

KaVo ProXam iX

Instructions for use



EN

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 authorised personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions.

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1 Introduction

The KaVo ProXam iX X-ray unit produces intraoral X-ray images for the diagnosis of teeth and adjacent structures.

This Instructions for use describes how to operate the KaVo ProXam iX intraoral X-ray unit equipped with KaVo ProXam iS digital X-ray system.

The KaVo ProXam iX is a trade name of Planmeca ProX, manufactured for and distributed by KaVo.

NOTE

Read these instructions carefully before using the X-ray unit.

Note that if you use the KaVo ProXam iS digital X-ray system, you need a PC with Romexis imaging software to save, view and modify the radiographs. The Romexis software has a separate manual, which should be used in conjunction with this Instructions for use.

CAUTION

FOR US USERS:

Federal law restricts this device to sale by or on the order of a health care professional.

NOTE

This Instructions for use is valid for software revisions 4.00 or later.

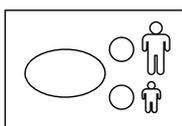
NOTE

The KaVo ProXam iX intraoral X-ray unit is allowed to be used only under supervision of a dental/health care professional.



The X-ray unit fulfils the requirements of Medical Device Regulation (EU) 2017/745, Class IIB and RoHS, REACH and WEEE.

BASIC UDI-DI (Global Model Number): 6430035420095V



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 Instructions for use 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 Intended use

KaVo ProXam iX is an extraoral X-ray source intended for 2D intraoral imaging. It is intended to be used together with intraoral receptors for dental radiographic examinations, diagnosis and follow up of diseases of the teeth, jaw and oral structures.

1.1.1 Intended patient population

Age	From infant to geriatric without any specific age limits
Sex	Not relevant
Weight	Not relevant

Height	Not relevant
Other	Patient must be in conscious state

1.2 Usage environment

This X-ray unit is intended to be used in a professional healthcare environment such as dental offices, clinics and similar environments.

1.3 IT security measures

Since the imaging software is used with a computer that can be connected to the Internet, the following security measures need to be taken.

- Use antivirus software and update it regularly
- Look for evidence of possible virus infection and, if applicable, check with the antivirus software and remove the virus
- Back up data regularly
- Restrict access to trustworthy users, e.g. with a user name and password
- Make sure that only trustworthy content is downloaded
- Only install software and firmware updates that have been authenticated by the manufacturer

See *Romexis technical manual* for more information on IT security.

2 Associated documentation

The KaVo ProXam iX X-ray unit is supplied with the following Instructions for use:

- KaVo ProXam iX Instructions for use
- KaVo ProXam iX Assembly instructions
- KaVo ProXam iX Technician's instructions
- KaVo ProXam iS Instructions for use
- KaVo ProXam iS Assembly instructions

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

- Romexis user's manual
- Romexis technical manual

3 Symbols on product labels



Fulfills the requirements of Medical Device Regulation (EU) 2017/745.



Medical Device (Standard ISO 15223-1).



Manufacturer (Standard ISO 15223-1).



Date of manufacture (Standard ISO 15223-1).



Serial number (Standard ISO 15223-1).



Type B applied part (Standard IEC 60417).



Alternating current (Standard IEC 60417).



Consult electronic instructions for use (Standard ISO 15223-1).



Refer to instruction manual/booklet (Standard ISO 7010).



Warning: Electricity (Standard ISO 7010).

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.



Intermediate focal spot (Standard IEC 60417).



Separate collection for electrical and electronic equipment according to Directive 2012/19/EU (WEEE).



No pushing (Standard ISO 7010).

4 Safety precautions



WARNING

Warning statements alert the user to the possibility of personal injury to the user or the patient, or other serious damage associated with the use or misuse of the unit.

CAUTION

Caution statements alert the user to the possibility of a problem with the unit associated with its use or misuse. Such problems include unit malfunction, unit failure, damage to the unit or damage to other property.

NOTE

Note messages are used to indicate information which may be helpful or of special interest to the reader.



WARNING

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



WARNING

Failure to install the X-ray unit in an approved location may be dangerous to both patient and operator.



WARNING

No modification of this equipment is allowed. Do not modify this equipment without authorisation of the manufacturer. If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe use of equipment.



WARNING

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.



WARNING

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.



WARNING

To protect the user from stray radiation control of the X-ray unit must be from a distance of not less than 2 metres from the focal spot or X-ray beam.



WARNING

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 SIP/SOP shall not be used in the X-ray unit, but only for connecting the digital sensor device.

CAUTION

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

CAUTION

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

CAUTION

Do not spill water on the X-ray unit.

CAUTION

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the X-ray unit, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

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.

NOTE

Portable mobile devices and other high frequency electromagnetic energy emitting devices used close to the X-ray system may affect the system's performance. Diagnostic information of the X-ray image may be lost and unnecessary X-ray dose to the patient may result.

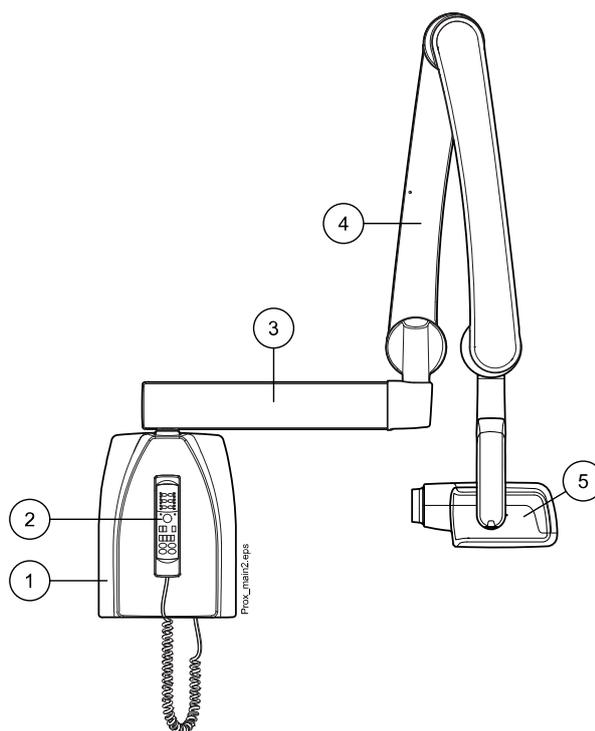
NOTE

Portable devices should be stored securely when not in use so that they cannot be stolen or damaged.

4.1 Reporting serious incidents

Serious incidents that have occurred in relation to the X-ray unit must be reported to the manufacturer and the local competent authority.

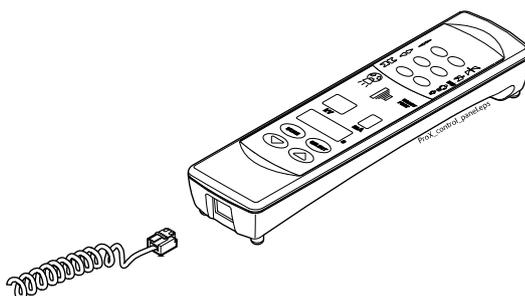
5 Main parts



- 1 Generator box
- 2 Control panel
- 3 Extension arm
- 4 Support arm
- 5 Tube head

5.1 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.

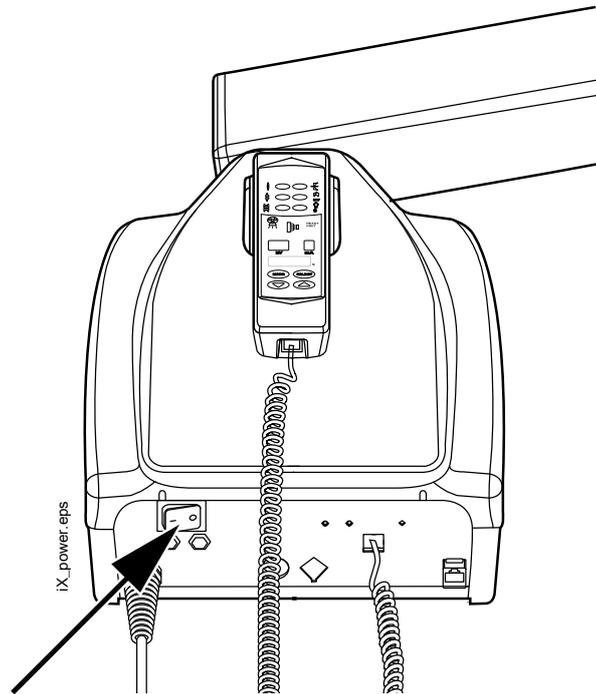


CAUTION

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

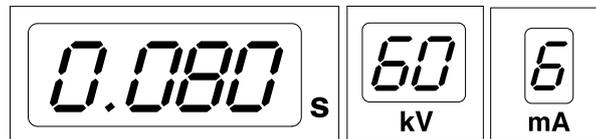
6 Switching unit on and off

The on/off (1/0) 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 appears on the displays.

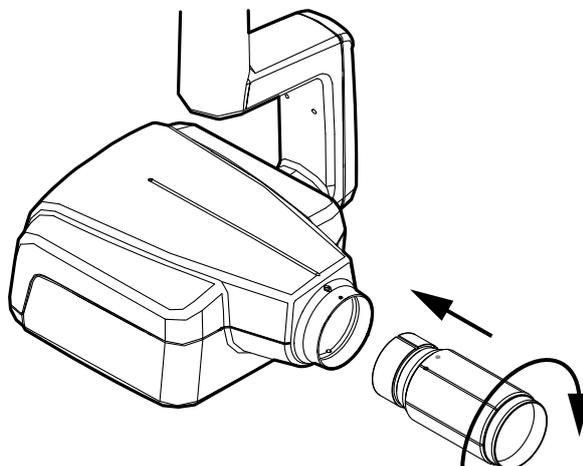


The default exposure values can be reprogrammed by the user, see section "Programming exposure values" on page 31.

