



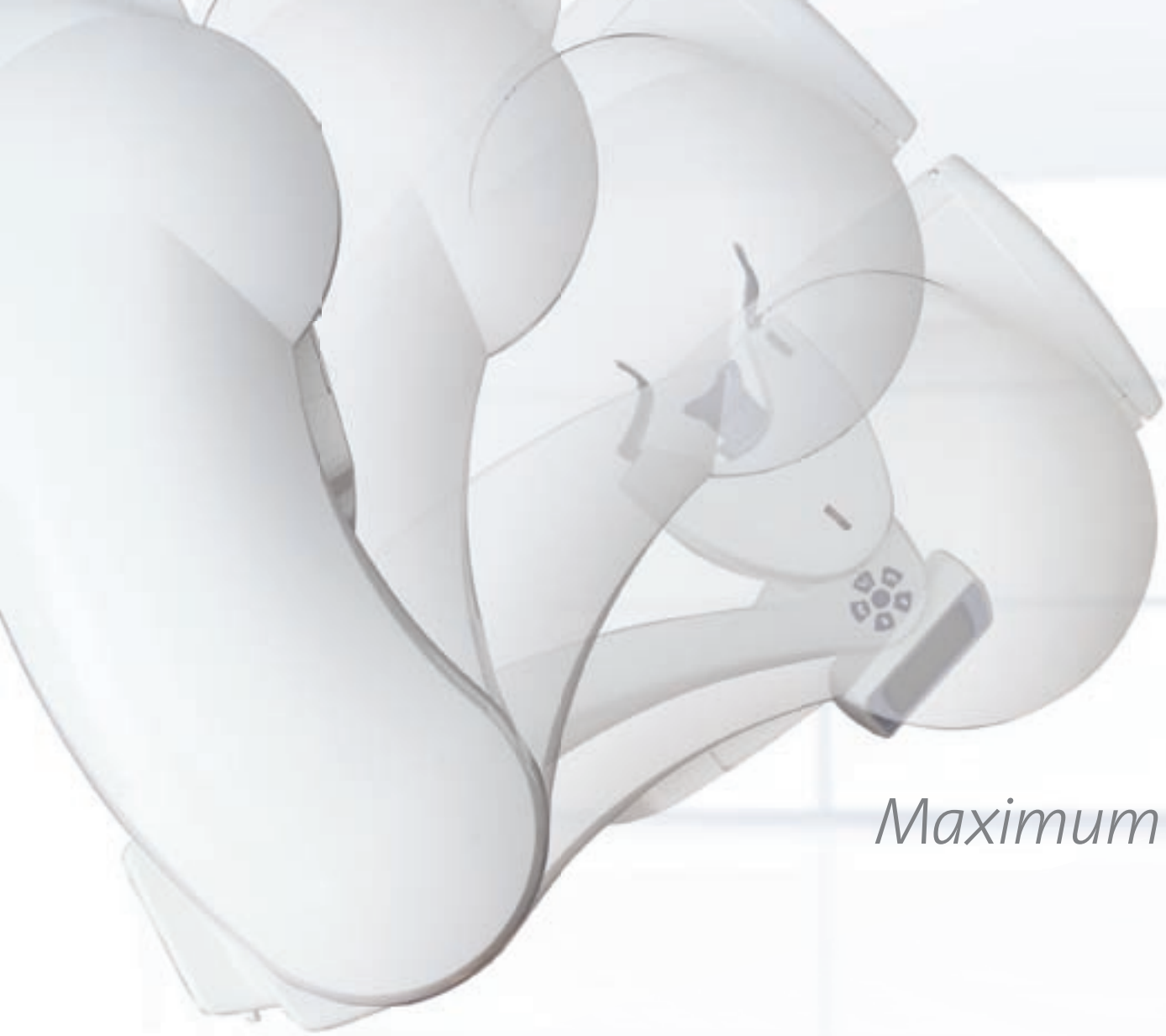
**PLANMECA**  
ProMax



## *New era of dental imaging*

The revolutionary Planmeca ProMax X-ray unit provides a wide range of extraoral X-ray imaging modalities for the needs of modern surgical dentistry. The Planmeca ProMax platform is unique in that it allows effortless upgradeability to 3D imaging; as this imaging modality is made possible simply with an upgrade of an existing digital Planmeca ProMax.

The Planmeca ProMax X-ray unit offers a multitude of features that were not available in a dental office X-ray equipment until now. The advanced design and functional concept ensure that the unit can perform superior maxillofacial radiography now and in decades to come. The unit is a true evidence of Planmeca's technological leadership, acknowledged design concept, and the understanding of maxillofacial X-ray units they have developed over the years. And the result is highly sophisticated and user-friendly.



## *Maximum results with unique technology*

The state-of-the-art Planmeca ProMax platform uses robotic SCARA technology to provide such utterly precise arm movements that are needed for rotational maxillofacial radiography. With this unique technology, the software-calculated imaging geometry is performed with a three-joint SCARA arm. The arm can freely produce any movement pattern required by any existing or future exposure program; hence the unit mechanic design will never restrict its imaging capabilities.

In addition, the technology concept Planmeca decided to develop allows adding new imaging programs with software upgrades. In conclusion, Planmeca ProMax provides, and will continue to provide, optimal radiography for virtually any need in maxillofacial diagnostics.





The design and the operating principles of the Planmeca ProMax maxillofacial X-ray unit are based on the latest scientific research and a clinical insight of the requirements of today's maxillofacial radiology. Planmeca ProMax offers a variety of imaging modalities in one intelligent X-ray unit.

- Panoramic radiography for general diagnostics of the tooth arch and the jaw
- Advanced panoramic radiography for specific diagnostics of the tooth arch, jaw, maxillary sinuses, and temporomandibular joints
- Dental tomographic slices for detailed morphologic diagnostics of facial bones
- Cephalometry for skull imaging



The configuration of the unit can be tailored to comply with user-specific needs. New features and imaging modalities can easily be added at a later date.

The Planmeca ProMax X-ray unit is 100% digital:

- Direct digital image capture with real-time image acquisition\*
- Digital user interface on the colour TFT main display
- Digital exposure movement control, micro step motors with smooth, quiet, and accurate movements
- Digital control system of the X-ray generator providing high-quality and uniform radiation insensitive to any external disturbances
- Fast digital communications interfaces (Ethernet)

Each Planmeca ProMax incorporates a digitally controlled X-ray generator, allowing a fast pulse sequence and an Ethernet-based data path to its digital sensor for high capacity image data transfer. This technologically advanced design enables Planmeca ProMax to evolve into a state-of-the-art 3D imaging platform with Cone Beam Volumetric Tomography (CBVT). Thus the same X-ray unit can serve as a platform for film, CR-plate, direct digital, or 3D dental imaging.

