EN

PLANMECA
Intra

user's manual

10006187_19

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The manufacturer, assembler, and importer are responsible for the safety, reliability and performance of the 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 IEC364
- 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 operate the Planmeca Intra X-ray unit and the Planmeca Intra equipped with Dixi digital X-ray system. Please read these instructions thoroughly before using the unit.

Note that if you use the Dixi digital Intra X-ray system, you need a PC with a Planmeca Dimaxis imaging software to save, view and modify the radiographs. The Dimaxis software has a separate manual, which should be used in conjunction with this manual.

NOTE **Federal law restricts this device to sale by or on the order of a dentist.**

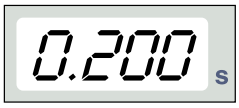
NOTE **This manual is valid for software revisions 3.08 or later.**

NOTE **The Planmeca Intra X-ray unit is allowed to be used only under supervision of a dental/health care professional.**

CE 0537

The Planmeca Intra X-ray unit fulfills the requirements of Directive 93/42/EEC.

All key illustrations indicate that the key should be pressed or, where indicated, pressed and held down. Pressing a key will either switch a function on or off, depending on the original setting, or change the indicated value.



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

Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before using the unit.

1.1 Symbols

Type B equipment (Standard IEC 601-1).

Alternating current (Standard IEC-417).

Attention, consult accompanying documents (Standard IEC 601-1).

Intermediate focal spot (Standard IEC-417).

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

2 WARNINGS AND PRECAUTIONS

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.**

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.***

NOTE **Electromagnetic interference between the equipment and other devices can occur in very extreme conditions. Do not use the equipment in close conjunction with sensitive devices, or devices creating high electromagnetic disturbances.**

CAUTION ***The SIP/SOP shall not be used in Intra, but only for connection of Dixi equipment.***

3 CHECKLIST - BEFORE USING THE UNIT

- Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before using the unit.

- Make sure that the film processor is in working order and is ready for use.

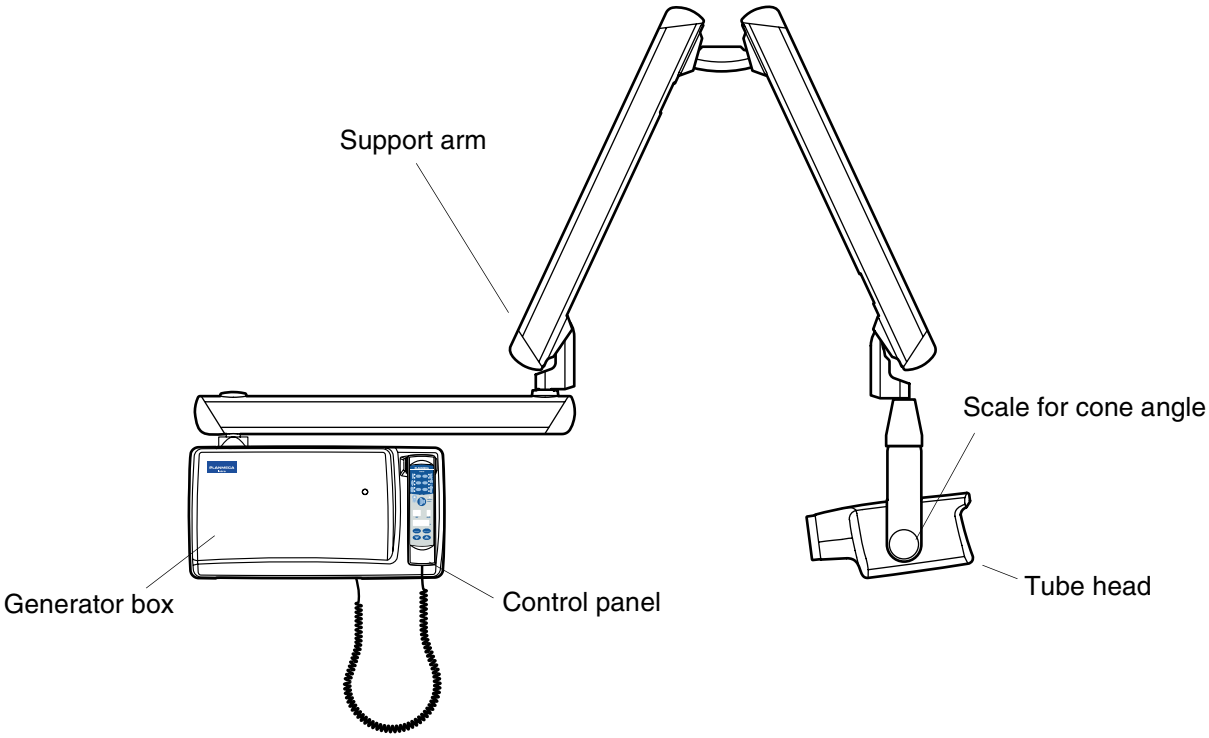
- Make sure that you are using the correct film processing chemicals for the film you are using.

- Make sure that the processing chemicals you are using are fresh and are at the correct processing temperatures and concentrations.

- Make sure that the film you are going to use is fresh. Do not use old film. Store and handle the film according to the manufacturer's instructions.

4 PLANMECA INTRA X-RAY UNIT - MAIN PARTS

4.1 General view of the X-ray



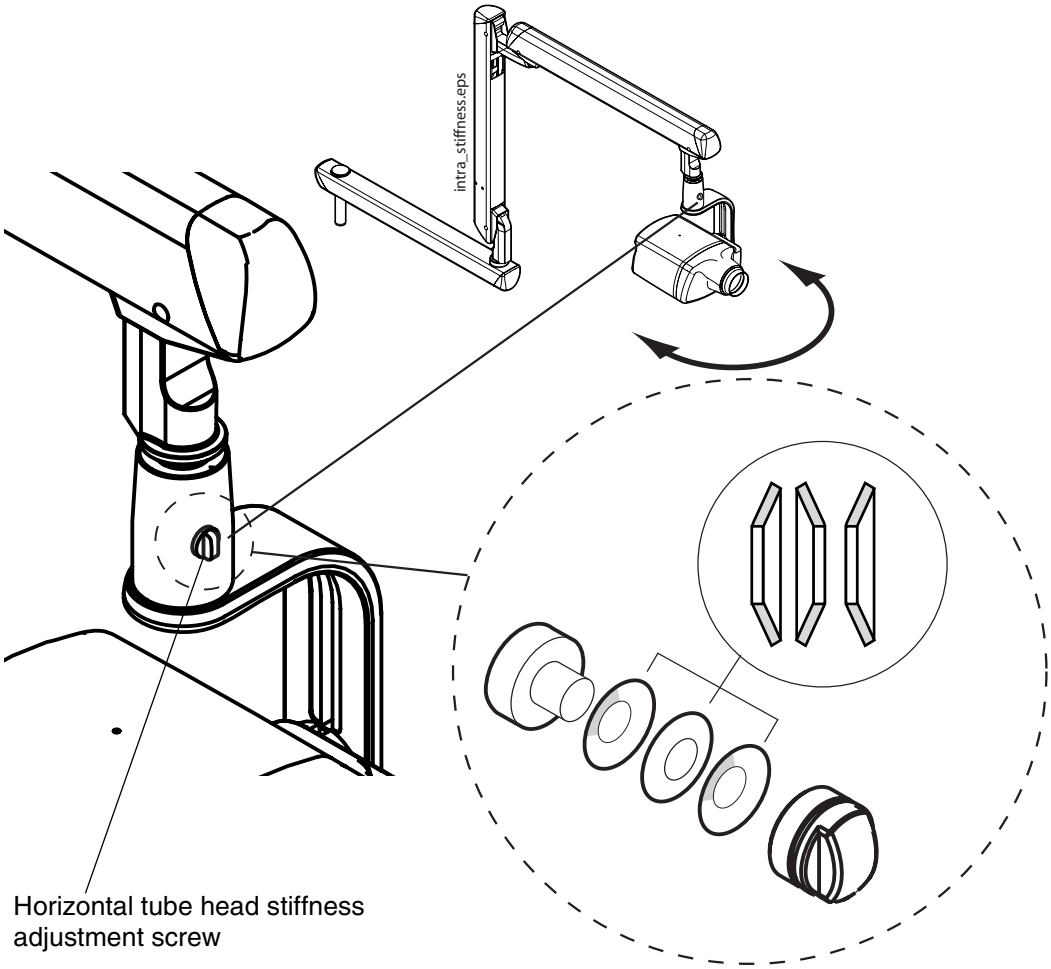
Horizontal tube head stiffness adjustment screw

Adjust the stiffness of the tube head horizontal movement by turning the adjustment screw on the support axle manually or with a wrench tool (see next page).

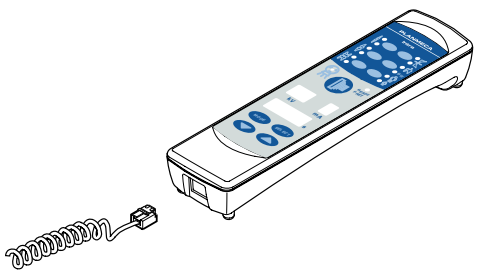
The stiffness of the tube head horizontal movement has been preadjusted at the factory, and can be changed by the user, if necessary.

Turn the adjustment screw 0,5 - 1 rounds clockwise if you want to tighten the tube head and 0,5 - 1 rounds counterclockwise to loosen it.

NOTE **Do not turn the adjustment screw too much counterclockwise to avoid the screw to come loose.**



4.2 Control panel

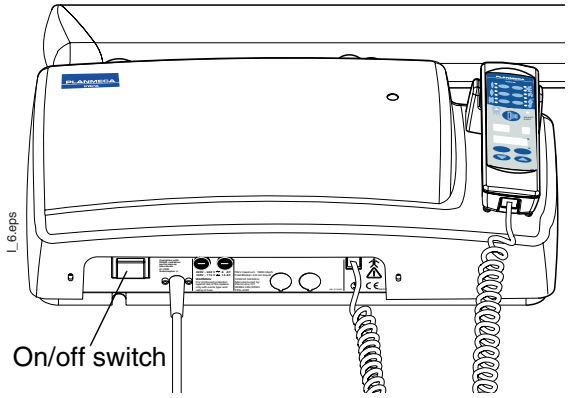


One end of the control panel cable is connected to the terminal at the underside of the generator box, and the other end to the control panel.

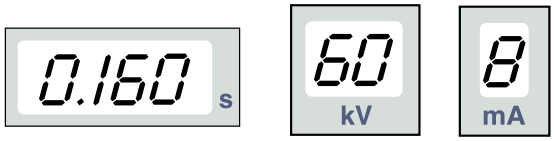
CAUTION Do not connect any other equipment to the control panel's terminal.

5 PREPARATIONS FOR THE EXPOSURE

5.1 Switching the unit on



The on/off switch is located under the generator box. When the unit is switched on it will carry out an automatic self-test during which the Display CPU software version is shown on the kV display, and the Tube head CPU software version on the time display.



After the self-test is completed the default exposure values will appear on the displays.

The default exposure values can be reprogrammed by the user, see section 14.1 “Programming the default exposure and density values” on page 39.

