

# **KODAK 9000 AND KODAK 9000 3D Extraoral Imaging System**

## **User Guide**

# Notice

Congratulations on your purchase of the KODAK 9000 and KODAK 9000 3D Extraoral Imaging System. Thank you for your confidence in our products and we will do all in our power to ensure your complete satisfaction.

The User Guide for the KODAK 9000 and KODAK 9000 3D Extraoral Imaging System includes information both on the Panoramic features as well as the 3D features. If you have purchase only the KODAK 9000 Panoramic system, information relevant to 3D does not apply to your radiological system. We recommend that you thoroughly familiarize yourself with this Guide in order to make the most effective use of your system.

KODAK 9000 and KODAK 9000 3D Extraoral Imaging System is intended to be used at the direction of dentists, oral surgeons and orthodontists for panoramic extraoral x-ray imaging of the dento-maxillo-facial area. In addition, the 3D systems include a digital volumetric tomography mode which is intended to produce three-dimensional x-ray images of the dento-maxillo-facial region.

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KODAK 9000 and KODAK 9000 3D Extraoral Imaging System, complies with Directive 93/42/CEE relating to medical equipment.



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# Chapter 1

## About This Guide

### Conventions in this Guide

The following special messages emphasize information or indicate potential risk to personnel or equipment:



***WARNING***

**Warns you to avoid injury to yourself or others by following the safety instructions precisely.**



***CAUTION***

**Alerts you to a condition that might cause serious damage.**



***IMPORTANT***

**Alerts you to a condition that might cause problems.**



***NOTE***

**Emphasizes important information.**



***TIP***

**Provides extra information and hints.**

## Note to the User



### **WARNING**

**X-rays can be harmful and dangerous if not used properly. The instructions and warnings contained in this guide must be therefore carefully followed.**

As a manufacturer of radiology units that conform to stringent radiological protection standards in force throughout the world, we guarantee as low as reasonably achievable degree of protection against radiation hazards. Nonetheless, you are handling a radiology unit specially designed to emit x-ray doses in order to carry out a medical diagnosis.

The room in which your radiology unit is to be installed must comply with all official regulations applicable to protection against radiation. You must install your radiology unit in a room protected against x-ray emission. This room must reduce to at least 12db the frequency interferences of the 30MHz to 1GHz band.

Your local representative will assist you in the initial use of your radiology unit and will supply any relevant information you may require.

To use and operate your panoramic unit and your digital imaging software you must follow the instructions contained in this guide.

## Warning and Safety Instructions

When operating the KODAK 9000 and KODAK 9000 3D unit, observe the following warning and safety instructions:



### **DANGER OF ELECTRIC SHOCK**

**This is an electrical unit. DO NOT expose it to water spray. Such action may cause an electric shock or a malfunction of the unit.**



### **LASER WARNING**





**For maximum safety, advise the patient not to look at the beam. Before turning on the beams, lower the Frankfurt plane beam to the lowest level. While making adjustments, ensure that the beam is not directed into the eyes of the patient.**



**WARNINGS:**

- You are responsible for the operation and maintenance of this unit. Only legally qualified persons can operate this unit. They **MUST** have training to use the radiological equipment. **DO NOT** open the cover of the unit. When necessary, have a trained authorized service technician carry out inspection and maintenance operations.
- Install this unit in an x-ray room that complies with current installation standards. From this location, you must be able to maintain visual or audio communication with the patient and be able to access the Acquisition interface module during exposure. This unit must be permanently connected to the ground with a fixed power supply cable.
- **DO NOT** place the PC and the peripheral equipment connected to it in the immediate vicinity of the patient in the unit. Leave at least 1.5 m distance between the patient and the unit. The PC and the peripheral equipment must conform to the IEC60950 standard.
- See your computer installation guide for details of the data processing system, PC and screen. Leave a sufficient amount of clear space around the CPU to ensure that it is properly ventilated.
- To obtain maximum image quality and visual comfort, position the screen to avoid direct light reflections from internal or external lighting.
- **DO NOT** operate the unit if there is the threat of an earthquake. Following an earthquake, ensure that the unit is operating satisfactorily before using it again. Failure to observe this precaution may expose patients to hazards.
- X-ray equipment is hazardous to patients and the operator if you do not observe the exposure safety factors and operating instructions.
- **DO NOT** place objects within the field of operation of the unit.
- The patient should wear a protective lead-lined shoulder apron, unless other Radiation Protection Protocols apply locally.
- Disinfect any parts of the unit that come into contact with the patient and the operator after each patient has been exposed to x-rays.
- While adjusting the height of the unit, ensure that the patient is kept clear of the mechanism.
- When the unit is not in use, ensure that the ON/OFF switch is set to OFF (O).
- If the unit develops a fault, switch it to off (O), display an “Unserviceable” notice and contact a service technician.
- To dispose of the unit or its components, contact a service technician.
- Ask the patient to refrain from moving during the entire period of exposure.
- Ask the patient to remain still until the unit arm has stopped moving and the RESET movement has completed.
- **DO NOT** use this unit in conjunction with oxygen-rich environments. This unit is not intended for use with flammable anesthetics or flammable agents.

## Marking and Labeling Symbols

	<p>Type B device symbol complying with the IEC 60601-1 standard</p>
	<p>In the EEC, this symbol indicates: <b>DO NOT</b> discard this product in a trash receptacle; use an appropriate recovery and recycling facility.</p> <p>Contact your local sales representative for additional information on the collection and recovery programs available for this product</p>
	<p><b>WARNING</b> and <b>IONIZING RADIATION</b> symbols warn you about radiation dangers.</p>
	<p><b>LASER WARNING</b></p> <p>Laser radiation. <b>DO NOT</b> stare into the beam. Class 2 laser product. Maximum output power: 1mW, 650 nm (IEC 60825-1 standard) This unit emits laser radiation.</p>



## Chapter 2

# KODAK 9000 AND KODAK 9000 3D UNIT OVERVIEW

The KODAK 9000 and KODAK 9000 3D digital imaging unit is compliant with the requirements of the EEC and international medical standards.

The KODAK 9000 and KODAK 9000 3D unit has been designed to carry out the following radiological examinations:

- Panoramic
- Maxillary Sinus
- Temporomandibular Joints (TMJ)
- 3D images

## General Overview

The KODAK 9000 unit is composed of the following functional components:

- The rotative arm
- The fixed arm with a control panel
- The panoramic digital sensor
- The x-ray source assembly
- The x-ray remote control
- The chin rest base
- The panoramic chin rest and bite block
- The temple supports
- The hand grips
- The acquisition software (see “**Imaging Software Overview**”)

The KODAK 9000 3D unit is composed of the following functional components:

- The rotative arm
- The fixed arm with a control panel
- The panoramic digital sensor
- The 3D digital sensor
- The x-ray source assembly
- The x-ray remote control
- The chin rest base
- The panoramic chin rest and bite block
- The 3D chin rest and bite block
- The temple supports

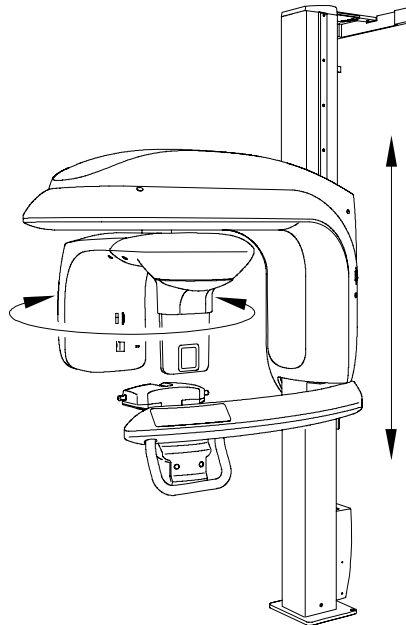
- The hand grips
- The acquisition software (see “**Imaging Software Overview**”)

The following figures illustrate the general overview of the KODAK 9000 and KODAK 9000 3D unit.

## Mobile Components

Figure 2-1 illustrates the up and down movement of the KODAK 9000 and KODAK 9000 3D mobile component and the 180° rotation of the rotative arm.

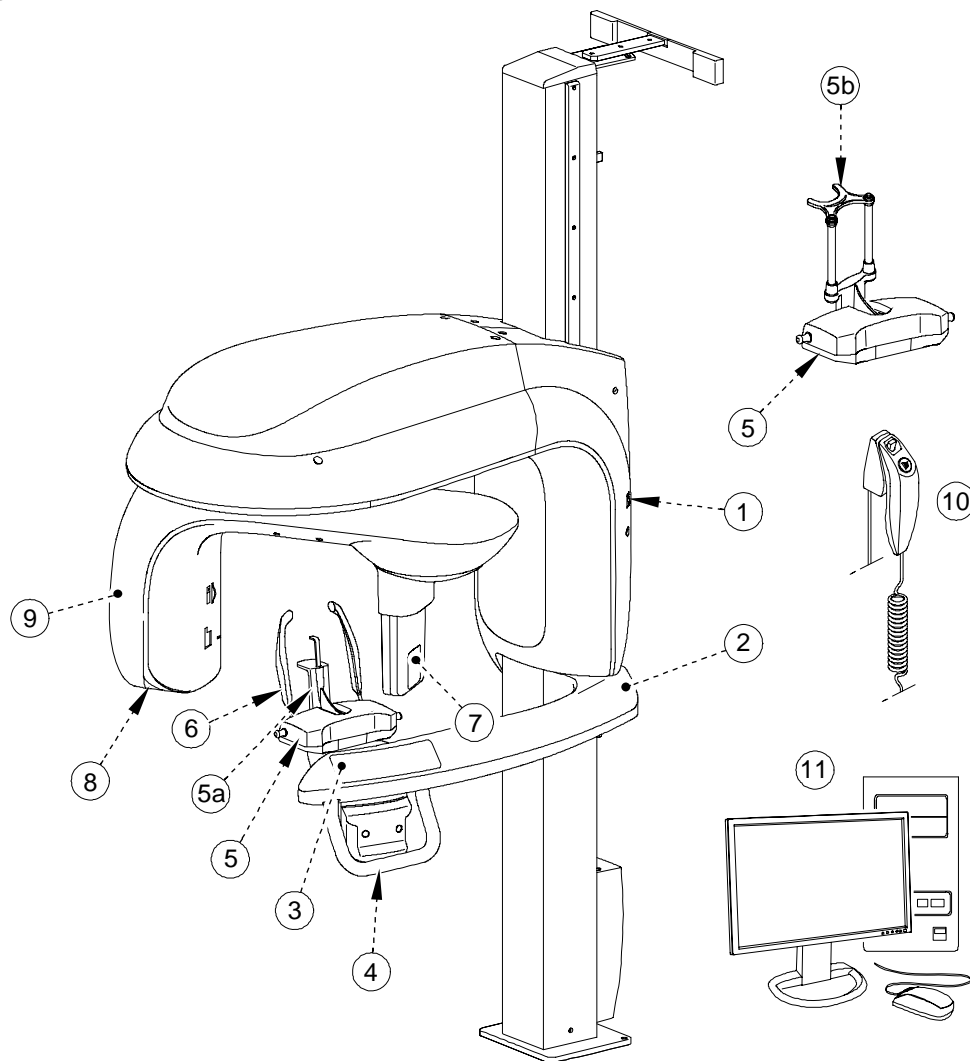
**Figure 2-1 KODAK 9000 and KODAK 9000 3D Unit Mobile Components**



## General Functional Components

Figure 2-2 illustrates the general functional components of the KODAK 9000 and KODAK 9000 3D.