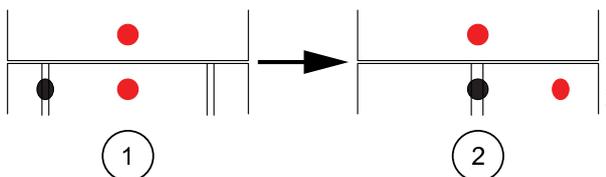
7 Selecting cone

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



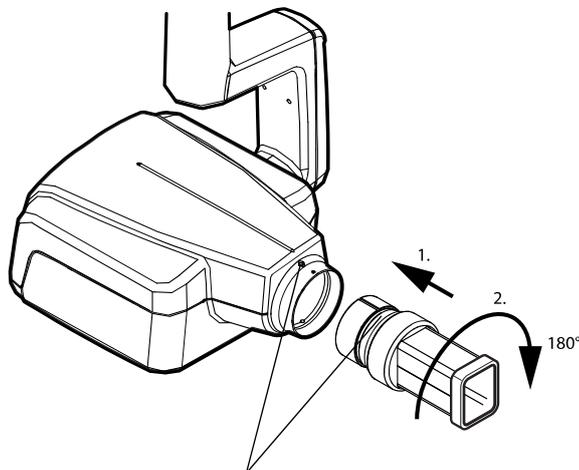
The long cone is attached into its position by pushing it into the short cone and rotating it so that the red point on the short cone and the black point on the long cone are in line.



- 1 Attach/remove: Red points in line
- 2 In position: Red and black points in line

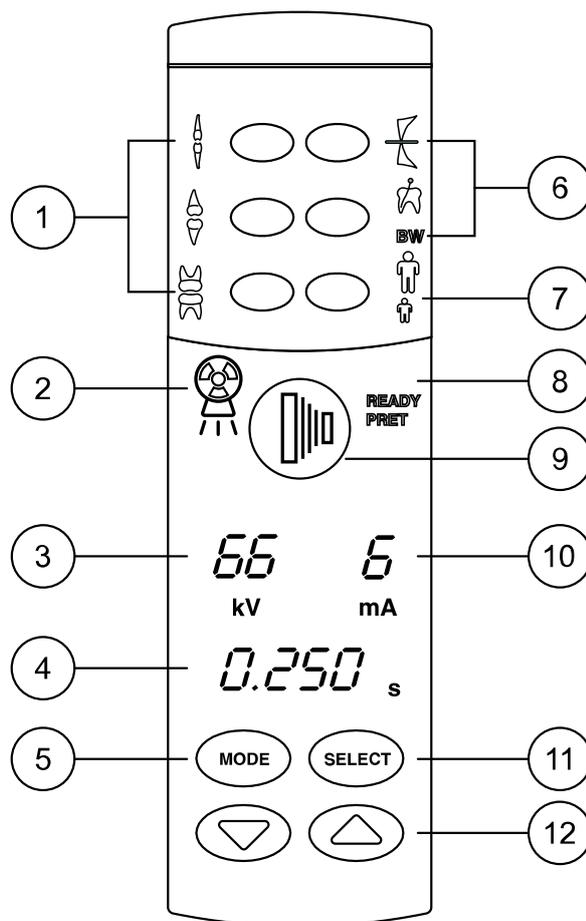
Long rectangular cone

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 $\pm 90^\circ$.



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

8 Control panel

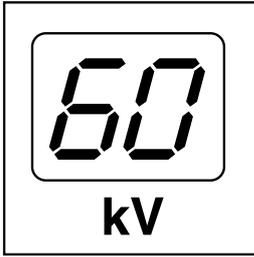


Control_panel_buttons3.eps

- 1 Preprogrammed settings keys and indicator lights
- 2 Exposure warning indicator light
- 3 kV display
- 4 Time display
- 5 MODE key
- 6 Preprogrammed setting keys and indicator lights
- 7 Adult/child selection key and indicator lights
- 8 Ready indicator light
- 9 Exposure key
- 10 mA display
- 11 SELECT key
- 12 Parameter adjustment keys

8.1 Displays

kV display

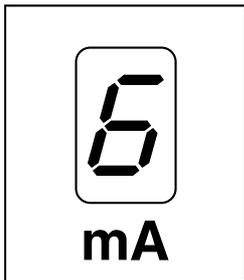


The selected kV value is shown on the kV display. There are four different values that can be selected: 60, 63, 66 and 70 kV.

NOTE

The kV range can be 60-70, 66-70, 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

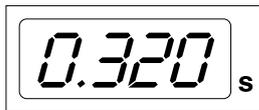
The selected exposure time is shown on the time display. After taking an exposure a waiting time starts to flash on the time display which indicates the delay before the next exposure can be taken.



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



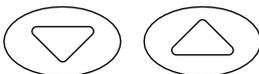
In the imaging plate mode the exposure time is shown with the prefix *P*.



In the film mode there is no prefix in the exposure time field.

After exposure the WAIT time appears on the display. The wait time is 15 times the time of exposure, however always at least 6 seconds.

If the DAP display is activated (service mode parameter 24=1 or 3) the WAIT time display changes to DAP display after a few seconds. In this case the beam limiting device number (between 1 and 12) appears on the *kV* display. The letter A is shown in the *mA* display and the DAP value (0.1 - 9.9, 10 - 9999 mGy*cm²) appears on the s (time) display.



The beam limiting devices can be selected using the arrow keys.

Beam limiting devices

kV display	mA display	Sensor type	Explanation	Part number
1	A	-	No tube	-

Beam limiting devices

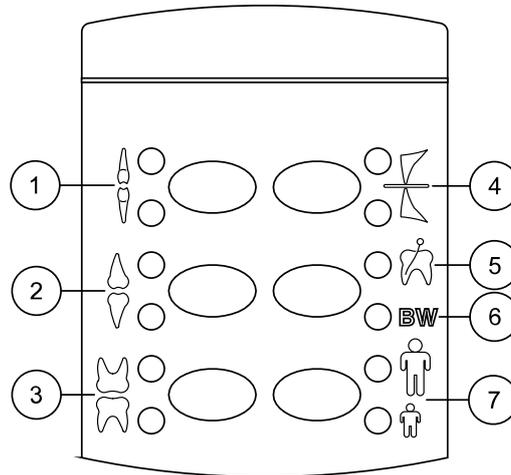
kV display	mA display	Sensor type	Explanation	Part number
2	A	-	Round tube without supplementary limiting device	-
9	A	KaVo ProXam iS	Rectangular Collimator 43x31 mm Sensor S2	2.023.1056
10	A		Rectangular Collimator 38x25 mm Sensor S1	2.023.1057
11	A		Rectangular Collimator 30x23 mm Sensor S0	2.023.1058
12	A	-	Rectangular tube without supplementary limiting device	-

See the Technician's instructions for DAP values of the 1, 2 and 12 beam limiting devices.

8.2 Keys and indicator lights

8.2.1 Preprogrammed settings 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.



Control_panel_buttons4.eps

The selections that can be made are:

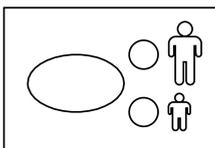
- 1 Incisors
- 2 Premolars and canines
- 3 Molars
- 4 Occlusal exposure
- 5 Endodontic exposure
- 6 Bite-wing exposure
- 7 Adult/child mode

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 "Programming exposure values" on page 31.

8.2.2 Adult/child 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.

8.2.3 SELECT key

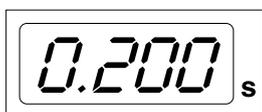


- Press the **SELECT** key briefly to select the parameter - kV, mA or exposure time - to be changed. When the parameter value is flashing on the display, the parameter can be changed. After adjusting the kV or mA value or exposure time the unit will return automatically to the time adjustment mode after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

8.2.4 MODE key



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



In the film-based imaging mode no prefix is shown on the display. To enter the digital imaging mode from the film-based mode press and hold down the MODE key for 2 seconds. The exposure time with prefix *d.* appears on the time display. All the keys function as in the film-based imaging mode.



To enter the imaging plate mode from the digital imaging mode press the MODE key and hold it down for two seconds. The exposure time with prefix *P.* appears on the time display in the imaging plate mode. All the keys function as in the film-based imaging mode.



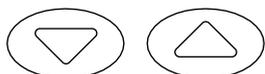
All the exposure parameters remain selected after the exposure until the user changes the parameters or until the unit is switched off. The selected mode stays in the unit memory even in case of power failure.

If the DAP display is activated (service mode parameter 24 = 2 or 3) by pressing the MODE key briefly the DAP value $\text{mGy}\cdot\text{cm}^2$ appears on the time display, the beam limiting device value between 1 and 12 appears on the kV display and the letter *A* on the mA display. The beam limiting device value can be changed using the arrow up/ down keys.

If the exposure count display is activated (service mode parameter 23=2) by pressing briefly the MODE key the exposure count value (00000 - 50000) appears on the mA and time displays. The text EC appears on the kV display.

To return to the exposure value (kV, mA, sec) displays press briefly the SELECT key.

8.2.5 Parameter adjustment keys

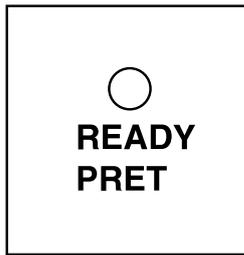


Press the SELECT key briefly to select the parameter - kV, mA, exposure time or density - to be changed.

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.

8.2.6 Ready indicator light

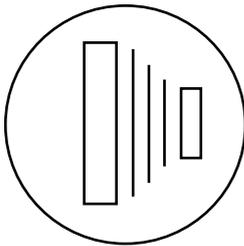


The green ready indicator light will come on when the unit is ready to take an exposure. The waiting time between exposures is 12 times the exposure time, but is always at least six seconds.

NOTE

You can set the unit so that the Ready indicator light will only come on when Romexis is ready for the exposure, i.e. the message *Waiting for exposure* appears on the computer screen. To change the settings of the unit contact your technical support.

8.2.7 Exposure key



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

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

8.2.8 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.

