

PURCHASE ORDER: 652-B80065

REQUESTING SERVICE: RADIOLOGY/NUCLEAR MEDICINE

SHIP TO: CHF,ACQ & MAT MGT
V.A. Medical Center
REC. WHSE. BLDG 500
1201 BROAD ROCK BLVD.
RICHMOND, VA 23249

Qty

Item Description

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SOMATOM Force

The all new SOMATOM Force contains two new Vectron X-ray tubes with unprecedented 2 x 1,300 mA tube current at 2 x 120 kW generator power. The new Stellar Infinity detector, including TrueSignal and Edge Technology providing increased in plane resolution (1,840 channels) and ~ 50% increased z-coverage, compared to SOMATOM Definition Flash. SOMATOM Force takes CT imaging where it has never gone before by routinely generating ultra-thin 0.5 mm slices e.g. for most accurate stenosis, plaque and stent analysis and for low-kV imaging without compromises, even in adults or obese patients at scan speeds up to 737 mm/s (opt.). Additionally, the all new measurement system sets the benchmark in low contrast detectability. An object size of 2 mm, at a contrast difference of 3 HU, with a CTDIvol (Ø 32 cm) of only 12.3 mGy (with Phantom CATPhan (20 cm)) can be detected. The all new SOMATOM Force gantry, with its powerful hollow shaft motor achieves maximum rotation speeds of up to 0.25 seconds (optional) resulting in down to 66 ms, heart rate independent temporal resolution to freeze motion. It features the all new Turbo Flash mode, with a dynamic Field of View (FoV) of up to 50 cm, even in ultra-high pitch applications (737 mm/s table speeds, Opt.). Besides, it enables reduction in dose, while it improves overall image quality (both high- and low-contrast resolution) for all scans, resulting, e.g. in dose down to sub-mSv for cardiac imaging and below. In its third generation, Dual Energy with Tin Filter (~30% better energy separation, for more precise Dual Energy quantification), automatically provides a second contrast for the best possible diagnosis without any extra dose at a Dual Energy Field of View (FoV) of up to 35 cm at scan speeds up to 285 mm/s (opt.).

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CT Acute Care Engine - Scan Opt

The CT Acute Care Engine Scan Options provide the following:

- Extended FoV of 78 cm for obese patient imaging
- HeartView, including
- Prospectively triggered high-pitch Turbo Flash Spiral, e.g. for sub-mSv cardiac scanning
- ECG-Gated Spiral for high and irregular heart rates
- Cardio Sequence for moderate heart rates
- 0.25 s rotation time to freeze any motion (e.g. cardiac motion)
- MinDose ECG Pulsing dose saving in cardiac function
- Edge Technology for 0.30 mm spatial resolution
- Cardio BestPhase Plus for optimal cardiac phase selection

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CT Acute Care Engine Pro - Scan Opt

The CT Acute Care Engine Pro Scan Options include the following:

Qty	Item Description
	<ul style="list-style-type: none"> - Adaptive 4D Spiral acquisition for whole organ perfusion - UHR with extra wide comb for high isotropic resolution - Tilttable (adjustable) head holder for optimal positioning of stroke patients
1	Rear cover incl. gantry panels Standard CT gantry back cover, including two gantry panel control units.
1	Ring Light SOMATOM Force offers a gantry ring mood light (LED) in different, preset, adjustable colors that are synchronized with the gantry funnel light. They help creating a relaxing atmosphere for your patients, making a SOMATOM Force examination even more exciting and memorable.
1	Tunnel Light SOMATOM Force offers a funnel mood light (LED) in different, preset, adjustable colors that are synchronized with the gantry ring light. It makes the gantry bore appearing wider thus making it easier for patients with claustrophobia to undergo their examination.
1	Patient Table The table is especially designed for 200 cm scan range and ultra-fast spiral scanning (up to 737 mm/s with HeartView in Turbo Flash spiral). The included Physiological Measurement Module allows connecting a 3 channel ECG cable (included) for ECG controlled cardiac acquisition.
1	Mattress w. improved table protect. This mattress is ideal for trauma and acute care settings. The mattress has wide flaps and offers additional protection by preventing liquids spilling into the table by covering the gaps between table top and the table base.
1	Cooling System Water/Air #split Water-to-air heat exchanger for the dissipation (to the air outside) of heat, generated in the gantry.
1	Service Switch Service switch to shut off the outdoor cooling unit for maintenance or in case of emergency
1	Trafo for cooling system water/air For adequate power consumption the chiller system may need an additional transformer: If the electrical connection to be used can not provide either 400V at 50Hz or 460V at 60Hz this transformer is needed.
1	CARE Child Dedicated pediatric CT imaging, including 70 kV scan modes and specific CARE Dose4D curves and protocols
1	X-CARE Partial scanning to reduce direct X-ray exposure for the most dose-sensitive body regions, e.g. the breasts, thyroid gland or eye lens.
1	FAST CARE Platform Siemens' unique FAST CARE platform is set to raise the standard of patient-centric productivity. Utilizing FAST - Fully Assisting Scanner Technologies - typically time-consuming and complex procedures during the scan process are extremely simplified and automated, not only improving workflow efficiency, but optimizing the clinical outcome by creating reproducible results, making diagnosis more reliable and reducing patient burden through streamlined examinations. Siemens' desire for as little radiation exposure as possible lies at the heart of the CARE - Combined Applications to Reduce Exposure - research and development philosophy offering a unique portfolio of dose saving features, many of them being introduced as industry's first.