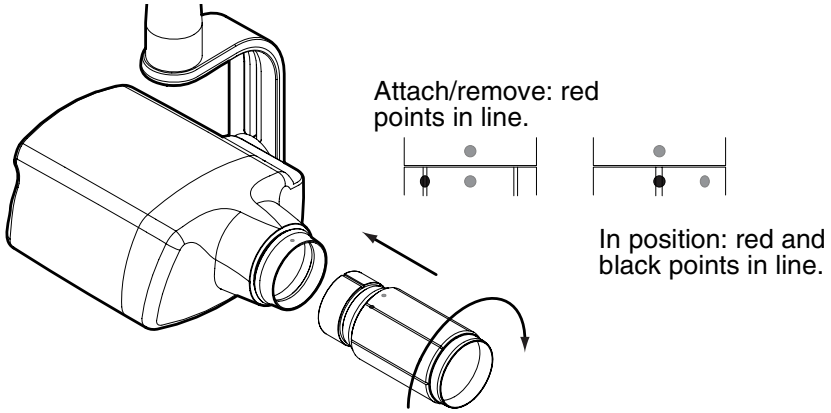
NOTE **There are two sets of default exposure values: one for the adult mode and one for the child mode. The unit is always in the adult mode when it is switched on.**

5.2 Selecting the cone

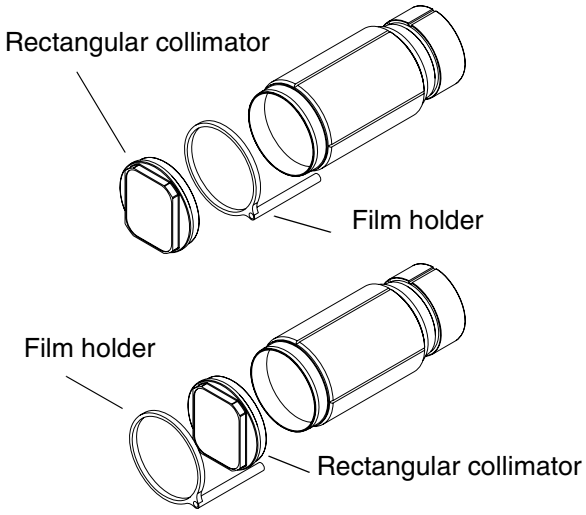
Select the cone to be used in the exposure. It is recommended to use the optional long cone in order to keep the absorbed dose to the patient as low as possible.

Long 30 cm (12") cone

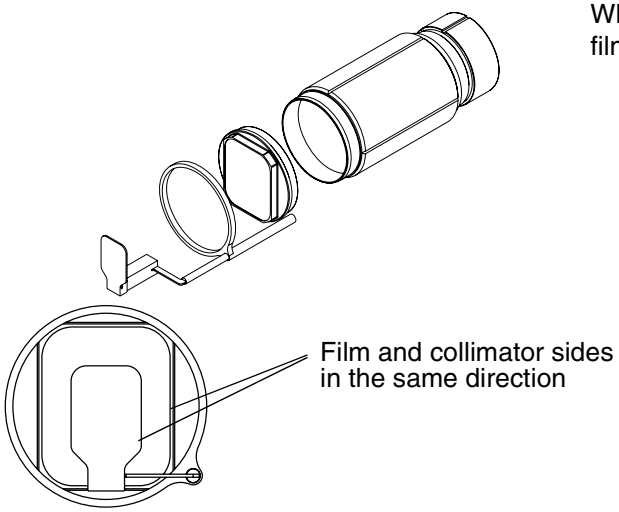
The long cone is attached into its position by pushing it into the short cone and rotating it so that the red point on the short cone and the black point on the long cone are in line.



HAWE film holder



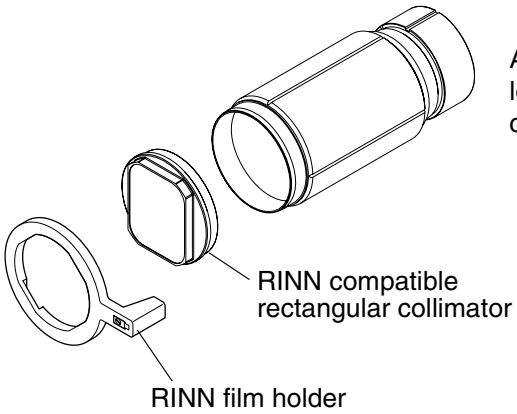
The rectangular collimator can be attached to the long cone either before the film holder or after it. When the collimator is attached before the film holder, the film holder rotates when the collimator is rotated.



When attaching the film to the holder make sure that the film is in the same direction as the rectangular collimator.

NOTE **The exposure values must be selected according to the cone used in the exposure, refer to the section 13 "EXPOSURE VALUES" on page 36.**

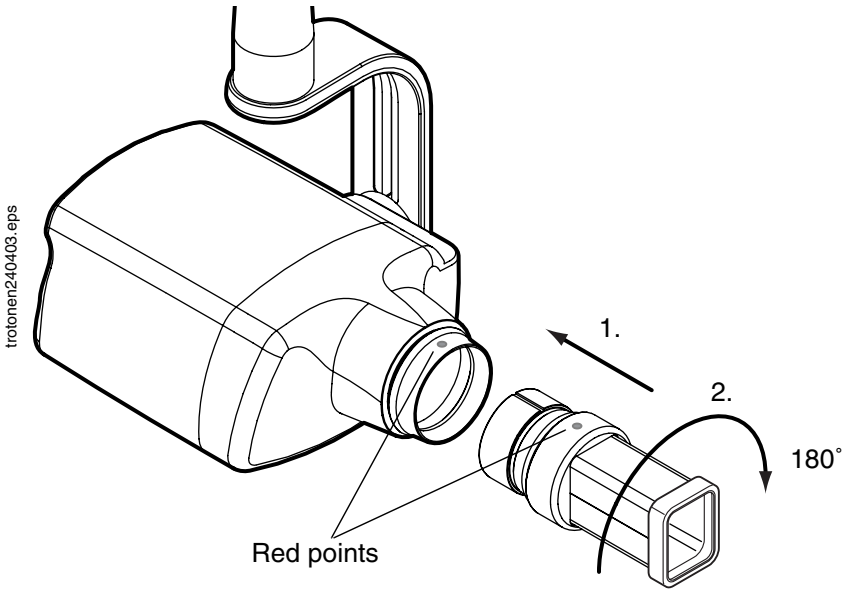
RINN film holder



Attach the RINN compatible rectangular collimator to the long cone. The film holder can be attached to the collimator.

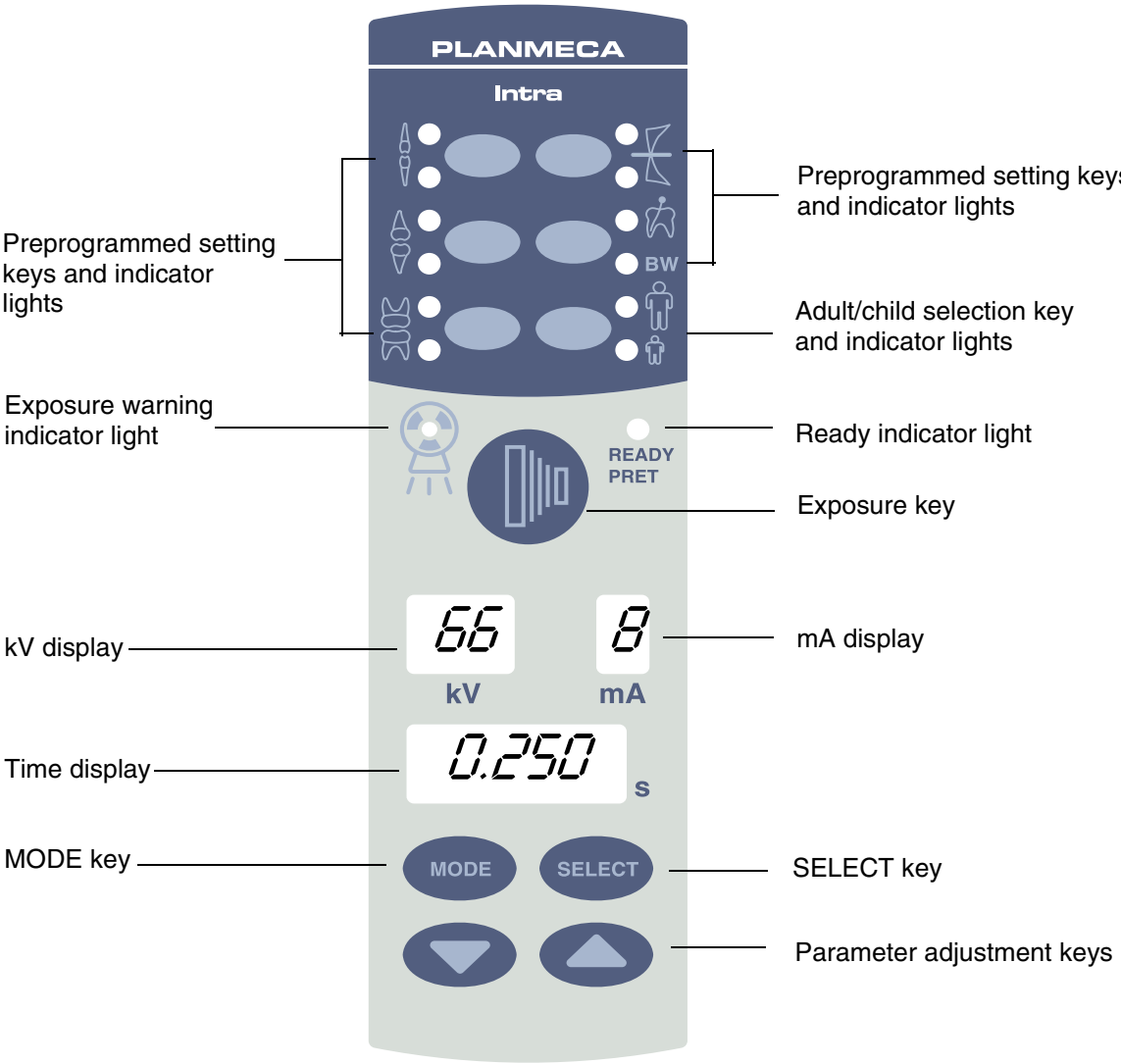
Long rectangular cone

Push the rectangular cone into the short cone so that the red dots on the short cone and on the rectangular cone are in line (1), and rotate the cone 180°, until the black dot on the rectangular cone and the red dot on the short cone are in line (2). The cone can be now rotated in its position ±90°.



The rectangular cone can be removed when the red dots on the short cone and on the rectangular cone are in line.

6 CONTROL PANEL



6.1 Displays

kV display

The selected kV value is shown on the kV display. There are eight different values that can be selected: 50, 52, 55, 57, 60, 63, 66 and 70 kV.

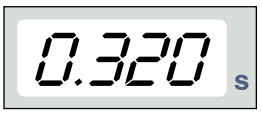
NOTE **The kV range can be 50-70, 55-70, 60-70, 66-70, 70, 50-68, 55-68, 60-68, 66-68 or 68 depending on the local requirements.**

mA display

The selected mA value is shown on the mA display. There are seven different values that can be selected: 2 - 8 mA.

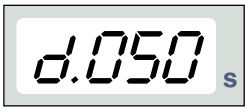
NOTE **The minimum available mA value depends on the local requirements.**

Time display



Film-based imaging mode

The selected exposure time is shown on the time display. After taking an exposure a waiting time starts to flash on the time display which indicates the delay before the next exposure can be taken.



Digital imaging mode

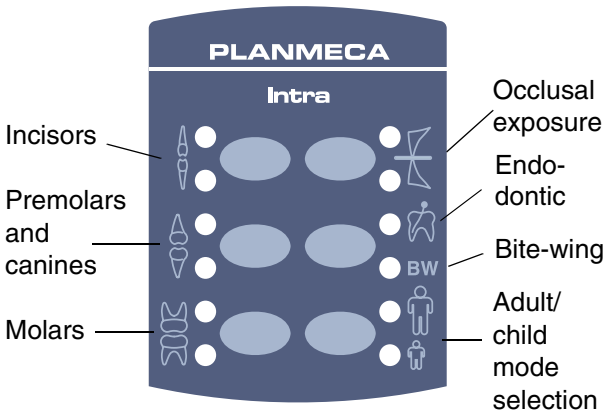
In the digital imaging mode the exposure time is shown with the prefix “d.”

Phosphoric mode

In the phosphoric mode the exposure time is shown with the prefix “P.”.

6.2 Keys and indicator lights

Preprogrammed setting keys and indicator lights



The unit is preprogrammed with exposure parameters - time, kV and mA values - which can be selected by pressing these keys. There are ten sets of parameters for both the child mode and the adult mode: one for each exposure region and one for default exposure values, which are in use when an exposure region is **not** selected.

The selections that can be made are: *molars, premolars & canines, incisors, occlusal exposure, endodontic and bite-wing*.

Press the desired key once to select the projection of the maxilla. The indicator light of the selected projection will come on.

