Helianthus C

General Description

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Digital Mammography System

Helianthus C is a digital mammography system suitable for 2D image acquisition; it is not upgradable, but it can be integrated with a wide range of accessories with unmatched performance price specs.

Helianthus C is a "Standalone" equipment solution characterized by:

• Mammo unit with isocentric C-Arm;

• Digital flat field detector in Amorphous Selenium (a-Se);

• Acquisition workstation embedded on stand or (optional) separated with integrated X-ray barrier.

The equipment provides a specific user interface to perform screening and diagnostic mammograms. It allows to perform conventional mammography (2D) with flat field digital detector.

MAIN COMPONENTS

• Integrated high voltage X-Ray generator:

- 100 kHz ripple – 7,4 kW power

- 20 ÷ 35 kV (20 ÷ 49 kV optional) - (0.5 kV step allowed)

- 1 ÷ 640 mAs

• C-Arm with motorized vertical movement and manual rotation for patient positioning (motorized rotation in option);

- Fixed focus detector (S.I.D.) distance of 66 cm

• X-Ray tube with tungsten biangular anode:

- 0,1 and 0,3 mm focal spots

- 3.000 rpm (10.000 rpm optional)

- 300 kHU maximum anode heat storage capacity

- Double filter (50 µm Rhodium/50 µm Silver)

• Automatic selection of anode/filter combination with Auto exposure mode;

• "SensROI" Automatic Exposure Control (AEC) with full automatic kV/mAs, manual kV/auto mAs in function of effective Breast Density evaluated by pre-exposure X-Ray pulse or breast thickness for fast operation and/or special cases with silicone prosthesis. Dose limits according to European Protocol for Dosimetry and EUREF protocol;

• AGD (Average Glandular Dose) calculator;

• Collimation device with automatic recognition of format and position of compression paddle. The operator can switch from automatic collimation mode to manual collimation mode;

• "Smart µPress" compression system:

- Motor-driven adjustable force with safety release compression with fine adjustment by double manual rotating controllers

- Descending paddle speed proportionally reduced with increasing compression force

- Mechanical release of compression system for manual compression

- Fast unlock of compression paddles

- Compression paddles with softly curved and smooth lines for higher patient comfort

• Standard compression paddles:

- Compression paddle for normal breasts and specific for 2D exams (24x30 cm format)

- Compression paddle with lateral shifting for small breasts (18x24 cm format)

• Optional compression paddles:

- Compression paddle for Φ 7,5 cm spot contact examination (18x24 cm format)

- Compression paddle for 9x9 cm spot contact examination (18x24 cm format)

- Compression paddle for magnification (9x21 cm format)

- Spot compression paddle for magnification (Φ 7,5 cm format)

- Squared compression paddle for magnification (9x9 cm format)

- Compression paddle with holes for bidimensional biopsy (18x24 cm format)

- Compression paddle for axillary examination (10x24 cm format)

- Compression paddle for prosthesis examination (10x24 cm format)

• Removable Potter-Bucky with anti-scatter grid (Ratio 6:1, 36 lp/cm)

• Direct Conversion Full Field Flat Panel Detector:

- Format: 24x30;

- Sensor Physical dimension: 23.9x30.5 cm

- Technology: Amorphous Selenium (a-Se)

- ADC bit Depth: 16 bit

- Pixel Pitch: 85x85 µm

- Active area: 2816x3584 pixels

- Read time: <1.1 s (24x30 cm format)

• Fast lock protective screen to keep patient's face out of X-ray beam during two dimensional exams;

• Double 7" touch screen colour display on both sides of C-Arm showing information like: compression force, compressed breast thickness, patient name, projection angle, breast laterality, ACR code, collimation format, magnification factor, messages to the operator in several languages;

• One foot-control (for motorized compression). Optionally two foot-controls or one/two multifunction foot-controls (for vertical movement of C-Arm and motorized compression)

• Two emergency push-buttons on both size of mammography unit and another one on optional separate AWS;

• Optional kit for geometric magnification (variable 1,5x/1,8x/2x) consisting of:

- Platform without anti-scatter grid interchangeable with Potter-Bucky

- Compression paddle for magnification (9x21 cm format)

• Standard integrated AWS (Acquisition WorkStation):

- Industrial embedded computer with removable hard disks (one 128 GB SSD for operating system, acquisition software and Toolkit software and one 1 TB HDD SATA for images storage).

