Translate
7T research power into clinical care
MAGNETOM Terra
MAGNETOM Terra – Translate 7T research power into clinical care

MAGNETOM Terra is designed to let you explore new territories in MRI by enabling powerful 7T research and enhancing clinical care. Uncover a whole new world of clinical insights with double SNR\(^1\) for more precision. Our advanced ultra-high-field (UHF) technology will keep you at the cutting edge of MRI, to attract the brightest minds to your facility, sharpen your competitive edge and strengthen your reputation. It delivers a fertile platform for unlocking research capabilities, publishing new insights first, and setting the pace in diagnostic imaging. Welcome to an exclusive research community. Welcome to a whole new world in MRI.

Welcome to clinical 7T.

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MAGNETOM Terra – Translate 7T research power into clinical care

**Unique Dual Mode functionality**

- Uncover a whole new world of clinical knowledge with the flexibility to get more from your scanner
- Secure switch between research and clinical operation in less than 7 minutes
- Operating with 2 separate databases for clear research and clinical distinction

**80/200 gradients, 16-channel pTX** and up to 64 channels

- More power for greater diffusion MRI and functional MRI with 80/200 gradients
- Higher homogeneity for challenging body regions with up to 16-channel parallel transmit (in research mode)
- Higher acceleration factors with 64 receive channels

**50% lighter 7T magnet technology**

- Released for clinical use in Europe and the U.S.
- Lower weight and cold-shipment for easier integration in clinical environments
- Reduced operating costs thanks to Zero Helium boil-off

**Double SNR for more precision**

- 0.2 mm in-plane resolution to visualize previously unseen structures
- 0.14 cm³ voxel sizes for metabolic brain mapping (in research mode)
- Submillimeter BOLD fMRI precision to visualize sub-cortical activations
Explore metabolism

- $^{23}$Na MRI and $^{31}$P MRS for metabolic insights in clinical mode$^1$
- Dedicated $^{23}$Na head coil and $^{31}$P loop coil
- Broadband RFPA enabling X-nuclei MR with up to 10 nuclei in research mode$^2$

$>$ 75% global market share in 7T technology

- Over 75% of 7T and 100% of vendor-integrated $>$ 7T MRI human scanners worldwide from Siemens
- 7 of 11 leading U.S. hospitals with a 7T, (2018–2019), trust Siemens when they decide for 7T investment$^1^2$
- 73% of ISMRM UHF abstracts in 2018 were based on data from Siemens UHF systems$^1^3$

The world’s largest UHF community

- Largest installed base for exchanging ideas in a strong collaborative network
- An opportunity to enhance your reputation and competitiveness
- Incentive for the brightest minds in the MRI community to work with you
Uncover a whole new world of clinical insights

Discovering new ground in MRI can help you significantly enhance patient outcomes. Imaging at 7T offers more than double the SNR of 3T. This delivers potential for better lesion conspicuity, faster image acquisition to reduce motion artefacts, and earlier disease detection at submillimeter resolution. MAGNETOM Terra is released for clinical use within Europe and the US. Its Dual Mode lets you switch between clinical and research tasks, unlocking new opportunities and providing a solid, well-founded platform for innovative results.

“Based on higher resolution, 7T provides new insights into gray and white matter disease in the brain, such as multiple sclerosis, focal cortical dysplasia, and hippocampal sclerosis. Furthermore, functional MR benefits from 7T based on a clinically relevant increase in functional sensitivity and specificity. In musculoskeletal imaging, 7T enhances the visualization of small joint structures and subtle pathologies, such as small meniscal tears, triangular fibrocartilage lesions, and early stages of cartilage degeneration.”

Professor Siegfried Trattnig
Director of the MR Centre of Excellence,
MedUni Wien, Vienna, Austria
Uncover a whole new world of clinical insights – Double SNR¹ for more precision with clinical applications in Dual Mode

**Dual Mode flexibility²**
MAGNETOM Terra is the first 7T scanner released for clinical use within Europe and the US. With the release for selected neurological and musculoskeletal scan protocols, it has potential to uncover a whole new world of clinical care. Its unique Dual Mode functionality lets you switch between research and clinical operation, giving you flexibility to get more from your scanner.

**Ultra-fine anatomical resolution**
In brain and musculoskeletal MRI, 7T reveals details previously unseen at lower field strengths. For example, cerebral cortex imaging at 0.2 mm in-plane resolution¹ may detect changes in cortical structure indicating early dementia. It also helps visualize cortical microinfarcts and plaques in MS patients and delivers insight into the plaque-vessel relationship and iron accumulation.