Qty	Item Description
1	FAST Planning #AWP Direct, organ-based setting of scan and recon ranges for a faster and more standardized workflow.
1	DoseMAP DoseMAP - Siemens CT Dose Management Program - creates transparency in dose values and makes it possible to assess the dose situation. It improves security by setting dose alerts. DoseMAP has three components for complete and comprehensive dose management: Report, Analyze, and Protect.
1	ADMIRE ADMIRE (Advanced Modeled Iterative REconstruction) is the next generation of Iterative Reconstruction. ADMIRE offers on the fly powerful dose reduction, excellent image quality and everyday suitability. Other unique qualities of ADMIRE are: Superb details, Positive impact on the reconstructed image quality in comparison to SAFIRE, Reader-ready reconstructions deliver the desired image impression on the fly. Due to the computer power of the new Image Reconstruction System (IRS), ADMIRE has a potential to lower radiation, and to offer a routine-ready performance.
1	FAST Spine #AWP Accurate and anatomically aligned preparation of spine recons with just a single click.
1	FAST 3D Align FAST 3D Align enables automated alignment of FOV, adjustments and reconstructions of standard views.
1	FAST DE (DE WorkStream 4D) FAST Dual Energy (DE) is a 4D workflow for the Dual Energy data with direct generation of axial, sagittal, coronal, or double-oblique images from standard Dual Energy scanning protocols. The Advantage: the elimination of time consuming, error prone, manual reconstruction steps and a reduction of data volume up to a factor of 10, since virtually all diagnostic information is captured in 3D slices.
1	syngo Dual Energy Scan with SPS II The syngo Dual Energy Scan with SPS II (Selective Photon Shield II) option allows the use of both SOMATOM Force X-ray sources simultaneously at different energies, while the Selective Photon Shield II reduces dose and at the same time increases energy separation by blocking unnecessary parts of the energy spectrum. syngo Dual Energy offers the possibility to acquire two spiral data sets simultaneously from a single scan running the tubes at 80/140 kV, 100/140 kV and newly with 80/150 kV (for obese Dual Energy imaging). The results are two data sets with diverse information.
1	syngo Security Package Security package for general regulatory security rules
1	Computer Desk New CT desk to accommodate the control components and color monitor. Width: 1200 mm, Depth: 800 mm, Height: 720 mm.
1	Computer Desk, height adjust 110V The height adjustable table (710 mm to 1100 mm) supports optimal ergonomic working positions at the CT consoles. It allows users to switch between the dynamism of a standing desk and the comfort of a traditional desk.
1	Additional User Manual Additional user manual for the above selected CT system.

