

Magnetic Resonance Imaging (MRI) Scanner - Technical Requirements/Questionnaire

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TECHNICAL REQUIREMENTS	YES/NO	DESCRIPTION
<i>1.0 Vendor & System Names</i>		
1.0.1 Identify vendor's name.		
1.0.2 Identify system model and name.		
1.0.3 Indicate system's revision level.		
1.0.4 In which year was this model first introduced?		
1.0.5 When was the last major revision or upgrade?		
1.0.5 Where is the system manufactured?		
1.0.6 Who manufactures the magnet?		
<i>1.1 Magnet Weight</i>		
1.1.1 Indicate weight of complete magnet.		<i>kg</i>
1.1.2 Indicate floor loading.		<i>kg/m²</i>
<i>1.2 Magnet's Maximum External Dimensions</i>		
1.2.1 Indicate height.		<i>cm</i>
1.2.2 Indicate width.		<i>cm</i>
1.2.3 Indicate length.		<i>cm</i>

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1.3 Magnet Bore		
1.3.1 Indicate useful diameter with all coils in place.		<i>cm</i>
1.3.2 Indicate length of bore.		<i>cm</i>
1.3.3 Indicate length of straight section of the bore.		
1.4 Magnet Cooling		
1.4.1 Indicate helium capacity.		<i>l</i>
1.4.2 Indicate boil-off rate.		<i>l/h</i>
1.4.3 Indicate maximum weekly consumption.		<i>l</i>
1.4.4 Indicate down time for maximum refill.		<i>h</i>
1.4.5 Indicate minimum required refill frequency.		
1.4.6 Does system have a helium recovery or regeneration system?		
1.5 Magnet Field		
1.5.1 Indicate field strength.		<i>T</i>
1.5.2 Indicate x distance from isocentre to 5 Gauss line.		<i>m</i>
1.5.3 Indicate y distance from isocentre to 5 Gauss line.		<i>m</i>
1.5.4 Indicate z distance from isocentre to 5 Gauss line.		<i>m</i>
1.5.5 Is the main field rampable?		
1.5.6 State the field inhomogeneity over 50 cm spherical volume with no dynamic shimming.		<i>ppm</i>
1.5.7 State the field inhomogeneity over a 40		<i>ppm</i>

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cm spherical volume with no dynamic shimming.		
1.5.8 State the field inhomogeneity over 30 cm spherical volume with no dynamic shimming.		<i>ppm</i>
1.5.9 State the field inhomogeneity over a 20 cm spherical volume with no dynamic shimming.		<i>ppm</i>
1.5.10 State the field inhomogeneity over 10 cm spherical volume with no dynamic shimming.		<i>ppm</i>
1.5.11 Indicate maximum field of view.		
1.5.12 Indicate number of planes used to measure field inhomogeneity.		
1.5.13 Indicate number of sample points in each plane used to measure field inhomogeneity.		<i>ppm</i>
1.5.14 Indicate the temporal stability of field.		
1.5.15 Indicate time required for an emergency shut down of main field.		<i>ppm</i>
1.5.16 Indicate down time after emergency shut down of main field.		
1.5.17 Describe method of shim field adjustment.		
1.5.18 Indicate type of active shim coils.		
1.5.19 Indicate number of active shim coils.		<i>ppm/h</i>
1.5.20 Indicate minimum time for shim field adjustment.		
1.5.21 Indicate maximum sensitivity.		<i>ppm</i>

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1.5.22 Indicate type of shielding on main magnet.		
1.6 Gradient System (complete for each gradient option)		
1.6.1 Name & model of gradient option.		
1.6.2 Are the gradient coils actively shielded to minimise eddy current artefacts?		
1.6.3 Indicate number of gradient coils for x-axis.		
1.6.4 Indicate number of gradient coils for y-axis.		
1.6.5 Indicate number of gradient coils for z-axis.		
1.6.6 Indicate coil configuration for x-axis.		
1.6.7 Indicate coil configuration for y-axis.		
1.6.8 Indicate coil configuration for z-axis.		
1.6.9 Can all three (3) gradients be simultaneously operated at 100% duty cycle?		
1.6.10 Indicate peak x-gradient field strength at 100% duty cycle?		<i>mT/m</i>
1.6.11 Indicate peak y-gradient field strength at 100% duty cycle?		<i>mT/m</i>
1.6.12 Indicate peak z-gradient field strength at 100% duty cycle?		<i>mT/m</i>
1.6.13 Indicate x-gradient field slew rate at 100% duty cycle.		<i>mT/m/ms</i>
1.6.14 Indicate y-gradient field slew rate at 100% duty cycle.		<i>mT/m/ms</i>