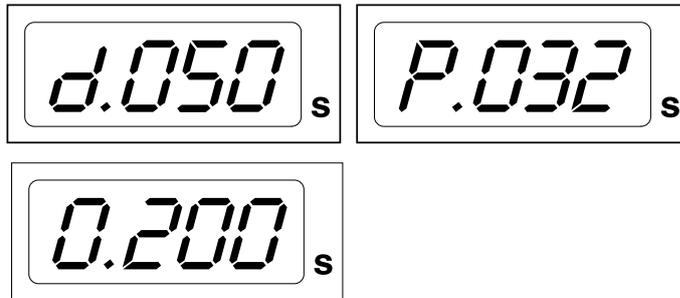
9 Selecting exposure parameters

About this task

The preprogrammed exposure values are shown in section "Default exposure values".

Steps

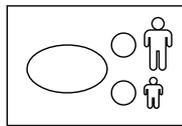
1. Check that the X-ray unit is in the desired imaging mode.



- d. digital imaging mode
- P. imaging plate mode
- 0. film-based imaging mode



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

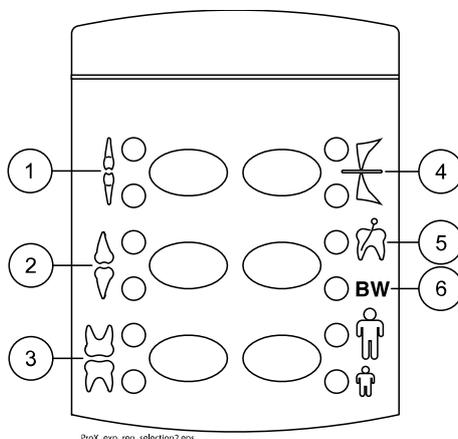


2. The indicator light of the selected mode will come on.
Select the adult or child mode.

3. Select the exposure region with the preprogrammed setting keys.

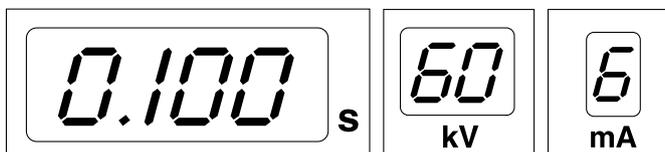
Press the desired exposure region key once to select the projection of the **maxilla**, and press the key twice to select the projection of the **mandible**.

The indicator light of the selected projection will come on.



- 1 Incisors
- 2 Premolars and canines
- 3 Molars
- 4 Occlusal exposure
- 5 Endodontic exposure
- 6 Bite-wing exposure

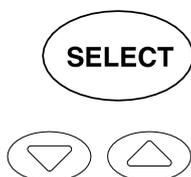
The preprogrammed time (s), kV and mA values appear on the respective displays (example below).



4. If needed, you can change the preprogrammed exposure parameters temporarily for the current exposure.

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 Patient positioning

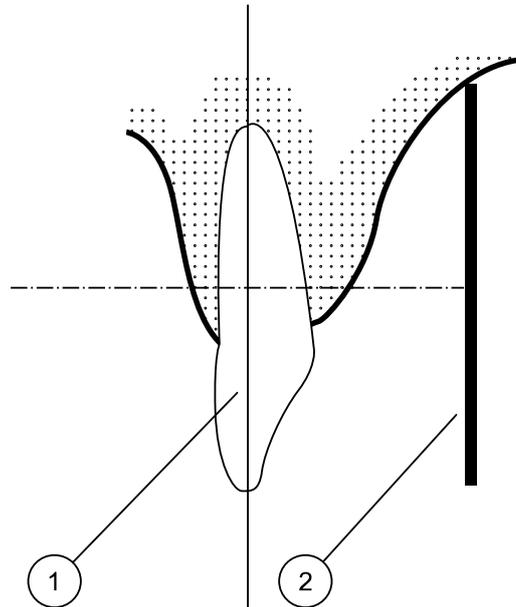
Steps

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

11 Sensor positioning

Paralleling technique (recommended)

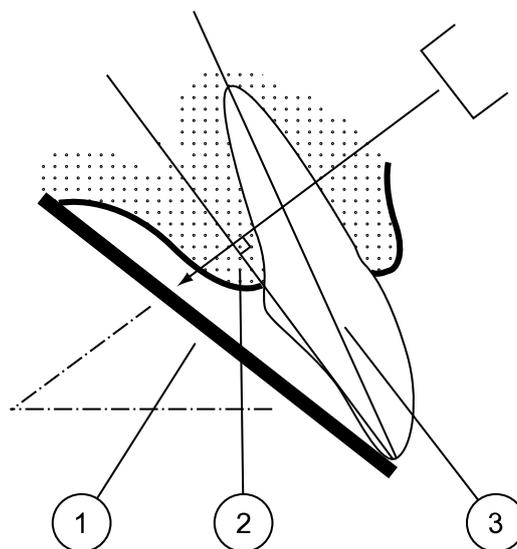
The sensor is placed to a sensor holder which is used to align the sensor (2) parallel to the long axis of the tooth (1).



Use a long cone for the paralleling technique.

Bisecting angle technique (optional)

The patient holds the sensor (1) in place with his finger. The X-ray beam is directed perpendicularly towards an imaginary line (2) which bisects the angle between the sensor plane and the long axis of the tooth (3).



12 Cone positioning

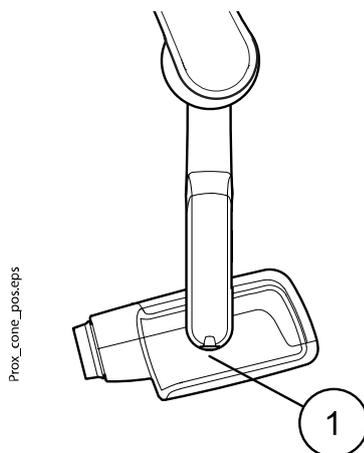
Position the cone according to the exposure type.

For instructions, refer to the following sections:

- Molar exposure
"Molar exposure" on page 21
- Premolar and canine exposure
"Premolar and canine exposure" on page 22
- Incisor exposure
"Incisor exposure" on page 23
- Occlusal exposure
"Occlusal exposure" on page 24
- Endodontic exposure
"Endodontic exposure" on page 25
- Bite-wing exposure
"Bite-wing exposure" on page 25

12.1 Molar exposure

The angle of the cone is indicated on the scale located on the vertical joint of the tube head (1).



The optional long cone can be attached into the short cone. Refer to section "Selecting cone" on page 9.

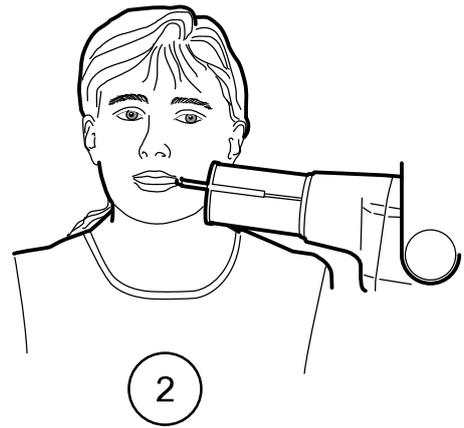
Select the cone angle from the table below.

Teeth		Angle of inclination
Molars	Maxilla	+35°
Molars	Mandible	-5°

Position the cone according to the figures below.



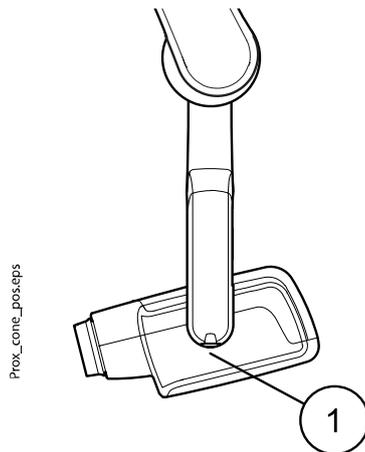
1 Maxillary molar



2 Mandibular molar

12.2 Premolar and canine exposure

The angle of the cone is indicated on the scale located on the vertical joint of the tube head (1).



The optional long cone can be attached into the short cone. Refer to section "Selecting cone" on page 9.

Select the cone angle from the table below.

Teeth		Angle of inclination
Premolars and canine teeth	Maxilla	+45°
	Mandible	-10°

Position the cone according to the figure below.

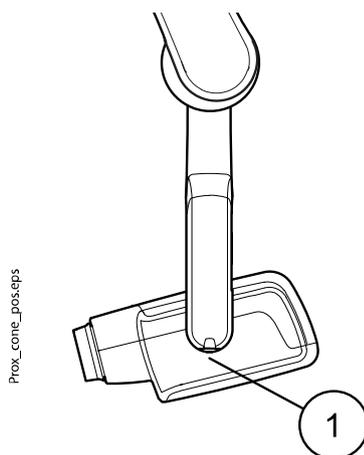


Left Maxillary premolar and canine

Right Mandibular premolar and canine

12.3 Incisor exposure

The angle of the cone is indicated on the scale located on the vertical joint of the tube head (1).

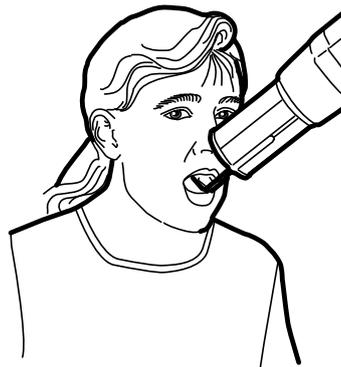


The optional long cone can be attached into the short cone. Refer to section "Selecting cone" on page 9.

Select the cone angle from the table below.

Teeth		Angle of inclination
Incisors	Maxilla	+55°
	Mandible	-20°

Position the cone according to the figures below.



1

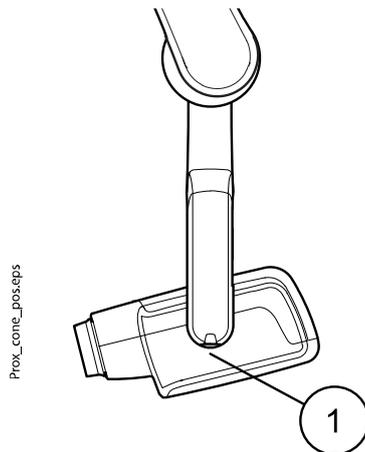


2

- 1 Maxillary anterior
- 2 Mandibular anterior

12.4 Occlusal exposure

The angle of the cone is indicated on the scale located on the vertical joint of the tube head (1).