**Submillimeter fMRI¹⁰**
The BOLD contrast increases linearly with field strength. In clinical use, this could mean higher precision in oncology compared to 3T applications, for example, through smaller voxel sizes. Potentially, this can increase the accuracy of neurological pre-surgical evaluation of eloquent areas before tumor removal, while keeping scanning times viable¹⁵.

**Powerful image reconstruction**
MAGNETOM Terra delivers improvements in workflow for easier operation and better patient handling. Leveraging the latest syngo MR E12 software platform, it lets you work in the same way as you do with cutting-edge 3T technology. What’s more, it comes with the most powerful MaRS (Measurement and Reconstruction System) computing technology ever built.⁶

**Physiology is at your fingertips**
MAGNETOM Terra is the first 7T MRI scanner to unleash the full potential of the increased MR signal with multinuclear imaging and spectroscopy in clinical settings. The multinuclear option allows the use of two dedicated coils – a ²³Na head coil and a ³¹P loop coil, to explore metabolic insights¹¹.
Switch between research and clinical tasks with Dual Mode²

Ultra-fine resolution to visualize details previously unseen

Explore physiology with multinuclear MR¹¹

Ultra-fast image reconstruction⁴ and syngo MR E12

Clinical insights MAGNETOM Terra
**Dual Mode** offers the flexibility to switch from research to clinical tasks

**Clinical Mode**
- 1 transmit channel
- 11 kW RF power
- 2 $^1$H coils (Head 32, Knee 28)
- 2 MNO coils ($^{23}$Na Head 32, $^{31}$P Flex Loop)
- Neuro and MSK optimized clinical applications

**Research Mode**
- single channel and up to 16-channel parallel transmit
- 16 x 2 kW RF power
- Wider range of RF coils
- Whole-Body WIP Applications
- Broadband RFPA for X-nuclei MR (10 nuclei)
• syngo MR E12 software line
• XR Gradients 80/200
• Up to 64 receive channels
• Latest MaRS computer
• 3rd order shims
Clinical Mode – Multiple Sclerosis

Hyperintense MS lesion with hypointense center

DarkFluid TSE
0.3 x 0.3 x 3 mm³, 5:59 min

SWI minIP/phase
0.2 x 0.2 x 1.2 mm³, 5:38 min

Typical central vein and perivenular demyelination is visible.
Multiple Sclerosis with low lesion load

Multiple Sclerosis with high lesion load

Dark Fluid TSE
0.3 x 0.3 x 3 mm³, 5:20 min

T2 TSE
0.2 x 0.2 x 3 mm³, 5:33 min

SWI
0.2 x 0.2 x 1.2 mm³, 5:38 min
Clinical Mode – Tumor

3D SWI of Glioblastoma
3D SWI minIP provides superior assessment of the microvasculature.

Erwin L. Hahn Institute for MRI, Essen, Germany

3 Tesla
0.85 x 0.72 x 2 mm³

7 Tesla
0.25 x 0.25 x 1 mm³
Glioblastoma

Higher SNR for ultra-high 0.2 mm in-plane resolution for imaging tumor vascularization.

DKFZ, Heidelberg, Germany
Clinical Mode – Stroke

Small focus of strong cortical/subcortical signal abnormality in the right precentral gyrus.

FAU, Erlangen, Germany
Clinical Mode – Tumor

High resolution standard protocols for detailed visualisation of pathologies, increased tissue contrast and high resolution at 7T.

FAU, Erlangen, Germany

SWI miniP 0.2 x 0.2 x 3 mm³, 5:38 min

T2 TSE 0.2 x 0.2 x 3 mm³, 5:33 min

DarkFluid TSE 0.4 x 0.4 x 3 mm³, 4:22 min
Clinical Mode – Healthy volunteer

Hippocampus imaging
High-resolution imaging of the hippocampus at 0.25 mm in-plane resolution.
Scannexus, Maastricht, Netherlands

T2* weighted imaging
High-resolution imaging of the brainstem at 0.3 mm in-plane resolution.
MGH, Boston, USA
Clinical Mode – Diffuse axonal injury

The higher sensitivity at 7T reveals hemosiderin from traumatic brain injury in PD images.

Erwin L. Hahn Institute for MRI, Essen, Germany
Clinical Mode – Healthy volunteer

Clear identification of anatomical structures with increased tissue contrast and high resolution at 7T.