**Figure 2-2 KODAK 9000 and KODAK 9000 3D Unit Functional Components**



- |            |                             |           |   |
|------------|-----------------------------|-----------|---|
| <b>1</b>   | ON/OFF button               | <b>6</b>  | Temple supports                                     |
| <b>2</b>   | Unit fixed arm              | <b>7</b>  | Sensor  |
| <b>3</b>   | Control panel               | <b>8</b>  | X-Ray source assembly                               |
| <b>4</b>   | Hand Grips                  | <b>9</b>  | Unit rotative arm                                   |
| <b>5</b>   | Chin rest base              | <b>10</b> | X-Ray remote control                                |
| <b>5 a</b> | Panoramic chin rest         | <b>11</b> | PC hosting the imaging and the acquisition software |
| <b>5 b</b> | 3D chin rest and bite block |           |   |

## Digital Sensor Locations

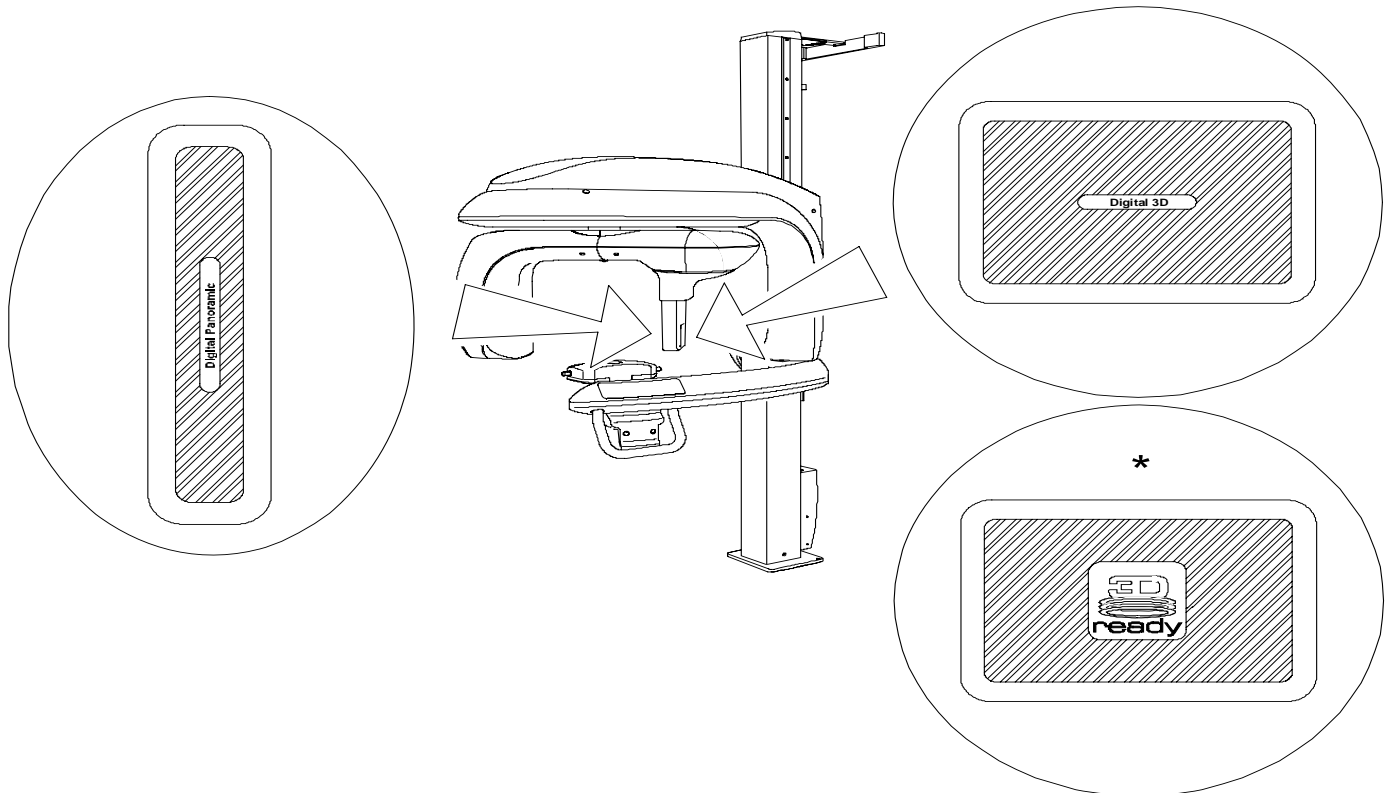
Figure 2-3 illustrates the locations of the panoramic and the 3D digital sensor of the KODAK 9000 and KODAK 9000 3D.



### **IMPORTANT**

**\* When the unit is ONLY panoramic, the 3D option is not available. Therefore, the location of the digital sensor indicates that it is ready for the 3D option.**

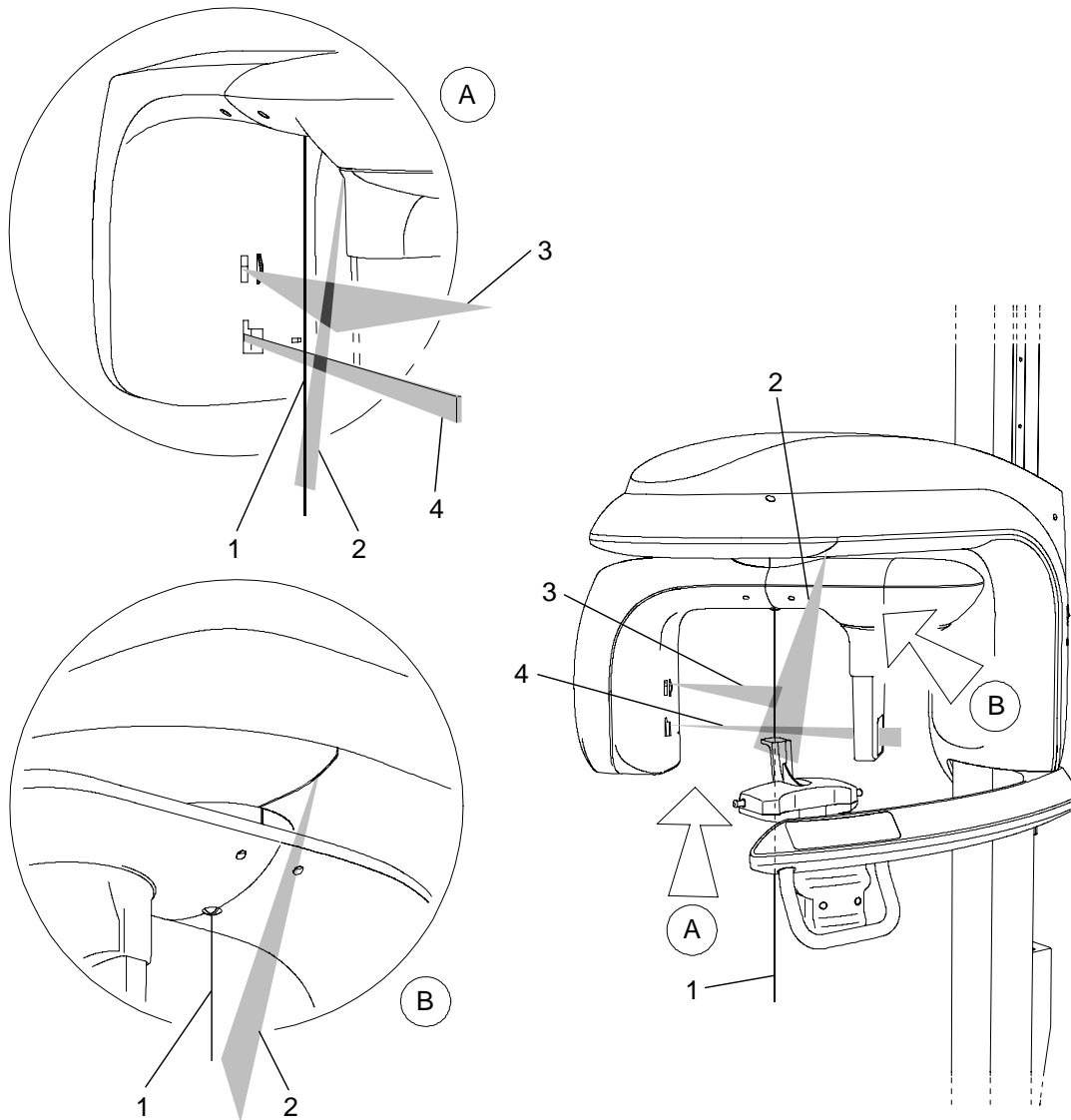
**Figure 2-3 KODAK 9000 and KODAK 9000 3D Unit Panoramic and 3D Digital Sensor Locations**



## Laser Locations

Figure 2-4 illustrates the location of the lasers of the KODAK 9000 and KODAK 9000 3D.

**Figure 2-4 KODAK 9000 and KODAK 9000 3D Unit Laser Beam Positions**



- 1 3D central positioning laser beam
- 2 Mid-sagittal positioning laser beam
- 3 Horizontal positioning laser beam
- 4 3D Field of View (FoV) positioning laser beam

## Label Locations

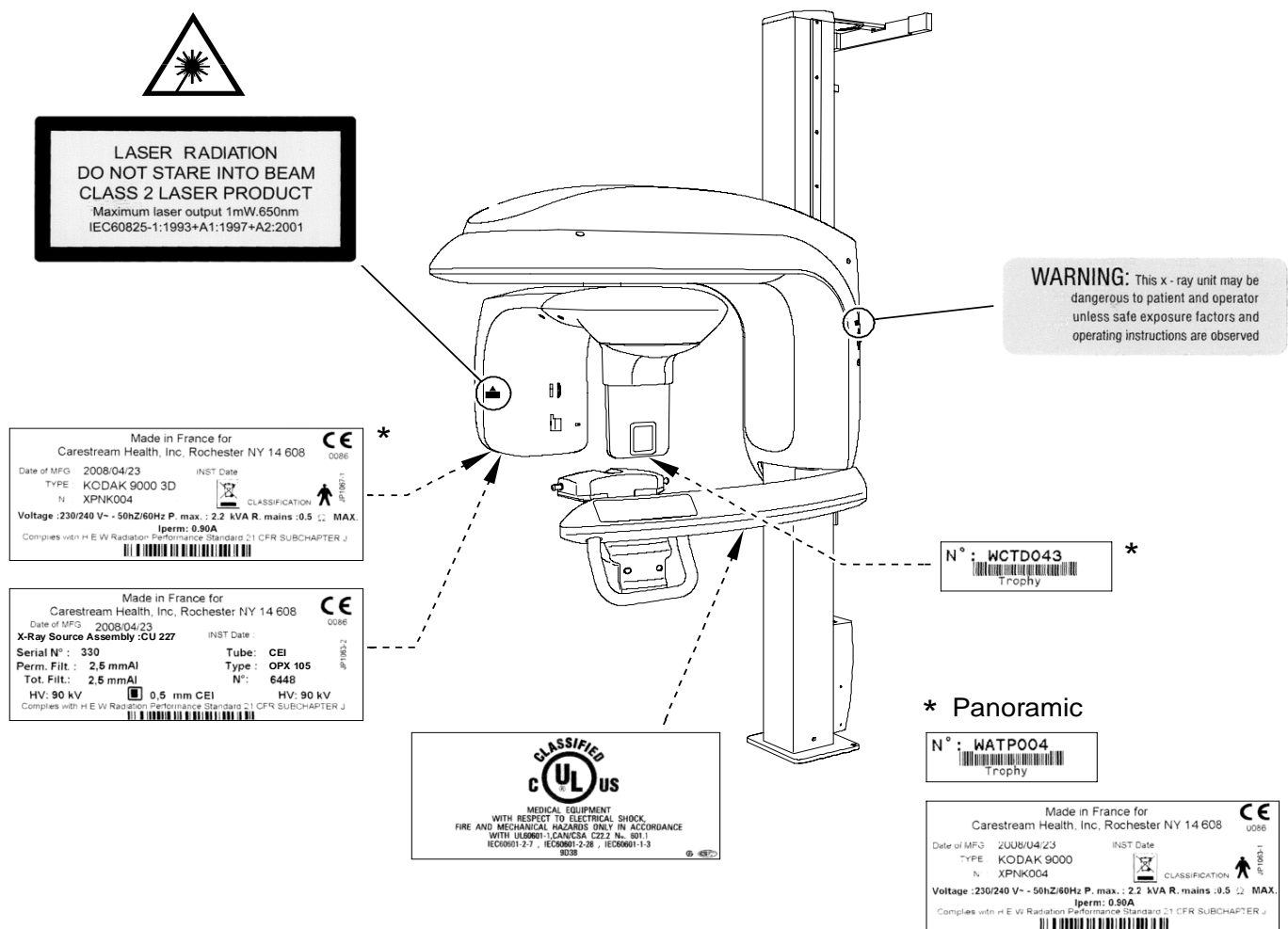
Figure 2-5 illustrates the location of all the labels of the KODAK 9000 3D. The label locations of the KODAK 9000 are presented with \*.



### IMPORTANT

The labels presented are **ONLY** for the **KODAK 9000 3D** option. The “\*Panoramic” presents the labels and their locations for the **KODAK 9000**.

