Product Data

Digital Panoramic / Cephalometric X-Ray unit

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.
- **Bitewing (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 Bitewing projection performs both Bitewing 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.
Digital Cephalometric

Digital cephalometric 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 cephalometric.

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 resolution (2x2 binning), for the enhancement of the finest details
- high speed (3x3 binning), for patient dose reduction and for the decrease of artifacts 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:

<table>
<thead>
<tr>
<th>Application</th>
<th>Images formats</th>
<th>Scanning time (High resolution 2x2 binning)</th>
<th>Scanning time (High speed 3x3 binning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull Latero-Lateral</td>
<td>22 x18 cm vertical asymmetric</td>
<td>9 s</td>
<td>4.5 s</td>
</tr>
<tr>
<td>Skull Latero-Lateral, with full view of the nape</td>
<td>22 x 24 cm horizontal asymmetric</td>
<td>12 s</td>
<td>6 s</td>
</tr>
<tr>
<td>Skull mainly Latero-Lateral. Can also be used for AP/PA projections</td>
<td>22 x 30 cm horizontal asymmetric</td>
<td>15 s</td>
<td>7.5 s</td>
</tr>
<tr>
<td>Skull Antero/Posterior or Postero/Anterior</td>
<td>22 x 24 cm vertical symmetric</td>
<td>12 s</td>
<td>6 s</td>
</tr>
<tr>
<td>Hand/wrist examination</td>
<td>22 x 18 cm vertical symmetric</td>
<td>4.5 s</td>
<td>----</td>
</tr>
</tbody>
</table>

**Anatomic Programs**
- Patient type: 2 choices: adult, child
- Patient size: 3 choices: small, medium, large
- Arch shape: 3 choices: standard, protrusive, retrusive
**Image Magnification**

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

(*) **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 key-board selection, without patient movement

**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
- Exposure times:
  - Panoramic: 13.8 s adult/child
  - Hemipanoramic: 7.4 s adult, 7.3 s child
  - Open/close mouth TMJ: 4 x 2.44 s (total 9.7 s)
  - Maxillary sinus P-A: 9.4 s
  - Improved orthogonality dentition: 11.9 s adult/child
  - Frontal dentition: 4.4 s
  - Low dose panoramic: 11.4 s
  - Bitewing: 3.2 s right/left
  - 6.3 s right and left
  - Implant: 9.2 s (incisors and canines), 7.3 s (premolars and molars)
**X-ray Tube**
- Focal spot size: 0.5 (EN 60336)
- Heat storage capacity: 30kJ (40kHU)
- Total filtration: 2.5mm Al eq.
- Duty cycle: Adaptive Duty Cycle according to exposure factors. From 1:8 (at 60kV, 6mA) up to 1:20 (at 76kV, 12mA). Further reduction for the first three exposures: from 1:3.6 (at 60kV, 6mA) up to 1:9 (at 76kV, 12mA).

**Automatic Collimator**
- Primary collimator with motorized operation, automatic selection of 2 diaphragms:
  - panoramic
  - cephalometric
- Secondary collimator near the cassette to reduce scattered radiation.
- 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

**Accessories**
- Standard chin support with bite stick (standard)
- Reduced height chin support (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**
Console with flat and waterproof surface for easy cleaning and disinfecting
- Alphanumeric “OLED” Display of 2 lines of 20 characters
- X-ray push button with extensible cable
- Every operation is guided by messages shown on the display
- Selectable languages: Italian, English, French, Spanish, German, Turkish, Portuguese, Dutch
- USB port for direct images storage
Keyboard Functions

- "Exam mode selection" buttons
- Messages display
- Light signalling "Re-Ady for x-rays"
- Light signalling "X-rays in progress"
- "Centring/ Patient Entrance" button
- "Test" button
- "Centring devices ON" button
- "Exposure Parameters Variation" button
- "Function" button
- "Column movement" buttons
- "Adult/Child selection" button
- "Size Selection" button
- "Protrusion selection" button
- "Exam mode selection" buttons
- Messages display
- Light signalling "Re-Ady for x-rays"
- Light signalling "X-rays in progress"
- "Centring/ Patient Entrance" button
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Digital Acquisition System

PAN CCD Sensor
- Technology: CCD sensor with Cesium Iodide (CsI) scintillator screen
- Sensor size: 6x146 mm
- Pixel size: 48 µm (96 µm in 2x2 binning modality)
- Image matrix: 1536 x 2805 pixels in 2x2 binning modality (standard panoramic)
- Sensor resolution: 10.4 lp/mm maximum theoretical
  5.2 lp/mm with CTF 60% real (in 2x2 binning modality)
- Gray levels: 4096 (12 bits) in acquisition (A/D converter)
- Max useful image size: equivalent to a 15x30 cm film

CEPH CCD Sensor
- Technology: CCD sensor with Cesium Iodide (CsI) scintillator screen
- Sensor size: 6x220 mm
- Pixel size: 48 µm (96 µm in 2x2 binning; 144 µm in 3x3 binning)
- Sensor resolution: 5.2 lp/mm (in high resolution modality - 2x2 binning)
  3.4 lp/mm (in high speed modality – 3x3 binning)
- Gray levels: 4096 (12 bits) in acquisition (A/D converter)
- Scanning: horizontal, with constant speed:
  20 mm/sec (binning 2x2)
  40 mm/sec (binning 3x3)
- 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. The images are seen forming on-screen in *real time* during the exposure.

