# UltraFocus® DXA

Specimen Radiography System

## User's Guide

**5081-9536-DXA Revision 001**

HOLOGIC®

# UltraFocus® DXA

Specimen Radiography System

# Imaging Module

User Guide

For Software Version 3.1

Part Number 5081-9536-DXA
Revision 001
April 2021

HOLOGIC®

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# Table of Contents

**List of Figures** vii

**1: Introduction** 1
1.1 General 1
1.2 Features Overview 1

**2: General Information** 3
2.1 System Overview 3
2.1.1 Operational Overview 3
2.2 Safety Information 5

**3: Using the UltraFocus® DXA System and Software** 7
3.1 System Start-up Sequence Protocol 7
3.1.1 Power Up and Configure X-Ray Cabinet 7
3.1.2 Start the Software 8
3.1.3 Calibrate the System 9
3.2 Image Acquisition – DXA Mode 10
3.2.1 Procedure Data Entry 10
3.2.2 Specimen Preparation and Positioning the Animal 13
3.2.3 Acquiring DXA Images and Analysis 14
3.3 Saving Reports for Import into Spreadsheet 18
3.4 Selecting Regions of Interest 21
3.5 Saving ROI Results in a Tabular Log 24
3.6 Measurements and Annotations 25
3.6.1 Measurements 25
3.6.2 Annotations 26

**4: Standard Imaging procedure - DXA Software** 27

**5: High-Resolution Imaging Only Mode – Bioptics Vision Software** 29

**6: System Shut Down Procedure** 33

**7: Cleaning, and Disinfecting** 35
7.1 General Information 35
7.1.1 For General Cleaning 35
7.1.2 For Disinfecting 35
7.1.3 To Prevent Possible Injury or Equipment Damage 35
7.2 Component Specific Care 36
7.2.1 How to Clean the Image Display Monitor 36

**Appendix A System Specifications** 37

A.1 Product Measurements ..... 37
A.2 Operation and Storage Environment ..... 38
A.2.1 General Conditions for Operation ..... 38
A.2.2 General Conditions for Transport and Storage ..... 38
A.3 Technical Specifications ..... 39
A.3.1 System Specs ..... 39
A.3.2 Laser Information ..... 40
A.3.3 X-Ray Tube ..... 40
A.3.4 Computer Specification ..... 41

**8: Glossary of Terms ..... 43**

# List of Figures

Figure 1: UltraFocus® DXA System ....3
Figure 2: UltraFocus® System Key ....7
Figure 3: Detector Shelf Set Up for DXA Procedure ....7
Figure 4: Detector Shelf Position for DXA Procedure ....8
Figure 5: Magnification Shelf Storage ....8
Figure 6: Vision DXA and BiopticsVision Software Icons ....8
Figure 7: Standard Procedure, DXA Procedure, and Calibrate System button in the Toolbar ....9
Figure 8: Calibration Dialogs ....9
Figure 9: Calibration Dialogs ....9
Figure 10: Calibration Dialogs ....10
Figure 11: DXA Procedure button ....10
Figure 12: Sample Data button ....11
Figure 13: Database File Entry Window ....11
Figure 14: Imaging Information Editor ....12
Figure 15: Calibration Dialogs ....13
Figure 16: Specimen Positioned on Detector ....13
Figure 17: UltraFocus® DXA Control Panel (Physical Panel on front of cabinet) ....14
Figure 18: Device Panel Button and Device Control Panel (Software) ....14
Figure 19: Low Energy Image ....15
Figure 20: High Energy Image ....15
Figure 21: 4-Pane Review Window and DXA Tissue Decomposition Statistics ....16
Figure 22: DXA Tissue Decomposition Statistics ....16
Figure 23: DXA Anatomic Inclusion Filters Menu ....16
Figure 24: Next Button ....17
Figure 25: Calibration Dialogs ....17
Figure 26: Calibration Dialogs ....18
Figure 27: Save/Log Report ....18
Figure 28: DXA Tissue Decomposition Statistics “Save Report” Dialog ....19
Figure 29: DXA Tissue Decomposition Statistics saved report ....19
Figure 30: Accessing ROI and WHOLE Area Logs ....20
Figure 31: Whole Area Tabular Log ....20
Figure 32: Next Button ....21
Figure 33: Zoom and Pan ....21
Figure 34: Adjusting Contrast ....22
Figure 35: Open the ROI Tool ....22
Figure 36: ROI Selection and DXA Tissue Decomposition Statistics ....23
Figure 37: Calibration Dialogs ....24
Figure 38: Check Box – ROI Tabular Log ....24
Figure 39: On-Screen Menu ....25
Figure 40: The Ruler ....25
Figure 41: Selecting Annotate from the Menu ....26
Figure 42: Annotation Toolbox ....26

Figure 43: Exit and Standard Procedure Buttons ....27
Figure 44: Animal Placed on Magnification Shelf ....27
Figure 45: Device Control Panel – Full Auto Mode ....28
Figure 46: Exit and Exit Program Buttons ....29
Figure 47: Calibration Dialogs....30
Figure 48: BiopticsVision Icon....30
Figure 49: Calibration and Start Procedure Buttons ....31
Figure 50: Start-up Screen (Main Screen) and Shutdown System button ....33
Figure 51: System Key on Front Panel ....33
Figure 52: Cabinet Measurements ....37

# Chapter 1 Introduction

This manual is a supplement to the UltraFocus® User's Manual, P/N 5081-9536, and covers the operation of the UltraFocus® DXA Imaging Module. Refer to the UltraFocus® User's Manual for information on the cabinet, detailed instructions on the Standard Vision imaging software, compliance, and warnings and cautions.

Please follow these instructions to ensure that you get the best results with your new UltraFocus® DXA system.

## 1.1 General

The UltraFocus® Dual Energy X-Ray Absorptiometry (DXA) Vision software module supports a supplementary DXA procedure option. It is designed to coexist with the standard Vision imaging software and is currently only available on UltraFocus® DXA systems.

The DXA module provides bone mineral density (BMD) and content (BMC), fat content, and lean mass and percent, of mice and other small animals. The DXA module is capable of both whole specimen and region-of-interest (ROI) analysis. The data generated by the DXA module can generate reports for third-party data analysis and for historical record keeping.

## 1.2 Features Overview

The features offered by the DXA Vision Software include:

- Whole body and Region of Interest (ROI) analysis including:
  - Total weight of animal and ROI
  - Weight breakdown by:
    - Lean mass
    - Fat mass
    - Bone mass
  - BMC of animal and ROI
  - BMD of animal and ROI
- Easy to view and manipulate bone and tissue maps for separated, localized information,
- Ability to save reports for third-party data analysis and record keeping.

# Chapter 2 General Information

## 2.1 System Overview

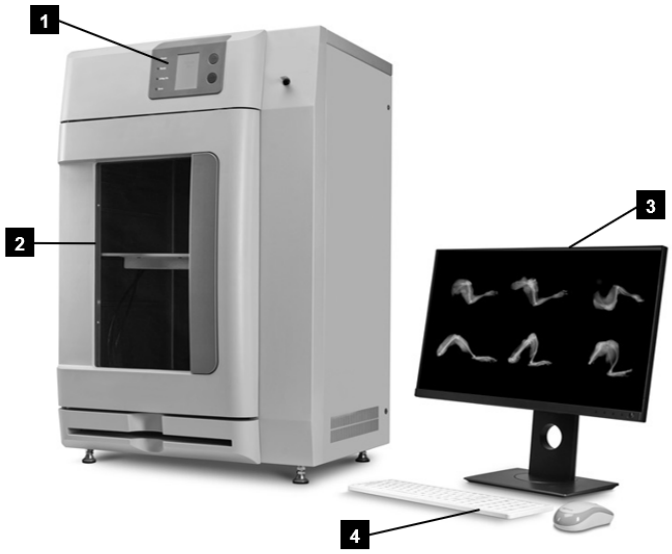


*Figure 1: UltraFocus® DXA System*

**Figure Legend**

1. Control Panel
2. X-Ray Imaging Chamber
3. Image Display Monitor
4. Keyboard & Mouse

### 2.1.1 Operational Overview

The UltraFocus® DXA system has two modes of operation: DXA imaging and High-Resolution Imaging Only. The primary operational difference between the imaging modes is the position of the detector shelf in the x-ray chamber and starting the appropriate imaging software; either “Vision DXA” or “Bioptics Vision”.

The DXA mode combines high resolution imaging and DXA analysis and is accessed by clicking the Vision DXA icon on the computers’ desktop. DXA mode requires the user to place the detector shelf in the 2.0x magnification position, or the second level from the bottom of the chamber.

Note that a Standard Procedure may also be performed while the system is configured for DXA operation. The High-Resolution Imaging Only mode provides higher resolution than the DXA Standard Procedure and access to two additional magnification levels. This is due to the position of the detector shelf in the chamber, which is on the chamber floor

in the High-Resolution Imaging Only mode versus magnification level 2.0 for the DXA Standard Procedure.

The High-Resolution Imaging Only mode is accessed by clicking the BiopticsVision icon. This mode requires the user to place the detector shelf on the floor of the chamber, which allows access to all levels of geometric magnification. For detailed information on the operation of the UltraFocus® system in High-Resolution Imaging Only mode please refer to the UltraFocus® User's Manual, P/N 5081-9536.

## 2.2 Safety Information

Read and understand this manual before you use the system. Keep the manual available during the operation of the unit.

Always follow all the instructions in this manual. Hologic does not accept responsibility for injury or damage from incorrect system operation. Hologic can arrange for training at your site.

The system has safety interlocks, but the user must understand how to safely operate the system and be aware of the health hazards of x-ray radiation.

# Chapter 3 Using the UltraFocus® DXA System and Software

## 3.1 System Start-up Sequence Protocol

### 3.1.1 Power Up and Configure X-Ray Cabinet

1. Turn the key on the front of the cabinet 90° clockwise to power on the DXA system. *See figure below.*

*Figure 2: UltraFocus® System Key*

2. Configure the chamber for a DXA procedure. *See figures below.*
   a. Open the chamber door and make sure the detector shelf is at level 2. *If the shelf needs to be re-positioned take care not to pull or put tension on the cables connected to the detector shelf.*
   b. Make sure nothing is in the detectors active field of view.
   c. Also verify that the magnification shelf is not in the chamber. *(It should be stored in the slot below the chamber door.*
   d. Close the chamber door.