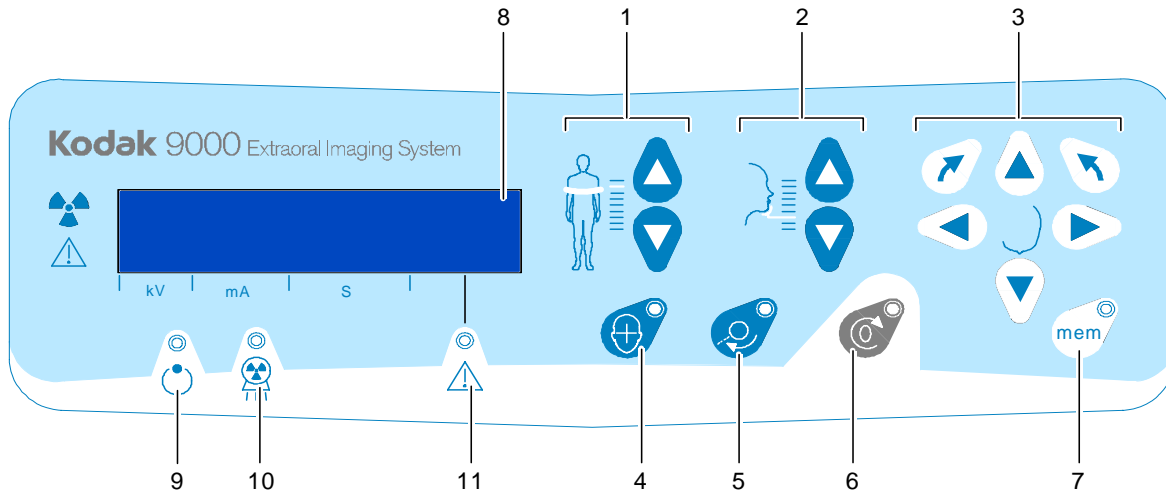
Figure 2-5 KODAK 9000 and KODAK 9000 3D Unit Label Locations



# Control Panel

The control panel is an alphanumeric, digital soft touch console. It allows the operator to control certain unit functions. It also displays the operating parameters and error messages.

Figure 2–6 Unit Control Panel

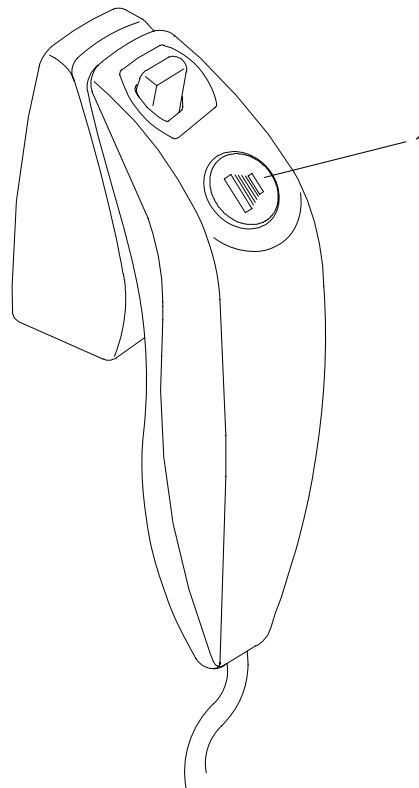


- 1 **Height Adjustment button:** Adjusts the height of the unit to the height of the patient.
- 2 **3D Head Adjustment button:** Adjusts the patient head to the x-ray beams.
- 3 **3D Adjustment button:** Adjusts the unit rotative arm movements to correctly position the patient for 3D acquisition.
- 4 **Laser Beam button:** Activates the beams to correctly position the patient.
- 5 **3D Position Verification button:** Positions the unit rotative arm at the selected or memorized 3D position.
- 6 **Reset button:** Resets the unit arm to the initial position to enable the patient to enter and exit the unit.
- 7 **3D Memorization button:** Memorizes the 3D current positioning parameter settings that override the default parameters.
- 8 **Display Screen:** Displays the current acquisition parameters and the error messages.
- 9 **Ready Indicator LED:** Green, indicates the unit is ready for acquisition.
- 10 **X-Ray Emission LED:** Yellow, indicates the x-rays are being emitted.
- 11 **System Status LED:** Red, indicates the error alerts.

## X-Ray Remote Control Overview

The x-ray remote control enables you to launch a radiological image acquisition via the exposure button from outside the x-ray room. You must press and hold the exposure button until the end of acquisition. Premature release of the exposure button interrupts the acquisition.

**Figure 2-7 X-Ray Remote Control**



- 1 Exposure button:** launches image acquisition.






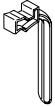

# Positioning Accessories and Replacement Parts

The following accessories are used when positioning a patient. They are delivered with the KODAK 9000 and KODAK 9000 3D digital imaging unit.

## Panoramic Positioning Accessories

Table 2-1 lists the panoramic positioning accessories.

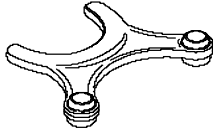
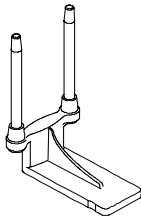

**Table 2-1 Panoramic Positioning Accessories and Replacement Parts**

Accessory	Description
	<ul style="list-style-type: none"> <li>• Panoramic chin rest</li> <li>• TMJ x2</li> <li>• Sinus</li> </ul>
	<p>TMJ x4 nose rest</p>
	<p>Panoramic standard bite block</p>
	<p>Bite block for edentulous patients</p>
	<p>Single use sheaths for bite blocks (500 pcs box)</p>

## 3D Positioning Accessories

Table 2-2 lists the 3D positioning accessories.

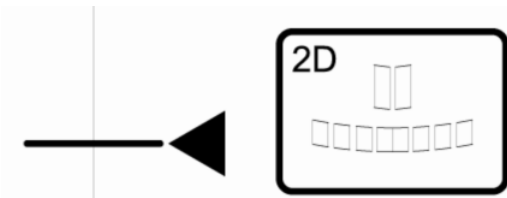
**Table 2–2 3D Positioning Accessories and Replacement Parts**

Accessory	Description
	3D bite block
	3D bite block support
	Single use sheaths for bite blocks (500 pcs box)

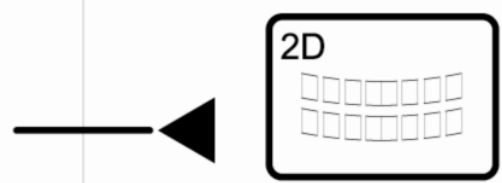
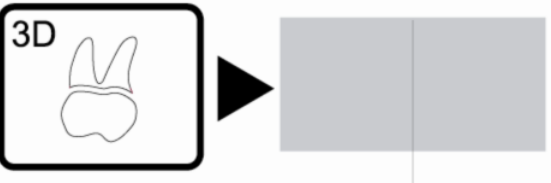

## Patient Positioning Indicators

Table 2-3 lists the patient positioning indicators represented on the chin rest base.

**Table 2–3 Patient Positioning Indicators**

Positioning Indicators	Description
	For sinus positioning

**Table 2-3 Patient Positioning Indicators (Continued)**

Positioning Indicators	Description
	<ul style="list-style-type: none"> <li>• For TMJ x2 and TMJ x4 positioning</li> <li>• For panoramic positioning</li> </ul>
	<p>For 3D upper jaw positioning</p>
	<p>For 3D lower jaw positioning</p>



# Chapter 3

## IMAGING SOFTWARE OVERVIEW

### PC System Requirements

This section specifies the minimum PC system requirements for KODAK 9000 and KODAK 9000 3D extraoral imaging system software.



**IMPORTANT**

It is **MANDATORY** to check that the PC system configuration is compatible with the PC system requirements for the **KODAK 9000** and **KODAK 9000 3D** software. If necessary you **MUST** update your PC system configuration. **KODAK 9000** and **KODAK 9000 3D** **MUST** be connected to the PC via a point-to-point Ethernet link and not via a LAN. **DO NOT** place the PC and the peripheral equipment connected to it in the immediate vicinity of the patient in the unit. Leave at least 1.5 m distance from the unit. The PC and the peripheral equipment must conform to the IEC 60950

standard.



**IMPORTANT**

For **KODAK 9000** (panoramic), you can use the “Viewing” graphic board configuration for acquisition.

**Table 3–1 Minimum PC System Requirements**

Item	Viewing	Acquisition *	Comments
CPU	2 GHz Intel Duo Core	2 GHz Intel Duo Core	
RAM	2 GB	2GB	RAM has a major impact on system performance.
Hard disk drive	<ul style="list-style-type: none"> <li>1.2 GB for software installation</li> <li>80 GB free space to use the software</li> </ul>	1.2 GB for software installation	
Graphic board	Nvidia / ATI based board supporting Open Glide 1.2 with 256 MB of video RAM on AGP x8 video bus (for example: Nvidia GeForce 6800 GT)	Nvidia based board on PCI Express video bus with minimum 512 MB of video RAM (for example: Nvidia GeForce 8800 GT or Quadro FX 4600)	The video RAM has major impact on system performance.
Monitor	<ul style="list-style-type: none"> <li>1 monitor</li> <li>17" or larger</li> <li>1024 x 768 minimum screen resolution - 32 bits color mode</li> </ul>	<ul style="list-style-type: none"> <li>1 monitor</li> <li>17"</li> <li>1280 x 880 minimum screen resolution</li> </ul>	Your monitor is a vital component in displaying quality images. Low-quality screens will prevent you from proper diagnoses and treatment.

**Table 3–1 Minimum PC System Requirements**

Item	Viewing	Acquisition *	Comments
<b>Operating system</b>	<ul style="list-style-type: none"> <li>Windows 2000 SP4</li> <li>Windows XP Home / Pro edition SP2</li> <li>Windows Vista 32 bits</li> </ul>	<ul style="list-style-type: none"> <li>Windows XP Home / Pro edition SP2</li> <li>Windows Vista 32 bits</li> </ul>	
<b>Ethernet interface</b>	1 Ethernet interface	1 Ethernet interfaces (100Mbits)	If there is a LAN connection a second Ethernet interface is required.
<b>CD/DVD drive</b>	A DVD-BURNER drive is required to install the product.	A DVD-BURNER drive is required to install the product.	
<b>Backup Media</b>	Removable/portable, external hard disk drive	Removable/portable, external hard disk drive.	We strongly recommend a daily backup of x-ray images and patient records.
* For the KODAK 9000 (panoramic) acquisition, you need only the “Viewing” graphic board configuration.			

## General Software Overview

The KODAK 9000 and KODAK 9000 3D extraoral imaging system operates with the following software:

- KODAK dental imaging software
- Acquisition interface module

## KODAK Dental Imaging Software

The KODAK dental imaging software is a user-friendly working interface that was designed and developed specifically for radiological diagnosis. It is the common imaging platform for all our digital systems for dentistry.

The KODAK dental imaging software has the following features:

- Patient record management using **Patient Window** features
- Extraoral and intraoral image management using **Imaging Window** features
- 3D image management using **3D Imaging Window** features



### **NOTE**

For a complete information on the KODAK Dental Imaging Software, see the “*KODAK Dental Imaging Software, Quick Start Guide*”.

## Acquisition Interface Module

The Acquisition interface module is a user-friendly working interface that was designed and developed specifically for KODAK 9000 and KODAK 9000 3D extraoral imaging system.

The Acquisition interface module has the following features:

- Panoramic acquisition interface using **Panoramic Acquisition Window**
- 3D acquisition interface using **3D Acquisition Window**

# Acquisition Interface Module

## Panoramic Acquisition Window Overview

The **Panoramic Acquisition Window** is the main panoramic interface with the KODAK 9000 and KODAK 9000 3D extraoral imaging system that provides you with imaging acquisition functions.

**Figure 3–1 Panoramic Acquisition Window**



**1 Information button:**

- **About:** Identifies the Software and the Firmware versions
- **Reset of the Values:** Resets to the manufacturing parameter settings
- **Memorize settings:** Memorizes the user preference settings for each patient type (kV, mA and seconds)

**2 Preview Screen:** Displays the acquired image in real time.

**3 Selected Parameter Display:** Displays the current acquisition parameter settings.

**4 System Status Screen:** Displays various alert or warning messages originating from the unit.

**5 X-Rays ON / OFF button:** Turns off the x-ray emissions to demonstrate the acquisition process for the patient.

**6 Generator Cooling indicator:** Indicates the automatic cooling time (mm:ss) required for the generator to reach 0 for a new acquisition.

