

**1. Static unit – Atleast 2 > 500mA (DR/CR system)**

<b>1. Digital Radiography System: 500 mA</b>
<b>Make &amp; Model : Aero DR NS (SKR 4000) with Mi800 HF</b>
Floor mounted Digital Radiography System with One Portable Detector for Whole Body Digital Radiography.
A fully digital radiography system capable of detector exposure and image acquisition in vertical, horizontal and oblique positions to perform all skeletal body and chest radiography. Complete system operation with control of generator, X-ray tube and imaging system from a single integrated user interface should be possible.
<b>Generator</b>
Generator should be of latest technology with High-frequency, multipulse generator with inverter principle and automatic exposure control (AEC) for constant output.
Output – Minimum 52 kW
kV range should be at least 40 kV- 150kV
Output at 100 kV should be 640mA
It should have automatic exposure control device (AEC)
It should have digital display or kV and mAs and ms in the console.
Anatomical programming for different radiography applications should be possible
It should have overloading protection
<b>X-ray tube and Collimator</b>
The X-ray tube should be floor mounted with rotating anode, fully compatible with the generator and must have dual focus. Focal spot of the following sizes are required:
Large focus: 1.2mm or less
Small focus: 0.6mm or less
Tube should be with anode heat storage capacity of 300 kHU or more.
The X-ray tube and Generator should be manufactured by the manufacturer of the DR system.
Floor mounted column support
Floor mounted tube column stand support must be provided
Vertical movement of 150 cm or more should be available
Longitudinal movement of 130 cm or more should be available
Specify the SID of the system
Specify the horizontal and vertical tube rotation angle around the respective axes.
Rotation of tube about vertical axis at +/- 90 degree should be possible with stop position at 0 degree & 90 degree.
<b>X-ray Patient Table</b>
Horizontal Table with floating table top with minimum table height of 70 cm

Every company has their own mechanical parameters, we request you to amend it as Longitudinal tabletop travel should be minimum +/- 46 cm and transverse tabletop travel should be minimum +/- 12 cm and the table movement should be have electromagnetic brakes
Possibility of taking Patient weight 200kg or more
Whole body head to toe examination of patient should be possible without repositioning.
The grid supplied with the table should be of minimum grid ratio of 10: 1 at focus of 115 cm.
Patient coverage should be 180 cm or more without repositioning should be possible
It should be able to accommodate mobile flat detector system of 35 cm X 42 cm size or more.
Automatic exposure control should be offered as standard.
Vertical Bucky stand
The unit should be provided with Vertical Bucky
It should have provision to do chest radiography without grid
The vertical Bucky stand should also accommodate the same detector as in the table.
The minimum grid ratio of the moving grid on the vertical Bucky should be 10:1 and not less.
<b>Detector systems:</b>
The portable detector should be of solid state flat detector with suitable scintillator material. Mention the scintillator material being offered CSI.
The size of detector should be 35 x 43cm and should be compatible to both patient table & Vertical Bucky.
The resolution should be minimum of 3.3 lines pair/millimeter
The pixel resolution should be 150 um
Image acquisition and image processing based on body part and viewing position.
The digital workstation should be based on the latest high speed processor of at least 12 bit.
It should have the possibility of acquiring the images from the detector system and retrieval of patient list and examination data from Hospital/Radiology Information systems (HIS/RIS) should be possible.
It should have image storage disk of 10,000images or more.
The system should have ready DICOM Interface and networking capability with RIS/HIS/PACS
Post processing function must be available.

