



rotograph evo^D

Digital Panoramic / Cephalometric X- Ray unit

Product Data

General Features

Movement technology: multi-motor with digital trajectory control
Patient alignment: through two laser pointers that allow to locate the reference planes: mid-sagittal, Frankfurt

Standard Examination Programs

- Adult panoramic
- Child panoramic exposure parameters reduction
- TMJ open/close mouth: 4 slices are taken in the same image: left/right condyle, open/close mouth. Condyles are examined in lateral projection
- Maxillary Sinus P-A: one P-A projection, where both the maxillary sinuses are represented.

In every program the compensation of spinal column is obtained by means parameters modulation, optimized in function of the anatomic program.

Optional “Evo XP eXtended Programs”

- Adult half-panoramic (right and left)
- Child half-panoramic (right and left)
- Improved orthogonality dentition: panoramic projection limited to the dentition obtained with X-ray beam constantly perpendicular to the arch. It allows to reduce superimposition of adjacent teeth and to improve visualization of possible interproximal caries.
- Frontal dentition: panoramic limited to the frontal dentition (canine to canine), that allows to improve the detail definition on incisors.
- Low dose panoramic: panoramic with reduced angle of rotation to exclude the ascending ramus from the image. The result is a panoramic limited to the dentition area using a reduced patient dose.
- Bite-wing (right, left, double): the right or left projection allows the examination of lateral dentition (from eighth to fourth approximately), with optimized trajectory of rotating arm for a higher orthogonality of the x-ray beam on the adjacent teeth, to improve visualization of possible interproximal caries. Double Bite-wing projection performs both Bite-wing views in sequence, joining them on the same image.



Optional “IMPLANT “ Package – Linear tomography for implantology

The exam procedure consists of 3 transversal exposures

Transversal layer thickness:	4 mm (for incisors and canines)
	5 mm (for premolars and molars)
Distance between transversal layers:	4 mm (for incisors and canines)
	6 mm (for premolars and molars)

Note: the exam is performed through a specific positioner maintaining the examined zone at the center of useful area.

Optional Digital Cephalometry

Digital Ceph is available in two different versions:

- **Single** sensor: the same sensor is used for both Pan and Ceph exams and can be moved to the required position. Sensor length: 22 cm
- **Dual** sensor: unit is permanently equipped with two dedicated sensors and doesn't require sensor repositioning to switch from Pan to Ceph exam. Sensor length: 15 cm for Panoramic, 22 cm for Ceph.

The digital Cephalometry is based on a linear scanning technique, obtained maintaining the focus in a fixed position, guaranteeing the same projection geometry as if using film.

The x-ray source is automatically aligned to digital sensor.

It can be executed in two modalities, selectable from console:

- High Definition (3x3 binning), for the enhancement of the finest details
- High Speed (5x5 binning), for patient dose reduction and for the decrease of artefacts due to possible patients movements.

Adjustable soft tissue filter enhances profile of the soft tissues of the face on the lateral skull view.

The system allows the following projections:

Applicazione	Formati
Skull Latero-Lateral	22 x18 cm vertical asymmetric
Skull Latero-Lateral, with full view of the nape	22 x 24 cm horizontal asymmetric
Skull mainly Latero-Lateral. Can also be used for AP/PA projections	22 x 30 cm horizontal asymmetric
Skull Antero/Posterior or Postero/Anterior	22 x 24 cm vertical symmetric
Hand/wrist examination	22 x 18 cm vertical symmetric



Image Magnification

Image magnification	Geometric magnification (*)	Magnification after software correction (**)
Adult / Child standard Panoramic	1 : 1.23 (constant over dentition part)	1 : 1
TMJ open/closed mouth, 4 images	1 : 1.20 (nominal)	1 : 1
Sinus	1 : 1.22 (nominal)	1 : 1
Implant	1 : 1.32 (constant)	1 : 1
Ceph (on the sagittal medial plane in LL projection)	1 : 1.10	1 : 1

(*) **Note:** the magnification factor is calculated in the center of the focal layer, which is based on a shape of the mouth-ascending ramus complex, as defined in international literature.

(**) **Note:** The declared image magnification value for digital images depends on the calibration of the specific SW used and is therefore valid after proper software calibration.