2. **Acquisition on USB peripheral**
   - Rotograph EVO D is equipped with USB port for images and exposure parameters storage without a direct connection to a PC. The maximum image size is 16 Mb. Images stored on the card can be transferred to any PC at any time after the acquisition by the QuickVision software.
   - 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 in the slot and there is no ethernet connection
- On both PC and USB device when the USB slot is not empty and ethernet connection is available

The exposure is inhibited when there is no ethernet connection and no USB device in the slot.
QuickVision Software
Rotograph EVO D digital is supplied with the QuickVision software for image acquisition, storage and processing.

The QuickVision software is available in 9 languages (English, Italian, French, German, Spanish, Portuguese, Russian, Polish and Chinese) with the following functions:

Patient and Image Archive
Various archives are created including:
- Main patients data
- Exams for each patient
- Radiological parameters set for each exam (kV, mA, sec, anatomical program)
It is also possible to send by email the acquired exams through few mouse clicks on the exams thumbnails.

Virtual Keyboard
Thanks to a “Virtual keyboard” reproducing the Rotograph EVO D console on-screen, it is possible to set the exposure parameters directly from the PC.
Use of the virtual keyboard and of the on-board console is also possible at the same time.

For safety reasons, the virtual keyboard cannot activate X-ray emission, switch on the laser, or start any motorized movements.

Exam repetition
A dedicated function allows to repeat an exam using the exposure parameters of a previous session. The operator selects the exam he wants to repeat, and all the parameters are automatically transferred to Rotograph EVO D.

Image processing
The QuickVision software allows to employ the following functions:
- Image contrast adjustment
- Image brightness adjustment
- Gamma factor adjustment
- Filter for edge enhancement, with possibility to adjust the filter level
- Gray scale equalization to improve the image definition
- Hi contrast
- Embossed view
- 3-D view
- Image rotation (90° and 180°)
- Image horizontal inversion
- Pseudo-colors
- Gray scale inversion (Negative/Positive)
- Magnification (up to X32)
- Distance measurement
- Drawing and annotation

Image hardcopy
Images can be printed on any Windows compatible printer (image quality may differ according to the printer model). Images are printed with the following parameters:
- Patient data and examination date
- Exposure parameters
Software DAP meter (Dose-Area product)
Irradiated dose is estimated by software according to the exam exposure factors. The dose data is automatically burnt in each image.
Reading accuracy: ±20%

By pressing the F1 button on the keyboard the DAP value is shown on the unit’s display.

Dicom Connectivity (option)
If the system is equipped with the optional “QuickPrint Dicom Gateway” package for QuickVision, images can be printed on any Dicom 3 printer. Images are printed with the following parameters:
- Name of the practice/hospital
- Patient data
- Exposure parameters
- Examination date

Minimum Requirements for the PC Hardware (for QuickVision software)
- CPU: Intel Pentium 4 or AMD Athlon at 1.6 GHz or more (2 GHz suggested)
- RAM: 512MB or more (1Gb suggested)
- Hard Disk: 40 Gb or more (320 Gb suggested)
- Video: 1024x768, 16 Million colors or more
- Connectivity: Ethernet 10/100

NO dedicated PC board is required.
Mechanical Characteristics
• 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: 147kg (324 lb); 177 kg (390 lb) for floor mount
  - Version with ceph arm: 167kg (368 lb); 197 kg (434 lb) for floor mount
• Total height max:
  2450mm (96,4”)
  2350mm (92,5”)
  2250mm (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 Characteristics
• Power supply voltage: 110-120 V / 220-240 V (±10%) single phase
• Frequency: 50/60 Hz
• Current rating: 15 A @ 115V / 7 A @ 230V
• Power rating: 1,5 kVA

Environmental Characteristics
| 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
| CE 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 | c-ETL-us approval means that the product meets the requirements of the applicable US and Canadian standards (Only for 120V version) |
| FDA | FDA approval grants the product compliance to US Code of Federal Regulations title 21 subchapter j (Only for 120V version) |
| Santé Canada | Health Canada Licence grants the product compliance to the Canadian Medical Device Regulations SOR/98-282 (Only for 120V version) |
Dimensions Pan version (all quotes in mm and inches)

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

with free standing base
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.