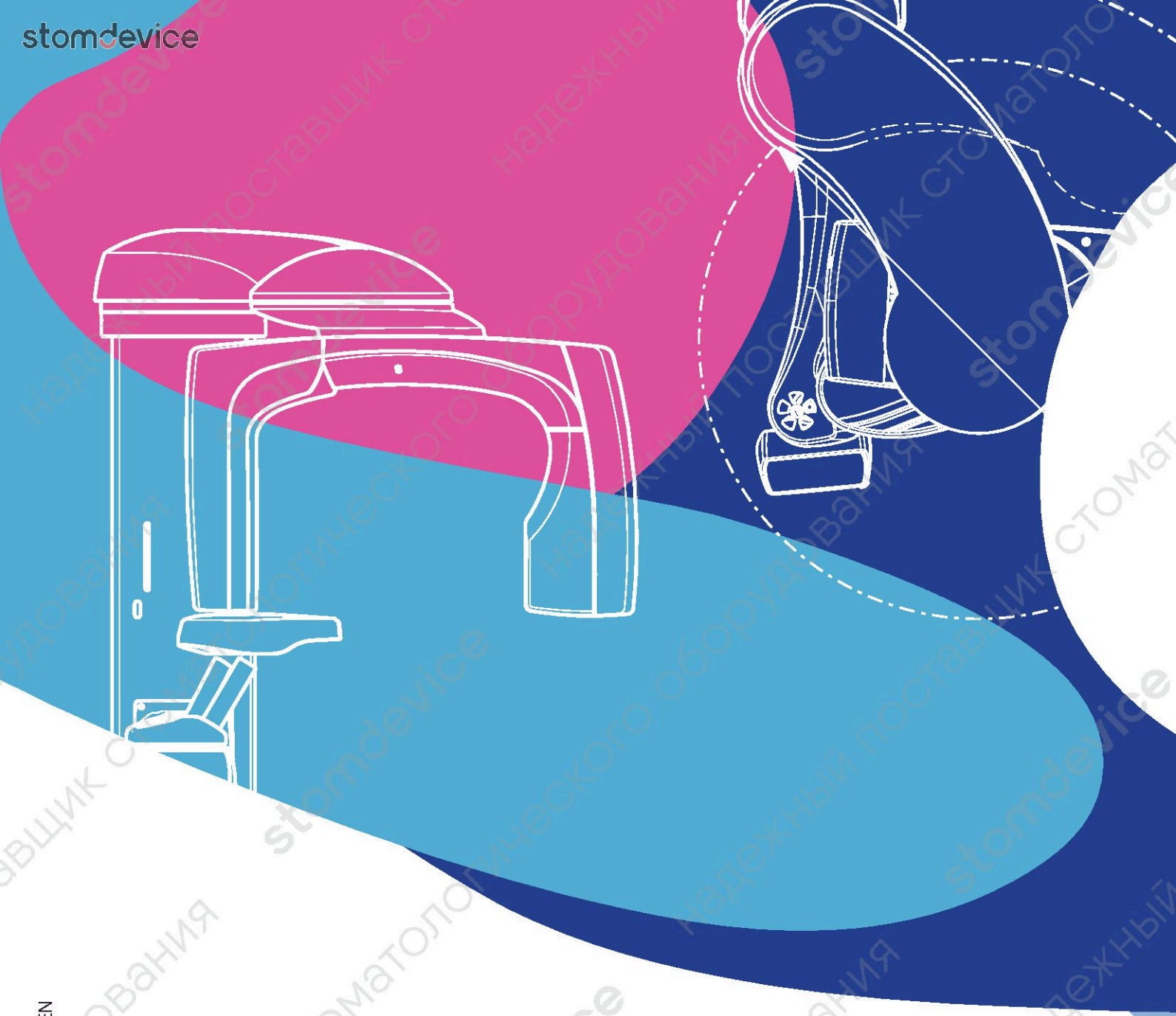
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EN

Planmeca ProMax 3D Max

user's manual

10019220_14

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The manufacturer, assembler, and importer are responsible for the safety, reliability and performance of the X-ray unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorized personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

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1 INTRODUCTION

This manual describes how to take 3D exposures. Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before you use the X-ray unit.

The X-ray unit uses Cone Beam Computed Tomography (CBCT) to produce three-dimensional (3D) X-ray images. If the X-ray unit has a ProFace sensor, you can take a 3D photo of the patient's face.

The X-ray images can be used to examine:

- Dentomaxillofacial area
- Ear, nose and throat
- Cervical spine
- Other cranial anatomies

The 3D face photo can be used for patient education or in order to follow the results of medical treatments.

You need a PC with the Planmeca Romexis program in order to save, view and modify the images.

NOTE **The X-ray unit may be used by health care professionals only.**

NOTE **The software version is shown briefly on the control panel when the X-ray unit is switched on. This manual is valid for software version 2.7.6.0.r or later. This software version is compatible with Romexis software version 3.7.0.r or later.**

The X-ray unit features preset exposure values. However, the exposure values required to produce good X-ray images will vary considerably according to the build and age of the patient. The preset exposure values are average values and they are only meant to guide the user. Users are encouraged to develop their own radiographic techniques based on these values. The kV value can be reduced from the suggested value to improve image contrast. The radiation dose can be reduced by decreasing the suggested mA value.

The display values shown in this manual are only examples and should not be interpreted as recommended values unless otherwise stated.

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2 ASSOCIATED DOCUMENTATION

The X-ray unit is supplied with the following manuals:

- User's Manual,
  Original English publication: 10019220
- Installation Manual,
  Original English publication: 10019222
- Technical Manual,
  Original English publication: 10019223

These manuals are intended to be used in conjunction with the documentation for the Planmeca Romexis program. The Romexis package contains the following manuals:

- User's Manual,
  Original English publication: 10014593
- Installation Manual,
  Original English publication: 10014600

NOTE **The latest versions of the User's Manuals are available on Planmeca's website.**

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3 SYMBOLS ON PRODUCT LABELS



CE marking according to European standard (Directive 93/42/EEC)



SGS marking according to US and Canadian standards (ANSI/UL 60601-1 and CAN/CSA C22.2 No. 601.1-M90)



Date of manufacture (Standard ISO 15223-1)



Attention, consult accompanying documents (Standard IEC 60601-1)



Type B applied part (Standard IEC 60601-1)



Separate collection for electrical and electronic equipment (Directive 2002/96/EC WEEE)



Alternating current (Standard IEC 60417)



Electrostatic sensitive device (Standard IEC 60417)

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4 SAFETY PRECAUTIONS

CAUTION ***FOR US USERS:***
Federal law restricts this device to sale by or on the order of a health care professional.

CAUTION ***This X-ray unit may be dangerous to both patient and operator unless safe exposure values are used and correct operating procedures are observed.***

CAUTION ***The patient positioning lights are laser lights. Do not stare into the laser beam.***

CAUTION ***If an exposure is interrupted (e.g. exposure button is released or emergency stop button activated), the patient must be guided away from the X-ray unit before the C-arm is moved.***

CAUTION ***Do not connect items which are not specified as part of the system.***

CAUTION ***Do not connect a multiple portable socket outlet (MPSO) or extension cord to the system.***

CAUTION ***Do not touch an electrical connector and the patient at the same time.***

CAUTION ***If the X-ray unit shows any signs of oil leakage, disconnect the unit from mains and contact your service technician for help.***

CAUTION ***Do not use the X-ray unit in an oxygen rich environment or in the presence of flammable anesthetics.***

CAUTION ***Never use a defective or damaged X-ray system. Contact your service technician for help.***

NOTE **It is very important that the place where the unit is to be used and the position from which the user is to operate the unit are correctly shielded. Since radiation safety requirements vary from country to country and state to state it is the responsibility of the user to ensure that all local safety requirements are met.**

NOTE **Cone beam imaging should not be used for routine (or screening) examinations. The imaging examinations must be justified for each patient to demonstrate that the benefits outweigh the risks.**

NOTE **When it is likely that evaluation of soft tissues will be required as part of the patient's radiological assessment, conventional CT or MR medical imaging should be used rather than CBCT.**

NOTE **Before taking an exposure, ask any female patient of childbearing age whether she might be pregnant. The X-ray unit is not intended for use on pregnant women.**

NOTE **FOR CANADIAN USERS:**
All patients must be provided with a shielded apron for gonad protection and a thyroid shield. The use of a thyroid shield is especially important in children. The shielded apron and thyroid shield should have a lead

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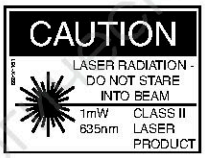
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equivalence of at least 0.25 mm on both sides (front and back of the patient).

NOTE If the X-ray unit has been stored at temperatures under +10°C for more than a few hours, time must be allowed for the unit to reach room temperature before turning it on.

NOTE Ensure efficient air conditioning in the X-ray room. It is recommended to keep the room temperature between +20°C and +25°C at all times.

NOTE If exposures are taken in rapid succession the X-ray tube may overheat and a cooling time will flash on the touch screen. The cooling time indicates the delay before the next exposure can be taken.



NOTE If the X-ray system is not connected to an Uninterruptible Power Supply (UPS), disconnect the system from mains during lightning storms.

NOTE FOR US & CANADIAN USERS:
The patient positioning lights are class II laser products (21 CFR § 1040.10).



NOTE FOR EUROPEAN USERS:
The patient positioning lights are class 1 laser products (Standard IEC / EN 60825-1: 2007).

NOTE EMC requirements have to be considered, and the equipment must be installed and put into service according to the specific EMC information provided in the accompanying documents.

NOTE Portable and mobile RF communications equipment can affect the X-ray unit.

NOTE External equipment intended for connection to signal input, signal output or other connectors, shall comply with relevant IEC standard (e.g. IEC 60950 for IT equipment and the IEC 60601 series for medical electrical equipment). In addition, all such combinations - systems - shall comply with the standard IEC 60601-1-1, Safety requirements for medical electrical systems. Equipment not complying to IEC 60601 shall be kept outside the patient area (more than 2m (79 in.) from the X-ray unit).
Any person who connects external equipment to signal input, signal output or other connectors has formed a system and is therefore responsible for the system to comply with the requirements of IEC 60601-1-1. If in doubt, contact your service technician or local representative for help.

NOTE Contact your service technician if you notice a decrease in image quality.

NOTE Contact your service technician if you have taken an exposure but the image does not appear in the Planmeca Romexis program. The last ten images can be manually imported into Romexis.

NOTE Never place or hang any objects on any part of the X-ray unit.

NOTE Make sure that neither you nor your patient can get caught or hooked up on any part of the X-ray unit. Keep loose items of clothing, hair and jewellery tucked away safely.

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NOTE **If you have any reason to believe that the C-arm might hit the patient during exposure (e.g. patients with wide shoulders), take a test exposure without radiation first. Refer to section 9.3 “Special functions (i400)” on page 40 for information on how to switch radiation off.**

NOTE **Do not touch the arm structures when the X-ray unit is moving.**

NOTE **Patients are not allowed to hang on the patient handles.**

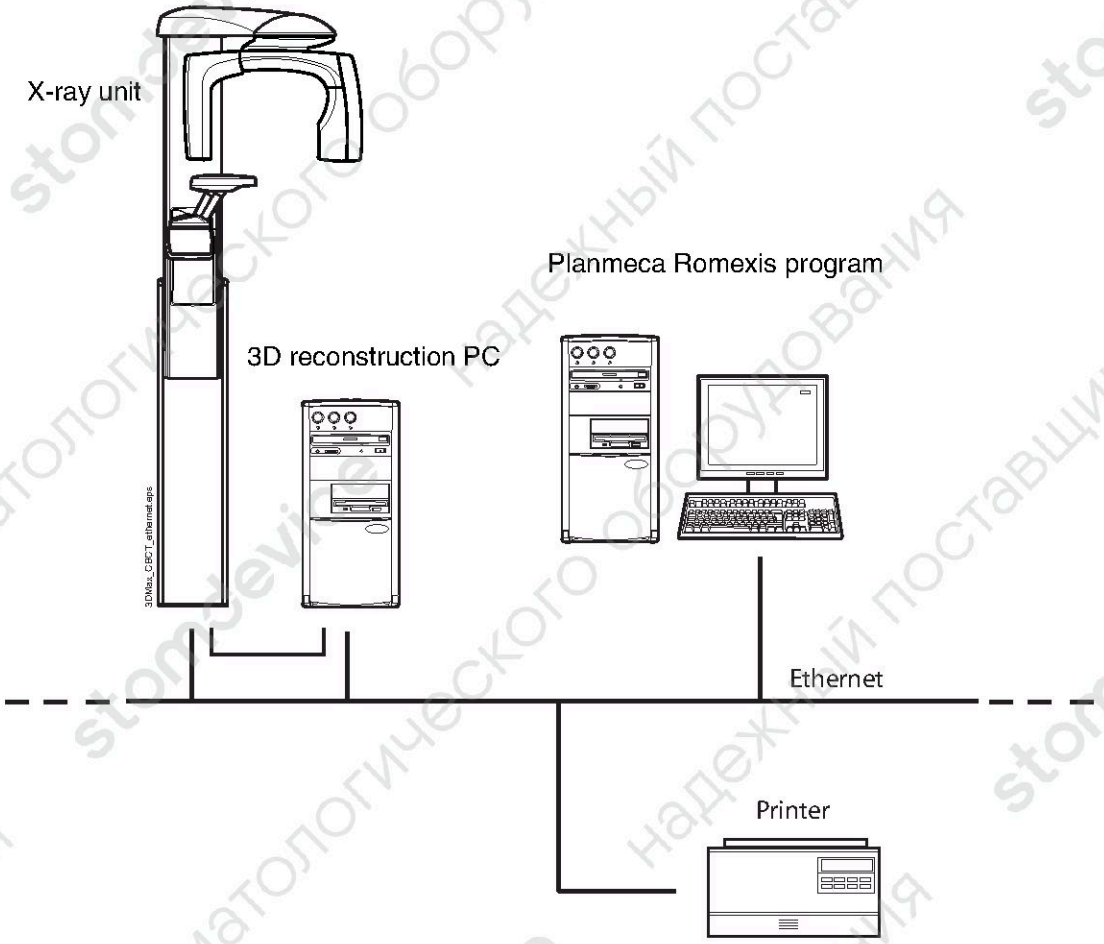
NOTE **FOR PROFACE SENSOR:**
Do not touch the glass windows. Fingerprints or other stains on the glass surface destroy image quality.

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5 MAIN PARTS

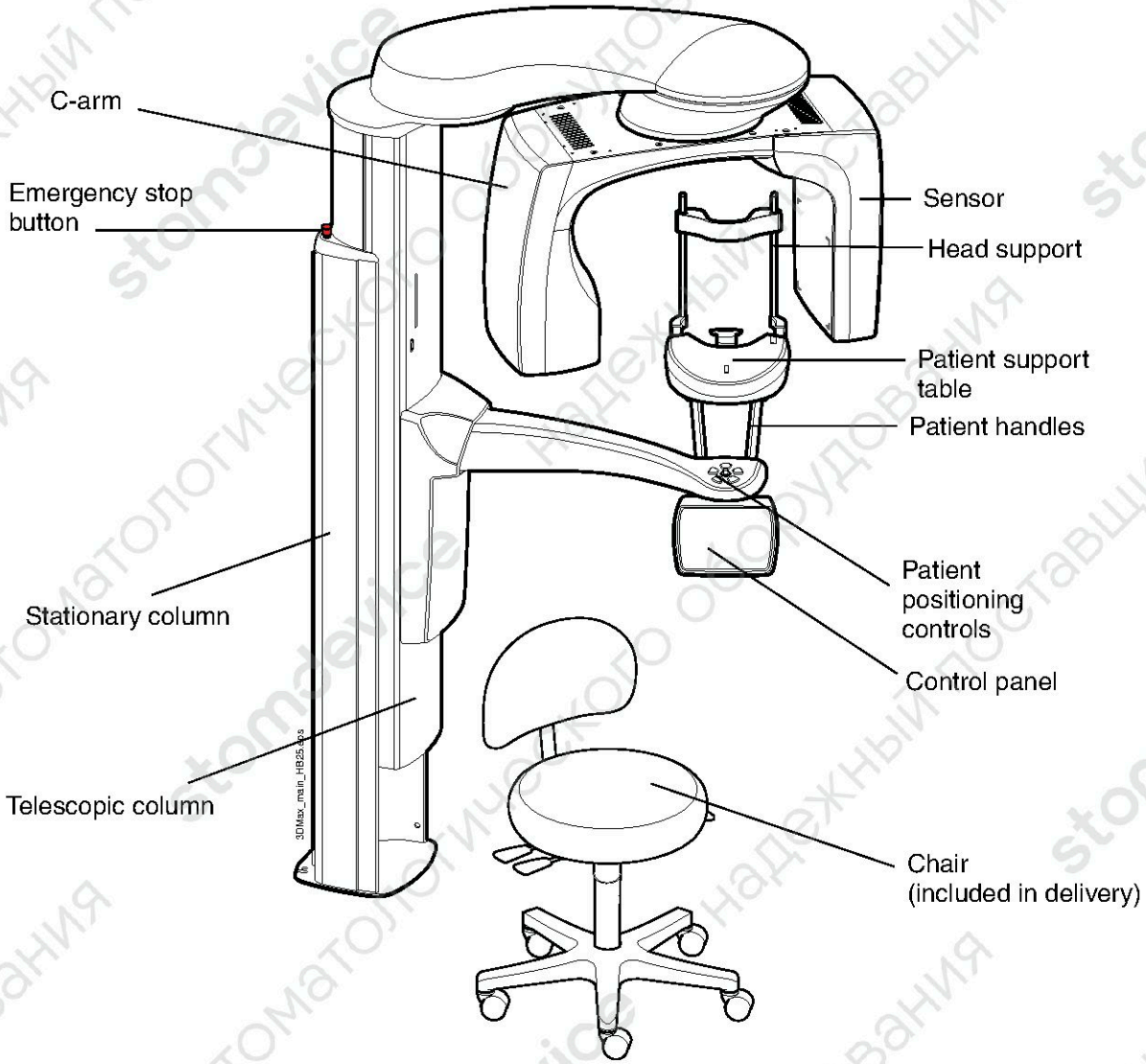
5.1 General view of system



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5.2 General view of X-ray unit

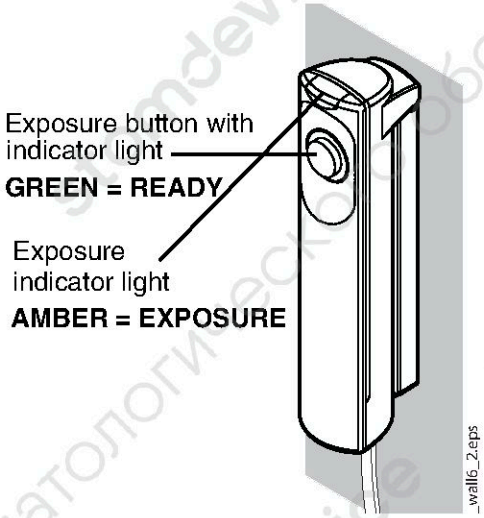


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5.3 Exposure switch

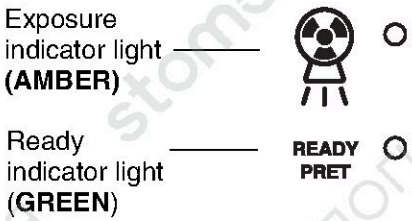
The exposure switch can be mounted on the wall, or it can be hung from the hook provided on the stationary column top if a protected area is within reach.

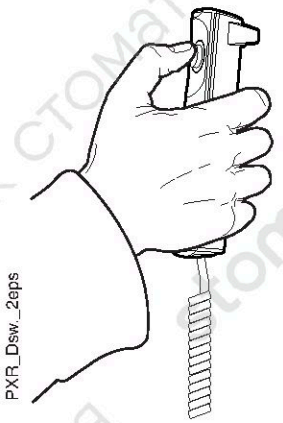


On the exposure button and on the control panel a green indicator light will come on when the unit is correctly set up and ready to take an exposure. Additionally, the word READY will stop flashing on the control panel display.

An amber indicator light will come on on the exposure switch and on the control panel when you take an exposure. It indicates that the unit is generating radiation. You will also hear a radiation warning signal.

CONTROL PANEL LIGHTS:





When you take an exposure you must press and **hold down** the exposure button for the whole duration of the exposure.

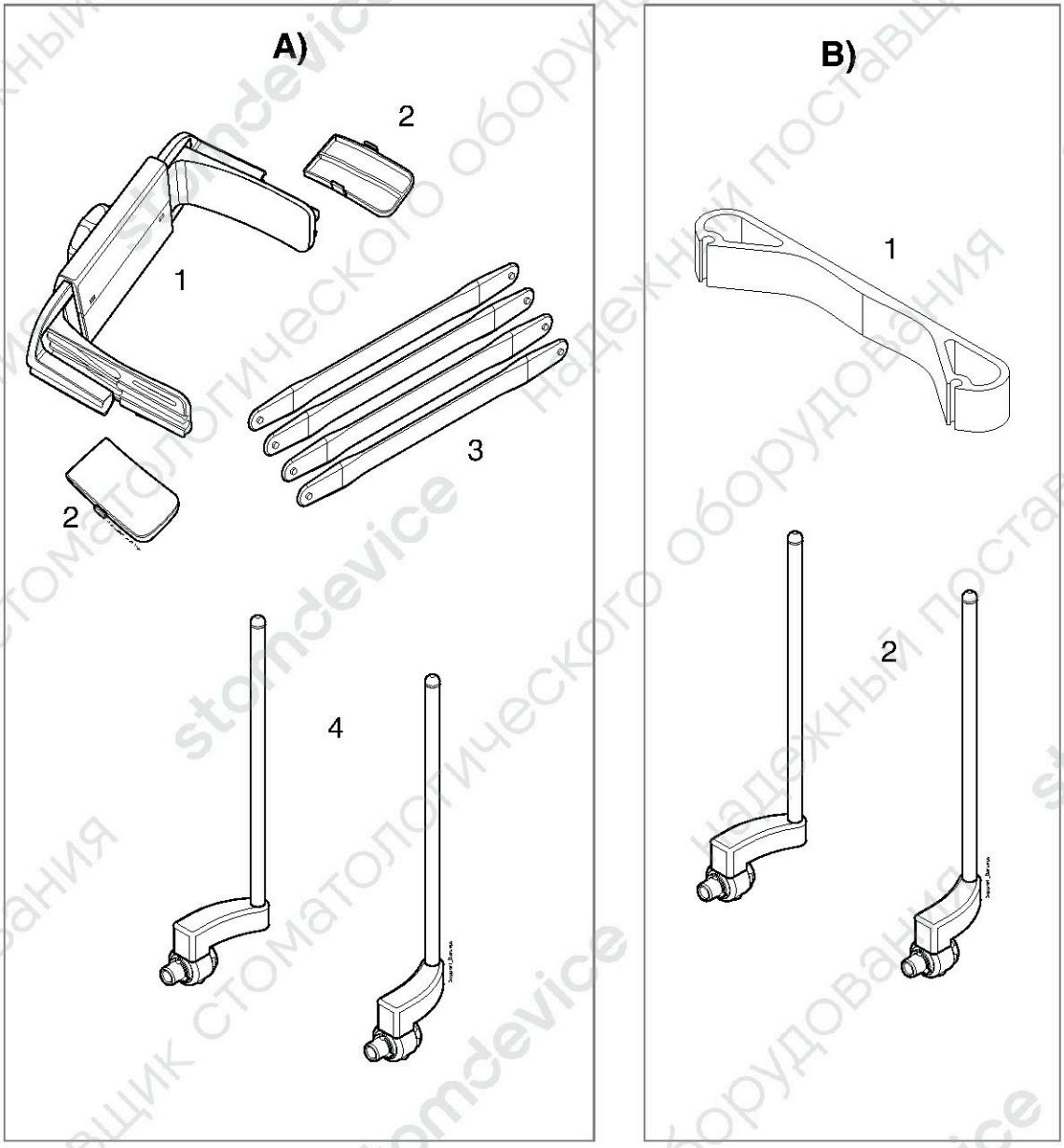
If you remove your thumb from the exposure button before the exposure cycle is completed radiation will be interrupted, the C-arm will stop moving and a help message will appear on the control panel display. Guide the patient away from the X-ray unit. Then clear the help message by touching *OK*.

