

**Madhya Pradesh Public Health Services Corporation Limited
(A Government of Madhya Pradesh Undertaking)**

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Ref.No:-55/MPPHSCL/Medical College-Equip/2015

Annexure-2

1. The SPECIFICATION OF Schedule No.5 Item No.2- HIGH FREQUENCY VENTILATOR Should be read follows :-

- Advanced microprocessor based continuous flow, pressure limited, time cycled ventilator for very low body weight infants (premature, newborns) upto maximum 20 kg, for conventional modes and up to 4 KG for high frequency modes.
Upgradeable for additional functions
- Should be an upgradeable design with software/hardware upgradeability for new/future functions with inbuilt graphic screen.
- Should be supplied with external medical grade air compressor of same make & should be mounted on trolley of ventilator.
- The ventilator should have ventilation modes as below:
 - IPPV / IMV
 - Assist Control
 - SIMV
 - CPAP
 - PSV
 - VG
 - HFOV – should be integrated in same machine
 - It should be possible to combine HFV as below :
 - IPPV + HFV
 - CPAP + HFV.
 - The HFV function should be integrated in same machine and NOT external facility.
 - The HFV function should control :
 - Frequency in Hz : 5 – 20 Hz.
 - Amplitude control : 0 – 100%.
 - It should be possible to use HFV WITHOUT disconnecting the patient by simply switching ON/OFF in the same machine .If HFV is offered, separate patient tubings for same to be offered.
 - Should measure parameters in HFV such as DCO₂, VtHF (tidal volume in HFV), MV_{im} (MV in IMV strokes in inspiration), VT_{im} (MV in IMV strokes in expiration)
- Should have settings for :

Peak Inspiratory Pressure

10 - 80 cmH₂O

Flow independent PEEP	0 – 25 cmH ₂ O
Inspiratory Time	0.1 – 2 sec
Expiratory Time	0.2 – 30 sec
Maximum Rate (based on Insp. Time and exp. Time)	Up to bpm
Inspiratory flow	1 – 30 lpm
Base flow (VIVE)	1 – 30 lpm
FiO ₂	21 - 100%

- Machine should have bidirectional flow sensor at Y- piece for adequate volume measurements.
- Machine should have autoclavable expiratory Valve.
- Machine should have automatic calibration for O₂ sensor.
- Machine should not require any bleed flow from mixer.
- Should have real time monitoring of:
 - Pressure - Peak, Plateau, Mean, CPAP/PEEP
 - Expired Tidal Volume (Monitored), Expired Minute Volume, leakage in %
 - Frequency/ Rate - Set (Inspiratory), Spontaneous MV in %, total , I:E ratio
 - FiO₂
 - Lung Mechanics - Resistance, Compliance , C₂₀/C, Time constant T_c, RVR
 - Trends of P_{mean}, FiO₂, Resistance, Compliance & RVR
- Should have automatic alarm settings for all alarms. MV alarm can be manually adjusted along with alarms for :
 - Disconnection
 - High/low Pressure
 - High/low Minute Volume
 - High Rate
 - High Tidal Volume
 - Apnoea / apnoea alarm time
 - High/low O₂ % (automatic settings)
 - Oxygen line failure
 - Compressed air failure
 - Total electronic failure (with error code)
- Should have specific alarms for
 - Tube blocked
 - Ventilation hose kinked
- Pressure Support
 - Pressure support should be leakage adapted and should have back up ventilation, so that machine start mandatory ventilation as rate of patients drops below set rates.
- Volume Guarantee