\* Planmeca ProMax is also available as a conventional film unit, which can later be fully digitalised.



Planmeca ProMax utilises unique SCARA technology (Selectively Compliant Articulated Robot Arm). SCARA is a revolutionary electro-mechanical construction, providing flexible, precise, and complex movements required in rotational maxillofacial radiography.

In Planmeca ProMax, SCARA technology is combined with real-time computation of dynamic rotation patterns. These enable optimised radiography of each patient's anatomy, meeting with virtually any diagnostic requirement in maxillofacial dentistry.

The whole Planmeca ProMax concept design declares the unit can perform superior maxillofacial radiography today and in decades to come.

- Rotational freedom – the SCARA arm can produce any rotation pattern.
- Network connectivity – the unit has an Ethernet connection for high-speed data communications.

- Graphical user interface – the colour TFT display with GUI displays all and any required controls.
- Advanced collimation – the four-blade collimator can flexibly shape the X-ray beam.
- Upgradeable software – new imaging programs and features can be introduced with software upgrades.
- Upgradeable to 3D imaging – all Planmeca ProMax units can be field upgraded to include three-dimensional imaging (CBVT technology).

Direct digital radiography has numerous advantages both for the patient and for the X-ray imaging workflow.

Direct digital X-ray imaging saves time. Images appear on screen within seconds after the exposure and are immediately available for diagnosis anywhere in the practice network.

Since film, film processing, and darkroom are no longer needed, the most common reasons for image retakes are eliminated.

Digital images can be enhanced in imaging software. This gives new opportunities for diagnostics and allows adjustment of the image darkness and contrast to optimise diagnostically relevant regions.

Digital archives and networks enable efficient image communications. Electronic image copies match the original in quality and thus the highest quality image is always accessible for on-site diagnostics as well as for remote consultation.

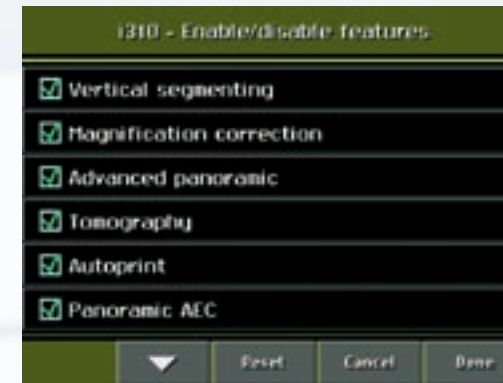


Planmeca ProMax's open positioning concept minimises errors caused by incorrect patient positioning, one of the most frequent reasons for failed radiographs. The unit features a SCARA imaging arm that can be moved completely away from the patient for positioning. This allows the operator to observe the patient freely from all directions, making patient positioning quick, precise, and easy.

A triple laser beam system ensures proper alignment, as it accurately indicates the correct anatomical positioning points.

- The midsagittal plane positioning beam shows the correct sideways alignment of the patient's head, so that the resulting image is symmetric and undistorted in the left-right direction.
- The Frankfort horizontal plane positioning beam shows the correct forward tilt of the patient's head, so that the dental arch lines up straight in the radiograph.
- The focal layer positioning beam indicates the focal layer's position in the incisor region and ensures the patient is positioned fully inside the focal layer for sharp and clear images.

The side entry allows easy access for all types of patients. The exposure can be performed the patient standing – the recommended way for short procedures – or seated. If necessary, the patient to be radiographed can even remain seated on a wheelchair.



With Planmeca ProMax, no mirrors are needed for positioning. Instead, the patient has an open and comfortable view and is relaxed by the personal contact. This also means a child can keep a direct eye contact with an accompanying adult during the procedure.

The unique digital Dynamic Exposure Control (DEC) optimises the whole imaging chain individually for each patient. All components from the X-ray generator to the digital sensor are tuned to produce optimum image quality.

The full colour TFT display and the graphical user interface (GUI) guide the operator with text and clear graphic symbols. All exposure settings are logically grouped and easy to understand, which makes the imaging procedure quick, and allows the operator to fully focus on patient positioning and communication.

After taking a digital image, the user can see a preview image on the main display. The preview image can be

zoomed in for observation before accepting the image. Once the image has been accepted, it is automatically stored in the image database.

Planmeca ProMax allows a selection of correct exposure formats, minimising the radiation dose for all types of patients and diagnostic purposes. The pediatric program automatically selects the narrow focal layer and reduces the exposed area from the top and the sides. This reduces the patient dosage by 35%, while providing full diagnostic information.

With the horizontal and vertical segmenting option, the exposed area can be limited only to the diagnostic area of interest. With a simple selection on the GUI, the patient dosage can be reduced by up to 93%, compared to a full area panoramic exposure. This is highly advantageous and radiation hygienic when a follow-up image is needed on a limited part of the jaw. \*

When purchasing a new imaging program to the Planmeca ProMax X-ray unit, the new feature is taken into use by entering an activation code on the GUI. This smart activation makes introduction of new features fast and trouble-free.

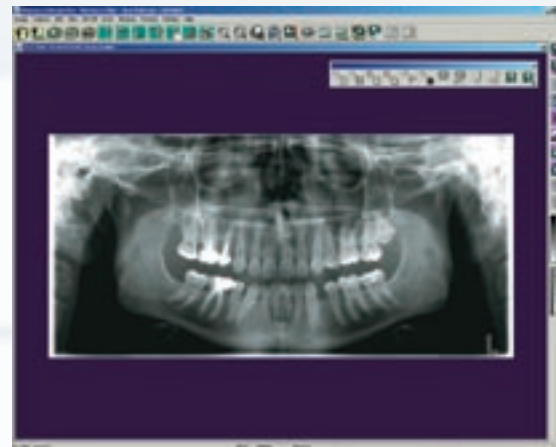
The self-diagnostic system continuously monitors the unit, and clear language help messages guide the operator enabling the correct use of the unit. In addition, the unit control system records an event log in case of abnormal operation. This helps both the operator and the technical service.

