

# Beyes<sup>®</sup> CANADA



## OPERATING INSTRUCTIONS DURAY ART Plus C

English

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**Table of contents**

<b>FOREWORD</b> .....	<b>5</b>
<b>1. WARNING AND SAFETY NOTES</b> .....	<b>6</b>
<b>2. GENERAL DESCRIPTION</b> .....	<b>9</b>
<b>3. OPERATING CONTROLS AND DISPLAYS</b> .....	<b>10</b>
3.1. UNIT .....	10
3.2. REMOTE HAND-SWITCH.....	11
3.3. CONTROL PANEL .....	12
3.4. OPERATING POSITIONS.....	13
<b>4. POSITIONING TOOLS</b> .....	<b>14</b>
<b>5. APPLICATION SOFTWARE</b> .....	<b>15</b>
5.1. DURAY DG SUITE .....	15
5.2. INDIRECT ACQUISITION - AJAT APPLICATION SW .....	16
<b>6. EXPOSURE PROGRAMS</b> .....	<b>18</b>
6.1. P1 PROGRAM (Adult standard panoramic image) .....	18
6.2. P2 PROGRAM (Children panoramic image) .....	18
6.3. P3 PROGRAM (Left hemi-arch panoramic image) .....	18
6.4. P4 PROGRAM (Right hemi-arch panoramic image) .....	19
6.5. P5 PROGRAM (Anterior teeth panoramic image).....	19
6.6. P6 PROGRAM (Temporo-madibular joint TMJ, closed / open mouth) .....	19
6.7. P7 PROGRAM (Maxillary sinuses).....	20
6.8. P8 PROGRAM (Bitewing).....	20
6.9. P9 PROGRAM (Latero-lateral cephalometric image) .....	21
6.10. P10 PROGRAM (Antero-posterior cephalometric image).....	21
6.11. P11 PROGRAM (Carpus image).....	21
<b>7. OPERATION – P1 to P8 PROGRAMS</b> .....	<b>22</b>
7.1. PREPARING EQUIPMENT FOR EXPOSURE .....	22
7.2. PREPARING PATIENT BEFORE POSITIONING.....	24
7.3. POSITIONING THE PATIENT.....	24
7.3.1. Panoramic Exams (from P1 to P5, P8) .....	24
7.3.2. TMJ Exam (P6) and Sinus Exam (P7) .....	25
7.4. POSITIONING THE PATIENT - Part 2.....	25
7.5. RELEASING THE EXPOSURE.....	28
7.6. AFTER THE EXPOSURE.....	29
7.7. COOLING DOWN OF THE TUBEHEAD.....	29
<b>8. OPERATION – CEPHALOMETRY (P9 to P11 PROGRAMS)</b> .....	<b>30</b>
8.1. PREPARING EQUIPMENT FOR EXPOSURE .....	30
8.2. PREPARING PATIENT FOR EXPOSURE .....	31
8.3. POSITIONING THE PATIENT.....	32
8.3.1. Latero-lateral program (P9) .....	32
8.3.2. Antero-posterior program (P10) .....	33
8.3.3. Carpus program (P11).....	34
8.4. RELEASING THE EXPOSURE.....	35
8.5. AFTER THE EXPOSURE.....	36
8.6. COOLING DOWN OF THE TUBEHEAD.....	36
<b>9. PROGRAMMING</b> .....	<b>37</b>
9.1. PROGRAMMING PROCEDURE .....	37
9.2. PROGRAM VALUES.....	38
<b>10. CARE OF THE SURFACES</b> .....	<b>39</b>
<b>11. MESSAGES</b> .....	<b>40</b>
11.1. WARNING MESSAGES.....	40
11.2. ERROR MESSAGES .....	41

<b>12. INSPECTION AND MAINTENANCE .....</b>	<b>42</b>
<b>13. TECHNICAL DESCRIPTION .....</b>	<b>43</b>
<b>14. ELECTROMAGNETIC COMPATIBILITY .....</b>	<b>46</b>
14.1. ELECTROMAGNETIC EMISSION .....	46
14.2. ELECTROMAGNETIC IMMUNITY .....	46
14.3. SYSTEMS THAT ARE NON LIFE SUPPORTING .....	47
14.4. RECOMMENDED SAFETY DISTANCES FOR SYSTEMS THAT ARE NOT LIFE SUPPORTING .....	47

## FOREWORD

Dear Customer,

Thank you for purchasing your new DURAY ART Plus C.

We provided you with a set of technical literature:




- Operating Instructions,
- Installation manual,
- Service manual,
- Maintenance manual,
- Warranty conditions.

Keep this literature for easy and quick reference.

Read the Operating Instructions to become familiar with the unit before taking radiographs on the patient.

Please observe the radiation Protection Regulations and Warning and Safety Notes.

## 1. WARNING AND SAFETY NOTES

Instructions	 <p>The accompanying documents among which the Operating Instructions and the Installation Instructions supplied with the unit are integral parts of the product.</p>
Labeling of warning and safety information	 <p>The original language of the Operating Instructions is English. The manual information are subject to changes without any notice. The manufacturer is not responsible for direct, indirect or accidental damage resulting from or relating to the provision or use of this information. This document may not be reproduced, adapted or translated, in part or in full, without the prior written permission of the manufacturer.</p>  <p>In order to prevent injury to persons and damage to the equipment you must also read the warning and safety notes given in these Operating Instructions.</p>
Indication for use	<p>This unit is an extraoral source dental X-ray system intended to perform panoramic and cephalometric exams with production of diagnostic images in the dento-maxillo-facial region and in subregions, for general and pediatric dentistry, as well as carpal images for dental clinical investigations.</p>
Contraindications	<p>There are no contraindications to the use of the equipment within the indication for use other than those related to exposure of the patient to ionizing radiation, which should be limited to the maximum.</p>
Prescription for use	<p>Caution: Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.</p>
Responsibilities of the User	<p>The user has the following responsibilities:</p> <ul style="list-style-type: none"> <li>• Use the system following the instructions and recommendations contained in this user manual.</li> <li>• Keep the machine in perfect working condition following the maintenance instructions given by the manufacturer. Failure to observe the instructions relieves the manufacturer or his agent from any responsibility for injury, damage or non-conformities that may derive there from.</li> <li>• Promptly notify the competent Health Authority and the manufacturer in the event of an accident involving this medical device and/or operations that may cause death or put the patient and/or the user at risk. The type and serial numbers of the components involved, indicated on the external labels, are to be communicated to the manufacturer.</li> </ul>
General safety information	<p>As manufacturers of medical devices, we can assume responsibility for safety-related performance of the equipment only if maintenance, repair and modifications are carried out only by us or agencies we have authorized for this purpose, and if components affecting safe operation of the unit that may be needed are replaced with original parts.</p> <p>We suggest that you request a certificate showing the nature and extent of the work performed, from those who carry out such work, and specify that the certificate show any changes in rated parameters or working ranges, as well as the date, the name of the firm, and a signature.</p> <p>For safety reasons only use original accessories indicated in this Operating Instructions. It is the user's risk when using non-released accessories.</p> <p>Exposures of patients may only be taken if the unit functions fault-free. Never leave the unit unattended.</p>
System assembly at installation	<p>The system is fully tested in manufacturing and can be operated once the major modules are mechanically assembled at installation and then connected to the power line.</p>

Safety measures during switch-on

Following extreme temperature fluctuations, condensate formation may occur; therefore please do not switch on the device until normal room temperature has been reached (see chapter 7.1, Preparing for exposure).

Electromagnetic Compatibility

This unit may be operated in a residential/hospital area, provided it is used under the responsibility of a trained medical operator, and following the recommendations reported in chapter 13, Electromagnetic Compatibility.

DURAY ART Plus C needs special precautions regarding EMC, and needs to be installed and put into service according to the EMC information provided in Chapter 13.

Portable and mobile Radio Frequency communications equipment can affect medical electrical equipment like DURAY ART Plus C.

The use of accessories and cables other than those provided, with the exception of accessories and cables sold by the BEYES as replacement parts for internal components, may result in increased emissions or decreased immunity of the device.

DURAY ART Plus C should not be used adjacent to or stacked with other equipment; if adjacent or stacked use is necessary, DURAY ART Plus C. should be observed to verify normal operation in the configuration in which it will be used.

Interference with medical devices by radio telephones

To guarantee the operational safety of medical devices, it is recommended that the operation of mobile radio telephones in the medical practice or hospital is prohibited.

Malfunction of electronic units / devices which are worn on the patient's body

In order to prevent failure of electronic units and data storage devices, e.g. radio-controlled watch and telephone card, etc., it is essential that these be removed prior to X-ray exposure.

Laser light localizers used

This product incorporates Class 1 lasers as light localizers for the positioning of the patient. They must not be used for other purposes. A minimum distance of 100 mm must be maintained between the eye and the laser. Avoid unnecessary exposure of the eyes and pay attention that the beams are not intercepted by any optical device.

Electrical safety

Trained and qualified technicians only are authorized to remove covers and have access to power circuits.

Power supply lines must comply with safety legislation and have ground terminals for protective earth connection.

Explosion

This unit cannot be used in presence of flammable gases or vapours.

Radiation protection guidelines

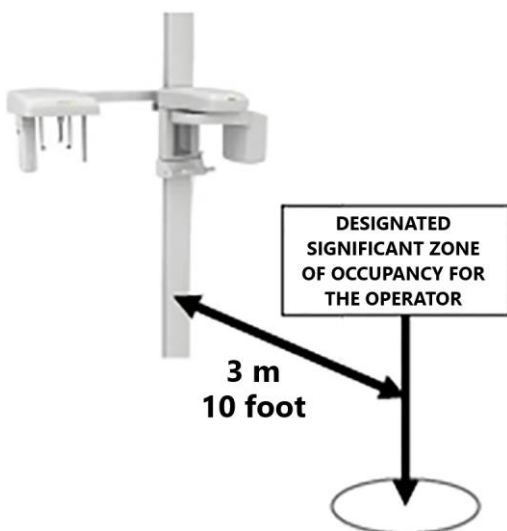
X-ray equipment produces ionizing radiation that may be harmful if not properly controlled. It is therefore recommended that the equipment be operated by trained personnel only, in accordance with existing law. Exposure to ionizing radiation is of particular concern in pediatric patients. It is thus recommended to follow the specific pediatric protocol available on the unit. Refer also to the Image Gently in Dentistry Campaign materials (<http://www.imagegently.org/Roles-What-can-I-do/Parent/Dentist>) for best practices in pediatric X-ray imaging.

Observe the applicable health physics regulations. The radiation protection facilities should be used.

The operator should remain as far away from the X-ray tube as the cable of the release button permits (in the designated significant zone of occupancy for the operator).

With the exception of the patient, no other persons may remain in the room while the exposure is being made. Under exceptional circumstances a third person, however not belonging to the dental practice, may then assist.

Maintain visual contact with the patient and the unit during the exposure and in case of faulty operation, immediately discontinue the exposure by releasing the X-ray button.



