

GE Healthcare

Signa® HDe 1.5T

Technical Data



imagination at work

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Signa HDe 1.5T

Smaller. Simpler. Sooner.

It’s GE’s most compact 1.5T MRI system and with 30% smaller overall siting than other comparable field systems, you can comfortably bring MRI into many new places. In a hospital, a remote imaging center, or an independent clinic, the Signa HDe offers a complete set of imaging applications and is simply the best choice for your next MRI scanner.

Sigma HDe 1.5T System Overview

The Sigma HDe 1.5T system brings lower operating cost and minimized siting requirements to high-performance MRI. This means the breakthrough clinical applications associated with GE’s proven high-definition (HD) platform can now be offered just about anywhere including hospitals, remote imaging centers and independent physician offices.

Clinical Leadership

The Sigma HDe delivers outstanding image quality and consistently accurate results across applications including GE signature applications such as PROPELLER, TRICKS, LAVA and VIBRANT.

Technology Leadership

The Sigma HDe is the latest example of GE’s continued leadership in MRI innovation. The use of GE’s water-cooling technology and the consolidation of critical components into a single electronics cabinet enable the HDe system to be sited in minimal space.

Yet this compact stature has been achieved without compromising performance.



Its extraordinary hardware is a primary reason.

- The HD high homogeneity, short-bore magnet features 18 superconductive shim coils for enhanced image quality
- A modular 4- or 8-channel receive chain takes full advantage of GE’s quadrature architecture and high-density coils.
- GE’s next generation Volume Reconstruction Engine delivers leading reconstruction capability in comparison to industry standards.

The result: a scanner that’s ready to deliver exceptional results over virtually all applications.

Workflow and Ease of Use

The Sigma HDe also brings a new level of simplicity to diagnostic MRI. Its intuitive, point-and-click interface is one reason. The HD wide-screen monitor provides excellent visualization of the scan, filming, archiving operations and enables the implementation of the Autoview window on all desktops for viewing convenience. Equally important are its detachable table and its unique approaches to acquisition. Together, these traits add up to productivity-enhancing ease of use and consistently successful exams, patient after patient.

A Total Partnership

When you choose the Sigma HDe 1.5T, you get more than just an outstanding and reliable MRI scanner. You also get the full support of GE Healthcare, including the unsurpassed training and service that are part of the GE Sigma product family.

Patient-Friendly Design

The Sigma HDe’s wide-open design minimizes claustrophobic reactions. Once inside its spacious 60 cm bore, your patients will appreciate the in-bore lighting and ventilation system. In addition, our MR system is engineered to be as quiet as possible, without compromising pulse-sequence performance.

Patient Bore Specifications	
Dimensions	70 cm x 60 cm x 60 cm (L x W x H)
Laser alignments	Axial, sagittal and coronal reference planes
Features	<ul style="list-style-type: none">• Dual-flared patient bore• Two-way, in-bore intercom system• Interface for music system• In-bore patient ventilation system• In-bore music system (optional)• Look-out, head-coil mirror
Lighting	In-bore
Table and scanner controls	Dual sided
Patient entry	Feet first or head first



Patient Environment

Patient Transport: Safety and Ease of Use

The Signa HDe 1.5T and GE's detachable, mobile patient table allows your technologists to scan one patient while preparing another outside the scan room. Then, when the scan room is free, the next patient can be moved quickly and easily to the magnet by a single technologist.

The detachable table not only enables improved productivity, it also provides additional patient safety. If an emergency arises, it takes less than 30 seconds to remove a patient from the magnet and scan room; such rapid egress could make all the difference.

Patient Transport	
Patient table height	68.58 cm (27 in.) to 96.52 cm (38 in.) continuous
Patient table drive	Automated, power driven vertical and longitudinal
Longitudinal speed	10.26 cm/sec (fast) and 1.29 cm/sec (slow)
Vertical speed	2.58 cm/sec (1.02 in./sec)
Total cradle length	210.8 cm (83 in.)
Total cradle travel	244 cm (96.25 in.)
Scanning range	193.9 cm (76.34 in.)
Positioning accuracy	± 0.05 cm (± 0.0019 in.)
Maximum patient weight for scanning	159 kg (350 lbs.)



Operator Scanning Experience

The Signa HDe 1.5T computer platform minimizes the delays associated with conventional MRI. Built on a parallel, multiprocessor design, it enables simultaneous scanning, reconstruction, filming, archiving, networking and post-processing. That makes it ideal for busy clinical environments.