\* Absorbed dose reduced by sliced exposure using sector selector system with rotational panoramic radiography, Y. Hayakawa, N. Kobayashi, Y. Kousuge, H. Fujimori and K. Kuroyanagi, Bulletin of Tokyo Dental College, Vol. 35, No. 3, pp. 127-131, August, 1994

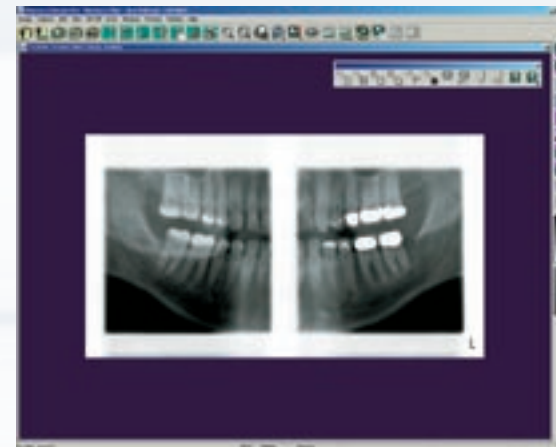
Open positioning and GUI for ease of use



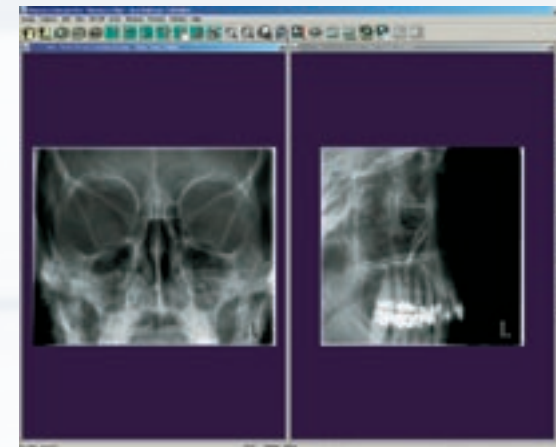
Standard Pediatric



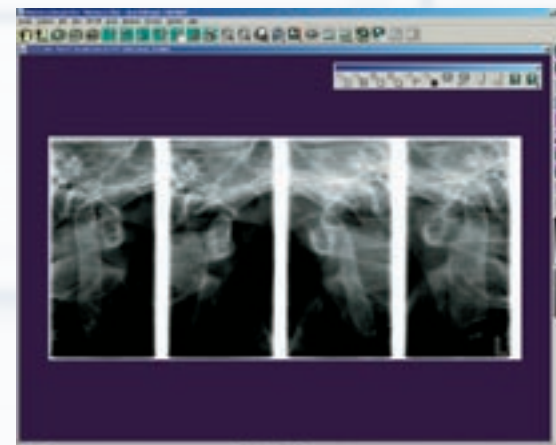
Standard Panoramic



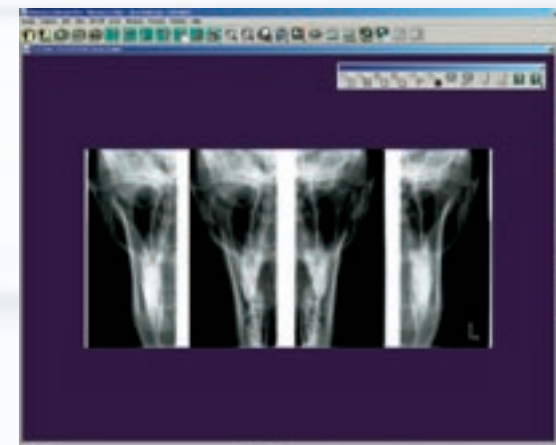
Bitewing Panoramic



PA and Lateral Non-Rotational Sinus



Lateral Double TMJ



PA Double TMJ

In a traditional panoramic image, the teeth interproximal contacts often overlap, which prevents diagnosis of interproximal caries. Planmeca ProMax's optional Improved Interproximal Angulation Panoramic program produces a panoramic image where the teeth interproximal contacts are open, making the radiograph useful for caries detection.

An image taken with the optional Bitewing Panoramic program, using the improved interproximal angulation geometry, resembles an intraoral bitewing image pair. The advantage is that the image has been obtained with one simple extraoral exposure, which produces a very low radiation dosage to the patient.

The assessment of the crestal alveolar bone height is a standard study in periodontal diagnostics. The optional

Improved Orthogonality Panoramic program produces an image where the alveolar crest is clearly visible for improved diagnostics of the periodontal condition. In addition, radiographs taken with this program are highly valuable for implant planning.

The TMJ imaging programs produce lateral or posteroanterior views of open or closed temporomandibular joints. The imaging angle and position can be adjusted to correspond to the individual anatomy of each patient.

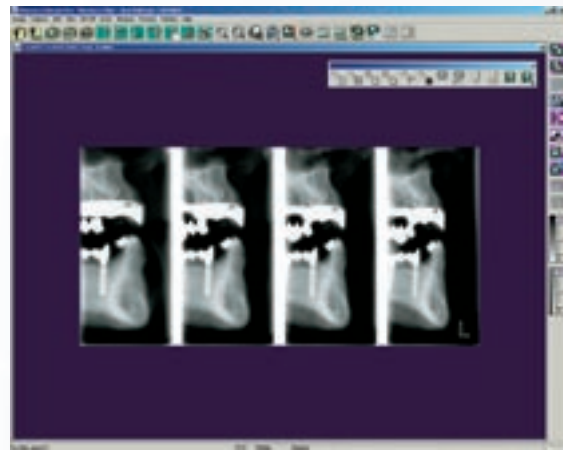
The standard Double TMJ programs produce mouth open and mouth closed images of the TMJs on the same radiograph either from lateral or from posteroanterior view.

The optional Lateral-PA TMJ program produces lateral and PA views on the same radiograph. Multi-angle TMJ programs produce radiographs with images from three different angles either from the lateral or from posteroanterior view.

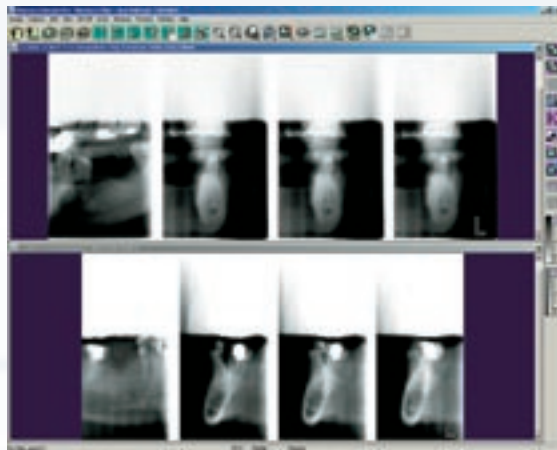
In Planmeca ProMax, the PA Rotational Sinus program is a standard program. The image layer is straight and the resulting radiograph gives a clear view of the maxillary sinuses.

The optional advanced sinus programs produce lateral or posteroanterior transillumination sinus images by linear scanning. The resulting images are diagnostically similar to cephalometric projections of the sinus area.

