BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

EQUIPMENT DESCRIPTION

BMI Biomedical International distributes high technology remote control diagnostic systems, able to satisfy every need of X-ray operators.

BRT-90 Plus DRP is equipped with Hi-Tech control electronics, modular and expandable, interfaced through LAN and CAN to the generator, collimator, images acquisition devices and remote tele-diagnosis server.

BRT-90 Plus DRP analogue features +90-90 tilting, elevating tabletop and a very easy access to the patient, even from a stretcher or a wheel chair. SID (Source-Imager Distance) is variable from 105cm up to 180 cm thus allowing thorax exams without the use of an additional bucky stand.

It offers a complete control of the system, of the exam parameters and of the lowest patient dose so that fast execution time and ensures an impressive image quality for any examination.

The flat panel technology of **BRT-90 Plus DRP** delivers sharp and accurate images to support the diagnosis and is not affected by geometric distortion.

BRT-90 PLUS DRP

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STANDARD CHARACTERISTICS

GENERAL	
Kind of equipment and class According to IEC60601 -1	Class II with applied parts of B type
Protection degree according to IEC 60529	Continuous working
Covers	ABS PUR Metallic
Colors	Standard: - White RAL9001 - Green NCS S 0575G40Y
ELECTRICAL	
Standard power supply	3N ~ 380-400 Vac
Frequency	50-60 Hz
Net isolation	Transformer 2 kVA
Protection	8A with thermo magnetic switch
Line impedance	< 1.0 Ω 380-400 Vac ± 10%
Loaded voltage fall	< 2%

BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

	REMOTE CONTROLLED TILTING TABLE
MECHANICAL CARACTERISTICS	
Table height in vertical position	2580 mm
Vertical mount height	1960 mm
Width	2545 mm
Maximum height with table in horizontal position and focus to film at 180 cm	2370 mm
Minimum and maximum height from ground with table in horizontal position	430 mm – 1450 mm
Depth (distance between mounting base and tabletop inside)	2040 mm
Access from forth side (back)	300 mm
Column displacement	2240 mm
DFR holder displacement	2250 mm
Rx covering area	430 x 2090 mm
Distance from tabletop to receptor	70 mm
Weight distribution plate (to be anchored on the floor)	1520x1520x20 mm – 360 Kg, alternatively 1520x1520x15 mm – 262 Kg

BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

PATIENT TABLE TOP	
Tabletop dimensions	250 x 70 cm. Width 27 mm Useful are: 232x50,5 cm
Tabletop	Standard tabletop (white): carbon fiber covered with laminated Filtration 0,7 mm Al @ 100 kV Max patient weight 225 Kg (without limitation) Optional tabletop (black): carbon fiber Filtration 0,4 mm Al @ 100 kV Max patient weight 225 Kg (without limitation) Tabletop side profiles of 6 mm, ready to attach some accessories.
Tabletop lateral excursion movement	±15 cm
Longitudinal excursion	Tube column longitudinal excursion: 188 cm Spot film device (center) excursion: 168,5 cm The movement of both column and flat panel allows for patient total scanning: **209 cm** at adjustable speed up to **15** cm/sec, controlled through joystick. *Important:* *The movement of the longitudinal tabletop is not necessary as the complete exposure of the patient is guaranteed by the field of movement of the column and the flat panel.*
Tube angulations range for oblique projections with I.I. parallax correction	± 40°
Tabletop tilting range	- 90° to +90° continuously
X-ray tube assembly rotation range	-180° to +180° motorized, control from console
SID	From 105 to 180 cm continuously or with presets

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

ACCESSORIES

Standard	• Removable footrest with surface 400x600 mm; • Shoulder rest • Pair of ergonomic handlers
Optional	• Paper roll bearer • LDC glass bearer • Compression band • OB-GYN legs bearer • Lateral cassette holder for oblique projection • Hand safety stripes • Additional pedal (in examination room) for RAD/Fluoro

