GE Healthcare

Signa® HDxt 1.5T

Technical Data

imagination at work

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Signa HDxt 1.5T

Recent advances in clinical imaging technologies and workflow have placed even greater demands on today's MR systems. With new, high-density, multi-channel coil technologies, a faster and fully scalable reconstruction engine, and new parallel imaging acquisition and reconstruction technology, the Signa HDxt represents the next level of performance in 1.5T imaging.

Whether you choose an 8,- 16- or 32-channel configuration, this system will give you instant access to GE's leading edge capabilities – including our proven compact high homogeneity 1.5T magnet, powerful high-fidelity gradients, high-performance computing platform, and exclusive HDxt technology. The result is superb image quality, combined with uncompromised performance and workflow for today's most demanding researchers and clinicians.

Signa HDxt 1.5T System Overview

Clinical Leadership

Powered by GE signature applications such as Cube™, IDEAL, PROPELLER, TRICKS-XV, LAVA-XV and VIBRANT-XV, the Signa HDxt 1.5T MR scanner improves your diagnostic confidence for even the most difficult of patients. It raises the bar on 1.5T imaging and delivers new levels of clinical performance, with quick and accurate results across all applications.

Leading Edge Hardware

HDxt performance starts with advanced hardware including:

- Our actively shielded, high-homogeneity CXK4 magnet with 18 superconducting shim coils
- A high-fidelity HDxt gradient platform delivering excellent TR, TE and ESP performance
- A modular 8,- 16- or 32-channel receive chain that takes full advantage of GE's quadrature receive architecture and high density coils
- The latest in reconstruction power – XVRE volume reconstruction

Signa HDxt 1.5T delivers outstanding results across all applications, including advanced, data-intensive and highly accelerated techniques.

Workflow and Ease of Use

Advances in MR technology should not translate into increased complexity. With its intuitive point-and-click user interface, detachable table and unique acquisition approaches to maximize the success of every exam, Signa HDxt 1.5T delivers quick and accurate results patient after patient.

Full GE Support

When you choose the Signa HDxt 1.5T, you get more than just the finest MR scanner available. You also get the full support of GE Healthcare, from training and service to obsolescence protection – proven protection, demonstrated by the fact that 1.5T Signa systems installed as far back as 1988 have been upgraded to today's state-of-the-art performance levels.

Signa HDxt 1.5T – Your System of Choice

Patient Environment

A patient's first impression of a system can have a major impact on the success of a procedure. That's why the Signa HDxt 1.5T with its 1.89 m length (with enclosures), has been designed to put patients at ease. Once inside its spacious 60 cm bore, your patients will appreciate the in-bore lighting and ventilation system.

Patient Transport: Safety *and* Ease of Use

With the Signa HDxt 1.5T, there's no need to tie up the scan room with patient preparation. Thanks to its detachable mobile table – easily operated by a single technologist – your staff can scan one patient while preparing the next.

The detachable table isn't just about productivity. It's also about safety. When emergency extraction is required, it takes less than 30 seconds to transport a patient from inside the magnet to outside of the scan room, eliminating the need for MR-compatible emergency equipment.

Operator Scanning Experience

The Signa HDxt 1.5T computer architecture minimizes the delays often associated with conventional MRI. Built on a parallel, multiprocessor design, it enables simultaneous scanning, reconstruction, filming, archiving, networking and post-processing – ideal for both clinical and research environments.

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

- A high-definition, wide-screen monitor that consolidates the MR procedure from prescription through image review and post-processing into a simple and single user interface.
- HDxt gating, equipping your technologists with a simple lead placement algorithm that ensures 99% gating accuracy.
- HDxt ProtoCopy, for click-of-the-mouse downloading of complete exam protocols from other systems into the protocol database.
- AutoVoice to ensure consistent, repeatable breath-holding instruction.
- SmartPrescan, delivering system optimization for consistent image quality without the need for repetitive and unnecessary scan set-up time.

Patient Bore	
Patient bore (L x W x H)	70 cm x 60 cm x 60 cm
Laser alignments	Axial and sagittal
Patient bore	Dual flared
Lighting	In-bore
Table and scanner controls	Dual sided
Patient entry	Feet first or head first

Patient Transport	
Detachable table	Table detachment via a single motion, pedal driven detaching mechanism
Patient table	Completely detachable
Additional table	Optional
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 (fast)	10.26 cm/sec (4.03 in./sec)
Longitudinal speed (slow)	1.29 cm/sec (0.51 in./sec)
Vertical speed	2.58 cm/sec (1.02 in./sec)
Total cradle length	213.4 cm (84 in.)
Total cradle travel	244 cm (96.25 in.)
Scanning range	193.9 cm (76.34 in.)
Maximum patient weight for scanning	159 kg (350 lbs.)

The 1.5T Magnet

The Cornerstone of Uncompromised MRI

When it comes to image quality and applications flexibility, no other component of an MRI system has a greater impact than the magnet.

Easy Siting, Affordable Operation

The Signa HDxt 1.5T magnet is one of the most compact systems available. Complemented by GE's active shielding technology, the ceiling height requirement and magnet weight, the Signa HDxt 1.5T can be sited almost anywhere.

High Homogeneity Guaranteed

High homogeneity– our 1.5T magnet provides excellent results even in:

- Large FOV imaging up to 48 cm x 48 cm x 48 cm
- Off-center FOV imaging such as knee, shoulder and wrist imaging
- Fat saturation techniques required for abdominal, breast, musculoskeletal imaging
- Demanding applications such as cardiac, fMRI, diffusion tensor and spectroscopy

Magnet Specifications	
Operating field strength	1.5 Tesla
Operating frequency	63.85 MHz
Shim coils	18 super-conducting
Magnet shielding	Active
EMI	99%
Size (W x L x H)	2.07 m x 1.73 m x 2.36 m (6.8 ft. x 5.7 ft. x 7.7 ft.)
Magnet weight	5,532 kg with cryogens and gradient coil
Magnet cooling	Cryogenic (liquid helium)
Long-term stability	< 0.1 ppm/hour over 24-hour period
Cryogen refill period	Approximately 4 years
Cryogen refill period	Zero boil off*
Fringe field – 5 Gauss	4.0 m x 2.5 m (Axial x Radial) (13.12 ft. x 8.13 ft.)
Fringe field – 1 Gauss	5.7 m x 3.4 m (Axial x Radial) (18.7 ft. x 10.7 ft.)
Manufacturer	GE Healthcare

*Under normal operating conditions

LV-RMS Homogeneity		
DSV (Diametrical Spherical Volume)	Minimum ppm	Typical ppm
10 cm	< 0.05	< 0.025
20 cm	< 0.25	< 0.05
30 cm	< 0.50	< 0.25
40 cm	< 1.00	< 0.50
45 cm	< 1.25	< 0.63
48 cm	< 2.00	< 0.95

Large Volume Root-Mean-Square (LV-RMS) method is the most rigorous method with over 173,000 measurements collected over spherical volume.