Qty	Item Description
1	<p>CT Project Management</p> <p>A Siemens Project Manager (PM) will be the single point of contact for the implementation of your Siemens equipment. The assigned PM will work with the customer's facilities management, architect or building contractor to assist you in ensuring that your site is ready for installation. Your PM will provide initial and final drawings and will coordinate the scheduling of the equipment, installation, and rigging, as well as the initiation of on-site clinical education.</p>
1	<p>CT Standard Rigging and Installation</p> <p>This quotation includes standard rigging and installation of your CT new system.</p> <p>Standard rigging into a room with reasonable access, as determined by Siemens Project Management, during standard working hours (Mon. - Fri./ 8 a.m. to 5 p.m.)</p> <p>It remains the responsibility of the Customer to prepare the room in accordance with the SIEMENS planning documents.</p> <p>Any special rigging requirements (Crane, stairs, etc.) and/or special site requirements (e.g. removal of existing systems, etc.) is an incremental cost and the responsibility of the Customer.</p> <p>All other "out of scope" charges (not covered by the standard rigging and installation) will be identified during the site assessment and remain the responsibility of the Customer.</p>
1	<p>Initial onsite training 32 hrs</p> <p>Up to (32) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist. Uptime Clinical Education phone support is provided during the warranty period for specified posted hours. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p>Initial onsite training 32 hrs GovOffset</p>
1	<p>Additional onsite training 32 hours</p> <p>Up to (32) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist if applicable. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p>Additional onsite training 32 hours</p> <p>Up to (32) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist if applicable. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p>Additional onsite training 24 hours</p> <p>Up to (24) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist if applicable. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.</p>
1	<p>teamplay Welcome & Registration Package</p> <p>teamplay is a cloud-based network that brings together your imaging modality users, the systems' dose and utilization data, and the users' expertise to help you improve the delivery of care to your patients. Basic features are provided free of charge. Premium features (benchmarking, non-Siemens devices) are provided on a trial basis for three months at no</p>

Qty	Item Description
	charge, and may be used thereafter on a subscription fee basis. To register: http://teamplay.siemens.com/#/institutionRegistration/1
1	Riedel Chiller Start-up by SBT
1	Surge Protective Device (SPD)
1	Stellant D Dual Ceiling w/Certegra WS New Stellant D Dual Ceiling mounted with Certegra Workstation NO Informatics. Short ceiling post - 580 mm. Other ceiling post lengths are available (different part numbers): 850 mm and 1000 mm. Includes Stellant D, Dual Head, ceiling mounted injector; Certegra workstation; installation and warranty through Medrad.
1	Bayer Contrast Dose Mgt S/W Contrast Dose Management Software package Point-of-Care Data Entry Automates Direct Documentation Auto-populate the accession number, study description, and more, directly from RIS. Capture vital injection details, including contrast brand and concentration, saline, catheter gauge, injection site, lot number, expiration date, and technologist IDs Includes the following: CT Point of Care Software Contrast Dose Management with VM Installation & Implementation Services through Bayer
1	Bayer PACS Outbound Interface Interface to display updated contrast-injection records, alongside associated PACS image sets, for reading-room visibility into any adjustments made to the protocol prescribed. PACS connectivity - requires Informatics Starter Package, installation included when purchased with the Bayer injector.
1	Bayer Outbound SR Interface Speech Recognition interface - requires Informatics Starter Package, installation included when purchased with the Bayer injector. Auto-populate patient, injection, and study information into interfaced RIS and Radiology Speech Reporting Systems, to eliminate dictation and speed report turnaround time.
1	Bayer HL7 Outbound Interface HL7 Outbound Interface, RIS Systems Interface - Workflow Connections for Quality and Analytics. The platform makes contrast-dose connections through the Medrad Injection system, Contrast-injection records are collected and shared across interfaced IT systems. Requires Informatics Starter Package. Installation included when purchased with the Bayer injector.
1	Low Contrast CT Phantom & Holder
1	Standard UPS for Force The standard partial system uninterruptible power system (UPS) is built directly into the power distribution cabinet (PDC) and supports the critical circuits for table and gantry electronics, console computer, image reconstruction system, and the internal Ethernet switch (to ensure connectivity). This enables safe removal of patient if outage occurs during scanning. The UPS allows for a safe shutdown of the CT scanner in the event of power interruption. The

