- Press OK to confirm.

The **Tab** ⇆ key is used to quickly move from one field to another; the **Pgup** ▲ and **Pgdn** ▼ keys open the Windows menu and scroll between options.

Tools Settings

The option allows the user to edit the view labels used for Stress echo, to configure Stress protocols, CnTI protocols (only on **MyLabFive, MyLab40, MyLab25**, **MyLab30** and **MyLab50** models), QIMT and QAS settings and to set 3D/4D volume presentations. Refer to the specific sections of this manual for detailed information.

Footswitch

Available on MyLab60, MyLab70 and MyLab90 Models

The option allows the user to select which controls shall be linked to to the left and right footswitches. Any control of both the control panel and software keys can be assigned to the footswitch.

Procedure

- Select the "Footswitch" option.
- Place the cursor on the desired footswitch graphic box and press **ENTER**.
- Press the desired control to assign it to the footswitch: the control is automatically displayed in the box.
- Press OK to confirm.

Edit ID

Only on MyLabFive, MyLab25 Gold and MyLab30 Gold models

The option allows the user to modify the exam data.

Chapter 2

2 - General Preset

This chapter lists the parameters that are available in the General preset option of the system Menu and explains how to configure the parameters.

General Preset Menu

General Preset Menu options may differ among MyLab models.

The General Presets menu options are organized within internal folders. To access the various folders, position the cursor on one and press **ENTER**.

Date/Time Folder

This option is used to set the date and time, displayed on the screen.

Date Format

Various formats can be set: the possible options are listed in the following table.

Format	Displayed date
dd/mm/yyyy	01/12/2004
dd/mmm/yyyy	01/Dec/2004
mm/dd/yyyy	12/01/2004
mmm/dd/yyyy	Dec/01/2004

Time Format

The time format is available on a 24 or 12 hour basis. In the 12 hour option, the time is displayed with a.m. and p.m.

Center

This field is used to input the center name to be displayed on the screen.

Video

Via this option the standard video, PAL or NTSC, and the type of incoming signals, S-VHS or VHS, can be set.

On **MyLabFive, MyLab20Plus, MyLab40, MyLab25**, **MyLab30** and **MyLab50** models the screensaver can be set as floating logo or snowflakes.

Only for MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

Measure Units

Via this option, either the Celsius or Fahrenheit scale can be selected for probes equipped with a temperature sensor, as well as, setting the measurement units for height and weight.

Archive

When set to auto, the unit automatically saves the exam as per user preset at the end of the exam without displaying the end exam window.

On **MyLab60**, **MyLab70** and **MyLab90** models when the option "Auto save" is checked, media characteristics both for archiving the exams and for sending the report can be set. Data are saved in native format into the local archive and into the remote archive ("Local archive" and "Archive" options), and in DICOM format ("DICOM" option); the report is saved in XML format. Option "Anonymize" allows to anonymize patient data.

"Auto Start on Change Application" allows the user to change the application during the exam. When set, the **PROBE** key allows the user to change both the probe and the application. When the application is changed the system automatically closes the current exam and enters a new exam with the same patient data.

Keyboard

MyLab60, MyLab70 and MyLab90 models

The Keyboard option allows the operator to change the control panel light, the software keys light, the keys beep duration, the LCD contrast and backlight through different sliders.

The same menu allows the user to set the action of the left key of the trackball. The left key can be set as confirming key (**ENTER**) or as context menu key (**UNDO**).

Trackball

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

The option allows the user to set the action of the left key of the trackball. The left key can be set as confirming key (**ENTER**) or as context menu key (**UNDO**).

Only on MyLab60, MyLab70 and MyLab90 models

The trackball option is used to set the trackball speed.

Only for MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

Cine Mode

The option allows the user to define the default size of the memory to be used for sequences, to define whether the presentation shall be activated in cine mode and to set the default speed.

On MyLab60, MyLab70 and MyLab90 models

When set, the AUTOMATIC PLAY ***option allows to review the stored images in cine mode when the*** FREEZE ***key is pressed.***

Other

The option allows the user to define whether to display the frame rate shall be displayed and to set the exam type for OB exams (whether in Fetal Age or Fetal growth).

4D Settings

With the same menu option the user can set which presentation has to be used for 4D acquisition: refer to the specific section for further information.

On **MyLab60**, **MyLab70** e **MyLab90** the same window allows to set the automatic activation of real time at the end of the volume acquisition in 3D CnTI.

Contrast

MyLab60, MyLab70 and MyLab90 models

The option allows the operator to configure advanced settings for the CnTI modality: Refer to the specific section for further details.

Saving Settings

Settings are confirmed by pressing OK: The modification will be active at next exam.

Chapter 3

3 - Application Presets

This chapter explains how to set the default active transducer of the transrectal probe, to customize the gray map and set the XView parameters and the absolute angle.

Transrectal Probe Transducer

On MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models

The transrectal probe is equipped with two transducers: one linear and one convex. Set the default transducer and press OK to confirm.

Gray Map Customization

Only on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models. For MyLab60, MyLab70 and MyLab90, please refer to the "Software Keys" section

The gray map of the active application can be modified and saved in real-time.

The **GRAY MAP** key selects the desired post-processing curve: the number displayed in the "PST" field shows which curve is active.

The selected curve can be modified in real-time to improve the image quality.

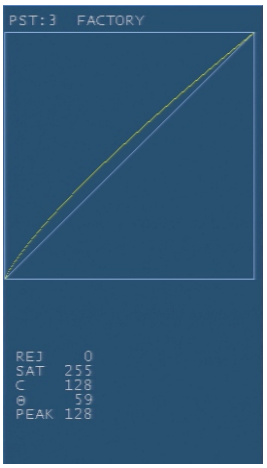
Procedure

- Press the **MENU** key in real-time.
- Select the "Gray Map" option.

The below figure is placed side by side to the real-time image.

The yellow line displays the trend of the active post-processing curve, indicated by the number shown on the top ("PST" field).

Below the curve the set values of the adjustment parameters are displayed.



Software Keys

The software keys available for the curve adjustment are:

SAVE	**SLOPE**
CENTER	**PEAK**
REJ	**CURVE**
SATUR	**FACTORY**

The curve trend is modified when changing the parameters and the real-time image is consequently updated.

The **CURVE** key changes the shape: five different curves are available.

The **CENTER** key moves the curve center to the left or to the right.; the **PEAK** key increases or decreases the curve peak while the **SLOPE** key changes the curve inclination.

The **REJECT** and **SATUR** key modify the rejection and saturation values.

The **SAVE** key saves the modifications: the saved post-processing curve will be identified by the label "C#n" and, from this moment on it will be available in the same application. The **FACTORY** key restores the factory parameters values.

XView Parameters Configuration

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and Mylab50 models.

The X-Smooth, X-Detail and X-Enhanc parameters can be differently set for each application. Refer to the "Software Keys" section for their use.

Set the parameters and press OK to confirm.

Absolute Angle and High Definition Zoom

MyLab60, MyLab70 and MyLab90 models.

The angle correction factor of linear probes can be correlated either to the line cursor or to the line perpendicular to the transducer surface (absolute angle). In the first case the angle correction is kept constant when the line is moved; in the second case an angle correction is calculated whenever the line is moved.

To activate the angle correction factor check the corresponding field.

High Definition Zoom

When the High Definition Zoom is set, the zoom offers a superior definition of the enlarged image. The high definition zoom works only in real time. To activate this function, check the corresponding box.

Chapter 4

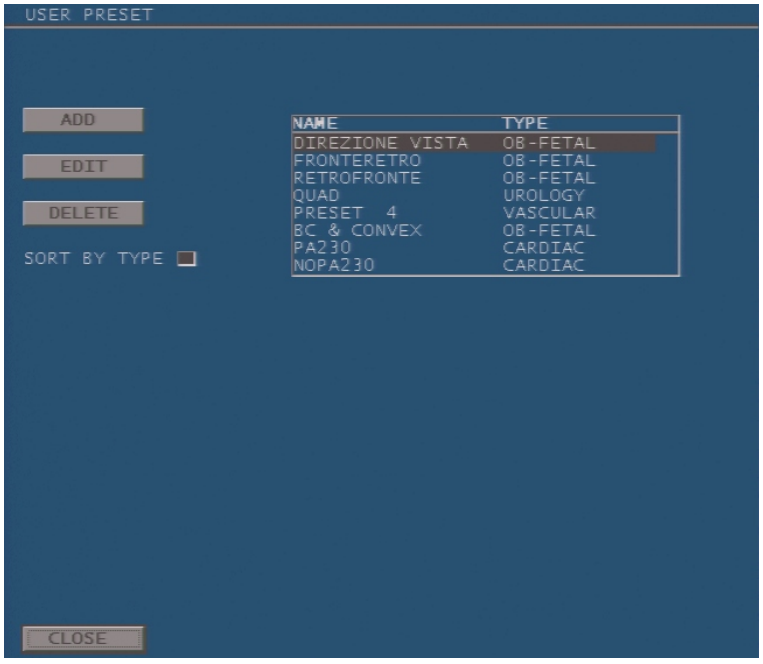
4 - User Preset

User Preset Menu options differs among MyLab models.

This chapter lists the parameters available in the User preset option of the system Menu and explains how to configure the parameters.

User Preset Menu on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

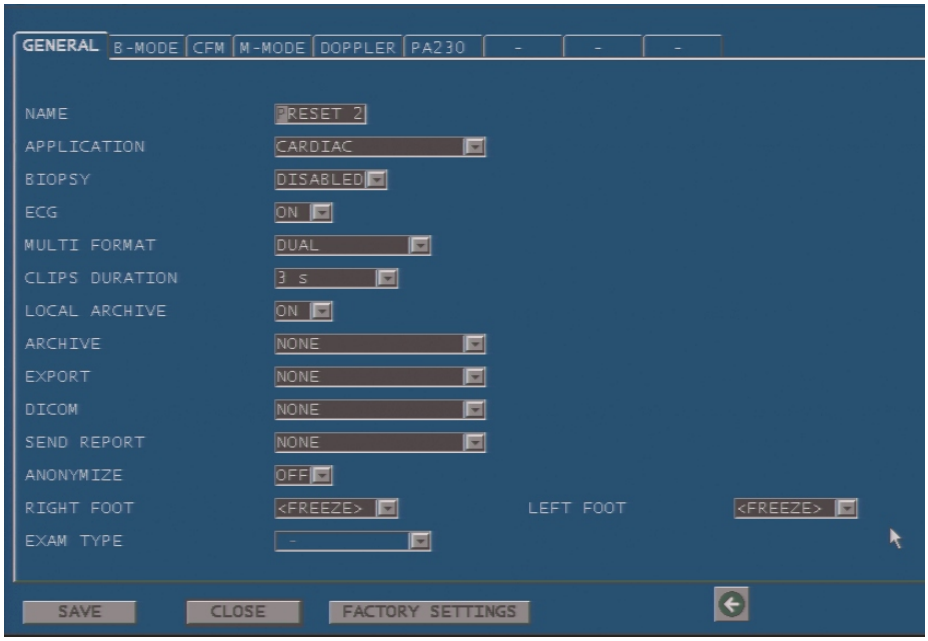
This procedure enables the creation of a new preset (ADD option), modification to an existing preset (EDIT option) and deletion of an existing preset (DELETE option). The set presets can be selected from the page at the start of the exam or by using the **PRESET** key. To access the various options, select the type of preset, position the trackball on the required option and press **ENTER**.



By enabling the "Sort by type" field, the user presets are sorted by application.

New Preset on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

This option allows a new preset to be created. The menu is organized in a General folder, four Modes folders and four Probes folders.



Press SAVE to save the settings. The CLOSE key exits the menu without saving the settings. The new parameters will be immediately active, provided that the saved preset is uploaded through the **PRESET** key.

> ***Note***
>
> The system allows to save presets with the same name: check therefore that the assigned name is not already available in the list.

Factory settings relating to the application (FACTORY SETTINGS key) are apply to the preset.

The  key returns the user to the Preset menu without saving the settings.

General Folder

This menu allows the user to assign a name and associate one of the available applications (with its configurations) to a new preset.

The following table summarizes other settings available in this folder.

Field	Action
BIOPSY	Activates or de-activates biopsy display.
ECG	Activates or de-activates ECG display.
MULTI FORMAT	Sets the multi format (Dual, Quad or Simultaneous) that can be activated with the and keys.
CLIPS DURATION	Sets clips duration.
LOCAL ARCHIVE	Selects the local archive.
ARCHIVE	Identifies the default final archiving support of the exam.
EXPORT	Identifies the default medium where the exam will be exported.
DICOM	Identifies the default archiving medium of the exam.
SEND REPORT	Identifies the default medium where to send the report in XML format.
ANONYMIZE	Activates or de-activates the anonymization of the patient data
FOOT	Defines the mode keys assigned to the left and right footswitch commands.
EXAM TYPE	Set fetal age or fetal growth when the application is the Obstetric.

Final Archiving Medium

The final archiving medium can be selected among CD/DVD, USB medium, DICOM server, a network directory or none of the above. When the **START END** key is pressed at the end of the exam, the system automatically shows the End Exam window with the archiving enabled and the medium already selected (if set).

Modes Folders

Different parameters can be set for each mode.

The following tables list the value or initial status of parameters that can be set mode by mode.

B-Mode

Field	Action
COLORIZE	Sets the chromatic scale active in 2D.
GRAY MAP	Sets the greys scale active in 2D.
DYN RANGE	Sets the dynamic range.
PERSISTENCE	Sets the persistence level.
ORIENTATION	Sets the orientation of the 2D sector (high/low).
SHARPNESS	Sets the image's sharpness value (low, average, high).
XVIEW	Sets the initial value of the XView algorithm.
MVIEW	Sets the initial value of the MView mode.
TPVIEW	Set the status (active/inactive) of the trapedoizal view on Linear probes

CFM

Field	Action
FILTER	Sets the wall filter in CFM (low, average, high).
PERSISTENCE	Sets the Persistence level.
PRF	Sets the default PRF.
DENSITY	Sets the Density (high, low).
SENSITIVITY	Sets the sensitivity level.
SMOOTH	Sets the smooth level.
BASELINE	Sets the position of the Baseline.
MODE KEY ON	Sets the Mode key (**PWR D** or **TVM**).
MODE KEY STATUS	Sets the status (active or inactive) of the Mode key.
V-MAP	Sets the CFM scale for Speed modes.
P-MAP	Sets the CFM scale for Power modes.

