

*Altaire*<sup>®</sup>

Product Data



**HITACHI**  
Inspire the Next

# Performance That Delivers

Altaire builds upon Hitachi's success in Open MR technology and takes it to the next level with higher field strength as well as an advanced gradient and RF system to deliver high-field performance and Open MR comfort.

Advanced performance begins with the high homogeneity vertical-field superconducting magnet. The 55T/m/s slew rate gradient system provides acquisition speed and resolution, while the multi-channel digital RF receiver system and high-speed computer workstation provide excellent clinical image quality and system flexibility.

## MAGNET SYSTEM

Altaire's magnet incorporates Hitachi's signature design, an asymmetric two-post architecture, for maximum openness. The panoramic open design affords patients a comfortable scanning environment with a magnet that delivers high-field performance.

Magnet Type: .....	Superconducting
Magnetic Field: .....	Vertical
Field Strength: .....	0.7T
Homogeneity: .....	±1.5ppm@35cm DSV (P-P,15 plane) 0.35ppm@35cm DSV (Vrms)
Shimming: .....	Computer-aided passive shim, and per patient active shim (linear and higher order)
Temporal Field Stability: .....	<0.05ppm/hr.
Shielding: .....	Self-shielded, passive
5G Fringe Field: .....	10.2ft. (horizontal) x 11.8ft.(vertical)
Cryogen System: .....	4K refrigerator, with cryogen level monitor
Safety: .....	Emergency run-down
Refill Frequency: .....	2 times per year

## GRADIENT SYSTEM

An advanced flat gradient system supports Altaire's ultra rapid acquisition and sub-millimeter resolution imaging capabilities. The system's high slew rate contributes to short TE and inter-echo times as well as long echo train lengths with ss-EPI and ss-FSE. The high maximum amplitude enables a combination of rapid acquisitions with demanding scan parameters to yield thin-slice, small FOV, high-resolution images. A sophisticated digital eddy current compensation design ensures parameter flexibility and consistent image quality for a wide range of demanding applications.

Strength: .....	22mT/m
Slew Rate: .....	55T/m/s
Shielding: .....	Active
Cooling Method: .....	Water
DAC Resolution: .....	18 bits

## RADIO FREQUENCY SYSTEM

An optimized radio frequency (RF) system design philosophy is particularly important in Open MR design to take maximum advantage of the available signal. With Altaire, Hitachi has employed its Scalable DualQuad® Four-Channel RF System. The 10kW RF amplifier and quadrature transmit coil design provides ample uniform RF excitation for advanced applications and imaging larger patients. The RF system design and high magnet homogeneity provides excellent coverage over a large 45cm FOV.

Advanced multiple array coils, designed for anatomically-specific regions of interest, provide high signal-to-noise even with the most demanding sequences.

### Solid-State Transmitter

- Quadrature
- 10kW power
- Phase resolution - 0.05 degree
- Flat Multi-Element Resonator (MER) Coil

### Full Digital Receiver

- RF multiple array design supports 8 preamplifier channels
- Ultra-low noise (0.5dB) preamplifier
- Automatic and user-variable bandwidth selection
- RAPID™ Parallel Imaging Technology



### Multiple Array RF Receiver Coils\*

- Head
- C-spine
- Knee
- Flexible body (M,L,XL)
- Shoulder
- CTL
- TMJ
- Wrist
- RAPID Head
- RAPID Body
- Breast
- Peripheral Vascular
- Neurovascular

### Linear Coils

- Extremity (L)
- Neck/C-spine



## PATIENT MANAGEMENT SYSTEM

An important factor in the success of the Open MR system is patient comfort. Patients will choose a system based upon comfort and physicians will refer based upon image quality. Altaire offers the ideal combination of image quality and patient comfort, satisfying physicians and patients.

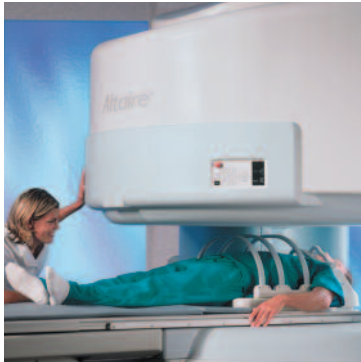
Gantry Opening: .....47cm  
 Width of Table Top: .....80cm  
 Vertical Movement: .....Power-driven, 490-970mm range  
 Lateral Movement: .....Power-driven, ±100mm range  
 Longitudinal Travel Speed: .....Power-driven, 120mm/sec, or 20mm/sec  
 Positioning: .....Three-plane, laser light localization

Positioning Accuracy: ..... ±1mm  
 Emergency Evacuation: ..... Manual table-top release  
 Weight Limit: ..... 500 lbs.  
 Communication: ..... Two-way intercom, technologist alert system



\*Some RF Receiver coils are options.