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1.6.15 Indicate z-gradient field slew rate at 100% duty cycle.		<i>mT/m/ms</i>
1.6.16 How long can all three (3) gradients be run simultaneously at 100% duty cycle?		
1.6.17 Indicate linearity of x-gradient over 40 cm diameter volume.		<i>%</i>
1.6.18 Indicate linearity of y-gradient over 40 cm diameter volume.		<i>%</i>
1.6.19 Indicate linearity of z-gradient over 40 cm diameter volume.		<i>%</i>
1.6.20 Indicate linearity of x-gradient over 50 cm diameter volume.		<i>%</i>
1.6.21 Indicate linearity of y-gradient over 50 cm diameter volume.		<i>%</i>
1.6.22 Indicate linearity of z-gradient over 50 cm diameter volume.		<i>%</i>
1.6.23 Indicate linearity of x-gradient over maximum FOV.		
1.6.24 Indicate linearity of y-gradient over maximum FOV.		
1.6.25 Indicate linearity of z-gradient over maximum FOV.		
1.6.26 Indicate type of gradient cooling system.		
1.6.27 Indicate maximum noise at isocentre produced by gradients during an EPI sequence.		<i>dB</i>
<i>1.7 RF System: For each answer please state if the quoted value is standard or an option.</i>		

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1.7.1 Is the transmitter fully digital allowing precise control over frequency and phase of the RF pulses?		
1.7.2 Is the receiver fully digital allowing digital signal processing of the MR signal prior to reconstruction?		
1.7.3 How many receivers are standard on the system for phased array imaging?		
1.7.4 Indicate maximum number of receivers supported by the system for phased array imaging.		
1.7.5 Indicate maximum number of coil elements attached to system.		
1.7.6 Indicate number of connectors for attaching coils.		
1.7.7 Indicate number of A-to-D converters.		
1.7.8 Indicate maximum number of coil elements multiplexed into one A-to-D.		
1.7.9 Indicate RF analogue-to-digital conversion precision.		<i>bits</i>
1.7.10 Indicate RF analogue-to-digital conversion rate.		<i>MHz</i>
1.7.11 Indicate RF digital-to-analogue conversion precision.		<i>bits</i>
1.7.12 Indicate RF digital-to-analogue conversion rate.		<i>MHz</i>
1.7.13 Indicate transmitted frequency operating range.		<i>MHz</i>
1.7.14 Indicate RF power amplifier output rating.		<i>kW</i>
1.7.15 State the RF power amplifier		

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maximum duty cycle at maximum power output for a rectangular pulse.		%
1.7.16 Indicate transmitter RF resolution.		Hz
1.7.17 Indicate maximum receiver bandwidth.		kHz
1.7.18 Indicate minimum receiver bandwidth.		kHz
1.7.19 Indicate receiver amplifier gain.		dB
1.7.20 Indicate receiver noise level.		dB
1.7.21 Indicate RF amplifiers cooling system type.		
<i>1.8 RF Coils: Please answer these questions for each coil including the built-in body coil.</i>		
1.8.1 Indicate coil name and application.		
1.8.2 Is this coil standard equipment or an option?		
1.8.3 Indicate configuration.		
1.8.4 Indicate type (ie. Solenoid, Helmholtz, surface).		
1.8.5 Indicate number of elements (ie. 8 for a spine array).		
1.8.6 Indicate outer dimensions.		
1.8.7 Indicate receiving/transmitting/both.		
1.8.8 Indicate size of useful region of sensitivity.		
1.8.9 Indicate linear or quadrature excitation.		

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1.8.10 Indicate decoupling (active/passive/intrinsic).		
1.8.11 Is it tuned and matched to each patient?		
1.8.12 Indicate typical time required to tune.		s
1.8.13 Is manual tuning required?		
1.8.14 Is a preamp integrated into the coil?		
1.8.15 Please state any other important features.		
<i>1.9 General Imaging: For each answer please state if the quoted value is standard or an option.</i>		
1.9.1 Can the system acquire an image plane in any orientation?		
1.9.2 Indicate ranges of the field-of-view (FOV).		
1.9.3 Are the ranges of FOV available for all image plane orientations?		
1.9.4 Is a rectangular FOV standard or an option?		
1.9.5 What aspect ratios are allowed?		
1.9.6 Which sequences can not use a		

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rectangular FOV.		
1.9.7 Does the system perform image de-warping at the edge of FOV?		
1.9.8 Can de-warping be turned on & off manually?		
1.9.9 Indicate maximum field-of-view without de-warping.		
1.9.10 Indicate ranges of matrix size.		
1.9.11 Are the ranges of matrix size available for all image plane orientations?		
1.9.12 Indicate maximum number of frames in a Cine' loop for dynamic studies.		
1.9.13 Can frequency and phase axes be exchanged for all sequences?		
1.9.14 Can the frequency encode direction be changed (ie. right-to-left instead of left-to-right)?		
1.9.15 Can the phase encode direction be changed (ie. bottom-to-top instead of top-to-bottom)?		
1.9.16 Is the ability to prevent phase wrap an option?		
1.9.17 Is the ability to prevent frequency wrap an option?		
1.9.18 Indicate maximum number of RF coil elements that can be connected simultaneously.		
1.9.19 Indicate maximum number of RF coil elements from which data can be simultaneously acquired.		