**7 Stop button:** Stops the unit rotative arm movement



- 8    **Ready Indicator LED**
  - Green indicates the unit is ready to start acquisition.
  - Black indicates the unit is not ready to start acquisition.
- 9    **Exit button:** Closes the Acquisition Window.
- 10   **X-Ray Emission indicator:** Yellow, indicates the x-ray emission status.
- 11   **Selector Button:** Selects different acquisition setting options.
  - Click **Program** to select examination type options.
  - Click **Patient** to select patient type parameters.
  - Click **Parameters** to select exposure parameter options.

The **Selector button** enables you to access the following 3 panes:

- **Program pane:** Examination type options
- **Patient pane:** Patient type parameter options
- **Parameters pane:** Exposure parameter options


## Panoramic Program Pane

The Panoramic **Program pane** enables you to choose different radiological exams. The diagram in the **Panoramic Program pane** represents a jaw, with the right side of the diagram corresponding to the right side of the patient. Click on a section of the jaw to select an anatomical zone for radiological exam. The selected segment is highlighted.

Figure 3–2 Panoramic Program Pane



### 1 Radiological exam options:



Click  for a Maxillary Sinus exam.

Click  for an anterior exam.

Click  for a Panoramic exam.

### 2 TMJ exam options:

Select  for a TMJ x2.

Select  for a TMJ x4 exam and click .



### NOTE

The above list of exam types are only a sample of exam options of the **Program pane**.


## Panoramic Patient Pane


The Panoramic **Patient pane** enables you to choose different patient parameters. The selection of the patient parameters influences the quality of the image. The selected parameters must be based on the age and morphology of the patient .


**Figure 3–3 Panoramic Patient Pane**




### 1 Patient type parameters:


Click  if the patient is a child.

Click  if the patient is small.


Click  if the patient is medium.

Click  if the patient is large.


### 2 Patient dental arch morphology:


Click  for a **square** dental arch.


Click  for a **normal** shape dental arch.

Click  for a **sharp** dental arch.

### 3 Incisors orientation:

Click  for a vestibular orientation.

Click  for an axial orientation.

Click  for a lingual orientation.



## Panoramic Parameter Pane

The **Panoramic Parameter pane** enables you to choose exposure parameters for the radiological image acquisition. If the default parameter setting is not adapted to your patient's type, you can manually adapt the parameter settings to the patient's type and save this setting as the default setting.

Figure 3-4 Panoramic Parameter Pane




**1 Fine-tuning buttons:**


Click  to fine-tune the kV and click  to fine-tune the mA.

**2 Radiation dose options:**

 kilovolt

 milliampere

**3 Exposure time:**

 seconds

## 3D Acquisition Window Overview

The **3D Acquisition Window** is the main 3D interface with the KODAK 9000 3D extraoral imaging system that provides you with imaging acquisition functions.

Figure 3–5 3D Acquisition Window



- 1 **Information button:**
  - **About:** Identifies the Software and the Firmware versions
  - **Reset of the Values:** Resets to the manufacturing parameter settings
  - **Memorize settings:** Memorizes the user preference settings for each patient type (kV, mA and seconds)
- 2 **Preview Screen:** Displays the acquired image in real time.
- 3 **Selected Parameter Display:** Displays the current acquisition parameter settings.
- 4 **System Status Screen:** Displays various alert or warning messages originating from the unit.
- 5 **X-Rays ON / OFF button:** Turns off the x-ray emissions to demonstrate the acquisition process for the patient.
- 6 **Generator Cooling indicator:** Indicates the automatic cooling time (mm:ss) required for the generator to reach 0 for a new acquisition.
- 7 **Stop button:** Stops the unit rotative arm movement.
- 8 **Multi-Volume button:** Accesses the multi-volume **Program** pane.

- 9 **Pre-shoot button:** Pre-acquires test images for correct selection of region of interest.
- 10 **Ready Indicator LED:**
  - Green indicates the unit is ready to start acquisition
  - Black indicates the unit is not ready to start acquisition
- 11 **X-Ray Emission Indicator:** Yellow indicates the x-ray emission status.
- 12 **Exit button:** Closes the Acquisition Window.
- 13 **Validation button:** Validates the selected region of interest.
- 14 **Cancellation button:** Cancels the selected region of interest.
- 15 **Selector button:** Selects different acquisition setting options.
  - Click **Program** to select examination type options
  - Click **Patient** to select patient type parameters
  - Click **Parameters** to select exposure parameter options

The **Selector button** enables you to access the following 3 panes:

- **Program pane:** Examination type options
- **Patient pane:** Patient type parameter options
- **Parameters pane:** Exposure parameter options

## 3D Program Pane

The 3D **Program pane** enables you to choose different radiological exams. The diagram in the **Program pane** represents the dental arch. The 3D **Program pane** is composed of the following 2 interfaces:

- 3D single-volume **Program pane** (by default).
- 3D multi-volume **Program pane**

Figure 3–6 3D Single-Volume Program Pane

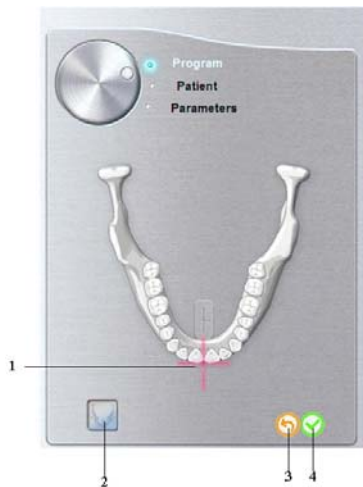
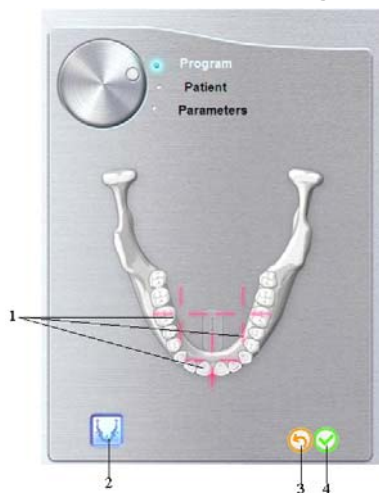




Figure 3–7 3D Multi-Volume Program Pane



- 1 **Selection Indicator:** Enables you to select the region of interest.
- 2 **Multi-Volume button:** Enables you to access the multi-volume **Program pane**.
- 3 **Validation button:** Click  to validate the region of interest selection.
- 4 **Cancellation button:** Click  to cancel the region of interest selection.


## 3D Patient Pane


The 3D **Patient pane** enables you to choose different patient parameters. The selection of the patient parameters influences the quality of the image. The selected parameters must be based on the age and morphology of the patient.


**Figure 3–8 3D Patient Pane**




### 1 Patient type parameters:


Click  if the patient is a child.

Click  if the patient is small.


Click  if the patient is medium.

Click  if the patient is large.


### 2 Patient dental arch morphology:


Click  for a **square** dental arch.


Click  for a **normal** shape dental arch.

Click  for a **sharp** dental arch.

### 3 Incisors orientation:

Click  for a vestibular orientation.

Click  for an axial orientation.

Click  for a lingual orientation.



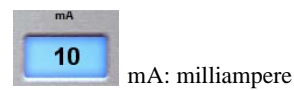
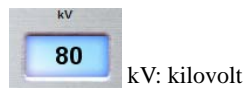
## 3D Parameter Pane

The **3D Parameter pane** enables you to choose exposure parameters for the radiological image acquisition. If the default parameter setting is not adapted to your patient's type, you can manually adapt the parameter settings to the patient's type and save this setting as the default setting.

**Figure 3–9 3D Parameter Pane**




**1 Radiation dose options:**

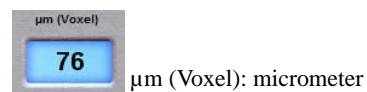


**2 Fine-tuning buttons:**



Click  to fine-tune the kV, the mA and the  $\mu\text{m}$  (voxel).

**3 Image resolution options:**





# Chapter 4

## GETTING STARTED

### Switching on the Unit

Before switching on the unit, check that:



- The installation of the unit is complete.
- The PC is switched on.

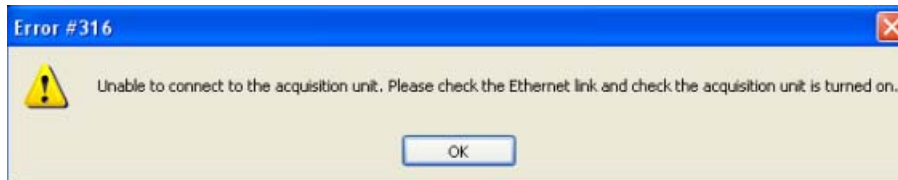


#### **IMPORTANT**

**You must switch on the PC and wait for it to be ready for the connection before switching on the unit.**

To switch on the unit, follow these steps:

1. On the unit column, press the **ON** button.
2. Switch on the unit and wait for a minute for the connection between the unit and the PC to be established. In the status bar,  must become .
3. If you start the imaging software before the connection is established an error message is displayed. Click **OK**, close the imaging software and wait for the connection to be established.



4. You can now proceed to start the imaging software.



#### **IMPORTANT**

**To increase the operating life of the x-ray tube, if the unit has not been used for a month, you must follow the following procedures before use.**


1. In the **Panoramic Acquisition Window**, select the **Parameter pane**.

2. Select the following series of parameter settings:
  - 70 kV - 6.3 mA
  - 80 kV - 10 mA
  - 85 kV - 10 mA
3. leave the x-ray room and close the door. For each parameter setting, from the x-ray remote control, press and hold the button to launch the x-ray

The unit is now ready to be used for acquisition.

## Starting the Imaging Software

To start the imaging software, follow these steps:

1. On your desktop, double-click .

**OR**

From your PC, click **Start > All Programs > Kodak > Kodak Dental Software**.




A blank **Patient Window** is displayed.

2. Create or open an existing patient record.

## Creating a Patient Record


To create a patient record, follow these steps:

1. In the **Patient Window**, from the toolbar, click .

**OR**

From the menu bar, select **Patient > New**.

2. Enter the required patient information. The **Last name**, the **First name** and the **Date of birth** fields are required.

3. From the menu bar, select **Picture > Insert Picture** to add a \*.tif or \*.bmp picture of the patient to the record. Select the picture from your directory and click **Open**.
4. Click **OK** to save. The patient record is automatically assigned a 7-digit number starting with a letter (for example, M0000001).
5. Click  to access the **Imaging Window**.
6. Select an image acquisition.

## Accessing the Acquisition Windows

To access the **Acquisition Windows**, follow these steps:

1. In the **Imaging Window**, from the toolbar, click  to access the **Panoramic Acquisition Window**, or, click  to access the **3D Acquisition Window**.
2. See the chapter “**Acquiring an Image**” to launch an acquisition.



# Chapter 5

## ACQUIRING IMAGES

### Acquiring a Panoramic, TMJ x2 or Sinus Image

Before acquiring an image, check that you have:


- Reset the unit rotative arm to the start position for patient to enter the unit.
- Selected the patient record.
- Accessed the **Imaging Window**.
- Accessed the **Panoramic Acquisition Window**.

### Preparing the Unit and Setting the Acquisition Parameters

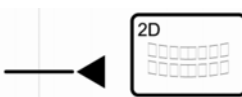
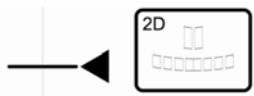
To set the acquisition parameters, follow these steps:

1. In the **Panoramic Acquisition Window**, click the **Program** button to access the **Program pane**. Click on the section of the jaw to select the anatomical zone for the x-ray image, such as panoramic, TMJ x2 or sinus.
2. Click the **Patient** button to access the **Patient pane**.

Select the patient:

- Type
  - Dental arch morphology
  - Incisors orientation
3. If the default parameter setting is not adapted to your patient type, click the **Parameter** button and select the appropriate parameters. To save the new parameter settings as the default settings, click  and select **Memorize settings**.
  4. Position the appropriate chin rest on the chin rest support and cover the bite block with a hygienic barrier. If needed, use the edentulous bite block.

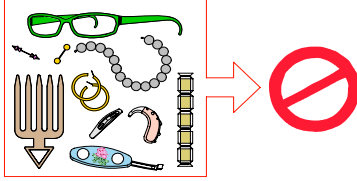
5. Press and hold  to raise the chin rest to the following positioning indicators:

- For a panoramic or TMJ x2 positioning 
- For a sinus positioning 


## Preparing and Positioning the Patient

To prepare and position the patient, follow these steps:

1. Ask the patient to remove all metal objects.



2. Ask the patient to wear a lead apron. Ensure that the apron lays flat across the patient's shoulders.

3. On the **Control Panel**, press and hold  to raise the chin rest to the maximum height.

4. Ask the patient to enter the unit. On the **Control Panel**, press and hold  to adjust the unit to the height of the patient.

