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| Clinical Specialty | **Cardiology** |
| Generic Name | **Single Plane Angiography Machine** |
| Clinical Purpose | Single Plane Angiography Machine is intended toperformdiagnostic and therapeutic procedures. |
| **TECHNICAL SPECIFICATIONS** |
| A fully digital flat single plane cardiac angiography / cardiac catheterization system for interventional cardiac procedures. Capable of head-to-toe coverage without repositioning of patient. Companies shall offer their latest systems and applications with best resolution and minimum possible radiation dose.**Ceiling Mounted Positioning Arm:**1. The position placement of the arm ceiling reflects on the capacity and capability of the equipment.

**Geometry:**1. C-Arm or G – ArmGeometry
2. Motorized digital flat panel system with smart collisiondetector
3. Rotation Range (Degrees): ROA / LAO +/- 105° ormore
4. Cranial / Caudal: Minimum +/-45°
5. Rotational Angiography Speed: 50° / sec or more in LAO to RAO or vice versa; 18° / sec or more for AP Cranial to AP Caudal or viceversa
6. Source to Image Distance (SID) Range: 95 – 105 cm or wider (PA /Lateral)
7. Iso-Centric Height: Variable / fixed
8. Auto Positioning: Programmable auto positioning of selected angulations, (50 or more) programmablepositions
9. All rotational angles should be digitally displayed on themonitor
10. Motorized / manual parking & rotation of the positioning arm, capable of head-to-toe coverage without patientrepositioning

**Digital Flat Panel Detector:**30 x 30 cm or larger or Diagonal 40 cm (+ / - 4 cm) orlarger**Further Detector Specifications:**1. ASi / CsI / aSe Type
2. Image matrix of 1024 x 1024 pixels at minimum 14 bits depth for detector orbetter
3. Standard Cardiology Field of View (FOV) sizes: Three formats ormore
4. Built in temperaturestabilizer
5. Integrated Collision Protection / Collision Detection Technology 18.All other standard accessories according to this digital flat panel
6. Minimum Pixel Size: 200 µm orless
7. Removable grid for Paediatricapplications
8. Minimum Spatial Resolution: 2.5 lp / mm ormore
9. Minimum Detector / Detective Quantum Efficiency (DQE): More than 75 % orbetter

**Patient Support Table:**1. Floor mounted, 8-ways horizontal floating top catheterization table with up / down, vertical, longitudinal, and transverse movements with pivoting.

**Further Table Specifications:**1. Minimum table length 280 cm with unobstructed image coverage
2. Longitudinal Travel: 1100 mm with tabletop movement or more
3. Lateral Travel: 280 mm ormore
4. Vertical Travel: 90 – 105 cm from the floor or more
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| 1. **CPR should be possible in any table position**
2. Tabletopshouldbeabletoacceptpatients’weightofupto200kgplus100kgfor

resuscitation1. Tabletop should be metal free (X-ray density < 2mm AI equivalent orbetter)
2. Complete accessories including arm holder, hand grip, arm support/arm rest and positioningaids

**X-Rays Generator:**Microprocessor based high frequency using fiber optics for data communication between each imaging system1. Dedicated X-Rays generator of 100 KW
2. Radiographic mA up to1,000
3. Radiographic kV 40 / 50 – 125kVp
4. Serial filming exposures with shortest exposure of 1 ms, with automatic KV and mA control for optimum image quality
5. Capability of digital radiography andfluoroscopy
6. Capability of doing multiple rate digital pulsed fluoroscopy and cine minimum at range of 3.75 to 30fps
7. Capability to change frame rate during the samestudy

**X-Rays Tube:**The bidder will mention the models in their technical offer.1. Tube (Liquid Metal BearingTechnology)
2. Dual / Triple focus with Anode Heat Storage Capacity: 3 MHU ormore
3. Anode Small Focal Point: 0.3 – 0.5 orlower
4. Anode Large Focal Point: 0.8 – 1.0 mm orlower
5. Dose management with Fluoro filters range of 0.1 / 0.2 mm and 0.6 / 1.0 mm Cu or Real Time Automatic Filter selection based on patient bodyweight
6. State of art cooling system