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1.9.20 Indicate which coils are integrated into the patient table?		
1.9.21 When using multiple coils, ie. head and spine, can arbitrary coil elements be selected?		
1.9.22 Indicate which third-part coils are supported?		
1.10 Pediatric Imaging		
1.10.1 Does the system have low-acoustic noise sequences?		
1.10.2 Indicate which sequences can be low acoustic noise?		
1.10.3 Is there a head coil suitable for small children (a size typically between a knee coil and an adult head coil)?		
1.10.4 Are there other coils design specifically for imaging children?		
1.10.5 List the sequences developed specifically for imaging children.		
1.10.6 Indicate which ultrafast sequences are included for neonatal and fetal applications?		
1.10.7 Is there a respiratory monitor suitable for small children?		
1.10.8 Is there an ECG monitor suitable for small children?		
1.10.9 Are there any other features specific to pediatrics? If so, please indicate.		
1.11 Single Slice Spin Echo & Inversion Recovery Imaging		
1.11.1 Is this standard or an option (state		

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option name)?		
1.11.2 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.11.3 Indicate echo delay time (TE) and increments.		<i>ms</i>
1.11.4 Indicate interpulse delay (TI) range.		<i>ms</i>
1.11.5 Indicate maximum number of echoes per excitation.		
1.11.6 Indicate range of slice thicknesses.		<i>mm</i>
1.11.7 Indicate range of number of excitations (NEX).		
1.11.8 Indicate resolution of frequency encoding axis.		
1.11.9 Indicate resolution of phase encoding axis.		
1.12 Multiple Slice Spin Echo & Inversion Recovery Imaging		
1.12.1 Is this standard or an option (state option name)?		
1.12.2 Indicate which sequences are available?		
1.12.3 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.12.4 Indicate range echo delay time (TE) and increments.		<i>ms</i>
1.12.5 Indicate interpulse delay (TI) range.		<i>ms</i>
1.12.6 Indicate number of echoes.		

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1.12.7 Indicate range of slice thickness.		<i>mm</i>
1.12.8 Indicate slice excitation ordering.		
1.12.9 Indicate range of interslice spacing.		
1.12.10 Indicate range of number of excitations (NEX).		
1.12.11 Indicate maximum number slices obtained simultaneously.		
1.12.12 Indicate resolution of frequency encoding axis.		
1.12.13 Indicate resolution of phase encoding axis.		
1.12.14 Indicate maximum number of slices for spin echo.		
1.12.15 Indicate maximum number of slices for inversion recovery.		
1.12.16 Indicate maximum number of slices for multiple spin echo.		
1.13 Gradient Echo Imaging		
1.13.1 Is this standard or an option (state option name)?		
1.13.2 Indicate which sequences are available?		
1.13.3 Are spoiled and steady state free precession gradient sequences available?		
1.13.4 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.13.5 Indicate range of echo delay times (TE) and increments.		<i>ms</i>

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1.13.6 Indicate range of thicknesses.		<i>mm</i>
1.13.7 Indicate number of slices.		
1.13.8 Indicate minimum total acquisition time.		
1.13.9 Indicate range of pulse flip angles.		
1.13.10 Indicate range of number of excitations (NEX).		
1.13.11 Indicate image matrix size and field-of-view.		
1.13.12 Indicate resolution of frequency encoding axis.		
1.13.13 Indicate resolution of phase encoding axis.		
1.13.14 Indicate maximum number of slices.		
<i>1.14 Fast Gradient Echo Imaging</i>		
1.14.1 Is this standard or an option (state option name)?		
1.14.2 Indicate which sequences are available.		
1.14.3 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.14.4 Indicate echo delay time (TE) and increments.		<i>ms</i>
1.14.5 Are multiple TE allowed?		
1.14.6 Indicate range of slice thicknesses.		<i>mm</i>
1.14.7 Indicate number of slices.		
1.14.8 Indicate minimum total acquisition		

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time.		
1.14.9 Indicate range of pulse flip angles.		
1.14.10 Indicate range of number of excitations (NEX).		
1.14.11 Indicate image matrix size and field-of-view.		
1.14.12 Indicate resolution of frequency encoding axis.		
1.14.13 Indicate resolution of phase encoding axis.		
1.14.14 Indicate maximum number of slices.		
<i>1.15 Fast Spin Echo Imaging</i>		
1.15.1 Is this standard or an option (state option name)?		
1.15.2 Indicate which sequences are available.		
1.15.3 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.15.4 Indicate echo delay time (TE) and increments.		<i>ms</i>
1.15.5 Are multiple TE allowed?		
1.15.6 Indicate range of slice thicknesses.		<i>mm</i>
1.15.7 Indicate number of slices.		
1.15.8 Indicate minimum total acquisition time.		
1.15.9 Indicate range of pulse flip angles.		
1.15.10 Indicate range of number of		