Disassembly and reinstallation

For disassembly and reinstallation of the unit proceed as described in the installation instructions for new installation to ensure perfect function of the unit and its stability.

Disposal



It generally applies that any disposal of this product must comply with the relevant national regulations. Please observe the regulations applicable in your country.

Within the European Economic Community, Council Directive 2012/19/EU (WEEE) requires environmentally sound recycling / disposal of electrical and electronic devices.

Your product is marked with the adjacent symbol. Disposal of your product with domestic refuse is not compatible with the objectives of environmentally sound recycling / disposal. The black bar underneath the garbage can symbol means that it was put into circulation after Aug. 13, 2005 (see EN 50419:2005).

Please note that this product is subject to Council Directive 2012/19/EU (WEEE) and the applicable national law of your country and must be recycled or disposed of in an environmentally sound manner.

The X-ray tube assembly of this product contains a tube with a potential implosion hazard, a lead lining and mineral oil.

Please contact your dealer if final disposal of your product is required.

## 2. GENERAL DESCRIPTION

**Thank you for choosing DURAY ART Plus C as your new digital Panoramic and Cephalometric solution!** Our patients, dentists and partners are inspiring us every day. With all our knowledge, passion and experience, we provide complete modern dental solutions to improve global dentistry. We hope that DURAY ART Plus / DURAY ART Plus C will help you to provide happy and healthy smiles to your patients, every day.

DURAY ART Plus and DURAY AR Plus C uses the finest patented digital imaging technologies. Its CdTe (Cadmium Telluride)-CMOS sensor directly converts X-Rays to electrical signals, thus increasing image clarity and contrast while needing only a fraction of the usual radiation dose. Experience extraordinary image quality after every exposure.

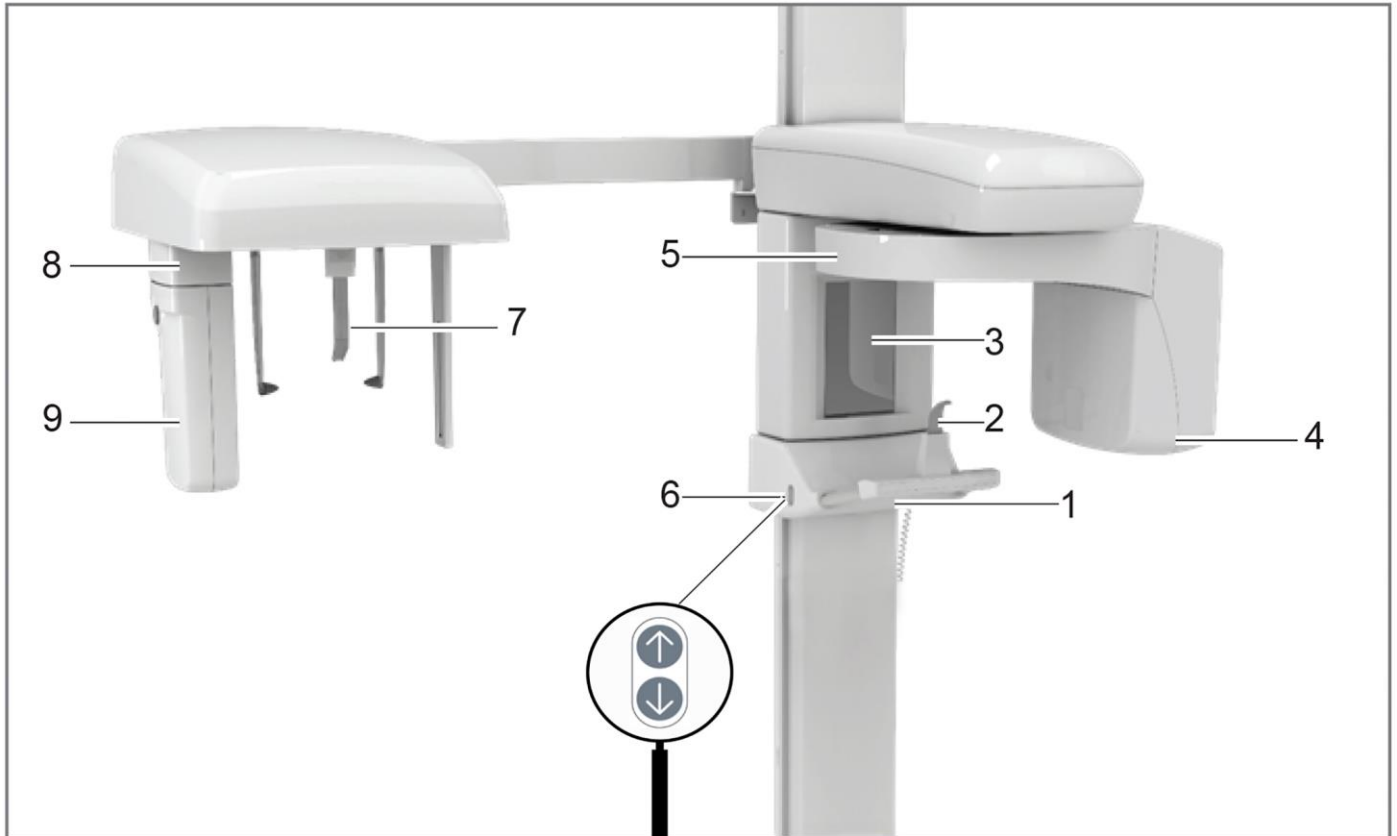
CdTe sensor technology provides more than 4.200 differently focused images during a single panoramic exposure. Thanks to the autofocus tool, the software automatically moves to the layer most in focus, thus correcting blurred image areas without the need for additional exposures.

Operating the DURAY ART Plus (Pan only) and DURAY ART Plus C (Pan-Ceph) is both easy and efficient. Fluent workflow is supported by an ergonomically designed control panel with intuitive symbols and alphanumeric display. Exposure parameters are easily set by simply selecting from 4 patient sizes, 7 panoramic and 3 cephalometric programs.

To keep your system in top shape, consult regular maintenance checks with your distributor. This will ensure that your DURAY ART Plus / DURAY ART Plus C will be updated, in good condition and performing according to highest standards.

**3. OPERATING CONTROLS AND DISPLAYS**

**3.1. UNIT**



1. Main switch	8. Housing for CEPH sensor
2. Bite block	9. Digital Sensor
3. Patient positioning mirror	10. Control panel
4. X-Ray generator	11. Knob for Frankfurt plane adjustment
5. Housing for PAN	12. X-Ray button
6. Height adjustment buttons	13. Optional self standing base
7. Cephalostat	

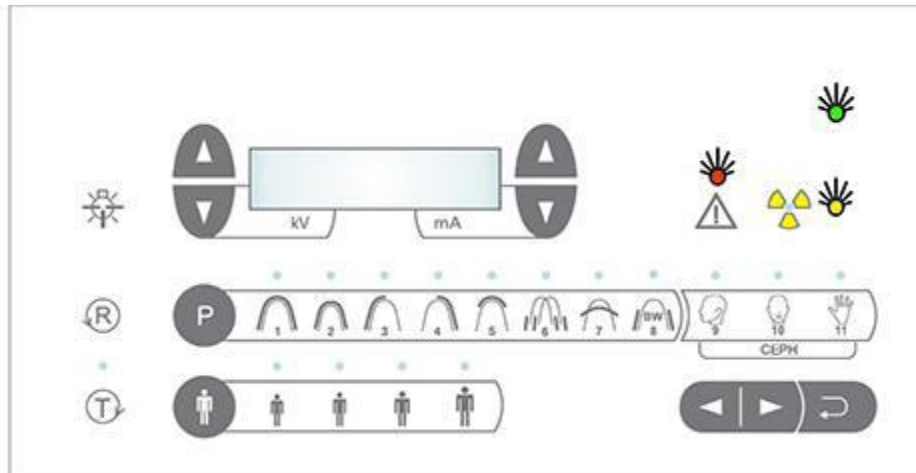
### 3.2. REMOTE HAND-SWITCH



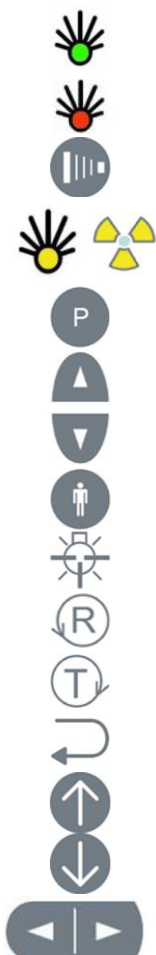
The hand switch can alternatively be mounted remotely in case the unit is located in an X-ray room which has a door and enables visual contact with the patient.

An optional kit is available for remote mounting of the hand switch.

### 3.3. CONTROL PANEL



Unit ON with light on display.



READY green light ON when system ready.

ALARM red light ON upon alarm message.

EXPOSURE key on Hand Switch.

X-ray Radiation – Orange Light ON.

PROGRAM Selection.

INCREASE kV (left side) mA (right side).

DECREASE kV (left side) mA (right side).

PATIENT build: Small, Medium, Large, Extra-Large.

LIGHT for alignment ON for 60 s.

RETURN Arm Movement.

TEST Mode without Radiation.

BACK for backward movement and alarm reset.

UP carriage movement.

DOWN Carriage movement.

Arrows for the positioning of the canine laser.

### 3.4. OPERATING POSITIONS



- PATIENT ENTRY position

Control panel and X-ray source on the right of the patient and the image receiver on the left.



- START position









System ready to start the exposure. When the unit reaches the START position the green light of the READY indicator on the control panel is turned ON.



- PATIENT EXIT position

Control panel and X-ray source on the left of the patient and the image receiver on the right.

**4. POSITIONING TOOLS**

	<p>1 Bite block with chin rest.</p>		<p>5 Bite block for TMJ and sinus exams.</p>
	<p>2 Chin rest with support for edentulous.</p>		<p>6 Nasal support for TMJ and sinus exams.</p>
	<p>3 Bite block.</p>		<p>7 Temple support can be added as an option.</p>
	<p>4 Nasal support for edentulous patients.</p>		<p>8 Adjustable Nasion Support+ 2 auricular rods (Cephalometric exams).</p>

**5. APPLICATION SOFTWARE**

**5.1. DURAY DG SUITE**

The software DURAY DG Suite is a complete and simple to use tool for the management of the dental cabinet and enhancement of digital radiographic images.

The software allows to manage all data of the Dental cabinet in a very simple and intuitive way. Moreover, it allows to acquire the images from a wide range of electronic devices: video radio X-Ray system, telecameras, digital extraoral units, scanners, cameras, slides scanner, etc.

All the acquired images, independently from their origin, can be saved and elaborated. A series of measurement functions exist (distance, angles, areas, etc.) for reliable treatment planning.