This inherent speed is complemented by a number of workflow simplifications including:

- A highly intuitive user interface that streamlines everything from scan prescription through filming.
- Dyna-Plan, for enhanced multi-phased imaging, enables much easier abdominal dynamic scanning.
- ProtoCopy, for click-of-the-mouse downloading of complete external protocols into the protocol database.
- AutoVoice to ensure consistent, repeatable breath-holding instruction.
- Keystroke minimizing scan optimization including one-click launch.
- SmartPrescan, delivering system optimization for consistent image quality without the need for repetitive and unnecessary scan set-up time.
- Large desk top area for the monitor and scan controls and provides a convenient workspace.
- Auto MinTR guides the selection of TR and number of acquisitions when optimizing the number of slices.

The System of Choice

The Signa HDe 1.5T Magnet

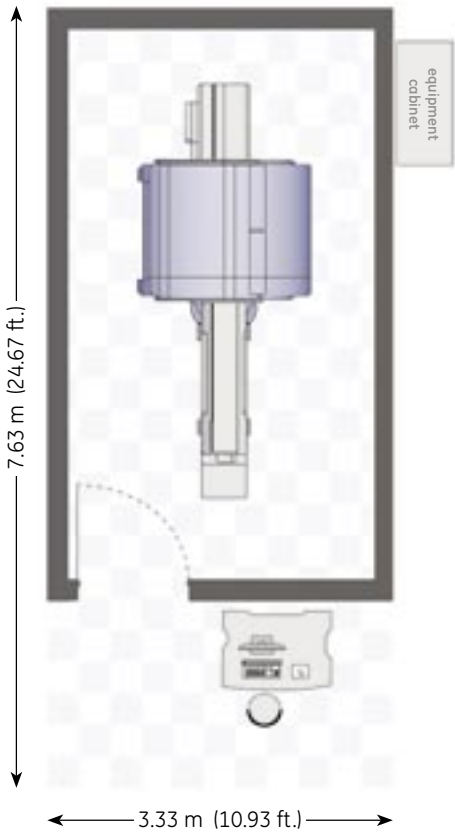
The Cornerstone of MRI

The Signa HDe 1.5T MR system features a short-bore, superconducting magnet that creates outstanding homogeneity throughout the imaging volume, which translates into superior image quality. In addition, the magnet provides an open appearance that makes patients comfortable without compromising image quality, and an extremely low helium consumption rate that means a long time between refills.

High Homogeneity

Superb homogeneity is essential for providing excellent image quality. The Signa HDe magnet delivers excellent homogeneity and consistent high image quality, which is seen in applications such as:

- Large FOV imaging up to 48 cm x 48 cm x 48 cm
- Off-center FOV imaging
- Fat saturation techniques
- Other advanced applications



Easy Siting, Affordable Operation

With the Signa HDe 1.5T system's extremely compact footprint and complemented by GE's robust active shielding, the Signa HDe 1.5T scanner can be sited in locations where other 1.5T systems cannot. In fact, it can be sited almost anywhere.

The Signa HDe's operation is very affordable. Both its helium consumption and system-wide energy usage are extremely low. This not only means lower operating costs, it also means improved uptime and productivity.

Magnet Homogeneity	
DSV (Diametrical Spherical Volume)	Typical Homogeneity
10 cm	0.004 ppm Vrms
20 cm	0.02 ppm Vrms
30 cm	0.06 ppm Vrms
40 cm	0.27 ppm Vrms
45 cm	0.81 ppm Vrms
48 cm	1.65 ppm Vrms

Magnet Specifications	
Operating field strength	1.5 Tesla
Operating frequency	63.86 MHz
Shim coils	18 super-conducting
Magnet shielding	Active
EMI	99%
Size (W x L x H)	208 cm x 172 cm x 216 cm
Enclosure length	1.95 m
Magnet weight	5155 kg (11,340 lbs.)
Magnet cooling	Liquid Helium
Temporal field stability	< 0.1 ppm/hr
Long-term stability	< 0.1 ppm/hr over 24-hour period
Cryogen refill period	> 3 years, depending upon frequency of shimming
Boil-off rate	< 0.03 liters/hr
Fringe field	5 Gauss = 4.0 m x 2.48 m (Axial x Radial) 1 Gauss = 0.7 m x 3.28 m (Axial x Radial)
Manufacturer	GE Healthcare

Gradient System

High Fidelity

Typically, gradient systems have been defined in terms of peak amplitude (mT/m) and rate of change of the gradient field (T/m/s). While these parameters are important in achieving high temporal-resolution parameters such as TRs, TEs and Echospacing, applications such as PROPELLER and TRICKS rely more heavily on gradient fidelity, accuracy and reproducibility, with advanced control over gradient waveforms.

