Turbo Suite
Setting the pace in MR acceleration.
Efficiency is the key

Constantly growing MR procedure numbers and dropping reimbursement are the key challenges in staying profitable.

“Worldwide MRI is continuing to operate in an environment where the volume of exams is ever increasing with pressure on technologists and radiologists to maintain both image quality and diagnostic confidence. This continues against a background of decreasing reimbursements from government while patients expect high quality exams in an ever decreasing amount of time. Siemens Healthineers continue to innovate to provide solutions to these problems with yet more applications in SMS and CS coming soon to a magnet near you.”

James Hancock
Benson Radiology,
North Adelaide, Australia
With rising patient volumes in the face of falling reimbursement, there is a clear need for greater efficiency. At the same time, the quality of exam results should not diminish. We are committed to help you transform care delivery by significantly shortening entire examinations for the whole spectrum of clinical MRI with Turbo Suite. Turbo Suite offers the right solution for your clinical question. It is comprised of disruptive MR acceleration technologies, which are tailored to the clinical question. With Turbo Suite you accelerate the complete exam, covering all contrasts, all orientations, static and dynamic imaging, leading to up to 50% shorter exams.

Get ready for the future of MR and setting the pace in MR acceleration with Turbo Suite.
Setting the pace in MR acceleration with Turbo Suite

Turbo Suite is comprised of three packages with unique parallel imaging, Simultaneous Multi-Slice, and Compressed Sensing technologies that are tailored to your clinical need. And – with Turbo Suite, you gain access to future developments in MR acceleration, keeping you always up to date.

Turbo Suite Essential
Ahead in scan time.

Turbo Suite Essential comprises of core MR acceleration techniques to maximize productivity for all contrasts, orientations, for all routine imaging from head to toe.

Reduce the total exam time by up to 50%³)

Routine exams in 10–15 minutes⁴)
**Turbo Suite Excelerate**  
*One step ahead in acceleration.*

Turbo Suite Excelerate is a paradigm shift in productivity with up to 50%\(^3\) time savings for complete exams. With Turbo Suite Excelerate, you get continuous access\(^4\) to cutting edge neuro, orthopedic, and body MR acceleration techniques.

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**Turbo Suite Elite**  
*Two steps ahead in capabilities.*

Turbo Suite Elite enhances clinical capabilities by expanding the population eligible for MRI. Full free-breathing examinations increase patient satisfaction and significantly shorten exam times. With Turbo Suite Elite, you get continuous access\(^5\) to dynamic acceleration techniques.
Turbo Suite Essential

Be ahead in scan time and maximize productivity with core MR acceleration technologies.

Turbo Suite Essential leverages high element density coils and unique parallel imaging techniques to deliver routine exams in 10 to 15 minutes.

With Turbo Suite Essential, a comprehensive neurological exam, including time-of-flight, can be performed in 10 minutes.

Isotropic 3D MSK exams utilize the power of CAIPIRINHA, delivering all clinically relevant contrasts in 10 minutes. For body imaging, up to 50% shorter breath-holds and high-resolution scans are possible with CAIPIRINHA.

What you get:

• Routine examinations in 10–15 minutes \(^3\) scan time
• Rapid, high-resolution 3D imaging
• Turbo Suite Essential is standard with the syngo MR XA platform.
High resolution – less time

**Neuro imaging**

2D T2 TSE  
0.6 × 0.6 × 4 mm³  
TA 1:28 min  

2D T1 SE  
0.6 × 0.6 × 4 mm³  
TA 1:02 min  

T2 Dark Fluid  
0.8 × 0.8 × 4 mm³  
TA 1:20 min  

T2*  
0.8 × 0.8 × 4 mm³  
TA 1:17 min  

DWI, b1000  
1.1 × 1.1 × 4 mm³  
TA 0:52 min  

3D TOF  
0.3 × 0.3 × 0.6 mm³  
TA 4:02 min  

Total exam  
10:01 min

**Fast and efficient 3D CAIPIRINHA for Neuro, MSK and Abdominal imaging – all contrasts and body regions in isotropic 3D resolution**

T2 CAIPIRINHA SPACE  
0.5 mm³ iso  
TA 4:41 min  

PD FS CAIPIRINHA SPACE  
0.6 mm³ iso  
TA 4:45 min  

T2 CAIPIRINHA SPACE  
Dark Fluid, PAT 4  
2:40 min

CAIPIRINHA VIBE  
CAIPI 6, Matrix 320, SL 1.5 mm  
TA 18.1 s  

CAIPIRINHA VIBE  
CAIPI 4  
TA 10 s

The benefit: Significantly shorter breath-holds and improved resolution
Turbo Suite Excelerate

Be up to 50%\textsuperscript{3}) faster for clinical routine with a paradigm shift in MR acceleration technologies.