0.6 x 0.6 x 0.6 mm³, 13:45 min

FAU, Erlangen, Germany
Clinical Mode – Stroke

Time of Flight (ToF) with 400 micron isotropic resolution reveals smallest vessels in the brain. The higher the signal and the longer the T1 at 7T are, the higher the quality of the Maximum Intensity Projection (MIP) gets.

Visualize smallest vessels with 0.4 mm isotropic resolution.

0.4 x 0.4 x 0.4 mm³, 8:09 min

FAU, Erlangen, Germany
Clinical Mode – Healthy volunteer

Ultra-fine 0.2 mm anatomical resolution can be achieved at 7T with susceptibility weighted imaging (SWI). Enlarged section: At this resolution, previously unseen structures, such as cortical veins, can be visualized.

The basal ganglia Caudate, Putamen and Globus Pallidus can be differentiated.
Clinical Mode – Enchondroma

Fine structure visible in the lesion with different contrasts.

PD TSE FS 0.2 x 0.2 x 2.5 mm³, 3:15 min
T2 TSE 0.3 x 0.3 x 2 mm³, 3:24 min
3D DESS 0.5 x 0.5 x 0.5 mm³, 3:43 min
Clinical Mode – Healthy volunteer

Clear delimitation of anatomical structures, such as ligaments, vessels or cartilage.

T1 SE
0.2 x 0.2 x 2.5 mm³,
4:05 min

T1 qSE
0.3 x 0.3 x 2.5 mm³,
7:21 min
Clinical Mode – Healthy volunteer

PD qTSE FS
0.2 x 0.2 x 2.5 mm³,
3:15 min

T1 FL3D WE
0.5 x 0.5 x 0.5 mm³,
4:35 min

FAU, Erlangen, Germany
Clinical Mode – Healthy volunteer

High resolution fiber tracking with SMS RESOLVE at 7T and syngo.via Frontier\textsuperscript{16}.
1.4 mm isotropic, 29:22 min.

CAIPRINHA acceleration for the SPACE pulse sequence at 7T, acceleration: 3x2.
0.7 mm isotropic, 6:52 min.

FAU, Erlangen, Germany
Clinical Mode – Healthy volunteer

$^3$P FID of the human calf with NOE enhancement
Non selective 1:42 min
FAU, Erlangen, Germany

$^3$P CSI of the human liver
15 ml voxel volume, 4:42 min
FAU, Erlangen, Germany
Clinical Mode – Healthy volunteer

Additional metabolic information with $^{23}$Na UTE, fused with T2 TSE

3 mm isotropic, 7:38 min

FAU, Erlangen, Germany
Clinical Mode – Tumor

Additional metabolic information with $^{23}$Na UTE, fused with T2 TSE
3 mm isotropic, 7:38 min
FAU, Erlangen, Germany
MAGNETOM Terra  Change the game
Medical research funding has stagnated in the last decade. Ensuring your high-end MRI endeavors have the right business impact is crucial in today’s competitive environment. MAGNETOM Terra is the result of over 25 years of Siemens UHF innovations, culminating in the design of a brand-new, volume-produced 7T magnet. The magnet is 50% lighter than previous generations and supports easier integration into clinical environments. MAGNETOM Terra can help you become more competitive, while making a tangible difference to clinical care, research – and your business.

“When you talk to other people in the field, it is clear that Siemens has by far the greatest expertise in ultra-high-field imaging.”

Professor Rainer Goebel
University of Maastricht & scannexus, Maastricht, The Netherlands
Innovative magnet technology
Siemens Healthineers’ 7T magnet is a milestone in MR magnet technology. Its unique design and thermally balanced materials minimize physical interactions between core components. The result is 50% lighter than previous generations, with a higher structural stability and a greater fundamental stress capacity. In addition, excellent homogeneity makes for enhanced image quality.

Increased competitiveness
MAGNETOM Terra can help you broaden research funding opportunities, making your institution stand out as a leader in life sciences. By being at the cutting edge of clinical care and research, you have the opportunity to increase competitiveness for grants, benefit from reduced complexity in clinical trials, and open up potential for clinical imaging reimbursements.

Easy clinical integration
Thanks to the lighter magnet, the scanner can be shipped cold via airfreight. What’s more, you benefit from up to 50% faster installation time and ramp-up. Zero Helium boil-off translates into lower lifecycle costs and an improved eco-footprint. All this has the potential to enhance performance, lower resource consumption, improve sustainability, and reduce operating costs.