Fidelity is defined as the degree to which an electronics system accurately reproduces sounds or images of the input signal. Applied to MRI gradient systems, gradient fidelity refers to the system’s ability to generate a requested waveform. GE gradients’ high fidelity is achieved through the innovative design of the digital control architecture within the gradient amplifier.

This architecture controls two paths.

- A dedicated, active feedback loop to regulate errors.
- A unique, predictive feed-forward control loop to further refine the control at the amplifier input.

Consistent, Reliable Gradient Performance

Signa HDe gradients deliver the accuracy and reproducibility needed to ensure top-quality results across all applications and all pulse sequences.

Gradients	
Maximum gradient amplitude in each orthogonal plane	23 mT/m
Maximum gradient slew rate	50 T/m/s
Maximum FOV	480 mm (x, y, z)



Computing Power

MRI’s fastest growing applications tend to be the most data intensive. And evolving applications that depend on unique k-space trajectories and acceleration techniques further increase the volumes of raw data generated in a single MR scan.

Far from being overwhelmed by these massive data sets, the Signa HDe 1.5T is designed to help you manage and benefit from these trends. It optimizes every component in the data pipeline, in the process boosting scanning speed, resolution and SNR.

Technical Specifications	
Main CPU	<ul style="list-style-type: none">• AMD Opteron dual 2.4 GHz processors• NVIDIA Quadro FX 1400 Graphics• 1 GHz System Bus• 1 MB full-speed L2 advanced transfer cache
Word size	32 Bit
Host memory	4 GB ECC DDR 400 (12.8 Gbps with processor integrated memory controller)
Graphics subsystem	Main display: NVIDIA Quadro FX 1400 <ul style="list-style-type: none">• 128 MB DDR graphics memory• Spec PROE -02: 46.8• Spec UGS -03: 52.0• Spec 3DSMAX -02: 29.9
Cabinets	Single, tower configuration
Disk subsystem	<ul style="list-style-type: none">• System disk: 250 GB, 7200 rpm, Serial ATA-150• Data disk: 250 GB (2-36 GB)• 400,000 uncompressed 256 x 256 image files• Maximum rates 150 MB/s
Network	3x Gigabit (10/100/1000) Ethernet ports



Reconstruction

The Signa HDe 1.5T features a powerful new Volume Reconstruction Engine that makes possible virtually real-time image generation. Delivering leading reconstruction capacity in comparison with industry standards, this engine features massive onboard memory and local raw-data storage.

Reconstruction
Volume reconstruction engine
Dual AMD Opteron 2.4 GHz processors
1350 FFT's per second (256 x 256)
Linux-based operating system
MPI parallel computing
64-bit floating point data format
Local memory: 4 GB
Linked to host computer via a 1-Gigabit, high-speed Ethernet connection

Receiver Architecture, Coils and Arrays

The RF architecture of the Signa HDe 1.5T is unsurpassed. Its standard quadrature 4-channel design, with optional 8-channel configuration, offers consistently excellent imaging performance.

The scanner also offers a choice of GE phased array coils to deliver coverage where you need it, focusing high-density arrays around the anatomy of interest for routinely outstanding image quality. It is also compatible with many other vendors’ coils, so you can select the best possible coil for every application.

Signa HDe System Coil Compatability		
	4-channel	8-channel
Quadrature head coil	●	●
4-channel CTL/spine array	●	●
4-channel neurovascular array	●	●
4-channel breast array	●	●
4-channel body array	●	●
4-channel cardiac array	●	●
4-channel wrist array	●	●
Shoulder phased array	●	●
Quadrature knee/foot coil	●	●
General purpose flex coil	●	●
5-inch loop coil	●	●
3-inch loop coil	●	●
8-channel CTL/spine array		●
8-channel neurovascular array		●
8-channel breast array		●
8-channel body array		●
8-channel knee array		●



Quadrature head coil



HD 8-channel neurovascular array



HD 8-channel body array



HD 4- and 8-channel CTL/spine array



HD 8-channel knee array



HD 8-channel breast array

ScanTools HDe

Signa ScanTools HDe provides a complete set of pulse sequences and applications, optimized for 1.5T performance.