DYNAMIC CHARACTERISTICS

Tabletop rise time from lower to max height (horizontal position)	15 sec
Tabletop combined rotation from 0° to +90°	25 sec
Tabletop combined rotation from 0° to -90°	26 sec
Tabletop combined rotation from -90° to +90°	37 sec
Tabletop lateral displacement	From 1cm/sec to 2,5 cm/sec
Lined translation (tube + receptor) along the horizontal axis	12 sec
Rotation only from 0° to +90°	16 sec
Focus to film extension from 105 to 180 cm	18 sec

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

TOMOGRAPHY

Type	Planigraph with homothetic linear movement and electronic fulcrum calculation
Stratum max height	400 mm (physical limit 450 mm)
Increase / decrease	• Manual, 1 mm step • Automatic (auto step function) with step mm program and selectable according to starting tomo angle
Speed	10° - 21° / sec. Adjustable
Tilting angles	• Preset 8° - 15° - 20° - 30° - 40° • According to customer preference within max 80° with respect to the chosen anatomical area and FFD
Tomo timings	Up to 5 speeds can be chosen that represent a percentage of the max speed: 3525 cm/ sec (21°/sec) For each tilting angles the speed can be decreased in 5 steps of approx. 10% per step. A tomography at 40° and FFD 105cm at the maximum speed will take approx. 2,2 sec.
Direction	Bi-directional in each position of table and FPD/column group
Sequence tomography	Sequence program with outward and inward emission up to the limits set by the operator or to the reaching of preset limit; stratum, area, etc.
Receptor movement range	Tomography can be executed in different receptor position according to the angle, to the FFD and the selected stratum.

BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

ABDOMINAL COMPRESSOR (OPTIONAL)

Positions	• Park • On field • Compression
Commands	On the touch screen, through the joystick and on table control boards
Compression power	Can be set from 2 kg to 20 kg with 0,5 kg step
Min. distance compressor cone from tabletop	80 mm
Max. distance compressor cone from tabletop	420 mm
Compressor displacement	340 mm
Protections	Compressor limit control Automatically deductible compressor
Movements and parking	Motorized
Other characteristics	Remote controlled with automatic parking. It can be separately installed. Display of the dynamic pressure and of the set pressure Possibility to go out of the x-ray field at end-of-the-run with longitudinal retraction, for better safety.

STEP ANGIO (optional)

Type	Linked to digital acquisition system DRF
Step length	• Manual, adjustable with 1 mm step • Automatic according to detector size
Direction	Selectable
Interface	Integrated with HF Generator, collimator and digital images acquisition system

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

STITCHING (optional) Exams of the column and lower arts	
Type	Linked to digital acquisition system DRF
Images size	• 43 x 60 (2 images) • 43 x 90 (3 images) • 43 x 120 (4 images)
Direction	Head to foot
Interface	Integrated with HF Generator, collimator and digital images acquisition system

COLLIMATOR

CHARACTERISTICS	
Model	R225 ACS inclusive of retractable tape meter
Functioning	Manual with push buttons and knob Automatic, microprocessor controlled and CAN-BUS interface
Field	Square & rectangular + iris
Inherent filtration	2 mm Al eq.
Square field covering at 1 mt FFD	430x430 mm
Field light indicator	> 160 lux
Light indicator accuracy	< 1% FFD
Laser pointer	Single line projection
Options	
Laser pointer	Double (cross) line projection
Additional filtering	Disk support with automatic filter exchange device; it can be manual of automatically controlled by CAN-BUS 1mm Al + 0.1mm Cu 1mm Al + 0.2mm Cu 2mm Al
RO314	Integrated camera for patient view
RO320	Collimator motorized rotation

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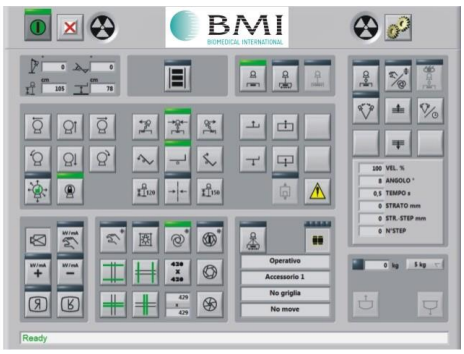
BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