Field	Action
TVM MAP	Set the CFM scale for TVM modes.

M-Mode

Field	Action
COLORIZE	Sets the chromatic scale active in M-Mode.
GRAY MAP	Sets the scale of the greys active in M-Mode.
DYN RANGE	Sets the Dynamic Range.
SHARPNESS	Sets the Sharpness value.
DISPLAY	Sets the M-Mode presentation format.
PLEX STATUS	Sets the status (active or inactive) of the **PLEX** in M-Mode.
SWEEP	Sets the default value of the sweep speed.

Display

Dual (referenced 2D on the left side of the screen and M-Mode trace on the right), Split (referenced 2D at the top of the screen and the trace at the bottom) and Full screen formats can be set via Display. In the Split format, the referenced 2D can be set to small, medium or large.

Doppler

Field	Action
COLORIZE	Sets the chromatic scale active in Doppler.
GRAY MAP	Sets the scale of the greys active in Doppler.
DISPLAY	Sets the Doppler presentation format (Split, Dual or Full screen).
MODE KEY ON	Sets the Mode key either as **PLEX** or **TV** key (available only in cardiac applications).
MODE KEY STATUS	Sets the status (active or inactive) of the Mode key.
SV (mm)	Sets the default value of the sample volume.
PW FILTER (Hz)	Sets the wall filter value in Pulsed Wave Doppler.
CW FILTER (Hz)	Sets the wall filter value in Continuous Wave Doppler.
BASELINE	Sets the position of the Base Line.
SWEEP	Sets the default value of the scanning speed.
REJECT	Sets the default value of the reject filter.
AUDIO VOLUME	Sets the initial sound value.
REVERSE	Sets the orientation of the speed scale
DYN RANGE	Sets the Dynamic Range.
PW VELOCITY	Sets the default amplitude of the speed scale in Pulsed Wave Doppler.
CW VELOCITY	Sets the default amplitude of the speed scale in Continuous Wave Doppler.
RANGE	Sets the speed scale and the correction angle.
Θ ANGLE	Sets whether the angle correction factor is oriented with fixed increments (5° steps) or with a freely configurable angle correction factor
DOPPLER GRID	Sets the grid in Doppler

Display

The same formats are available in Doppler and M-Mode.

Range

Possible options are: Velocity (the scale is shown in m/s) and CosΘ.

Probes Folders

Four probes can be set for each user preset. Each probe is individually configurable. Once the probe is selected, the system displays the default parameters.

Four types of settings are defined: Power , other parameters (such as number of focuses, sector size..), gains and 3D presentation.

Setting the Power

Initial Power values can be set for each mode (Imaging, CFM, Doppler, and TEI, if licensed).

WARNING

Prior to using this parameter, the user should have a thorough understanding of the "Safety and Standards" manual; Esaote recommends that this parameter not be increased from factory settings.

Setting Other Parameters

The initial values of the parameters listed in the following table can be set for each application.

Field	Action
FOCUSES	Number of focuses active in transmission.
DEPTH (cm)	Sector depth
B-MODE SIZE	Amplitude of 2D angle.
CFM SIZE %	Amplitude (in %) of CFM sector.
CFM DISPLAY	2D-CFM, Concurrent or Dual CFM
B/M FREQ (MHz)	Imaging frequency or TEI mode.
CFM FREQ (MHz)	CFM frequency.
DOP FREQ (MHz)	Doppler frequency.
REVERSE	Sector orientation (right/left).
DENSITY	Density (High/Low)
D-STEER	Number of intervals for the D steering (Linear probes)
SMART D	Activatse or disactivates Smart Doppler (Linear probes)

Imaging Frequency

If available, the TEI (Tissue Enhancement Imaging) mode can also be selected as **TEI PEN** for optimal penetration, as **TEI RES** for higher resolution or as **TEI GEN** as optimal compromise between resolution and penetration.

Setting the Gains

For each mode (Imaging, CFM, Doppler) the initial gain value can be set.

3D/4D Preset

When the selected probe manages 3D/4D acquisition, the following parameters can be set:

Field	Action
VIEW DIR	Sets the view direction.
SCAN ANGLE	Sets the angle to be used to scan the the volume (Bi-Scan probes).
QUALITY	Sets the frame density for the volume reconstruction (Bi-Scan probes).

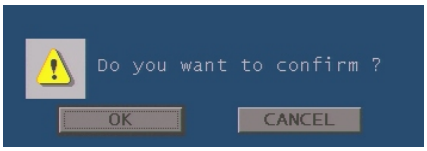
Field	Action
SCAN MODE	Sets whether acquisition occurs along a surface or around an axis (not motorized probes)
SCAN L/ANG	Sets the volume scan angle / length (not motorized probes)

Edit Preset on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

Select the required preset with the trackball from the ones listed above. Position the cursor on the EDIT field and press **ENTER**. The menu displayed is the same as the one for setting new presets.

Delete Preset on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

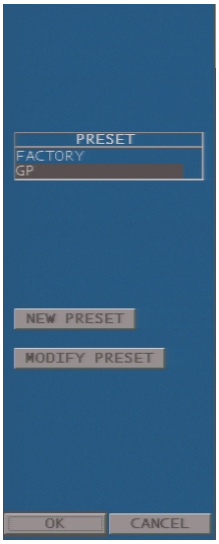
Select the preset with the trackball from the ones listed above. Position the cursor on the DELETE and press **ENTER**. The system displays the following warning message:



The preset is deleted by pressing OK.

Real-Time Presets on MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

MyLab allows the user to create, modify and save the presets in Real-Time in any application.



This menu is displayed on the right of the image when the **PRESET** key is pressed.

The menu allows the user to select a different preset: select the desired one and press OK to confirm.

The MODIFY PRESET saves all settings done in Real-Time using the software keys in the active preset. The preset parameters are changed and saved according to the software keys settings.

The NEW PRESET creates a new preset whose configuration is the one defined in every modality by the software key settings in Real-Time.

Note

The real-time XView settings can be saved as a preset through the specific option of the "Application Preset" menu. The saved presets are associated to the active application: these presets will be automatically applied each time the application is selected.

User Preset Menu on MyLab60, MyLab70 and MyLab90 Models

This procedure enables to delete an existing preset (DELETE PRESET) or all presets, and to set the factory preset (FACTORY PRESET options).

Real Time Presets on MyLab60, MyLab70 and MyLab90 Models

MyLab allows to create, modify and save the presets in real time in any application.

This procedure enables the creation of a new preset (NEW PRESET option) and the modification of an existing one (MODIFY PRESET option).

Procedure

- Adjust the real-time image as desired
- Press the **PRESET** key.
- Press MODIFY PRESET to overwrite the current preset (also the factory presets can be overwritten) or using the alphanumeric keyboard type a new preset name and press NEW PRESET.

The MODIFY PRESET saves all settings done in real time in the active preset.

The NEW PRESET creates a new preset whose configuration is the one defined in every modality in real time.

Note

The parameter set of the **POWER** control in B-Mode is not saved in the user preset; for this control the factory preset is kept.

The configured presets can be selected from the page displayed when starting the exam or by using the **PRESET** key. To select the preset, position the trackball on the required option and press **ENTER**.

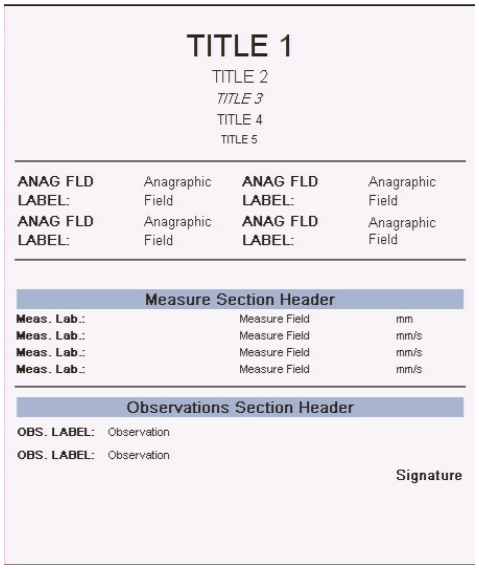
Chapter 5

5 - Report Customization

This chapter explains how to use the **MyLab** menus to customize the report and print layout.

Print Layout

The report print layout style, shown in the figure below, is composed of three sections: the title section (including title and patient data), the measurement area and the observation area.



Activating Menus

MyLab offers different menus allowing configuration of the report. The following options are available by pressing **MENU** and by expanding the REPORT folder.

Option	Setting
Header	Title settings.
Print Layout	Selection of data to be printed.
Edit Observations	Observation settings.
Print Layout Style	Selection of the print template.

The first three menu options include then as many selections as the available applications. To access the configuration menu, press **MENU** and open the "Report Layout" folder by pressing **ENTER**. To open the sub-folders, position the cursor on the desired option and press **ENTER**. Then, select the application and press **ENTER** to confirm.

In each option, **FACTORY SETTINGS** allows to assign factory settings.

Ok saves the new settings, which will be activated next time the system is turned on. **CANCEL** exits the menu without saving modifications.

Setting Titles

MyLab allows set up of five title levels. Place the cursor on the desired field and press **ENTER** to activate text insertion. Use the alphanumeric keyboard to insert the desired title.

The header can be customized with the center logo (which is printed only when the "SHOW" box is crossed). Place the cursor on the "CHANGE" field and press **ENTER**: the system displays a menu from which the desired file can be selected.

Report Print Layout

The window includes three areas: the Print Preview area, the Graphs area and the Header Fields area.

Print Preview Area

The Print Preview function, available when pressing **REPORT**, allows the user to select and manage the fields to be printed.

The following table lists the available options.

The calculation configuration menu is described in this same section.

Option	Action
USE MEASURE DESCRIPTION	Measures are identified by the description inserted into the calculations settings menu.
SHOW AVERAGE ONLY	Only the measurements average will be printed.
SKIP OBSERVATIONS EMPTY FIELDS	Fields which do not include observations will be skipped.
SKIP OBSERVATIONS TITLES	Observations titles will not be printed
SKIP HEADER EMPTY FIELDS	Empty header fields will not be printed.

OB Graphs Display

This option allows to select the graphs of the obstetric report to be printed. To select them, place the cursor on the desired field and press **ENTER**.

Enable Header Fields

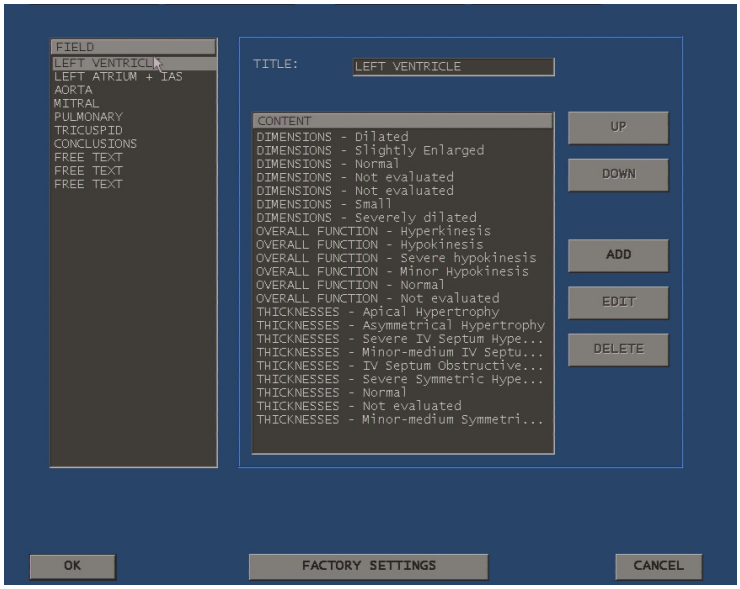
This option allows to select the fields of the header area to be printed. To select them, place the cursor on the desired field and press **ENTER**.

Editing Report Observations

See the "Calculation" Section to use the report.

The Editing Report Observations option allows each application to create a group of words and text sequences to be used to insert text in the report page.

MyLab offers, for each application, up to ten observation groups. Each group may include the desired number of words and text sequences. The figure below shows the configuration window.



Place the cursor on the desired group and press **ENTER** to select; the system will display the title assigned to that group and the associated text sequences.

The title is user configurable by placing the cursor on the desired field and using the alphanumeric keyboard to enter the text.

*Place the cursor on the desired item and press **ENTER** to highlight.*

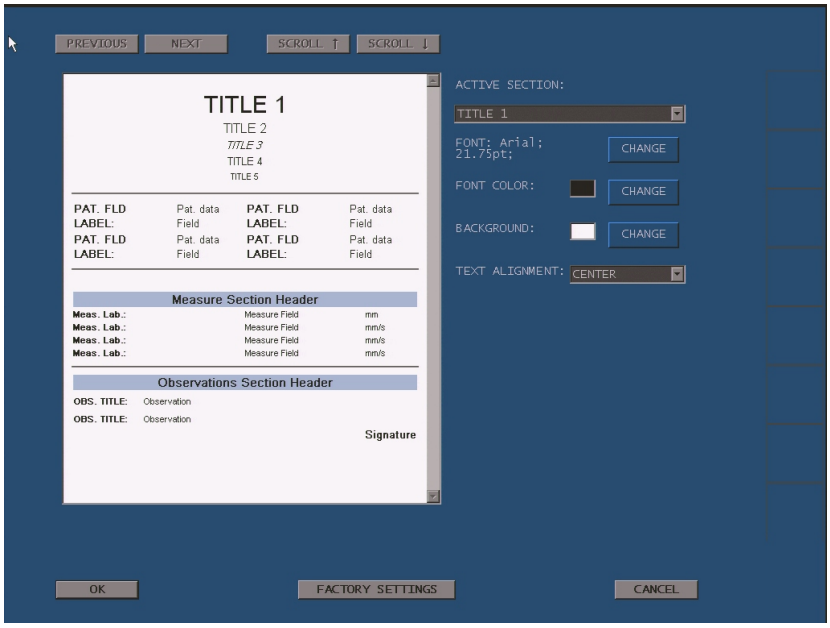
The **UP** and **DOWN** keys allow scrolling of the text sequence highlighted within the list. **ADD** opens the window allowing insertion of new items; **EDIT** allows the highlighted text sequence to be edited.