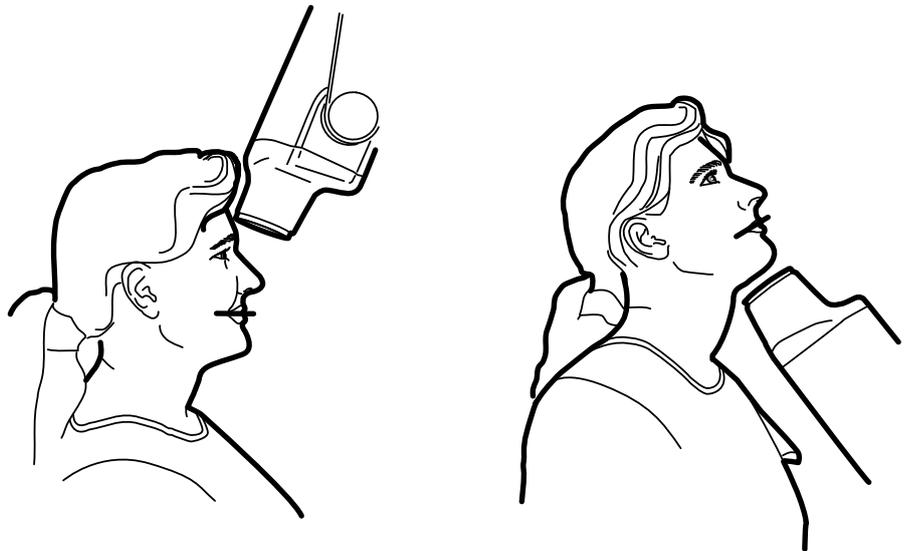


The optional long cone can be attached into the short cone. Refer to section "Selecting cone" on page 9.

Select the cone angle from the table below.

Teeth		Angle of inclination
Occlusal exposure	Maxilla	+75°
	Mandible	-60°

Position the cone according to the figures below. Note the sensor placement in the mouth.



Left Maxillary occlusal

Right Mandibular occlusal

12.5 Endodontic exposure

When taking an endodontic exposure use the same exposure parameters and patient positioning methods as with the molar, premolar, canine and incisor exposures.

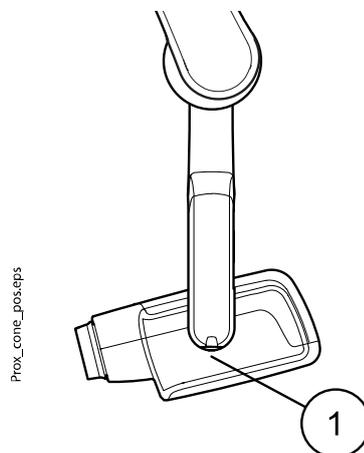
For more information, see sections:

- "Molar exposure" on page 21
- "Premolar and canine exposure" on page 22
- "Incisor exposure" on page 23

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

12.6 Bite-wing exposure

The angle of the cone is indicated on the scale located on the vertical joint of the tube head (1).



The optional long cone can be attached into the short cone. Refer to section "Selecting cone" on page 9.

Select the cone angle from the table below.

Teeth	Angle of inclination
Bite-wing exposure	5°

Position the cone according to the figure below.



13 Taking exposure

Steps

1. Ask the patient to remain as still as possible.
2. Move as far away from the X-ray tube as the length of the cable from the control panel permits.

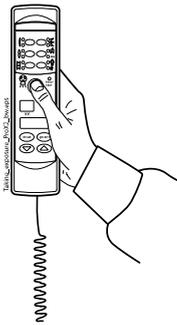
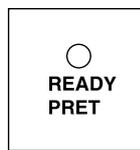
The distance must be at least 2 meters (6.6 ft) from the X-ray tube.

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.

3. Check that the ready light is on.



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

NOTE

Releasing the exposure key terminates the unit's operation.

Results



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

14 Exposure values

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

For more information on programming, see section "Programming exposure values" on page 31.

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.

14.1 Default exposure values

The following table shows the default exposure values for KaVo ProXam iS and KaVo ProXam iP with no target selected.

These values can be modified by the user, see section "Programming default exposure values" on page 31.

NOTE

These values are for digital sensor and speed F films.

KaVo ProXam iS (and F speed film)				KaVo ProXam iP			
	Short cone				Short cone		
	kV	mA	s		kV	mA	s
Adult	63	8	0.1	Adult	63	8	0.125
Child	60	8	0.08	Child	60	8	0.1
	Long cone				Long cone		
	kV	mA	s		kV	mA	s
Adult	63	8	0.2	Adult	63	8	0.25
Child	60	8	0.16	Child	60	8	0.2

14.2 Preprogrammed settings values

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 "Programming preprogrammed settings" on page 34.

The recommended exposure values are given in section "User's statement" on page 50.

14.2.1 KaVo ProXam iS

Short cone 20 cm (8")

NOTE

These values are for digital sensor and speed F films.

NOTE

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

		Incisors			Premolars and canines			Molars		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	60	8	0.080	63	8	0.1	63	8	0.125
	Mandible	60	8	0.063	63	8	0.08	63	8	0.1
Child	Maxilla	60	8	0.063	60	8	0.08	60	8	0.1
	Mandible	60	8	0.050	60	8	0.063	60	8	0.08

		Occlusal exposure			Endodontic			Bite-wing		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	70	8	0.08	60	8	0.08	60	8	0.125
	Mandible	70	8	0.08						
Child	Maxilla	66	8	0.063	60	8	0.063	60	8	0.1
	Mandible	66	8	0.063						

Long cone 30 cm (12")

When using the 30 cm long cone program the values according to the table given in section "Exposure value tables" on page 36 or select three steps darker density (longer exposure time).

		Incisors			Premolars and canines			Molars		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	60	8	0.16	63	8	0.2	63	8	0.25
	Mandible	60	8	0.125	63	8	0.16	63	8	0.2
Child	Maxilla	60	8	0.125	60	8	0.16	60	8	0.2
	Mandible	60	8	0.1	60	8	0.125	60	8	0.16

		Occlusal exposure			Endodontic			Bite-wing		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	70	8	0.16	60	8	0.16	60	8	0.25
	Mandible	70	8	0.16						
Child	Maxilla	66	8	0.125	60	8	0.125	60	8	0.2
	Mandible	66	8	0.125						

14.2.2 KaVo ProXam iP

Short cone (8")

		Incisors			Premolars and canines			Molars		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	60	8	0.1	63	8	0.125	63	8	0.16
	Mandible	60	8	0.08	63	8	0.1	63	8	0.125
Child	Maxilla	60	8	0.08	60	8	0.1	60	8	0.125
	Mandible	60	8	0.063	60	8	0.08	60	8	0.1

		Occlusal exposure			Endodontic			Bite-wing		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	70	8	0.1	60	8	0.1	70	8	0.16
	Mandible	70	8	0.1						
Child	Maxilla	66	8	0.08	60	8	0.08	70	8	0.125
	Mandible	66	8	0.08						

Long cone 30 cm (12")

When using the 30 cm long cone program the values according to the table given in section "Exposure value tables" on page 36 or select three steps darker density (longer exposure time).

		Incisors			Premolars and canines			Molars		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	60	8	0.2	63	8	0.25	63	8	0.32
	Mandible	60	8	0.16	63	8	0.2	63	8	0.25
Child	Maxilla	60	8	0.16	60	8	0.2	60	8	0.25
	Mandible	60	8	0.125	60	8	0.16	60	8	0.2

		Occlusal exposure			Endodontic			Bite-wing		
		kV	mA	s	kV	mA	s	kV	mA	s
Adult	Maxilla	70	8	0.2	60	8	0.2	70	8	0.32
	Mandible	70	8	0.2						
Child	Maxilla	66	8	0.16	60	8	0.16	70	8	0.25
	Mandible	66	8	0.16						

15 Programming exposure values

15.1 Programming default exposure values

Before you begin

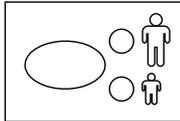
NOTE

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

About this task

The default exposure values can be programmed for both the adult and child mode.

Steps



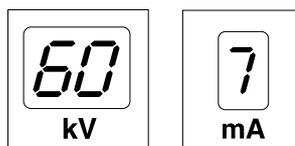
1. Select the adult or child mode of which the default exposure values is to be programmed.

The indicator light of the selected mode will come on. The current exposure values are shown on the **time**, **kV** and **mA** displays.



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

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



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



3. Modify the exposure time.

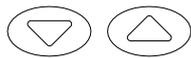
The exposure time value is changed with the parameter adjustment keys.

The exposure times are shown in section "Exposure value tables".



4. Press the **SELECT** key **briefly**.

The **kV** display will start to flash.



The **kV** value can now be changed with the parameter adjustment keys.
 Note, the available kV range can be modified in Service mode, for more information see the unit's *Technical manual / Technician's instructions*.



5. Press the **SELECT** key **briefly**.

The **mA** display will start to flash.



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

6. Select the other (child or adult) mode and program its settings as described above or exit as instructed in the next step.
7. Exit the programming mode by pressing and holding down the **SELECT** key.

The density value is stored in the memory.

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.

Results

The new default exposure and density values are set.

15.2 Programming density values

Before you begin

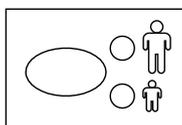
NOTE

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

About this task

By changing the density value all the preprogrammed values can be changed. This can be used for example when the cone is being changed.

Steps



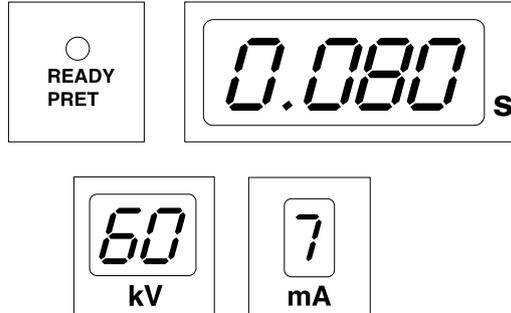
1. Select the adult or child mode of which the default exposure values is to be programmed.