Multi-Purpose Applications	
Fast Spin Echo (FSE)	
Uses echo-train technology to reduce total acquisition times	<ul style="list-style-type: none">• Builds on Spin Echo, the gold standard for T1, proton density and T2 imaging• Minimizes T2 blurring with very short echo-spacings
Fast Recovery Fast Spin Echo (FRFSE) and FRFSE-XL	
The new sequence of choice for high-quality, high-speed, high-contrast T2-weighted imaging	<ul style="list-style-type: none">• Ideal for neurological, body, orthopedic and pediatric applications• Used instead of FSE, allows operator to choose between shorter acquisition times and increased slice coverage
Single Shot Fast Spin Echo (SSFSE) and Enhanced MRCP	
Ultra-fast dataset acquisition with a single RF excitation period	<ul style="list-style-type: none">• Can acquire slices in less than one second• Excellent for T2-weighted brain and abdominal scans• Ideal for MR Cholangio-Pancreatography (MRCP)
Gradient Echo (GRE)	
Quick T1- or T2-weighted imaging	<ul style="list-style-type: none">• Gradient Echo (GRE)• 2D and 3D Fast Gradient Echo (FGRE)• 2D and 3D Spoiled Gradient Echo (SPGR)• Fast Spoiled Gradient Echo (FSPGR)• Ultra-short TRs and TEs ensure performance needed for top-quality vascular and contrast-enhanced MRA
Spectral Inversion at Lipids (SPECIAL)	
High-performance fat saturation	<ul style="list-style-type: none">• Spectral inversion pulse sequence• Permits use of fat saturation in conjunction with 3DGRE
ART (Acoustic Reduction Technology)	
Optional tool that reduces acoustic noise	<ul style="list-style-type: none">• Reduces noise in bore by up to 10 dB, improving patient comfort• Modifies pulse sequences without compromising image quality
i-Drive Pro	
Real-time interactive imaging	<ul style="list-style-type: none">• Facilitates generation of detailed information on any anatomy• Allows user to change scan parameters on the fly while evaluating results• Especially useful for organs subject to motion artifacts such as spine, heart, diaphragm and GI tract, or when timing-of-contrast boluses are required

ScanTools HDe (continued)

Body Applications	
LAVA (Liver Acquisition with Volume Acceleration)	
A 3D spoiled gradient echo technique that enables state-of-the-art, contrast-enhanced, dynamic liver imaging	<ul style="list-style-type: none">Imaging in both slice and imaging planesUses acceleration factors up to twoDelivers superior spatial and temporal resolutionPerforms large volume slice coverage in significantly shorter total scan times than those possible with conventional techniquesOutstanding for high-quality, liver breath-hold applicationsWorks by automatically applying a partial K_z filling technique along with a robust fat saturation technique called SPECIALDoes not compromise inplane spatial resolution with data interpolation
Dual Echo Gradient Echo	
Outstanding abdominal imaging	<ul style="list-style-type: none">Acquires two sets of images within a single breath-hold to capture both in- and out-of-phase TEsPerfect slice registration for more accurate abdominal evaluations
Additional Neuro Applications	
T1 and T2 Fluid-Attenuated Inversion Recovery (FLAIR)	
Important tool for neurological applications	<ul style="list-style-type: none">FLAIR sequence suppresses signal from CSFT1 and T2 FLAIR add exceptional contrast between white and gray matter in T1- and T2-weighted brain and spine imaging
Echoplanar and FLAIR Echoplanar Imaging	
Essential for high throughput sites using advanced techniques	<ul style="list-style-type: none">Enable rapid imaging in procedures such as functional brain mappingFacilitate neuro studies of uncooperative patients
Diffusion Echoplanar Imaging	
Essential tools for detection of stroke	<ul style="list-style-type: none">Enables the detection of acute and hyper-acute strokeSingle-Shot FLAIR EPI and Single-Shot, diffusion-weighted EPI with b-value up to 2,500 s/mm²Automatic isotropic diffusion-weighted imagingMulti-NEX capabilityOn-line image processingADC maps (enabled by FuncTool Performance – see page 13)

ScanTools HDe

Additional Cardiac and Vascular Applications	
Black Blood Double and Triple Inversion Recovery (Black Blood IR)	
Enables “black blood” cardiac imaging via an IR prep pulse to null the signal from blood	<ul style="list-style-type: none">User selectable, blood suppression factor to optimize image qualityBased on patient’s heart rate, factor anticipates null pointPerforms across a single or double R-R interval
ECG-Gated FGRE and FSPGR FastCine	
Enables functional acquisitions of the heart	<ul style="list-style-type: none">Full R-R coverage to image the entire cardiac cycle from systole through diastoleBased on the patient’s heart rate, view sharing is utilized to easily fit the acquisition into a single breath-hold
2D and 3D Phase Contrast (2DPC, 3D PC)	
Determines flow velocities and directional properties	<ul style="list-style-type: none">Outstanding for demonstrating these properties in vesselsAlso useful in other moving fluids such as CSF
SmartPrep	
Dramatically improves contrast-enhanced MRA	<ul style="list-style-type: none">Uses special tracking pulse sequence to constantly monitor the signal throughout user prescribed volumeDetects arrival of contrast bolus to automatically trigger the acquisitionOptimizes contrast enhancement
SmartStep	
Enhances peripheral vascular run-offs	<ul style="list-style-type: none">Adds table stepping capabilities to SmartPrepOptimizes contrast enhancement in peripheral vascular run-offs
Interactive Vascular Imaging (IVI)	
Quickly post processes and removes background from MR angiography images	<ul style="list-style-type: none">Produces angiographic and Maximum Intensity Projections (MIPs) in multiple scan planesEasy, interactive operationResults can be auto-saved as separate series within an exam for quick recall
IR-Prepared FGRE Sequence	
Allows the suppression and enhancement of various tissues within the myocardium	<ul style="list-style-type: none">User programmable inversion timeComes in 2D and 3D versions