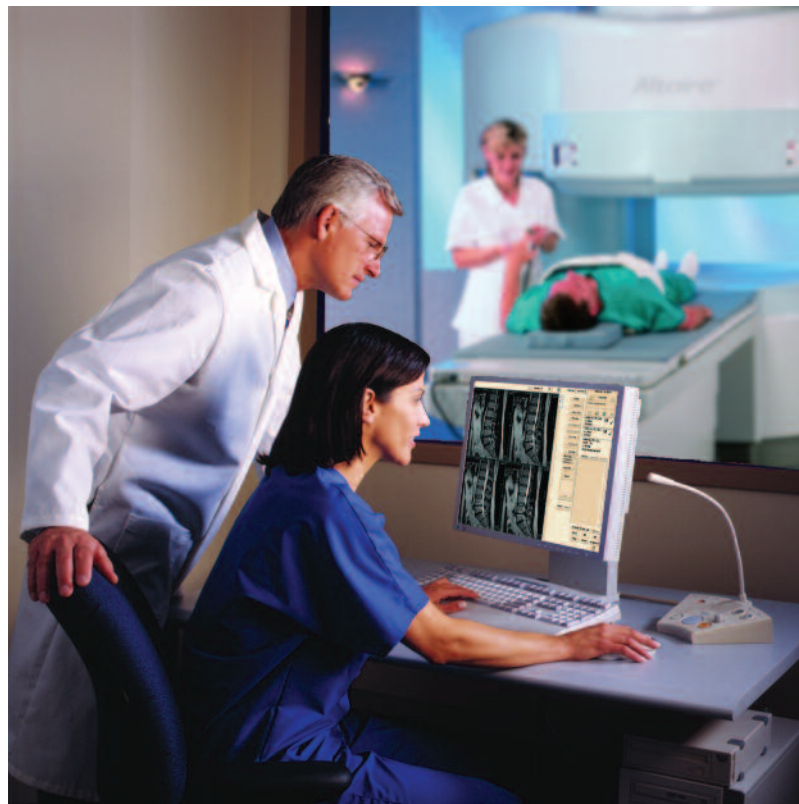
# Technology Driven Performance



## COMPUTER SYSTEM

Altair's host Dual XP CPU is a dual-processor 64-bit RISC-based system. With multiple, independent distributed processors, the operation of acquisition and image processing for the technologist is streamlined. All functions can be performed in a multi-tasking mode to keep the patient throughput high. Combine these features with an attractive and efficient graphical user interface and the Altair computer system meets all of your daily needs.

Host CPU: .....	64-bit RISC-based
Memory: .....	2GB RAM
Reconstruction Time: .....	<0.05s/image 256 <sup>2</sup>
Display: .....	LCD color monitor with GUI and 1280 x 1024 display matrix
Magnetic Disc: .....	73.4GB, storage for 50,000 images
DVD-RAM: .....	9.4GB, storage for 60,000 images
MOD (optional): .....	2.6GB, storage for 17,000 images
CD: .....	For individual study storage with auto launching PC image viewer



## ASCENT™ OPERATING SYSTEM SOFTWARE

The complex activities associated with the demands of contemporary diagnostic imaging are simplified through Hitachi's unique Ascent MR operating system. Technologists select from customized predefined clinical studies and tasks containing the pulse sequences and post-processing tools appropriate for the clinical situation. Users enjoy the software's advanced multi-tasking capabilities, performing simultaneous acquisition and processing tasks, including scanning, reconstruction, filming and data transfer. Technologists interact with the system through Ascent's task card and tool architecture.

### Scan Card

- Scan parameter selection
- Slice positioning
- Presaturation positioning
- Display of reconstructed images
- Pause/restart/abort scan

### 2D Processing Task Card

- Edge enhancements, smoothing
- Adaptive image processing
- Elimination of background
- Image addition/subtraction
- Image intensity compensation

### 3D Processing Task Card

#### Multi-Planar Reformatting (MPR)

- Orthogonal and angled slice selection
- Interactive triplanar melt-through reformats
- Single oblique reformats
- Multi-slice reformats
- Radial reformats
- Curved and user-defined reformats

#### Maximum Intensity Projection (MIP)

- Volume of interest definition using rectangular, elliptical and free-hand ROI
- Set direction, rotation and tilt for viewing