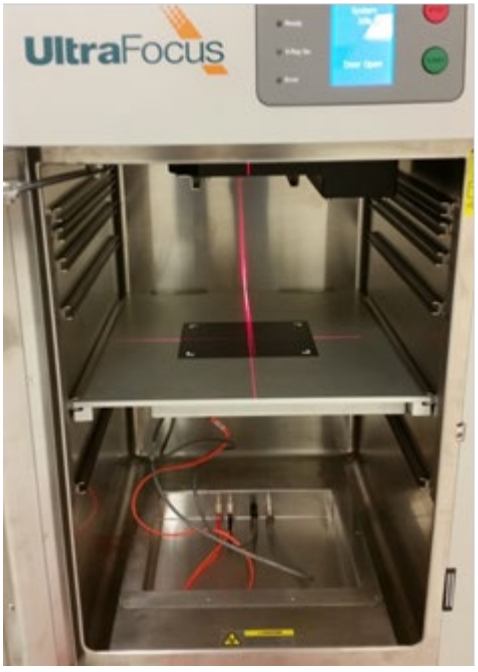


*Figure 3: Detector Shelf Set Up for DXA Procedure*

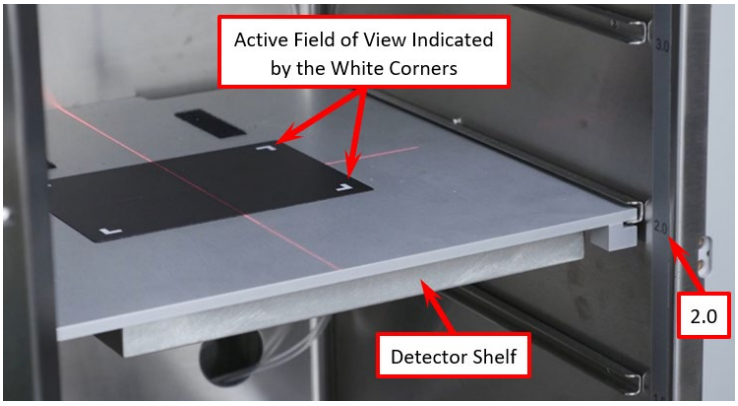


*Figure 4: Detector Shelf Position for DXA Procedure*

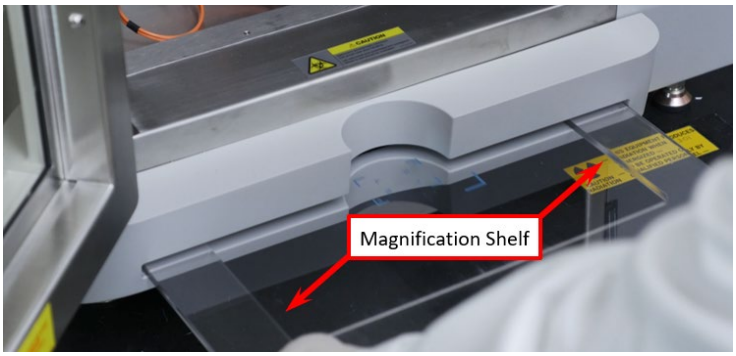


*Figure 5: Magnification Shelf Storage*

3. Start the PC (computer) and display monitor.

### 3.1.2 Start the Software

1. Once the computer has booted up to the Windows Desktop double-click on the "Vision DXA" icon. *See figure below.* This will launch the Vision DXA software module.

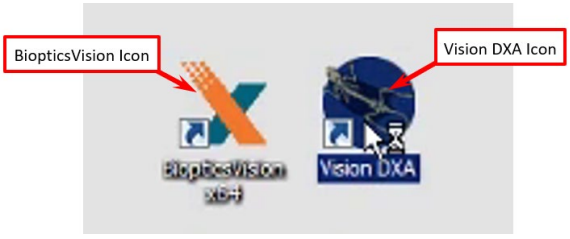


*Figure 6: Vision DXA and BiopticsVision Software Icons*

### 3.1.3 Calibrate the System

1. The system will automatically perform a calibration, if needed. The user may perform a calibration at any time by clicking on the **Calibration** button. *See figures below.*

*Figure 7: Standard Procedure, DXA Procedure, and Calibrate System button in the Toolbar*

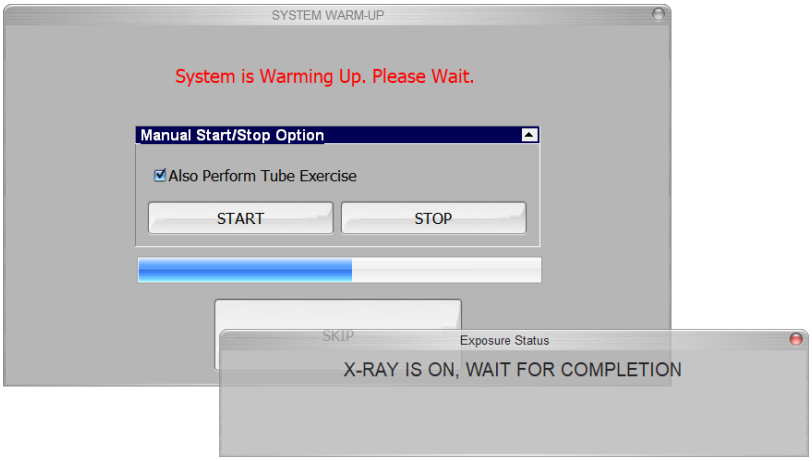


*Figure 8: Calibration Dialogs*

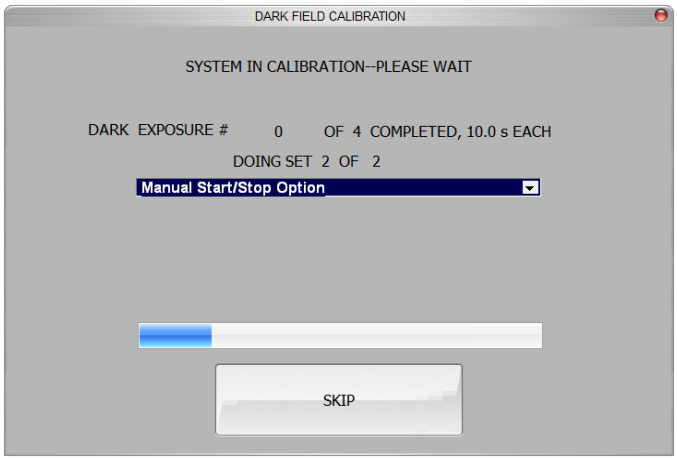


*Figure 9: Calibration Dialogs*

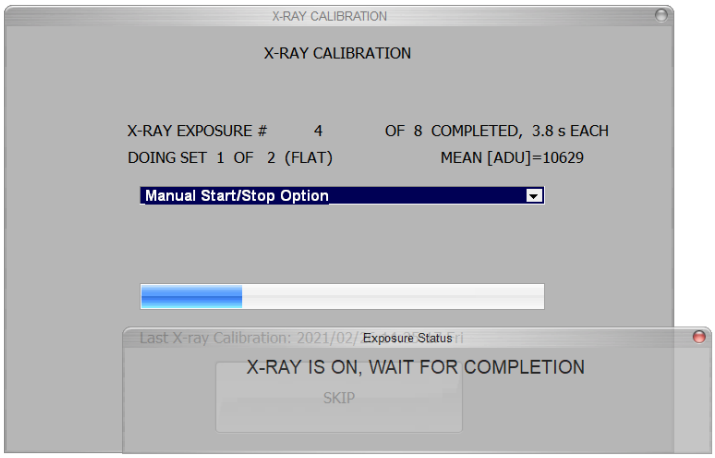


*Figure 10: Calibration Dialogs*

**Note**
Make sure the magnification shelf is not in the chamber during calibration. Also verify that nothing is in the active image area of the detector.

Do not open the chamber door during the calibration as this will immediately stop the X-rays.

DO NOT attempt to place a specimen in the chamber until the calibration is complete.

**Note**
Calibration of the DXA system must be performed at least daily to ensure optimum results.

2. While the system is calibrating you can prepare your specimen or anesthetize your animal for placement on the detector.
3. Once the calibration is complete you are ready to enter sample information.

## 3.2 Image Acquisition – DXA Mode

### 3.2.1 Procedure Data Entry

1. To tart a DXA procedure click on the **DXA Procedure** button. *See figure below.*

*Figure 11: DXA Procedure button*

2. Click on the **Sample Data** button to open the "Database File Entry Window". *See figures below.*

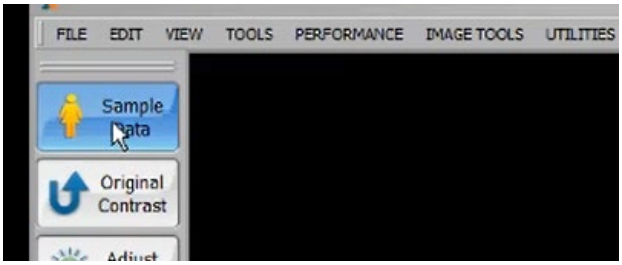


*Figure 12: Sample Data button*

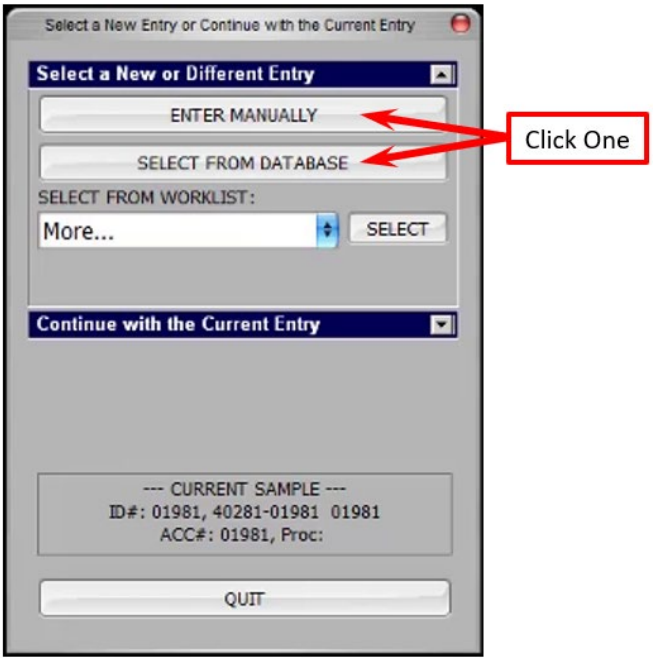


*Figure 13: Database File Entry Window*

3. Click on **SELECT FROM DATABASE** to start from a pre-exiting file or **ENTER MANUALLY** to start a new file or entry. The "Imaging Information Editor" will open. *See figures above and below.*