The indicator light of the selected mode will come on. The current exposure values are shown on the **time**, **kV** and **mA** displays.

SELECT

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

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

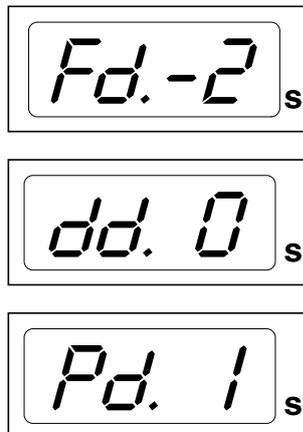
**MODE**

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

- Press the **SELECT** key briefly three times.
- Press the **SELECT** key **briefly**.

SELECT

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



Changing the density value will change the selected time value as follows: one density step equals to one time step.

The density range has 11 steps from -9 (light exposures) to +9 (dark exposures). The negative density value shortens the selected time value, whereas the positive value lengthens it.

Note that the density value will affect the time value on both adult and child modes.

- Exit the programming mode by pressing and holding down the **SELECT** key.

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.

Results

The new density values are set.

15.3 Programming preprogrammed settings

About this task

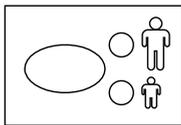
NOTE

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

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 imaging plate mode when you exit the programming mode.

Steps



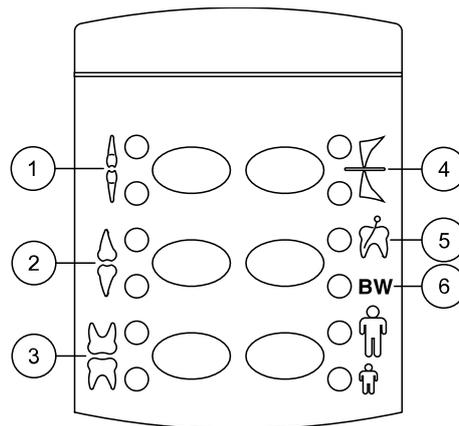
1. Select the adult or child mode of which the preprogrammed settings is to be programmed.

The indicator light of the selected mode will come on.

2. Select the exposure region of which the preprogrammed settings is to be programmed.

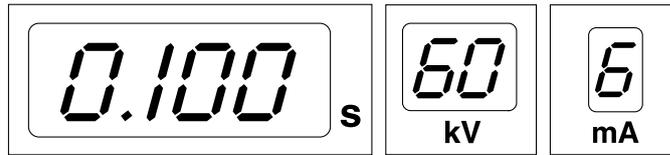
Press the desired exposure region key once to select the projection of the **maxilla**, and press the key twice to select the projection of the **mandible**.

The indicator light of the selected projection will come on.



- 1 Incisors
- 2 Premolars and canines
- 3 Molars
- 4 Occlusal exposure
- 5 Endodontic exposure
- 6 Bite-wing exposure

The preprogrammed time (s), kV and mA values appear on the respective displays (example below).



3. 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.



4. Modify the exposure time.

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



5. 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.



6. 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.

7. 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.

Results

The new preprogrammed settings are set.

16 Exposure value tables

NOTE

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

16.1 KaVo ProXam iS and F-speed films

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

I INCISORS

P PREMOLARS AND CANINES

M MOLARS

Short cone 20 cm (8") exposure values

Jaw	mA	Time	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s
Maxi	8 mA	70 kV/ child		I	P	M				
Mand			I	P	M					
Maxi	8 mA	66 kV/ child			I	P	M			
Mand				I	P	M				
Maxi	8 mA	63 kV/ child				I	P	M		
Mand					I	P	M			
Maxi	8 mA	60 kV/ child					I	P	M	
Mand						I	P	M		
Maxi	8 mA	70 kV/ adult			I	P	M			
Mand				I	P	M				
Maxi	8 mA	66 kV/ adult				I	P	M		
Mand					I	P	M			
Maxi	8 mA	63 kV/ adult					I	P	M	
Mand						I	P	M		
Maxi	8 mA	60 kV/ adult						I	P	M
Mand							I	P	M	

Long cone 30 cm (12") exposure values

Jaw	mA	Time	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s
Maxi	8 mA	70 kV/ child		I	P	M				
Mand			I	P	M					
Maxi	8 mA	66 kV/ child			I	P	M			
Mand				I	P	M				
Maxi	8 mA	63 kV/ child				I	P	M		
Mand					I	P	M			
Maxi	8 mA	60 kV/ child					I	P	M	
Mand						I	P	M		

Jaw	mA	Time	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s
Maxi	8 mA	70 kV/ adult			I	P	M			
Mand				I	P	M				
Maxi	8 mA	66 kV/ adult				I	P	M		
Mand					I	P	M			
Maxi	8 mA	63 kV/ adult					I	P	M	
Mand						I	P	M		
Maxi	8 mA	60 kV/ adult						I	P	M
Mand							I	P	M	

16.2 KaVo ProXam iP

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

- I INCISORS
- P PREMOLARS AND CANINES
- M MOLARS

Short cone 20 cm (8") exposure values

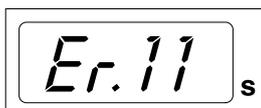
Jaw	mA	Time	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s
Maxi	8 mA	70 kV/ child		I	P	M				
Mand			I	P	M					
Maxi	8 mA	66 kV/ child			I	P	M			
Mand				I	P	M				
Maxi	8 mA	63 kV/ child				I	P	M		
Mand					I	P	M			
Maxi	8 mA	60 kV/ child					I	P	M	
Mand						I	P	M		
Maxi	8 mA	70 kV/ adult			I	P	M			
Mand				I	P	M				
Maxi	8 mA	66 kV/ adult				I	P	M		
Mand					I	P	M			
Maxi	8 mA	63 kV/ adult					I	P	M	
Mand						I	P	M		
Maxi	8 mA	60 kV/ adult						I	P	M
Mand							I	P	M	

Long cone 30 cm (12") exposure values

Jaw	mA	Time	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s
Maxi	8 mA	70 kV/ child		I	P	M			
Mand			I	P	M				

Jaw	mA	Time	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s
Maxi	8 mA	66 kV/ child			I	P	M		
Mand				I	P	M			
Maxi	8 mA	63 kV/ child				I	P	M	
Mand					I	P	M		
Maxi	8 mA	60 kV/ child				I	P	M	
Mand					I	P	M		
Maxi	8 mA	70 kV/ adult		I	P	M			
Mand			I	P	M				
Maxi	8 mA	66 kV/ adult			I	P	M		
Mand				I	P	M			
Maxi	8 mA	63 kV/ adult				I	P	M	
Mand					I	P	M		
Maxi	8 mA	60 kV/ adult					I	P	M
Mand						I	P	M	

17 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	$\pm 15\text{VDC}$ 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).

18 Cleaning

Surfaces

NOTE

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

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

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

Cleaning agents approved by manufacturer

Manufacturer	Brand name
Alpro Medical	CleanWipes
Alpro Medical	IC-100
Alpro Medical	MinutenSpray-classic
Clinell	Clinell Universal Wipes
Clinitex	R515 Detergent Multi-Surface Wipes
Ecolab	Actichlor Plus
SciCan	Optim Blue Wipes

Surface disinfectants approved by manufacturer

Manufacturer	Brand name
Alpro Medical	MinutenSpray-classic
Antibac	Antibac 75%
CCS HealthCare	Dax Extra
CCS HealthCare	Dax 70+
Chemi-Pharm AS / Plandent	Orbis surface disinfectant
Clinell	Clinell Universal Wipes
Dür	FD366
Ecolab	Actichlor Plus
SciCan	Optim Blue Wipes

Sensor holders

See the manufacturer's instructions for cleaning.

19 Service

To guarantee user and patient safety and to ensure image quality the unit must be checked and recalibrated by a KaVo qualified service technician once a year or after every 10 000 exposures if this is sooner. Please refer to the X-ray unit's Technician's instructions for complete servicing information.

All cyber security software updates listed in a technical bulletin must be installed on the X-ray unit.

KaVo Technical Service

If you have any questions or complaints, please contact the KaVo Technical Service:

+49 (0) 7351 56-2900

service.xray@kavo.com

20 Terms and conditions of warranty

KaVo provides the final customer with a warranty that the product cited in the handover certificate will function properly and guarantees zero defects in the material or processing for a period of 12 months from date of installation subject to the following conditions:

Upon justified complaints of flaws or a short delivery, KaVo will make good its warranty by replacing the product free of cost or repairing it according to the choice of KaVo. Other claims of any nature whatsoever, in particular with respect to compensation, are excluded. In the event of default and gross negligence or intent, this shall only apply in the absence of mandatory legal regulations to the contrary.

KaVo cannot be held liable for defects and their consequences due to natural wear, improper cleaning or servicing, non-compliance with operating, servicing or connection instructions, calcification or corrosion, contaminated air or water supplies or chemical or electrical factors deemed abnormal or impermissible in accordance with factory specifications.

The warranty does not usually cover bulbs, glassware, rubber parts, software, scanner tips, batteries, tubes, screws, nuts, and other fasteners, imaging plates and the colourfastness of plastics.

Defects or their consequences that can be attributed to interventions on or changes made to the product by the customer, or a third party are excluded from the warranty.

Claims from this warranty can only be asserted when the transfer form (copy) belonging to the product has been sent to KaVo, and the original can be presented by the operator or user.

Exceptions to the standard warranty

- KaVo ProXam iS (sensors only) are covered by a 36-month warranty from the date of dispatch.
- All Romexis® upgrades are free of charge 12 months from the license activation date. Upgrade does not include new separately installed modules or significant new features or significant new functions.
- Dell computers ordered from KaVo are covered by a 2-year onsite warranty from Dell. Registration is required to activate the warranty.
- Retrofit kits are manufactured to order and returns are therefore not accepted.
- Autoclavable parts damaged by the sterilization process are not covered by the warranty.