### Analysis Card

- Velocity calculation
- Dynamic analysis
- DWI analysis

### Data Card

- Simultaneous multi-image review

### Maintenance Card

- System performance evaluation tools
- ACR accreditation support tools

### Film, Archive and Network Tools\*

- Auto/manual film
- Auto/manual archive
- DICOM 3.0 interface
  - Store (automatic/manual)
  - Query/retrieve
  - Print
  - Modality worklist
  - IHE Scheduled Workflow

### Window/Level Tools

- Window/level adjustment
- Window/level jump
- Window/level reset
- Window/level preset
- Nonlinear window

### Cine Tools

- Image scrolling
- Swing mode cine
- Sequential mode cine

### Comment/Annotation Tools

### Magnify/Shift Tools

- Image magnification
- Image pan

### ROI Tools

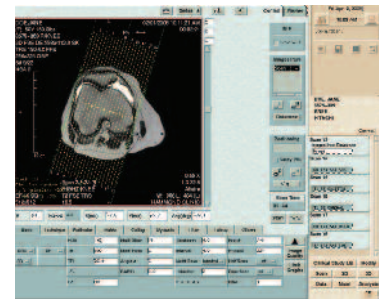
- Rectangular, elliptical, irregular
- ROI statistics

### Rotate/Reverse Image Tools

- Image rotation
- Image flipping

### Measurement Tools

- Measure distance
- Measure angle



### Statistics Tools

- Line profile
- ROI histogram

### Album Tools

- Grid display
- Caliper display
- Grayscale display
- Reference image display
- Clipping display

### Physiological Waveform Display

- ECG
- Peripheral Pulse
- Respiratory

\*Some items are options.

# Specifications Add Up To Performance



## IMAGING SEQUENCES

The best measure of an MR imaging system is its clinical capabilities. Altaire provides a broad range of conventional applications as well as advanced capabilities like ss-EPI and diffusion. Altaire's powerful gradients and computer workstation provide the platforms for imaging enhancements for years to come. Hitachi's tradition of satisfying clinicians, radiologists and patients continues with Altaire.

### Spin Echo (SE)

- Four echoes

### Gradient Echo (GE)

- Gradient Rephase (GR) - flow compensation

### Steady State Acquisition with Rewinded Gradient Echo (SARGE™, SG)

- Balanced SARGE (BASG) and Phase Balanced SARGE (PBSG) - for T2-weighted high-signal acquisitions
- Time-reversed SARGE (TRSG) - for T2-weighted rapid acquisitions
- RF-spoiled SARGE (RSSG) - for T1-weighted, high-resolution images
- Rephased SARGE - for steady-state with flow compensation effects

### Inversion Recovery (IR)

- STIR
- FLAIR

### Fast Spin Echo (FSE)

- Choice of 2-256 echo factor
- Single-shot FSE (ss-FSE)
- Driven Equilibrium FSE (DE-FSE) - FSE type contrast with shorter TR
- Shared Echo FSE - Dual echo contrast with reduced scan time

### Fast Inversion Recovery (FIR)

- Fast STIR
- Fast FLAIR
- Driven Equilibrium FIR

### MR Angiography

- Time-of-flight (TOF) with MTC
- Timed Bolus MRA
- 3D RF-spoiled SARGE (RSSG)
- Phase contrast

### Echo Planar Imaging (EPI)

- Single-shot (ss-EPI)
- Multi-shot (ms-EPI)
- Spin Echo EPI (SE-EPI)
- Inversion Recovery EPI (IR-EPI)
- RF-spoiled (RSSG) Gradient Echo EPI

### Diffusion-Weighted Imaging (DWI)

- Single-shot EPI-DWI (ss-EPI-DWI)
- Multi-shot EPI-DWI (ms-EPI-DWI)
- STIR-DWI

### FatSep™ - Two- and Three-Point Techniques

- FatSep Spin Echo (FatSepS)
- FatSep Gradient Echo (FatSepG)
- FatSep SARGE (FatSepSG)
- FatSep Fast Spin Echo (FatSepFSE)



## ACQUISITION FEATURES

### Imaging Plane Selection

- Transverse
- Sagittal
- Coronal
- Single and double oblique
- Multiple-slice, multiple-angle

### Prescan

- Transmit signal optimization
- Receive signal optimization
- Three-axis per patient shim

### Off-Center Field-of-View (FOV)

- Up to 1/2 the FOV

### Motion Compensation

- Gradient rephasing for flow compensation
- Presaturation (up to 6 presat bands)
- Cardiac Gating
- Peripheral Pulse Gating
- Respiratory Compensation
  - PERRM
  - Trigger Mode
- Navigator Echo

