**Tеchnical Specifications - MRI Scanner**

**MRI System 1,5T with „Turnkey” site preparation**

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| **Line Number** | **Specifications Required** | **Specification offered** | **Location in technical specification (datasheet) or original producer statement** |
| 1. | **МAGNET 1.5Т** | | |
| 1.1. | Superconductive magnet with active shielding |  |  |
| 1.2. | Tunnel bore diameter in isocenter – min. 70 cm. |  |  |
| 1.3. | Guaranteed homogeneity values of magnetic field in accordance with V.R.M.S. method: |  |  |
|  | - DSV, for spheric volume with diameter of 10 cm: not bigger then 0,04 ppm. |  |  |
|  | - DSV, for spheric volume with diameter of 40 cm: not bigger then 1.4 ppm. |  |  |
| 1.4. | Magnet length: no longer than 150 cm. |  |  |
| 1.5. | Field Of View (FOV)– not less then 45 cm in each direction X,Y,Z. |  |  |
| 1.6. | Zero boíl off technology. |  |  |
| 1.7. | Noise reduction in tunnel. |  |  |
| 2. | **GRADIENT SYSTEM** | | |
| 2.1. | The greatest amplitude in each orthogonal projection at maximum Field of View- not less than 44 mT/m. |  |  |
| 2.2. | The highest value of slew rate amplitude in each orthogonal projection- not less than 200 T/m/s. |  |  |
| 3 | **RF SYSTEM** | | |
| 3.1. | Digital radio-frequency system with simultaneous signal recipient of minimum 32 independent channels. |  |  |
| 3.2. | The resolution of the signal receiver is not less than 32 bits. |  |  |
| 3.3. | RF transmitter power not less than 16 kW |  |  |
| 4. | **RF COILS with required number of elements (integrated or independent)** | | |
| 4.1. | Latest generation integrated coil technology (GEM, Tim 4G, dStream, etc.) which supports simultaneous acquisition from integrated and independent coils and provides creating of diagnostic image. |  |  |
| 4.2. | Integrated whole body coil. |  |  |
| 4.3. | Separate, dedicated body coil (one or combination of two) for body scanning in range of min. of 60 cm (from neck to pelvic) and with min. of 32 coil elements in total (one or combination of two). |  |  |
| 4.4. | Separate, dedicated multi-channel coil for the imaging of head and neck including neuro-vascular examination with minimum of 19 coil elements for basic and advanced head studies capable for simultaneous acquisition with other coils. |  |  |
| 4.5. | Spine coil with minimum 12 coil elements. |  |  |
| 4.6. | Separate, dedicated Multi-channel flex coils (two of them) for the imaging of smaller joints like foot, elbow, wrist. |  |  |
| 4.7. | Separate, dedicated multi-channel coil for the imaging of pediatric (babies) head and neck including neuro-vascular examination with minimum of 16 coil elements for basic and advanced head studies capable for simultaneous acquisition with other coils. |  |  |
| 4.8. | Separate, dedicated multi-channel coil for the imaging of small Field of Views and small structures near the surface. |  |  |
| 4.9. | Separate, dedicated multi-channel coil for the imaging of shoulder with minimum of 8 coil elements, flex coil is not acceptable. |  |  |
| 4.10. | Separate, dedicated multi-channel coil for the imaging of knee, with minimum of 8 coil elements, flex coil is not acceptable. |  |  |
| 5. | **PATIENT TABLE** | | |
| 5.1. | Horizontal table movement range of not less than 215cm. |  |  |
| 5.2. | Maximal scan range- not less than 140cm. |  |  |
| 5.3. | In bore ventilation and lightening. |  |  |
| 5.4. | In room loudspeaker adjustment and bidirectional voice communication. |  |  |
| 5.5. | Patient video monitoring system. |  |  |
| 5.6. | Max. patient weight for vertical and horizontal table movement, not less then 200 kg. |  |  |
| 5.7. | Patient table horizontal movement (stepping) to secure neither repositioning of patient nor repositioning of RF coil. |  |  |
| 5.8. | Coil storage cart. |  |  |
| 6. | **PHYSIOLOGICAL MEASURMENT UNIT** | | |
| 6.1. | ECG with trigger |  |  |
| 6.2. | Puls |  |  |
| 6.3. | Respiration |  |  |
| 7. | **WORKSTATIONS (ACQUISITION WORKSTATION AND EVALUATION WORKSTATION)** | | |
| 7.1. | Three workstations:   1. One acquisition workplace and 2. Two workplaces for evaluation with advanced applications. |  |  |
| 7.2. | Direct connection with other digital, diagnostic devices and RIS in DICOM format and has the following DICOM SCU (Service class user) features at the acquisition place: |  |  |
| 7.2.1. | DICOM STORAGE |  |  |
| 7.2.2. | DICOM QUERY/RETRIVE |  |  |
| 7.2.3. | DICOM PRINT |  |  |
| 7.2.4. | MODALITY WORKLIST |  |  |
| 7.3. | Color LCD monitor with resolution not less then 1.3MP with diagonal size not less then 19“, for acquisition workplace and two workplaces for evaluation. |  |  |
| 7.4. | CD or DVD for DICOM archiving on acquisition workplace and two workplaces for evaluation. |  |  |
| 7.5. | Acquisition packages for basic Neurology, Angiography, Cardiology, Radiology, Oncology, Musculoskeletal and Pediatric examination on acquisition workplace. |  |  |
