

NM PET MR, VAMC PALO ALTO, CA 640-B64012

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SIGNA PET/MR 3.0T

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The SIGNA PET/MR system from is designed to deliver maximum flexibility by combining state-of-the-art lutetium based scintillators (LBS) and Silicon Photomultiplier (SiPM) PET detectors. The SiPM detectors enable Time-of Flight (TOF) reconstruction, integrated in an MR750w 3.0T magnet with a 60 cm bore. The SIGNA PET/MR provides simultaneous PET/MR acquisition with advanced MR and PET applications. The high sensitivity of the Time-of-Flight PET offers the potential for dose reduction or shortened PET scan duration. TOF offers higher signal-to-noise images with improved PET contrast-to-noise.

The EL platform package delivers the PET/MR electronics, operating software, imaging software, post-processing software and RF coil suite for the SIGNA

PET/MR system:

- Magnet/Gradient Technology
- Acoustic Reduction Technology
- OpTix RF Receive Technology
- RF Transmit Technology
- SiPM Technology
- PET Performance/Reconstruction
- Volume Reconstruction Engine
- Computing Platform and DICOM
- Patient Table with IntelliTouch
- Express Workflow and In-Room Console
- Integrated PET/MR User Interface
- Offline Image Viewing
- SIGNA PET/MR Coil Suite
- EL MR-only Coil Suite
- PET/MR ScanTools and EL Tools
- Silent Neuro Exam Suite

Magnet Technology: The SIGNA PET/MR is designed to combine the latest PET imaging technology with the power of GE's 3.0T magnet technology for uncompromised MR performance with high homogeneity, a compact design, excellent gradient linearity and RF uniformity.

Gradient Technology: The SIGNA PET/MR system utilizes a peak amplitude per axis of 44mT/m and up to 200 T/m/s instantaneous peak slew rate per axis to deliver premium clinical performance. The gradients are non-resonant and actively shielded to minimize eddy currents.

Acoustic Noise Reduction Technology: The SIGNA PET/MR system features four levels of acoustic reduction

technology to deliver an enhanced patient environment.

- Gradient coil isolation
- RF coil isolation
- Vibro-acoustic isolation
- Gradient waveform optimization

OpTix RF Receive Technology: The SIGNA PET/MR system utilizes the OpTix RF receive chain to enable high bandwidth, high channel count reception with improved SNR over conventional MR receiver designs.

RF Transmit Technology: The SIGNA PET/MR system integrates an innovative RF transmit architecture designed to enhance overall image uniformity, and a multi-faceted SAR optimization system.

The RF architecture of the SIGNA PET/MR system consists of a liquid-cooled 30 kW solid-state RF power amplifier with multiple independent output channels. The MultiDrive RF amplifier adjusts/optimizes the phase and amplitude of each RF amplifier output channel that is applied to the 2-port drive whole body RF transmit coil. The SIGNA PET/MR system utilizes the PERFORM 2.0 SAR management system to optimize scanning efficiency.

Silicon Photomultiplier Technology (SiPM): The PET hardware is based on LBS crystals and MR-compatible Silicon Photomultiplier technology. The SiPM PET ring is integrated into the MR RF body coil at the magnet's isocenter and provides a 25cm axial field of view (aFOV). This detector

combination of an LBS scintillator and SiPM gives SIGNA PET/MR the ability to perform time-of-flight PET simultaneously with 3.0T MR imaging.

PET Performance: With a Field-of-View (FOV) of 25cm and the superlative timing and light collection properties of the SiPM detector, the sensitivity of the SIGNA PET/MR is outstanding.

PET Reconstruction: The SIGNA PET/MR system includes iterative reconstruction both with and without TOF for regular and calibration/image quality control utilization. SIGNA PET/MR reconstructions include standard corrections as well as those specific to MR and PET. Of particular importance is the use of non-attenuated corrected TOF PET images to determine patient boundary information that is not available in MR attenuation correction maps (MRAC). In addition to included reconstruction algorithms, the SIGNA PET/MR supports output of PET data in list mode.

- VUE Point HD is designed to maximize image quality with 3D iterative reconstruction and advanced correction techniques.
- VUE Point FX incorporates greater contrast and activity delineation for improved image quality.
- Sharper IR is an advanced system modeling in PET reconstruction that enhances visual contrast and resolution.

PET/MR Volume Reconstruction Engine (VRE): The SIGNA PET/MR system features a powerful MR volume reconstruction engine with onboard memory and local raw data storage to support and maintain simultaneous data acquisition and reconstruction. VRE uses 64-bit computing, delivering high acquisition memory and fast performance. Parallel processing and high speed interconnects provide scalable memory and throughput.

Computing Platform and DICOM: The SIGNA PET/MR system computing platform is designed for efficiency and built upon a parallel, multiprocessor design that delivers the simultaneity and speed needed for advanced clinical operation. Productivity, efficiency and streamlined data management are assured through simultaneous scanning, reconstruction, filming, archiving, networking and post-processing. The scan control keyboard features intercom speaker, microphone, volume controls, start scan, pause scan, stop scan and table advance to iso-center controls. Please refer to the SIGNA PET/MR product data sheet for greater detail.

The SIGNA PET/MR system generates simultaneous PET/MR or MR only images, secondary capture, structured report, and gray scale softcopy presentation state DICOM objects. The DICOM networking supports both send and query retrieve as well as send with storage

commit to integrate with PACS archive.