- 2 MPixel LCD Display System (24" viewable size). Optionally 3 or 5 Mpixel LCD Display System (21,3" viewable size) may be provided

- Integrated UPS (24 Vdc - 5÷10 minutes typically)

- Keyboard with integrated touchpad

- CD/DVD writer

- USB port

- Speaker for talking voices messages

• Optional separated AWS (Acquisition WorkStation) is inclusive of:

- Transparent anti-X protective barrier for operator

- Touch screen color display (15" size), mouse or trackball

- 2 or 3 or 5 MPixel LCD Display System (move away from mammo unit)

- X-ray push buttons (move away from mammo unit)

- CD/DVD writer (move away from mammo unit)

- USB port (move away from mammo unit)

- Speaker for talking voices messages (move away from mammo unit)

- Emergency push-button

• Acquisition software is complete of:

- Off-line images display and viewing

- Local operational mode

- Patient information local DataBase

- Tools to make following operations:

- ✓ Local opening of new studies (i.e. not from the worklist)
- ✓ Local studies storing (i.e. in the internal memory of the AWS)
- ✓ Local studies reloading (i.e. from internal memory of the AWS)
- ✓ Local database managing

- "POEt" Post-processing algorithm specific for mammography to optimize the quality of the acquired images. Dedicated filters for geometric magnification and in case of prosthesis, metallic clips, surgical markers, clusters of micro calcifications, breast specimens and surgical anatomical parts

- Graphic tools to manipulate images:

- ✓ Selection and positioning of images to display
- ✓ Display protocol with ACR predefined views
- ✓ Current session loaded images
- ✓ Fit to window, Zoom, Pan, Magnification lens
- ✓ 1:1, Effective size
- ✓ DICOM W/L, High/Very High/Skin contrast
- ✓ Histograms
- ✓ Override ACR settings
- ✓ Mirroring operations on ACR standard views (CC, MLO)
- ✓ Geometric transformations: invert, mirror, flip, 90° CW and CCW rotation, Reset
- ✓ Measurements: ruler, oval, freehand, angle
- ✓ Annotations and Markers

- DICOM tools:

- ✓ Worklist studies opening and closing
- ✓ Sending of locally stored studies to the appropriate RIS server
- ✓ Studies printing
- ✓ Studies recording on CD/DVD
- ✓ QC tools based on EUREF protocol

- HIS-RIS-PACS Interface

MAIN FEATURES

HIGH VOLTAGE X-RAY GENERATOR

- High Frequency: 100 kHz ripple
- Power: 7,4 kW
- kV range: 20 ÷ 35 kV (20 ÷ 49 kV optional) (0,5 kV steps)
- mAs range: 1 ÷ 640 mAs

ISOCENTRIC C-ARM

- Vertical movement motorized/manual rotation (motorized rotation opt.)
- Up/down movement: travel of 91 cm (54 to 145 cm from floor)
- Rotation: +/- 180°

- Focus-detector distance of 66 cm
- Movements controlled by touchscreen displays on each side of the C-arm
- Vertical movement can also be controlled by multiswitches and multifunction foot-control (opt.)
- Automatic rotation on seven programmable projections (opt.)
- Continuous fine adjustment of projection angle (CW and CCW) (opt.)

X-RAY TUBE AND FILTERS

- Rotating tungsten biangular anode
- High speed rotation: 3.000 rpm (10.000 optional)
- Focal spots: 0,1x0,1 and 0,3x0,3 mm
- Anode heat storage capacity: 300 kHU
- Maximum anode heat dissipation rate: 60 kHU/min
- Maximum current: 65 mA (Small Focus) – 135 mA (Large Focus)
- Filters: Rhodium, Silver

Helianthus C makes as a standard a Tungsten biangular anode and a Rhodium/Silver automatic filter. Biangular anode reduces exposure times and then movements obtaining a better quality of images in magnification technique.

Tungsten offers a superior quality with digital detectors at reduced patient radiation dose (better than 50% for an average breast) if compared to Molybdenum anode imaging.

Silver filter is a further improvement for larger and denser breasts and not only gives superior imaging performance at lower dose but also significantly reduces the x-ray exposure time to eliminate potential patient motion problems.

The unique combination of a Tungsten x-ray tube with Rhodium filter offers optimal dose and image quality performance for digital mammography over all ranges of breast thicknesses. A further dose reduction of about 20% and image quality enhancement for large breasts is associated with the use of silver filter still and tungsten anode.