Parallel-Imaging Acceleration Techniques	
Array Spatial Sensitivity Encoding Technique (ASSET)	
Used for reducing scan time, for increasing spatial or temporal resolution, or for acquiring more slices in a given scan time	<ul style="list-style-type: none">• Use with phased-array coils and acceleration factors up to two• Minimizes patient’s total RF exposure• Spin Echo• 2D Fast Gradient Echo (2DFGRE)• 2D Fast Spoiled Gradient Echo (2DFSPGR)• 3D Fast Gradient Echo (3DFGRE)• 3D Fast Spoiled Gradient Echo (3DFSPGR)• 3D Time-of-Flight Gradient Echo (3DTOFGRE)• 3D Time-of-Flight Fast Spoiled Gradient Echo (3DFSPGR)• 2D Fast Recovery Fast Spin Echo-XL (2DFRFSE-XL)• 2D Fast Spin Echo Inversion Recovery (2DFSE-IR)• 2D T1-Fluid Attenuated Inversion Recovery (T1-FLAIR)• 2D T2 FLAIR• Single-Shot Fast Spin Echo (SSFSE)• Echoplanar Imaging (EPI)• Diffusion-Weighted Echoplanar Imaging (DW-EPI)• LAVA (optional HD body application)• VIBRANT (optional HD body application)• 2D FIESTA (optional HD application)• 2D FIESTA-C (optional HD application)▪ 3D FIESTA (optional HD neuro application)▪ 3D FIESTA-C (optional HD neuro application)• 3D FRFSE

Post-Processing Applications	
Multi-Projection Volume Reconstruction (MPVR)	
Quick and easy generation of volumetric images for MR angiography	<ul style="list-style-type: none">• No need for thresholding• Uses an entire volume to generate images in any plane• Simultaneously creates real-time frames of reference
Multi-Planar Reformation (MPR)	
Enables evaluation of anatomy in off-axis planes	<ul style="list-style-type: none">• Sagittal, coronal, oblique and curved planar reformations• Batch reformations• Interactive Vascular Imaging (IVI)• Makes possible real-time assessments• Comparison mode• Multi-image ROI• 3D surface rendering
FuncTool Performance	
Enables advanced MRI post-processing using an array of sophisticated algorithms	<ul style="list-style-type: none">• ADC maps• eADC maps• Correlation coefficients for mapping of motor strip and visual/auditory stimuli• NEI (Negative Enhancement Integral)• MTE (Mean Time To Enhance)• Positive enhancement integral• Signal enhancement ratio• Maximum slope increase• Maximum difference function• Difference function• Optional single-voxel, 2D and 3D CSI post-processing

Optional Neuro Applications

PROPELLER

PROPELLER gets its name from its unique k-space acquisition, in which it acquires data in radial “blades” that rotate in sequence until the acquisition is complete.

Since each blade passes through k-space center, PROPELLER has unusually low sensitivity to motion artifacts, and unusually high contrast-to-noise properties. That makes it ideal for producing robust, high-resolution images in circumstances that might otherwise be very challenging.

It is available in three different acquisition techniques that deliver real clinical impact.

- T2 FSE PROPELLER creates motion artifact insensitive T2 FSE scans, with substantial increases in contrast-to-noise without any time penalty. Imagine acquiring a motion-free scan, every time, on even the most difficult of patients.
- T2 FLAIR PROPELLER achieves T2 FLAIR image contrast with all of the same motion reduction attractions.
- Diffusion weighted PROPELLER reduces susceptibilities that challenge traditional EPI-based DWI imaging. It produces high-quality results in the skull base even in the presence of dental work, craniotomies or other abnormalities that may cause a magnetic-field disturbance.