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5.4 Patient supports

5.4.1 Head supports (A or B)



1 Adjustable head support
2 Temple pads for children
3 Fastening straps
4 Support bars

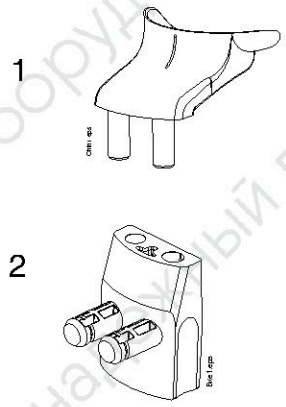
1. Head band 25
2. Support bars

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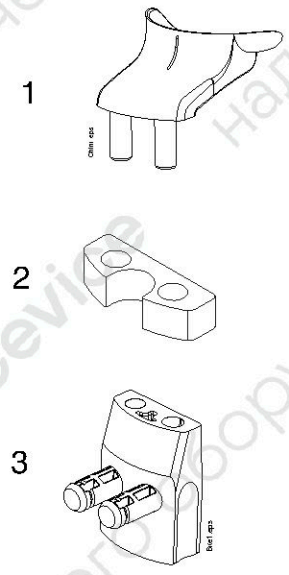
5.4.2 Chin supports

X-ray units with 3D sensor



1 Chin cup
2 Adapter

X-ray units with ProFace sensor



1 Chin cup
2 Spacer
3 Adapter

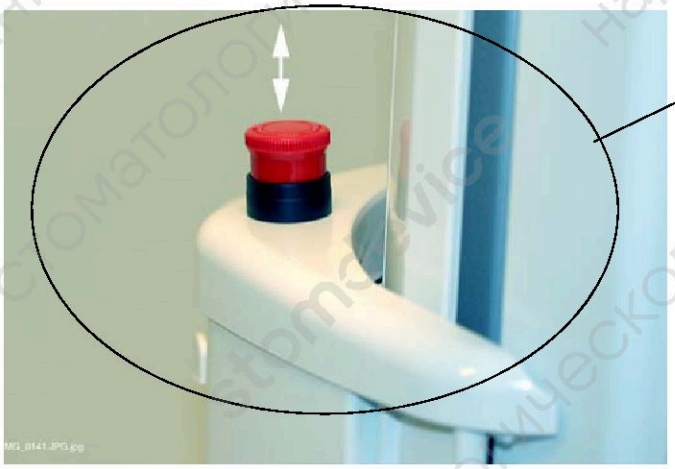
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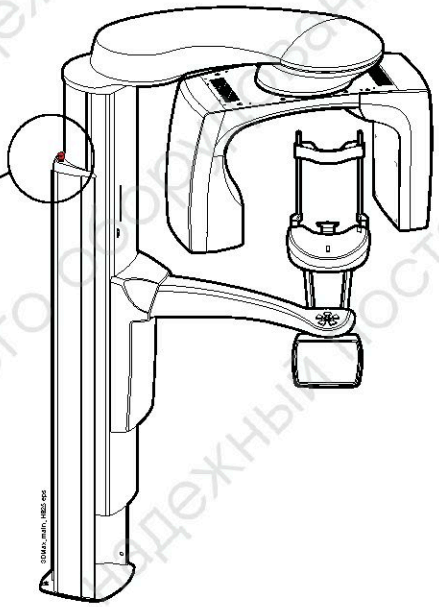
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5.5 Emergency stop button

The emergency stop button is located on the top of the stationary column. Press the button to stop the X-ray unit operating in an emergency. When the emergency stop button is pressed down, all movements of the X-ray unit are blocked and the unit will not generate radiation. The up / down movement will stop within a distance of 10 mm (0.4 in.).

A help message will appear on the control panel display. Guide the patient away from the X-ray unit. Then release the emergency stop button. The X-ray unit will automatically restart.

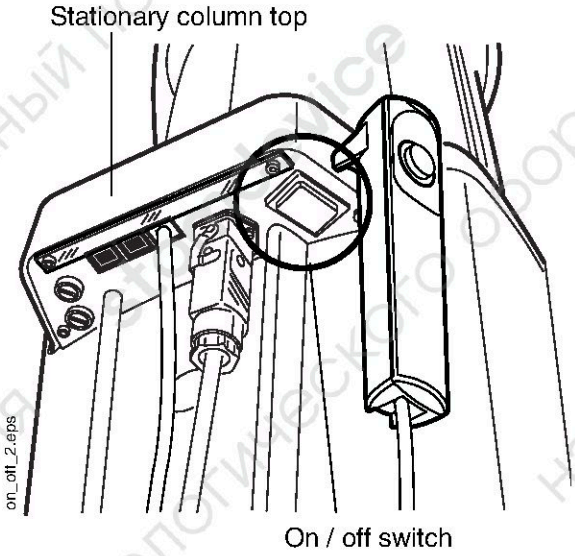




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6 SWITCHING X-RAY UNIT ON



The on / off switch is located on the underside of the stationary column top. When you switch the X-ray unit on the main display will be shown on the control panel and the unit will carry out a self-test which will last a few seconds.

The X-ray unit is then ready for use.

NOTE **To prolong the lifetime of the Planmeca ProMax 3D Max X-ray unit, always switch the X-ray unit off when it is not in active use.**

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7 PROGRAMS

7.1 3D Dental

7.1.1 Volume sizes for children

Program type	Ø42 mm	Ø85 mm	Ø110 mm	Ø230 mm
TOOTH	Ø42 x H50 mm			
TEETH		Ø85 x H50 mm Ø85 x H75 mm		
JAW			Ø110 x H50 mm Ø110 x H75 mm	
FACE		Ø85 x H110 mm	Ø110 x H110 mm Ø110 x H136 mm	
SKULL				Ø230 x H160 mm Ø230 x H260 mm
HORIZONTAL PAIR	2 x Ø42 x H50 mm			

7.1.2 Volume sizes for adults

Program type	Ø50 mm	Ø100 mm	Ø130 mm	Ø230 mm
TOOTH	Ø50 x H55 mm			
TEETH		Ø100 x H55 mm Ø100 x H90 mm		
JAW			Ø130 x H55 mm Ø130 x H90 mm	
FACE		Ø100 x H130 mm	Ø130 x H130 mm Ø130 x H160 mm	
SKULL				Ø230 x H160 mm Ø230 x H260 mm
HORIZONTAL PAIR	2 x Ø50 x H55 mm			

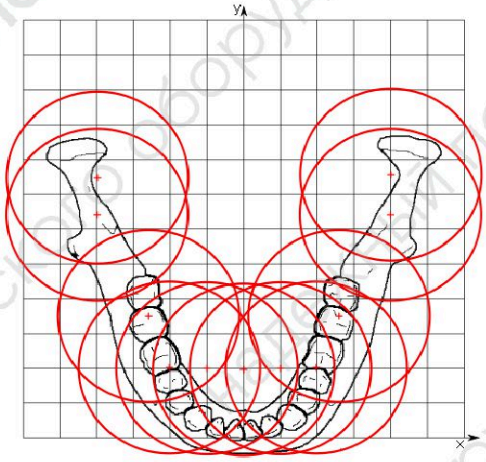
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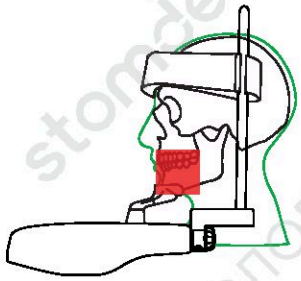
7.1.3 Preprogrammed target positions for average jaw size

Program type *Tooth*

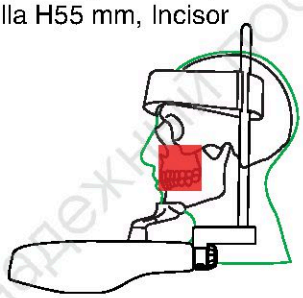
Tooth Ø50 mm



Example:
Adult, Tooth, Ø50 mm,
Mandible H55 mm, Incisor



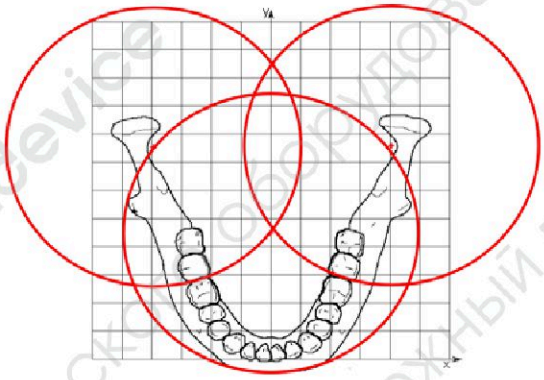
Example:
Adult, Tooth, Ø50 mm,
Maxilla H55 mm, Incisor



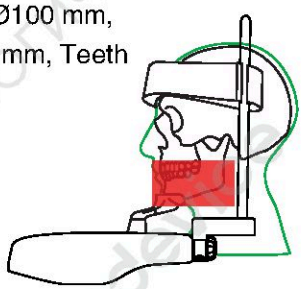
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Program type *Teeth*

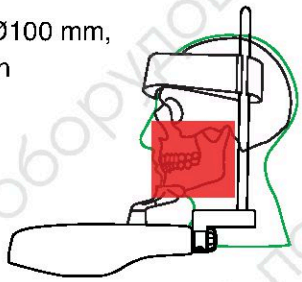
Teeth Ø100 mm



Example:
Adult, Teeth, Ø100 mm,
Mandible H55 mm, Teeth

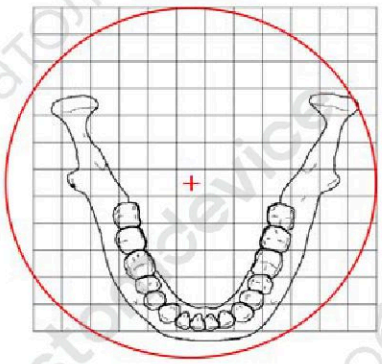


Example:
Adult, Teeth, Ø100 mm,
H90 mm, Teeth

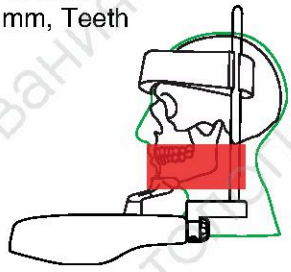


Program type *Jaw*

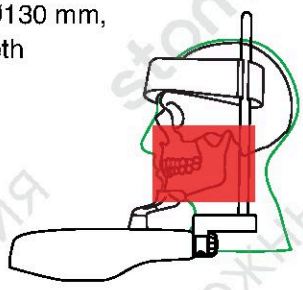
Jaw Ø130 mm



Example:
Adult, Jaw, Ø130 mm,
Mandible H55 mm, Teeth



Example:
Adult, Jaw, Ø130 mm,
H90 mm, Teeth

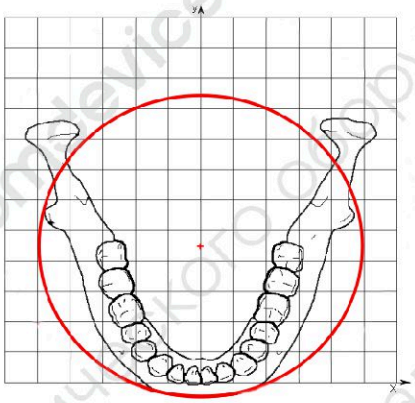


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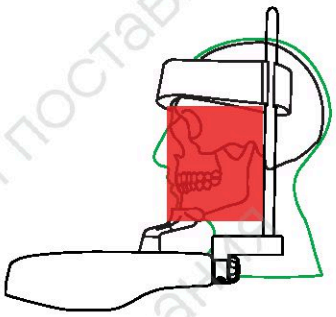
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Program type *Face*

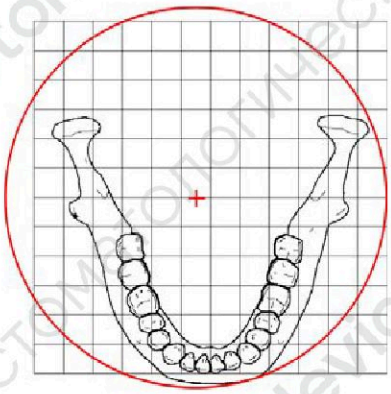
Face Ø100 mm



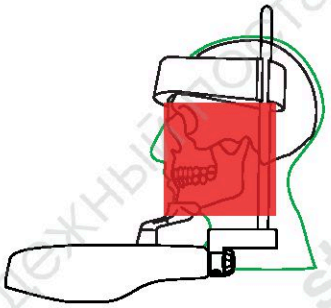
Example:
Adult, Face, Ø100 mm, H130 mm



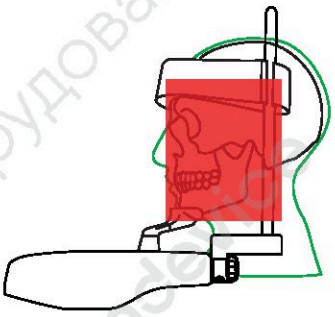
Face Ø130 mm



Example:
Adult, Face, Ø130 mm, H130 mm



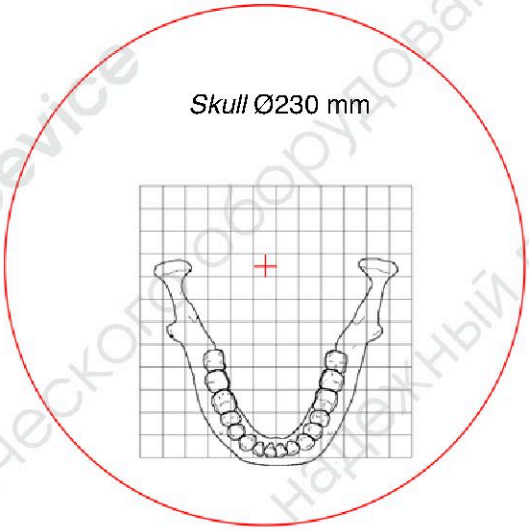
Example:
Adult, Face, Ø130 mm, H160 mm



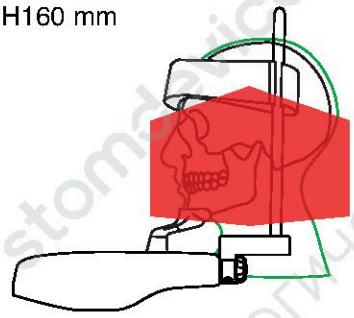
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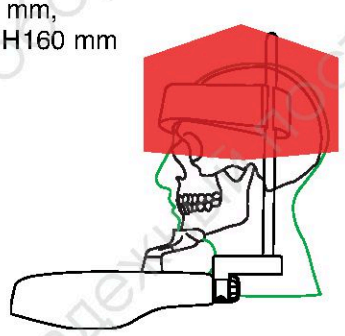
Program type *Skull*



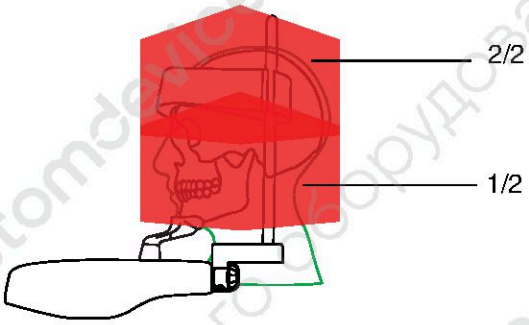
Example:
Skull, Ø230 mm,
Lower skull H160 mm



Example:
Skull, Ø230 mm,
Upper skull H160 mm



Example:
Skull, Ø230 mm,
H260 mm



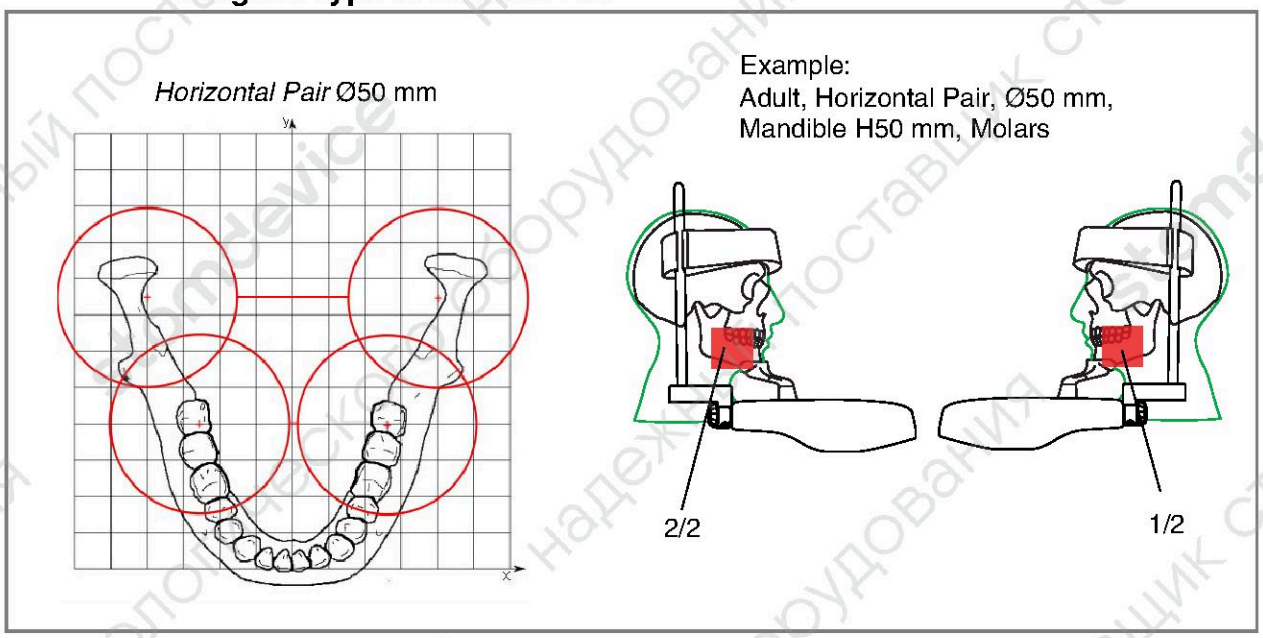
Program type *Skull H260 mm* produces images which consist of two cylindrical volumes. The volumes are positioned on top of each other with a slight overlap in the middle.

The imaging procedure is carried out in two stages. The lower volume is imaged first (1/2) and the upper volume second (2/2). The C-arm is automatically moved upwards between the volumes.

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Program type *Horizontal Pair*



Program type *Horizontal Pair* takes two symmetrical images: one from the left (1/2) and one from the right (2/2) side of the patient. The imaging procedure is carried out in two stages.

7.2 3D ENT (Ear, Nose and Throat)

7.2.1 Volume sizes for children

Program type	Ø42 mm	Ø85 mm	Ø110 mm
SINUS		Ø100 x H90 mm Ø100 x H130 mm	Ø130 x H130 mm Ø130 x H160 mm
MIDDLE EAR	Ø42 x H50 mm		
MIDDLE EAR PAIR	2 x Ø42 x H50 mm		
TEMPORAL BONE		Ø85 x H75 mm	
TEMPORAL BONE PAIR		2 x Ø85 x H75 mm	
VERTEBRAE		Ø85 x H75 mm Ø85 x H110 mm	
AIRWAYS		Ø85 x H75 mm Ø85 x H110 mm	Ø110 x H110 mm Ø110 x H136 mm

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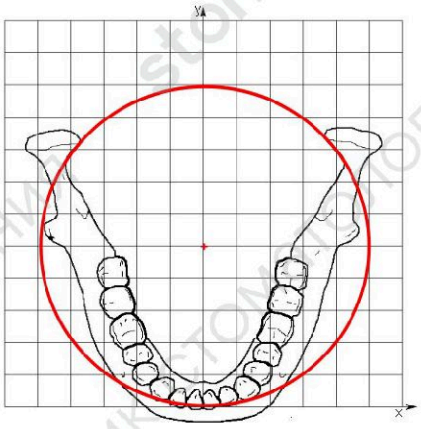
7.2.2 Volume sizes for adults

Program type	Ø50 mm	Ø100 mm	Ø130 mm
SINUS		Ø100 x H90 mm Ø100 x H130 mm	Ø130 x H130 mm Ø130 x H160 mm
MIDDLE EAR	Ø50 x H55 mm		
MIDDLE EAR PAIR	2 x Ø50 x H55 mm		
TEMPORAL BONE		Ø100 x H90 mm	
TEMPORAL BONE PAIR		2 x Ø100 x H90 mm	
VERTEBRAE		Ø100 x H90 mm Ø100 x H130 mm	
AIRWAYS		Ø100 x H90 mm Ø100 x H130 mm	Ø130 x H130 mm Ø130 x H160 mm

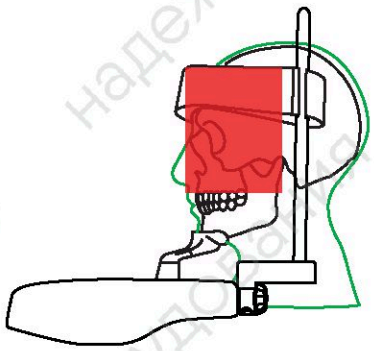
7.2.3 Preprogrammed target positions for average jaw size

Program type *Sinus*

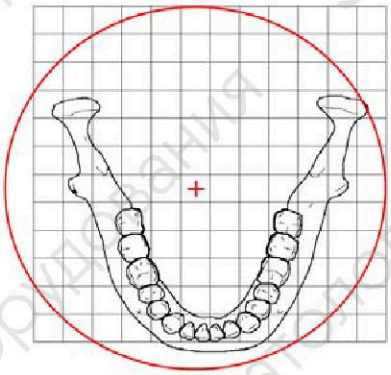
Sinus Ø100 mm



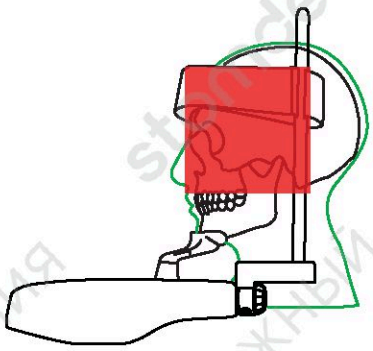
Example:
Adult, Sinus, Ø100 mm, H130 mm



Sinus Ø130 mm



Example:
Adult, Sinus, Ø130 mm, H130 mm

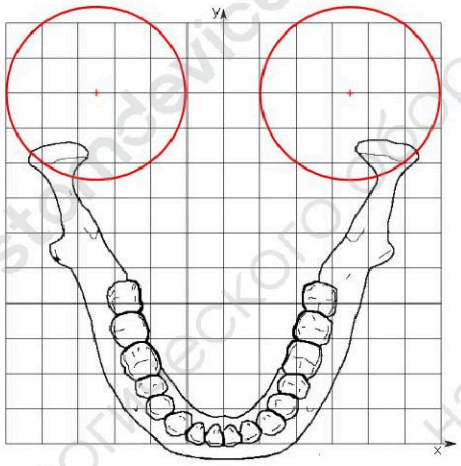


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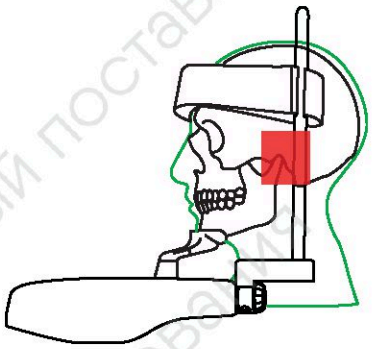
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Program type *Middle Ear*

Middle Ear Ø50 mm

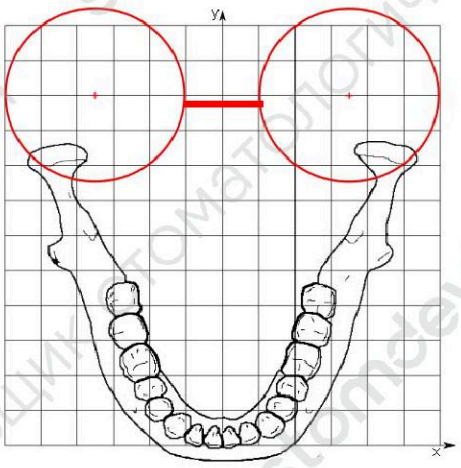


Example:
Adult, Middle Ear, Ø50 mm, H55 mm, Left

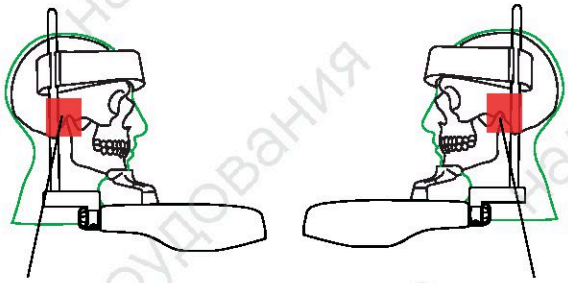


Program type *Middle Ear Pair*

Middle Ear Pair Ø50 mm



Example:
Adult, Middle Ear Pair, Ø50 mm, H55 mm



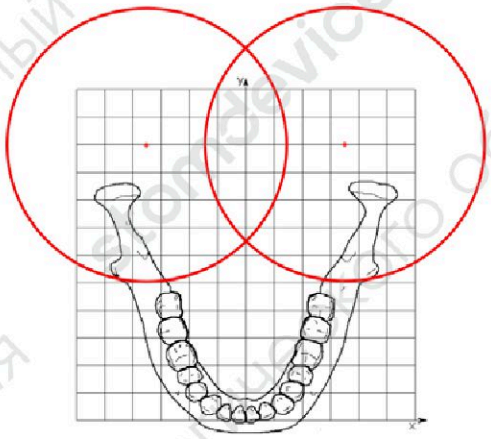
Program type *Middle Ear Pair* takes two symmetrical images: one from the left (1/2) and one from the right (2/2) side of the patient. The imaging procedure is carried out in two stages.

