

Date (dd.mm.yyyy): 18.06.2025

Product description:

MAGNETOM Sola - System

1 Product Overview

Included products are listed below:

Item	Description	Qty	Rel
	<u>MAGNETOM Sola - System</u>		
1.	MAGNETOM Sola - System 14460300 / Country of Origin: DE	1	R
2.	MR General Engine #BM 14460161 / Country of Origin: DE	1	R
3.	myExam Brain Assist 14475308 / Country of Origin: DE	1	R
4.	myExam Spine Assist 14475309 / Country of Origin: DE	1	R
5.	myExam Large Joint Assist 14475310 / Country of Origin: DE	1	R
6.	myExam Brain Autopilot 14482834 / Country of Origin: DE	1	R
7.	myExam Knee Autopilot 14482835 / Country of Origin: DE	1	R
8.	Quiet Suite #T+D 14441748 / Country of Origin: DE	1	R
9.	Tim Whole Body Suite #NX 14460162 / Country of Origin: DE	1	R
10.	Tim Planning Suite #BM 14460227 / Country of Origin: DE	1	R
11.	syngo TimCT FastView #BM 14456329 / Country of Origin: DE	1	R
12.	Advanced Diffusion #NX 14460160 / Country of Origin: DE	1	R
13.	WARP & Advanced WARP 14456327 / Country of Origin: DE	1	R

14.	Advanced Cardiac incl. PSIR #BM 14456237 / Country of Origin: DE	1	R
15.	Inline Composing syngo 14456323 / Country of Origin: CN	1	R
16.	syngo Expert-i XA50/XA51 14475447 / Country of Origin: DE	1	R
17.	Tim [204x48] XJ Gradient #So 14460302 / Country of Origin: DE	1	R
18.	Coil Package Tim [204x48] #So 14460306 / Country of Origin: DE	1	R
19.	BioMatrix Technology 14456328 / Country of Origin: DE	1	R
20.	BioMatrix Respiratory Sensors 14470783 / Country of Origin: DE	1	R
21.	BioMatrix Table #So 14460412 / Country of Origin: DE	1	R
22.	Green Technology Package 14483089 / Country of Origin: DE	1	R
23.	BioMatrix Coil Shim #Vi,So,Ci 14470792 / Country of Origin: DE	1	R
24.	BioMatrix Select & GO #Vi,So,Ci 14470795 / Country of Origin: DE	1	R
25.	BioMatrix SliceAdjust #BM 14470794 / Country of Origin: DE	1	R
26.	Silver & White Design #So 14460410 / Country of Origin: DE	1	R
27.	PC Keyboard US English #NX 14456270 / Country of Origin: CN	1	R
28.	High-End Computing [204x48] #So 14460419 / Country of Origin: DE	1	R
29.	Advanced Host Computer #NX 14460295 / Country of Origin: DE	1	R

30.	Peripheral Pulse Unit #NX 14456238_4724 / Country of Origin:	1	R
31.	Patient Video Monitoring 14416948 / Country of Origin: DE	1	R
32.	SW syngo MR XA51A 14482823 / Country of Origin: DE	1	R
33.	Neuro Perfusion Package 14416946 / Country of Origin: DE	1	R
34.	CS SPACE #NX 14461590 / Country of Origin: DE	1	R
35.	Neuro fMRI/DTI Package #NX 14456234 / Country of Origin: DE	1	R
36.	Spectroscopy Package #NX 14456235 / Country of Origin: DE	1	R
37.	MapIt syngo #Tim 14405341 / Country of Origin: DE	1	R
38.	NATIVE syngo 14409198 / Country of Origin: DE	1	R
39.	Turbo Suite Essential 14461619 / Country of Origin: DE	1	R
40.	FREEZEit+ Package 14456275 / Country of Origin: DE	1	R
41.	Arterial Spin Labeling 3D 14482844 / Country of Origin: DE	1	R
42.	PCASL #NX 14461562 / Country of Origin: DE	1	R
43.	Deep Resolve Pro Package 14475525 / Country of Origin: DE	1	R
44.	SWI #Tim 14402527 / Country of Origin: DE	1	R

45.	Tx/Rx Knee 18 #1.5T 14460423 / Country of Origin: CN	1	R
46.	Positioning Aids Shoulder&Ankle #NX 14456282 / Country of Origin: US	1	R
47.	Flex -> UltraFlex Upgrade #1.5T 14469229 / Country of Origin: DE	1	R
48.	syngo MR Workplace #NX 14456244 / Country of Origin: DE	1	R
49.	Shoulder Shape 16 #1.5T 14460315 / Country of Origin: CN	1	R
50.	Foot/Ankle 16 #1.5T 14416962 / Country of Origin: CN	1	R
51.	PC Keyboard US English #NX 14456277 / Country of Origin: DE	1	R
52.	Patient Education Toolkit 14483039 / Country of Origin: DE	1	R
53.	Sanitary Installation Pack. #Tim 08465325 / Country of Origin: DE	1	R
54.	Eco Chiller 60kW 14416975 / Country of Origin: DE	1	R
55.	Handheld Metal Detector 09693698 / Country of Origin: DE	1	R

T O T A L quantity is for one system

Optional products are listed below:

Item	Description	Qty	Rel
	<u>MAGNETOM Sola - System</u>		
	<u>T O T A L quantity is for one system</u>		

2 Technical description

Item	Description
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1. MAGNETOM Sola - System

MAGNETOM Sola - the first 1.5T BioMatrix system - leverages the intelligent combination of Tim 4G and the Siemens unique BioMatrix technology to be ready to embrace the unique set of challenges that each and every patient brings to the MRI exam.

The system includes:

BioMatrix Technology

In order to meet the requirements of the changing healthcare market, Tim® is now further enhanced with the ability to address patient biovariability: Evolving from Total imaging matrix, BioMatrix® technology addresses the intrinsic biovariability in humans.

BioMatrix can anticipate challenges in MR examinations, for example, the limited ability to hold one's breath, to manage growing patient populations and increasing exam complexity in MRI.

BioMatrix can adapt to all patients and their anatomic individuality, even the critical ones, to make MRI more predictable and consistent for all patients, even critical ones. BioMatrix can accelerate the workflow, without compromising quality of care by assisting interactions between the patient and the user, to improve MRI cost-effectiveness and patient outcomes.

BioMatrix anticipates, adapts and accelerates to embrace human nature.

Tim 4G

Tim 4G provides excellent image quality and speed in MRI combined with increased patient comfort and optimized workflow efficiency. Only one patient setup, no repositioning, no changing of coils. Ultra-light-weighted coils with high density of coil elements for maximized patient comfort and increased SNR. Feet-first positioning reduces claustrophobia.

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

Magnet:

- Short 145 cm long (157 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 magnet design which allows for a cylindrically optimized homogeneity volume resulting in higher image quality (50 × 50 × 45 cm³ DEV, typ. 2,8 ppm based on the 24-plane plot method)
- Temperature sensors with real time correction algorithm for unmatched long-term stability at 70 cm
- The magnet has 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.

Item	Description
	<ul style="list-style-type: none"> - It has an integrated magnet cooling system. - The combination of standard active shim and passive shim allows for maximized magnetic field homogeneity and consistent high image quality for a wide range of applications - Integrated Eco-Power technology to save around 30% of energy during standby of the system. <p>Gradient system:</p> <ul style="list-style-type: none"> - Actively shielded water-cooled world-class gradient system - All axes force compensated for lowest vibrations and acoustic performance <p>DirectRF - RF Transmit/Receive System:</p> <ul style="list-style-type: none"> - 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 - Integrated no tune transmit/receive Body Coil - The revolutionary Tim 4G technology allows connecting 204 channels (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. <p>Select&GO</p> <p>The Select&GO interface enables fast and easy single-touch patient positioning. Correct positioning saves unnecessary wasted time for repositioning and additional adjustments, therefore shortening the total room time.</p> <ul style="list-style-type: none"> - The ergonomically designed Select&GO touch panels are integrated into the front cover on each side of the patient tunnel for controlling table movement, guidance for patient setup and comfort features. They are well illuminated for easy visual recognition. - Automated table move 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 Select&GO touch panels provide 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. <p>DotGO (≤ SW syngo MR XA31)</p> <p>Go for consistent results, efficiently with Dot Engines.</p> <p>Dot offers a customizable framework for patient personalization, user guidance and exam automation. Optimized scan strategies are provided and can be selected based on patient condition, which allow for high quality exams even when conditions change.</p> <p>Integrated decision points allow the user to easily add or remove one or a group of protocols with one click. Step by step image and text guidance guides novice users even through the most complicated exams. Exam automation allows optimal timing for breathing, scanning, planning or contrast arrival. Dot can be</p>

Item	Description
	<p>easily customized to follow the individual standards of care.</p> <p>Dot is personalized, guided and automated and designed to improve workflow efficiency and image consistency.</p> <p>Dot Cockpit</p> <p>The central tool to continuously build knowledge into standardized exams 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>myExam Companion (≥ SW syngo MR XA51)</p> <p>myExam Companion stands for built-in expertise that works with the user to achieve consistent, reproducible results for all patients. It offers patient personalization, user guidance and process automation via myExam Assists and intuitive protocol management via myExam Cockpit. myExam Companion helps users efficiently achieve high-quality results – regardless of their experience level, the patient, or throughput.</p> <p><i>myExam Autopilot</i></p> <p>myExam Autopilot helps users to automate intelligently. It enables less trained staff to scan with just a few simple clicks. By using automation and AI, it takes away burdensome routine tasks for all technologists.</p> <p><i>myExam Assists</i></p> <p>myExam Assist provides guided and flexible workflows. Optimized scan strategies are provided and can be selected based on patient condition, which allows for reproducible, high image quality and time efficient exams. The built-in flexibility allows users to change predefined strategies at any time during the workflow, and to personalize to the individual patient's condition and clinical need. Integrated decision points allow the user to easily add or remove one or a group of protocols with one click. Step by step image and text guidance guides novice users even through the most complicated exams. Exam automation allows optimal timing for breathing, scanning, planning or contrast arrival. The different myExam Assists can be easily customized to follow the individual standards of care.</p> <p><i>myExam Cockpit</i></p> <p>myExam Cockpit allows users to customize intuitively. It provides a central workspace for protocol management. Users can set up and maintain protocols, build knowledge into standardized exams, and make those continuously available for every user in the MRI department.</p> <p>Recon&GO</p> <p>The Recon&GO technology encompasses a wide range of in-line functionalities automizing reconstruction and post-processing steps to provide ready-to-read results for the radiologist. Examples are Inline ADC calculation, inline subtraction of dynamic contrast-enhanced series, up to Inline Launch of advanced post-processing applications.</p> <p>MR View&GO</p> <p>MR View&GO is MAGNETOM Sola's all-in-one viewing and reading solution for fast and intuitive quality check and result distribution. It receives the images directly as they come on the scanner, giving the user a clear overview of the quality of images scanned, without being distracted by constant context switches.</p>

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Once the images have been checked for acceptable quality, they can easily be sent to the PACS with minimal user interaction.

Beyond that, MR View&GO offers the additional advantage to perform extended post-processing, directly at the scanner. In-line launching of post-processing applications makes it possible to fully automate the evaluation of, for example, perfusion maps, permeability or cardiac function, all without additional user interaction. This makes it possible to save radiologist time by delivering quantitative, ready-to-read results, directly to the PACS.

Tim Application Suite

The Tim Application Suite offers a complete range of clinically optimized examinations for all regions. The Tim Application Suite -allowing excellent head-to-toe imaging - is provided standard on MAGNETOM Sola.

- Neuro Suite
- Angio Suite
- Cardiac Suite
- Body Suite
- Onco Suite
- Breast Suite
- Ortho Suite
- Pediatric Suite
- Scientific Suite

Neuro Suite

Comprehensive head and spine examinations can be performed with dedicated programs. High-resolution pulse sequences and motion-insensitive pulse sequences for patients which have difficulties to lay still are provided. The Neuro Suite also includes pulse sequences for diffusion imaging, perfusion imaging, and fMRI.

It includes for example:

- Fast 2D imaging with SE, TSE, GRE pulse sequences for high-resolution imaging
- BLADE for motion-insensitive TSE imaging
- EPI pulse sequences and protocols for diffusion imaging, perfusion imaging, and fMRI for advanced neuro applications. Diffusion-weighted imaging is possible with up to 16 b-values in the orthogonal directions. For reduced distortions and homogeneous signal intensity even in the presence of challenging susceptibility interfaces and at station boundaries, SliceAdjust (slice-by-slice adjustments) can be selected.
- 3D TOF for non-contrast-enhanced angiography
- 3D isotropic resolution volume imaging using T1 3D MPRAGE / 3D
- FLASH, SPACE DarkFluid, T1 SPACE and T2 SPACE pulse sequences
- High-resolution T2 SPACE pulse sequence optimized for inner ear examinations
- Double Inversion Recovery 3D pulse sequences (DIR SPACE) with two user-selectable inversion pulses for the simultaneous suppression of e.g. cerebro-spinal fluid and white matter
- MP2RAGE (Magnetization Prepared 2 Rapid Acquisition Gradient Echoes) provides homogeneous tissue contrast for segmentation and applications such as voxel-based morphometry. In combination with MapIt*, it also provides T1 mapping functionality.
- Whole-spine pulse sequences in multiple steps with software-controlled table

Item	Description
	movement
-	2D and 3D MEDIC pulse sequences for T2-weighted imaging, particularly for C-spine examinations in axial orientation where reproducibility is difficult due to CSF pulsations and blood flow artifacts
-	RESOLVE (Readout Segmentation Of Long Variable Echo-trains) delivers high-resolution, low-distortion diffusion-weighted imaging (DWI) for accurate depiction of lesions.
-	BioMatrix's CoilShim helps to reduce patient induced strongly localized B0 inhomogeneities as may arise, e.g., in the neck region.
-	3D Myelo with 3D HASTE for anatomical details
-	3D CISS (Constructive Interference in Steady State) for excellent visualization of fine structures such as cranial nerves. High-resolution imaging of inner ear
-	TGSE sequence used primarily for T2-weighted imaging for shorter measurement time, decreased RF power deposition, and high resolution imaging of the brain
-	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 with or without contrast agent.

- 3D MRA pulse sequences for carotid arteries, abdominal arteries, and peripheral arteries, with short TR and TE. The strong gradients make it possible to separate the arterial phase from the venous phase.
- Dynamic MRA for 3D imaging over time Signal from Respiratory Sensor can be selected to actively trigger MR image acquisition, e.g. with NATIVE*.

Contrast-enhanced MRA

3D contrast-enhanced MRA pulse sequences for dynamic carotid, abdominal, and peripheral arteries, shortest TR and TE. The strong gradients make it possible to separate the arterial phase from the venous phase

- TestBolus workflow for optimal bolus timing and excellent image quality
- CareBolus functionality for accurate determination of the bolus arrival time and the "Stop and Continue" of the 3D ce-MRA pulse sequence after the 2D bolus control scan
- Dynamic ce-MRA for 3D imaging over time

Non-contrast-MRA and venography

- Time-of-Flight (ToF) pulse sequences for MRA for the Circle of Willis, carotids and neck vessels; can be adapted for venography, and Breath-hold protocols for abdominal vessels
- Triggered 2D ToF sequences for non-contrast-MRA in the legs
- MR venography and arteriography with Phase-Contrast
- TONE (Tilted optimized non-saturating excitation) techniques for improved Contrast-to-Noise Ratio (CNR)

Image processing tools

- 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

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Cardiac Suite

The cardiac suite covers comprehensive 2D routine cardiac applications, ranging from morphology and ventricular function to tissue characterization. It moreover features BEAT 2D in conjunction with iPAT, T-PAT and e-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.

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

Visualization of structural cardiovascular pathologies with CMRBEAT

- 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: 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)
- Pulse sequences for whole-heart coverage
- Integration of Compressed Sensing Cardiac Cine (optional) for highest temporal and spatial resolution (segmented and real-time pulse sequences)
- Real-time imaging in case the patient is not able to hold his breath

4D imaging and tissue characterization with BEAT; pulse sequences for high-contrast and high-resolution tissue characterization

- Pulse sequences for stress and rest imaging with TurboFLASH contrast support the acquisition of multiple slices with high-resolution and arbitrarily adjustable slice orientation for each slice T-PAT and e-PAT with mSENSE and GRAPPA for advanced parallel imaging provides fast high-resolution dynamic imaging
- Segmented IR TrueFISP / FLASH with TI scout for optimization of tissue contrast
- Advanced tissue characterization with 2D phase-sensitive IR (PSIR) pulse sequences with TrueFISP and FLASH contrast. Magnitude and phase-sensitive images with one acquisition.

Item	Description
	<ul style="list-style-type: none"> - Simple: no adjustment of inversion time (TI) necessary with PSIR technique - Motion correction/averaging of multiple measurements with iPAT or tPAT accelerated single-shot TrueFISP or GRE images of the heart, for free-breathing acquisition. <p>Physiological Measurement Unit (PMU) - Wireless Physio Control</p> <ul style="list-style-type: none"> - Synchronizes the measurement with the physiological cycles (triggering to minimize motion artifacts caused by cardiac and respiratory movements) - Wireless Sensors - Wireless Vector ECG / respiration for physiologically synchronized imaging, rechargeable battery-powered - for optimized patient handling - Physiological Signals Display - ECG (3 channels) - Respiration - External Trigger Input Display <p>ECG Triggering:</p> <ul style="list-style-type: none"> - 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 - 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 - Retrospective gating for ECG, peripheral pulse, and external trigger input <p>Breast Suite</p> <p>MR imaging provides excellent tissue contrast that may be useful in the evaluation of the breasts. Extremely high spatial and temporal resolution can be achieved in very short acquisition times by using iPAT with GRAPPA and CAIPIRINHA. Customized pulse sequences (e.g. with fat saturation or water excitation or silicone excitation), as well as flexible multiplanar visualization allow a fast, simple and reproducible evaluation of MR breast examinations.</p> <p>This package includes:</p> <ul style="list-style-type: none"> - High-resolution 2D pulse sequences for morphology evaluation - High-resolution 3D pulse sequences covering both breasts simultaneously - Pulse sequences to support interventions (fine needle and vacuum biopsies, wire localization) - Pulse sequences 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 - iPAT² with CAIPIRINHA that allows state-of-the-art sagittal breast imaging and

Item	Description
	further improvement of the temporal resolution in dynamic scans while maintaining spatial resolution
	<ul style="list-style-type: none"> - Inline subtraction and MIP display - Offline subtraction, MPR and MIP display - REVEAL: diffusion imaging for breast exams. In pulse sequences with multiple b-values individual numbers of averages may be specified per b-value. - RESOLVE: Diffusion-weighted, readout-segmented (multi shot) EPI sequence for high-resolution susceptibility-insensitive DWI of the breast - RADIANT: Ultrasound-like reconstruction around the nipple

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

The Body Suite is dedicated to clinical body applications. Ultra-fast high-resolution 2D and 3D pulse sequences are provided for abdomen, pelvis, MR Colonography, MRCP, dynamic kidney, and MR Urography applications.

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 HASTE (RESTORE) and 2D / 3D TSE- it is possible to use a phase navigator, which measures respiratory induced off-resonance effects. The positioning can be done automatically for most pulse sequences.
- Optimized fast single shot HASTE pulse sequences and high-resolution
- 3D pulse sequences based on SPACE and TSE for MRCP and MR Urography examinations
- REVEAL: diffusion imaging for abdomen and whole body exams.
- For reduced distortions and homogeneous signal intensity even in the presence of challenging susceptibility interfaces and at station boundaries, SliceAdjust (slice-by-slice adjustments) can be selected.
- In pulse sequences with multiple b-values, individual numbers of averages may be specified per b-value. Inline calculation of ADC maps, exponential ADC maps and inverted b-value images can be selected. Inline calculation (extrapolation) of high b-values (up to $b=5000 \text{ s/mm}^2$) is possible.
- Signal from Respiratory Sensor can be selected to actively trigger MR image acquisition.

ABDOMEN:

2D:

- T1 (FLASH) breath-hold scans with and without FatSat (SPAIR, Quick FatSat, in- / opp-phase)
- T2 (HASTE, TSE / BLADE, EPI) breath-hold scans with and without FatSat (SPAIR, FatSat, STIR)
- T1 (TFL) triggered scans (2D PACE free breathing) in- / opp-phase T2

Item	Description
	<p>(HASTE, TSE / BLADE, EPI) triggered scans (2D PACE free breathing) with and without FatSat (SPAIR, FatSat, STIR) as well as HASTE- and TSE-multi-echo</p> <ul style="list-style-type: none"> - Optimized fast single-shot HASTE pulse sequences and high-resolution pulse sequences based on SPACE and TSE for MRCP and MR urography examinations <p>3D:</p> <ul style="list-style-type: none"> - Dixon (VIBE 2pt-Dixon) breath-hold scans, following contrasts can be obtained: in-phase, opposed phase, fat and water image - Dynamic (VIBE and Quick-FatSat) pulse sequences with Inline motion correction for visualization of focal lesions with high spatial and temporal resolution - Colonography dark lumen with T1-weighted VIBE - REVEAL: Diffusion-weighted imaging of the prostate, cervix, rectum and other organs with multiple b-values. Inline calculation of - ADC maps, exponential ADC maps and inverted b-value images can be selected. Inline calculation (extrapolation) of high b-values (up to $b=5000 \text{ s/mm}^2$) is possible. <p>PELVIS:</p> <ul style="list-style-type: none"> - High-resolution T1, T2 pelvic imaging - Isotropic T2 SPACE 3D pulse sequences - Dynamic volume examinations with 3D VIBE <p>THORAX:</p> <ul style="list-style-type: none"> - High-resolution T1, T2 thorax imaging - Motion-insensitive pulse sequences (BLADE, HASTE) - TrueFISP pulse sequences for imaging of respiratory mechanics - Dynamic imaging with TWIST (optional), TWIST-VIBE (optional) - Non-contrast-enhanced vessel visualization with SPACE pulse sequences - STIR pulse sequences for the evaluation of lymph nodes - Diffusion-weighted imaging with REVEAL <p>Onco Suite</p> <p>MR imaging provides excellent soft-tissue differentiation, multiplanar capabilities, and the possibility of selectively suppressing specific tissue, e.g. fat or water. The Onco Suite features a collection of pulse sequences and evaluation tools that may be used for a detailed assessment of a variety of oncological conditions.</p> <p>General features:</p> <ul style="list-style-type: none"> - STIR TSE, HASTE, and FLASH in-phase and opposed-phase pulse sequences for highly sensitive visualization of focal lesions - Dynamic imaging pulse sequences for assessment of the kinetic behavior of tissue - Quantitative evaluation and fast analysis of the data with colorized Wash-in, Wash-out, Time-To-Peak, Positive-Enhancement-Integral, MIP-time and combination maps with Inline technology - Display and analysis of the temporal behavior in selected regions of interest with the included MeanCurve postprocessing application. - This includes the capability of using additional datasets as a guide for defining regions of interest even faster and easier than before. - REVEAL: Diffusion-weighted imaging with multiple b-values. In pulse sequences with multiple b-values, individual numbers of averages may be specified per b-value. Inline calculation of ADC maps, exponential ADC maps and inverted b-value images can be selected. Inline calculation (extrapolation)

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	<p>of high b-values (up to $b = 5000 \text{ s / mm}^2$) is possible. For reduced distortions and homogeneous signal intensity even in the presence of challenging susceptibility interfaces and at station boundaries, SliceAdjust (slice-by-slice adjustments) can be selected.</p> <ul style="list-style-type: none"> - RESOLVE: high-resolution, low-distortion diffusion-weighted imaging (DWI). In pulse sequences with multiple b-values, individual numbers of averages may be specified per b-value. Inline calculation of ADC maps, exponential ADC maps and inverted b-value images can be selected. Inline calculation (extrapolation) of high b-values (up to $b=5000 \text{ s / mm}^2$) is possible. <p>Prostate:</p> <ul style="list-style-type: none"> - Dedicated prostate pulse sequences for a variety of clinical scenarios - T1-weighted 3D VIBE pulse sequences with high temporal resolution (VIBE, TWIST (optional) and TWIST-VIBE (optional)) allow time course evaluation - Prostate spectroscopy (3D CSI (optional) volume scan) with up to 8 sat bands (suppression of water and fat signal) <p>Whole-body imaging:</p> <ul style="list-style-type: none"> - TSE STIR pulse sequences for head-to-toe and head-to-pelvis imaging - Dedicated pulse sequences for focus regions head, neck, thorax, abdomen and pelvis - Diffusion-weighted imaging with REVEAL including SliceAdjust <p>Ortho Suite</p> <p>Ortho Suite is a comprehensive collection of pulse sequences for joint and spine imaging.</p> <p>This package includes:</p> <ul style="list-style-type: none"> - 2D TSE pulse sequences for PD, T1, and T2-weighted contrast with high in-plane resolution and thin slices - 3D MEDIC, 3D TrueFISP pulse sequences with water excitation for T2-weighted imaging with high in-plane resolution and thin slices - High-resolution 3D VIBE pulse sequences for MR Arthrography (knee, shoulder, and hip) - 3D MEDIC, 3D TrueFISP, 3D VIBE pulse sequences with Water Excitation having high isotropic resolution optimized for 3D postprocessing - T1 and PD SPACE 3D imaging with high isotropic resolution, optimized for post-processing Single-step, and multi-step pulse sequences - Excellent fat suppression in off-center positions, e.g. in the shoulder due to high magnet homogeneity - Dynamic TMJ pulse sequence (different joint positions) - Multi Echo SE sequence with up to 32 echoes for T2 mapping - High-resolution 3D DESS (Double Echo Steady State): T2 / T1- weighted imaging for excellent fluid-cartilage differentiation - 2-point Dixon technique for fat and water separation - Turbo Spin Echo sequence - WARP - 2D TSE sequence combining optimized high-bandwidth pulse sequences and View Angle Tilting (VAT), tailored to reduce susceptibility artifacts caused by orthopedic MR-conditional implants. This helps in evaluation of soft tissue in proximity of the implants. Available pulse sequences include T1- weighted, T2-weighted, proton density and STIR contrast. - Advanced WARP enables the reduction of gross artifacts (i.e. through-plane

Item	Description
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artifacts) caused by large MR-Conditional* implants. It contains the 2D TSE based SEMAC technique and is especially useful in the case of hip and knee joint replacements.

- Available pulse sequences include T1-weighted, proton density and T2 TSE STIR contrast.

Pediatric Suite

Tissue relaxation times and examination conditions in pediatrics are very different compared to those of adults. The reasons for these differences range from developing tissues, body size and faster heart rates to non-compliance with breath-hold commands. Pulse sequences can be easily adapted for imaging infants.

Scientific Suite

The Scientific Suite supports scientific users by providing easy access to application-specific data for further processing and advanced image calculus.

- Support of USB Memory sticks
- Anonymization of patient data
- Easy creation of AVIs and screen snapshots to include in presentations or teaching videos
- Export of tables, statistics and signal time courses to communal exchange formats like e.g. tabulated text files (MeanCurve, Spectroscopy evaluation, DTI evaluation)
- Advanced image calculus including addition, subtraction, multiplication, and division of images

This *syngo* software version provides security settings to protect the scanner against known security threats.

- User management with authentication to prohibit unauthorized access
- Privileges to grant rights and define functionality based on user/role Hardened operating system and restricted network communication
- Whitelisting (Embedded Control) against manipulation of scanner software
- Security Delivery process to frequently distribute security updates Option to protect customer pulse sequences trees against unauthorized modifications
- Audit trail to log system and data access by the defined users and service
- Support of customers to implement their security policy including compliance with HIPAA (Health Insurance and Accountability Act)

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
- 2D TSE with multiple average - it is possible to acquire T2-weighted TSE images during shallow breathing, in a time efficient manner
- 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

Item	Description
	<p>DarkFluid Contrast</p> <ul style="list-style-type: none"> - 2D Optimized high bandwidth TSE (T1, T2, and PD weighted and STIR) with WARP for the reduction of susceptibility artifacts caused by MR Conditional metal* implants. <p>Gradient Echo family of sequences:</p> <ul style="list-style-type: none"> - 2D / 3D FLASH (spoiled GRE) - dual echo for in- / opposed phase imaging 3D VIBE (Volume Interpolated Breath-hold 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) - RESOLVE (Readout Segmentation Of Long Variable Echo-trains) delivers high-resolution, low-distortion diffusion-weighted imaging (DWI) for accurate depiction of lesions. - 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 - BEAT Tool - TrueFISP segmented; 2D FLASH segmented; Magnetization-prepared TrueFISP (IR, SR, FS); IR TI scout; Retrogating <p>Standard Fat/Water Imaging</p> <ul style="list-style-type: none"> - 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 - available both based on VIBE (2 point Dixon) <p>Standard Techniques</p> <ul style="list-style-type: none"> - 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 - Analysis Tools for addition, subtraction, division, multiplication, calculations of

Item	Description
	<p>ADC maps and b-value images</p> <ul style="list-style-type: none"> - Image Filter - 3D post-processing MPR, MIP, MinIP, VRT - Data storage of images on CD / DVD with DICOM viewer (external CD/DVD burner required) - Export of cine AVI files on external media - Selectable centric elliptical phase reordering via the user interface - Inversion Recovery to nullify the signal of fat, fluid or any other tissue - Multiple Direction Diffusion Weighting (MDDW) - diffusion tensor imaging measurements can be done with multiple diffusion-weightings and up to 12 directions for generating data sets for diffusion tensor imaging. - WARP - 2D TSE sequence combining optimized high-bandwidth protocols and View Angle Tilting (VAT), tailored to reduce susceptibility artifacts caused by orthopedic MR-Conditional* implants. - Advanced WARP - 2D TSE based Slice Encoding for Metal Artifact Correction (SEMAC) technique for the reduction of through-plane distortions from large MR conditional* implants. - ID Gain for targeted denoising of spatially varying noise in TSE, SE and TSE_DIXON (for SW versions >= XB10A). - Deep Resolve Sharp for higher inplane resolution in TSE, SE and TSE_DIXON (for SW versions >= XB10A). <p>Standard techniques for Flow Artifact reductions</p> <ul style="list-style-type: none"> - LOTA (Long-Term 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 - GMR (Gradient Motion Rephasing). Sequences with additional bipolar gradient pulses, permitting effective reduction of flow artifacts <p>Standard Motion Correction</p> <ul style="list-style-type: none"> - 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 e.g. of the heart or liver - PSIR HeartFreeze (Phase-Sensitive Inversion Recovery) - Motion correction/averaging of multiple measurements with iPAT or tPAT accelerated single-shot TrueFISP or GRE images of the heart, for free-breathing acquisition <p>MAGNETOM Sola runs on syngo MR XA software that offers an acquisition workplace with a large 16:10 24" monitors, one keyboard and one mouse. The MR acquisition workplace provides environments for scheduling, scanning and basic quality assurance as well as viewing, basic and advanced post-processing, and data handling (Export, Import, Transfer, Record to media). The</p>

Item	Description
	<p>acquisition workplace can host one MR View&GO for viewing, basic postprocessing, and data distribution and up to three post-processing applications in parallel.</p> <p>For faster data transfer and reduced storage demand <i>syngo</i> MR XA uses the DICOM Enhanced MR Image format for its scanning result.</p> <p>Features like Online Help, DICOM MPPS autocomple, inline technologies, and scan@center additionally support the workflow.</p> <p>Patient Communication</p> <ul style="list-style-type: none"> - The intercom system includes an ergonomically designed patient communication unit for desktop positioning on the <i>syngo</i> Acquisition Workplace and pneumatic headphones for the patient. - 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. <p>Computer System</p> <p>The PC-based computer system uses the intuitive <i>syngo</i> MR user interface and allows the usage of up to 3 advanced <i>syngo</i>.via applications at the scanner workplace.</p> <p>High-performance host computer:</p> <ul style="list-style-type: none"> - Intel Xeon processor \geq E5-1650 (6 core) - Clock rate \geq 3.5 GHz - Main Memory (RAM) \geq 64 GB - SSD \geq 480GB - Electronic mouse - One high-resolution 24" color LCD flatscreen monitors with 1920 x 1200 pixel display, integrated gamma correction for optimum display of radiographic grayscale images and automatic backlight control for long-term brightness stability. <p>Installation</p> <ul style="list-style-type: none"> - The relatively light-weight design of MAGNETOM Sola eliminates in most cases the need for structural building reinforcements and also facilitates installation in upper floors. - The compact integrated design allows for short installation times and reduces the required space to less than 28 sqm (302 sq. ft.) for the entire installation. The minimum room height clearance is only 2.40 m (7' 10"). - MAGNETOM Sola allows siting of the system without a dedicated computer room - no additional cooling or floor requirements. - MAGNETOM Sola 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.

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2. **MR General Engine #BM**

Main functionalities of *syngo*.MR General Engine:

- MR Basic workflow with Easy Reading mode for easy, fast, and intuitive MR reading, based on single-click and drag&drop interactions:
 - single-click interaction to navigate through the series
 - intelligent layout adaptation to compare series together
 - single-click fusion between different contrasts
- MR Cardio-Vascular Workflows: Cardiac Reading, Angio Single Station, Angio Multi Station, Angio TimCT and Angio TWIST
- MR Evaluation tools: Subtraction, MeanCurve, Image Filter, 2D/3D Distortion Correction. ADC and b-value tool (for extrapolated b-values), Multiplication, Division, Addition, Elastic Motion Correction. Workflow optimized report templates.

Scope of delivery:

syngo.MR General Engine software package with MR Radiology workflows, MR Cardio-Vascular workflows and MR Evaluation for a workstation-based server.

3. **myExam Brain Assist**

myExam Brain Assist incorporates step-by-step user guidance which is seamlessly integrated into the exam. Example images and guidance texts are displayed for each individual step of the scanning workflow and are easily configurable by the user.

AutoAlign Head uses AI to provide automated positioning and alignment of slice groups to the anatomy, relying on multiple anatomical landmarks. This provides fast, easy, and reproducible patient scanning to consistently deliver high image quality with a standardized slice orientation.

AutoAlign Head can also automatically position and align for other structures within the head, such as the inner ear, orbits and optic nerve.

Inline Diffusion automatically calculates trace-weighted images and ADC maps in real time.

Item	Description
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4. **myExam Spine Assist**

myExam Spine Assist incorporates step-by-step user guidance which is seamlessly integrated into the exam. Example images and guidance texts are displayed throughout the scanning workflow and are easily configurable by the user.

AutoAlign Spine, with intervertebral disc detection, uses AI to provide automated positioning and alignment of slice groups to the anatomy, relying on multiple anatomical landmarks. This provides fast, easy, and reproducible patient scanning to consistently deliver high image quality with a standardized slice orientation.

Furthermore, it includes AutoCoverage, AutoSatPosition, as well as initial and interactive snapping. Users gain efficiency with AutoLabeling of vertebrae, automatic curved multiplanar reconstructions of 3D datasets and Inline Composing.

5. **myExam Large Joint Assist**

myExam Large Joint Assist incorporates step-by-step user guidance which is seamlessly integrated into the exam. Example images and guidance texts are displayed throughout the scanning workflow and are easily configurable by the user.

AutoAlign uses AI to automate the positioning and alignment of slice groups to the anatomy, relying on multiple anatomical landmarks. This provides fast, easy, and reproducible patient scanning by consistently delivering high image quality with a standardized slice orientation. AutoCoverage maximizes the speed of the examination by automatically setting the number of slices and the FoV to fully cover knee, hip or shoulder anatomy.

Inline Multi Planar Reconstruction (MPR) can be easily configured to automatically generate any required 2D images from high-resolution 3D acquisitions using the position information from the AutoAlign algorithm. For Knee and Hip, examinations using protocols with WARP to reduce artefacts caused by large orthopedic implants are included.

Item	Description
6.	<p>myExam Brain Autopilot</p> <p>myExam Brain Autopilot uses AutoAlign Head with AI to provide automated positioning and alignment of slice groups to the anatomy, relying on multiple anatomical landmarks. This provides fast, easy, and reproducible patient scanning and consistently delivers high image quality with standardized slice orientations.</p> <p>AutoAlign Head can also automatically position and align for other brain structures such as the inner ear, the orbits and the optic nerve. Automatic real-time calculation of trace-weighted images and ADC maps with Inline Diffusion Technology is performed on the fly.</p> <p>Users can switch to myExam Assist at any time to personalize the exam to the individual patient.</p>
7.	<p>myExam Knee Autopilot</p> <p>myExam Knee Autopilot uses AutoAlign with AI to provide automated positioning and alignment of slice groups to the anatomy, relying on multiple anatomical landmarks. This provides fast, easy, and reproducible patient scanning and consistently delivers high image quality with standardized slice orientations.</p> <p>Furthermore, it provides AutoCoverage for consistent coverage of the patient's anatomy by automatically setting the number of slices and the FoV to fully cover knee.</p> <p>Users can switch to myExam Assist at any time to further personalize the exam to the individual patient.</p>

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8. **Quiet Suite #T+D**

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. Within the TSE-sequence, the parameter "Echo-spacing" allows the user to further lower the gradient slew-rates. QuietX has also been enabled for susceptibility and diffusion-weighted imaging and these sequences are available with the SWI and Advanced Diffusion licenses (not available for MAGNETOM ESSENZA), respectively. 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.

9. **Tim Whole Body Suite #NX**

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).

Item	Description
10	<p>Tim Planning Suite #BM</p> <p>The dedicated Tim Planning Suite user interface has been optimized for these comprehensive measurement requirements. Set-n-Go protocols for entirely automated examinations in each body region in one work step are available. For example, for orthopedic, oncological or angiographic imaging.</p> <ul style="list-style-type: none">- Easy planning on a FoV of any desired size (up to 205 cm, depending on system scan range).- Planning of multiple steps simultaneously, e.g. on a whole-body image, with only one Set-n-Go protocol - which includes several steps.- Tim Planning Suite UI: Dedicated user interface and exclusive tools for effective and smooth working on a large FoV.- Multiple slice groups with their overlap are displayed together and can be easily arranged.- All steps can have independent sets of parameters.- All steps are displayed together with a single mouse click.- Easy positioning of all steps, for example, through Align FoV.- Full support of Phoenix, thus maximum reproducibility, for example, for follow-up studies, multi-centric studies or exchange of experiences across different institutions.- Dedicated protocols are provided for the Tim Planning Suite, for example, for orthopedic, oncological or angiographic indications.- It is highly recommendable to order application training!
11	<p>syngo TimCT FastView #BM</p>

Item	Description
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12	<p>Advanced Diffusion #NX</p> <p>RESOLVE is a diffusion-weighted, readout-segmented EPI sequence optimized towards high-resolution imaging with reduced distortions.</p> <p>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 (SEEt sequence for prostate DWI), brain and spine with a high level of detail and spatial precision.</p> <p>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.</p> <p>QuietX DWI protocols for the brain utilize 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. All features and contrasts of DWI remain available, delivering image quality comparable to a conventional single shot diffusion sequence, while providing at least 70% sound pressure reduction for increased patient comfort.</p>
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13	<p>WARP & Advanced WARP</p> <p>2D TSE sequence combining optimized high-bandwidth protocols and View Angle Tilting (VAT) technique helps in evaluation of soft tissue in proximity of the implant. SEMAC (Slice Encoding for Metal Artifact Correction) is a technique to correct through-plane distortions by means of additional phase encoding in slice direction. It is especially useful in the case of hip and knee joint replacements.</p> <p>WARP and Advanced WARP help in evaluation of soft tissue in proximity of the implant. Available protocols include T1-weighted, T2-weighted, proton density and STIR contrast.</p> <p>Main Features:</p> <ul style="list-style-type: none"> - Can be switched on in the standard TSE sequences - For each slice, additional phase encoding is performed to better characterize the distortion - Distorted signals are corrected by dedicated inline processing
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Item	Description
14	<p>Advanced Cardiac incl. PSIR #BM</p> <p>Combining the unique advantages of Tim and BEAT with iPAT and powerful gradients, it allows performing cardiac MR examinations without compromise in image resolution or acquisition speed.</p> <p>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.</p> <p>BEAT automatically adjusts all parameters associated with the changes.</p> <p>Cardiac and Vessel Morphology</p> <ul style="list-style-type: none"> - 3D aortopathy imaging with free breathing (SPACE) <p>Global or Regional Wall Motion Analysis with BEAT</p> <ul style="list-style-type: none"> - 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) <p>Dynamic myocardial imaging with BEAT</p> <ul style="list-style-type: none"> - Ultra-fast, high-SNR sequence for dynamic imaging with GRE EPI contrast for stress and rest exams <p>Tissue characterization with BEAT</p> <ul style="list-style-type: none"> - Robust myocardial tissue characterization with 3D PSIR (phase-sensitive inversion recovery) - Fast and complete coverage of the myocardium with IR 3D FLASH and TrueFISP - Including PSIR HeartFreeze (motion correction) for free-breathing measurements <p>Coronary imaging with BEAT</p> <ul style="list-style-type: none"> - 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)

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15	<p>Inline Composing syngo</p>
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	<p>Inline Technology - Processing Instead of Post-processing</p>
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	<p>The Inline Composing option includes the following functions:</p>
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| | <ul style="list-style-type: none"> - Inline calculation of full-format images of the spine, the central nervous system or the vessel tree, for example, combined from multiple overlapping steps. - Dedicated composing algorithms, optimized for the generation of anatomical or angiographic full-format images. - Data sets with different FoV, resolution, matrix and slice thickness can be combined. - Generation of full-format images from inline-computed MIPs. |
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	<p>Different inline functions can be combined; e.g. in case of multiple-step angios, Inline subtraction, Inline MIP and Inline Composing can be performed fully automatically.</p>
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	<p>Full-format acquisitions from Inline Composing are ideal for further measurement planning on large FoV, e.g. with the Tim Planning Suite.</p>
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16	<p>syngo Expert-i XA50/XA51</p>
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	<p>The option is integrated in the <i>syngo</i> user interface thus enables easy access to the user interface of the <i>syngo</i> Acquisition Workplace for planning and processing support purposes.</p>
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	<p>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.</p>
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	<p>The client software can be operated on any commercial PC with the following specification:</p>
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| | <ul style="list-style-type: none"> - Operating system: Windows 7/8.1/10 - .NET Framework version 4.5 or higher |
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Item	Description
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17 **Tim [204x48] XJ Gradient #So****Tim [204x48] performance level**

BioMatrix builds on DirectRF - The 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 innovative architecture packs more coil elements in a smaller space and the system provides a maximum number of 204 channels (coil elements) that can be connected simultaneously. Advanced iPAT capabilities and SNR are enabled by the 48 independent RF channels that can be used simultaneously in one single scan and in one single FOV, each generating an independent partial image.

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.

XJ gradients

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

The XJ gradients have:

- Max. amplitude: 57 mT/m (Actual 33 mT/m for every gradient axis)
- Max. slew rate: 216 T/m/s (Actual 125 T/m/s for every gradient axis)
- Min. rise time from 0 to 57 mT/m: 264 μ s
- Note: max. amplitude and max. slew rate achieved through vector addition of all three gradient axes simultaneously, actual maximum amplitude of 33 mT/m and actual maximum slew rate of 125 T/m/s are achievable simultaneously along each axis.
- Maximum output voltage for each of the gradient axes 2000 V
- Maximum output current for each of the gradient axes 625 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 ultrashort 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 50 cm in z direction) for optimal coverage and highest spatial resolution in diagnostic imaging. 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.

Computer system

The specifications of the high-performance measurement and reconstruction computer can be found within the data sheet.

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.

Item	Description
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18 **Coil Package Tim [204x48] #50**

Tim 4G & BioMatrix Coils

The coils in the standard coil package combine the new BioMatrix functionalities CoilShim and Respiratory Sensor with the Tim 4G coil technology with Dual-Density Signal Transfer, DirectConnect and SlideConnect technology. The results are key imaging benefits: Excellent image quality, high patient comfort, and unmatched flexibility.

The Tim 4G & BioMatrix coils are designed for highest image quality combined with easy handling. BioMatrix's CoilShim helps to reduce patient induced localized B0 inhomogeneities.

Respiratory sensors, embedded in the BioMatrix Spine 32, detect the breathing pattern of the patient as soon as he/she is on the table. The high coil element density 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 weight coils with an open design ensure highest patient comfort resulting in better patient cooperation and image quality. No coil changing with multi-exam studies saves patient setup- and table time.

AutoCoilSelect for dynamic, automatic, or interactive selection of the coil elements within the Field of View fastens 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.

BioMatrix Head/Neck 20 tiltable with CoilShim

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/Neck 20 without cables. The possibility to tilt the coil in 3 different positions together with 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 integrated CoilShim is located in the lower coil part which may remain on the table for most of the examinations and can be used without the upper part. The BioMatrix Head/Neck 20 and BioMatrix 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 BioMatrix Head/Neck 20 coil is equipped with two removable cushioned head stabilizers for stable and comfortable patient positioning.

The BioMatrix 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 BioMatrix Spine 32 and Body 18 but also other combinations e.g. with flexible coils like the Flex Large 4 are possible.

Whole-body set ups from Head to Toe are possible with the combination of BioMatrix Head/Neck 20, BioMatrix Spine 32, Body 18 coils, and Peripheral Angio 36 in one MR examination.

BioMatrix Spine 32 with Respiratory Sensors

The 32-channel coil with its 32 integrated pre-amplifiers ensures maximum signal-to-noise ratio. The unique integrated BioMatrix Respiratory Sensors measure the

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patient's respiratory signal in head-first and feet-first position. The DirectConnect technology allows connecting the 32 coil elements of the BioMatrix 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 iPAT compatible in all directions.

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

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

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 BioMatrix Spine 32 resulting in a 30 channel body imaging setup.

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

The Body 18 is typically used in combination with the BioMatrix 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 the perfect combinability of the BioMatrix Spine 32, further Body 18 Coils (optional), the Peripheral Angio 36 (optional), but also the BioMatrix Head/Neck 20 and all flexible coils (e.g. Flex Large 4, Flex Small 4, UltraFlex Large 18 (optional) or UltraFlex Small 18 (optional) a broad range of indications up to whole-body imaging are covered.

Flex Large 4/ Flex Small 4

Light-weight, 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.

Item	Description
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19	<p>BioMatrix Technology</p> <p>BioMatrix Sensors anticipate challenges before they happen. Respiratory sensors are integrated in the BioMatrix Spine coils and measure the patient's respiratory signal in head-first and feet-first position. The sensor loops measure the change in impedance resulting from the shift of the tissue and organs during the inhaled and exhaled phase of the patient's respiration as soon as the patient is lying on the table.</p> <p>BioMatrix Tuners – adapt to all patients, even critical ones. The BioMatrix Tuners are CoilShim and SliceAdjust. BioMatrix's CoilShim helps to reduce patient induced strongly localized B0 inhomogeneities by generating the respective anatomy-specific B0 field with 4 independent shim channels built into the system. Calculation and fine-tuning of local CoilShim currents integrated into global shim algorithm. BioMatrix Head/Neck 20 tiltable with CoilShim and the Head/Neck 64 with CoilShim have local shim elements integrated into the posterior part, addressing patient induced B0 distortions in the neck region. BioMatrix SliceAdjust enables precise slice-by-slice tuning of resonance frequency, transmitter voltage, and first order B0-shim and B1-shim. For whole-body diffusion, the SliceAdjust technology helps to avoid station boundaries and apparent broken spine artifacts as well as to preserve the SNR for whole-body diffusion.</p> <p>BioMatrix Interfaces – accelerate workflow without compromising quality of care The BioMatrix body model, leveraged by the Select&GO panel on the front of the system, is able to derive the precise location of the organs based on the patient's individual characteristics. With a single touch, the technologist can quickly position the body part of interest at the isocenter and start the examination. To simplify and speed up patient transportation, the BioMatrix table with eDrive (optional) and AutoDocking (optional) functionalities is motorized, making patient management easy in all situations: no matter their size or strength, all technologists can handle all patients. By facilitating patient transport and accelerating patient positioning using individual characteristics, the BioMatrix Interfaces accelerate the complete workflow without compromising image quality.</p>
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Item	Description
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20 **BioMatrix Respiratory Sensors**

Respiratory sensors are integrated in the BioMatrix Spine coils and measure the patient's breathing cycle in head-first and feet-first orientation. The sensor loops measure the change in impedance resulting from the shift of the patient's tissue and organs during the inhalation and exhalation phase of the breathing cycle. They do not require preparation and are active as soon as the patient is lying down on the coil.

21 **BioMatrix Table #So**

The new BioMatrix table with its 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 BioMatrix 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 Tim 4G and BioMatrix coils can be connected at the same time for efficient and patient friendly examinations. The seamless integration of multiple Tim 4G and BioMatrix 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.

Item	Description
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22	Green Technology Package
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23	BioMatrix Coil Shim #Vi,So,Ci
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BioMatrix CoilShim helps to reduce patient induced strongly localized B0 inhomogeneities by generating the respective anatomy-specific B0 field with 4 independent shim channels built into the system. Calculation and fine-tuning of local CoilShim currents is integrated into the global shim algorithm.

Item	Description
24	<p data-bbox="316 293 671 315">BioMatrix Select & GO #Vi,So,Ci</p> <p data-bbox="316 324 1394 488">The two BioMatrix Select&GO interface enables fast and easy single-touch patient positioning from both sides of the patient table. The interfaces are integrated left and right into the front covers. Correct positioning saves unnecessary wasted time for repositioning and additional adjustments, therefore shortening the total room time.</p> <ul data-bbox="316 497 1394 987" style="list-style-type: none"> <li data-bbox="316 497 1394 622">- The ergonomically designed Select&GO touch panels are integrated into the front cover on each side of the patient tunnel for controlling table movement, guidance for patient setup and comfort features. They are well illuminated for easy visual recognition. <li data-bbox="316 631 1394 689">- Automated table move to upmost position, to center position or Home position facilitate smooth patient preparation and will reduce table time <li data-bbox="316 698 1394 898">- Variable (6 levels) ventilation and lighting inside the magnet bore or volume adjustments are possible for increased patient comfort The Select&GO touch panels provide 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. <li data-bbox="316 907 1394 987">- Almost all table control functions, including ventilation and illumination of the magnet bore, can be also controlled from the operator console for convenient operation
25	<p data-bbox="316 1128 612 1151">BioMatrix SliceAdjust #BM</p> <p data-bbox="316 1160 1362 1319">BioMatrix SliceAdjust enables precise slice-by-slice tuning of resonance frequency, transmitter voltage, and first order B0-shim and B1-shim. For whole-body diffusion, the SliceAdjust technology helps to avoid station boundaries and apparent broken spine artifacts as well as to preserve the SNR for whole-body diffusion.</p>

Item	Description
26	<p>Silver & White Design #So</p> <p>The unique color and material selection enhances the visual appeal of the new system design, thereby creating an enticing, patient friendly impression. The unique Select&GO panels are neatly integrated into the front design ring. The aesthetically pleasing and ergonomically designed control elements are well illuminated for easy visual recognition.</p> <p>In particular, the table cover and the smoothly embracing colored system cover parts have been designed to promote a modern visual appearance.</p> <p>This combination of ingenuity and practical design as presented with the “Silver & White” design with its brilliant white and silver makes MAGNETOM Sola an overall visually appealing system and creates a patient-friendly environment.</p>
27	<p>PC Keyboard US English #NX</p> <p>The keys of the numerical key panel are assigned to <i>syngo</i>-specific functions and labeled with the corresponding <i>syngo</i> icons. The keyboard supports the country specific special characters.</p>

Item	Description
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28	High-End Computing [204x48] #So
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The high-end computing option brings high-end image reconstruction performance to the MAGNETOM Sola/ Sola Fit Tim [204x48]. The high-end image reconstruction computer offers faster processing power for intensive algorithms, high amount of data storage for large data sets acquired over long-term measurements, a large amount of main memory for fast processing of measurement data, and a general purpose graphic processing unit for highly intensive computational calculations.

The specifications of the high-end image reconstruction computer can be found within the data sheet.

29	Advanced Host Computer #NX
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The Advanced Host Computer offers increased computing power and increased memory for supporting an external *syngo* MR Workplace (optional) and/or to give a performance boost to applications that generate and process large data sets acquired over longer-term measurements (e.g. BOLD imaging, fMRI post-processing).

The Advanced Host Computer has the following specifications:

≥ 1x Octa-Core Xeon™, 3.7 GHz

≥ 96 GB RAM

≥ 480 GB SSD system hard disk

one Card Reader

Item	Description
30	Peripheral Pulse Unit #NX Peripheral Pulse Unit for Pulse Triggering: <ul style="list-style-type: none">- Reduces flow artifacts caused by pulsatile blood flow.- Excellent image quality by synchronizing data acquisition to the pulsatile blood flow.
31	Patient Video Monitoring Special video camera for monitoring the patient during an MR examination. Color 640 x 480 pixel LCD monitor may be positioned at the <i>syngo</i> Acquisition Workplace or at a convenient wall location (wall support not included in scope of delivery) in the control room.

Item	Description
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32	<p>SW syngo MR XA51A</p> <p><i>syngo</i> MR XA51A provides environments for: scheduling; scanning and basic quality assurance as well as viewing; basic and advanced post-processing; and data handling (Export, Import, Transfer, Record to media). For faster data transfer and reduced storage demand <i>syngo</i> MR XA51A uses the DICOM Enhanced MR Image format for its scanning result. Features like Online Help, DICOM MPPS autocomplete and inline technologies additionally support the workflow.</p> <p>For scanning, myExam Companion provides tailored assistance enabling consistent image quality regardless of the operator's experience:</p> <ul style="list-style-type: none"> - myExam Autopilot helps users to automate intelligently. It enables less trained staff to scan with just a few simple clicks. By using automation and AI, it takes away burdensome routine tasks for all technologists. - myExam Assist provides guided and flexible workflows. Optimized scan strategies are provided and can be selected or flexibly adapted based on the patient's condition. - myExam Cockpit provides a central workspace for protocol management and customization. Users can set up and maintain protocols intuitively, build knowledge into standardized exams and make those continuously available for every user.
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33	<p>Neuro Perfusion Package</p> <p>Neuro Perfusion Package provides a modified sequence and image reconstruction for motion correction and post-processing in dynamic susceptibility contrast (DSC) based perfusion imaging.</p> <p>Depending on whether motion correction is switched on, the following uncorrected or motion corrected perfusion maps can be calculated: time-to-peak (TTP), relative cerebral blood volume (relCBV), relative cerebral blood flow (relCBF), relative mean transit time (MTT), relative corrected cerebral blood volume (relCCBV) and bolus plots.</p> <p>Perfusion parameter maps are calculated based on a Local Arterial Input Function. The algorithm selects many AIFs per slice and volume based on a number of built-in criteria. This removes the need for manual selection of AIF voxels to calculate the cerebral perfusion parameters and allows the calculation to be performed in-line at the end of the measurement. It also minimizes deconvolution errors due to the effects of delay and dispersion of the contrast agent bolus. Additionally, in cases of contrast extravasations due to a disrupted blood-brain barrier, the postprocessing allows a correction to be applied during calculation of the relCBV maps.</p>
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Item	Description
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34	CS SPACE #NX
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35	Neuro fMRI/DTI Package #NX
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Diffusion Tensor Imaging

Diffusion Tensor Imaging provides a Single Shot EPI sequence for measuring diffusion-weighted data sets with up to 256 directions of diffusion weighting. Based on these data sets, the diffusion tensor itself and parametric maps derived from it (e.g. fractional anisotropy) are calculated automatically and in real-time. The package supports both clinical applications regarding diseases of the white matter (e.g. multiple sclerosis, brain maturation disorders, or displacement of nerve fiber tracts through masses) and advanced research applications. Diffusion spectrum imaging (DSI), an extension of diffusion tensor imaging, is included in this package. DSI expands on the DTI acquisition capabilities by providing the ability to resolve white matter fiber crossings.

syngo.MR Tractography

syngo.MR Tractography enables the representation of diffusion paths of the human brain based on diffusion tensor imaging. syngo.MR Tractography supports surgery planning and is suitable for neurophysiological research in relation to cortical networking and pathologies of the white matter.

Inline BOLD Imaging

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

Item	Description
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neurosurgical interventions.

3D PACE *syngo*

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.

syngo.MR Neuro fMRI

syngo.MR Neuro fMRI is a workflow oriented visualization package for BOLD fMRI. It enables the visualization of task-related areas of activation overlaid onto 2D or 3D anatomical datasets, providing the spatial correspondence of BOLD results with cortical landmarks or brain lesions. Image-based registration and multi-contrast evaluation are also available.

Functional and anatomical image data can be exported for surgical planning as DICOM datasets.

36 Spectroscopy Package #NX

Single-Voxel Spectroscopy

Integrated software package including sequences and protocols for proton spectroscopy to examine metabolic changes. Includes optimizations for brain tissue and for the breast (GRACE).

In order to obtain best spectral quality in the breast, it is recommended to use one of the following breast coils: Breast 18, Breast BI 7, (2-/4-/8-Channel or (2-/10-/16-Channel Sentinelle Breast coil.

2D Chemical Shift Imaging

The 2D Chemical Shift Imaging option is used to measure 2D 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 8 minutes.

The package comprises:

- 2D hybrid CSI measurement with Spin Echo and STEAM techniques
- Echo times 30-1500 msec for Spin Echo and 20-300 msec for STEAM
- Repetition times 0.5-10 sec.
- Voxel size down to a minimum of 1,7x1,7x5 mm³ for Spin Echo and 2,5x2,5x5 mm³ for STEAM in the three spatial directions
- Field of View down to a minimum of 55 mm for Spin Echo and 80 mm for STEAM, matrix size between 8x8 and 32x32 voxels
- Slices can be freely angulated
- Fully automatic adjustments including localized 3D volume shimming for

Item	Description
	<p>optimized homogeneity of the large volumes with 2D Hybrid CSI</p> <ul style="list-style-type: none"> - All adjustments can still be performed manually with real-time guidance (as i.e. interactive shimming). - Optimized B1-insensitive and T1-insensitive water suppression with variable suppression bandwidth - Optimized protocols for CSI brain examinations - Quality control using an FID technique - Fully excited Vol (Volume of Interest) - Outer Volume Suppression (OVS) - Spectral Suppression

3D Chemical Shift Imaging

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 package comprises:

- 3D hybrid CSI measurement with Spin Echo and STEAM techniques
- Echo times 30-1500 msec for Spin Echo and 20-300 msec for STEAM
- Repetition times 0.5-10 sec.
- Voxel size down to a minimum of 1,7x1,7x3,4mm³ for Spin Echo and 2,5x2,5x5 mm³ for STEAM in the three spatial directions
- Field of View down to a minimum of 55 mm for Spin Echo and 80 mm for STEAM, matrix size between 8x8x8 and 32x32x16 voxels
- Volumes can be freely angulated
- Fully automatic adjustments including localized 3D volume shimming for optimized homogeneity of the large volumes with 3D Hybrid CSI
- All adjustments can still be performed manually with real-time guidance (as i.e. interactive shimming).
- Optimized B1-insensitive and T1-insensitive water suppression with variable suppression bandwidth
- Quality control using an FID technique
- Fully excited Vol (Volume of Interest) within the partitions
- Outer Volume Suppression (OVS)
- Spectral Suppression

syngo.MR Spectro Engine

syngo.MR Spectro SVS provides evaluation of proton MR Single Voxel Spectroscopy (SVS) data with comprehensive workflow guidance.

syngo.MR Spectro SVS includes the possibility of an integrated reading of MR images and spectroscopy data for breast exams.

syngo.MR Spectro CSI provides evaluation of proton MR Chemical Shift Imaging (CSI) data with comprehensive workflow guidance.

syngo.MR Spectro CSI includes the possibility of an integrated reading of MR images and spectroscopy data for prostate exams.

syngo.MR Spectro Extension provides comprehensive evaluation of proton MR spectroscopy data with workflow guidance.

Item	Description
	<p>Both Single Voxel Spectroscopy (SVS) and Chemical Shift Imaging (CSI) data are supported.</p> <p><i>syngo</i>.MR Spectro Research offers workflow and data processing solutions for research customers, such as export of raw data, quantification of multi nuclear data and expert curve value etc. It extends the clinical routine package (<i>syngo</i>.MR Spectroscopy) with additional features to fulfil the needs of research customers.</p> <p>Scope of delivery:</p> <p>1 x <i>syngo</i>.MR Spectro Engine software package with</p> <ul style="list-style-type: none"> - Single Voxel Spectroscopy - Chemical Shift Imaging - Spectroscopy Extension - Spectro Research
37 MapIt syngo #Tim	<p>Features:</p> <ul style="list-style-type: none"> - 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 <p>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.</p> <p>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 “<i>syngo</i> Image Fusion”</p>

Item	Description
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38 **NATIVE syngo**

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
- *syngo* NATIVE SPACE

39 **Turbo Suite Essential**

Turbo Suite Essential contains:

- iPAT and iPAT² parallel imaging capabilities for all contrasts, orientations and body regions
- T-PAT (temporal iPAT) for advanced parallel imaging provides fast high-resolution dynamic imaging in cardiac exams by distributing reference scans over time
- CAIPIRINHA for advanced iPAT² is a unique k-space reordering scheme that improves the g-factor significantly and therefore improves the SNR, which can be translated into higher imaging speed.
- CAIPIRINHA SPACE – high-resolution, fast 3D imaging with isotropic, sub-millimeter resolution, all contrasts. Protocols optimized for joints are provided.
- CAIPIRINHA VIBE – T1 weighted 3D imaging for high-resolution imaging throughout the body and significantly shortened breath-hold scans.

Item	Description
40	<p>FREEZEit+ Package</p> <p>Main Features:</p> <p>TWIST is a sequence for time-resolved (4D) angiographic imaging with high spatial and temporal resolution, in particular for angiography. For fat suppression, water-selective excitation is used.</p> <p>TWIST-VIBE is a VIBE sequence with CAIPIRINHA capability providing high spatial resolution. The view-sharing mode provides temporal information to ensure the right contrast timing for different lesions. Dixon is used for fat-water separation.</p> <p>StarVIBE allows body imaging in free breathing mode, providing a solution for patients without breath-hold capabilities.</p>
41	<p>Arterial Spin Labeling 3D</p> <p>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.</p> <p>Starting with syngo MR XA31, following additional features are included:</p> <ul style="list-style-type: none">- relCBF maps calculation for relative assessment of the cerebral bold flow- Support of multi-T1 measurements- Measurement of bolus arrival time maps (BAT maps) for visualization of the inflow

Item	Description
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42	<p>PCASL #NX</p>
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<p>Blood labeling technique Pseudo Continuous Arterial Spin Labeling (PCASL), providing high signal to noise contrast and high contrast uniformity.</p>

43	<p>Deep Resolve Pro Package</p>
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<p>With the Deep Resolve Pro Package you get access to our advanced image reconstruction environment which features deep learning methods.</p>
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Deep Resolve Gain uses a targeted algorithm to detect and remove noise in the image. Noise detection and removal is performed optimized for the individual scan thus addressing spatially varying noise of the specific acquisition. The method allows to gain SNR which can be turned into either improved resolution or into higher productivity, e.g. by reducing the number of averages or by increasing the acceleration factor of the scan. Deep Resolve Gain can be combined with standard GRAPPA and SMS acceleration and is available for following sequences:

- TSE, TSE DIXON, SE

Deep Resolve Boost is a deep learning reconstruction algorithm, which has been trained on a large amount of data sets to reconstruct high signal to noise ratio images from under-sampled raw data. The network has been optimized to work on highly accelerated scans, thus enabling fast acquisitions. It can be seamlessly applied to data acquired from head-to-toe with different contrast weightings and orientations. Deep Resolve Boost shows highest potential when combined with GRAPPA and SMS acceleration and is available for following sequences:

- TSE

Deep Resolve Sharp is a deep neural network, which has been trained on a large amount of high-resolution MR data to reconstruct sharp images from low resolution data. The reconstruction algorithm also reduces the Gibbs ringing which is present around edges. Consistency with the acquired raw data is

Item	Description
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ensured in the reconstruction process. It can be seamlessly applied to data acquired with different contrast weightings and orientations. Deep Resolve Sharp offers up to a factor of two in in-plane resolution. Deep Resolve Sharp can be combined with Deep Resolve Gain or Deep Resolve Boost and is available for following sequences:

- TSE, TSE DIXON, SE

This package requires the option "High-End Computing".

44 SWI #Tim

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.

Item	Description
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45 **Tx/Rx Knee 18 #1.5T**

Thanks to its 18-channel design this coil is perfectly suited for high-resolution images with excellent SNR. With the arrangement of the antennas in three rings of 6 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).

The housing of this coil has a flared opening towards the patient's thigh, as well as an easy coil sliding and opening mechanism.

46 **Positioning Aids Shoulder&Ankle #NX**

This package contains a wedge shaped cushion that can be used together with the UltraFlex Large 18 or UltraFlex Small 18, e.g. for shoulder imaging and an L-shaped holder that can be used together with the coil holder of the UltraFlex Small 18 or UltraFlex Large 18 for ankle imaging to achieve a 90° angle of the patient's ankle.

Item	Description
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47 **Flex -> UltraFlex Upgrade #1.5T**

This option exchanges the Flex Small & Large 4 coils incl. the Flex Coil Interface from the standard coil configuration for the superior UltraFlex Small & Large 18.

UltraFlex Large 18

The UltraFlex Large 18 can be wrapped around or placed flat on top of the area of interest. This rectangular coil measures approx. 29 cm x 59 cm and connects with only one SlideConnect plug which allows for fast and easy patient preparation. The positioning aids that come with the coil enhance positioning flexibility and help minimize involuntary patient motion artifacts.

UltraFlex Small 18

The UltraFlex Small 18 can be wrapped around or placed flat on top of the area of interest. This rectangular coil measures approx. 19 cm x 41 cm and connects with only one SlideConnect plug which allows for fast and easy patient preparation. The positioning aids that come with the coil enhance positioning flexibility and help minimize involuntary patient motion artifacts.

48 **syngo MR Workplace #NX**

syngo MR Workplace is a client-server-based computer system and includes:

- Second console on site at *syngo* MR Workplace
- High-resolution color LCD widescreen monitor

The new *syngo* MR software includes the following functions of relevance to *syngo* MR Workplace:

- Parallel working on the same patient at the Acquisition Workplace and at the MR Workplace so that a colleague can begin postprocessing while the scan is still being performed.
- All display and postprocessing functions of the Acquisition Workplace are also available at the MR Workplace.
- For basic and extended postprocessing, up to four MR View&GO or postprocessing applications can be run simultaneously at each workplace.
- The basic postprocessing functions of the MR General Engine are included as standard in the offer and can be used simultaneously at the Acquisition Workplace and the MR Workplace.
- Any extended postprocessing applications over and above these must be purchased only once as a #MR license. They are then available as a floating license at either the Acquisition or the MR Workplace.
- If simultaneous use at the Acquisition Workplace and the MR Workplace is required, the corresponding #MR+ license must also be ordered.
- Data management (DICOM - export, import, transfer, storage on data media)

Item	Description
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49 **Shoulder Shape 16 #1.5T**

The iPAT compatible Shoulder Shape 16 is ergonomically designed and adapted to the shape of the shoulder.

The flexibility in size obtains maximum image quality for different body sizes. The opening of the coil can be adjusted between 16 cm - 27 cm to cover small, medium and large shoulders.

The coil can be used either for left or right shoulders. It features an L-shaped cushion than can easily be placed for comfortable positioning. The coil excels in highest resolution imaging with exceptional signal-to-noise ratio.

50 **Foot/Ankle 16 #1.5T**

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.

Item	Description
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51	PC Keyboard US English #NX
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	The keys of the numerical key panel are assigned to <i>syngo</i> -specific functions and labeled with the corresponding <i>syngo</i> icons. The keyboard supports the country specific special characters.
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52	Patient Education Toolkit
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Item	Description
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53	Sanitary Installation Pack. #Tim
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54	Eco Chiller 60kW Chiller KKT ECO 133 - L
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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:

Item	Description
	<ul style="list-style-type: none">- Interface function between the KKT chiller and the MR cabinet.- Water supply for MREF, MBB, CBB and TX box. <p>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.</p> <p>Dimensions: 800 mm x 1150 mm x 210 mm (height x width x depth). Weight: 67 kg</p>

55 Handheld Metal Detector