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excitations (NEX).		
1.15.11 Indicate image matrix size and field-of-view.		
1.15.12 Indicate resolution of frequency encoding axis.		
1.15.13 Indicate resolution of phase encoding axis.		
1.15.14 Indicate maximum number of slices.		
1.15.15 Indicate number of lines acquired with each preparation.		
1.16 Echo Planar Imaging		
1.16.1 Is this standard or an option (state option name)?		
1.16.2 Indicate what options are required for EPI?		
1.16.3 Can EPI be performed with all RF coils?		
1.16.4 Indicate type of gradient cycling (resonant, non-resonant, both).		
1.16.5 Indicate shape of gradient pulses (trapezoidal, sinusoidal, both).		
1.16.6 Indicate maximum image size acquired with a single excitation.		
1.16.7 Indicate maximum image size acquired with multiple excitations.		
1.16.8 Indicate scan times for a 128 x 128 image.		
1.16.9 Is fat suppression available with EPI?		

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1.16.10 Is presaturation available with EPI?		
1.16.11 Is off-centre imaging available with EPI?		
1.16.12 Can images be acquired in any orientation?		
1.17 Three-Dimensional (Volume) Imaging		
1.17.1 Is this standard or an option (state option name)?		
1.17.2 Indicate which sequences are available?		
1.17.3 Indicate range of pulse repetition times (TR) and increments.		<i>ms</i>
1.17.4 Indicate echo delay time (TE) and increments.		<i>ms</i>
1.17.5 Indicate range of slab thicknesses.		<i>mm</i>
1.17.6 Indicate number of slices.		
1.17.7 Indicate minimum total acquisition time.		
1.17.8 Indicate range of pulse flip angles.		
1.17.9 Indicate number of excitations (NEX) per view.		
1.17.10 Indicate image matrix size and field-of-view.		
1.17.11 Indicate resolution of frequency encoding axis.		
1.17.12 Indicate resolution of phase encoding axis.		
1.17.13 Indicate resolution of phase encoding		

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slice axis.		
1.18 MR Angiography		
1.18.1 Is MR angiography standard or an option?		
1.18.2 Is any additional hardware required for angiography? If so, please describe.		
1.18.3 Indicate which sequences are available.		
1.18.4 Can the system perform 2D time-of-flight (2D TOF)?		
1.18.5 Can the system perform 3D time-of-flight (3D TOF)?		
1.18.6 Can the system perform 2D phase-contrast (2D PC)?		
1.18.7 Can the system perform 3D phase-contrast (3D PC)?		
1.18.8 What is the range of selectable velocity-encoding range?		<i>cm/s</i>
1.18.9 Can 2D and 3D images be gated to the cardiac cycle?		
1.18.10 Is Cine' phase contrast included?		
1.18.11 Can 2D and 3D images be acquired in any orientation?		
1.18.12 Can the system automatically trigger a power syringe?		
1.18.13 Can the system track a bolus through an ROI to automate the start of acquisition?		
1.18.14 Can the system automatically move the table to track a bolus?		

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1.18.15 Can the system calculate the velocity and flow rate in an ROI?		
1.18.16 For Cine', can the system plot velocity and flow rate over time?		
1.18.17 Can the system perform MIP in an ROI?		
1.18.18 Describe other methods of rendering and displaying 3D angiograms.		
1.19 Perfusion Imaging		
1.19.1 Is perfusion imaging standard or an option?		
1.19.2 Is any addition hardware required? If so, please describe.		
1.19.3 Is any addition hardware recommended? If so, please describe.		
1.19.4 Indicate which sequences are available.		
1.20 Diffusion Imaging		
1.20.1 Is diffusion imaging standard or an option?		
1.20.2 Is any addition hardware required? If so, please describe.		
1.20.3 Is any addition hardware recommended? If so, please describe.		
1.20.4 Indicate which sequences are available.		
1.20.5 Can the system display the ADC map?		
1.20.6 Indicate range of b values.		<i>s/mm²</i>

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1.20.7 Can the diffusion weighting be in any direction?		
1.20.8 Can three (3) images with orthogonal weighting directions be easily acquired and simultaneously displayed?		
1.21 Single Voxel Spectroscopy		
1.21.1 Is single voxel spectroscopy standard or an option?		
1.21.2 Is any addition hardware required for single voxel spectroscopy?		
1.21.3 From which nuclei can spectra be obtained?		
1.21.4 What is the range of voxel size?		
1.21.5 Can the ROI be selected from any slice orientation?		
1.21.6 Is there automatic shimming and tuning specific to the ROI?		
1.21.7 Which water suppression techniques are available?		
1.21.8 Is water suppression fully automated?		
1.21.9 Can manual adjustments be made to water suppression?		
1.21.10 Which lipid suppression techniques are included?		
1.21.11 Can spectral peaks be automatically identified and labeled?		
1.22 Spectroscopy Imaging (CSI)		
1.22.1 Is chemical shift imaging standard or		