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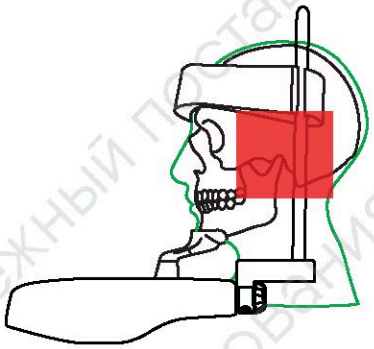
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Program type *Temporal Bone*

Temporal Bone Ø100 mm

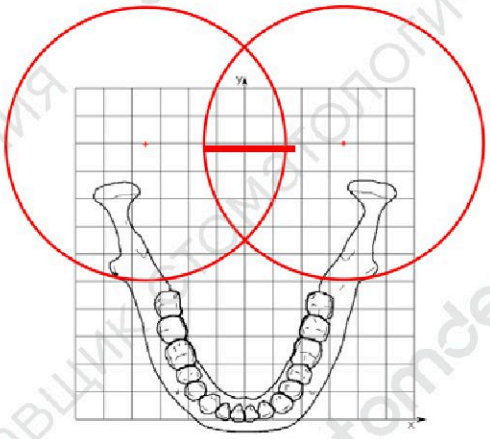


Example:
Adult, Temporal Bone, Ø100 mm, H90 mm, Left

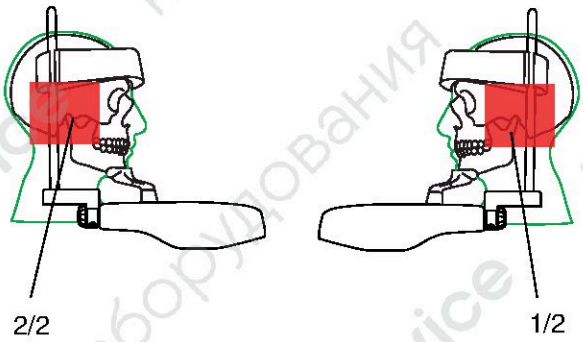


Program type *Temporal Bone Pair*

Temporal Bone Pair Ø100 mm



Example:
Adult, Temporal Bone Pair, Ø100 mm, H90 mm



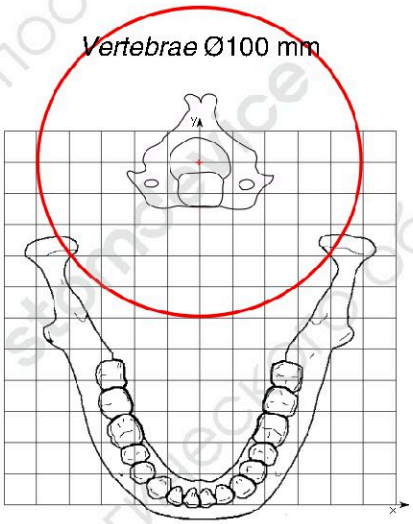
Program type *Temporal Bone Pair* takes two symmetrical images: one from the left (1/2) and one from the right (2/2) side of the patient. The imaging procedure is carried out in two stages.

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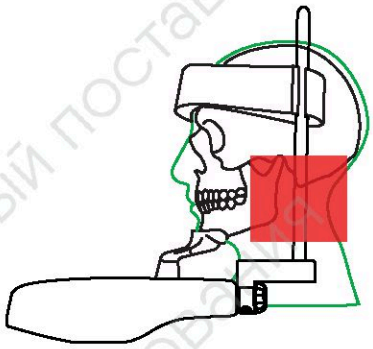
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Program type *Vertebrae*

Vertebrae Ø100 mm

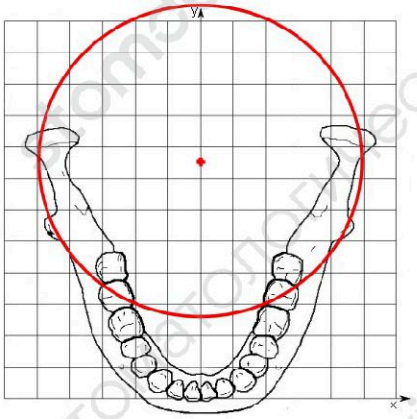


Example:
Adult, Vertebrae, Ø100 mm, H90 mm

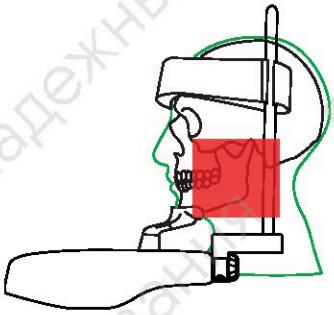


Program type *Airways*

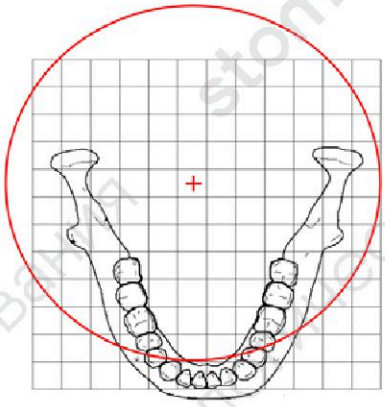
Airways Ø100 mm



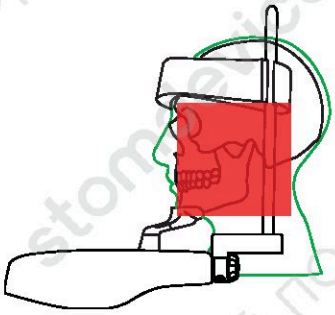
Example:
Adult, Airways, Ø100 mm, H90 mm



Airways Ø130 mm



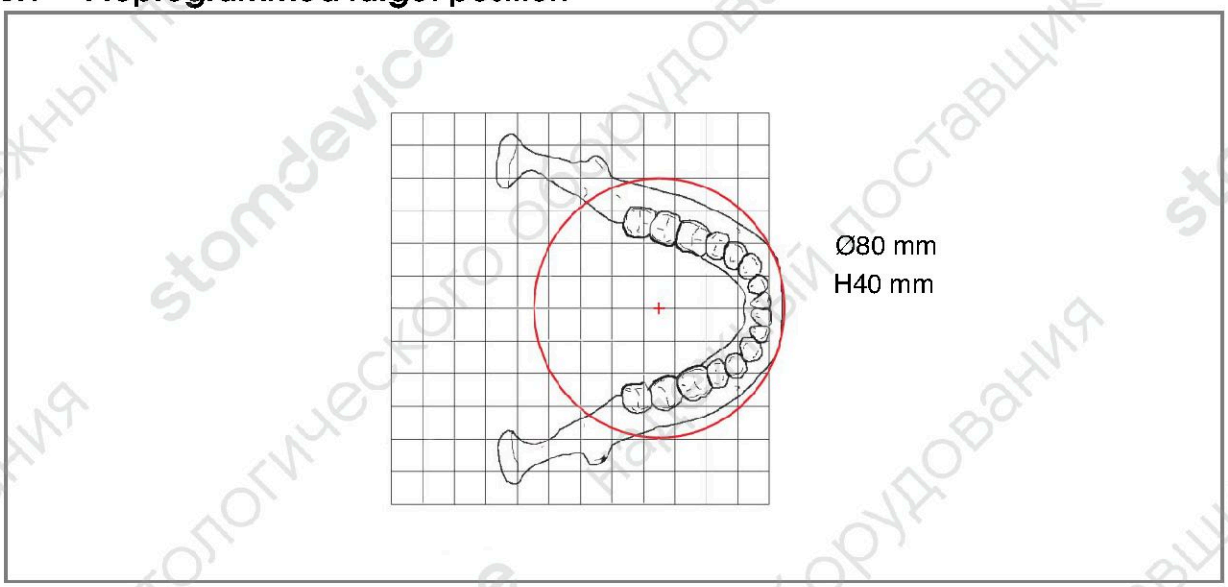
Example:
Adult, Airways, Ø130 mm, H130 mm



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7.3 3D Model

7.3.1 Preprogrammed target position



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8 CONTROL PANEL

8.1 General about control panel

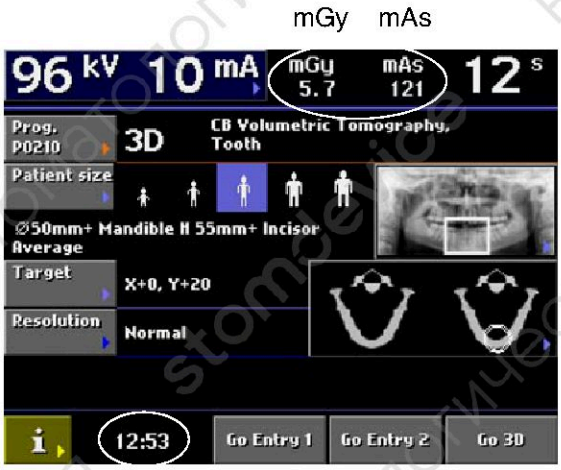


NOTE **Never allow patients to touch the display when they are positioned in the X-ray unit. Touching the display during exposure will stop the imaging process.**

To make a selection on the control panel, simply touch a text field or an icon with your finger or a soft stylus. For example, to select a program touch the *Prog.* field. You will hear a signal tone when a field or an icon is activated.

NOTE **Do not use sharp objects to operate the control panel.**

Only the text fields and icons on the display are touch-sensitive, and touching areas outside them will not activate an action.



You can set the X-ray unit so that the current time will be shown at the bottom of the display. You can choose in which format (e.g. 12:53) it will be shown. Refer to section “Date & time (i210)” on page 33 for more information.

The estimated milliampere-second (mAs) value will be shown at the top of the display for the exposure you are going to take.

You can set the X-ray unit so that the estimated radiation dose will be shown on the display in milligray (mGy). Refer to section “Visual adjustments (i250)” on page 36 for more information.

You can set the X-ray unit so that also the actual radiation dose will be shown in a pop-up window after each exposure. The value shown on the display indicates the highest radiation dose the patient was exposed to during the exposure. Refer to section “Behavioural preferences (i230)” on page 35 for more information. Note that you will have to accept the pop-up message by touching OK.

The display will automatically switch to stand-by mode if you do not touch the display or the exposure button for more than thirty minutes. In stand-by mode the green ready lights on the exposure button and control panel indicate that the X-ray unit is switched on even though the display is dark. The display will switch on as soon as you touch it again.

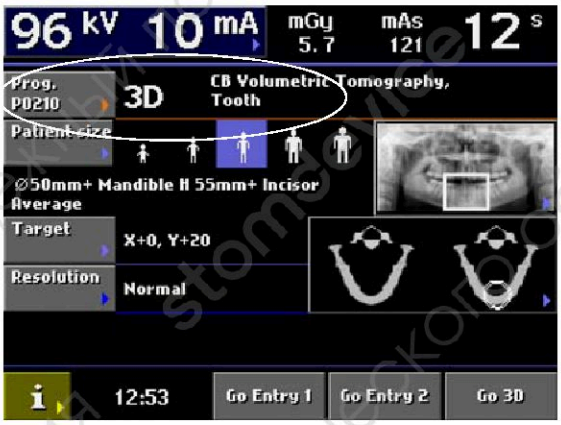
NOTE **The control panel display can be adjusted to respond to your individual finger touch. Refer to section “Visual adjustments (i250)” on page 36 for more information.**

NOTE **You can switch practice mode on if you wish to practice or demonstrate the functions of the X-ray unit without radiation. Refer to section “Special operation mode (i410)” on page 41 for more information.**

NOTE **The exposure time indicated on the display before an exposure is taken is an estimated value. The real value is shown after the exposure. Variation in exposure time is caused by mA automation.**

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8.2 Selecting program type



To select the program type touch the *Prog.* field on the main display. The main display is the display that is shown when the X-ray unit is switched on.

The *Select program type* display appears. Select the program you wish to use.



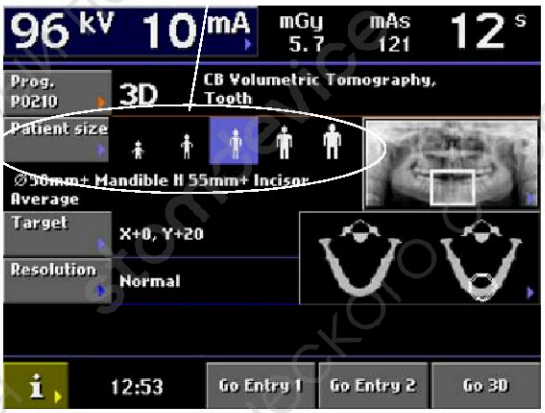
Refer to section 7 “PROGRAMS” on page 14 to view the preprogrammed target areas in each program.

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8.3 Selecting patient size

Patient size field



From left to right: Child
Adolescent
Small adult
Average-sized adult
Large adult

Select the patient size by touching the corresponding size symbol in the *Patient size* field on the main display.

Select the smallest patient size symbol for a child. Selecting the smallest patient size symbol will automatically reduce the volume size (in most programs) and patient dose.

Select the second patient size symbol for an adolescent. Select the third patient size symbol for a small adult. Select the fourth patient size symbol for an average-sized adult. Select the biggest patient size symbol for a large adult.

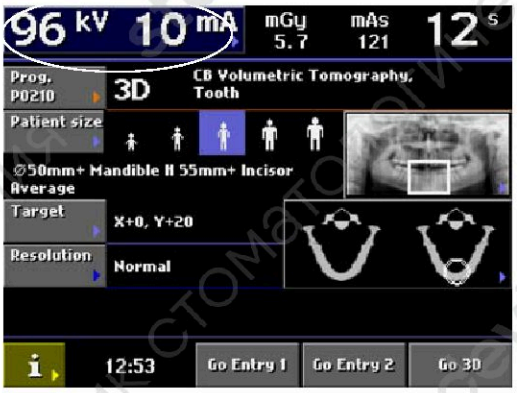
The selected patient size will be highlighted.

NOTE The exposure values will automatically change to correspond with the selected patient size and image resolution.

NOTE The setting in the jaw size field will automatically change to correspond with the selected patient size.

8.4 Selecting kilovolt and milliampere values

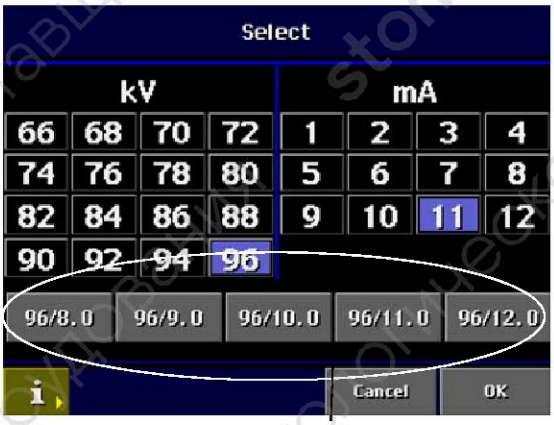
kV / mA field



NOTE The exposure values will automatically change to correspond with the selected patient size and image resolution.

The preset exposure values are average values and they are only meant to guide the user.

To change the preset exposure values, touch the *kV / mA* field on the main display.



Quick buttons

The *Select kV / mA* display appears. Select the required exposure values by touching the kV and mA values. The selected values will be highlighted.

Confirm your selection and return to the main display by touching *OK*.

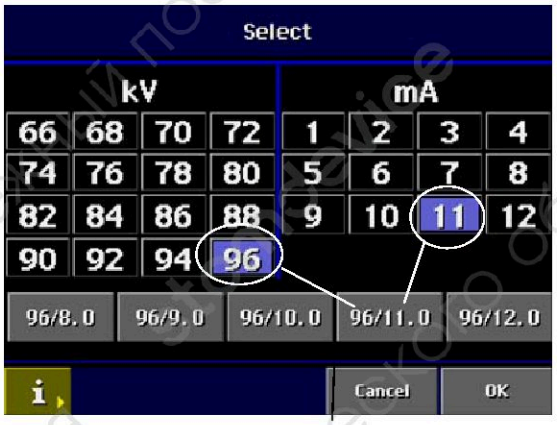
The preset exposure values for each patient size are shown in the quick buttons at the bottom of the display.

NOTE Selecting kV and mA values manually will override the automatic quick button setting.

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8.4.1 Changing exposure values for quick buttons



Quick buttons

The quick button exposure values have been preset at the factory. If needed, the preset values can be changed by the user.

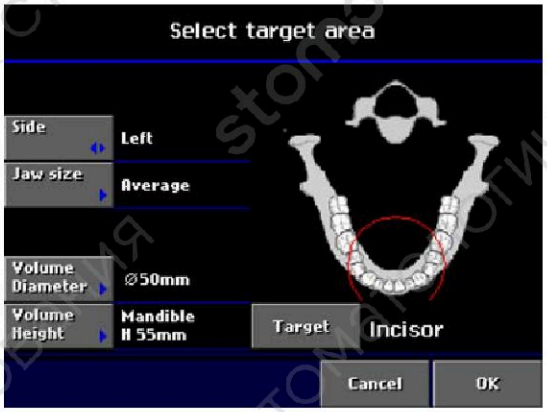
To change the preset values of a quick button, first select the required kV and mA values by touching the corresponding fields on the parameter display and then touch and hold the desired quick button at the bottom of the display until you hear a signal tone. The quick button will now show the new exposure values.

The quick button values can be set separately for each image resolution.

NOTE **To view the preset exposure values, refer to the tables in chapter 11 "3D PATIENT EXPOSURE" on page 47.**

Confirm your selection and return to the main display by touching *OK*.

8.5 Selecting target area



When you have selected the program type, the *Select target area* display will appear.

On the *Select target area* display, specify the image volume by selecting the jaw side, jaw size, volume diameter, volume height and target area.

The selected diameter will be marked with a red circle on the image. The selected height will be marked with a white square (or rectangle).

Side (if selectable)



Select the right or left side by touching the *Side* field.

NOTE **The side selection can also be made by simply touching the image on that side.**

Jaw size

NOTE **The positions of the preprogrammed target areas depend on the selected jaw size.**

NOTE **The setting in the jaw size field will automatically change to correspond with the selected patient size.**

Selecting the smallest patient size will automatically change the jaw size setting to *Narrow*.

Selecting any of the three patient sizes in the middle will automatically change the jaw size setting to *Average*.

Selecting the largest patient size will automatically change the jaw size setting to *Wide*.

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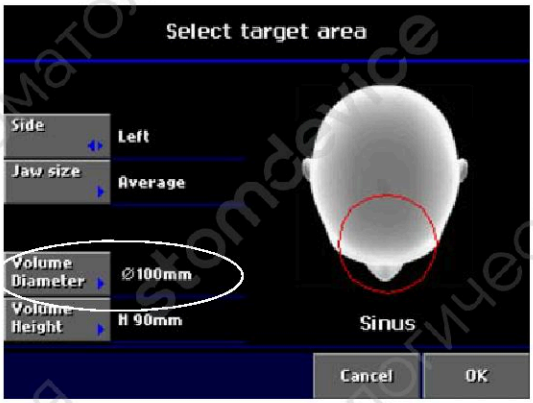


If necessary, you can select the jaw size manually by touching the *Jaw size* field.



The *Select jaw size* display appears. Select the required jaw size by tapping the corresponding icon on the display. The selected jaw icon will be highlighted. Confirm your selection and return to the previous display by touching *OK*.

Volume diameter (if selectable)

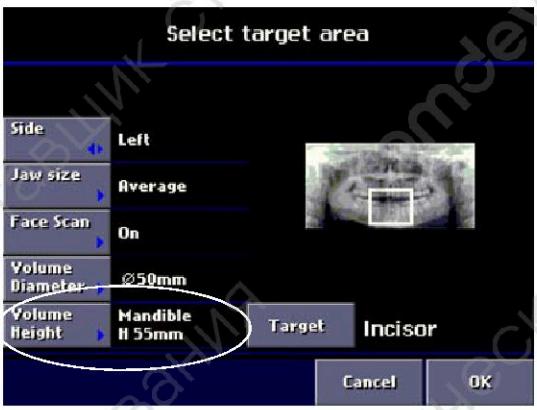


In program type 3D *Dental / Face* the volume diameter can be set to 100 or 130 mm (child 85 or 110 mm).

In program type 3D *ENT/ Sinus* the volume diameter can be set to 100 or 130 mm (child & adult). In program type 3D *ENT/ Airways* the volume diameter can be set to 100 or 130 mm (child 85 or 110 mm).

The size of the red circle on the image will change accordingly.

Volume height (if selectable)



***3D Dental*:**

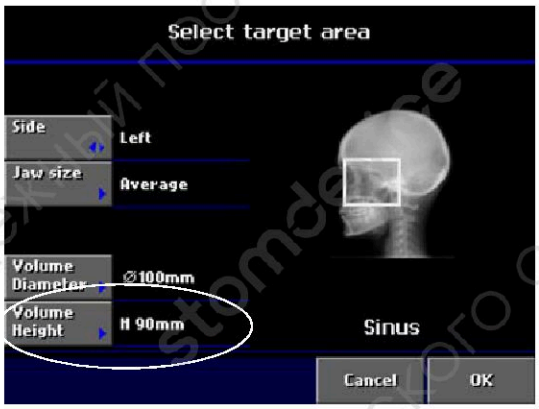
In program types *Tooth* and *Horizontal Pair* the volume height can be set to:
- *Mandible* (child 50 / adult 55 mm)
- *Maxilla* (child 50 / adult 55 mm).

In program types *Teeth* and *Jaw* the volume height can be set to:
- *Mandible* (child 50 / adult 55 mm)
- *Maxilla* (child 50 / adult 55 mm
- *75 / 90 mm* (child / adult).

In program type *Face* the volume height can be set to:
- *110 / 130 mm* (child / adult)
- *136 / 160 mm* (child / adult).

In program type *Skull* the volume height can be set to:
- *Lower* (child & adult 160 mm)
- *Upper* (child & adult 160 mm)
- *260 mm* (child & adult).

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3D ENT:

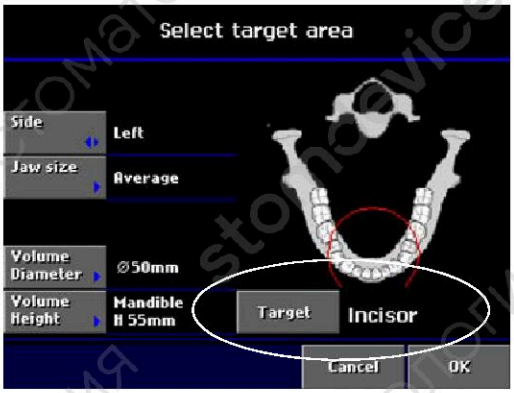
In program type *Sinus* the volume height can be set to:
- *90 mm* (child & adult)
- *130 mm* (child & adult)
- *160 mm* (child & adult).

In program type *Vertebrae* the volume height can be set to:
- *75 / 90 mm* (child / adult)
- *110 / 130 mm* (child / adult).

In program type *Airways* the volume height can be set to:
- *75 / 90 mm* (child / adult)
- *110 / 130 mm* (child / adult)
- *136 / 160 mm* (child / adult).

The size of the white square (or rectangle) on the image will change accordingly.

Target (if selectable)



Select the target area by touching the *Target* field.

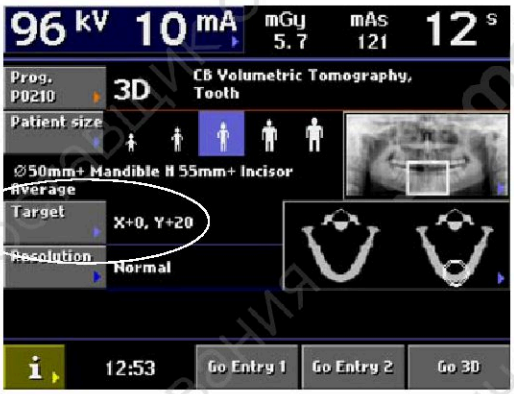
Touching the *Target* field repeatedly will cycle you through the preprogrammed target areas. The location of the red circle on the image will change accordingly.

The target area can also be selected by simply touching the jaw icon on the corresponding location.

Refer to section 7 “PROGRAMS” on page 14 to view the preprogrammed target areas for each program type.

Confirm your selections and return to the main display by touching *OK*.

8.6 Selecting target coordinates (volumes with Ø100 mm or less)



Touch the *Target* field on the main display to fine-adjust the position of the selected target area. A display appears where you can adjust the x / y coordinates by touching the left / right arrows. The selected coordinates will be shown on the display.

When you select a large volume diameter (Ø110 mm or more) the *Target* field shows the position of the y coordinate.

Touching either of the jaw icons on the right side of the main display will take you to the *Select target area* display where you can change any settings for the target area. See section 8.5 “Selecting target area” on page 28 for more information.

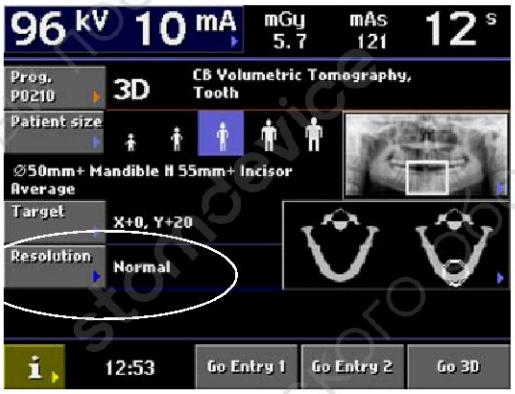
NOTE **The position of the target area can also be adjusted by using the positioning joystick.**

NOTE **The y coordinate can also be adjusted by moving the thumb wheel that is located on the underside of the patient support table.**

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8.7 Selecting image resolution



Touch the *Resolution* field to select the image resolution. Note that the available options depend on the selected program type.