Qty	Item Description
	UPS provides 5-7 minutes of power, during which the user is prompted and guided through the process to perform a safe shutdown of the system. This safe shutdown ensures that no data is lost.
1	Access Protection Scan Protocols are password protected allowing only authorized staff members to access and permanently change protocols
1	Adaptive Dose Shield Adaptive Dose Shield for spiral acquisition to eliminate pre- and post-spiral over-radiation.
1	CARE Analytics Stand-alone tool, for installation in any PC in the hospital network, allowing evaluation of DICOM dose Structured Reports (DICOM SR)
1	CARE Dashboard Visualization of activated dose reduction features and technologies for each scan range of an examination to analyze and manage the dose to be applied in the scan
1	CARE Dose4D CARE Dose4D delivers the highest possible image quality at the lowest possible dose for patients - maximum detail, minimum dose. Adaptive dose modulation for up to 60% dose reduction
1	CARE Dose Configurator CARE Dose Configurator: Enhancement of Siemens' renowned real-time dose modulation CARE Dose4D, introducing new reference curves for each body region and for each body habitus allowing to adjust the configuration even more precisely to the patient's anatomy.
1	CARE kV CARE kV: First automated, organ-sensitive voltage setting to improve image quality and contrast-to-noise-ratio while optimizing dose and potentially reducing it by up to 60%.
1	CARE Profile CARE Profile: Visualization of the dose distribution along the topogram prior to the scan
1	DICOM SR Dose Reports DICOM structured file allows for the extraction of dose values (CTDIvol, DLP)
1	DoseLogs Whenever a dose limit exceeds the established reference dose levels (Dose Notification and Dose Alert) a report is automatically created on the system, enhancing your ability to track radiation dose.
1	Dose Alert Dose Alert: Dose Alert automatically adds CTDIvol and DLP values depending on z-position (scan axis). The Dose Alert window appears, if either of these cumulative values exceeds a user-defined threshold.
1	Dose Notification Dose Notification: Dose Notification provides the ability to set dose reference values (CTDIvol, DLP) for each scan range. If these reference values are exceeded the Dose Notification window informs the user.
1	FAST Adjust FAST Adjust: assists the user to handle system settings in a fast and easy way by automatically solving of conflicts within user defined limits by one single click on the FAST Adjust button. The limits for scan time and tube current per scan are defined via the Scan Protocol Assistant. FAST Adjust offers an undo functionality to return to previously set values.

Qty	Item Description
1	FAST Scan Assistant FAST Scan Assistant: An intuitive user interface for solving conflicts by changing the scan time, resp. the pitch and/or the maximum tube current manually.
1	NEMA_XR-29 Standard This system is in compliance with NEMA XR-29 Standard Attributes on CT Equipment Related to Dose Optimization and Management, also known as Smart Dose.
1	SureView Provides exceptional image quality at any pitch setting, enabling you to scan faster because you can scan at any pitch without degrading image quality
1	UFC Detector Ultra Fast Ceramics (UFC) technology is a unique type of scintillation technology material that quickly and efficiently transforms radiation from the X-ray tube into light signals. Its superb overall quantum efficiency and unique short afterglow enable time-critical X-ray detection at low doses and extremely fast data collection.
1	Neuro BestContrast The Neuro BestContrast algorithm can provide enhanced tissue contrast, resulting in improved contrast between gray and white matter without increasing image noise. This post processing step is rapid and can be easily incorporated into clinical workflow where it can be used with other dose reduction approaches such as iterative reconstruction.
1	SOMATOM Force System Complimentary Biomed Training This educational offering includes system training tuition for 1 clinical engineering professional on the SOMATOM Force system and the syngo multimodality workstation as applicable. The training curriculum depends on and is limited to the system purchased and may include multiple courses including classroom training in USA or an international site, and/or virtual and web-based training. Additional modality basics training may be required as a prerequisite to these courses and must be purchased separately. This system training includes a 15% discount. Travel and lodging are not included. This educational offering must be completed by the later of (12) months from purchase or install end date; if training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund. This forfeiture does not apply to Federal government agencies.

Incidental Services for SOMATOM Force (VA50) on Quote Nr. 1-NLH6DL Rev. 2

Offset SOMATOM Force System Complimentary Biomed Training

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

Offset Part CT_ADD_32 One Additional Onsite Training 32 hours

Offset Part 14440662 Additional User Manual

Quote Nr:	1-O2CSWQ Rev. 0
Terms of Payment:	00% Down, 80% Delivery, 20% Installation Free On Board: Destination
Purchasing Agreement:	IDIQ CONTRACT 2017 IDIQ CONTRACT 2017 terms and conditions apply to Quote Nr 1-O2CSWQ

syngo.via - Upgrades and Options for Installed Base VB20

Qty	Item Description
3	syngo.CT Cardio-Vasc. Engine #1+ The CT Cardio-Vascular Engine Pro permits access for one additional user.
3	syngo.CT Cardio-Vasc. Engine Pro#1+ The CT Cardio-Vascular Engine Pro permits access for one additional user.
3	syngo.CT DE Advanced Package #1+ The syngo.CT Dual Energy Advanced Package upgrade contains an additional single user access for: - syngo.CT Dual Energy Advanced Package