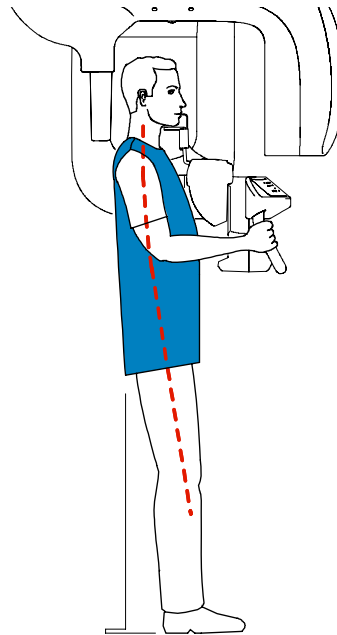


### **NOTE**

If the patient is too tall, ask the patient to sit on a stool.


5. Ask the patient to do the following:

- Stand up straight.
- Grip the lower handle on each side.
- Rest the chin on the chin rest support and bite into the bite block.
- Position the feet slightly forward.
- Relax the shoulders for full motion of the unit rotative arm.

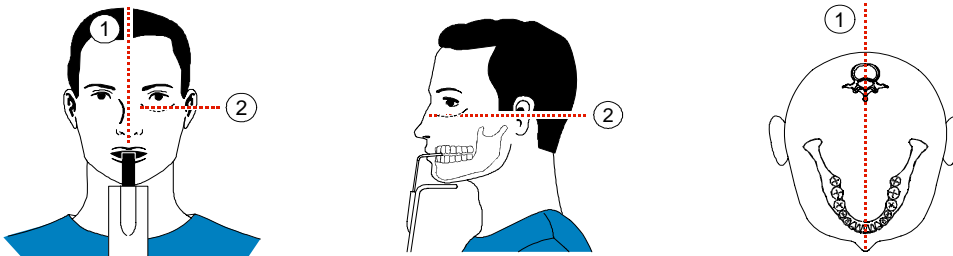





- i NOTE**  
Correct posture reduces the shadow of the spinal column transferred to the image.

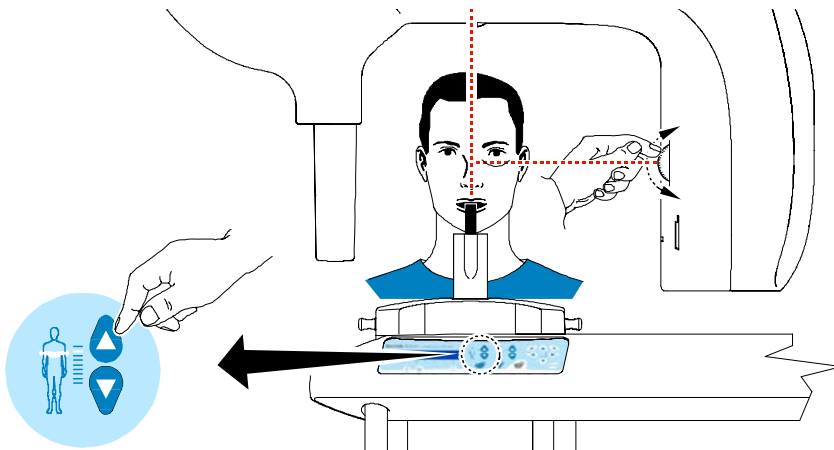
6. On the **Control Panel**, click  to turn ON the 2 positioning laser beams:
- The mid-sagittal (1) positioning laser beam for a vertical alignment.
  - The horizontal (2) positioning laser beam for a Frankfort plane alignment.

- i NOTE**  
You can re-activate the laser positioning beams as needed. You can press the same button to turn OFF the laser beams, or wait 60 seconds for the beams to turn OFF automatically.

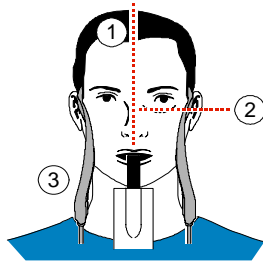


- ! IMPORTANT**  
The spinal column and the nose of the patient must be aligned in a straight line (1).

7. Correctly align the Frankfort and mid-sagittal planes using  and the adjusting thumb wheel.

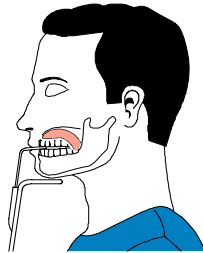


8. Immobilize the patient head with the temple supports (3).



9. Ask the patient to do the following:

- To close the eyes
- To remain still
- To swallow
- To place the tongue in contact with the palate
- To breath through the nose



## Launching the X-ray

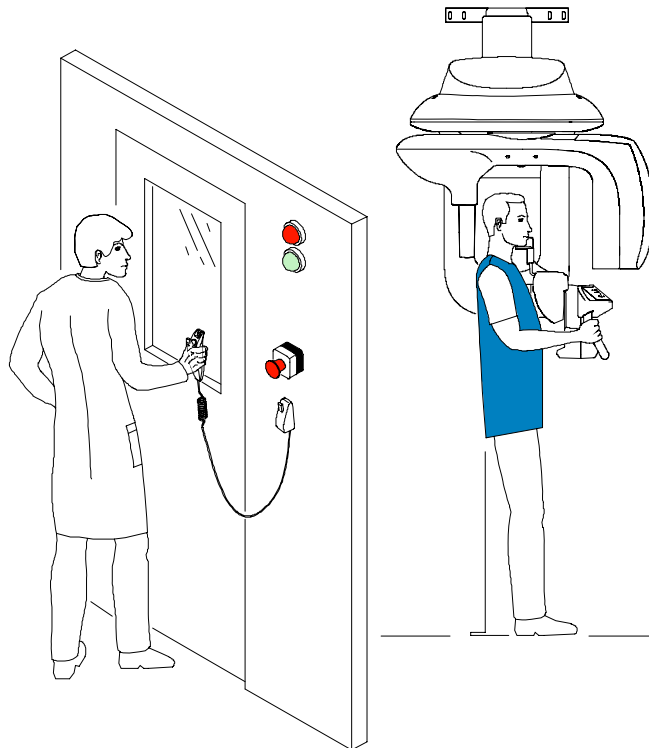
To launch the x-ray, follow these steps:

1. Leave the x-ray room and close the door. You must keep visual contact with the patient during acquisition.




### **IMPORTANT**

To stop the acquisition, if any problem, release the exposure button of the remote control or press the red emergency stop button.



2. Launch the x-ray with the remote control. Press and hold the exposure button until the end

of acquisition. The  turns yellow, indicating x-ray emission. The image appears on the **Preview Screen** of the **Panoramic Acquisition Window**. When the acquisition ends, the **Panoramic Acquisition Window** disappears and the acquired image is automatically transferred to the **Imaging Window**.


3. Check the image quality.
4. Do the following when the acquisition is finished:
  - Open the temple supports and release the patient.
  - Remove the hygiene barrier of the bite block.
  - Reset the unit rotative arm for the next acquisition.



## Acquiring a TMJ x4 Image


Before acquiring a TMJ x4 image, check that you have:

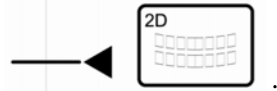
- Reset the unit rotative arm to the start position for patient to enter the unit.
- Selected the patient record.
- Accessed the **Imaging Window**.
- Accessed the **Panoramic Acquisition Window**.

To acquire a TMJ x4 image, follow these steps:


1. From the **Panoramic Acquisition Window**, in the **Program pane**, select the TMJ and click .

2. Remove , place  on the chin rest support and cover it with a hygienic barrier.

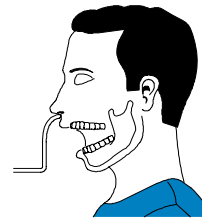
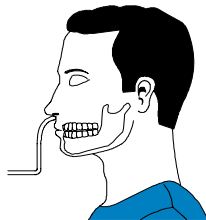
3. Press and hold  to raise the chin rest to the TMJ x4 positioning indicator



4. Correctly position the patient using the 2 positioning laser beams.
5. Ask the patient to remain still and close the eyes. Acquire an image with the mouth closed.

6. To acquire an image with open mouth, on the **Control Panel**, click  to reset the unit rotative arm.

7. Ask the patient to stay in the same position and open the mouth. Acquire an image with the mouth open.



8. Do the following when the acquisition is finished:
  - Open the temple supports and release the patient.
  - Remove the hygiene barrier of the bite block.
  - Reset the unit rotative arm for the next acquisition.

## Acquiring a 3D Single-Volume Image

Before acquiring a 3D single-volume image, check that you have:

- Reset the unit rotative arm to the start position for patient to enter the unit.
- Selected the patient record.
- Accessed the **Imaging Window**.
- Accessed the **3D Acquisition Window**.

## Preparing the Unit and Setting the Acquisition Parameters



To set the acquisition parameters, follow these steps:

1. Click the **Patient** button to access the **Patient pane**.

Select the patient:


- Type
- Dental arch morphology (optional)
- Incisors orientation (optional)

2. In the **3D Acquisition Window**, click the **Program** button to access the **Program pane**.

Select the region of interest and click  to validate the selection, or click  to cancel the modifications.


3. Click the **Parameter** button to access the **Parameter pane**.


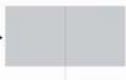


- kV and mA: If the default parameter settings for kV and mA is not adapted to your patient type, select the appropriate kV and mA parameters. To save the new parameter

settings as the default parameter settings, click  and select **Memorize settings**.

- $\mu\text{m}$  (Voxel): If the default parameter setting is not adapted to the desired image resolution, select the appropriate  $\mu\text{m}$  parameter. The higher you select the image resolution the greater will be the image data size.
  - For the highest resolution and detailed information, for example for endodontics, select 76  $\mu\text{m}$ .
  - For the lowest resolution and less detailed information, for example for implantology, select 100 or 200  $\mu\text{m}$ .
  - The selected parameter will be saved automatically as default value.

4. Position the 3D head rest and 3D standard bite block and cover the bite block with a hygienic barrier.

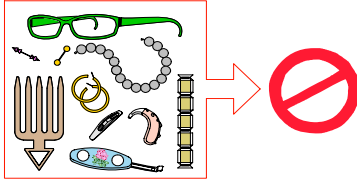
5. Press and hold  to raise the chin rest to the following positioning indicators:

- For an upper jaw positioning  
- For a lower jaw positioning  

## Preparing and Positioning the Patient

To prepare and position the patient, follow these steps:

1. Ask the patient to remove all metal objects.

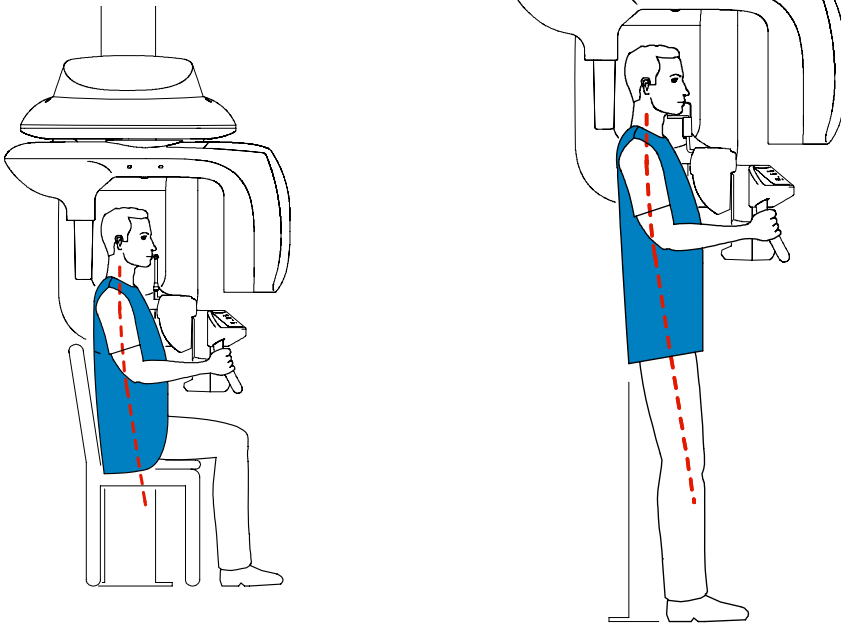


2. Ask the patient to wear a lead apron. Ensure that the apron lays flat across the patient's shoulders.

3. Ask the patient to enter the unit. On the **Control Panel**, press and hold  to adjust the unit to the height of the patient.