V-RMS Homogeneity		
DSV (Diametrical Spherical Volume)	Minimum ppm	Typical ppm
10 cm	< 0.02	< 0.004
20 cm	< 0.06	< 0.02
30 cm	< 0.14	< 0.06
40 cm	< 0.35	< 0.27
45 cm	< 0.97	< 0.81
48 cm	< 2.00	< 1.65

Volume Root-Mean-Square (V-RMS) method is based on 24 measurements in each of 13 planes.

The Gradient System

High-Fidelity, High-Performance Gradients

Signa HDxt 1.5T delivers the accuracy, reproducibility, and power (33 mT/m amplitude and 120 T/m/s slew rate on each axis) you need to help ensure top quality results across all applications and pulse sequences.

The advantages become especially apparent in acquisitions demanding high spatial and temporal resolution and in rigorous applications such as Echoplanar (EPI) and Diffusion Tensor (DT) imaging. The Signa combines high gradient amplitudes and slew rates with 100% duty cycles assuring you of optimized contrast, SNR and scan time for any exam.

Signa HDxt 1.5T gradients are non-resonant and shielded to minimize eddy currents and improve image quality.

EchoSpeed Gradient Specifications	
Maximum integrated error*	250 µAs
Shot-to-shot*	25 µAs
Cycle-to-cycle*	35 µAs
Symmetry error*	90 µAs
Maximum gradient amplitude in each orthogonal plane	33 mT/m
Maximum effective gradient amplitude	57.2 mT/m
Minimum rise time to maximize amplitude (microseconds)	276
Maximum gradient slew rate	120 T/m/s
Maximum imaging FOV	48 cm (x, y, z)

* Typical gradient fidelity, measured in micro-Amperes-second (µAs), is derived from the following measurements: Maximum Error is the maximum integrated current error over a full-scale, echo-planar gradient waveform. Shot-to-Shot is the largest difference between integrated errors across waveforms. Cycle-to-Cycle is the largest integral current error between any two epi waveforms. Symmetry Error is the largest difference in integrated current error when comparing positive and negative gradient waveforms.

Computing Power and Data Management

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 HDxt 1.5T has been designed to help you manage and benefit from these trends.

Technical Specifications	
Main CPU	• Intel® Xenon 5130 (2.0 GHz) processor • PCI-express x16 graphics • 1 GHz AMD HyperTransport • 4 MB shared L2 cache
Word size	64 Bit
Host memory	8 GB FBD DDR2-667 ECC
Graphics subsystem	Main Display: NVIDIA® Quadro® FX 570 • 265 MB DDR graphics memory at 12.8 GB/sec • ProE-04: 38.81 • UGNX-01: 13.14 • 3ds Max-04: 37.07
Cabinets	Single, tower configuration
Disk subsystem	• System Disk: ▸ 73 GB, 15,000 RPM ▸ Serial attached SCSI • Data Disk: ▸ 146 GB (3 x 73GB), 15,000 RPM ▸ Serial attached SCSI, Raid 0 • 400,000 uncompressed 256 x 256 image files
Network	3x Gigabit (10/100/1000) Ethernet ports

Display

The Signa HDxt 1.5T scanner comes with a state-of-the-art, wide-screen HD (high definition) monitor. The monitor features:

- 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 on the Signa HDxt 1.5T include:

- Drag and drop filming
- One-button print series
- One-button print page
- Multi-image formats include 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
- Color printing

Archiving

Optional MOD drive
Maxoptix™ erasable, rewritable media
1.3 or 2.3 GB unformatted
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 images per MOD
Offline retrieval of image and scan files

DVD Interchange
DVD-RW
Data transfer rate 21.6 MB/s
Access speed – average random stroke approx. 200 ms
Average 35,000 images per 4.7 GB DVD

Networking and DICOM Compliance

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

The system generates images that adhere to the 2004 version of the DICOM compliance standard. Please refer to the DICOM Conformance Statement located at *http://www.ge.com/dicom* and the IHE Integration Statement for the HDxt product line for further details.

Objects created by the system include:

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

Additional supported objects:

- CT images
- PET images
- RT structure set
- GEMS PET raw information
- MOD, CD-R and DVD-R for DICOM interchange

Transactions Supported as a Storage Class User (SCU) or Storage Class Provider (SCP)
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

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

Transmit, Receiver and Image Reconstruction

Signa HDxt 1.5T scalable RF architecture easily accommodates 8-, 16- or 32-channel 1.5T configurations.

Standard RF Transmit Architecture	
RF amplifier	Air cooled, small footprint
Maximum output power	21 kW body, 4 kW head
Maximum RF field	> 24 µT
Transmit gain	> 100 dB (30 dB course/ 84 dB instantaneous)
RF exciter frequency range	64 ± 0.6 MHz
Amplitude control	16 bit with 50 ns resolution
Frequency resolution	< 0.6 Hz/step
Phase resolution	< 0.006 degrees/step
Amplitude stability	< 0.1 dB (5 min)
Phase stability	< 1.2 degrees (5 min)
Frequency stability	1 part per billion (10^9) (5 min)
Digital RF pulse control	2 amplitude modulators, 2 frequency or phase modulators

Optional Multi-Nuclear RF Transmit Architecture	
Maximum output power	2 kW or 4 kW options
Broadband RF exciter range	10-130 MHz
Amplitude control	16 bit with 50 ns resolution
Frequency resolution	< 0.6 Hz/step
Phase resolution	< 0.1 degree/step

Standard Receive Chain Architecture	
Receive channels	8 (std.), 16 or 32 (optional)
Analog to digital converters	8 (std.), 16 or 32 (optional)
Receive chain noise figure	< 0.8 dB nominal (includes switches, receivers, preamps)
Sampling rate	1 MHz @ 16 bits per channel
ADC sampling resolution	16 bit with 50 ns alignment
Receive signal filtering/decimation	Digital, non-recursive, linear FIR
Quadrature demodulation	Digital
Receiver dynamic range	> 145 dB/Hz
Receive signal resolution	Up to 32 bits
System pre-amplifiers*	9 with 28 dB gain
Pre-amplifier noise figure	< 0.5 dB

*Additional pre-amplifiers are provided with multi-channel, phased array coils.

