RIVIERA LP PLUS

U-ARM RADIOGRAPHIC SYSTEM

The general radiographic system **RIVIERA LP PLUS**, designed to provide maximum flexibility and clinical productivity in general trauma, chest, urology, abdomen and emergency applications, allowing both **AP**, **lateral** and **oblique** projections with or without a table on wheels.

U-Arm design maintains constant alignment between the X-ray beam and the image detector, regardless the tilt positions and the image receptor angle. Its extraordinary flexibility makes the system ideal for all patients in standing, sitting or laying position, including those who are disabled or physically restricted. The total integrated system combines modern technology of the High Frequency X-Ray Generator with a **fully motorized** in all its movements, **Variable SID, Anti-crushing system** and **two speeds** for fine adjustment all designed to give a user-friendly operation system and easy positioning of the patient.

Total Height of the Column		224 cm
Maximum Height (Under-Table Position)		265 cm
Maximum Height (of positioner)		277.5 cm
Maximum Distance from Focal Spot of X Ray Tube to Floor		169 cm
Motorized Movements		
◦ Vertical Travel		126.5 cm
◦ Source-Image Distance (SID Variable)		From 100 to 180 cm
Rotation Movements		
· Rotation of Swivel Arm		+120°/-30°
· Rotation of Receptor		±45°
· Rotation of Tube-Collimator Assembly (Manual)		±180°

Column Fixing	Floor-Wall
Brakes	Electromagnetic brakes (in all movements)
System & Movements	Counterbalanced in all movements

MOVEMENTS AND CONTROLS

Movement can be operated via different controls:

◦ touch screen of the Control Panel and peripheral buttons

◦ keyboard on the detector bucky

◦ Remote Control.

All the following movements can be possible:

◦ Source-Image Distance (SID).

◦ Vertical Travel.

◦ Swivel Arm Rotation and detector angulation.

◦ **Automatic pre-positioning** for Thorax Position and Under-table Position.
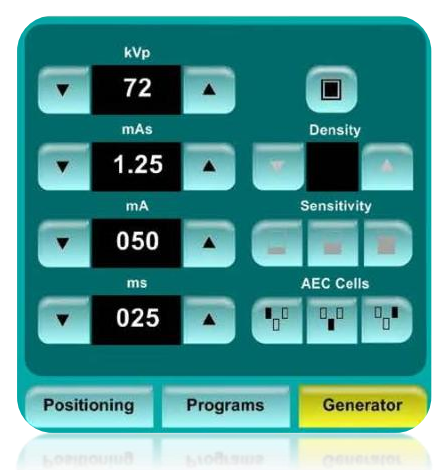
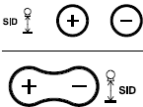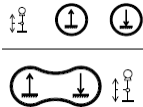| POSITIONING SCREEN	PROGRAM SCREEN for auto-positioning	GENERATOR PARAMETERS SCREEN

*AUTO-POSITIONING: Position control with **10 programs** for the most common exposure positions: 1. Select the program n° with the Up and Down buttons. 2. Press "Select", the screen changes to Positioning screen (with the picture of the selected Programmed Position). 3. Press and hold the "Move" button from the Remote Control for auto-positioning.

** MODIFYING PROGRAMS: From this screen, inserting a password, an already saved Program can be modified for operator convenience. The SID, Arm Angle, Arm Height and Detector Angle of a program can be customized and saved for further use.

OTHER FUNCTIONS:

	SID 100	**SID:** Two buttons to increase or decrease the SID, Motorized movement. Release them to lock in position. Detents at **100 cm and 180 cm** are indicated on Display. When one of these positions is reached, the movement is blocked. The SID position is continuously indicated in the Touch Screen Console. When the Tube Assembly has reached a limit, a message appears on the Screen.
	Height 129	**VERTICAL MOVEMENT:** Two buttons to control the vertical motorized movements of Swivel Arm movements. Release them to lock in position. The Swivel Arm height, from the Center of the Detector axis to floor, is continuously indicated in the Touch Screen Console. When the U- Arm has reached to the highest or lowest vertical position a message appears on the Screen.
	Arm Angle 0	**SWIVEL ARM ROTATION:** Buttons to enable clockwise or counterclockwise motorized rotation of the Swivel Arm. Release button to lock in position. When the Swivel Arm detects a not allowed movement (close to floor or ceiling), the motion is Locked and buttons blinks. The Swivel Arm rotation is continuously indicated in the Touch Screen Console. When the Arm has reached to an Angle limit, a message appears on the Screen.
		UNDERTABLE POSITION: Press and hold this button to place automatically the Swivel Arm in Under-table position. If this button is released while the arm is in motion it stops movement, press the button again to allow the Swivel Arm continue motion to Under-table position.
		THORAX POSITION: Press and hold this button to place automatically the Swivel Arm in Thorax position. If this button is released while the arm is in motion it stops movement, press "thorax position" button again to allow the Swivel Arm continue motion to Thorax position.
		LOW / HIGH SPEED: Movements are performed by default at High Speed. Press this button (lights up) to perform movements at Low Speed for accurate positioning. By pressing, it Lights up in the Touch Screen Console.
		SAFETY LOCK: This button lights up when a safety device is activated and when a Thorax or under-table position is reached. The Safety Lock stops any motion of the Swivel Arm. The Operator must press it before performing any other motion. Also, this button resets all recoverable errors.
MOVE		**MOVE TO AUTO-POSITION:** Press and hold this button once a Program n° is selected in the Program Screen of the Touch Screen Console or from the Remote Control. The Arm moves

		automatically to the selected position. Once the Program position is reached, a message appears on the Screen.
		MOTORIZED IMAGE RECEPTOR ROTATION: This motorized movement allows a maximum of +45° Clockwise movement and a minimum of -45° Counterclockwise movement. It includes detents at 0° and when the Receptor is in parallel with respect to the floor. The Detector Rotation is continuously indicated in the Touch Screen Console and when the Detector has reached to an Angle limit, a message appears on the Screen.
		ROTATION DISPLAY: This Display shows the angle performed by the Armand the angle performed by the Detector. It also displays some error messages.

AUTOMATIC MOVEMENT TO UNDER-TABLE & THORAX POSITION

When the Swivel Arm arrives to Thorax Position, the movement stops and the "Safety Lock" button lights up. Motorized movement.

When the Swivel Arm arrives to Under-table Position, the movement stops and the "Safety Lock" button lights up. Motorized movement.