Patient Positioning

Patient positioning is assured through multiple references

- 2 temple clamps
- One front rest
- 5 types of positioning supports are included: standard with bite stick, reduced height with bite stick, for edentulous patients, for ATM and for Sinuses.
- Two laser pointers that allow to locate the reference planes: mid-sagittal, Frankfurt
- One glass for the frontal patient view
- Communication of protrusion degree through dedicated function, without patient movement

Anatomic Programs

- Patient type: 2 choices: adult, child
- Patient size: 3 choices: small, medium, large
- Arch shape: 3 choices: standard, protrusive, retrusive

Generator

- High frequency generator, constant potential
- Ripple: < 4%
- High frequency: 200 kHz
- High voltage: 60 ÷ 86 kVp, 2 kV steps
- Anodic current: 6 ÷ 12 mA, step 1 mA for cephalometry
6 ÷ 10 mA, step 1 mA for other exams



X-ray Tube

Focal spot size:	0.5 (EN 60336)
Heat storage capacity:	30 kJ (40kHU)
Total filtration:	2.5 mm Al eq.
Duty cycle:	Adaptive Duty Cycle according to exposure factors. From 1:8 (at 60 kV, 6 mA) up to 1:20 (at 76 kV, 12 mA). Further reduction for the first three exposures: from 1:3.6 (at 60 kV, 6 mA) up to 1:9 (at 76 kV, 12 mA).

Automatic Collimator

Primary collimator with motorized operation, automatic selection of 2 diaphragms:

- panoramic
- cephalometric
- Secondary collimator on the CEPH arm, with synchronized movement with Ceph sensor.
- Soft tissue filter enhances profile of the soft tissues of the face on the lateral skull view. Motorized positioning of the filter can be adjusted to match the contour of any patient

Exposure times

Standard programs

Projection	Exposure time
Panoramic	13.8 s adult / child
Panoramic with Evo trajectory	14.4 s adult 13.3 s child
TMJ Open/Close mouth	4 x 2.44 s (total 9.7 s)
Maxillary sinus P-A	9.4 s

Evo XP package programs

Projection	Exposure time
Hemipanoramic	7.4 s adult 7.3 s child
Hemipanoramic with Evo trajectory	7.8 s adult 7.3 s child
Improved orthogonality dentition	11.9 s adult/child
Frontal dentition	4.4 s
Low dose panoramic	11.4 s
Low dose panoramic with Evo trajectory	11.9 s adult 10.8 s child
Bite-wing	3.2 s right/left 6.3 s right and left

Implant package program

Projection	Exposure time
Implant	9.2 s (incisors and canines)



	7.3 s (premolars and molars)
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Cephalometric programs

Projection	Images formats	Scanning time (High Definition 3x3 binning)	Scanning time (High Speed 5x5 binning)
Skull Latero-Lateral	22 x18 cm vertical asymmetric	9 s	4.5 s
Skull Latero-Lateral, with full view of the nape	22 x 24 cm horizontal asymmetric	12 s	6 s
Skull mainly Latero-Lateral. Can also be used for AP/PA projections	22 x 30 cm horizontal asymmetric	15 s	7.5 s
Skull Antero/Posterior or Postero/Anterior	22 x 24 cm vertical symmetric	12 s	6 s
Hand/wrist examination	22 x 18 cm vertical symmetric	4.5 s	----

Accessories

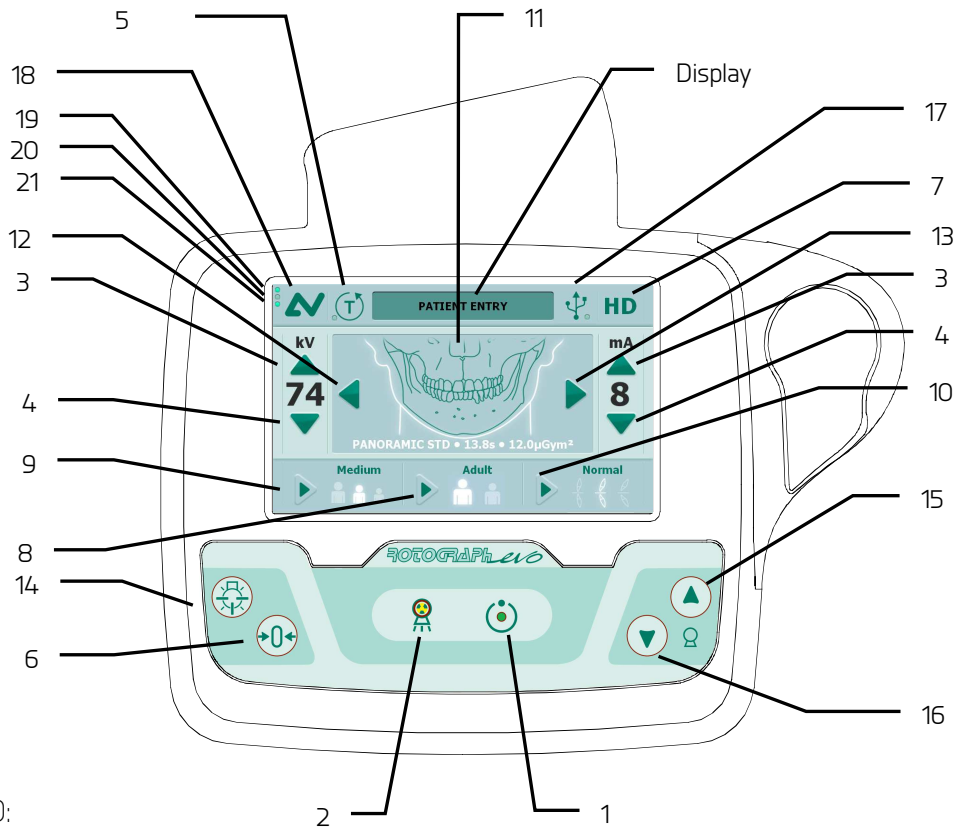
- Standard chin support with bite stick (standard)
- Reduced height chin support with bite stick (standard)
- Chin support for edentulous patients (standard)
- Reduced height support for Sinus (standard)
- Specific support for TMJ analyses (standard)
- 10 bites (standard)
- 2 temple clamps + 1 front rest (standard)
- X-ray push button with extensible cable (standard)
- 10 ear centring pins for ceph (standard)
- Disposable byte protective sleeves (optional)