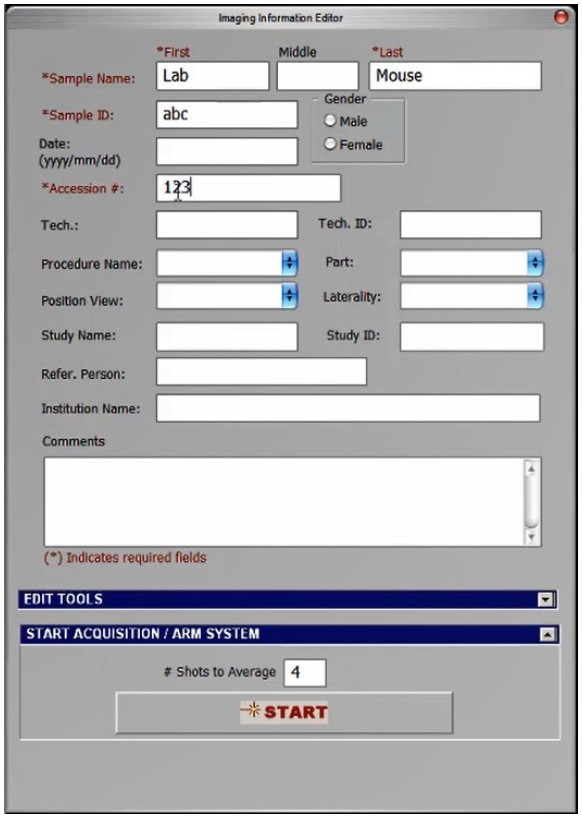


*Figure 14: Imaging Information Editor*

4. Fill out all of the required fields, denoted by a red asterisk and red field title, in the "Imaging Information Editor". Then click the **START** button. *See figure above.*

**Note**
The **START** button will be greyed out until all the required fields are populated.

**Note**
Clicking the **START** button puts the system in a "Ready" state. It does not start the X-rays.

5. The system is now "armed" and ready to take X-rays. The "Ready" status is indicated by the "Ready" LED and Message on the control panel on the front of the cabinet. *See figure below.*

*Figure 15: Calibration Dialogs*

### 3.2.2 Specimen Preparation and Positioning the Animal

**Note**
Calibration of the DXA system must be performed at least daily to ensure optimum results.

**Note**
You can prepare your specimen or anesthetize your animal for placement on the detector while the system is calibrating.

1. Open the chamber door and place the anesthetized animal or specimen on the detector, parallel to the back of the chamber. *See figure below.*

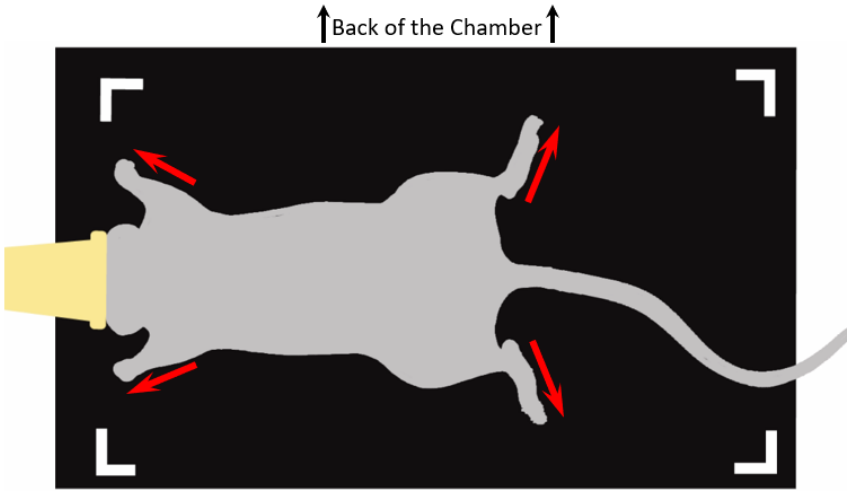


*Figure 16: Specimen Positioned on Detector*

2. If you are using gaseous anesthesia place the nose cone on the animal. Make sure the nose cone or mask is not in the detectors active field of view, and that the animal is completely anesthetized. *See figure above.*
3. Position the animal with the bottom of its jaw flat on the detector and its limbs spread away from the body. *See figure above.*
4. Once the animal is correctly positioned close the chamber door.
5. Verify that the animal isn't moving and is still in the proper position.

### 3.2.3 Acquiring DXA Images and Analysis

1. Press the green **X-RAY** button on the UltraFocus® control panel to start the scan. Alternatively, the user may start X-rays from the software by clicking the **Device Panel** button in the left menu then clicking the **REQUEST X-RAYS** button. *See figures below.*

*Figure 17: UltraFocus® DXA Control Panel (Physical Panel on front of cabinet)*

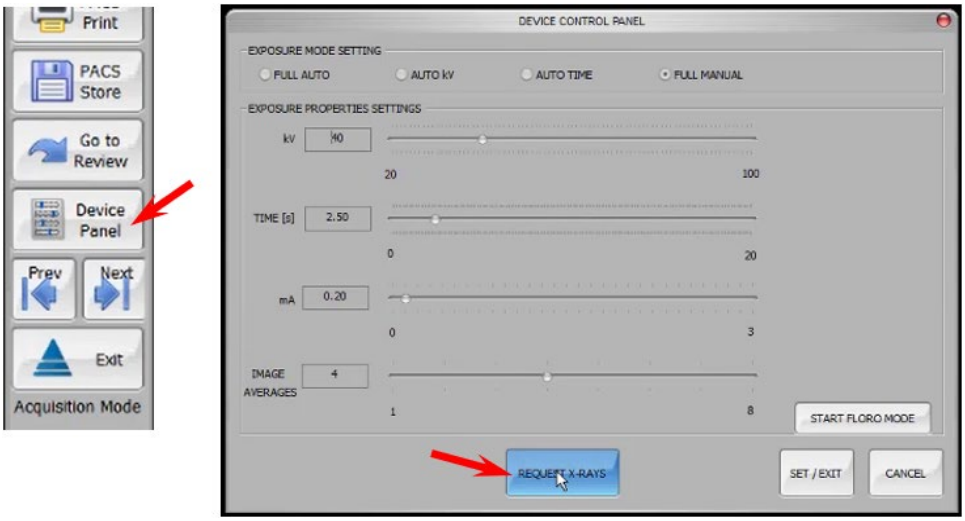


*Figure 18: Device Panel Button and Device Control Panel (Software)*

2. A series of "Low Energy", then "High Energy" images will appear on the screen while the scan is in progress. *See figures below.*

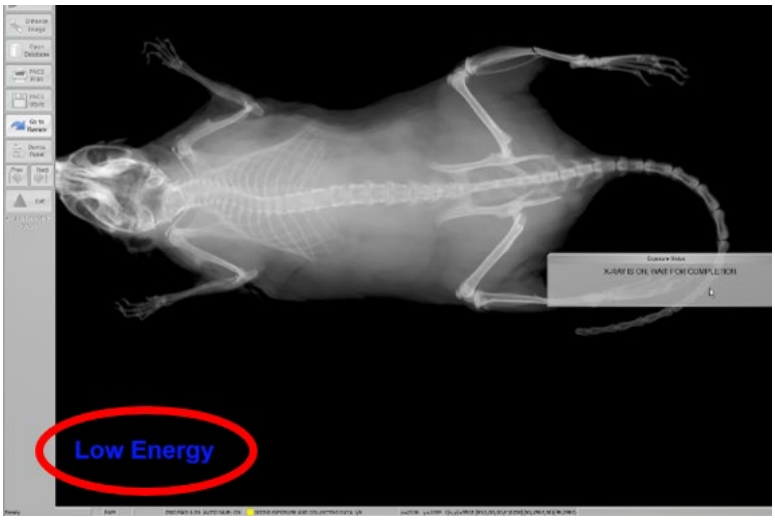


*Figure 19: Low Energy Image*

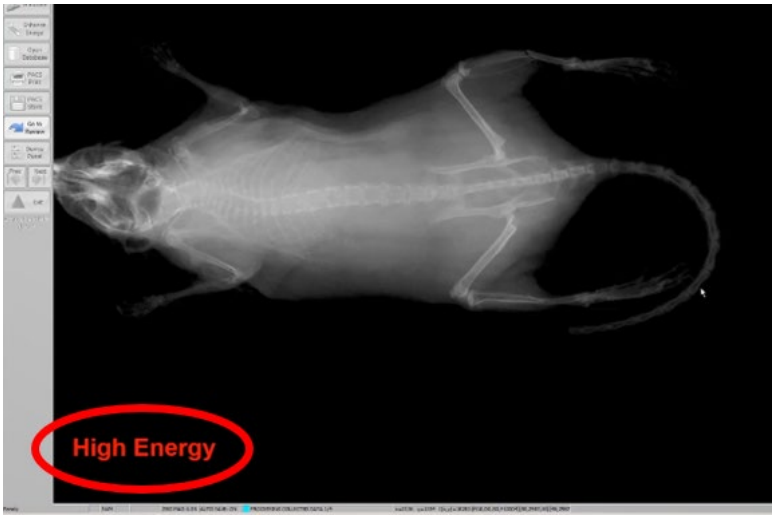


*Figure 20: High Energy Image*

3. Once the image series have been acquired, the software will auto-process and auto-analyze the images to generate DXA tissue decomposition maps. When DXA processing is complete, the program will show a 4-pane review window and the "DXA Tissue Decomposition Statistics" dialog box. The review window displays bone, lean tissue and fat tissue maps and the DXA status map. The pixel values displayed in the map represent 1µm thickness of bone or 10µm of soft-tissue or adipose tissue thickness per unit pixel. *See figures below.*

*Figure 21: 4-Pane Review Window and DXA Tissue Decomposition Statistics*

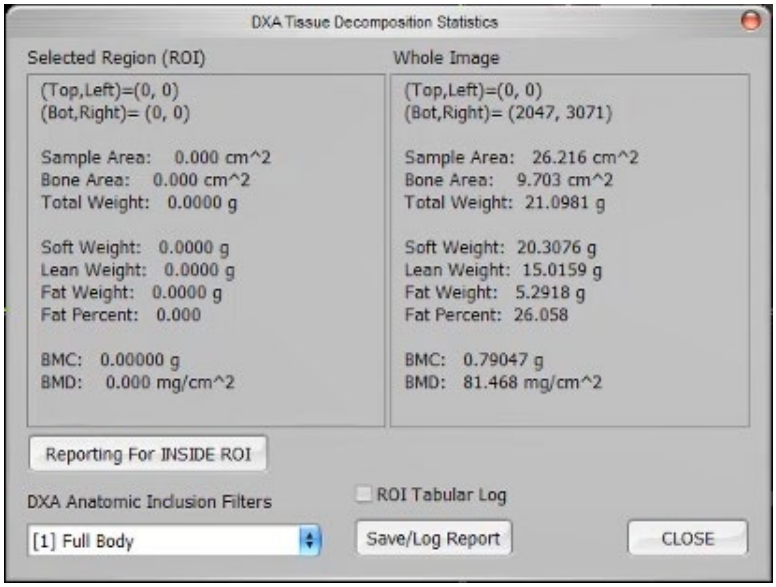


*Figure 22: DXA Tissue Decomposition Statistics*

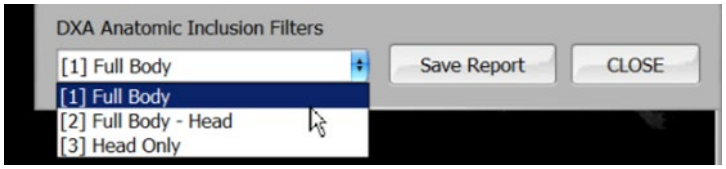


*Figure 23: DXA Anatomic Inclusion Filters Menu*

4. The "DXA Tissue Decomposition Statistics" dialog contains two panes. The left pane is for the ROI selected by the user. The right pane is for the entirety of the specimen. There are "Anatomoic Inclusion Filters" available in the bottom left corner which adjust the calculations from "Full Body", "Full Body-Head" *(full body without the head)*, and "Head Only". The results will update automatically as different filters are applied. *See figures above.*