Forward-looking technology
An investment in MAGNETOM Terra is an investment in the future. Siemens is committed to serving the ultra-high-field community – today and tomorrow – with a host of outstanding innovations. From development and production, to service – all of MAGNETOM Terra’s key components are delivered from a single reliable partner you can trust, for maximum peace of mind.

Change the game in UHF business with Siemens Healthineers’ 50% lighter 7T magnet

change the game
Lower weight and cold-shipment for easy integration

50% lighter magnet technology

Released for clinical use in Europe and the U.S.

Zero Helium boil-off
Proven innovations in the development and production of magnet technology

1980
The world's first superconducting whole-body MRI

1989
The world's first 1.5T active-shielded magnet

1994
The world's first open MRI magnet

1997
The world's first 3T active-shielded magnet

Award-winning development and production

Siemens Magnet Technology in Oxford, UK, has received seven Best Factory Awards and seven Queen's Awards for Enterprise in multiple categories, including for processes and design. The facility deploys leading-edge supply chain management methods, and prides itself on reliable, robust production and the highest standards of quality.
April 2015 – Installation of Siemens’ first 7T magnet

During the 30 years that we have been producing 1.5T and 3T magnets, we have gained extensive engineering skills and well-founded process expertise. This knowledge and experience has led to the development and production of our own 7T magnet.

“We are extremely proud at Siemens Magnet Technology to have developed the 7T magnet at the heart of the MAGNETOM Terra. Once again our expert design and process teams have demonstrated how their innovative thinking has led to a product that has pushed forward the boundaries of magnet technology. It is wonderful to see how seamlessly the manufacture of this flagship product has already been integrated into our award winning facility.”

Ralph Seidler
Managing Director, Siemens Magnet Technology
MAGNETOM Terra Beyond clinical limits
Unlock research beyond clinical limits

When it comes to research, the freedom to push the boundaries is imperative for gaining a competitive edge. For neuroscience and clinical research applications, MAGNETOM Terra delivers ultra-high SNR and up to 16-channel pTX² for imaging challenging body regions. In addition, it has up to 64 receive channels³ for higher acceleration factors⁵ and 80/200 gradients for maximum flexibility, as well as a broadband RFPA for the multinuclear option. Moreover, this powerful, reliable scanner supports basic research by helping you develop groundbreaking technologies, set new trends and translate your outcomes into clinical routine.

“The increased spatial resolution offered by 7T MRI enables us to study fine-grained activation patterns within cortical areas and investigate detailed functional topography of the cerebral cortex in individual human subjects. This will provide us with a deeper understanding of the human brain and its connectomics in healthy and diseased populations.”

Professor Kamil Ugurbil
Director of the Center for Magnetic Resonance Research (CMRR), Minneapolis, Minnesota, USA
Unlock research beyond clinical limits with 16-channel parallel transmit²

Enhanced images with pTX²

Image quality and speed are key, but inhomogeneities may present challenges, for example, in body MRI. MAGNETOM Terra’s pTX technology with up to 16 channels helps you overcome these issues and generate images of excellent quality. This particularly promising technology has the potential to support your own hardware developments.

Ultra-high resolution spectroscopy²

Proton magnetic resonance spectroscopy at 7T not only delivers metabolic information, but also gives accurate anatomical insight. Ultra-high 0.14 cm³ resolution⁹ has the potential to reveal valuable new diagnostic information for clinical applications – including patients with tumors, epilepsy, multiple sclerosis or other neurodegenerative diseases.

More power for your research

MAGNETOM Terra offers a host of cutting-edge research functionalities, providing access to works in progress packages² and powerful hardware configurations. 80/200 gradients and up to 64 receive channels deliver enhanced capabilities for your studies. What’s more, the scanner gives you the freedom to explore and develop new clinical applications only possible at ultra-high-field strengths.

Open platform architecture²

MAGNETOM Terra provides a flexible, fertile ground for your own UHF hardware and software developments. For example, Siemens collaboration partners benefit from technical support and direct access to the sequence, the Image Calculation Environment (ICE), and imaging protocols.

Discover a world beyond anatomy

The broadband RFPA enables the acquisition of spectra and images with up to 10 nuclei². While ²³Na and ³⁵Cl imaging can give insights to salt balance, ³¹P spectroscopy can shed a light on energy metabolism¹¹. Use this additional layer of information to dive into a world of metabolic imaging with MAGNETOM Terra.
16-channel pTX for higher homogeneity\(^2\)

80 / 200 gradients and 64 receive channels\(^3\) for more research power

Open platform architecture for own developments\(^2\)

Dive into Physiology with X-nuclei MR for up to 10 nuclei\(^{2,11}\)
Transparent fibers

Tracks calculated with spherical deconvolution based on diffusion-weighted EPI acquisitions with 1 mm isotropic resolution covering the whole brain. The high SNR provided by 7T allows resolving crossing fibers in many brain sub-regions.