Reconstruction

The Signa HDxt 1.5T features a powerful volume reconstruction engine (XVRE) that enables virtually real-time image generation, even when massive parallel imaging datasets are involved. Delivering high reconstruction capacity, the Signa HDxt 1.5T reconstruction engine features massive onboard memory for local raw data storage.

XVRE Reconstruction Engine (1 blade)
2 x 2.26 GHz dual-core AMD Opteron 2218 CPUs
16 GB ECC DDR2 667 RAM (21.3 GB/sec with processor integrated memory controller)
2 x 73 GB hard disk storage
4 GHz AMD HyperTransport
1MB full-speed L2 advanced transfer cache
1GB/sec Ethernet image transfer
2700 2D FFTs per second (full FOV, 256 x 256 matrix)

Specifications shown above are minimum performance levels

RF Coils and Arrays

The RF architecture of the Signa HDxt 1.5T scanner comes with an 8-quadrature channel design as standard or optional 16- and 32-channel configurations. It provides compatibility with surface coils developed by GE as well as coils developed by other vendors.

GE surface coils are developed to provide anatomical coverage without compromising image quality. Coverage is maintained while providing high-density arrays focused around the anatomy of interest to promote the highest image quality.

The scanner comes with a split-top, transmit/receive head coil as standard. Optional coils are shown here.

HD CTL Spine Array

- 8-channel, 14-element phased array design
- Whole spine imaging
- 75 cm S-I coverage
- 45 x 18 x 9.4 in (113 x 47 x 24 cm)

HD Cardiac Array

- 8-channel, 8-element phased array design
- Anatomically-optimized elements in the FOV
- Optimized for parallel imaging techniques performed in double oblique scan planes
- 34 cm S-I coverage
- 18 x 20 x 5 in (46 x 50 x 13 cm)

Quadrature Knee/Foot Coil

- Transmit/receive single channel multi-purpose foot/knee coil.
- Flexible positioning
- High uniformity and SNR
- 19 x 12 x 14in (48 x 31 x 36cm)

Head-Neck-Spine Array

- 16-channel, 29-element modular phased array design:
  - 12-element brain
  - 16-element NV
  - 5-element anterior neck
  - 8-element thoracic-lumbar spine
- Brain, neck and spine imaging without changing a coil
- Optimized for parallel imaging techniques
- 3 separate coils that may be plugged in simultaneously
- 90 cm S-I coverage
- 48 x 18 x 15 in (122 x 46 x 38 cm)

HD Breast Array

- 8-channel, 8-element phased array design
- Optimized for parallel imaging techniques
- VIBRANT compatible
- Biopsy compatible for both medial and lateral approaches
- PURE compatible
- Open design allows access to the breast for biopsy or needle localization procedures
- 20 x 21 x 10 in (50 x 54 x 25cm)

HD Lower Leg Array

- 16-channel, 32-element phased array design
- Optimized for parallel imaging
- Available on either 16- or 8-channel systems

HD NV Array (MedRad)

- 8-channel, 12-element phased array design
- Optimized for parallel imaging
- 44 cm FOV S-I coverage

HD NV Array (Invivo)

- 8-channel, 13-element phased array design
- Optimized for parallel imaging
- 40 cm FOV S-I coverage

HD Body Array

- 8- or 12-channel phased array versions
- Optimized for parallel imaging techniques
- 48 cm S-I coverage

GP Flex Coil

- Receive-only, multi-purpose coil
- Flexible positioning

HD Wrist Coil

- 8-channel, phased array coil
- Optimized for parallel imaging
- PURE compatible

HD Torso Array

- 8-channel, 8-element phased array design
- Optimized for parallel imaging techniques
- 40 cm S-I coverage
- 43 x 15 x 13 in (110 x 38 x 33 cm)

HD Knee Array

- 8-channel, 9-element phased array design
- Transmit/receive tapered design reduces aliasing artifacts
- PURE compatible
- IDEAL compatible
- Optimized for parallel imaging techniques
- Confidence in injury evaluation
- 16 cm S-I coverage
- 16 x 14 x 8 in (39 x 35 x 19 cm)

HD Brain Array

- 8-channel, 8-element patient-friendly and phased array design
- Optimized for parallel imaging techniques
- Compatible with fMRI stimulus hardware
- 24 cm S-I coverage
- 27 x 15 x 16 in (69 x 38 x 41 cm)

HD Shoulder Array

- 8-channel, 8-element concentric array design
- Unique Concentric Array Technology offers uniform depth penetration while maximizing signal-to-noise ratio
- Optimized for off-center imaging and joint visualization
- Homogenous imaging FOV and robust fat saturation
- Flexible housing contours to shoulder anatomy for easy set up and patient comfort
- PURE compatible
- IDEAL compatible
- 20 cm S-I coverage
- 25 x 23 x 25 in
  (10 x 9 x 10cm)

Dual Array Package

- Combined capability of 7.5 cm (3 in.) coil and flex coil
- Includes dual-coil combiner, TMJ positioning device, two 7.5 cm (3 in.) coils, two general-purpose flex coils, Eye/TMJ/IAC surface coil positioning device

HD Foot/Ankle Coil

- 8-channel, 8 elements
- Novel "ski boot" design keeps foot flexed for proper anatomical positioning
- Adjustable flexion and stabilization pads for optimal comfort
- Full foot imaging, including toe coverage
- IDEAL compatible
- 21 x 11 x 13 in
  (53 x 28 x 33 cm)

Endorectal Coil

- Compatible with HD Body Array
- Flexible design
- 18 x 18 x 9 in
  (45 x 45 x 22 cm)

General Purpose Surface Coils

- Single element receive-only coils
- 7.5 cm (3 in.) and 12.5 cm (5 in.) diameter loops
- Optional dual-array package includes positioning device, two 7.5 cm (3 in.) coils, and coil combiner for high-resolution, bilateral imaging
- High SNR over small FOV's

Imaging Performance

The Signa HDxt 1.5T is a 1.5T scanner offering a complete portfolio of clinical applications. It positions you to conduct a full range of routine and advanced procedures, to enhance throughput, revenues, and– most importantly – your diagnostic confidence.

Scan Parameters

The Signa HDxt 1.5T's unique architecture optimizes transmission, gradient pulse play-out and RF amplifier performance study after study. It routinely achieves the high pulse sequence performance specifications to produce uniformly excellent SNR, spatial and temporal resolution.