**Note**
The "Selected Region (ROI)" values will remain at 0 (zero) until you manually select a Region of Interest.

5. The DXA Status map, located in the top right, indicates areas of bone (medium gray), the skull (light gray), the bone region of interest, indicated with a blue periphery, and soft tissue (dark gray). *See figure 21.*
6. The user may click the **Prev** or **Next** buttons on the left tool bar to cycle through each individual map to better review the images, as well as see the low and high energy shots. *See figure below.*

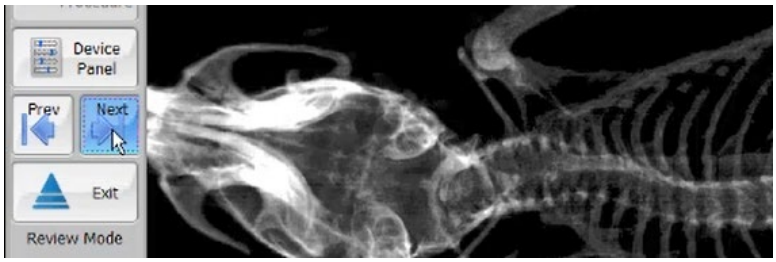


*Figure 24: Next Button*

7. If analysis re-processing is required, right click in any of the image panes, select Analysis, then select DXA Process/Reprocess. This option is most useful in storage space-constrained situations for saving only the input files but not the processed tissue maps. *See figure below.*

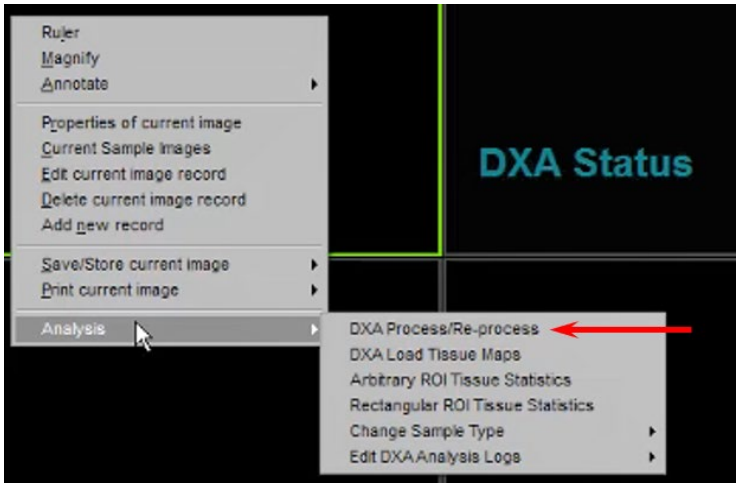


*Figure 25: Calibration Dialogs*

8. To scan and analyze very small excised and clean bone, right click in the bone or tissue maps, select Analysis, select "Change Sample Type", then select "Set Sample Type: BONE ONLY". *See figure below.*

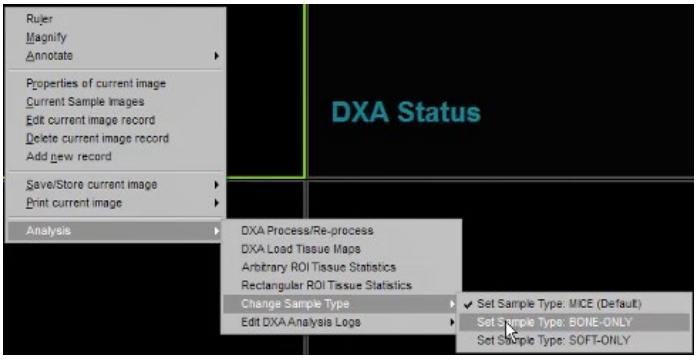


*Figure 26: Calibration Dialogs*

## 3.3 Saving Reports for Import into Spreadsheet

1. To save a JPEG screen capture and TEXT file of the results, click the **Save/Log Report** button in the "DXA Tissue Decomposition Statistics" dialog box. *See figure below*.

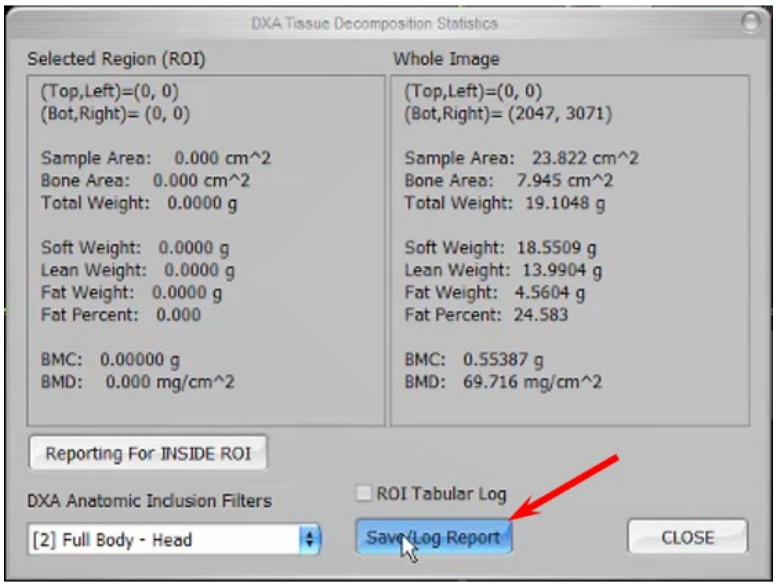


*Figure 27: Save/Log Report*

2. Pressing the **Save/Log Report** button will open a dialog allowing the user to save the report. The dialog will ask to save JPEG/BMP images with a default filename convention of

"DXA_Report#_ImageFilename"

Where:

- # is an incremental counter per given ImageFileName (i.e., different ROI reports per same DXA analysis)
- ImageFileName should match the name of the DXA images saved during acquisition and can be changed to user preference.

There will one .jpg/.bmp file and one .txt text file with the same filename but with different extensions created.

*See figures below.*

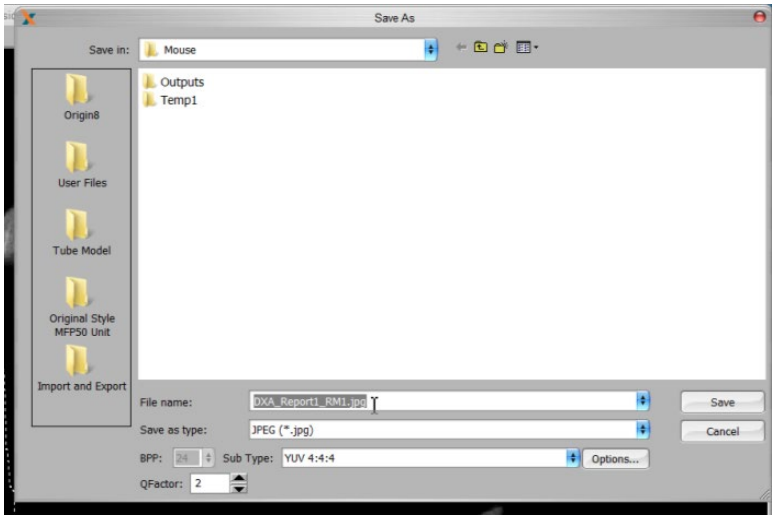


*Figure 28: DXA Tissue Decomposition Statistics "Save Report" Dialog*

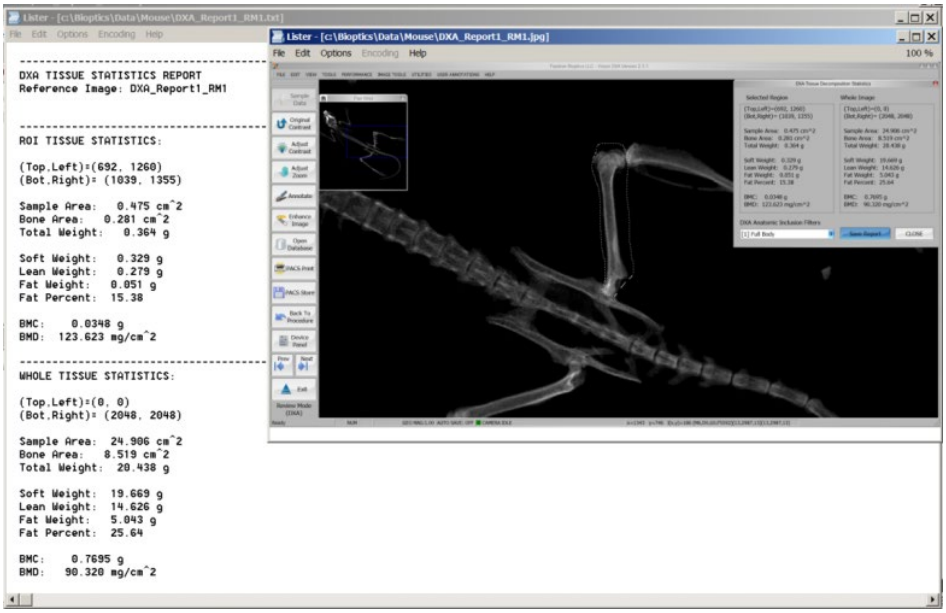


*Figure 29: DXA Tissue Decomposition Statistics saved report*

3. The .txt file may be opened in any standard file editor. The JPEG/BMP image may be opened in any standard image viewer. In order to refer to the original images, the system will also keep a saved copy within the local database within Vision DXA software, which may be re-analyzed at any given point. All images are saved locally, automatically, and are automatically entered into the database at acquisition.
4. Whole area results are also automatically logged in a single Whole Tabular Log file every time DXA results are processed or reprocessed. This file can be found in the following location:

   C:\DXA\WHOLE_Area_Logs\WHOLE_TabularLog.txt

5. The log file can be easily opened in the Notepad editor by right-clicking on any DXA review pane/map to show the menu. Select "Analysis", "Edit DXA Analysis Logs", then select the log you need to access. Either "Edit ROI Area Logs" or "Edit WHOLE Area Logs". *See figure below.*

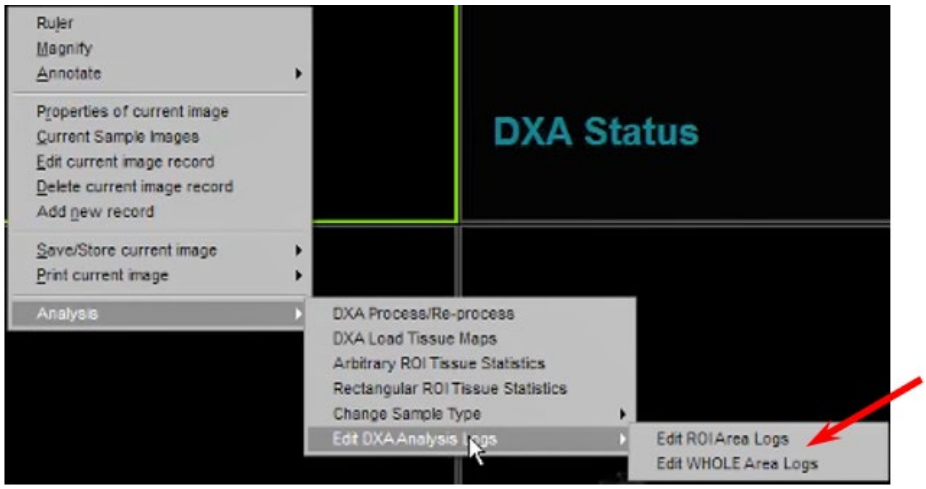


*Figure 30: Accessing ROI and WHOLE Area Logs*

6. From there you can save the file as a different file name, then delete the data in the original log file if you want to segregate the results into separate files. Otherwise, the results from every DXA analysis will remain chronologically listed in the main log file. *See figure below.*

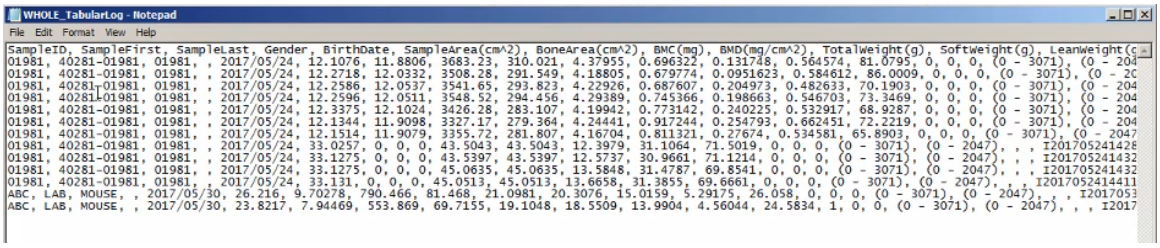


*Figure 31: Whole Area Tabular Log*

7. The log file has various fields including sample, study, path of the DXA image and DXA analysis results. All the fields, including the header line, are comma delimited so they can be easily imported into spreadsheets using the IMPORT function.

## 3.4 Selecting Regions of Interest

The ROI capability of the UltraFocus® DXA software is used to select only specific parts of an image for analysis. With this method, very small regions can be selected, such as in the case of monitoring met development longitudinally. You can also use the ROI tool to analyze and save individual reports for multiple animals or excised bones imaged in a single scan. Simply ignore the Whole Image values and use the ROI tool instead.

1. To select a Region of Interest, close the DXA Statistics window and click the **Next** button to page through the individual maps and images to locate the one you wish to work with. *See figure Below.*

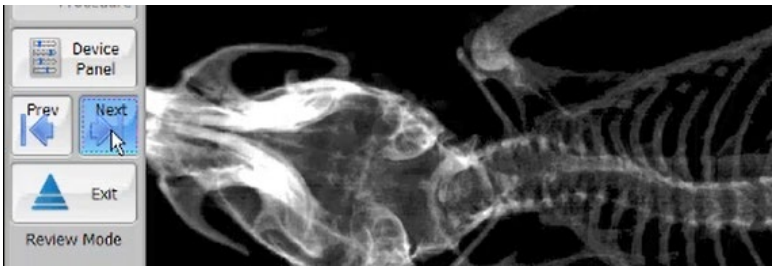


*Figure 32: Next Button*

2. Click the **Adjust Zoom** button and use the slider bar to zoom in to your preferred magnification level on the image. *See figure below.*

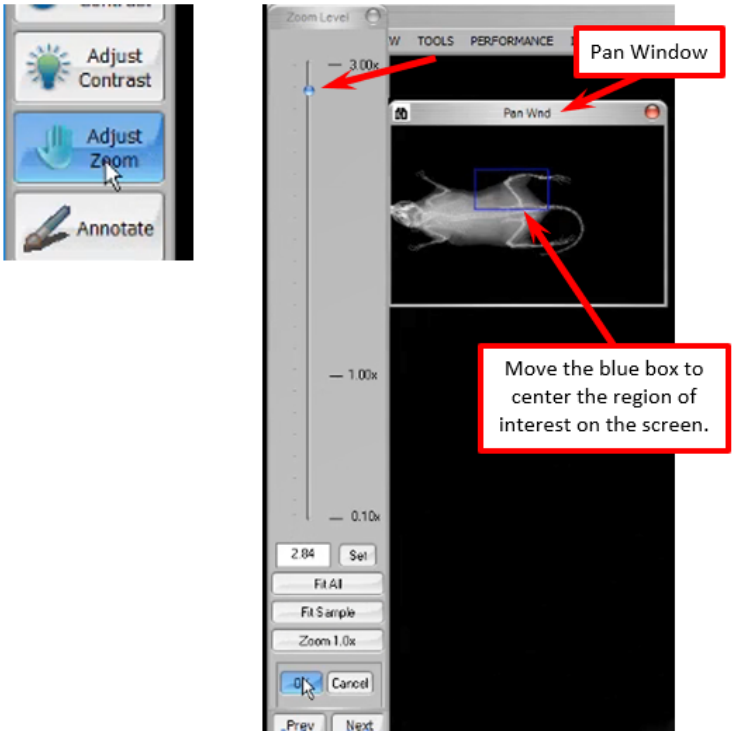


*Figure 33: Zoom and Pan*

3. Center the region of interest on the screen by moving the blue box in the "Pan Window". *See figure above.* You may also want to adjust the contrast of the image by clicking the **Adjust Contrast** button and moving the slider. *See figure below.*

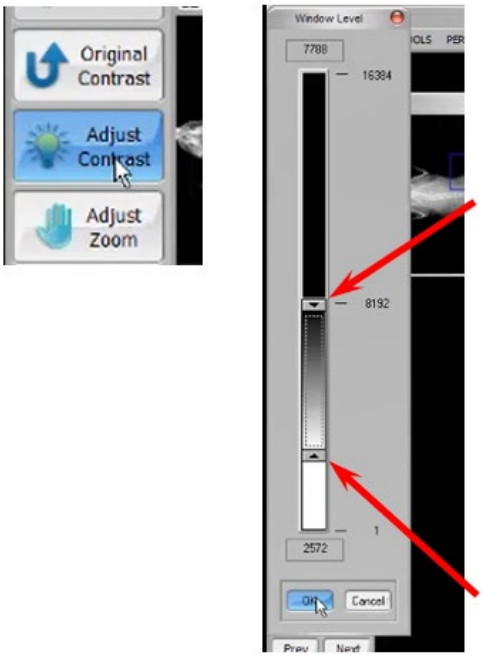


*Figure 34: Adjusting Contrast*

4. Right click on the image, select "Analysis" at the bottom of the menu, then select "Arbitrary ROI Tissue Statistics". *See figure below.*

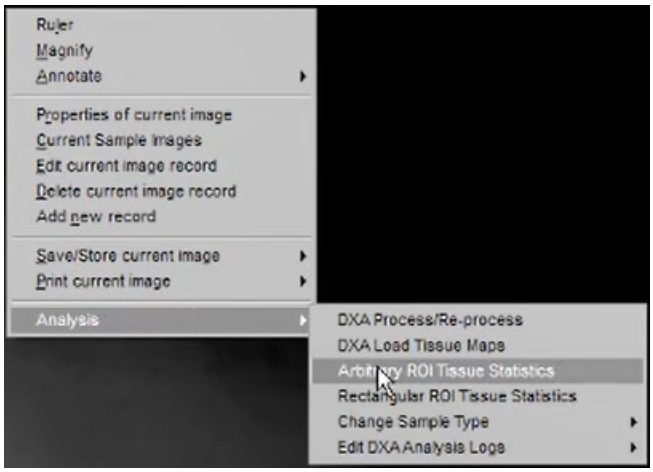


*Figure 35: Open the ROI Tool*

5. Use the mouse to position the crosshairs at your desired starting point, then left click and hold to draw around the region of interest. Release the mouse button when you have finished your selection. *See figure below.*