Max Planck Institute, Leipzig, Germany
In-vivo histology

syngo via Frontier, the research extension of syngo via, helps bridge the gap in post-processing translational research. Cinematic rendered images based on MR data sets may be used for patient counseling, surgery planning, or teaching purposes.
Transparent fibers

Tracks calculated with spherical deconvolution based on diffusion-weighted EPI acquisitions with 1 mm isotropic resolution covering the whole brain. The high SNR provided by 7T allows resolving crossing fibers in many brain sub-regions.

Max Planck Institute, Leipzig, Germany
In-vivo histology

syngo via Frontier®+, the research extension of syngo via, helps bridge the gap in post-processing translational research. Cinematic rendered images based on MR data sets may be used for patient counseling, surgery planning, or teaching purposes.
Functional MRI

Contrast-to-noise ratio maps in resting state fMRI.

Consortium The Human Connectome Project.
CMRR, Minnesota, USA
Washington University, St Louis, USA
Oxford University, UK
Depiction of cortical layers

Post-processed high-resolution anatomical MR data reveals reconstructed surfaces at different cortical depth levels. The inner red surface runs along the white/gray matter boundary. The outer blue surface runs along the outer (pial) boundary of the cortex.

Scannexus, Maastricht, The Netherlands
Tissue segmentation

Delineation of subcortical nuclei in the thalamus and brainstem at 1 mm isotropic resolution. White matter nulled MPRAGE (top TA 8:52 min) and gray matter nulled MPRAGE (bottom TA 10:38 min).

*MGH, Boston, USA*
High-resolution fMRI

Cortical-layer-specific activation with fMRI at 1 mm isotropic resolution, inflated view. The fMRI visual stimulus was designed to activate a pattern in the shape of the number “7” using the known retinotopic mapping in the human visual cortex.

MGH, Boston, USA

“Siemens provides the best possible open hardware and software environment to explore these new transmit and receive concepts, all of which have proved essential to allow ultra-high fields to fulfill their potential for the benefit of human health.”

Professor Lawrence L. Wald, Director
MGH NMR Core at Martinos Center, Department of Radiology,
Boston, Massachusetts, USA
Spine imaging

Ultra-high resolution of the cervical spine using a custom-built spine coil.

MGH, Boston, USA
Body imaging

Left image, 3D VIBE FatSat, right image, thin MIP from the 3D VIBE FatSat. Images acquired using pTX and custom-built coils.

Erwin L. Hahn Institute for MRI, Essen, Germany

Body imaging

Image left, rectum carcinoma imaged with a ce-FLASH (0.3 x 0.6 x 2 mm³, TA 2:14 min). Images acquired using pTX and custom-built coils. Image right, abdominal small bowel imaging with TrueFISP (0.4 x 0.8 x 2 mm³, TA 26 s).

Erwin L. Hahn Institute for MRI, Essen, Germany
Cardiac imaging

Accelerated T1-weighted FLASH acquisitions using a customer-built coil.

Berlin Ultrahigh Field Facility, Berlin, Germany
Hip cartilage transplant

Cartilage transplant visible in 3D DESS (0.37 x 0.74 x 0.74 mm³, TA 5:11), 3D VIBE SPAIR (0.19 x 0.39 x 0.8 mm³, TA 5:58) and T2 MapIt (0.25 x 0.5 x 2.5 mm³, TA 4:47) 14 months after Autologous Chondrocyte Transplantation (ACT) using a customer-built coil.

Erwin L. Hahn Institute for MRI, Essen, Germany
Biochemical imaging using CEST

Male patient nine years after Autologous Osteochondral Transplantation (AOT) in the medial femoral condyle.

MedUni Wien, Vienna, Austria
Breast imaging

High-resolution bilateral breast imaging in short acquisition time. Pre- and post-contrast 3D FLASH SPAIR, 1.4 mm isotropic resolution, TA 1:48 min/series using a customer-built coil.

NYU Langone Medical Center, New York, USA
Join the largest research community

Your reputation plays a pivotal role in your institution’s success. MAGNETOM Terra has the power to let you go deeper than ever before, making your research and patient outcomes stand out from the rest. What’s more, this leading-edge technology can help you attract the brightest minds to your facility, further enhancing your capabilities. MAGNETOM Terra has the potential to put your organization firmly on the map, offering access to an exclusive network of expertise and broad scope for collaboration and exchange.

