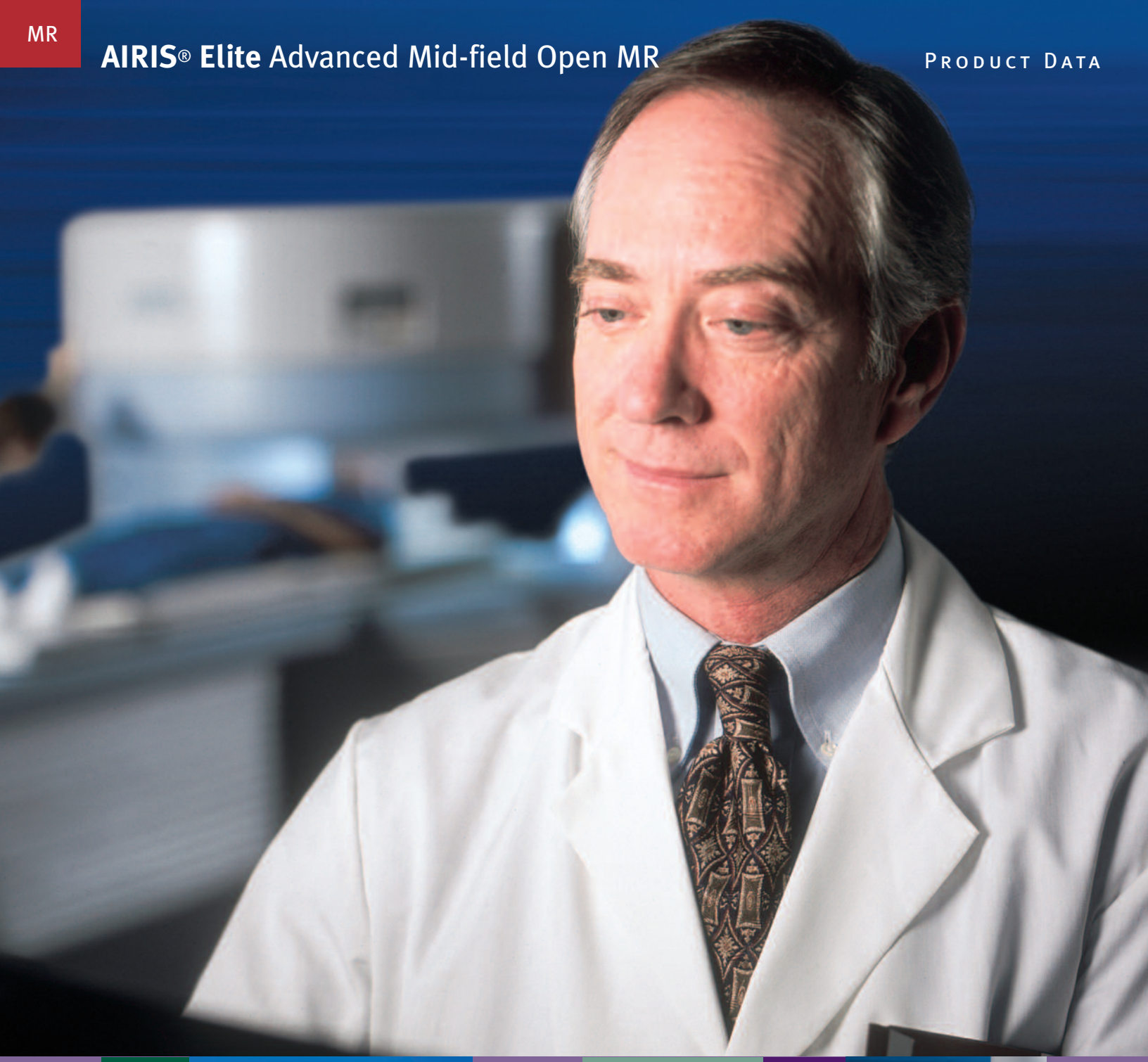
MR

AIRIS® Elite Advanced Mid-field Open MR

PRODUCT DATA



HITACHI

Inspire the Next

AIRIS Elite continues the tradition of Hitachi's leadership in Open MR technology, providing clinical capabilities that rival the performance of many high field systems.

This breakthrough results from AIRIS Elite's Scalable DualQuad™ RF system, higher-order active shim technology, high homogeneity vertical field permanent magnet, super-fast gradients and sophisticated sequence capabilities, which are all integrated through Hitachi's unique approach to overall system performance.