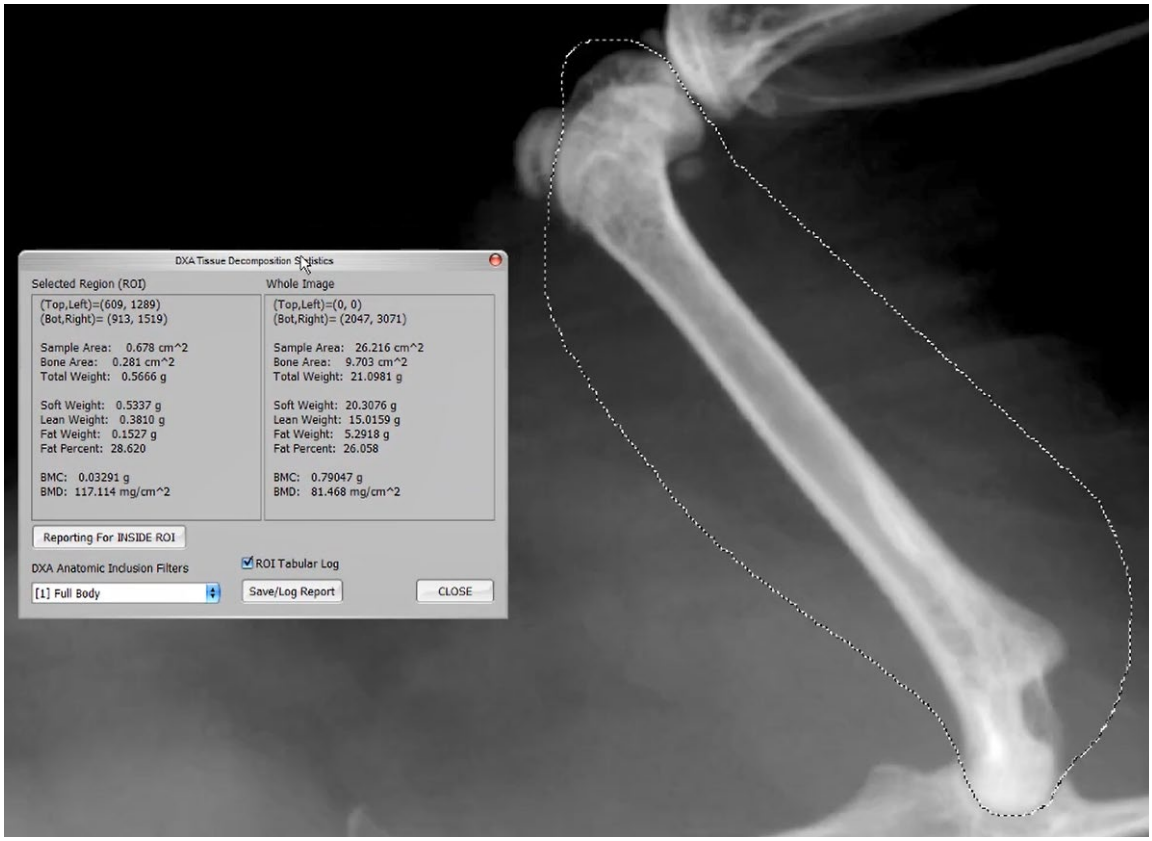


*Figure 36: ROI Selection and DXA Tissue Decomposition Statistics*

6. The "DXA Tissue Decomposition Statistics" dialog box will open showing the statistics for your selected ROI and the Whole Image. Note that default values are pulled from inside the ROI, but values outside the ROI can also be selected, such as with manual head selection. *See figure above.*
7. Note that ROI analysis doesn't have to be completed at the time of the DXA scan. Multiple animals or specimens can be scanned in series, then the saved files can be opened for analysis at a later time.
    a. To get back to previously saved data files, click the **Open Database** button. *See figure below.*
    b. This will open the database where you'll find the E1/E2 (Low Energy/High Energy) image pairs for each procedure or scan. *See figure below.*
    c. Double click to open either image. The image maps and results will be automatically displayed.
    d. You can then follow this procedure to select ROIs.

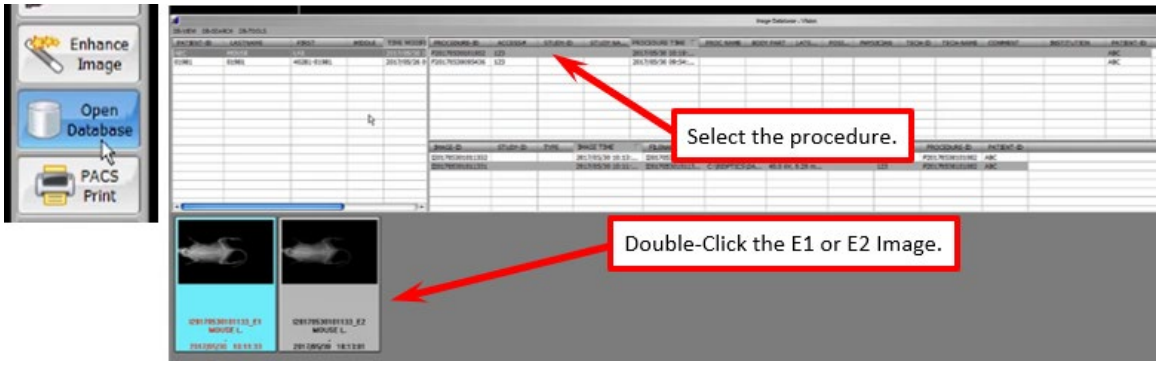


*Figure 37: Calibration Dialogs*

## 3.5 Saving ROI Results in a Tabular Log

1. To log ROI areas, the "ROI tabular log" box must be checked in the "DXA Tissue Decomposition Statistics" dialog box. Once it's checked, ROI area analysis will be added to the log each time a ROI area is selected, and you save the standard report. *See figure below.*
2. The ROI Tabular Log can be found in:

   C:\DXA\ROI_Area_Logs\ROI_TabularLog.txt

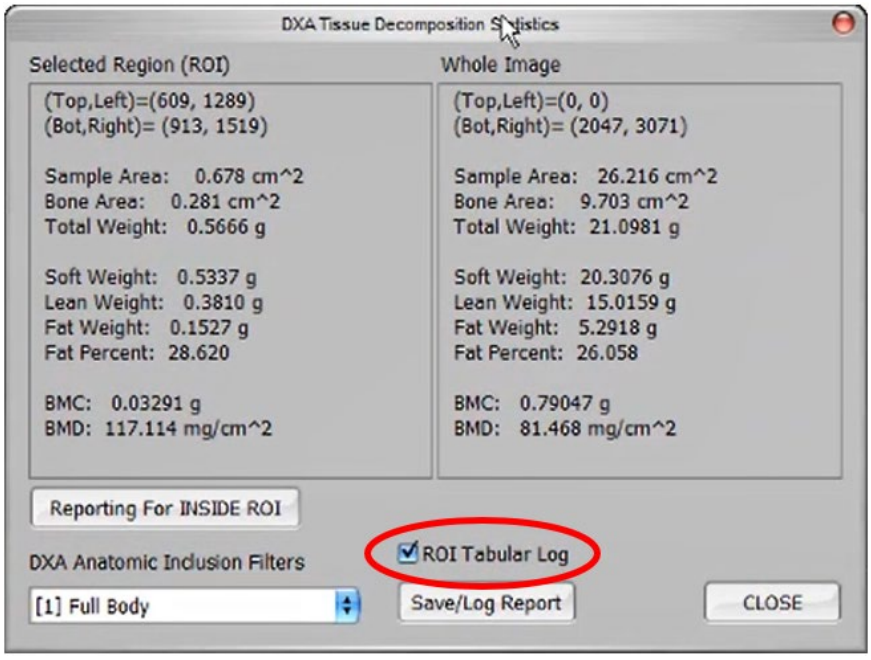


*Figure 38: Check Box – ROI Tabular Log*

## 3.6 Measurements and Annotations

The DXA software provides some useful tools for obtaining measurements directly from an image, and for applying annotations to an image for later reference.

### 3.6.1 Measurements

1. If you need to take measurements, right click on the image, then select "Ruler" at the top of the menu. *See figure below.*

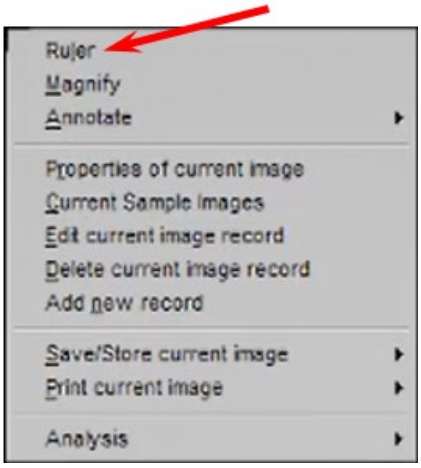


*Figure 39: On-Screen Menu*

2. Position the crosshairs at the starting point, left click, then drag and release the mouse button at the end point to make your measurement. *See figure below.*

*Figure 40: The Ruler*

### 3.6.2 Annotations

1. The annotation tool allows you to make notes directly on the image.
2. Access this tool by "Right-Clicking" on the image. Select "Annotate" in the menu, then select any item in the secondary menu. The "Annotation Tool-Box" will open in the upper right corner of the screen. *See figures below.*

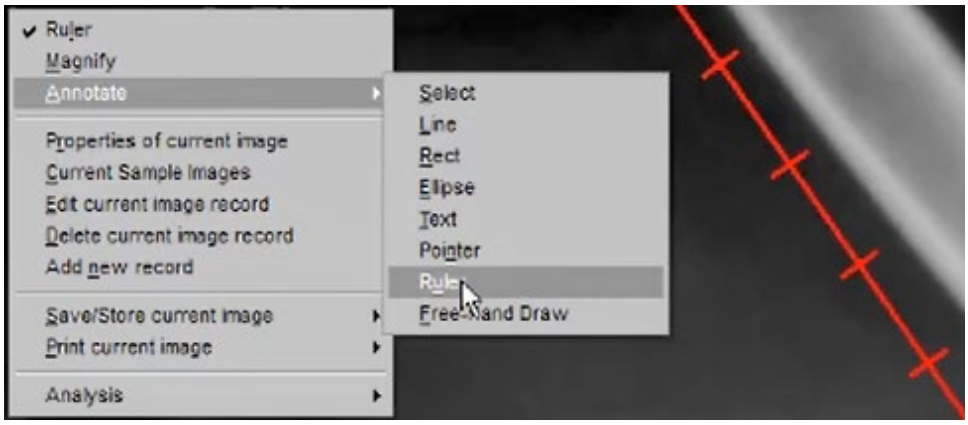


*Figure 41: Selecting Annotate from the Menu*

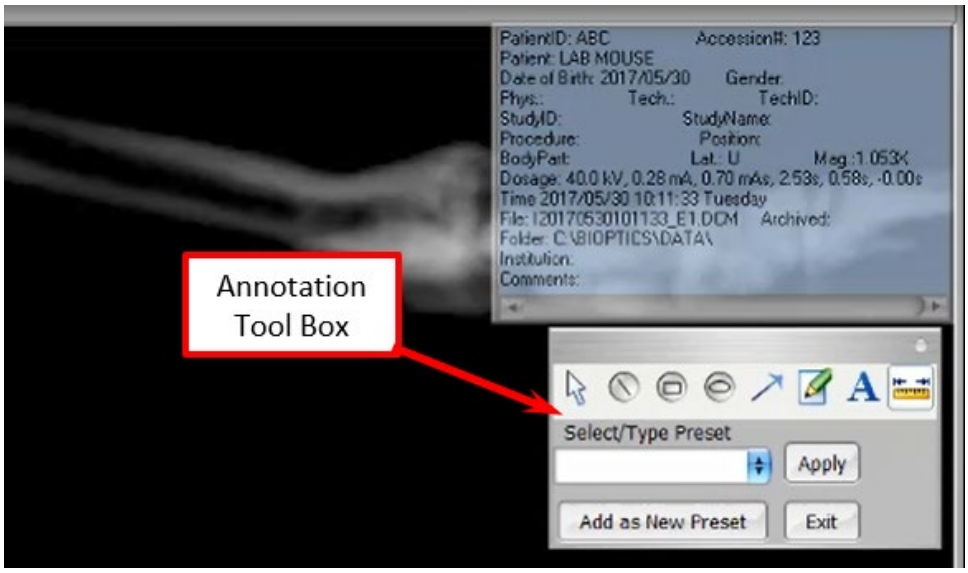


*Figure 42: Annotation Toolbox*

# Chapter 4 Standard Imaging procedure - DXA Software

### Standard Imaging Procedure – DXA Software

1. If you want high resolution non-DXA images, click the **Exit** button, to go to the main menu, then click the **Standard Procedure** button. *See figure below.*