User Interface

- User interface based on LCD touch screen display with the following specifications:
 - Display: 7"
 - Size: 16:9
 - Resolution: 800x480
 - Colours: 262144 (2¹⁸)
- Every operation is guided by messages shown on the display
- Selectable languages: Italian, English, French, Spanish, German, Turkish, Portuguese, Dutch, Russian, Simplified Chinese, Arabic (Saudi Arabia), Farsi (Iran)
- USB port for direct storage of acquired images
- X-ray push button with extensible cable



Keyboard Functions



LEGEND:

Messages

Display: indicates operative messages and warnings

Signal lights

- 1 - Light indicating the machine is ready for X-ray emission (green LED)
- 2 - Light indicating X-ray emission (yellow LED)

Manual setting of exposure parameters

- 3 - kV / mA increase key
- 4 - kV / mA decrease key

Preparation functions

- 5 - Key to set Test function (green LED)
- 6 - Key for:
 - > Resetting and realigning the device's axes (in case of collision with patient or in case of release of rays button)
 - > Repositioning the rotation group (to bring the group to the initial position after the examination and to exit from the "making an exposure" mode)
 - > Confirmation
- 7 - Key to select the modality in use (High Definition or High Speed)

Anatomic selection

- 8 - Patient selection key: Adult or Child
- 9 - Size selection key: Small, Normal, or Large
- 10 - Arch selection key: Protruded, Standard or Retracted (for panoramic execution)

Examination mode

- 11 - Exam mode selection key
- 12 +13 - Type of exam selection keys

Centring devices

- 14 - Sagittal and Frankfurt plane centring device ON / OFF key

Column height adjustment

- 15 - Column up key
- 16 - Column down key

Other

- 17 - USB Pen Drive key
- 18 - Service menu key
- 19 - Virtual keyboard active (green LED)
- 20 - Presence of PAN only sensor (for PAN only or dual sensor machine) (green LED)
- 21 - Presence of PAN-CEPH sensor (green LED)



Digital Acquisition System

PAN CCD Sensor

- Technology: CCD sensor with Caesium Iodide (CsI) scintillator screen
- Sensor size: 6.9 x 150.7 mm
- Pixel size: 27 μm (81 μm in 3x3 binning)
- Image matrix: 1860 x 3310 pixels in 3x3 binning mode (standard panoramic)
- Sensor resolution: 18.5 lp/mm maximum theoretical
- Gray levels: 65536 (16 bits) in acquisition (A/D converter)
- Max useful image size: equivalent to a 15x30 cm film

CEPH CCD Sensor

- Technology: CCD sensor with Caesium Iodide (CsI) scintillator screen
- Sensor size: 6.9 x 220.3 mm
- Pixel size: 27 μm (81 μm in HD mode, 135 μm in HS mode)
- Image matrix: 2720 x 3555 pixels in 3x3 binning mode
- Sensor resolution: 18.5 lp/mm maximum theoretical
- Gray levels: 65536 (16 bits) in acquisition (A/D converter)
- Scanning: horizontal, with constant speed:
 - 20 mm/s (binning 3x3)
 - 40 mm/s (binning 5x5)
- Max useful image size: equivalent to a 24x30 cm film

Image Acquisition

Rotograph Evo D allows to acquire digital images in two different modalities:

1. Direct acquisition through Ethernet connection

The images and the exposure parameters are transferred from Rotograph Evo D to the PC via Ethernet connection.