VERTICAL movement – swivel arm – receptor rotation – SID adjustment

- ○ Swivel Arm speed: High and low speed.
- ○ Distance Focal Spot to Floor:
     Min 42.5 cm, Max 169 cm.
- ○ Vertical Travel: 126.5 cm.

- ○ SID Adjustment Speed (SID): 8.7 cm/s.
- ○ Detents: 100 and 180 cm.
- ○ Variable SID:
     Min: 100 cm Max: 180 cm.

- ○ Detents on Rotation movements at: 0° and 90°.
- ○ Rotation of Swivel Arm: +120°/-30°

- ○ Movement Rotation of the receptor:
     +45° and -45° cm.
- ○ Detent at: 0° and parallel to floor.

SAFETY LIGHT BEAM

Double photocell light system, which guarantee full safety with the patient during the execution of the technique:

◦ Once the photocell light, at the beginning of the "U" arch of the Swivel arm, detects the patient on the Table, Low Speed is automatically activated. Also lowering the Arm below the Table-Top and rotation will not be allowed.

◦ At the end of the "U" arch of the Swivel arm, the second photocell disables all movements when the photocell light is interrupted (except for Arm up movement).

The Touch Screen shows a message when the Proximity Sensor is activated.

EMERGENCY STOP FOR MOVEMENTS

◦ An Emergency Stop, located at the **Receptor,** disables all movements of the Swivel Arm in case of emergency (except for the Receptor Rotation).

◦ In the **Room Electrical Cabinet**, there is an Emergency-OFF Switch that allows to cut the power Supply of the Unit.

◦ Parachute system, the system has a sensor that detects the tension of the steel cable that supports the Swivel "U" Arm, locking the system whenever it detects a loss of tension of the cable, stopping the movement of the equipment even with a broken cable.

DETECTOR BUMPER & ANTICRUSHING SYSTEM

◦ **Anti-collision pressure sensor** during the movement of the system, along the Swivel arm.

◦ **Bumper with pressure sensor** located on the side of the receptor.

◦

◦ Both safety devices allow to **detect any pressure** during the up-down or rotation movements of the system, **stopping** the unit and **reversing the movement** to release the pressure made.

DIMENSIONS

AUTOMATIC COLLIMATOR

LED Light device and **LASER line alignment** for limiting the X-ray beam, multiplanar & automatic with rotation system.

The square field is defined by 6 pairs of lead faced shutters contained in the collimator body. Two pairs of shutters are located near the X-ray focus to control the X-ray beam and eliminate off-focus radiation. Two pairs are located on the entrance window. The other two pairs of shutters are positioned near the exit window to provide a sharply defined X-ray field.

- To have a safer radiological protection, a **Dosimeter** has been integrated in the collimator which provides the absorbed dose rate (equivalent dose) in the radiological area.
- The field dimensions may be decreased and increased to the desired size by rotating the two knobs on the collimator front panel.
- In addition, a **laser alignment** has been added, which allows a greater radiographic accuracy at field size as well as **filters** that allow us an additional reduction of the dose rates in superficial patient´s tissues and skin without losing the quality in the image.
- **Automatic or Manual Operation,** a key switch on the rear cover of the collimator allows to select between automatic and manual operation modes.
- The microprocessor board controls the motors and gives the possibility of selecting automatically the collimation fields, by **CAN-BUS protocol. It provides the step-less adjustment of the square field dimensions at variable SID.**
- The electronics of the control board regulates the automatic movements of the filters (optional). A second control board provides power and constant current to the high intensity LED light. This allows us to simulate the X-ray field accurately in any kind of patient.

Alphanumeric front screen with indication of the following parameters:

- Operating mode: manual / Automatic.
- X-ray field size.
- Focal distance.
- Selected filter.

Front panel for manual selection of:
- Opening shutters.
- Filter selection.
- Centered light activation.

TECHNICAL FEATURES

Continuous Film Coverage Max	Max: 48 x 48 cm at 100 cm (40") SID.
Maximum Radiation Leakage	150 kVp - 4 mA.
Minimum Inherent Filtration	2 mm aluminum equivalent.
Light Field	High luminosity provided by a White LED simulating the X-ray field. The light field is controlled by an electronic timer.
Light Field Indicator	at 100cm SID,160 lux
Field Positioning	Automatic positioning of the radiation field depending on the distance.
GC-Led-5A timer board	GC-Led-5A for light source supply and operation. The board is CanBus controlled.
Retractable Tape	1 unit. Mounted on a radiological unit, measures the distance between the focus and the patient.
Key Switch	Key to change automatic or manual.
GC-Led-5A Timer Board	timer board for light source supply and operation. The board is CanBus controlled.
RSR008 Electronic Board	Controls two motors for Cross/Long shutter movements.
Single LASER	LASER for the alignment of the collimator to the receptor.
Rotation	Manual $\pm$ 90° on the horizontal plan, detents at 0°
Angles	Integrated Device for monitoring the collimator´s angles
Railes	A set of rail guides inside the collimator allows the insertion of dose area meter
Electronic light Timer	Electronic light timer with manual and automatic on / off depending on the activation of movements in the other components of the system.
Centering Calibration	Centering of the collimator with respect to the X-ray tube.

Filtration

Additional variable filtrations according the EU MDD, through three filters on rotating support, accommodated as follows:

- ◦ 0.1 mm Cu + 1.0 mm Al (Al eq. 3.8 mm)
- ◦ 0.2 mm Cu + 1.0 mm Al (Al eq. 6.5 mm)
- ◦ 2.0 mm Al.

INFRARED REMOTE CONTROL

CONTROL / FUNCTIONALITIES

	VERTICAL MOVEMENT: Motorized Vertical Movement of Swivel Arm.		Safety Lock
	SWIVEL ARM ROTATION: Motorized Rotation Movement of Swivel Arm.		**IMAGE RECEPTOR ROTATION**: Motorized Rotation Movement of Image Receptor.
	SID: Motorized SID Adjustment.		**LOW SPEED:** Low Speed.
	UNDERTABLE POSITION: Automatic Undertable Positioning.		**Collimator Control Button**
	THORAX POSITION: Automatic Thorax Positioning.		Pre-programmed Functions (Not Available)
	MOVE TO AUTO-POSITION: Automatic Positioning Button.		Tube Rotation (Not Available)

GENERATOR 50 KW, 150 KVP, 3-PHASE 400VAC

This High Frequency X-ray Generator is designed for conventional or digital radiography and is controlled by multiple microprocessors providing an increased **image / exposure consistency, efficient operation and extended Tube life.**

There are "service tools" available that facilitate configuration, calibration and remote diagnosis. Being able to remotely update the generator software, collect data from error logs, equipment counters, perform or restore backups of calibration and / or configuration data, download data from new X-ray tubes, consult the software versions and / or the license installed on the computer. Even with the presence of an operator in the room, by activating the hand-switch, the generator could be calibrated remotely and simultaneously while the curves of kV, mA, filament current versus mA, or other internal generator signals are analyzed.