3D FIESTA

3D FIESTA (Fast Imaging Employing Steady-state Acquisition) combines 3D volumetric data acquisition with fluid sensitive steady-state imaging. Tissues with a high ratio of T2/T1 such as CSF and blood have high signal intensity, and the 3D volumetric acquisition enables high-resolution imaging of small structures such as the internal auditory canal, middle ear or joints.

FIESTA-C

This phase-cycled FIESTA approach reduces sensitivity to susceptibilities that may be encountered when imaging in the posterior fossa.

It provides exquisite contrast that is ideal for visualizing the Internal Auditory Canals (IACs) as well as for T2 imaging through the cervical spine.

Optional Cardiovascular Applications

TRICKS (Time Resolved Imaging of Contrast Kinetics)

Conventional MRA mandates trade-offs between spatial and temporal resolution, and poorly timed bolus capture often makes the problem worse. GE-exclusive TRICKS takes an entirely different approach to this challenge, in the process revolutionizing MRA. It uses an intricate, 3D K-space acquisition and reconstruction strategy – an approach that accelerates the acquisition’s temporal resolution without sacrificing spatial resolution. The result is perfect arterial, venous and equilibrium 3D volumes, even in those instances where there may be delayed flow, or different flow patterns exhibited between the contralateral and ipsilateral sides.

In addition, TRICKS can provide images subtracted from a mask view or unsubtracted images – the latter of particular utility in cases where patient motion in the abdomen or chest might otherwise be problematic for MR angiography. The user can select subtracted, unsubtracted, or both types of reconstructions from a single image set.

Fluoro-Triggered MRA

Fluoro-Triggered MRA images the anatomy continuously, enabling the user to manually trigger each angiographic acquisition as soon as he or she is satisfied with the level of vessel enhancement. This switch-over occurs almost instantly, in less than one second.

The result is an interactive, ASSET compatible and extremely accurate approach to contrast-enhanced MRA.

ECG-Gated 2D FIESTA Cine Cardiac Imaging

FIESTA (Fast Imaging Employing Steady State Acquisition) is a fully balanced, steady-state coherent imaging pulse sequence; it uses fully balanced gradients to re-phase the transverse magnetization at the end of each TR interval. This sequence accentuates the contrast of anatomy with high T2/T1 ratios (such as the cardiac blood pool), while suppressing the signal from tissues with low T2/T1 ratios (such as muscle and myocardium). This provides the net result of significant contrast enhancement between the myocardium and the blood pool.

Cardiac Tagging

Tagging is an application of spatial SAT pulses over the anatomy of interest to obtain cardiac images that are sensitive to tissue motion, and is sometimes used to evaluate contractile motion of the myocardium. There are two tagging selections available – stripes and grid.

3D Fat Sat FIESTA Coronary Artery Imaging

This acquisition allows acquisition of breath-held, 3D datasets of the coronary arteries. It combines enhanced vessel contrast with maximum background suppression. The resulting datasets can be quickly reformatted to demonstrate a entire coronary distribution in a single scan volume.

IR-Prepared FGRE Sequence

This technique consists of an IR-prepared FGRE sequence that through the application of a user programmable inversion time, allows the suppression and enhancement of various tissues within the myocardium. It comes in 2D and 3D versions.

Optional Body Applications

VIBRANT™ (Volume Imaging for Breast Assessment)

VIBRANT is a breast imaging application that allows the choice of direct sagittal or axial imaging. With sagittal VIBRANT, both breasts are imaged simultaneously (in the time it would normally take to do one). With the axial VIBRANT, imaging is performed without in-plane data interpolation (zero-filling) for enhanced data integrity. Both are multi-phase techniques that use dual shimming for optimum image quality and provide the choice of subtraction for enhanced background suppression.

VIBRANT integrates ASSET technology with unique bilateral shimming and a patented fat-suppression technique developed specifically for breast imaging.

Clinical Performance

The Signa HDe 1.5T is the most compact 1.5T scanner available; yet it offers a complete portfolio of clinical applications. It positions you to conduct a full range of procedures to enhance throughput, revenues, and most importantly, the diagnostic confidence of your physicians.



Scan Parameters

The Signa HDe 1.5T’s unique architecture optimizes transmission, gradient-pulse and RF-amplifier performance exam after exam. It makes excellent SNR, spatial resolution and temporal resolution part of your clinical routine.