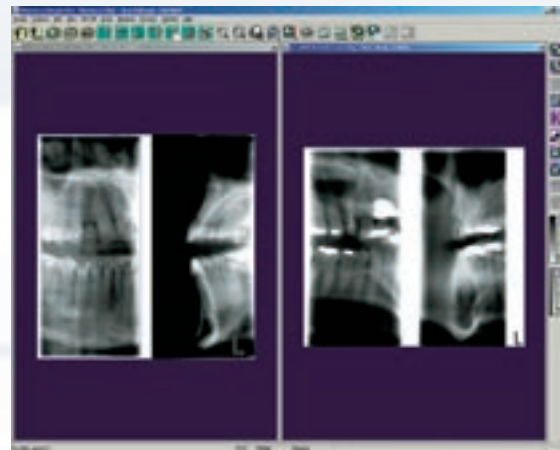
Special programs for various diagnostic needs



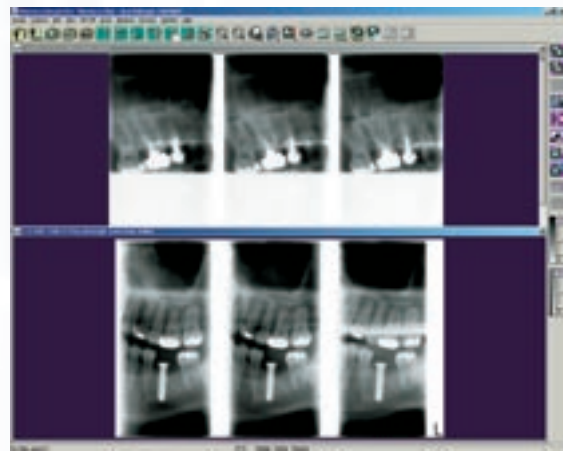
4 cross-sectional tomograms



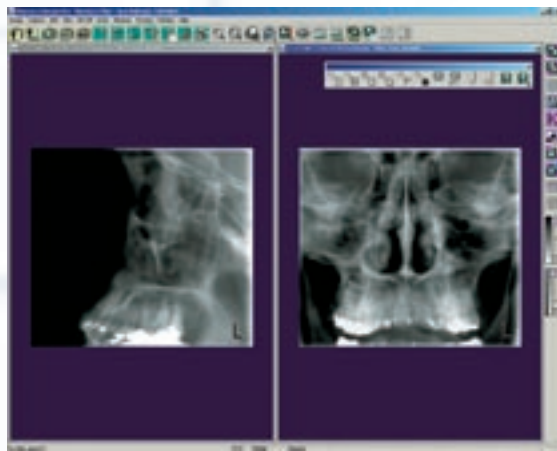
Combined tomography: 3 cross-sectional and 1 longitudinal tomograms



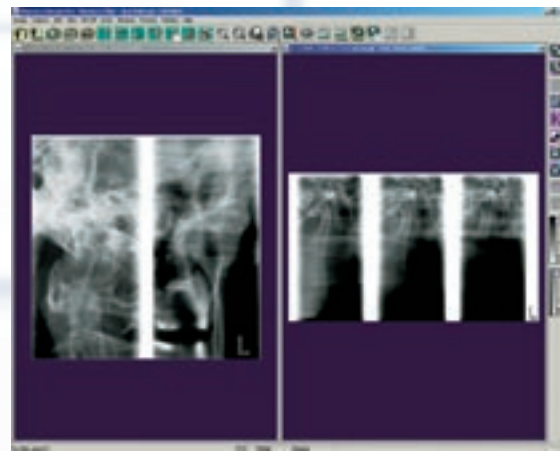
Combined tomography: 1 cross-sectional and 1 longitudinal tomograms



3 longitudinal tomograms



Sinus: lateral and posteroanterior tomograms with Transtomography\*



TMJ tomograms

With Planmeca ProMax, any maxillofacial radiographic examination can be carried out in the dental practice instead of sending patients to specialised radiologists. For example, all required images for the analysis, planning, and follow-up of implantology can be taken using the Planmeca ProMax tomography programs. This opens new high-value opportunities for the dental practices.

The pre-adjustment of the position and the angle of the tomographic exposure is done automatically according to the operator's program and target selection on the main display. Fine-alignment using the smart positioning joystick is highly practical and intuitive.

An impression model of the patient's tooth arch allows easy and reliable fine-alignment of the position and the angle of the desired tomographic image. The dual laser beams indicate the exact site and orientation of the tomographic cut.

The tomographic imaging procedure is straightforward; the operator simply selects the target, the required view, and the slice thickness (1, 3, 6, 9, 18, 36 mm) in the GUI. Planmeca ProMax is delivered with a user guide DVD, which provides clear step-by-step instructions on taking successful tomograms as well as other radiographs.

The increasing use of osseointegrated implants has created a wider demand for radiographic techniques for pre-surgical and post-operative patient evaluation. Correct topographic information is required on the prospective site for planning the implant location.

The Planmeca ProMax tomography system produces clear tomographic slices of any part of the maxilla, mandible, or temporomandibular joints. The tomogram can be cross-sectional or longitudinal and is adjustable to any specific angle. The constant 1.5-fold magnification factor and combination programs enable exact measurements.

Transtomography\* uses a multiple sweep method to produce linear tomography effect with a narrow X-ray beam. Transtomography\* combines the translation movement with an oscillation movement where the centre of the rotation moves over the region of interest. The layer thickness can be adjusted like in film-based linear tomography. Thanks to the highly advanced imaging method, the image of the anatomies is truthful and layer separation is maximised.\*

With cross-sectional tomography programs, the user can take 1–4 cross-sectional images on one radiograph either manually or using the versatile automatic programs. The automatic programs provide series of images with adjustable tomographic cuts (adjustable interval), multi-angle tomographic cuts, or special images of the sinus and the nasal cavity.

The longitudinal programs provide 1–4 longitudinal tomographic cuts on one radiograph either manually or with the versatile automatic programs. The automatic programs provide series of images with adjustable interval, multi-angle images, or special images of the sinus and the nasal cavity.

Longitudinal slices are highly useful for instance for third molar assessment and the diagnostics of the temporomandibular joints.

The combined tomography programs provide cross-sectional and longitudinal views on the same radiograph. This is highly valuable for implant planning since both the transversal and longitudinal views record the same vertical position. The level measurement tool of the Planmeca Dimaxis software can be applied to the combination radiograph, which gives a solid confirmation of the exact position of the images.