- Volume guarantee should be regulated with lowest possible airway pressure within set PIP to give set Tidal volume.
 - Volume Guarantee should work in all synchronized modes like SIMV, SIPPV & Pressure Support.
- Nasal CPAP ventilation
 - The nasal CPAP unit should be self contained in ventilator with head cap, head band, nasal prongs, nasal masks & fixing unit.
 - Should be possible to field upgrade the same if required.
- Graphic Display
 - 12" TFT Touchscreen operation.
 - Storage of graphic trends and trend tables upto 10 days minimum.
 - Storage of waveforms upto 12 hours minimum.
 - Direct access and readout of all parameters.
 - It should have facility to for data export via Pen drive/CD Drive.
 - Screen can be mounting on top of the ventilator and side rail pole both.
- Scope of supply should include
 - Basic Unit (220 - 240 V)
 - Modular corrosion free imported Trolley of the same make.
 - Silicon heated Hose set for neonates for HFOV and conventional modes- 1 each
 - Servo controlled humidifier (F&P MR 850) with reusable chamber
 - Flow sensors- 1 set of 5 pieces
 - O2 cell
 - Nebulizer
 - Oxygen connecting Hose
 - Air connecting Hose
 - Nasal CPAP kit- disposable
 - Medical Grade Air Compressor of same make
 - Hinged arm for rail (Support for patient circuit)
 - Neonatal test lung
 - Instruction Manual
 - Price list for spare parts & accessories should be submitted along with tender.
- Quality Standards and Support requirements –
 - The unit also should have US FDA and European CE certification
 - The unit should comply with relevant IEC Certification
 - Indian subsidiary/ dealer should have nationwide network, support offices and must be also ISO 9001 certified.

2.The Specification of Schedule No. 8 Item No.1- 3D–4D color Doppler high resolution USG machine is revised and should be read as follows:-

Name of Item: - 4D color Doppler high resolution USG machine

Sr. No	Name of Equipment	Detail Specifications
1.	4D color Doppler high resolution USG machine:	<p>These are broad specifications the companies should quote with their latest model and comparable technologies. Major or minor deviations from the specifications given below will be evaluated by technical committee for keeping the specific equipment in one category which broadly meets the requirement.</p> <p>Demonstration has to be arranged by the company before the price bid opening at their own cost for their quoted models to the technical committee</p> <ul style="list-style-type: none"> • The system should be State of the art with full Digital Technology with Broadband beamformer & should be for Whole Body applications including Abdominal, Ob/Gyn, Cardiac, Cerebrovascular, Peripheral Vascular, Musculoskeletal, Transcranial & Small Parts Imaging such as Breast, Thyroid, Testes, Intracavitary applications like Transvaginal & Transrectal, & Intraoperative applications. System should have the capability of Epicardial and contrast imaging. • The broadband beamformer should be capable of simultaneously processing ultrasound signals from 1 MHz to 17 MHz. • The system should incorporate facility for High-resolution 2D, M Mode, PW, CW, Colour Flow Imaging, Power Doppler Angio, Duplex, Triplex Imaging modes. Should be capable of Dual Live display of grayscale reference image with colour Doppler image • The equipment should have minimum 50,000 Digital Channels or more, and should be upgradable on the site to higher number of Channels. Higher Number of Channels is preferred. • The system should employ the state of the art Transmit Real Time Compound Imaging Technology with Multiple transmitted lines of sight of at least 9 lines, wherein Multiple Coplanar Images from different viewing angles are obtained and combined into a single