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an option?		
1.22.2 Is any addition hardware required for chemical shift imaging?		
1.22.3 From which nuclei can spectra be obtained?		
1.22.4 What are the ranges of voxel sizes?		
1.22.5 What is the range of 2D image matrix sizes?		
1.22.6 Can the ROIs be in any slice orientation?		
1.22.7 What is the range of 3D image matrix sizes?		
1.22.8 Can the voxel locations be repositioned after acquisition?		
1.22.9 Is there automatic shimming and tuning specific to each ROI?		
1.22.10 Which water suppression techniques are available?		
1.22.11 Can water suppression be fully automated?		
1.22.12 Can manual adjustments be made to the water suppression?		
1.22.13 Which lipid suppression techniques are included.		
1.22.14 Can spectral peaks be automatically identified and labeled?		
1.22.15 Can spectra be overlaid on the image?		
1.23 Sequences and Options		

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1.23.1 For each sequence available, please give its name, clinical application, and the option package it belongs to.		
sequence name e.g. spin echo (SE)	application e.g. standard imaging	option package e.g. standard
1.24 Flip Angle Calibration		
1.24.1 Is flip angle calibration performed for every patient during reduced tip angle sequences?		
1.24.2 How long does the calibration take?		
1.24.3 Can the calibration be overridden?		
1.25 Artefact Suppression: Also state if any of the following are options & give option name		
1.25.1 Is cardiac gating included?		
1.25.2 What hardware used for cardiac gating (ie. # of ECG leads).		
1.25.3 Is there provision for an external cardiac trigger?		
1.25.4 Are cardiac trigger cues are available in software.		
1.25.5 Is respiratory gating included?		
1.25.6 What hardware used for respiratory gating (ie. pressure belt).		
1.25.7 Is there provision for an external respiratory trigger?		
1.25.8 Are respiratory trigger cues are available in software.		

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1.25.9 What type of motion suppression in 3D-FT gradient echo imaging.		
1.25.10 Indicate other motion correction algorithms.		
1.25.11 Indicate methods for reducing chemical shift effects.		
1.25.12 Indicate methods for reducing Gibbs phenomenon.		
1.25.13 Indicate methods for water and fat suppression.		
1.25.14 Is long TE available?		
1.25.15 Is selective excitation available?		
1.25.16 Is double quantum filtering available?		
1.25.17 Is selective saturation available?		
1.25.18 State maximum number of pre-saturation bands.		
<i>1.26 Patient Table: Also state if any of the following are options & give option name.</i>		
1.26.1 Is the table removable or integrated into the scanner?		
1.26.2 For removable table, indicate which coils are mounted to the table top?		
1.26.3 For integrated table, indicate which coils are mounted to the table top?		
1.26.4 For a removable table, indicate what is its weight (including transport)?		
1.26.5 Indicate maximum load capacity in		<i>kg</i>

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any position.		
1.26.6 What is the range of distances from floor to table top.		<i>cm</i>
1.26.7 Indicate length of table.		<i>cm</i>
1.26.8 Indicate width of table.		<i>cm</i>
1.26.9 Indicate methods for changing height, ie. electric or manual.		
1.26.10 Indicate range of motion along scanner bore.		<i>cm</i>
1.26.11 Are there are two or more speeds for translation?		
1.26.12 Does the scanner remember table location between scans?		
1.26.13 Indicate number of localizer lights.		
1.26.14 Indicate width of table.		<i>cm</i>
1.26.15 Can the table position be adjusted from the council?		
1.26.16 Can the table position be adjusted during a scan?		
1.27 Patient Comfort: Please indicate which features are options.		
1.27.1 What is the distance from table top to bore in scan configuration.		<i>cm</i>
1.27.2 Is the magnet bore ventilated?		
1.27.3 What type of illumination in the bore.		
1.27.4 Is there music via headphones?		
1.27.5 Which coils have a mirror?		

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1.27.6 Is there a separate mirror for those coils lacking an integral one?		
1.27.7 Is there audio communication between patient and council?		
1.27.8 Is there a separate signal to the council, ie. a squeeze bulb?		
1.27.9 Is there closed circuit video of the patient?		
1.27.10 What is the maximum noise level in bore during a scan.		<i>dB</i>
1.27.11 Indicate type of immobilization devices.		
1.28 Operator's Council: Video Monitor(s)		
1.28.1 How many image display video monitors are standard equipment on the council?		
1.28.2 How many image display monitors can be connected?		
1.28.3 What is the monitor's type, ie. Trinitron, LCD.		
1.28.4 What is the monitor's physical size.		<i>cm</i>
1.28.5 What is the pixel matrix size (resolution, ie. 1024X768).		
1.28.6 What is the video scan rate?		<i>Hz</i>
1.28.7 Is the monitor interlaced or non-interlaced?		
1.28.8 Are contrast & brightness adjusted via analogue knobs or through a software panel?		