DELETE removes the highlighted item from the list.

Print Layout Style

This option allows the desired style to be assigned to the report. The following figure shows the interaction window.

To select an item, place the cursor on it and press ***ENTER****.*



This window allows to the assignment of the desired font to each report field, the preferred size and color. For each section, the desired background and text alignment can be chosen.

Chapter 6

6 - Measurements Configuration

This chapter explains how to customize the calculation packages of each application, available though the **MEASURE** key.

Activating the Configuration Menu

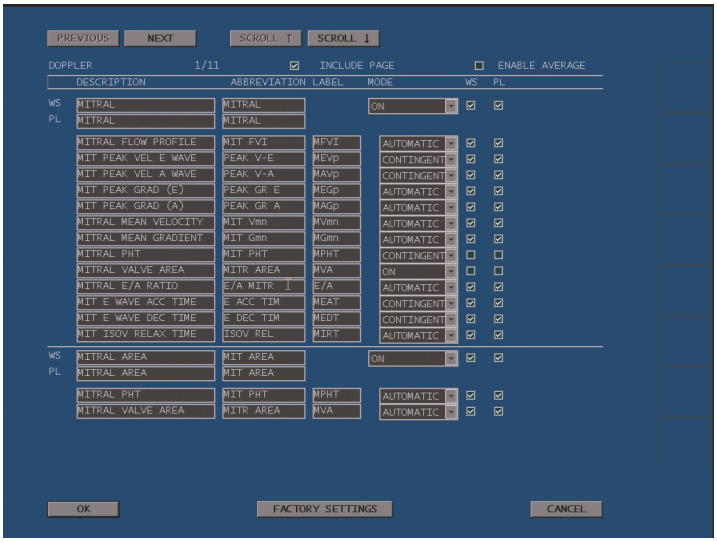
To access the configuration menu, press **MENU** and select "Application Measurements". Then, select the desired application and press **OK** to confirm.

Measurements Organization

The system shows the available measurement sets available for the application, organized by pages.

The **PREV** and **NEXT** keys allow scrolling through the different pages, while **SCROLL↑** and **SCROLL↓** scroll the content of a single page

This figure shows the B-Mode page of the cardiac application.



When the "Included page" option is selected, the measurements set option from the **MEASURE** page is available. The "Enable average measure" option displays the measurements average in the report page.

Measurement Configuration

Pages are organized by measurement groups. The group is displayed (i.e. available by pressing **MEASURE**) when the Mode field is set to **ON**.

To customize descriptions in the cardiac and vascular applications, please contact Esaote personnel

From the applications enabled by the General Imaging license, the user can assign different descriptions and abbreviations to groups, for the worksheet and for the print layout. It is also possible to identify a single measurement with the desired description, abbreviation and label.

It is also possible to disable one parameter or parameter group (**OFF**). For each parameter, the user can define the activation mode: **AUTO** means that the parameter is included in the automatic measurement sequence, which the system manages when measurements are activated through the Group Title. A parameter set to **ON** will only be activated if manually selected.

> ***Note***
>
> ***AUTO* for a derived parameter** (i.e. not calculated but derived from a formula) means that this parameter will automatically be calculated and updated on the report page as soon as basic measurements have been performed.

Doppler Measurements

Doppler parameters can also be set to **Contingent**: this option allows the user both directly measure the single parameter and automatically calculate it from the flow profile.

Parameters set to **ON** and **Contingent** (for Doppler measurements) will be displayed in the group, to allow selection for a direct measurement.

The group and single parameters are included in the worksheet and can be printed when the corresponding boxes (**FL** e **DIS**) are checked.

Bilateral Measurements

When applications include bilateral measurements, select the desired side (right or left).

The **FACTORY SETTINGS** key allow assigning of the factory settings.

> ***Note***
>
> The **FACTORY PRESET** key applies the factory presets to all user presets in all applications, including generic measurements.

To save settings, press **OK**; they will be activated the next time the system is turned on: **CANCEL** exits the menu without saving the new settings.

Configuration of OB Measurements

The Obstetrics measurement configuration menu is organized in different pages: the fetal Doppler page the mother Doppler page, the B-mode page, the gynaecological measurements pages, the M-Mode page, the other parameters page and the custom tables manager page.

The "B-Mode" page allows the user to select the parameters to be measured both relating to fetal age and to fetal growth.

For each parameter the system offers the related available bibliographic references and the selection of measurement methods for 2D measures. As for the other application measurements, the group and single parameters are included in the worksheet and can be printed when the corresponding boxes (**FL** and **DIS**) are checked.

In the "Other Parameters" page the user can set the ratios to be automatically calculated; the bibliographic references for the fetal weight, both in fetal age and fetal growth; the measure unit for the estimated fetal weight; the method to be used for the biophysical profile and the formula to be used for the EDD computation. In the same page the user can set the reference table to be used for the EFW graph: the user is recommended to set the same reference used for the fetal weight.

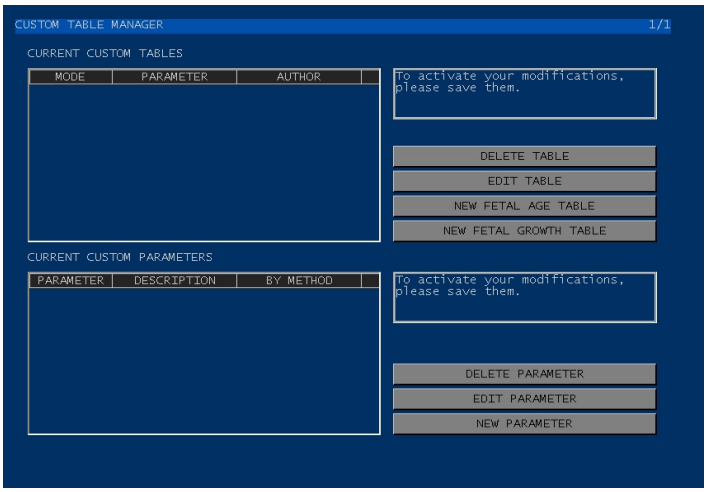
The same window allows to enable both the derived head circumference and the derived abdominal circumference and to set the obstetric reports headers and the graphics to be displayed on the first page of the report.

The "Custom table manager" page allows the user to create custom tables whether in Fetal Age and in Fetal Growth and to create a new parameter.

Custom Table

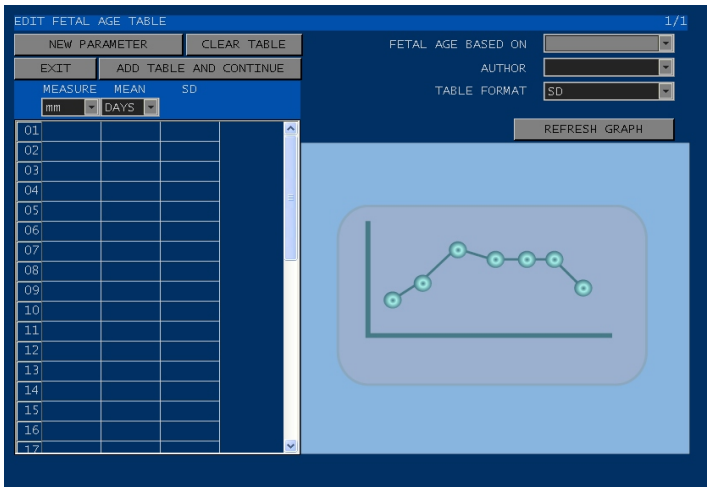
The **NEW FETAL AGE TABLE** field allows the user to create a customized table based on the fetal age parameter, the **NEW FETAL GROWTH TABLE** option based on fetal growth.

Custom Table Page



EDIT TABLE allows the user to change the highlighted table while DELETE TABLE deletes it.

Once selected one of the two options, the system displays the following window:



The table can based on one of the available reference curves ("Fetal Age/Growth based on" and "Author" fields) as well as it can be based on a new parameter

("New Parameter" option). The graph can be displayed with Standard Deviation or within minimum and maximum values ("Table Format" option).

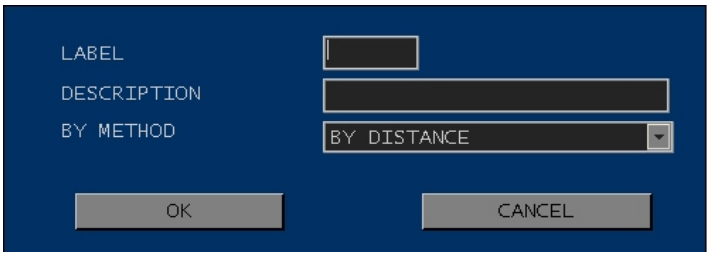
Procedure

- Select the measure unit ("Measure" field).
- Select whether based on days or on weeks ("Mean" field).
- Place the cursor measure column and press enter to activate the cell.
- Digit the number and press enter to confirm.
- Repeat the same operation for the other columns.
- Press ADD TABLE AND CONTINUE to save the table and continue

Press CLEAR TABLE to erase all input data and CANCEL to quit. The REFRESH GRAPH key displays the parameter trend according to the input data.

New Parameter

The **NEW PARAMETER** field allows the user to create a new parameter. The system displays:



The parameter is identified by a label, a description and a measuring method.

Coincident Names

Whenever a custom parameter and/or table and an Esaote parameter/table have identical names, the extension @ is added to the custom parameter/table name to avoid any misunderstanding. The extension @ is displayed both in the report and in the print preview

Configuration of Vascular Measurements

The configuration menu of vascular measurements allows the user to set velocities ratios. Velocities ratios can be set in the following groups:

- Carotid velocities (ratio between velocities of internal carotid and common carotid sections).
- Aorta (ratio between velocities of superior mesenteric artery and aorta sections).

The ratio is set on the maximal velocity.

Configuration of Gynaecologic Measurements

The configuration menu of gynaecologic measurements allows the user to set the method to be used to measure the follicle diameter, either by one distance or by the average of two distances.

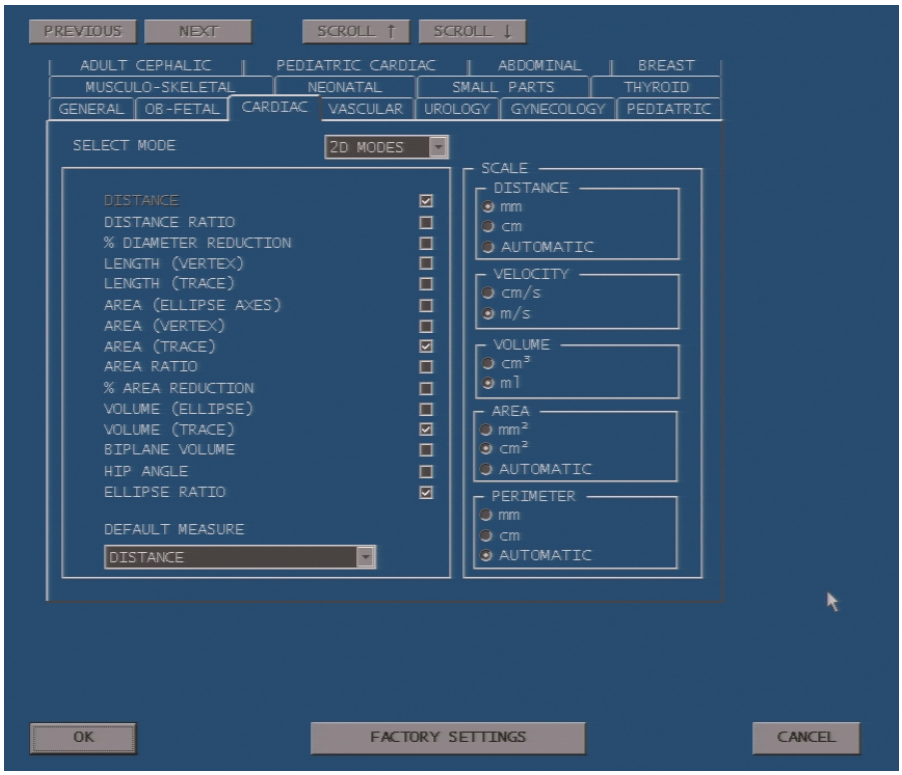
Chapter 7

7 - Generic Measurements

This chapter explains how to configure the generic measurements available in each application.

Generic Measurements Configuration

The generic measurements can be customized for each application.



Procedure

- Select the application by placing the cursor on the relevant tab and press **ENTER**.
- For each mode (2D, M-Mode, Doppler) check the desired measurements, uncheck the others and select the measure units.
- Set the default measure. This measure will be active as soon as the **+….+** key is pressed.. Choosing the "none" option no measure will be active, when the **+….+** key is pressed.

Chapter 8

8 - Glossary

This chapter explains how to configure the glossary, available during annotations.

Glossary Configuration

The glossary is composed of several user configurable libraries. It is possible to assign a specific library to each application. To access the configuration menu, press **MENU** and select " Glossary".

This menu is organized in folders: the first two folders allow assigning of the desired library to each application.

Selecting Folders

To select the desired folder, press **ENTER** once the cursor has been positioned, or use the **NEXT** and **PREVIOUS** keys.

Folder "Generic"

This folder allows choosing of the font size. To automatically delete the text when returning to Real Time, select the corresponding field.

Refer to the "Software Keys" section for further details

If the "First cursor action: move" field is set, the trackball moves the cursor when activating the annotation session. By setting the "Enable shortcut function keys" the F7-F10 alphanumeric keys are linked to the By Sentence glossary.

Folder "Libraries Setup"

The user can assign both a list of single words and a list of sentences to a library.

Library by Word

The configuration menu looks like the figure below:

Refer to the "Software Keys" section for further details on the glossary

This menu appears in the mid part of the active library, followed by the list of words to be assigned. On the right, there is a list of all the words available, inserted in the different libraries.

To insert a new word in the list, double click on the desired box. **MyLab** will automatically allow entering of text through the alphanumeric keyboard. The blank box can be used as a space inside the list.