Console station must be provided for image processing , image display, post processing function and networking with anti glare color monitor of LCD type with size 19" with matrix of 1024 x 1024		
Automatic and selective filming with virtual film sheet should be available		
<b>Essential Accessories:</b>		
Voltage stabilizer for the complete DR system should be quoted along with the unit. It should be of required capacity and the make and capacity of the voltage stabilizer should be specified.		
On line UPS with suitable rating and 30 minutes back up for console / digital system should be supplied along with the DR system.		
X-Ray equipment offered should have USFDA or CE approvals for quality standard.		
<b>Others:</b>		
The generator and the X-ray tube of the system should preferably be from the same manufacturer so that the parameters match with accuracy. The system should be supplied only by reputed X-ray manufacturers with good track record of life of the DR systems including X-ray tube, detector etc.		
The system should have all necessary approvals such as AERB Type approval certificate.		
standards like USFDA or CE certificate		
<b>Warranty</b>	:	<b>3 years warranty from date of installation</b>

## 2. Mobile unit > 60 mA

<b>Mobile X-ray unit 60MA</b>		
<b>Make &amp; Model</b>	:	<b>Make: Allengers &amp; Model: MARS-3.5</b>
<b>Description</b>	:	High Frequency mobile X-ray machine with following output:
		Focal Spot- 1.5X1.5
		High frequency 2.5 kw
		kV - 40kV to 100 kV
		mA - 13mA to 70mA
		mAS - atleast 0.32 to 200 mAS
		The machine should have a good colimator with bright light.
		The X-ray machine should be light weight and easy to move around. It should have a disinfectable control panel for extensive use in Operation Theatre.

		The weight should be below 150 kg and height in parking position should be less than 160cm
		Display : Digital display of atleast mAS and kV for easy parameter settings
		The machine should be equipped with proper wheel locks and exposure switch. It should also have cassette storage box.
		Radiation safety is of extreme importance and the machine with less skin dose will be preferred.
		Should be AERB&IS:7620&IEC60601 approved
<b>Warranty</b>	<b>:</b>	<b>With a warranty of 3 years</b>

### 3. USG (with Color doppler)

<b>USG machine with colour Doppler with Echo facility</b>	
A state of art fully digital, compact portable Colour Doppler Ultrasound machine (weight <4kg) is required with following	
Unit should be able to give very high image quality with advance technologies like compound imaging for better cardiac contrast resolution, tissue differentiation and edge detection, equivalent to high end cart based systems. Please specify the technology	
System should be able to support speckle reduction imaging for better tissue differentiation and edge enhancement please specify the technology	
The system shall have the ability to enhance tissue margins and improve contrast resolution by reducing artifacts and improving visualization of texture patterns & needle tip within the image, please specify the technology	
System should have both online (Read) as well as offline (Write) zoom facility	
Imaging modes of Real time 2D, Colour Doppler, Pulsed wave Doppler, Continuous wave Doppler, Power Doppler must be available on all cardiac transducers.	
System should non-windows based for virus free operation & faster boot up.	
System should support transducer technologies like phased array, convex. Linear, TEE etc.	
<b>Cine memory on all modes</b>	
The system shall process a dynamic range that is at least 165db. The system must display at a maximum depth of 35 cm.	

The system must have a dedicated cardiac calculation packages with PISA, TDI calculation packages, vascular calculations packages		
The unit must be compact, portable and lightweight, weighing less than 4 kg.		
Unit must be sturdy, resistant to breakage & damage on fall/hit against the wall or hard surface for out of the hospital use (Certified to be drop tested).		
Flat LCD/TFT monitor of at least 10 inches with flicker free image		
Alphanumeric soft keys keyboard with easy access scans controls, facility to sanitize the system keyboard to avoid cross contamination		
The System must have the ability to function by AC/DC or battery power with same degree of functionality, the battery life (run time) shall be at least 2 (Two) hours, this need to be demonstrated.		
The system must have archive capability for storage and retrieval of images and clips data.		
Data Transfer facility should be available as standard, to transfer images etc. easily onto another system/computer etc		
The system shall support the all DICOM functionality. Storage, Print and Work List, also ready to connect to PACS		
System should possess software for enhanced needle visualization to track the needle clearly at steep angles during the procedures while maintaining striking image quality of the target structures and surrounding with simple on/off functionality		
The equipment should be mountable on trolley & locking mechanism should be inbuilt into the trolley safety & security of the system		
System should have both European CE and US FDA quality certification		
<b>Transducers to be supplied as standard</b>		
1. 2-5 (+/-1) MHz multi-frequency broadband curved array transducer for general purpose, abdominal, deep nerve access applications		
2. 6-13(+/-1) MHz multi-frequency, broadband linear array transducer for vascular, nerve imaging with less than 40 mm size for vascular access, small parts, vascular, musculoskeletal application. Higher frequency will be preferred.		
3. 1-5 (+/-1) MHz multi-frequency, broadband phased array transducer for cardiac applications		
4. Mobile cart with transducer holder and space for printer		
5. Triple Transducer Connector – TTC		
<b>Warranty</b>	<b>:</b>	<b>3 years warranty from date of installation</b>

