

DIGITAL RADIOGRAPHY SYSTEM

TECHNICAL SPECIFICATIONS

Digital radiographic X-ray system radiography
Recumbent, standing or seated patient position
Ceiling - mounted x-ray tube assembly and digital imaging system.
Motorized multi leaf collimator
Fix Dual flat panel detector for table and chest stand separately
Automatic image positioning through vertical motorization of wall stand

X-Ray Generator:

80 KW or better high-frequency X-ray generator
800 mA at 100 KV.
1 ms shortest exposure time.
Integrated automatic exposure control (three chamber).
Organ programs to be available.

Motorized Multileaf Collimator:

Ceiling-mounted tube assembly support, with tube assembly Multileaf collimator for vertical, oblique, horizontal, and lateral acquisitions Rotation upto +/-40° or more.
Filters to avoid soft radiation
Automatic collimation and cassette and detector sensing. Manual collimation should also be available.

Patient Table:


Height adjustable patient positioning table with six way floating tabletop,
Access the patient from all sides.
Head to toe cassette and detector cover range.
Autotracking during table height adjustment.
Foot paddle for height adjustment of the patient positioning table of the floating tabletop.

Flat Panel Detector (cable less):

Flat panel detector with active image size of 16"x16" or better
Cesium (CsI) scintillator or better
Pixel size 200 µm or better.
Spatial Resolution 2.5 lp/mm or better or DQE 60% or more
Matrix size approximately 2800 x 2800 or better.
14 bits or better detector depth.
Time for data acquisition, transmission and viewing for full image to be 10 sec. or less.

X-Ray Tube:

Page 40 of 59
Exposure voltage 140 kV or more.
Focal spot 0.6 mm and 1/1.2 mm or better.


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Anode heat storage 300 KHU or more
Motorized tube movement for precise imaging.

Chest Stand:

Motorized Chest stands with height-adjustable and tiltable Bucky cabinet to house FD and X-Ray cassettes /Detector holder for image acquisition.

Chest stand should have moving exchangeable grid for scattered radiation reduction for Pediatric acquisitions.

The grid should be removable

The chest stand should have servo / auto tracking i.e., the ceiling stand should move automatically with the height adjustment of the chest stand.

Complete with overhead handle for optimum positioning of patient for lateral exposures and lateral patient handles for optimum patient positioning, e.g. during PA thorax exposures.

Imaging System

High resolution digital imaging reconstruction.

Image display with DICOM network connection, complete with 19 inch color TFT display.

Digital Radiography System

Dual core or better microprocessor with at least 2 GB Ram.

Storage of 5,000 or more images.

Imaging System should be capable of patient and study

Administration

Exposure and post processing

Image documentation, archiving, display of image markers.

Organ program selection and configuration.

Image processing functions such as rotate, mirror, zoom, window, filter, insert comment line and stitch etc.

The system to have SW/HW to attain higher detail contrast (soft tissue and bone)

Reduced noise with the multi-scale procedures for images post- processing.

DICOM Functions include: Send, print and CD Write.

UPS for the digital system 5 KVA for 20 minutes backup.

ACCESSORIES:

Lead glass size 1.5 mm or better: size 80 cm x 100 cm.

Compression belt.

Lead Aprons 0.5 mm

Thyroid shield: 0.5 mm pb

Lead goggle and gonadal shields


DICOM 3.0 compliant Grayscale Dry LASER Printer with 3 online sizes.

Should have minimum productivity of 150 films/ hour in mixed sizes.

Printer should be capable of printing 08x10, 10x12, 11x14, 14x14 & 14x17 size films.

Minimum resolution should be 10 pixels/mm with 12-bit gradation.

1000 x14x17" Dry LASER films


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UPS

UPS 100 KVA for 20 minutes backup of the whole system. The dry batteries will be included in company warranty.