- 3.9 mm minimum slice thickness
- 4 mm minimum FOV
- 1 shot minimum
- 2500 s/mm² maximum b value
- Maximum diffusion tensor directions: (n/a)
- Maximum ETL: 512

EPI			
	64 x 64	128 x 128	256 x 256
Minimum TR	6.0 ms	7.0 ms	8.0 ms
Minimum TE	1.7 ms	1.9 ms	2.4 ms
ESP at 25 cm FOV	0.700	0.992	1.544
ESP at 48 cm FOV	0.504	0.712	1.012
ESP at 99 cm FOV	0.352	0.496	0.700
Images per second	26	11	3

- 1 mm minimum slice thickness
- 1 cm minimum FOV
- 48 cm maximum FOV
- Maximum Echo Train length: 12

2D Fast Gradient Echo		
	128 x 128	256 x 256
Minimum TR	2.8 ms	3.4 ms
Minimum TE	1.0 ms	1.2 ms

- 0.2 mm minimum slice thickness
- 1 cm minimum FOV
- 48 cm maximum FOV

3D Fast Gradient Echo		
	128 x 128	256 x 256
Minimum TR	1.3 ms	1.7 ms
Minimum TE	0.5 ms	0.8 ms

- 0.9 mm minimum slice thickness
- 1 cm minimum FOV
- 48 cm maximum FOV

2D Spin Echo		
	128 x 128	256 x 256
Minimum TR	11.0 ms	11.0 ms
Minimum TE	2.7 ms	3.2 ms

- 0.9 mm minimum slice thickness (2D)
- 2 cm minimum FOV
- 48 cm maximum FOV
- Minimum number of shots: 1
- Maximum echo train length for SSFSE: 264

Fast Spin Echo		
	128 x 128	256 x 256
Minimum TR	12.0 ms	14.0 ms
Minimum TE	2.6 ms	2.9 ms
Minimum echo spacing at maximum FOV	3.0 ms	3.3 ms

Slice Thickness and FOV	
Minimum slice thickness in 2D	0.9 mm
Minimum slice thickness in 3D	0.2 mm
Minimum FOV	10 mm
Maximum FOV	480 mm

Note: Optional software packages may be required to achieve certain specifications.

Post-Processing

Post-processing has become an increasingly important factor in the diagnostic utility of MRI exams, especially as scanners have evolved to amass ever greater volumes of data. The Signa HDe lets users take full advantage of the resulting datasets with a portfolio of proven and new post-processing capabilities.

The optional GE Advantage Workstation® is an excellent tool for post-processing datasets acquired with the Signa HDe. It gives users instant access to advanced capabilities that address your biggest clinical and workflow challenges enterprise wide.



Data Management

Display

Your Signa HDe 1.5T scanner also comes standard with a state-of-the-art, wide-screen HD (high definition) monitor.

Networking

Our optional Performed Procedure Step (PPS) automatically notifies your HIS/RIS and PACS of procedure status, in effect closing the loop from patient arrival through billing.

DICOM Compliance

Images generated by the Signa HDe scanner adhere to the 2004 version of the DICOM conformance standard.

Objects created by the system include:

- MR images
- Secondary-capture images, both grayscale and color
- Grayscale Softcopy Presentation State (GSPS)
- Structured reports

In addition to supporting MOD, CD-R and DVD-R for DICOM interchange, the system also supports:

- CT images
- PET images
- RT structure set
- GEMS PET raw information

Transactions supported as a Storage Class User (SCU) or Store Class Provider (SCP) include:

- DICOM store with storage commit (SCU)
- DICOM store (SCU/SCP)
- DICOM modality worklist (SCU)
- DICOM performed procedure step (SCU)
- DICOM query retrieve (SCU/SCP)
- DICOM print – grayscale and color – (SCU)
- Basic application level confidentiality profile as a de-identifier

Finally, this system supports the following IHE Technical Profiles.

- Scheduled workflow with the following options:
 - Patient-based worklist query
 - Broad worklist query
 - Assisted-acquisition protocol setting
- Patient information reconciliation
- Simple image and numeric report
- Consistent presentation of images

HD Display Monitor Specifications
23 in. wide-screen (16:9) LCD flat panel
1920 x 1200 dot resolution
Non-interlaced, flicker-free presentation
Contrast ratio – 500:1
92 kHz horizontal deflection frequency, 85 Hz refresh rate
Digital DVI Interface

Filming

Image Filming Features
Drag and drop filming
One-button print series
One-button print page
Multi-image formats – 1:1, 2:1, 4:1, 6:1, 9:1, 12:1, 15:1, 16:1, 20:1, 25:1 and 35 mm slide
DICOM 3.0 basic grayscale print service class

Archiving

Standard MOD Drive
Maxoptix™ erasable, rewritable media
1.3 or 2.3 GB unformatted
Assigned to DICOM 3.0 format image file and protocol file storage/retrieval
Stores up to 15,000 (for 1.3 GB) or 30,000 (for 2.3 GB) loss-less JPEG compressed 256 x 256 image per MOD
Offline retrieval of image and scan files
DVD Interchange
Data transfer rate 21.6 MB/s
Access speed – average random stroke approx. 200 ms
Average 35,000 images per 4.7 GB DVD

For further details, please refer to the DICOM Conformance Statement and the IHE Integration Statement for the HDe product line.