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1.28.9 Are there numeric indicators for contrast & brightness levels?		
1.28.10 Are there optional monitors available?		
<i>1.29 Operator's Council (Localiser/Scout Images)</i>		
1.29.1 Indicate number of localiser (scout) images displayed simultaneously.		
1.29.2 Is the location & orientation of image planes, including oblique, shown graphically and simultaneously on all localiser images?		
1.29.3 Is the size of image planes, including oblique, shown graphically and simultaneously on all localiser images?		
1.29.4 Is the size of rectangular FOV image planes, including oblique, shown graphically and simultaneously on all localiser images?		
1.29.5 Is the location & orientation of saturation bands shown graphically and simultaneously on all localiser images?		
1.29.6 Is the size of saturation bands shown graphically and simultaneously on all localiser images?		
1.29.7 Is the location and state of individual coil elements shown graphically and simultaneously on the localiser images?		
1.29.8 Can the location of image planes be adjusted by moving a graphical representation on the localiser images?		
1.29.9 Can the orientation of image planes be adjusted by moving a graphical representation on the localiser images?		

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1.29.10 Can the size of image planes be adjusted by moving a graphical representation on the localiser images?		
1.29.11 Can image size, location and orientation be set by numeric input?		
1.29.12 Can saturation band size, location and orientation be set by numeric input?		
1.29.13 If the patient table is moved, are new localiser images required?		
1.29.14 Can images from different acquisitions be used for localisation?		
1.29.15 Can oblique images be used for localisation?		
1.29.16 Can dynamic studies (Cine loops) be used for localisation? Please state if this is an option.		
1.29.17 Can rendered image, ie. MIPS, be used for localisation? Please state if this is an option.		
1.29.18 Can multislice acquisitions be used for localisation? Please state if this is an option.		
<i>1.30 Operator's Council</i>		
1.30.1 Where are the ECG, respiratory, and pulse rate data displayed?		
1.30.2 Where are the ECG, respiratory, and pulse rate data always displayed, ie. when a scan is or is not in progress?		
1.30.3 Can voice commands to the patient, ie. breath hold, be given automatically?		
1.30.4 Is it possible to pause and resume a		

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scan from the council?		
1.30.5 During a scan can one enter the parameters for the next scan?		
1.30.6 During a scan can one display previously acquired images?		
1.30.7 During a scan can one create/modify stored scan protocols?		
1.30.8 During a scan can one print images?		
1.30.9 During a scan can one reformat planar images?		
1.30.10 During a scan can one save images to disc?		
1.30.11 During a scan can one load files from disc.		
1.30.12 Which functions cannot be performed during a scan.		
1.30.13 During a scan, is the time remaining displayed?		
1.30.14 Before a scan, is the total time required displayed?		
1.30.15 Is there online help?		
1.30.16 Can custom protocols be developed?		
1.30.17 Can the protocols be edited as a text file?		
1.30.18 Can protocols be developed using a GUI only?		
1.30.19 Can protocols be developed using a text editor only?		

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1.30.20 Indicate which reconstruction filters can be used.		
1.30.21 Can images be reconstructed with our filtration?		
<i>1.31 Magnet Room Display & Keypad</i>		
1.31.1 Does the magnet have a display panel?		
1.31.2 Can a scan be paused from within the magnet room?		
1.31.3 Can a scan be resumed from within the magnet room?		
1.31.4 Can a scan be initiated from within the magnet room?		
1.31.5 Indicate which scan parameters are displayed in the scan room?		
1.31.6 Are physiological parameters displayed in the magnet room?		
1.31.7 Is there voice communication from the council to beside the magnet, ie. between the scanner tech and a patient attendant?		
<i>1.32 Scanner Computer System</i>		
1.32.1 State name of software that controls scanner.		
1.32.2 State name of software for image presentation on council.		
1.32.3 Indicate standard host computer platform of main council.		
1.32.4 Indicate optional host computer platforms of main council.		
1.32.5 Indicate host computer processor type		

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and clock speed.		
1.32.6 Indicate optional host computer processor type and clock speed.		
1.32.7 Indicate memory host computer.		
1.32.8 Indicate optional memory of host computer.		
1.32.9 Indicate operating system used by host computer.		
1.32.10 Is a separate hard drive used for image storage?		
1.32.11 Is a separate processor board used to reconstruct images?		
1.32.12 Indicate memory on separate processor board.		<i>Mbytes</i>
1.32.13 List options concerning the separate processor board.		
1.32.14 Indicate reconstruction rate for 256X256 images.		<i>images/s</i>
1.32.15 Indicate reconstruction time for 512X512X256 3D-FT image.		<i>s</i>
1.32.16 Is volume rendering performed by the host computer or a separate processor board?		
1.32.17 What performs the RF pulse shaping?		
1.32.18 What controls the gradient magnet?		
1.32.19 What performs the RF control, ie. the pulse programmer?		
1.32.20 What performs the coil tuning?		