General System Slice Thickness and FOV Specifications	
Minimum slice thickness in 2D	0.5 mm
Minimum slice thickness in 3D	0.1 mm
Minimum FOV	10 mm (1 cm)
Maximum FOV	480 mm (48 cm)
Minimum and maximum imaging matrix	64 – 1024

- 0.6 mm minimum slice thickness
- 4 cm minimum FOV
- 1 shot minimum
- 7,000 s/mm^2 maximum b value
- 150 maximum tensor directions

EPI			
	64 x 64	128 x 128	256 x 256
Shortest TR	4.0 ms	5.0 ms	6.0 ms
Shortest TE	1.1 ms	1.2 ms	1.6 ms
ESP at 25 cm FOV	0.456 ms	0.660 ms	1.032 ms
ESP at 48 cm FOV	0.328 ms	0.460 ms	0.680 ms
ESP at 99 cm FOV	0.228 ms	0.320 ms	0.556 ms
Maximum images/sec	34	22	6

- 0.7 mm minimum slice thickness
- 1 cm minimum FOV

2D Fast Gradient Echo		
	128 x 128	256 x 256
Shortest TR	2.3 ms	2.7 ms
Shortest TE	0.9 ms	1.0 ms

- 0.1 mm minimum slice thickness
- 1 cm minimum FOV

3D Fast Gradient Echo		
	128 x 128	256 x 256
Shortest TR	1.0 ms	1.2 ms
Shortest TE	0.4 ms	0.5 ms

- 0.5 mm minimum slice thickness

2D Spin Echo		
	128 x 128	256 x 256
Shortest TR	9.0 ms	10.0 ms
Shortest TE	2.5 ms	2.5 ms

- 0.3 mm minimum slice thickness
- 1 cm minimum FOV
- 2.5 ms minimum echo spacing
- Maximum echo train length: 262

Fast Spin Echo		
	128 x 128	256 x 256
Shortest TR	10.0 ms	10.0 ms
Shortest TE	2.5 ms	2.5 ms

Signa HDxt 1.5T ScanTools

Signa HDxt 1.5T ScanTools is provided as standard on your system and provides a comprehensive set of pulse sequences and applications optimized for clinical performance.

Multi-Purpose Functionality	
Fast Spin Echo (FSE)	
Uses echo-train technology to reduce scan acquisition times	• 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	
High-quality, high-speed, high-contrast T2-weighted imaging	• Ideal for neurological, body, orthopedic and pediatric applications • Gives operator shorter acquisition times, increased slice coverage, and improved contrast when compared to conventional FSE
Single Shot Fast Spin Echo (SSFSE) and Enhanced MRCP	
Ultra-fast data acquisition within a single TR excitation	• Motion insensitive abdominal and pediatric imaging • Superior image quality T1 and T2 contrast • Uncompromised scan parameter selection and slice coverage
Gradient Echo (GRE)	
Rapid T1- or T2-weighted imaging	• 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
Dual Echo Gradient Echo	
Outstanding abdominal imaging	• Acquires two sets of images within a single breath-hold to capture both fat and water in- and out-of-phase TEs • Excellent slice registration for more accurate abdominal evaluations
Spectral Inversion of Lipids (SPECIAL)	
High-performance fat saturation	• Spectrally-selective inversion recovery pulse sequence • Rapid, optimized fat suppression to be used in conjunction with 3DGRE
i-Drive Pro	
Real-time interactive imaging	• Allows user to change scan parameters on the fly while evaluating real-time imaging results • Especially useful for organs subject to motion artifacts such as heart, diaphragm and GI tract, or when timing of contrast boluses is required

Additional Body Functionality

LAVA (Liver Acquisition with Volume Acceleration)

An enhanced 3D spoiled gradient echo technique that enables state-of-the-art, contrast enhanced, breath-hold dynamic liver imaging

- Uses ASSET acceleration
- Delivers superior spatial and temporal resolution
- Performs large volume slice coverage in significantly shorter total scan times than is possible with conventional techniques

3D Dual Echo

- GE unique, single breath hold abdominal imaging
- Designed to overcome the challenge of obtaining detailed tissue characterization within a single breath hold.
- It is an in-phase and out-of-phase acquisition that provides higher SNR (compared to 2D equivalent)
- Optimal contrast due to perfect co-registration of images and multiplanar reformatting capabilities

Additional Neuro Functionality

T1 and T2 Fluid-Attenuated Inversion Recovery (FLAIR)

Suppresses signal from CSF

- T1 and T2 FLAIR provide exceptional contrast between white and grey matter while suppressing the signal from CSF in T1- and T2-weighted brain and spine imaging

Echoplanar and FLAIR Echoplanar Imaging

Rapid neuro imaging

- Enables rapid imaging in procedures such as functional brain mapping

Diffusion-Weighted Echoplanar Imaging

Enables the detection of acute and hyper-acute stroke

- Single Shot FLAIR EPI and Single Shot, diffusion-weighted EPI with b-values up to 7,000 s/mm^2
- Automatic isotropic diffusion-weighted image generation
- Multi-NEX capability
- Online image processing
- ADC maps (enabled by FuncTool Performance – see page 18)

BRAVO (Brain Volume) Imaging

Fast IR-prepared 3D gradient echo imaging technique

- Affords isotropic, whole brain coverage with 1 mm x 1 mm x 1 mm resolution
- Coupled with parallel imaging, produces superior grey-white matter contrast in one third of the time of a conventional acquisition

2D MERGE (Multi-Echo Recombined Gradient Echo)

2D imaging technique designed to image the C-spine

- Automatically acquires and sums multiple gradient echoes at various echo times
- Improves grey-white matter contrast within the spinal cord
- Provides excellent demonstration of neuroforaminal canals

Signa HDxt 1.5T ScanTools (continued)