All the mentioned service tools along with its advanced self-diagnosis system with indication of error codes, simplify the troubleshooting of the equipment, allowing easy maintenance.

Its low ripple factor and high accuracy of the radiographic parameters (KVp, mA, exposure time), reduce soft radiation and improve the X-ray beam homogeneity allowing an improvement in the image quality and a reduction of the patient dose. There are also optional or configurable functionalities that reduce the kV peak times and the kV drop times, allowing to **reduce even more the patient and the soft radiation doses.**

Generator with advanced features in an **Ultra-Compact Size:**
◦ Remote service, update and diagnosis possibility.
◦ High frequency Constant potential, with interlocking protection for overload.
◦ Tube protection circuitry prolongs Tube life and increases system reliability
◦ Equipped with closed loop control of X-ray Tube current, kVp and filaments, which minimizes potential errors and the need for readjustments.
◦ Automatic line compensation due to closed loop operation of X-ray Tube current and kVp.
◦ Heat Unit storage for the X-ray Tube, even after turning On/Off the equipment.
◦ Independent memory for storing Radiographic or Fluoroscopic operating parameters. This permits rapid switching from one technique to another. Remote service, update and diagnosis possibility.
◦ Space charge compensation.
◦ Power cabinet and electronic control.

TECHNICAL SPECIFICATIONS

GENERATOR TYPE	THREE PHASE, HIGH FREQUENCY
INPUT LINE OPERATION	400Vac 50/60Hz
STAND–BY CONSUMPTION	300 W
FREQUENCY	25 kHz
MAXIMUM POWER kW	50kW, According to IEC definition (0,1s, 100Kv)
MINIMUM POWER kW	0.4 kW (40kVp 10 mA)
kVP RANGE	From 40 kVp to 150 kVp in steps of 1 kV
kVP ACCURACY	± (3% +1kVp)
mAs RANGE	From 0.1mAs to 630*mAs in 39 steps, Renard10 Scale
mAs ACCURACY	± (10% + 0.2mAs)
mA RANGE	From 10 mA to 630 mA in 19 steps, Renard10 Scale 10,12.5,16,20,25,32,40,50,63,80,100,125,160,200,250,320 400,500, 630
mA ACCURACY	± (4% +1 mA)
EXPOSURE TIME RANGE	0.001 to 10 seconds
ACCURACY EXPOSURE TIME	± (2% + 0.1 ms)
POWER OUTPUT (@ 0,1s)	630 mA @ 79 kVp 500 mA @ 100 kVp 400 mA @ 125 kVp 320 mA @ 150 kVp
RIPPLE FACTOR	1 %
Radiation output accuracy	Lower than 5% in all parameters
Automatic Line Compensation	± 10%Vac
MAs in AEC	500mAs
WEIGHT & DIMENSIONS	L445mm x W360mm x H564.5mm 65 Kg
NOTE	Under requirement, mA and exposure time stations could be configured to three different logarithmic scales by the Field Service Engineer: * R´10: 63mA, 630 mA, 63 ms, 630ms, 6.3 s. * R´10(64): 64mA, 640 mA, 64 ms, 640ms, 6.4 s. * R´10(65): 65mA, 650 mA, 65 ms, 650ms, 6.5 s.

UPGRADE TO 150 KVP

UPGRADE to 150 kVp for RSTR Generators

GENERATOR MODEL	Power	Output
RSTR300	32 kW	320mA @ 100kVp 250mA @ 128kVp 200mA @ 150kVp
RSTR400	40 kW	400mA @ 100kVp 320mA @ 125kVp 250mA @ 150kVp
RSTR500	50 kW	500mA @ 100kVp 400mA @ 125kVp 320mA @ 150kVp
RSTR600	65 kW	630mA @ 103kVp 500mA @ 130kVp 400mA @ 150kVp
RSTR800	80 kW	800mA @ 100kVp 630mA @ 126kVp 500mA @ 150kVp

ON/OFF BOX FOR DIGITAL SYSTEMS

Generators controlled through a virtual Console on a PC are equipped with a PC Interface Box or **ON/OFF Box.** This Box comprises the controls for "Power ON/OFF" and Hand-switch to make radiographic exposures.

The Handswitch button has three positions:

- Off
- Preparation
- X-ray Exposure

PREP: Press the hand-switch half-way ("Prep" position) to prepare the selected X-ray tube for exposure. The "Ready" indicator on the Integrated Console will light when the X-ray tube is prepared and there are no interlock failure or system faults.

After pressing this push-button, the following functions are activated:

- Anode rotation.
- Filament current switches from stand-by to the selected mA.

EXP: After the "Ready" indicator is illuminated on the Control Console, fully, press the hand-switch to start the X-ray exposure.

- If the button is released before the Generator completes the selected time or the AEC (optional) time, the exposure will be prematurely terminated and the actual mAs and Exposure Time will be displayed.
- The "X-ray On" indicator remains illuminated on the Integrated Control Console during the length of exposure.

OFF: Hand-switch disconnected. Simultaneously to the use of the hand-switch, the indicators showed below are displayed in the integrated control console:

READY: Indicates that the technique selected is properly set, there are no interlock failures or system faults, the anode is rotating and the X-ray Tube is ready for exposure.

X RAY ON: Indicates that the X-ray exposure is in progress., An audible signal sounds during exposures.
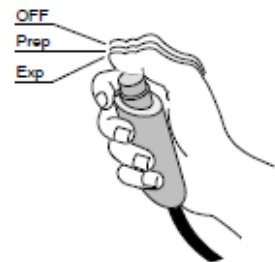
AUTOMATIC EXPOSURE CONTROL

Automatic exposure control (AEC) allows to obtain a constant radiographic quality regardless of the type / thickness of the patient. Up to a total of **two detectors (ionization chamber or Solid State)** can be installed in the system. Its function is to control the radiation received by the image receiver to obtain a correct image, acting on the generator and determining the X -ray exposure time.