## 4. Ask the patient to do the following:

- Stand up straight or sit on a stool.
- Grip the lower handle on each side.
- Position the feet slightly forward.
- Relax the shoulders for full motion of the unit rotating Arm



## 5. Position the patient:

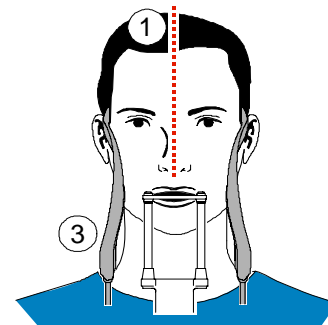
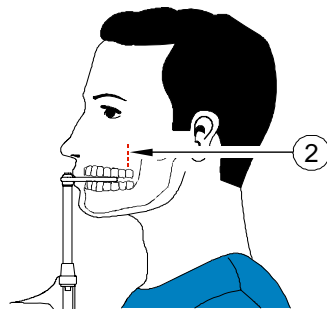
- Ask the patient to open the mouth.
- Ask the patient to bite gently and naturally into the bite block without joining the incisors.
- Center the upper incisors with the bite block.


6. Click  on the **Control Panel** to turn ON the positioning laser beams. Adjust the patient using the following 2 positioning laser beams:
- The mid-sagittal (1) positioning laser beam
  - The 3D FoV (2) positioning laser beam



**NOTE**

You can re-activate the laser positioning beams as needed. You can press the same button to turn OFF the laser beams, or wait 60 seconds for the beams to turn OFF automatically.



7. Press and hold  to align the upper or lower jaw with the 3D FoV (2) positioning laser beam. Tighten the temple supports (3).
8. Ask the patient to close the eyes, to remains still and to breath through the nose.



## Launching the x-ray

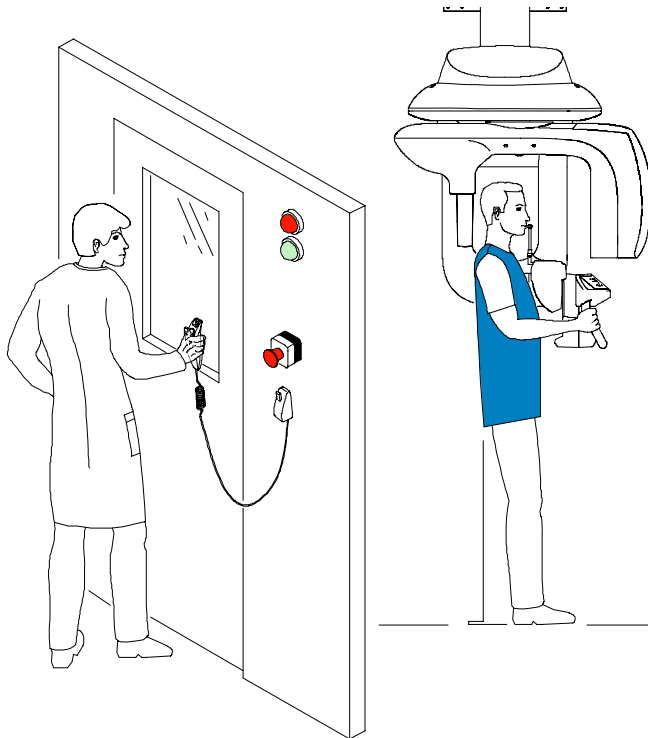
To launch the x-ray, follow these steps:

1. Leave the x-ray room and close the door. You must keep visual contact with the patient during acquisition.




### **IMPORTANT**

To stop the acquisition, if any problem, release the exposure button of the remote control or press the red emergency stop button.



2. Trigger the x-ray with the remote control. Press and hold the exposure button until the end

of acquisition. The  turns yellow, indicating x-ray emission. The image appears in the **Preview Screen**. When the acquisition ends, the **3D Acquisition Window** disappears.

3. Open the 3D head support and release the patient while waiting for the 3D image reconstruction. Remove the hygiene barrier of the bite block.
4. Wait for the 3D image reconstruction. Open the **Imaging Window** and

in the  pane, click  to access the patient's record and to open the acquired 3D image.

## Manually Pre-Setting the Single-Volume Position of the Patient



### **TIP**

You can pre-set the acquisition parameters of the region of interest manually using dental plaster imprint.

To pre-set the acquisition parameters, follow these steps:

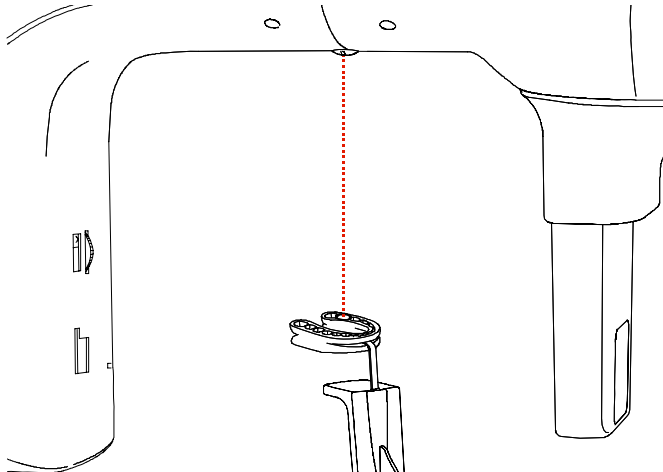
1. Select the appropriate settings in:
  - The **Program pane**
  - The **Patient pane**
  - The **Parameter pane** if needed
2. To pre-set the position of the patient positioning, ask the patient to bite into a plate of dental impression paste and wait for the imprint to harden.



3. Place the dental imprint on the bite block location. Press and hold the 3D central positioning laser beam icon to align the unit rotative arm to the region of interest using the 3D central positioning laser beam. Press



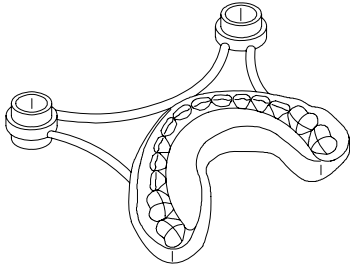
to save the manually selected parameter settings of the unit rotative arm.



4. Remove the plaster imprint and position the patient in the unit and follow the appropriate steps to acquire the 3D image of the region of interest.

## Acquiring a 3D Multi-Volume Image

Before acquiring a 3D multi-volume image, prepare the patient's bite registration. Place the dental impression paste on the 3D bite block. Ask the patient to bite into the impression paste.




### **NOTE**

The used impression paste must follow the manufacturers's recommendations for safety precautions.

## Preparing the Unit and Setting the Acquisition Parameters

To set the acquisition parameters, follow these steps:

1. Before selecting the acquisition parameters:
  - Reset the unit rotative arm to the start position for patient to enter the unit.
  - Select the patient file.
  - Access the **Imaging Window**.
  - Access the **3D Acquisition Window**.
2. Click the **Patient** button to access the **Patient pane**. Select the patient:
  - Type
  - Dental arch morphology (optional)
  - Incisors orientation (optional)
3. Click the **Program** button to access the **Program pane**.
4. Click  to access the multi-volume **Program pane**. By default, the 3 regions of interest indicators are displayed. To remove a region of interest indicator, click on the indicator.



### **IMPORTANT**

The 3 regions of interest indicators displayed are fixed and not modifiable.

5. Select the following regions of interest according to the desired exam:

- Full arch (by default), covering a zone of  $\pm 7$ cm (depth) x  $\pm 8$  cm (Width):




- Anterior posterior right:





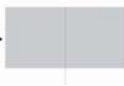


- Anterior posterior left:




6. Click  to initialize the rotative arm position for the multi-volume.

7. Position the 3D bite block support and 3D bite block with the patient's bite registration.

8. Press and hold  to raise the chin rest to the following positioning indicators:

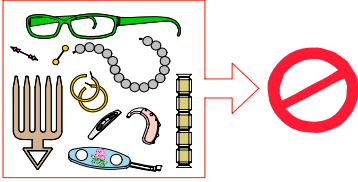
- For an upper jaw positioning  
- For a lower jaw positioning  

9. Click  on the **Control Panel** to turn on the positioning laser beams. Adjust the bite registration with the FoV laser.

## Preparing and Positioning the Patient

To prepare and position the patient, follow these steps:

1. Ask the patient to remove all metal objects.

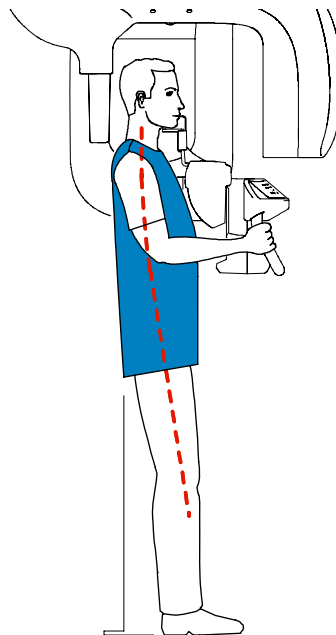
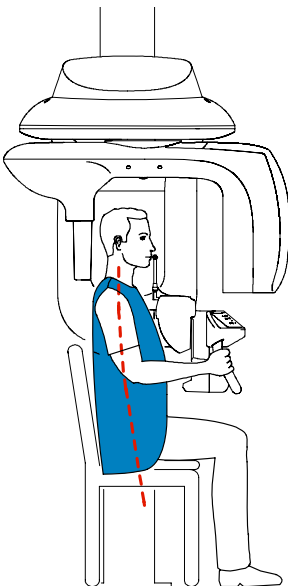


2. Ask the patient to wear a lead apron. Ensure that the apron lays flat across the patient's shoulders.


3. Ask the patient to enter the unit. On the **Control Panel**, press and hold  to adjust the unit to the height of the patient.

4. Ask the patient to do the following:

- Stand up straight or sit on a stool.
- Grip the lower handle on each side.
- Position the feet slightly forward.
- Relax the shoulders for full motion of the unit rotating Arm.



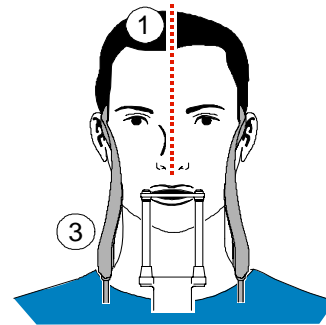
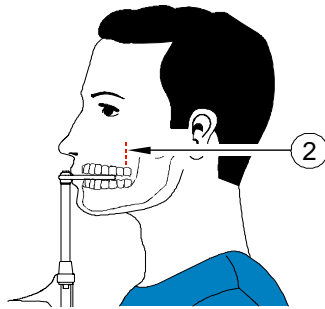
5. Ask the patient to bite gently and naturally into his own bite registration on the 3D bite block.


6. Click  on the **Control Panel** to turn ON the positioning laser beams. Adjust the patient using the following 2 positioning laser beams:
- The mid-sagittal (1) positioning laser beam
  - The 3D FoV (2) positioning laser beam



**NOTE**

You can re-activate the laser positioning beams as needed. You can press the same button to turn OFF the laser beams, or wait 60 seconds for the beams to turn OFF automatically.



7. Press and hold  to align the upper or lower jaw with the 3D FoV (2) positioning laser beam. Tighten the temple supports (3).
8. Ask the patient to close the eyes, to remains still and to breath through the nose.