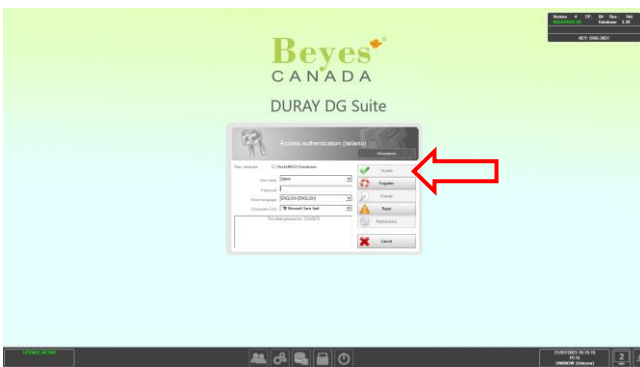
The software DURAY DG Suite allows the acquisition of panoramic and cephalometric X-ray images and X-Ray images for 3D reconstruction, managing also the associated patient data records.

The images acquired by DURAY DG Suite can be saved in DICOM format.

For more information on the use of the application, refer to the DURAY DG Suite user manual.

The procedure for image acquisition is described below. The instructions for subsequent processing and storage of the images are described in the DURAY DG Suite User Manual

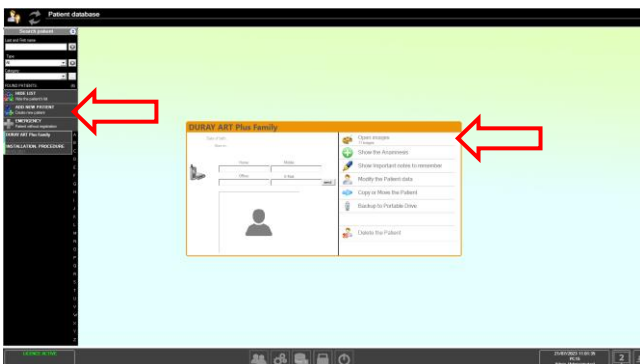
**A. Starting**



On the PC connected to the equipment with DURAY DG Suite installed:

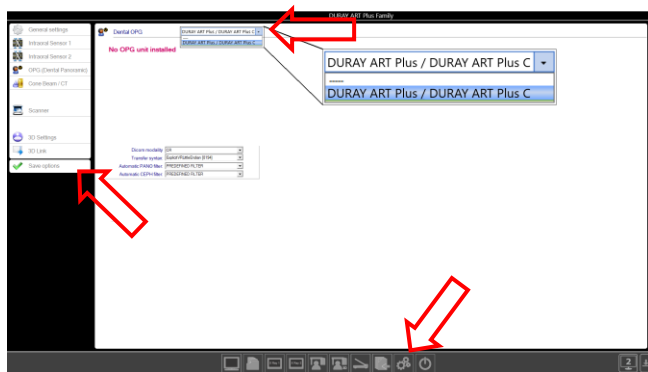
- Start DURAY DG Suite and select the Patient module with the relevant button.


**B. Selecting the patient**

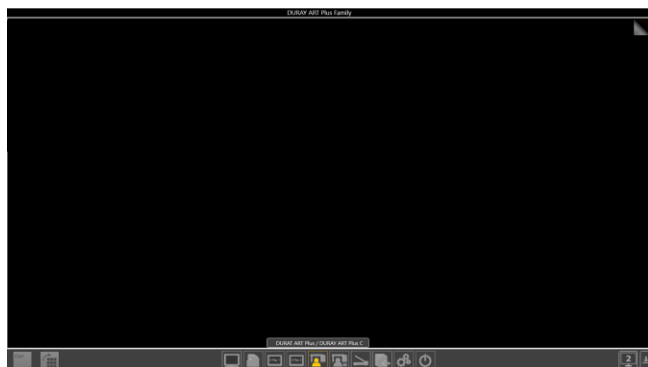



- Select the patient from the list or insert a new patient.
- Then start image management.

### C. Selecting the X-ray system

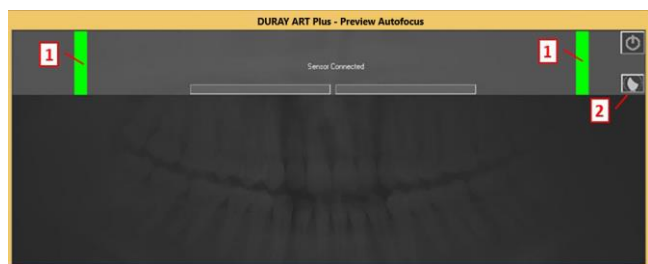


- Click on the setting button  in the lower part of the window.
- Select **DURAY ART Plus / DURAY ART Plus C** from the menu **Dental OPG**, in the upper part of the window.
- Put a tick in the box “Direct connection”.
- Click on **Save option** in the left part of the window.



- Start an acquisition session by selecting the DURAY ART Plus / DURAY ART Plus C button , in the bottom part of the window.

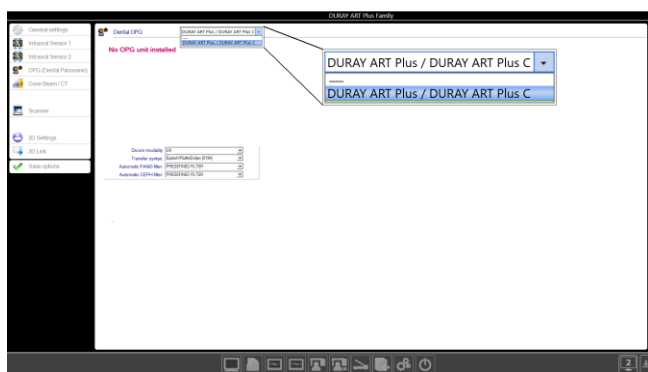
### D. Software Acquisition Interface



- The two vertical bars (1) on acquisition module can be:
- RED: system is not connected to PC. Please check that Ethernet cable is properly connected to the PC, setting of the Network interface card are correct, calibration files are present on the PC.
  - GREEN: system is properly connected to PC. In this condition it is possible to properly take X-Ray images.


By clicking on the button in the right part of the acquisition window (2) the file containing the step by step positioning guide will be shown.

## 5.2. INDIRECT ACQUISITION - AJAT APPLICATION SW



If you want to use the AJAT application SW for the acquisition of the images, instead of DURAY DG Suite, remove the tick on the box “Direct connection”, in the setting page.

Start an acquisition session by selecting the DURAY ART

Plus / DURAY ART Plus C button , in the bottom part of the window. The acquisition module of the AJAT SW will shown.

**A. Image Acquisition**

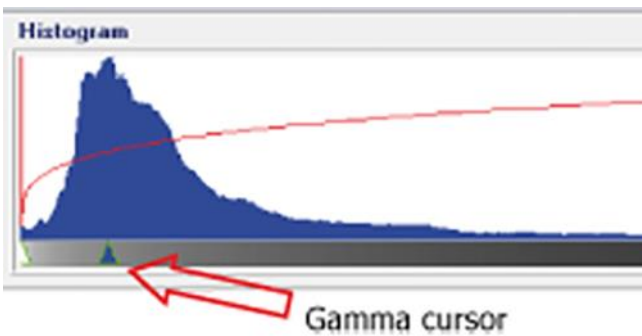


When the unit is ready for image acquisition, the green light is turned on. At this point, the image can be acquired by pressing the X-Ray button.

**B. Preliminary Image Processing**



Preliminary processing can be done immediately after image acquisition.



Grey level adjustment can be done by moving the gamma cursor.



Focus can be activated in case of need.

Save changes and close the Ajat application. When finished, the image is automatically saved in the patient data base.

**C. Image Processing**



The image can be further processed using the DURAY DG Suite environment.

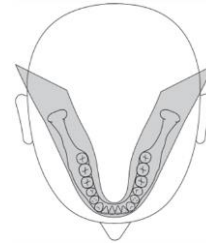
## 6. EXPOSURE PROGRAMS

The image at receptor's plane is approximately 27% higher than real size: the vertical magnification on adult standard profile is 1.27:1 approximately with constant vertical magnification on dental arch.

### 6.1. P1 PROGRAM (Adult standard panoramic image)



- Program duration time approx.: 16 s.
- Program exposure time: 14.2 s.

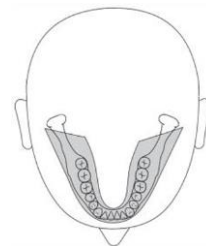


- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

### 6.2. P2 PROGRAM (Children panoramic image)



- Program duration time approx.: 16 s.
- Program exposure time: 11.5 s.

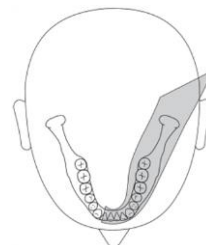


- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

### 6.3. P3 PROGRAM (Left hemi-arch panoramic image)



- Program duration time approx.: 16 s.
- Program exposure time: 7.3 s.

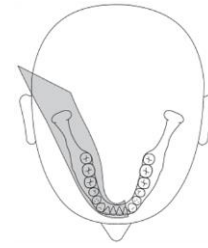


- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

#### 6.4. P4 PROGRAM (Right hemi-arch panoramic image)



- Program duration time approx.: 16 s.
- Program exposure time: 7.3 s.

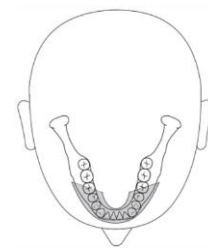


- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

#### 6.5. P5 PROGRAM (Anterior teeth panoramic image)



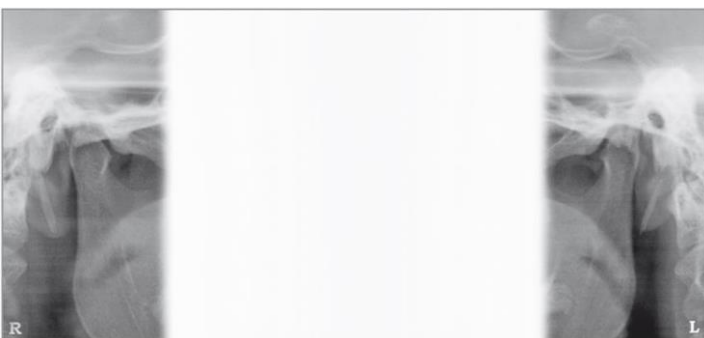
- Program duration time approx.: 16 s.
- Program exposure time: 4.8 s.



- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

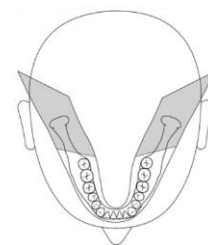
#### 6.6. P6 PROGRAM (Temporo-madibular joint TMJ, closed / open mouth)

Two exposures are usually taken with closed and open mouth. (Please refer to “Positioning the patient” paragraph 7.3)  
Patient is positioned with bite block under the nose.  
Once taken the first set of two images, return the unit.  
A second set of two exposures can be taken immediately.