Up to a total of two ionization chambers can be installed in the system. This option can be described by the reproducibility and accuracy of the optical density control under varying conditions, such as different patient thicknesses and tube voltages.

The AEC allows us to produce greater consistency of the image quality with excellent contrast regardless of the selected radiographic technique.

The AEC module comprises the controls for the selection of:

- **FIELD SELECTION:** Each button indicates the related physical location of the selected field in the AEC Exposure Detector, and it may be selected or deselected by touching it. Any combination of fields can be selected and the color of buttons change (highlighted) when active.
- **FILM / SCREEN COMBINATION:** Each of these buttons allows adjustment of the mAs in relation to a programmed Film / Screen combination that may be slow, medium, or fast respectively (200, 400, 800). Each time a Film / Screen button is selected (highlighted), the others are automatically deselected.
- **DENSITY:** These buttons are used to adjust the radiographic density. The selected value is shown on the Density Display. Film density can be increased or decreased in several steps.
- **AEC RESET:** If the exposure is aborted by the AEC back-up timer, "Error 55" is shown on the Console accompanied by an audible alarm. Next exposure is inhibited until the AEC function is reset by touching the "AEC Reset" button or the "Reset Error" button.
- **RAPID TERMINATION:** Exposure was aborted because a lack of radiation received on the AEC.

For a correct use of AEC requires accurate patient positioning and the operator will need to select the desired AEC parameters.

INTEGRATED DOSE-AEREA METER (DAP)

Patient safety Monitoring. Directly connected to the generator and fully integrated into the system. Allows to determine the level of radiation to which the patient is exposed. Values will appear by the digital image thanks to the software system installed in the PC.

kV range	From 40 to 150kV.
Measuring DAP range	From 0.1 to 99,999.999 µGy·m².
Dap Resolution	0.1 µGy/ m²
AIR Kerma DAP rate range	12 µGy/s. to 2 Gy/s.
Accuracy	+/- 18%.
Active Area Dimensions	140x140 mm.
Transparency	≥75%.
Quality equivalent filtration	<0.5mm. Al.
Cable connector for AEC chamber	Included.
Rails for collimator mounting	Equipped
CAN INTERFACE	Included

ION CHAMBER FOR AEC
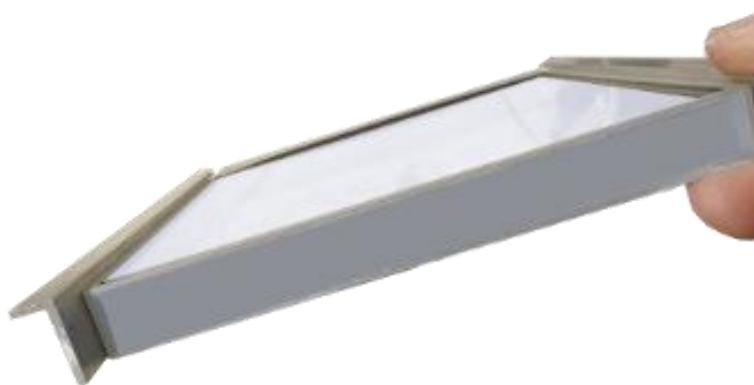
- **Three fields** Ion Chamber
- Range of KVp, from 40 to 150 kVp
- Range of dose, 0.5 at 1000 µGy/sec.
- Range of exposition time, from 0.001 to 10 sec.
- Absorption equivalent to 0.65 mm. Al.
- Differences between areas, less than 5 %
- Power supply tension, ±11.5 Vdc a ±15.75 Vdc
- Adaptation and cables for the connection between the Generator and the Chamber
- Adaptation to control more than two Ion Chambers in the system.
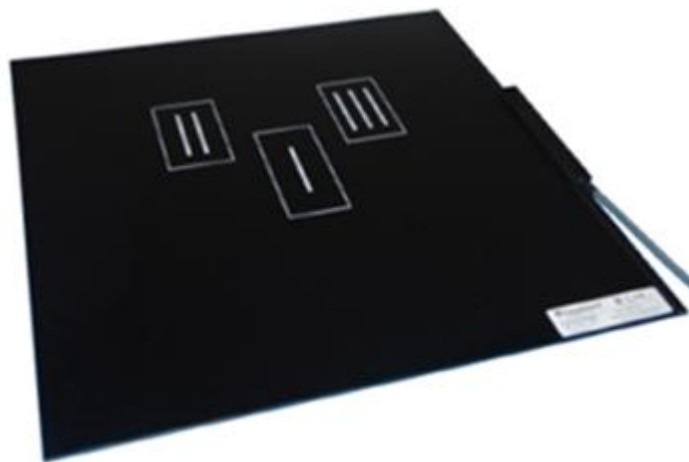
X-RAY TUBE CANON XRR-3331

Maximum tension	150 kV
Focus sizes	Small focus 0.6 mm Large focus 1.2 mm
Maximum power low speed	Small focus 22 kW (60 Hz) Large focus 54 kW (60 Hz)
Maximum power high speed	Small focus 32 kW (180 Hz) Large focus 78 kW (180 Hz)
Maximum current	Small focus 400 mA Large focus 1000 mA
Anode degree target angle	12°
Anode heat capacity	300 kHU
Max Anode heat dissipation capacity	73 kHU/min
Housing heat capacity	1,250 kHU
Housing heat dissipation capacity	15 kHU/min
Anode rotation	3.200/9700 rpm
Anode composition	Rhenium & Tungsten faced Molybdenum Target
Anode diameter	74 mm
Filtration equivalent @75kV	0.9 mm Al

PRIMO ACQUISITION SOFTWARE

Primo is a complete innovative and technological advanced digital DR system with multi-detector operations

- Professional acquisition software for X-ray images from flat panel systems (DR)
- The software controls X-ray generator, providing a smooth and systematic workflow.
- The professional image processing can be adapted to individual user needs and provides a complete control of all image capture

- functions within the examination room, enhancing the entire workflow by delivering diagnostic images instantly, and allowing users to move X-ray images electronically to remote workstations, image archives, and printers.
- Integrated functions and intuitive operation greatly simplify daily routine tasks.

SYSTEM LOGIN

There are three user levels: *Administrator - Advanced – User*, with different privileges.

The system allows to set, for each user, a permanent password or a password that lasts for 60 days. When necessary, the user will be advised to change his own password a few days before expiration.