Selecting normal image resolution will create 3D images with a smaller file size. Selecting high image resolution will create sharper 3D images which require more storage space.

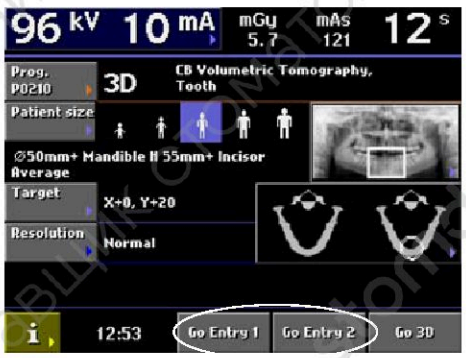
Selecting *HD* (High Definition) will provide better image quality, particularly when imaging small targets (e.g. ear bones).

Selecting *Low dose* will reduce the exposure values and minimize the radiation dose to the patient.

NOTE **The exposure values will automatically change to correspond with the selected patient size and image resolution.**

Resolution	Exposure time	Exposure values	Voxel size	Image frames
High	Medium	High	Typically 0.10 mm	
HD (High Definition)	Long	High	Typically 0.15 mm	More frames
Normal	Medium	High	Typically 0.20 mm	
Low dose	Short	Low	Typically 0.40 / 0.60 mm	Less frames

8.8 Selecting patient entry position



The X-ray unit offers two patient entry positions: *Entry 1* and *Entry 2*. You can use either of them according to your individual preference.

Selecting *Go Entry 1* will move the C-arm to the back, away from the patient positioning area. This full view position allows you to monitor and adjust the patient's position freely from all directions.

Selecting *Go Entry 2* will position the C-arm around the patient support. This is the traditional closed patient entry position.

NOTE **If needed, the *Go Entry 1* function can be disabled as described in section "Behavioural preferences (i230)" on page 35. This might be necessary if there is no space for the C-arm to move back.**

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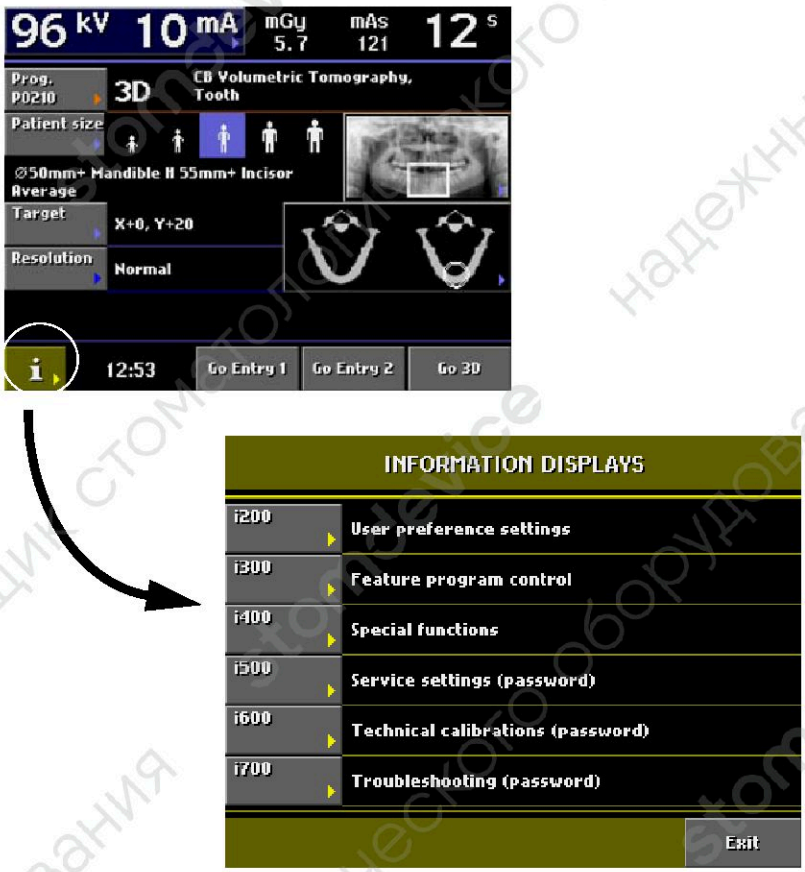
9 INFORMATION DISPLAYS

CAUTION ***Some of the settings can be used to alter the operation of the X-ray unit. Never use functions that you are not familiar with.***

NOTE **The contents of the information displays depend on the unit configuration. The displays shown here are from an X-ray unit featuring all currently available exposure programs.**

The control panel has a number of additional functions for special requirements. Some of the functions (*User preference settings, Feature program control* and *Special functions)* can be entered by the user, and others (*Service settings, Technical calibrations* and *Troubleshooting*) are for the use of service personnel only and access to these settings requires a password. This section describes the functions that can be entered by the user.

To get to the list of the *Information displays*, first touch the **i** field. The display shown below appears.



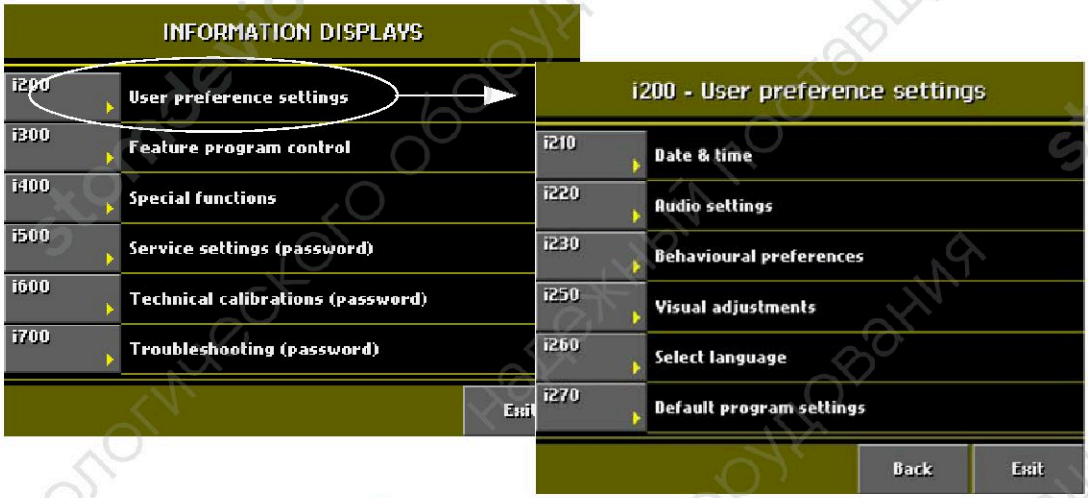
You can return to the main display by touching the *Exit* field.

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9.1 User preference settings (i200)

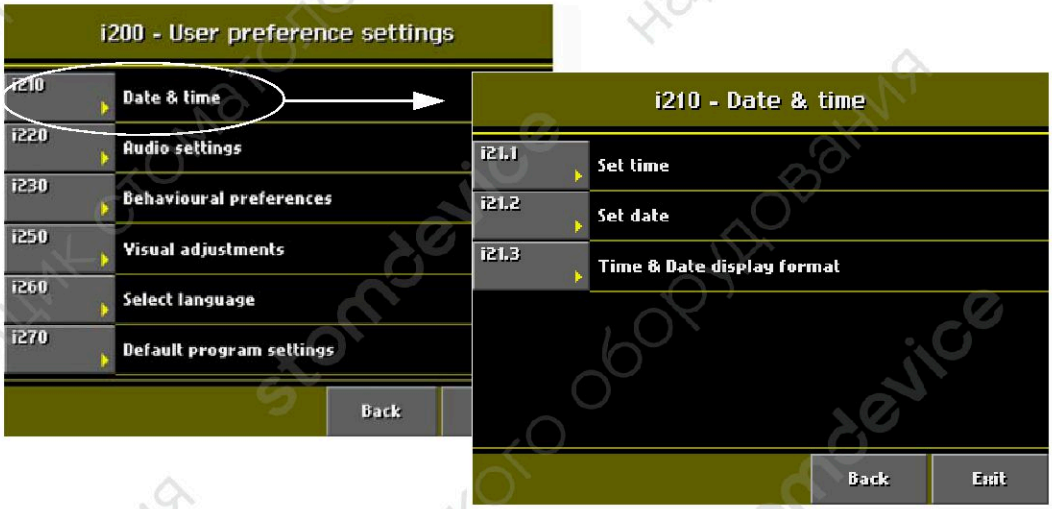
Touch *User preference settings* (i200) on *Information Displays.* The display shown below appears.



Date & time (i210)

NOTE **The time is set to the local time at the factory. Change the time setting to show the correct time before you start using the X-ray unit.**

To set the time select *Set time* on the *Date & time* display (i210). If you want to change the date, select *Set date*. The option *Date & time display format* allows you to select the format you wish to use for displaying date and time.



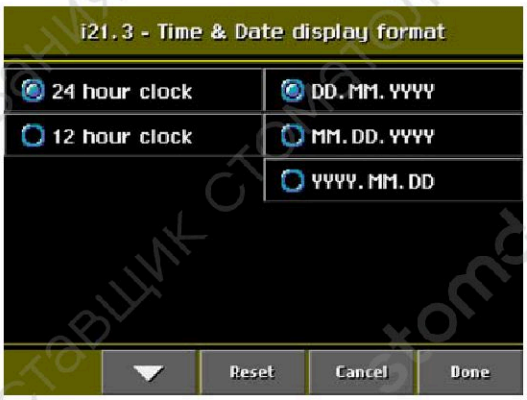
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- **Set time (i21.1)**
  Set the correct time with the *Hour* and *Minutes* arrows. Save the new time by touching the *Done* field or exit the display without saving changes by touching the *Cancel* field.



- **Set date (i21.2)**
  Set the correct date with the *Year, Month* and *Day* arrows. Save the new date by touching the *Done* field or exit the display without saving changes by touching the *Cancel* field.



- **Time & Date display format (i21.3)**
  You can choose between 12 and 24 hour system for the time display. The date can be displayed in following formats: DD.MM.YYYY, MM.DD.YYYY or YYYY.MM.DD.
  Select the time and date format you wish to use. The selected options will be marked with a blue dot. Confirm your selections by touching *Done* or exit the display without saving changes by touching the *Cancel* field.

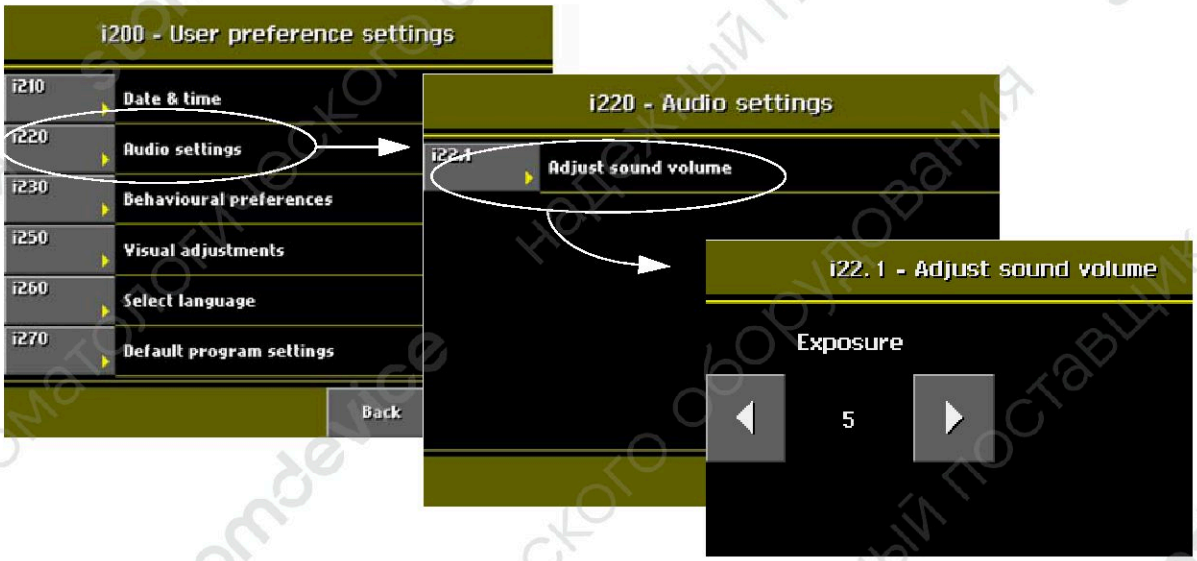
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Audio settings (i220)

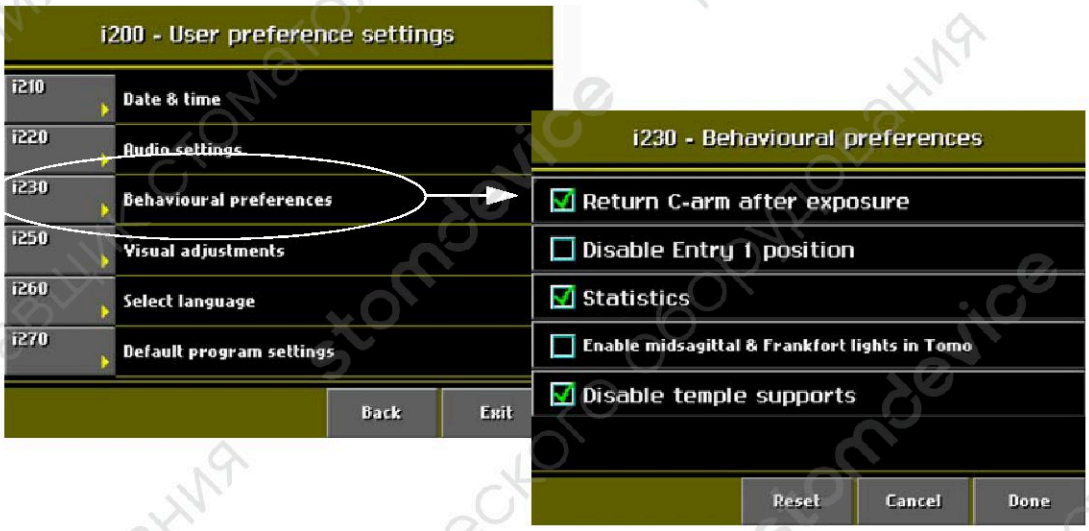
Select *Audio settings* (i220) on the *User preference settings* (i200) display to adjust the volume of the radiation warning signal. On the *Adjust sound volume* (i22.1) display, touch the arrows to adjust the volume between 1 (quiet) and 255 (loud).

Save the new setting by touching the *Done* field or exit the display without saving changes by touching the *Cancel* field.



Behavioural preferences (i230)

Select *Behavioural preferences* (i230) on the *User preference settings* (i200) display.



- **Return C-arm after exposure**
  Touch the *Return C-arm after exposure* field to set the X-ray unit so that the C-arm will automatically return to the starting position at the end of an exposure cycle.
  Note, however, that the automatic function works only if the exposure button is pressed and held down for the entire duration of the exposure.

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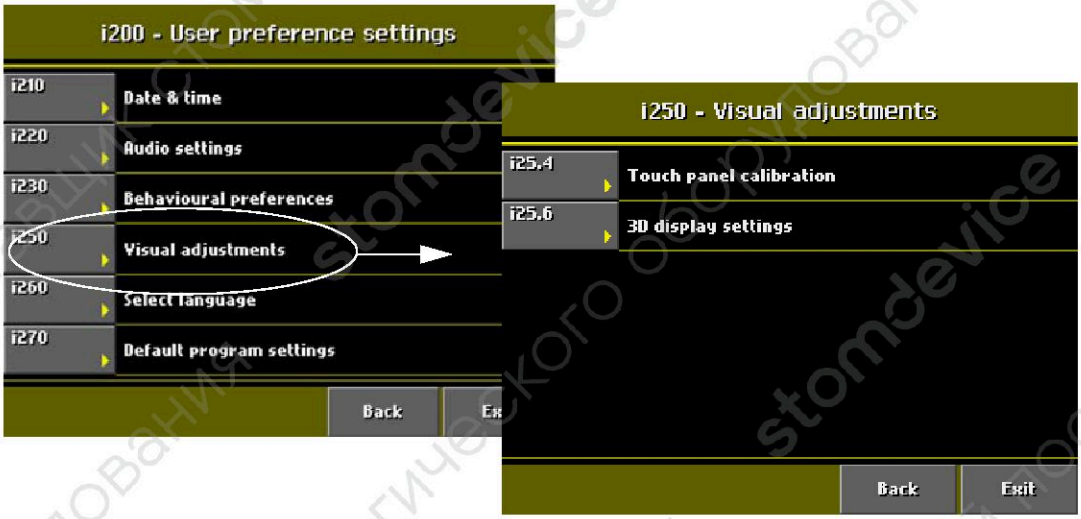
- **Disable Entry 1 position**
  Select this option if you need to disable Entry 1 position. This might be necessary if there is no space for the C-arm to move back.
- **Statistics**
  Touch the *Statistics* field to set the X-ray unit so that the radiation dose will be shown in a pop-up window after each exposure. The program measures the highest radiation dose the patient is exposed to during exposure. Note that if the patient does not cover the whole exposure area (e.g. *Skull* program) the real patient dose is lower.
  Radiation dose is indicated in terms of DAP (Dose Area Product). The measurement unit for DAP is mGy*cm².
- **Enable midsagittal & Frankfort lights in Tomo**
  Select this option to set the X-ray unit so that the midsagittal and Frankfort lights come on when the patient positioning lights are switched on.
- **Disable temple supports**
  Select this option to disable the temple supports.

The selected option(s) will be marked with a green check mark. To deselect a function, touch the field again. The green check mark will disappear.

Confirm your selection(s) by touching *Done*. Touching the *Cancel* field will bring you back to the *User preference settings* (i200) display.

Visual adjustments (i250)

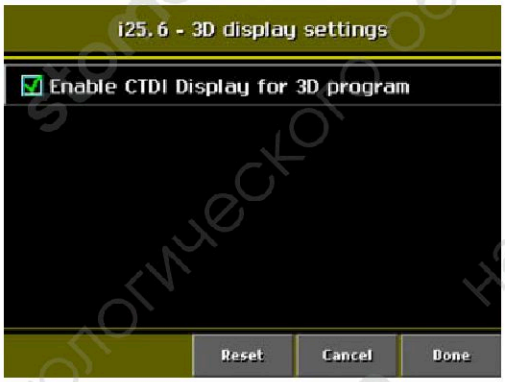
Select *Visual adjustments* (i250) on the *User preference settings* (i200) display to calibrate the touch panel or change 3D display settings.



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- **Touch panel calibration (i25.4)**
  Select *Touch panel calibration* to calibrate the touch panel. Touch panel calibration adjusts the panel to respond to the pressure level of your finger touch.
  A black calibration display will appear. Touch the display to "teach" the panel the pressure of your individual finger touch and to make it react rapidly to this pressure level. Note that you have to touch the display within five seconds as the calibration procedure will be cancelled once this time limit has expired.
- **3D display settings (i25.6)**
  Select the option *Enable CTDI Display for 3D program* to set the X-ray unit so that the estimated milligray (mGy) value will be shown at the top of the display for the exposure you are going to take.



The selected option(s) will be marked with a green check mark. To deselect a function, touch the field again. The green check mark will disappear.

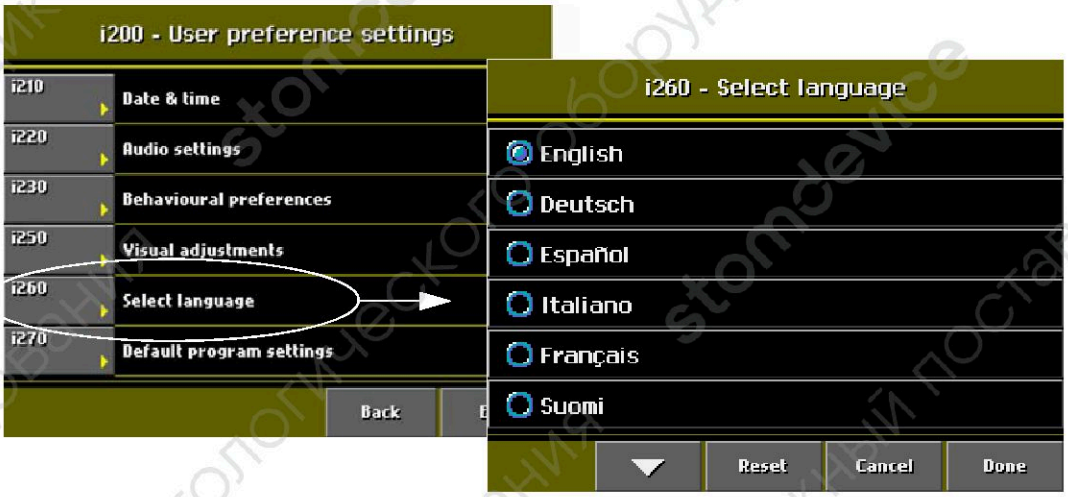
Confirm your selection(s) by touching *Done*. Touching the *Cancel* field will bring you back to the *Visual adjustments* (i250) display.

Select language (i260)

To change the language of the control panel displays, first select the option *Select language (i260)* on the *User preference settings* (i200) display. The *Select language (i260)* display will appear.

You can use the arrows at the bottom of the display to scroll up and down the list. Select the language of your choice. The selected language will be marked with a blue dot.

Confirm your selection by touching *Done*. Touching the *Cancel* field will bring you back to the *User preference settings* (i200) display.

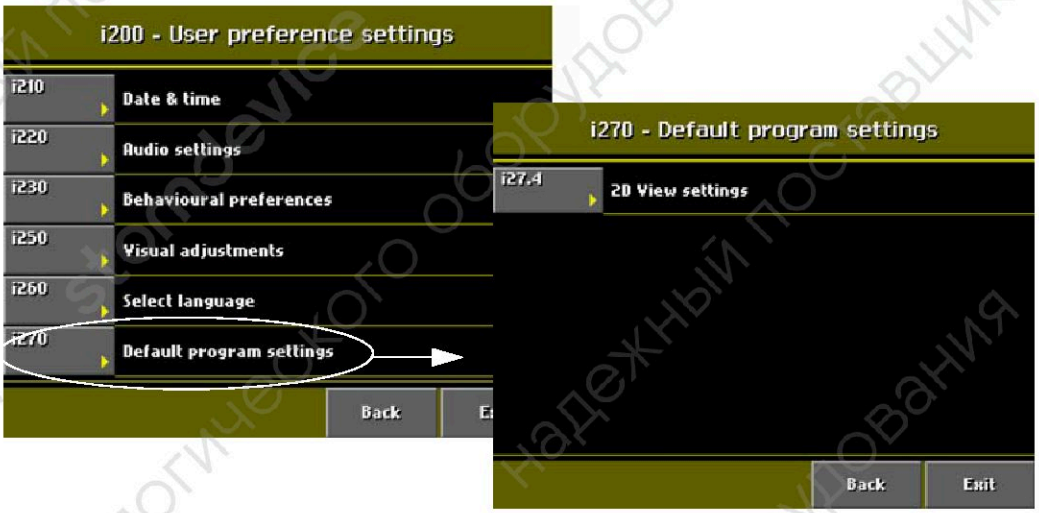


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Default program settings (i270)

On this display you can define presets for 2D views.





- **2D View settings (i27.4)**
  Touch the *2D View settings* field to select the type of 2D views that will be available when taking 3D exposures.

  The selected option will be marked with a blue dot. Confirm your selection by touching *Done*.

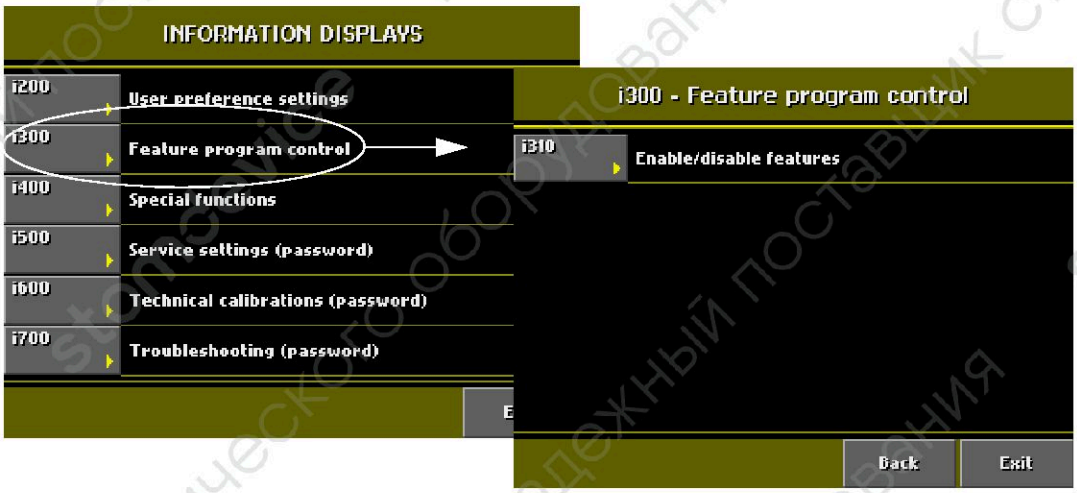
9.2 Feature program control (i300)

Enable / disable features (i310)

Select the option *Feature program control* (i300) on *Information displays*. On this display new features (e.g. *3D ENT programs)* can be added to the X-ray unit.