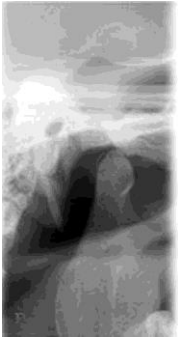


TMJ closed mouth:

- Program duration time approx.: 16 s.
- Program exposure time: 4.4 s (2 x 2.2 s).

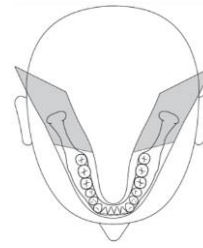


- Positioning tool: 5, 6, 7 (see §4. Positioning tools).



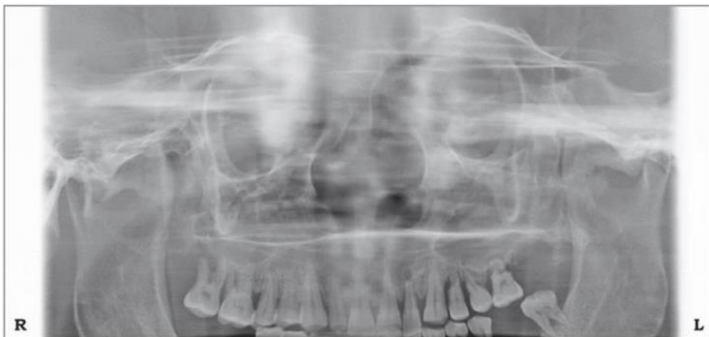
TMJ open mouth:

- Program duration time approx.: 16 s.
- Program exposure time: 4.4 s (2 x 2.2 s).

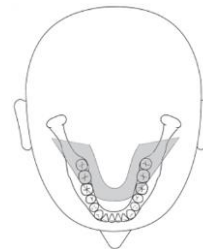


- Positioning tool: 5, 6, 7 (see §4. Positioning tools).

### 6.7. P7 PROGRAM (Maxillary sinuses)



- Program duration time approx.: 16 s.
- Program exposure time: 12.9 s.

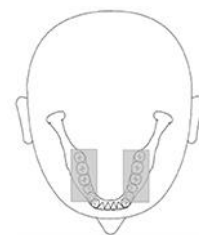


- Positioning tool: 5, 6, 7 (see §4. Positioning tools).

### 6.8. P8 PROGRAM (Bitewing)



- Program duration time approx.: 16 s.
- Program exposure time: 8.5 s (2 x 4.25 s).



- Positioning tool: 1, 2, 3, 4, 7 (see §4. Positioning tools).

### 6.9. P9 PROGRAM (Latero-lateral cephalometric image)



- Program duration time approx.: 12 s.
- Program exposure time: 10 s.

- Positioning tool: 8 (see §4. Positioning tools).

### 6.10. P10 PROGRAM (Antero-posterior cephalometric image)



- Program duration time: approximately 12 s.
- Program exposure time: 8 s.

- Positioning tool: 8, without nasion (see §4. Positioning tools).

### 6.11. P11 PROGRAM (Carpus image)



- Program duration time: approximately 12 s.
- Program exposure time: 8 s.

- Positioning tool: 8, without nasion and ear plugs (see §4. Positioning tools).

## 7. OPERATION – P1 to P8 PROGRAMS

### 7.1. PREPARING EQUIPMENT FOR EXPOSURE

#### A. Switching ON the Unit



By pressing the mains switch in the lower part of the vertical carriage under the mirror, the unit is supplied as indicated by the green light of the mains switch.

**⚠ ATTENTION:**

Following extreme temperature fluctuations, condensate formation may occur; therefore please do not switch on the device until normal room temperature has been reached.

**⚠ ATTENTION:**

When switching on the unit there must NOT be a patient positioned in the unit.

If a fault occurs which requires switching the unit off and then back on again, the patient must be taken out of the unit at the latest before switching it on again!

Initialization  
Please wait: xx

- The display on the control panel turns on.
- System initialization is started.

#### A1. Setting PAN or CEPH Mode

You can switch from PAN to CEPH mode or vice versa by moving the digital sensor after releasing it by pressing the button at the top of the sensor. The appropriate collimator will be automatically set through the selection of the program.

**⚠ ATTENTION:**

Always grip the digital sensor with both hands during the disconnection and connection operations in order to prevent accidental dropping which would irreparably damage it. In case of accidental fall immediately contact Technical Service and do NOT use the sensor on a patient before a functional test is performed.

#### B. Reset Function

\*Press R" to go\*  
\*Entry position\*



In order to use the equipment, it is necessary to press the Return button in order to initialize the device, as indicated on side figure.

By pressing the RETURN Arm Movement key the rotation arm locates the reference points and moves to the PATIENT ENTRY position.

\* Device \*  
\* moving!! \*

When the unit is moving, the message "Device moving!!" appears on the display.

#### C. Running Image Acquisition Software on the PC

Set the DURAY DG Suite program following the indication of §5, Application Software).

#### D. Selection of Exam



Press the key for PROGRAM selection, to sequentially change the program from 1 to 11 and back again.



**E. Selection of Patient Size**



Press the key for PATIENT build selection, from left: Small (1), Medium (2), Large (3), Extra Large (4). Indicatively, for P2 program, size 1, 2, 3, 4 to be used respectively for 10, 12, 14, 16 years old patient.



The pre-programmed technique factors (kV and mA) are automatically selected and appear on the display.



Manual correction of tube voltage and of tube current can be done using the INCREASE or DECREASE keys at display sides.

The same correction can be done through Image Acquisition module on PC side.

**i** NOTE

The pre-programmed values of technique factors are factory programmed. Different values can be loaded if needed using the available on board programming functionality. Refer to §8, Programming for details.

**Setting Tube Voltage**



Key INCREASE at the left of the display to manually raise kV level.

Key DECREASE at the left of the display to manually lower kV level.

The tube voltage can be set from 61 to 85 kV in steps of 3 kV.

61	64	67	70	73	76	79	82	85
----	----	----	----	----	----	----	----	----

**Setting Tube Current**



Key INCREASE at the right of the display to manually raise mA level.

Key DECREASE at the right of the display to manually lower mA level.

The tube current can be set from 4 to 10 mA.

4.0	5.0	6.3	8.0	10
-----	-----	-----	-----	----

**F. TEST Mode without Radiation (optional)**



READY GREEN LIGHT ON



Press RETURN Arm Movement to move the arm from PATIENT ENTRY position to START position, ready to start the exposure.

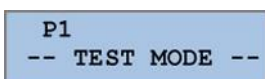
When the unit reaches the START position the green light of the READY indicator on the control panel is turned ON.



With unit in START position and the READY light ON, TEST mode can be activated to run the unit without radiation.

On the display are shown:

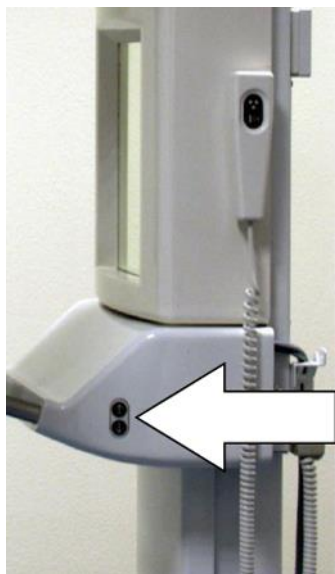
- The selected program number.
- The message "Test Mode" instead of values of kV and mA.
- A green light is also activated, above the key button.



Starting the unit with the hand-switch allows for rotation of the arm according to the program selected.

When the arm is returned to PATIENT ENTRY position test mode is terminated and the units enters normal mode.

## 7.2. PREPARING PATIENT BEFORE POSITIONING



Ask the patient to remove from head and neck all metallic items such as removable denture, earrings, necklaces, glasses which might cause ghost images on the radiograph.

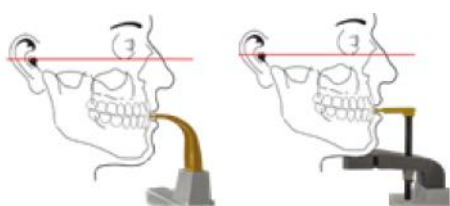
- Physical constitution, clothing, bandages, etc. must not interfere with the movement of the arm.
- If in doubt, perform a test rotation without radiation by having selected before the TEST mode.
- In case a protective apron is used leave the neck free not to interfere with the X-ray beam: radiation enters from sides and from back.
- Insert bite block or chin rest according need.
- With the arm in "PATIENT ENTRY" position, have the patient stand in front of the mirror, close to the unit.
- Bring the unit the proper height using UP or DOWN keys.

**i** NOTE

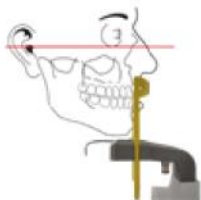
The height adjustment motor starts slowly and then increases its speed. Press the height adjustment key until the unit has reached the desired height.

## 7.3. POSITIONING THE PATIENT

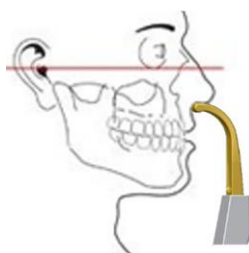
### 7.3.1. Panoramic Exams (from P1 to P5, P8)



- Bring the carriage to have the bite block or the chin rest slightly higher.
- The patient must stay with lowered shoulders and advanced feet, close to the column, to favor spine stretching at cervical level for a better beam penetration, holding firmly the handles

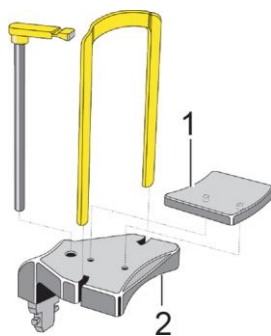


- With bite block, and chin rest with bite block**
- Have the patient bite into the indentation in the tip of the bite block. Mouth is closed but teeth are not superimposed.



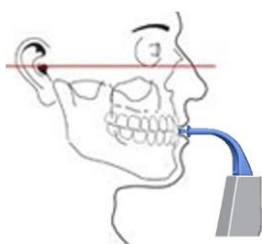
- With chin rest and support for patient without anterior teeth**
- Make sure the upper and lower jaws are lined up with each other. Use of a cotton roll to prevent superimposition of teeth.
- With nasal support**
- Instruct the patient to place his subnasale (the base of his nose) against the contact segment.

**i** NOTE



- In case the patient is a child:
  - The use of chin rest is recommended for greater stability.
  - The additional support (1) must be mounted on the chin rest (2).
  - Consider to seat the pediatric patient to have it still and stable.
  - Execute a free run in test mode for the pediatric patient to familiarize before the actual exposure.

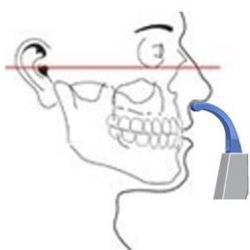
### 7.3.2. TMJ Exam (P6) and Sinus Exam (P7)



- Bring the carriage to have the bite block or the chin rest slightly higher.
- The patient must stay with lowered shoulders and advanced feet, close to the column, to favor spine stretching at cervical level for a better beam penetration, holding firmly the handles.