\* *Transtomography: a new tomographic scanning technique*, U. Welander, G. Li, W.D. McDavid and G. Tronje, *Dentomaxillofacial Radiology* (2004) 33, 188–195



New opportunities with tomography

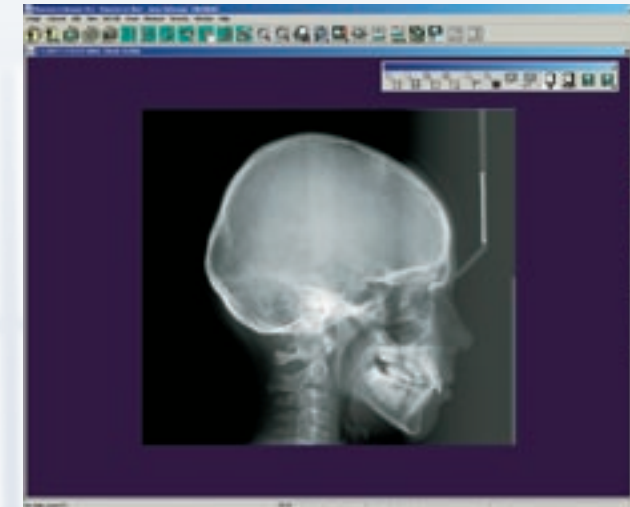


The Planmeca ProMax Cephalostat makes cephalometry easier and more accurate than ever before. The unit automatically aligns itself, and changing the place of the digital sensor easily turns over the imaging modality to cephalometric imaging. Optionally, the unit can be equipped with two fixed digital sensors.

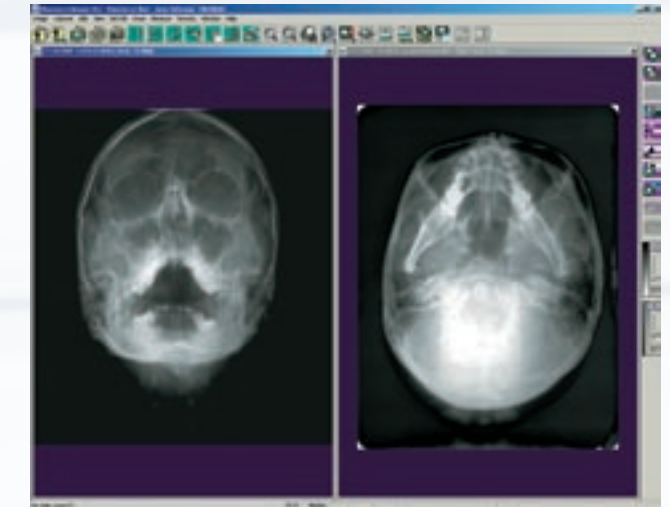
The functionally designed, easy-to-use head positioner guarantees accurate patient positioning in all cephalometric projections. The carbon fibre ear posts and nasal positioner are extremely durable, hygienic, and fully transparent to radiation.

The digital cephalostat scans the patient's head horizontally with a narrow X-ray beam. This results in reduced scatter radiation, which improves the image clarity. Planmeca's unique design allows exceptional flexibility in image formats, with field sizes of up to 30 x 27 cm (11.8 x 10.6 in.). This facilitates digital lateral radiographs of the whole skull. The image format and orientation are selected on the GUI.

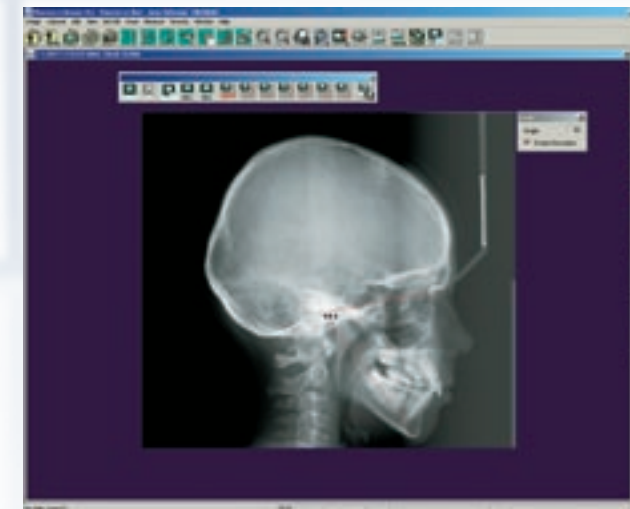
Thanks to digital imaging and the wide dynamic range of the digital sensor, the soft tissue filter is adjusted on the Planmeca Dimaxis imaging software. This means that the images can be viewed with or without the filter.



Lateral cephalometric image



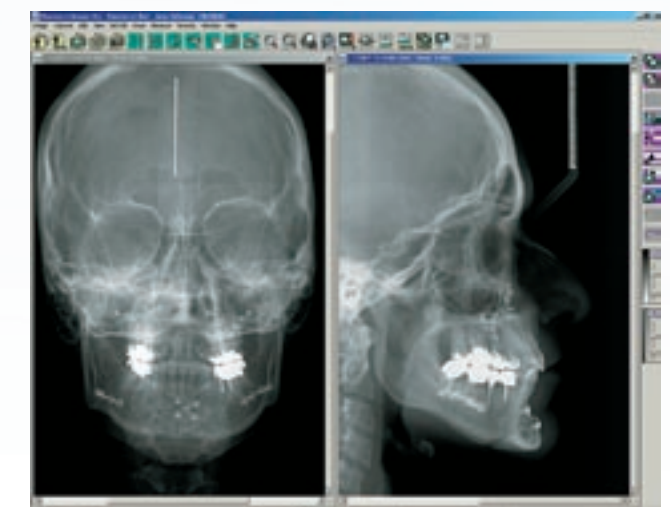
All common cephalometric projections are possible