Magnet System

AIRIS Elite's permanent magnet design incorporates an asymmetric two-post architecture, Hitachi's signature design, for maximum openness. Combined with Hitachi's higher-order active shim technology, the magnet produces a spherical imaging volume of remarkably high homogeneity.

- **Permanent magnet type**
- **Vertical magnetic field**
- **0.3T field strength**
- **Homogeneity: 0.4ppm@20cm DSV (FWHM)**
- **Shimming**
  - Computer-aided passive shim
  - Gradient shim
  - Active shim (4 channels plus Bo compensation)
- **Shielding**
  - Self-shielded
  - Passive
- **5G fringe field**
  - 6.6 ft (horz.) x 8.2 ft (vert.)

Gradient System

An advanced flat gradient system supports AIRIS Elite's rapid acquisition and sub-millimeter resolution imaging capabilities. High slew rate contributes to high image quality, short TE and inter-echo times, plus long echo train lengths for FSE and ss-EPI. High maximum amplitude enables rapid acquisitions with demanding scan parameters for thin slice, small FOV, high resolution images. Sophisticated digital eddy current compensation ensures parameter flexibility and consistent image quality.

- **Maximum strength: 21mT/m**
- **Maximum slew rate: 55T/m/s**
- **Cooling method: Air**
- **Acoustic noise: ≤100dBA**

Advancing Mid-field Performance

Radio Frequency System

AIRIS Elite employes Hitachi's Scalable DualQuad™ Four-Channel RF system. The 5kW quadrature transmitter amplifier and quadrature transmit coil provide remarkably-uniform RF excitation. The RF system design and high magnet homogeneity provide excellent coverage over a large 42cm FOV. Anatomically-specific, actively decoupled multiple array coils provide very high signal-to-noise even with the most demanding sequences.

- **Solid-state transmitter**
  - Quadrature
  - 5kW power
  - Flat multi element resonator (MER) coil
- **Full digital receiver**
  - 4-channel receiver
  - Ultra-low noise (0.3dB) system preamplifier
  - Automatic and user-variable bandwidth selection
  - Supports RAPID™ parallel imaging technology
- **RF receiver coils**
  - MA Head
  - MA Lower Extremity
  - MA C-spine
  - MA Flex Body (XL)
  - MA Flex Body (L)
  - MA Shoulder
  - Extremity
  - MA CTL Spine*
  - MA TMJ*
  - MA Wrist*
  - RAPID Head*
  - RAPID Body/Spine*
  - RAPID Extremity*
  - MA Flex Body (M)*

Patient Management System

The widespread acceptance of Open MR is based in large measure on patient comfort. Patients will choose a system based upon comfort and physicians will refer based upon image quality. AIRIS Elite delivers both. Moreover, AIRIS Elite's unique motorized 3 axis table maximizes operator ease of use.

- **Gantry opening: 43 cm**
- **Table top width: 80 cm**
- **Vertical movement**
  - Power-driven
  - Range 18 – 32 cm
- **Lateral movement**
  - Power-driven
  - Range ±4 cm
- **Longitudinal travel speed**
  - Power-driven
  - 4.7 cm/sec maximum
- **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

Computer System

AIRIS Elite's multiple, independent distributed processors streamline acquisition and image processing. All functions can be performed in a multi-tasking mode to keep patient throughput high. The AIRIS Elite computer system also features a user-friendly graphical user interface.

- **Host CPU: 64-bit RISC-based**
- **Memory: 2GB RAM**
- **Reconstruction time: <0.05s/image 256^2**
- **Display**
  - Large LCD color monitor
  - GUI
  - 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**
  - Individual study storage
  - Auto-launching PC image viewer

** optional*

Taking Mid-field MR Further

Ascent Operating System Software

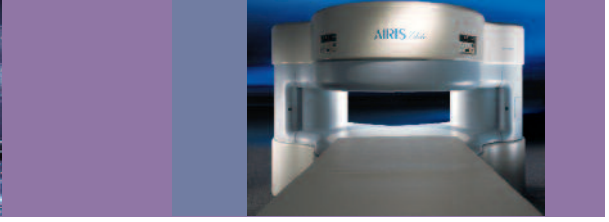
Complex activities associated with contemporary diagnostic imaging are simplified through Hitachi's unique Ascent MR operating system. Customized predefined clinical studies and tasks contain pulse sequences and post processing tools appropriate for the clinical situation. The software's multitasking capabilities perform simultaneous acquisition and processing tasks, including scanning, reconstruction, filming and data transfer.