**With bite block**

- Have the patient bite into the indentation in the tip of the bite block. Mouth is closed but teeth are not superimposed.



**With nasal support**

- Instruct the patient to place his subnasale (the base of his nose) against the contact segment.

### 7.4. POSITIONING THE PATIENT - Part 2



Switch on the light beam localizers. Laser stays ON for 5 minutes; when carriage reaches START Exams the lights are switched OFF automatically.

**⚠ ATTENTION:**

The light beams are LASER lights. Avoid unnecessary exposure of the eyes of the patient or of the operator to the laser radiation and pay attention that the laser beams are not intercepted by any optical device.



The Mid-sagittal laser beam should fall in the mid-sagittal plane of the patient. Stand behind the patient and check in the mirror if the vertical mid-sagittal laser beam (red line in the side image) is aligned with the patients mid-sagittal plane. Adjust the position by moving patients' head, if needed.



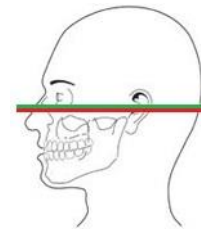
The FH (Frankfurt Horizontal) beam should be falling between the upper edge of the external auditory meatus and the lower edge of the infra-orbital rim.

- The height of the FH horizontal beam can be adjusted with a dedicated knob (11) on the right side of the tubehead.
- Adjust the height of the unit to have the Frankfurt plane Horizontal (FH) and the cervical vertebrae straight (not bent forward) and stretched. In the images below the Frankfurt plane on the patient is represented by a green line, the laser beam for Frankfurt plane alignment (emitted by equipment) is represented by a red line.
- Fine tune the head inclination for the FH setting by briefly touching the UP or DOWN height adjustment key.
- Verify side rotation of the head with reference to the Midsagittal light using the mirror from the back of the patient and correct in case.
- Ask the patient to swallow and keep the tongue lightly pressed to the palate.
- Eventually recommend to avoid movements till the end of the exposure



**Correct position:**

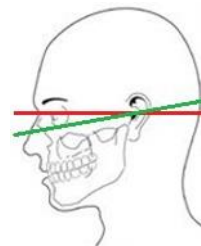
Frankfurt plane is horizontal.



**Wrong position:**

Frankfurt plane is NOT horizontal.

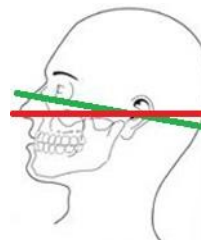
The head is tilted forward thus resulting in a V shaped dental arch on the X-Ray image.



**Wrong position:**

Frankfurt plane is NOT horizontal.

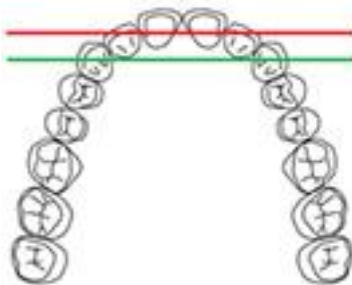
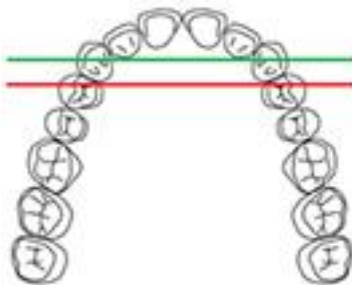
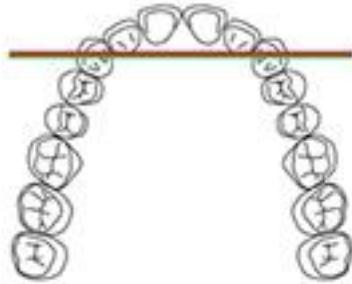
The head is tilted backward, thus resulting in a flat dental arch on the X-Ray image.





The lateral light beam does not need to be corrected for patients with normal occlusion.

In cases of overjet with class II or III malocclusion, move the carriage with the FORWARD / BACKWARD buttons until the lateral light beam is on the canine, to have the roots of the incisors within the layer in focus (the movement in mm is shown on the control panel).



- Layer correctly centered
  - The light beam (red line) falls on the canine (green line).
  - The roots of the incisors fall exactly in the centre of the layer in focus.
  - The front teeth appear sharp.
  
- The light beam (red line) falls behind the canine (green line).
  - The roots of the incisors fall outside the layer in focus.
  - The front teeth appear blurred and proportionally smaller.
  - Move the rotating arm forward (towards the column) to correct.
  
- The light beam (red line) falls in front of the canine (green line).
  - The roots of the incisors fall outside the layer in focus.
  - The front teeth appear blurred and proportionally larger.
  - Move the rotating arm backward (away from the column) to correct.

### 7.5. RELEASING THE EXPOSURE



**⚠ ATTENTION:**  
Operator: observe the radiation protection guidelines (see chapter 1, Warning and Safety Notes). Before releasing the exposure always check display for proper exposure data for the patient.

Move arm to START position using the RETURN Arm Movement key or the EXPOSURE key on the hand switch for short time.

RETURN Arm Movement to bring the arm from PATIENT ENTRY position to START position, ready to start the exposure.

When the unit reaches START position the green light of the READY indicator on the control panel is turned ON.

**⚠ ATTENTION:**  
Should you need to reposition the patient, the arm has to be moved from the START position back to the PATIENT ENTRY position keeping pressed the BACK key: see Resetting Carriage in PATIENT ENTRY position, in the following.

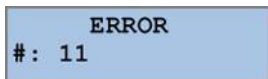
Run the acquisition program on PC to receive the radiographic image being created, as described in section 5 Application Software on page 11.

Go to the area designated for the operator behind the patient, three meters away from the column, or exit the room always keeping an eye on the patient, ready to immediately interrupt radiation if necessary.

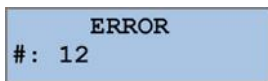
The exposure is released by keeping the exposure key pressed till end of movement. The rotation movement runs automatically in accordance with the exposure program selected.

During the X-Ray emission, a yellow light is ON both on control panel and X-Ray button and an acoustic signal is activated.

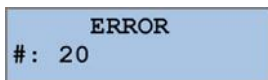
**⚠ ATTENTION:**  
For safety reasons the operator can terminate the exposure any time by releasing the exposure switch. Premature termination is signaled by an error message (see details in the following).



Premature termination is signaled by an error message:  
**Error 11: Exposure aborted during irradiation.**  
The patient has been partially exposed. Part of the radiograph is being available. Examination may have to be repeated.



**Error 12: Exposure aborted before irradiation.**  
The patient was not irradiated. Examination to be restarted.



**Error 20: Exposure aborted after irradiation.**  
No need to repeat the examination.

## 7.6. AFTER THE EXPOSURE



At the end of the X-Ray exposure the unit comes to a complete stop. Move the arm to PATIENT EXIT position using the RETURN Arm Movement key or the EXPOSURE key on the hand switch for short time.

Open the temple support (optional) and have the patient stepping out.



Move the arm to PATIENT ENTRY position for next exposure using the RETURN Arm Movement key or the EXPOSURE key on the hand switch for short time.

The resulting X-Ray exam will be available in the DURAY DG Suite program on the PC in a few time.

DAP  
123 mGycm<sup>2</sup>

The value of the dose by area product (DAP) in mGy cm<sup>2</sup> is indicated on display after a panoramic exposure. Do acknowledge the DAP value with RETURN or EXPOSURE key to proceed.

DAP computations can be enabled or disabled via service function.

## 7.7. COOLING DOWN OF THE TUBEHEAD

ALARM RED LIGHT  
BLINKING



Other error messages

This feature protects the X-ray tube by preventing premature triggering of a new exposure should the load requested by the next exposure exceed the available capacity. The red light on the control panel keeps blinking until cool-off time has elapsed.

Possible malfunctions during the use generate an error message and the unit is blocked. A list of messages are reported in chapter 12. Depending on the malfunction, technical service might be required.

## 8. OPERATION – CEPHALOMETRY (P9 to P11 PROGRAMS)

### 8.1. PREPARING EQUIPMENT FOR EXPOSURE

#### A. Switching ON the Unit



By pressing the mains switch in the lower part of the vertical carriage under the mirror, the unit is supplied as indicated by the green light of the mains switch.

**⚠ ATTENTION:**

Following extreme temperature fluctuations, condensate formation may occur; therefore please do not switch on the device until normal room temperature has been reached.

**⚠ ATTENTION:**

When switching on the unit there must NOT be a patient positioned in the unit.

If a fault occurs which requires switching the unit off and then back on again, the patient must be taken out of the unit at the latest before switching it on again!

Initialization  
Please wait: xx

- The display on the control panel turns on.
- System initialization is started.

#### A1. Setting PAN or CEPH Mode

You can switch from PAN to CEPH mode or vice versa by moving the digital sensor after releasing it by pressing the button at the top of the sensor. The appropriate collimator will be automatically set through the selection of the program.

**⚠ ATTENTION:**

Always grip the digital sensor with both hands during the disconnection and connection operations in order to prevent accidental dropping which would irreparably damage it. In case of accidental fall immediately contact Technical Service and do NOT use the sensor on a patient before a functional test is performed.

#### B. Reset Function

\*Press R" to go\*  
\*Entry position\*



In order to use the equipment, it is necessary to press the Return button to initialize the device, as indicated on side image.

By pressing the RETURN Arm Movement key the rotation arm locates the reference points and moves to the PATIENT ENTRY position.

\* Device \*  
\* moving!! \*

When the unit is moving, the message "Device moving!!" appears on the display

#### C. Running Image Acquisition Software on the PC

Set the DURAY DG Suite program following the indication of §5, Application Software).

#### D. Selection of Exam



Press the key for PROGRAM selection, to sequentially change the program from 1 to 11 and back again. All exposure programs are described in section 6. Select one of the cephalometric programs (P9: Latero-lateral program; P10 Antero-posterior program; P11 carpus program).



**E. Selection of Patient Size**



Press the key for PATIENT build selection, Small, Medium, Large, Extra Large.



The pre-programmed technique factors (kV and mA) are automatically selected and appear on the display.



Manual correction of tube voltage and of tube current can be done using the INCREASE or DECREASE keys at display sides.

The same correction can be done through Image Acquisition module on PC side.

**i** NOTE

The pre-programmed values of technique factors are factory programmed. Different values can be loaded if needed using the available on board programming functionality. Refer to §9, Programming for details.

**Setting Tube Voltage**



Key INCREASE at the left of the display to manually raise kV level.



Key DECREASE at the left of the display to manually lower kV level.

The tube voltage can be set from 61 to 85 kV in steps of 3 kV.

61	64	67	70	73	76	79	82	85
----	----	----	----	----	----	----	----	----

**Setting Tube Current product (mA)**



Key INCREASE at the right of the display to manually raise mA level.