Press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.

Pressing the key a third time will recall the default exposure values.

The preprogrammed settings can be changed by the user, see section 14 “PROGRAMMING THE EXPOSURE VALUES” on page 39.

Adult/child mode selection key and indicator light

Press the adult/child mode selection key once to select the child mode. The indicator light of the child mode will come on.

Press the key again to return to the adult mode. The indicator light of the adult mode will come on.

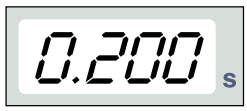
SELECT key

Press the SELECT key briefly to select the parameter - kV, mA or exposure time - to be changed. When the parameter value is flashing on the display, the parameter can be changed. After adjusting the kV or mA value or exposure time the unit will return automatically to the time adjustment mode after 5 seconds time.

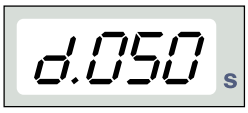
Press and **hold down** the SELECT key (about 4 seconds) until you have heard two signal tones to enter the programming mode. For more information about programming refer to chapter 14.1 “Programming the default exposure and density values” on page 39.

Press the SELECT key to clear the error from the display.

MODE key



Film-based imaging mode



Digital imaging mode

Phosphoric mode

Press the MODE key and hold it down for 2 seconds to select the exposure parameters for film, digital or phosphor plate imaging.

Press the MODE key and hold it down for 2 seconds to enter the digital imaging mode from the film-based imaging mode. There is no prefix on the display in the film-based imaging mode. The exposure time with prefix “d.” appears on the time display in the digital imaging mode. All the keys function as in the film-based imaging mode.

Press the MODE key and hold it down for 2 seconds to enter the phosphoric mode from the digital imaging mode. The exposure time with prefix “P.” appears on the time display in the phosphoric mode. All the keys function as in the film-based imaging mode.

All the exposure parameters remain selected after the exposure until the user changes the parameters or until the unit is switched off.

Parameter adjustment keys

Press the SELECT key briefly to select the parameter - kV, mA, exposure time or density - to be changed. When the parameter value is flashing on the display, the parameter can be changed with the parameter adjustment keys. The up key increases the value and the down key decreases it.

After adjusting the kV or mA value or exposure time the unit will return automatically to the time adjustment mode after 5 seconds time.

Ready indicator light

The green ready indicator light will come on when the unit is ready to take an exposure. The waiting time between exposures is 15 times exposure time, but always at least 6 seconds.

In the programming mode the ready light will start to flash.

NOTE **Planmeca Intra with Dixi3 system:**
You can set the unit so that the Ready indicator light will only come on when the Dimaxis program is ready for the exposure, i.e. “Waiting for exposure” message appears on the computer screen. To change the settings of the unit contact your Planmeca technical support.

Exposure key

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

Exposure warning indicator light

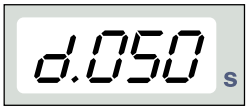
The yellow exposure warning light will come on when you take an exposure. You will also hear an audible warning sound during the exposure.

7 MOLAR EXPOSURE

7.1 Selecting the exposure parameters

Film-based imaging mode

Phosphoric mode

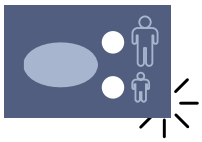


Digital imaging mode

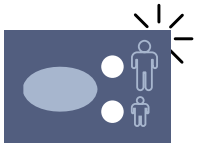
The preprogrammed exposure values are shown in section 13 “EXPOSURE VALUES” on page 36.

Check that you are in the desired mode: in the film-based imaging mode, in the digital imaging mode or in the phosphoric mode.

The imaging mode can be changed by pressing the MODE key for 2 seconds.

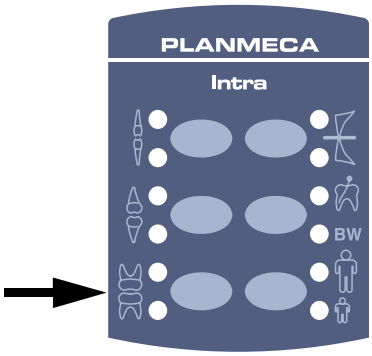


Child



Adult

Select the adult or child mode. The indicator light of the selected projection will come on.



Molars

Select the molar exposure region with the preprogrammed setting keys. Press the molar key once to select the projection of the maxilla, and press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.

The preprogrammed time, kV and mA values appear on the respective displays.

The preprogrammed time, kV and mA values can be temporarily changed with the parameter adjustment keys. This will not affect the preprogrammed values.

Select the parameter to be adjusted with the SELECT key.

When the parameter value is flashing on the kV display, the anode voltage can be changed with the parameter adjusting keys.

When the parameter value is flashing on the mA display, the anode current can be changed with the parameter adjusting keys.

When the parameter value on the kV or mA display is **not** flashing, the exposure time value can be changed with the parameter adjusting keys.

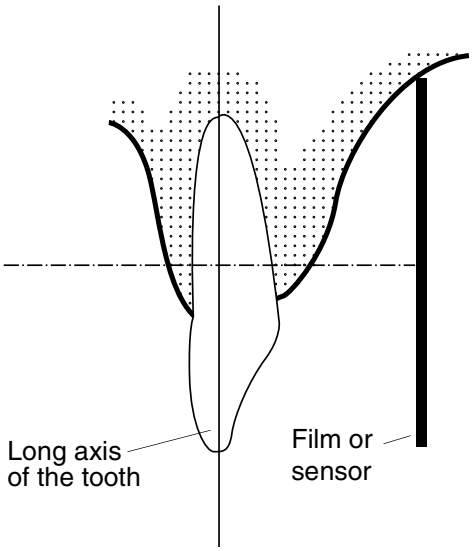
NOTE **After adjusting the kV or mA value the unit will return automatically to the time adjustment mode after 5 seconds time.**

7.2 Patient positioning

Ask the patient to sit down. Place a protective lead apron over the patient's chest.

Positioning the film/sensor

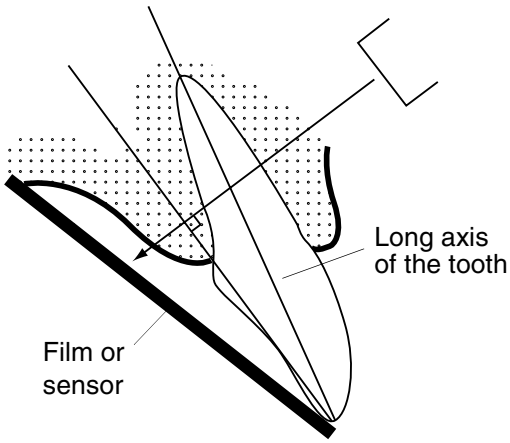
Paralleling technique (recommended)



The film or sensor is placed to a film holder which is used to align the film parallel to the long axis of the tooth.

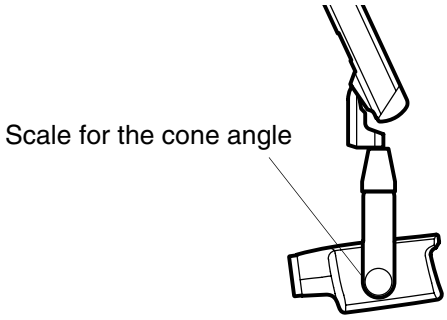
Use a long cone for the paralleling technique.

Bisecting angle technique (optional)



The patient holds the film or sensor in place with his finger. The X-ray beam is directed perpendicularly towards an imaginary line which bisects the angle between the film plane and the long axis of the tooth.

Positioning the cone



The angle of the cone is indicated on the scale located on the vertical joint of the tube head.

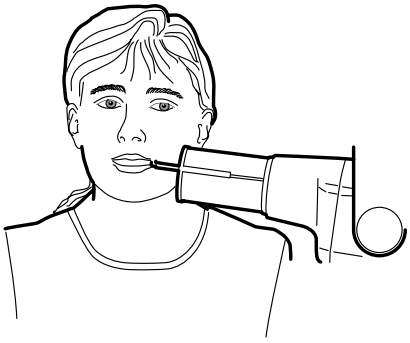
The optional long cone can be attached into the short cone. Refer to chapter 5.2 “Selecting the cone” on page 8.

Select the cone angle from the table below.

TEETH		ANGLE OF INCLINATION
Molars	**Maxilla**	+35°
Molars	**Mandible**	-5°

Position the cone according to the figures below.

Maxillary molar



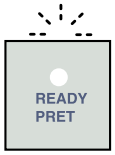
Mandibular molar

7.3 Taking an exposure

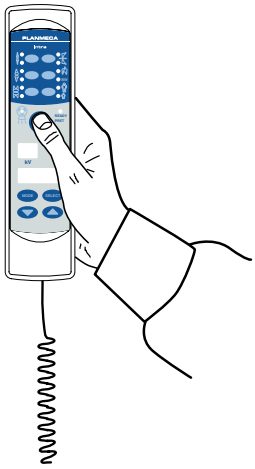
Ask the patient to remain as still as possible. Move as far away from the X-ray tube as the length of the cable from the control panel permits. The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

No one except the patient may remain in the radiation area while the exposure is taken.

NOTE **Maintain audio and visual contact with the patient and unit during the exposure.**



Check that the ready light is on.

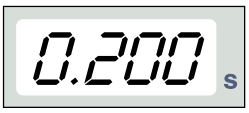


Press and hold the exposure key on the control panel for the duration of the exposure.

The exposure warning light will come on. You will also hear the radiation warning tone during the exposure.

8 PREMOLAR AND CANINE EXPOSURE

8.1 Selecting the exposure parameters



Film-based imaging mode

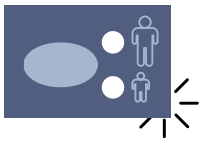
Phosphoric mode

Digital imaging mode

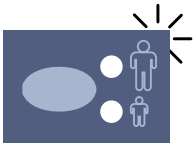
The preprogrammed exposure values are shown in section 13 “EXPOSURE VALUES” on page 36.

Check that you are in the desired mode: in the film-based imaging mode, in the digital imaging mode or in the phosphoric mode.

The imaging mode can be changed by pressing the MODE key for 2 seconds.

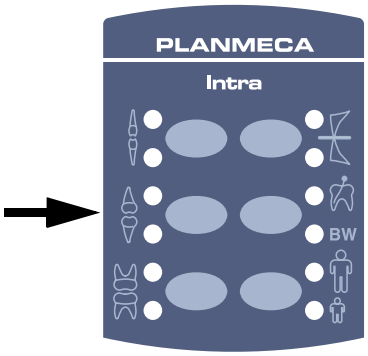


Child



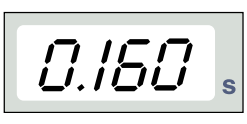
Adult

Select the adult or child mode. The indicator light of the selected projection will come on.



Premolars and canines

Select the premolar and canine exposure region with the preprogrammed setting keys. Press the premolar and canine key once to select the projection of the maxilla, and press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.



The preprogrammed time, kV and mA values appear on the respective displays.

The preprogrammed time, kV and mA values can be temporarily changed with the parameter adjustment keys. This will not affect the preprogrammed values.

Select the parameter to be adjusted with the SELECT key.

When the parameter value is flashing on the kV display, the anode voltage can be changed with the parameter adjusting keys.

When the parameter value is flashing on the mA display, the anode current can be changed with the parameter adjusting keys.

When the parameter value on the kV or mA display is **not** flashing, the exposure time value can be changed with the parameter adjusting keys.

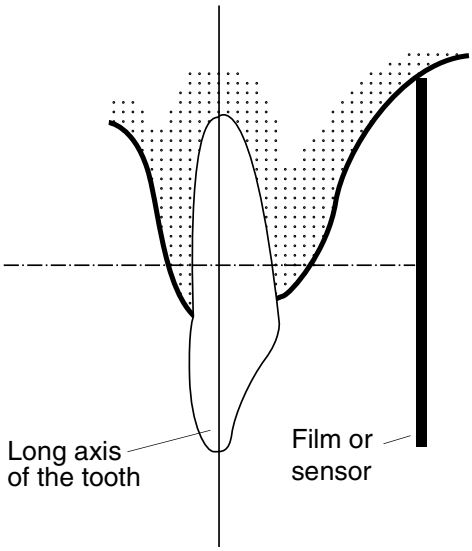
NOTE **After adjusting the kV or mA value the unit will return automatically to the time adjustment mode after 5 seconds time.**

8.2 Patient positioning

Ask the patient to sit down. Place a protective lead apron over the patient's chest.