“When we were in a position to order a 7T system, Siemens was the logical choice.”

Professor Peter Jezzard
Professor of Neuroimaging,
University of Oxford, Oxford, UK
Enhance your reputation

MAGNETOM Terra helps you achieve your research goals, giving you the opportunity to publish first and become a true opinion leader. This advanced technology has the potential to strengthen your position by attracting the brightest brains to your facility. The scanner lets you deliver previously unseen insights that could improve patient outcomes and further enhance your reputation.

Expand your network

Even if you are taking your first steps in ultra-high-field imaging, you will never be alone. Siemens has proven expertise in UHF MRI and cultivates links with an extensive network of users. As a result, you benefit from the experience of others and can share your own ideas. Siemens is the global leader in 7T – with a market share of over 75% and more than 25 years of experience in this field.

Exchange your ideas with peers

When you become part of the Siemens UHF community, you join an exclusive group of outstanding MRI experts. Through collaboration and exchange with other leaders in your field, you can extend your own knowledge and gain deeper insights. Siemens’ regular user meetings and an online discussion board are the ideal platforms to interact with your peers.

73% of ISMRM UHF abstracts in 2018 were based on data from Siemens UHF systems.
Over **75%** of 7T scanners deployed worldwide are from Siemens

Attract and retain the brightest minds and publish first

Strong network for collaboration and peer-to-peer exchange
UHF systems installed and projects in progress

1. Athinoula A. Martinos Center for Biomedical Imaging of MGH, Boston, Massachusetts, USA
2. Leibniz Institute for Neurobiology (LIN), Magdeburg, Germany
3. Bernard and Irene Schwartz Center for Biomedical Imaging (CBI) of New York University Langone Medical Center, New York City, New York, USA
4. Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA
5. Neuroscience Research Institute (NRI) of Gachon University of Medicine and Science, Incheon, South Korea
6. Advanced Imaging Research Center (AIRC), Oregon Health & Science University, Portland, Oregon, USA
7. Erwin L. Hahn Institute for Magnetic Resonance Imaging (ELH), Essen, Germany
8. Center for Imaging in Biomedicine (CIBM), École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland
9. Max Planck Institute for Biological Cybernetics (MPI KYB), Tübingen, Germany (9.4T)
10. NeuroSpin, French Alternative Energies and Atomic Energy Commission (CEA), Saclay, France
11. NeuroSpin, French Alternative Energies and Atomic Energy Commission (CEA), Saclay, France (11.7T)
12. Magnetic Resonance Research Center (MRRC), University of Pittsburgh Medical Center (UPMC), Pittsburgh, Pennsylvania, USA
13. Max Planck Institute for Human Cognitive and Brain Sciences (MPI), Leipzig, Germany
14. Excellence Center for Highfield MR, Medical University of Vienna (MUW), Vienna, Austria
15. German Cancer Research Center (DKFZ), Heidelberg, Germany
16. Institute of Neuroscience and Medicine (INM), Research Centre Jülich, Jülich, Germany (9.4T)
17. Center For Magnetic Resonance And Optical Imaging (MMRRCC), University of Pennsylvania Health System (HUP), Philadelphia, Pennsylvania, USA
18. Berlin Ultrahigh Field Facility (B.U.F.F.), Experimental and Clinical Research Center (ECRC), Berlin, Germany
19. State Key Laboratory of Brain and Cognitive Science, Institute of Biophysics, Chinese Academy of Sciences (CAS), Beijing, China