Turbo Suite Excelerate heralds a paradigm shift in productivity with up to 50%\textsuperscript{3}) time savings, for all contrasts, orientations, and body regions.

Dramatically transform care delivery with cutting-edge and Siemens Healthineers unique acceleration technologies Simultaneous Multi-Slice and Compressed Sensing for static 2D and 3D imaging\textsuperscript{4)}, for neurological, orthopedic, and body MRI.

With Turbo Suite Excelerate, you get continuous access\textsuperscript{4)} to new cutting-edge MR acceleration techniques.

What you get:

- Maximize your productivity with up to 50%\textsuperscript{3}) exam time savings
- Future security with access to two additional applications, either Compressed Sensing or SMS, at no additional cost\textsuperscript{4)}
Faster imaging – higher resolution

Neuro imaging – Turbo Suite Essential

2D T2 TSE
0.6 × 0.6 × 4 mm³
TA 1:28 min

2D T1 SE
0.6 × 0.6 × 4 mm³
TA 1:02 min

T2 Dark Fluid
0.8 × 0.8 × 4 mm³
TA 1:20 min

DWI, b1000
1.1 × 1.1 × 4 mm³
TA 0:52 min

3D TOF
0.3 × 0.3 × 0.6 mm³
TA 4:02 min

T2*
0.8 × 0.8 × 4 mm³
TA 1:17 min

Total exam
10:01 min

Neuro imaging – Turbo Suite Excelerate

2D T2 TSE SMS
0.6 × 0.6 × 4 mm³
TA 0:47 min

2D T1 SE
0.6 × 0.6 × 4 mm³
TA 1:02 min

T2 Dark Fluid
0.8 × 0.8 × 4 mm³
TA 1:20 min

DWI SMS 2, b1000
1.1 × 1.1 × 4 mm³
TA 0:32 min

3D CS TOF
0.3 × 0.3 × 0.6 mm³
TA 2:31 min

T2*
0.8 × 0.8 × 4 mm³
TA 1:17 min

Total exam
7:29 min

25% reduction

91.2018 · Turbo Suite
Neuro imaging – increase conspicuity with 3D SPACE\(^6\) DIR

**Turbo Suite Essential**

- 3D SPACE DIR, 1.4 x 1.4 x 1.4 mm\(^3\)
  - TA 6:07 min

**Turbo Suite Excelerate**

- 3D CS SPACE\(^6\) DIR, 1.0 x 1.0 x 1.0 mm\(^3\)
  - TA 3:07 min

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**Abdominal imaging**

**Turbo Suite Essential**

- T2 HASTE cor
  - TA 1:10 min
- T2 HASTE FS tra
  - TA 0:50 min
- DWI, b800
  - TA 3:29 min
- 3D T2 SPACE MRCP
  - TA 5:48 min
- CAIPIRINHA VIBE tra
  - 4 x 12 s breath-hold

**Turbo Suite Excelerate**

- T2 HASTE cor
  - TA 1:10 min
- T2 HASTE FS tra
  - TA 0:50 min
- DWI SMS 2, b800
  - TA 1:46 min
- CS 3D T2 SPACE\(^6\) MRCP
  - TA 0:16 min
- CAIPIRINHA VIBE tra
  - 4 x 12 s breath-hold
- CAIPIRINHA VIBE cor
  - 18 s breath-hold