Positioning the film/sensor

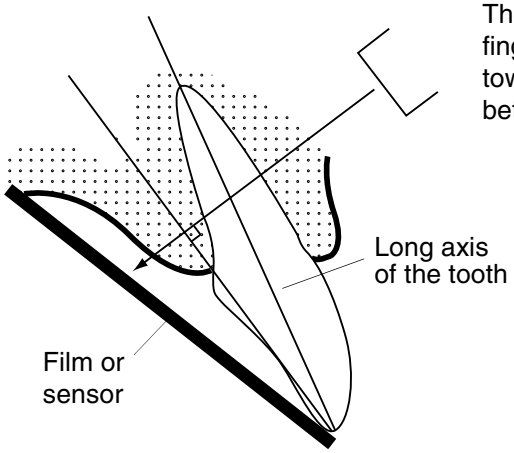
Paralleling technique (recommended)



The film or sensor is placed to a film holder which is used to align the film parallel to the long axis of the tooth.

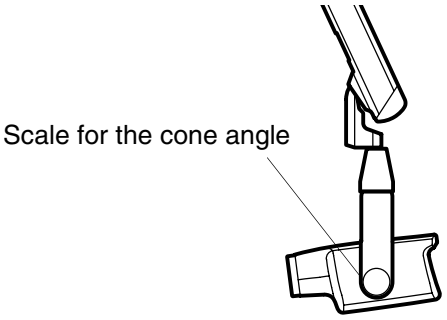
Use a long cone for the paralleling technique.

Bisecting angle technique (optional)



The patient holds the film or sensor in place with his finger. The X-ray beam is directed perpendicularly towards an imaginary line which bisects the angle between the film plane and the long axis of the tooth.

Positioning the cone



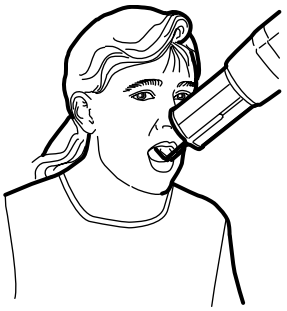
The angle of the cone is indicated on the scale located on the vertical joint of the tube head.

The optional long cone can be attached into the short cone. Refer to chapter 5.2 “Selecting the cone” on page 8.

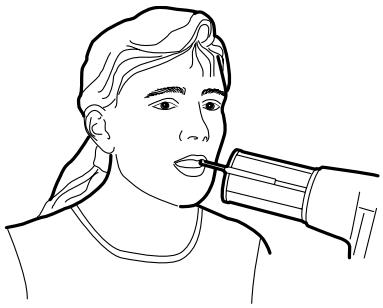
Select the cone angle from the table below.

TEETH		ANGLE OF INCLINATION
Premolars and canine teeth	**Maxilla**	+45°
Premolars and canine teeth	**Mandible**	-10°

Position the cone according to the figure below.



Maxillary premolar and canine



Mandibular premolar and canine

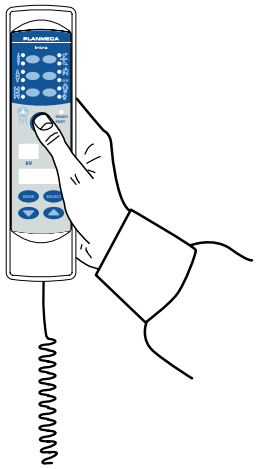
8.3 Taking an exposure

Ask the patient to remain as still as possible. Move as far away from the X-ray tube as the length of the cable from the control panel permits. The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

No one except the patient may remain in the radiation area while the exposure is taken.

NOTE **Maintain audio and visual contact with the patient and unit during the exposure.**

Check that the ready light is on.



Press and hold the exposure key on the control panel for the duration of the exposure.

The exposure warning light will come on. You will also hear the radiation warning tone during the exposure.

9 INCISOR EXPOSURE

9.1 Selecting the exposure parameters

Film-based imaging mode

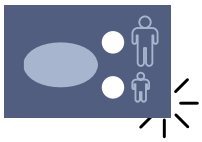
Phosphoric mode

Digital imaging mode

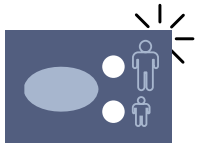
The preprogrammed exposure values are shown in section 13 “EXPOSURE VALUES” on page 36.

Check that you are in the desired mode: in the film-based imaging mode, in the digital imaging mode or in the phosphoric mode.

The imaging mode can be changed by pressing the MODE key for 2 seconds.

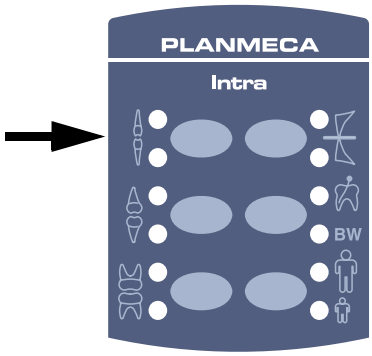


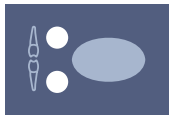
Child



Adult

Select the adult or child mode. The indicator light of the selected projection will come on.





Incisors

Select the incisor exposure region with the preprogrammed setting keys. Press the incisor key once to select the projection of the maxilla, and press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.

The preprogrammed time, kV and mA values appear on the respective displays.

The preprogrammed time, kV and mA values can be temporarily changed with the parameter adjustment keys. This will not affect the preprogrammed values.

Select the parameter to be adjusted with the SELECT key.

When the parameter value is flashing on the kV display, the anode voltage can be changed with the parameter adjusting keys.

When the parameter value is flashing on the mA display, the anode current can be changed with the parameter adjusting keys.

When the parameter value on the kV or mA display is **not** flashing, the exposure time value can be changed with the parameter adjusting keys.

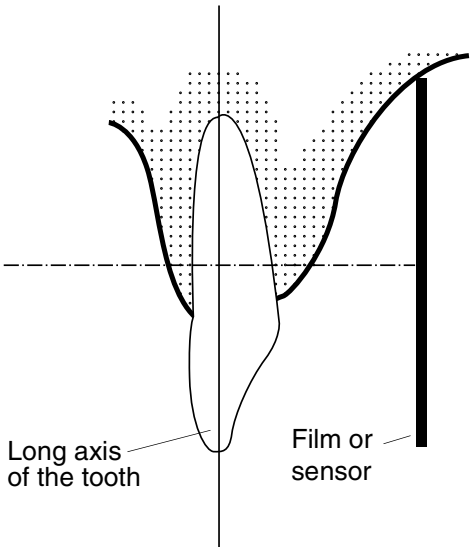
NOTE **After adjusting the kV or mA value the unit will return automatically to the time adjustment mode after 5 seconds time.**

9.2 Patient positioning

Ask the patient to sit down. Place a protective lead apron over the patient's chest.

Positioning the film/sensor

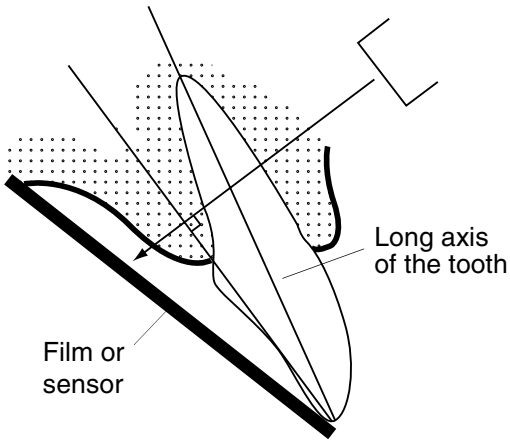
Paralleling technique (recommended)



The film or sensor is placed to a film holder which is used to align the film parallel to the long axis of the tooth.

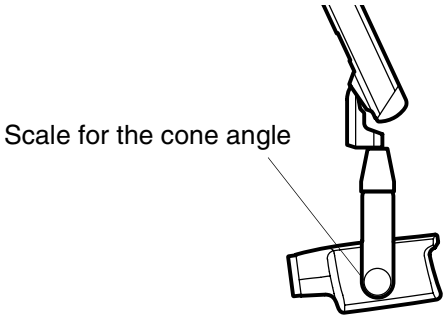
Use a long cone for the paralleling technique.

Bisecting angle technique (optional)



The patient holds the film or sensor in place with his finger. The X-ray beam is directed perpendicularly towards an imaginary line which bisects the angle between the film plane and the long axis of the tooth.

Positioning the cone



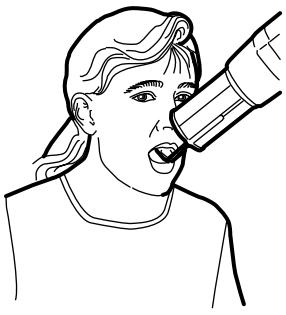
The angle of the cone is indicated on the scale located on the vertical joint of the tube head.

The optional long cone can be attached into the short cone. Refer to chapter 5.2 “Selecting the cone” on page 8.

Select the cone angle from the table below.

TEETH		ANGLE OF INCLINATION
Incisors	**Maxilla**	+55°
Incisors	**Mandible**	-20°

Position the cone according to the figures below.



Maxillary anterior

Mandibular anterior

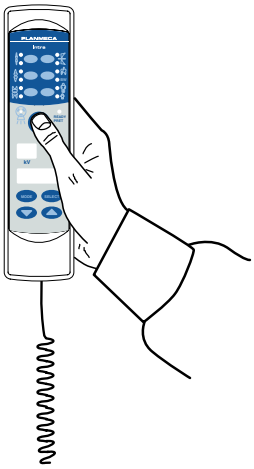
9.3 Taking an exposure

Ask the patient to remain as still as possible. Move as far away from the X-ray tube as the length of the cable from the control panel permits. The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

No one, except the patient may remain in the radiation area while the exposure is taken.

NOTE **Maintain audio and visual contact with the patient and unit during the exposure.**

Check that the ready light is on.

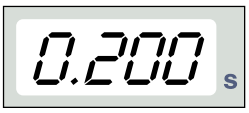


Press and hold the exposure key on the control panel for the duration of the exposure.

The exposure warning light will come on. You will also hear the radiation warning tone during the exposure.

10 OCCLUSAL EXPOSURE

10.1 Selecting the exposure parameters



Film-based imaging mode

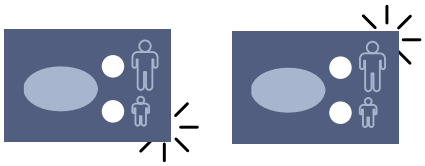
Phosphoric mode

Digital imaging mode

The preprogrammed exposure values are shown in section 13 “EXPOSURE VALUES” on page 36.

Check that you are in the desired mode: in the film-based imaging mode, in the digital imaging mode or in the phosphoric mode.

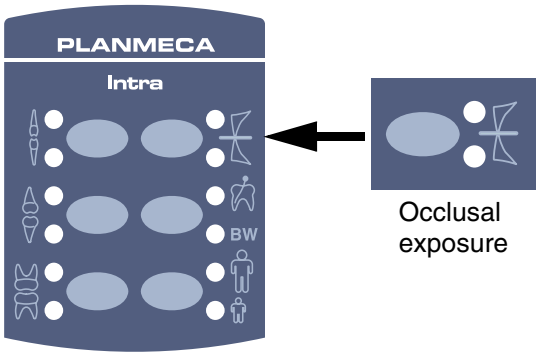
The imaging mode can be changed by pressing the MODE key for 2 seconds.



Child

Adult

Select the adult or child mode. The indicator light of the selected projection will come on.



Occlusal exposure

Select the occlusal exposure region with the preprogrammed setting keys. Press the occlusal exposure key once to select the projection of the maxilla, and press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.

The preprogrammed time, kV and mA values appear on the respective displays.