*Figure 43: Exit and Standard Procedure Buttons*

2. Follow the steps in 3.2.1, Procedure Data Entry, to select or create a Database file.
3. Leave the detector shelf in the same position, mag level 2.0. *See figures 3 and 4.*
4. Place the animal or specimen on the magnification shelf then place the magnification shelf at the desired level above the detector. Close the chamber door. *See figure below.*

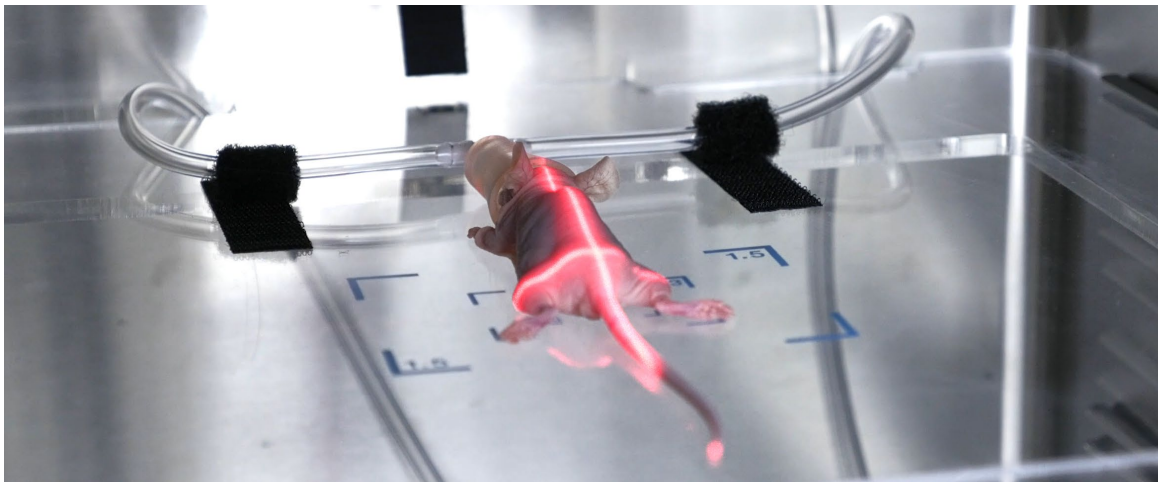

*Figure 44: Animal Placed on Magnification Shelf*

5. Click on the **Device Panel** button. *See figure 18.*

6. Make sure "Full Auto" is selected as the exposure mode, then click on the **REQUEST X_RAYS** button, and the system will automatically determine the most appropriate kilovolts (kV) and Exposure Time for the optimal image. *See figure below.*

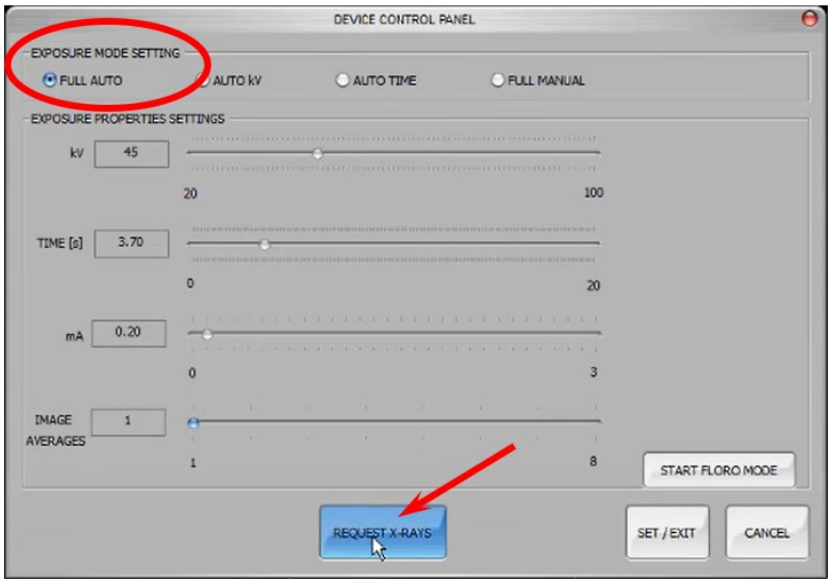


*Figure 45: Device Control Panel – Full Auto Mode*

7. Once the exposure is complete the image will be displayed on the screen.
8. Follow the instructions outlined earlier to adjust zoom and contrast, take measurements, and annotate the image. *Refer to Section 3.4, steps 2 & 3, and Sections 3.6.1 & 3.6.2.*

# Chapter 5 High-Resolution Imaging Only Mode – Bioptics Vision Software

### High-Resolution Imaging Only – BiopticsVision Software

In the DXA software Standard Procedure, the available levels of geometric magnification are limited due to the placement of the detector shelf. If all levels of magnification are required, the system should be operated in "High-Resolution Imaging Only" mode through the BiopticsVision software.

1. To access BiopticsVision, exit the Vision DXA software completely. *See figure below.*
    - Click the **Exit** button, then the **Exit Program** button.
    - This will take you to the Windows Desktop.

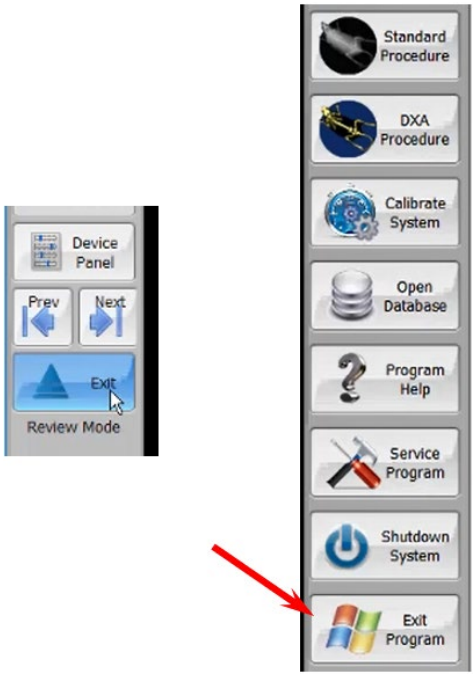


*Figure 46: Exit and Exit Program Buttons*

2. Open the chamber door then move the detector shelf to the bottom of the chamber. *See figure below.*

**Note**
Take care not to pull or put tension on the cables connected to the detector shelf.

*Figure 47: Calibration Dialogs*

3. Ensure that nothing is in the detectors active field of view and that the magnification shelf is not in the chamber.
4. Close the chamber door and click the "BiopticsVision" icon to start the software. *See figure below.*

*Figure 48: BiopticsVision Icon*

5. Click the **Calibrate System** button to re-calibrate the system with the detector shelf in the new position. *See figure below.*

**Note**
The system must be re-calibrated any time you move the detector shelf from the DXA position to the floor and vice-versa.

*Figure 49: Calibration and Start Procedure Buttons*

6. When the calibration is complete click the **Start Procedure** button. *See figure above.*
7. Click on the **Sample Data** button and either create a new file/procedure or select an existing file/procedure from the database. *Refer to Section 3.2.1, Procedure Data Entry.*
8. Open the chamber door and position the specimen on the detector or mag tray. If using the mag tray insert it into the desired position, then close the chamber door.
9. Click on the **Device Panel** button and verify the system is set to "Full Auto" mode, then click on the **REQUEST X-RAYS** button.
10. The image will be displayed on the screen in ~10 seconds, depending on the specimen.

**Note**
Refer to the UltraFocus® User's Manual, P/N 5081-9536, for detailed Standard Imaging Procedure instructions.

**Note**
It's important to remember that prior to returning to DXA mode you must return the detector shelf to magnification position 2.0 and re-calibrate the system in the Vision DXA software.

# Chapter 6 System Shut Down Procedure

Follow these steps to shut down the UltraFocus® DXA system:

1. Go to the "Start-up Screen" also known as the "Main Screen". See figure below.

*Figure 50: Start-up Screen (Main Screen) and Shutdown System button*

2. Click on the "Shutdown System" button, and then choose "OK". This will turn off the computer. *See figure above.*
3. Once the computer is off, turn the key switch on the front panel, counterclockwise until it stops, then you can remove the key. *See figure below.*

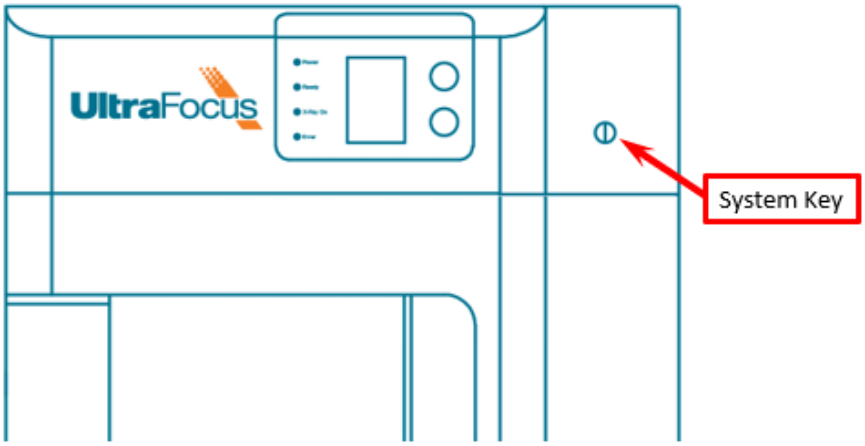


*Figure 51: System Key on Front Panel*

# Chapter 7 Cleaning, and Disinfecting

## 7.1 General Information

### 7.1.1 For General Cleaning

This procedure includes cleaning the unit and the surfaces that the specimens do not contact.

Use a lint-free cloth and apply a diluted dishwashing liquid to clean components and surfaces.

**Caution:**
**Use the least possible amount of cleaning fluids. The fluids must not flow or run.**

### 7.1.2 For Disinfecting

To disinfect the system's components and surfaces, Hologic recommends the following disinfecting solutions:

- 10% chlorine bleach solution and water with one part commercially available chlorine bleach solution (normally 5.25% chlorine and 94.75% water) and nine parts water. Mix this solution daily for best results.
- Commercially available isopropyl alcohol solution (70% isopropyl alcohol by volume, not diluted)
- 3% maximum concentration of hydrogen peroxide solution

After you apply any of the above solutions, use a clean cloth to clean the system, observing appropriate contact (wet) times.