Manufacture WARRANTY / TERMS & CONDITIONS:


The Manufacturer will undertake to maintain the equipment during the period of warranty which shall be for five years from the date of full functional commissioning with all specified parameter and shall cover labour and parts of all equipment supplied / stated in the contract including non-properties parts accessories transducer batteries etc.

TRAINING:

- 01 week local training for two technicians.
- 01 visit of application specialist before commissioning and 01 visit after proper working of machine.
- Visit of the two ~~Consultants~~ in the manufacturing factory and hospital to see the working of the machine.

SITE PREPARATION/INSTALLATION:

Civil work (Building construction as per required drawing)


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WHOLE BODY MULTI SLICE CT SCAN 128 SLICE

TECHNICAL SPECIFICATIONS

GANTRY

System should be capable of Acquiring /Generating 128 slices per gantry rotation in real time. Gantry bore / aperture to be at least 70 cm or more. Minimum gantry rotation time to be at least 0.35 seconds or better, for 128 slices per 360 degree rotation, for all applications.

All the firms should quote their latest model scanner with shortest rotation time Breath holding time 05 sec or less in cardiac scan.

System should be able to acquire helical OR sequential scan with the gantry tilted from the vertical.

Gantry tilt range must be + 30 degree.

Maximum scan field of view to be at least 50 cm. For Paeds & Children the system should be able to reduce the field of view to 250 mm.

Minimum slice thickness 0.625 mm or better in Helical mode.

Dual Control (including tilt,) of gantry and table from the gantry-housing and console.

TUBE

Heat storage capacity of at least 7 MHU or better. Generator output of up to 550mA or more.

Active collimation during scanning.

GENERATOR

High frequency power generator with minimum power of at least 70 KW or more should be capable of variable kV setting in steps from 80 to 135/140 KVP.

Should have ability to vary the power (mAs) automatically in steps Real-time dose reduction hardware / software and with ECG modulation Iterative dose reduction must be offered.

Low contrast detect ability (LCD) calculated on a CATPHAN 20 cm, of 5 mm resolution with a CT No. of 3 HU (0.3 %) or better, contrast difference Scan Length of at least 1.7 meters or more of helical or axial scan in a single acquisition.

Maximum Scan Time 100sec. or better.


DETECTORS

Solid state crystal / ceramic detectors with conversion efficiency (x-ray to signal strength) of nearly 98% latest technology.

Isotropic voxel size of 0.35 mm or better, in all three axis.

Minimum 64 Detectors and detector electronics capable of providing 128 slices per gantry rotation.

Detectors width 38 mm or more.


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COUCH

Dual motorized control (from console and gantry) of table movements in horizontal and vertical axis.

Maximum weight allowed on the couch up to 200 kg or more Horizontal movement speed up to 100 mm per second.

Single acquisition scan range of at least 1.8 meter.

Scan with at least 0.25 mm accuracy / reproducibility on a 200 kg patient.

Lateral movement table.

CONSOLE COMPUTER

System architecture and operating system must be based on latest technology.

(64 bit RISC or Dual Xenon Processor PC) original.

Multitasking and parallel processing CPU system.

At least 8 GB RAM or more Hard disc capacity for image storage of at least 500 GB or more.

Capable of storing at least 3000 raw data files / rotations or 700 GB raw data / 450000 images in 512 x 512 format.

Reconstruction of at least 25 images FRAMES per seconds or better at 512 x 512 matrix. Image area display matrix dimensions (1024 x 1024).

Console color monitor (X 02), LCD of at least 19 inches, medical grade with maximum viewing angle.

DVD and CD writer

SOFTWARE:

- a. All the latest whole body & cardio-vascular software should be supplied as standard which is available at the time of shipment original with their part No of company.
- b. USER INTERFACE SOFTWARE True isotropic volume acquisition
- c. Prospective and retrospective ECG gated acquisition
- d. Variable Delay algorithm like fixed percent delay (FPD) and fixed offset delay (FOD) or better, for selection of period of least motion in cardiac cycle (temporal resolution of 44 milli second or less will be preferred).
- e. Automated contrast media bolus tracking software.
- f. 3D Reconstruction Display Original Company Software.
- g. Maximum and minimum intensity projections
- h. Multi-planer and curved planer reconstruction
- i. 3D shaded surface display
- j. 3D volume rendering software
- k. 3D virtual endoscopy, colonoscopy with lumen / fillet view /electronic cleansing / auto segmentation of the colon and bronchoscopy.
- l. 3D cone beam correction.