**Radiation Reduction and Monitoring Systems:**Dose management and reduction / optimization to be done without image quality compromise.1. Grid pulsed / physical radiation reduction system / flat emitter technology / similar technology tubes with radiation dose management and with auto adjusting Fluoro filters
2. Dedicated X-Rays radiation dose monitoring and dose reduction software features of the latest variety provided by themanufacturer
3. Angulation dependent automatic exposure control including KV, mA, pulse width & focal spotadjustments
4. Automatic calculation and optimization of exposure data based on fluoroscopicdata
5. Radiation free patient positioning without activeFluoro
6. Radiation freecollimation
7. DAP threshold intimation / warningsystem
8. DICOM structured report containing patient/procedure/dosedata
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| **High Resolution Digital Imaging and Acquisition / Fluoroscopy System withReal Time Image Processing:**1. Acquisition, storage, and display all at minimum 14 bits
2. Parallel processing capability / multitasking facility
3. Real time filtering and roadmapfunction
4. Magnetic disk capacity for storage of minimum 100,000 images in 1024 x 1024 x 14 bit on the magnetic disk of mainconsole
5. Minimum Cine Length: 10 seconds in 1024 matrix @ minimum 30fps
6. Images storage and retrieval from archive disk for possible manipulation and quantification using available software packages (compatible format / bits)
7. Acquisition at 1024 x 1024 @ 30fps and 512 x 512 @ 60fps for paeditrics should both be available

**MonitoringSystem:**1. Medical grade large display monitor in examination room, minimum 55" diagonal in size 8 Mega Pixels resolution along with Two 19" or larger medical grade monitors for backup, one for live image, second monitor for reference image
2. Two LCD / LED medical grade monitors for live images and road mapping in the control room, minimum 19” inch diagonal or largersize
3. All 19” or larger Monitors should be Medical Graded, complied with International Standards for medical monitors

**Controls:**1. Integrated table side touch screen console to adjust system parameters, frame rates, Haemodynamic system controls, quantitative analysis, stent enhancement soft-wares, Digital Subtraction Angiography (DSA), Mask- Unmask (Road-mapping) and RotationalAngiography
2. All controls of digital imaging system, measurements, post processing shall be in the control room as well as the examination room.
3. The control panel can be mounted at any side of the patent table

**Recording / Archiving & Communication System:**1. Recording / archiving system should be DICOM-3 compatible
2. Digital images should be stored as backup on CDs / DVDs with incorporated original DICOM software
3. DICOM (Send / store, commitment, retrieve /query)
4. PACS compatibility /integration
5. Compatibility to display Intra-Vascular Ultrasound, OCT, and FFR system images on mainscreen
6. Compatibility to display of ultrasound / echocardiography systemimages on main screen
7. Integrated bi-directional intercom system for Cath lab to control room (from Original Manufacturer).

**Software Packages:**Complete analysis package for following cardiac applications should be included: 1. Dynamic pre and post PTCA / Valvotomy comparison with one image live and other

reference1. Automatic loops replay after acquisition orfluoroscopy
2. Dynamic real time pan /zoom
3. Dynamic real time digital imaging processing like edge enhancement or gamma correction, noise reduction (spatialfiltration)
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| 1. Online image density (gray scale) correction
2. Simultaneous display of fluoroscopy and reference images
3. Facility to review previous studies in the examination room from the patients’ oldCD
4. Automatic positioning of the c-arm corresponding to referenceimage
5. Store Fluoro facility to store last fluoroscopyrun