2. Acquisition on USB peripheral

Rotograph Evo D is equipped with USB port located on the side of the on-board keyboard for images and exposure parameters storage without a direct connection to a PC. The maximum image size is 16 Mb. Images stored on the USB device can be transferred to any PC at any time after the acquisition.

Images are stored in a proprietary format that must be read using the acquisition software installed.

The system automatically recognizes where the image can be stored:

- On PC when Rotograph Evo D is connected to a PC via Ethernet connection
- On USB device when it is inserted in the USB port and there is no Ethernet connection

The exposure is inhibited when there is no Ethernet connection and no USB device in the port.



Dental Studio Plus software

Rotograph Evo D is equipped with Dental Studio Plus software for image acquisition, storage and processing (see dedicated product data for specific details).

Software DAP meter (Dose–Area product)

Irradiated dose is estimated by software according to the exam exposure factors.

Reading accuracy: $\pm 20\%$

DAP value is displayed on the touch screen keyboard for each selected examination program.

Mechanical features

- Source to image distance: 500 mm (19,7") for panoramic, TMJ and Sinus
1650 mm (65") for ceph
- Vertical column movement: 850 mm (33,5"). Motorized column double speed
- Weight
 - Version without Ceph arm: 147 kg (324 lb); 177 kg (390 lb) for floor mount
 - Version with Ceph arm: 167 kg (368 lb); 197 kg (434 lb) for floor mount
- Total height max: 2450 mm (96,4")
2350 mm (92,5")
2250 mm (88,58")
Heights to be selected by the technician at the moment of installation
- Room size:
 - Version without Ceph arm: minimum 1300 x 1200 mm (52" x 47,2")
recommended 1300 x 1400 mm (51,2" x 55,1")
 - Version with Ceph arm: minimum 1450 x 2020 mm (57" x 78,7")
recommended 1600 x 2220 mm (63" x 86,6")
- Type of installation: wall or floor mount

Electrical features





- Power supply voltage: 110-120 V / 220-240 V ($\pm 10\%$) single phase
- Frequency: 50/60 Hz
- Current rating: 15 A @ 115 V / 7 A @ 230 V
- Power rating: 1,5 kVA

Environmental features

Operating temperature	+10°C ÷ +40°C
Operating relative humidity	30% ÷ 75%
Operating atmospheric pressure	700 – 1060 hPa
Transport and storage temperature	-20°C ÷ +70°C
Transport and storage relative humidity	<95 % non condensing
Transport and storage atmospheric pressure	630 hPa

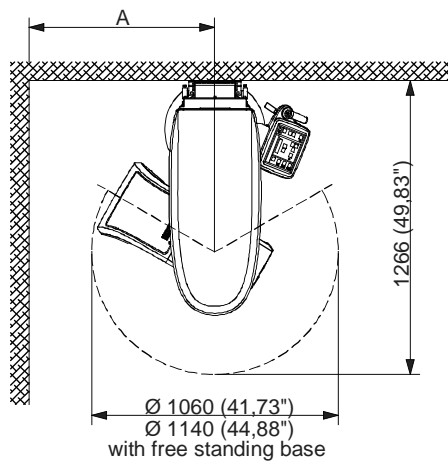
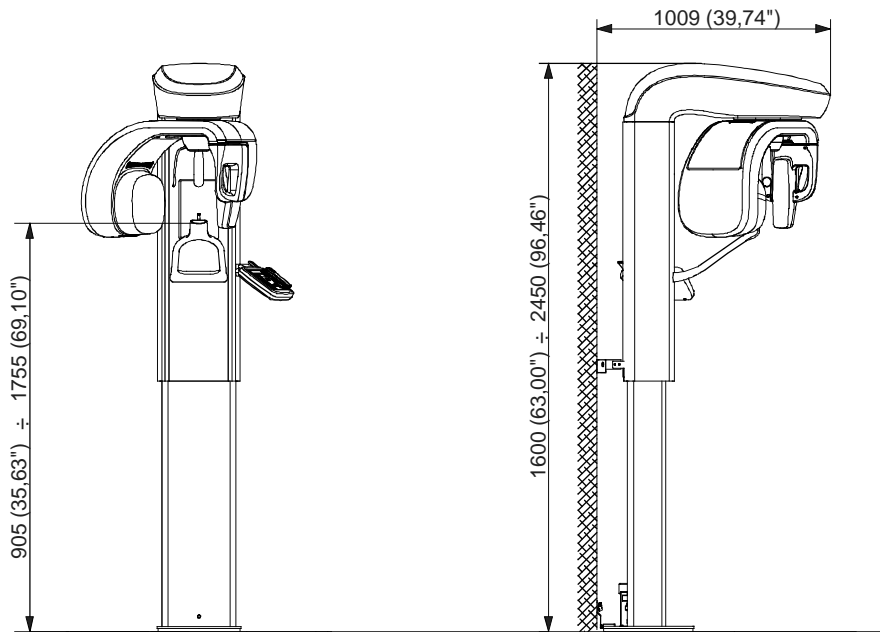