The preprogrammed time, kV and mA values can be temporarily changed with the parameter adjustment keys. This will not affect the preprogrammed values.

Select the parameter to be adjusted with the SELECT key.

When the parameter value is flashing on the kV display, the anode voltage can be changed with the parameter adjusting keys.

When the parameter value is flashing on the mA display, the anode current can be changed with the parameter adjusting keys.

When the parameter value on the kV or mA display is **not** flashing, the exposure time value can be changed with the parameter adjusting keys.

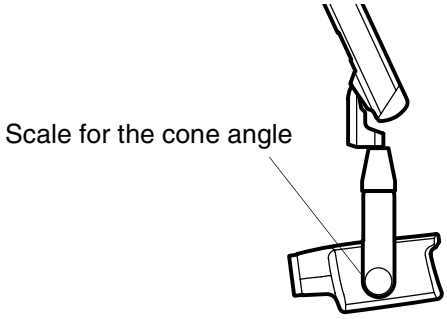
NOTE **After adjusting the kV or mA value the unit will return automatically to the time adjustment mode after 5 seconds time.**

10.2 Patient positioning

Ask the patient to sit down. Place a protective lead apron over the patient's chest.

In the intraoral occlusal exposures the film or sensor is positioned between patient's upper and lower teeth.

Positioning the cone



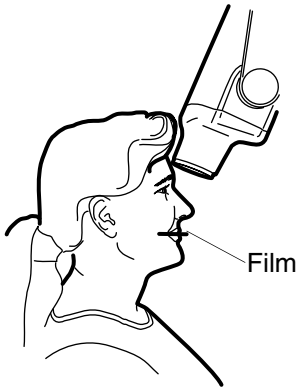
The angle of the cone is indicated on the scale located on the vertical joint of the tube head.

The optional long cone can be attached into the short cone. Refer to chapter 5.2 “Selecting the cone” on page 8.

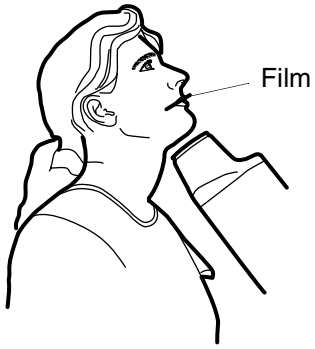
Select the cone angle from the table below.

TEETH		ANGLE OF INCLINATION
Occlusal exposure	**Maxilla**	+75°
Occlusal exposure	**Mandible**	-60°

Position the cone according to the figures below.



Maxillary occlusal



Mandibular occlusal

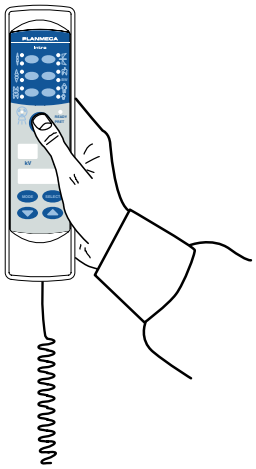
10.3 Taking an exposure

Ask the patient to remain as still as possible. Move as far away from the X-ray tube as the length of the cable from the control panel permits. The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

No one except the patient may remain in the radiation area while the exposure is taken.

NOTE **Maintain audio and visual contact with the patient and unit during the exposure.**

Check that the ready light is on.



Press and hold the exposure key on the control panel for the duration of the exposure.

The exposure warning light will come on. You will also hear the radiation warning tone during the exposure.

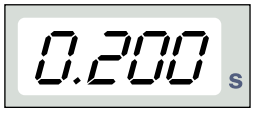
11 ENDODONTIC EXPOSURE

When you are taking an endodontic exposure use the same exposure parameters and patient positioning methods as with the molar, premolar & canine and incisor exposures. See chapters 7 “MOLAR EXPOSURE” on page 15, 8 “PREMOLAR AND CANINE EXPOSURE” on page 19 and 9 “INCISOR EXPOSURE” on page 23 for more information.

It is possible to program two sets of exposure parameters with the endodontic exposure; adult and child.

12 BITE-WING EXPOSURE

12.1 Selecting the exposure parameters



Film-based imaging mode

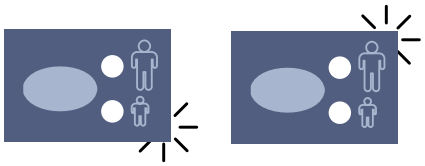
Phosphoric mode

Digital imaging mode

The preprogrammed exposure values are shown in section 13 “EXPOSURE VALUES” on page 36.

Check that you are in the desired mode: in the film-based imaging mode, in the digital imaging mode or in the phosphoric mode.

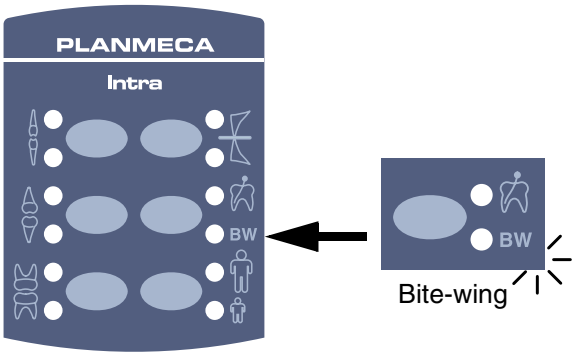
The imaging mode can be changed by pressing the MODE key for 2 seconds.



Child

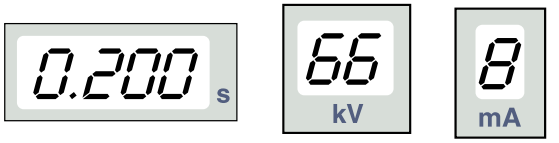
Adult

Select the adult or child mode. The indicator light of the selected projection will come on.



Bite-wing

Select the bite-wing exposure region with the preprogrammed setting keys. Press the bite-wing key once to select the projection of the endo, and press the key twice to select the projection of the bite-wing. The indicator light of the selected projection will come on.



The preprogrammed time, kV and mA values appear on the respective displays.

The preprogrammed time, kV and mA values can be temporarily changed with the parameter adjustment keys. This will not affect the preprogrammed values.

Select the parameter to be adjusted with the SELECT key.

When the parameter value is flashing on the kV display, the anode voltage can be changed with the parameter adjusting keys.

When the parameter value is flashing on the mA display, the anode current can be changed with the parameter adjusting keys.

When the parameter value on the kV or mA display is **not** flashing, the exposure time value can be changed with the parameter adjusting keys.

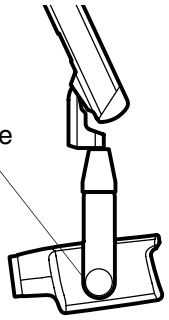
NOTE **After adjusting the kV or mA value the unit will return automatically to the time adjustment mode after 5 seconds time.**

12.2 Patient positioning

Ask the patient to sit down. Place a protective lead apron over the patient's chest.

In the bite-wing exposures the patient closes the teeth during the exposure on the film's tab or on the film/sensor holder.

Positioning the cone



The angle of the cone is indicated on the scale located on the vertical joint of the tube head.

The optional long cone can be attached into the short cone. Refer to chapter 5.2 “Selecting the cone” on page 8.

Select the cone angle from the table below.

TEETH	ANGLE OF INCLINATION
Bite-wing exposure	5°

Position the cone according to the figure below.

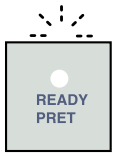
Bite-wing

12.3 Taking an exposure

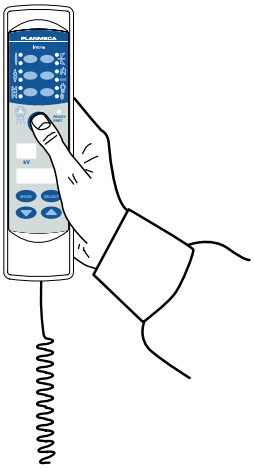
Ask the patient to remain as still as possible. Move as far away from the X-ray tube as the length of the cable from the control panel permits. The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

No one, except the patient may remain in the radiation area while the exposure is taken.

NOTE **Maintain audio and visual contact with the patient and unit during the exposure.**



Check that the ready light is on.



Press and hold down the exposure key on the control panel for the duration of the exposure.

The exposure warning light will come on. You will also hear the radiation warning tone during the exposure.

13 EXPOSURE VALUES

13.1 Default exposure values

When the unit is switched on, the default exposure values appear on the displays.

These values can be programmed by the user, see section 14.1 “Programming the default exposure and density values” on page 39.

NOTE The exposure values are programmed corresponding the density value 0 (factory preset value). The exposure time values are automatically scaled according to the density value.

NOTE These values are for speed F films (Kodak Insight). For the speed E films (Kodak Ektaspeed) select 1 step longer and for the speed D films 4 steps longer exposure time.

NOTE The following exposure values need 8 mA.

PATIENT	kV	time
Adult	63	0.080
Child	60	0.064

NOTE The preprogrammed default exposure values are for the 20 cm (8”) cone. When using the 30 cm long cone, use the exposure values given in the table below.

PATIENT	kV	time
Adult	63	0.160
Child	60	0.120

NOTE When using the digital sensor change the exposure values by pressing the MODE key.

PATIENT	kV	time
Adult	63	0.050
Child	60	0.040

PATIENT	kV	time
Adult	63	0.160
Child	60	0.125

13.2 Preprogrammed settings values

NOTE Two sets of exposure values (time/kV/mA) have been programmed for each exposure region: one for adult mode and one for child mode.

NOTE The exposure time values are programmed corresponding the present density value.
The exposure time values are automatically scaled according to the density value. If you select a density value other than 0, the new values are shown both in programming and exposure mode.

These values can be programmed by the user, see section 14.2 “Programming the preprogrammed settings” on page 41. The recommended exposure values are given in section 17 “EXPOSURE VALUE TABLES” on page 44.

NOTE These values are for speed F films (Kodak Insight). For the speed E films (Kodak Ektaspeed) select 1 step longer and for the speed D films 4 steps longer exposure time.

NOTE The following exposure values need 8 mA.

NOTE The values in the following three tables correspond to the density value 0.

		INCISORS		PREMOLARS AND CANINES		MOLARS		OCCLUSAL EXPOSURE		ENDO-DONTIC		BITE-WING	
		kV	time	kV	time	kV	time	kV	time	kV	time	kV	time
Adult	Maxilla	60	0.080	63	0.080	63	0.100	70	0.080	60	0.080	63	0.080
	Mandible	60	0.064	63	0.064	63	0.080	70	0.080				
Child	Maxilla	60	0.050	60	0.064	60	0.080	66	0.064	60	0.064	60	0.064
	Mandible	60	0.040	60	0.050	60	0.064	66	0.064				

When using the 30 cm long cone program the values according to the table given in section 17 “EXPOSURE VALUE TABLES” on page 44 or select three steps darker density (longer exposure time).

		INCISORS		PREMOLARS AND CANINES		MOLARS		OCCLUSAL EXPOSURE		ENDO-DONTIC		BITE-WING	
		kV	time	kV	time	kV	time	kV	time	kV	time	kV	time
Adult	Maxilla	60	0.050	63	0.050	63	0.064	70	0.050	60	0.050	63	0.050
	Mandible	60	0.040	63	0.040	63	0.050	70	0.050				
Child	Maxilla	60	0.032	60	0.040	60	0.050	66	0.040	60	0.040	60	0.040
	Mandible	60	0.020	60	0.032	60	0.040	66	0.040				

		INCISORS		PREMOLARS AND CANINES		MOLARS		OCCLUSAL EXPOSURE		ENDO-DONTIC		BITE-WING	
		kV	time	kV	time	kV	time	kV	time	kV	time	kV	time
Adult	Maxilla	60	0.125	63	0.125	63	0.160	70	0.160	60	0.160	63	0.160
	Mandible	60	0.100	63	0.100	63	0.125	70	0.160				
Child	Maxilla	60	0.064	60	0.080	60	0.100	66	0.125	60	0.125	60	0.125
	Mandible	60	0.040	60	0.064	60	0.080	66	0.125				

14 PROGRAMMING THE EXPOSURE VALUES

14.1 Programming the default exposure and density values

Programming the default exposure values

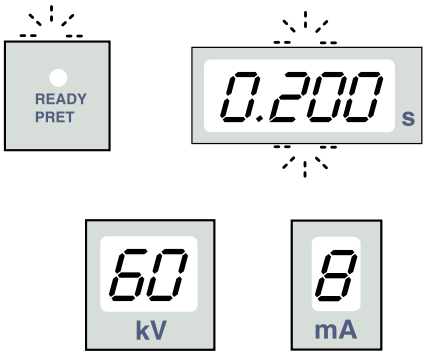
The default exposure values can be programmed for both the adult and child mode. The indicator light of the selected projection will come on. The current exposure values are shown on the time, kV and mA displays.