If a wrong password is entered for 5 times consecutively, the user gets automatically blocked.
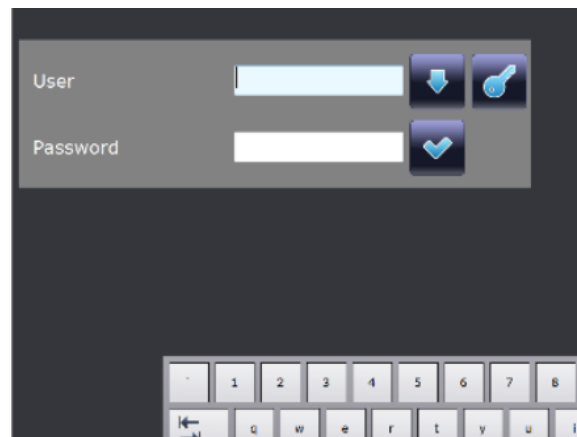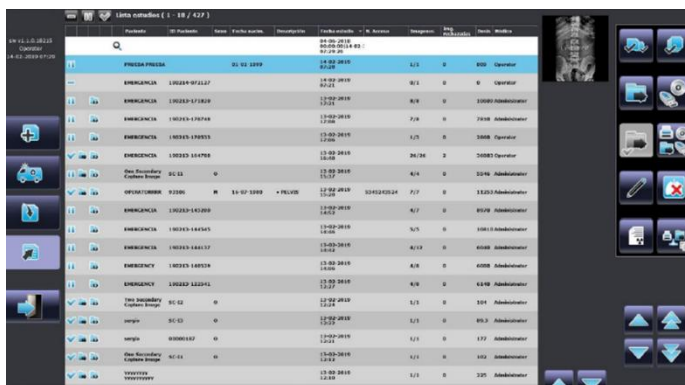
PATIENT CREATION FRAME

Possibility of Creating manually a new study:

◦ Last Name and First Name
◦ Patient ID
◦ Date of birth
◦ Weight & Height, sex
◦ Accession Number
◦ Technician and doctor
◦ Patient´s notes, study description

Emergency mode: to go directly in the working frame (without entering all the patient data), to place the exam faster.

ACCESSING THE STUDY LIST (WORKLIST)

- On the right-hand side of the study list frame, you find the following keys:
- DICOM Store.
- Export studies to CD/DVD or USB.
- Report Tools.
- Patient´s data Edit.
- Rejected images (statistics).
- RDSR (Radiation Dose Structured Report):
- dose report of the selected study.
- DICOM SPOOLER shows the queue for DICOM store and print services.
- Browse the list, if there is more than one page.

- Possibility of Creating a new study from the Worklist.
- Possibility of requesting the Worklist from the RIS.
- Transfer one or more selected studies to the Study List.
- Associate the selected study with a previous study.
- Delete one or more selected studies.
- Delete the entire list of studies received from the RIS.

WORKING FRAME AND IMAGE ACQUISITION

To start the radiographic exam the Working Frame lead you to the exam selection window to choose the anatomical region required, then the anatomical part and finally the right exam:

- Head
- Chest
- Abdomen
- Cervical spine

- Pelvic measurement
- Humerus
- Femur
- AEC adjustment

Disposition of the Working Frame Information:

· Image area
· Exam List / Preview List
· Patient Data
· Messages Area:

This area contains indications of the detector connection status, the battery charge level, the amount of free space (%) on the archive disk and equipment status warnings and alarms.

· **Generator Console** (X-ray parameters): Information about X-ray generator controls and parameters is shown in this area, with pre-programmed anatomical views (APR) for automatic selection. The operator may introduce modifications manually in all the original APR techniques and store them for later use. System can store thousands APRs.
· **Exam Management Area**: contains keys to delete, move or add procedure to your study, and to suspend or close the study.
· **Anatomical Region and exam selection.**

PROCEDURES TECHNIQUE

For an easy use is possible to set a Procedure to guide you through the performance of the exposures required for a study. Procedures define the exam/projection types needed for the study.

- Procedures are defined during installation of the system, in accordance with the operators and depending on the type of work required in the radiology theatre.
- A procedure can be associated to:
  o A single exam (projection) (e.g.: Std Thorax with just the PA projection of the thorax).
  o Several exams (projections) (e.g.: Full Thorax with both PA and LAT projections).
- You can either receive the Procedure from RIS via the Worklist function or chose it manually, e.g. when creating a new study manually.
- If a procedure is associated to a study, the system guides you during image acquisition and automatically presents the exams required.
- Otherwise, you need to select the exam type manually pressing the button PROC as in indicated below. All the procedures set in the system will be displayed.

X RAY GENERATION SETTING AND IMAGE ACQUISITION
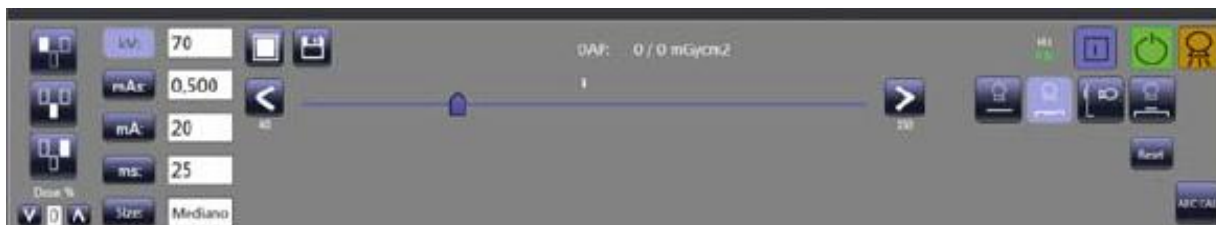
- The exposure parameters for the X-ray generator are automatically set to suit the exam and the patient size selected.
- To make things easier, the equipment shows the best X-ray generator settings for each exam and patient size (pre-set in the database during installation, as agreed with the users.)
- The following parameters are shown:
  - 2-point technique (kV and mAs) or 3-point technique (kV, mA, and ms),
  - kV, mAs, mA and ms, to suit the technique,
  - Patient size.
  - Status warning: "Ready for acquisition"

IMAGE PROCESSING FRAME

A. Previews / Exams List
B. Image area and dose information
C. Patient data
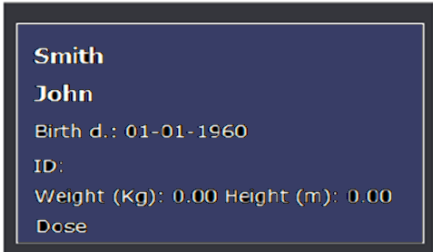
D. Image Processing commands
E. Study commands

Grey Scale	Exposure Values	Radiation Dose **(DAP)**	• ELT: Exposure index target according to the data of the selected technique.	Exam / Projection	Acquisition date and time	• Image Nº • Digital Zoom

		• EI: Exposure Index detected in the acquired image. • DI: Deviation of the Exposure index achieved from the target.			
Smith John Birth d.: 01-01-1960 ID: Weight (Kg): 0.00 Height (m): 0.00 Dose		• Patient´s name • Birth Date • Patient ID • Weight and height • Total Dose		

SYSTEM LOG FILES

All systems operations are recorded in dedicated log files, including time stamp of operation and user data.