- **Scan task card**
  - Scan parameter selection
  - Slice positioning
  - Pre-saturation positioning
  - Reconstruction parameter selection
  - Start / pause /abort scan control
- **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 tri-planar 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
- **Vascular volume rendering**
- **Analysis task card**
  - Velocity calculation
  - Dynamic analysis
  - DWI analysis*
- **Data Task Card**
  - Simultaneous multi-image review
- **Maintenance task 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
    - Workflow Plus (IHE SWE)*
      - Modality worklist managment
      - Storage committment
      - Performed procedure step
- **Window/Level tools**
  - Window/level adjustment
  - Window/level jump
  - Window/level reset
  - Window/level preset
  - Non-linear 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

Imaging Sequences

AIRIS Elite's clinical capabilities are unprecedented in mid-field, providing a range of both standard applications and advanced capabilities. Its Scalable Dual Quad RF system, higher-order active shim technology, fast gradients and computer system provide imaging enhancement platforms for years to come

- **Spin Echo (SE)**
  - 4 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
  - RF-Spoiled SARGE (RSSG)for T1-weighted high resolution images
  - Rephased SARGE combines steady-state acquisition with flow compensation
  - Time-Reversed SARGE (TRSG) for T2-weighted fluoroscopy acquisitions
- **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 (SE-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)
- **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



Elite Equals Unsurpassed Flexibility

- **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
  - Multi-plane
  - Single and double oblique
  - Multiple slice, multiple angle
- **Pre-scan**
  - Transmit signal optimization
  - Receiver signal optimization
  - Magnetic field uniformity optimization
- **Off-center field of view (FOV)**
  - Phase and frequency axis
- **Motion compensation**
  - Gradient rephasing for flow compensation
  - Presaturation (up to 6 presat bands), including intermittent
  - Cardiac gating
  - Peripheral pulse gating
  - Respiratory compensation
    – PERRM
    – Trigger mode
  - Navigator echo for DWI*
- **Fat suppression**
  - RF-Fat saturation
  - FatSep™
  - Inversion recovery sequences
  - In-out-of-phase gradient echo
- **MR angiography features**
  - Sloped Slab Profile (SSP™)
  - PEAKS and rPEAKS – k-space filling
  - MTC
  - High Resolution High Definition (HR/HD)
- **Rectangular FOV**
  - Automatic and manual
- **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) for echo fraction selection
  - Half-scan
  - Three-quarters scan
- **Dual slice acquisition**
  - Available for SE, IR and GE sequences

Critical Imaging Parameters**

- **Slice thickness**
  - 2D: 2-100 mm
  - 3D: 0.5-5.0 mm
- **FOV range: 5-42 cm**
- **TR (Time of Repetition) range: 4 - 16,700 msec**
- **TE (Time of Echo) range: 2 - 7,680 msec**
- **TI (Time of Inversion) range: 20 - 8,000 msec**
- **Echo factor range**
  - FSE – 2 - 256
  - EPI – 2 - 128
- **Inter-echo times (IET)**
  - 6.0 - 30 msec (FSE)
  - 1.4 - 8.0 msec (EPI)
- **RF flip angle**
  - SE: 3 - 120 degrees
  - GE: 3 - 90 degrees
- **b factor range: 0 - 2,000 sec/mm²**
- **Signal acquisition**
  - 1-99
  - Selectable in one unit increments
- **Multiple slab: Up to 32**
- **Maximum number of slices**
  - 2D: 256 (256^2)
  - 3D: 512 (256^2)
- **Acquisition matrix selection:** (64 - 1024) x (64 - 512)

** Optional*

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

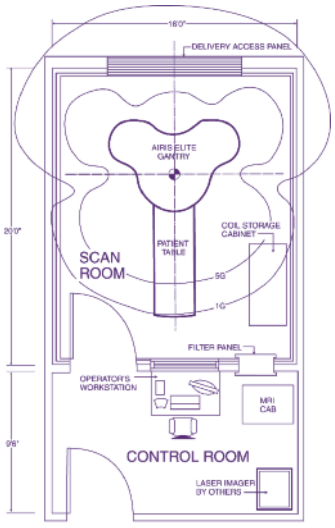
Elite Means Siting Design Freedom

AIRIS® Elite continues Hitachi's tradition of providing MR systems that offer cost-effective siting and operation. AIRIS Elite's small footprint, self-shielding and other remarkable design attributes make it as accommodating to existing facilities as to new construction. As the acknowledged leader in Open MR, Hitachi can share an enormous range of site planning experience, as well as a proven system for efficient siting, installation and start-up. We work with you from the very first step, from initial site selection through layout, electrical and HVAC requirements, right through to delivery and installation.