**Caution:**
**To prevent damage to the electronic components, do not use disinfectant sprays on the system.**

### 7.1.3 To Prevent Possible Injury or Equipment Damage

Do not use a corrosive solvent, abrasive detergent, or polish. Select a cleaning/disinfecting agent that does not damage the plastics, metal covers or carbon fiber.

Do not use strong detergents, abrasive cleaners, high alcohol concentration, or methanol at any concentration.

Do not expose equipment parts to steam or high temperature sterilization.

Do not let liquids enter the internal parts of the equipment. Do not apply cleaning sprays or liquids to the equipment. Always us3e a clean cloth and apply the spray or liquid to

the cloth. If liquid enters the system, disconnect the electrical supply and examine the system before returning it to use.

**Caution:**
**Wrong cleaning methods can damage the equipment, decrease imaging performance, or increase the risk of electric shock.**

Always follow instructions from the manufacturer of the product you use for cleaning. The instructions include the directions and precautions for the application and contact time, storage, wash requirements, protective clothing, shelf life, and disposal. Follow the instructions and use the product in the most safe and effective method.

## 7.2 Component Specific Care

### 7.2.1 How to Clean the Image Display Monitor

- Do not touch the display when working with specimens.
- Use care when you clean the outer surface of the display area.
- Always use a clean, soft, lint-free cloth to clean the display area. Microfiber cloths, available at most stores, are recommended.
- Strong chemicals and abrasives can damage the display and should never be used.
- Never use a spray or flow a liquid onto the display.
- Never apply pressure to the display area.
- Never use a detergent with fluorides, ammonia, alcohol, or abrasives.
- Never use bleach.
- Never use steel wool.
- Never use a sponge with abrasives.

There are many commercially available products to clean LCD displays. Any product that is free of ingredients or abrasives described above and used according to the directions of the manufacturer can be safely used.

# Appendix A System Specifications

## A.1 Product Measurements

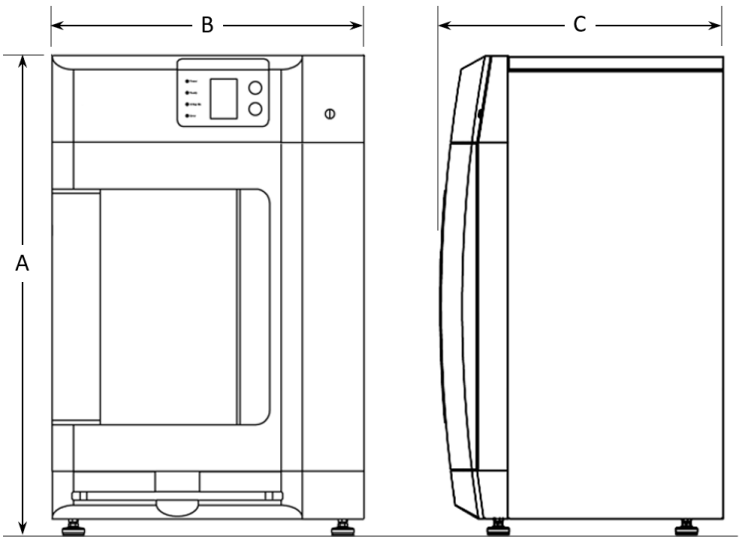


*Figure 52: Cabinet Measurements*

| | | |
|---|---|---|
| *A.* | *Height* | *91.4 cm (36 inches)* |
| *B.* | *Width* | *58.4 cm (23 inches)* |
| *C.* | *Depth* | *53.3 cm (21 inches)* |
| | *Weight* | *188 kg (415 pounds)* |

## A.2 Operation and Storage Environment

### A.2.1 General Conditions for Operation

This equipment is designed for safe and effective operation under the following conditions for Indoor Use:

| | |
|---|---|
| *Altitude* | *To 2,000 m (6.562 feet)* |
| *Degree of Pollution* | Pollution Degree 2 |
| *Temperature Range* | 15.5 °C (60 °F) to 30 °C (86 °F) |
| *Relative Humidity Range* | *<75%* |

### A.2.2 General Conditions for Transport and Storage

#### Console

| | |
|---|---|
| *Temperature Range* | *–20 °C (-4 °F) to 50 °C (122 °F)* |
| *Relative Humidity Range* | *<75%* |

# A.3 Technical Specifications

## A.3.1 System Specs

| | |
|---|---|
| *Spatial Resolution* | *48µm* |
| *Source to Imager Distance (SID)* | *318.42mm (12.54") in DXA Mode (Detector Shelf in Mag 2.0 position)*<br>*593.00 (23.34") in Standard Imaging Mode (Detector Shelf on chamber floor).* |
| *Exposure Control* | *Fixed, or pre-programmed, in DXA Mode.*<br>*Fully Automatic, Manual Time-Auto kV, Auto Time-Manual kV, or Fully Manual control available in Standard Imaging Mode. NOTE: Fully Automatic is recommended)* |
| *Geometric Magnification* | *1.053:1, 1.580:1, 2.355:1, 2.681:1. and 3.560:1 in DXA Mode (Detector Shelf in Mag 2.0 position)*<br>*1.028:1, 1.440:1, 1.928:1, 2.902:1, 3.909:1, 4.893:1, and 6.610:1 in Standard Mode (Detector Shelf on the chamber floor).* |
| *Imaging Area* | *10cm x 15cm* |
| *Energy Range* | *20kV to 100kV, Configurable.* |
| *Exposure Time Range* | *0.1s to 20.0s, Configurable.* |
| *Typical Image Acquisition time* | *~4 min for DXA image acquisition and analysis.*<br>*~25 sec for Standard image acquisition* |
| *Target Material* | *Tungsten (W)* |
| *Beryllium Window Thickness* | *0.25mm (0.010")* |
| *Tube Current* | *0.3mA max (Isowatt limited to 12W from 41-100kV)* |
| *Focal Spot Size* | *< 15 microns* |
| *Input Power* | *100-240VAC ±10%, 50/60Hz, 200VA* |
| *Transient Overvoltages* | *To the levels of Overvoltage Category II* |
| *Peak Line Current* | *<5 Amps* |
| *Line Connection* | *Standard line cord and plug – medical grade* |

### A.3.2 Laser Information

| | |
|---|---|
| *Class* | *II* |
| *Peak Power* | *2 mW* |
| *Wavelength* | *670 nm* |

### A.3.3 X-Ray Tube

| | **TRUFOCUS** | **MXR** |
|---|---|---|
| **Hologic P/N:** | 130-552023 | 130-55027 |
| **Manufacturer P/N:** | TFX-8100 SW | 18032 |
| *Max Anode Voltage* | *100 kV* | *100 kV* |
| *Max Anode Current** | *0.3 mA* | *0.3 mA* |
| *Maximum Power* | *12 W* | *12W* |
| *Duty Cycle* | *50%* | *50%* |
| *Focal Spot Size* | *<15 microns* | *<15 um* |
| *Anode Material / (Target)* | *Tungsten (W)* | *Tungsten (W)* |
| *Cooling* | *Forced Air 100 cfm* | *Air cooled, 100 CFM fan recommended* |
| *Beryllium Window Thickness* | *0.25mm (0.010")* | *0.25mm (0.010")* |
| *Window Material* | *Beryllium IF-1®* | *Be 98.5%* |
| *Cone Angle* | *44 Degrees min* | *45 Degrees* |
| *Operating/Storage Temp Range* | *+10 ℃ to +55 ℃ / 0 ℃ to +60 ℃* | *10◎ C-30◎ C* |
| *Operating/Storage Humidity Range* | *85% RH* | *10%-70% non-condensing* |
| *Weight* | *2 lbs* | *3 lbs* |

***Note**
Max Anode current is limited by the UltraFocus® controller. Tube can operate at 0.5mA.

### A.3.4 Computer Specification

This table provides minimum recommended specifications at time of publication.

Hologic P/N: 2009-0029

| | |
|---|---|
| *Processor* | *Intel® Core™ i5-8500 (6 Cores)* |
| *Operating System* | *Windows 10 Enterprise LTSE (64 bit)* |
| *System RAM* | *8 GB (2s4GB) 2666MHz DDR4* |
| *Hard Drive* | *M.2 512GB NVMe Class 35 Solid State Drive* |
| *Optical Drive* | *N/A* |
| *Network Connectivity* | *Integrated Intel I219-LM Ethernet LAN 10/100/1000* |
| *USB Ports* | *FRONT Panel*<br>*USB 2.0 – 2X*<br>*USB 3.1 Gen 1 – 1X*<br>*USB 3.1 Gen 1 Type-C – 1X*<br>*REAR Panel*<br>*USB 2.0 – 2X*<br>*USB 3.1 Gen 1 – 4X* |
| *Graphics* | *Integrated Intel® HD Graphics 630* |
| *Video RAM* | *N/A* |
| *Case/Chassis* | *Small Form Factor (SFF)* |
| *Dimensions (H x W x D)* | *11.42″ x 3.7″ x 11.50″ (29.0cm x 9.26cm x 29.2cm)* |
| *Min. Weight* | *11.57 lbs (5.26 kg)* |
| *Monitor*<br>*Hologic P/N: CMP-01803* | *24″*<br>*2560 x 1440 (3.7MPX) Native Resolutions*<br>*1000:1 Contrast Ratio*<br>*300 cd/m^2 Brightness*<br>*Display Port Input* |

# Glossary of Terms

**Annotations**

Markings on an image to indicate an area of interest.

**BMC**

Bone Mineral Content

**BMD**

Bone Mineral Density

**Bone Mass**

Mass of bone identified in a DXA scan.

Also called BMD, bone density and bone mineral density.

**DXA**

Dual-Energy X0Ray Absorptiometry

**Fat Mass**

Mass of fat identified in a DXA scan.

**Lean Mass**

Mass of muscle and organs identified in a DXA scan.

Note that because muscle has approximately the same density as other organs (liver, skin, etc…) and other types of muscle (heart, smooth muscle, etc…) the DXA software cannot differentiate between certain organs and muscles.

**Met Development**

The growth of a metastatic tumor.

**ROI**

Region of Interest

**SID**

Source to Image Distance

HOLOGIC®

**Hologic Inc.**
36 Apple Ridge Road
Danbury, CT 06810 USA
1.800.447.1856
www.hologic.com

EC REP

**Hologic BV**
Da Vincilaan 5
1930 Zaventem
Belgium
Tel: +32 2 711 46 80
Fax: +32 2 725 20 87

CE

Refer to the corporate website for more facilities worldwide.

**www.hologic.com**