**Total exam**

- 12:23 min

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**Turbo Suite Excelerate**

- 49% reduction

- Value add

- >50% reduction

**Total exam**

- 5:08 min
Complete lumbar spine exam

**Turbo Suite Essential**

- T2 TSE
  - $0.6 \times 0.6 \times 4 \text{ mm}^3$
  - TA: 1:05 min

- T1 TSE
  - $0.6 \times 0.6 \times 4 \text{ mm}^3$
  - TA: 1:33 min

- T2 STIR
  - $0.6 \times 1.2 \times 4 \text{ mm}^3$
  - TA: 2:06 min

- T1 TSE
  - $0.7 \times 0.9 \times 4 \text{ mm}^3$
  - TA: 4:26 min

- T2 TSE
  - $0.6 \times 0.8 \times 4 \text{ mm}^3$
  - TA: 2:33 min

**Total exam**
- **11:43 min**

**Turbo Suite Excelerate**

- T2 TSE
  - $0.6 \times 0.6 \times 4 \text{ mm}^3$
  - TA: 1:05 min

- T1 TSE
  - $0.6 \times 0.6 \times 4 \text{ mm}^3$
  - TA: 1:33 min

- T2 STIR
  - $0.6 \times 1.2 \times 4 \text{ mm}^3$
  - TA: 2:06 min

- T1 TSE SMS 2
  - $0.7 \times 0.9 \times 4 \text{ mm}^3$
  - TA: 1:50 min

- T2 TSE SMS 2
  - $0.6 \times 0.8 \times 4 \text{ mm}^3$
  - TA: 1:43 min

**Total exam**
- **8:17 min**

30% reduction
Complete knee exam

Turbo Suite Essential

PD TSE FS
0.4 × 0.4 × 3 mm³  
TA 2:43 min

PD TSE FS
0.3 × 0.3 × 3 mm³  
TA 3:05 min

PD TSE FS
0.4 × 0.4 × 3 mm³  
TA 2:20 min

T1 TSE
0.3 × 0.3 × 3 mm³  
TA 2:12 min

T2 TSE
0.3 × 0.3 × 3 mm³  
TA 2:56 min

Total exam
13:16 min

Turbo Suite Excelerate

PD TSE FS SMS 2
0.4 × 0.4 × 3 mm³  
TA 1:30 min

PD TSE FS SMS 2
0.3 × 0.3 × 3 mm³  
TA 1:43 min

PD TSE FS SMS 2
0.4 × 0.4 × 3 mm³  
TA 1:18 min

T1 TSE SMS 2
0.3 × 0.3 × 3 mm³  
TA 1:06 min

T2 TSE SMS 2
0.3 × 0.3 × 3 mm³  
TA 1:35 min

Total exam
7:12 min

46% reduction
Advanced metal artifact reduction for clinical routine with CS SEMAC\textsuperscript{6,7)}

**Turbo Suite Essential**

- SEMAC, 1.2 x 1.2 x 3 mm\textsuperscript{3}
- TA 11:10 min

**Turbo Suite Excelerate**

- CS SEMAC\textsuperscript{6}, 1.2 x 1.2 x 3 mm\textsuperscript{3}
- TA 5:30 min

51% reduction

Fast and distortion free DWI with SMS RESOLVE\textsuperscript{6)} with up to 60% acquisition time savings\textsuperscript{8)}

**Turbo Suite Essential**

- Conventional RESOLVE, b800
  - 1.2 x 1.2 x 5.0 mm, 28 slices
  - TA 4:21 min

**Turbo Suite Excelerate**

- SMS RESOLVE\textsuperscript{6}, SMS 2, b800
  - 1.2 x 1.2 x 5.0 mm, 28 slices
  - TA 2:35 min

- SMS RESOLVE\textsuperscript{6}, SMS 3, b800
  - 1.2 x 1.2 x 5.0 mm, 28 slices
  - TA 1:44 min
Turbo Suite Elite

Expand your clinical capabilities and increase the number of patients eligible for MRI.

Turbo Suite Elite leverages the full potential of Compressed Sensing for dynamic, and full free-breathing examinations.

With Compressed Sensing GRASP-VIBE, perform full free-breathing liver dynamics for greater patient comfort and fewer rescans. With Compressed Sensing Cardiac Cine, cardiac function can be captured in one short scan, under free-breathing, even for the most challenging patients.

With Turbo Suite Elite, you get continuous access\(^5\) to new cutting-edge MR acceleration techniques.

What you get:

• Allow more patients access to MRI
• Increased patient satisfaction
• Significantly shortened exams
• Future security with access to one additional new Compressed Sensing or SMS application at no additional cost\(^5\)
More capabilities – ahead in resolution

Abdominal imaging

Turbo Suite Essential

- T2 HASTE cor
  TA 1:10 min
- T2 HASTE FS tra
  TA 0:50 min
- DWI, b800
  TA 3:29 min
- 3D T2 SPACE MRCP
  TA 5:48 min
- CAIPIRINHA VIBE tra
  4 x 12 s breath-hold
- CAIPIRINHA VIBE cor
  18 s breath-hold