<b>4. Premium colour Doppler system</b>
The ultrasound system provided to be a state of art system which is reliable and stable. System should have Full Digital Super-wide Band Beam Former, Digital Dynamic Focusing, and Multi-beam Processing, etc.
System should have facility of system maintenance and upgrade completed by updating software to achieve product improvements and advanced technology.
System should have whole body scanning Applications & software for have a wide range of applications includes: Abdominal, OB/GYN, Cardiology, Urology, small parts, vascular, orthopedic, anesthesia and MSK applications
System should have following Scanning Modes:
a) General :- B, Dual B, Quad B, THI, M mode, Color Doppler, Power Doppler Imaging, Directional PDI, PW
b) Cardiac :- TDI,HPRF, CW, Color M, Anatomic M mode
c) Dual-Live, Duplex and Triplex mode
d) Trapezoid Imaging, Real-time Panoramic Imaging(B mode as well as color)
System should have Tissue Harmonic Imaging Facility with Convex ,Linear, Cardiac and the TVS probes.
System must have Frequency compounding facility. Other equivalent Technology can also be offered. Processing technology in technical bid should be highlighted.
The system offered must have High Definition Speckle Reduction Imaging, which is a real-time algorithm to increases contrast resolution by reducing speckle noise while maintaining true tissue appearance. This image processing technique should be able to remove speckles and clutter artifacts.
Should have Auto Image optimization function in B mode as well PW mode, a physical key should be available on the keyboard for easy access
System should offer at least 8 slider controls for TGC.
When image is frozen, system must be capable of adjusting gain as well as zoom level.
System should have at least 256 gray scale for better imaging.
System should be able to zoom a required ROI for maximum 10 times.
System must go on full screen zoom mode.
System should have focus number up to 4 focal points & more and the intra-focus distance should be adjustable
System should have complete package for calculations of OB/GYN calculation package, Vascular calculations, Urology calculations, Cardiac Calculations, Doppler calculations
Auto Trace facility for measurements should be available on frozen screen as well as Real time

Machine should indicate GA on screen while performing the OB scan
System should have provision for NT measurements.
System must have provision of taking the measurement automatically Automated Carotid Intima Media Thickness measurement package for risk assessment in evaluating health of arteries.
System must have provision of calculating EF value semi-automatically.
System must have software for better visualization of needle and the needle tip while performing needle guided procedures
System should have minimum 19" high resolution monitor display with swivel and tilt facility.
The system should include user-friendly sensitive touch screen of about 8 " Or more
Alpha numeric physical/Digital keyboard must be in built in the system for user's convenience.
System should offer maximum scanning depth of 40cms
System should have Cine loop of minimum 1000 Frames
System should be provided with facility to do measurements on saved image and the report page should get updated automatically
The system should have a high dynamic range of about 280dB, higher will be preferred.
The system should have real time 2D panoramic view imaging that operates by sweeping a transducer over the area of interest. The system should have real time color panoramic view imaging that operates by sweeping a transducer over the area of interest
System should have in built facility for Volume 3D/4D Imaging.
System should have advance 3D /4D features rendering modes for visualizing fetal face, fetal limbs, fetal spine such as Surface, Skeleton, etc.
System should show depth perception in the 4D images.
System should have advanced 3D/4D features.
System must provide facility of tomographic Slice view with at least 25 slices.
System should have Strain Elastography Imaging on linear probe .It should provide qualitative as well as quantitative assessment.
System should have Contrast Imaging on convex probe .It should provide qualitative assessment.
System should have 4 probe Connectivity ports as standard and all ports should be universal and can support all transducers
Probes offered should be Broad band frequency probes offering at least user 5 selectable frequency range