Detailed Technical Specifications

Description

The SOMATOM Force is Siemens' state-of-the-art high-end Dual Source CT that provides the possibility to scan with Turbo Flash speed to be two steps ahead in

- a) Preventive Care, with low-kV scanning and low dose early detection (e.g. in Lung and Colon)*
- b) Freezing Motion, with free-breathing CT imaging and fastest, most versatile scanning (Turbo Flash Spiral mode)
- c) Decision Making, with 4D imaging at up to half the dose and most precise DE quantification

SOMATOM Force - the scanner that is able to scan:

- adults and obese patients at very low kV settings in order to save radiation or contrast media dose (concentration)**
- with comparable air-to-soft tissue contrast (e.g. lung and colon) at significantly lower dose, compared to Definition Flash)
- to scan soft tissue and the brain at new and higher low-contrast resolution
- with the Turbo Flash mode up to a FoV of 50 cm, dependent on the pitch (min. FoV 35 cm), making it suitable for trauma and ED imaging, also in obese patients
- all organs for dynamic perfusion imaging (whole organ coverage) (opt.)
- 4D dynamic imaging at reduced doses, compared to Definition Flash (opt.)
- 4D dynamic imaging at higher temporal resolution and longer ranges (opt.)
- the whole heart in 4D dynamic myocardial stress perfusion (quantitative) (opt.)
- in Dual Energy without dose penalty at a very high precision for iodine quantification (opt.)
- in Dual Energy at a fast acquisition speed of up to 285 mm/s, at a larger FoV (35 cm) making it suitable for ED/trauma imaging. (opt.)
- the heart in Dual Energy mode with a temporal resolution down to 66 ms (opt.)
- the heart routinely below 1 mSv, and selected patients even at 0.1 mSv (opt.)
- patients without the need for breath hold or holding still
- pediatric patients without controlled breathing
- thorax/heart/abdomen in about 0.2 s at a dose of <3 mSv

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- to scan the heart even in the systolic phase with Turbo Flash mode (opt.)

- to scan the body and the heart at an higher high-contrast resolution (standard: 22 lp/cm @ 0% MTF in x/y plane (0.24 mm) and 16.7 lp/cm in z-direction (0.30 mm))

- to scan the lung at a slice width of down to 0.4 mm (opt.)

The SOMATOM Force *may achieve the same Contrast-to-Noise level (in terms of image pixel noise) in the image at reduced dose.

**** *"With the low kV / high mA capabilities of the VECTRON tube, SOMATOM Force allows scanning with a very high tube current of up to 1300 mA at 70, 80 and 90 kV, such that a high tube output even for these low kV settings can be achieved. Along with SOMATOM Force's unique Turbo Flash Mode, this scan configuration is also available for conventional spiral or sequential scanning."***

- at 66 ms temp. resolution for all heart rates (even atrial fibrillation) (opt.)

- obese patients up to 307 kg (opt.) with 78 cm bore and 2 x 120kW

- at up to 60% lower dose with iterative recon (SAFIRE)* at an unprecedented recon speed

* In clinical practice, the use of SAFIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. The following test method was used to determine a 54 to 60% dose reduction when using the SAFIRE reconstruction software. Noise, CT numbers, homogeneity, low-contrast resolution and high contrast resolution were assessed in a Gammex 438 phantom. Low dose data reconstructed with SAFIRE showed the same image quality compared to full dose data based on this test. Data on file.

The SOMATOM Force is founded on the two fully-integrated Siemens' Stellar Infinity detector systems, with two revolutionary Vectron X-ray sources, the Turbo Flash Spiral scanning up to 737 mm/s, the diagonal z-Sharp technology, Dual Energy with Selective Photon Shield II and a range of proven CARE solutions from X-CARE to the Adaptive Dose Shield.

Using Siemens' diagonal z-Sharp technology the SOMATOM Force can provide the fastest sub-millimeter volume coverage at industry's highest spatial resolution. The high rotation time of 0.25 seconds delivers excellent temporal resolution up to 66 ms independent from the heart rate.