NOTE **Make sure that no exposure region is selected, i.e. no preprogrammed setting indicator light is on.**

NOTE **The exposure parameters - time, kV and mA - are programmed corresponding to the density value 0. The time value will be automatically changed according to the selected density value in the film-based imaging mode, in the digital imaging mode and in the phosphoric mode when you exit the programming mode.**

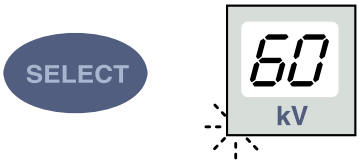
Press and **hold down** the SELECT key (about 4 seconds) until you have heard a signal tone to enter the programming mode.

The imaging mode can be changed by pressing the MODE key briefly.



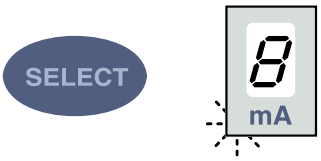
The ready light will start to flash. The time display will start to flash and the default exposure values will appear on the displays.

The exposure time value is changed with the parameter adjustment keys. The exposure times are shown in section 17.1 “Exposure values for speed F films” on page 44.



Press the SELECT key **briefly**, the kV display will start to flash and the exposure time value is stored in the memory.

The kV value can now be changed with the parameter adjustment keys.



Press the SELECT key **briefly**, the mA display will start to flash and the kV value is stored in the memory.

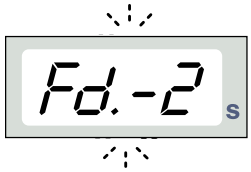
The mA value can now be changed with the parameter adjustment keys.

Programming the density values

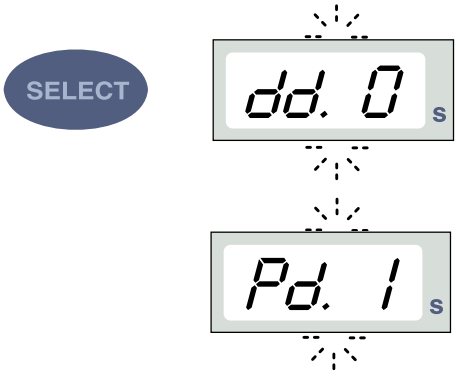
In the film-based imaging mode the type of the film processor, processing chemicals and temperatures used will affect the film density.

By changing the density value all the preprogrammed values can be changed. This can be used for example when a more sensitive or less sensitive film is being used or when the cone is being changed.

Changing the density value will change the selected time value as follows: one density step equals to one time step. The negative density value shortens the selected time value, whereas the positive value lengthens it.



When the SELECT key is pressed a third time **briefly**, the current density value starts to flash on the time display and the mA value is stored in the memory.



The imaging mode can be changed by pressing the MODE key briefly.

The density value can now be changed with the parameter adjustment keys. Note that the density value will affect the time value both in adult and in child mode.

The density has 11 steps from -5 (light exposures) to +5 (dark exposures).

Select the child/adult mode and program its settings as described above or exit the programming mode by pressing and holding down the SELECT key. The density value is stored in the memory.

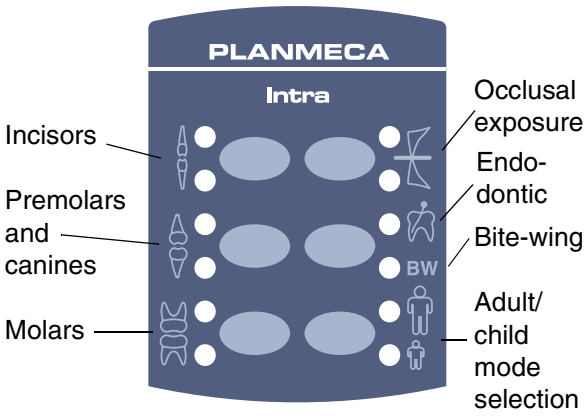
NOTE **Both the child and adult mode have the same density values.**

NOTE **If you interrupt programming for over 45 seconds, the unit automatically exits the programming mode, and the current values will be stored in the memory.**

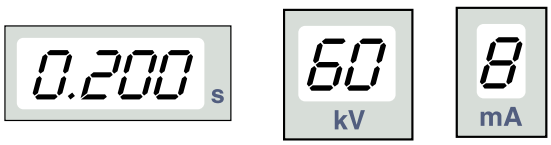
14.2 Programming the preprogrammed settings

NOTE **Two sets of exposure values (time/kV/mA) can be programmed for each exposure region: one for adult mode and one for child mode. The indicator light of the selected projection will come on.**

NOTE **The exposure parameters - time, kV and mA - are programmed corresponding to the density value 0. The time value will be automatically changed according to the selected density value in the film-based imaging mode, in the digital imaging mode and in the phosphoric mode when you exit the programming mode.**



Select the exposure region with the preprogrammed setting keys. Press the desired key once to select the projection of the maxilla, and press the key twice to select the projection of the mandible. The indicator light of the selected projection will come on.

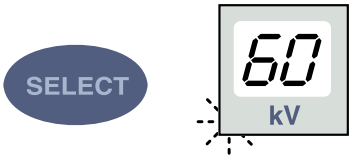


The current time, kV and mA values appear on the respective displays.

Press and **hold down** the SELECT key (about 4 seconds) until you have heard a signal tone to enter the programming mode. The time display and the ready light will start to flash.

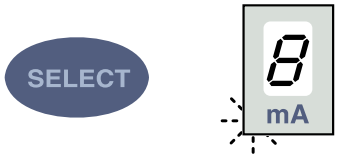
The imaging mode can be changed by pressing the MODE key briefly.

The exposure time value is changed with the parameter adjustment keys.



Press the SELECT key **briefly**, the kV display will start to flash and the exposure time value is stored in the memory.

The kV value can now be changed with the parameter adjustment keys.



Press the SELECT key again **briefly**, the mA display will start to flash and the kV value is stored in the memory.

The mA value can now be changed with the parameter adjustment keys.

You can now select a new exposure region or exit the programming mode by pressing and holding down the SELECT key (about 4 seconds). You will hear a signal tone.

NOTE **If you interrupt programming for over 45 seconds, the unit automatically exits the programming mode, and the current values will be stored in the memory.**

15 CLEANING

15.1 Surfaces

NOTE When cleaning the unit surfaces, always disconnect the unit from mains.

The unit surfaces can be cleaned with a soft cloth damped in a mild cleaning solution.

Stronger agents can be used for disinfecting the surfaces. We recommend Dürr System-hygiene FD 322 or respective disinfecting solution.

15.2 Film holder

The film holder can be autoclaved up to 145°C or cleaned with alcohol-based solutions.

16 SERVICE

To guarantee user and patient safety and to ensure image quality the 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. Please refer to the **Planmeca Intra Technical Manual** for complete servicing information.

17 EXPOSURE VALUE TABLES

17.1 Exposure values for speed F films

NOTE **These values are for speed F films (Kodak Insight). For the speed E films (Kodak Ektaspeed) select 1 step longer and for the speed D films 4 steps longer exposure time.**

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s
8 mA	70 kV/ child				I		P	M	O		MAXILLA																
		I			P		M		O		MANDIBLE																
8 mA	66 kV/ child						I	P	M	O		MAXILLA															
					I		P	M		O		MANDIBLE															
8 mA	63 kV/ child							I	P	M	O		MAXILLA														
							I	P	M		O		MANDIBLE														
8 mA	60 kV/ child								I	P	M	O		MAXILLA													
								I	P	M		O		MANDIBLE													
8 mA	57 kV/ child									I	P	M	O		MAXILLA												
									I	P	M		O		MANDIBLE												
8 mA	55 kV/ child										I	P	M	O		MAXILLA											
										I	P	M		O		MANDIBLE											
8 mA	52 kV/ child											I	P	M	O		MAXILLA										
											I	P	M		O		MANDIBLE										
8 mA	50 kV/ child												I	P	M	O		MAXILLA									
												I	P	M		O		MANDIBLE									
8 mA	70 kV/ adult							I	P	M	O		MAXILLA														
							I	P	M		O		MANDIBLE														
8 mA	66 kV/ adult								I	P	M	O		MAXILLA													
								I	P	M		O		MANDIBLE													
8 mA	63 kV/ adult									I	P	M	O		MAXILLA												
									I	P	M		O		MANDIBLE												
8 mA	60 kV/ adult										I	P	M	O		MAXILLA											
										I	P	M		O		MANDIBLE											
8 mA	57 kV/ adult											I	P	M	O		MAXILLA										
											I	P	M		O		MANDIBLE										
8 mA	55 kV/ adult												I	P	M	O		MAXILLA									
												I	P	M		O		MANDIBLE									
8 mA	52 kV/ adult												I	P	M	O		MAXILLA									
												I	P	M		O		MANDIBLE									
8 mA	50 kV/ adult													I	P	M	O		MAXILLA								
													I	P	M		O		MANDIBLE								

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s
8 mA	70 kV/ child								I	P	M	O		MAXILLA													
								I	P	M		O		MANDIBLE													

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s
8 mA	66 kV/ child									I	P	M	O		MAXILLA												
									I	P	M		O		MANDIBLE												
8 mA	63 kV/ child										I	P	M	O		MAXILLA											
										I	P	M		O		MANDIBLE											
8 mA	60 kV/ child											I	P	M	O		MAXILLA										
											I	P	M		O		MANDIBLE										
8 mA	57 kV/ child												I	P	M	O		MAXILLA									
												I	P	M		O		MANDIBLE									
8 mA	55 kV/ child													I	P	M	O		MAXILLA								
													I	P	M		O		MANDIBLE								
8 mA	52 kV/ child														I	P	M	O		MAXILLA							
														I	P	M		O		MANDIBLE							
8 mA	50 kV/ child															I	P	M	O		MAXILLA						
															I	P	M		O		MANDIBLE						
8 mA	70 kV/ adult										I	P	M	O		MAXILLA											
										I	P	M		O		MANDIBLE											
8 mA	66 kV/ adult											I	P	M	O		MAXILLA										
											I	P	M		O		MANDIBLE										
8 mA	63 kV/ adult												I	P	M	O		MAXILLA									
												I	P	M		O		MANDIBLE									
8 mA	60 kV/ adult													I	P	M	O		MAXILLA								
													I	P	M		O		MANDIBLE								
8 mA	57 kV/ adult														I	P	M	O		MAXILLA							
														I	P	M		O		MANDIBLE							
8 mA	55 kV/ adult															I	P	M	O		MAXILLA						
															I	P	M		O		MANDIBLE						
8 mA	52 kV/ adult																I	P	M	O		MAXILLA					
																I	P	M		O		MANDIBLE					
8 mA	50 kV/ adult																	I	P	M	O		MAXILLA				
																	I	P	M		O		MANDIBLE				

I INCISORS
M MOLARS
P PREMOLARS AND CANINES
O OCCLUSAL EXPOSURE

17.2 Exposure values for Dixi2 V1 sensors (high sensitivity)

Select the digital imaging mode of the unit or adjust the exposure time according to the table.

NOTE In the digital imaging mode the highest time value that can be selected is 0.80 seconds.