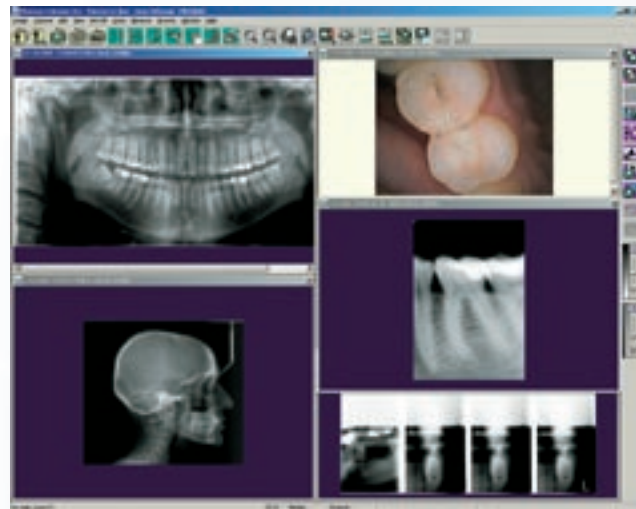
Distance and angle measurements



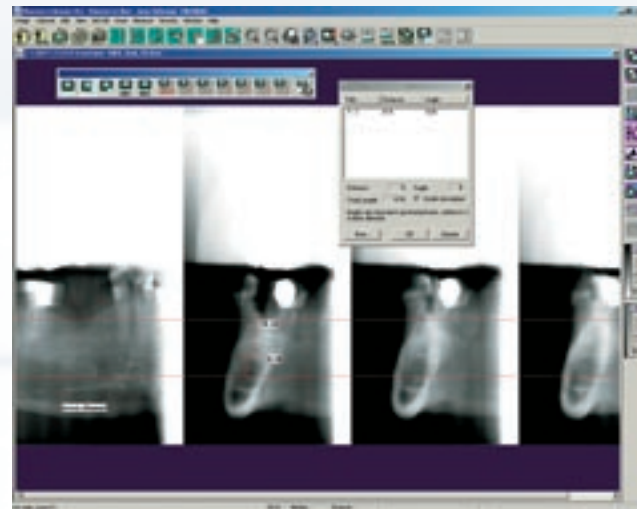
Lateral image and hand image



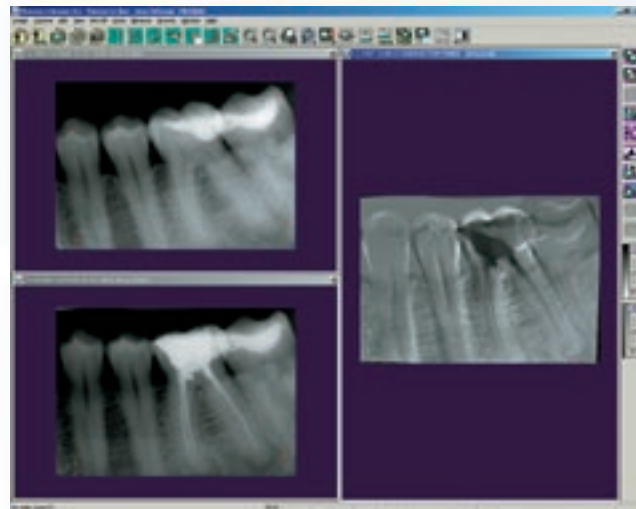
PA and lateral projections



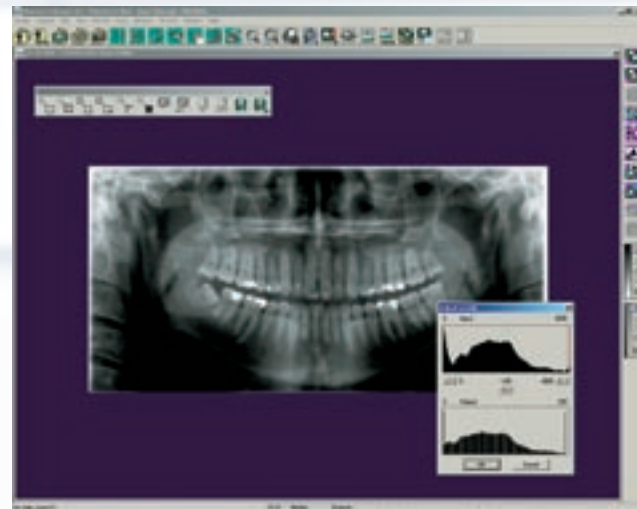
Planmece Dimaxis handles all image types



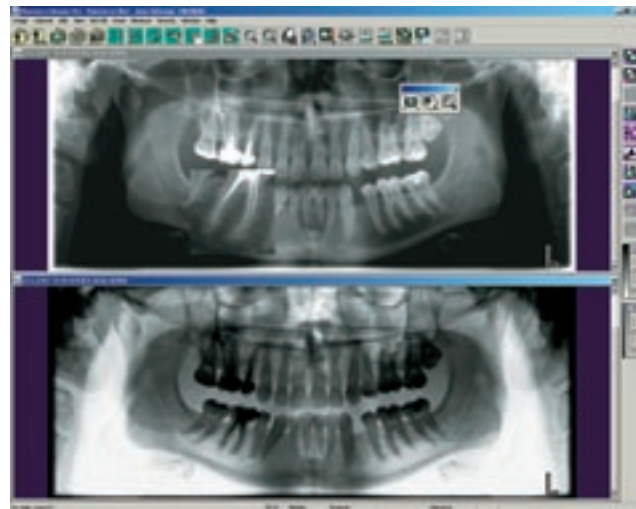
Easy and accurate measurements in tomography



Optional subtraction tool shows the changes between two exposures



Adjustments of the greyscale



Loop magnification tool inversion



The digital Planmece ProMax unit is delivered with the Planmece Dimaxis imaging software that includes powerful and easy-to-use image processing tools:

- Adjustments of the image greyscale for optimal image contrast and darkness
- Filters for image sharpening and noise reduction
- Angle, length and level measurements
- Imaging communications through annotations, diagnose window, image export, and printing.

These versatile tools facilitate image communications, bring visible significant image information and thus improve the diagnostic value of radiographs after the exposure.

Planmece Dimaxis comes with Solid EmbeddedEngine™ database, a professional solution for image storage. This database provides automated and secure storage of all image information. Automated back-ups meet the strictest requirements of data security and prevent all loss of clinical information.

Planmece Dimaxis complies with the DICOM standard (Digital Imaging and Communications in Medicine), a worldwide standard for image transfer in medical information systems. Planmece's system is 100% DICOM compatible and fully ADA compliant and provides, as an option, the widest possible DICOM functionalities (see page 22).

All Planmece's digital imaging products use the Dimaxis software, which links together intraoral and extraoral X-ray, intraoral video, and still camera images.

Planmece Dimaxis can be integrated into the practice management software through Planmece's flexible and clearly defined interface. This allows a smooth workflow and practical integration of the practice information systems.

Planmece TWAIN Driver allows for direct digital X-ray image acquisition into a third party imaging software. It allows another vendor's TWAIN compliant imaging software to directly acquire the digital Planmece ProMax X-ray images.



In order to get accurate and clear panoramic radiographs, the form of the X-ray unit's focal layer must follow the actual patient anatomy. In Planmeca ProMax, the form of the focal layer follows the scientifically defined shape of human dental arch and jaw, which results in panoramic radiographs with clearly superior clinical quality.\*

The jaw size and shape varies between individuals according to size, gender, race, and age. Consequently, one fixed panoramic focal layer form cannot be optimal for all patient cases. In Planmeca ProMax, the operator may adjust the shape of the focal layer according to the jaw size and shape characteristic to the patient.\*\*

Planmeca ProMax's imaging geometry efficiently eliminates redundant shadows and ghost images caused by objects outside the image layer. This significantly increases the diagnostic value of panoramic radiographs.