REMOTE CONTROL CONSOLE



Description	19” Control console Medical Grade Panel PC Touch Screen with all commands N. 4 joysticks duplicating the most frequent commands: tube angulations movements; FFD; tabletop tilting and elevation movements; longitudinal and transversal displacement.
Touch screen characteristics	Dimension: 19” Resolution: 1600x1200 pixel Brightness: 350 cd/m^2 Number of colors: 32 bit View angle: 170°H - 170°V Aspect ratio: 4:3
Available connections	Dedicated LAN connected to control CPU Standard LAN for networking N. 4 RS232 ports
Additional controls	N. 2 additional membrane keyboards are located on the image receptor front and x-ray tube front duplicating all table controls.

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

GENERAL SPECIFICATIONS	50 kW	65 kW	80 kW	100 kW
Generator type	High Frequency Output (maximum 400 KHz)			
Anode speed	Low Speed Starters / optional Dual Speed Starter			
Input Phase / Voltage	3 Φ 400-480 VAC			
Line voltage Range	±10%			
Manual Power De-Rating	<10% line			
Compatible X-Ray tubes	>300 tube models			
Tube operation	1 tube standards (2 tubes optional)			
Anatomical programs (membrane /Touch screen console)	1024 / 20.000 + techniques			
Image receptors	Up to 6			
Techniques Selection	kV / AEC, kV / mAs or kV / mA / ms			
Communication ports	RS232, RS422			
Auxiliary Room & collimator Power	Standard feature			
GenWare® Service Software	PC based and technical support software			
RADIOGRAPHY	**50 kW**	**65 kW**	**80 kW**	**100 kW**
kV_p range/Steps	40-150 kV in 1 kV increments			
kV_p accuracy	± (2% + 1 kV) for 70-85 kV, ± (5% + 1 kV) for 40 – 150 kV			
High Voltage Ripple	<1 kV @ 110 kV			
mA range	10-630 mA	10-800 mA		10-1000 mA
mA accuracy	± (5% + 1 mA) measured at + 5 ms for exposure > 5 ms ± (20% for exposure ≤ 5 ms (≤ 0.5 mAs)			
Exposure Time Range	1 ms – 6300 ms in 1 ms increments			
Exposure Time Accuracy (measured at 75% points of kV waveform)	± (2% + 0.5 ms) from 5 ms to 6300 ms, ± (10% + 1 ms) ≤ 5 ms (≤ 0.5 mAs)			
mAs Range (non-AEC)	0.1 – 1000 mAs			
mAs Accuracy	± (10% + 0.2 mAs) for exposure > 5 ms (> 0.5 mAs)			

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

CONTINUOUS FLUOROSCOPY		65 kW	80 kW	100 kW
kV_p range/Steps	40-125 kV in 1 kV steps			
kV_p Accuracy	± (2% + 1 kV) for 70-85 kV, ± (5% + 1 kV) for 40 – 150 kV			
High Voltage Ripple	<1 kV @ 110 kV			
mA Range / Steps	0.1 - 10 mA in 0.1 mA steps			
mA Accuracy	± (5% + 1 mA) measured at > 50 ms; ± (20%) for exposure ≤ 6.7 mA			

OPTIONS (not included)	50 kW	65 kW	80 kW	100 kW
AEC Interface	Available – Ionization, PTM, or Solid State			
Hand Switch	Standard			
Dose Area Product (DAP) Interface	Available			
Dual Speed Starter	Available			
Falling Load	Available			
High Level Continuous Fluoroscopy	Available – Up to 20 mA			
High level Pulsed Fluoroscopy	Available			
Remote Fluoroscopy Control	Available			
Additional Tube Capability	Available			
Standard Console Pedestal	Available			
Standard Console Wall Mount	Available			
Touchscreen Console	Available			
Touchscreen Wall Mount	Available			