"SensROI" AUTOMATIC EXPOSURE CONTROL (AEC)

The Automatic Exposure Control of Helianthus C is active in Fully Automatic or Semi-Automatic Exposure Technique. It has dual mode: PRE and FAST.

PRE-exposure is tissue composition based and exposure parameters are determined by means of a short X-ray exposure proportionally related to the breast size starting from a minimum of 1 mAs. The digital detector is used to set optimal exposure parameters in an automatic or semi-automatic mode. According to the compression paddle employed, a continuous portion of the sensitive area of the detector is selected for a particular procedure and the actual density of the tissue to be examined is determined using a short pre-exposure pulse.

FAST exposure is based on compressed breast thickness. Exposure sequence is FASTer than PRE- exposure and gives comparable results in all operating

conditions including special cases with breast implants and surgical metal aspects.

In both modes the exposure parameters are set in order to satisfy the "EUROPEAN GUIDELINES".

AUTOMATIC AND MANUAL COLLIMATOR

Helianthus C is provided with an advanced automatic collimation device. An optoelectronic system recognizes the type and the position of compression paddle, then selects the appropriate collimation format. The operator can switch from automatic collimation mode to manual collimation mode.

"SMART μPRESS" COMPRESSION SYSTEM

Helianthus C is equipped with an advanced compression system.
The breast compression can be motor driven or manual with fine adjustment.

In case of motor driven compression, a function of tissue strength evaluation (FTSE) allows to modulate the force. A microcontroller detects breast density and automatically adapts compression force accordingly.
Compression paddle descent speed slows down proportionally while compressing the breast. Exerted compression force and breast thickness are shown on two displays placed on both sides of C-arm.

A fine manual compression is possible acting on the rotating controllers placed on both sides of C-arm. In any time, the operator can pass from motor driven to manual compression and viceversa.

Soft release of compression paddle at the end of each exposure.

A very powerful diagnostic algorithm provided by microcontroller and up to three redundant safety solutions working in real-time for full patient protection.

POTTER-BUCKY

- Removable / Interchangeable with Magnification platform
- Integrated with anti-scatter grid (Ratio 6:1, 36 l/cm).

FULL FIELD DIGITAL DETECTOR

- Technology: Amorphous Selenium (a-Se)
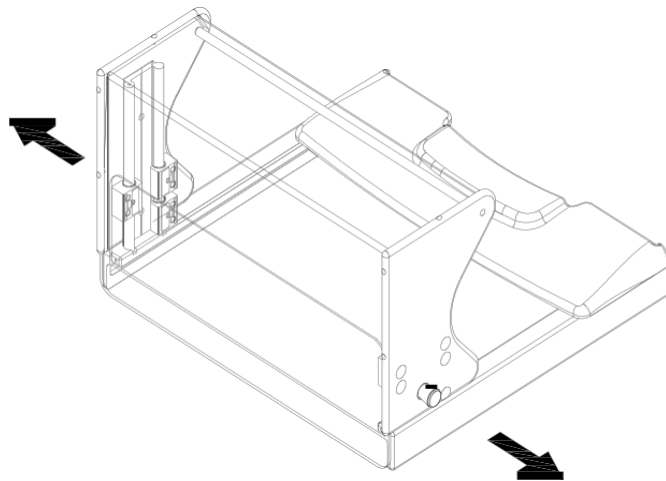
- DQE: >50% (@ 1 lp/mm); >20% (@ 5.8 lp/mm)

Reconstruction time from last exposure (Model 020 BR3D CIRS phantom, 50 mm thickness)	< 4 s
Time to display the image on the AWS from last exposure (Model 020 BR3D CIRS phantom, 50 mm thickness)	< 5 s

GEOMETRIC MAGNIFICATION (OPTIONAL)

Helianthus C can be supplied with a device for geometric magnification (1,5x, 1,8x or 2x factor) without anti-scatter grid. It is easily interchangeable with Potter-Bucky.