7T MRI scanners
9.4T, 10.5T and 11.7T MRI scanners
21 Magnetic Resonance Imaging Research Center, Auburn University, Auburn, Alabama, USA
22 Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA
23 Functional MRI Facility (FMRIF), National Institute of Mental Health and Neurological Disorders and Stroke, National Institutes of Health (NIH-NIMH & NINDS), Bethesda, Maryland, USA
24 National Institute of Neurological Disorders and Stroke, National Institutes of Health (NIH-NINDS), Bethesda, Maryland, USA (11.7T)
25 National Institute of Information and Communication Technology (NICT) / Center for Information and Neural Networks (CiNET), Osaka, Japan
26 Center for MR Research (CMRR), University of Minnesota, Minneapolis, Minnesota, USA (10.5T)
27 Center for Imaging of Neurodegenerative Diseases (CIND), San Francisco VA Medical Center, UCSF, San Francisco, California, USA
28 German Center for Neurodegenerative Diseases (DZNE), Bonn, Germany
29 Biomedical Research Imaging Center (BRIC), University of North Carolina (UNC), Chapel Hill, North Carolina, USA
30 Maastricht Brain Imaging Centre (M-BIC), Maastricht University, Maastricht, The Netherlands
31 Maastricht Brain Imaging Centre (M-BIC), Maastricht University, Maastricht, The Netherlands (9.4T)
32 Mount Sinai School of Medicine, New York City, New York, USA
33 Cleveland Clinic, Cleveland, Ohio, USA
34 Centre for Advanced Imaging, University of Queensland, Brisbane, Queensland, Australia
35 Royal Melbourne Hospital, University of Melbourne, Victoria, Australia
36 University of Sao Paulo (USP), Sao Paulo, Brazil
37 Centre d’Exploration Métabolique par Résonance Magnétique (CEMEREM), Marseille, France
38 Centre for Functional and Metabolic Mapping, Robarts Research Institute, London, Ontario, Canada
39 National Institute for Physiological Sciences (NiPS), Okazaki, Japan
40 Kyoto University, Kyoto, Japan
41 Zhejiang University, Hangzhou, China
42 Brigham and Women’s Hospital (BWH), Boston, USA
43 University of Southern California (USC), Los Angeles, California, USA
44 Cardiff University Brain Research Imaging Centre (CUBRIC) Cardiff, UK
45 Wolfson Brain Imaging Centre (WBIC), University of Cambridge, Cambridge, UK
46 Imaging Centre of Excellence (ICE), South Glasgow University Hospital, Glasgow, UK
47 Magnetic Resonance Research Center (MRRC), Yale University, New Haven, Connecticut, USA
48 Comprehensive Heart Failure Center (CHFC), Würzburg University Hospital, Würzburg, Germany
49 Weizmann Institute of Science, Rehovot, Israel
50 Mayo Clinic, Rochester, USA
51 Toronto Western Hospital (TWH), University Health Network (UHN), Toronto, Canada
52 National Institute of Health, National Institute on Drug Abuse (NIH-NIDA), Bethesda, Maryland, USA
53 Forschungszentrum Jülich, Jülich, Germany
54 CRC, University of Liege, Liege, Belgium
55 Houston Methodist, Houston, Texas, USA
56 Athinaoula A. Martinos Center for Biomedical Imaging of MGH, Boston, Massachusetts, USA
57 University Clinic Erlangen, Erlangen, Germany
58 Montreal Neurological Institute and Hospital (MNI), McGill University, Montreal, Canada
59 Sungkyunkwan University (SKKU), Seoul, South Korea
60 Balgrist Hospital, Zürich, Switzerland
61 King’s College London (KCL), London, UK
62 Barnes-Jewish and Children’s Hospital (BJC), St. Louis, Missouri, USA
63 Fudan University, Fudan, China
64 Swiss Institute for Translational and Entrepreneurial Medicine and Inselspital Bern (sitem-insel), Bern, Switzerland
65 University of California Berkeley, Berkeley, California, USA
66 Norwegian University of Science and Technology (NTNU), Trondheim, Norway
67 Welcome Centre for Human Neuroimaging, University College London, UK
68 Centre Hospitalier Universitaire de Poitiers (CHU), Poitiers, France
69 Zhongnan University Xiangya Hospital, Hunan, China
Siemens’ end-to-end services ensure you stay at the leading edge of MRI technology throughout the entire system lifecycle – from installation, to operation, to upgrades, to ongoing support. Moreover, our diverse communication platforms and communities keep you up to speed on the world of MRI and enable you to share your ideas and experiences with your peers.
Utilization management and reporting
This powerful solution gives you more from your MRI scanner. It allows you to monitor KPIs and benchmark your system against other Siemens MRI machines at any facility or organization. So you can keep track of your MRI performance, and reap the maximum reward from your scanner.

Predictive maintenance
When systems go down, it impacts both your ability to care for your patients and your bottom line. Siemens provides a predictive maintenance service to help you minimize lost time. It informs you when a part of your MRI system is likely to fail, enabling you to plan repairs and prevent downtime before it happens.

EVOLVE
Keep your hardware and software up to date at all times – a key factor in enhancing performance and diagnostic quality. You receive all applicable upgrades for software and the syngo OS, plus at least one workstation hardware upgrade within the first six years.