		<p>compound Image at real-time frame rates for improved visualization & better Image quality in Abdominal & Vascular Imaging & to virtually clean up the Image of artifacts.</p> <ul style="list-style-type: none"> • System should have advanced Image Processing algorithms to analyze between targets and artifacts so as to sharpen target anatomy and reduce the speckle & artifacts for improved Image quality. • The system should have 256 Grey shades or more. • The system should offer a scan depth up to 30cm. • The system shall have three universal transducer ports with electronic switching capability allowing any transducer to be connected to any port. • The system should support Convex, Linear, Sector, Volume, Matrix Array and static transducers. It should support volume imaging by freehand, mechanical, and electronic methods. • The system should support multiple fully sampled Live Volume Imaging, for both adult and paediatric imaging. • All transducers should have Broad Bandwidth technology for extreme High Resolution 2D Imaging. The system should be able to capture all frequencies in a single Probe, without the need for user selection. • The system should have a high dynamic range of 160 dB or more. • The system should have facility for zoom (real-time and frozen image) and manipulation of Image through pre processing and post processing with Cine loop viewing of Images of all modes. • System should have Cineloop review facility in individual and mixed modes with memory upto minimum of 2000 images and 100 seconds of M Mode data. • The system should offer a very high frame rate upto 500 frames per second. The system shall be able to perform mechanical 4D acquisitions at 30 Volumes per second. Please specify.
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		<ul style="list-style-type: none"> • There should not be any reduction or change in pulsed Doppler PRF/scale when moving between duplex pulsed wave Doppler and simultaneous/triple modes. Also, system should offer automatic single button optimization of Doppler baseline and scale. • The system should have Harmonic Imaging for Tissues for hard to image patients. The system shall support Tissue Harmonic Imaging capability on phased, linear, 3D and curved array transducers. Tissue Harmonic Imaging should be available in colour flow imaging, M-Mode, and 3D rendering modes. • System should be able to work in combined mode of Harmonic Imaging and Real-time Compound Imaging to get excellent Image quality. The system shall offer Tissue Harmonic Imaging in Power Doppler imaging mode for improved sensitivity and specificity in differentiating blood/agent from tissue. • The system should have Contrast Harmonic Imaging and should have optimization settings to detect the Contrast Agents. Please specify other advanced Technologies to perform better Contrast Harmonic Imaging. • System should offer real-time extended field of view imaging (panoramic imaging) up to 100 cm with curved and linear transducers. All grayscale imaging must be capable of real-time spatial compounding during the panoramic imaging. • The system shall quantitatively calibrate panoramic images, allowing the user to perform area, circumference, distance and curved-linear distance measurements. • The system shall support simultaneous display of volume and multiplanner reconstructed (MPR) views. • The system should have the in-built software tool for imaging MPR, Thick Slice, and slice plane views. • The system shall support full screen display of all 3D views including individual X, Y, Z MPR views and simultaneous display of thumbnail views on the same system display monitor. • Full Trim capability must be supported: Oblique and
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		<p>linear trimming in the MPRs; Freehand trimming of the volume.</p> <ul style="list-style-type: none"> • The system should support a utility for the creation of user-defined general imaging protocols and the editing of default general imaging protocols. • Preset controls shall include abdominal, carotid, lower extremity venous and gynaecological exam guides that follow industry and accreditation guidelines. • The system should have automatic real-time quantification of Doppler parameters like velocity, frequency, time, heart rate, slope, flow volume, pulsatility index, resistivity index, peak velocity, average value, point value, area and diameter flow volume, etc • The system should provide extensive measurement, calculation and analysis packages for Abdominal (General, Vascular, Renal), Small Parts (Thyroid, Testicle, Breast), Ob/Gyn, Cardiology etc., • The system should support Intima Media Thickness (IMT) Quantification with automatic or user assisted tracing of intima-media complex and the calculation and display of mean and standard deviation IMT based spatial average of intima-media distances from each scan line. • The system should provide automated, real-time analysis of peak and mean Doppler spectral waveforms. • The system should have a flicker free high resolution TFT Flat panel display of a minimum of 20 inch with four way articulation with a provision to adjust the height. • System should have Fully Articulating Control Panel including Height, swivel & slide adjustments. Should have a full alphanumeric keyboard with illuminated keys and status display. • The system should have a fast Boot up time of less than 150 seconds, which switched on from 'OFF' position, and also less than 60 seconds from 'STANDBY' position. • The system should have digital storage (atleast 1 TB built-in hard disc) and retrieval of B/w & Colour image