The shadow of the cervical vertebrae, which commonly disturbs the clarity of the anterior region, is automatically eliminated by adjusting the amount of radiation in the central incisor region. This computer-controlled correction ensures that there is no loss of image contrast or density.

\* Standard Forms of Dentition and Mandible for Applications in Rotational Panoramic Radiography, U. Welander, P. Nummikoski, G. Tronje, W.D. McDavid, P.E. Legrell and R.P. Langlais, Dento-Maxillofacial Radiology, 1989, Vol. 18, May

\*\* Dental and Mandibular Arch Widths in Three Ethnic Groups in Texas: A Radiographic Study, P. Nummikoski, T. Prihoda, R.P. Langlais, W.D. McDavid, U. Welander and G. Tronje, Oral Surgery & Oral Medicine & Oral Pathology 1988, 65:609-17

Each patient has an individual bone and tissue thickness, which varies according to size, race, and age. The optional Automatic Exposure Control (AEC) measures the patient's radiation transparency, and correctly adjusts exposure values to achieve the desired film darkness and contrast.

In Planmeca ProMax, the short and constant object-film distance minimises the image magnification in panoramic radiographs. Adding the magnification correction option to the film unit further improves accuracy of panoramic images, since the film is always parallel to the focal layer.

Autoprint is a fully automatic film marking system for panoramic radiography. During the exposure, Autoprint marks the exposure parameters, the chosen program, and all the information necessary for patient identification on the film. This provides an automatic way to document exposure values and to reproduce images at a later date. Autoprint functions are controlled on the main display or through an external keyboard.

Planmeca ProMax film units can be transformed fully digital any time in the future. This applies to all imaging modalities – panoramic, tomographic, and cephalometric imaging – as well as to all imaging programs.

For Planmeca ProMax film units, two alternative versions of the cephalometric system are available:

- Planmeca ProMax Cephalostat CA features the automatic selection of the correct cephalometric aperture according to the cassette size and its position on the cassette holder, and an automatic laser beam assisted soft tissue filter positioning.
- Planmeca ProMax Cephalostat CM features a motorized adjustment of cephalometric apertures and the soft tissue filter according to the operator's selection on the GUI.

A cephalometric system – film or digital – can easily be added to the Planmeca ProMax unit any time in the future.



Feature	Options	Film	Digital	Required construction
Receptor	Film	●		
	Digital		●	
Imaging mode	Basic panoramic programs (standard): • Standard Panoramic • Standard Pediatric • Lateral Double TMJ • PA Double TMJ • PA Rotational Sinus	●	●	SCARA2 2 joint robot arm or SCARA3 3 joint robot arm
	Vertical Segmenting (optional)	●	●	
	Magnification Correction Panoramic program (optional)	●		SCARA2 or SCARA3 and cassette rotation
	SCARA3 construction required for advanced and tomographic programs (SCARA3 is not possible to upgrade later)	●	●	Adds 3rd joint
	Advanced panoramic programs (optional): • Horizontal Segmenting • Improved Orthogonality Panoramic • Improved Interproximal Angulation Panoramic • Bitewing Panoramic • Lateral-PA Double TMJ • PA Multi-angle TMJ • Lateral Multi-angle TMJ • PA Non-Rotational Sinus • Lateral Non-Rotational Sinus • Midsagittal Lateral Non-Rotational Sinus	●	●	SCARA3 3 joint robot arm
	Tomography (optional)	Digital tomography incl. Transtomography® Wide beam linear tomography Wide beam true linear tomography	●	●
User interface	Graphic colour TFT display	●	●	
Film marking	Autoprint	●		
	Extra Autoprint keyboard (PS2) Admark	●		
Panoramic cassette format	15 x 30 cm	●		
Cephalostat	Ceph CM	●		
	Ceph CA	●		
Ceph cassette format	Digital Ceph (Dimax)		●	Available for both SCARA2 and SCARA3 constructions
	18 x 24 cm 24 x 30 cm 8 x 10 in.	●	●	
AEC	Pan AEC	●		
	Ceph AEC	●		
DEC	Pan DEC		●	
	Ceph DEC		●	
Additional features	Accessory cabinet	●	●	
	External user interface	●	●	
Column support	Wall	●	●	
	Free standing	●	●	

Generator	Constant potential, resonance mode high frequency 80 - 150 kHz	
X-ray tube	D-054SB-P	
Focal spot size	0.5 x 0.5 mm (IEC 336)	
Total filtration	min. 2.5 mm Al equivalent	
Anode voltage	50 - 84 kV	
Anode current	0.5 - 16 mA DC	
Exposure time	Pan	2.7 - 16 s
	Ceph	0.2 - 19 s
	Tomo	3 - 24 s / frame
SID	Pan	500 mm (19 in.)
	Ceph	163 - 170 cm (64 - 67 in.)
Magnification	Pan	constant 1.2
	Ceph	1.08 - 1.13
CCD pixel size	33 µm	
Image pixel size	66/99/132 µm selectable	
CCD active surface	Pan	9 x 136 mm
	Ceph	9 x 270 mm
Resolution (digital)	Pan	max. 9 lp/mm
	Ceph	max. 5.7 lp/mm
Image field (digital)	Pan	14 x 30 cm (5.5 x 12 in.)
	Ceph	24/27 x 18/30 cm (9/10.6 x 7/11.8 in.)
File size, uncompressed (digital)	Pan	4.5 - 7.7 MB
	Ceph	5 - 12 MB
Line voltage	100 - 240 V, 50 or 60 Hz	
Regulation	Automatic, ± 10%	
Line current	8 - 16 A	
Colour	White (RAL 9016)	

### Computer requirements, Planmeca Dimaxis

	Workstation PC (no image storage)	Image Server PC
Processor	Pentium 4	Pentium 4
RAM	256 MB	512 MB or more
Hard disk space	50 MB	2 x 80 GB
Graphics card	24 or 32 bit graphics card	24 or 32 bit graphics card
Monitor	SVGA, 1024 x 768 or more, 24 bit colours or more	SVGA, 1024 x 768 or more, 24 bit colours or more
Local bus	PCI, USB	PCI, USB
Network card	Ethernet 10/100 Mbps	Ethernet 10/100 Mbps
Peripherals	CD-ROM drive	CD-ROM drive
Backup medium	None necessary	DAT
Operating system	Windows XP, 2003 or 2000	Windows XP, 2003 or 2000