IMAGE POST- PROCESSING

· Vertical/Horizontal image flip.
· Digital Zoom
· Spatial filters
· SMOOTH filter: this softens the edges of the image
· SHARP filter: this hardens the edges of the image
· SMOOTH + SHARP filters: both types of correction are applied.
· Images Cropping.
· Add object and text
· Duplicate images
· Store DICOM
· No grid function
· Protect an image
· Image Multiview
· ATH Harmonization
· Measurements
· Distance calculation (with calibration function)
· Angle calculation.
· Rotate images
· Report Tool
· Magnifying glass
· Reject and image/Restore images
· Thumbnail.
· Brightness and contrast control.
· STATISTICS: The statistics function is used by the Technical Service when checking the system and so can only be accessed by the Advanced user.
    - Allow to find the co-ordinates and pixel values for the image.
    - Rectangle of a size set by the operator.
    - Raw image statistics (RAW).
        · Equalized image statistics applied parameters:
        · Harmonization algorithm (ATH).
        · ROI for automatic W and L correction.
        · Gamma correction curve (LUT).
    - Possibilities to export image to a removable device (CD or PEN DRIVE) in either DICOM or RAW format.
· OVERVIEW You can view more than one image in a study on the monitor at the same time. Select the overview function by pressing the relevant command.

IMAGES RECORDS

The following DICOM functions can be used to produce image records:

Export images to PENDRIVE or CD/DVD	Send images TO WORKSTATION/ PACS DICOM (Store DICOM)	Send images to DICOM printer	SPOOLER DICOM

STUDIES REPORT

The software incorporates a powerful reporting tool System with immediate on-screen information display or the possibility of a later analysis by exporting the report to a folder into the hard disk.

The exported data include the following information for each study:

- Acquisition date.
- Patient Surname and first name.
- Study image number.
- Image N° and % removed from the study

- Image N° and % rejected from the study.
- Image N° and % accepted from the study.
- The reasons why an image has been rejected.

GRIDLESS IMAGING. DIRECT EXPOSURES FREEDOM

The software includes **Dynamic Range Algorithm (DRC)**, a complex image processing technique which allows the detector to be used live without the need to incorporate a grid while maintaining high image quality:

Scatter Reduction

corrects the effects of scattered radiation from the acquired image. This led to an improvement in both contrast and clarity of the image.

Edge Enhancement

enhances the edge contrast of an image to improve its acutance (apparent sharpness).

Adaptative Contrast Enhancement

the contrast of the image, or the difference in light between parts of it, is modified adaptative by this algorithm to improve its perception by human eye.

WITHOUT SCATTER CORRECTION

WITH SCATTER CORRECTION

Software algorithm advantages compared to conventional grids:

- Up to 60% of patient dose reduction.
- Enhance high-contrast structures.
- No extra handling and weight during patient preparation.

- Patient Workflow improved.
- Fewer retakes caused by grid misalignment.
- Algorithm applicable to images of any anatomical area.

STITCHING IMAGE RECONSTRUCTION

The Stitching function creates an image of great length by joining several images which were acquired during a longitudinal scan of the patient. The reconstructed image can consist of **2, 3 or 4 images**. With scanning steps of 30cm, for example, the reconstructed image will have a length **up to 120cm**. Three types of reconstructions are available: Automatic, Manual, Definition of dots, Manual, Superposed images.
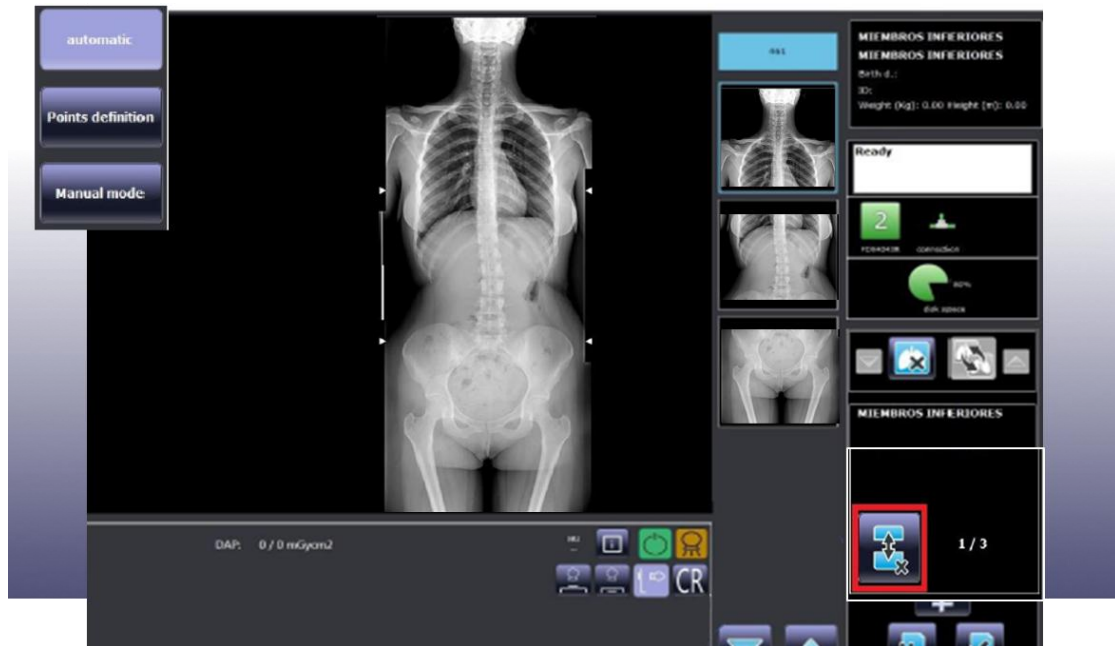

IMAGE QUALITY CONTROL TOOLS

The software allows the acquisition of images in "Raw" format (RAW) from the same user station. RAW images have a DICOM extension so they can be opened from external image control applications such as those specific to some quality control phantoms. Additionally, the verification of the images can be done from the application itself, as a complete module is available with the possibility of selecting ROIs and tools for measuring the average pixel value and noise.