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1.32.21 What performs the shim control?		
1.32.22 What performs the image data acquisition.		
1.33 Physicians Workstation: Video Monitor(s)		
1.33.1 How many video monitors standard equipment on workstations.		
1.33.2 How many monitors can be connected?		
1.33.3 What is the monitor's type, ie. Trinitron, LCD.		
1.33.4 What is the monitor's physical size.		<i>cm</i>
1.33.5 What is the pixel matrix size (resolution, ie. 1024X768).		
1.33.6 What is the video scan rate?		<i>Hz</i>
1.33.7 Is the monitor interlaced or non-interlaced?		
1.33.8 Are contrast & brightness adjusted via analogue knobs or through a software panel?		
1.33.9 Are there numeric indicators for contrast & brightness levels?		
1.33.10 Are there optional monitors available?		
1.34 Physicians Workstation		
1.34.1 State name of software for image presentation on workstation.		
1.34.2 List which software options are available.		

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1.34.3 Indicate computer platform of workstation.		
1.34.4 Is there an optional computer platform of workstation?		
1.34.5 Indicate standard memory of workstation.		
1.34.6 Indicate optional memory of workstation.		
1.34.7 Which operating system used by workstation.		
1.34.8 Can the workstation be booted and used independently of the main council?		
1.34.9 Is a separate hard drive used for image storage.		
<i>1.35 Image Processing: Please state if any of the features listed are options</i>		
1.35.1 Are all image processing and display functions available on both the operator's council and physicians workstation?		
1.35.2 Is the interface (GUI) the same on the operator's council and physicians workstation?		
1.35.3 What is the maximum number of images that can be displayed?		
1.35.4 Is there a command to perform histogram averaging?		
1.35.5 Is there a command to perform slice addition?		
1.35.6 Is there a command to perform slice subtraction?		

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1.35.7 Is there a command to perform edge enhancement?		
1.35.8 Is there a command to perform noise reduction?		
1.35.9 Is there a command to select an ROI for analysis of SD & mean?		
1.35.10 Is there a command to display a line profile?		
1.35.11 Can 3D images be reformatted in any oblique plane?		
1.35.12 Can 3D images be reformatted in a curved plane?		
1.35.13 Is slicing of a 3D texture-map image performed in real-time?		
1.35.14 What 3D rendering capabilities and routines are included?		
1.35.15 What 3D rendering capabilities and routines are options?		
1.35.16 Is image fusion standard or available as an option?		
1.35.17 If image fusion is available, indicate which modalities are supported?		
1.35.18 Can images from 2D studies be made into a movie?		
1.35.19 Can projections from volume renderings be made into a movie?		
1.35.20 Can two (2) or more movies be added to give one (1) long movie?		
1.35.21 Can individual slices be saved from a movie?		

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1.36 Networking (Main Council)		
1.36.1 Is DICOM standard?		
1.36.2 What are the DICOM options.		
1.36.3 What is the DICOM compatibility level? <u>Please attach required documents.</u>		
1.36.4 What physical network connections are provided?		
1.36.5 Are other network methods provided or available?		
1.36.6 Can images be sent to our existing MR scanner? Is this an option?		
1.36.7 Can images be sent to our existing MR workstation? Is this an option?		
1.36.8 Can images be accepted from our existing MR workstation? Is this an option?		
1.36.9 Can images be sent to our existing MR laser film printer? Is this an option?		
1.36.10 Can images be sent to our existing PACS? Is this an option?		
1.36.11 Can images be accepted/retrieved from our existing PACS? Is this an option?		
1.36.12 Is the system fully compatible with eFilm Workstation?		
1.37 Networking (Workstation)		
1.37.1 Is DICOM standard?		
1.37.2 What are the DICOM options?		
1.37.3 What is the DICOM compatibility		

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level? <u>Please attach required documents.</u>		
1.37.4 Which physical network connections are provided?		
1.37.5 Are other network methods provided or available?		
1.37.6 Can images be sent to our existing MR scanner? Is this an option?		
1.37.7 Can images be sent to our existing MR workstation? Is this an option?		
1.37.8 Can images be accepted from our existing MR workstation? Is this an option?		
1.37.9 Can images be sent to our existing MR laser film printer? Is this an option?		
1.37.10 Can images be sent to our existing PACS? Is this an option?		
1.37.11 Can images be accepted/retrieved from our existing PACS? Is this an option?		
1.37.12 Is the system fully compatible with eFilm Workstation?		
1.38 Image Storage (Fixed)		
1.38.1 Are images stored on main council, physicians workstation, or both?		
1.38.2 What is the size of the main council's standard hard disc drive?		<i>Mbytes</i>
1.38.3 How many images can be stored on the main council?		
1.38.4 What drive options are available for main council?		
1.38.5 What is the size of the physicians		