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s
2 mA	70 kV/ child				I			P		M		MAXILLA									
		I			P			M				MANDIBLE									
4 mA	66 kV/ child				I			P		M		MAXILLA									
		I			P			M				MANDIBLE									
8 mA	63 kV/ child				I		P	M		MAXILLA											
		I			P		M			MANDIBLE											
8 mA	60 kV/ child						I	P	M		MAXILLA										
					I		P	M			MANDIBLE										
8 mA	57 kV/ child							I	P	M		MAXILLA									
							I	P	M			MANDIBLE									
8 mA	55 kV/ child								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	52 kV/ child									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	50 kV/ child										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	70 kV/ adult				I		P	M		MAXILLA											
		I			P		M			MANDIBLE											
8 mA	66 kV/ adult						I	P	M		MAXILLA										
					I		P	M			MANDIBLE										
8 mA	63 kV/ adult							I	P	M		MAXILLA									
							I	P	M			MANDIBLE									
8 mA	60 kV/ adult								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	57 kV/ adult									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	55 kV/ adult										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	52 kV/ adult											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	50 kV/ adult												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				

I INCISORS
P PREMOLARS AND CANINES
M MOLARS

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s
8 mA	70 kV/ child						I	P	M		MAXILLA										
					I		P	M			MANDIBLE										
8 mA	66 kV/ child							I	P	M		MAXILLA									
							I	P	M			MANDIBLE									
8 mA	63 kV/ child								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	60 kV/ child									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	57 kV/ child										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	55 kV/ child											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	52 kV/ child												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	50 kV/ child													I	P	M		MAXILLA			
													I	P	M			MANDIBLE			
8 mA	70 kV/ adult								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	66 kV/ adult									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	63 kV/ adult										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	60 kV/ adult											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	57 kV/ adult												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	55 kV/ adult													I	P	M		MAXILLA			
													I	P	M			MANDIBLE			
8 mA	52 kV/ adult														I	P	M		MAXILLA		
														I	P	M			MANDIBLE	
8 mA	50 kV/ adult										MAXILLA					I	P	M			
											MANDIBLE				I	P	M				

I INCISORS
P PREMOLARS AND CANINES
M MOLARS

17.3 Exposure values for Dixi2 V3 sensors

Select the digital imaging mode of the unit or adjust the exposure time according to the table.

NOTE In the digital imaging mode the highest time value that can be selected is 0.80 seconds.

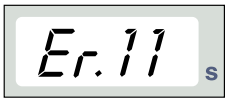
mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s
8 mA	70 kV/ child				I		P	M		MAXILLA											
		I			P		M			MANDIBLE											
8 mA	66 kV/ child						I	P	M		MAXILLA										
					I		P	M			MANDIBLE										
8 mA	63 kV/ child							I	P	M		MAXILLA									
							I	P	M			MANDIBLE									
8 mA	60 kV/ child								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	57 kV/ child									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	55 kV/ child										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	52 kV/ child											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	50 kV/ child												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	70 kV/ adult							I	P	M		MAXILLA									
							I	P	M			MANDIBLE									
8 mA	66 kV/ adult								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	63 kV/ adult									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	60 kV/ adult										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	57 kV/ adult											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	55 kV/ adult												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	52 kV/ adult													I	P	M		MAXILLA			
													I	P	M			MANDIBLE			
8 mA	50 kV/ adult														I	P	M		MAXILLA		
														I	P	M			MANDIBLE		

I INCISORS
P PREMOLARS AND CANINES
M MOLARS

mA	TIME	0.010s	0.012s	0.016s	0.020s	0.025s	0.032s	0.040s	0.050s	0.064s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.640s	0.800s
8 mA	70 kV/ child								I	P	M		MAXILLA								
								I	P	M			MANDIBLE								
8 mA	66 kV/ child									I	P	M		MAXILLA							
									I	P	M			MANDIBLE							
8 mA	63 kV/ child										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	60 kV/ child											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	57 kV/ child												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	55 kV/ child													I	P	M		MAXILLA			
													I	P	M			MANDIBLE			
8 mA	52 kV/ child														I	P	M		MAXILLA		
														I	P	M			MANDIBLE		
8 mA	50 kV/ child										MAXILLA					I	P	M			
											MANDIBLE				I	P	M				
8 mA	70 kV/ adult										I	P	M		MAXILLA						
										I	P	M			MANDIBLE						
8 mA	66 kV/ adult											I	P	M		MAXILLA					
											I	P	M			MANDIBLE					
8 mA	63 kV/ adult												I	P	M		MAXILLA				
												I	P	M			MANDIBLE				
8 mA	60 kV/ adult													I	P	M		MAXILLA			
													I	P	M			MANDIBLE			
8 mA	57 kV/ adult														I	P	M		MAXILLA		
														I	P	M			MANDIBLE		
8 mA	55 kV/ adult										MAXILLA					I	P	M			
											MANDIBLE				I	P	M				
8 mA	52 kV/ adult											MAXILLA					I	P	M		
												MANDIBLE				I	P	M			
8 mA	50 kV/ adult												MAXILLA					I	P	M	
													MANDIBLE				I	P	M		

I INCISORS
P PREMOLARS AND CANINES
M MOLARS

18 ERROR CODES



The error code is displayed on the time display.

Press the SELECT key to clear the error from the display.

ERROR CODE	ERROR MESSAGE EXPLANATION
Er.00	Exposure key was released too early during the exposure.
Er.10	X-ray tube Anode voltage (kV) overshoot.
Er.11	X-ray tube Anode voltage (kV) dropped suddenly.
Er.12	X-ray tube cathode filament preheating voltages are not calibrated.
Er.13	Filament preheating voltage calibration failed.
Er.29	Membrane keyboard key short-circuited/pressed during the self test or faulty display board.
Er.30	kV value does not reach or it exceeds the given value (difference more than 5%).
Er.31	X-ray tube Anode current (mA) missing, or not in specified limits.
Er.33	X-ray tube Filament voltage (V) missing, or outside the range (too low or too high).
Er.34	X-ray tube Anode voltage (kV) missing, or below the specified limit.
Er.36	Too long exposure.
Er.37	kV feedback signal open circuit or short circuit.
Er.38	mA feedback signal open circuit or short circuit.
Er.50	Tube head temperature sensor short circuit.
Er.51	Tube head temperature sensor open circuit.
Er.52	Filament voltage feedback not in specified limits.
Er.57	Exposure key pressed during self test.
Er.60	± 15VDC voltage is out of limits.
Er.61	Communication error between control panel and tube head CPU.
Er.71	FLASH memory check-sum error (tube head CPU).
Er.81	EEPROM memory defective (tube head CPU).
Er.83	Config register error (tube head CPU).

19 DISPOSAL OF THE UNIT

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 centres, after hazardous waste has been removed. Disposal of obsolete units is the responsibility of the waste possessor.

All parts and components containing hazardous materials must be disposed of in accordance with waste legislation and instructions issued by the environmental authorities. The risks involved and the necessary precautions must be taken into account when handling waste products.

Part	Main materials for disposal	Recyclable material	Waste disposal site	Hazardous waste (separate collection)
Frame and covers				
- metal				
	Aluminium,	X		
	galvanized steel,	X		
	lead			X
- plastic				
	PEI,	X		
	PC, ABS	X		
- rubber			X	
Motors		(X)		
Component boards		(X)		
Cables, transformers	Copper,	X		
	steel,	X		
	transformer oil		X	
X-ray tube				X
Packing	Wood, cardboard,	X		
	paper	X		
		X		
Other parts			X	

20 TECHNICAL SPECIFICATIONS

20.1 Technical data

Generator	Constant potential, microprocessor controlled, operating frequency 66 kHz
X-ray tube	Toshiba D-0711SB
Focal spot size	0.7 mm according to IEC 60336
Cone diameter	ø 60 mm (2.36 in.) Rectangular 33 x 43 mm (1.30 x 1.69 in.)
Max. symmetrical radiation field	ø 60 mm at SSD 200 mm ø 60 mm at SSD 300 mm according to IEC 806
Total filtration	min. 2 mm Al equivalent at 70 kV according to IEC 60522
Inherent filtration	1 mm Al equivalent at 70 kV according to IEC 60522
Anode voltage	50, 52, 55, 57, 60, 63, 66, 70kV, ±2 kV
Anode current	8, 7, 6, 5, 4, 3, 2 mA, ± (5% + 0,2 mA)
Target material	Tungsten
Target angle	16°
Exposure times	0.01 - 3.20 sec., ± (5% + 0,001 s), 26 steps
Reference current time product	8 mAs at 70 kV, 8 mA, 1 sec.
Lowest current time product	0.02 mAs at 2 mA, 0.01 sec.
Max. nominal anode voltage	70 kV
Power input	1000 VA
Max. electrical output	560 W at 70 kV, 8 mA
Electrical output at 0.1 sec.	560 W at 70 kV, 8 mA
Max. loading energy	1800 mAs/h at 70 kV
SID (SID = source - image receptor distance)	min. 200 mm (8 in.)
SSD (Source-Skin Distance) Standard/Long Long with rectangular collimator	 200 mm (8 in.)/300 mm (12 in.) 306 mm (12.04 in.)
Mains voltage	100 V~/110-115 V~/220-240 V~
Apparent resistance	0,3 ohms 100-115 V~/ 0,8 ohms 220-240 V~
Mains frequency	50/60 Hz
Duty cycle	1:15, automatic control
Electrical classification	Class I, Type B
Weight	total 23 kg (51 lbs) tube head 4.5 kg (10 lbs)
Internal mains fuses:	units with 100V~ or 110-115V~ voltage setting: 15AT, 250V, slow blow (6.3x32mm) (special fuse, manufacturer Bussmann, type MDA) units with 220-240V~ voltage setting: 8AT, 250V, slow blow (6.3x32mm) (special fuse, manufacturer Bussmann, type MDA)

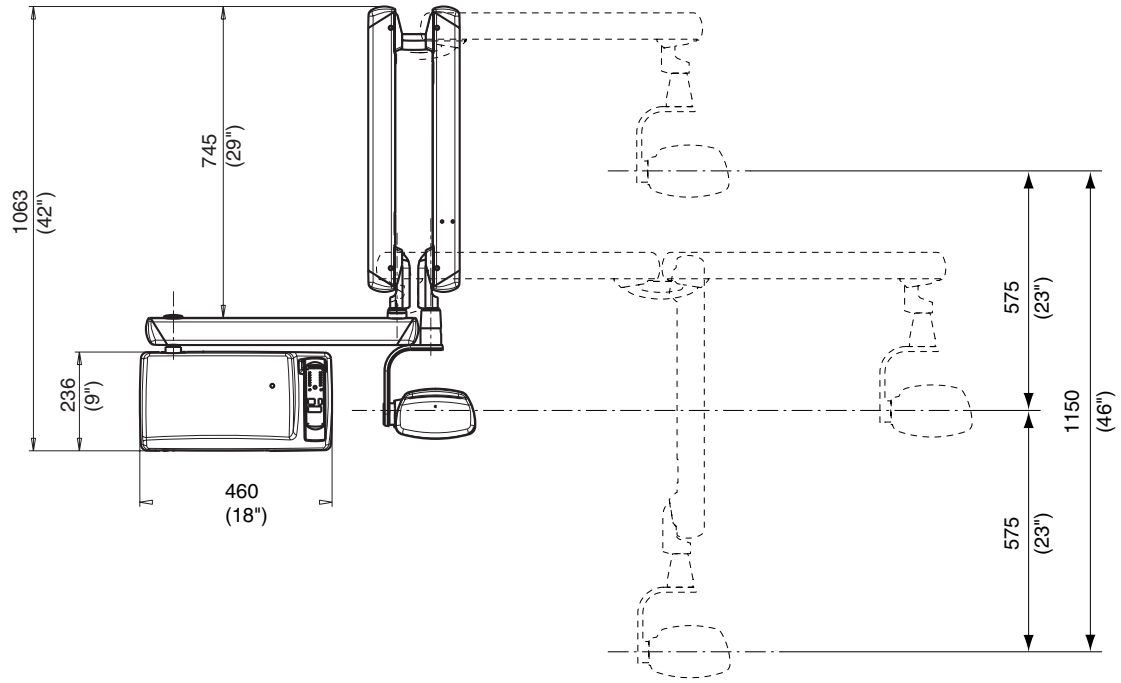
Environmental requirements

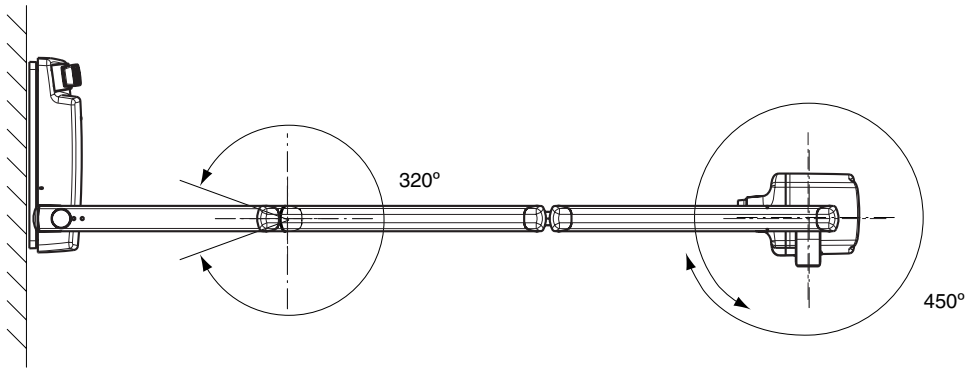
Ambient temperature	operating +5°C - +40°C storage -10°C - +50°C transport -10°C - +50°C
Humidity	25% - 75%
Atmospheric pressure range	700 hPa - 1060 hPa