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

FLAT PANEL DETECTOR

Model	Trixell Pixium RF 4343 FL
Scintillator	Pixium © CsI
Pixel size	148 µm
Sensitive area	17 x 17 inch 43 x 43 cm
Image size	2880x2880 pixels
X-ray exposure	0.2 to 3 µGy
X-ray saturation dose	85 µGy/fr
X-ray linear dose range	Up to 50 µGy/fr
X-ray generator voltage range	40-150 kV
DQE @ 0 lp/mm	65%
MTF @ 1 lp/mm	55%
MTF @2 lp/mm	25%
Lag (1st frame)	< 1%
Lag (2nd frame)	< 0.5%
AD conversion	16 bits
Number of modes	17 (5 RAD, 12 fluoroscopy)
Detector dimensions	500x490x45 mm
Detector weight	14 Kg

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

DIGITAL IMAGE ACQUISITION SYSTEM: MIRROR DRF

X-ray examinations	• Muskoloskeletal; • Chest; • Genitourinary; • Gastrointestinal; • Interventional; • Swallowing; • Tomography; • Limphography and Myelography; • Long leg 6 spine stitching; • E.R.C.P.
Advantages	• Best comfort for the operator and the patient; • Image quality: High DQE – best resolution, 148 µm pixel size; • Speed: from single frame (thorax or skeleton) to 30 fps (swallowing); • Connectivity: integrated hospital IT, RIS-PACS; • Massive dose saving in all R&F studies; • Real time images.
System control	• X-ray beam and dose for each programmed study are controlled by a dedicated PC; • Multi-grids control: anti scattered grids ratio 12, 80 l/cm (suggested); • Ione chamber with 3 selectable area for the automatic dose rate control; • X-ray beam size digitally controlled, in pre-acquisition, via CAN-BUS collimator; • Rx generator: preset parameters.
Advanced Imaging Processing	• Instant t ready Image • Unlimited APR programs • More than 30 preset parameters for each anatomical study • Anatomical presentation of the images for the best intuitive use • Choice of the lowest X dose for each selected study • Reduce examination time • Better comfort for the patient and the operator

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

DIGITAL IMAGE ACQUISITION SYSTEM: MIRROR DRF

A.T.H. - Anatomical Tissue Harmonization	• An advanced image processing in DR modality, an image quality enhancement as never before. • A greater flexibility by adapting the processing to the anatomical region • A good detail visibility in under and over penetrated areas • Increasing of latitude without loss of detail contrast • A.T.H. reduces the need to window and level the images presented on a workstation display in PACS system • Images with inherent large latitudes as chest, skull and lateral spine strong enhanced without noise amplification and edge artifacts • A great benefit thanks to a better diagnostics accuracy and radiologist productivity
Dose Saving	• Virtual collimator; • Virtual scanning.
Digital Tomography	Combining the flat detector image quality with the remote control table ergonomics, the digital Tomography becomes again very affective.
Image processing	• Sharp spatial filtering, kernel 3X3 to 11x11; • Automatic or manual Windowing: contrast, brightness; grey level inversion; • Automatic or manual magnification of the image: zoom on detector and on the image; • Multi image display, with “imagette” for a quick exam check; • Automatic or manual electronic collimators; • Measurement SW: distances, angles, stenosis. • Image display: H/V inversion, 90° rotation, true size image editing; • Text editing with large fixed strings selection.
Networking	• DICOM work list management – RIS connection • DICOM storage service – Send images to a workstation & or archiving system • DICOM storage commitment. • DICOM print service – Print film editor program • DICOM CDROM – Archiving on CD ROM from Mirror • DICOM – Modality Performed Procedures Step (MPPS) • LCD 18” or 19” Monitor for medical images display

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

DIGITAL IMAGE ACQUISITION SYSTEM: MIRROR DRF

STITCHING (OPTIONAL)

Images Stitching - Integrated procedures for leg & spine images stitching.