*Position the cursor on the desired item and press **ENTER** to activate.*

Words available from the list on the right can be highlighted and dragged and dropped into the library. Highlight the desired item while keeping the **UNDO** key pressed; drag the word into the desired field with the trackball. When releasing **UNDO**, the word will automatically be included in the library.

To create a new library, place the cursor on the desired field and enter the name of the library with the alphanumeric keyboard. Click on **NEW LIBRARY** to create new words following the previous instructions.

The **SAVE LIBRARY** key saves the new library; **DELETE LIBRARY** deletes the library.

In each folder, the **FACTORY SETTINGS** key allows assignment of factory settings.

Ok saves the new settings, which will be activated the next time the system is turned on. **CANCEL** exits the menu without saving modifications.

Glossary by Sentences

The configuration menu looks like the figure below:

Refer to the "Software Keys" section for further details on glossary

The menu shows the active library with, below, a table composed of four columns. Every row of the table is a sentence, composed of the four words listed in the four columns. At the right of the table the system displays the list of the words present in all libraries.

The procedure to create and modify a library is the same of the glossary by word.

Folders Assigning Libraries

MyLab allows assignment of a preferred library to each application. The drop-down menu shows the available libraries. Both a library by word and by sentences can be assigned to each application. Place the cursor on the desired library and press **ENTER** to confirm selection.

*Any alphanumeric key or the **ANNOT** key will automatically activate text insertion during the exam*

When **Automatic word recognition** is selected, **MyLab** automatically activates, during the annotation phase, the search of words relating to the application library. If the characters entered occur in the active library, the system will automatically propose that word. To confirm the proposed word, press **ENTER**; or proceed with text insertion.

Chapter 9

9 - Peripherals

Options may differ among MyLab Models

This chapter explains how to set the remote control of video peripherals.

Peripherals Remote Control

The system can remotely control (through the keys REC/PRINT **1**, **2** or **3**, depending on the model) recording from VTR and both b/w and color printing,. The icons of the set peripherals are displayed at the right top of the screen.

Peripherals icons

BW Printer	RGB Printer	PC Printer	DICOM Printer	VTR	No Peripheral
					

During the printing phase, the printers' icons are surrounded by a yellow, flashing frame. The frame disappears at the end of the operation.

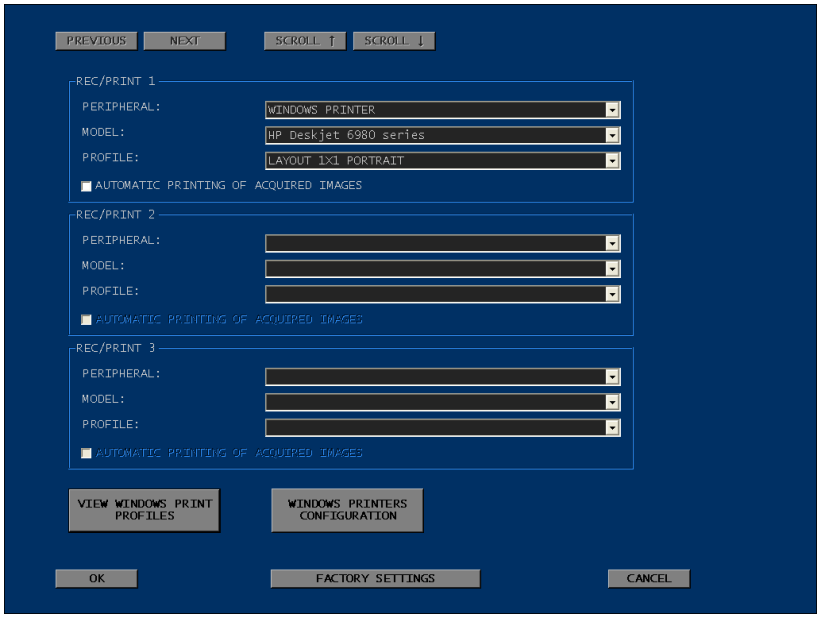
Peripherals Configuration

For DICOM Printer configuration see further in this section.

MyLab manages both laser and inkjet USB printers. Contact Esaote personnel for suggested models and assistance with proper configuration of the printer or visit Esaote web site (www.esaote.com).

To access the configuration menu, press **MENU** and select "Peripherals": The system shows the configuration window where the REC/PRINT1, 2 and 3 parameters can be set to remotely control peripherals through the **1**, **2** and **3** control panel keys (depending on the model).

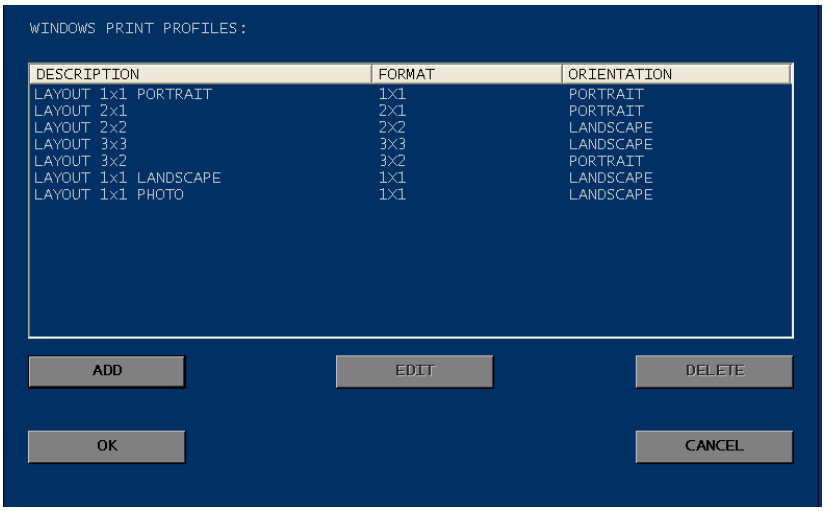
This figure shows the peripherals menu for MyLab60, MyLab70 and MyLab90 models.



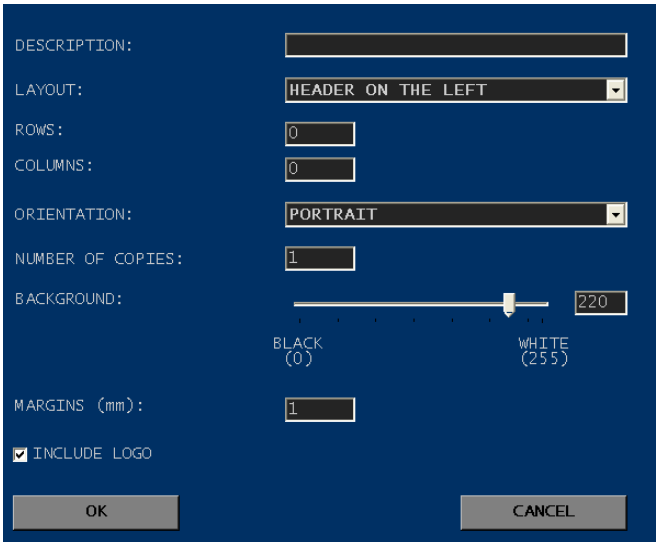
Field	Action
PERIPHERAL	Sets the type of peripheral (Windows printer, DICOM printer, VTR, B/W or CFM thermal printer)
MODEL	Sets the printer model to be selected among the installed ones
PROFILE	Sets the printing format
AUTOMATIC PRINTING OF ACQUIRED IMAGES	Sets the automatic printing of all printable images (only on Mylab60, MyLab70 and MyLab90 models)

View Windows Print Profiles

VIEW WINDOWS PRINT PROFILES allows to add ("Add" option) a printing profile, to modify ("Edit" option) or to delete ("Delete" option) an existing profile.



Once ADD or EDIT is pressed the following windows is shown:



Field	Action
DESCRIPTION	Defines the name of the profile.
LAYOUT	Positions the header on the top or on the left of the page
ROWS and COLUMS	The number of images in the page is defined by the number of rows and columns (ex. 2 rows and 3 columns are 6 images on one sheet)
ORIENTATION	Portrait or Landscape
NUMBER OF COPIES	Sets the number of copies to be printed
BACKGROUND	Defines the printed page background: "0" sets black , "255" sets white, the other values intermediate gray levels
MARGINS	Defines the print margins
INCLUDE LOGO	The logo (Esaote or Biosound Esaote) is added to the print when checked

Format Icons

The set print format icon is displayed in the header bar beside the symbol of the printer.

Print format icons

The format icon gradually becomes black as images are sent to the printer.

The figure on the left displays the print format set on 3x2 and three images sent to the printer. Printing takes place when the icon is completely black.

The printing function is also available off line, i.e. when the printer is not physically connected to the system. In this case, print outs are temporarily stored on the hard disk. Printing is automatically activated once the printer is connected.

Windows Printers Configuration

The WINDOWS PRINTER CONFIGURATION button directly activates Windows® "Printers and Faxes" menu: to install the printer, refer to Windows® instructions.

Note

Should printer drivers be necessary, always use the original printer installation disk of the manufacturer.

Once the printer has been installed, switch the system off and then on again: **MyLab** will manage the printer only after this operation.

DICOM Printer

The option allows the user to set the DICOM printer model and its printing configuration.

Note

The DICOM Printer requires the DICOM license.

DICOM Printing Configuration Icon

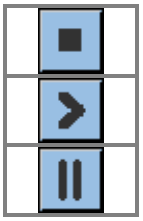
The printing configuration icon is displayed next to the DICOM printer icon, on the right upper part of the screen. Two numbers are displayed on the icon: the upper number indicates the number of images sent to be printed and the lower number indicates the number of images which can be printed in one sheet. In the icon shown here, on the left, one image has been sent to be printed and one sheet can contains up to four images.

Video Recorder

The system allows the remote management of a VTR: contact Esaote personnel for the list of compatible models.

Once remote management has been activated, the active function is displayed beside the video recorder's icon:

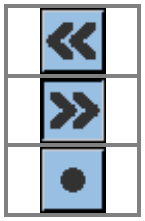
Video recorder control is described in the "Software Keys" section



STOP

PLAY

PAUSE



BACK (REWIND)

FORWARD (FAST FORWARD)

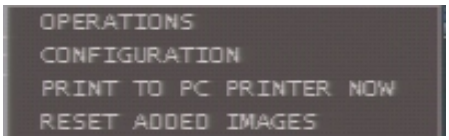
RECORDING

Peripherals Management

PC Printer Management

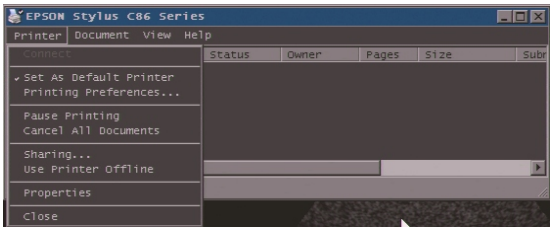
PC Printer icon

When the trackball is activated in the pointer function, the user can open the window to manage the PC printer. Position the pointer on the icon and press the **UNDO** key. The system will display the following menu:



Operations

The system displays the following window:



This window allows control of the printing queue and selection of printing preferences.

Configuration

This option is to be used by ESAOTE Service personnel only.

Print to PC Printer now

To print before formatting is complete, select the **Print to PC Printer now** option to start printing. Press the **FREEZE** key to return to Real Time.

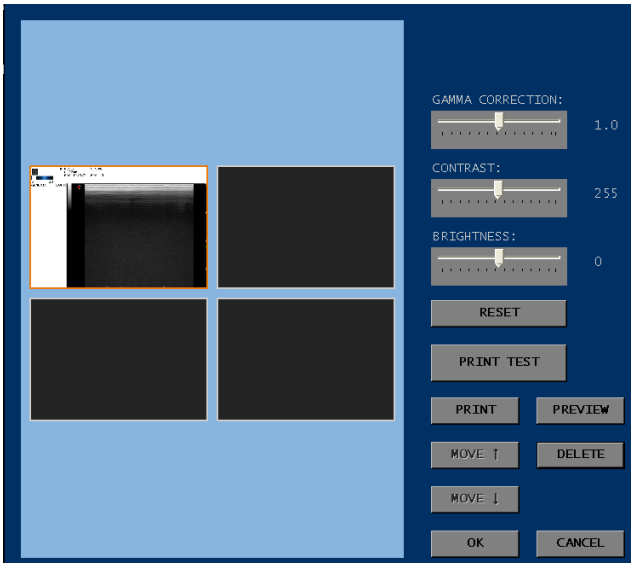
Reset Added Images

The option cancels all images that have been send to be printed: the printing counter is automatically reset.

Printing Quality

Printing quality can be adjusted, and images can be moved or deleted.

When the trackball is in pointer modality, the printing quality menu can be accessed. Place the cursor on the print format icon and press **ENTER**. The system displays the following lay-out:



The three cursors respectively modify gamma correction (managing the dark colour dynamics), contrast and brightness: the PRINT TEST key prints a test page, the PREVIEW key shows a print preview. The modifications will be active (available when pressing PRINT key) once they have been confirmed by pressing OK.

The MOVE key changes the position of the selected image (orange frame). The DELETE key cancels the selected image.

DICOM Printer Icon

DICOM Printer Management

When the trackball works as pointer, the user can access to the DICOM printer menu. Place the cursor on the icon and press **UNDO**. The system displays the following menu:

Operations The user can check the printing queue.

Retry Failed Operations The system automatically repeats all failed operations. Position the cursor on the option and press **ENTER** to repeat or delete.

Reset Failure Flag This option is used to eliminate the bar from the icon without having to repeat or delete failed operations.

Print now to DICOM Printer To print before formatting is complete, select the **Print to now DICOM Printer** option to start printing. Press the **FREEZE** key to return to Real Time.

Reset Added Images The option cancels all the images that have been send to be printed: the printing counter is automatically reset.