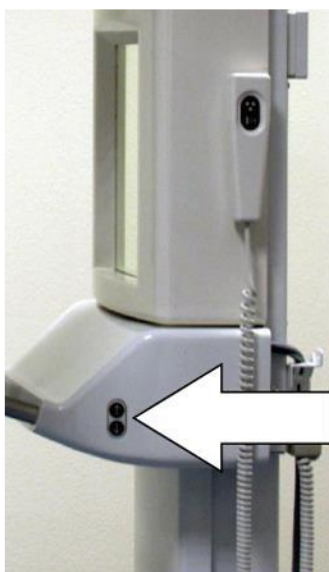


Key DECREASE at the right of the display to manually lower mA level.

The mAs level can be selected from 2 to 40.

4.0	5.0	6.3	8	10
-----	-----	-----	---	----

**8.2. PREPARING PATIENT FOR EXPOSURE**



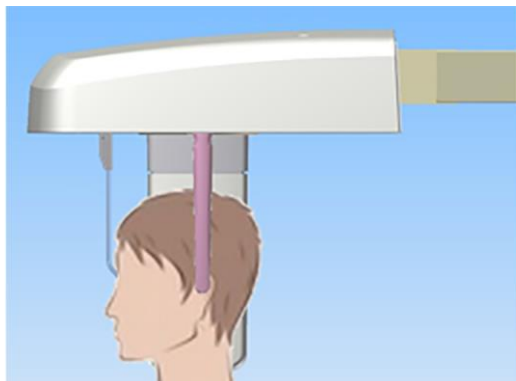
- Ask the patient to remove from head and neck all metallic items such as removable denture, earrings, necklaces, glasses which might cause ghost images on the radiograph.
- Physical constitution, clothing, bandages, etc. must not interfere with the movement of the arm.
- In case a protective apron is used leave the neck free not to interfere with the X-ray beam: radiation enters from sides and from back.
- Bring the unit the proper height using UP or DOWN keys Bring the unit the proper height using UP or DOWN keys.

### 8.3. POSITIONING THE PATIENT

A craniostat with auricular rods is available for Latero-lateral or Antero-posterior projection and an adjustable nasion support.

Remove the nasion support by acting on the release pin in the case of Antero-posterior or Carpus projection.

#### 8.3.1. Latero-lateral program (P9)

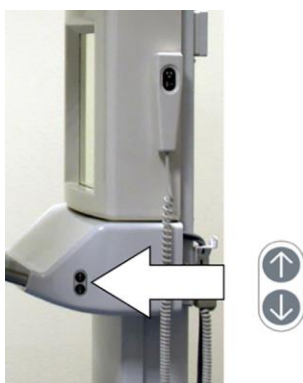


The configuration of the craniostat for Latero-lateral program is indicated in the side image.

Turn the ear plug holder, in order to have ear plug and nasion as illustrated in side image.

Grasp the holders at the very top with both hands. Push the holders simultaneously outwards as far as they will go.

Insert the protective caps for ear plug.

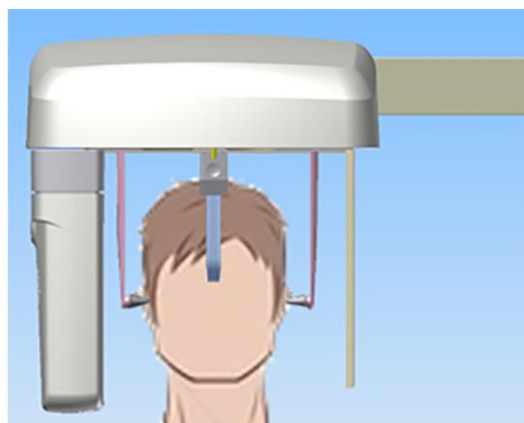


Bring the unit the proper height using UP or DOWN keys.

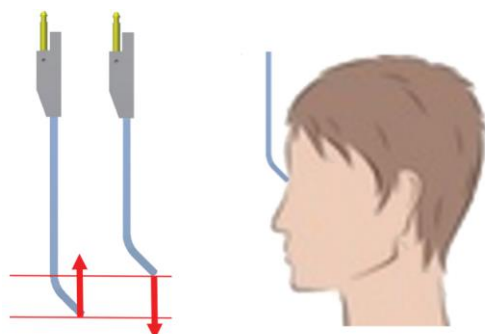
**i** NOTE

The height adjustment motor starts slowly and then increases its speed. Press the height adjustment key until the unit has reached the desired height.

Ask the patient to stand with back to the cephalometric arm, and guide him between the two ear plug holders.



Grasp the ear plug holders at the top and simultaneously slide them together. The ear plugs are positioned on the patient's outer auditory passage.

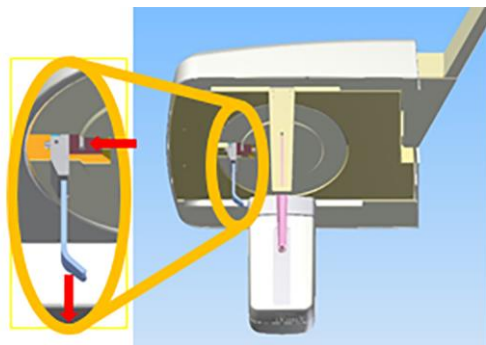


Grasp the plastic part of the nasion support and adjust the nasion support height by bringing it up/down.

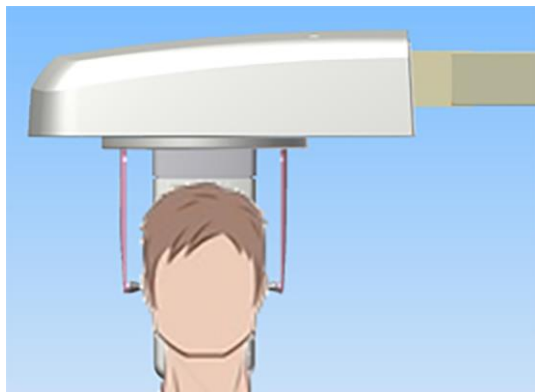
The end of nasion support must be in contact with nasion of patient.

Instruct the patient to keep this position until the end of the exam.

### 8.3.2. Antero-posterior program (P10)



Remove the nasion support by acting on the release pin as illustrated in the side image.

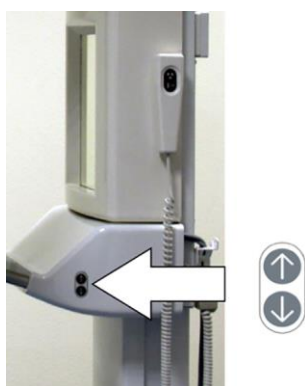


The configuration of the craniostat for Antero-posterior program is indicated in the side image.

Turn the ear plug holder, in order to have ear plug as illustrated in side image.

Grasp the holders at the very top with both hands. Push the holders simultaneously outwards as far as they will go.

Insert the protective caps for ear plug.

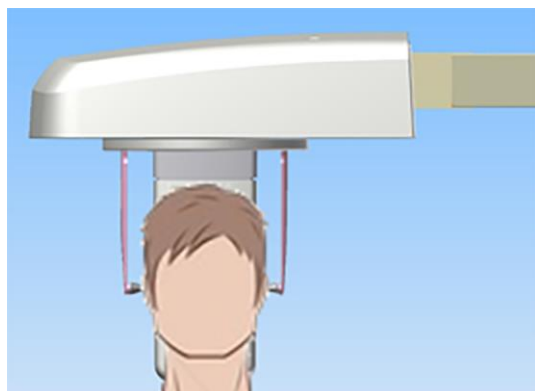


Bring the unit the proper height using UP or DOWN keys.

**i** NOTE

The height adjustment motor starts slowly and then increases its speed. Press the height adjustment key until the unit has reached the desired height.

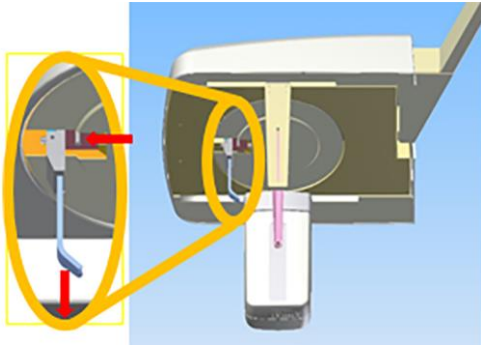
Ask the patient to stand with back to the cephalometric arm, and guide him between the two ear plug holders.



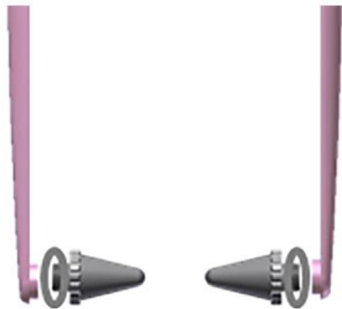
Grasp the ear plug holders at the top and simultaneously slide them together. The ear plugs are positioned on the patient's outer auditory passage.

Instruct the patient to keep this position until the end of the exam.

### 8.3.3. Carpus program (P11)

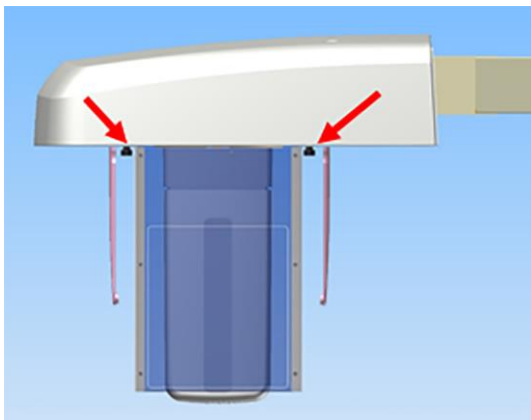


Remove the nasion support by acting on the release pin as illustrated in the side image.

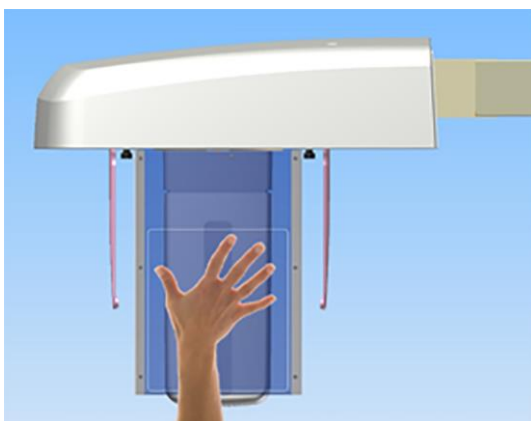


Remove the ear plug from the ear plug holder, by unscrewing them. Pay attention not to lose the washer.

Grasp the holders at the very top with both hands. Push the holders simultaneously outwards as far as they will go.



Mount the carpus support, by screwing the two black screws (please refer to side image, red arrows).



Guide the patient sideways into the unit.

Instruct the patient to place his hand in contact with the carpus support, in the designated rectangle area.

Instruct the patient to keep this position until the end of the exam.