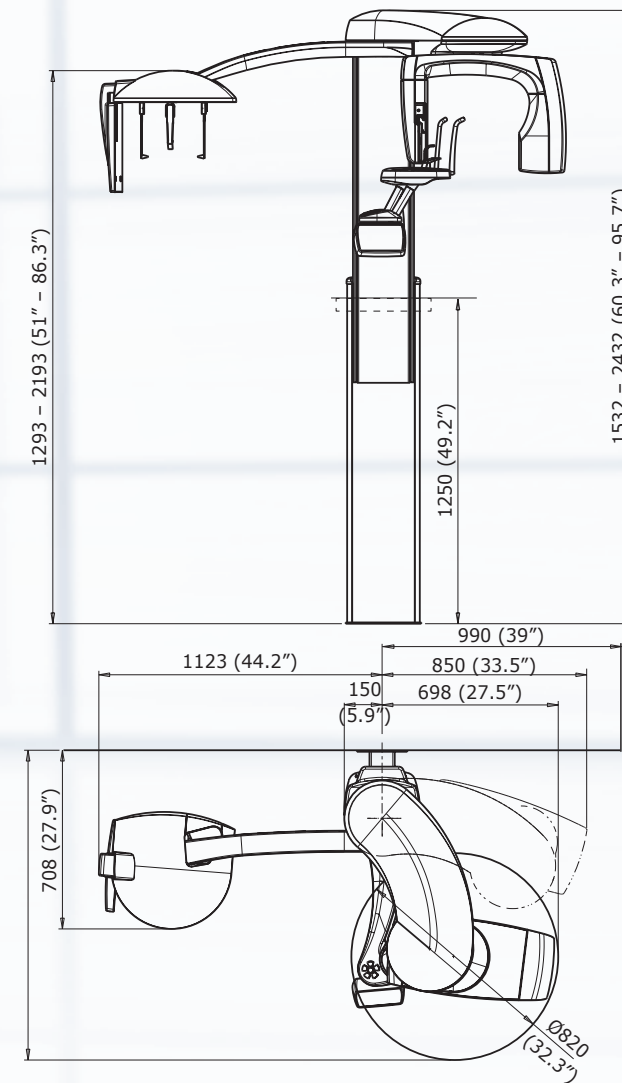
### DICOM description

Planmeca Dimaxis can be made DICOM compliant with Planmeca's DICOM Basic or DICOM Advanced add-on modules, which include the following DICOM functionalities:

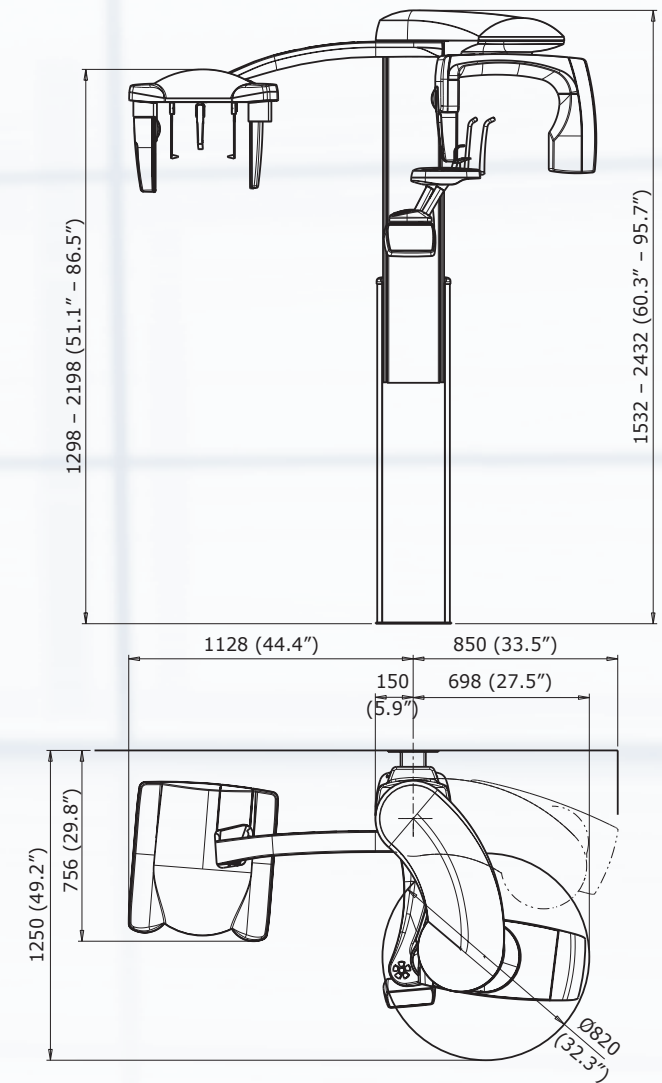
- Storage - saving images into DICOM image archive
- Media Storage - saving images into removable DICOM media
- Print - printing images on film or paper with a DICOM medical printer
- Query/retrieve - importing digital images from DICOM image archive (DICOM Advanced only)
- Modality Worklist Management - importing a patient list from DICOM patient management system (DICOM Advanced only)
- Storage Commitment - confirmation of a successful image storage (DICOM Advanced only)

Planmeca's DICOM conformance statement, including a detailed technical description, can be downloaded at [www.planmeca.com](http://www.planmeca.com)

### Planmeca ProMax with film-based Cephalostat



### Planmeca ProMax with digital Cephalostat



	Physical space requirements			Minimum operational space requirements			Weight
	Width	Depth	Height*	Width	Depth	Height*	
Planmeca ProMax Panoramic	96 cm (38 in.)	125 cm (49 in.)	153 - 243 cm (60 - 96 in.)	150 cm (59 in.)	163 cm (64 in.)	243 cm (96 in.)	113 kg (lbs 248)
Planmeca ProMax Panoramic with Cephalostat	194 cm (76 in.)	125 cm (49 in.)	153 - 243 cm (60 - 96 in.)	215 cm (85 in.)	163 cm (64 in.)	243 cm (96 in.)	128 kg (lbs 282)

\*The maximum height of the unit can be adjusted for offices with limited ceiling space.

Planmeca ProMax is a configurable product. Each unit is individually configured according to the customer's selections. When selecting features, please refer to the table above.



*Planmeca Oy designs and manufactures a full line of high technology dental equipment, including dental care units, panoramic and intraoral X-ray units, and digital imaging products. Planmeca Oy, the parent company of the Finnish Planmeca Group, is strongly committed to R&D, and is the largest privately held company in the field.*

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