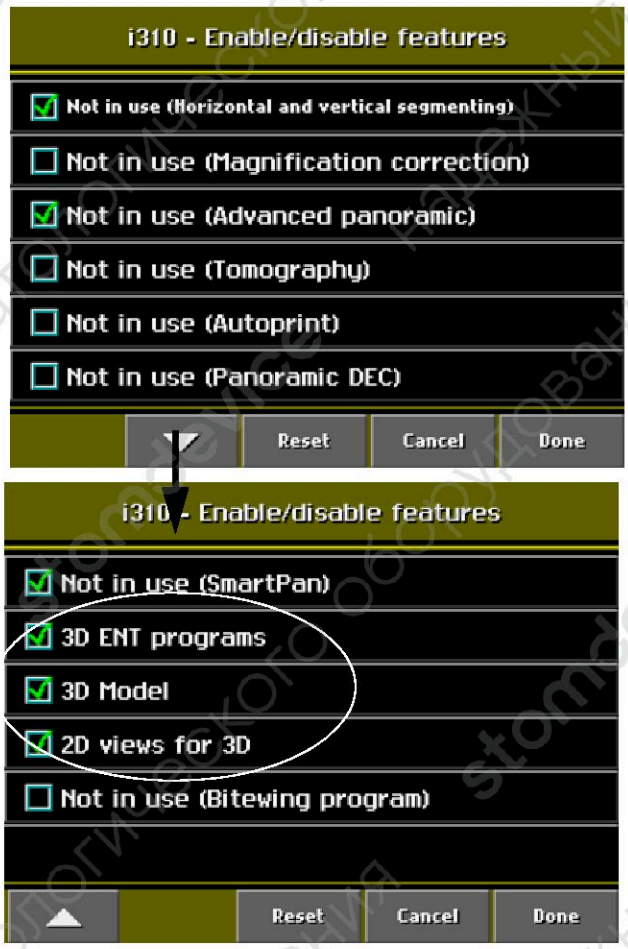
To add new features, first select the option *Enable / disable features* (i310). A list of features will appear.

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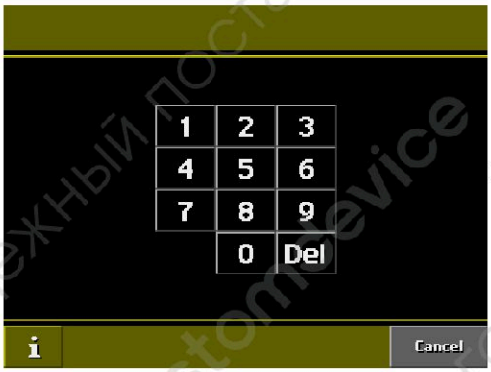


By touching the down arrow at the bottom of the display more features will appear. On the next displays, touch the up arrow to return to the previous display.

On the *Enable / disable features* display, touch the feature you wish to activate. Enabled features will be marked with a green check mark. Confirm the selection by touching *Done*.



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You will need a license code to add a new feature to the X-ray unit.

Touch the feature field (e.g. *3D ENT programs)* to switch this feature on. A number display will appear. Enter the license code to enable the selected feature.

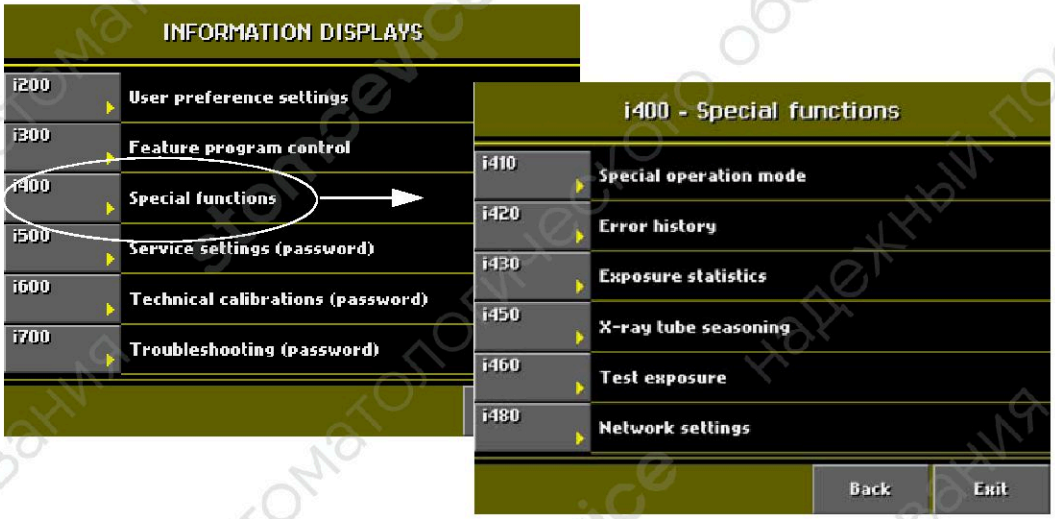
NOTE **Each license code is unit and module specific, i.e. it can only be used on the specified X-ray unit and for the specified program feature.**

To disable the selected feature repeat the procedure.

NOTE **After enabling / disabling a new feature the X-ray unit must be restarted.**

9.3 Special functions (i400)

Touch *Special functions* (i400) on *Information Displays.* A list of special functions appears.

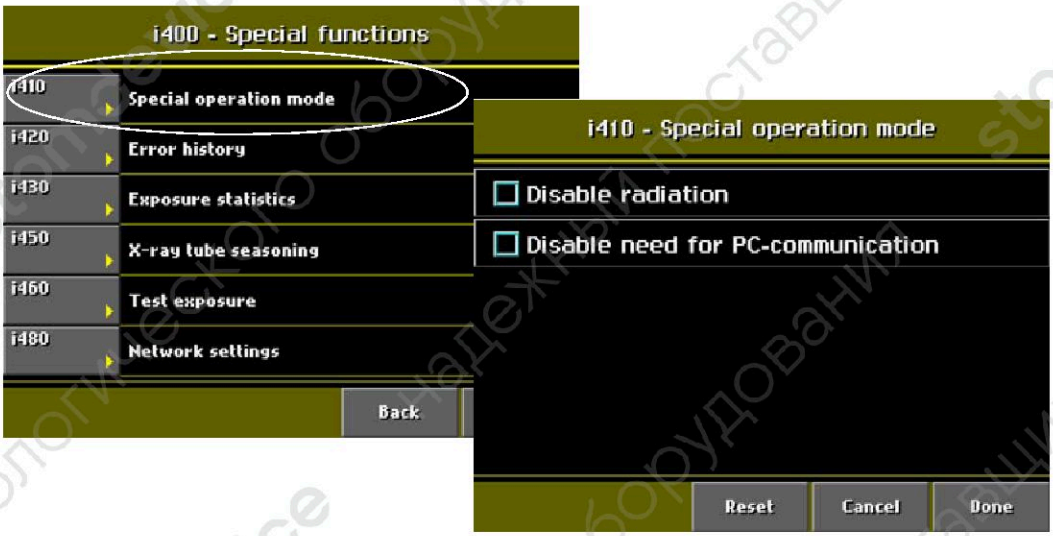


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Special operation mode (i410)

Select *Special operation mode* (i410) on the *Special functions* (i400) display. The display shown below appears.



- **Disable radiation**
  This option allows you to switch the exposure function on or off.
  When the exposure function is switched off no radiation is generated when you press the exposure button. The C-arm will move normally but no radiation will be generated and no radiation warning signals will be given, i.e. this is a “dummy run” function for training and demonstration purposes. For example, you might want to demonstrate the C-arm movements before taking exposures of children or nervous patients.

  The exposure function is switched on when the check box in the *Disable radiation* field is empty. The exposure function is switched off when the *Disable radiation* field is selected (check mark shown).
- **Disable need for PC communication**
  This option allows you to demonstrate or practice the functions of the X-ray unit without PC communication. Note, however, that if the Planmeca Romexis program is in the “Waiting for Ready” status the communication to the PC cannot be disabled. Close the program before disabling the communication.

NOTE **Radiation or PC communication cannot be activated if demo licenses are switched on (i510).**

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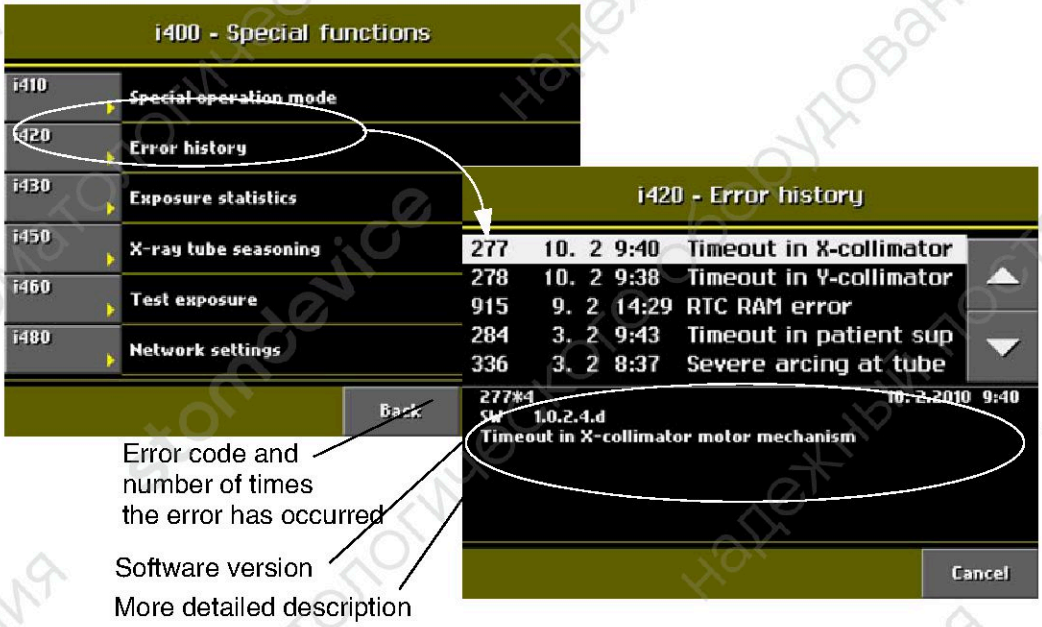
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Error history (i420)

Select *Error history* (i420) on the *Special functions* display. The display shown below appears.

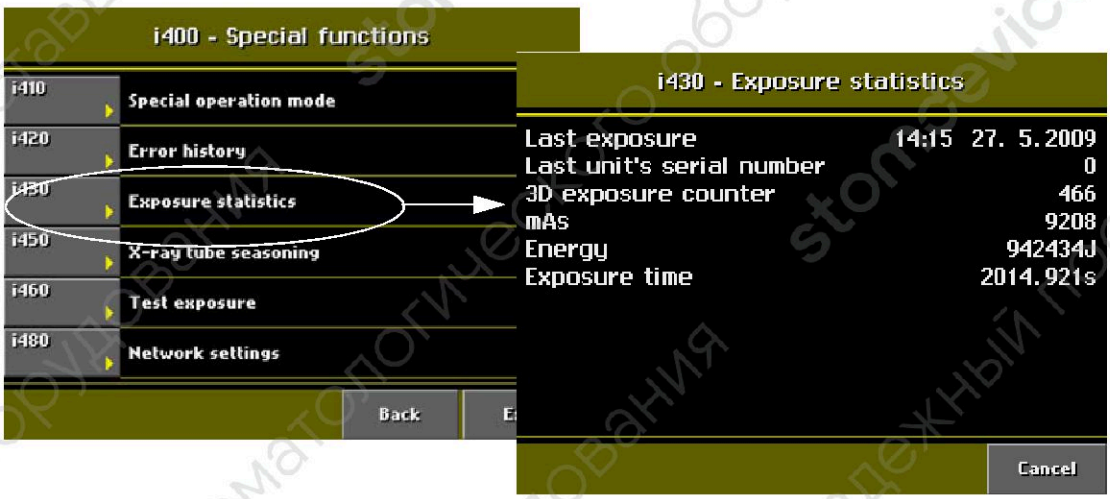
The *Error history* display lists the last 100 software related errors that have occurred. Additionally, the list shows another 40 tube head related errors. Use the arrows on the side to scroll up and down the list.

Select the error you wish to check. The selected error is shown in more detail at the bottom of the display (error code and number of times the error has occurred, date and time, software version of the X-ray unit, more detailed description).



Exposure statistics (i430)

Select *Exposure statistics* (i430) on the *Special functions* (i400) display. The display shown below appears.



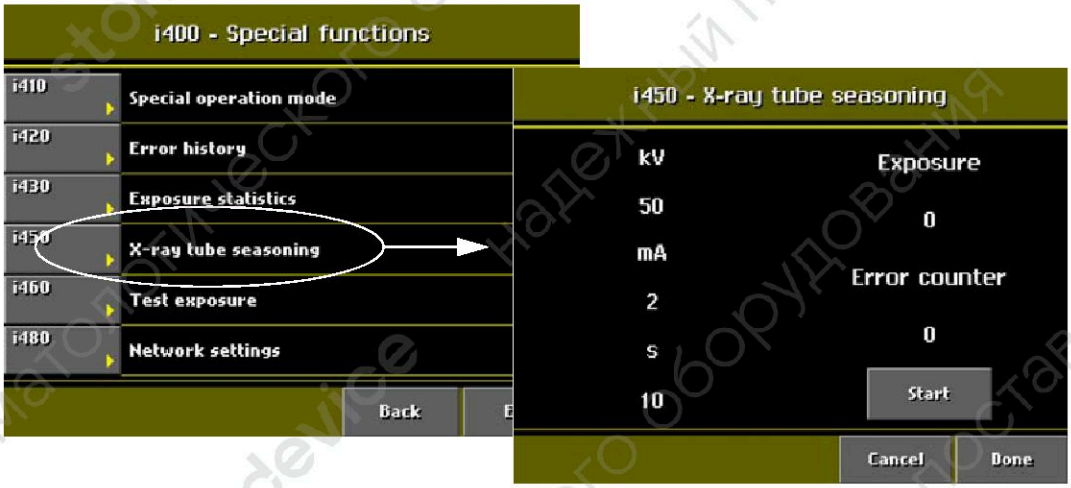
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The *Exposure statistics* display contains various statistical data about the X-ray unit, e.g. date and time of the last exposure, total number of exposures and total exposure time.

X-ray tube seasoning (i450)

Select *X-ray tube seasoning* (i450) on the *Special functions* (i400) display. The display shown below appears.



This option allows you to warm up the X-ray tube, i.e. run an X-ray tube seasoning process. This is necessary if the X-ray unit has not been used for a few days and you receive error message E332 (Arcing across X-ray tube).



Touch the *Start* field. The word *Ready* appears at the bottom of the display and you can now press the exposure button to start the seasoning process.

During the process the words *Exposure* and *Wait* will appear on the display. You can press and hold down the exposure button for the whole duration of the process or remove your thumb from the exposure button when the word *Wait* appears on the display.

The seasoning process will take up to about three minutes. After a successful process the message *OK* is shown on the display.

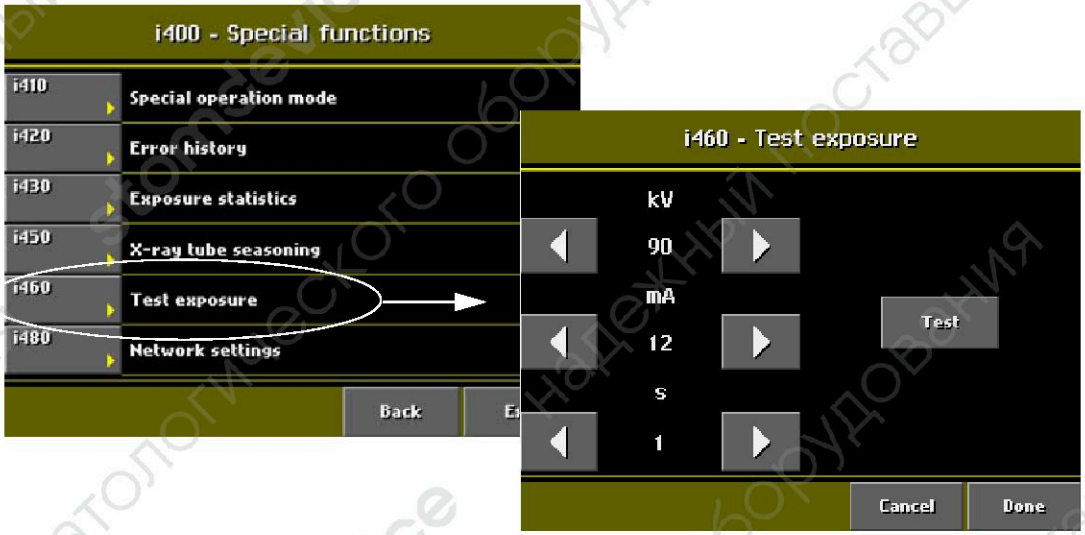
NOTE **Contact your service technician for help if error message E332 (Arcing across X-ray tube) reappears after a successful seasoning process.**

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Test exposure (i460)

Select *Test exposure* (i460) on the *Special functions* (i400) display. The display shown below appears.



This option allows you to take a test exposure. The *Test exposure* (i460) display shows the exposure values which are in use on the main display.

Touch the arrows to select the exposure values (kV, mA and time) you wish to use. Then touch the *Test* field. The word *Ready* will appear at the bottom of the display and you can now press the exposure button to take a test exposure. Note that the C-arm will not move when you take a test exposure.

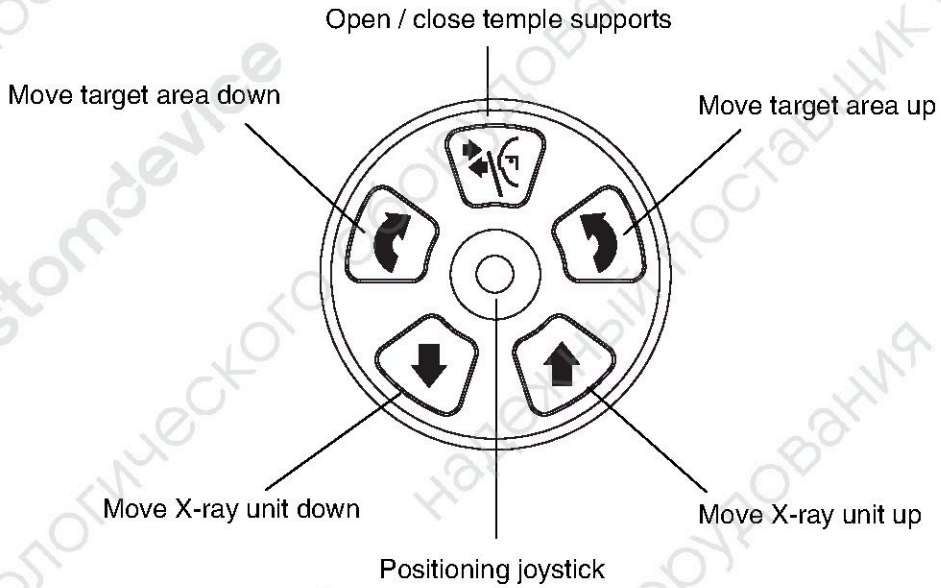
Network settings (i480)

Refer to the Technical Manual for further information on network settings.

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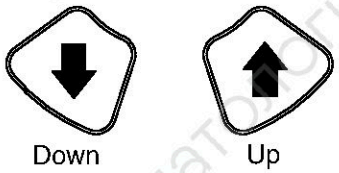
10 PATIENT POSITIONING CONTROLS



NOTE **Never allow patients to press the positioning controls when they are positioned in the X-ray unit.**

NOTE **Touching any of the positioning controls (button or joystick) will switch the patient positioning lights on.**

X-ray unit up / down

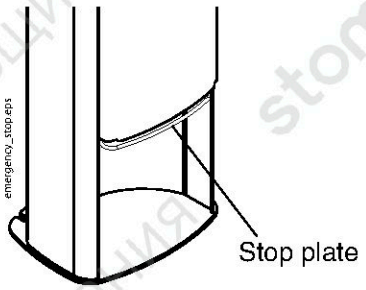


The X-ray unit up and down buttons are used to adjust the X-ray unit to suit the height of the patient.

The X-ray unit moves slowly at first, then faster.

NOTE **If for some reason either of the buttons gets stuck during operation, you can stop the up / down movement by pressing any of the other control buttons or the positioning joystick. This is a safety measure that guarantees that the up / down movement can be stopped in an emergency.**

NOTE **Be careful that the X-ray unit does not hit the ceiling when you press the up button. The maximum height can be adjusted to suit offices with low ceiling, contact your service technician for help.**

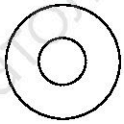


NOTE **Make sure that there is no object under the telescopic column when you press the down button. If something is in danger of becoming trapped, release the button immediately to stop the movement.**

NOTE **The column movement stops automatically if the emergency stop plate at the bottom is pressed upwards. Clear any obstruction before moving the column again.**

NOTE **When positioning wheelchair patients always first move the X-ray unit down before you position the patient in the unit.**

Positioning joystick

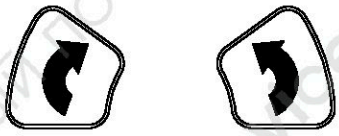


The positioning joystick is used for horizontal fine-adjustment of the target area. It is used when the patient is positioned in the X-ray unit.

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Target area up / down



The target area up and down buttons are used for vertical fine-adjustment of the target area. The buttons are used when the patient is positioned in the X-ray unit.

The X-ray unit moves slowly when you press the up / down button. The height of the patient support table is not changed, i.e. the patient remains in the same position.

Open / close temple supports



Press the temple support button to open the temple supports. The temple supports can be closed by pressing the temple support button again.

NOTE **The temple supports can be disabled as described in section “Behavioural preferences (i230)” on page 35.**

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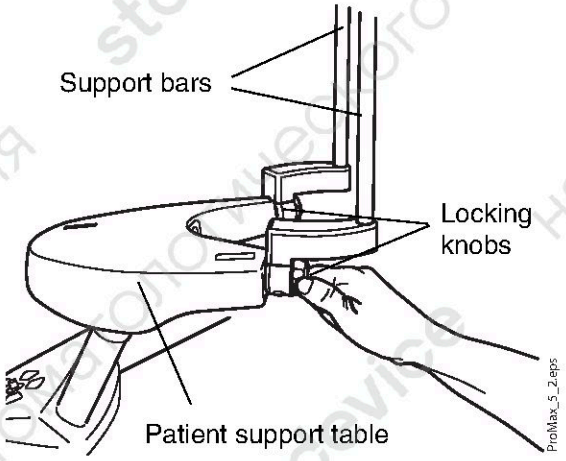
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11 3D PATIENT EXPOSURE

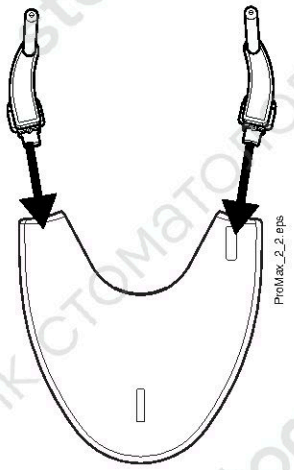
11.1 Step 1: Before exposure

NOTE **The available head supports are shown in section 5.4.1 “Head supports (A or B)” on page 10.**

Attaching support bars



Insert the support bars into the holes in the patient support table and secure them in position by tightening the locking knobs.