CT ANGIOGRAPHY:

- a. Basic Comprehensive Brain perfusion analysis.



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- b. Image reconstruction Automatic real time dose adjustment according to the body attenuation i.e. core 4D dose/longitudinal dose workstation/ 40 boost/ sure exposure 3D/ organ specific dose modulation or similar.
- c. Artifact reduction algorithm.
- d. Automatic control of tube current over high and low attenuation areas for patient dose reduction software for low dose to patient original / certified.
- e. Iterative Dose Reduction Software.
- f. Bone removal software.
- g. Metal artifact reduction software.
- h. Dental CT
- i. optimal dual energy to be separately quoted.

WORK-STATION- 03 in number with thin client server (work station with 03 license users) Independent, automatic multimodality, fully functional. All companies will supply the Work-stations by the manufacturer that they provide world-wide as a standard. Work-stations will be supplied from manufacturer of CT to ensure similar work flow.

High speed link to operator console on DICOM network

System architecture and operating system

- a. Dual processor Xeon
- b. 2.66 GHz or more speed
- c. 512 cache or more
- d. Graphic card and network card

Original Licensed software: Window XP/7/8 or Linux, MS Office 2013, Norton / equivalent antivirus (current and upgradeable for at least for the time of warranty) Should have at least one high resolution LCD monitor (medical grade as recommended by the manufacturer) of 18 inch or more.

DVD RW (super-drive will be preferred)


DICOM-3 viewer with universal PC display capability (licensed)

WORKSTATION SOFTWARE

(original with certificate) with thin client, server with three concurrent users).

Software up-gradation of all existing applications for at least next 05 years will be provided free of cost. Following software will be provided at the workstation of the same origin as are being used in USA/EUROPE & JAPAN. 3D Reconstruction display.

- a. UPS 3 KVA (x 03), Branded, dry battery capable of providing 20 minutes of back-up for workstations (MG, APC, MC, Chloride, Riello, Emerson). The dry batteries will be included in company warranty.
- b. Heavy duty Laser black and white printer (qty: 3) A4 /letter size 2400 dpi or higher, two paper trays for A4/ letter size media, (HP, Lexmark, Xerox, CANNON) network-ready DICOM
- c. DICOM 3 ready (multi-vendor and multimodality compatible for send, receive, archive, retrieve and print, on main console and workstations).


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UPGRADE-ABILITY

All vendors will quote their latest and best system.

The system should have a software upgrade route to higher versions with undertaking of above two by the principal manufacture, that is their latest version been used in USA/EU & Japan.

POWER REQUIREMENT

Three phase with line voltage of 380-440V, 50Hz.

ACCESSORIES:

Programmable, dual head power injector with flow/volume and temperature control. Mounted on mobile base, with 500 syringes of 150 ml capacity and connecting tubes (Medrad, Medtron / Mallen, Nemoto).

DICOM 3 ready dry laser camera / imager, Multi-size up to 14 x17 in. (Agfa, Fuji, Kodak/Carestream, Konica) for black and white printing on films including 5000 films.

FILM VIEWER (x 08) for images up to 14 x 17 inch with variable light control and shutters for control of viewing area, with 04 x 1 format MEDICANVAS, MAVIA

On-line sine wave UPS for whole CT suite, with a minimum back-up time of 30 minute on full load including air-conditioning system.

Air conditioners Two Ton each for UPS room office and waiting area lights/fans etc.

Protection devices:

Lead aprons with hangers.