Siemens Guardian program
This program provides the latest service technology so you can better manage your MRI system. It combines many features in a single package – offering real-time system monitoring, expert advice to improve workflow efficiency, proactive maintenance, and support. Moreover, it guarantees defined repair times, giving you complete peace of mind.

Proven upgrade paths
With MAGNETOM scanners, taking your MRI system to the next level is simplicity itself, thanks to clearly defined upgrade paths. In fact, Siemens has built an entire organization (CDV) to help customers truly maximize their system life – and increase their return on investment.
Service and exchange – Peer-to-peer information

On MAGNETOM Flash:
“An excellent and useful combination of technological and clinical articles that both keep one up to date with advances in MRI and provide practical assistance for day-to-day practice – good and interesting learning material.”

Mark Lourensz
St Vincent’s Hospital, Fitzroy, Victoria, Australia
MAGNETOM World
Siemens Healthineers’ global MRI community offers peer-to-peer support and information. Radiologists, cardiologists, technologists, and physicists have all contributed with publications, presentations, training documents, case studies, and more—all freely available to you via this unique network. Plus, the bi-annual MAGNETOM World Summit is the ideal opportunity to share and exchange ideas.

MAGNETOM Flash
Published quarterly, the MR customer magazine features up-to-date clinical case studies, application tips and technical and product information relevant to you. All content is carefully compiled by experts to meet the needs of today’s MRI users in both clinical and research scenarios. In fact, 98.5% of readers report that MAGNETOM Flash is clinically relevant.

IDEA / UHF Online Discussion Board
IDEA³ is an open development platform for the largest and most active 3T and UHF research communities in the world. It unites users from across the globe and fosters innovation in the field of MRI. Members collaborate online at www.mr-idea.com and at an annual meeting. IDEA includes an exclusive area, the UHF Online Discussion Board, to help users focus on topics of interest, as well as find and communicate with the right peers.

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# Technical specifications

**MAGNETOM Terra**  
**Technical specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field strength</td>
<td>7 Tesla</td>
</tr>
<tr>
<td>Bore size</td>
<td>60 cm</td>
</tr>
<tr>
<td>Magnet length</td>
<td>270 cm</td>
</tr>
<tr>
<td>System length</td>
<td>297 cm</td>
</tr>
<tr>
<td>System weight (in operation)</td>
<td>&lt; 25 tons</td>
</tr>
<tr>
<td>Minimum room size(^a)</td>
<td>65 m(^2) / (w/o pTX(^2) and 3rd order shim option)</td>
</tr>
</tbody>
</table>
| Dual Mode functionality\(^b\)  | Clinical Mode  
|                                | Research Mode\(^b\) |
| RF transmit                    | TimTx-1, TimTx-8, TimTx-16  
|                                | (in research mode)\(^c\) |
| Maximum number of channels\(^d\) | 32, 64 |
| Number of independent receiver channels that can be used simultaneously in one single scan and in one single FOV, each generating an independent partial image | 32, 64 |
| Gradient strength              | XR gradients (80 mT/m @ 200 T/m/s) |
| Helium consumption             | Zero Helium boil-off technology |
| Quiet Suite/DotGO              | Available in research mode\(^e\) |
| Local coils in clinical mode   | 1TX/32RX head coil  
|                                | 1TX/28RX knee coil  
|                                | 23Na 1Tx/32Rx head coil  
|                                | 31P/1H TxRx flex loop coil |
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At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare.

An estimated 5 million patients globally everyday benefit from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine, as well as digital health and enterprise services\textsuperscript{19}.

We are a leading medical technology company with over 170 years of experience and 18,000 patents globally. With more than 48,000 dedicated colleagues in 75 countries, we will continue to innovate and shape the future of healthcare.
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1 Compared to 3T systems.
2 Research mode as part of dual mode is available as an option and not intended for clinical use.
3 Channels (coil elements) that can be connected simultaneously.
4 Compared to standard 3T systems.
6 Compared to previous 7T generation.
7 Under normal operating conditions with standard Siemens sequences/protocals.
8 Example images available in this Brochure: Page 22 ; SWI
12 https://health.usnews.com/best-hospitals
13 https://www.ismrm.org/18m
14 The statements by Siemens’ customers described herein are based on results that were achieved in the customer’s unique setting. Since there is no “typical” hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.
16 Cinematic VR is recommended for communication, education, and publication purposes and not intended for diagnostic reading.
17 Rendered with a Siemens internal cinematic rendering prototype.
18 Minimum total space requirement for magnet, electronics, and console room.