SYSTEM CONNECTIVITY

The acquisition station incorporates the following functionalities in accordance with the standard DICOM 3.0:

- Modality Worklist.
- Storage.
- Modality Performed Procedure Step (MPPS).
- Basic Greyscale Print.
- Storage Commitment
- Verification.
- Query / Retrieve
- Grayscale Standard Display Function (GSDF).
- Radiation Dose Structured Report (RDSR).

DETECTOR IRAY MARS 1717X

Designed to provide the highest quality of X-Ray images with an active matrix of 4267 × 4267 pixels and **100µm pitch** (CSI).

With a Gigabit Ethernet connection for high data transfer rates and equipped with the possibility of query/upload images from detector to workstation, enable easy interchangeability between different X-Ray modalities (X-Ray mobile and fix ones).

It is the optimal choice for both retrofit and new DR System solutions, offering an effective and fast work flow.

- Wireless cassette detector. ISO 4090, fits in any bucky.
- Software with Auto-Exposure Detection.
- Best-in-class 100 µm pixel pitch with 16-bit ADC for more image details.
- Large capacity battery design, with **8+ hours battery life.**
- Lightweight design with IP56 ingress water protection.
- Supports a fast workflow for a better user experience.
- Direct deposition Csl, with excellent DQE at all frequencies .

Very High trigger Sensitivity even with the thickest patients. Equipped with **internal X-ray sensors** which automatically detect the X-ray and synchronize image acquisition.

drop monitoring

Equipped with a unique drop monitoring system which serves as a real time tracker of panel dropping and shocking.

back up power cable, online charging solution

With its Charging connector is easy to keep the panel continuously charging without needing to replace the battery. The additional ethernet interface makes extremely easy to switch between wireless and wired mode.

long lasting battery

Faster operation, at least 500 exposures and **8,5 hours of continuous operation** before to recharge the battery. A few seconds to replace and restart the detector.

dual battery charger

Battery charger with capacity of charging two batteries simultaneously for a non-interrupted workflow.

With Battery charging capacity indicator.

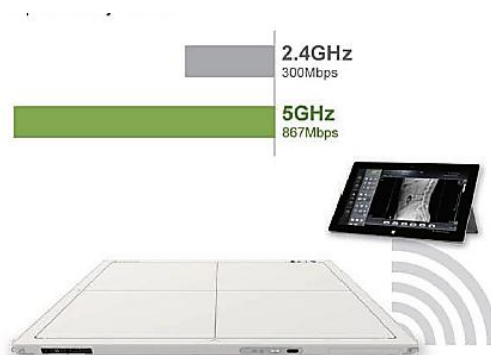Pack of **two batteries included**.

robust wifi signals

Both 2.4G and 5G wireless mode is supported. With higher speed and stability under 5G modes.

Faster readout speed reaching the smallest pixels for better resolution and lower noise for improved low-dose DQE and less leakage for higher dynamic range.

TECHNICAL DATA – MAIN CHARACTERISTICS

Detector Technology	Amorphous Silicon (a-Si) TFT
Scintillator	CsI (Cesium Iodide)
Active Area	430 x430mm
Pixel Matrix	4267 × 4267
Pixel Pitch	100 μm
Gray Scale	16bit
Spartial Resolution	4.3 lp/mm
AD Conversion	16bit
Battery Autonomy	8h
WiFi	802.11ac / 2.4 and 5 GHz
Trigger Mode	· Software (with Auto-Exposure Detection). · AED (Optional).
Full Image Time	Typ. 3.5s
Dimensions	460x460x15mm
Weight with battery	3.4 kg
Drop Monitoring	70cm @3mm PVC
Static Loading	300Kg (over the surface) 150 kg (on a 4 cm diameter area)
Protection Index	IP56
MTF	70% (1.0 lp/mm) 40.4% (2.0 lp/mm) 22.8% (3.0 lp/mm)
DQE (2 μGy @RQA5)	73.4% (0 lp/mm) 55.9% (1.0 lp/mm) 40.4% (2.0 lp/mm) 28% (3.0 lp/mm)
Operating Temperature	10-40 °C
Image Acquisition Time	3 sec
BATTERIES	
Rated Capacity	Min. 4,700mAh, Typ. 4,900mAh @ Discharge 0.2C
Nominal Voltage	11.55V
BATTERY CHARGER	
Simultaneous Charging	Pack of 2 batteries
Full charging time	3 hours
Rated power supply	24V(DC)
COMPONENTS	
Components included	1 Adapter for detector and battery charger 2 Batteries (Pack) 1 Gigabit Ethernet cable 1 AC Power Cable + 1 DC Power Cable

DETECTOR CHARGING CABLE

Kit for external connection for power supply and data transmission through a single cable, which can be easily connected to the front side.
**Maximum certainty** on battery charging while housed thanks to the external assisted charge.
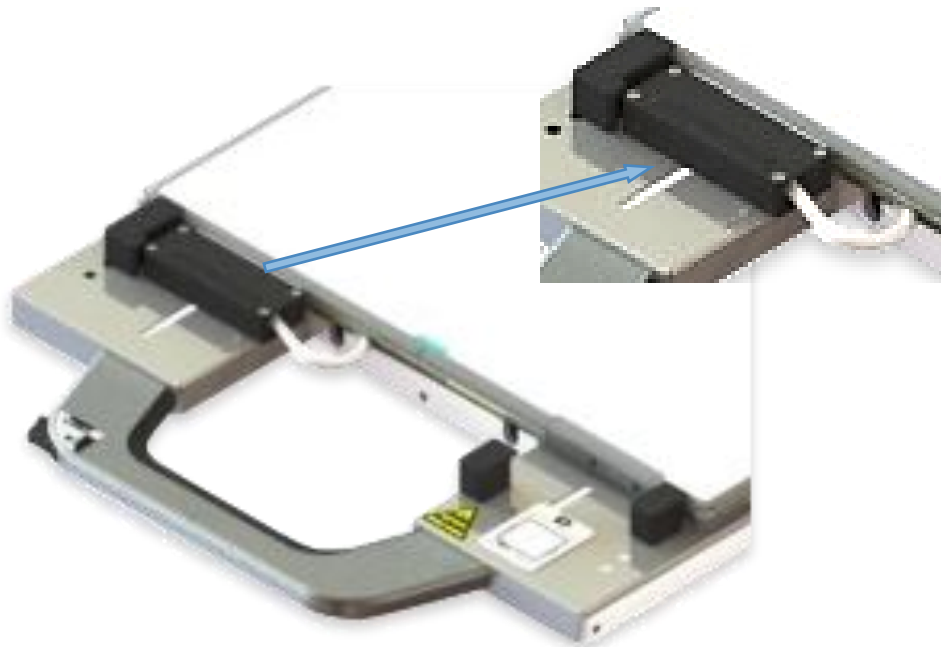
DETECTOR CABINET WITH TRAY