Lead-gloves

Lead goggles

Thyroid Shields all 0.5 mm lead equivalent European & Japanese.

Lead glass for control room , 0.5 mm lead equivalent.

Standard set of Phantoms for calibration of CT

Pediatric scanning package - software and hardware original.

Cardiac defibrillator.

Dedicated Cardiac Monitor for synchronize with cardiac scan.

Pulse oximeter.

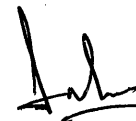
ECG machine, multichannel (three channels)

Cardiac Resuscitation trolley completely equipped with all necessary items.

Table Accessories – Table pads, arms rest, patient restraint kit, IV pole, infant cradle, flat head holder, ceiling mounted hand holder patient (original accessories from the vendor)
Digital Transcription system for reporting (hand held units – x 03, and Complete stenotype desktops unit (x 02).

UPS

160 KVA system, Branded, dry battery capable of providing 20 minutes of back-up for CT Scanner (MG, APC, MC, Choride, Riello, Emerson). The dry batteries will be included in company warranty.



4

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Manufacture WARRANTY / TERMS & CONDITIONS:

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TRAINING:

- 01 week local training for four technicians.
- 01 visit of application specialist before commissioning and 01 visit after proper working of machine.
- Visit of the two ~~Consultants~~ in the manufacturing factory and hospital to see the working of the machine.

SITE PREPARATION/INSTALLATION:

Civil work (Building construction as per required drawing)

Complete Site renovation of CT, Console and UPS room, including lead shielding of the CT room and doors, Air-Conditioning, False ceiling, painting, Antistatic flooring, Electrical DB, Earthing and Power cable from Main Transformer / Hospital. LT Panel Will be the responsibility of the supplier.

The installation will be a turnkey project and any modification in the existing site will be the responsibility of the firm.

The firm will be responsible for complete interface free installation keeping in view the requirement and recommendation of manufacturers and its surroundings to ensure artifacts examinations/procedures.



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TECHNICAL SPECIFICATIONS

Positioning ARMs:

One Ceiling mounted and one Floor mounted C--arm with motorized. Real time display of rotation angulations.

The C-arms should have the possibility of head to toe coverage of the patient without repositioning the patient.

Both-planes should have Flat Detector.

Right anterior oblique | Left anterior Oblique +/- 100° or more for Floor It -27 to +100 Degree for ceiling.

Cranial / Caudal: Minimum + 45 / 45 Degree or more for both planes.

Rotation speed:

10° / sec. or more in LAO | RAO for floor mounted and 8° / sec for ceiling mounted C-arm.

Motorized parking for floor and ceiling mounted C-Arms.

Integrated, computer-aided collision monitoring | Protection | Touch sensor

Programmable auto positioning of selected angulations. (50 or more programmable positions)

Variable source-to-detector distance

Motorized gantry rotation for free positioning of system and table», for optimum patient access.

The C-arm should maintain FD position, isocenter and projection while swiveling gantry around the patient.

PATIENT SUPPORT / TABLE:

Floor mounted examination table for angiography and interventions

Motorized height adjustment with variable speed. Floating tabletop with longitudinal and transverse movements

Left /right pivotal table rotation +/- 90 deg. or more

Patient weight bearing capacity 200 kg or more. Capability to handle additional load (100 kg) in any table position

Accessories:

Arm cradles (pair), Unilateral armrest, infusion bottle holder, Instrument tray.

X-Ray Generator

Microprocessor based high frequency X-ray generator

Output Power 100 KW. Radiographic rating minimum 1000 mA at 100 KV

The system should have capability of digital radiography and fluoroscopy

Continuous/Pulsed fluoro output power of 2 KW or more to ensure good image quality during fluoro at oblique angles


Shortest Exposure time of 1 msec with automatic exposure control

X-RAY Tubes:

Dual/Triple focus X-ray tubes for both planes with anode heat storage capacity of at least 2.0 MHU or better.