21 Device label

		WARNING: For continued protection against risk of fire replace only with same type and rating of fuse	70 kV maximum 700mAs/h Total filtration: 2,5 mm EquAl 1000 VA 50/60 Hz (220-240V) 890 VA 50/60 Hz (100-115V)	Complies with DHS radiation performance standards 21 CFR Subchapter J.			materialbank.planmeca.com	
SPECIAL FUSE(S) T 8 A H 250V (220-240V) T 15 A H 250V (100-115V)		Trademark: Planmeca Intra Type: ProX			CONFORMS TO ANSI/AAMI ES60601-1 CERTIFIED TO CAN/CSA C22.2 NO.60601-1-08			
		Planmeca OY Asentajankatu 6 00880 HELSINKI FINLAND		Interetek 3143029				

KaVo ProXam iX

KaVo REF 2.023.1000

		
Planmeca Oy Asentajankatu 6 00880 Helsinki Finland	KaVo Dental GmbH Bismarckring 39 88400 Biberach Germany www.kavo.com	Manufactured for 

22 Technical specifications

22.1 Technical data

Generator	Constant potential, microprocessor controlled, operating frequency 66 kHz
X-ray tube	D-041SB
Focal spot size	0.4 mm according to IEC 60336
	
Cone diameter	60 mm (2.36 in.) Rectangular 36 x 45 mm (1.42 x 1.77 in.)
Max. symmetrical radiation field	∅ 60 mm at SSD 200 mm ∅ 60 mm at SSD 300 mm according to IEC 806
Total filtration	min. 2.5 mm Al equivalent at 70 kV according to IEC 60522
Inherent filtration	1 mm Al equivalent at 70 kV, according to IEC 6052
Anode voltage	2-8 mA: 60, 63, 66, 70 kV, ±2 kV
Anode current	8, 7, 6, 5, 4, 3, 2 mA, ± (5% + 0.2 mA)
Target material	Tungsten
Target angle	12.5°
Exposure times	0.01- 2 sec. ±(5% + 0.001 sec.), 24 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 (220-240 V) 890 VA (100-115V)
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	1987 mAs/h at 70 kV
SID (Source - Image receptor Distance)	min. 200 mm (8 in.)
SSD (Source-Skin Distance)	200 mm (8 in.)/ 300 mm (12 in.)
Standard/Long	306 mm (12.04 in.)
Long with rectangular collimator	
Mains voltage	100 V~ / 220-240 V~
Apparent resistance	0.3 ohms 100-115 V~ / 0.8 ohms 220-240 V~
Mains frequency	50/60 Hz
Fusing	Units with 100 V~ or 110-115 V~ voltage setting: 15 AT, 250 V, slow blow (6.3 x 32 mm) (special fuse, manufacturer Bussmann, type MDA) Units with 220-240 V~ voltage setting: 8 AT, 250 V, slow blow (6.3 x 32 mm) (special fuse, manufacturer Bussmann, type MDA)
Duty cycle	1:13,5 automatic control, at least 6 s automatic control

Electrical classification Class I Type B

Mechanical data

Weight	Total
	33 kg (73 lbs)
	Tube head
	4.2 kg (9.3 lbs) with standard cone
	4.5 kg (10 lbs) with long cone
Colour	RAL 9016

Environmental requirements

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

External mains fuse recommendation

The recommendation for the external mains fuses are:

- units with 100 V~ or 115 V~ voltage setting: 16 A, time lag
- units with 220-240 V~ voltage setting: 10 A, time lag

No other equipment should be connected to the same fused mains line as the X-ray unit. In some countries an additional external fault current guard is also required.

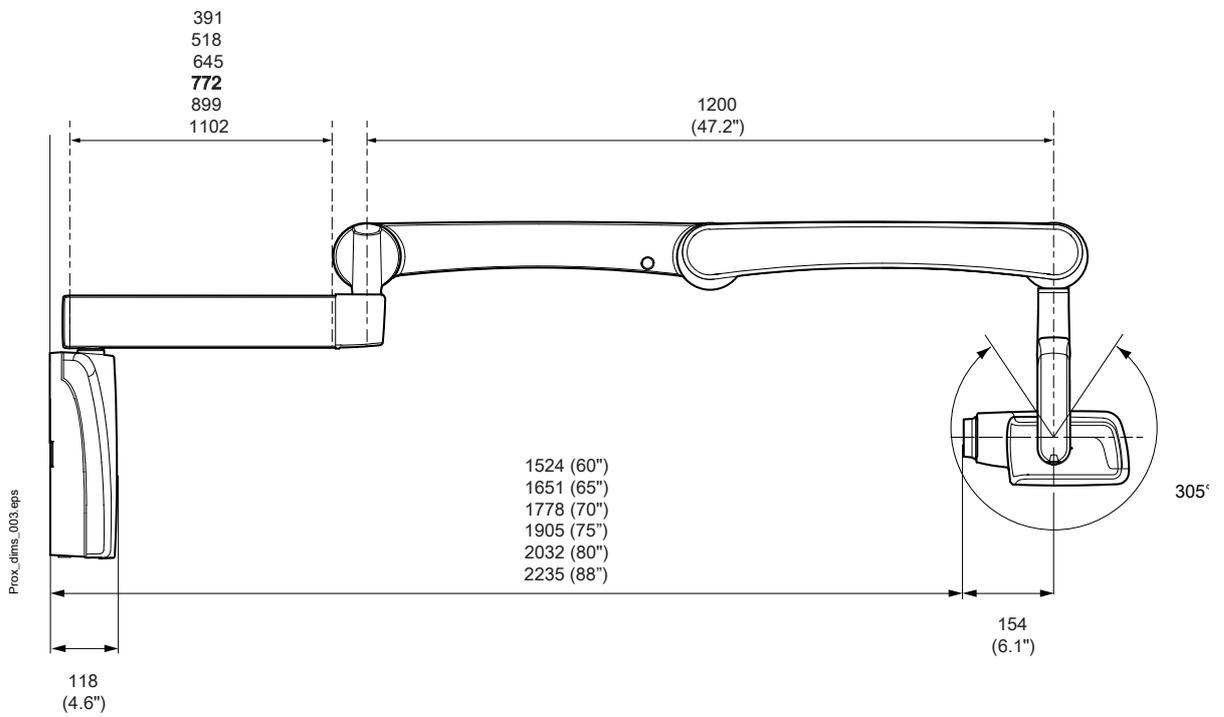
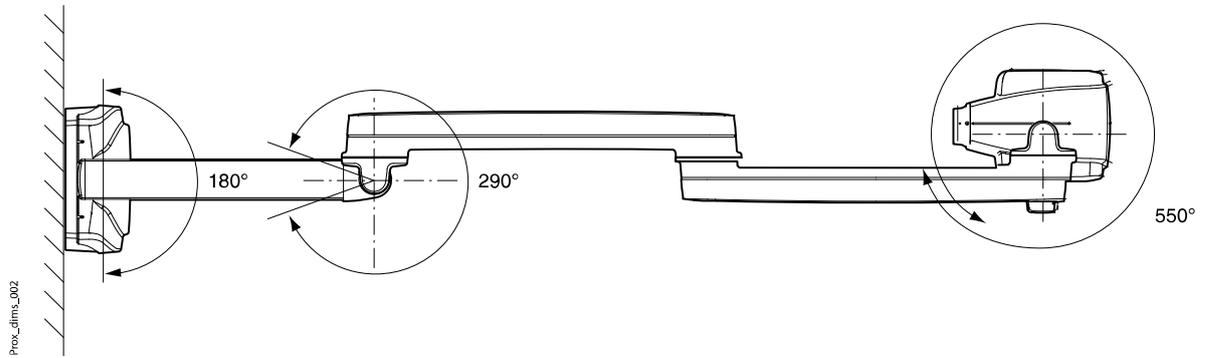
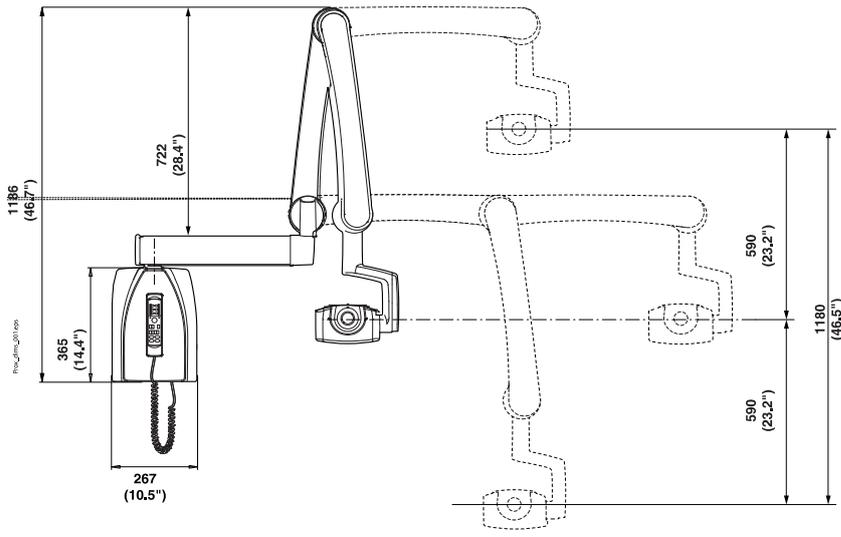
Original manufacturer