System should be provided with built in battery and able to support the continuous scanning for more than 2 hrs OR ONLINE UPS should provide for the same back up.		
System should be provided with DICOM connectivity as standard		
System should have 500 GB hard disk for digital image storage. It should provide extensive image management capability including thumb nail review, Cine loop editing etc. needs to be available		
The TVS probe field of view should be more than 180 degree		
System should have at least 4 ports of USB for data transfer and inbuilt CD/DVD writer		
System should be supplied with following probes.		
1. Broad Band Phased array Probe (Frequency Range 1.0-5.0MHz) ( $\pm 1$ MHz)		
2. Broad Band Convex probe (Frequency Range 2 – 6MHz)		
3. Broadband Liner Probe for vascular applications ( Frequency range 3-13 MHz) +/- 1MHz		
4. Broad Band Volume Convex probe (Frequency Range 2– 6 MHz)		
System should be offered with B/W Digital Thermal Paper Printer		
Certificates : Should be US FDA/CE/BSI and ISO 13485		
3 Years warranty and 4 years CMC with spares excluding consumable accessories.		
<b>Warranty</b>	<b>:</b>	<b>3 years warranty from date of installation</b>

### **CT Scan( > 16 slice- spiral)**

<b>1. CT Scan – 16 slices</b>
The system should be latest, State-of-the Art system with latest release in the worldwide market. Should have valid CE/FDA and AERB certificate. Vendors should have at least 10 installations in South India to support after sales capability.
The spiral CT scanner system for high-resolution whole-body scanning. The instrument must be capable of acquiring minimum 16 slices per 360° rotation. The system must have latest iterative reconstruction technique in raw data space.
<b>Minimum Technical specification</b>
<ul style="list-style-type: none"> <li>• Scan Time – <ul style="list-style-type: none"> <li>a. The scan time for one gantry rotation of complete 360° rotation should be 0.8Sec or less.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Scanning Capability – <ul style="list-style-type: none"> <li>a. Pediatric and infant base protocols shall be available based on the infant weight 80 KV or less. Station must be offered.</li> </ul> </li> </ul>