Additional Cardiac and Angiographic Functionality	
Black Blood Double and Triple Inversion Recovery	
Enables "black blood" cardiac imaging via an Inversion Recovery (IR) prep pulse that nulls the signal from blood	• User selectable, blood-suppression inversion time to optimize image quality • Performs across a single or double R-R interval • Triple IR-suppresses the signal from lipids
ECG-Gated FGRE and FSPGR FastCine	
Enables functional acquisitions of the heart	• Full R-R coverage to image the entire cardiac cycle from systole through diastole • Based on the patient's heart rate, view sharing is utilized to easily fit the acquisition into a single breath-hold
2D, 3D Gated and Enhanced Time of Flight (TOF) Imaging	
Ideal for non-contrast enhanced angiography in the body	• Relies on flow related enhancements to distinguish moving from stationary spins
2D and 3D Phase Contrast (2D PC, 3D PC)	
Determines flow velocities and directional properties of blood flow in vessels	• Uses image phase to encode velocity information • Also useful for other moving fluids such as CSF
SmartPrep	
Improves contrast-enhanced MRA by ensuring trigger upon contrast arrival	• Uses special tracking pulse sequence to constantly monitor the signal throughout user-prescribed volume • Detects arrival of contrast bolus to automatically trigger the acquisition
SmartStep	
Enhances peripheral vascular run-offs	• Adds table stepping capabilities to SmartPrep • Optimizes contrast enhancement in peripheral vascular run-offs
Interactive Vascular Imaging (IVI)	
Quickly post-processes and removes background from MR angiography images	• Produces angiographic and maximum intensity projections (MIPs) in multiple scan planes • Results can be auto-saved as separate series within an exam for quick recall

Parallel-Imaging Acceleration Techniques

Array Spatial Sensitivity Encoding Technique (ASSET)

Used for reducing scan time, for increasing spatial or temporal resolution, decreasing susceptibility-induced distortions, or for acquiring more slices in a given scan time.

- Use with phased array coils
- Minimizes patient's total RF exposure, thereby reducing SAR
- Compatible with the following pulse sequences:
  - 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 Spin Echo (2DFSE)
  - 2D Fast Spin Echo-XL (2DFSE-XL)
  - 2D Fast Recovery Fast Spin Echo (2DFRFSE)
  - 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)
  - Single-Shot Fast Spin Echo (SSFSE)
  - Echoplanar Imaging (EPI)
  - Diffusion-Weighted Echoplanar Imaging (DW-EPI)
  - Brain Volume Imaging (BRAVO)
  - LAVA
  - Diffusion Tensor Imaging (DTI)
  - Vibrant-XV
  - TRICKS-XV
  - BrainWave-RT

Autocalibrating Reconstruction for Cartesian imaging (ARC™)

GE developed Parallel Imaging technique that represents a major step forward in the speed and accuracy of highly accelerated parallel imaging.

- Improved image quality and patient throughput, increased spatial resolution or volumetric coverage, depending on the application
- Autocalibrating therefore requires no coil sensitivity map, enabling smaller FOV prescriptions and is less sensitive to motion artifacts compared to conventional parallel imaging techniques.
- Imaging FOV can be prescribed close to or even smaller than the anatomy of interest, enabling higher spatial resolution and diagnostic confidence.
- Unlike other methods, ARC uses a full 3D data kernel to synthesize missing target data from all three imaging directions, taking full advantage of available information along all three dimensions for improved reconstruction accuracy with fewer required calibration lines.
- ARC is enabled in the 3D Dual Echo Application and by the installation of the following options on your system
  - 3D Cube T2
  - 3D Cube PD
  - 3D Cube T2 FLAIR
  - LAVA-XV

Signa HDxt 1.5T ScanTools (continued)

Post-Processing Functionality	
Multi-Projection Volume Reconstruction (MPVR)	
Quick and easy generation of volumetric images for MR angiography	• 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	• Sagittal, coronal, oblique and curved planar reformations • Batch reformations • Interactive Vascular Imaging (IVI) • 3D surface rendering
FuncTool Performance	
Enables advanced MRI post-processing	• 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 • Single-voxel, 2D and 3D CSI post-processing

Imaging Options

Standard Imaging Options

Standard pulse sequence imaging options	• ASSET • Blood suppression • Cardiac gating/triggering • Cardiac compensation • Classic • DE prepared • Extended dynamic range • Flow compensation • Fluoro trigger • Full echo train • IR prepared • Magnetization transfer • Multi-station • Multi-phase and DynaPlan	• No phase wrap • Real time • Respiratory compensation • Respiratory gating/triggering • Sequential • SmartPrep • Spectral spatial RF • Square pixel • T2 prep • Tailored RF • ZIP 1024 • ZIP 512 • 3D Slice Zip x 2 (Z2) and Zip x 4 (Z4)

Additional Imaging Options

Available with the purchase of optional software packages	• Fluoro trigger (with the purchase of Fluoro-Triggered MRA) • Navigator (with the purchase of Navigators 3D Cardiac)

Neuro Applications

PROPELLER

PROPELLER derives its name from its unique k-space acquisition, acquiring data in radial "blades" that rotate in sequence until the acquisition is complete.

Since each blade passes through the center of k-space, PROPELLER has unusually low sensitivity to motion artifacts, and unusually high contrast-to-noise properties. This makes it ideal for producing robust, high-resolution images even in challenging patient situations.

It is available in three different acquisition techniques.

- T2 FSE PROPELLER creates motion-artifact insensitive T2 FSE scans without time penalty while providing substantial increases in contrast-to-noise.
- T2 FLAIR PROPELLER achieves T2 FLAIR image contrast, with the same motion reduction attributes as T2 FSE PROPELLER.
- Diffusion-weighted PROPELLER reduces susceptibilities that challenge traditional EPI-based DWI imaging. It produces high-quality results even in the presence of dental work or surgical clips.

3D Cube

A GE-exclusive technique, replaces several slice-by-slice, plane-after-plane 2D FSE acquisitions with a single 3D volume scan – providing you with T2, T2 FLAIR or PD sequences. You can easily reformat sub-millimeter isotropic volume data from a single acquisition into any plane –without gaps, and with the same resolution as the original plane. Our new self-calibrating parallel imaging engine ARC helps eliminate artifacts while accelerating image acquisition.

Diffusion Tensor Imaging with FiberTrak

This package expands EPI capability to include Diffusion Tensor imaging, a special technique that utilizes up to 150 diffusion-sensitizing gradient directions. It generates excellent image contrast based on the degree of diffusion anisotropy in cerebral tissues such as white matter. FuncTool capabilities on the console (included with ScanTools) create Fractional Anisotropy Maps (FA Maps) and Volume Ratio Anisotropy Maps (VRA Maps).

The FiberTrak post-processing capability utilizes the eigen-vector information from the Diffusion Tensor acquisition and processing. Using a robust and efficient seeding process, this processing quickly produces maps of diffusion along the white-matter tracts using the principal axes of diffusion (eigen vectors).