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		<p>data (both frozen and cine loops) on built-in as well as removable media (CD, DVD & Magneto optical Disk). System must be able to export JPG and AVI file formats.</p> <ul style="list-style-type: none"> • The system should be DICOM 3.0 ready with a facility for structured reporting for OB, GYN, and vascular data. • ELASTOGRAPHY System shall be equipped to perform elasticity imaging using latest available technology in a variety of application (liver, breast, prostate) and on a variety of transducers (convex, linear and endo-cavitary) accompanied by necessary quantification package software. One touch entry into elastography mode. Elastogram applied as a region of interest box with user control of size and location through entire field of view. Realtime indicator for elastogram quality. Single screen 2D with elastogram and side-by-side display of 2D image and 2D with elastogram. Shadow duplication and measurement capability in side-by-side display. Distance and area tools. Acquisition rate control for elastogram optimization. Elastogram optimization settings to optimize to different tissue compositions. • The System should be capable of FUSION IMAGING. i.e, Fusion of Ultrasound Images with CT,MRI,PET CT with Needle tracking system, Auto Registration, Motion artifact Eliminator. <p>Equipment with above features to be offered with the following Broad Bandwidth Probes</p> <ul style="list-style-type: none"> • Broadband Convex Array Transducer 1-5MHz without need for frequency switching. • Broadband Linear Transducer 5-17MHz without need for frequency switching. • Broad Band Transvaginal / Transrectal Probe with frequency range between 5 to 9 Mhz. • Broadband Volume Transducer 2-6MHz without need for frequency switching for 4D Applications. <p>The system should have the following Documentation Devices:</p> <ol style="list-style-type: none"> 1. Two Color laser printers with high resolution. One printer should allow direct printing from the machine while other should be connected to the PC provided
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		<p>with the machine.</p> <ol style="list-style-type: none"> 2. Latest generation Processor PC (Pentium 7 with at least 3GB RAM and one terabyte hard disc) with Frame grabber card and an image management software like sonodoc or similar. Image acquisition in real time should be possible for still images and cineloops. CD and DVD writer should be available on the machine and the attached computer. Antivirus software should be provided during warranty and CMC period. 3. A fast internet connection should be provide during the period of warranty and CMC which will allow immediate upload of the PNDT data of the patients done on the machine. 4. Biopsy attachment for the Convex, Linear & the TV/TR probes 5. CVT/Servo Voltage Stabilizer 6. UPS of appropriate rating with 30 mins back up should be provided. Specify optimal conditions for operating of system and battery in terms of temperature, humidity should be specified. 7. Two ton split window AC with remote control. 8. Two revolving chairs with adjustable height for the sonographer. Two revolving stools for the patient. 9. Patient couch of appropriate height with mattress and pillow. 10. System should be DICOM ready and should be able to connect to HIS/RIS with company providing the necessary software and hardware and licences for the DICOM communication. HIPAA compliance should be given. <p>WARRANTY;</p> <p>The complete system including the machine, equipments & all accessories including computer system, AC to be under warranty for 5 years. Thereafter, a comprehensive maintenance contract (including repair/replacement of the parts) of the complete system, all accessories, computers and printers and all other items supplied/ installed should be offered for 5 years.</p> <p>During warranty/ AMC period all breakdowns must be attended to within 24 hours and repairs completed within 72 hours of reporting.</p> <p>DOWN TIME:</p> <ol style="list-style-type: none"> a. Maximum acceptable down time of equipment during the warranty period/AMC should not exceed five percent, calculated separately for each year. b. If the down time exceeds the level, then the
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		<p>warranty period / AMC to be extended by twice the period of downtime exceeding 5%.</p> <p>RESPONSIBILITIES: During the period of warranty/ comprehensive maintenance contract, the following will be the responsibilities of the firm.</p> <ol style="list-style-type: none"> a. Maintenance and replacement of the batteries of the UPS as and when necessary. b. Air conditioning; maintaining optimum temperatures in all seasons. c. To provide/ refill/ replace cartridge used for the printer supplied. d. Up-gradation of software of main equipment, workstation, servers and supplied computers. e. Maintenance of the civil structure including all electrical and other fixtures.
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Turnkey requirements:

The renovation of the room including the floor tiling and dado upto 7 feet using vitrified tiles.

Electrical fittings needed for the efficient operation of the system, lighting and the computers should be provided.

False Ceiling work of the room has to be done with LED Panel lights to be fitted.

A door with door closures to ensure that the air conditioning is maintained.

A changing corner should be made with appropriate curtains and hanger.

Two film flat panel slim line digital view box.

Preparation of cabin of aluminium frame and foremica ply, size approximately 15 X 8 X 7 feet with door and lock.

Provisions of cables switches for providing electric supply required for the machine.

Provision of electric supply for AC.

Provision of a proper good quality curtain rod and curtain for the existing doors and windows.

Provision of foremica plywood 3 X 6 feet examination table with comfortable height for sonography examination with chair matress.

4 metal sofas with stainless steel legs and hands and perforated metal sheet capacity three each for sturdy and standard quality for patient sitting

The turnkey requirements should be confirmed with the local department for any additions if required and the company should do a site visit for appropriate estimation of the extent of the work before

quoting price. The price of the turnkey should be quoted separately.

3. Turnkey work for DSA machine

All the civil work for DSA machine will be as per the AERB norms in a 20 x20 feet room size area.

Civil Work

1. Dismantling/Brick works.
2. Dismantling of walls floor (If any)
3. Dismantle all electrical & furniture fittings.
4. Disposal of all debris from the site.
5. Door/window work-P/F aluminum or wooden door with frame & lead lining as per the AERB requirements (if applicable). Sensor-based automatic door opening to avoid cross infection by hand or fomites in all the working areas.
6. Wall/Ceiling repair work-repairing the cement/plaster. Leakage site to be identified first and fixed permanently with proper water proofing.
7. Redesigning the site for housing the system, control, electronics etc. The fixtures should be from branded company and best. Optimally all fixtures should be wall mounted.
8. Floor, walls, roof and false ceiling should be aesthetically designed and prepared for use for the life of the equipment and easily maintainable. Flooring work: providing and fixing highest quality vitrified tiles. False ceiling: providing and fixing perforated A1 ceiling. Construction of walls as per AERB requirements (if applicable).
9. If applicable: Lead partition of approx. 180X90cm between control rooms, side window to have lead glass approx... 115X80cm, the sliding door to have lead glass approx., 125X80(two in number) and 70X80cm (two in number).

Examination room and console room

1. Wall paneling-glass wall paneling on the wall form 5' height above floor till ceiling height. Ceramic tiles/High quality marble on wall up to 5' height from the floor up to the glass panel. Tile should be at least 2'X2' or more in dimensions and of highest quality (Grade5)
2. Redesigning the site for the controls, monitors, electronics etc. Walls to be covered with highest quality tiles in its entire heights. Flooring work provides and fix highest quality vitrified tiles (at least 2'X2' or better, grade 5).
3. Appropriate designing of the examination room to provide for the safe operation and parking of the C-arms, TV stand, Patient Trolley, instrument trolley (modular design, height quality) and anesthesia work station, patient monitoring system, infusion pumps, syringe pumps to be done.
4. Modular design walls cabinets (highest quality) for safe keeping and storage of drugs, catheter, interventional items, and manuals procedures sets, linen, trays etc. under lock and key. Specify the material, brand and area to be covered.
5. Wall mounted hangars for suspended lead free apron, film viewer (N-2 flat panel design) for display of images and bill board for memos should be provided.
6. Instrument trolleys, height adjustable operator chairs, patient foot step, ergonomically designed chairs with wheels for control room personnel, wall

counters for medication, consumables, anesthesia equipment and emergencies drugs to be provided.

7. The whole area should be water proof, fire safe and designed to prevent pest and rodents and kept functional all the time. Wall mounted clocks and rooms thermometers (wet and dry), pest repellent devices and fire extinguishers to be provided in all the rooms. The area should be properly designed to keep particularly the operating area and the electronics cabinet dust free and leakage free. As far as possible the floor should be free from encumbrances for case of cleaning.
8. Drainage for water from account condensate should be provided and the whole area should be free of flooding. Special care should be taken to reinforce the roof, joints and all potential points of water leakage during monsoon or accidental water logging on the roof. Full facility for piped medical grade gas and vacuum supply to multiple points in the angio suit should be provided. This facility should confirm to existing fire/explosion safety standard.

Electrical and air condition work

Appropriate UPS with 30 min battery backup for the entire system including all accessories using maintenance free dry batteries should be provided with 95% up time warranty. Air conditioning of entire area to be done by the Service Provider.

1. All electrical panels, switches distribution boards cables should be of the highest quality for safe and trouble free operation. Adequate number of voltmeters ampmeters and frequency meters as well as circuit breakers, fire extinguishers alarm system and low battery indicator to be provided. Proper grounding to be provided. All points of entry and exit of cable, ducts etc. to the site should be sealed to prevent entry of pest and rodents. All entry and exit points of examination room should have lead lined doors and X-Ray on light with radiation area () symbol. All cable channel and conduits to be properly covered and sealed to protect from rodents and be easy to access for maintenance. Air conditioning blowers/diffusers should be located appropriately and be provide with effective regulators to control the environment in the examination room to meet the requirements of the patient including infants and neonates.

Furniture

1. Work station table (Height quality or modular)
2. Executive chairs-4 (Height adjustable, high quality or better)
3. Table top storable 15'X2' 6"X2" preferable of metal/modular design and highest quality for the examination room.
4. Storage cabinet (modular design) in nurses' room, examination room and console room if possible. Redesigning the area in front of the lab for usage as changing room or housing the sterilizer equipment.