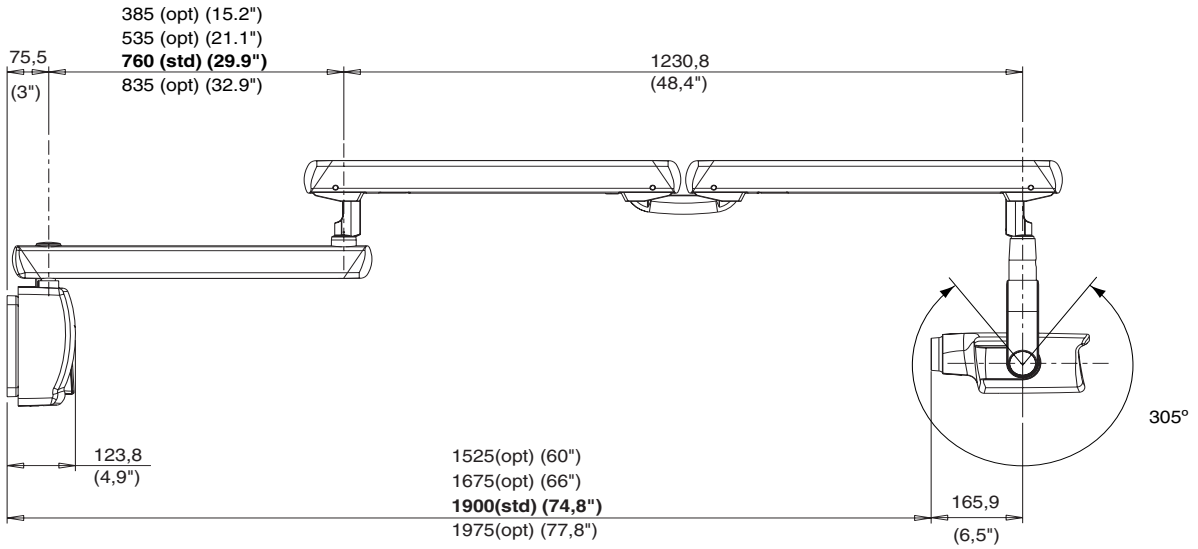
Original manufacturer

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

20.2 Dimensions (in mm)







20.3 User's statement for Planmeca Intra

Radiation leakage technique factors

The maximum rated peak tube potential is 70 kV and the maximum rated continuous tube current is 0.53 mA for the maximum rated peak tube potential.

Minimum filtration

The radiation port contains an added 1.0 mm aluminium filtration. The measured half-value is 0.50 - 0.55 at 70 kV. The measured value corresponds to an aluminium equivalent of 2.0 mm.

Rated line voltage

100, 110-117, 220-240 V~ ±10%. Line voltage regulation 10%.

Maximum line current

6.1 A at 230 V~, 12.2 A at 115 V~

Technique factors that constitute the maximum line current condition

70 kV, 8 mA

Generator rating and duty cycle

1.4 kW, duty cycle 1:15. The wait period is controlled automatically by calculating it according to the formula tw = 15 x texp.

Maximum deviation of peak tube potential from indicated value

± 2.0 kV

Maximum deviation of tube current from indicated value

±10%

Maximum deviation of exposure time from indicated value

±10%

DEFINITION OF MEASUREMENT CRITERIA

Exposure time

The beginning and end points of the exposure time are defined at 70% of the peak radiation waveform measured with a calibrated x-ray monitor.

Peak tube potential

Is defined as the high voltage mean value measured with a calibrated non-invasive kVp meter.

Tube current

Is defined using the voltage over the feedback resistor measured with a calibrated multimeter. The mA value is calculated by dividing the voltage by the resistance value.

The nominal x-ray voltage together with the highest x-ray tube current obtainable from the high-voltage generator when operated at it's highest x-ray tube voltage

70 kV, 8 mA

The nominal x-ray tube current when operated at the highest x-ray tube voltage

8 mA, 70 kV

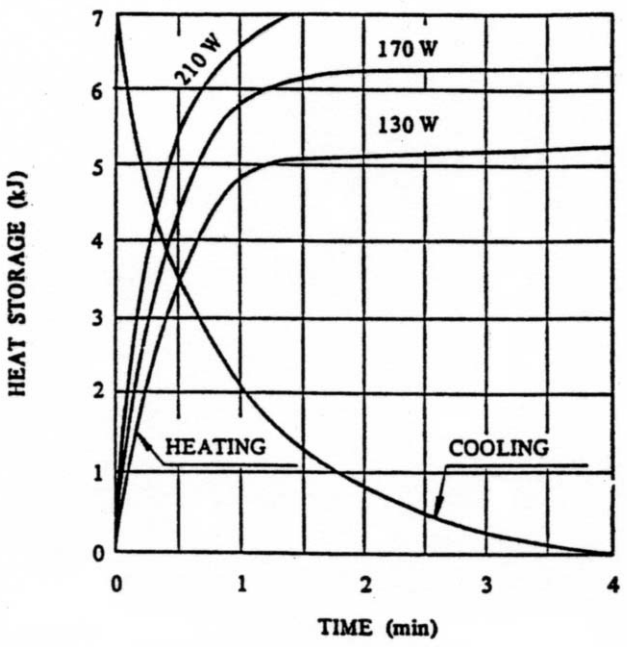
The x-ray tube voltage and tube current which result in the highest electric output power

70 kV, 8 mA

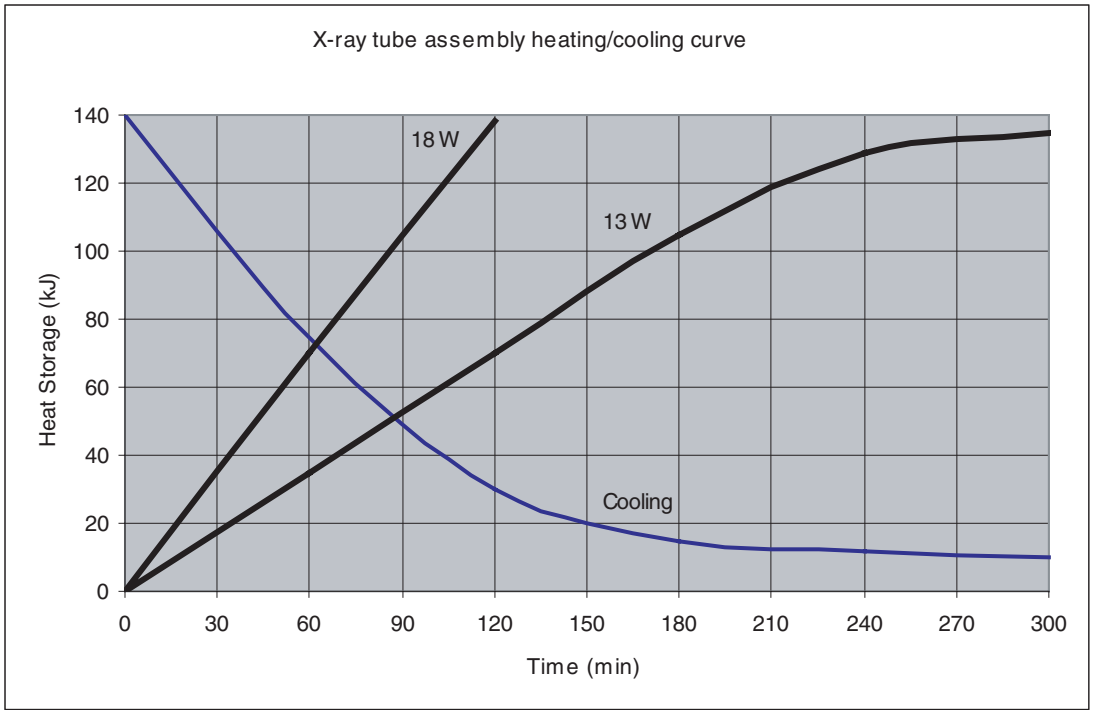
The nominal electric power for a load time of 0.1 sec and at the nominal x-ray tube voltage

1.4 kW at 70 kV, 8 mA

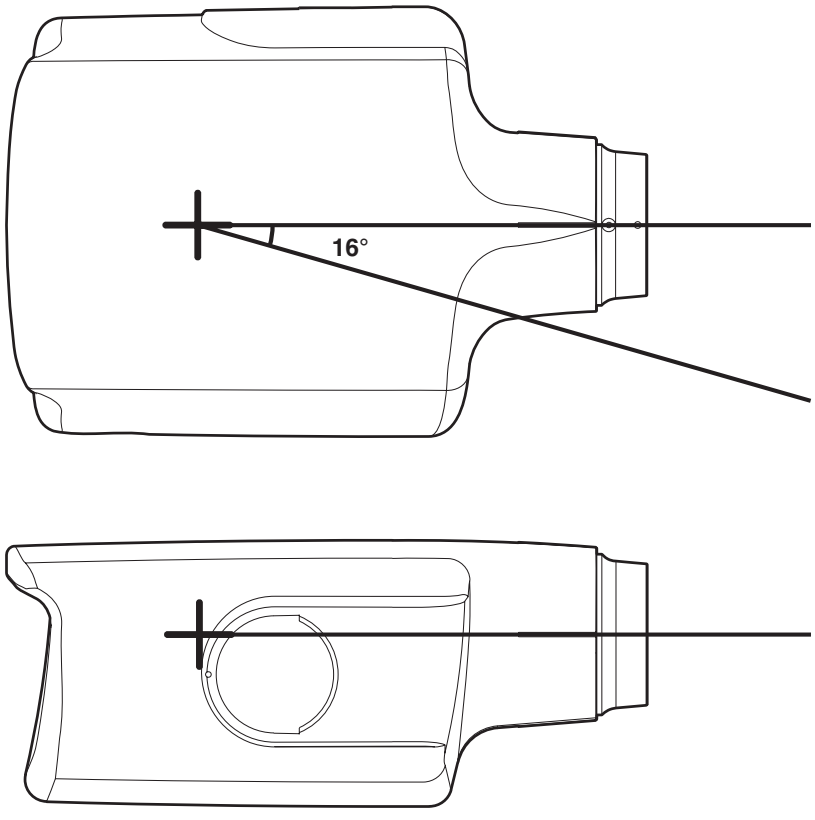
Anode heating/cooling curve of the X-ray tube



X-ray tube assembly heating/cooling curve



Reference axis to which the target angle and the focal spot characteristics of the tube head assembly refer



Target angle with respect to the reference axis

16°

Dimensions of the tube head assembly

(WxHxD) 175mm x 105mm x 165mm

Weight of the tube head assembly

3.1 kg

Values of loading factors concerning leakage radiation

70 kV, 8 mA

Tolerances of the focal spot on the reference axis

X= ±0.5 mm (sideways)
Y= ±0.5 mm (in depth)
Z= ±0.5 mm (in height)

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