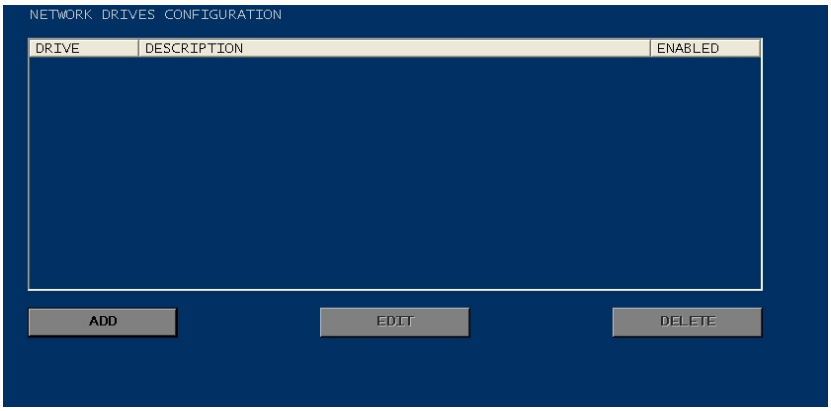
Chapter 10

10 - Network Directory

This chapter explains how to configure the network directories that can be used as archiving media.

Network Directory Configuration

Once selected the option, the system displays:

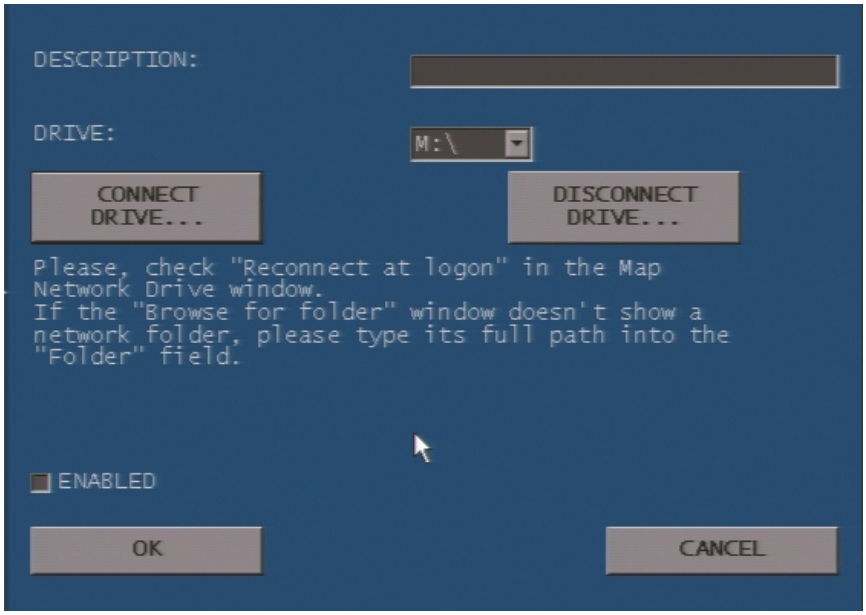


Note

The network has to be configured before setting network directory: see the "Archive" section for further details.

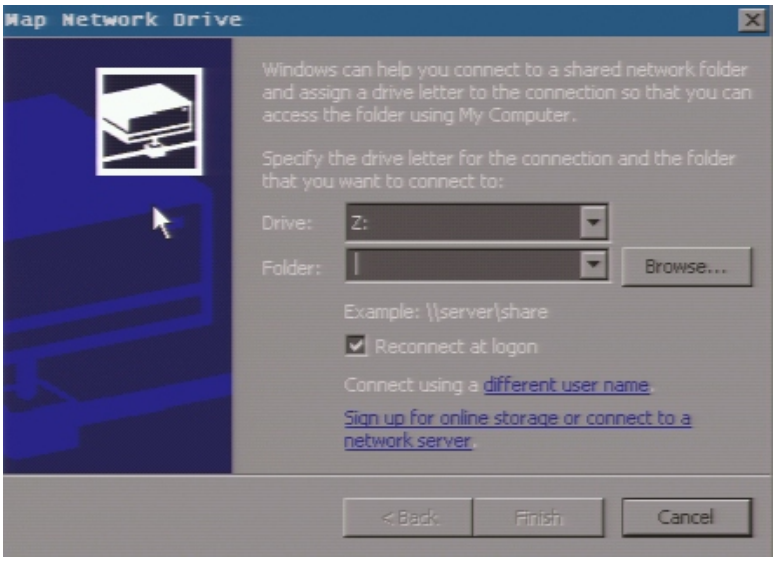
Procedure

- Place the cursor on the **ADD** button and press **ENTER**.
- The network directory configuration window is displayed:

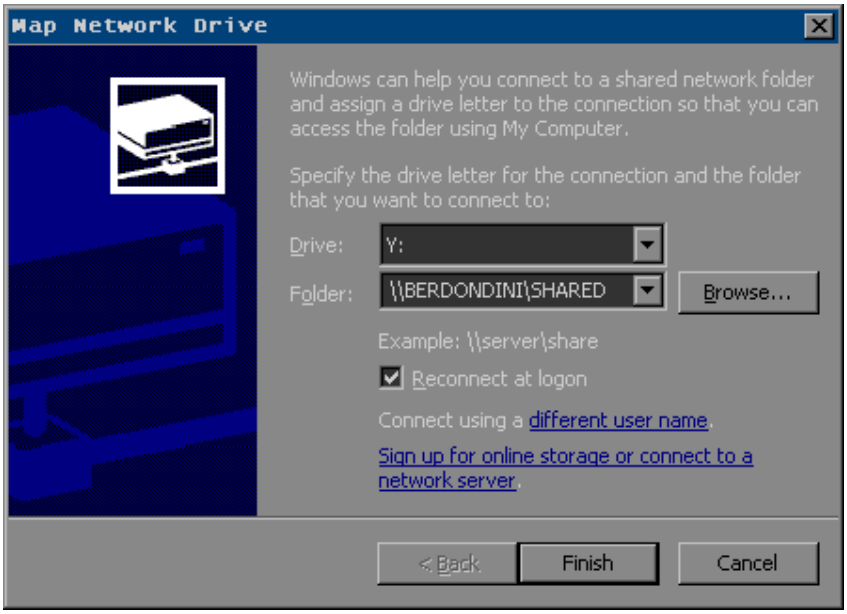


Before going on with the procedure, disconnect the drives which are no longer used.

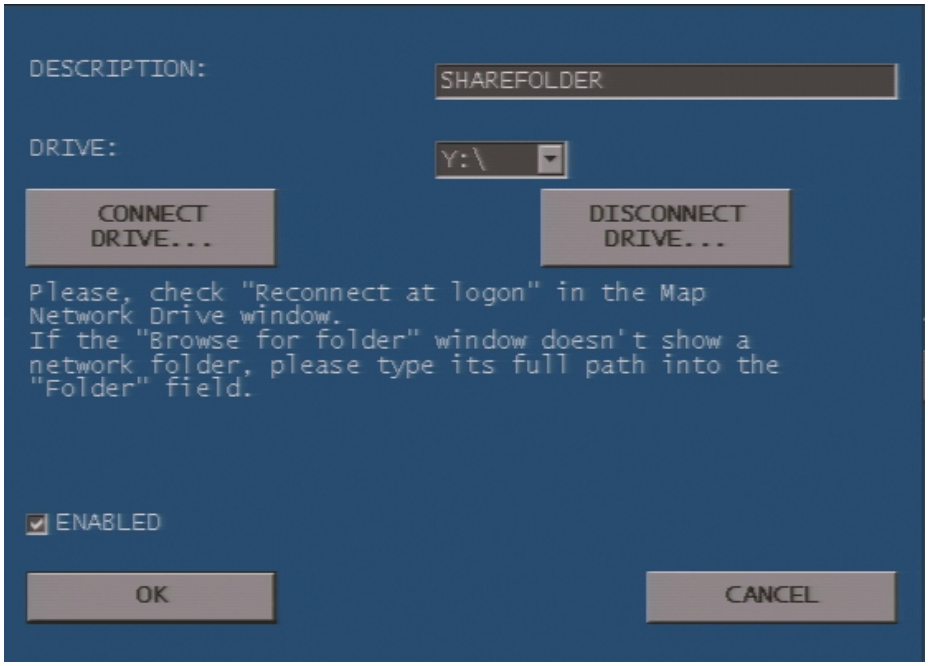
- Place the cursor on the **CONNECT DRIVE** button and press **ENTER**.



- Enter the folder path in the "Folder" field in the Map Network Drive window, **making sure to have checked the "Reconnect at logon" option**



- The next window requests user ID and password. Enter these parameters and **check the option "Remember my password"**.
- Enter a folder description and check the "Enabled" option to use it as network directory.



When a network drive is configured and enabled, it will appear in the list of the media available for archiving and exporting exams.

To remove a network directory press the **DISCONNECT DRIVE** button and select the folder to be removed.

Remote Archive Icon

The network directories are listed in the Remote Archive icon: place the cursor on the icon and press **UNDO**. Select the desired network directory in Archive Review and press **ENTER** to access to the remote archive.

Chapter 11

11 - DICOM Configuration

Menu configuration options may differ among MyLab models

This chapter explains how to configure the DICOM functions and how to configure the DICOM printer. Both options are available if the system is DICOM licensed.

DICOM Printers

Refer to the site www.esaote.com for the detailed list of the compatible DICOM printers and for the supported DICOM classes.

Configuration Menu

Refer to the Archiving section for the description of DICOM functions dialogue windows.

The configuration menu is organized in folders: five folders for DICOM configuration of the Storage server, of the Worklist, of MPPS (Modality Performed Procedure Step) and of the SC (Storage Commitment) , one **PRINT** folder and two **QUALITY** and **REPORT** folders to set image characteristics and report forwarding modalities.

Place the cursor on the desired folder and press **ENTER** or use the NEXT and PREVIOUS keys to access to it. The FACTORY SETTINGS sets the factory presets.

OK and CANCEL keys

Both in the main menu and in the sub-menu, the OK key exits from the menu saving the settings while the CANCEL key without saving.

General Folder

The option sets the **MyLab** AE Title. The factory setting is "MyLab". The "TCP LISTEN PORT" field is related to the SC DICOM class and defines which port **MyLab** uses for Storage Commitment.

The options of the "Stress Images" field defines how the stress echo images are forwarded (by stage, by view or as single view).

Storage Server, Worklist, MPPS and SC Configuration

The configuration menus of these DICOM classes are similar and allow the user to add (ADD option), delete (DELETE option) one Storage server, one worklist etc. or to modify (EDIT option) its parameters.

This option allows the user to set the AE Title, the Host name (or IP address), the port used to communicate with the **MyLab**. The Storage Commitment class also requires the setting of the Response Time (in minutes). The TEST CONNECTION key checks the connection status.

> ***Note***
>
> To use DICOM functions, a static IP address is recommended.

The DICOM class is used only when the "Enabled" field is selected.

MPPS

When the MPPS DICOM class is enabled, **MyLab** displays a warning message whenever an exam is started without any patient data inserted.

The MPPS DISCONTINUED box is added to the End Exam window. The box has to be checked whenever the exam is interrupted.

Worklist

The **WORKLIST** key is displayed in the Start Exam window when the Worklist DICOM class is enabled: the patients list can be scrolled by pressing this key.

SHOW QUERY PARAMETERS displays the query menu for the patient selection.

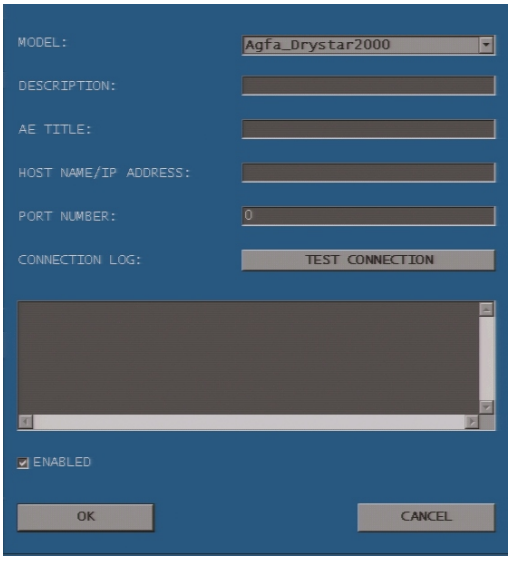
Once inserted the search criteria, press OK to run it.

DICOM Printer Configuration

The menu allows the user to add (ADD key) or to cancel (DELETE key) a DICOM printer and to modify (EDIT key) the settings and print layout of a listed printer.

The FACTORY SETTINGS key sets the default settings for the selected DICOM printer.

Adding a Printer



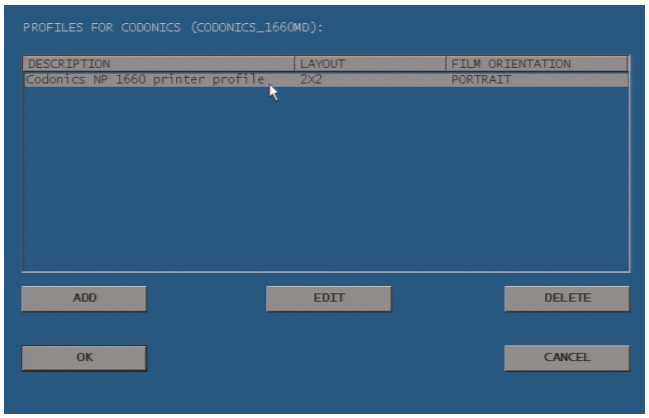
Every DICOM printer connected to **MyLab** has to be selected among the available ones and has to be identified by a mnemonic name. The menu also sets the printer AE Title and the Host name (or IP address), used to communicate with the **MyLab**.

As for the other DICOM classes, the connection status can be checked through the TEST CONNECTION key.

The DICOM printer is available only when the "Enabled" field is selected.

Print Profiles

Each DICOM printer can have different print lay outs. Highlight the desired printer and press VIEW PROFILES.



The menu lists the set printer profiles. The EDIT key modifies the selected printer profile, the DELETE key cancels it. The ADD key adds a new profile for the selected DICOM printer.

Print Profile

The print layout depends on the selected DICOM printer. The menu allows the user to set the print layout, the orientation, the size, medium type (sheet, film..), the colour scale and the number of copies.

Report and Quality Folders

Report Folder

MyLab allows to set one of the following options for the report format:

- Biopacs report. Biopacs is an Esaote product for ultrasound exam management
- DICOM image format for other DICOM servers.
- DICOM structured report (refer to the DICOM Conformance Statement to know which applications are supported by the structured report; when not available, **MyLab** automatically uses the DICOM image format).