The stitching function, (usually used for spine and legs scan) is needed for the automatic reconstruction of an X-ray image starting from a series of images acquired at fixed frequency during the scanning of the patient.

The image is reconstructed, keeping all original pixels, and can be viewed on the monitor, processed, printed or sent to the network.

As for standard acquisition, stitching is done giving the x-ray command from the generator control panel – the system automatically generates the required exposures (2,3,4) each time irradiating a different part of the patient.

After the exposure, the system automatically processes the acquired images and then recomposes them creating a single image shown on the monitor after approx 30 seconds.

MIRROR DRF—Technical specification - STANDARD

General description

User interface

- Windows XP OS, intuitive icon, 3F mouse, keyboard
- Multi language information: Italian, English, French, German, Spanish, other languages upon request

Archive display

- Patient data archive: work-list, studies to do, studies completed, studies documented (Print, store, etc)

Operative panel

- Frame area : 1280x1024 pixels
- Image area: 1024x1204 pixels, overwrite tools (patient data, image data, dose, symbols and graphics)
- Icons area: pre-acquisition data selection, post-processing functions, images destination for reporting, system status, exposure dose rate evaluation.
- Thumbnails of the main 6 images/run acquired.

Display

- In room: one/two 19" LCD high brightness (1.500 cd/m^2), medical display, DICOM LUT, native monochrome (live and reference images)

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BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

Operating Modes

Continuous fluoroscopy	43x43cm, 1Kx1K resolution, 16fps **(large area studies)** 30x30cm 1Kx1K resolution, 12fps **(medium area studies)** 20x20 cm 0.7x0.7K resolution, 20 fps **(low dose and high speed studies)**
Pulsed fluoroscopy	43x43cm, 1Kx1K resolution, frequency from 0.5 to 12 fps - **(large area, low dose, no moving, particularly for pediatrics)** 30x30cm 1Kx1K resolution, frequency from 0.5 to 12 fps - **(for dynamic studies on medium areas, best resolution and lowest radiation)** 20x20 cm 0.7x0.7K resolution, frequency from 0.5 to 12 fps - **(low dose studies)** **15x15 cm, 1Kx1K, rate from 0.5 to 6 fps, 3,5 lp/mm resolution**
Radiography	**H.R. Radiography**: 43x43 cm, 148 µm pixel size, from single image to 2fps **(for large size x-ray images, high resolution)** **H.S. Radiography:** 43x43cm, 296 µm pixel size, single images up to 6 fps **(for large size x-ray images, medium resolution)**

MIRROR DRF—Technical specification - OPTIONALS

Special operating modes

Tomography	Linear tomography with angle scan selection
Stitching	Serial images acquisition and related automatic reconstruction (60, 90, 120 cm)
Display	In room: one/two 19" LCD high brightness (1.500 cd/m^2), medical display, DICOM LUT, native monochrome (live and reference images)
Network	DICOM 3.0 class: store and storage commitment, Print Worklist Modality Performed Procedures Steps (RIS-PACS)
Archive	Local archive with removable support (CD/DVD Rom, DICOM or raw format). Remote archive in mass storage devices (PACS) Remote print using the film editor program: true size format, standard, row, col, slide, upper

BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

CONFIGURATION

Description	
Detector	Dimensions: 500x490x45.5 mm Weight: < 14 Kg Cooling: ambient air, no water cooling required Sensitive Area 43x43 Zoom mode: 30x30cm, 20x20cm and 15x15cm Scintillator: CsI Image dimension: 2880x2880 pixels Pixel pitch: 148x148µm2 Dynamic range, A/D conversion: 16 bits Frame rate (continuous / pulsed) up to 20 fps
Detector group	Pixium RF 4343-FL aSi flat panel Ione chamber: 3/5 fields Anti-scattering grid: carbon fiber ratio 12:1, 80 l/cm
PC cabinet	Main Controller Control PC for the complete Rx diagnostic with interface & controls of: remote table, collimator, generator, ione chamber, grid, DAM, PID, PU4343 PID PC for images processing. PC architecture: Windows XP OS, Pentium 4/3 GHz, 2 or 4 GB RAM, 80 GB HD (minimum configuration) PU4343 Control PC of the Pixium detector, distortion correction, uniformity. PC architecture: Windows XP Pro OS, Pentium 4/3 GHZ 2/4 GB RAM, 80 GB HD (minimum configuration) Cabinet with cables
Dose Area Meter	Software for elaborating dose area product in radiography and fluoroscopy, for the single image and for the complete study: acquisition, processing and data storage. Further conversion into DICOM format to be sent to RIS DAP chamber DAP data print

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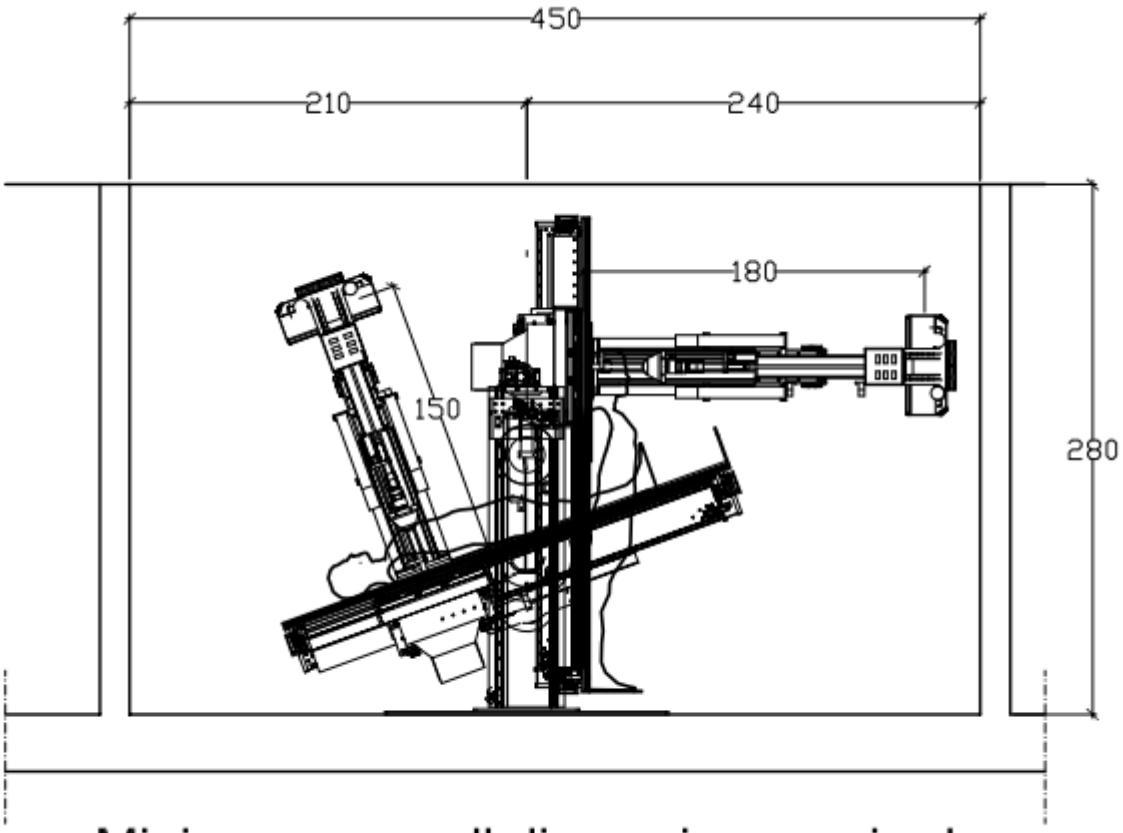
BRT-90 PLUS DRP