3D FIESTA

3D FIESTA (Fast Imaging Employing Steady-State Acquisition) delivers extremely short repetition times (TR) between RF pulses, delivering high T2 contrast and making it ideally suited for rapid, high-resolution imaging in areas such as the Internal Auditory Canals (IACs).

FIESTA-C

This phase-cycled FIESTA approach reduces sensitivity to changes in magnetic susceptibility that may be encountered when imaging in the posterior fossa and near air-tissue boundaries. It provides exquisite contrast that is ideal for visualizing the Internal Auditory Canals (IACs) as well as for T2 imaging in the cervical spine.

3D COSMIC

This 3D imaging technique is designed specifically for imaging in the C-spine. It provides a unique, fluid-weighted contrast to improve visualization of the cervical nerve roots and the intervertebral disks.

PROBE-PRESS Single-Voxel

PROBE-PRESS Single-Voxel Spectroscopy allows you to non-invasively evaluate the relative concentrations of in-vivo metabolites. It lets you acquire and display volume localized, water-suppressed 1H spectra in single-voxel mode. This package includes the PROBE-P (PRESS) pulse sequence as well as automated reconstruction, acquisition set-up and graphic prescription of spectroscopic volumes.

PROBE-PRESS and PROBE-STEAM Single-Voxel

For advanced spectroscopy users, this enables single-voxel capability with both the PROBE-PRESS and PROBE-STEAM pulse sequences.

PROBE 2DCSI

This capability lets you extend your Probe-PRESS spectroscopic capabilities to perform 2D CSI acquisitions, thereby enabling simultaneous multi-voxel, in-plane acquisitions. Post-processing, including the creation of metabolite maps, is automatically generated with the FuncTool Performance Package (included in ScanTools). Signa HDxt 1.5T supports true, multi-channel PROBE 2DCSI capabilities.

PROBE 3DCSI

With this capability, you can extend advanced Probe-PRESS 2DCSI spectroscopic capabilities to include three-dimensional, multi-voxel acquisitions. All post-processing, including the creation of metabolite maps, is automatically generated with the FuncTool Performance Package (included in ScanTools). Signa HDxt 1.5T supports true, multi-channel PROBE 3DCSI capabilities.

BrainWave Real-Time Functional Brain Mapping Package

This advanced software package allows a single operator to acquire, process and display BOLD (Blood Oxygen Level Dependent) fMRI color activation images in real time, directly on the scanner operator console. With ASSET compatibility to further improve image quality, BrainWave RT supports up to 25 frames per second of EPI imaging with these images being installed directly into the scanner database (up to 20,000 images/series).

Multiple options for displaying 2D real-time activation maps are available in order to improve patient compliance. This package may be used with user-minded paradigms and custom stimulus equipment supplied independently from GE. Resulting images may be rendered in 3D with the BrainWave Post Acquisition (BrainWave PA) software option.

BrainWave Post-Acquisition Software

This high-performance visualization software allows you to render detailed 3D brain images to provide visualization of functional activation from fMRI data acquired with BrainWave Real-Time. Display modes for the composite color activation Z-maps generated from one or more paradigms include segmented brain-only and unsegmented transparent-skull modes. Additional interrogation tools such as cut, peel and cross-reference permit detailed visual exploration of activated areas on the 3D-rendered model.

BrainWave Hardware Lite Supplemental Paradigm Delivery

BrainWave Hardware Lite is a supplemental paradigm-delivery system for functional MRI, developed for use with BrainWave Real-Time (RT) image acquisition software on the HDx MR system. BrainWave Hardware Lite includes a dedicated computer workstation, equipment rack and penetration panel waveguide insert, Cedrus patient response pads, and related cabling and connectors. It is designed to deliver visual and auditory stimuli and receive a tactile response. The computer includes preset paradigms and software tools to generate custom protocols. The visual and auditory output can be coupled to fMRI delivery systems purchased separately from other vendors (not included with BrainWave Hardware Lite).

BrainSTAT

The BrainSTAT post processing application automatically generates parametric maps for neuro Blood Flow, Blood Volume, Mean Transit Time, and Time to Peak signal intensity. A Gamma Variant fitting algorithm is used to automatically estimate the arterial input function, then calculate the values for the four parametric maps. The maps may be saved in DICOM format and fused with high resolution anatomic datasets for improved visualization of tissue and anatomy.

Advanced Spectroscopic Imaging

Multi-Nuclear Spectroscopy

GE offers a complete multi-nuclear package tailored for non-proton spectroscopy and imaging applications. This package includes a powerful, broadband RF amplifier and SAGE 7 post-processing software. Sites purchasing MNS will also want to consider which nuclei they want to study. Possible choices include 31P, 13C, 19F, 23Na, 7Li, 129Xe or 3He. All T/R switches and MNS coils must be purchased separately.

Advanced Spectroscopy Package

Tailored for your advanced spectroscopy needs, this package gives you complete flexibility in spectroscopic functionality. It expands conventional Probe-P (PRESS) and Probe-S (STEAM) capabilities to give you access to fid, spin-echo and self-refocused spin echo sequences.

SAGE 7 Software

SAGE 7 (Spectroscopy Analysis by General Electric, Version 7) allows you to process, display, manipulate, analyze, manage and print in-vivo spectroscopy data via an easy-to-use, graphical interface. You are able to apply a wide array of filters, transformations, correction algorithms, segmentations and quantifications to obtain precise information from your spectroscopic data. You can also output the data not only to a postscript printer, but also in electronic formats ranging from BMP, EPS and GIF to JPEG, PICT and TIF.

Cardiovascular Applications

TRICKS-XV: 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's exclusive TRICKS-XV takes an entirely different approach to this challenge. 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 excellent arterial, venous and equilibrium 3D volumes, even in those instances where there may be delayed flow or different flow patterns exhibited between the contra-and epsilateral sides.

To further enhance the temporal resolution capability, GE has made TRICKS-XV compatible with ASSET. This technique enables quick, repeated scanning of large, high-resolution volumes and benefits applications where fast flow is seen such as in ArterioVenous Malformations (AVMs) or shunts.

Additionally, TRICKS-XV can provide unsubtracted images or images subtracted from a mask view. The user is able to select subtracted, unsubtracted or both types of reconstruction from a single image set.

SWIFT: Switch on the Fly Technique

The SWIFT application combines TRICKS, parallel imaging technology, a unique dual-slab 3D data acquisition strategy and GE's exclusive 32-element peripheral vascular array to produce high-resolution images of the vascular tree.