Liquid bearing technology for longer durability and quiet operation

1


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Focus 0.3mm, 0.6mm and 1.0 mm or better for triple focus & 0.4 & 0.8 mm or better for dual focus tube.

Continuous heat dissipation of 2500 W or more.

FLAT DETECTORS:

The high resolution dynamic flat panel detector with integrated detachable grid especially designed to fulfill the requirements for diagnostic and interventional radiology.

Large Flat Panel Detector on both planes: size 30 x 30cms or more for both planes.

Pixel size: 200 um or less.

Spatial resolution: 2.5 LP/mm or more.

Image acquisition to be done in 14 bit digitization depth.

Digital imaging system (Acquisition / Fluoroscopy)

High resolution digital imaging system.

Acquisition, storage and display in 1024 x 1024 x 12 bits.

Real time filtering, online edge enhancement, noise reduction (spatial filtration) re-masking, and road map function,

Dynamic real time Pan/Zoom

Manual and automatic pixel shift for DSA studies

Hard Disk/Magnetic Disk Capacity for storage of 50,000 images with 1024 x 1024 x 12-bits matrix

DICOM 3.0 with standard exchange media

The system must have Dicom send, Dicom print and Dicom Query / Retrieve facility.

Digital pulsed fluoroscopy / radiography with 7.5/10 and 15 frames per second in 1024 x 1024 x 12-bits or more for single plane

Display of scene directory for easy selection of any image or scene from the examination room of control room

Variable copper filtration during fluoroscopy and acquisition for radiation protection

The selection of the Cu filters must be automatic by the system based on patient weight / absorption without any user interaction.

Vessel analysis with determination of degree of stenosis, distance measurement and calibration. The system should have catheter-and sphere calibration

Automatic positioning of the-c-arm corresponding to reference image and preferably vice versa

Simultaneous display of subtracted and un-subtracted fluoroscopy images. single plane and biplane on flat display monitor for both plane

Overlay fade feature i.e. online. Superposition of active fluoroscopy and reference image.

The system must have online image density (gray scale) correction i.e. Automatic online image density correction of dynamic scenes and single images for clear view in the bright and dark areas of the image.

Facility to review previous studies in the examination room from the patients old CD. The system has the capability for retrieval of angio images back in to the digital imaging system from the CDs and/or the network.

Online Digital subtraction angiography (DSA) with frame rates from 0.5 to 6.0 fls selectable.

Flexible pixel shift automatic manual.



2

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Digital rotation angiography in SD effect with 'un-subtracted and dynamic subtracted image display in acquisition with rotating for acquisition in 1024 x 2 matrix 25 f/s or better in single plane.

The system should display subtracted images during acquisition preferably while rotating.

All controls of digital imaging system must be available in the examination as well as control room.

CD RECORDER

CD drive for automatic digital image storing on CD-ROM for off-line data exchange in DICOM 3 format. The system must archive the images/scenes on to the CD in background

MONITORS FOR THE SYSTEM:

Active Matrix TFT monitors with 1024 x 1280 matrix resolution.

Monitors should be ceiling-mounted in the operating /examination room. The ceiling suspension for monitors in the examination room should have room for six monitors.

Two 19 inches or more active matrix digital TFT monochrome monitors for live images of each plane in the operating/examination room. Brightness of the imaging monitors: 600 cdlm² or more

Two 19 inches or more active matrix digital TFT monochrome monitors for road mapping in the operating/examination room. Brightness of the imaging monitors: 600 cd/m

19 inches color display I monitor for display of images of the workstation in the examination room (Quantity 01).

19 inches active matrix TFT monochrome monitors for live images and road mapping in the control room (Quantity 04).

Brightness of the imaging monitors; 600 cd/m

Additional Workstation: As recommended by the Manufacturer and being supplied worldwide.

High Performance Windows/LINUX based Multimodality /dedicated workplace with 2 X Dual Core 3GHz Pentium Processors with minimum 3GB or more. The workstation to be equipped with graphic board to support 3D applications.