**Dedicated Adult Features:**1. Digital subtraction angiography package with manual / real time pixel shift for compensation of patient movement duringacquisition
2. Image masking with real-time overlay of liveFluoro
3. Real time live stent enhancement with integrated table side control with touch panel(older stent enhancement on frozen image is not acceptable)
4. Rotational angiographysoftware
5. Quantitative coronary analysissoftware

**Physiological Haemodynamic Monitoring System:**Original from manufacture of Angiography system.1. Integrated Haemodynamic System with full table side control having bi-directional communication with the machine for automatic / synchronized acquisition, transfer and display of patient Haemodynamic parameters and demographicdata
2. Multichannel (16 channels or more) to record at least 4 channels IBP, Cardiac output with thermo dilution method, Surface ECG in any configuration and simultaneous 12 lead ECG, NIBP and SpO2measurements with Electrophysiology capability and hardware for 64 Unipolar channels/32 Bipolar Channel or more.

**Haemodynamic SystemFeatures:**1. Complete software for all Paediatric & adult, right / left heart, Angio / Valvular Haemodynamic calculations such as gradients, valve areas, shunts including annotations and 12 channelsECG
2. Live Waveforms display on main monitor in the examinationroom
3. Digital display of all the parameters like IBP, Heart rate, cardiac outputparameters
4. Possibility to print the waveforms simultaneously while acquiring the data in the background
5. Capability to store the waveforms on the hard disk of the physiological recording system
6. Two Monitors in the control room, one for live waveforms and the other for control and data entry
7. Facility for freezing Haemodynamic data and simultaneous recovery of recent data/ compare stored data with currentwaveform

**Workstation:**Hardware must be as per original manufacturer’s recommendations and Software should be from original manufacturer of Angiography System. Online workstation to review studies directly and the facility to review studies with lossless compression and original image quality as on console.1. DICOM – 3 compatible
2. Capable of universal DICOMsupport
3. Original DICOM handling software from the manufacturer with permanentlicense
4. Edge enhancement/adjustable view speeds/post processingcapabilities
5. High-Definition Medical Graded LCD / LED monitor of minimum 19 inchessize
6. CD / DVD writer and CD / DVD ROMDrive
7. Image storage capacity as per manufacturers’ approvedhardware
8. SCSI or equivalent controller as per manufacturer's approvedhardware
9. Black & white laser/ink jet printer
10. Dedicated application for TAVI planning on workstation/console.

**Radiation Protection Equipment / Accessories:**Must be FDA / CE / MHLW approved.1. Ceiling suspended tilt table lead glass for radiation protection of operator’s head & neck regions and upper bodyparts
2. Table mounted adjustable lower body radiation shields / flaps on bothsides
3. Lead glass window size 4 x 1 meter or larger lead equivalent 2.0 mm orbetter
4. Lead aprons (vest and skirt), double side with different sizes, light weight, lead equivalent front 0.5 mm and back 0.35 mm with belts (FDA / CE approved) (Qty.05)
5. Wall Mounted / Trolley mounted hangers of S.S 304L for lead aprons (To be supplied Locally)
6. Thyroid shields with lead caps. (FDA / CE approved) (Qty.05)
7. Lead Goggles: Light Weight (FDA / CE approved) (Qty.05)
8. Patient Protection Lead Sheet: Light weight having 30 inches insize approximately

**Other Accessories:**1. Ceiling suspended shadow-lesslight
2. Programmable Contrast Media Power Injector (Medrad, Angiomat, Medtrone, Nemoto, Guerbet) with 100 disposable syringes
3. Operational & ServiceManual
4. Brand New and Latest Version 160 KVA or more true online sine wave Double conversion UPS for whole system with a minimum back up time of 10 minutes including room lights, microprocessor based IGBT technology. Display and alarms of parameters. Three phase line voltage of 220 50Hz with all necessary standard parts including dry batteries

**Quality and Safety Standards:**1. For Angiography System, FDA 510K/CE(MDD)/MHLW.
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