Product Data Remote Controlled R&F Table ± 90° Tilting

ROOM DIMENSIONS



Minimum over all dimension required during operation

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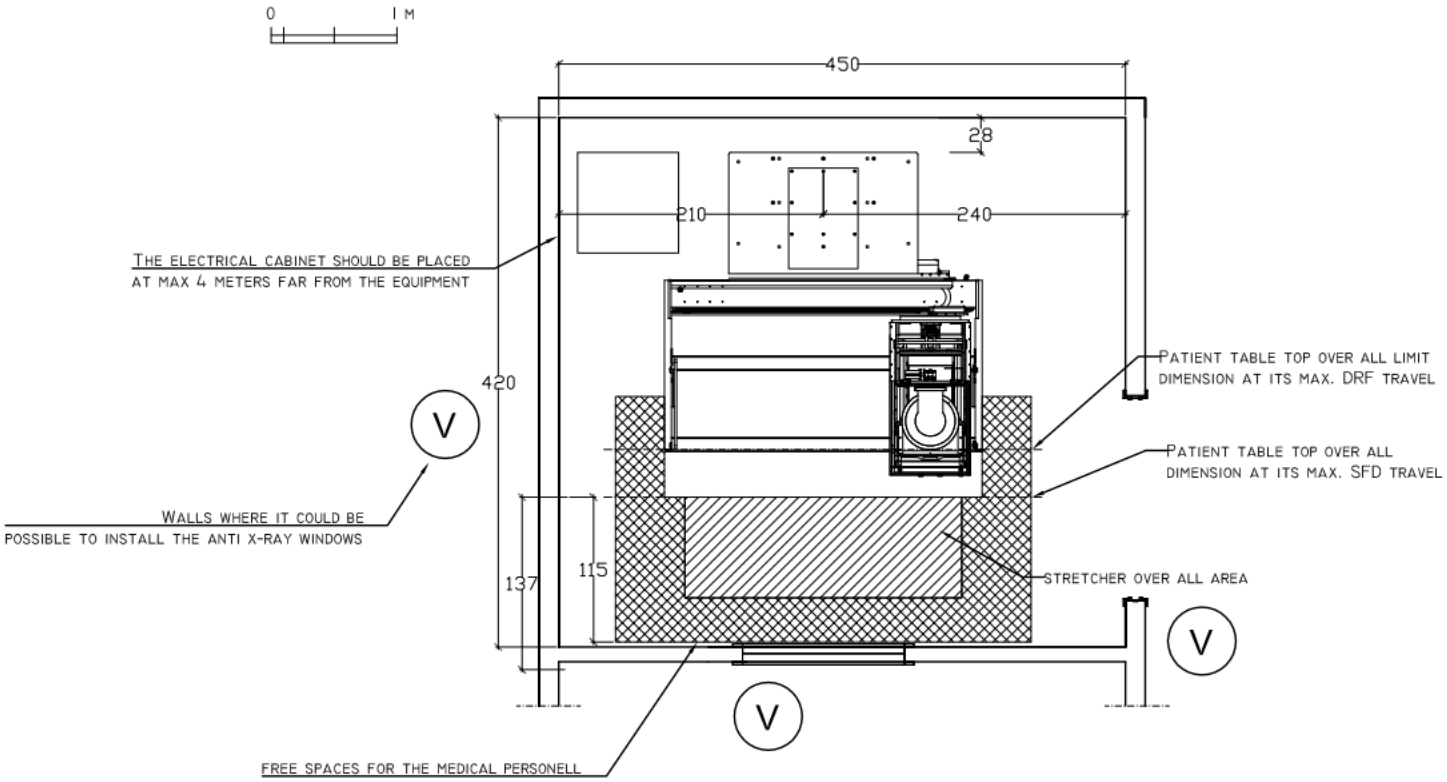
Product Data Remote Controlled R&F Table ± 90° Tilting

ROOM DIMENSIONS



In case of DRF the depth could be reduced from 420 cm to 380 cm

Data subject to modification without prior notice

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