During a SWIFT exam, two unique and independent 3D sagittal volumes are prescribed and acquired using TRICKS (Temporally Resolved Imaging with Contrast KineticS) while continually alternating the TR between the left and right volumes. ASSET is used to improve the temporal resolution of the SWIFT acquisition.

Each single leg of the HD Peripheral vascular coil receives data using 8 RF channels and hence, SWIFT is a technique which enables 8-channel HDxt MRI systems to scan both legs simultaneously during an MR angiogram in a oblique sagittal plane. This effectively brings 16-channel capability in lower leg MR angiography to 8-channel MRI scanners.

SWIFT is also particularly useful in 16-channel Signa HDxt configurations as it can reduce the scan time by 45% versus equal anatomical coverage of both lower legs.

SWAN

SWAN is a high-resolution 3D multi-echo gradient echo sequence that produces weighted averaging across images with different TE's to achieve higher susceptibility weighting. It provides minimum intensity projections over neighboring slices, enhancing contrast for certain tissues containing iron, venous blood, and other substances with susceptibilities that are different than the background tissues.

MR Echo

MR Echo combines the contrast, resolution and image quality of MR with the real-time speed and interactive capability of Ultrasound for MR cardiac imaging. With Signa HDxt 1.5T, the MR Echo environment utilizes parallel imaging-enabled FIESTA and fast gradient echo sequences to provide both anatomical and functional imaging capabilities.

Presently, patients have to undergo multiple breath-holds to achieve the "whole heart coverage" for wall motion. MR Echo employs a bright blood, ultra-fast FIESTA sequence which freezes motion without the need for breath-holding. The intuitive interface enables the operator to quickly scan the heart in any orientation and to save real-time images to the browser through bookmarks. Additionally, a Scan & Save mode enables high-resolution heart imaging with VCG and enables multiple functional images over many slices to be prescribed and scanned in a single breath-hold. The operator immediately visualizes scan time for the number of prescribed slices enabling each scan to be tailored to the patients breath-hold capability. All images acquired in Scan & Save are stored on the browser whilst the operator immediately continues with real-time scanning. MR Echo is able to significantly reduce typical cardiac exams times.

MR Echo also incorporates time course and myocardial evaluation imaging within a dedicated cardiac interface. The operator is able to switch rapidly between pulse sequences which reduces the scan time required for a comprehensive cardiac MRI exam. Time course imaging includes both a high contrast-to-noise ratio FGRE pulse sequence and a FIESTA pulse sequence.

A new "Lock Coverage" feature within MR Echo time course imaging automatically maintains start and end slice coverage despite changes in the patient' s heart rate between rest and stress time course imaging.

Myocardial Evaluation imaging is also performed within the MR Echo cardiac interface to complete a full assessment of the heart. All the pulse sequences in MR Echo are compatible with the AutoVoice feature in multiple languages to aid the operator workflow.

StarMap

StarMap are T2 and T2* mapping sequences and processing utilities used to image the heart and other tissues. This technique acquires multiple echoes at different TE times at each location resulting in datasets of images that represent different T2 and T2* weighting. Post-processing of the images is employed to generate maps of the MR signals T2 or T2* signal decay across the echoes.

Flow Analysis

A subset of the ReportCard 4.0, clinicians interested only in quantifying CSF or blood flow can access all of the ReportCard's flow features including: peak & average flow charts& graphs, automated contour detection & PACs compatibility. This is an Advantage Workstation Application.

AngioCARD

A reporting tool that allows clinicians to portray complex MR/CT angiography images in a concise and graphical format. Schematics of anatomy are used interactively to assist in communicating complex pathology. This is an Advantage Workstation Application.

Inhance Application Suite

The Inhance application suite consists of several new sequences designed to provide high-resolution images of the vasculature with short-acquisition times and excellent vessel detail. These new sequences include:

Inhance 3D Velocity

Inhance 3D Velocity is designed to acquire angiographic images in brain and renal arteries with excellent background suppression in a short scan time. By combining a volumetric 3D phase contrast acquisition with parallel imaging, efficient k-space sampling, and pulse sequence optimization, Inhance 3D Velocity is faster than previous generations and is capable of obtaining the whole neurovascular anatomy in approximately 5-6 minutes. Furthermore, background suppression is improved by the optimized pulse sequence design, resulting in better visualization of small branches. Respiratory triggering is also compatible with Inhance 3D Velocity to enable abdominal angiography, specifically renal arteries. The results are improved productivity and image quality.

Inhance 2D Inflow

The Inhance 2D Inflow pulse sequence is designed to acquire angiographic images of arteries, that follow almost a straight path (i.e. femoral, popliteal and carotid arteries). Arterial blood flow is faster during the systolic phase and slows down during the diastolic phase. Therefore, Inhance 2D Inflow is designed to acquire data during the systolic phase and offers the following:

- Optimized spatial saturation gap to improve fat suppression and background suppression. With this saturation gap optimization, higher views per segment (vps up to 48) can be used, resulting in significant scan time reduction.
- Peripheral Gating that minimizes the pulsatile artifacts.
- Optimized view ordering to improve arterial signal.
- ASSET acceleration compatibility to reduce scan time.

Inhance Inflow IR

Inhance Inflow IR is a new angiographic method, which has been developed to image renal arteries. It has an ability to suppress static background tissue and venous flow. This sequence is based on 3D FIESTA, which improves SNR as well as produces bright blood images. A selective inversion pulse is applied over the region of interest, which inverts arterial, venous, and static tissue. At the null point of the venous blood, an excitation pulse is applied to generate signal. The net result is an angiographic image with excellent background suppression that is free of venous contamination. Uniform fat suppression is achieved using a spectrally selective chemical saturation (SPECIAL) technique to provide uniform fat suppression while respiratory gating compatibility reduces respiratory motion artifacts during free-breathing renal exams.

Body Applications

LAVA-XV Imaging

LAVA-XV (Liver Acquisition with Volume Acceleration) extends LAVA functionality that comes standard with the Signa HDxt 1.5T ScanTools package. LAVA-XV utilizes ARC™ parallel imaging, which is an autocalibrating technique that requires no coil sensitivity map. ARC™ enables smaller FOV prescriptions and imaging that is less sensitive to motion artifacts when compared to conventional parallel imaging techniques.

3D Dual Echo

With improvements in parallel imaging and RF coil arrays, volumetric imaging in the body is becoming a standard of care. The 3D Dual Echo sequence produces in-phase and out-of-phase images in a single breath hold. As a result, the high-resolution images are in perfect alignment, simplifying the diagnostic process. In addition, the improved SNR of the 3D acquisition permits thinner slices than are traditionally available using 2D techniques.