Siting

The specifications provided here will give you an overview of the siting requirements of the 1.5T Signa HDe scanner including the CXK4-150 magnet and gradient electronics.

Your GE representative can provide you with a comprehensive installation and siting manual for your engineering and architectural staff.

Power Requirements

Power consumption depends on actual usage. The values shown in the chart to the right are an approximation. They exclude consumption by shield cooler compressor (9 kVA).

Electrical Supply System Requirements

GE recommends the following electrical supply configuration.

- 3-phase grounded WYE configuration with neutral and ground (5-wire system)

Alternatively, the supply system can be configured as follows.

- 3-phase DELTA with ground configuration (4-wire system)
- Corner grounded Delta configuration

Voltage Levels

Voltage levels for this product are as follows.

- 480/415/400/380/208/200 Vrms
- Frequency of 50 ± 0.5 Hz or 60 ± 0.5 Hz (Local voltage adaptation may be required)
- Recommended voltage configurations of:
 - 480 VAC/60 Hz 3-phase grounded WYE or
 - 400 VAC/50 Hz 3-phase grounded WYE

Installation Dimensions and Weights			
	Width	Height	Weight
Magnet assembly CX150 with K4 technology active shield	212 cm (83.27 in.)	241 cm (94.96 in.)	5155 kg (11,340 lbs.)
Signa patient transport	67 cm (26.13 in.)	97 cm (37.83 in.)	286 kg (629 lbs.)
Signa lite-patient transport	62 cm (20.3 in.)	97 cm (37.83 in.)	150 kg (330 lbs.)
Control room equipment			80 kg (175 lbs.)
MR equipment			1494 kg (3,287 lbs.)
Vibroacoustic mat (optional)			231 kg (510 lbs.)

Typical Room Layouts, Minimum Values

Magnet room	
Dimensions (W x D)	3.33 m x 5.70 m (10-11.3 ft. x 18 ft.)
Ceiling height	Typical 2.67 m (8.76 ft.) Minimum 2.5 m (8.20 ft.)
Equipment room	
Dimensions (W x D)	2.65 m x 2.5 m (8 ft. x 8 ft.) Also available in a no-equipment room configuration
Control room	
Dimensions (W x D)	1.52 m x 1.9 m (5 ft. x 7 ft.)

Power Consumption	
Standby (no scan)	4.4 kVA
Overnight mode (sleep mode)	2.5 kVA
Average power	10 kVA
Continuous sustained power (> 5 seconds)	34 kVA
Peak instantaneous power (in < 5 seconds)	40 kVA
1-phase	5.9 kVA*
3-phase	8.9 kVA*

*Excludes 9 kVA for shield/cryo cooler

System Cooling Options	
	Continuous Power Draw
Indoor chiller	6.5 kW @ 50 Hz / 7.5 kW @ 60 Hz
Outdoor chiller (200V)	7.5 kW @ 50 Hz / 8.5 kW @ 60 Hz
Outdoor chiller (400V)	7.5 kW @ 50 Hz / 8.5 kW @ 60 Hz

Fringe Field Considerations		
	Axial	Radial
0.5mT (5-gauss line)	4.00 m (13.12 ft.)	2.48 m (8.13 ft.)
Equipment room	5.70 m (18.7 ft.)	3.28 m (10.76 ft.)

Last Words

Here are a few more important things you should know about the Signa HDe 1.5T scanner.

Accessory Package

The scanner comes complete with SPT phantom set and storage cart, customer diagnostic software, operator manualsand patient log books.

Emergency Stop

Located in the magnet room, this control disconnects electrical power to the RF and gradient components in the magnet room; a duplicate control is located on the magnet itself.

Warranty

The published Company warranty in effect on the date of shipment shall apply. The Company reserves the right to make changes.

InSite™ Remote Diagnostics

GE-unique remote service and applications support including magnet monitoring, is readily available. This capability also allows downloading of applications software including the trial software available to users through our eFlex program.

GE Regulatory Compliance

The 1.5T Signa HDe system is a CE-compliant device that satisfies Electro-Magnetic Compatibility (EMC) and Electro-Magnetic Interface (EMI) regulations, pursuant to IEC-601.

Laser alignment devices contained within this product are appropriately labeled according to the requirements of the Center for Devices and Radiological Health.



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