b. Real time contrast monitoring acquisition with auto scan initiation protocol and with auto injector trigger.
c. High Contrast Resolution should be at least 15 lap/cm for axial and spiral scan at 2 % MTF
d. Low contrast resolution should be at least 3 mm at 3%
<ul style="list-style-type: none"> <li>• Gantry - <ul style="list-style-type: none"> <li>a. Aperture of 70 cm</li> <li>b. Auto Positioning Lights</li> <li>c. Should have FOV of at least 50 cm or more</li> <li>d. Physical/Digital Gantry Tilt must be provided with Tilt <math>\pm</math> 30</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Detectors - <ul style="list-style-type: none"> <li>a. Data acquisition system capable of acquiring 16 Slices or more per 360° rotation with 16 or more rows of detector. Total coverage of the detectors must be 11 mm or more.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Slice Thickness - <ul style="list-style-type: none"> <li>a. 16 slice acquisition with minimum thickness of 0.80 mm or less</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Pitch Factor (Volume Pitch) - <ul style="list-style-type: none"> <li>a. Should be variable between 0.6 - 1.5 or better and should be user selectable or automated. Specify all possible pitch selections.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Scan Time and length in Spiral/Helical Technique - <ul style="list-style-type: none"> <li>a. Should be at least 100sec continuous</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• X-Ray Generator - <ul style="list-style-type: none"> <li>a. High Frequency type</li> <li>b. Power output: 32 KW or higher Voltage Selection: 80-130 K or wider</li> <li>c. mA Range: 300 mA or more (with incremental steps of 1 mA)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• X-Ray Tube - <ul style="list-style-type: none"> <li>a. Anode Heat Storage Capacity- Minimum of 3.5 MHU or more</li> <li>b. Anode Heat Dissipation: Specify the minimum value in KW.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Patient Table - <ul style="list-style-type: none"> <li>a. Carbon Fiber Tabletop with Load carrying capacity 150 Kg with 1mm positioning accuracy.</li> <li>b. Horizontal Table speed preferably 100 mm/sec.</li> <li>c. Metal free scan able range of 140 cm or more</li> <li>d. Facility of positioning aid for horizontal iso-centric positioning of the patient.</li> <li>e. Elevating table.</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>• Image Reconstruction - <ul style="list-style-type: none"> <li>a. Reconstruction Field of View Range: 5-45 cm</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Image Display - <ul style="list-style-type: none"> <li>a. Image Area Matrix Dimension: 1024 x 1024</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Image Reconstruction - <ul style="list-style-type: none"> <li>a. Image reconstruction capability should be at least 10 images/sec with simultaneous reconstruction facility.</li> <li>b. Storage Capacity 1 TB or more (or 500 GB internal + 1TB external can be provided)</li> <li>c. System should have latest iterative reconstruction technique in raw data space.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Operator Console - <ul style="list-style-type: none"> <li>a. It should have 19" or more high-resolution LCD monitor OR two 18" separate monitors.</li> <li>b. The system should be user friendly with all functions menu driven. It should be modern user interface.</li> <li>c. All functions including scanning image reconstruction, film documentation, archiving, transferring, MPR Angiography maximum intensity projection, 3D volume rendering, 3D SSD, CT Angio, CT Urography, vessel analysis, should be possible on console MIP, CT Angio software with quantitative vessel analysis must be provided.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Computer System &amp; Image Processor - <ul style="list-style-type: none"> <li>a. 64 Bit main CPU with at least 8 GB RAM memory or better</li> <li>b. High speed CPU with latest software should be provided.</li> <li>c. Hard Disc of 1 TB or more</li> <li>d. Image storage in 512 x 512 matrix for storage of 75,000 images or more.</li> <li>e. DVD/CD archive capacity with DICOM viewer software default.</li> <li>f. Image Processor: Operating system shall be windows/ Linux based</li> <li>g. The image reconstruction time should be at least 10 images /sec or better for all types of acquisition modes including Cone Beam Correction, Neuro Imaging studies.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Software - <ul style="list-style-type: none"> <li>a. Should have DICOM 3.0 compatibility</li> <li>b. Volume rendering technique with axial cross reference imaging along with measurement tools on volume rendered image 3D, 3D small volume measurement package MIP slab viewer</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Patient Communication System - <ul style="list-style-type: none"> <li>a. An integrated intercom and Automated Patient Instruction System (API) should be provided</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>• Others - <ul style="list-style-type: none"> <li>a. System should have PACS interface ready without any new hardware or software.</li> <li>b. Fully DICOM 3.0 compliant including <ul style="list-style-type: none"> <li>i. DICOM Modality work list, with automatic procedure selection</li> <li>ii. Capability from HIS-RIS interface</li> <li>iii. A Barcode reader for entering patient data from HIS RIS must be possible.</li> </ul> </li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Dose saving protocols – <ul style="list-style-type: none"> <li>a. Latest dose saving protocols must be available</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• CT Fluoroscopy for Biopsy:(optional, to be quoted if available) - <ul style="list-style-type: none"> <li>a. Continuous CT (CCT) biopsy mode to enable the clinician to perform scans from the gantry room using a foot pedal and view the images on a cart-mount, in room monitor for guidance planning and monitoring. Each scan exposure is a 240° axial. Reconstructed images may be viewed as one image or three images.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Accessories - <ul style="list-style-type: none"> <li>a. Lead Glass of size 100 X 150 cm</li> <li>b. Single Head Pressure Injector (300psi) with 100 syringes</li> <li>c. Patient Trolley</li> <li>d. The equipment should be new and unused. The manufacturing date should not be more than 180 days when it would reach the consignee address.</li> <li>e. All patient positioning accessories including head rest</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Standard &amp; Safety - <ul style="list-style-type: none"> <li>a. Should be of CE ("Conformité Européene") or FDA (US) and AERB approved. Quoted model release should be within 3 years. Please submit the documents for the same.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Workstation: - Price to be quoted separately and will be taken for evaluation. <ul style="list-style-type: none"> <li>a. Standalone multimodality independent workstation from the same manufacturer.</li> <li>b. 1 TB Hard disc &amp; 8 GB RAM</li> <li>c. Should be capable of simultaneous viewing all post processing functions and filming independently without the help of main console. Two-way data transfer between the operative console and the satellite workstation should be standard.</li> <li>d. Image evaluation tools: All advanced post processing Software like MIP, MPR, VRT, SSD, IMAGE FUSION, Neuro Subtraction or equivalent CT Angio for both brain and body, Virtual endoscopy, Vessel analysis, Vessel segmentation.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Suitable UPS for the entire system - including CT scanner, console, and additional workstation with sufficient rating for 15 minutes back up.</li> </ul>
<ul style="list-style-type: none"> <li>• Dry / Laser Imager <ul style="list-style-type: none"> <li>a. Resolution: 16 bits/ 500 dpi or more with minimum three trays.</li> <li>b. Support Multiple Film Sizes: one of which must be 17"x14".</li> <li>c. DICOM Compatible</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• One branded Personal Computer - i7 or latest with laser printer of latest configuration</li> </ul>