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workstation hard disc drive?		<i>Mbytes</i>
1.38.6 How many images can be stored on the physicians workstation?		
1.38.7 What drive options are available for the workstation?		
1.39 Image Storage (Removable Optical Media)		
1.39.1 Indicate type of removable optical media drives for image storage.		
1.39.2 Indicate the capacity of the optical discs?		<i>Mbytes</i>
1.39.3 Which disc formats are supported, ie. MS DOS, LINUX, MacOS?		
1.39.4 How many images can be stored?		
1.39.5 Can dynamic studies (Cine') be stored?		
1.39.6 What other types of information be saved to a disc?		
1.39.7 Which formats can images be stored as, ie. DICOM, TIFF, MPEG, JPEG.		
1.39.8 Indicate time required to save an image to disc?		
1.39.9 Which images formats can be retrieved from disc?		
1.40 Image Storage (Removable Magnetic Media)		
1.40.1 Indicate type of removable media drives for image storage, ie. ZIP, floppy.		
1.40.2 Indicate which drives are options.		

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1.40.3 Indicate the capacity of the discs.		<i>Mbytes</i>
1.40.4 Which disc formats are supported, ie. MS DOS, LINUX, MacOS.		
1.40.5 How many images can be stored.		
1.40.6 Can dynamic studies (Cine') be stored?		
1.40.7 What other types of information be saved to a disc.		
1.40.8 Which image formats can images can be stored as, ie. DICOM, TIFF, JPEG, MPEG.		
1.40.9 Indicate time required to save an image to disc.		
1.40.10 Which images formats can be retrieved from disc.		
1.41 Image Storage (CDR/W DVDR)		
1.41.1 Indicate type of drives for image storage, ie. CDR, CDRW, DVDR.		
1.41.2 Indicate which drives are options?		
1.41.3 Indicate capacity of the discs.		<i>Mbytes</i>
1.41.4 Which disc formats are supported, ie. MS DOS, LINUX, MacOS.		
1.41.5 How many images can be stored.		
1.41.6 Can dynamic studies (Cine') be stored?		
1.41.7 What other types of information be saved to a disc.		
1.41.8 Which image formats can images can		

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be stored as, ie. DICOM, TIFF, JPEG, MPEG.		
1.41.9 Indicate time required to save an image to disc.		
1.41.10 Which images formats can be retrieved from disc.		
1.42 Image Storage (Magnetic Tape Media)		
1.42.1 Is a magnetic tape backup standard?		
1.42.2 Indicate which tape drives are options.		
1.42.3 Indicate capacity of the tapes.		<i>Mbytes</i>
1.42.4 Can all patient data be backed up?		
1.42.5 Can individual studies be recalled from a tape?		
1.42.6 Can multiple studies be recalled from a tape?		
1.42.7 Can patient data be saved while the scanner and workstation are in use?		
1.42.8 Can the operating system & applications be backed up to tape?		
1.42.9 Can the operating system & applications be recovered from tape?		
1.42.10 Is there any other archive device?		
1.43 Quality Assurance Software		
1.43.1 Does the system supply software for routine quality assurance?		
1.43.2 Are there any options regarding QA/QC software?		

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1.43.3 Does the scanner have software, possibly in a service mode, for detailed verification of proper operation?		
1.43.4 Is documentation supplied describing recommended phantom positioning for the built-in QA software?		
1.43.5 Can the RF pulse duration be independently and easily varied?		
1.43.6 Can the RF pulse amplitude be independently and easily varied?		
1.43.7 Does the scanner have a protocol for measuring T1 and T2?		
1.43.8 Can the scanner display phase images?		
1.43.9 Can the scanner display spectra to verify spectral peak position and width?		
<i>1.44 Quality Assurance Phantoms: It is understood that a single phantom may be used for more than one test.</i>		
1.44.1 Is a phantom for testing resonant frequency supplied?		
1.44.2 Is a phantom for testing signal-to-noise ratio supplied?		
1.44.3 Is a phantom for testing image uniformity supplied?		
1.44.4 Is a phantom for testing slice thickness supplied?		
1.44.5 Is a phantom for testing geometric distortion supplied?		
1.44.6 Is a phantom for testing high contrast resolution supplied?		

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1.44.7 Is a phantom for checking the accuracy and precision of T1 and T2 supplied?		
1.44.8 Is a phantom for calibrating CSI supplied?		
1.44.9 Is a phantom for testing signal linearity supplied?		
1.44.10 Is a phantom for testing low contrast detectability supplied?		
1.44.11 Are phantoms for properly loading each coil supplied?		
1.45 Research Applications		
1.45.1 Are you interested in providing support for research projects?		
1.45.2 What type of support would you consider offering?		
1.45.3 Can the system be put into a separate research mode to prevent changing of clinical settings?		
1.45.4 What programming languages are supplied with the system?		
1.45.5 Does your system provide features that are intended purely for research, ie. access to preprocessed data?		
1.45.6 What support do you provide for developing pulse sequences.		
1.45.7 What support do you provide for developing RF coils.		
1.45.8 What support do you provide for developing gradient coils.		

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