## Launching the x-ray

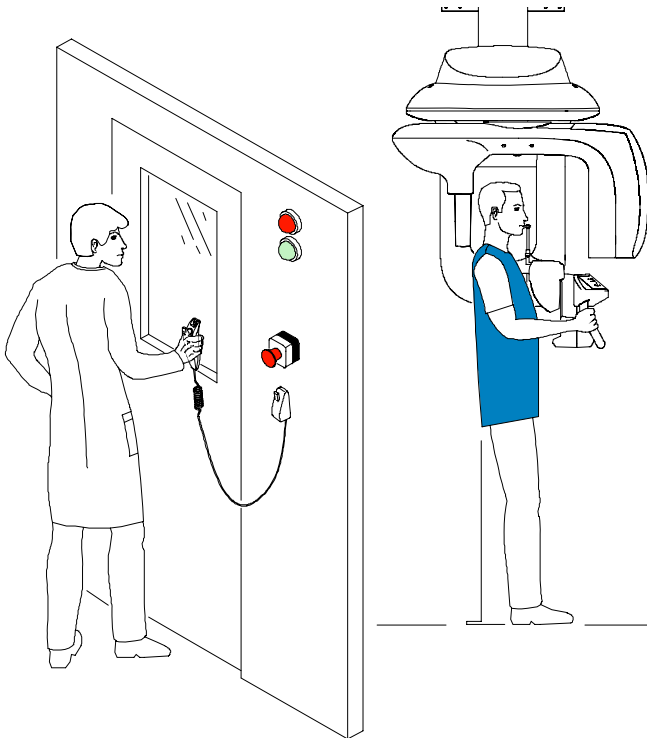
To launch the x-ray, follow these steps:


1. Leave the x-ray room and close the door. You must keep visual contact with the patient during acquisition.



### **IMPORTANT**

To stop the acquisition, if any problem, release the exposure button of the remote control or press the red emergency stop button.








2. Trigger the x-ray with the remote control. Press and hold the exposure button until the end of the first region of interest acquisition. The  turns yellow, indicating x-ray emission. The image appears in the **Preview Screen**.

When you release the exposure button, the rotative arm automatically is positioned for the second region of interest acquisition.

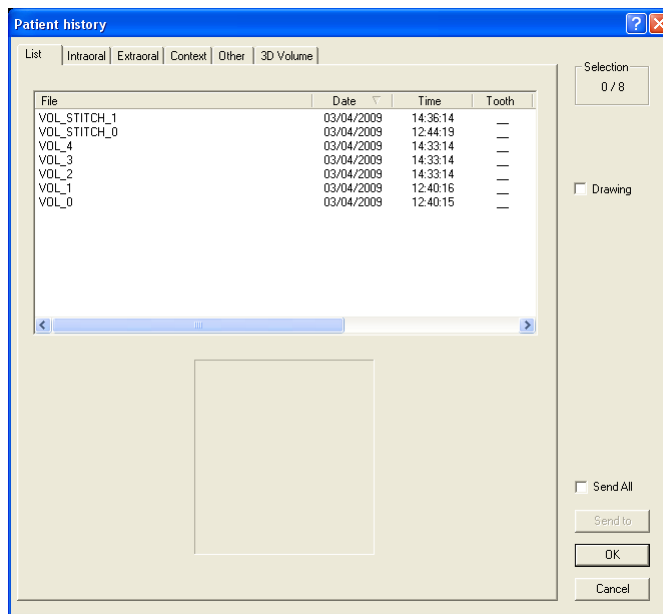


### **NOTE**

You can release the patient after acquiring each region of interest. In this case, you must make sure that the height of the 3D bite block and the position of the unit arm remains unchanged.

3. When  is green, press and hold the exposure button until the end of the second region of interest acquisition. The  turns yellow, indicating x-ray emission. The image appears in the **Preview Screen**.
4. If you have selected the “full arch” mode, the rotative arm automatically is positioned for the third region of interest acquisition. When  is green, press and hold the exposure button until the end. When the acquisition ends, the **3D Acquisition Window** disappears.
5. Open the temple supports and release the patient while waiting for the 3D image reconstruction. Remove the dental impression paste from the bite block and sterilize for the next patient.
6. Wait around 1 to 2 minutes for multiple volume 3D reconstruction. Open the **Imaging Window** and in the  pane, click  to access the patient’s record. The **Patient History** dialog box is displayed.

**Window** and in the  pane, click  to access the patient’s record. The **Patient History** dialog box is displayed.



7. The multi-volume reconstructed image is identified by **Vol\_STITCH\_N°**. The N° is the multi-volume counter for the number of multi-volume images acquired for this patient. You can identify the desired reconstructed image by the date and the time of acquisition.

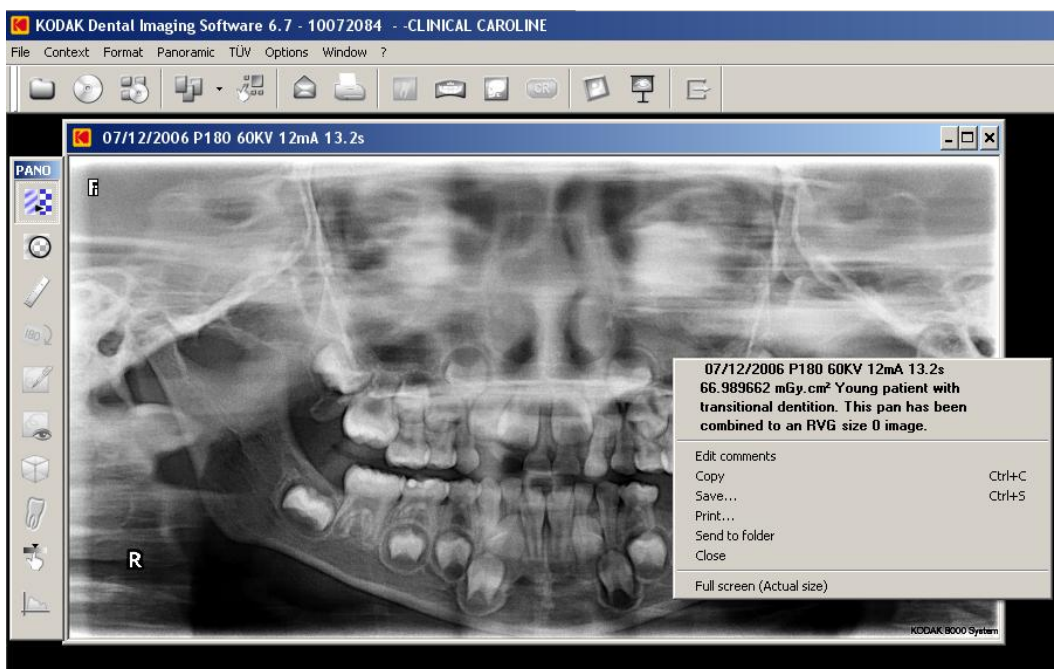


# X-Ray Dose Emission Information

## Compliance with EURATOM 97/43 Directive

You can right-click on each image to display the estimated emitted dose received by the patient. You can use this information to calculate the effective dose received by the patient for the image.

The radiation emission dose is expressed in  $\text{mGy}\cdot\text{cm}^2$ . This dose is measured at the primary collimator outlet. The dose is accurate to  $\pm 30\%$ . The primary slot is 0.5 mm wide and 18.2 mm high.





# Chapter 6

## TROUBLESHOOTING

### Quick Troubleshooting

Occasionally, malfunctions can occur during use in the event of an incorrect action. An information (**I**) error code is displayed on the **Display Screen** of the unit **Control Panel** and the message is displayed on the popup on the **Acquisition Window System Status Screen**. In some cases, an audible warning is also issued.

The following table lists the information messages, their description and the action to take:





#### **IMPORTANT**


If and “E” message is displayed, the malfunction persists or more serious conditions occur, contact a qualified technician. When you call the qualified technician have the following information ready:

- **Model Number: KODAK 9000 or KODAK 9000 3D**
- **Error Code Number: E xxx**
- **Message displayed on the popup on the Acquisition Window.**

**Table 6–1 Quick Troubleshooting**

Information Error Code	Information Message	Description	Action
<b>I 1</b>	X-Ray tube cooling	Cooling in progress.	Wait until the <b>Generator Cooling Indicator</b> on the <b>Acquisition Window</b> reaches zero.
<b>I 2</b>	Thermal security	Cooling in progress.	Wait until the <b>Generator Cooling Indicator</b> on the <b>Acquisition Window</b> reaches zero.
<b>I 3</b>	Release handswitch	The acquisition has ended.	Release the exposure button of the x-ray remote control.
<b>I 6</b>	Wrong rotative arm position	The exposure button of the x-ray remote control is inactive because the rotative arm is not in the start position.	 Press  to reset the rotative arm in start position.
<b>I 15</b>	Interface inactive	The <b>Acquisition Window</b> cannot be accessed.	<ul style="list-style-type: none"> <li>• Check that the unit is switched on.</li> <li>• Wait for the connection between the unit and the PC.</li> <li>• Check that the <b>Acquisition Window</b> is not masked by another application, in this case close the masking application.</li> </ul>
<b>I 16</b>	Incorrect positioning of the chin rest	This error applies only to panoramic mode.	Raise the chin rest to the maximum height.

**Table 6–1 Quick Troubleshooting (Continued)**

Information Error Code	Information Message	Description	Action
I 17	Sensor in movement	The sensor is in the positioning process for either panoramic, 3D or Ceph mode.	Wait for the end of the positioning process.
I 18	Unidentified Sensor positioning	The Sensor is incorrectly positioned for acquisition.	Check that no object stops the correct positioning of the sensor, then, press  to reset.

# Chapter 7

## MAINTENANCE

This section describes the maintenance tasks that you need to perform regularly for your KODAK 9000 and KODAK 9000 3D unit and the accessories.



**WARNING**

Switch off the unit, then, clean all accessible parts of the machine with an alcohol-based non-corrosive product. Avoid using liquids inside the unit. Follow the alcohol-based product manufacturer recommendations for safety precautions.




**CAUTION**

You can use the usual disinfectant products, but we recommend that you protect the unit from contamination by using barriers available from dental distributors. Follow the disinfectant product manufacturer recommendations for safety precautions.

### Daily

Carry out the following maintenance tasks:

**Table 7-1 Daily Maintenance Tasks**

Accessories	Maintenance Tasks
<b>3D and Panoramic bite block</b>	Sterilize with cold sterilization or autoclave up to 134°C before the next patient is x-rayed.
<b>Edentulous bite block</b>	Sterilize with cold sterilization or autoclave up to 134°C before the next patient is x-rayed.
<b>Temple support</b>	Clean the temple support and chin rest with medical-grade 76% alcohol disinfectant or any disinfectant based on peracetic acid before the next patient is x-rayed.
<b>Chin rest (panoramic, sinus and TMJ)</b>	
<b>All components that come into contact with the patient and the operator</b>	Clean all components with medical-grade 76% alcohol disinfectant or any disinfectant based on peracetic acid before the next patient is x-rayed.
<b>Outer covers of the unit</b>	Wipe the unit with a dry cloth at the end of each day's operation.   <b>WARNING</b> <b>Do not use detergents or solvents to clean the outer covers of the unit.</b>

### Monthly

Wipe the outer covers of the unit with a soft and dry cloth.

## **Annually**

We recommend a general inspection of the unit carried out by an authorized service technician.

# Chapter 8

## TECHNICAL SPECIFICATIONS

### Compliance with International Standards

The KODAK 9000 and KODAK 9000 3D digital imaging Unit is compliant with the International and EEC standards.

**Manufactured by:**

TROPHY  
4, Rue F. Pelloutier, Croissy-Beaubourg  
77435 Marne la Vallée Cedex 2, France

**For:** Carestream Health, Inc.

150 Verona Street  
Rochester,  
New York - USA 14608

**Model**

KODAK 9000 3D and KODAK 9000

### Compliance with International Regulations

- Medical Device directives 93/42/ European Economic Community (EEC), Class II b
- ElectroMagnetic Compatibility (EMC) directive 89/336/EEC
- FDA Center for Devices & Radiological Health (CDRH-21CFR title 21 sub chapter J) (USA)
- Radiation Emitting Devices Act - C34 (Canada)
- Medical Devices Regulations (Canada)

### Compliance with European and International Standards

- EN 60601-1 / IEC 60601-1
- EN 60601-1-3 / IEC 60601-1-3
- EN 60601-2-7 / IEC 60601-2-7
- EN 60601-2-28 / IEC 60601-2-28
- EN 60601-1-4 / IEC 60601-1-4
- CSA 601.1
- UL 60601.1
- EN ISO 14971

**Classification in Accordance with EN/IEC 60601-1**

Type of protection against electric shock	Class 1 equipment
Degree of protection against electric shock	Type B
Protection against harmful ingress of water	Ordinary equipment
Operation mode	Continuous operation with intermittent loading
Flammable anesthetics	Not suitable for use in presence of flammable anesthetics or a mixture of flammable anesthetics with air or oxygen or nitrous oxide

**Classification in Accordance with EN/IEC 60601-1-2**

Group I, class B +12db

**Ambient Operating Conditions**

- **Temperatures:** 5 ~35 °C
- **Relative humidity:** 30 ~ 85%
- **Atmospheric pressure:** 700 ~ 1060 hpa

**Storage Conditions**

- **Temperatures:** -10 ~ 60 °C
- **Relative humidity:** 10 ~ 95%
- **Atmospheric pressure:** 700 ~ 1060 hpa

**Transport Conditions**

- **Temperatures:** -10 ~ 60 °C
- **Relative humidity:** 10 ~ 95%
- **Atmospheric pressure:** 700 ~ 1060 hpa



## Unit Technical Specifications

Table 8-1 describes the technical specifications for the KODAK 9000 and KODAK 9000 3D digital imaging unit.