<ul style="list-style-type: none"> <li>• View boxes - LED type of 14"X17" 3 film type.</li> </ul>		
<ul style="list-style-type: none"> <li>• Light weight vinyl Lead Aprons - of 0.5 mm lead equivalence.</li> </ul>		
<ul style="list-style-type: none"> <li>• warranty – <ul style="list-style-type: none"> <li>a. Three years for CT scanner system including X ray tube and all accessories.</li> <li>b. The offer should be accompanied by original data sheet/brochure of the product</li> <li>c. The cost of the CMC (Comprehensive maintenance Contract) from 4th year to 10th year inclusive of labor, spares and X ray tube is to be quoted. The CMC should cover all vendor items and local accessories.</li> <li>d. CE/USFDA and AERB approved.</li> </ul> </li> </ul>		
<ul style="list-style-type: none"> <li>• Turnkey works : (for 1000 Sft area)</li> </ul> <p>The bidder shall survey the site, prepare a lay out diagram, attached it in the tender at Annexure - X. The hospital will arrange to provide a clear site (Annexure – X) with the rated power supply as required by the successful bidder. It shall be the responsibility of the bidder to alter the site (Annexure – X), provide false ceiling, internal electrical wiring, Lights, Air conditioners – Two tons X Four no., wall tiles up to false ceiling, vinyl floor work, trench for the cable, 100 A tripper box with on / off switch for the CT scanner with double earth pit, lead lined doors with at least 2 mm lead frame for the lead glass, radiation safety lights, foundation platform for the CT scanner, The cost of the turn key works shall be included in the offer.</p> <p>Ductable Air Conditioner as per requirement and need of the equipment at site to be provided.</p>		
<b>Warranty</b>	<b>:</b>	<b>3 years warranty from date of installation</b>