| 7.6. | Advanced cardiac package with special sequences and protocols for advanced cardiac imaging including 3D and 4D functionalities. It should support advanced techniques for ventricular function imaging, dynamic imaging, tissue characterization, coronary imaging, and more, on acquisition workplace. |  |  |
| 7.7. | Advanced application for evaluation: |  |  |
| 7.7.1. | Basic 3D post-processing techniques – VRT, Multi Planar Reconstruction (MPR), Maximum Intensity Projection (MIP), Shaded Surface Display (SSD) on both workplaces for evaluation. |  |  |
| 7.7.2. | Evaluation package for diffusion studies on one workplace for evaluation. |  |  |
| 7.7.3. | Evaluation package for integration (composing) of several diagnostic images in 1 “Full Format” (skeleton and blood vessels) on one workplace for evaluation. |  |  |
| 7.7.4. | Evaluation package for fusion of different modality images (CT, MR, NM, PET) on one workplace for evaluation. |  |  |
| 7.7.5. | Analysis and quantification of flow on one workplace for evaluation. |  |  |
| 7.7.6. | Perfusion quantification without contrast (ASL) on acquisition workplace or one workplace for evaluation. |  |  |
| 7.7.7. | Neuro perfusion evaluation on one workplace for evaluation. |  |  |
| 7.7.8. | Evaluation package for DTI with Tractography on one workplace for evaluation. |  |  |
| 7.7.9. | Spectroscopy evaluation on one workplace for evaluation. |  |  |
| 8. | **SEQUENCES AND IMAGING TECHNIQUES** | | |
| 8.1. | Basic package of sequences for neuro-radiology exams wich comprises following sequences: |  |  |
| 8.1.1. | 3D FLAIR |  |  |
| 8.1.2. | SWI |  |  |
| 8.1.3. | ASL |  |  |
| 8.1.4. | MTC (Magnetization Transfer Contrast) |  |  |
| 8.1.5. | DTI |  |  |
| 8.1.6. | 3D for T2w, SPACE 3D, CUBE, VISTA, mVOX or equivalent |  |  |
| 8.1.7. | DIR (Double Inversion Recovery) |  |  |
| 8.2. | Basic and advanced body imaging package which comprises following techniques: |  |  |
| 8.2.1. | Respiratory (breathing) and patient movement artifact elimination- PROPELLER or BLADE or MultiVane or JET or equivalent) |  |  |
| 8.2.2. | 2D and 3D MRCP |  |  |
| 8.2.3. | Contrast angiography (TRICKS or TWIST or 4D-TRACK or Freeze Frame or equivalent) and angiography with synchronized bolus tracking (SmartPrep or BolusTrak or Care Bolus or equivalent) noncontrast angiography (for peripheral blood vessels, abdomen and neuro exams- NATIVE TrueFISP or Inhance inflow IR or B-TRANCE or Time-SLIP or equivalent). |  |  |
| 8.2.4. | Fat and water separation technique (using DIXON or similar technique) |  |  |
| 8.2.5. | Single Voxel Spectroscopy (SVS) i Chemical Shift Imaging (CSI) spectroscopy studies. |  |  |
| 8.2.6. | DWI with Single- Shot EPI |  |  |
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| 9. | **ADDITIONAL EQUIPMENT, WORKS AND SERVICES** | | |
| 9.1. | RF cabin for electromagnetic protection (damping value of min 90dB). RF cabin contains complete cabin with antistatic floor, door, window, antimagnetic lightening, all necessary filters, also with connections for gases supply of the anesthesia system, and all final works, for running requirements of MR scanner for work with the patients. |  |  |
| 9.2. | Chiller for MR gradient system cooling. |  |  |
| 9.3. | Electrical distribution cabinet for MR system. |  |  |
| 9.4. | Injector for MR studies. |  |  |
| 9.5. | Antimagnetic stretcher for patient transport. |  |  |
| 9.6 | To make location project based on space and room project where system will be installed. |  |  |
| 9.7 | To make project for civil, electro and thermo-technical works for technical room, examination room and control room. |  |  |
| 9.8 | Installation of the offered system- “Turnkey” project  (Preparation of facilities- technical room, examination room and control room, HV cable from HV substation to technical room has to be provided by Beneficiaries). |  |  |
| 10 | **TECHNICAL CRITERIA** | | |
| 10.1 | Magnet length incl. covers (in cm) |  |  |
| 10.2 | RF system – number of independent digital RF channels |  |  |
| 10.3 | Coil technology – number of simultaneously connected coil elements |  |  |
| 10.4 | RF transmitter power (in kW) |  |  |
| 10.5 | Performance of gradient system (Amplitude [mT/m] x Slew Rate [T/m/s]) |  |  |
| 10.6 | Number of coil elements for spine coil |  |  |
| 10.7 | Number of coil elements for dedicated knee coil |  |  |
| 10.8 | Number of coil elements for dedicated shoulder coil |  |  |
| 10.9 | 3D sequences in GRE for inner ear examination: |  |  |
| 10.10 | 3D sequences in GRE for mandibular bone and joint examination |  |  |
| 10.11 | Artifact free abdominal imaging without gating or breathold using Radial imaging technique |  |  |
| 10.12 | Multishot readout segmented EPI for reduced distortions and higher resolution |  |  |
| 10.13 | Number of parallel imaging techniques |  |  |
| 10.14 | Quiet scanning compatible with all coils |  |  |
| 10.15 | Weight of offered body coil |  |  |