On the same menu the user can set not to export the exam.

Quality Folder

This option allows the user to set three different compression levels both for clips and for single images. The following values can be set: high (minimum compression), medium and low (maximum compression) quality.

The set quality is used for any DICOM archiving operation (on server or on any other medium).

MyLab60, MyLab70 and MyLab90 models

Clips can be left uncompressed on these models. As explained in the warning below, this option has to be set only when the Esaote compression algorithm is not compatible with other DICOM environments.

WARNING

The uncompression option has to be set only when incompatibility occurs as the compression hugely affects the dimension of the converted files and thus the conversion time.

Chapter 12

12 - Export Settings

This chapter explains which formats can be set to export the exams.

Images and Clips Formats

The option allows to set the compression format of single images and clips and the export format of the stress images and reports. The defined formats will be used each time images, clips, stress exams and reports are exported.

Clips Formats

The following formats are available:

- Codec MS-PEG4 V2, ensuring the best image quality.
- Codec MS-VIDEO1, ensuring a higher compatibility with other software programs for clips management.

Image Formats

The following formats are available:

- No compression (BMP format), ensuring the best image quality.
- Medium compression (PNG format), ensuring a good image quality.
- Compressed (JPEG format), with low image quality.

Stress Images

The stress images can be exported:

- By stage.
- By view.
- As single images

Report

The report can be exported in:

- XML format.
- HTML format

Chapter 13

13 - Saving and Loading Presets

This chapter explains how to save and load the user presets.

Saving User Presets

This option is used to save all user presets on the USB medium. Connect the USB support to the system and press OK to confirm..

CAUTION

On MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 models, if the presets have been previously saved through the option "Save & Load Presets", they can be loaded to be restored **only when the "Save & Load Preset" operations are performed with the same software release**.

Loading User Presets

The presets can be reloaded onto the hard disk at any time, using the same procedure. It is possible to load specific user presets: the system lists the user configurations available for being reloaded.

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

The table below lists which configuration can be separately re-loaded. Once selected the desired presets, press OK to start the loading procedure.

CAUTION

With the exception of the user presets, the loaded configurations completely overwrite the ones set on the system: the previous configurations are then lost.

Preset	Action
GENERAL	Overwrites all settings of the "General Preset" menu option.
USER	Adds the saved presets among the existing user presets
GRAY MAP	Overwrites all settings of the "Gray Map" option of the "Application Preset" menu.
APPLICATION MEASUREMENT, GENERIC MEASUREMENT…	Overwrites all settings of "Application Measurements", "Generic Measurements", "Report Layout", "Glossary", "Peripherals", "Network Directory", "Dicom Configuration", "3D Presentation" and "Export Settings" menu options.
SPECIAL PROBES	Overwrites all settings of the "Special Probes" option of the "Tools Settings" menu.
STRESS ECO PRESET	Overwrites all stress presets created through the "Tools Settings" menu option.
CnTI PRESET	Overwrites all CnTI presets created through the "Tools Settings" menu option.
X-VIEW	Overwrites all settings of the "X-View" option of the "Application Preset" menu.
QIMT SETTINGS	Overwrites all settings of the "QIMT" option of the "Tools Settings" menu.

User Preset

The menu allows to select the user presets to be added to the existing ones.

Procedure

- Place the cursor on BROWSE and press **ENTER** to confirm.
- The system displays the list of the presets saved on the USB medium.
- Highlight the preset to be loaded and press ADD to confirm.
- Repeat the operation for all the desired presets to be loaded.

MyLab 60, MyLab70 and MyLab90 Models

The table below lists the configurations , which can be individually reloaded.

CAUTION

In case of homonymy, the loaded configurations completely overwrite the existing ones, set on the system: the previous configurations are then lost.. The other presets are added to the existing ones.

Preset	Action
GENERAL	Loads all configurations of the "General Preset" and "Footswitch" menu options.
APPLICATION	Loads all configurations of the "Application Preset" menu option.
USER	Loads all configurations of the "User Preset" menu option.
APPLICATION MEASURE	Loads all configurations of the "Application Measurement" menu option.
GLOSSARY	Loads all configurations of the "Glossary" menu option
ARCHIVE PRESET	Loads all configurations of the "Report layout", "Peripherals", "Network Directory", "3D Presentations", "Dicom Configuration", "Generic Measurement" and "Export Settings" menu options.

Chapter 14

14 - Security

Access to the system, particularly access to the archive, can be reserved to authorized users. In this case all users have to enter a password to use the system and to access the archive data. The access under password allows a secure management of the archive: its data can be reviewed and modified only by authorized personnel.

This chapter explains the archive security management offered by **MyLab** and how to define the list of the authorized users.

This chapter also describes the **MyLab** measures implemented and suggested by Esaote to avoid attacks from viruses.

Users Accounts

Two different accounts are available: administrator and user.

The system administrator can decide whether to activate the access security management. When enabled, he can create, add, delete users and define their profiles. The administrator can set the emergency access to the system (access without password). More administrators can be defined.

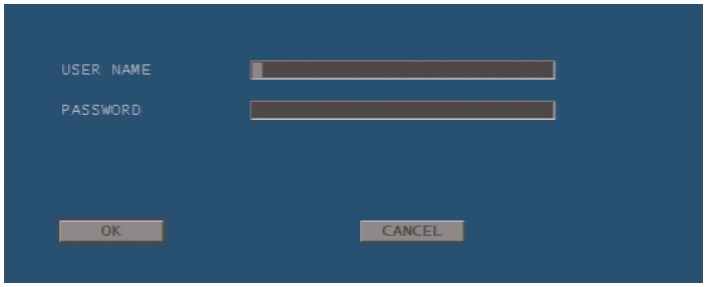
Note

The default administrator user name and password are: ADMINISTRATOR and MYLAB. Change this account if the security management is activated.

Both administrator and users can access the archive, both in exam review and in archive review.

Security Access to the System

When security is enabled, a password is required to access the system. When starting up, the system requires to enter user name and password.



Emergency Access

When the Emergency option is active, exams can be performed (EMERGENCY button) without entering any user name and password. The Emergency access allows to perform exams and review saved images in Exam Review, but won't allow to access the Archive (**ARCHIVE REV** key).

> ***Note***
>
> Emergency exams are automatically saved on the local archive. Only authorized users can access these exams

Log Off

The LOG OFF button is displayed besides the OK button in the Start Exam window. The system is set in stand-by by pressing this key and can be reactivated by inserting user name and password again.

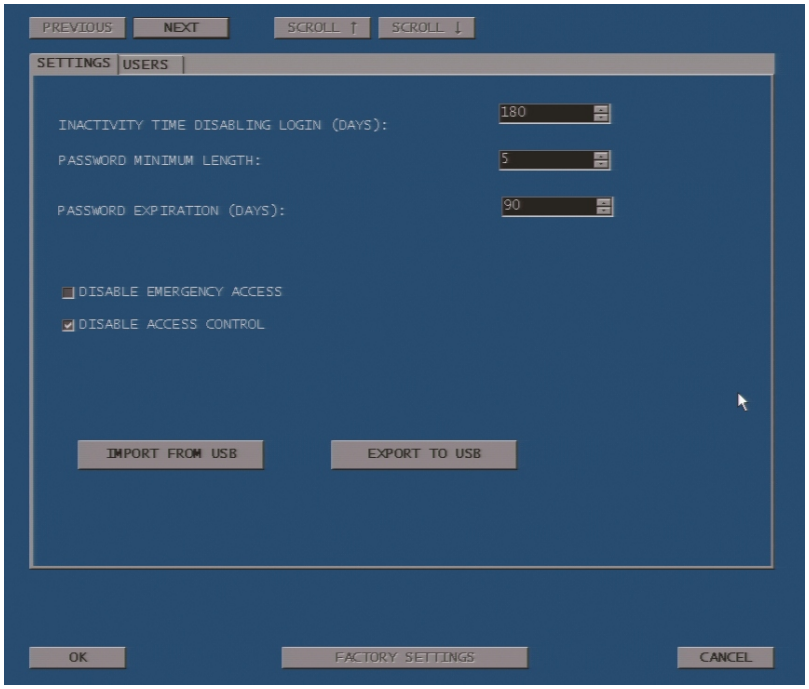
Security Configuration

The "Security" option has two folders: "Configuration" and "Change Password". The last folder is displayed only when the security is enabled.

Configuration

Only administrators can access this option. The configuration menu has two folders: "Settings" and "Users".

Settings Folder



The following settings are available:

Field	Action
INACTIVITY TIME DISABLING LOGIN (DAYS)	Sets the inactivity time (in days) after which the account automatically expires.
PASSWORD MINIMUM LENGTH	Sets the minimum number of characters for the password (maximum 20).
PASSWORD EXPIRATION (DAYS)	Sets the time (in days) after which the password expires.
DISABLE EMERGENCY ACCESS	Disables the emergency access when checked.
DISABLE ACCESS CONTROL	Disables the security access when checked.

Note

The system is case sensitive.

Users Folder

User accounts can be added (ADD button), modified (EDIT button) or deleted (DELETE button).

A new user account is identified by "User name", "Last name", "First name" and "Middle name". The user can be set as administrator when the relevant box is checked.

The system requires a new password at the first login if the "Change password at next login" option is checked.

Only enabled users are able to access the system.

The ASSIGN PASSWORD button (available with the EDIT button) allows to change the password for an existing user.

Saving the configuration

The settings can be saved on (EXPORT TO USB) or imported from a USB medium (IMPORT FROM USB). The system saves all configurations (Settings and Users) and the access security log (see below) in the *MyLabUserManagement* folder of the USB pen drive. This procedure can be used to backup the security configuration, or to copy it to another **MyLab** system with a compatible software release.

Change Password

This option is available for all authorized users and allows to change the password. Old and new passwords have to be inserted.

Access Security Control

When enabled, the security access management produces a log file (called *UserManagementLog.txt*) tracing every access to the unit (access log). This allows the system administrator to fulfil the security regulations requiring this kind of log.

The log file can be considered to have adequate completeness, inalterability and integrity. The log file is automatically produced and internally archived by the **MyLab** system: this file can be then considered complete and can be exported into a USB pen drive. **MyLab** can be considered a closed system: the normal user (including the system administrator) cannot modify the contents of the log file: this guarantees its inalterability. Moreover it is always possible to export again the log file to verify its integrity.

Protection from Viruses

As every other computer-based system, **MyLab** can be exposed to malware attacks. The term "malware" indicates software (sometimes called virus, trojan horse, worm, etc.) that is designed to infiltrate or damage a computer system without the owner knowing. Theoretically malware can affect the operations of a computer system in different ways: it could delete its system files, thus stopping it's functioning; it could also compromise the security of the machine, allowing unwanted exposition of the data contained in it. In a medical imaging system, like the **MyLab** system, this could compromise the privacy of the examined patients or damage the exam database.

Esaote develops its products, including **MyLab**, with the objective of providing its customers with enhanced security capabilities and is committed to cooperate with customers in their efforts to comply with security and privacy laws and regulations (such as HIPAA in the U.S.A., EU Security Directive in Europe …).

Unfortunately, as for any other computer-based system, internal security measures do not ensure a complete protection of **MyLab** against malware. For this reason the user must be aware of Esaote countermeasures and must know which is the best approach to work with **MyLab** in the best possible security conditions.

Malware Infection

Malware can enter into a computer system when executing a program with a viral payload. Such a program could be either intentionally or accidentally executed. Normally **MyLab** does not allow to intentionally execute other software programs than the pre-loaded ones: exceptions occur when installing a printer.

Refer to the "Peripherals" chapter for information on printer installation

While installing the printer, the **MyLab** system could require specific printers drivers, if these are not already present.

CAUTION

Some printers may require additional drivers: always use the original printer installation disk of the manufacturer.

Besides these operations, **MyLab** can be considered a closed system. To ensure the maximum level of security, auto-running software from removable devices is disabled.

CAUTION

Always and only use removable devices with a safe content (devices used only on systems protected by malware).

Note

Any operation different from the ones described in the Operator manuals is not authorized by Esaote. Any system malfunctioning caused by unauthorized operations is considered as falling under the user's responsibility.

MyLab Operating System Patches Policy

Malware can also enter a computer system through the data network, exploiting a failure of the operating system. For this reason it is very important to install as soon as possible the relevant security patches released from the manufacturer of the operating system.

The operating system is Windows® XP Embedded for **MyLab25**, **MyLab30** and **MyLab50** models and Windows® XP[1] for **MyLab60**, **MyLab70** and **MyLab90**. Esaote includes the manufacturer operating system patches into the **MyLab** software releases: this will ensure that the patches do not affect the system functioning and are validated by Esaote.

[1] Windows® XP Embedded and Windows® XP are manufactured by Microsoft Corporation

At least every six-eight months, Esaote will issue a new software release, including all relevant patches released by Microsoft.

Antivirus

Esaote does not install an antivirus program because it could affect the regular operations of **MyLab**: to be really effective an antivirus software should be configured in a way that heavily limits the system resources, especially regarding the real time ultrasound acquisition. Moreover any antivirus software is effective only if continuously updated (almost every day). As explained above, any update should be carefully validated by Esaote to be sure it does not affect the regular operations of **MyLab**.

Firewall

It is anyway advisable to close to the malware any possible access from the data network: for this reason all unused network ports are closed in the **MyLab**.

To minimize the exposition to the threats coming from the network, medical devices based on a networked computer system, like **MyLab**, should be connected only to a carefully managed data network, i.e. a network that is carefully isolated from external networks through suitable firewalls and that is not used to connect external devices (such as laptops coming from outside the department, etc.)[2].

To ensure a complete protection of **MyLab** from any network attack, Esaote suggests to use a complete agentless intrusion-prevention system: this is a system that acts like a firewall protecting the network against malware from outside, but it also checks the internal network traffic, without requiring any additional software installation in the **MyLab** system[3].

Should further information be needed, please contact Esaote personnel.

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[2] Refer for example to the USA Department of Veterans Affairs Medical Device Isolation Architecture Guide, April 30, 2004, available at the HIMSS website: http://www.himss.org/ASP/topics_FocusDynamic.asp?faid=101.