Total exam
12:23 min

Turbo Suite Excelerate

- T2 HASTE cor
  TA 1:10 min
- T2 HASTE FS tra
  TA 0:50 min
- DWI SMS 2, b800
  TA 1:46 min
- CS 3D T2 SPACE MRCP
  TA 0:16 min
- CAIPIRINHA VIBE tra
  4 x 12 s breath-hold
- CAIPIRINHA VIBE cor
  18 s breath-hold

Total exam
5:08 min

>50% reduction

Turbo Suite Elite

- CS 3D GRASP-VIBE
  free-breathing dynamics

Free-breathing exam
Cardiac imaging

**Turbo Suite Essential**

Conventional Cardiac Cine
TA 4–6 min, 7–12 breath-holds

**Turbo Suite Elite**

Compressed Sensing Cardiac Cine
TA 15–20 sec 1 heartbeat, free-breathing

> 4 mins saved
Free-breathing exam
Technical specifications

Turbo Suite is available for MAGNETOM MRI systems operating on the XA Software platform.

**Turbo Suite Essential contains:**
- iPAT and iPAT²
- T-PAT (temporal iPAT)
- CAIPIRINHA for advanced iPAT²
- CAIPIRINHA SPACE for high resolution MSK and neuro imaging in all contrasts and orientations
- CAIPIRINHA VIBE for high resolution T1-weighted 3D imaging

**Turbo Suite Excelerate contains:**
**Simultaneous Multi-Slice (SMS) imaging**
- SMS TSE, supporting all TSE contrasts and orientations
- SMS DWI/DTI for neuro, breast, liver and pelvic imaging
- SMS RESOLVE⁶ for high-resolution, distortion free DWI in up to 60% shorter scan time

**Compressed Sensing (CS) static imaging**
- CS Time-of-Flight imaging⁶ with 10 fold acceleration for high-resolution 3D ToF angiography in only 2 minutes
- CS SPACE⁶ enables accelerated acquisition of high-resolution 3D images of the brain in 3 minutes per contrast for fast, 16s breath-hold acquisitions of RCP’s.
- Future security: CS TOF, CS SPACE, CS SEMAC⁶ and SMS RESOLVE are pending 510(k) clearance with syngo MR XA11B for MAGNETOM Vida and with syngo MR XA12 for MAGNETOM Amira, A BioMatrix System. The introduction of these features is planned with syngo MR XA20 for MAGNETOM Sola, Lumina and Altea. Turbo Suite Excelerate will provide access to these additional static Compressed Sensing or SMS applications at no additional cost. If a system software upgrade is required, it will be provided at no additional cost.

**Turbo Suite Elite contains:**
**Compressed Sensing (CS) 2D dynamic imaging**
- CS Cardiac Cine provides functional assessment within one short breath-hold. It is robust against arrhythmia and breathing artifacts

**Compressed Sensing (CS) 3D dynamic imaging**
- CS GRASP-VIBE extends the patient population eligible for dynamic liver MRI – through free-breathing exams for patients who cannot reliably hold their breath
- TWIST and TWIST-VIBE for high-resolution 3D dynamic imaging and angiography
- StarVIBE for motion robust T1-weighted 3D imaging
- Future security: Starting with syngo MR XA11B, Turbo Suite Elite will provide access to 1 additional dynamic Compressed Sensing or SMS application at no additional cost with a new system software. System software upgrades released globally after 2019 may require an EVOLVE step or separate purchasing.
Why Siemens Healthineers?

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.

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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Disclaimer and footnotes


3) Data on file; results may vary

4) The planned introduction of the individual CS and SMS applications may vary for different MAGNETOM systems. Turbo Suite Excelerate will provide access to these additional static Compressed Sensing or SMS applications at no additional cost. If a system software upgrade is required, it will be provided at no additional cost.

5) Starting with syngo MR XA11B, Turbo Suite Elite will provide access to 1 additional dynamic Compressed Sensing or SMS application at no additional cost with a new system software. System software upgrades released globally after 2019 may require an EVOLVE step or separate purchasing.

6) 510(k) pending. It is not commercially available in all countries. Due to regulatory reasons the future availability cannot be guaranteed.

7) The MRI restrictions (if any) of the metal implant must be considered prior to patient undergoing MRI exam. MR imaging of patients with metallic implants brings specific risks. However, certain implants are approved by the governing regulatory bodies to be MR conditionally safe. For such implants, the previously mentioned warning may not be applicable. Please contact the implant manufacturer for the specific conditional information. The conditions for MR safety are the responsibility of the implant manufacturer, not of Siemens.


9) Depending on individual patient conditions and heart-rate.