PLANMECA OY
Asentajankatu 6 FIN-00880
Helsinki FINLAND
Phone: +358-20-7795 500

Distribution

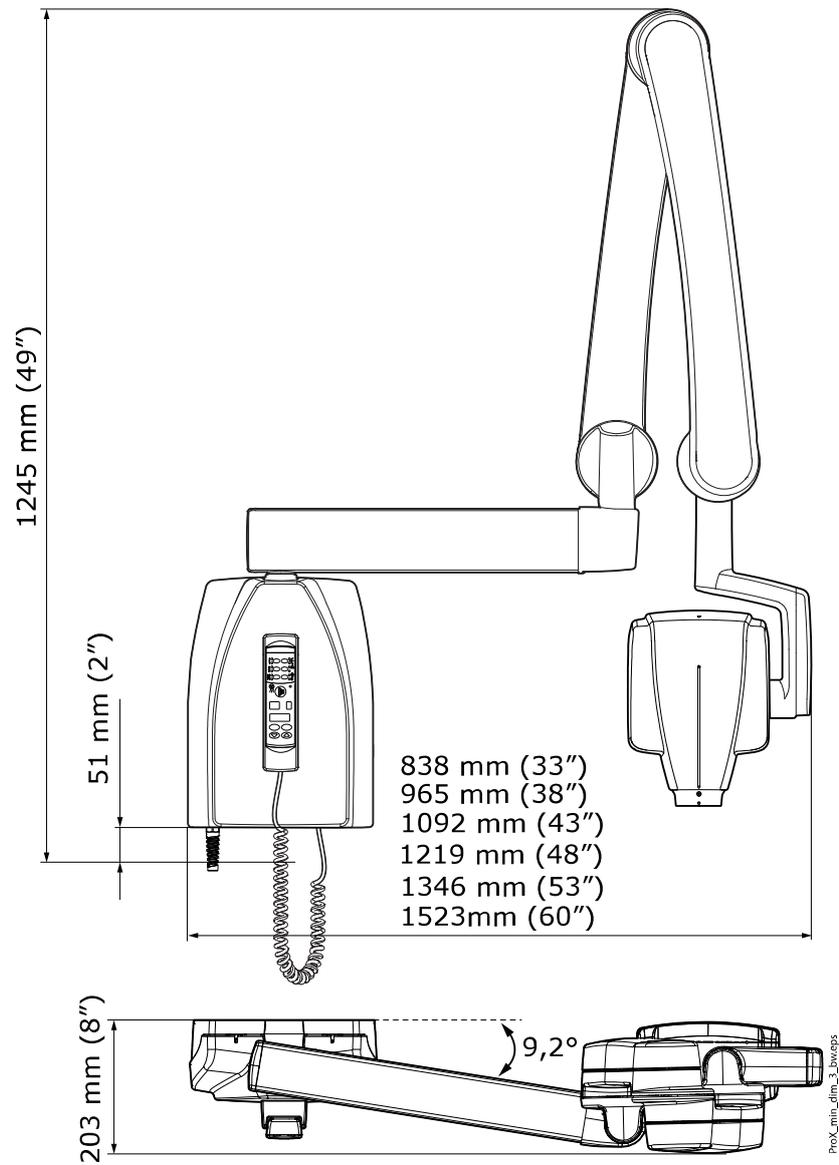
KaVo Dental GmbH
Bismarckring 39
88400 Biberach
Germany
Phone +49 7351 56-0
Fax +49 7351 56-1488

22.2 Dimensions

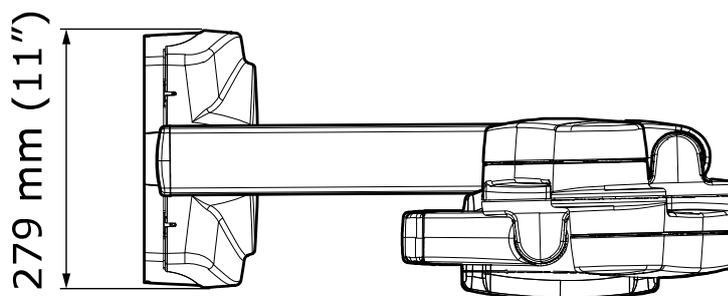
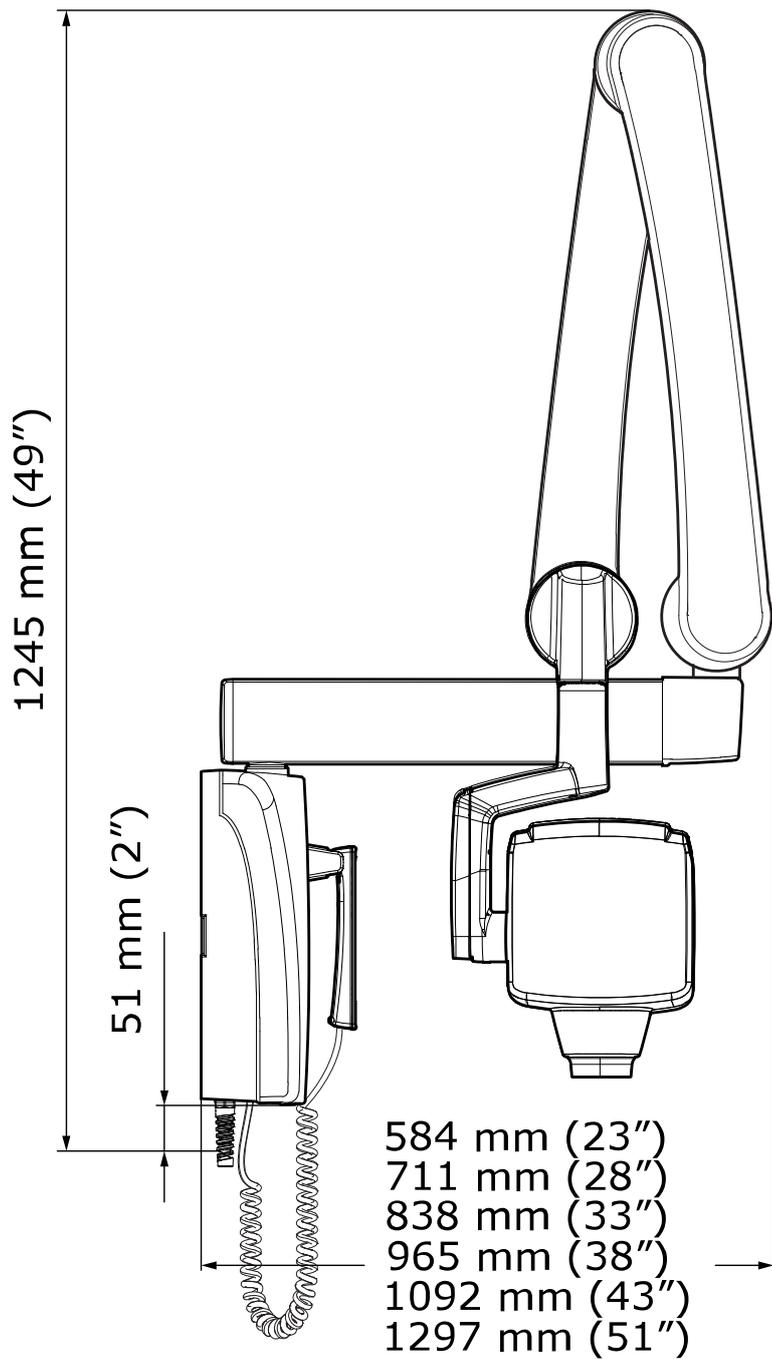


22.2.1 Minimum dimensions

Thin



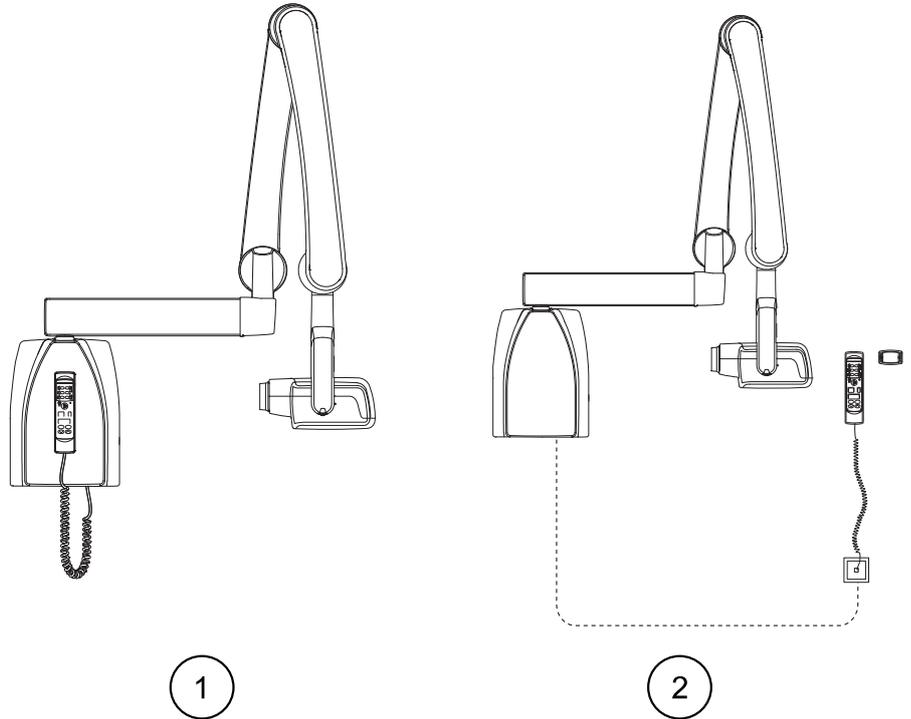
Narrow



ProX_min_dim_4.eps

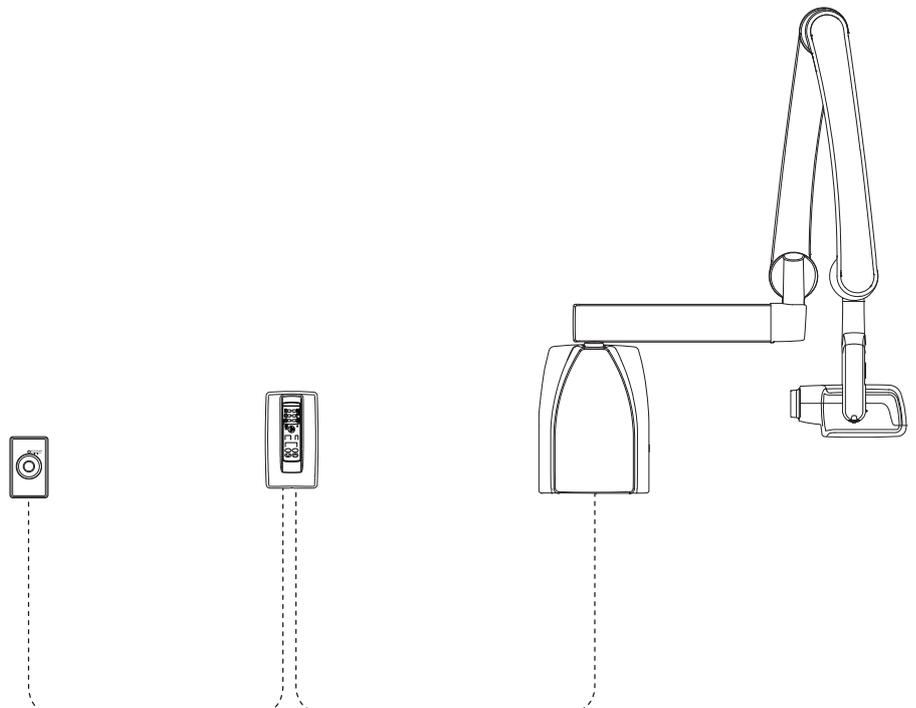
22.3 Installation options

Standard wall mount or remote control panel



- 1 Standard wall mount
- 2 Remote control panel

Fixed control panel with double exposure button



22.4 User's statement

Radiation leakage technique factors

The maximum rated peak tube potential is 70 kV and the maximum rated continuous tube current is 0.14 mA for the maximum rated peak tube potential.