### 8.4. RELEASING THE EXPOSURE



**⚠ ATTENTION:**

The operator must observe the radiation protection guidelines (see chapter 1, Warning and Safety Notes). Before releasing the exposure always check in the display that proper exposure technical parameters (kV and mAs) has been set for the the patient.

Press the Return key or the Exposure key on the hand switch for short time to bring the arm from Patient entry position to ceph start position, ready to start the exposure.

Go to the area designated for the operator behind the patient (at least three meters away from the column) or exit the room always keeping an eye on the patient, ready to immediately interrupt radiation if necessary.

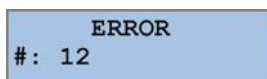
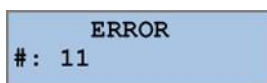
During the X-Ray emission, a yellow light is ON both on control panel and X-Ray button and an acoustic signal is activated.

**Release the exposure by keeping the exposure key pressed on the hand switch until the acoustical and optical alarms are terminated.**

**⚠ ATTENTION:**

For safety reasons the operator can interrupt and terminate the X-Ray exposure any time by releasing the exposure button on the hand switch.

Premature termination is signaled by an error message:



**Error 11: Exposure aborted during irradiation.**

The patient has been partially exposed. Part of the radiograph is being available. Examination may have to be repeated.

**Error 12: Exposure aborted before irradiation.**

The patient was not irradiated. Examination to be restarted.

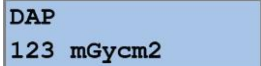
## 8.5. AFTER THE EXPOSURE

At the end of the X-Ray exposure grasp the holders at the very top with both hands. Push the holders simultaneously outwards as far as they will go, in order to let the patient get away from the equipment.



Keep pressed the BACK key for 5 s in order to bring the carriage in Patient Entry position.

The resulting X-Ray exam will be available in the DURAY DG Suite program on the PC in a few time.



DAP  
123 mGycm<sup>2</sup>

The value of the dose by area product (DAP) in mGycm<sup>2</sup> is indicated on display after the exposure. Do acknowledge the DAP value with Return or Exposure key to proceed. DAP computations can be enabled or disabled via service function.

## 8.6. COOLING DOWN OF THE TUBEHEAD

ALARM RED LIGHT  
BLINKING



This feature protects the X-ray tube by preventing premature triggering of a new exposure should the load requested by the next exposure exceed the available capacity. The red light on the control panel keeps blinking until cool-off time has elapsed.


Other error messages

Possible malfunctions during the use generate an error message and the unit is blocked. A list of messages are reported in chapter 12. Depending on the malfunction, technical service might be required.


## 9. PROGRAMMING


### 9.1. PROGRAMMING PROCEDURE



Default kV and mA values for each program are assigned by default in factory. Such values can be re-loaded using a dedicated service function. If you want to modify these default values please follow the instruction below.

 By keeping pressed the BACK key for 5 s the system enters Service Mode.

Service +/-  
Expos. Settings


 Service function can be selected using the INCREASE or DECREASE keys on the RIGHT side of the display. Scroll the menu until Exposure Settings is displayed.

 Press the PROGRAM key to enter Exposure Settings.

 **NOTE.**  
 Keep pressed the TEST key to reset all values to default (factory) conditions.



 Select the exposure program by pressing the program key:



 Select the patient build by pressing the PATIENT key, Small, Medium, Large, Extra Large.




 \* SET kV / mA \*  
67 6.3

 Change the kV level to the desired value by pressing the INCREASE or DECREASE keys at the LEFT side of the display.  
 Change the mA level to the desired value by pressing the INCREASE or DECREASE keys at the RIGHT side of the display.

 Keep pressed the LIGHT key to store the selected value.

















Repeat kV setting and mA setting for each patient build (if requested) and for each exposure program.

 Press BACK key to exit EXPOSURE SETTINGS.

 Press TEST Mode key to exit SERVICE MODE.

  
 Do verify proper setting by changing PATIENT build for each exposure program.

**9.2. PROGRAM VALUES**

	Factory programmed values				Freely programmed values			
Panoramic Programs								
P1, P3, P4, P5, P6, P7, P8	61/6.3	67/6.3	73/6.3	79/6.3				
P2	61/5.0	67/5.0	73/5.0	79/5.0				
Cephalometric Programs								
P9, P10	73/8.0	76/8.0	79/8.0	82/8.0				
P11	61/4.0	61/4.0	61/4.0	61/4.0				

## 10. CARE OF THE SURFACES



**ATTENTION:**

Always disconnect the system from the mains (main switch in the room) before cleaning it.

Cleaning

Use a mild soap to remove fingerprints or other traces of dirt being careful not to let liquid substances penetrate the machine.

The plastic covers can be cleaned with a soft cloth and a mild detergent.

Disinfecting

The parts that come into contact with the patient must be cleaned after each use with a detergent (for example, a 2% ammonia solution) and then disinfected. DO NOT use solvents or corrosive substances.


The bite block and the chin rest can be sterilized in autoclave at 134°C.

## 11. MESSAGES

### 11.1. WARNING MESSAGES

Message	Action required
Low Battery (NVRAM battery)	The battery on the control board is almost discharged and must be replaced within a month.
X Ray generator hot	The system is cooling down and the requested exposure would exceed the loading capacity. Wait until ready.
CAM init (starting in progress)	Wait for system to complete initialization.
Adj Arm Position	The rotating arm is out of position. Turn the system OFF and manually relocate the arm centrally, then turn the system ON.
Wait PC ready	The communication line to the computer is missing or the image acquisition program is not in input mode. Perform necessary correction. This warning message is not active in test mode (service functions).
X-Ray Sensor Not Connected	If DURAY ART Plus C does not detect the presence of the X-ray sensor in either of the two positions (PAN or CEPH), the message "X-Ray Sensor Not Connected" will be shown on the display. In this condition, DURAY ART Plus C will remain in standby until it detects the presence in one of the two positions. If the digital sensor is installed but not detected, an electrical problem may have occurred.
Wrong CEPH Format	The message "Wrong CEPH Format" appears when there is an incongruence between the configuration of the dip switches in the control unit and the CEPH format selected with the CEPH Format function in the Service menu. The message is shown once the examination start position in CEPH mode has been reached.

## 11.2. ERROR MESSAGES

ALARM RED LIGHT BLINKING  The ERROR number is shown on the display with the red light blinking.

 To reset the error condition, press the BACK key.

Error#	Message	Action required
1	kV reference signal out of range.	Switch the unit off. Report to technical service.
2	mA reference signal out of range.	Switch the unit off. Report to technical service.
3	Rotation sensor malfunction (R-axis).	Switch the unit off. Report to technical service.
4	Translation sensor malfunction (X-axis).	Switch the unit off. Report to technical service.
5	Rotation sensor reading error (R-axis).	Switch the unit off. Report to technical service.
6	Translation sensor reading error (X-axis).	Switch the unit off. Report to technical service.
9	Tube-head temperature exceeding limit.	Wait for tube cool down.
11	Interruption of exposure during irradiation.	Restart if termination was requested by the operator. Call for technical service if termination was spontaneous.
12	Interruption of exposure before irradiation.	Restart if termination was requested by the operator. Call for technical service if termination was spontaneous.
13	38 VDC supply voltage out of range.	Switch the unit off. Report to technical service.
14	24 VDC supply voltage out of range.	Switch the unit off. Report to technical service.
15	15 VDC supply voltage out of range.	Switch the unit off. Report to technical service.
16	5 VDC supply voltage out of range.	Switch the unit off. Report to technical service.
17	High voltage failure.	Switch the unit off. Report to technical service.
19	Set exposure time exceeded.	Switch the unit off. Report to technical service.
20	Interruption of exposure after irradiation.	Call for technical service if termination was spontaneous.
21	Anode current insufficient or absent.	Switch the unit off. Report to technical service.
23	Filament current out of range.	Switch the unit off. Report to technical service.
25	Thermal sensor faulty or not connected.	Switch the unit off. Report to technical service.
26	System battery voltage below threshold.	Switch the unit off. Report to technical service.
27	Multiplexer board malfunction with sensor presence in PAN and CEPH.	Switch the unit off. Report to technical service.
28	CEPH movement end stop exceeded.	Switch the unit off. Report to technical service.
30	CEPH movement end stop during examination.	Switch the unit off. Report to technical service.
32	Microprocessor-controlled board fault.	Switch the unit off. Report to technical service.

## 12. INSPECTION AND MAINTENANCE

Inspection and maintenance work must be performed at regular intervals to protect the safety and health of patients, users and third parties.

As the operator, you should ensure the safety and reliability of your system by performing maintenance on it at regular intervals (at least once annually) or having this work performed by your dental dealership.

In addition to the scheduled annual inspection by the user or persons contracted to perform this, a maintenance inspection must be performed by the service technician after 4, 7, 10 years and then every two years.

### Checking image quality

At regular intervals, however at least once a year, the quality image must be evaluated.

**13. TECHNICAL DESCRIPTION**

Equipment classification



IEC: Class I, type B equipment with Class I LASER sources (IEC 60825-1).

This product complies with the following standards:

IEC 60601-1:2005	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.
IEC 60601-1-2:2007	Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests.
IEC 60601-1-3:2008	Medical electrical equipment - Part 1-3: General requirements for basic safety and essential performance - Collateral Standard: Radiation protection in diagnostic X-ray equipment.
IEC 60601-2-63:2012	Medical electrical equipment - Part 2-63: Particular requirements for the basic safety and essential performance of dental extra-oral X-ray equipment.
IEC 60601-1-6:2010	Medical electrical equipment - Part 1-6: General requirements for basic safety and essential performance - Collateral standard: Usability.
IEC 62366:2007	Medical devices - Application of usability engineering to medical devices.
IEC 60825-1:2014	Safety of laser products. Part 1: Equipment classification, requirements and user's guide.
US FDA 21CFR1020.30	Performance Standards for Ionizing Radiation Emitting Products: Diagnostic X-ray Systems and their major Components.
US FDA 21CFR1020.31	Performance Standards for Ionizing Radiation Emitting Products: Radiographic Equipment.
US FDA 21CFR1040.10	Performance Standard for Light Emitting Products: Laser products.