StarMap

StarMap are T2 and T2* mapping sequences and processing utilities used to image the liver and other tissues. This technique acquires multiple echoes at different TE times at each location resulting in datasets of images that represent different T2 and T2* weighting. Post-processing of the images is employed to generate maps of the MR signals T2 or T2* signal decay across the echoes.

Breast Applications

VIBRANT-XV Breast Imaging

VIBRANT-XV (Volume Imaging for Breast Assessment) permits simultaneous, high-definition and fat-suppressed bilateral breast imaging in both the axial or sagittal scan planes. With VIBRANT-XV, imaging is performed without in-plane data interpolation for enhanced data integrity. VIBRANT-XV allows acceleration in both the phase encoding as well as the slice select direction. This is coupled with a patented fat-saturation technique and automatic subtraction of the images. The result is high spatial and temporal resolution images that demonstrate exquisite contrast and high lesion conspicuity. The high spatial resolution make the VIBRANT-XV acquisition ideally suited for reformation into other scan planes.

BREASE Breast Spectroscopy

Conventional MR imaging has been well established as delivering high sensitivity breast imaging. Through the use of single-voxel breast spectroscopy, breast MR may now also deliver improved specificity. A voxel placed over a lesion in question allows the detection of choline in the resultant spectrum.

CadStream Breast Analysis

The CADStream package includes hardware and post-processing software that facilitates analysis and management of breast image data. Image processing is performed automatically, using predefined templates for non-rigid image registration, subtraction, parametric maps, maximum intensity projection and multi-planar reformat. CADStream also generates reports that include images and graphs that can be exported in PDF or DICOM formats.

CADstream includes SureLoc – a tool that helps radiologists to more efficiently calculate coordinates for MR-guided interventions at the point of procedure. SureLoc reports needle position in real time and displays images and needle position in the patient's orientation.

Musculoskeletal Applications

CartiGram

Cartigram is a non-invasive T2 mapping package that provides high-resolution maps of the T2 values in cartilage and other tissues. The imaging results are color coded to highlight those structures with increased water-content yielding elevated T2 values.

IDEAL

Areas such as the foot/ankle, shoulder, and off-isocenter wrist make fat saturation a challenge. With IDEAL, water, fat, in-phase, and out-of-phase images can be generated even in the presence of large static-field variations. This sequence produces consistent and reliable images in challenging anatomical areas.

Post-Processing

Post-processing has become an important factor in the diagnostic utility of MRI exams, especially as scanners have evolved to amass ever-greater volumes of data. The Signa HDxt lets users take full advantage of the resulting datasets with a portfolio of proven and new post-processing capabilities. You'll find a number described with their associated applications on page 19 of this datasheet.

The GE Advantage Workstation® is an excellent tool for post-processing datasets acquired with the Signa HDxt 1.5T, providing streamlined workflow that doesn't encroach on valuable scanner console time.

Siting

The specifications provided here will give you an overview of the siting requirements of the 1.5T Signa HDxt scanner including the LCC (CXK4) magnet and gradient electronics.

Alternative environments, such as modular buildings, may also be appropriate; buildings including air-conditioning, heating, chiller, RF shielding and additional magnetic shielding in the walls. Your GE representative can provide you with a comprehensive installation and siting manual for your engineering and architectural staff.

Electrical Supply System Requirements

GE recommends the following electrical supply configuration.

- 480 VAC/60 Hz 3-phase grounded WYE or
- 400 VAC/50 Hz 3-phase grounded WYE

Standby power consumption is 13.4 KVA at 0.9 lagging Power Factor including 4.4 KVA for PDU and 9KVA (continuous operation) for Shield/Cryo Cooler Cabinet.

Typical Room Layouts, Minimum Values Layout Dimensions

Magnet Room	
Dimensions (W x D)	3.34 m x 5.98 m (10.96 ft. x 19.61 ft.)
Ceiling height	Typical 2.67 m (8.76 ft.) Minimum 2.5 m (8.20 ft.)
Equipment Room	
Dimensions (W x D)	2.44 m x 3.66 m (8.0 ft. x 12.0 ft.)
Control Room	
Dimensions (W x D)	1.52 m x 2.13 m (4.98 ft. x 6.98 ft.)

Fringe Field		
	Axial	Radial
0.5mT (5-gauss line)	4.0 m (13.12 ft.)	2.5 m (8.13 ft.)
0.1mT (1-gauss line)	5.7 m (18.70 ft.)	3.4 m (10.76 ft.)

Installation Dimensions and Weights			
	Width	Height	Weight
Magnet assembly LCC (CXK4) actively shielded with enclosures, gradient and RF coil, and cryogens	2.3 m (7.56 ft.)	2.39 m (7.84 ft.)	5,532 kg (12,198 lbs.)
Vibroacoustic mat (optional)			261 kg (575 lbs.)
Patient transport	62.2 cm (2.04 ft.)	97 cm (3.18 ft.)	127 kg (280 lbs.)

Other Considerations

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

Optional capabilities

Many features and capabilities listed in this data sheet are optional with a GE Signa HDxt system and are subject to change without notice. Contact a GE representative for the most recent data.

Accessory Package

The scanner comes complete with System Performance Testing (SPT) phantom set and storage cart, customer diagnostic software, operator manuals and 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 GE warranty in effect on the date of shipment shall apply. GE reserves the right to make changes.

InSite™ Remote Diagnostics

GE-unique remote service and applications support, including magnet monitoring, is readily available. InSite also allows downloading of applications software including the capability to trial GE's optional software packages through GE's eFlexTrial program.

GE Regulatory Compliance

The 1.5T Signa HDx system is a CE-compliant device that satisfies Electro-Magnetic Compatibility (EMC) and Electro-MagneticInterference (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.

General Electric Company, Inc.,
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Healthcare Re-imagined

GE is dedicated to helping you transform healthcare delivery by driving critical breakthroughs in biology and technology. Our expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, and biopharmaceutical manufacturing technologies is enabling healthcare professionals around the world to discover new ways to predict, diagnose and treat disease earlier. We call this model of care "Early Health." The goal: to help clinicians detect disease earlier, access more information and intervene earlier with more targeted treatments, so they can help their patients live their lives to the fullest. Re-think, Re-discover, Re-invent, Re-imagine.

GE Healthcare
3000 North Grandview
Waukesha, WI 53188
U.S.A.

www.gehealthcare.com

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