

## 501-B40026 - XR MRI, VAMC ALBUQUERQUE, NM redacted benchmark

RADIOLOGY

DISTR CTR

V.A. Medical Center

BLDG 46

1501 SAN PEDRO SE

ALBUQUERQUE, NM 87108

Trade-in: Manufacturer:

Siemens Medical Solutions USA, Inc.

Description: Magnetom Avanto

Model#: 10142046

Serial#: 1823

Siemens Site #400-198872

System Acquisition 2008

Qty	Item Description
1	<b>Flow Quantification</b> Special sequences for quantitative assessment of flow.
1	<b>SWI</b> Susceptibility Weighted Imaging is a high-resolution 3D imaging technique for the brain with ultra-high sensitivity for microscopic magnetic field inhomogeneities caused by deoxygenated blood, products of blood decomposition and microscopic iron deposits. Among other things, the method allows for the highly sensitive proof of cerebral hemorrhages and the high-resolution display of venous cerebral blood vessels.
1	<b>TWIST syngo #V</b> This package contains a Siemens unique sequence and protocols for time-resolved (4D) MR angiographic and dynamic imaging in general with high spatial and temporal resolution. syngo TWIST supports comprehensive dynamic MR angio exams in all body regions. It offers temporal information of vessel filling in addition to conventional static MR angiography, which can be beneficial in detecting or evaluating malformations such as shunts. In case of general dynamic imaging, for example an increase in spatial resolution by a factor of up to 2 at 60 seconds temporal resolution (compared to conventional dynamic imaging) is possible due to intelligent k-space sampling strategies. Alternatively, increased temporal resolution at constant spatial resolution is possible.
1	<b>NATIVE syngo</b> Integrated software package with sequences and protocols for non-contrast enhanced 3D MRA with high spatial resolution. syngo NATIVE particularly enables imaging of abdominal and peripheral vessels and is an alternative to MR angiography techniques with contrast medium, especially for patients with severe renal insufficiency.
1	<b>Advanced Cardiac Paket #T+D</b> This package contains special sequences and protocols for advanced cardiac imaging including 3D and 4D syngo BEAT functionalities. It supports advanced techniques for ventricular function imaging, dynamic imaging, tissue characterization, coronary imaging, and more.
1	<b>Tim Whole Body Suite #T+D</b> Tim Whole Body Suite puts it all together. This suite enables table movement for imaging of up to 205 cm (6' 9") FoV without compromise. In combination with Tim's newly designed ultra highdensity array higher spatial and temporal resolution can be achieved along with unmatched flexibility of any coverage up to Whole Body. For faster exams and greater diagnostic confidence.
1	<b>Hand/Wrist 16 #Ae</b> The new Tim 4G coil technology with Dual Density Signal Transfer and SlideConnect

**Qty****Item Description**

Technology combines key imaging benefits: excellent image quality, high patient comfort, and unmatched flexibility.

Hand/Wrist 16 for examinations of the left or right hand and wrist region consists of a base plate and an iPAT compatible 16-channel coil and allows high resolution imaging of the wrist and the hand within one examination. Hand/Wrist 16 will be connected via a SlideConnect plug for fast and easy patient preparation.

1

**Tx/Rx 15-channel Knee Coil DDST #Ae**

New 15-channel transmitter/receiver coil for joint examinations in the area of the lower extremities.

Main features :

- 15-element design (3x5 coil elements) with 15 integrated preamplifiers,
- iPAT-compatible
- SlideConnect Technology

1

**MAGNETOM Aera - System**

MAGNETOM Aera - 1.5T Tim+Dot system - The integration of the next generation Tim - "Tim 4G" and the Siemens unique Dot Engines (Day optimizing throughput Engine). Short and open appearance (145 cm system length with 70 cm Open Bore Design). Tim 4G's redesigned RF system and all-new coil architecture. - Siemens unique DirectRF(tm) technology enable Tim's new all digital-in/ digital-out design - All-new coil architecture including Dual-Density Signal Transfer Technology - Whole-body superconductive Zero Helium Boil-Off 1.5T magnet - TrueForm Magnet and Gradient Design - Actively Shielded water-cooled Siemens gradient system - Head/Neck 20 DirectConnect, Spine 32 DirectConnect, Body 18, Flex Large/Small 4 Dot offers patient personalization, user guidance and process automation that result in consistent examination results. - Brain Dot Engine is designed to simplify general brain examinations through personalized, guided and automated workflows. - Dot Display and Dot Control Centers - efficient patient preparation. Additional features include: -Tim Application Suite including Neuro, Angio, Cardiac, Body, Onco, Breast, Ortho, Pediatric and Scientific Suite - syngo MR software including 1D/2D PACE, syngo BLADE, iPAT<sup>2</sup>, Phoenix, Inline Technologies. - High performance host computer and measurement and reconstruction system. The system (magnet, electronics and control room) can be installed in 30sqm space. For system cooling either the Eco Chiller options or the Separator is required.

1

**Tim [204x48] XQ Gradients #Ae**

Tim [204x48] XQ-gradients performance level Tim 4G with it's newly designed RF system and innovative coil architecture enables high resolution imaging and increased throughput. Up to 204 simultaneously connected coil elements in combination with the standard 48 independent RF channels, allow for more flexible parallel imaging. Maximum SNR through the new Tim 4G matrix coil technology. This option includes also Advanced High Order Shim. XQ - gradients The XQ- gradients are designed combining high performance and linearity to support clinical whole body imaging at 1.5T. The force compensated gradient system minimizes vibration levels and acoustic noise. The XQ gradients combine 45 mT/m peak amplitude with a slew rate of 200 T/m/s.

1

**PC Keyboard US english #Tim**

Standard PC keyboard with 101 keys.

1

**Pure White Design #T+D**

The MAGNETOM Aera / MAGNETOM Skyra design is available in different light and appealing variants which perfectly integrates into the different environments. The color of the main face plate cover of the Pure White Design Variant with the integrated Dot Control Centers and the unique Dot Display is brilliant white surrounded by a brilliant silver trim. The asymmetrical deco area on the left side is colored white matte and also with a brilliant surrounding silver trim.

The table cover is presented also in the same color and material selection.

1

**Tim Table #Ae**

The new Tim Table is designed for maximized patient comfort and smooth patient preparation. The unique design of the Tim Table can support up to 250 kg (550 lbs) patients without restricting the vertical or horizontal movement.

Qty	Item Description
1	<p><b>SW syngo MR E11</b> syngo MR E11 software with new Dot features and applications.</p> <p>DotGO Go for consistent results, efficiently with Dot engines.</p> <p>Dot Cockpit The central tool to continuously build knowledge into standardized exam strategies and to make those available for every user in the MRI department. Dot Cockpit is the new starting point for every exam.</p> <p>- TGSE - WARP including VAT</p>
1	<p><b>Quiet Suite #T+D</b> Quiet Suite enables complete, quiet examinations for neurology and orthopedics with at least 70% reduction in sound pressure levels.</p>
1	<p><b>syngo.via MR Scanner Bundle</b> MR system bundled with syngo.via</p>
1	<p><b>syngo.via XL-Software</b> The syngo.via XL-Software offers 2D, 3D, 4D multi-modality routine reading capabilities and a variety of advanced applications tailored to the XL-Server HW grade. The combination of syngo.via XL-Software and XL-Server Hardware is ideal for 5 - 15 users. The availability of all applications and workflows included in syngo.via XL-SW is virtually unlimited, i.e. the number of opened cases is only constrained by server HW resources.</p> <p>The syngo.via client runs on standard Windows computers in the network and integrates into radiologist's reading workplace (RIS; PACS) for efficient image reading based on a wide range of clinical applications (advanced visualization applications) for different clinical cases. Those applications are available as additional options for syngo.via.</p> <p>The optional advanced visualization applications/Engines follow the flexible concurrent user model (users working at the same time). The service support for syngo.via requires the provision of an administrator with dedicated tasks and a minimum broadband Internet connection bandwidth.</p>
1	<p><b>WebViewer User #1 Integrated Server</b> syngo.via WebViewer is a web-based client server add-on to syngo.via. It provides high-speed 2D and 3D image data review and basic manipulation functionality within the healthcare institution's network and through secure VPN connection both over LAN and wireless connections. The integrated server can be used for internal image distribution only (internet access only by VPN infrastructure). The syngo.via WebViewer runs on PC, Mac and laptops equipped with appropriate browsers, as well as on Apple iPad.</p>
1	<p><b>syngo.via General Engine #1</b> The syngo.via General Engine provides functionalities for highly efficient reading and reporting of routine to advanced cases.</p> <p>The syngo.via General Engine comprises the following software modules:</p> <p>ALPHA technology speeds up the workflow by automating and standardizing reconstructions and improves consistency in image presentation.</p> <p>syngo.via Advanced Reporting enables efficient and structured management and communication of syngo.via results plus easy creation and administration of report templates.</p>

Qty	Item Description
1	<p><b>Server HW Config XL</b></p> <p>syngo.via server hardware configuration XL.</p> <p>Hewlett Packard rack mount server.</p>
1	<p><b>HP Care Pack. 5y 24x7 HW Support</b></p> <p>Extended Prime HW Support for 5 years</p>
1	<p><b>Software License Ext. Server HW XL</b></p> <p>Mandatory license extension for embedded applications on Hardware systems with more than one CPU.</p> <p>Second CPU license.</p>
1	<p><b>Basic Implementation Package</b></p> <p>This Basic Implementation Package includes installation and integration services for syngo.via dedicated to one modality.</p> <p>This package includes professional services, such as:</p> <ul style="list-style-type: none"> <li>- Installation of the syngo.via server software</li> <li>- Installation of the syngo.via client software on one clinical user's computer for one user</li> <li>- Connection to up to 5 DICOM nodes</li> <li>- Configuration of basic syngo.via workflows and rules</li> <li>- Installation and integration of one syngo.via client workplace on one syngo MultiModality Workplace.</li> <li>- Basic installation service for the syngo.via hardware at the customer's site.</li> <li>- Integration into the Local Area Network of the customer and to Siemens Remote Service over internet connection.</li> <li>- Installation of WebViewer integrated license (syngo.via SW version VA30 or higher, country restrictions might apply).</li> </ul>
1	<p><b>Multi Server License Sharing (MSL)</b></p> <p>Multi-Server License Sharing (MSL) enables the customer to pool their individual licenses into a single license repository, thus making the usage of applications' licenses more flexible across multiple servers. Connected syngo.via servers will check-out their licenses from this repository. The repository operates in a peer-to-peer manner across the syngo.via machines and does not require additional server machines to operate.</p> <p>The following prerequisites have to be fulfilled for using MSL:</p> <ul style="list-style-type: none"> <li>- All servers have to be on the same Hotfix level (this feature requires at least software version VA20B).</li> <li>- For applications requiring RDS it needs to be ensured that RDS is licensed for all servers (this applies to MI Cardiology and Neurology applications).</li> </ul>
1	<p><b>Implement. Multi-Server Licensing</b></p> <p>These implementation services include installation of the Multi-Server Licensing option to syngo.via for several departmental syngo.via servers.</p> <p>The professional services are in short:</p> <ul style="list-style-type: none"> <li>- Planning with the customer</li> <li>- Configuration of the license master and slave(s)</li> <li>- Testing</li> </ul>
1	<p><b>License Multi Server Access</b></p> <p>Multi-Server Access (MSA) enables access to patient cases located on different syngo.via servers from one syngo.via client workplace.</p> <p>This feature provides easy access to examinations which are distributed over different syngo.via servers (up to four servers are supported). This license is required to integrate the Multi-Server Access feature with an OEM call-up from PACS or RIS. The feature is available for syngo.via desktop integration scenarios where the PACS/RIS application is the leading</p>

Qty	Item Description
	<p>system in customer's reading workflow and triggers the context-specific syngo.via launch (e.g. based on Study UID). This PACS/RIS call-up launches syngo.via studies automatically for reading even if they are located on different syngo.via servers in multiple clinical areas (e.g. Radiology, Cardiology, Neurology).</p> <p>Scope of Delivery: Software License</p>
1	<p><b>Prof.Serv. for MultiServerAccess</b></p> <p>Configuration of syngo.via Multiserver</p>
1	<p><b>VIA Govt Trng in Basic Imp (</b></p> <p>Per agreement, credit for initial training in Basic Implementation 14412662</p>
1	<p><b>Server HW Installation Standard</b></p> <p>Basic installation of the syngo.via server hardware with the operating system at the customer's site by the hardware supplier. Integration into the Local Area Network of the customer and to Siemens Remote Service over internet connection. Please check that the following information is included in the customer quote: correct and complete delivery location, customer's contact person for implementation planning. See also the questions in the Sales Checklist, which supports you in evaluation of the customer's requirements.</p>
1	<p><b>Virt Initial Trn for GOV 4hrs, syngo.via</b></p> <p>This virtual initial consultation session, up to 4 hrs in duration, is designed to define the clinical customization of syngo.via specific to radiology workflow for government facilities. Through direct communication with a clinical education specialist, this session will identify and configure site-specific workflow and imaging storage and retrieval parameters. This educational offering must be conducted no more than 4 weeks before the scheduled system turnover event. This consultation session will be scheduled during standard business hours, Monday through Friday. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p><b>Initial onsite for GOVT 24hrs, syngo.via</b></p> <p>Up to (24) hours of on-site clinical applications training on syngo.via basic navigation and modality specific clinical workflows, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4)government users. Training will focus on the use of syngo.via in clinical routine and customization of systems based on workflow needs. This educational offering must be completed (12) months from turnover date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p><b>Additional GOVT trng 16hrs, syngo.via</b></p> <p>Up to (16) hours of on-site clinical applications training on syngo.via navigation and modality specific clinical workflows, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) government users. The training offering must be completed (12) months from the later of turnover date or offering purchase date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p><b>VIA Govt Server HW Install</b></p> <p>Per agreement, credit for syngo.via hardware installation by 3rd party integrator 14412656</p>
1	<p><b>Advanced Dot Imaging Package #T+D</b></p> <p>The following components are already included in the DotGO Advanced Package:</p> <ul style="list-style-type: none"> <li>- Angio Dot Engine</li> <li>- Abdomen Dot Engine</li> </ul> <p>The Angio and Abdomen Dot Engine offer a comprehensive set of guidance and automation, so that robust image quality can be achieved efficiently and consistently for Vascular and Abdominal MR imaging.</p> <p>Angio Dot Engine</p> <p>The timing of contrast injection and scan is widely considered the most challenging part of an angiographic exam. Angio Dot guides the user through angiographic single or multi station examinations by providing semi-automatic detection of arterial and venous timing windows</p>

Qty

### Item Description

using a test bolus technique. This information is fed back into the next planning steps automatically adapting scan parameters to the individual patient and patient's condition.

Where needed, AutoVoiceCommands support the communication with the patient and ensure optimal timing of breathing, scanning and contrast media. All steps of contrast injection are presented in a simple, automated graphic on the monitor.

syngo Inline Composing and the Tim Planning Suite are included.

Abdomen Dot Engine provides:

- Personalized Exam Strategies
- Guidance
- Automatic sequence scaling
- Auto Navigator
- Auto-FoV
- Timeline setup and monitoring
- Automatic Voice Commands
- Auto Bolus Detection
- Inline radial range calculation for MRCP
- Inline Subtraction
- Inline Registration

1

### Spine Dot Engine #T+D

The Spine Dot Engine provides optimized cervical, thoracic and lumbar spine imaging. Amongst various features to support streamlined spine workflow is Labeling of the vertebrae suggested by the system, Tim Planning Suite and In-line Composing. syngo WARP with View Angle Tilting (VAT) technique is provided for reducing in-plane geometric distortions syngo WARP can be used throughout the body.

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### Cardiac Dot Engine, USA #T+D

Cardiac examinations: Dot Cardiac - Customized workflows that are easier to repeat. Using anatomical landmarks, standard views of the heart (such as dedicated long axis and short-axis views), are easily generated and can easily be reproduced using different scanning techniques. Scan parameters are adjusted to the patient's heart rate and automatic voice commands are given.

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### Argus Flow

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### Argus 4D Ventr.Function syngo #Tim

syngo Argus 4D Ventricular Function software processes MR cine images of the heart and generates quantitative results for physicians in the diagnostic process.

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### Large Joint Dot Engine E11 #T+D

Large Joint Dot Engine optimizes image quality of knee, hip and shoulder scans by proposing the most appropriate protocols according to the examination strategy chosen for the specific patient. It ensures reproducible image quality and streamlines large joint examinations to the greatest extent.

Large Joint Dot Engine features AutoAlign and AutoCoverage for knee, hip and shoulder. Susceptibility artifact reduction functionality can be used on knee and hip examinations. The WARP technique enables susceptibility artifact reduction functionality, optimized protocols are provided.

With syngo MR E11, the Advanced WARP option is also included.

Inline MPR (Multi Planar Reconstruction) calculations provide increased efficiency, reproducibility and ease of use.

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### Mapit syngo #Tim

Based on the T1, T2 or T2\* properties of the cartilage syngo ParametricMap allows the early detection of osteoarthritic break down of cartilage structures even before morphological changes occur. The method supports therapeutic decisions in individual patients and can be used to control treatments non-invasively, replacing surgeries or biopsies.

The assessment of T1, T2 and T2\* properties of tissues in other body regions is also possible.

syngo ParametricMap provides very fast 2D and 3D high resolution imaging sequences and

Qty	Item Description
	the Inline calculation of parametric maps for the T1, T2 and T2* properties of the imaged tissue.
1	<b>Image Fusion syngo</b> This application provides a dedicated evaluation software for spatial alignment (matching) and visualization of image data either from different modalities (CT,MR,NM,PET) or from the same modality but from multiple examinations of the same patient. It supports optimal diagnostic outcome (fusion of morphological and functional information) and therapy planning.
1	<b>DTI Package #T+D</b> The DTI Package is a bundle of: <ul style="list-style-type: none"> <li>- Diffusion Tensor Imaging</li> <li>- DTI Evaluation and</li> <li>- DTI Tractography syngo</li> </ul> The bundle comprehends all acquisition and postprocessing tools for comprehensive DTI exams.
1	<b>Inline BOLD Imaging #Tim</b> The BOLD imaging package is based on blood oxygen level dependent (BOLD) contrast-sensitive single-shot EPI sequences. Inline technology enables the automatic real-time calculation and display of statistical (t-value) images during the measurement of BOLD paradigms (including 3D motion correction and spatial filtration). The mosaic image format is supported. Clinical protocols are prepared. With Inline BOLD Imaging, functional brain mapping can be optimally integrated into clinical routine, e.g. prior to neurosurgical interventions.
1	<b>3D PACE syngo #Tim</b> 3D PACE (Prospective Acquisition CorrEction) enhances Inline BOLD imaging with motion correction during the acquisition of a BOLD exam. In contrast to a retrospective motion correction that corrects previously acquired data, the unique 3D PACE tracks the head of the patient, correcting for motion in real time during the acquisition.
1	<b>BOLD 3D Evaluation syngo #Tim</b> BOLD 3D Evaluation syngo is the comprehensive processing and visualization package for BOLD fMRI. It provides a full set of features for clinical fMRI, as well as advanced features for more research oriented applications. The package provides statistical map calculations from BOLD datasets. It enables the visualization of task-related areas of activation with 2D or 3D anatomical data, allowing, in real time, to assess the spatial relation of eloquent cortices with cortical landmarks or brain lesions.
1	<b>RESOLVE #T+D</b> RESOLVE is a diffusion-weighted, readout-segmented EPI sequence optimized towards high resolution imaging with reduced distortions. The sequence uses a very short echo-spacing compared to single-shot EPI, substantially reducing susceptibility effects. A 2D-navigator correction is applied to avoid artefacts due to motion-induced phase errors. This combination allows diffusion weighted imaging of the breast, prostate, brain and spine with a high level of detail and spatial precision.
1	<b>Arterial Spin Labeling 3D #T+D</b> 3D acquisition of non-contrast enhanced brain perfusion with a TGSE sequence for minimal susceptibility and full brain coverage. Higher SNR, optimized contrast uniformity and reduced motion sensitivity. Inline calculation of PWI (perfusion weighted images) for a qualitative assessment of brain perfusion.
1	<b>Spectroscopy Package #T+D</b> The Spectroscopy Package is a comprehensive software package which bundles Single Voxel Spectroscopy, 2D Chemical Shift Imaging, 3D Chemical Shift Imaging and syngo Spectroscopy Evaluation. Sequences and protocols for proton spectroscopy, 2D and 3D proton chemical shift imaging (2D CSI and 3D CSI) to examine metabolic changes in the brain (e.g. in tumors and degenerative diseases) and in the prostate are included. Furthermore included is the comprehensive syngo Spectroscopy Evaluation Software which enables fast evaluation of

## Qt

### Item Description

spectroscopy data on the syngo Acquisition Workplace.

1

#### **GRACE syngo #Tim**

Integrated software package including sequences and protocols for proton spectroscopy, optimized for breast studies.

SVS (Single Voxel Spectroscopy) technique (spin echo sequence) optimized for breast spectroscopy.

- The technique contains a special spectral lipid suppression pulse (user definable) for lipid signal reduction.
- Water reference detection (to visualize the normalized choline signal) (Siemens unique)
- Online frequency shift correction for reduction of breathing related artifacts, inline implementation, no additional user interaction is required.

Clinical applications:

- Can help the physician improve the specificity for tumor diagnoses
- Predicting clinical response to neoadjuvant chemotherapy in an early stage (24 hours after receiving the first dose)

Specific characteristic starting with SW version syngo MR B15:

- includes reference tube for quantitative spectroscopy

In order to obtain best spectral quality, it is recommended to use one of the following breast coils: Siemens Breast Matrix Coil, 16-channel AI Breast Coil, Breast 18, (2/4/8)-channel or (2/10/16)-channel Sentinelle Breast coil.

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#### **MR Elastography #T+D**

MR Elastography offers a new diagnostic tool for all Tim+Dot systems that allows identifying variations in liver tissue stiffness.

The MR Elastography package consists of new protocols and sequences, new reconstruction algorithms and inline reconstruction.

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#### **fMRI Trigger Converter**

An optical trigger signal is available to trigger external stimulation devices in fMRI experiments.

With the "fMRI Trigger Converter" this signal can be converted to an electrical signal (TTL/BNC and RS 232 interface for PC; modes: toggle or impulse).

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#### **syngo Expert-i #T+D**

This software application enables remote access to the system (connected via local area network) for planning and processing.

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#### **Breast Dot Engine, USA #T+D**

A set of predefined Breast Dot Engines are provided for lesion detection, implant evaluation and breast biopsy. The Engines offer a comprehensive set of user guidance, workflow automation and personalization towards the individual patient so that excellent image quality and increased consistency for breast diagnosis and intervention can be achieved.

The following Breast Dot Engine configurations will be provided:

- 16ch AI FatSat
- 16ch AI NonFatSat
- 4ch BI FatSat
- 4ch BI NonFatSat
- 8ch Sentinelle FatSat



Qty

**Item Description**

- 8ch Sentinelle NonFatSat
- Biopsy Sentinelle 4/2ch
- Biopsy 4ch BI

They include:

- Patient View for fast adaptation to patient conditions

- Evaluation of patients implant situation

- Guidance View with image and text guidance

- Auto-Coverage

- Auto Bolus Detection

- Inline MPR Planning

- Display of Biopsy Target Coordinates at

Dot Display if a Siemens' planning software is used.

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**2/10/16ch Sentinelle BreastCoil #Ae**

The 2/10/16-channel Sentinelle Breast Coil can be used as a breast imaging coil, a bilateral biopsy coil, as well as a unilateral biopsy coil providing large biopsy access

This coil consists of a positioning frame with exchangeable coils with different numbers of channels as described in detail in the E text.

The preamplifiers are integrated into the coil.

The coil is iPAT-compatible.

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**Tim Coil Interface 1.5T**

Coil adapter plug for up to 8 receive and 1 transmit channels, in order to connect existing dedicated knee and breast coils (Tx/Rx 15-channel Knee Coil, CP Extremity Coil, 4-channel BI Breast Coil, 16-channel AI Breast Coil, (2/4)/8-channel Sentinelle BreastCoil and (2/10)/16-channel Sentinelle BreastCoil) with all MAGNETOM 1.5T Systems using Tim 4G-technology.

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**Peripheral Angio 36 #Ae**

The new Tim 4G coil technology with Dual Density Signal Transfer and SlideConnect Technology combines key imaging benefits: excellent image quality, high patient comfort, and unmatched flexibility:

- 36 channels
- Dual Density Signal Transfer
- Ultra light-weight
- SlideConnect Technology

The 36-channel coil includes 36 integrated pre-amplifiers for excellent signal-to-noise ratio. The single SlideConnect Plug allows for fast and easy patient preparation.

The Peripheral Angio 36 features:

- 36-element design with 36 integrated preamplifiers, distributed over 6 planes with 6 elements each
- Operates in an integrated fashion with Body 18 coils and with the Spine 32 . For Whole-Body examinations also with the Head/ Neck 20
- Automatic table feed and active coil switch
- Can be utilized head and feet first
- Both legs are independently covered with coil elements, maximizing the coil filling factor and the signal-to-noise ratio
- No coil tuning
- iPAT-compatible
- Dual-Density Signal Transfer enables ultra-high density coil designs by integrating key RF components into the local coil
- SlideConnect technology for easy coil set up

**Qty****Item Description**

- One cable only for easy handling
- Includes special non-ferromagnetic coil cart for safe, user-friendly storage

**Applications:**

- High-resolution angiography of both legs incl. Pelvis (by additional use of the Body 18) with highest signal-to-noise ratio
- Visualization of the iliac arteries and aorta in combination with Body 18
- Bilateral examinations of long bones of the legs

**Typically combined with:**

Head/ Neck 20, Body 18, Spine 32, and all flexible coils such as Flex Large 4 or Flex Small 4

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**Shoulder 16 Coil Kit #Ae**

The new Tim 4G coil technology with Dual Density Signal Transfer and SlideConnect Technology combines key imaging benefits: excellent image quality, high patient comfort, and unmatched flexibility. The Shoulder 16 Coil Kit for examinations of the left or right shoulder consists of a base plate and two different sized iPAT compatible 16 channel coils (Shoulder Large 16 and Shoulder Small 16). These will be attached and can be relocated on the base plate. The 16-element coils with 16 integrated pre-amplifiers ensure maximum signal-to-noise ratio. Shoulder Large 16 and Shoulder Small 16 will be connected via a SlideConnect plug for fast and easy coil set-up and patient preparation.

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**Foot/Ankle 16 #Ae**

The new Tim 4G coil technology with Dual Density Signal Transfer and DirectConnect Technology combines key imaging benefits: excellent image quality, high patient comfort, and unmatched flexibility.

Foot/Ankle 16 for examinations of the left or right foot and ankle region consists of a base plate and an iPAT compatible 16-channel coil and allows high resolution imaging of the foot and ankle within one examination. Foot/Ankle 16 is a cable-less coil and will be connected via DirectConnect for fast and easy patient preparation.

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**Body 18 #Ae**

The Tim 4G coil technology with Dual Density Signal Transfer and SlideConnect Technology combines key imaging benefits: excellent image quality, high patient comfort, and unmatched flexibility:

- 18 channels (inherent) or up to 30 (in combination with the Spine 32)
- Dual Density Signal Transfer
- Ultra light-weight
- SlideConnect Technology

The Body 18 is part of the standard configuration. The 18-channel coil with its 18 integrated pre-amplifiers ensures excellent signal-to-noise ratio. The 18 coil elements provide extensive coverage in all directions. The single SlideConnect plug allows for fast and easy patient preparation. The light-weight coil ensures highest patient comfort.

**The Body 18 Coil features:**

- 18-element design with 18 integrated preamplifiers (3 clusters of 6 elements each)
- Operates in an integrated fashion with the Spine 32 as an 30 channel body coil
- Can be combined with further Body 18 coils for larger coverage
- Can be positioned in different orientations (0°, 90°, 180°, 270°) for patient specific adaptations
- No coil tuning
- iPAT compatible in all directions

**The highly flexible design enables a wide variety of applications including:**

- Thorax (incl. heart)
- Abdomen
- Pelvis
- Hip

Qty	Item Description
	<p>Typically combined with:</p> <ul style="list-style-type: none"> <li>- Head / Neck 20</li> <li>- Spine 32</li> <li>- Additional Body 18 coil(s) (optional)</li> <li>- Peripheral Angio 36 (optional)</li> <li>- Flex Large 4</li> <li>- Flex Small 4</li> <li>- Loop coils (optional)</li> <li>- Endorectal coil (optional)</li> </ul>
1	<p><b>Tx/Rx CP Head Coil #Ae</b></p> <p>Circularly polarized no-tune transmit/receive coil with an open patient-friendly design. The integrated transmit mode allows volume selective excitation. Integrated, extremely low-noise pre-amplifiers permit very high signal-to-noise ratio. Furthermore, the coil is outfit with SlideConnect Technology, allowing for easier patient preparation and less table time for the patient.</p>
1	<p><b>Special Purpose Coil #Ae</b></p> <p>The 4-channel special purpose coil is a no-tune receiver coil designed for examination with small Field-of-Views.</p>
1	<p><b>MR Workplace Table 1.2m</b></p> <p>Table suited for syngo Acquisition Workplace and syngo MR Workplace based on syngo Hardware.</p>
1	<p><b>MR Workplace Container, 50cm</b></p> <p>50 cm wide extra case for the syngo host computer with sliding front door to allow change of storage media (CD/DVD/USB).</p>
1	<p><b>Soft Tissue Motion Correction #Tim</b></p> <p>3D post-processing step, elastic soft tissue/breast motion correction. The algorithm enables higher accuracy in detection of multi-focal lesions.</p> <p>Key features are:</p> <ul style="list-style-type: none"> <li>- possible for images with matrix sizes up to 512x512</li> <li>- w/o contrast media and on 2D/3D datasets</li> <li>- works on fat sat, water excitation and non fat sat</li> <li>- independent on slice orientation</li> <li>- original images remain untouched</li> </ul> <p>This option includes BRACE (BReast Acquisition and CorrEction) functionalities.</p>
1	<p><b>Patient Supervision TV #T+D</b></p> <p>The supervision solution is customizable and designed to address different site specific requirements. Up to 4 cameras can be optionally connected for patient supervision in the examination or waiting room.</p> <p>This package contains a special video camera for monitoring the patient during an MR examination, conveniently mounted on the wall of the examination room. The information is displayed on an LCD monitor in the control room, included in this kit.</p>
1	<p><b>Patient TV wall support</b></p> <p>Wall mount for the patient monitor.</p>
1	<p><b>Comfort Kit #T+D</b></p> <p>Vacuum cushions for stable positioning of the patient during the examination. The kit comprises of an integrated vacuum pump and 3 anatomically shaped (spine, head, small joints) cushions of different sizes.</p>

Qty	Item Description
1	<b>Coil Storage Cart #T+D</b> Specially designed non-ferromagnetic cart for easy storage of the most commonly used coils and accessories.
1	<b>Additional Set of Manuals</b> Additional set of manuals for the above selected MR system.
1	<b>MR_GOV_RIG_INSTL</b>
1	<b>T+D Preinstall kit for fixed table</b>
1	<b>Standard Cryogenics</b>
1	<b>MR Project Management</b> A Siemens Project Manager (PM) will be the single point of contact for the implementation of your Siemens equipment. The assigned PM will work with the customer's facilities management, architect or building contractor to assist you in ensuring that your site is ready for installation. Your PM will provide initial and final drawings and will coordinate the scheduling of the equipment, installation, and rigging, as well as the initiation of on-site clinical education.
1	<b>Initial onsite training 32 hrs</b> Up to (32) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist. Uptime Clinical Education phone support is provided during the warranty period for specified posted hours. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	<b>Follow-up training 32 hrs</b> Up to (32) hours of follow-up on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Uptime Clinical Education phone support is provided during the warranty period for specified posted hours. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	<b>MR Dot Govt. Training Class (No T&amp;L)</b> Tuition for (1) government attendee to attend a Classroom Course of choice at one of the Siemens training centers. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	<b>Additional onsite training 24 hours</b> Up to (24) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist if applicable. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	<b>Additional onsite training 32 hours</b> Up to (32) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist if applicable. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	<b>GOV'T ONLY - MR Training Class</b> Tuition for (1) government attendee to attend a classroom course of choice at one of the Siemens training centers. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.

Qty	Item Description
1	<b>Offset for Initial onsite train 32 hrs</b>
1	<b>Armrest #MR</b>
1	<b>KKT ECOCHILLER 133L</b> The KKT ECO 133 -L chiller is a dedicated 20°C cooling system for MAGNETOM Aera and MAGNETOM Skyra which automatically adapts to the different cooling requirements (e.g. system in operation, standby, ...) to reduce the energy consumption for cooling. The cooling system must be used in combination with the IFP (Interface Panel), if there is no on-site chilled water supply at all. The IFP is included in the scope of supply.
1	<b>Kraus Start-up and Warranty</b>
1	<b>9390 160kVA UPS</b> Includes: PW9390 160kVA Electronics Cabinet, (1) Battery Cabinet with hold over time of 8 minutes @ .9 pf, UPS includes: Single Feed Option, Hi-Res Delta Kit, and 8" Side Car housing 3-Circuit Breaker, 480V, 35kAIC Integrated Maintenance Bypass. Start-Up (5x8) and One (1) Year On-Site Parts and Labor coverage (7x24), Plus One (1) Year of remote monitoring.  Installation including rigging, electrical, and any HVAC required is not included and is the responsibility of the customer or its contractor.
1	<b>Integrated Electrical Cabinet</b> NOT approved for OSHPD facilities.  The Integrated Electrical Cabinet (IEC) is a device that automatically resets the circuit breakers that have been tripped by temporary voltage fluctuations such as power snags or power surges. Voltage fluctuations are generally caused by lightning or during the start-up of a back-up power supply unit. The IEC minimizes helium losses for MR systems due to the helium compressor/cold head not being operational. The IEC - MR250A, which contains all Siemens brand components, is a power distribution solution for MAGNETOM Skyra, Verio, Trio A TIM System, Avanto, Aera, Espree, and Biograph mMR. The IEC includes the required circuit breaker for the MR system (170A) and the circuit breakers for both the chiller (70A) and RF cabin lighting (25A). It also includes a 250A main disconnect circuit breaker, as well as four Siemens Emergency Stop (EPO) buttons. These mushroom pushbuttons are equipped with: a protective shroud, a positive latching function, and a mechanical switching position indicator. The IEC is intended to be operated in 480V 50-60 Hz grids. Siemens Project Manager will coordinate the delivery of the IEC. The electrical installation of the IEC - MR250A cabinet and the EPO buttons is the responsibility of the customer and has to be performed by a qualified electrician.
1	<b>Spectris Solaris EP Injector iCBC</b> Includes Spectris Solaris EP injector and Integrated Continuous Battery Charger (ICBC). - Optimized color touch screen with few keystrokes. - Six user-programmable phases for added flexibility. - Independent Keep Vein Open (KVO) allows more time to focus on patient. - Large 115 mL saline syringe allows for longer KVO and multiple flushes. - Design of low pressure tubing eliminates dead space in the "T" connection that can waste contrast. - The clear barrel design with molded FluidDots help detect the presence of air in a syringe. - Pressure Limit Setting control software enables user to select from one to six preset maximum pressure limits, ranging from 100-300 psi, and to view current pressure during injection next to the pre-selected maximum value on the Solaris display.  Installation, applications and one year warranty provided by Medrad.  Not for mobile use, refer to Siemens part number M3SSMR300EPM for the Solaris injector used in a mobile environment.

Qty	Item Description
	This product has been tested and verified for compatibility with the following Siemens' products: MAGNETOM Trio, Espree, Essenza, Verio, Avanto, Symphony, Aera, Skyra and Biograph mMR. Compatibility with other products cannot be guaranteed and use with any other products may void service contracts and/or system warranties.
1	<b>Local Offset - Spine Dot Engine</b>
1	<b>Dot Engine 1 pricing offset</b> To be eligible for this promotion, a binding purchase order of the application(s) must be received by Siemens Medical on or before September 30, 2015.
1	<b>Local Offset - Breast Dot Engine, USA</b>
1	<b>Dot Engine 1 pricing offset</b> To be eligible for this promotion, a binding purchase order of the application(s) must be received by Siemens Medical on or before September 30, 2015.
1	<b>Local Offset - Cardiac Dot Engine, USA</b>
1	<b>Dot Engine 2 pricing offset</b> To be eligible for this promotion, a binding purchase order of the application(s) must be received by Siemens Medical on or before September 30, 2015.
1	<b>MR Wall sign -English</b> Highly durable 1mm PVC wall signs with high-tack, double-back tape. Sticks to most any surface. English. 12" x 18".
1	<b>MRI Patient Audio System</b> The MRI Patient Audio System is to be installed in the technologist room and is connected to the Siemens intercom system. The package provides the following benefits: <ul style="list-style-type: none"> <li>• Create custom, commercial-free radio stations based on artist, song or genre preferences</li> <li>• Avoid any AM/FM tuning issues that may occur in RF-shielded rooms</li> <li>• Compatible with all popular audio apps (e.g. tunein, Spotify, iTunes, Audible, iHeartRadio, Pandora, etc.)</li> </ul> <p>Includes amplifier; all cables and adapters; Bose Companion 2 technologist speakers; 3.5 mm to RCA cable; and customized iPad Mini with all original accessories and TuneIn Radio Pro App (pre-paid and installed).</p> <p>The MR Stereo can play regular radio, internet radio (depending on quality of and access to Radio wave signals and Wi-Fi signals) and device (iPad) stored audio content. Optimal performance requires access to radio wave signals for regular radio and Wi-Fi signals for Internet radio through the facility's wireless network.</p> <p>Installation is not included unless purchased with the Siemens system.</p> <p>Includes 3 year limited liability warranty on all system components through MRIaudio.</p>
1	<b>Elastography hardware</b> RESOUNDANT Hardware starter set for Elastography The hardware components of the MR Elastography option create, conduct and introduce mechanical waves into the human body. They are designed to be used in conjunction with imaging systems. <p>The set includes these major specific components of the MR Elastography option:</p> <ul style="list-style-type: none"> <li>The active driver, which creates the mechanical waves</li> <li>Two (2) passive driver, which applies the mechanical waves to the patient's body</li> <li>Long and short plastic tubings for mechanical wave transfer from active to passive driver</li> <li>Applicator belt for securing the passive driver to the patient's body</li> </ul>

**Qty****Item Description**

Cords and cables for connecting the trigger box with the active driver and the components with the scanner electronics

DO NOT TAKE THE ACTIVE DRIVER OR TRIGGER BOX INTO THE MAGNET ROOM.

Customer is responsible for hardware installation.

Requires minimum software version syngo MR D13A or syngo MR B19.

The system price includes two years parts warranty through Mayo.

1

**Advanced Expression w/Draeger Mount**

ECG, SpO2, EtCO2, NIBP, Agents, Body Temperature with printer and 1 wireless display (can be used in both rooms) o Accessories to perform all the above parameters on 20-30 (each) Adult, Pediatric and Neonatal patients o Gating connector included o Mounting hardware for the Draeger Anesthesia Machines Includes installation and one year warranty through Invivo.

This product has been tested and verified for compatibility with the following Siemens' products: MAGNETOM Symphony, Avanto, Espree, Trio, Skyra, Verio, Aera, Essenza, and Biograph mMR. Compatibility with other products cannot be assured and may void service contracts and/or system warranties.

1

**Invivo Expression wireless display**

Can be combined with any of the Expression DCU monitors for a redundant display. Includes installation and one year warranty through Invivo.

This product has been tested and verified for compatibility with the following Siemens' products: MAGNETOM Symphony, Avanto, Espree, Trio, Skyra, Verio, Aera, Essenza, Biograph mMR. Compatibility with other products cannot be assured and may void service contracts and/or system warranties.

**MR Elevate Program**

Project # 2014-1929,Avanto, expires 1/21/2016, deinstall 6 / 2016, Elevate

One complimentary biomedical tuition is included with the purchase of this system. This training must be completed before the end of the warranty period.

This educational offering must be completed by the later of (12) months from purchase of training or if applicable, completion of installation. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.

Offset Part MR\_FOLLOWUP\_32 Follow-up training 32 hrs

Offset Part 14407354 Additional Set of Manuals

Airfare for Complimentary Biomedical Training for one engineer from ABQ - RDU at

This cost represents the typical direct expense to Siemens to pay for travel and lodging to attend training at the Siemens Cary, NC training facility. All arrangements must be arranged through Siemens designated travel agency. The precise expense may vary, depending upon the timing of the travel schedule and changes to airfare and hotel rates. Should the expense to Siemens exceed this cost, Customer will not be charged for the difference; should the expense be less than this cost, Siemens will not refund the difference.

Lodging for Complimentary Biomedical Training for one engineer for 24 nights at

This cost represents the typical direct expense to Siemens to pay for travel and lodging to attend training at the Siemens Cary, NC training facility. All arrangements must be arranged through Siemens designated travel agency. The precise expense may vary, depending upon the timing of the travel schedule and changes to airfare and hotel rates. Should the expense to Siemens exceed this cost, Customer will not be charged for the difference; should the expense be less than this cost, Siemens will not refund the difference.

#### **XX2SYNGO - Syngo with Multimodality Workstation - (5 days)**

This educational offering must be completed by the later of (12) months from purchase of training or if applicable, completion of installation. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.

#### **MR2AERASKY - MAGNETOM Aera/Skyra - (15 days)**

This educational offering must be completed by the later of (12) months from purchase of training or if applicable, completion of installation. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.

#### **MR5TTIMWBT - TIM System - (4 hours)**

This educational offering must be completed by the later of (12) months from purchase of training or if applicable, completion of installation. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.

#### **Airfare for Additional Biomedical Training for one engineer from ABQ - RDU at**

This cost represents the typical direct expense to Siemens to pay for travel and lodging to attend training at the Siemens Cary, NC training facility. All arrangements must be arranged through Siemens designated travel agency. The precise expense may vary, depending upon the timing of the travel schedule and changes to airfare and hotel rates. Should the expense to Siemens exceed this cost, Customer will not be charged for the difference; should the expense be less than this cost, Siemens will not refund the difference.

#### **Lodging for Additional Biomedical Training for one engineer for 24 nights at**

This cost represents the typical direct expense to Siemens to pay for travel and lodging to attend training at the Siemens Cary, NC training facility. All arrangements must be arranged through Siemens designated travel agency. The precise expense may vary, depending upon the timing of the travel schedule and changes to airfare and hotel rates. Should the expense to Siemens exceed this cost, Customer will not be charged for the difference; should the expense be less than this cost, Siemens will not refund the difference.

#### **Standard Deinstallation of Equipment Elevate**



## Description

Flow Quantification enables the acquisition of flow encoded images and the evaluation of blood as well as of cerebro-spinal fluid (CSF).

Sequences include:

- ECG triggered 2D phase contrast with iPAT support
- Retrospective reconstruction algorithms for full R-R interval coverage
- Maxwell Term Compensation

Despite a strong sensitivity for local magnetic field inhomogeneities Susceptibility Weighted Imaging (SWI) as a 3D technology keeps up the signal near large susceptibility leaps due to very thin slices and high resolution in the slice (high image quality e.g. in the area of the forebrain near the frontal sinus).

Moreover, the phase information of the MR signal is integrated in the image display. In order to further increase sensitivity for localized microscopic magnetic field inhomogeneities, large-area magnetic field inhomogeneities (e.g. caused by susceptibility leaps near the sinus) are specifically suppressed in the phase images.

This allows even smallest amounts of deoxygenated hemoglobin (e.g. in cerebral veins) or from products of hemoglobin decomposition (e.g. from hemorrhages) to be displayed.

Interesting measuring times for the ultra-high-resolution 3D protocols are achieved through parallel imaging with iPAT (GRAPPA).

The Susceptibility Weighted Imaging package includes:

- SWI measuring sequence, iPAT compatible
- optimized measuring protocols for the head
- inline-postprocessing for automatic calculation of relevant images within the scope of image reconstruction:
  - calculation of susceptibility-weighted images
  - venous angiography: MIP of a thin slice block

SWI has been optimized for clinical use to support diagnostics with cerebrovascular diseases (e.g. cerebral insult), venous malformation, brain trauma and tumors.

*syngo* TWIST provides:

- Visualization of contrast agent dynamics in the vessel system of interest with maximum flexibility.
- Needs only a low amount of contrast agent.
- Imaging in all body regions, e.g. carotids, pulmonary and peripheral vessels with brilliant spatial and temporal resolution.
- Clear separation of the arterial and venous phase.
- High speed acquisition by intelligent k-space strategies and use of iPAT, powered by Tim.
- *syngo* TWIST provides fat suppression using water selective excitation.
- Inline technologies, such as subtraction and MIP are provided for optimal workflow.
- In case of very high spatial resolution *syngo* TWIST may even replace conventional static MR angio. Moreover, *syngo* TWIST does not require any bolus timing - just inject and go.

*syngo* NATIVE offers:

- Non-contrast enhanced MRA
- Separate imaging of arteries and veins
- Visualization of - e.g. - renal arteries or peripheral vessels

The *syngo* NATIVE package comprises:

- *syngo* NATIVE TrueFISP

## Description

- *syngo* NATIVE SPACE

Combining the unique advantages of Tim and *syngo* BEAT with iPAT and powerful gradients, it allows performing cardiac MR examinations without compromise in image resolution or acquisition speed. *syngo* BEAT is a unique tool for fast and easy cardiovascular MR imaging. It provides 1-click switch from cine imaging to tagging for wall motion evaluation and 1-click switch from 2D to 3D imaging. *syngo* BEAT automatically adjusts all parameters associated with the changes.

### Cardiac and Vessel Morphology

- Multi echo technique for e.g. thalassemia assessment
- 3D aortopathy imaging with free breathing (SPACE)

### Global or Regional Wall Motion Analysis with *syngo* BEAT

- 3D cine acquisition for full CT-like heart coverage
- 2D segmented FLASH for visualization of the regional wall motion using various tagging techniques (grid or stripes)

### Dynamic myocardial imaging with *syngo* BEAT

- Ultra-fast, high-SNR sequence for dynamic imaging with GRE EPI contrast for stress and rest exams

### Tissue characterization with *syngo* BEAT

- Robust myocardial tissue characterization with 3D PSIR (phase-sensitive inversion recovery), e.g. after myocardial infarction or for differentiation of cardiomyopathies
- Fast and complete coverage of the myocardium with IR 3D FLASH and TrueFISP

### Coronary imaging with *syngo* BEAT

- 3D Whole-Heart non-contrast Coronary MRA
- 3D Whole-Heart MRA with advanced free-breathing navigator compensating diaphragm shifts during the acquisition (motion-adaptive respiratory gating)

Tim and the Tim Whole Body Suite enable for true whole body MR scanning for head-to-toe imaging. Whole body imaging with highest image quality without patient repositioning and without the need to change a single coil, not even once, this means whole body imaging without compromise.

The Tim Whole Body Suite features:

- The all-new Tim Table or Tim Dockable Table enable a full Field-of-View with coverage up to 205 cm (6' 9"). The table top has the same length as the standard system without whole body capabilities. Additional free space is required at the rear part of the magnet to ensure, that the table movement is not limited by the rear wall.
- Table movement to its full extent can be remotely controlled from the operator console either by the operator or by sequence protocols.
- Protocols and programs for whole body MR angiography and morphology e.g. for metastasis visualization and preventive care examinations.
- Whole body MR Angiography is possible with high speed, high resolution and high image contrast on the entire volume combining high speed gradients and iPAT.
- The large FoV of 205 cm supports the assessment of metastases distribution in the body with sequences such as TIRM (Turbo Inversion Recovery).

The 16-element coil with 16 integrated pre-amplifiers excels in highest resolution imaging with exceptional signal/noise ratio, while taking full advantage of iPAT in all directions.

Hand/Wrist 16 is ergonomically designed and adapted to the shape of the hand/wrist region. The coil features a hinged design of the upper part and slidable attachment to the base plate. Together with the included stabilization pads the coil allows easy, fast and comfortable patient positioning.

## Description

Thanks to its 15-channel design this coil is perfectly suited for high-resolution images with excellent SNR. With the arrangement of the antennas in three rings of 5 elements each, the coil is specially designed for parallel imaging with high acceleration factors.

The coil is positioned on a laterally movable support and therefore allows for comfortable patient positioning of both legs for off-center examinations. SlideConnect Technology allows for fast and easy patient preparation, resulting in less table time. Furthermore, the upper part can be removed for easier patient positioning. Additional cushions allow for optimum patient immobilization.

The integrated transmission function makes volume-sensitive excitation with greatly reduced RF power possible on the one hand and, on the other, prevents aliasing artifacts (e.g. due to the other knee).

### Aera ex Erlangen ENS\_14416900

MAGNETOM Aera - the first 1.5T Tim+Dot system - integrates the next generation Tim - Tim 4G and the Siemens unique Dot Engines (Day Optimizing Throughput Engines) enabling workflow efficiency combined with higher diagnostic confidence due to consistent results.

The system includes:

#### Tim 4G+Dot

Tim 4G provides increased patient comfort and optimized workflow efficiency. Only one patient setup, no repositioning, and no changing of coils. Ultra-light-weighted coils with high density of coil elements for maximized patient comfort and increased SNR. Feet-first positioning for almost all examinations possible reduces claustrophobia.

Tim 4G is 4G flexibility, accuracy and speed and brings image quality and acquisition speed to a new level.

Dot helps to take away the complexity in MRI scanning through patient personalization, user guidance and process automation. Optimized scan strategies are provided and can be selected based on patient condition, which allows for high quality exams even when conditions change. Integrated decision points allow the user to easily add or remove one or a group of protocols with one click. Step by step real-time on board guidance guides novice users even through the most complicated exams. Process automation allows optimal timing for breathing, scanning, and planning. Dot can be easily customized to follow the individual standards of care.

Dot is personalized, guided and automated and designed to improve workflow efficiency and image consistency.

MAGNETOM Aera with its 70 cm Open Bore design and a system length of only 145 cm gives a patient friendly appearance that can significantly help patients with anxiety or claustrophobia.

#### Magnet:

- Ultra-short 137 cm long (145 cm with covers), whole-body superconductive 1.5T magnet with active shielding (AS) technology with counter coils
- External Interference Shielding (E.I.S.)
- Excellent homogeneity enabled by TrueForm magnet design which allows for a cylindrically optimized homogeneity volume resulting in higher image quality (50 × 50 × 45 cm<sup>3</sup> DEV, typ. 3.6 ppm based on the 24-plane plot method)
- The magnet has a helium capacity of approximately 1,280 liters and a typical Helium boil-off rate of 0 l/yr during typical, undisturbed clinical operation depending on the sequences used and examination time, and provided the system is serviced in regular intervals.
- It has an integrated magnet cooling system.

#### Gradient system:

- Actively shielded water-cooled world-class gradient system
- True Form Gradient Design
- All axes force compensated

#### DirectRF - RF Transmit/Receive System:

- Fully integrated Transmit and Receive path in the magnet housing including extremely compact water-cooled solid state amplifier with 26.1 kW peak power
- High dynamic range
- Immediate feedback loop for real-time sequence adaptation

## Description

- Integrated no tune transmit/receive Body Coil
- The revolutionary Tim 4G technology allows connecting up to 204 coil elements simultaneously enabling higher SNR and iPAT in all directions. No repositioning of patients is needed even for large Field of View examinations.
- Dual-Density Signal Transfer enables ultra-high density coil design by integrating key RF components into the local coil.

### Tim 4G Coils:

The new Tim 4G coil technology with Dual-Density Signal Transfer, DirectConnect and SlideConnect Technology combines key imaging benefits:

Excellent image quality, high patient comfort, and unmatched flexibility.

The Tim 4G coils are designed for highest image quality combined with easy handling. The high element density of the coils increases SNR and reduces examination times. DirectConnect and SlideConnect™ technology reduce patient set up time significantly. The coils are designed with the patient in mind. Light weighted coils and open design ensure highest patient comfort which results in better patient cooperation and image quality. No coil changing with multi-exam studies saves patient setup- and table time.

AutoCoilSelect enables dynamic, automatic, or interactive selection of the coil elements within the Field of View and speeding the exam preparation at the host.

All coils are time-saving "no-tune" coils.

A comprehensive set of pads for comfortable and stable patient positioning together with safety straps are included.

- **Head/Neck 20**  
The 20-channel coil with its 20 integrated pre-amplifiers ensures excellent signal-to-noise ratio. The unique DirectConnect technology allows users connecting the 20 coil elements of the Head/Neck20 without cables. The patient friendly open design allows for maximum patient comfort which is supported in addition by a look-out mirror for claustrophobic patients. The high channel coil is iPAT compatible in all directions.

The open and light design of the upper coil part increases patient comfort and is removable for easy patient handling. The lower coil part may remain on the table for most of the examinations can be used without the upper part. The Head/Neck 20 and Spine 32 are smoothly integrated into the patient table, thus enabling high flexibility in imaging and fewer coil changes and easy handling when switching patients. The Head/Neck 20 coil is equipped with two removable cushioned head stabilizers for stable and comfortable patient positioning.

The Head/Neck 20 can be used for applications like head examinations, neck examinations, MR Angiography, combined head/neck examinations or for imaging of the TMJ (temporomandibular joints).

Typically combined with the Spine 32 and Body 18 or Peripheral Angio 36 but also other combinations eg with flexible coils like the Flex Large 4 are possible.

- **Body 18**  
The 18-channel coil with its 18 integrated pre-amplifiers ensures maximum signal-to-noise ratio. The 18 coil elements of the Body 18 with only one SlideConnect Plug allows for fast and easy patient preparation resulting in less table time. Fast acquisition times enabled by iPAT in all directions. The light-weighted coil ensures highest patient comfort.

Body 18 operates in an integrated fashion with the Spine 32 as a 30 channel body coil

Body 18 can be combined with further Body 18 coils for larger coverage and positioned in different orientations (0°, 90°, 180°, 270°) for patient specific adaptations

The Body 18 is typically used in combination with the Spine 32 for examinations of the thorax, abdomen, pelvis or hip and operates as a 30 channel body coil (3 rings 10 elements). The Body 18 can also be used for cardiac or vascular applications. Through its perfect combinability with the Spine 32, further Body 18 (optional), the Peripheral Angio 36 (optional), but also the Head/Neck20 and all flexible coils (e.g. Flex Large 4, Flex Small 4) it contributes for a broad range of indications up to whole-body imaging.

- **Spine 32**  
The 32-channel coil with its 32 integrated pre-amplifiers ensures maximum signal-to-noise ratio. The unique DirectConnect technology allows connecting the 32 coil elements of the Spine 32 without the need to plug in any cable. The patient friendly ergonomic design allows for maximum patient comfort. The high element coil is

## Description

iPAT compatible in all directions.

Smoothly integrated into the patient table the Spine 32 may remain on the patient table for nearly all exams.

The Spine 32 is typically combined with Body 18, Head/Neck 20, Peripheral Angio 36 or Flex Large 4, Flex Small 4.

- Flex Large 4/ Flex Small 4

Light-weighted, very flexible, iPAT compatible, 4-element no-tune receiver coils which are made of soft and smooth material. The coils can be wrapped around or used flat.

Both coils can be connected via Flex Coil interface. One Flex Coil interface is already delivered as standard.

The coils can be used for different examinations ranging from examinations of the extremities to abdominal examinations.

### TimTable

- The maximum scan range of the Tim Table is 140 cm. A scan range of 205 cm can be achieved with the Tim Whole Body suite (optional)
- The maximum patient weight of 250 kg (550 lbs) is valid for horizontal and vertical movements, which ensures maximized patient comfort for obese patients.
- The patient table can be lowered to a minimum height of 52 cm from the floor, for easier patient positioning and better accessibility for geriatric, pediatric or immobile patients. An infusion stand is integrated to ensure fast patient set up also for critical patients.
- Multiple Tim4G coils can be connected at once for efficient and patient friendly examinations.
- The Tim Table can be moved with two clicks into the isocenter - one click to the upmost position and one click into the isocenter.

### Dot (Day Optimizing Throughput) Engine

Dot multiplies the power of Tim resulting in greater image consistency and diagnostic confidence

### Dot Control Centers and Dot Display

- The ergonomically designed Dot Control Centers are integrated left and right into the front covers for controlling table movement and interaction with the Dot Display. The Dot Control Centers are well illuminated for easy visual recognition.
- Automated table move up to upmost position, to center position or Home position facilitate smooth patient preparation and will reduce table time
- Variable (6 levels) ventilation and lighting inside the magnet bore or volume adjustments are possible for increased patient comfort
- The Dot Display provides on board guidance for patient set up where it's needed - directly at the scanner. Information such as Patient name or exam type or required patient position, guidance for ECG set up and immediate visualization of physiological curves will be provided for convenient operation.
- Almost all table control functions, including ventilation and illumination of the magnet bore, can be also controlled from the operator console for convenient operation.

### Dot Technology

Dot makes it easy to get the best possible results for virtually any type of patient. Dot gives uniquely tailored, optimized scans configurable to patient condition or clinical question.

Dot provides patient personalization, user guidance and process automation and is of course configurable by the user to adapt to the different clinical needs and standards of care.

### Brain Dot Engine

The Brain Dot Engine simplifies general brain examinations with guided and automated workflows customized to the site specific standards of care. The Brain Dot Engine supports the user in achieving reproducible image quality with increased ease of use and time efficient exams.

The brain workflow can be personalized to the individual patient condition and clinical need. Several predefined strategies are included, which can be easily selected with one click. They can be changed at any time during the brain workflow.

Protocols tailored for use of contrast media are integrated.

- Standard: Standard examination with 2D protocols

## Description

- Resolution focus: Examination with 3D protocols (with e.g. SPACE) for detailed views
- Speed focus: Examination with fast 2D protocols (with e.g. HASTE) for further speeding up the exam
- Limited patient capabilities: Examination with *syngo* BLADE protocols
- to minimize and correct for the effects of motion automatically

Step-by-step user guidance is seamlessly integrated. Example images and guidance text are displayed for each individual step of the scanning workflow. Both - images and text - are easily configurable by the user.

Easy positioning of the patient with AutoPosition. The patient is automatically placed at the isocenter without any laser marking required.

AutoAlign Head allows automatically slice positioning and aligns on the anatomically derived sagittal, coronal, and axial slices of the localizer. The operator-free alignment and anatomical marking are consistent, independently of patient age, head position, or disease.

Automatic real-time calculation of trace-weighted images and ADC maps with Inline DiffusionTechnology.

Easy rerun or repeat with functionality allows for reduced table time even in case of patients with pain or claustrophobia. An image inside the examination UI can be selected and a rerun of the corresponding series can be triggered with identical sequences or parameters. Alternatively an exam can be repeated with a changed strategy.

The Brain Dot Engine as all Dot Engines can be modified by the user to their individual standard of care.

### Tim Application Suite

The Tim Application Suite offers a complete range of clinically optimized sequences, protocols and workflow functionalities for all body regions. Excellent head-to-toe imaging can be accomplished with the sequences and features included in this application suite. To enable this comprehensive application range, ten dedicated application packages have been included.

- *syngo* TimCT FastView
- Neuro Suite
- Angio Suite
- Cardiac Suite
- Body Suite
- Onco Suite
- Breast Suite
- Ortho Suite
- Pediatric Suite\*
- Scientific Suite

\* MR scanning has not been established as safe for imaging fetuses and infants less than two years of age. The responsible physician must evaluate the benefits of the MR examination compared to those of other imaging procedures.

### *syngo* TimCT FastView

*syngo* TimCT FastView is a "one go" localizer for the whole body or large body regions such as the whole spine or the whole abdomen. It acquires the complete extended Field of View in one volume with isotropic resolution. Transversal, coronal and sagittal reformats of the volume are calculated inline and displayed for planning subsequent exams. Moreover, while planning is underway, adjustments are acquired automatically for further time savings in subsequent measurements.

*syngo* TimCT FastView runs without laser light positioning to further streamline the workflow for several indications.

### Neuro Suite

Comprehensive head and spine examinations can be performed with dedicated programs. High resolution protocols and fast protocols for uncooperative patients are provided. The Neuro Suite also includes protocols for diffusion imaging, perfusion imaging, and fMRI. It includes for example:

## Description

- EPI sequences and protocols for diffusion, perfusion and fMRI for advanced neurological applications. Diffusion weighted imaging is possible with up to 16 b-values in the orthogonal directions. Dynamic Analysis software (included in standard configuration) enables calculation of:
  - ADC maps
  - t-test maps from the EPI images for fMRI
  - Time-to-Peak maps for perfusion analysis.
- Whole spine protocols acquire in multiple steps via software controlled table movement in a single click.
- 3D isotropic resolution volume imaging using T1 3D MPRAGE / 3D FLASH, SPACE DarkFluid, T2 SPACE and 3D TSE
- T2-weighted high resolution 3D Restore protocols optimized for inner ear examinations
- Whole-spine protocols in multiple steps with software controlled table movement
- 2D and 3D MEDIC protocols for T2-weighted imaging, particularly for C-spine examinations in axial orientation where reproducibility is difficult due to CSF pulsations and blood flow artifacts
- 3D Myelograms with 3D HASTE and 3D True-FISP for anatomical details
- Dynamic sacro-iliac joint imaging after contrast administration using a fast T1-weighted FLASH 2D sequence
- Spine diffusion protocols to differentiate osteoporosis versus tumor infiltration and post-radiotherapy changes versus residual tumor with PSIF sequence
- Precision filter for high spatial accuracy e.g. for neuro intra-operative imaging and stereotactic planning
- 3D CISS (Constructive Interference in Steady State) for excellent visualization of fine structures such as cranial nerves. High resolution imaging of inner ear and spine
- AutoAlign Head LS providing a fast, easy, standardized, and reproducible patient scanning supporting reading by delivering a higher and more standardized image quality

### Angio Suite

Excellent MR Angiography can be performed to visualize arteries and veins without contrast agent.

-

#### *Non-contrast-MRA and venography*

- 2D and 3D Time-of-Flight (ToF) protocols for MRA for the Circle of Willis, carotids, neck vessels, and breath-hold protocols for abdominal vessels
- Triggered 2D ToF sequences for non-contrast MRA, particularly of the abdomen and the extremities
- 2D/3D Phase-Contrast
- MR venography with 2D/3D Time-of-Flight (ToF) and Phase-Contrast
- TONE (Tilted Optimized Non-saturation Excitation) and MTC (Magnetization Transfer Contrast) techniques for improved Contrast-to-Noise Ratio (CNR)

#### *Image processing tools*

- MPR, MIP, MinIP, and 3D SSD
- Inline MIP for immediate results
- Inline subtraction of pre- and post-contrast measurements
- Inline standard deviation maps of Phase-Contrast measurements for delineation of arteries and veins

### Cardiac Suite

The cardiac suite covers comprehensive 2D routine cardiac applications, ranging from morphology and ventricular function to tissue characterization. Featuring *syngo* BEAT 2D in conjunction with iPAT and T-PAT techniques.

#### *Cardiac views*

- Fast acquisition of the basic cardiac orientations for further examination planning
- Cardiac scouting provides users with a step-by-step procedure for the visualization and planning of typical cardiac views, e.g. based on TrueFISP or Dark Blood TurboFLASH: short axis, 4-chamber and 2-chamber views.

#### *syngo BEAT*

- Unique tool for fast and easy cardiovascular MR imaging
- E.g. 1 click change from FLASH to TrueFISP for easy contrast optimization
- 1-click to switch arrhythmia rejection on / off
- 1-click change from Cartesian to radial sampling to increase effective image resolution (e.g. in pediatric patients) and avoid folding artifacts in large patients

## Description

### *Visualization of structural cardiovascular pathologies with CMR - syngo BEAT*

- Breath-hold and free breathing techniques for strong contrast between the blood and vascular structures. Dark Blood TSE and HASTE imaging are available for the structural evaluation of the cardiothoracic anatomy, including vessels or heart valves. Cine techniques (FLASH & TrueFISP) for high-resolution valve evaluation
- Multiple contrasts such as T1- and T2-weighted imaging for use in diseases such as myocarditis (inflammation / hyperaemia), ARVD (fibrous-fatty degeneration) or acute myocardial infarction (edema)
- Dark-blood TSE with motion compensation for high-quality vessel wall imaging in small or large vessels

### *Tools for rapid evaluation of left or right ventricular function*

- Acquisition of a stack of short-axis slices (standard segmented FLASH, or advanced segmented TrueFISP)
- Automatic adjustment of the acquisition window to the current heart rate
- Use of the Inline ECG for graphical ECG triggering setup
- Retrospective gating with cine sequences (TrueFISP, FLASH)
- Protocols for whole-heart coverage
- iPAT integration for highest temporal and spatial resolution
- Real-time imaging in case the patient is not able to hold his breath

### *imaging and tissue characterization with syngo BEAT*

- Protocols for high-contrast and high-resolution tissue characterization
- Protocols for stress and rest imaging with TrueFISP or TurboFLASH contrast support the acquisition of multiple slices with high resolution and arbitrarily adjustable slice orientation for each slice
- T-PAT with mSENSE and GRAPPA for advanced parallel imaging provides fast high-resolution dynamic imaging
- Segmented IR TrueFISP / FLASH with T1 scout for optimization of tissue contrast
- Advanced tissue characterization with 2D phase-sensitive IR (PSIR) sequences TrueFISP and FLASH contrast. Magnitude and phase-sensitive images with one acquisition
- Simple: no adjustment of inversion time (TI) necessary with PSIR technique
- Ungated single-shot PSIR imaging for tissue characterization under difficult conditions: free-breathing technique that can be applied even in case of arrhythmia

### *Physiological Measurement Unit (PMU) - Wireless Physio Control*

- Synchronizes the measurement with the physiological cycles (triggering to minimize motion artifacts caused by cardiac and respiratory movements)
- Wireless Sensors
- Wireless Vector ECG / respiration and pulse sensors for physiologically synchronized imaging, rechargeable battery-powered - for optimized patient handling
- Physiological Signals Display
- ECG (3 channels)
- Pulse
- Respiration
- External Trigger Input Display

### *ECG Triggering:*

- Acquisition of multiple slices, e.g. of the heart, at different phases of the cardiac cycle
- Excellent image quality by synchronizing data acquisition with cardiac motion
- Peripheral Pulse Triggering:
- Reduces flow artifacts caused by pulsatile blood flow
- Excellent image quality by synchronizing data acquisition to the pulsatile blood flow
- Respiratory Triggering:
- Excellent image quality by synchronizing data acquisition with the respiratory motion
- External Triggering:
- Interface for trigger input from external sources (e.g. Patient Monitoring System) inside the examination room
- Interface for trigger input from external sources (e.g. pulse generator, trigger sources for fMRI) outside the examination room
- Optical trigger output for fMRI



## Description

- Retrospective gating for ECG, peripheral pulse, and external trigger input

### Breast Suite

MR imaging has proven a very high sensitivity for breast lesions and is the gold standard for the examination of silicone implants. Extremely high spatial and temporal resolution can be achieved in very short measuring times by using iPAT with GRAPPA.

Excellent soft tissue differentiation, customized protocols (e.g. with fat saturation or water excitation or silicone excitation), as well as flexible multiplanar visualization allow for fast, simple and reproducible evaluation of MR breast examinations.

This package includes:

- Quantitative evaluation and fast analysis of the data with colorized Wash-in, Wash-out, Time-To-Peak, Positive-Enhancement-Integral, MIPtime and combination maps with Inline technology or for offline calculation
- High-resolution 2D protocols for morphology evaluation
- High-resolution 3D protocols covering both breasts simultaneously
- Protocols to support interventions (fine needle and vacuum biopsies, wire localization)
- Protocols for evaluating breasts with silicone implants
- Automatic and manual frequency adjustment, taking into account the silicone signal
- Detection of the silicone signal either to suppress the silicone signal, if the surrounding tissue is to be evaluated, or to suppress the tissue signal in order to detect an implant leakage
- SPAIR - robust fat sat (robust fat suppression using an adiabatic frequency selective inversion pulse)
- DIXON - 2-point Dixon with 3D VIBE, the following contrasts can be obtained: in-phase, opposed phase, fat and water image.
- iPAT with GRAPPA for maximum resolution in short time
- Inline subtraction and MIP display
- Offline subtraction, MPR and MIP display
- *syngo* REVEAL: diffusion imaging for breast exams
- iPAT Extension allows bilateral 3D sagittal breast imaging with Fat Sat or Water excitation

The Breast Suite also includes:

### ***syngo* VIEWS (Volume Imaging with Enhanced Water Signal)**

- bilateral - both breasts are examined simultaneously
- axial - the milk ducts are directly displayed
- fat-saturated or water-excited - fat complicates clinical evaluation and is suppressed
- near-isotropic 3D measurement - the same voxel size in all three directions for reconstruction in any slice direction
- submillimeter voxel - highest resolution for precise evaluation

### Body Suite

Body Suite covers your needs for clinical body applications. Ultrafast high resolution 2D and 3D protocols are provided for abdomen, pelvis, MR Colonography, MRCP, dynamic kidney, and MR Urography applications. Siemens unique 2D PACE technique makes body imaging easy allowing for multi-breath hold examinations as well as free breathing during the scans. Motion artifacts are greatly reduced with 2D PACE Inline technology.

This package includes:

- Free breathing 2D PACE applications with 2D/3D HASTE (RESTORE) and 2D/3D TSE (RESTORE)
- Optimized fast single shot HASTE protocols and high-resolution 3D RESTORE protocols based on SPACE and TSE for MRCP and MR Urography examinations

### **ABDOMEN:**

2D:

- T1w (FLASH) breath-hold scans +/- Fat Sat (SPAIR, Q-FatSat, in-/opp-phase)
- T2w (HASTE, TSE/BLADE, EPI ) breath-hold scans +/- Fat Sat (SPAIR, FatSat, STIR)
- T1w (TFL) triggered scans (2D PACE free breathing) in-/opp-phase
- T2w (HASTE, TSE/BLADE, EPI) triggered scans (2D PACE free breathing) +/- Fat Sat (SPAIR, FatSat, STIR) as well as HASTE- and TSE-multi-echo
- Optimized fast single shot HASTE protocols and high-resolution 3D RESTORE protocols based on SPACE and TSE for MRCP and MR urography examinations

## Description

### 3D:

- CAIPIRINHA enables VIBE sequence with improved iPAT<sup>2</sup> algorithm to improved abdominal dynamic scans as well as SNR. Reduced patient stress can be achieved through reduced acquisition (and breath-hold) times.
- Dixon (VIBE 2pt-Dixon) breath-hold scans, following contrasts can be obtained: in-phase, opposed phase, fat and water image.
- Dynamic (VIBE + Q-FatSat) protocols for best visualization of focal lesions with high spatial and temporal resolution
- Colonography bright lumen with T2-weighted TrueFISP and dark lumen with T1-weighted VIBE

### PELVIS:

- High-resolution T1w, T2w pelvic imaging (prostate, cervix)
- Isotropic T2w SPACE 3D protocols for tumor search in the pelvis
- Dynamic volume examinations with 3D VIBE
- *syngo* REVEAL: diffusion imaging for liver and whole body exams

### Onco Suite

MR imaging has an excellent advantage of soft tissue contrast, multi-planar capabilities and the possibility of selectively suppressing specific tissue e.g. fat or water. This helps visualize pathologies, particularly metastases. The Onco Suite features a collection of sequences as well as protocols and evaluation tools that guide through a detailed screening of clinical indications, such as in hepatic neoplasms.

This package includes:

- STIR TSE and HASTE, FLASH in-phase and opposed-phase protocols with a high sensitivity to metastases visualization
- Dynamic imaging protocols for assessment of the kinetic behavior for lesion visualization and characterization
- Quantitative evaluation and fast analysis of the data with colorized Wash-in, Wash-out, Time-To-Peak, Positive-Enhancement-Integral, MIPTIME and combination maps with Inline technology or for offline calculation
- Display and analysis of the temporal behavior in selected regions of interest with the included MeanCurve post-processing application. This includes the capability of using additional datasets as a guide for defining regions of interest even faster and easier than before.
- *syngo* REVEAL: diffusion imaging for liver and whole body exams

Dedicated prostate protocols for detection, localization, and staging of tumors and recurrences

- *syngo* REVEAL (diffusion-weighted imaging)
- Protocols with high temporal resolution allow time course evaluation based on pharmacokinetic modeling

### OrthoSuite

Ortho Suite is a comprehensive collection of protocols for joint and spine imaging. MR imaging is especially suitable for avascular necrosis and internal derangements. The protocols included in this Suite can also be applied for imaging of tumors and infections.

This package includes:

- 2D TSE protocols for PD, T1 and T2-weighted contrast with high in-plane resolution and thin slices
- 3D MEDIC, 3D TrueFISP protocols with water excitation for T2-weighted imaging with high in-plane resolution and thin slices
- High resolution 3D VIBE protocol for MR arthrography (knee, shoulder and hip)
- 3D MEDIC, 3D TrueFISP, 3D VIBE protocols with water excitation having high isotropic resolution, optimized for 3D post-processing
- PD SPACE with fat saturation and T2 SPACE with high isotropic resolution optimized for 3D post-processing
- Whole spine single-step or multi-step protocols
- Excellent fat suppression in off-center positions, e.g. in the shoulder due to high magnet homogeneity
- Dynamic TMJ and ilio-sacral joint protocol
- Susceptibility-insensitive protocols for imaging in the presence of a prosthesis
- Multi-Echo SE sequence with up to 32 echoes for the calculation of T2 time maps (calculation included in the Scientific Suite)
- High resolution 3D DESS (Double Echo Steady State): T2 / T1-weighted imaging for excellent fluid-cartilage

## Description

- differentiation
- *syngo WARP Susceptibility Artifact Reduction*  
2D TSE sequences with high bandwidth protocols tailored to reduce susceptibility artifacts. Available protocols include T1-weighted, T2-weighted, proton density and STIR contrast.

### Pediatric Suite\*

The parameters for pediatric imaging vary significantly in comparison to the parameters for adults. The reasons are developing tissues, body size, faster heart rates and restricted compliance with breath-hold commands. Protocols can be adapted for imaging infants.

\* MR scanning has not been established as safe for imaging fetuses and infants less than two years of age. The responsible physician must evaluate the benefits of the MR examination compared to those of other imaging procedures.

### Scientific Suite

Scientific Suite supports the scientifically oriented user with an easy access to application-specific data for further processing and advanced image computation methods.

- Support of USB memory sticks
- Access to the file system by means of a secure and convenient browser
- Anonymization of patient data
- Easy generation of AVIs and screenshots for integration into presentations and training videos
- Export function for tables, statistics and signal-time-courses in a communal format (MeanCurve, Spectroscopy, DTI evaluation)
- Advanced image computation methods such as T2 and T1 time calculation, addition, subtraction, multiplication, division, and integration of images

The sequences, features and techniques for acquisition and reconstruction included in the Tim Application Suite are described in detail below.

### Sequences

Spin Echo family of sequences:

- Spin Echo (SE) - Single, Double, and Multi Echo (up to 32 echoes); Inversion Recovery (IR)
- 2D / 3D Turbo Spin Echo (TSE) - Restore technique for shorter TR times while maintaining excellent T2 contrast; TurboIR: Inversion Recovery for STIR, DarkFluid T1 and T2, TrueIR; Echo Sharing for dual-contrast TSE
- 2D / 3D HASTE (Half-Fourier Acquisition with Single Shot Turbo Spin Echo) - Inversion Recovery for STIR and DarkFluid contrast
- SPACE for 3D imaging with high isotropic resolution with T1, T2, PD, and DarkFluid Contrast

Gradient Echo family of sequences:

- 2D / 3D FLASH (spoiled GRE) - dual echo for in- / opposed phase imaging 3D VIBE (Volume Interpolated Breathhold Examination) - quick fat saturation; double echo for in-phase / opposed phase 3D imaging; DynaVIBE: Inline 3D elastic motion correction for multi phase data sets of the abdomen; Inline Breast Evaluation
- 2D / 3D MEDIC (Multi Echo Data Image Combination) for high resolution T2 weighted orthopedic imaging and excellent contrast
- 2D / 3D TurboFLASH - 3D MPRAGE; single shot T1 weighted imaging e.g. for abdominal imaging during free breathing
- 3D GRE for field mapping
- 2D / 3D FISP (Fast Imaging with Steady State Precession)
- 2D / 3D PSIF - PSIF Diffusion
- Echo Planar Imaging (EPI) - diffusion-weighted; single shot SE and FID e.g. for BOLD imaging and Perfusion-weighted imaging; 2D / 3D Segmented EPI (SE and FID)
- ce-MRA sequence with Inline subtraction and Inline MIP
- 2D / 3D Time-of-Flight (ToF) Angiography - single slab and multi slab; triggered and segmented
- 2D / 3D Phase Contrast Angiography

## Description

- *syngo* BEAT Tool - TrueFISP segmented; 2D FLASH segmented;
- Magnetization-prepared TrueFISP (IR, SR, FS); IR T1 scout; Retrogating

### Standard Fat/Water Imaging

- Fat and Water Saturation. Additional frequency selective RF pulses used to suppress bright signal from fatty tissue. Two selectable modes: weak, strong
- Quick FatSat
- SPAIR: robust fat suppression for body imaging using a frequency selective inversion pulse
- Fat / Water Excitation. Spectral selective RF pulses for exclusive fat / water excitation
- Dixon technique for fat and water separation - based on VIBE (2 point Dixon)

### Standard Techniques

- True Inversion Recovery to obtain strong T1-weighted contrast
- Dark Blood inversion recovery technique that nulls fluid blood signal
- Saturation Recovery for 2D TurboFLASH, gradient echo, and T1-weighted 3D TurboFLASH with short scan time (e.g. MPRAGE)
- Freely adjustable receiver bandwidth, permitting studies with increased signal-to-noise ratio
- Freely adjustable flip angle. Optimized RF pulses for image contrast enhancement and increased signal-to-noise ratio
- MTC (Magnetization Transfer Contrast). Off-resonance RF pulses to suppress signal from certain tissues, thus enhancing the contrast. Used e.g. in MRA
- Argus viewer for reviewing cine studies•
- Report Viewer for DICOM structured reports including report editing
- Dynamic Analysis for addition, subtraction, division, standard deviation, calculations of ADC maps, T1 and T2 values, TTP, t-Test, etc.
- Image Filter
- 3D post-processing MPR, MIP, MinIP, SSD
- Flexible film formats and paper print
- Data storage of images and cine AVI files on CD / DVD with DICOM viewer as the viewing tool for hand out to the patients or referrals
- Selectable centric elliptical phase reordering via the user interface
- Multiple Direction Diffusion Weighting (MDDW) - perform diffusion tensor imaging with multiple diffusion weightings and up to 12 directions for generating data sets.
- Inversion Recovery to nullify the signal of fat, fluid or any other tissue

### Standard techniques for Flow Artifact reductions

- LOTA (LongTerm Data Averaging) technique to reduce motion and flow artifacts
- Pre-saturation techniques using RF saturation pulses to suppress flow and motion artifacts
- Tracking SAT bands maintain constant saturation of venous and/or arterial blood flow e.g. for 2D/3D sequential MRA
- TONE (Tilted Optimized Non-saturating Excitation - variable excitation flip angle to compensate inflow saturation effects in 3D MRA - selectable on desired flow direction and speed
- Gradient Motion rephasing permitting effective reduction of flow artifacts

### Standard Motion Correction

- *syngo* Blade - improves image quality by minimizing and correcting for the effects of motion during an MR sequence acquisition. e.g. head, spine, orthopedic imaging and the abdomen
- 1D PACE (Prospective Acquisition CorrEction) allows examination of patients with free breathing
- 2D PACE (Precise Motion Correction) detects and corrects respiratory motion eg of the heart or liver

MAGNETOM Aera runs *syngo* MR software. *syngo*® is the unique software platform for medical applications. Parallel working and one-click exams are efficiently supported and increase productivity. Parallel scanning and reconstruction are standard.

The unique Phoenix technique is the easiest way to exchange protocol data. It supports intelligent extraction of sequence parameters from images acquired on a MAGNETOM Aera system.

Inline technologies, scan@center or AutoVoiceCommands speed up the workflow further.

## Description

The context-sensitive "Online Help" function and *syngo* Scan Assistant offer support and propose solutions to MR-specific questions and parameter conflicts.

Studies can be easily networked and managed using the standard DICOM 3.0 protocol for efficient support of workflow. The following standard functions are supported: Send/Receive, Query/Retrieve, and Basic Print for DICOM-compatible laser cameras (camera is not included in the basic unit), DICOM Worklist, DICOM Storage Commitment (SC) DICOM Modality Perform Procedure Step (MPPS), DICOM Structured Report (SR), DICOM Study Split.

### Patient Communication

- The intercom system includes an ergonomically designed patient communication unit for desktop positioning on the *syngo* Acquisition Workplace and pneumatic headphones for the patient.
- Active Noise Cancellation allows for increased user comfort in the control room combined with comprehensive patient supervision.
- It controls emergency table stop, volume control of speaker and headphones in the examination room, volume control of speaker in the control room, response to the patient's activation of the assistance-call button and provides a connection to an external audio system (external audio system is not included in the basic unit) for music playback.

### Computer system

The high performance host computer and the new high performance measurement and reconstruction system are ideally suited for even the most demanding applications. The PC-based computer system uses the intuitive *syngo* MR user interface. The computer system includes the following components:

High-performance measurement and reconstruction system

- Two Intel Quadcore Processor  $\geq$  E 5540
- clock rate of  $\geq 2 \times 2.53$  GHz
- Main memory (RAM) of 48 GB,
- Hard disk for raw data  $\geq 300$  GB
- Hard disk for system software  $\geq 100$  GB
- Parallel Scanning and Reconstruction of up to 8 data sets
- Reconstruction speed
  - 12.195 recons per second (256 x 256 FFT, full FoV)
  - 37.914 recons per second (256 x 256 FFT, 25 % recFoV)

High-performance host computer

- Intel Xeon processor  $\geq$  W3520 QuadCore
- clock rate  $\geq 2.66$  GHz
- Main Memory (RAM)  $\geq 4$  GB
- three hard disks
  - system SW  $\geq 146$  GB SAS
  - data base  $\geq 146$  GB SAS
  - images  $\geq 146$  GB SAS
- DVD-R writer for CD-R (approx. 4000 images 256<sup>2</sup> DICOM Standard, ISO 9660 ) and DVD-R (approx. 25 000 images 256<sup>2</sup> DICOM Standard, ISO 9660) storage of DICOM data or other data like AVI files
  - DVD-ROM drive
  - Electronic mouse.
- The combination of host computer and the measurement and reconstruction system offers a truly powerful imaging system designed for large image matrix sizes of up to 1024 x 1024. The unrestricted multitasking capability allows time-saving parallel scanning and reconstruction.
- High-resolution 19" color LCD flat screen monitor with 1280 x 1024 pixel display, integrated gamma correction for optimum display of radiographic grayscale images and automatic backlight control for long term brightness stability.

### Installation:

- The relatively lightweight design of the MAGNETOM Aera in most cases eliminates the need for structural

## Description

building reinforcements and thus facilitates installation in upper floors.

- The compact integrated design allows for short installation times and reduces the required space to less than 30 sqm (323 sq. ft.) for the entire installation. The minimum room height clearance is only 2.40 m (7' 10").
- MAGNETOM Aera allows siting of the system without a dedicated computer room - no additional cooling or floor requirements.
- MAGNETOM Aera combines state-of-the-art performance with peace of mind. High system availability is ensured by the expert, highly trained Siemens MR service engineers;
- Your Siemens service contract (not included in the basic unit) offers a comprehensive range of benefits such as Uptime Remote Diagnostics for improved productivity and maximum uptime.

### Tim [204x48] performance level

Tim 4G offers DirectRF a completely redesigned RF architecture. This new all digital-in/ digital-out design integrates all RF transmit and receive components at the magnet, eliminating analog cables for true signal purity. This compact and efficient design enables a dynamic feedback control for temporal stability and power linearity. The all-new innovative coil architecture packs more coil elements in a smaller space. Therefore up to 204 coil elements can be simultaneously connected. The newly designed ultra high density array is an essential part supplementing Tim4G. Combined with the 48 independent RF channels advanced iPAT capabilities and SNR are enabled.

An additional benefit of multiple coil elements and receiver channels is improved performance in multi-directional, i.e. three dimensional, high-speed, high-resolution iPAT in the head-feet, anterior-posterior or left-right directions.

This option includes also Advanced High Order Shim.

### XQ gradients

Siemens XQ gradients provide actively shielded, water cooled world-class gradients. All axes are force-compensated.

The XQ gradients have:

- Maximum gradient amplitude of 45 mT/m, per axis, i.e. 78 mT/m vector summation gradient performance,
- max. slew rate 200 T/m/s per axis, i.e. 346 T/m/s vector summation,
- minimal rise time 225  $\mu$ s, from 0 to 45 mT/m amplitude
- Max. output voltage for each of the gradient axes 2250 V
- Max. output current for each of the gradient axes 900 A
- Separate cooling channels that simultaneously cool primary and secondary coils allow the application of extremely gradient intensive techniques in a new class of performance.
- 100% duty cycle for fast and demanding techniques such as ultra-short TE MRA in continuous operation, thin slice single breath-hold liver studies and EPI imaging techniques (all optional in appropriate clinical packages).
- Variable Field-of-View selection from 0.5 cm to 50 cm (up to 45 cm in z direction) for optimal coverage and highest spatial resolution in diagnostic. The minimum slice thickness in 2D and 3D is 0.1 mm and 0.05 mm, respectively.
- Acquisition of sagittal, transverse, coronal, single oblique and double oblique slices with highest resolution.
- The extremely compact water-cooled gradient amplifier features a modular expandable design with excellent linearity and pulse reproducibility. It is digitally controlled and has very low switching losses due to ultrafast solid state technology.

The keys of the numerical key panel are assigned to syngo-specific functions and labeled with the corresponding syngo icons. The keyboard supports the country specific special characters.

The unique color and material selection enhances the visual appeal of the new system design, thereby creating an enticing, patient-friendly impression.

The Dot Control Centers and the unique Dot Display are neatly integrated into this main face plate. The aesthetically pleasing and ergonomically designed control elements of the Dot Control Centers are well illuminated for easy visual recognition.

In particular, the table cover and the asymmetric left deco area cover have also been designed to promote a modern visual appearance. This combination of ingenuity and practical design as presented with "Pure White" design with its brilliant white and the silver trim simply makes the MAGNETOM an overall visually appealing

## Description

system and creates a patient-friendly environment.

The new MAGNETOM Aera table with its light appealing design allows for a fast patient preparation and maximized patient comfort. It provides unobstructed foot space for attending staff and direct access to the patient. The patient table can be lowered to a minimum height of 52 cm from the floor, for easier patient positioning and better accessibility for geriatric, pediatric or immobile patients. The Tim Table can be moved with two clicks into the isocenter - one click to the upmost position and one click into the isocenter. The tabletop travels beyond the rear end of the system, enabling additional patient access. An infusion stand is integrated to allow for fast patient set up of critical patients. Multiple Tim4G coils can be connected at once for efficient and patient friendly examinations. The seamless integration of multiple Tim4G coils is possible via 4 SlideConnect and 4 DirectConnect connector slots, which are embedded in the table. This allows for comprehensive examinations without the need of repositioning.

The software *syngo* MR E11 permits access to new and innovative applications.

*syngo* MR E11 provides the new Dot Cockpit for easy Dot engine configuration together with several workflow and performance enhancements.

There are new options (with separate licenses) available with the *syngo* MR E11 software:

- Quiet Suite
- MyoMaps
- TWIST VIBE
- StarVIBE
- Advanced WARP
- LiverLab

Now included in the standard configuration:

- **TGSE** is an ultrafast sequence providing high resolution imaging or extremely short acquisition times. Turbo GSE (GRASE) is a sequence that uses different share of spin echoes and gradient (EPI) echoes for fast, high resolution image acquisition. The Turbo factor refers to the Spin echo content while the EPI factor to the gradient echo content. Multi-shot (segmented), as well as single-shot techniques are supported. Extension of the EPI factor leads to further reduction of the acquisition time. Turbo GSE is able to acquire rapid T2 weighted images with resolution ranging from 256 - 1024 matrix. Techniques with Turbo factor between 1 and 65 are provided, while the EPI factor ranges between 1 and 21.
- **WARP**: Supporting the WARP-switch for TSE with high bandwidth mode (with VAT 0-100%).

Effective noise reduction is achieved through Quiet Suite by targeting the main source of MRI noise - rapid switching in the gradient coils. Quiet Suite consists of QuietX, an intelligent algorithm which effectively reduces noise through summation of gradients and reduction of slew rates while keeping timing parameters within the same range. QuietX has been enabled for TSE, SE and GRE sequences for T1, T2 and DarkFluid contrasts as well as for SWI. Within the TSE-sequence, the parameter "Echo-spacing" allows the user to further lower the gradient slew-rates. The automated algorithm runs in parallel to normal protocol handling. All features and contrasts of the TSE, SE, and GRE sequences remain available.

In addition, Quiet Suite contains PETRA, a 3D T1 UTE sequence. The PETRA sequence allows for even lower gradient switching. With its unique gradient trajectories, no acoustic noise associated with gradient switching is generated during a PETRA scan. Residual noise may arise due to radio frequency switching.

With Quiet Suite, optimized quiet protocols for imaging the brain and large joints are also provided.

### Brief description

*syngo*.via provides one graphical user interface to prepare and read images from various modalities. Supported images types are:

- Computed Tomography Images
- Magnetic Resonance Images
- PET Images
- Computed Radiography Images

## Description

- Digital X-Ray Images
- X-Ray Angiographic Images
- X-Ray Radio-Fluoroscopic Images
- Ultrasound 2D Images
- Secondary Capture Images
- Encapsulated PDFs

### General reading functions, such as:

- Browser functionality for patient and data access
- Loading and displaying images
- Scrolling through images (e.g. movie mode, fast mouse scrolling, synchronized scrolling)
- Mirror, rotate, invert, windowing, pan/zoom, annotations, distance and angle measurement, pixel lens, ROI / VOI evaluation
- Findings navigator - create, collect and navigate findings
- Correlated cursor
- Series synchronization for pan/zoom, windowing, LUT, scrolling
- Locked navigation of different modality types (e.g. MR / CT)
- User-defined context menu
- Multiple layouts for 2D, 3D, 4D diagnosis
- Snapshot images as secondary capture

### Integrated 3D tools, such as:

- All reformats immediately available: VRT, MIP thin/thick, MPR thin / thick, interactive slice thickness change
- VRT Punch
- VRT Gallery
- Clip plane and clip box
- Bone removal for fast segmentation and removal of bony structures
- Fusion and registration
- Parallel, curved & radial ranges
- 2D & 3D reference lines, 3D reference point
- Region growing and quantification for interactive segmentation of anatomical structures

### Anatomic intelligence:

- Automatic spine labeling
- Automatic rib labeling for CT thorax scans
- Automatic landmark registration for accurate anatomical alignment of multiple timepoint cases

### Applications for dedicated clinical areas

Beside general 2D/3D/4D capabilities, the following advanced functionalities for dedicated clinical areas are part of *syngo.via*.

These applications are medical products in their own right and necessary country-specific approvals might not yet be available (e.g. 510k, CE Mark).

#### CT Cardiac

Review Marker, Heart Isolation, Movie (Beating Heart), Manual Coronary Tracking, Cardiac Planes, Curved & Cross-Section MPR, Integrated Reporting

#### CT Vascular

Bone Removal, Table Removal, Review Marker, MPR, Thin MIP Ranges, Curved & Cross Sectional MPR, Integrated Reporting

#### PET&CT Oncology

10 CT image series per time point, RECIST/WHO measurement, Basic PET evaluation, Image fusion, Registration, Time point comparison (two time points) 3D overview image, Local registration, Export CSV



## Description

### *syngo*.CT Dual Energy

*syngo*.CT Dual Energy offers a viewer that displays a fused image for initial diagnosis. It includes Optimum Contrast to calculate automatically contrast-optimized images as well as the possibility to calculate monoenergetic images for a range of 40 - 190 keV. The additional, optional Dual Energy applications utilize *syngo* Dual Energy's two data sets even further: the material-specific difference in attenuation enables an easy classification of the elementary chemical composition of the scanned tissue. *syngo*.CT Dual Energy works with Dual Energy images from SOMATOM Definition, Definition Flash & SOMATOM Force and with single source Dual Energy images from SOMATOM Definition Edge and SOMATOM Definition AS family and SOMATOM Perspective.

### MR Reading

- Automatic data loading:  
All data of the current study is automatically loaded in a 2\*2 stack layout - including 3D and 4D data.
- Follow-up support:  
Follow-up layout for comparison between two timepoints.
- Rescan handling:  
Repeated scans are collected in one stack that provides an overview layout to select the best rescan for reading.
- Workflow customization and creation:  
MR Reading allows the user to generate new, customized workflows.  
MR Reading report template included.

### Workflow Automation

- Triggered by PACS or modality:  
Disease-specific workflow mapping can also be done based on image information (modality and/or study description)
- Triggered by RIS:  
*syngo*.via requests the DICOM Modality Worklist (DMWL) from the connected RIS to enable automatic disease-specific workflow mapping and prefetching of examinations from PACS for follow-up reading.

### Disease-specific reporting:

- Disease-specific reports can be derived from different clinical applications (structured reporting).
- Findings collected in the Findings Navigator can be transferred to disease-specific reporting application and can then be stored as DICOM Structured Reports.
- The reports created with *syngo*.via are stored as encapsulated PDF DICOM objects. Additionally the report can be saved in the file system as a PDF file. The stored PDF report can be viewed and printed by the clinical user.
- A modified report can be saved as new report template.

### Further functionality, such as:

- *syngo* Expert-i support for *syngo* MMWP integration
- *syngo*.plaza Integration
- Query/retrieve from DICOM nodes
- Export images and creating patient media
- Filming (DICOM print) or postscript printing functionality

### Prerequisites for all service related issues:

- Availability of a customer administrator that performs dedicated administration and support tasks (e.g. 1st line support, data security, backup,...).
- Minimum broadband internet connection bandwidth for uncompromised service support are 2000 kBit/s downstream and 512 kBit/s upstream.  
Otherwise, certain support services may not be provided and the agreed remote response time cannot be guaranteed.

### Specification of minimum broadband internet connection in detail:

- Downstream: 2000 kBit/s for Software update, IT- and Application support
- Upstream: 512 kBit/s for Application support

## Description

- Upstream: 256 kBit/s for Software update and IT support

### Scope of delivery:

- DVDs with *syngo.via* software  
(software license for *syngo.via* XL-Software)

*syngo.via* WebViewer runs integrated on the *syngo.via* L server and XL / XL – 10TB server hardware and can be accessed on the clients through an URL over a web browser session. The integrated server can be used for internal image distribution only (no internet access possible).

It provides mobile diagnostic image reading, basic patient data browsing, high speed 2D and 3D image review and basic image manipulation functionality\* for the following use-cases:

- Emergency cases, e.g. iPad (not meant for primary image diagnosis)
- Second opinion
- Demonstrations and conferences
- Patient education

\* Because of the wide variation in devices supported by *syngo.via* WebViewer (desktop computers with large screens through to mobile devices such as the iPad) not all features will be possible on all types of clients (e.g.: The flexibility to change viewing layouts on mobile devices is limited).

### General 2D / 3D Imaging:

The following image processing and viewing functions are supported:

- Color LUT display
- Grayscale VOI LUT display
- Zoom & Pan
- Windowing
- Rotating (3D mode only)
- Home position
- Pixel Lens
- Measurement of Distance and Angles
- Scroll
- Image Fusion

The following image types are supported:

- CT (Computed Tomography)
- MR (Magnetic Resonance)
- SC Image
- Encapsulated PDF
- CR/DR
- PET
- PET/CT

### Data Navigation:

- 2D Image Sorting and Scrolling
- Series Navigation

### Supported Browsers

The following browsers are supported: Internet Explorer, Safari, Firefox, Google Chrome web browsers. (Refer to the WebViewer Data Sheet for detailed information about the supported browser versions.)

### Licensing

- WebViewer software follows the floating licenses paradigm for clients.

### Scope of delivery:

- DVDs with *syngo.via* WebViewer software
- Licenses for *syngo.via* WebViewer 1 User

## Description

- User Documentation

### Regulatory information

The application *syngo.via* WebViewer is not for diagnostic viewing/reading on mobile devices in the USA. Please refer to your sales representative whether the product is available for your country. Diagnostic reading of images with a web browser requires a medical grade monitor.

For iPhone and iPad country-specific laws may apply. Please refer to these laws before using for diagnostic reading/viewing.

For Japan: Applications on iPhone / iPad / iPod are not a medical device in Japan. Use at your own risk. They are not intended to be used for diagnosis.

The *syngo.via* General Engine provides functionalities for highly efficient reading and reporting of routine to advanced cases and comprises the software modules ALPHA technology and *syngo.via* Advanced Reporting.

**The ALPHA technology** speeds up the workflow by automating and standardizing reconstructions and improves consistency in image presentation. Anatomical Range Presets powered by ALPHA technology automatically initialize ranges and projections with respect to the underlying anatomy. Practically eliminating the need for manual interaction, this feature supports consistent results, efficient procedures, and diagnostic confidence.

**The *syngo.via* Advanced Reporting** is a set of features for merging 3D reading with flexible reporting. It enables efficient and structured management and communication of *syngo.via* results. Findings from different workflows can be combined in a single document. Print layouts can be flexibly selected. Formatted content and images can be easily copied from the *syngo.via* Report as RTF into a diagnostic report or can be sent easily as a pdf-document\* with an HL7 message to an information system (e.g. RIS/HIS). And the *syngo.via* Report can be distributed to PACS as DICOM SC image. In addition, *syngo.via* Advanced Reporting provides tools for easy creation and administration of report templates. So you can easily edit and create sections and picklists and quickly create your own report templates or customize default templates for your institution.

Irrespective of modality or clinical field, *syngo.via* General Engine offers many benefits:

- Faster case preparation as manual interaction usually not needed
- Consistent result quality across users and patients
- Flexible combination of diagnostic results to provide the full picture in one document
- Easily report incidental findings in a structured way
- Having the full diagnostic picture is basis for appropriated treatment selection and patient satisfaction

\* Prerequisite for embedded pdf in HL7 message:

- Licenses for HL7 Patient Information Reconciliation (PIR) AND Report Export for *syngo.via*
  - Implementation respectively: PACS/RIS-Driven Implementation Package, PIR Configuration and Report Export Configuration

### Brief description

Type: Hewlett Packard rack mount server.  
Processor: 2 CPU  
RAM: 96GB  
System Disk: RAID Level 1  
DB Data Disk: RAID Level 1  
Data Disk: RAID Level 5,  
1x Hot Spare for RAID 5  
Gross Image Storage: approximately 4900 GB  
Optical drive: CD/ DVD-RW  
Graphical Processing Unit: NVIDIA GPU  
Mouse: USB Optical Scroll Mouse  
Keyboard: USB standard international  
Rack mount kit for 19" HP rack included

Operating System: Windows Server 2012 R2 Standard

This server is configured with a redundant fan and a redundant power supply.

## Description

### Recommended Environment Requirements

Server for operation only in server rooms.

A 100 Mbit/s (minimum) / 1 Gbit/s (recommended) network environment is needed for optimal performance.

For remote access a 10 Mbit/s (minimum) / 16 Mbit/s (recommended) broad-band connection is required.

### Service Package

Basic care pack for this server configuration is not included and has to be ordered separately!

Technical details are subject to change without notice!

### Brief description

Extended Prime HW Support with a service window depending on your IT Care Plan and on the SIEMENS Customer Care Center (CCC) office hours.

The delivery of the on-site Break&Fix support is performed by HP.

- Content of the Extended Prime HW Support: **Remote problem diagnosis and support** – Siemens Service remotely uses HP support tools to isolate your problem and facilitate resolution in close cooperation with the next HP service hub in your area.
- **Break & fix service with on-site support.** – For issues that cannot be resolved remotely, an authorized HP Services representative will be sent on-site and returns your system to operational condition, repairing or replacing components or entire units. If required, HP services restore at the same time system and network functionality to allow Siemens Service to seamlessly continue with any further required remote service activity.
- **Defective Media Retention Service** – This option lets you protect sensitive data by keeping your defective disk, without the need to return defective media.
- **Integrated service management:** - Seamless cooperation and processes between SIEMENS and HP to ensure optimized end-to-end issue handling.
- **Enhanced HW support** – Provision of necessary BIOS-, Firmware and Driver update packages to keep the HW system up to date. Required patches and updates are provided remotely to be installed conveniently during the next application maintenance or service window by the responsible IT system administrator.

The Basic Implementation Package includes the following tasks:

- Basic hardware installation and network integration
- Activation of Siemens Remote Services connections
- Import of all *syngo.via* server license files.
- Basic clinical configuration and integration of up to 5 DICOM nodes in *syngo.via* (e.g. one modality, one PACS, one *syngo* MultiModality Workplace, one printer). All nodes need to be validated for connection with *syngo.via*.
- Configuration of the DICOM access to *syngo.via* in one formerly installed *syngo* MMWP 2012A (VE50A) or higher;
- Integration of the basic *syngo* MMWP access into one *syngo.via* client workplace by installation and configuration of the software Expert-i on the *syngo.via* client
- Configuration of basic workflow rules: autodelete, archiving, autorouting in *syngo.via*.
- Installation of the WebViewer integrated license (applicable only for *syngo.via* SW version VA30 or higher and only in countries where released)
- Acceptance Test in cooperation with the customer.

## Description

Context of the implementation tasks:

- The DICOM conformance of the DICOM nodes is a prerequisite for connection to *syngo.via*.
- The DICOM nodes to be connected to *syngo.via* must be configured and tested by the customer, for e.g. configuration of the remote DICOM node *syngo.via*, routing rules, procedures. If necessary, the customer orders these services from the DICOM node's vendor.
- The configuration of the customer's Local Area Network is performed by the customer.
- Provision of a minimum broadband Internet connection bandwidth with 2000 kBit/s downstream and 256 kBit/s upstream for Siemens Remote Services (SRS) by the customer. If the customer does not provide SRS connectivity, then additional professional services for implementation without SRS support are offered. For service support after implementation the following minimum specification has to be provided: Downstream 2000 kBit/s (for Software update, IT- and Application support); Upstream 512 kBit/s (for Application support); Upstream 256 kBit/s (for Software update and IT support).
- The customer provides information, such as: IP addresses of the server for its network integration and the DICOM nodes identifiers.
- The customer provides the required power supply and the installation location for the server hardware, as well as the required LAN capacity. For the LAN capacity between *syngo.via* and the PACS/ modality systems a min. of 1 Gbit/sec is required. Between *syngo.via* workstations and server a min of 100 Mbit/ sec is required.
- Presence and support of the customer's administrators (clinical and IT administrator) is required during implementation. In preparation for implementation support the customer's administrators have completed the *syngo.via* web-based trainings, which are part of the scope of delivery.
- A list of applications and systems with validated connectivity to *syngo.via* can be requested from your Siemens Sales Representative.
- If a DICOM node or another system has not been validated yet for connection to *syngo.via* by Siemens, then the customer will give his acceptance though there could be a narrowed functionality of the connection.
- Installation of *syngo.via* client software on additional workplaces or configuration of additional DICOM nodes are performed by the customer's administrator or can be ordered from Siemens separately as an option.

Project coordination is performed by Siemens. Please see the *syngo.via* Data Sheet for system requirements and detailed description of implementation tasks.

The hardware installation service includes the following tasks:

- Unwrapping. Consolidation of all packaging material and notification to the customer that the materials are ready for removal.
- Mechanical and electrical connections at site of operation
- Mechanical installation in a common rack (e.g. HP, Fujitsu, IBM, Rittal) not older than three years and connection to a console.
- Connection to the power supply, to Uninterruptable Power Supply (if applicable)
- Startup of operating system; check status of patches, drivers, service packs and hot fixes, etc.
- Connection and network configuration of the server and the remote service board to the LAN
- Configuration of remote service board (network settings, users configuration) if supported by server
- Test monitor setup (if applicable) and Handover of the readily installed system to the customer.

For the HW installation the customer provides, as described in the product Data Sheet:

- Access to the location and space for server operation
- Electrical power
- LAN access and LAN configuration
- Configuration of the broadband internet access for Siemens Remote Services
- IT Administrator's coordination and support for the mechanical and IT installation.
- Server and monitor(s) are at the site of operation. The customer's monitors are accompanied by appropriate cables.
- The connection of one or two monitors to a server-based workstation does not include monitor calibration.
- For server-based workstation depending on local legal regulations, the monitor installation described here may allow viewing only

### Note:

Certain constraints apply regarding the supported OS versions for the *syngo.via* clients and the supported versions of MMWPs. For details please check the datasheet of the respective *syngo.via* version.

## Description

Multi-Server Licensing enables the customer to pool their individual licenses into a single central license repository. Connected *syngo.via* servers will check-out their licenses from this repository. The repository operates in a peer-to-peer manner across the *syngo.via* servers and does not require an additional server to operate.

The following tasks are included:

- Plan with the customer which server will be the license master
- Install new licenses and configure all servers to use the master license
- Test central licensing
- Update site documentation.

Prerequisites for the implementation:

- Each *syngo.via* system has to be on the same software level.
- The minimal software level is VA20B (= VA20A\_HF03).
- As with all other multi-server features, roll-out of this feature is limited to 6 *syngo.via* servers.

This implementation package includes the following tasks:

- Discuss installation, new distribution of modalities and *syngo.via* clients with the IT administrator
- Configure two *syngo.via* servers in a multiserver architecture.
- Test launching of the *syngo.via* client in a multiserver environment

Context of the implementation tasks:

- The license for the multiserver feature is available on all servers
- All servers are on the same version and hotfix level.
- All servers have exactly the same applications installed and licensed

This hardware installation service includes the following tasks:

- Unwrapping of server and monitors (if applicable). Consolidation of all packaging material and notification to the Customer that the materials are ready for removal
- Mechanical and electrical connections at site of operation
- Mechanical connections to console and to diagnostic monitors (if applicable)
- Connection to the power supply, to Uninterruptable Power Supply (if applicable)
- Startup of operating system, check status of patches, drivers, service packs and hot fixes etc.
- Connection of the server and the remote service board (e.g. the HP dash board) to LAN; network configuration of the server and the remote service board
- Configuration of the operating system for two monitors (if delivered by Siemens)
- Test monitors setup (if applicable)
- Handover of the readily installed system to the customer.

Context of the implementation tasks:

The customer provides, as described in the *syngo.via* Data Sheet:

- Access to the location and space for server operation as well as for the monitors (if applicable)
- Server and monitor(s) are on-site of operation. The customer's monitors are accompanied by appropriate cables.
- Electrical power
- LAN access and LAN configuration
- Configuration of the broadband internet access for Siemens Remote Services
- IT Administrator's coordination and support for the mechanical and IT installation.
- The connection of one or two monitors to a workstation-based server does not include monitor calibration.
- Depending on local legal regulations, the monitor installation described here may allow viewing only.

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## Description

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### Angio Dot Engine

#### *Guidance View*

- Step-by-step user guidance is seamlessly integrated.
- Example images and guidance text are displayed for each individual step of the scanning workflow.
- Both images and text are easily configurable by the user

#### *Test bolus*

- Automatic detection of arterial / venous timing window

#### *Feedback of bolus timing information*

- Timing information is fed back into planning steps and parameters are adapted automatically

#### *Auto Voice Commands*

- Integrated into the scanning workflow.
- The system plays them automatically at the right point in time.
- This ensures optimal timing of scanning, breathing and contrast media.
- The user can monitor which breath hold or pauses are actually played, and could add pauses between the automatic breath hold commands if necessary

#### *Customization*

Existing Dot engines can be modified by the user to their individual standard of care.

- Add/remove protocol steps
- Change guidance content (images and text)
- Change or add Dot Exam Strategies and Decision Points
- Modify the Parameter View

#### *Application Packages:*

##### *syngo Inline Composing*

- Automatic anatomical or angiographic composing of multiple adjacent coronal or sagittal images
- Composed images can be automatically loaded into Graphical Slice Positioning for scan planning purposes

#### *Tim Planning Suite*

With the Tim Planning Suite, multiple regions in the entire body can be examined in a minimum of time through measurement planning on a single FoV of any desired size.

### Abdomen Dot Engine

#### *Patient View*

- Within the Patient View the user can easily tailor the exam to each individual patient.
- Several pre-defined Dot Exam Strategies are integrated. The user just selects the appropriate strategy with one click and the queue and the complete scan set-up are automatically updated. Furthermore protocols tailored for use of contrast media are integrated.

Dot Exam Strategies allows personalizing the workflow to the individual patient condition and clinical need. The following predefined strategies are included:

- Standard with breath-hold
- Standard with PACE triggering
- Limited patient capabilities using *syngo* BLADE and PACE triggering.

#### *Guidance view*

- Step-by-step user guidance is seamlessly integrated.
- Example images and guidance text are displayed for each individual step of the scanning workflow.
- Both images and text are easily configurable by the user

#### *Parameter View*

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## Description

- This new view displays the parameters that are really needed for this scan set-up.
- This reduced set of protocol parameters allows the user to concentrate on the essentials.
- The Parameter View can be opened at any time during an examination

### Additional functionalities:

Automatic sequence scaling according to physiological characteristic. (Auto FoV, AutoNavigator, breath-hold adaptations).

Auto Navigator based automatic breathing pattern detection and scaling of triggered scans.

Automatic FoV: the optimal FoV is automatically estimated based on the localizer images.

### *Dot Decisions*

Decisions are seamlessly integrated into the scanning workflow. The user just selects the queue and the appropriate protocol or set of protocols are automatically added. For the abdomen MRCP and Diffusion decision points are offered.

Timeline setup and monitoring for best overview of multi-phase breath-hold examinations and CM enhancement curve visualization.

### *Auto Voice Commands*

The system plays them automatically at the right time point. This ensures optimal timing of scanning, breathing and contrast media. The user can monitor which breath hold or pauses are actually played, and could add pauses between the automatic breath hold commands if necessary.

Auto Bolus Detection initiates automatically the dynamic upper abdomen examination based on bolus detection. The user can override this function.

### *Inline radial range calculation for MRCP*

MRCP is measured and Inline Radial Ranges are automatically generated.

### *Inline Subtraction*

Within the contrast-enhanced abdomen exam, multiple phases are acquired: native, arterial phase, portal-venous phase and late-phase. The scanner automatically subtracts the native measurement from the arterial, portal-venous and late phase.

### *Inline Registration*

For best visualization of lesions, the system automatically performs a registration / alignment of the anatomy for the different dynamic phases. The importance of registration / correction can be seen when examining nodular enhancing pathologies.

### *Customization*

Existing Dot engines can be modified by the user to their individual standard of care.

- Add / remove protocol steps
- Change guidance content (images and text)
- Change or add Dot Exam Strategies and Decision Points
- Modify the Parameter View

The Spine Dot Engine provides optimized cervical, thoracic and lumbar spine imaging for patients of all conditions.

Spine Dot Engine provides the functionality to simplify your spine workflow by providing tools to reduce examination times, achieve optimal image quality, and assist you during reading.

- User guidance step-by-step
- AutoPosition
- AutoAlign Spine with intervertebral disc detection
- AutoCoverage
- AutoSatPosition
- Initial and interactive snapping



## Description

- AutoLabeling of vertebrae
- Automatic curved multiplanar reconstructions of 3D datasets

The Spine Dot Engine includes:

- Tim Planning Suite license
- In-line Composing license
- *syngo* WARP - high bandwidth protocols tailored to reduce susceptibility artifacts. Available protocols include T1-weighted, T2-weighted, proton density and STIR contrast. View Angle Tilting (VAT) technique is provided for reducing in-plane geometric distortions *syngo* WARP can be used throughout the body.

*The Spine Dot Engine does not support whole spine imaging in its first release.*

### Cardiac Dot Engine

#### Guidance View

- Step-by-step user guidance is seamlessly integrated.
- Example images and guidance text are displayed for the individual steps of the scanning workflow.
- Both images and text are easily configurable by the user

#### Patient View

- Within the Patient View the user can easily tailor the exam to each individual patient (e.g. patient with arrhythmia, breath hold capability).
- Pre-defined Dot Exam Strategies are integrated. The user just selects the appropriate strategy with one click and the queue and the complete scan set-up are automatically updated

#### AutoFoV (automatic Field of View calculation)

- Based on the localizer images the optimal FoV is automatically estimated.
- If the patient moves during the examination, this step can be repeated at any time

#### Automated parameter adaptation

- Scan parameters are automatically adapted to the patient's condition (e.g. heart rate)

#### Novel heart localization method

- On-board guidance visually facilitates anatomic landmark settings which are used for calculation
- Automated localization
- Automated localization of short-axis views

#### Cardiac Views

- Easy selection of cardiac views (e.g. 3 chamber view) during scan planning

#### Inline Ventricular Function Evaluation

- *syngo* Inline VF performs volumetric evaluation of cardiac cine data fully automatically right after image reconstruction.
- If desired, inline calculated segmentation results can be loaded to 4D Ventricular Function Analysis for further review or processing

#### Cardiac specific layout for the Exam task

- layouts show the new physio display and are configured for every step of the exam

#### Automated Naming

- Automated naming of series depending on cardiac views and sequence type

#### Auto Voice Commands

- Seamlessly integrated into scanning workflow.
- Played automatically
- The user controls breath-hold or pauses are actually played

## Description

- Ability to add pauses between automatic breath-holds

### **Dot Exam Strategies**

The workflow can be personalized to the individual patient condition and clinical need. The following predefined strategies are included. They can be changed at any time during the workflow:

- **Standard:** Segmented acquisition techniques
- **Limited patient capabilities:** switch to real-time and single shot imaging if breath-hold is not possible or arrhythmias occur

### **Customization**

Existing Dot Engines can be modified by the user to their individual standard of care.

- Add/remove protocol steps
- Change guidance content (images and text)
- Change or add Dot Exam Strategies and Decision Points
- Modify the Parameter View

The combination of automated contouring and easy-to-use editing tools, provides users with a rapid way to quantify flow parameters.

Argus Flow includes:

- Calculation of flow and velocity parameters( e.g. mean and max velocity, mean, cumulative, prograde, retrograde flow) for large and small vessels.
- Semi-automatic detection of regions of interest over time
- Color-coded display of velocity values
- Calculation of flow and velocity parameters (e.g. peak velocity, average velocity, flow, integral flow)
- Graphical and tabular display of the results (e.g. flow-time curves)
- Integration of the results in Argus structured report and storage in DICOM format for documentation.

This package includes Argus Function as well as Argus 4D Ventricular Function.

Argus Function:

- Automatic, semi-automatic, or manual segmentation of the left and semi-automatic or manual segmentation of the right ventricle.
- Volumetric analysis and wall thickness analysis.
- Output of parametric results, volume-time curves and bull's-eye plots.
- DICOM Structured Reporting.

Argus 4D Ventricular Function:

- Calculation of volumetric cardiac data of a given patient very quickly and easily.
- Parametric results and volume-time curves are calculated upon automatic creation and adaptation of a 4D model of the left ventricle.
- The resulting 4D model of the patient's heart can be visualized superimposed to anatomical images as a reference.

### **Dot Exam Strategies**

The workflow can be personalized to the individual patient condition and clinical need. The Large Joint Dot Engine comes with the following predefined strategies, which the user can select according to patient conditions or change at any time during the workflow, when conditions change:

- Image quality: Achieve highest image quality in a reasonable scan time with 2D and 3D protocols.
- Speed focus: Examine patients in the shortest possible time with protocols being accelerated to the maximal extent.
- Motion artifact reduction: Compensate for the effects of motion, e.g. with motion insensitive *syngo* BLADE protocols.
- Artifacts reduction: Reduce susceptibility artifacts, using *syngo* WARP.

## Description

### *AutoAlign*

- Automated, localizer based positioning and alignment of slice groups to the anatomy, relying on anatomical landmarks. Providing fast, easy, and reproducible patient scanning and supporting the reading by consistently delivering high image quality with a standardized slice orientation.

### *Inline MPRs - Automatic multiplanar reconstruction for 3D datasets*

- The Multi Planar Reconstruction (MPR) tool uses the position information from the AutoAlign algorithm and can be easily configured to automatically generate any required 2D images from high resolution 3D acquisitions.

### *Guidance View*

- Step-by-step user guidance is seamlessly integrated.
- Example images and guidance text are displayed for each individual step of the scanning workflow.
- Both images and text are easily configurable by the user

### *syngo WARP - Susceptibility Artifact Reduction*

- *syngo* WARP integrates different techniques tailored to reduce susceptibility artifacts caused by orthopedic MR-conditional metal implants. 2D TSE sequence combining optimized high-bandwidth protocols and View Angle Tilting (VAT) techniques. This helps in evaluation of soft tissue in proximity of the implant. Available protocols include T1- weighted, T2-weighted, proton density and STIR contrast.

### *New with SW syngo MR E11:*

- Advanced WARP application consists of SEMAC, a technique to reduce gross metal artifacts (i.e. through-plane artifacts) caused by large orthopedic implants. The main clinical applications are in hip and knee joint replacements. Available protocols include T1-weighted, T2-weighted, proton density and STIR contrast.

### *Customization*

The Large Joint Dot Engine can be modified by the user to their individual standard of care.

- Add/remove protocol steps
- Change guidance content (images and text)
- Change or add Dot exam strategies
- Add clinical decision points
- Add/remove parameters in the parameter viewing card

### *Features:*

- 3D VIBE sequence for Inline T1 mapping
- Multiecho spin echo sequence for Inline T2 mapping
- 3D Multiecho gradient echo sequence for Inline T2\* mapping
- iPAT compatibility
- Protocols for Inline parametric mapping

Using iPAT the 3D sequences provide isotropic imaging extremely high resolution while maintaining clinical measurement times. These data sets allow for the multi planar reconstruction of all planes. 3D is necessary to properly visualize the whole articular cartilage since it typically has a complex shape. In addition the accuracy of isotropic high resolution 3D data sets is superior because partial volume effects between e.g. synovial fluid and cartilage are minimized.

For the visualization of the parametric maps in the anatomical context the maps can be displayed as a colored overlay onto anatomical images using the optional package “*syngo* Image Fusion”

**CT, MR, NM, or PET images** are accepted as input for image fusion. Studies can be done with the same modality or with different modalities.

### **Registration Algorithms:**

## Description

- Easy-to-use visual alignment with 6 degrees of freedom (3x translation, 3x rotation)
- Landmark based registration with convenient landmark editor for point-based registration using anatomical landmarks
- Automatic registration
- Storage of transformation matrix after registration for later retrieval with datasets

### Visualization Techniques:

- Side by side visualization of both datasets with correlated pointer and correlated scrolling with dog ears
- 2D alpha-blending in monochrome or pseudo-color with adjustable balance between the two superimposed data sets.

Storage of fused results as secondary capture images.

### Diffusion Tensor Imaging

Diffusion Tensor Imaging allows for a complete description of the diffusion properties of the brain within the scope of the tensor diffusion model, both for anisotropic and isotropic diffusion. Efficient diffusion direction schemes are pre-defined to allow for optimal diffusion directional resolution. Schemes with up to 256 directions can be selected. Inline technology enables automatic and immediate calculation of the diffusion tensor, including grey-scale and colored "fractional anisotropy" (FA) map derived from it.

Details:

- Measurements with up to 256 different directions and with up to 16 different b-values
- Inline calculation of tensor, grey-scale and colored FA map, ADC map and trace-weighted image
- Support of parallel imaging (iPAT)
- Clinical protocols with full head coverage, incl. inline calculation of tensor, FA, ADC and trace-weighted images in 4 minutes.

### DTI Tractography *syngo*

*syngo* DTI Tractography is optimized for the clinical use by providing advanced 3D visualization of white matter tracts in the context of 2D or 3D anatomical datasets and DTI datasets. DTI data sets can be explored fast and intuitively using the interactive QuickTracking. QuickTracking instantaneously displays the tract originating from the mouse pointer position while moving over the DTI data set. This also allows identifying qualified regions to place seeding ROIs. Seed points can be set to assess connectivity by tracking with single ROI and with multiple ROIs. Furthermore they can be placed in fused views displaying the anatomical reference and e.g. the colored FA map simultaneously.

Texture Diffusion, a highly versatile in-plane visualization of white matter tracts, allows to display and read DTI Tractography results on PACS reading stations and in the OR.

At the same time the package provides the scientific user with the flexibility to configure the tracking algorithm and to change display settings for the tracts. Tract and seeding ROI statistics are included to support publications (e.g. mean/max FA value, min/mean/max ADC value).

All views can be exported as DICOM images or bitmaps. Tract and seeding ROI statistics can be exported as html files.

### DTI Evaluation

Clinical applications are supported by a dedicated DTI evaluation mode to support diagnostics of white matter diseases (e.g. multiple sclerosis and brain maturation disorders). Based on the tensor, in addition to the already inline-calculated parameter maps, further maps characterizing the anisotropy of diffusion properties can be calculated and stored. Multiple diffusion parameter maps (e.g. Fractional Anisotropy, ADC,  $b=0$ ) and an anatomical image are displayed next to each other in the same slice position for comparison. The images can be evaluated together based on ROIs and the results can be documented in a table. The display options include 2D and 3D tensor graphics, colour-coded images and overlay images on the anatomical images.

In addition, the package offers the scientific user full flexibility of 2- and 3-dimensional visualization of the diffusion tensor with measures of isotropic and anisotropic (fractional and relative) diffusion, Eigen vectors (E1, E2, E3) of the diffusion tensor and shape-descriptive measures of the diffusion tensor (linear, planar, spherical).

The BOLD imaging package allows the user to define protocols which, apart from the measurement, configure automatic evaluation of the measured data during the scan. With Inline Technology it is thus possible to generate statistical images (t-value) based on 3D motion corrected and spatially filtered data automatically in real time without any further user interaction. The Inline display of activation cards allows the user to decide during the scan whether enough statistical power has built up for his brain mapping task or if the examination is corrupted by

## Description

motion. As a result examinations will be shorter with a higher success rate. Functional brain mapping can be easily integrated into the clinical routine e.g. prior to neurosurgical interventions.

Additional Features:

- Inline retrospective 3D motion detection and correction in 3 rotational and 3 translational directions
- Inline t-statistics calculation for variable paradigms and display of t-value images
- Statistical evaluation by means of "General Linear Model (GLM)"
- Paradigms can be configured
- Transitions between passive and active states can be modeled by the hemodynamic response function
- Correction of low-frequency trends
- Allows for time delays due to the BOLD-EPI slice order during a measurement
- Display of GLM design matrix
- Display of a continuously updated t-value card during measurement
- Display of colored activation cards continuously updated during measurement, overlaid over the respective BOLD images using Inline technology
- MOSAIC image mode for accelerating display, processing and storage of images

By tracking the patients head 3D PACE reduces motion resulting in increased data quality beyond what can be achieved with a retrospective motion correction. As a result the sensitivity and specificity of BOLD experiments are increased.

Features:

- Real time prospective motion correction: Highest accuracy real time motion detection algorithm feeding a real time feed back loop to the acquisition system with updated positioning information
- 3D motion correction for 6 degrees of freedom (3 translation and 3 rotation)
- Motion related artifacts are avoided in first place instead of correcting for them retrospectively
- Significant reduction of motion-related artifacts in statistical evaluations
- Increased sensitivity and specificity of BOLD experiments

All tasks from statistical evaluation of the fMRI datasets to reading and exporting results are supported by BOLD 3D Evaluation *syngo*:

### Generation of statistical maps:

- In cases an inline calculated statistical map is not available a statistical map can be generated easily using processing protocols. An intuitive editor UI allows the paradigm definition and offers the selection of head motion correction, image filters and statistical evaluation.
- Predefined processing protocols and paradigms are available, which can be edited if required.

### Statistical evaluation using General Linear Model (GLM)

- Transitions between passive and active states modeled by the hemodynamic response function.
- Correction of low-frequency trends.
- Corrects for time delays due to the BOLD-EPI slice order during a measurement.
- Output of a t-value map and the GLM design matrix

### Inline monitoring of the fMRI exam

- During an ongoing BOLD imaging exam results are calculated (by Inline BOLD imaging) and displayed in real time.
- The results are displayed and continuously updated as an overlay on online adjustable, free angulated cut planes through the anatomical 3D data set.
- The evolving signal time courses in task-related areas of activation can be displayed and monitored.

### Visualization of fMRI Results

- Visualization with 3D volume rendering.
- Superimposing on cut planes through the volume.
- Interactive Navigation: Zoom, pan and rotate in 3D without noticeable delay. Free double oblique angulation of up to 6 cut planes.
- Cine display of the BOLD time series and of EPI volumes in 3 orthogonal cuts for evaluation of non-corrected

## Description

head motion.

### Data Quality Monitoring

- Based on the B0 field map, loaded automatically with the fMRI data, areas with less reliable results are indicated.

RESOLVE is a diffusion-weighted, readout-segmented EPI sequence optimized towards high resolution imaging with reduced distortions.

The sequence uses a very short echo-spacing compared to single-shot EPI, substantially reducing susceptibility effects. A 2D-navigator correction is applied to avoid artefacts due to motion-induced phase errors. This combination allows diffusion weighted imaging of the breast, prostate (SEEit sequence for prostate DWI), brain and spine with a high level of detail and spatial precision.

Additionally, an automatic reacquisition of data with large phase errors can be used to ensure that diffusion-weighted images of the brain are not affected by CSF pulsation.

3D acquisition of non-contrast enhanced brain perfusion with a TGSE sequence for minimal susceptibility and full brain coverage. Higher SNR, optimized contrast uniformity and reduced motion sensitivity. Inline calculation of PWI (perfusion weighted images) for a qualitative assessment of brain perfusion.

The Single Voxel Spectroscopy option is used to measure proton spectra from single voxels. The spectra may show alterations in brain metabolism e.g. in brain tumors, in degenerative changes of the brain and in metabolic diseases. The possibility of automatic adjustment, measurement and evaluation permits near automatic spectroscopy measurements. The whole procedure, including the evaluation of the spectra using the mandatory spectroscopy evaluation option, takes approx. 6 minutes and can be done by doctors or technologists.

The 2D Chemical Shift Imaging option is used to measure 2D proton spectroscopic data to generate metabolite images e.g. in brain tumors, metabolic diseases of the brain and degenerative changes in brain metabolism. The whole procedure, including the generation of metabolite images using the spectroscopy evaluation takes approximately 8 minutes.

The 3D Chemical Shift Imaging option is used to measure 3D proton spectroscopic data and allows for the evaluation of the spectra in measured volumes and the generation of metabolite images and spectral maps, e.g. in cases of brain tumors, metabolic diseases of the brain and degenerative changes in brain metabolism. The whole procedure, including the generation of metabolite images using the spectroscopy evaluation takes approximately 10-16 minutes

Optimized protocols for 3D CSI in the prostate are also included.

The evaluation software is fully integrated in *syngo* MR.

Evaluation protocols adapted to the scan protocols carry out a complete and automatic evaluation of the measured data.

The following functions are included:

- Subsequent water suppression with optional phase correction
- Apodization
- Zero filling
- Fourier transformation
- Base line correction
- Automatic or manual phase correction
- Curve fitting and peak labeling
- Summaries in tabular form of the essential results specifying the metabolites, their position, integrals and signal ratios in relation to a selectable reference.
- Capability of exporting spectroscopy header information and data into a documented external format.
- Automated peak normalization to tissue, water or reference.

For CSI the following functions are included:

- Spectra of selected voxels are automatically calculated, corrected for possible B0 deviations and displayed.
- Spectral fit is automatically optimized for each voxel.
- CSI data can be represented as spectral maps and colored metabolite images that can be superposed onto anatomical images.

## Description

Automatic adjustment and protocols permit largely automatic spectroscopy measurements.

The package comprises the following sequences and protocols:

- Single voxel measurement with Spin Echo technique
- Voxel size down to  $0.5\text{cm}^3$  (range 5mm - 40mm per direction)
- Voxels can be freely angulated
- Optimized B1-insensitive and T1-insensitive water suppression with variable suppression bandwidth
- Online frequency correction for reducing breathing artifacts
- Spectral suppression (user-definable parameters) to avoid lipid superposition in order to reliably detect e. g. choline in the breast
- Up to 8 regional saturation (RSat) bands for outer volume suppression can be defined by the user. A delta frequency can be determined for each RSat individually allowing the exact positioning of the RSat in the localizer image.
- Physiological triggering (ECG, pulse, respiratory or external trigger) possible
- Variable phase cycling
- An online display allows monitoring of the scan progress
- All adjustments can still be performed manually with real-time guidance

For proton spectroscopy in the breast, it is highly recommended to use one of the following breast coils: Siemens Breast Matrix Coil, 16-channel AI Breast Coil, Breast 18, (2/4)/8-channel or (2/10)/16-channel Sentinelle Breast Coil.

The option is integrated in the *syngo* user interface thus enables easy access to the user interface of the *syngo* Acquisition Workplace for planning and processing support purposes.

The access is protected by appropriate security mechanisms (active enabling prior to every connection through the user present on site, password protection), in order to prevent unwanted connections.

The client software can be operated on any commercial PC with the following specification:

- Operating system: Windows XP/ 7
- 32 bit graphics board
- 850 MHz CPU

A set of pre-defined Breast Dot Engines are provided for lesion detection, implant evaluation and breast biopsy. The Dot engines support various breast coils, head-first or optional feet-first positioning and examination approaches (fatsat, nonfatsat).

The following Breast Dot Engines configurations will be provided:

16ch AI FatSat  
16ch AI NonFatSat  
4ch BI FatSat  
4ch BI NonFatSat  
8ch Sentinelle FatSat  
8ch Sentinelle NonFatSat  
Biopsy Sentinelle 4/2ch  
Biopsy 4ch BI

### *Patient View*

Within the Patient View the user can easily tailor the exam to individual patient conditions ( e.g. patient with breast implants) and define the examination approach (Care Bolus, Autocoverage, frequency adjustment confirmation mode).

### *Implant Type/ Implant Situation*

Based on an "implant type identification scan", the user can visually select or modify the exam dependent on the actual implant type and laterality. The system automatically modifies the scan queue and the frequency adjustment setting of the protocols is changed (assume dominant fat or silicone).

### *Guidance View*

Example images and guidance text are displayed for individual steps

## Description

of the scanning workflow. They are configurable by the user.

### *Parameter View*

This view displays the parameters that are really needed for the examination at a glance. The displayed parameters are easily configurable by the user.

### *Autocoverage*

Based on the localizer data an automatic segmentation is performed, which allows the estimation of the optimal FoV (entire FoV for both breasts, right or left breast, breast with chest).

The user can predefine for every protocol individually which parameters shall be automatically adjusted, e.g. whether time or slice thickness shall remain constant.

Additional functionalities:

### *Inline MPR Planning*

For user-selected protocols, e.g. the high resolution "delayed VIEWS", adjustable MPRs are automatically calculated.

### *Biopsy support*

Two Biopsy Dot engines support interventions with the Sentinelle Breast or 4-ch BI Breast coils. The target coordinates of the lesion are displayed on the Dot display at the scanner (in case a Siemens biopsy planning software is used).

### *Customization*

The Breast Dot Engines can be modified by the user to their individual standard of care.

Add / remove protocol steps

Change guidance content (images and text)

Change or add Dot Exam Strategies and Decision Points

Modify the Parameter View

The 16-channel imaging configuration of the Sentinelle Breast Coil consists of two lateral 4-channel coil elements and an 8-channel coil middle element.

The 16-channel Sentinelle Breast Coil delivers brilliant image quality for high-resolution 2D and 3D MR breast imaging. Techniques for reducing scan times, such as parallel imaging, can be used very well.

The coil can be used with any 1.5T Tim/ Tim 4G systems of sufficient receive channel count (with the exception of MAGNETOM ESSENZA).

Together with the Tim Whole Body Suite Option, the coil can also be operated in "feet first" mode. This function substantially improves the examination flow with claustrophobic patients.

For optimal patient positioning, a set of 9 comfortable visco-elastic positioning cushions and aids, such as a height-adjustable head rest, is included.

The biopsy configuration consists of two lateral 1-channel coil elements and an 8-channel coil middle element. For the unilateral biopsy setup a contralateral support will be used.

The Sentinelle Breast Coil supports the Grid biopsy method.

A set of grid plates and a Biopsy Training Starter Kit (not for use on humans) are included in the delivery.

The 2/10/16-channel Sentinelle Breast Coil measures approx. 1097 mm x 582 mm x 279 mm (L x W x H) and weighs approx. 22 kg with base plate and 16 kg without base plate.

This adapter will be required if the following coils will be used:

- Tx/Rx 15-channel Knee Coil (two adapters required)
- CP Extremity Coil
- 4-channel BI Breast Coil
- 16-channel AI Breast Coil (two adapters required)
- (2/4)/8-channel Sentinelle BreastCoil
- (2/10)/16-channel Sentinelle BreastCoil (two adapters required)



## Description

The adapter can be plugged in any the SlideConnect plug of the system. The Tim Coil Interface has a compact design and measures only approx. 190 mm x 90 mm x 33 mm (W x H x D).

The Peripheral Angio 36 has a 36-element design with 36 integrated preamplifiers distributed over 6 planes with 6 elements each.

A uniquely designed non-ferromagnetic coil cart for safe coil storage is included. The PA Matrix Coil is also shipped with a set of positioning cushions for proper handling.

No tuning of the fully iPAT-compatible Peripheral Angio 36 is required.

With a length of about 1m both legs are covered from the iliac artery level down to the foot arch vessels using multiple, flexible wings. For the visualization of the abdominal aorta and the iliac bifurcation it can be combined with the Body 18 and Spine 32. For larger body coverage eg whole body with up to 205 cm possible coverage, it can be combined with Head/Neck20 or a further Body18 to allow for large Field of View examinations with high patient comfort. Patient set up is done once and no repositioning is necessary  
For peripheral Angiography the PA Matrix coil will be typically used in feet-first position, but also head-first positioning for whole-body examinations is possible (optional Tim Whole Body Suite required).

The dimensions of the Peripheral Angio 36 are:  
860 mm x 300 - 640 mm x 280 mm

The iPAT compatible Shoulder 16 Large and Shoulder 16 Small are ergonomically designed and adapted to the shape of the shoulder.

The different sizes obtain maximum image quality for different body sizes:

- 165 mm (6.5 in) diameter for small and medium sized shoulders
- 200 mm (7.9 in) diameter for large shoulders

The coils can be used either for left or right shoulders. It features sliding attachments to the base plate and can easily be adjusted for comfortable positioning. The coils excels in highest resolution imaging with exceptional signal/noise ratio.

The 16-element coil with 16 integrated pre-amplifiers excels in highest resolution imaging with exceptional signal/noise ratio, while taking full advantage of iPAT in all directions.

Foot/Ankle 16 is ergonomically designed and features a boot-like coil design. Together with the included stabilization pads the coil allows easy, fast and comfortable patient positioning.

The Body 18 has a 18-element design with 18 integrated preamplifiers that are arranged in 3 clusters of 6 coil elements each. The Body 18 will be typically used together with the Spine 32 with which it operates in an integrated fashion as a 30-element coil, resulting in 3 rings of 10 elements each for highest SNR and fast imaging. It can be positioned in different orientations and addresses the requirement range for the examinations of obese patient to pediatric patients. The light weight coil improves patient comfort and can be easily connected via SlideConnect technology. No tuning of the fully iPAT-compatible Body 18 is necessary allowing for efficient and patient friendly set-up.

For examinations where larger anatomical coverage is required, several Body 18 coils can be used simultaneously. Up to four Body 18 can be used simultaneously, but typically two Body 18 will be used for coverage of the entire abdomen or in the case of large patients.

The Body 18 is typically used in combination with the Spine 32 for examinations of the thorax, abdomen, pelvis or hip and is also well suited for cardiac or vascular applications. In addition, the Body 18 can be combined with the Spine 32, further Body 18 (optional), the Peripheral Angio 36 (optional), but also the Head/Neck20 and the 4-channel flex coils (e.g. Flex Large 4, Flex Small 4) it contributes for all large-Field-of-View applications up to whole-body imaging.

The dimensions of the Body 18 are 385 mm x 590 mm x 65 mm (L x W x H). Its weight is about 2 kg (4.5 lbs), whereas the patient feels as little weight as 1kg (2,25 lbs).

## Description

This enables studies with very high spatial resolution and very short scan time. The upper part of the coil is detachable and can be fitted with a mirror allowing the patient a rear view out of the magnet. Displaceable cushions are provided with the coil for positioning. The coil is suited for head proton imaging and brain spectroscopy.

The table design matches the MED-wide uniform design with silver-finished rim, use of friendly colors matching the Siemens color pattern for MAGNETOM and SOMATOM.

- Width 120 cm
- Depth 80 cm
- Height 72 cm

The table design matches the MED-wide uniform design with silver-finished rim, use of friendly colors matching the Siemens color pattern for MAGNETOM and SOMATOM.

Table height 72 cm, matching the *syngo* Acquisition Workplace and *syngo* MR Workplace console table, for installation in the operator room either directly to the left or right of the *syngo* Acquisition Workplace or *syngo* MR Workplace console table or separately.

- Width 50 cm
- Depth 80 cm
- Height 72 cm

Alternatively this casing is also suited for the Recon image processor (except for the MR systems with the Tim generation: there the Recon image processor is always placed inside the electronics cabinet).

Two different registration algorithms (fast and high quality) are now available to compensate for patient motion of the breast. Both correction possibilities can be applied offline for 2D and 3D MR data sets.

New image data are reconstructed and saved in a separate series within the patient browser. They can be combined with the original non-corrected image data.

### Fast algorithm

- Suitable for small to moderate motion
- Works in less than 3 minutes for large data sets

### High quality algorithm

- Optimized set of motion parameters suitable for more severe motion
- More time intensive for large data sets

*Prerequisite: Software syngo MR B13*

Special video camera for monitoring the patient during an MR examination.

Color 640 x 480 pixel LCD monitor may be positioned at the *syngo* Acquisition Workplace or at a convenient wall location (wall support not included in scope of delivery) in the control room.

Vacuum cushions for positioning and stabilization of the patient during the examination.

The comfort kit may significantly reduce patient exam times and optimize image quality by minimizing the occurrence of motion artifacts caused by involuntary patient motion.

The material of the cushions is a leather imitation, which is very soft to the touch, and easy to clean. The cushions are filled with tiny Styrofoam pellets and will conform to the exact shape of the anatomy around which they are placed. With the help of the vacuum, the region to be examined will be fixated. The vacuum connector is integrated in the patient table.

The kit comprises a vacuum pump and 3 anatomically shaped cushions of different sizes (spine, head, and small joints). The head and the small joints cushions are delivered with two washable pillowcases each.

The cart may be rolled to convenient locations in the examination room and can be opened up to work like a shelf. The coil storage cart has multiple drawers and trays as well as many other storage spaces for coils, cushions and miscellaneous items.

Its dimensions are: Width 140 cm (4' 7") when closed and 280 cm (9' 12") when opened, depth 54 cm (1' 9") and

## Description

height 121 cm (3'12").

An MR-compatible arm rest that supports the patient's arm on the magnet patient table when starting intravenous lines. The board is removed after the IV is inserted.

This product has been tested and verified for compatibility with the following Siemens' products: MAGNETOM Trio, Verio, Espree, Essenza, Avanto, Symphony, Aera, Skyra and Biograph mMR. Compatibility with other products cannot be assured and may void service contracts and/or system warranties.

### Chiller KKT ECO 133 - L

Function:

Supplies dedicated primary chilled water in cases where no chilled water supply is available on site. Air-cooled version, for outdoor installation up to a maximum distance of 25 m for connection to the IFP, incl. 50 m FOC for control.

The cooling capacity of the chiller is 60 kW, the chilled water temperature is 20°C, the water flow is 130 l/min.

Ambient temperature: -20 to +48°C

Connection rating: 28 kW

Voltage: 3/PE 400 V to 480 V / 50/60 Hz

Fuse rate: 80 A

Power consumption: 66 A

Dimensions: 2000 mm x 1100 mm x 2100 mm (height x width x depth).

Weight: 760 kg

Noise level at a distance of 10 m at outside temperatures of:

21°C 47 dB(A)

32°C 52 dB(A)

48°C 58 dB(A)

### IFP (Interface Panel)

Main functions of the IFP:

- Interface function between the KKT chiller and the MR cabinet.
- Water supply for MREF, MBB, CBB and TX box.

Additional devices such as integrated differential pressure control, a pressure gage, and a filter are used in order to guarantee the precise functioning of the cooling circuit, especially for the cold head compressor (MREF).

The connection must be made locally with 2" lines up to a maximum distance of 25 m.

Dimensions: 800 mm x 1150 mm x 210 mm (height x width x depth).

Weight: 67 kg

Includes Spectris Solaris EP injector and Integrated Continuous Battery Charger (ICBC).

- Optimized color touch screen with few keystrokes.
- Six user-programmable phases for added flexibility.
- Independent Keep Vein Open (KVO) allows more time to focus on patient.
- Large 115 mL saline syringe allows for longer KVO and multiple flushes.
- Design of low pressure tubing eliminates dead space in the "T" connection that can waste contrast.
- The clear barrel design with molded FluidDots help detect the presence of air in a syringe.
- Pressure Limit Setting control software enables user to select from one to six preset maximum pressure limits, ranging from 100-300 psi, and to view current pressure during injection next to the pre-selected maximum value on the Solaris display.

Installation, applications and one year warranty provided by Medrad.

**Not for mobile use, refer to Siemens part number M3SSMR300EPM for the Solaris injector used in a mobile environment.**

**This product has been tested and verified for compatibility with the following Siemens' products:**

**MAGNETOM Trio, Espree, Essenza, Verio, Avanto, Symphony, Aera, Skyra and Biograph mMR.**

**Compatibility with other products cannot be guaranteed and use with any other products may void service contracts and/or system warranties.**