High performance windows XP based multimodality workplace with 2 x Dual core 3 GHz Pentium processors with minimum 3 GB RAM or more and a minimum disk capacity of 140 GB or more 3D reconstruction SW for universal angiography & neuro applications for the reconstruction of 2D tomograms from the projection images.

Interactive 3D reconstruction and visualization in real time of a volume in volume rendering technique, MPR and MIP

Features:

Display of multiple volumes, to switch between un-subtracted and subtracted mode. Transfer, 3D reconstruction and visualization in one defined protocol within minimum time duration.

Different sets of acquisition and reconstruction protocols to meet the requirements for visualization of vessels, bones, clips and coils.

Reconstruction result can be native and subtracted.

Modification of reconstruction area to allow zoom via reconstruction

Display of the 3D reconstructed image data in the examination room on a monitor in the main ceiling suspension of angio monitors.

Control of 3D-reconstruction SW from the table side control / workstation

The workstation should have multi-modality capability on it or on a separate addition workstation in order to display CT/MRI images on it.

The Workstation must have the ability to post process DSA images on the SD workstation. If DSA post-processing is not possible on 3D Workstation, then additional workstation for DSA post processing is to be offered.

Special package to provide soft-tissue cross-sectional imaging in the interventional suite. It should suite and support Neuro-radiologist during interventional procedures in the angiography suite with both endovascular and non endovascular.

This package should provide excellent soft tissue image quality (in 512 matrix) for neuro and body imaging. Neuro images in 512 x 512 matrix are to be reconstruction minimum time. It should be possible to visualize a density difference of 10HU (Hounsfield Units, less preferred) of an object 10mm in size in a Thick-MPR display. (Measured with a CATPHAN CT phantom).

ACCESSORIES:

Surgical shadow-less light ceiling suspended.

Ceiling suspended Lead Glass for Upper Body Radiation Protection

Lower body radiation protection flaps.

1 x Fully programmable latest model contrast medium injector.

One Postscript level Network Laser Printer for taking image printouts on paper.

This printer is to be connected with the Main Digital imaging System. Paper for 500 prints should be delivered with the printer.

1000 write-able CDs should be delivered with the system

Lead Glass Window size 2 x 1 meter or more. Pb equivalence 2.1mm or better.

6 x Pb aprons, double sided. Pb equivalence front 0.5mm; back 0.35mm.

6 x Thyroid shields and 6 x Pb Glasses.

Intercom for communication between control and exam room.

DICOM Laser Camera with 14-x17 inches cassette formats.

UPS compatible for the whole system with back-up time of 10 minutes for fluoro and cine acquisition.

2x firm viewer for images up to 14 x 17 with variable light control and shutters.

Optional:

Workstation should create visualization and fading between the live / acquired 2D fluoro image and the matching 3D reconstructed image by the workstation for vessels / coil/bone. it should allow to overlay the colored 3D volume with regular/acquired fluoro as well as with subtracted fluoro and acquisition series on the display of the workstation. Thus this information is available in parallel to the regular or subtracted fluoro or acquisition.

Simultaneous display of subtracted and un-subtracted fluoroscopy images for single plane and biplane.

Additional display i.e., monitor per plane is to be included and these monitors are to be installed with the remaining monitors in the examination room.

Any other latest software available with the company should be offered as option which will not be considered as reason of rejection.



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UPS

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Manufacture WARRANTY / TERMS & CONDITIONS:

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- 01 week local training for four technicians.
- 01 visit of application specialist before commissioning and 01 visit after proper working of machine.
- Visit of the two *Consultants* in the manufacturing factory and hospital to see the working of the machine.

SITE PREPARATION/INSTALLATION:

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The installation will be a turnkey project and any modification in the existing site will be the responsibility of the firm.

The firm will be responsible for complete interface free installation keeping in view the requirement and recommendation of manufacturers and its surroundings to ensure artifacts examinations/procedures.



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