SIGNA PET/MR Patient Table with IntelliTouch: The fully detachable SIGNA PET/MR table is easily docked and undocked by a single operator and simple to move in and out of the exam room for patient transport and preparation. The SIGNA PET/MR patient table and associated patient handling system have been enhanced to provide high accuracy and reproducibility of positioning required to ensure maintenance of physical co-registration for simultaneous dual modality imaging.

- Maximum patient weight: 500 lbs
- Scan Range: 205cm MR and 188cm PET
- Vertical and longitudinal power drive
- IntelliTouch/Laser alignment land-marking

The SIGNA PET/MR table features a set of anti-skid patient comfort pads that have been characterized for PET attenuation correction.

Express Workflow and In-Room Operator Console: The SIGNA PET/MR system incorporates features designed to streamline and automate workflow. At the same time, the flexibility of the interface helps ensure the acquisition is tailored to every patient while the steps to set-up are consistent.

Express Exam Workflow includes:

- In-Room Operator Console and controls (iROC)
- Protocol Management: Protocol

Libraries,

- PhotoCopy, Protocol Notes, Modality Worklist
- Workflow Management and Auto Features: Workflow Manager, Linking, AutoStart, AutoScan, Auto Coil Prescription, AutoVoice, Auto-Calibration
- Inline Processing and Inline Viewing

The SIGNA PET/MR system has automated many routine tasks to simplify patient preparation and increase productivity. With IntelliTouch technology, In-Room Operator Console and dual-sided controls the technologist can touch the table sensor and the advance to scan button to perform the following:

- Landmark the patient
- Activate the surface coil
- Center the patient in the bore
- Start scanning
- Acquire, process and network images

The In-Room Operator Console, mounted on the front of the magnet, and dual-sided controls enable interaction with the host computer from the magnet room. The user has direct control or selection of:

- Display of patient name, ID, study description
- Display and entry of patient weight
- Display and entry of patient orientation and position
- Cardiac gating waveform display
- EKG lead confirmation with gating control: trigger select, invert, and

reset

- Respiratory waveform display
- IntelliTouch Landmarking
- AutoStart
- Display of coil connection and status
- Display of table location and scan time
- Screen saver

Integrated SIGNA PET/MR User Interface:

The SIGNA PET/MR system enables complete control of protocols for simple prescription, archiving, searching, and sharing. Protocols are organized into two libraries: GE Authored and Site Authored. The Modality Worklist provides an automated method of linking exam and protocol information for a patient directly from a DICOM Worklist server.

The SIGNA PET/MR integrated user interface (UI) enables flexibility and simplicity in scanner operation. The modality worklist (MWL) provides an automated method of obtaining exam and protocol information for a patient directly from a DICOM Worklist server. The automated insertion of MR sequences for MR attenuation correction per prescribed PET bed streamlines patient set up.

GraphicRx (PET and MR): The Workflow Manager controls the execution of scan prescription, acquisition, processing, viewing and networking and may automate these steps, when requested by the user, through the selection of Linking and AutoScan.

Auto Coil Prescription will automatically select the optimum subset of elements for scanning based on the prescribed FOV once the landmark has been set, and AutoStart will automatically start the first acquisition as the technologist exits the magnet room. In addition, AutoVoice ensures that consistent and repeatable instructions are delivered to the patient, and Auto Calibration will automatically acquire a calibration scan for ASSET and/or PURE when needed.

Processing steps are automatically completed with Inline Processing once the data have been reconstructed and the images saved into the database. For certain tasks, the user must accept the results or complete additional steps prior to saving the images. These automatic Inline Processing steps can be saved into the "Site Authored" Protocol Library.

Inline Viewing allows the user to conveniently view, compare, and analyze images from the Scan Desktop by selecting the desired series from the Workflow Manager. The ImageQC application is used to show PET images beside and fused with images from MRAC or other relevant simultaneous MR images.

PET/MR Imaging Coil Suite:

The PET/MR Coil Suite consists of a set of receive-only RF arrays designed for whole body simultaneous MR and PET imaging procedures. The coil

design ensures that the geometry of the surface coil matches the geometry of the patient, and the system automatically selects the coil mode configuration that best fits the selected region of interest.

The PET/MR compatible Coil Package supports parallel imaging in any plane and accommodate both feet-first and head-first positioning with HNU, UAA, LAA, and CMA. This package includes:

- 8-Channel HD Brain Array
- Head Neck Unit (HNU)
- Upper Anterior Array (UAA)
- Lower Anterior Array (LAA)
- Central Molecular imaging Array (CMA)

The PET/MR coil system is indicated for use of: head, neck, brachial-plexus, spine, pelvis, hips, prostate, abdominal, cardiac, lower extremities, blood vessels, and long bone imaging. The combined use of the PET/MR coils will facilitate high-resolution, high-SNR whole body imaging from top of head to mid-thighs.

The 8-channel HD Brain Array comprises:

- 8-channel, 8-element phased-array design
- Parallel imaging compatible
- Head-first only imaging

The HNU is a flexible neuro imaging coil system that includes a head base-plate and three (3) anatomically optimized anterior arrays: the anterior neuro-vascular array, the anterior cervical spine array, the

anterior open-face array.

The HNU may be positioned at either end of the SIGNA PET/MR patient table to support head-first or feet-first imaging and may remain in place for all body, vascular, spine, and the majority of MSK exams. The HNU base plate supports the patient's head and contains three rows of elements separated in both the superior/inferior and right/left dimensions.

The 3.0T HNU-Neuro-Vascular Array comprises:

- Elements: up to 27 combined with CMA and AA

The 3.0T HNU- Anterior Unit with the Open Face Adapter comprises:

- Elements: up to 15 elements in the FOV when combined with CMA

The Head Neck Cervical Spine Specifications comprises:

- Elements: up to 17 elements in the FOV when combined with CMA

The Central Molecular imaging Array (CMA) is integrated within the patient handling system at the PET/MR isocenter and is designed to be used in conjunction with the HNU, Upper AA or Lower AA. Unique electronic decoupling circuits ensure there is no interference between the coils enabling the CMA to remain in place for all MR and PET exams. The CMA may be removed for researchers performing Multinuclear Spectroscopy (MNS).

The 3.0T CMA comprises:

- Elements: 14

The Upper Anterior Array facilitates chest, abdomen, pelvis, and cardiac imaging. The UAA is lightweight, thin and flexible, and designed to conform to the patient's size and shape. With 54 cm of S/I coverage, the AA permits upper abdomen and pelvis imaging without repositioning the coil and can be combined with the LAA.

The 3.0T UAA comprises:

- Elements: 16 with up to 32 combined with LAA

The Lower Anterior Array facilitates imaging of the pelvis and lower legs. The LAA is lightweight, thin and flexible, and designed to conform to the patient's size and shape. With 54 cm of S/I coverage, the AA permits upper abdomen and pelvis imaging without repositioning the coil and can be combined with the UAA.

The 3.0T LAA comprises:

- Elements: 16 with up to 32 combined with UAA

EL MR Coil Suite: The EL Coil Package is validated for MR-Only imaging acquisitions. This package includes:

- 3.0T Flex Suite (SM, MD, and LG)
- 3.0T split-top, transmit/receive Head Coil

The Flex Suite is a versatile set of high density 16-channel receive arrays designed to provide high quality imaging in a wide range of clinical applications.

This extended set includes all three coils and a knee stabilization fixture designed for compatibility with the SIGNA PET/MR patient table.

- Large Flex Array: 23 cm x 70 cm
- Medium Flex Array: 23 cm x 48 cm
- Small Flex Array: 23 cm x 38 cm
- Flex Knee Stabilization Fixture

Split-Top Transmit/ Receive Head Coil:

The Split-top transmit/receive head coil comes standard with every scanner.

Coil Mode Configuration: All coils are designed to reduce the need for multiple physical coil changes within a single exam, between different exams, and to improve patient comfort. After positioning the coils, the operator can plug them into several available ports located within the magnet or directly on the patient table. The system will automatically select the coil mode configuration that best fits the selected region of interest.

PET/MR ScanTools: ScanTools and Essential Tools for SIGNA PET/MR comprise a comprehensive package of pulse sequences, core applications, imaging options and post-processing capability optimized for MR and PET performance. Please refer to the SIGNA PET/MR product data sheet for detailed descriptions.

- Spin Echo and Fast-Spin Echo suites: SE, FSE, FSE XL, Fast Recovery FSE, FSE Inversion Recovery, 3D FSE, Single-Shot FSE, Single-Shot FSE IR, T1 FLAIR and T2 FLAIR CNS imaging.
- Gradient Echo suite: 2D and 3D GRE, 2D and 3D Fast GRE, 2D and 3D Spoiled PGR, 2D and 3D Fast SPGR, 2D

and 3D Dual Echo GRE body imaging.

- SPECIAL spectral-spatial, inversion-based fat suppression for 3D FGRE sequences.
- Echo Planar Imaging suite: SE/GRE/FLAIR based EPI, Single/Multi-Shot/Phase EPI.
- Diffusion-Weighted EPI imaging with b-values up to 10,000 s/mm².
- FIESTA steady-state imaging includes 2D FIESTA cardiac imaging.
- PROPELLER 3.0 motion-insensitive imaging with T1 FLAIR, T2, T2 FLAIR or PD-weighted contrast - enabled in all scan planes.
- PROPELLER 3.0 DWI FSE-based diffusion weighted imaging with radial k-space filling.
- 3D Cube 2.0 high-resolution FSE-based imaging with T1, T2, T2 FLAIR or PD-weighted contrast.
- 3D BRAVO high-resolution SPGR-based T1 weighted brain imaging.
- ReadyBrain automated scan prescription for brain exams.
- 2D/3D MERGE multi-echo GRE-based imaging.
- 3D COSMIC high-resolution GRE-based cervical spine imaging.
- 3D LAVA single breath-hold, high resolution SPGR-based T1-weighted liver imaging with SPECIAL fat suppression.
- Time-of-Flight MRA Suite: 2D TOF, 2D Gated TOF, 3D TOF and Enhanced 3D TOF.

- Phase Contrast MRA Suite: 2D PC, 3D PC, Cine PC.
- SmartPrep automated bolus detection.
- Fluoro-Trigger MRA real time bolus monitoring with interactive triggering.
- QuickSTEP automated multi-station acquisition.
- iDrive Pro real time interactive imaging.
- Double/Triple IR black-blood cardiac imaging with/without fat suppression.
- FastCINE functional cardiac imaging with full R-wave coverage.
- 2D and 3D GradWarp automated distortion correction.
- ARC acceleration 3D data-based, auto calibrating parallel imaging technique.
- ASSET image-based parallel imaging technique with acceleration factors up to 3X.
- Cardiac gating/triggering, compensation, blood suppression, flow compensation.
- Respiratory gating/triggering compensation.
- IVI inline, interactive post-processing for vascular MRA data sets.
- Multi-Planar Volume Reformat inline, interactive post-processing for 3D volume data sets.
- FuncTool Performance advanced post processing algorithms.
- MR Pasting automated integration of

multi-stations exams into a single image.

- BrainStat GVF automated calculation of parametric maps for Cerebral Blood Flow, Blood Volume, Mean Transit Time and Time to Peak.
- BrainStat AIF calculation of parametric maps for Cerebral Blood Flow, Blood Volume, Mean Transit Time and Time-to-Peak signals.

Silent Neuro Exam comprises a comprehensive set of sequences designed to generate high resolution images with T1, T2, T2 FLAIR, PD weighted and MRA contrasts. The Silenz imaging sequence delivers 3D isotropic images with T1 or PD contrast with sound levels that are within 3dB of the ambient conditions.

EL Tools: EL Tools enable advanced clinical applications for SIGNA PET/MR with specialized applications and post-processing capability.

Clinical Applications:

- MAVRIC SL advanced visualization of soft tissues and bone near MR conditional devices on patients cleared for MR.
- FOCUS leads to a reduced field of view DWI/DTI acquisition which removes artifacts typically induced from motion, image back folding, image blurring or unsuppressed tissue by a selective excitation to include only the anatomy of interest.
- IDEAL and FLEX high resolution SPGR-based fat and water separation liver imaging with T1-weighted contrast.

- IDEAL IQ is an acquisition and recon technique that simultaneously obtains independent images of hydrogen nuclei that resonate at different frequencies to provide separation of water and triglyceride fat.
- StarMap T2* decay curve imaging using a variable echo, 3D GRE-based technique.
- CartiGram T2 mapping sequence and processing utility used to non-invasively detect changes in the collagen component of the extracellular cartilage matrix.

Neuro Applications:

- SWAN enhanced SNR T2*-weighted susceptibility imaging - multi-echo, 3D GRE based technique.
- 3D ASL high resolution quantitative brain assessment using an FSE-based sequence with pulsed continuous labeling.
- eDWI enhanced SNR diffusion-weighted imaging for brain and liver.
- Diffusion Tensor imaging with up to 150 different diffusion directions.
- FiberTrak post-processing for the generation of Eigen-vector information from DTI data sets.
- 3D PROMO provides real time 3D navigator based motion correction algorithm. 3D PROMO is compatible with both T2 and T2 FLAIR.
- CUBE acquisitions: CUBE 2.0 a 3D sub millimeter isotropic Cube volume data that can be easily reformatted

into any plane.

- Ready Brain provides the flexibility to automate the brain exam from acquiring a localizer image to prescribing acquisition planes, scanning relevant series, performing post-processing and transferring the final image data to a reading station.

Spectroscopy Applications:

- PROBE PRESS and STEAM single voxel proton brain spectroscopy using the PRESS and STEAM sequences.
- 2D and 3D PROBE CSI 2D multi-voxel and 3D multi-voxel brain spectroscopy using the PRESS sequence.

Vascular, Breast, and Cardiac Applications:

- Inhance 2.0 non-contrast MRA suite: Inflow IR, 3D Velocity, 2D Inflow and 3D DeltaFlow.
- 3D Heart high resolution 3D FatSat FIESTA-based whole-heart imaging with navigators and real time motion correction
- allows free-breathing, includes Cine IR multi-T1 myocardial imaging enables tissue characterization and approximation of the optimal null point for myocardium signal.
- FGRE TC multi-phase myocardial imaging with reduced artifact sensitivity for viability assessment.
- Flow Analysis on OC 4.0 automated calculation of peak and individual flow velocities for Phase Contrast MRA data sets.
- MR Echo dedicated interface and real time interactive imaging optimized

for cardiac studies - includes Scan and Save, 2D FIESTA, FGRE TC, 2D IR Prepared Gated FGRE.

- 2D and PS MDE enables delayed myocardial imaging with IR suppression.
- Cardiac Tagging 1D strip and 2D grid spatial saturation pulses for cardiac wall motion assessment.
- TRICKS dynamic, high resolution 3D volume MRA - eliminates the need for timing or triggering.
- Body Navigators are designed to deliver real time robust free breathing respiratory motion correction to improve routine and advanced body applications.
- Black Blood SSFSE is available for either dual or triple inversion pre-pulse single shot FSE based acquisition utilized for morphological imaging of the heart and vessels.
- VIBRANT high-resolution SPGR-based T1 weighted bilateral axial or sagittal breast imaging with SPECIAL fat suppression.
- VIBRANT Flex high resolution SPGR-based fat and water separation breast imaging with T1-weighted contrast.
- BREASE single voxel proton breast optimized spectroscopy using the PRESS sequence and TE-averaging (with phantom).

Also included is the host computer, keyboard, mouse, monitor, calibration phantoms, phantom cart, and operator console table.

SIGNA PET/MR 3.0T Magnet and SiPM Detector Assembly

SIGNA PET/MR 3.0T Magnet and SiPM Detector Assembly

The SIGNA PET/MR is equipped with GE's most advanced 3.0T magnet design, high-performance 44 mT/m and 200 T/m/s slew rate gradients, patient bore with bright inner-bore lighting, and MultiDrive RF transmit technology delivering performance, productivity and exceptional image quality.

GE's Wide-Bore Magnet Design: With GE's active shielding technology and space-age composite design, the lightweight 3.0T magnet minimizes weight while preserving homogeneity and minimizing fringe fields. The result is a 3.0T magnet that does not compromise performance yet can be installed almost anywhere. The magnet's high-homogeneity delivers excellent fat-saturation away from iso-center and ensures image quality over the entire field-of-view. Coupled with its zero boil off technology and remote magnet monitoring technology, the SIGNA PET/MR 3.0T magnet is designed to provide years of worry free, reliable, low-cost operation.

In-Room Console (iROC): By consolidating all controls into one place, the In-Room Operator Console (iROC) provides real-time feedback to the operator to improve exam room efficiency. With a high-resolution, color LCD display located just above the PET/MR gantry, coil-connection, patient set-up, cardiac and respiratory waveforms make exam

preparation a breeze. The iROC provides feedback on:

- Display of patient name, ID, and study description.
- Display and entry of patient weight.
- Display and entry of patient orientation / position.
- Cardiac and Respiratory waveform display.
- IntelliTouch landmarking information, table position, and scan time.
- Coil connection status.

High Performance Whole-Body Gradients:

The SIGNA PET/MR incorporates the latest in MR gradient technology with the wide eXtreme Resonance Module (XRMw). XRMw gradients deliver 44 mT/m peak amplitude and 200 T/m/s maximum slew-rate on each axis with unmatched fidelity, accuracy, and reproducibility. The gradients are water-cooled and equipped with integrated thermo-electric cooling panels to provide excellent stability and duty-cycle for gradient intensive applications. The XRMw gradients have been designed with excellent linearity across the entire FOV.

Utilizing a unique acoustic barrier material, acoustic noise levels are reduced for enhanced patient comfort without compromising imaging performance.

SIGNA PET/MR SiPM Detectors: The PET hardware is based on LBS crystals and MR-compatible Silicon Photomultiplier technology. The second generation of

photomultipliers capable of working within high magnetic field, SiPM technology provides an improvement in the signal-to-noise ratio, resulting in energy and timing resolution that compare favorably with state-of-the-art photomultiplier tubes. LBS based crystals have a high light output, fast timing and stopping power to enable Time-of-Flight PET imaging. The SiPM PET ring is integrated into the MR RF body coil at the magnet's isocenter and provides a 25cm axial field of view (aFOV). This detector combination of an LBS scintillator and SiPM gives SIGNA PET/MR the ability to perform time-of-flight PET simultaneously with 3.0T MR imaging.

- SIGNA PET/MR Scan Room Collector:
The PET/MR scan room electronics collector includes all of the following:
MultiDrive RF components (cabling and electronics).
- Mechanical and electrical docking architecture that interfaces the patient table to the PET/MR magnet.
- RF signal switching hardware and cabling
- that routes the MR signals received to the respective OpTix receivers.

Concealment Kit

The Preinstallation Collector delivers to the site in advance of the magnet and main electronic components. This facilitates the later delivery and installation of supporting electronics. The following are the main components in the Preinstallation collector:

- Heat exchange cabinet for distribution of chilled water.
- Primary Penetration wall panel for support of the penetration cabinet.
- Secondary Penetration wall panel for support of gradient filters, helium cables, and chilled air and water.
- Helium cryocooler hose kit.

The Cable Concealment Kit

accommodates a wide-range of scan room ceiling heights and is designed to provide a clean-look installation by concealing the overhead cabling from view.

Vibroacoustic Dampening Kit

Vibroacoustic Dampening Kit

Material in the Vibroacoustic Dampening Kit can significantly attenuate the transmission of gradient-generated acoustic noise through the building structure to nearby areas, including adjacent rooms and floors above or below the MR suite. If this kit is applied during the installation of a new magnet, no additional service charges are necessary. However, installation of the Vibroacoustic Dampening kit under an existing magnet requires special steps. The steps to

prepare the site and steps to install, such as modifications to the RF screen room, and other magnet rigging, modifications to the RF screen room, and other finishing work, are not covered in the pricing.

5	1	<p>SIGNA PET/MR Main Disconnect Panel</p> <p>SIGNA PET/MR Main Disconnect Panel</p> <p>The Main Disconnect Panel safeguards the MR system's critical electrical components, by providing complete power distribution and emergency-off control.</p>
6	1	<p>3.0T Cable Configuration - A</p> <p>3.0T Cable Configuration - A</p> <p>To accommodate various electronic and scan room configurations and sizes, the 3.0T has preset lengths of cables and connector kits to speed system installation. This cable collection is compatible with fixed and relocatable building configurations.</p>
7	1	<p>PET/MR Cable Collector - Configuration A</p> <p>PET/MR Cable Collector - Configuration A</p>
8	1	<p>English Keyboard</p> <p>English Keyboard</p> <p>Required for our operator console. This keyboard is ergonomically designed to keep your staff comfortable even through</p>

the longest shifts. The scan control keyboard assembly has an intercom speaker, microphone, volume controls and emergency stop switch.

9 1 MR Seismic Sub Contract Catalog
MR Seismic Sub Contract Catalog
The MR seismic anchorage catalog allows GE Healthcare customers and architects to sub-contract with qualified outside engineering firms to meet local seismic siting requirements. This catalog does not contain any GE Healthcare manufactured equipment or parts and is intended for use during the room construction and installation phases of GE Healthcare MR equipment. Any and all construction related to meeting local seismic siting requirements is solely the responsibility of the customer and not GE Healthcare.

10 1 SAGE 7 Spectroscopy Analysis
SAGE 7
SAGE 7 (Spectroscopy Analysis by General Electric, Version 7) allows one to process, display, manipulate, analyze, manage and print in- vivo spectroscopy data via an easy to-use, graphical interface. This powerful toolkit furnishes a wide array of filters, transformations, correction algorithms, and segmentation and measurement tools to extract the information contained in spectroscopy data. The results of the analysis can be output to a postscript printer and in electronic formats ranging from BMP, EPS

and GIF to JPEG, PICT and TIF. And the steps can be customized and saved in macros to streamline application of even the most sophisticated routines.

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3.0T MR Touch

3.0T MR-Touch

MR-Touch is a non-invasive method to measure relative tissue stiffness with MR. It is an acquisition and reconstruction technique that combines hardware, and acquisition and reconstruction algorithms to produce Elastograms, color-coded anatomical images showing varying degrees of elasticity or stiffness. The image contrast is related to relative stiffness of soft tissue and is generated from the real-time data acquisition during tissue palpation with low amplitude and low frequency sound waves. The hardware component is comprised of an active sound wave generator and a passive transducer that produces small vibrations in the area of the patient to be scanned. The MR-Touch acquisition software incorporates a spin-echo EPI phase contrast sequence making it less sensitive to susceptibility-induced signal loss. The acquisition software also triggers the sound wave generator to produce synchronized vibrations on the surface of the patient during the data acquisition. The reconstruction algorithms generate images that show the propagation of sound waves through the tissue (phase images) and also the corresponding strain wave and relative stiffness images.

Parallel imaging is used to accelerate image acquisition and provide for whole liver coverage in a few breath holds.

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3.0T 8-Channel Breast Array with Biopsy Grids (GEM or PET/MR)
3.0T 8-Channel Breast Array with Biopsy Grids (GEM or PET/MR)
The Breast Array generates high-definition MR breast images on 3.0T MR systems. Optimized for use with ASSET and VIBRANT for up to 3X acceleration, this 8-element phased-array coil helps ensure excellent temporal and spatial resolution, patient after patient. The array is also compatible with Fast Spin Echo, Fast Gradient Echo, and Diffusion Imaging sequences. It provides uncompromised lateral and medial access. This catalog contains a set of MR compatible biopsy grids that are compatible with this coil. This coil has a flat base-plate making it compatible with the flat-table GEM coil system or a PET/MR 3.0T system.

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Seismic MR Heat Exchanger for MR450, MR750, MR750w, PET/MR - Standard Ambient Temp near Coast
GE Discovery MR450 and Discovery MR750 Heat Exchangers - 70kW (30 Tons) - Seismically Certified Heat Exchanger
Cooling for your GE Healthcare MR system has never been so easy. GE Healthcare has partnered with the Glen Dimplex Group, a world leader in cooling systems, to offer heat exchangers designed to meet the

needs of your Discovery MR System. Now you can look to GE Healthcare for your entire MR purchase and support. This heat exchanger is highly reliable and the only unit verified to perform with the new platform of GE Healthcare MR systems. As part of your integrated GE Healthcare solution, you'll work with a single contact throughout the whole installation. A Project Manager of Installation will help with building layout, room designs, delivery and installation - every step until your system is ready to scan. Our team will work seamlessly with architects, contractors and your internal team to help ensure timely, cost-effective completion.

Once your cooling system is running, you'll get fast, highly-skilled service support managed through GE Healthcare - with the same quality and response time you expect from your MR system.

FEATURES AND BENEFITS

- Designed to provide stable fully dedicated cooling for your MR system's needs
- Water/glycol outdoor-air-cooled heat exchangers to support your highest exam volumes and your full range of diagnostic procedures
- Redundant fluid pumps with automatic switchover let you keep operating with no loss of cooling even if one pump goes down
- Quad compressor, dual tandem refrigeration circuit design saves on energy while your system smoothly transitions through the 10% to 100% heat load capacity cycles of patient

scanning and idling

- Quiet operation between patient exams and overnight - ideal for facilities in residential areas
- Comes with installation support, installation visits, preventative maintenance visit and 1 full year of parts and labor warranty
- Installation support includes: support through GE's Project Manager of Install, GE's Design Center, technical support from the Glen Dimplex company, two (2) installation visits
- Comprehensive and quality service rapidly delivered through our CARES service solution
- 65 gallons of 100% glycol concentrate for complete system filling and diluting
- Wall mounted remote display panel provides the ability to monitor the system's operation and indicates possible system errors
- Filter kit with flow meter helps to ensure purity of water prior to entry to the MR system
- Rust inhibiting configuration specifically designed to deal with corrosive environments typical within 10 miles of coastline
- Highly recommended that Vibration Isolation Spring Kit (E8911CJ) be added for systems that will be roof top mounted

SPECIFICATIONS

- Net Cooling Capacity: 70 kW / 30 Ton
- Maximum Coolant Flow: 35 gpm (132 l/m)

- Coolant Outlet Temperature: 48 F (8.9 C)
- Coolant Temp Stability: E 1.8 F (E1.0 C)
- Max Coolant Pressure : 70 Psi (4.8 Bar)
- Refrigerant: R407C
- Ambient Temp Range: -20 to 120 F (-30 to 50 C)
- Condenser Air Flow (Approx): 18,000 Cfm
- Tank Capacity: 100 gal (378 l)
- Flow Meter Range: 4-40 gpm
- Filters: 50 micron cartridge filters
- Supply Voltage: 460v / 3 phase / 60 Hz
- Coolant Connections: 2" NPTF
- Overall Size (L x W x H) 44" x 136" x 84.5"

COMPATIBILITY:

- GE Discovery MR450 1.5T MR system
- GE Discovery MR750 3.0T MR system

NOTES:

- Item is NON-RETURNABLE and NON-REFUNDABLE
- Standard bolt anchoring is recommended over vibration isolation spring mounts in earthquake prone regions

Seismically Certified Heat Exchanger: Unit for regions where seismic activity is of concern, or, is otherwise mandated by state regulation, to be designed to pass seismic shake table testing. These chilelrs have been tested and certified in accordance with certification method 'ICC-ES AC-156',

to remain fully operable after testing was completed. In addition, the units have passed the California Office of Statewide Health Planning & Development (OSHPD) board certification with pre-approval # OSP-0169-10.

14 1

Medrad Spectris Solaris EP Injector
w/ICBC - NOT FOR MOBILES
Medrad Spectris Solaris EP MR Injection
System
Medrad Spectris Solaris EP MR injector for
use use in all MR scanner field strengths
up to and including 3.0T. Optimized
touch-screen for fewer keystrokes, KVO
(keep vein open) allows patient to be
prepared before beginning the scan.
Larger 115 ml saline syringe for longer
KVO or multiple flushes. Includes cables
and starter kit...E
NOTE: GE is responsible for unpacking,
assembly, and installation of equipment.
Medrad will be available for technical
assistance by phone at (412)767-2400. An
additional charge will apply for on-site
installation assistance. Medrad will be
responsible for operational checkout, final
calibration, in-service of the equipment,
and initial applications training. Please
contact the local Medrad office two
weeks in advance of installation.

15 1

Magnacoustics Genesis Ultra Music
System for MR
Magnacoustics Genesis ULTRA

Communication & Music System

The Magnacoustics Genesis ULTRA is the only MRI Communication & Music System to interface directly with GE's MRI hardware and software. This allows software driven Auto Voice Commands from GE's computer to be delivered directly into the patient's ears for breath-hold sequences. This same interface allows the Technologist to talk directly to the patient through the console Mic even while the scan is in progress. The Genesis ULTRA also features an exclusive Patient Ready Signal. By simply depressing a small button on the handheld control an audible and visual signal is transmitted to the Technologist indicating the patient's readiness for the scan to begin. This simple step streamlines the breath-hold exam which amounts to approximately 30% of all exams. Patient Handheld Volume and Media Selection Controls with Voice Feedback interface with an FM/AM stereo, CD player, and iPod interface. This distracts even the most apprehensive of your patients by allowing them to be in control of their own environment. Additionally, the Auto Gain feature automatically raises and lowers the volume level for the patient based on the Sound Pressure Level of the MRI. Magnacoustics also provides the only patented 8-driver transducer that provides the highest sound directly to the patients ears with the MagnaLink Headset System. This patented system includes a stethoscope-style headset with the MagnaPlug (replaceable earplug) that

provides 29dB of attenuation and complies with GE Healthcare MR Safety Guide Operator Manual. The Genesis ULTRA's See-In-the-Dark GUI Electroluminescent Backlit Technologist Control Unit enhances operation in the normally low-lit MRI environment allowing the Technologist to operate the entire system with the touch of a button. The Genesis ULTRA includes an integral interface for fMRI with built-in input for audio stimulation and output for responses...E

16 1

700 VA Partial System UPS - MR
700 VA Partial System UPS - MR
Tested with all MR system computers, the 700VA Partial System UPS provides reliable, clean, consistent power for the data processing portion of the MR imaging system. The use of the double conversion UPS enables the MR system data processing portion electronics to operate when there is a power anomaly or total power loss. Valuable data and the system operating software are protected, if there is an extended outage the UPS allows for an orderly shutdown of the system.

FEATURES/BENEFITS

- True double-conversion, online technology provides reliable operation and uninterrupted glitch free power
- Automatic frequency selection eases startup, i.e., 50 or 60 Hz compatible
- Integral Electronic Static Bypass

switch means zero transfer time

- Improves user productivity, system reliability, reduces service costs and increases system uptime
- Advanced Battery Management (ABM) software monitors / indicates battery health and improves battery service life

SPECIFICATIONS

- Dimensions (H x W x D): 9.09" x 6.3" x 13.9"
- Weight: 26 lbs.
- Input Voltage Range: Single Phase 80-138 V
- Input Frequency Range: 47-70 Hz
- Rating: 700 VA / 630 W

COMPATIBILITY

- MR Systems
- NOTES This is a partial system UPS - it covers only the computer, not the entire MR imaging system. After a power event portions of the system will have to be reset before operation can resume
- Customer is responsible for rigging and arranging for installation with a certified electrician
- ITEM IS NON-RETURNABLE AND NON-REFUNDABLE

PET ANNULUS PHANTOM - DQA

- The PET Annulus DQA (Daily Qualified Assurance) imaging phantom for the Discovery IQ PET system or SIGNA

PET/MR system is a uniform solid suspension of Ge-68 encased and sealed in an annular, black plastic shell. Recommended for accurate calibration of your PET detector and easier quality control

- Designed to be held in place during use by standard source holders provided with scanning equipment
- No mechanical maintenance is required

18 1

PET MR VOLUMETRIC QUALITY
PET MR VOLUMETRIC QUALITY

19 1

PET MR PHANTOM SPHERE - 6
PET/MR Phantom Sphere, Germanium-68
Diameter 1.9cm Radioactive - VQC
phantom, Large Volume, one per bag

20 1

Signa PET/MR Succeed Elite
Signa PET/MR Succeed Elite
Signa PET/MR Succeed Elite. Dual
Modality Support Components. Program
duration 24 months. Program includes 40
Days Onsite, 24 Hours TVA, 1 class
delivered at site.

SIGNA PET/MR MNS Elite Package

SIGNA PET/MR MNS Elite Package

- Multi-Nuclear Spectroscopy 8Kw Amplifier
- 3.0T Phosphorous MNS T/R Switch
- 3.0T Carbon MNS T/R Switch

Multi-Nuclear Spectroscopy 8Kw Amplifier: The high performance Optical RF Receivers of the PET/MR are capable of broadband signal detection. This package includes an 8kW broadband RF amplifier and an 8 channel receiver converter.

Multi-nuclear coils may be connected to the system

for broadband
transmission and
reception of RF signals.

3.0T Phosphorous MNS TR

Switch: The kit
compliments your
multi-nuclear capabilities
by adding a ^{31}P T/R
switch. A patient ^{31}P coil
will need to be purchased
separately, but this kit
does include a coil for
service to ensure that the
functionality is operating
well on the system.

3.0T Carbon MNS TR Switch:

The kit compliments your
multi-nuclear capabilities
by adding a ^{13}C T/R
switch. A patient ^{13}C coil
will need to be purchased
separately, but this kit
does include a coil for
service to ensure that the
functionality is operating
well on the system.

fMRI Elite Package (on MR
console)

fMRI Elite Package (on MR
console)

- BrainWave RT (Real-Time)
- BrainWave PA (Post
Acquisition Analysis)
- BrainWave Fusion
- BrainWave Advanced
Visualization

- BrainWave Advanced DTI Tracking
- BrainWave Structured Reporting

BrainWave RT provides real-time acquisition, processing and display of functional results. It allows a single technologist to acquire, process and display BOLD (Blood Oxygen Level Dependent) fMRI studies acquired with synchronized stimuli. It is comprehensive, equipping you with all the real-time functionality you need, including paradigm control and development, and real-time display of color activation, overlaid on source EPI images. The main features are:

- 50,000 image storage per series with data acquisition rates up to 20 images per second.
- Display of 2D activation maps overlaid over Echo Planar source images in real time.
- Multiple 2x2 and 4x4 display.
- Optional saving of raw data in research mode for off-line analysis with 200,000 images.

BrainWave Post-Acquisition

allows you to produce, from raw fMRI data, 3D brain renderings displaying functional activation. Display alternatives for these maps include cross sectional displays, activation Z-maps and composite paradigm displays. The features include the following:

- Integration into the operator console.
- Intuitive graphic user interface for image analysis and display.
- Data quality check, motion correction, temporal filtering and spatial smoothing to optimize statistical analysis and mapping.
- Multiple regression analysis.
- Segmented structural MRI Scan using completely automatic threshold and histogram methods and mathematical morphology techniques.
- Rapid retrospective motion correction.
- Sophisticated visualization techniques including true volume rendering, light box and orthogonal displays.

BrainWave delivers tools for fMRI analysis starting with segmentation and skull stripping of anatomical structures, and data processing to include motion correction and smoothing. Paradigm supports both block single and multi-conditions, as well as event related conditions. Registration of anatomical imaging to fMRI outputs with color overlays and fusion through BIP (fused functional to anatomical maps). Supplied interface supports control between the scanner hardware and the paradigm generation device to control experiments.

The DTI Tracking tool enables directionally encoded FA maps to be presented in both grey and color scales for 3 plane presentation. Seed placement is provided in either 3D seeds, inclusion and/or exclusion ROIs as well as multiple ROI formats. The display is provided in real time to control tract settings based on FA, fiber length or angle. The output formats for tracts is via DICOM format.

Reporting of cases is provided in simplified format that streamlines the report structure and process while providing a detailed description of experiment methods, output of patient centric feedback (task response, motion plot and activation curves), delivery of color screenshots of results and clinical report fields for summary outcome. The export format provides user-defined threshold DICOM format activation maps for reformation and display for surgical navigation or PACS review.

BrainWave Hardware
BrainWave Hardware
BrainWave Hardware is the complimentary system to BrainWave Hardware Lite for previous MR systems. It is a supplemental paradigm generation system for functional MRI. Intended for use in conjunction with the BrainWave RealTime image acquisition software, BrainWave Hardware provides a trigger signal to allow synchronization of image acquisition with an external

stimulus presented to a subject. BrainWave Hardware includes the following:

- Dedicated computer workstation
- Equipment rack
- Penetration panel waveguide insert
- Cedrus patient response pads
- Cabling and connectors

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.