Manufacturer

**BEYES DENTAL CANADA Inc.**

23-595 Middlefield Road Toronto, Ontario, M1V 3S2 Canada

Nominal line voltage

230 V ± 10%, 115 V ± 10%,

Nominal line frequency

50/60 Hz

Line fuse

T8 A 250 V for 230 V version; T16 A 250 V for 115 V version

Mains Resistance

≤ 0.8 ohm at 230 V, ≤ 0.4 ohm at 115 V

Rating

1350 (W or VA)

Curve form of high voltage

High frequency multi-pulse, ripple ≤ 4%

Tube Voltage

61 - 85 kV ± 5%, constant potential

Tube Current

4 - 10 mA ± 10%, direct current (DC)

Focus size

0.5 IEC 60336

Total Filtration

> 2.5 mm Al /70 kV IEC 60522

Focus marking

Dot mark on generator's cover

Beam size at image receptor

Pan: 141 x 3.6mm<sup>2</sup>

Cephalometry: 217 x 5.1 mm<sup>2</sup>

Loading factor for leakage radiation

1.25 mA @ 85 kV

Leakage Radiation

≤ 1 mGy/h

Cool down pause

Variable pause depending on requested tube load

Maximum duty cycle

1/8

Column height

222 cm/87" (holes for wall plate at 210 cm/82.7" from floor)

Maximum height

229 cm/90.2"

Vertical displacement

92 cm/36.2", from 90 to 182 cm (da 35 a 71.7")

Vertical Movement

Motorized control with slow and quick motion

Weight

Pan Solo 100 kg/220 lb, Pan Ceph 120 kg/264 lb

Self standing base

Optional on request.



Panoramic Projections	P1: Adult Standard Panorama: 14.2 s, P2: Child Panorama: 11.5 s, P3: Left hemi-arch: 7.3 s, P4: Right hemi-arch: 7.3 s, P5: Anterior Teeth: 4.8 s, P6: TMJ normal occlusion or TMJ mouth opened: 2 x 2.2 s, P7: Frontal View of Maxillary Sinuses: 12.9 s P8: Bitewing: 8.5 s
Cephalometric Projections	P9: Antero-posterior (8 s), P10: Latero-lateral (10 s), P11: Carpus (8 s)
Anatomical Selection	4 Patient size levels: Small, Medium, Large, Extra Large
kV setting	9 positions in 3 kV steps: 61, 64, 67, 70, 73, 76, 79, 82, 85 kV
mA setting	5 positions according to R10 scale: 4, 5, 6.3, 8, 10 mA
Source-Image Receptor distance	Pan 51.3 cm/20.2", Ceph 165 cm/65"
Reproduction scale	Pan image at receptor's plane is approximately 27% higher than real size (vertical magnification on adult standard profile 1.27:1 approximately) Cephalometric images at receptor's plane is approximately 10% higher than real size (vertical magnification is approximately 1.10:1)
Centering References	Chin rest with bite block or support for edentulous, bite block for panoramic programs, bite block for TMJ and sinuses programs, nasal support for panoramic programs, bite block for TMJ and sinuses programs, temple bars (optional)
<b>Aiming lights:</b>	
Type	Class I LASER beam
Wavelength	650 nm
Output Power	< 0.15 mW at 100 mm
Reference planes	Median Sagittal Vertical, canine and Frankfurt Horizontal planes
Pulse duration	Lights stays on until the carriage goes to Start exam position
<b>Image receptor:</b>	
Type	Multi-element Cd(Zn)Te-CMOS
Active area	Panoramic modality: 151 mm x 6.4 mm; Cephalometric modality: 226.6 mm x 6.4 mm
Effective pixel size	100 micron
Spatial resolution	5 lp/mm
MTF (radiation quality RQA5)	>70% at 2 lp/mm, > 30% at 5 lp/mm
DQE (radiation quality RQA5)	> 80% at 0 lp/mm; > 60% at 2 lp/mm; > 20% at 5 lp/mm
A/D conversion	12 bits
Computer interface	Gigabit Ethernet connection
Resulting image format Pano	Panoramic image: about 26.5x13.5 cm <sup>2</sup> (2650x1350 pixel) Cephalometric image: about 24.9x21.5 cm <sup>2</sup> (2490x2150 pixel)
<b>Minimum requirements for PC Standard</b>	
Operating System	Information Technology Equipment (ITE) certified Windows 7 Professional / 8 / 10 (64 bit)
CPU	Intel® Core™ i7
RAM	8 GB
Hard disk	120 GB
Chipset	Intel chipset
Drives	CD ROM (not mandatory), 2 USB ports
Monitor	0.25 dot pitch; 450:1 contrast ratio 1024x768 minimum resolution

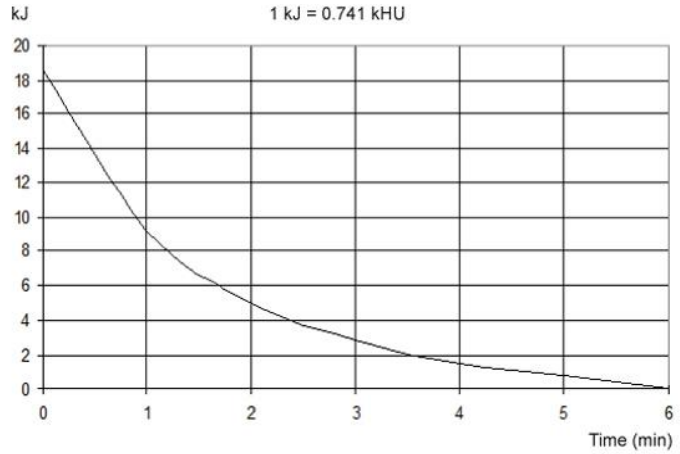
**Environmental data**

Operating conditions

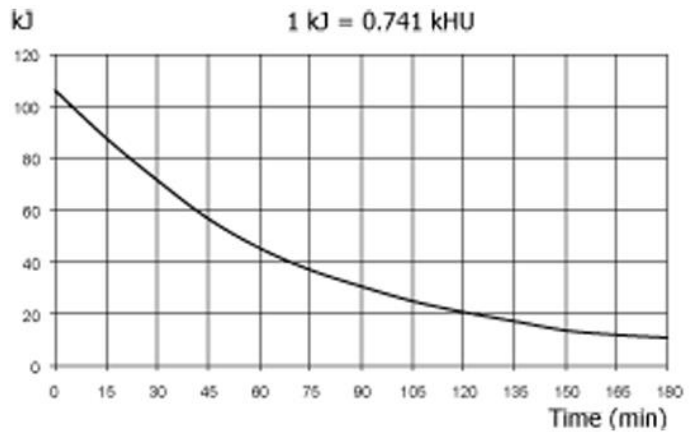
Temperature: from 10 to 40 °C  
 Humidity: from 30 to 75%  
 Pressure: from 700 to 1060 hPa  
 Temperature: from -10 to +50 °C  
 Humidity: from 20 to 80%  
 Pressure: from 500 to 1060 hPa

Transport and storage

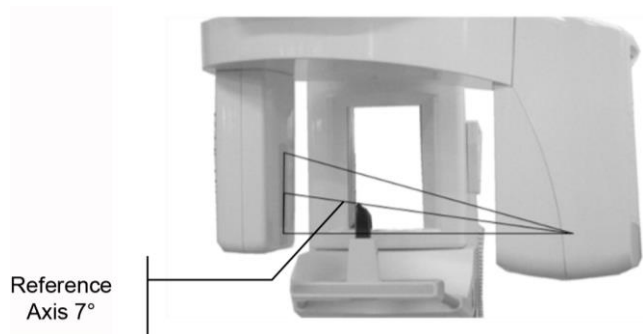
Cooling curve  
 X-ray tube



Cooling curve  
 Tube housing assembly



Reference axis



Used Icons

- |  |                                      |  |                           |
|--|--------------------------------------|--|---------------------------|
|  | OFF (disconnected from mains supply) |  | Inherent Filtration       |
|  | ON (connected to mains supply)       |  | Fragile, Handle With Care |
|  | Fuse                                 |  | Fear of Humidity          |
|  | Alternate Current                    |  | Up, Do Not Overturn       |
|  | Protective Earth                     |  | Stacking Limit Number     |

## 14. ELECTROMAGNETIC COMPATIBILITY

### 14.1. ELECTROMAGNETIC EMISSION

The DURAY ART Plus C system is suitable for use in the electromagnetic environment specified below. The customer or the user of DURAY ART Plus C system should assure that it is used in such an environment.

Emission test	Compliance	Electromagnetic environment
Radiated and conducted RF emissions CISPR 11	Group 1	This DURAY ART Plus C uses RF energy only for its internal function. Therefore, the RF emission is very low and not likely to cause any interference in nearby electronic equipment.
	Class B	This DURAY ART Plus C is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions EN 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions 61000-3-3	Complies	


### 14.2. ELECTROMAGNETIC IMMUNITY

The DURAY ART Plus C system is intended for use in the electromagnetic environment specified below. The customer or the user of the DURAY ART Plus C system should assure that it is used in such an environment.

Immunity test	EN 60601-1-2 test level	Compliance level	Electromagnetic environment
Electrostatic discharge (ESD) IEC 61000-4-2	6 kV contact 8 kV air	IEC 60601-1-2 Test level	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	2 kV for power supply lines 1 kV for input/output lines > 3 m	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	1 kV differential mode 2 kV common mode	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% Un for 0.5 cycles 40 % Un for 5 cycles 70 % Un for 25 cycles 0 % Un for 5 s	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DURAY ART Plus C requires continued operation during power mains interruptions. It is recommended that the DURAY ART Plus C be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	IEC 60601-1-2 Test level	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

### 14.3. SYSTEMS THAT ARE NON LIFE SUPPORTING

The DURAY ART Plus C system is suitable for use in the electromagnetic environment specified below. The customer or the user of the DURAY ART Plus C system should assure that it is used in such an environment.

Immunity test	EN 60601-1-2 test level	Compliance level	Electromagnetic environment
			Portable and mobile RF communications equipment should be used no closer to any part of the DURAY ART Plus C system, including cables, than the recommended separation distances calculated from the equation applicable to the frequency of the transmitter.  Recommended separation distances (d)
Radiated RF EN 61000-4-3	3 V/m: 80 MHz to 2.5GHz	3 V/m	$d = 1.2 \times \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \times \sqrt{P}$ 800 MHz to 2.5GHz
Conducted RF EN 61000-4-6	3V 150 kHz to 80MHz	3V	$d = 1.2 \times \sqrt{P}$
			Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 

### 14.4. RECOMMENDED SAFETY DISTANCES FOR SYSTEMS THAT ARE NOT LIFE SUPPORTING

The DURAY ART Plus C system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the DURAY ART Plus C system can help preventing electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DURAY ART Plus C system as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 KHz to 80 MHz $d = 1.2 \times \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \times \sqrt{P}$	800 MHz to 2.5GHz $d = 2.3 \times \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note:

At 80 MHz and 800 MHz the separation distance for the higher frequency range applies.

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection of structures, objects and people.



Federal law restricts this device to sale by or on the order of a dentist, physician, or any other practitioner licensed by the law of the states in which he or she practices to use or order the use of this device.

**Beyes Dental Canada Inc.**  
23-595 Middlefield Road  
Scarborough, ON M1V3S2  
Canada  
Tel: 1-855-603-1888  
Fax: 1-855-720-1228  
Email: [info@beyes.ca](mailto:info@beyes.ca)  
Website: [www.beyes.ca](http://www.beyes.ca)



**Lotus NL B.V.**  
Koningin Julianaplein 10, le Verd,  
2595AA, The Hague,  
Netherlands



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10.04.24