[3] Refer for example to Trend Micro Network VirusWall Enforcer or Firebox X Core Unified Threat Management products or SonicWALL TZ products, or similar

Chapter 15

15 - Licenses and System Configuration

This chapter explains how to use the Licenses option. The System Configuration option is briefly described.

Licenses

Licences menus may differ among MyLab models

The Licenses menu option allows to manage licenses. To activate a new license, the operator needs the appropriate form listing all licenses associated to the system. For each license insert the number indicated in the list and press OK.

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

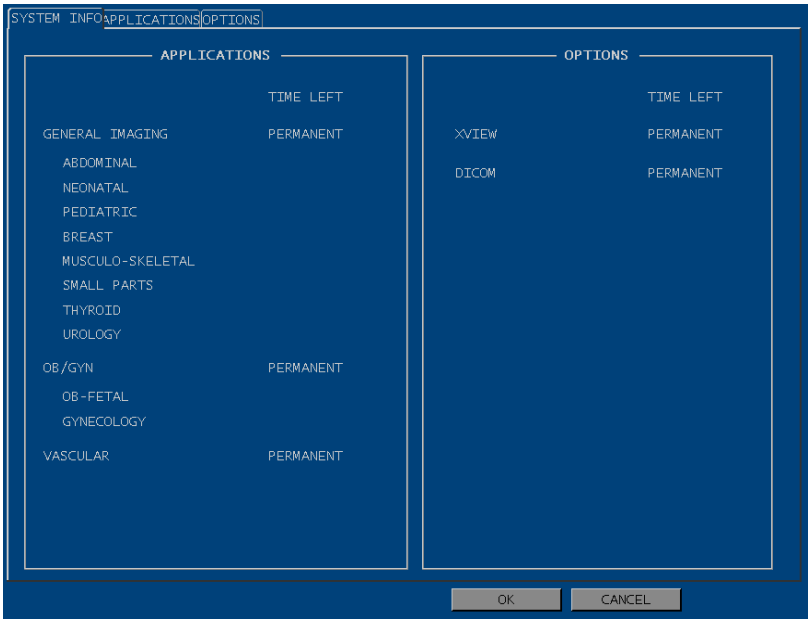
The Licenses menu is a window containing different fields. These fields are used to enter a new license. Enter the license number in the relative field and press OK to confirm. The license will be activated at next switching on.

Mylab60, MyLab70 and MyLab90 Models

The Licenses menu is organized in internal folders. To access the various folders, position the pointer on the corresponding tab and press **ENTER**.

System Info

This tab summarizes the status of the licenses for both Applications and Options.

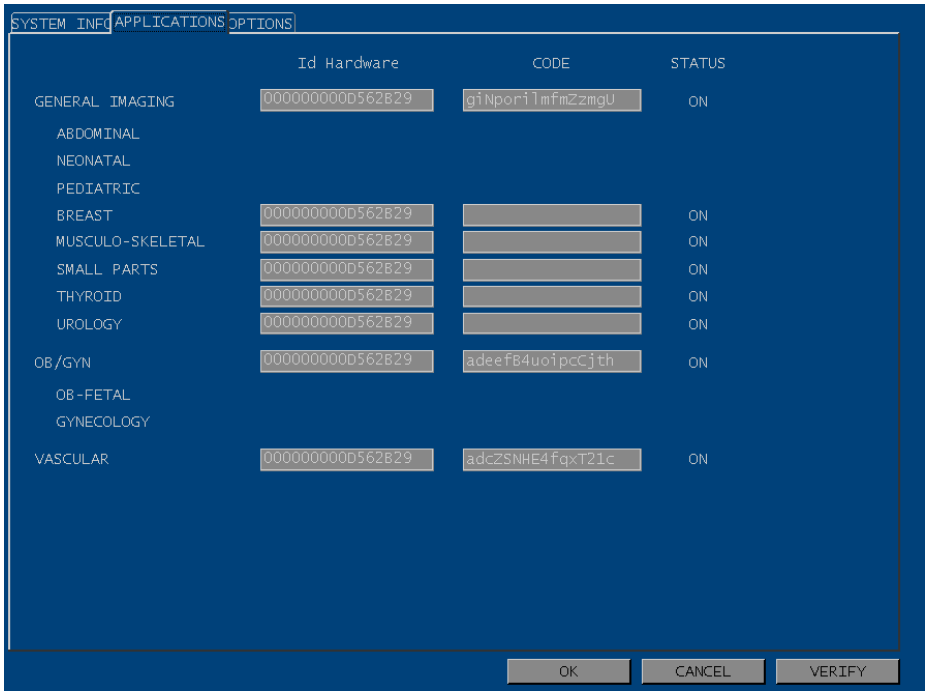


Applications
This tab allows to activate the Application licenses.

To activate a new license, type the license number in the code field and press VERIFY to confirm. If the number is correct, the status changes to ON. Note that the system is case sensitive.

License codes are generated according to the Hardware ID of the system: different codes cannot activate the same license.

If a demo license has been activated, this tab shows the elapsed time and the time left.



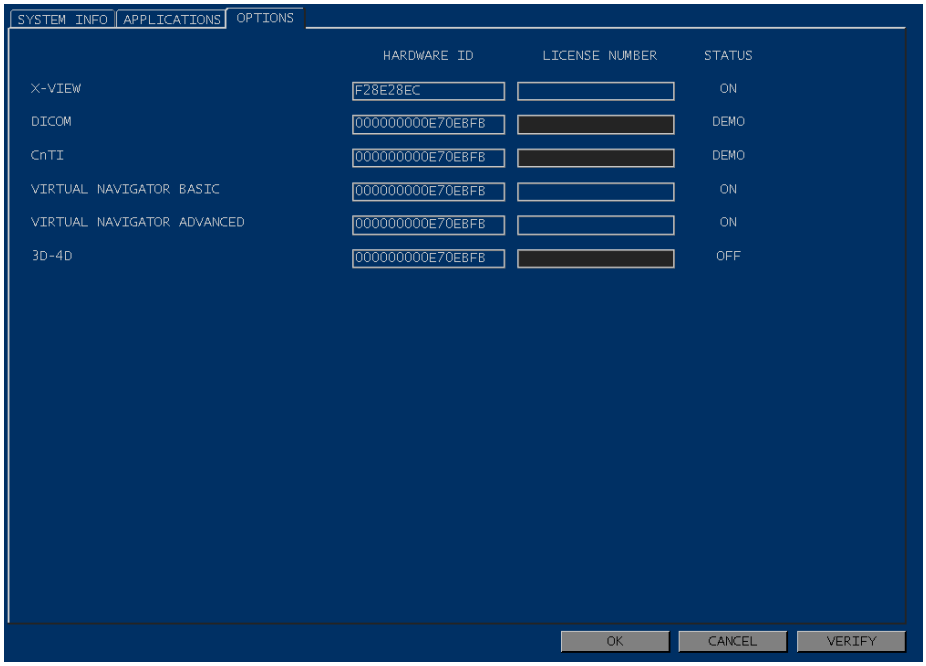
Options

This tab allows to activate the optional licenses.

To activate a new license, type its number in the code field and press VERIFY to confirm. If the number is correct, the status changes to ON. Note that the system is case sensitive.

License codes are generated according to the Hardware ID of the system: different codes cannot activate the same license.

If a demo license has been activated, this tab shows the elapsed time and the time left.



System Configuration

MyLabFive, MyLab20Plus, MyLab40, MyLab25, MyLab30 and MyLab50 Models

This option, organized into folders, displays the machine's Hardware and Software configuration. When demo licenses are used, their expiration can be checked in the relative folder.

The system configuration can be saved on a USB key through the **EXPORT** option.

Mylab60, MyLab70 and MyLab90 Models

The options display the current system version. The same option allows the user to save the log files on a USB key. To save the log files, insert a USB key into one of the two connectors and activate the procedure.

SPECIALTY PROBES AND NEEDLE GUIDE SECTION

Refer to Getting Started manual for probes available on ***MyLab*** *model.*

This section provides information on features specifically provided for specialty probes. It also explains how to interact with the Needle Guide.

The section is organized as follows:

- Chapter 1: The Transesophageal Probes

  This chapter describes the screen information specific for transesophageal exams. It also reviews the probe temperature control characteristics while scanning with a **MyLab** system

- Chapter 2: General Information on Needle Guides

  This chapter gives a list of the needle guide kits that can be used with **MyLab** and provides general information about the correct way to use the Needle Guide Software.

- Chapter 3: Using the Needle Guide

  This chapter explains how to verify the needle guide working and to use it with **MyLab**.

- Chapter 4: Using the Needle Guide with Bi-Scan Probes

  This chapter explains how to use the needle guides with Bi-Scan probe on **MyLab** unit.

Read the "Transducers and Consumables" Manual carefully for detailed information on how to properly and safely handle the probes and their Needle Guide Adaptors.

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Chapter 1

1 - Transesophageal Probes

This chapter describes the screen information specific to transesophageal exams. It also reviews the probe temperature control characteristics while scanning with a **MyLab** system

Screen Information

The following additional information is displayed while working with the transesophageal probes:

- The probe tip temperature
- The transducer orientation

Tip Temperature

The probe tip temperature is displayed, and continuously updated, in the upper left side of the screen. The << and >> symbols are displayed whenever the probe tip temperature is respectively lower or higher the working range limits.

It is displayed in Fahrenheit (°F) or Centigrade (°C), depending on your system settings, with a one decimal digit.

Tip Orientation

The bottom left side of the screen displays the plane orientation; an approximate graphic representation and the plane value is displayed in degrees.

A 0° plane is equivalent to the transverse plane of a mono- or bi-plane transesophageal probe. To optimize imaging while scanning, rotate with the probe handle control, the imaging plane up to 180° (i.e., a mirrored transverse plane) with incremental rotation angles of 2°. For a reference, at a 90° rotational angle, the probe imaging plane is equivalent to the longitudinal plane of a bi-plane transesophageal probe.

Temperature Control

TC

The guidelines described in the "Transducers and Consumables" Manual apply to the transesophageal probes with a MyLab system.

To ensure patient safety, the ultrasound scanner "allows" a maximum temperature indicated in the table below

Models	Maximum Temperature
MyLabFive, MyLab40, MyLab25, MyLab30 and MyLab50	**42.5°**C (**108.5°**F)
MyLab60, MyLab70 and MyLab90	**41.5°**C (**106.7°**F)

If the probe reaches this limit, the system automatically freezes, the probe is de-activated and the following warning message is displayed.

Warning! The probe is overheating. Please refer to the Operator manual or wait for the system to restart

Either, wait for the probe to cool down, or interrupt the procedure and remove the probe from the patient. As soon as the temperature cools to a value below the thermal limit, the message disappears and the probe starts working again.

MyLab60, MyLab70 and MyLab90 models

If the probe tip temperature reaches the value of 45°C (113°F), the following warning message is displayed:

WARNING: the probe is overheating! Please, disconnect the probe at once from the system.

To Minimize Probe Heating

Under normal conditions, the probe does not reach the thermal limit; the limit may be reached in patients with a fever or if the thermal sensor is broken.

Note

Before performing transesophageal exams on feverish patients, please refer to the current clinical practice to pharmacologically reduce the body temperature. This will prevent exam interruptions due to the probe reaching the maximum temperature limit.

The following is a list of recommendations to prevent the probe from over-heating:

- Set the B-Mode angle at maximum
- The CFM mode is the greatest heat "generator"; limit the use of the CFM as much as possible in patients with a high body temperature.

Transgastric projections reduce heat dissipation; repositioning the probe in the esophagus may allow the probe to cool down more quickly.

Chapter 2

2 - General Information on Needle Guides

ESAOTE supplies a series of optional adaptors for the biopsy needle guide, and an optional thermoablation kits, all equipped with specific couplings that attach to the probe. **MyLab** can be used to display a needle guideline throughout the ultrasound image. This chapter gives general information about the correct way to use the needle guides.

TC

The user should read and completely understand all information on probes and biopsy kits, as detailed in the "Transducers and Consumables" manual, prior to use of this software.

Needle Guide Kits

The table below lists the adaptors provided by Esaote:

Biopsy adaptor	Probe
ABS421	CA421, CA430, CA431
ABS1421 / TypeT	CA1421
ABS621	CA621, CA631
ABS523	LA523(P), LA522, LA532
ABS424	LA424, LA435
ABS123	EC123
ABS15	IOE323
ABS33	TRT33
WBSL33X	LA332
Attachment for CAB411A	CAB411A

Note

All the listed kits can be used only in biopsy needle guide procedures.

TC NG

Refer to the "Transducers and Consumables" manual for the needle guides to be used with Esaote probes. Needle guide kits which are not tested by Esaote could be noncompatible with the Esaote probes and thereby could compromise the patient's safety.

Thermoablation Kits

Thermoablation Kits	Probe
ABS42X3	CA421, CA430, CA431
ABS62X3	CA621, CA631

Note

The thermoablation kits can be used only in thermoablation procedures using Radiofrequency signal or Microvawe signal.

WARNING

Thermoablation kits which haven't been tested by Esaote could be not compatible with Esaote probes thus compromising the patient's safety.

General Information

The entire needle guide program is managed through the keyboard's **BIOPSY** key on **MyLab60**, **MyLab70** and **MyLab90** models or through the **BIOPSY** software key on the other models. The biopsy procedure is active only in B-Mode, in CFM and if the active probe is compatible with an attachment kit.

Needle Length

MyLab60, MyLab70 and MyLab90 Models

The needle length required for the biopsy procedure can be evaluated: by pressing the **LINE** key: a dotted line will be displayed in the middle of the needle working area. The dotted line represents the ideal path to be followed by the needle. The cursor displayed on the line allows the user to measure the distance from the kit exit point to the cursor itself. The distance value is displayed above the image sector, on the opposite site of the needle insertion point.

The trackball moves the cursor along the dotted line: the displayed value is automatically updated.

WARNING

The displayed value indicates the distance between the kit exit point and the cursor itself. The kit length has to be added up to this distance to evaluate the needle length required for the biopsy.

Press the **LINE** key again to switch back to the biopsy environment.

Chapter 3

3 - Using the Needle Guide

Refer to Getting Started manual for probes available on ***MyLab*** *model.*

This chapter explains how to verify that the needle guide is correctly working and how to use it with **MyLab**.