Minimum filtration

The radiation port contains an added 1.5 mm aluminium filtration. The measured half-value is 0.50 - 0.55 at 70 kV. The measured value corresponds to an aluminium equivalent of 2.5 mm.

Rated line voltage

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

Maximum line current

5A at 230V, 7,4A at 115V

Technique factors that constitute the maximum line current condition

70 kV, 8 mA

Generator rating and duty cycle

0,8 kW, duty cycle 1:13,5. The wait period is controlled automatically by calculating it according to the formula $t_w = n \cdot 13,5 \text{ x, min. } 6\text{s}$

Maximum deviation of peak tube potential from indicated value

± 2.0 kV

Maximum deviation of tube current from indicated value

± (5% + 0.2 mA)

Maximum deviation of exposure time from indicated value

± (5% + 0.001 sec)

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 its 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

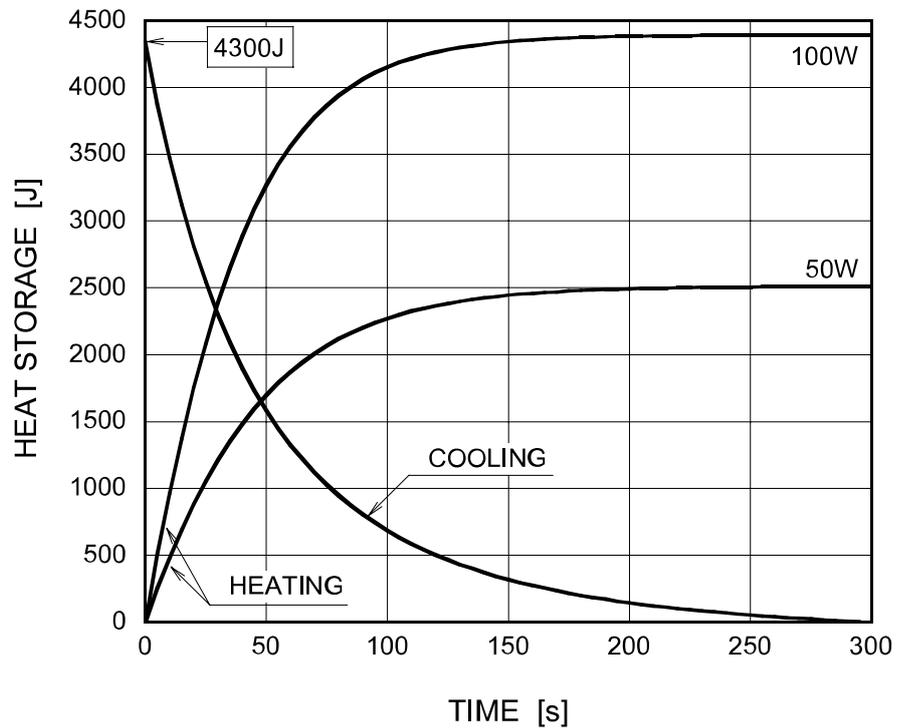
The x-ray tube voltage and tube current which result in the highest electric output power

70 kV, 8 mA

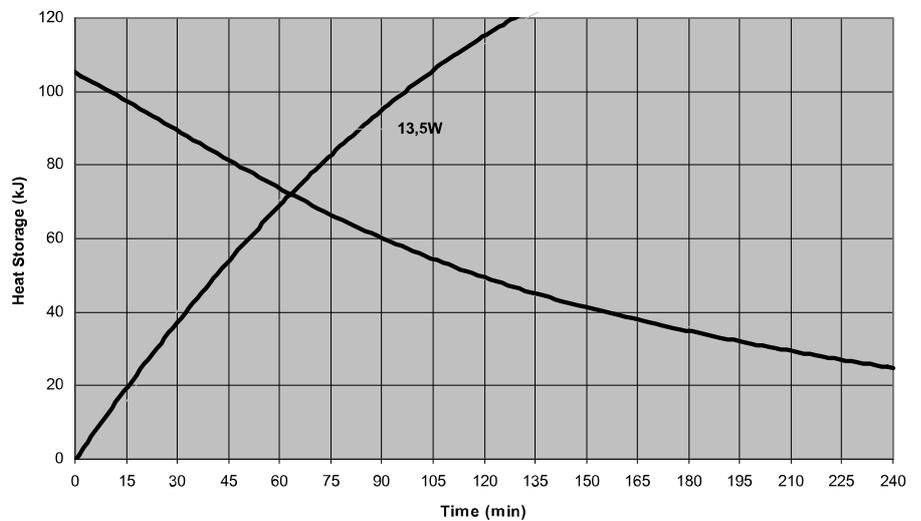
The nominal electric power for a load time of 0.1 sec and at the nominal x-ray tube voltage

1.4 kW at 70 kV, 8 mA

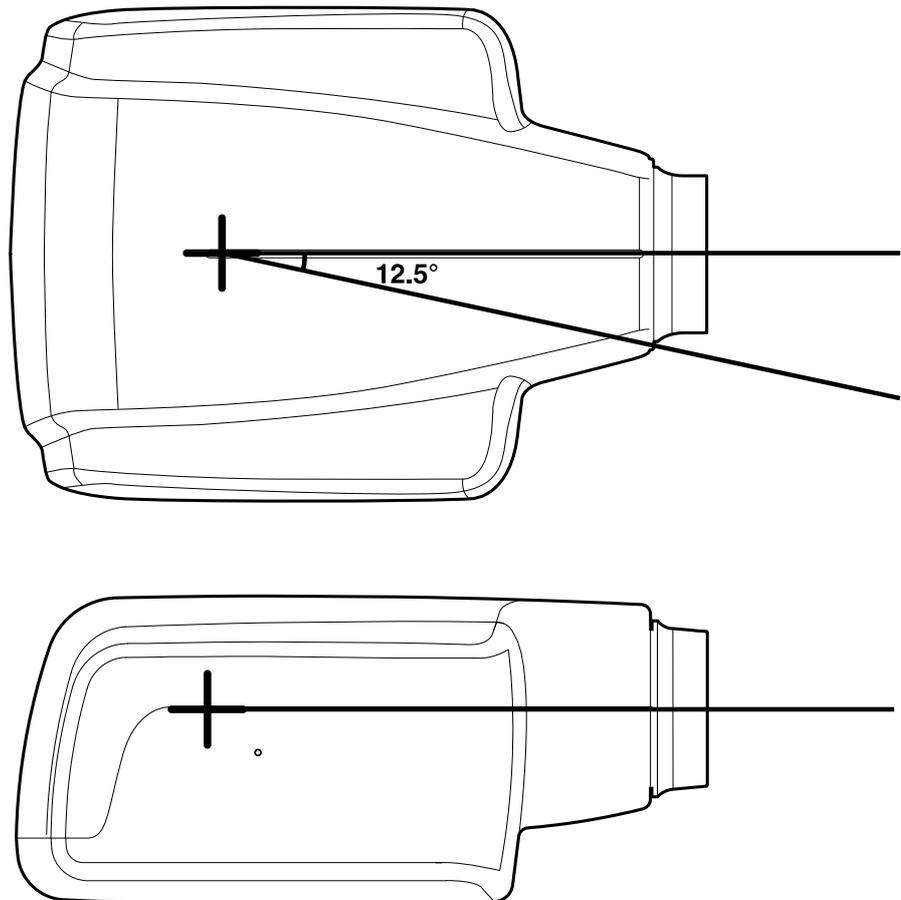
Anode heating/cooling curve of the X-ray tube



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

12.5°

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)

22.5 Distributor and manufacturer

Distributor

KaVo Dental GmbH, Bismarckring 39, 88400 Biberach, Germany

Phone +49 7351 56-0, Fax +49 7351 56-1488 <http://www.kavo.com>

Manufacturer



Planmeca Oy, Asentajankatu 6, FIN-00880, Helsinki, Finland

Phone: +358 20 7795 500, Fax: +358 20 7795 555, <http://www.planmeca.com>

23 Disposal

In order to reduce the environmental load over the product's entire lifecycle, our products are designed to be as safe as possible to dispose of. The products fulfil the requirements of directives RoHS, REACH and WEEE.

Disposal of obsolete units is the responsibility of the waste possessor. The risks involved and the necessary precautions must be taken into account when handling waste products.

Parts which can be recycled should always be taken to the appropriate processing centres, after hazardous waste has been removed. All parts and components containing hazardous materials must be disposed of in accordance with waste legislation and instructions issued by the local environmental authorities.

The following parts contain hazardous waste:

- X-ray tube assembly (lead, mineral oil)
- X-ray collimators (lead)
- Imaging sensors and sensor back covers (lead)

Batteries must be disposed of following the requirements of Directive 2006/66/EEC and in accordance with waste legislation and instructions issued by the local environmental authorities.

The following parts may contain batteries:

- Circuit boards

NOTE

FOR 3D RECONSTRUCTION PC

Delete all patient data from the hard drive before disposal. Use special sanitising software that cleans the media or physically destroy the hard drive.