The magnification device is equipped with a compression paddle 9x21 cm format, but the spot compression paddle Φ 7,5 cm format and the squared magnification paddle 9x9 cm format are available on request.
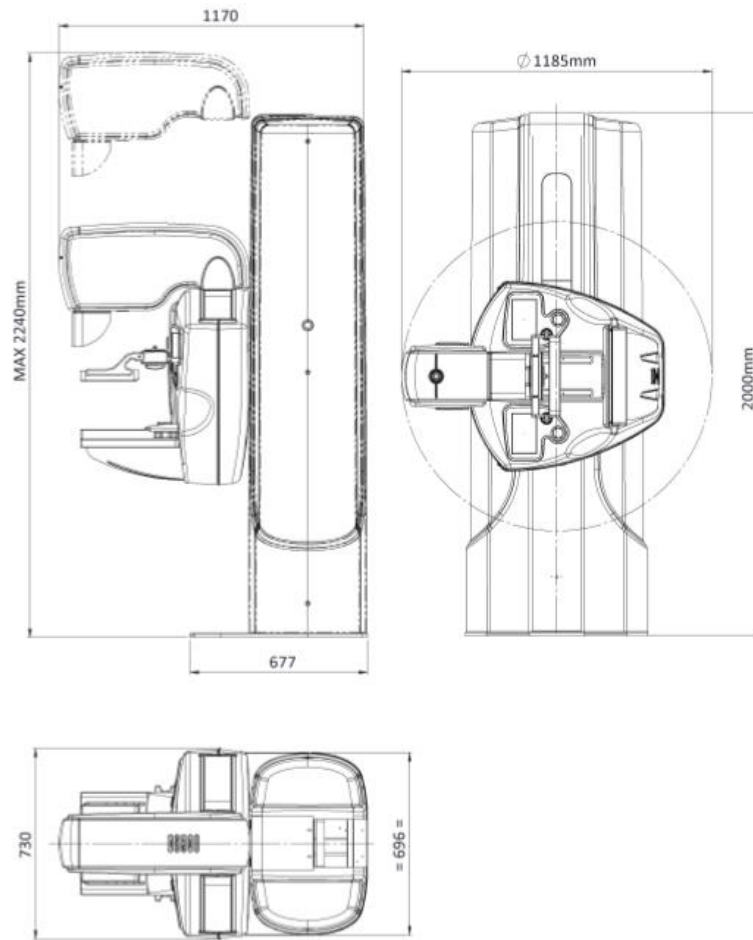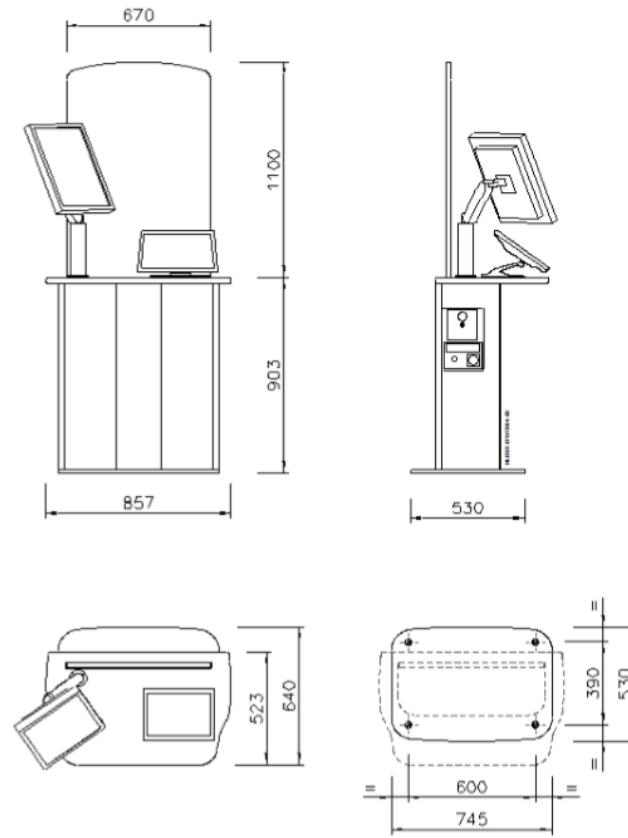
Inserting the device for geometric magnification, small focus is automatically selected.

1170

⌀ 1185mm

MAX 2240mm

2000mm

677

730

= 696 =

Weight: 300 kg

670

1100

903

857

530

523

640

390

530

600

745

DIMENSIONS IN mm

Weight:
90 kg (0,34mm Eq.Pb, thickness 20mm)
56 kg (0,50mm Eq. Pb thickness 11mm)

Optional separated AWS