Needle Guide Selection

After pressing the **BIOPSY** key (or the control panel **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models), the screen will display two dotted lines circumscribing the working region of the needle guide. The needle insertion angle can be fixed or variable, according to the probe and guide being used.

Warning

Always verify that the whole needle working area, from its insertion point up to the target, doesn't include anatomical structures that could be touched and damaged, thus compromising the patient's safety.

The same message will be displayed whenever the probe is changed during the exam. After having read the message, press OK to continue.

According to the probe and guide being used, select, when necessary, the guide and then the needle insertion angle.

Probe	Insertion angle
CA421, CA430, CA431	20^0, 30^0
CA1421	36.3^0
CA621, CA631	25^0, 35^0
CA123	15°*
CAB411A	0^0, 15^0, 30^0
LA522, LA523(P), LA532	45^0, 60^{0}*, 75^{0}*
LA424, LA435	45^0
LA332	35°
EC123, EC1123	0^{0}*, 3.8^0
E8-5 R10P	3^0
IOE323	45^0
TRT33	90^0

* Available only with disposable kit

The softkeys allow selection of the guide and the needle angle.

Checking the Guide Working

- Assemble the needle guide on the probe, following the instructions provided in the "Transducers and Consumables" manual.

TC

Carefully read the "Transducers and Consumables" manual: all features relating to system safety, warnings and cautions also apply to needle guides.

- Immerse the probe to the allowed limit (see the "Transducers and Consumables" manual) in a water tank.
- Press **BIOPSY** (or the control panel BIOPSY key for **MyLab60**, **MyLab70** and **MyLab90** models) and then OK to continue
- When necessary, select the guide (**N GUIDE** key) and then change the needle insertion angle, if required
- **MyLab** will display two dotted lines circumscribing the working region of the needle guide

WARNING

Before proceeding, be sure the kit has been correctly assembled and the needle has been inserted into the guide corresponding to the angle selected during the calibration procedure. Needle insertion into a guide with a different angle may be dangerous to the patient's safety!

- Both in B-Mode and Freeze, be sure that the needle is correctly displayed within the working area.
- If necessary, evaluate the needle length required by the biopsy procedure.

WARNING

If the needle is displayed outside the working area, do NOT use the guide and immediately contact ESAOTE Service.

Using the Needle Guide

Biopsy procedures can be activated on 2D or 2D-CFM image, in Dual, Dual-CFM and simultaneous formats.

WARNING

Biopsy procedures must be performed only on real time image. Never move the needle when the image is frozen.

Procedure

- Assemble the needle guide on the probe, following the instructions provided in the "Transducers and Consumables" manual.

TC

Carefully read the "Transducers and Consumables" manual: all features relating to system safety, warnings and cautions also apply to needle guides.

- Press the **BIOPSY** key (or the control panel BIOPSY key for **MyLab60**, **MyLab70** and **MyLab90** models). The system will display the following warning message:

Warning

Always verify that the whole needle working area, from its insertion point up to the target, doesn't include anatomical structures that could be touched and damaged, thus compromising the patient's safety.

- Carefully read the message and press OK to continue.
- When necessary, select the guide first (**N GUIDE** key) and then the angle to display the working area. If the selected guide corresponds to a thermoablation kit, the system displays the following message:

Warning

The displayed biopsy working area refers to the needle which is closest to the probe. The other two needles lie on different planes and can not be displayed.

Note

The thermoablation kits can be used only in thermoablation procedures using radiofrequency signal or microwave signal

WARNING

The line displayed on the screen provides an indication of the needle direction, according to the selected guide. Always watch the ultrasound image while inserting the needle into the patient's body, and be sure that the needle always stays within the displayed area.

Note

In Dual format or at certain scanning depths the needle insertion point or the needle itself could not be displayed.

WARNING

When scanning vascularized structures, display the needle guide working area keeping the CFM mode active so that vessels can be detected and avoided when inserting the needle. Once identified the optimal zone for biopsy, turn CFM off to gain the maximum needle visibility.

Once the needle guide line is displayed, the system temporarily disables all modes, except 2D or 2D-CFM image, in Dual, Dual-CFM and simultaneous formats;; set the guide line to **OFF** to access other Real Time modes.

To Erase the Needle Guide Line

To erase the needle guide line, press the **BIOPSY** key again (or **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models).

After the Examination

TC

When the biopsy procedure has been completed, remove the needle and the guide from the probe. Clean the items following the instructions provided in the "Transducers and Consumables" manual and by the manufacturer and, when applicable, dispose of the items according to the local regulations.

Chapter 4

4 - Using the Needle Guide with Bi-Scan Probes

Refer to Getting Started manual for probes available on ***MyLab*** *model.*

This chapter explains how to use the needle guide with Bi-Scan probes on **MyLab** unit.

Bi-Scan Needle Guide Kits

Bi-Scan probes can be equipped with disposable needle guides providing the following insertion angles listed in the table below.

Probe	Insertion Angle
BC431	25^0, 35^0
BL433	45^0, 60^0

TC

Carefully read the "Transducers and Consumables" manual: all features relating to system safety, warnings and cautions also apply to needle guides.

Refer to the previous chapter to perform the checking procedure.

Using the Needle Guide with Bi-Scan probes

Biopsy procedures with Bi-Scan probes can be activated on 2D and 2D-CFM image, in Dual, Dual-CFM and simultaneous formats.

WARNING

Biopsy procedures must be performed only on real time image. Never move the needle when the image is frozen.

Procedure

- Assemble the needle guide on the probe, following the instructions provided in the "Transducers and Consumables" manual.

TC

Carefully read the "Transducers and Consumables" manual: all features relating to system safety, warnings and cautions also apply to needle guides.

- Make sure that the scanning plane is at 0°; if necessary, move it into the correct position using the **PLANE** key, the plane slope value is shown on the left side of the system screen.

- Press the **BIOPSY** key (or the control panel **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models). The system will display the following warning message:

Warning!

Always verify that the whole needle working area, from its insertion point up to the target, doesn't include anatomical structures that could be touched and damaged, thus compromising the patient's safety.

- Carefully read the message and press OK to continue.

Note

MyLab automatically centers the scanning plane at 0° as soon as the **BIOPSY** key (or the control panel **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models) is pressed. Whenever this is not possible, the system will display the following warning message:

Warning!

The probe could not be centered. It is not granted that the needle path lies on the visualized image. Please contact the Service department.

- Select the insertion angle: the system displays the needle guide lines indicating the working area.

WARNING

The line displayed on the screen provides an indication of the needle direction, according to the selected guide. Always watch the ultrasound image while inserting the needle into the patient's body, and be sure that the needle always stays within the displayed area.

Note

In Dual format or at certain scanning depths the needle insertion point could not be displayed.

WARNING

When scanning vascularized structures, display the needle guide working area keeping the CFM mode active so that vessels can be detected and avoided when inserting the needle. Once identified the optimal area for biopsy has been identified, turn CFM off to gain the maximum needle visibility.

Once the needle guideline is displayed, the system temporarily disables all modes, except 2D or 2D-CFM image, in Dual, Dual-CFM and simultaneous formats.

To Erase the Needle Guide Line

To erase the needle guideline, press the **BIOPSY** key (or the control panel **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models) again.

Scanning Plane Verification

During the biopsy procedure, **MyLab** continuously checks that the scanning plane stays positioned at 0°. If this automatic check fails, the system will display the following message:

Plaese wait:

The probe is performing its centering calibration.

The calibration lasts few seconds: soon after the system is operative again.

When the calibration fails, the following warning message is displayed:

Warning:

the calibration procedure failed. Please contact the Service department.

Carefully read the message and press **OK** to continue: the dot lines of the active needle get a different color (from white to orange) to indicate the wrong working conditions. Interrupt the biopsy procedure as soon as possible and contact Esaote personnel.

As soon as the **BIOPSY** key (or the control panel **BIOPSY** key for **MyLab60**, **MyLab70** and **MyLab90** models) is pressed or the exam is closed (**START/END** key) **MyLab** displays the following message:

Warning!

The probe could not be centered. It is not granted that the needle path lies on the visualized image. Please contact the Service department.

4D Visualization

During biopsy procedure with Bi-Scan probe, it is possible to activate the volumetric acquisition in real-time.

WARNING

Always insert and move the needle only in real time 2D: in 4D presentations the needle could be not displayed.

Refer to Secion "3D/4D" for detailed information on 4D presentations and controls

- Press the **TOOLS** key and select 4D icon,
- Select the desired preset and press **OK**.
- Press **ACQUIRE** to display the ROI cursor.

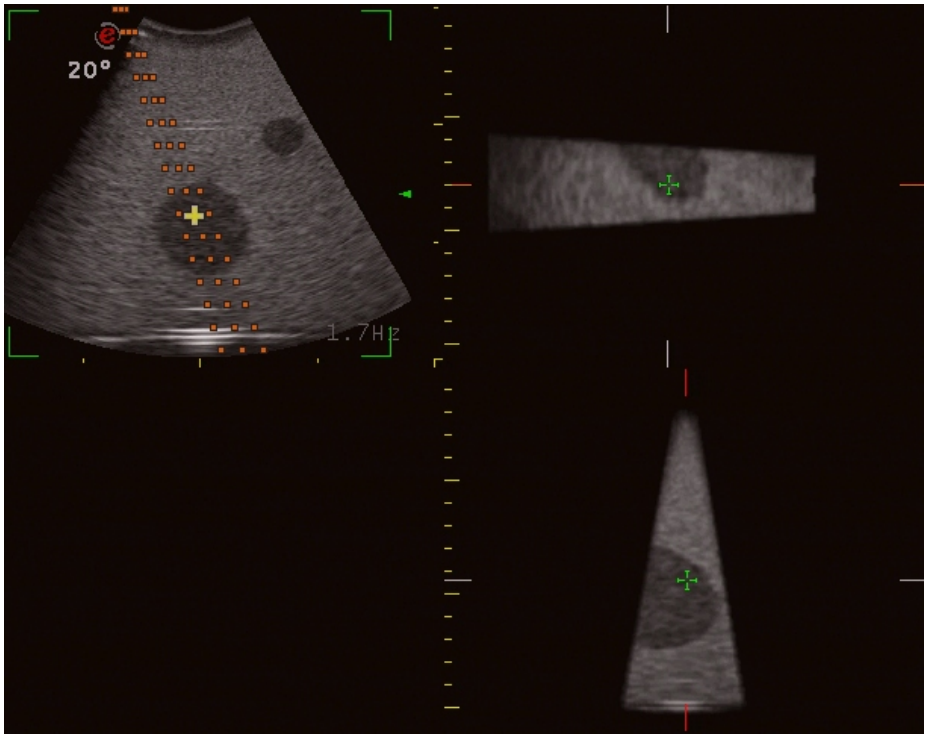
Note

During biopsy procedures there's no possibility of changing the ROI size, the scan angle and the volume reconstruction modality.

- Press **ACQUIRE** again to activate the 4D acquisition.

Reference Plane Icon

In biopsy procedures the default presentation is the Reference Plane.



The 2D image, corresponding to the XY plane, is displayed on the left side of the image area. The needle working region is overlaid on this image.

Note

The working region has a different color in the 2D real time image (the dot lines are white) and in the 4D image (the dot lines are orange): this gives a prompt indication to the user of which active mode is being used (whether 2D real time or 4D).

The XZ and YZ planes are displayed on the right side of the image area. These planes appear rotated around the Z axis of an angle equal to the insertion angle.

The trackball moves the cursor along the needle within the working area. When applicable, the green markers on the other two planes move inside the volume.

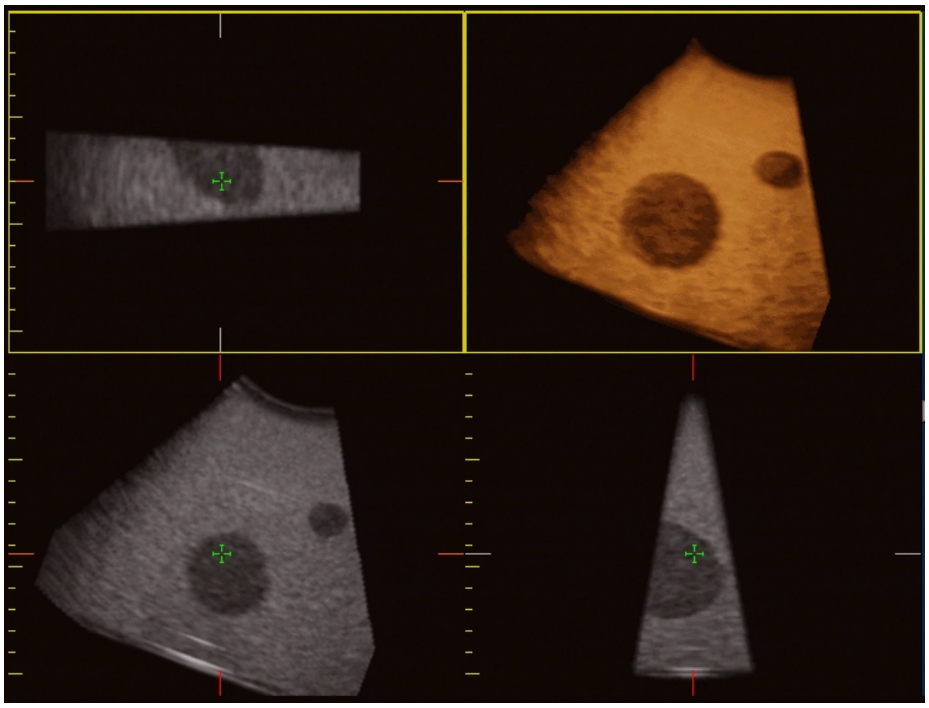
Refer to Section "3D/4D" for detailed information on Menu operations

Note

During biopsy procedures some 4D options and some 4D controls of the menus relating to operations on volumes are not available.

TPI Icon

In TPI presentation the three planes are displayed together with the rebuilt volume. Both the volume and the XY plane are rotated of an angle equal to the insertion angle.



After the Examination

TC

When the biopsy procedure has been completed, remove the needle and the guide from the probe. Clean the items following the instructions provided in the "Transducers and Consumables" manual and by the manufacturer and, when applicable, dispose of the items according to the local regulations.