**Table 8–1 Unit Technical Specification**

	KODAK 9000 3D	KODAK 9000
<b>X-Ray Generator</b>		
Tube voltage	60 - 90 kV (max), pulsed mode for 3D modality	
Tube current	2 - 15 mA (max)	
Frequency	140 kHz (max)	
Tube focal spot	0.5 mm (IEC 60336)	
Total filtration	> 2.5 mm eq. Al	
<b>3D Modality</b>		
Technology	Digital Volumetric Tomography (DVT)	NA
Sensor technology	<ul style="list-style-type: none"> <li>• CMOS</li> <li>• Optical fiber sensor with Csi coating</li> </ul>	NA
Gray scale	16384 - 14 bits	NA
Volume size	50 x 37 mm	NA
Voxel size	76.5 x 76.5 x 76.5 $\mu$ m	NA
Reconstruction time	Less than 2 minutes based on the recommended PC system configuration	NA
X-ray pulse time	30 ms	NA
<b>Panoramic Modality</b>		
Sensor technology	<ul style="list-style-type: none"> <li>• CCD</li> <li>• Optical fiber sensor with Csi coating</li> </ul>	
Sensor matrix	61 x 1244 pixels	
Image field	6.3 x 129.4 mm	
Gray scale	16384 - 14 bits	
Magnification	1.22 ( $\pm$ 10%)	
Exposure time	<ul style="list-style-type: none"> <li>• 4 to 16 sec.</li> <li>• Depending on the patient's type and the program selection</li> </ul>	
Programs	12 anatomical settings	
Radiological exam options	<ul style="list-style-type: none"> <li>• Panoramic</li> <li>• Segmented panoramic</li> <li>• Maxillary sinus</li> <li>• LA TMJ x2</li> <li>• LA TMJ x4</li> </ul>	

**Table 8-1 Unit Technical Specification (Continued)**

	<b>KODAK 9000 3D</b>	<b>KODAK 9000</b>
<b>Input voltage</b>	<ul style="list-style-type: none"><li>• 230 / 240 V - 50/60 Hz</li><li>• 100/110/130 V - 50/60 Hz</li></ul>	
<b>Unit dimensions</b>	1158mm (L) x 1595mm (D) x 2378mm (H)* *Unit with 2225 mm (H) is also possible	
<b>Required space</b>	1500 (L) x 2000 (D) x 2400 (H) mm	
<b>Weight</b>	160 kg (353 lb.)	

## Unit Electronic Specifications

Type of Electrical Power Supply	230/240 V ( $\pm 10\%$ ) 50/60 Hz, Single-Phase	100/110/130V ( $\pm 10\%$ ) 50/60 Hz, Single-Phase
Acceptable fluctuation	$\pm 10\%$	$\pm 10\%$
Apparent resistance of the power supply circuit	0.5 $\Omega$ (max.)	0.12 $\Omega$ (max.)
Permanent absorbed current	0.9 A	0.9 A
Current absorbed during the x-ray emission	9.5 A	22 A
Maximum absorbed power	2.2 kVA	2.2 kVA
Protection for the power supply system	By shutter release at a maximum current of 16A and a differential current of 30 mA	By shutter release at a maximum current of 20A and a differential current of 30 mA
Nominal high voltage	90 kV	90 kV
Maximum corresponding tube current	10 mA	10 mA
Nominal tube current	15 mA	15 mA
Maximum corresponding high voltage	80 kV	68 kV
Tube current/voltage combination for maximum output power	80 kV, 15 mA	85 kV, 12 mA
Nominal power for an exposure time of 0.1 s.	at 80 kV, 15 mA: 1200 W	at 85 kV, 12 mA: 1020 W

Utilization Rate in Continuous Mode (for example: one exposure - 85 kV, 5 mA - 13.9 second, every 3 minutes)	Utilization Rate in Intermittent Mode (for example: one exposure - 80 kV, 15 mA - 13.9 second, every 3 minutes)
33 W	93 W

Selection of the Load Parameters:	
kV (in increments of 1 kV)	From 60 to 90 kV
mA (in increments of 25%)	From 2 to 15 mA

Cooling Conditions	
Maximum dissipation of heat from the x-ray radiogenic assembly into the ambient air (for utilization rate in continuous mode)	33 W

Accuracy of the Load Parameters	
High voltage	kV $\pm 10\%$
Current in the tube	mA $\pm 20\%$
Exposure time seconds	Seconds $\pm (10\% + 1\text{ms})$

Measurement Conditions	
kV	Indirect on the peak kilovolt meter
mA	Direct measurement in the circuit using an oscilloscope
Exposure time	Measurement at 75% of the kV values with peak kilovolt meter

## X-Ray Generator Technical Specifications

**Table 8–2 Filtration of the Material in the X-ray Field**

Standard	Compliance
IEC 60601-1-3	Compliant
Nominal value of the inherent filtration at 70 kV	2.5 mm (0.10") eq. Al
Nominal value of the supplementary filtration at 70 kV	NA
Nominal value of the total filtration at 70 kV	2.5 mm (0.10") eq. Al
Filtration value for the enclosure of the x-ray tube (at 100 kV)	0.2 mm (0.008")
Filtration value for the enclosure of the image receiver unit (at 100 kV)	0.2 mm (0.008")
Filtration value for the sensor case	0.8 mm (0.031") eq. Al

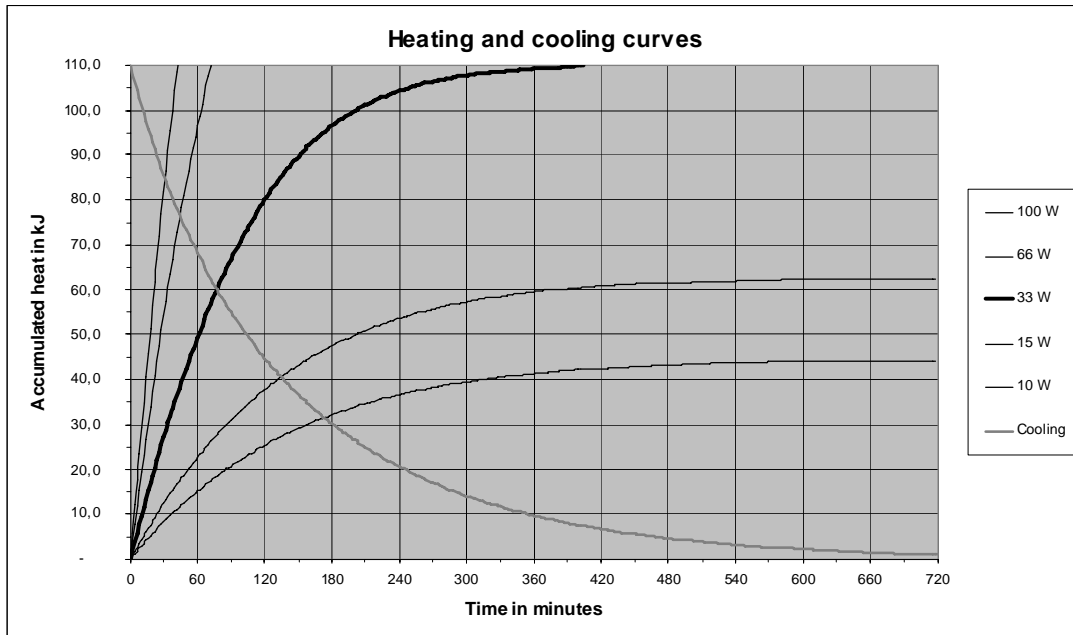
The x-ray generator comprises the following:

- A transformer and an x-ray tube and their associated electronic components immersed in oil
- An aluminum filter, which enhances the quality of the beam and reduces the dose received by the patient
- A lead collimator, which limits the size of the beam at the image receiver unit
- A thermal cutout, which trips at an operating temperature between 63 to 70° C ( $\pm 5^\circ$  C)

**Table 8–3 Technical Specifications of the X-ray Generator**

Standard	Compliance
IEC Standard 60601-2-28	Compliant
Manufacturer	Trophy
Degree of protection against electric shock	Class I
Degree of patient protection from the parts applied to the leakage current	Type B
Operation mode	Continuous operation with intermittent loading
Maximum accumulated heat	110 kJ
Maximum continuous heat dissipation	33 W
Tolerances on the position of the focal spot	+/- 2.5mm
Radiation leakage after one hour's operation (maximum utilization rate of 93W, i.e. 90 kV, 10 mA, 13.9 sec. every 2 minutes 15 sec.)	< 1 mGy
Weight	8.2 kg
Dimensions	235 x 245 x 120 mm

**Figure 8–1 Heating and Cooling Curves of the X-ray Generator.**



**Table 8–4 Beam Limitations of the X-ray Generator**

Manufacturer	Trophy
Type	Rigidly mounted unit with fixed window dimensions, not removable, and integrated x-ray generator

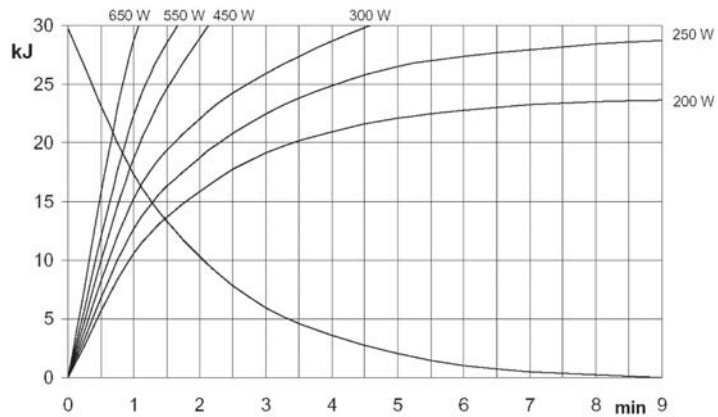
**Table 8–4 Beam Limitations of the X-ray Generator (Continued)**

Maximum symmetrical field of radiation at a distance of 613 mm from the focal point (Panoramic mode)	4 (-0.5/+1) x 128 (± 2) mm
Maximum symmetrical field of radiation at a distance of 690 mm from the focal point (3D mode)	47 (± 1) x 59 (± 1) mm

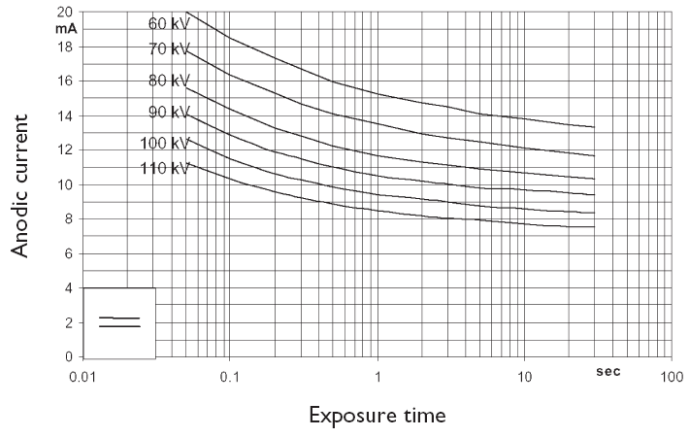
**Table 8–5 Characteristics of the X-ray Tube**

Manufacturer's name	CEI
Type	OPX 105
Nominal high voltage	90 kV
Nominal anode power	810 W
Maximum amount of heat accumulated in the anode	30 kJ
Nominal focal spot diameter (IEC 60336)	0.5 mm (0.020")
Anode materials	Tungsten
Target angle	5°
Inherent filtration	0.5 mm (0.20 ") eq. Al

**Figure 8–2 Heating and Cooling Curves of the X-ray Tube**



**Figure 8–3 Single Load Chart of the X-ray Tube**



**Figure 8–4 Filament Emissions of the X-ray Tube**