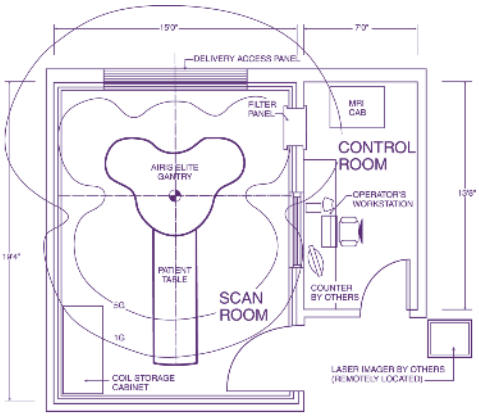
Component Dimensions

- **Gantry**
  - Depth: 73in • Height: 72 in
  - Width: 105in • Weight: 34,613lbs
- **Patient table**
  - Depth: 90 in • Height: 32 in
  - Width: 33 in • Weight: 1,323lbs
- **Operator's desk**
  - Depth: 30 in • Height: 28 in
  - Width: 48 in • Weight: 73 lbs
- **Keyboard**
  - Depth: 10 in • Height: 2 in
  - Width: 20 in • Weight: 5 lbs
- **Computer**
  - Depth: 18 in • Height: 19 in
  - Width: 13 in • Weight: 44 lbs
- **Control unit**
  - Depth: 7 in • Height: 2 in
  - Width: 10 in • Weight: 7 lbs
- **LCD monitor**
  - Depth: 8 in • Height: 15 - 23 in
  - Width: 17 in • Weight: 23 lbs
- **MRI cabinet**
  - Depth: 31 in • Height: 60 in
  - Width: 40 in • Weight: 1,158 lbs
- **Filter panel**
  - Depth: 6-20 in • Height: 45 in
  - Width: 27 in • Weight: 176 lbs
- **Coil storage cabinet**
  - Depth: 27 in • Height: 52 in
  - Width: 60 in • Weight: 50 lbs
- **Electrical power**
  - 208/220 volt
  - Single phase
  - 9.5 KVA requirement
  - 4 KW average

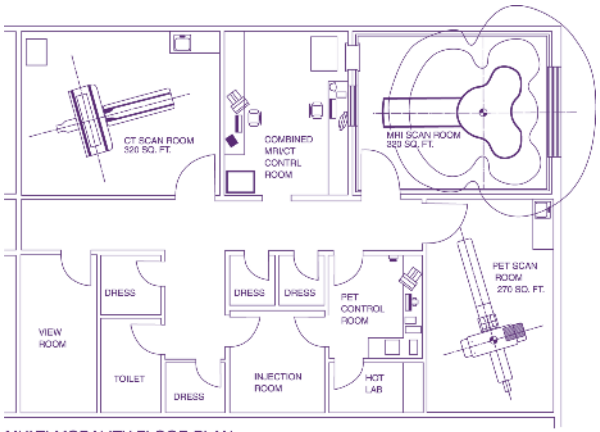
Low siting costs and minimal long-term operating expenses make AIRIS Elite's total cost of ownership very attractive. Its small footprint easily fits into closely-contained areas, while its design sophistication complements larger spaces as well. So floor plans which fit a wide range of situations can be easily designed. Because of AIRIS Elite's self-shielded design, a total siting space of as little as 388 sq. ft. is required, with the 5 Gauss line contained in the scan room. This gives AIRIS Elite real competitive siting advantages as well as siting flexibility. There is no need for a seperate equipment room or external chillers, which allows more room for your patients and staff.



AIRIS ELITE TYPICAL FLOOR PLAN
480 SQ. FT.



AIRIS ELITE ALTERNATIVE FLOOR PLAN
388 SQ. FT.



MULTI-MODALITY FLOOR PLAN

In these floor plans, AIRIS Elite is shown in a variety of settings. Example 1 shows the typical floor plan. Example 2 shows an alternative floor plan for placement where available space is limited. Any of these can easily be incorporated into a multi-modality setting similar to Example 3. Given its small footprint, AIRIS Elite offers a variety of orientation options for gantry and console placement.

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