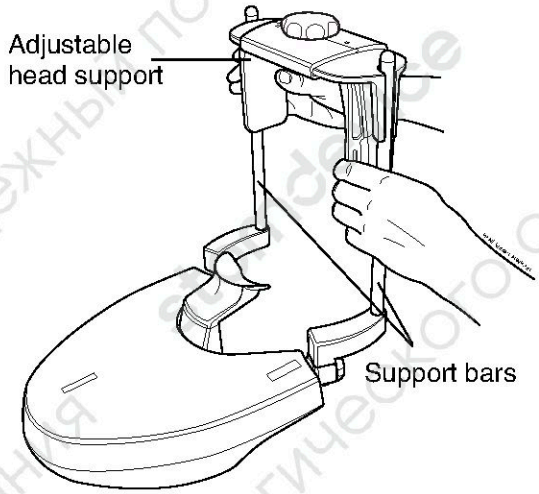


NOTE **Ensure that you insert the support bars the right way round.**

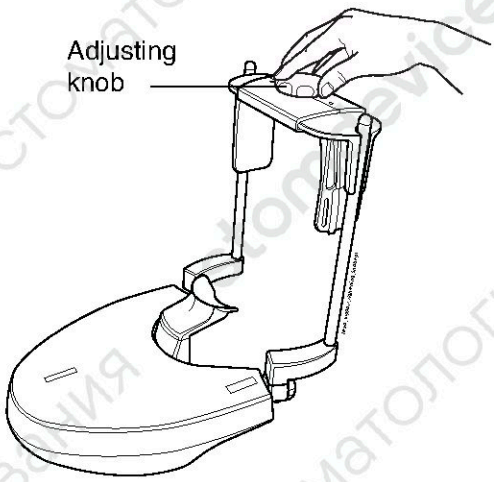
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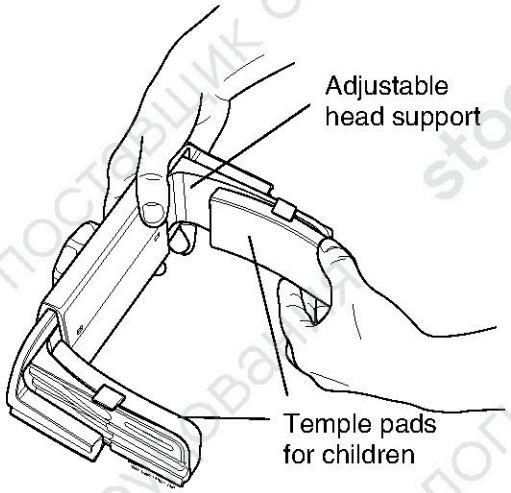
Head support A: Attaching adjustable head support



If you are using the adjustable head support, slide it onto the support bars.



Then turn the adjusting knob to adjust the head support to suit the size of the patient's head.



- You can use temple pads if you take exposures of children or patients with a small head. Slide the temple pads onto the adjustable head support as shown. Ensure that you slide the temple pads as far up as they will go.

NOTE Use temple pads on both sides (not on one side only).

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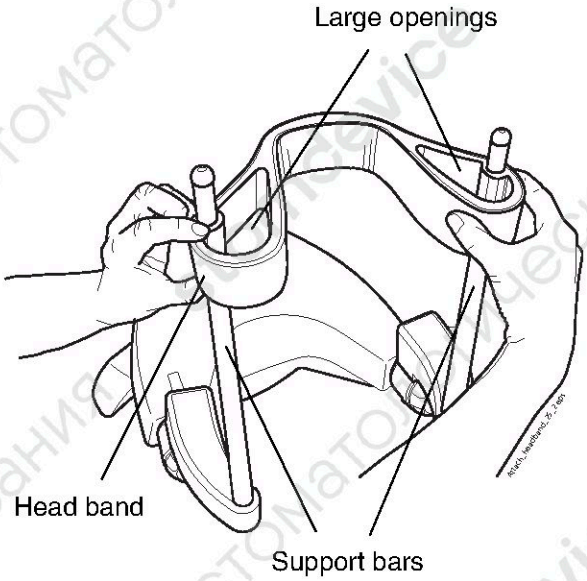


- You can use fastening straps for additional head support if needed. Attach one strap in front of the forehead and two at the back of the head as shown.

NOTE **Be careful when you handle the straps. Do not let the straps hit the patient in the eye or face.**

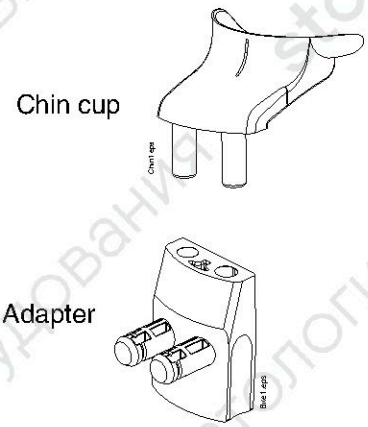
NOTE **Do not overstretch the straps. The straps lose their elasticity if you pull them more than 50 mm (1.9 in.). Straps with a free length (i.e. when they are not stretched) of over 255 mm (10 in.) do not support the patient's head firmly.**

Head support B: Attaching head band



If you are using the head band, attach it to the support bars as shown. The side with the large openings should be against the patient's forehead.

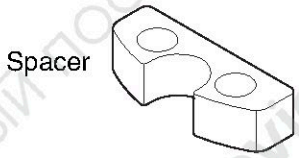
Attaching chin cup



Insert the chin cup into the adapter. Insert the adapter into the holes in the middle of the patient support table.

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NOTE **FOR X-RAY UNITS WITH PROFACE SENSOR:**
Attach a spacer to the chin cup before inserting the chin cup into the adapter.

Preparing patient

Ask the patient to remove any spectacles, hearing aids, dentures, hairpins, and personal jewellery such as earrings, necklaces and piercings as these can produce shadows or reflections in the image. The patient should also remove any loose items of clothing (e.g. scarf, tie) that might get caught in the arm structures of the X-ray unit.

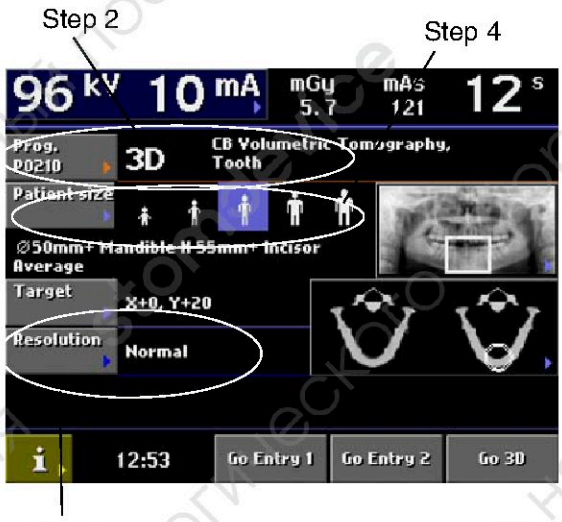
NOTE **High contrast objects, such as gold teeth or amalgam, may cause artefacts in the image.**

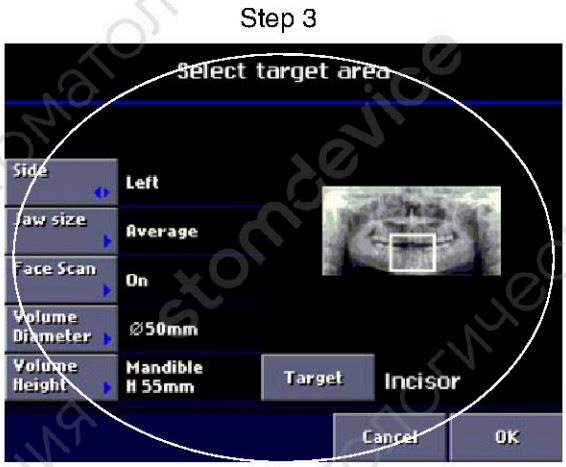
Place a protective lead apron over the patient's back if required.

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11.2 Steps 2-5: Selecting exposure settings





Now proceed as follows:

Step 2: Select the 3D program you wish to use (see section 8.2 “Selecting program type” on page 26).

Step 3: Specify the volume size and target area (see section 8.5 “Selecting target area” on page 28).

NOTE **If the X-ray unit has a ProFace sensor, you can take a 3D photo of the patient’s face at the same time as you take an X-ray image. Select *Face Scan On* to take both images at the same time.**

Step 4: Select the patient size (see section 8.3 “Selecting patient size” on page 27).

Step 5: Select the image resolution (see section 8.7 “Selecting image resolution” on page 31).

The exposure values will automatically change to correspond with the selected patient size and image resolution. The preset exposure values are shown in the following table.

The preset exposure values are average values and they are only meant to guide the user. If necessary, you can change the preset values as described in section 8.4 “Selecting kilovolt and milliampere values” on page 27.

NOTE **Always try to minimize the radiation dose to the patient.**

Exposure values for image resolution Normal, High and HD

PATIENT SIZE	kV VALUE	mA VALUE
Child	96	8
Adolescent	96	9
Small adult	96	10
Average-sized adult	96	11
Large adult	96	12

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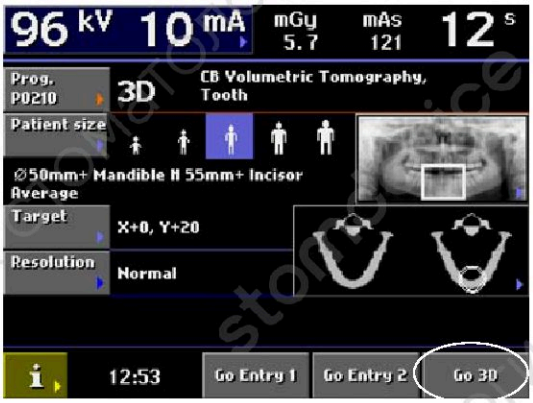
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Exposure values for image resolution Low dose

PATIENT SIZE	kV VALUE	mA VALUE
Child	96	4
Adolescent	96	5
Small adult	96	6
Average-sized adult	96	7
Large adult	96	8

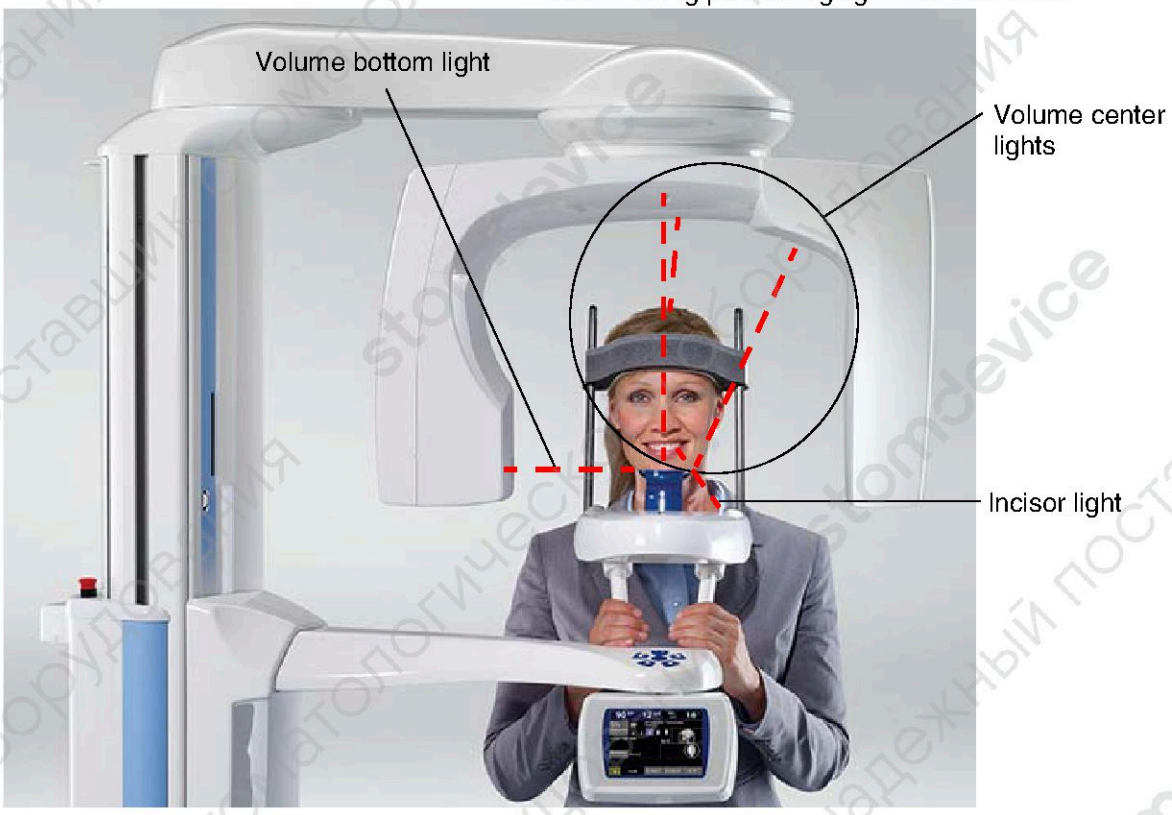
11.3 Step 6: Patient positioning

NOTE **You can use the *Go Entry 1* or *Go Entry 2* function for patient positioning if you wish to move the C-arm. Refer to section 8.8 "Selecting patient entry position" on page 31 for differences between the two positions.**



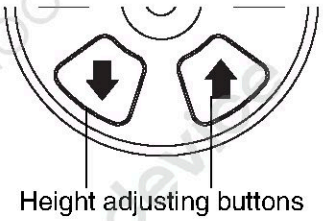
Touch the *Go 3D* field on the main display to move the C-arm to the selected target position.

The following positioning lights will come on:



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Guide the patient to the X-ray unit. The patient can sit or stand during the exposure.

Adjust the X-ray unit to suit the height of the patient. To do this, press either of the height adjusting buttons until the chin cup is approximately level with the patient's lower jaw.

The X-ray unit moves slowly at first, then faster.

Ask the patient to grasp the patient handles.

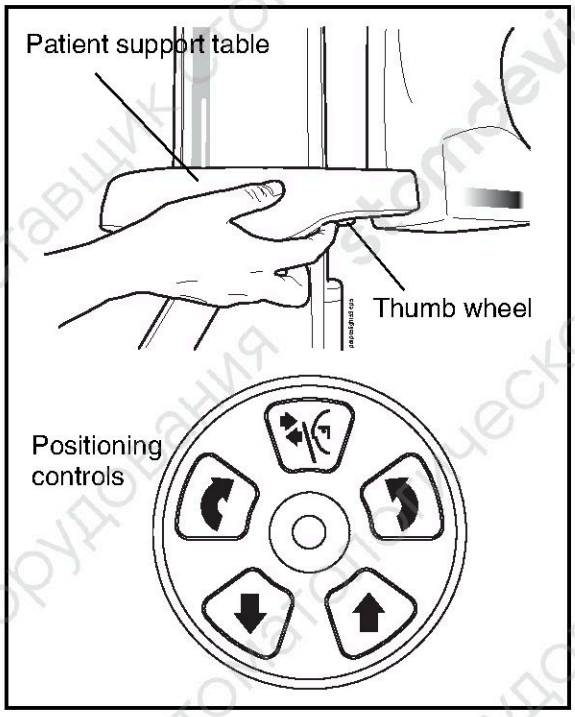


Check that the patient's head is firmly positioned in the head support.

If you are using the adjustable head support:

- You can adjust the head support by turning the adjusting knob at the top.
- You can use fastening straps for additional head support if needed. Refer to section "Head support A: Attaching adjustable head support" on page 48 for details.

11.4 Step 7: Adjusting volume position



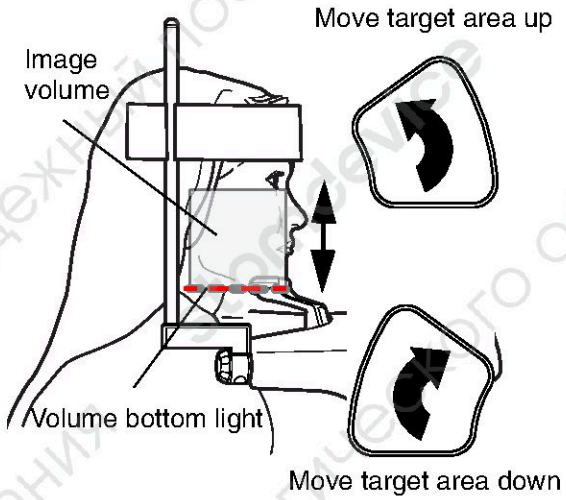
The target positions are preprogrammed for a standard patient. However, as all patients and their anatomical structures are different you have to check that the preprogrammed position covers the area of interest for this patient. If this is not the case, you will have to adjust the position of the image volume according to the patient's anatomy. The positioning lights will help you to do this.

If the positioning lights are not switched on, switch them on by touching the thumb wheel on the underside of the patient support table or by pressing any of the positioning controls (button or joystick). Note that the lights will automatically switch off after two minutes.

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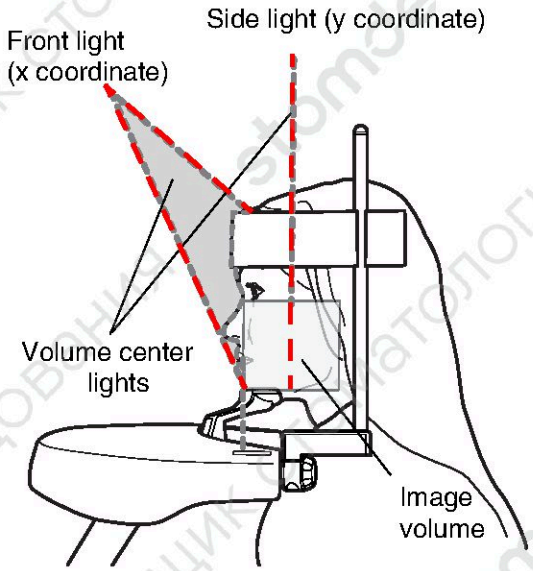
11.4.1 Adjusting volume bottom light



The volume bottom light indicates the position where the lower edge of the image volume will be.

Check that the image volume is positioned at the correct height for the exposure you wish to take. You can fine-adjust the vertical position of the image volume by pressing the target area up / down button. The lower edge of the volume will move accordingly.

11.4.2 Adjusting volume center lights (front and side lights)



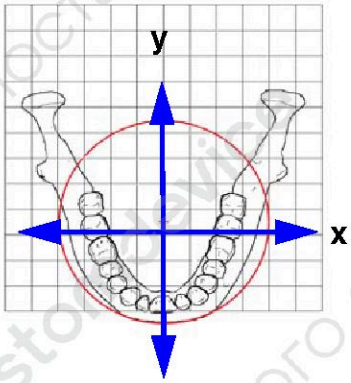
The volume center lights cross at the selected target position. The cross formed by the light beams indicates the center of the image volume. With the patient positioned in the unit, the volume center lights form red lines on the front (front light) and on the left side (side light) of the patient's head.



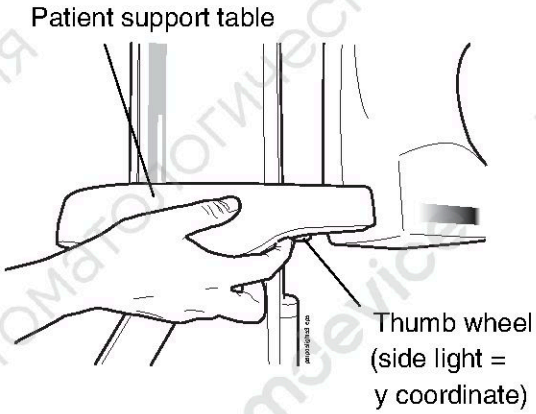
Rotate the C-arm 90 degrees clockwise by touching the *90°* field at the bottom of the display. This will give you a better view for checking the volume position.

Touch the *90°* field again to rotate the C-arm back to the original position.

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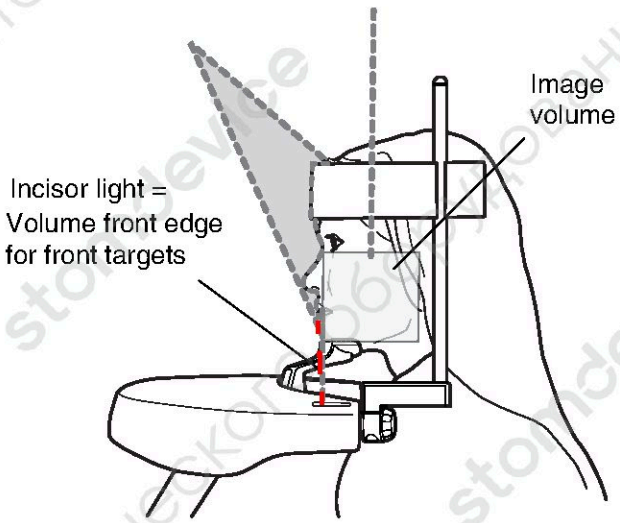
The horizontal position of the image volume can be fine-adjusted as follows.



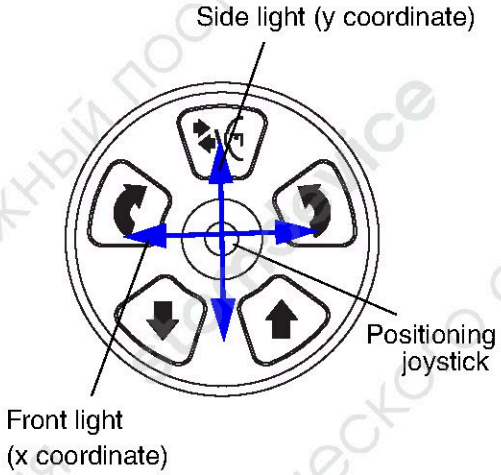
- The side light (y coordinate) can be adjusted by moving the thumb wheel that is located on the underside of the patient support table.

  The selected position is shown in the *Target* field on the main display.

NOTE **The incisor light indicates the front edge of the image volume when a front target position is selected.**



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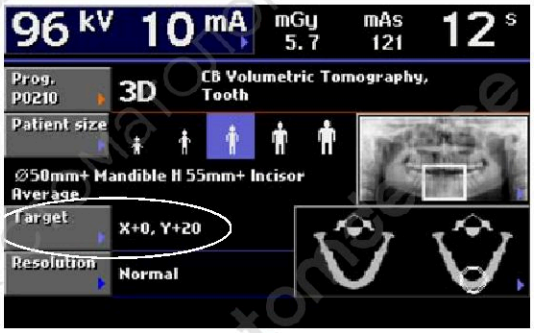


Small volumes (Ø100 mm or less):

- The side light (y coordinate) can also be adjusted by moving the positioning joystick towards / away from you.

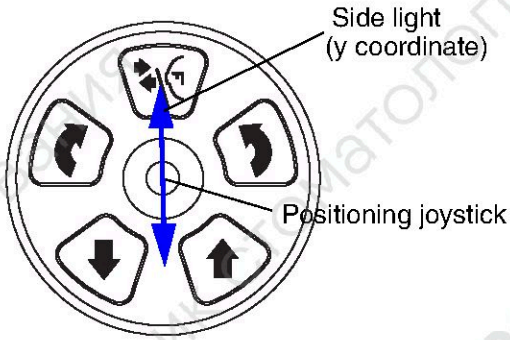
  The front light (x coordinate) can be adjusted by moving the positioning joystick to the left / right.

  The selected positions (x and y) are shown in the *Target* field on the main display.



- The side (y coordinate) and front (x coordinate) lights can also be adjusted by touching the *Target* field on the main display.

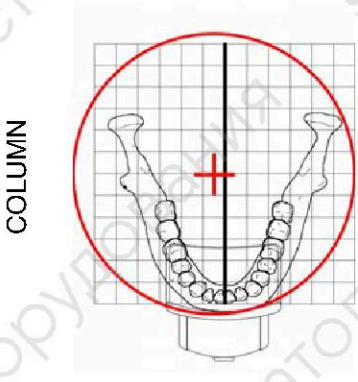
  A display will appear where you can adjust the x / y coordinates by touching the left / right arrows. The selected positions are shown on the display.



Large volumes (Ø110 mm or more):

- The side light (y coordinate) can also be adjusted by moving the positioning joystick towards / away from you.

  The selected position is shown in the *Target* field on the main display.



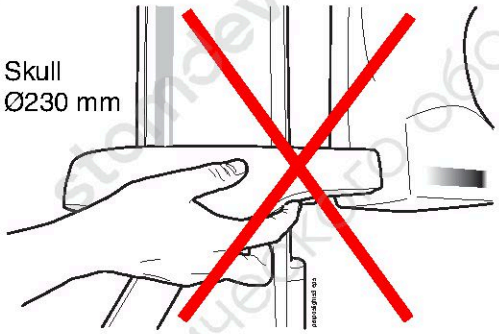
NOTE **Large volumes are slightly offset towards the column. The front light (x coordinate) cannot be adjusted.**

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NOTE **Moving the positioning joystick or adjusting the x / y coordinates in the *Target* field switches the incisor light off and you can no longer use the thumb wheel to adjust the side light (y coordinate).**

NOTE **In skull images (Ø230 mm) the side light (y coordinate) cannot be adjusted by moving the thumb wheel.**



NOTE **Take a scout image first if you wish to include the patient's nose in the skull image (Ø230 mm). See section 11.6 "Taking a scout image or 2D views (Lat-PA, Lat or PA)" on page 59 for details. If needed, then move the positioning joystick towards you to adjust the side light (y coordinate).**

11.5 Step 8: Taking an exposure

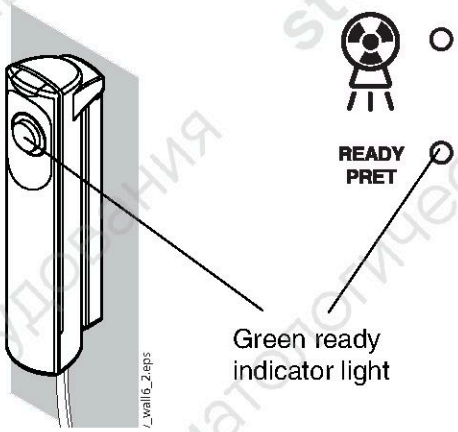
NOTE **Make sure that you have selected the right patient and 3D exposure mode in the Planmeca Romexis program before you take an exposure. Refer to the Romexis User's Manual.**

NOTE **If needed, you can take 2D views first. Refer to section 11.6 "Taking a scout image or 2D views (Lat-PA, Lat or PA)" on page 59.**



When you are ready to take an exposure touch the *Ready* field on the main display. The X-ray unit will move to the ready position.