Standards and Regulations

 0051	CE symbol grants the product compliance to the European Directive for Medical Devices 93/42/EEC and its revised versions as a class IIB device
	c-ETL-us approval means that the product meets the requirements of the applicable US and Canadian standards
	FDA approval grants the product compliance to US Code of Federal Regulations title 21 subchapter j (Only for 110-120V version)
 Santé Health Canada Canada	Health Canada Licence grants the product compliance to the Canadian Medical Device Regulations SOR/98-282



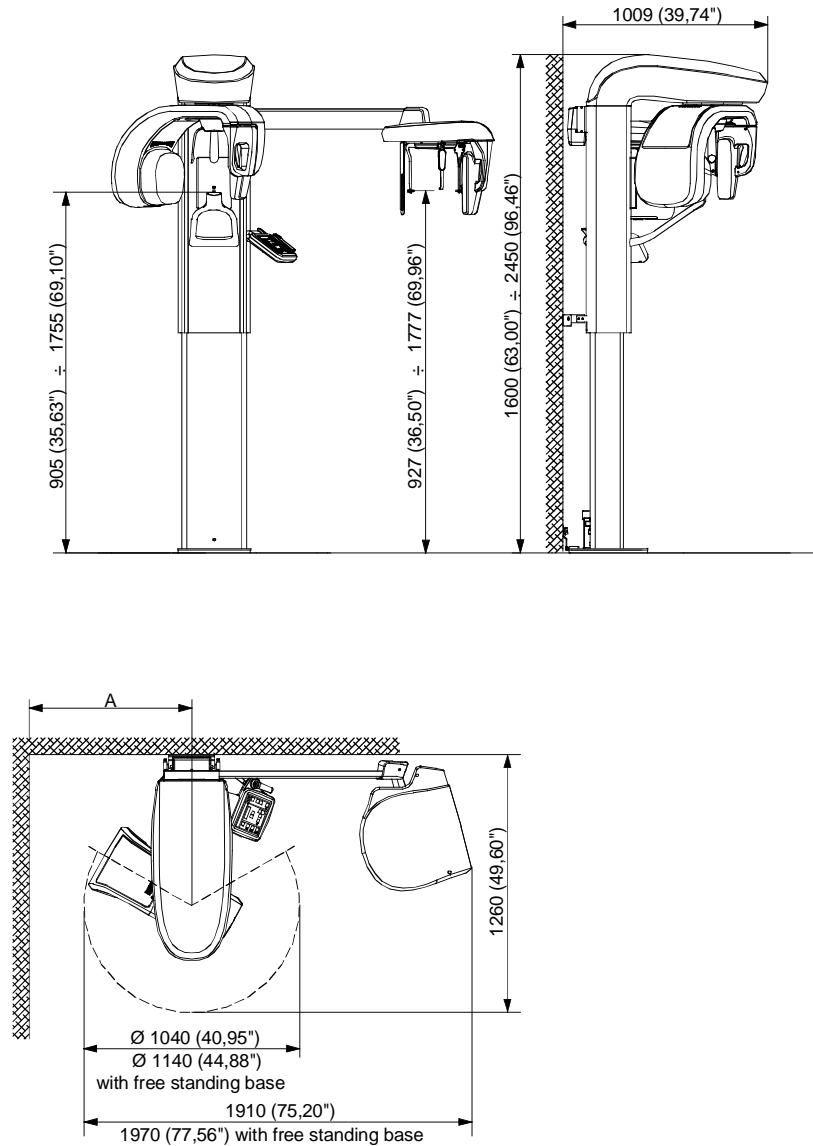
Dimensions Pan version (all quotes in mm and inches)



A= minimum 600 mm (23,6"), suggested 800 mm (31,5")



Dimensions Ceph version (all quotes in mm and inches)



A= minimum 600 mm , suggested 800 mm

Note: Products are continuously under review in the light of technical advancement. The actual specification may therefore be subject to improvement or modification without notice.

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