### Fat Suppression

- RF fat saturation
- FatSep™
- Fast STIR (FIR)
- STIR
- In-out-of-phase Gradient Echo

### Rectangular FOV

- Available in phase direction automatically and manually

### No Frequency Wrap

- Oversampling

### No Phase Wrap

- Time Mode
- Resolution Mode
- Time/Res Mode
- Automatic and manual

### Swap Phase/Frequency Direction

- User-defined

### Receiver Bandwidth Control

- Automatic
- User-defined

### Contrast Enhancement

- MTC - with user-variable offset frequency and amplitude

### Partial K-Space Techniques

- Half-echo
- AMI (Asymmetric Measurement Imaging)
- Half-scan
- Three-quarters scan

### Dual Slice Acquisition

- Available for SE, IR and GE sequences

### RAPID Parallel Imaging

- acceleration from 1.0 to 2.0 (0.1 increments)
- image-based algorithm

### Critical Imaging Parameters\*

Slice Thickness

2D: 2-100mm

3D: 0.5 - 5.0mm

FOV Range

50-450mm

TR (Time of Repetition) Range

3-16,700msec

TE (Time of Echo) Range

1.0-250msec

TI (Time of Inversion) Range

20-8,000msec

Inter-echo Times (IET)

5.2-30msec (FSE)

1.0-7.0msec (EPI)

RF Flip Angle

SE: 3-120 degrees

GE: 3-90 degrees

Signal Acquisition: 1-99

(selectable in one unit increment)

Multiple Slab: Up to 32

Maximum Number of Slices

2D: 256 (256<sup>2</sup>), 128 (512<sup>2</sup>)

3D: 512 (256<sup>2</sup>), 128 (512<sup>2</sup>)

Acquisition Matrix Selection

up to (64-1024) x (64-512)



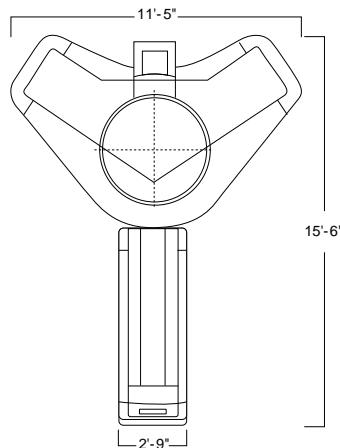
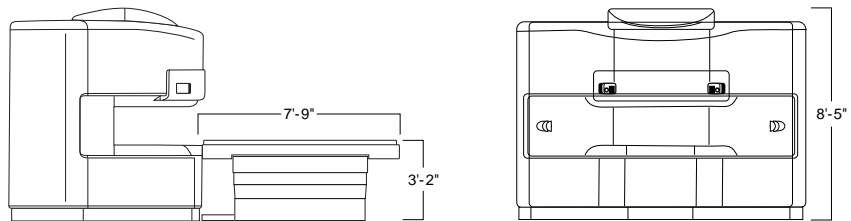
\* This is a function of imaging sequence selection and associated acquisition features.

# Altaire High-Field Performance Open MR

The Altaire high-field performance Open MR system gives you a combination of high-field performance and the patient comfort of Open MR. All of its elements - magnet, gradients RF, and computer - have been specifically optimized to work in concert, a blend of innovative features called VOSI® technology. VOSI allows Altaire to deliver Open MR comfort with high-field performance. This seamless blending is something you'd expect from Hitachi, the world leader in the advancement of Open MR technology.

Component	Component Dimensions			Weight
	Width	Depth	Height	
Gantry (Incl. self-shielding)	11'-5"	7'-9"	8'-5"	92,400 lbs.
Patient Table	2'-9"	7'-9"	3'-2"	1,122 lbs.
Operator Desk	4'-0"	2'-6"	2'-4"	73 lbs.
RF/DC cabinet	1'-11"	3'-1"	6'-2"	1,540 lbs.
IP Cabinet	1'-4"	2'-8"	2'-4"	132 lbs.
Gradient Amplifier	1'-11"	3'-1"	6'-2"	1,276 lbs.
Filter Box	2'-7"	1'-3"	3'-8"	132 lbs.
He Compressor	1'-6"	1'-8"	2'-3"	253 lbs.

*Important: A cryogen chiller is required to operate Altaire. Contact HMSA Site Planning for cryogen chiller specifications.*



## HITACHI Inspire the Next

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