On the exposure button and control panel a green indicator light will come on. Additionally, the word *Ready* will be shown on the left side of the control panel display. The Romexis program will show the *Waiting for Ready* message on the computer screen.

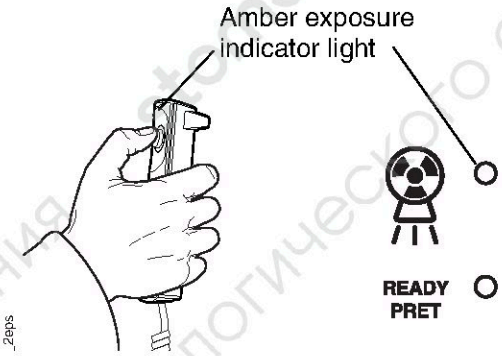


The green indicator lights and the word *Ready* will flash while the X-ray unit moves to the ready position. They will stop flashing when the X-ray unit has reached the ready position. The Romexis program will now show the *Waiting for Exposure Start* message on the computer screen.

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Ask the patient to stand as still as possible.

- If you are taking a 3D face photo at the same time, tell the patient that the lights on the sides of the sensor will flash during exposure but he should not be startled and move. Ask the patient to either keep his eyes shut or to focus them on a fixed point so that the eyes are not half open in the image.



Move to a protected area.

Press and hold down the exposure button for the entire duration of the exposure. The radiation warning lights on the exposure switch and on the control panel come on and you hear a radiation warning tone.

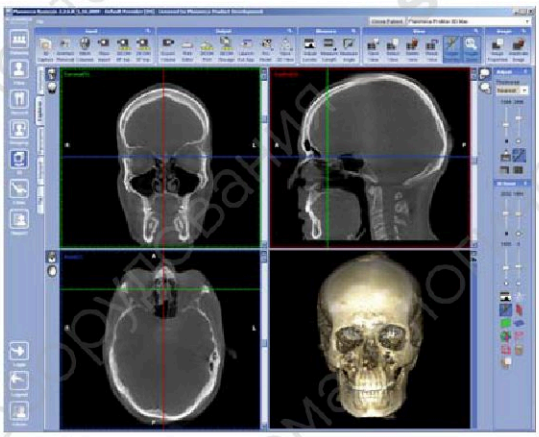
The C-arm moves around the patient's head.

- If you take two vertical image volumes the lower volume is imaged first and the upper volume last. The C-arm is automatically moved upwards between the volumes. You hear a warning tone when the C-arm moves up.
- If you take two horizontal image volumes the patient's left side is imaged first and the right side last.
- If you take one image volume and a 3D face photo the X-ray image is taken first and the photo last. You hear a fast ticking sound when the photo is taken.
- If you take two vertical image volumes and a 3D face photo the photo is taken between the X-ray images. You hear a fast ticking sound when the photo is taken and a warning tone when the C-arm moves up.
- If you take two horizontal image volumes and a 3D face photo the photo is taken last. You hear a fast ticking sound when the photo is taken.

NOTE **Do not release the exposure button before the end of the last exposure.**

NOTE **Maintain audio and visual contact with the patient and X-ray unit during exposure. If the C-arm stops moving during exposure, or moves in an erratic way, release the exposure button immediately.**

NOTE **If exposures are taken in rapid succession the X-ray tube may overheat and a cooling time will flash on the display. The cooling time indicates the delay before the next exposure can be taken.**



When the C-arm has completed the exposure cycle(s) you can guide the patient from the X-ray unit.

The image will show on the computer screen.

- If you took two image volumes you must accept the image stitching function in the Planmeca Romexis program. Refer to the Romexis User's Manual.

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11.6 Taking a scout image or 2D views (Lat-PA, Lat or PA)



You can set the X-ray unit so that a scout image or 2D views (Lat-PA, Lat or PA) will be shown on the computer screen before you take a 3D image. This will allow you to check the volume position or, if necessary, confirm the need for a 3D exposure. Refer to section "Default program settings (i270)" on page 38 for information on how to activate this function.

NOTE **The options shown on display i27.4 depend on the unit configuration. The X-ray unit can be upgraded with new exposure programs, contact your dealer for further information.**

The selected setting will be shown on the main display as follows:

- If you selected the second option on display i27.4, the *Scout* field will be shown at the bottom of the main display when you are ready to take an exposure.
- If you selected either of the last two options on display i27.4, the *2D View type* field will appear on the main display. Touching the field repeatedly will cycle through the available options. Select the view you wish to use. The selected view will be shown at the bottom of the display when you are ready to take an exposure.

NOTE **If the image consists of two volumes, only scout imaging will be available (regardless of the setting on i27.4). Scout imaging will be available for the first image volume (1/2) only.**

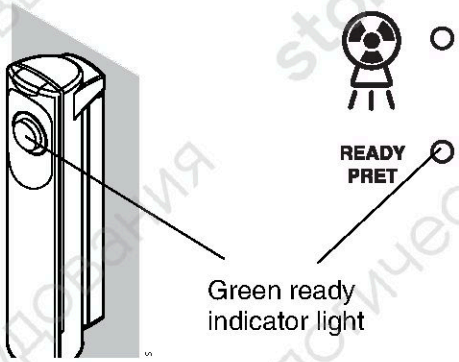
NOTE **2D views Lat-PA, Lat and PA are not available for the largest volume (Ø230 mm).**



Touch the bottom field (*Scout*, *Lat-PA*, *Lat* or *PA)* when you are ready to take the exposure.

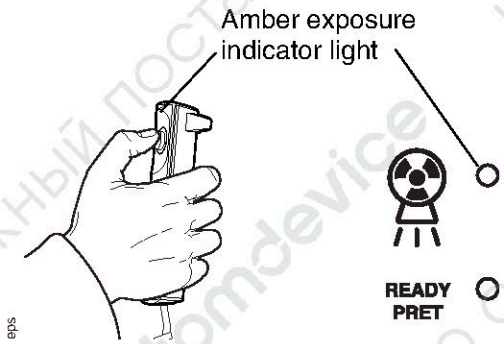
Ask the patient to stand as still as possible.

Move to a protected area.



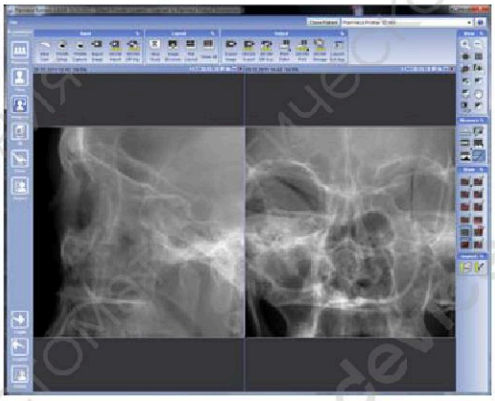
The green indicator lights will flash while the X-ray unit moves to the ready position. They will stop flashing when the X-ray unit has reached the ready position.

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Press and hold down the exposure button for the entire duration of the exposure.

During the exposure the radiation warning light on the exposure switch and on the display will come on and you will hear a radiation warning tone. A symbol indicating the type of view (scout, lat-PA, lat or PA) you are taking will appear on the jaw icon above the *Ready* field.



Lat-PA

The image will show on the computer screen.

If you took a scout image you can now readjust the volume position as described in section 11.4 “Step 7: Adjusting volume position” on page 53 and then take a new scout image as described above. Repeat the procedure until the position is correct.

NOTE **Scout images are not saved in the Romexis program.**

You can now take a 3D image as described in section 11.5 “Step 8: Taking an exposure” on page 57.

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12 3D FACE PHOTO



If the X-ray unit has a ProFace sensor, you can take a 3D photo of the patient's face.

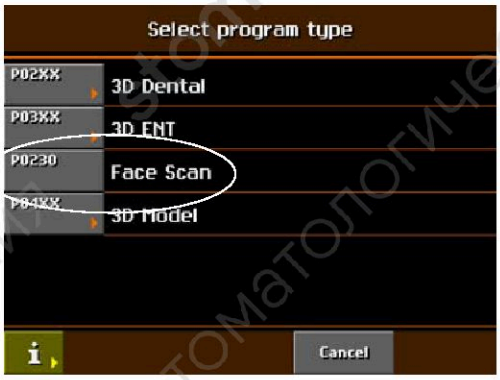
NOTE **If you wish to take an X-ray image and a 3D face photo at the same time, refer to section 11 "3D PATIENT EXPOSURE" on page 47.**

NOTE **Do not touch the glass windows on the ProFace sensor. Fingerprints or other stains on the glass surface destroy image quality.**

12.1 Before exposure

Proceed as described in section 11.1 "Step 1: Before exposure" on page 47.

NOTE **You do not need to use the chin cup and adapter when taking 3D face photos.**

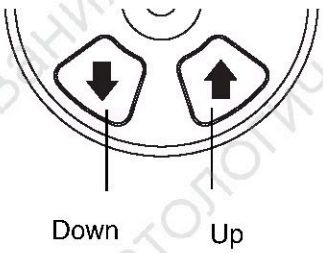


Select the Face Scan program on the control panel.

12.2 Patient positioning

Select the patient entry position as described in section 8.8 "Selecting patient entry position" on page 31.

Guide the patient to the X-ray unit. The patient can be seated on a stool or stand during the exposure.



Adjust the X-ray unit to suit the height of the patient. To do this, press either of the height adjusting buttons until the chin cup is approximately level with the patient's lower jaw.

Ask the patient to grasp the patient handles.

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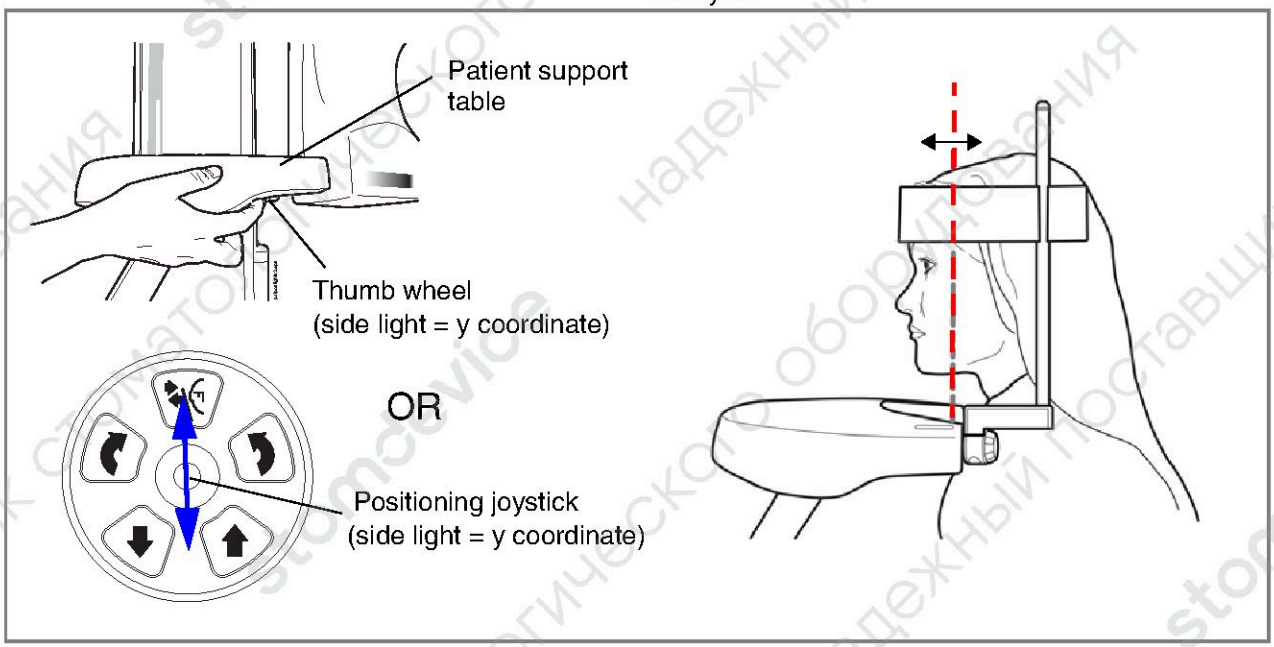


Touch the *Go Face Scan* field on the control panel.

Check that the side light (y coordinate) is positioned 1 - 3 cm (0.4 - 1.2 in.) behind the eye corner.

If you need to move the side light do one of the following:

- Move the thumb wheel that is located on the underside of the patient support table.
- Move the positioning joystick towards you or away from you.

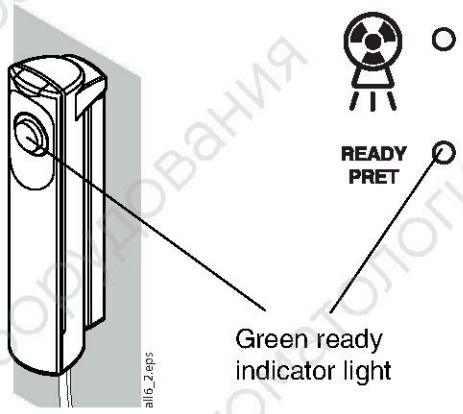


12.3 Taking a 3D face photo

NOTE **Make sure that you have selected the right patient and 3D exposure mode in the Planmeca Romexis program before you take an exposure. Refer to the Romexis User's Manual.**



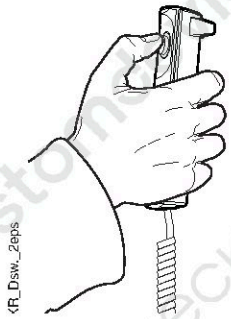
When you are ready to take an exposure touch the *Ready* field on the main display. The X-ray unit will move to the ready position.



On the exposure button and control panel a green indicator light will come on. Additionally, the word *Ready* will be shown on the left side of the control panel display. The Romexis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word *Ready* will flash while the X-ray unit moves to the ready position. They will stop flashing when the X-ray unit has reached the ready position. The Romexis program will now show the *Waiting for Exposure Start* message on the computer screen.

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Ask the patient to stand as still as possible. Tell the patient that the lights on the sides of the sensor will flash during exposure but he should not be startled and move. Ask the patient to either keep his eyes shut or to focus them on a fixed point so that the eyes are not half open in the image.

Press and hold down the exposure button for the entire duration of the exposure. The C-arm moves around the patient's head and you hear a fast ticking sound when the photo is taken.

When the C-arm has completed the exposure cycle you can guide the patient from the X-ray unit.



The photo will show on the computer screen.

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13 3D MODEL EXPOSURE

CAUTION ***The 3D Model programs must not be used for patient imaging. The programs are intended for taking exposures of impressions and plaster casts only.***

13.1 Calibrating X-ray unit for impression or plaster material

NOTE **The X-ray unit has to be calibrated for each new material that is used. The X-ray unit needs to be calibrated only once for each material.**

NOTE **FOR IMPRESSIONS**
Only monophase impression materials can be used.

NOTE **FOR PLASTER CASTS**
If the plaster cast consists of two materials, the X-ray unit has to be calibrated for the teeth material.

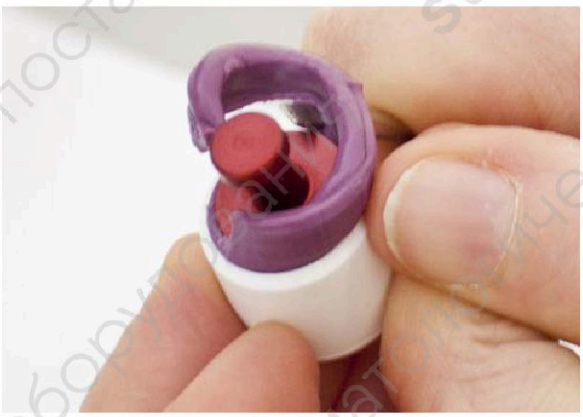


Insert material into the calibration cup provided (part number 10031325) until the calibration cup is full.



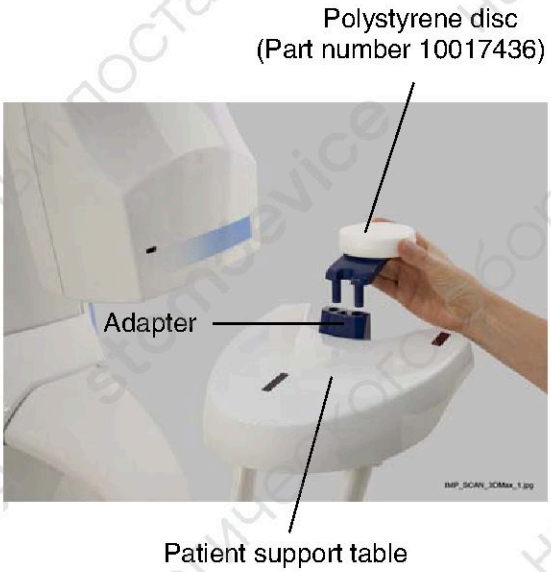
Place the calibration pin provided (part number 10031265) in the material. Note that the calibration pin has to be pushed in thicker end first. The middle rim has to be flush with the top edge of the calibration cup.

Let the material set. The setting time will depend on the material used. Wait slightly longer than recommended in the instructions supplied by the manufacturer to ensure proper hardening.

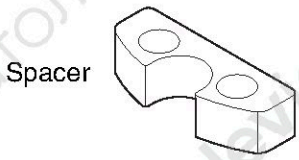


Remove all excess material from the top of the calibration cup. Then gently pull the calibration pin out and ensure that the surfaces of the hole formed by the calibration pin are even (no air bubbles in inside walls).

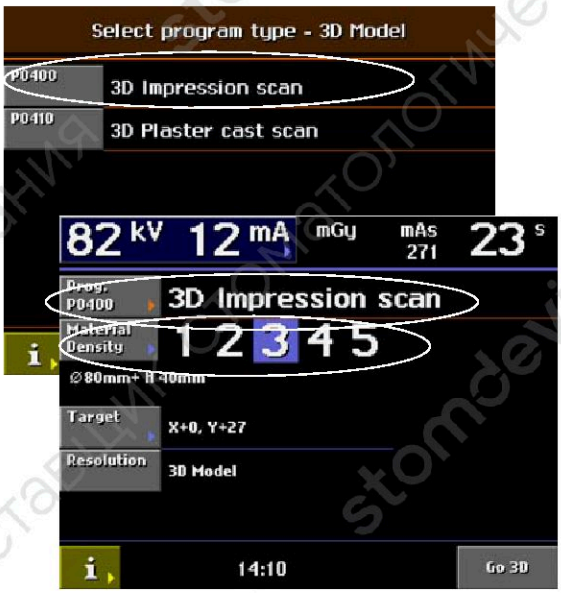
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Remove any patient supports attached to the X-ray unit patient support table. Insert the polystyrene disc provided (part number 10017436) into the adapter.



NOTE **FOR X-RAY UNITS WITH PROFACE SENSOR:**
Attach a spacer to the polystyrene disc support before inserting it into the adapter.



On the X-ray unit, select:

- *3D Model* > *3D Impression scan* for impression material or
- *3D Model* > *3D Plaster cast scan* for plaster material.
- Material density setting 3.

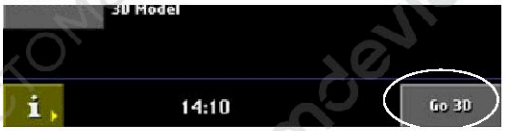
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The exposure values will automatically change to correspond with the selected material density. The preset exposure values for each material density are shown in the following table.

NOTE **The required exposure values depend on the material and X-ray unit (X-ray tube and sensor) used. You may need to select a different material density setting (1, 2, 4 or 5).**

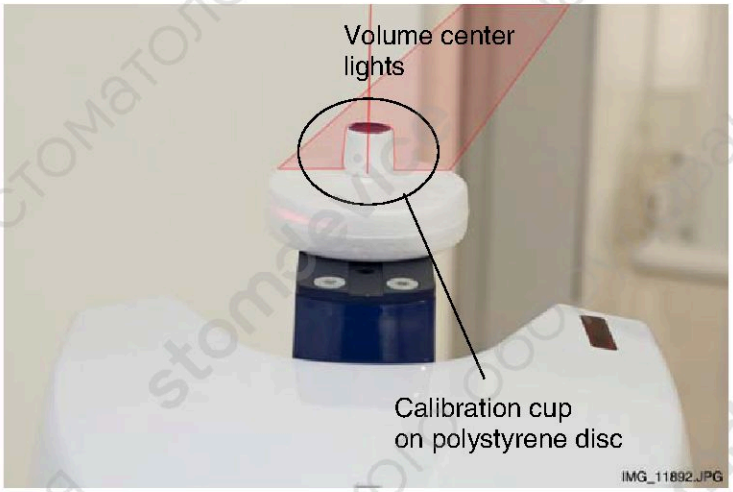
Exposure values for 3D Model programs

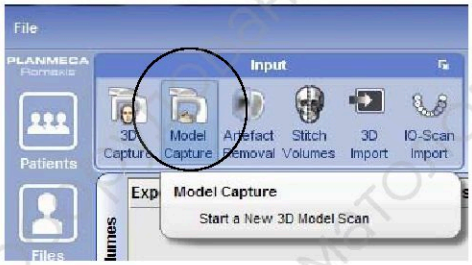
MATERIAL DENSITY	kV VALUE	mA VALUE
1	70	12
2	76	12
3	82	12
4	88	12
5	96	12



Touch the *Go 3D* field to move the C-arm to the target position. The positioning lights (volume center lights, volume bottom light and incisor light) will come on. The volume center lights cross in the middle of the image volume.

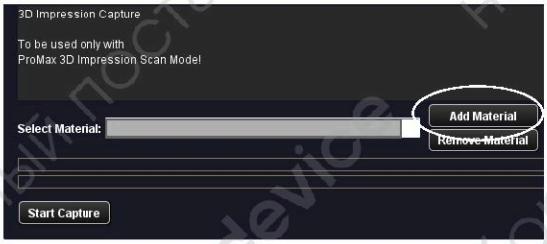
Place the calibration cup on the polystyrene disc so that the volume center lights cross in the middle of the cup.





In the Planmeca Romexis program, click *3D* > *Model Capture*. Refer to Romexis User's Manual for full details on how to use Romexis.

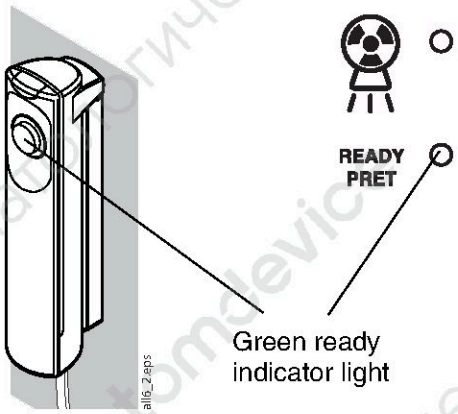
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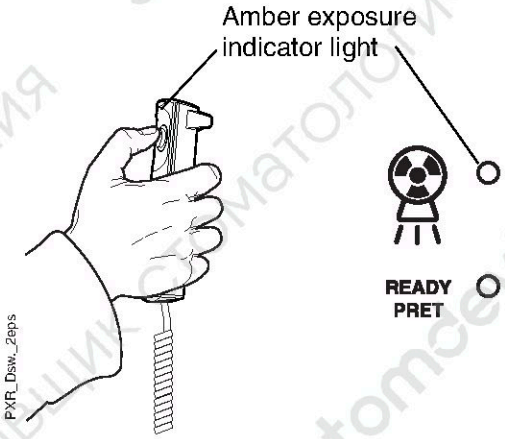
Then click the option *Add Material* in the window that appears.



On the X-ray unit, touch the *Ready* field to move the X-ray unit to the ready position.

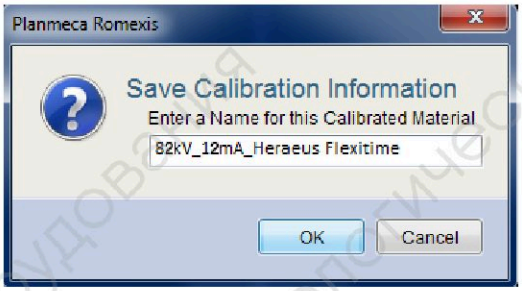


The green indicator lights will flash while the X-ray unit moves to the ready position. They will stop flashing when the X-ray unit has reached the ready position.



Press and hold down the exposure button for the entire duration of the exposure.

During the exposure the radiation warning light on the exposure switch and on the display will come on and you will hear a radiation warning tone. Note that the exposure will last longer than a 3D patient exposure.



In the Planmeca Romexis program, enter a name for this material and click *OK*.