- For 43x43 detectors in wall stand bucky LEFT loading
- Smooth insertion of the detector thanks to front stops and back shock absorber springs spring.
- Optical signals to detect:
    - Presence and SID of the grid.
    - Detector size, shape and presence.
- Manual positioning.
- Handle with brake bar for extraction and external button for horizontal displacement.
- Designed to accommodate:
    - Portable detector.
    - Ion chamber.
    - Removable grid (100, 150 and 180cm)
- Maximum certainty on detector charging with the possibility of external assisted charge (optional).

DETECTOR CABINET WITH TRAY
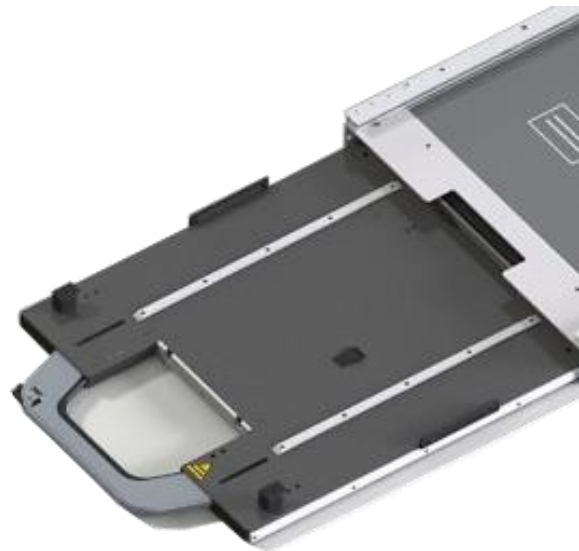
WORKSTATION LENOVO

State-of-the-art technology. Provides maximum reliability and powerful performance in small dimensions.

TECHNICAL SPECIFICATIONS

Platform	TW W680 500W	HDMI Port	Onboard HDMI Port
Processor	Intel® Core™ i5-12500 vPro® Processor (P-cores 3.00 GHz up to 4.60 GHz)	Ultra-Slim ODD	Slim DVD Rambo 9.0mm No OS
Memory Selection	8GB DDR5-4400MHz (UDIMM)	Audio Card	Integrated Audio
OB M.2 SSD G4 512	512 GB SSD M.2 2280 PCIe Gen4 Performance TLC Opal	SMA	Chassis Intrusion Switch Tower
OB M.2 SSD G4 RAID	No Onboard M.2 SSD Gen4 RAID	Additional Ethernet	Gigabit Ethernet, Intel I210-T1, 1x RJ-45, PCIe x1
HDD	OB M.2 SSD G4 512 512 GB SSD M.2 2280 PCIe Gen4 Performance TLC Opal 1TB Hard Drive, 7200RPM, 3.5", SATA3. 1TB= More than 30,000 images.	Dust Filter	Dust Filter Tower
HDD Boot Drive	No	Flex Bay	5.25" Flex Module
RAID	RAID 1 (2 HDDs min)	Second Serial Port	Second Serial Port Cable Tower
Graphic Card	Integrated Intel UHD Graphics 770	Operating System	Windows 10 LTSB 2016
Dimensions	170 x 315.4 x 376 mm (6.7 x 12.4 x 14.8 inches)	Weight	9.67 kg (21.32 lbs, maximum configuration)
Mouse	Yes	Keyboard	English Keyboard

MONITOR THINKVISION

4553882

Touch screen monitor with premium design, **23.8", 1920x1080 resolution**, **anti-glare**.

DISPLAY	
Screen Size	23.8" color, TFT, IPS technology
Display Area	535.12 mm x 313.12 mm
Active Area	527.04 mm x 296.46 mm
Pixel Pitch	0.2745 mm x 0.2745 mm
Aspect Ratio	16:9
Resolution	1920 x 1080
Viewing Angle	178° / 178°
Response time	4ms (Extreme Mode), 6ms (Normal Mode)
Brightness (typical)	300 cd/m²
Contrast Ratio (typical)	1000:1
Touch	Yes (10-point Projected Capacitive Touch)
Anti-glare	Yes
CONNECTIVITY	
Video Signal	1 x USB Type-C Gen 1 (DP 1.2 Alt Mode), 4 x USB Gen 1 (1 x BC1.2), 1 x HDMI 1.4, 1 x DP 1.2
USB HUB	Yes
USB Upstream	1 x USB 3.2 Gen 1 (1 by USB Type-C)
USB Downstream	4 x USB 3.2 Gen1 (1 x BC1.2)
MECHANICAL	
Tilt Angle (front/back)	-5° / 70°
Lift (Max range)	90 mm
DIMENSIONS & WEIGHT	244.1 x 430.5 x 539.8 mm - 5.85 kg
POWER CONSUMPTION	25W/150W

OPTION

TABLE ON WHEELS FIXED TABLETOP (STRETCHER)

Mobile patient table, fixed height and laminated top. Locking casters on back wheels to make sure it stays in place. The large wheels enable easy maneuverability for accurate positioning. Resistant and light-weighted design. Thanks to its dimensions, it is easy to move from one room to another.

Maximum Patient Weight	200 Kg
Dimensions (LxWxH)	200x65x70.5cm
X-ray Transparency Area (LxW)	188x52.8cm
X-ray Absorption Factor	< 1.2 mm equival. Al.
Table-Top Composition	Laminated
Locking Casters	2 Units

All data provided by the manufacturer: