MAGNETOM Sola

Tim [204x48] XQ Gradients

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SIEMENS Healthineers

Preliminary Edition - 03/2018

Magnet System

General		
Superconducting Magnet	Short bore, patient-friendly design, high homogeneity 1.5 Tesla with 70 cm Open Bore design	
	Easy siting due to AS (Active Shielding) and E.I.S. (External Interference Shielding) magnet technology	
Magnet Parameters		
Operating field strength	1.5 Tesla	
Magnet type	Superconductor	
Field stability over time	< 0.1 ppm/h	
Weight (with cryogens)	2700 kg	
Magnet length	1.45 m	
Open Bore design[1)]	70 cm	
System length cover to cover	1.57 m	
Homogeneity (based on highly accurate 24 plane plot)		
10 cm DSV	Guaranteed	0.006 ppm
	Typical	0.004 ppm
20 cm DSV	Guaranteed	0.05 ppm
	Typical	0.03 ppm
30 cm DSV	Guaranteed	0.20 ppm
	Typical	0.11 ppm
40 cm DSV	Guaranteed	0.75 ppm
	Typical	0.65 ppm
50 cm DSV	Typical	5.5 ppm
50 × 50 × 45 cm³ DEV	Guaranteed	3.0 ppm
	Typical	2.8 ppm

In compliance with the German "Qualifikationsvereinbarung".
Standard deviation Vrms (volume root-mean square) measured with highly accurate 24 plane plot method (20 points per plane).
Standart active shim with 3 linear channels.
DSV = Diameter spherical volume; DEV = Diameter elliptical volume (x, y, and z directions).

[1)] Incl. shim coils, gradient coil, RF body coil

Magnet System

Shimming		
Both: passive and active shimming. Passive shimming during installation		
Standard active shim with 3 linear channels (1st order) and 5 non linear channels (2nd order)		
3D Shim	Patient-specific automated shim	
	Time to shim	Approx. 15 s
Shielding		
Active Shielding (AS)	5th generation active shielding (AS) technology with counter coils	
Fringe field (axial × radial)	0.5 mT[1)]	4.00 × 2.50 m
	0.1 mT	5.8 × 3.4 m
External Interference Shield (E.I.S.)	Patented shielding system integrated into the magnet	
	Continuous compensation and automatic suppression of external magnetic field interferences during measurement (caused by moving ferromagnetic objects or nearby power lines)	
Magnet Cooling System		
Zero Helium boil-off technology		
Refill interval (typical)[2)]	Not applicable	
Boil-off rate (typical)[2)]	0.0 liter/year	

[1)] Pacemaker safety limit
[2)] For typical clinical use, depending on pulse sequences and operating time with running helium compressor. The system needs to be serviced at regular interval. Undisturbed magnet cooling for 24 hours and 7 days a week.

XQ Gradients

General Features

- Actively shielded (AS) whole-body gradient coil system
- Extremely low eddy currents
- Water-cooled coil and amplifier for maximum performance
- All axes force compensated

Gradient Performance for Each Axis

Max. amplitude	45 mT/m
Min. rise time	225 µs
Max. slew rate	200 T/m/s

Vector Gradient Performance (vector addition of all 3 gradient axes)

Max. eff. amplitude	78 mT/m
Max. eff. slew rate	346 T/m/s
Gradient duty cycle	100%

Resolution Parameters

Min. FoV	5 mm
Max. FoV[1)]	500 mm
Slice thickness 2D	min. 0.1 mm, max. 200 mm
Partition thickness 3D	min. 0.05 mm, max. 20 mm
Slab thickness 3D	min. 5 mm, max. 500 mm
Max. matrix	1024
Highest in-plane resolution	12 µm

[1)] Depending on the application, the maximum FoV in the z-direction can be up to 50 cm

XQ Gradients

Power Consumption[1]	
System Off	4.3 kW
System ready to measure[1]	8.7 kW
Scan[1]	22.7 kW

Gradient Amplifier	
Water-cooled, highly compact, modular design	
Ultra-fast solid-state technology with very low switching losses	
Max. output voltage[2]	2250 V
Max. output current[2]	900 A
Max. power[2]	2.025 MVA

Power Requirements	
Line Voltage	380V, 400V, 420V, 440V, 460V, 480V
Stability tolerance	± 10 %
Line frequency	50/60 Hz, ± 1Hz
Connection Value	88 kVA

Cooling	
Two different customer specific cooling alternatives (Separator or Eco Chiller) available	
Eco Chiller option with automatic adaptation to the required cooling demands (e.g. different night/day mode) to decrease energy cost	
GREEN Cooling Package[3]: The Free Cooling Unit reduces energy consumption by up to 39%. It automatically starts if the surrounding temperature is 18°C (64°F) or less and reduces the chiller energy consumption. If the temperature is less than –10 °C (14°F), the chiller is switched off[4].	

Cooling with seperator	
Water consumption	100 l/min +/- 10 l/min[5]
Heat dissipation to water	60 kW

[1] All values are typical values, applicable for 400V/50Hz.
The power consumption measurement is based on the COCIR methodology – MRI – Measurement of energy consumption.
Many variables impact power consumption, thus there can be no guarantee that each customer will achieve the same values.
[2] Values for each of the 3 gradient axes
[3] Optional: based on climatic dates of Munich; data on file; results may vary
[4] In case of clinical routine measurement conditions
[5] Water temperature 6°-14°C; allowed delta T: +/- 2K with max. 1K/30s

XQ Gradients

Sequences:				
		Matrix		
		64	128	256
Spin Echo	min. TR [ms]	5	5	5.5
	min. TE [ms]	1.5	1.5	1.8
Inversion Recovery	min. TR [ms]	26	26	26
	min. TE [ms]	1.5	1.5	1.8
	min. TI [ms]	21	21	21
2D GRE	min. TR [ms]	0.59	0.7	0.97
	min. TE [ms]	0.22	0.22	0.22
3D GRE	min. TR [ms]	0.59	0.7	0.97
	min. TE [ms]	0.22	0.22	0.22
TrueFISP	min. TR [ms]	1.66	1.81	2.28
	min. TE [ms]	0.76	0.77	0.98
TSE (HASTE)	min. Echo Spacing [ms]	1.54	1.54	1.84
	min. TR [ms]	5	5	5.5
	min. TE [ms]	1.5	1.5	1.8
	max. Turbo Factor = 512			
Turbo GSE	min. Echo Spacing [ms]	0.78	0.82	0.86
	min. TR [ms]	5.7	6.3	6.4
	min. TE [ms]	3	3.5	3.5
	max. Turbo Factor = 65			
	max. EPI Factor = 21			
EPI (single-shot and multi-shot)	min. Echo Spacing [ms]	0.28	0.49	0.66
	min. TR [ms]	10	10	10
	min. TE [ms]	2.1	2.3	2.7
	min. Measurement time	11	17	26
	max. EPI Factor = 256			
Diffusion Imaging	Max. b-value [s/mm^2]	10 000	10 000	10 000
	Min. TE [ms] with b = 1000 s/mm^2	40	42	46

All matrices without interpolation. Combinations of the stated parameters are not always possible; some parameters may require optional application packages.

Coils

1.5T BioMatrix Coils

A new ultra-high density BioMatrix coil (BioMatrix Spine 32) utilizes seamlessly integrated sensors to acquire and display the patient's respiration data without need for user interaction.
The integrated CoilShim technology in the BioMatrix Head/Neck 20 ensures that the challenging head/neck region is automatically and optimally shimmed for reproducible quality in every patient.

1.5T Tim 4G Coils

The Tim 4G coils are designed for highest image quality in combination with easy handling. High element coils increase SNR and reduce examination times. DirectConnect® and SlideConnect® technology reduce patient set up time. Light weight, ergonomically designed coils enable highest patient comfort.

- No coil changing with multi-exam studies saves patient setup time
- All coils are time-saving "no-tune" coils
- Low-noise preamplifiers
- AutoCoilSelect for dynamic, automatic, or interactive selection of the coil elements within the Field of View

Standard Coil Package - Tim [204 x48]

BioMatrix Head/Neck 20 tiltable with CoilShim (DirectConnect)	Application area	Head and Neck
	Dimensions (L × W × H)	425 mm × 370 mm × 385 mm
	Weight	5.7 kg
BioMatrix Spine 32 with Respiratory Sensors (DirectConnect)	Application area	Spine
	Dimensions (L × W × H)	1200 mm × 489 mm × 63 mm
	Weight	10.5 kg
Body 18 (SlideConnect)	Application area	• Thorax • Heart • Abdomen • Pelvis • Hip
	Dimensions (L × W × H)	385 mm × 590 mm × 65 mm
	Weight	1.6 kg
Flex Large 4	Application area	Multi purpose
	Dimensions (L × W)	516 mm × 224 mm
	Weight	550 g
Flex Small 4	Application area	Multi purpose
	Dimensions (L × W)	366 mm × 174 mm
	Weight	450 g
Accessories	• Flex Coil Interface 1.5T	

Combination of all coils possible for large Field of View exams.

Computer System

syngo Acquisition Workplace - Tim [204 x 48]		
Standard measurement and reconstruction system[1)]	Processor	2x Intel Xeon ≥ E5-2609v4 (8 Core)
	Clock rate	2x ≥ 1.7 GHz, or comparable
	Main memory (RAM)	64 GB
	SSD for raw data	≥ 480 GB
	SSD for system software	≥ 240 GB
	Parallel Scan & Recon	Simultaneous scan and reconstruction of up to 12 data sets
	Reconstruction speed	32 854 recons per second (256^2 FFT, full FoV) 122 137 recons per second (256^2 FFT, 25% recFoV)
Highend measurement and reconstruction system[1)]	Processor	2x Intel Xeon ≥ E5-2620v4 (8 Core)
	Clock rate	2x 3.3 GHz, or comparable
	Main memory (RAM)	96 GB
	SSD for raw data	≥ 480 GB
	SSD for system software	≥ 240 GB
	Parallel Scan & Recon	Simultaneous scan and reconstruction of up to 12 data sets
	Reconstruction speed	40 404 recons per second (256^2 FFT, full FoV) 149 532 recons per second (256^2 FFT, 25% recFoV)
	GPGPU	1× Nvidia Quadro P2000

[1)] Optional

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