NOTE **The calibration exposure values will be automatically included at the beginning of the name.**

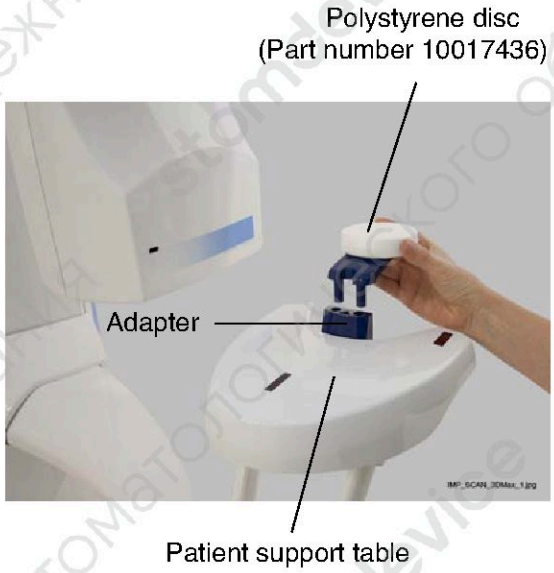
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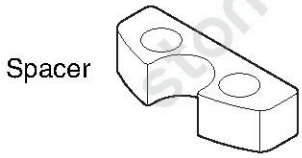
13.2 Taking an exposure of an impression or plaster cast

NOTE **The X-ray unit has to be calibrated for each new material that is used. Refer to the previous section for details.**

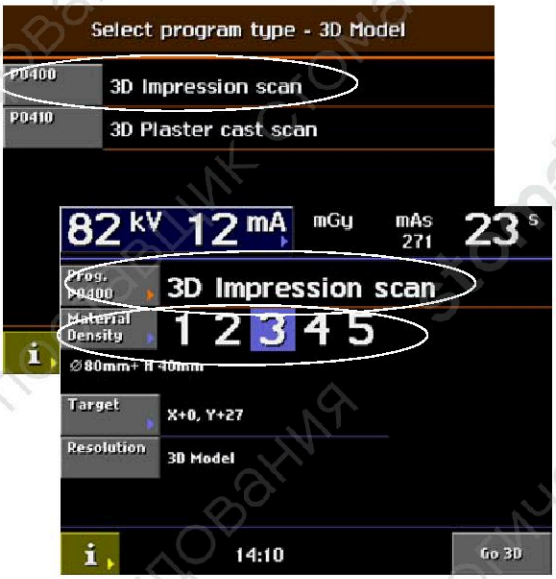
NOTE **FOR IMPRESSIONS**
Do not use impression trays made of metal.



Remove any patient supports attached to the X-ray unit patient support table. Insert the polystyrene disc provided (part number 10017436) into the adapter if it is not in place.



NOTE **FOR X-RAY UNITS WITH PROFACE SENSOR:**
Attach a spacer to the polystyrene disc support before inserting it into the adapter.



On the X-ray unit, select:

- *3D Model* > *3D Impression scan* for impressions or
- *3D Model* > *3D Plaster cast scan* for plaster casts.
- Material density setting you used in the calibration process for this material.

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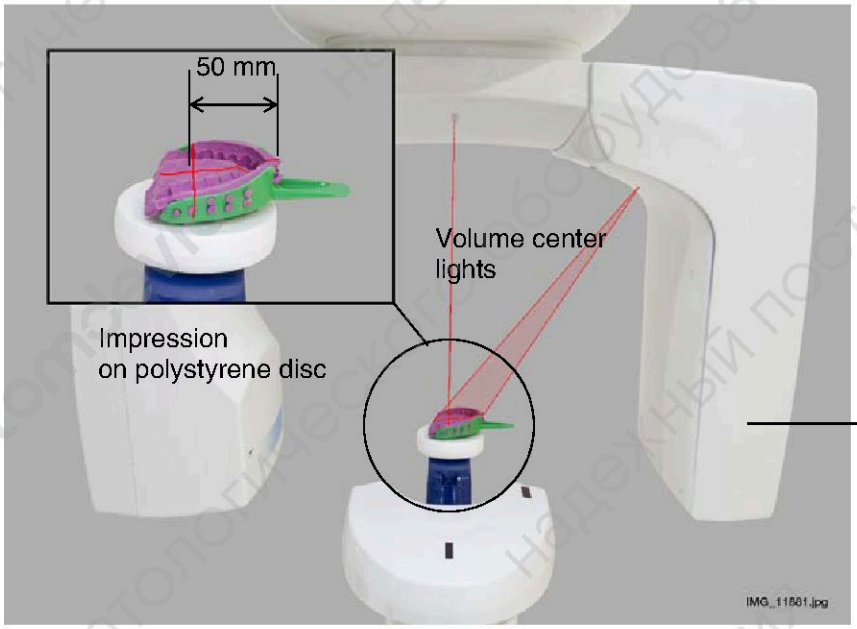


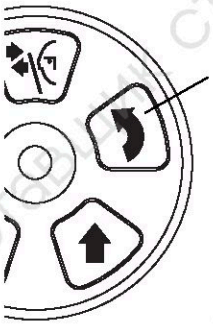
Touch the *Go 3D* field to move the C-arm to the target position. The positioning lights (volume center lights, volume bottom light and incisor light) will come on. The volume center lights will cross in the middle of the image volume.

Place the model (impression or plaster cast) on the polystyrene disc as shown.

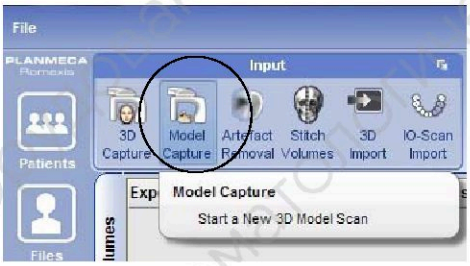
Note that the model has to:

- face the sensor and
- be positioned so that the distance between the cross formed by the volume center lights and the front edge of the model is 50 mm.



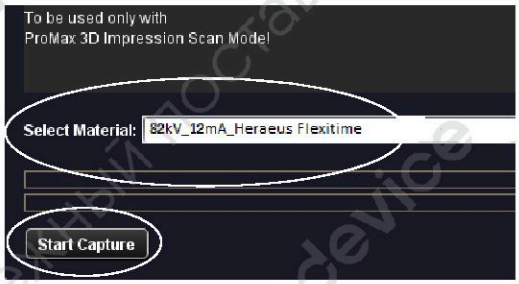


NOTE FOR PLASTER CASTS
Move the C-arm up about 13 mm (0.5 in.) by pressing the image volume up button.



In the Planmeca Romexis program, click *3D* > *Model Capture*. Refer to Romexis User's Manual for full details on how to use Romexis.

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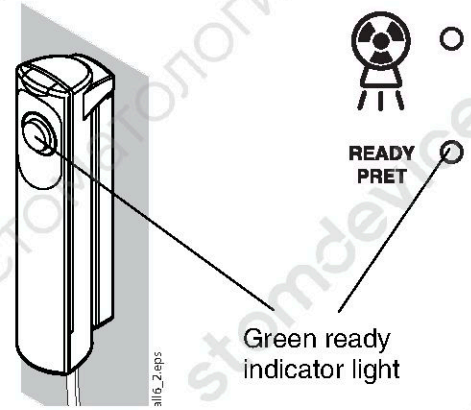


In the window that appears, first select the material you are exposing. Then click the option *Start Capture*.

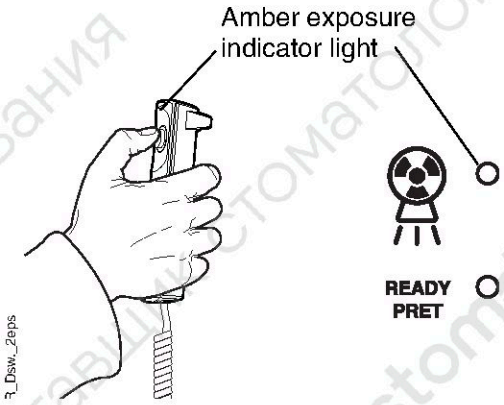
NOTE **Ensure that you have selected the correct exposure values on the X-ray unit.**



On the X-ray unit, touch the *Ready* field to move the X-ray unit to the ready position.

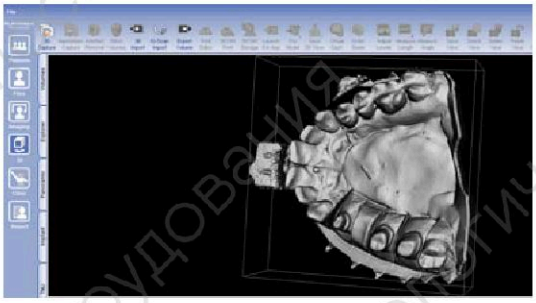


The green indicator lights will flash while the X-ray unit moves to the ready position. They will stop flashing when the X-ray unit has reached the ready position.



Press and hold down the exposure button for the entire duration of the exposure.

During the exposure the radiation warning light on the exposure switch and on the display will come on and you will hear a radiation warning tone. Note that the exposure will last longer than a 3D patient exposure.



The image will show on the computer screen.

NOTE **The Romexis function *Model Capture* creates surface models (instead of voxel data images).**

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14 CLEANING

NOTE **Disconnect the X-ray unit from mains before cleaning.**

NOTE **Do not use cleaning solutions in aerosol or spray form directly on unit surfaces.**

X-ray unit

	Autoclave up to 135°C	Wipe with soft cloth using alcohol based cleaning solution	Wipe with soft cloth using mild cleaning solution
3D head supports (incl. support bars and fastening straps)		X	X
Chin cup	X	X	X
Patient handles		X	X
Other surfaces (incl. control panel)			X

Sensors

	Wipe with soft cloth (NO CLEANING SOLUTION)	Compressed air
3D sensor	X	
ProFace sensor; laser windows in the middle		X
ProFace sensor; other surfaces (incl. glass windows on both sides)	X	

15 SERVICE

To guarantee user and patient safety and to ensure consistent image quality, the X-ray unit must be checked and recalibrated by a qualified Planmeca service technician once a year or after every 10 000 exposures if this is sooner. Refer to the Technical Manual for complete servicing information.

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16 DISPOSAL

In order to reduce the environmental load over the product's entire lifecycle, Planmeca's products are designed to be as safe as possible to manufacture, use and dispose of.

Parts which can be recycled should always be taken to the appropriate processing centers, after hazardous waste has been removed. Disposal of obsolete units is the responsibility of the waste possessor.

All parts and components containing hazardous materials, as well as batteries, must be disposed of in accordance with waste legislation and instructions issued by the environmental authorities. Batteries must be disposed of in compliance with the requirements of Directive 2006 / 66 / EEC.

The risks involved and the necessary precautions must be taken into account when handling waste products.

Part	Main materials for disposal	Recyclable material (X) = if available	Waste disposal site	Hazardous waste (separate collection)
Frame, covers & patient supports				
- metal	Aluminium,	X		
	galvanized steel,	X		
	lead			X
- plastic	PUR,		X	
	other plastics	X		
Motors		(X)		
Component boards		(X)		
Cables, transformers	Copper,	X		
	steel,	X		
	transformer oil			X
X-ray tube				X
Packing	Wood,	X		
	cardboard,	X		
	paper,	X		
	polystyrene	X		
Sensor	Return sensor to Planmeca.			
Other parts			X	

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17 HELP MESSAGES

The X-ray unit incorporates a self-checking feature that monitors the operation of the unit. If the system detects an operating error a help message (e.g. H101) will appear on the control panel.

The X-ray unit will not accept any commands from the user until the help message is cleared from the display. Clear the message by touching *OK*.

The following list shows, in numerical order, all the help messages that can appear on the control panel.

Code	Explanation		Comments
H101	**Exposure switch**	The exposure button was released before end of exposure.	Guide the patient away from the X-ray unit before moving the C-arm. Press and hold down the exposure button for the entire duration of the exposure.
H102		The exposure button is stuck or the cable is short circuited.	Release the exposure button. If necessary, contact your service technician to replace the exposure switch.
H105	**Emergency stop button**	The emergency stop button has been activated.	All movements of the X-ray unit are blocked, no radiation is generated. Guide the patient away from the X-ray unit. Then release the emergency stop button to resume normal operation.
H142	**Height movement**	Height movement is not possible because the stop plate at the bottom of the column was activated.	Clear any obstruction before moving the column again.
H144		Height movement is not possible because one (or more) of the positioning control buttons or the positioning joystick is stuck.	Release the button / joystick.
H148		Height movement is not possible. The position of the patient support table is too high.	Press the X-ray unit down button to move the patient support table down.
H149		Height movement was stopped because the C-arm cannot be moved lower.	Clear any obstruction before continuing.
H150		Height movement was stopped because the patient support table cannot be moved lower.	Clear any obstruction before continuing.

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Code	Explanation		Comments
H151	**Line voltage**	The line voltage was too low during exposure.	Exposure was interrupted. Contact your service technician for help.
H152		The line voltage is too low.	Exposure is not possible. Contact your service technician for help.
H161	**Temperature**	The temperature of the tube head is too high.	Wait for a few minutes for the tube head to cool down.
H162		The temperature of the lift motor is too high.	Wait for a few minutes for the lift motor to cool down.
H163		The temperature of the power supply unit (PSU) is too high.	Wait for a few minutes for the power supply unit (PSU) to cool down.
H165		The temperature of the tube head is too high for the selected exposure values.	Wait for a few minutes for the tube head to cool down.
H166		The maximum tube head energy level was exceeded.	Wait for a few minutes for the tube head to cool down or use lower exposure values.
H177	**User related messages**	Exposure is not possible with these settings.	Change the settings for target area.
H178		Exposure is not possible with these settings.	Change the settings.
H181		The imaging process was cancelled in Romexis.	
H182		Timeout in image data transmission.	Exposure was interrupted. Contact your service technician for help.
H187		Problem during image data transmission.	Exposure was interrupted. Contact your service technician for help.
H189		The control panel was touched during exposure.	Exposure was interrupted.
H191		The y coordinate is out of limits.	Set the y coordinate between 51-91 mm.
H192		It is not possible to enable radiation or PC communication (i410) when demo licenses are switched on (i510).	First switch off demo licenses (i510), then enable radiation or PC communication (i410).
H195		The 3D Model programs must not be used for patient imaging.	Use the 3D Model programs for taking exposures of impressions or plaster casts only.

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18 ERROR MESSAGES

NOTE **Contact your service technician for help if you receive an error message.**

The X-ray unit incorporates a self-checking feature that monitors the operation of the unit. If the system detects a technical fault an error message (e.g. E201) will appear on the control panel.

An error message indicates that the X-ray unit has a problem that needs to be solved before further exposures can be taken. The X-ray unit will not accept any commands from the user until the error message is cleared from the display. Guide the patient away from the X-ray unit. Then clear the message by touching *OK*.

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19 TECHNICAL SPECIFICATIONS

NOTE: SEE TECHNICAL MANUAL FOR USER'S STATEMENT

19.1 Technical data for Planmeca ProMax product family

Classification:	
• Medical Device Directive	93/42/EEC (Class IIb)
• IEC 60601-1	Class I, type B
• CISPR 11	Class B
Generator	Resonant-mode, DSP-controlled, 80...160 kHz, according to IEC 60601-2-7: 1998
X-ray tube	2D / 3D s / 3D Classic / 3D Plus / 3D Mid: Toshiba D-054SB 3D Max: Toshiba D-067SB
Focal spot size	According to IEC 60336 2D / 3D s / 3D Classic / 3D Plus / 3D Mid: 0.5 x 0.5 mm 3D Max: 0.6 x 0.6 mm
Total filtration:	
• 3D	min. 2.5 mm Al + 0.5 mm Cu
• Pan / ceph	min. 2.5 mm Al
Anode voltage (X-ray units with SW prior to 3.0):	
• 3D	3D s / 3D Classic / 3D Mid: 54 - 90 kV ±5% 3D Max: 54 - 96 kV ±5%
• Pan / SmartPan	54 - 84 kV ±5%
• Ceph	60 - 84 kV ±5%
Anode voltage (X-ray units with SW 3.0 or later):	
• 3D	3D s / 3D Classic / 3D Plus / 3D Mid: 60 - 90 kV ±5% 3D Max: 60 - 96 kV ±5%
• Pan / SmartPan	60 - 84 kV ±5%
• Ceph	60 - 84 kV ±5%
Anode current (X-ray units with SW prior to 3.0):	
• 3D	3D s / 3D Classic / 3D Mid: 1 - 14 mA ±10% 3D Max: 1 - 12.5 mA ±10%
• Pan / SmartPan	1 - 16 mA ±10%

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• Ceph	1 - 16 mA ±10%
Anode current (X-ray units with SW 3.0 or later):	
• 3D	3D s / 3D Classic / 3D Plus / 3D Mid: 1 - 14 mA ±10% 3D Max: 1 - 12.5 mA ±10%
• Pan / SmartPan	1 - 16 mA ±10%
• Scanning ceph	1 - 16 mA ±10%
• Planmeca ProCeph	16 mA ±10%
mAs range	min. / max. as indicated ±(10% + 0.2 mAs)
mGy range	min. / max. as indicated ±40%
Linearity of radiation output	< 0.1
Cooling period	Automatically controlled
Exposure time:	
• 3D	3D s: Pulsed, effective 4.8 - 36 s as indicated ±10% 3D Classic / 3D Plus / 3D Mid: Pulsed, effective 2.4 - 36 s as indicated ±10% 3D Max: Pulsed, effective 3.6 - 24 s as indicated ±10%
• Pan	2D / 3D Classic: 2.7 - 16 s as indicated ±10% 2D tomography: 4 - 12 s as indicated ±10%
• SmartPan	3D s / 3D Classic: 3.3 - 19 s as indicated ±10% 3D Plus / 3D Mid: 3.7 - 23 s as indicated ±10% 3D Max: 10 s as indicated ±10%
• Scanning ceph / Normal	12 - 18.7 s as indicated ±10%
• Scanning ceph / High Speed	6.4 - 9.9 s as indicated ±10%
• Planmeca ProCeph	0.1 - 0.8 s as indicated ±10%
SID:	
• 3D	3D s / 3D Classic: 527 mm (20.7 in.) 3D Plus / 3D Mid / 3D Max: 600 mm (23.6 in.)
• Pan	2D / 3D s / 3D Classic: 500 mm (19.7 in.) 3D Plus / 3D Mid: 573 mm (22.6 in.) 3D Max: 600 mm (23.6 in.)
• Ceph	1700 mm (66.9 in.)
Magnification:	
• 3D	3D s / 3D Classic: 1.57 3D Plus / 3D Mid: 1.38, 1.44 or 1.80 3D Max: 1.38, 1.41 or 1.80

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• Pan	2D / 3D Classic: 1.2 - 1.5 2D tomography: 1.5
• SmartPan	3D s / 3D Classic: 1.27 - 1.5 3D Plus / 3D Mid: 1.35 - 1.8 3D Max: 1.4
• Ceph	1.13
Duty cycle for height adjustment	25 s ON / 300 s OFF
Line voltage	100 - 220 V~ / 50 - 60 Hz 230 - 240 V~ / 50 Hz
Line current	8 - 17 A
Line harmonics	Cos better than 0.9
Max. permissible apparent impedance of supply mains	0.5 Ω (100VAC)
Maximum continuous heat dissipation	< 250W
Fuses:	
• 2 user replaceable fuses	100 - 220 V~ / 16A FF H 500V 230 - 240 V~ / 8A FF H 500V
• Type	195100 ELU
Weight:	
• 2D / 3D s / 3D Classic	119 kg (263 lbs)
• 3D Plus / 3D Mid	136 kg (300 lbs)
• 3D Max	134 kg (296 lbs)
• Scanning ceph	26 kg (57 lbs)
• Planmeca ProCeph	20 kg (44 lbs)
Colour	RAL 9016
Environmental requirements	
Transport:	
• Temperature	-20°C - +60°C
• Relative humidity	10 - 90% RH (non-condensing)
• Air pressure	700 - 1060 hPa
Storage:	
• Temperature	-10°C - +50°C
• Relative humidity	10 - 90% RH (non-condensing)

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• Air pressure	700 - 1060 hPa

Operating:

• Temperature	Pan / scanning ceph: +5°C - +40°C 3D / ProCeph: +10°C - +30°C
• Relative humidity	10 - 90% RH (non-condensing)
• Air pressure	700 - 1060 hPa

Image properties

3D:

• Flat panel pixel size	127 µm
• Flat panel active surface	3D s: 80 x 130 mm (3.15 x 5.12 in.) 3D Classic / 3D Plus: 130 x 130 mm (5.12 x 5.12 in.) 3D Mid: 146 x 146 mm (5.74 x 5.74 in.) 3D Max: 193 x 242 mm (7.6 x 9.5 in.)

SmartPan:

• Flat panel pixel size	127 µm
• Flat panel active surface	3D s / 3D Classic / 3D Plus: 8 x 130 mm (0.31 x 5.12 in.) 3D Mid: 8 x 146 mm (0.31 x 5.74 in.) 3D Max: 13 x 162 mm (0.51 x 6.38 in.) 3D Max MultiView: 25 x 162 mm (0.98 x 6.38 in.)

Pan / ceph CCD:

• Pixel size	48 µm
• Pan active surface	6 x 146 mm (0.24 x 5.74 in.)
• Ceph active surface	6 x 292 mm (0.24 x 11.15 in.)

Planmeca ProCeph:

• Flat panel pixel size	139 µm
• Flat panel active surface	302 x 249 mm (11.89 x 9.80 in.)

Operating conditions for X-ray units with ProFace sensor:

• Optimum colour temperature	Approx. 6500 Kelvin
• Frequency for fluorescent lamps	100 Hz
• Even and uniform lighting	
• No natural light	(no windows in the room)
• No green objects next to X-ray	

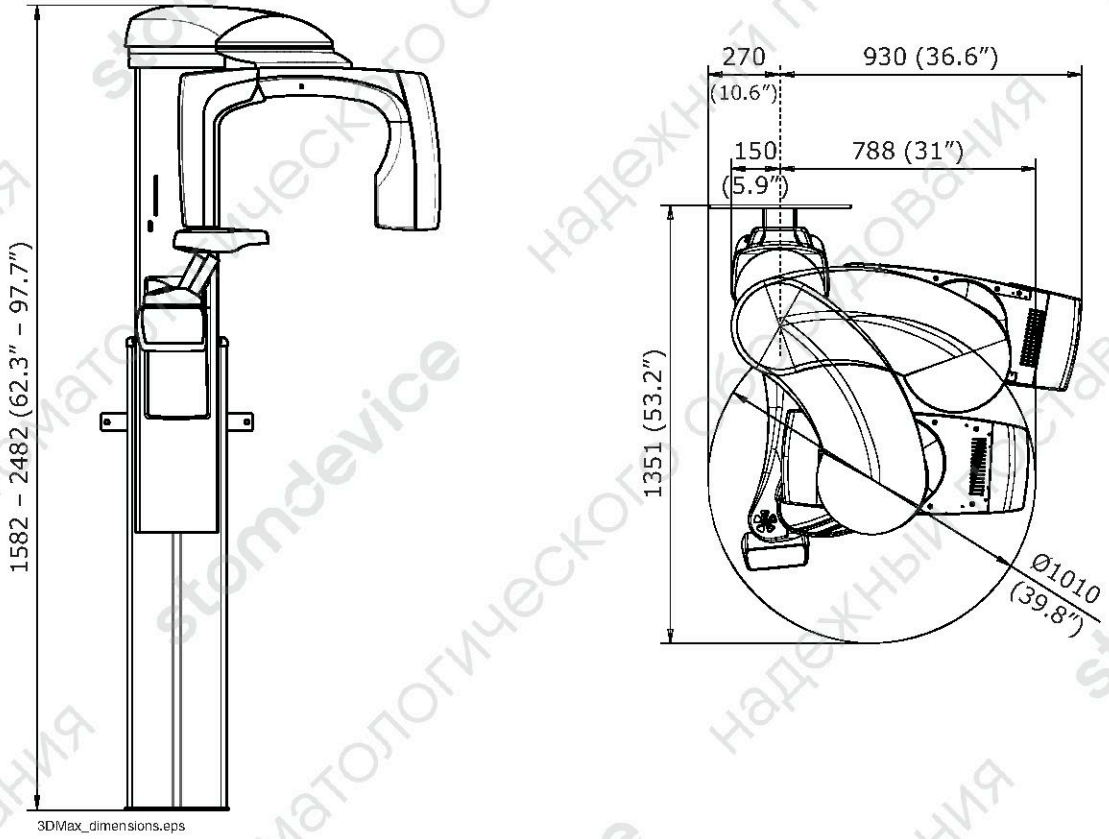
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19.2 Original manufacturer

PLANMECA Oy, Asentajankatu 6, FIN-00880 Helsinki, FINLAND
phone: +358 20 7795 500, fax: +358 20 7795 555, www.planmeca.com

19.3 Dimensions in mm (in.)



19.4 Minimum operational space requirements

NOTE The maximum height can be adjusted to suit offices with low ceiling.

	Width	Depth	Height
Planmeca ProMax 3D Max	1560 mm 62 in.	1740 mm 69 in.	2490 mm 98 in.

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Planmeca Oy | Asentajankatu 6 | 00880 Helsinki | Finland

tel. +358 20 7795 500 | fax +358 20 7795 555 | sales@planmeca.com | www.planmeca.com

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