The SOMATOM Force opens a door to new levels of patient friendliness with the speed to cover the entire thorax in less than a second - if necessary even without a breath hold. A whole-body scan requires only five seconds, while for perfusion or dynamic vascular imaging long-range scans become routine and pediatric scans become sub-second procedures. Your patients will be off the table faster than ever before - with positive feelings about their scan experience. Turbo Flash is also the solution for scanning your most difficult patients (i.e. obese and trauma patients, restless children, patients who cannot hold their breath for long), thus causing no time-consuming interruptions in your daily practice.

And now Siemens is once again redefining speed: the new SOMATOM

Force, with the new FAST CARE technology platform, allows you to maximize clinical outcomes - meaning you will have the best possible clinical results, but with significantly fewer resources bound to the CT system. The ultimate goal is to provide you with more time for patients and diagnosis - in effect, patient-centric productivity. The complete examination - from scan preparation, scanning, reconstruction, and data assessment - is streamlined, leading to a fast and reliable diagnosis with less patient burden. Ultimately, the combination of highest image quality and highest patient-centric productivity is the lever to maximizing your clinical outcomes.

Maybe even more important - and impressive - is the significant reduction in dose which allows e.g. for sub-mSv scanning in case of cardiac imaging

Furthermore, the third generation of dual source systems also enables the user to acquire Dual Energy data and benefit from Dual Energy post processing without compromising image quality or dose. Due to the introduction of the new Selective Photon Shield II, with an even further improved energy separation for more precise DE quantification, each scan on the SOMATOM Force can now become a precise Dual Energy scan. At the same time, X-CARE protects individual organs and the most radiation-sensitive body regions - for example, female breasts - by accurately and efficiently minimizing exposure while preserving image quality.

Description

With the new SOMATOM Force with FAST CARE, Siemens introduces several innovative Combined Applications to Reduce Exposure (CARE). CARE kV, for instance, is the industry's first tool that automatically solves the complex equation for optimal image quality at lowest possible dose for each individual CT exam while considering tube voltage, tube current, and contrast changes at different voltages and attenuation. This allows you to benefit from the industry's widest tube voltage range - not only 150 kV for bariatric imaging but now, if necessary, also down to 70 kV for new safety and image quality standards, not only in pediatric imaging, but thanks to Vectron tube, The SOMATOM Force may also allow obese low kV imaging. Add SAFIRE*, our raw-data-based iterative reconstruction and define low dose for all body regions to take best care of your patients' well-being.

*** In clinical practice, the use of SAFIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.**

The SOMATOM Force System Overview

- SOMATOM Force Gantry

The SOMATOM Force gantry is founded on two fully-integrated Stellar Infinity Detector systems, with two revolutionary Vectron X-ray sources, the Turbo Flash Spiral scanning up to 737 mm/s, the diagonal z-Sharp technology, Dual Energy with Selective Photon Shield II and a range of proven CARE solutions from the Adaptive Dose Shield to X-CARE.

The 78 cm large bore, the 200 cm scan range - with patient weight up to 307 kg (676 lbs) (opt.) - and the 200 kW generator power, it can scan most acute patients independent of size or condition, helping to save precious time from scan to diagnosis.

Its Ultrafast rotation time of 0.25 sec. (optional) leads to acquired (not reconstructed) 66 ms temporal resolution to freeze any cardiac motion even in high and irregular heart rates.

The optional Dual Source Turbo Flash Spiral mode acquisition of 2 x 192 x 0.6 mm allows for increased scan speed up to 737 mm/s e.g. for pediatric head or chest CT scans or routine sub-mSv heart examinations in patients with stable/low heart rate and a weight of up to 90kg.

- Vectron tubes with diagonal z-Sharp Technology

The two Vectron sources provide cooling through an water-chilled e-catcher, closely mounted to the rotating anode, for direct cooling of the anode. Utilizing the Turbo Flash Spiral scanning technology in combination with Siemens' own diagonal z-Sharp Technology it routinely enables the industry's highest isotropic, scan field position and pitch independent spatial resolution. This allows a highly beneficial combination of exceptional image detail and unmatched sub-millimeter volume coverage of 737 mm/sec enabling whole body examinations within sub-seconds and seconds, even without the need for breath hold - adapting to challenging patients such as poly-trauma and incautious or uncooperative patients, leading to an improvement in image quality (e.g. minimized motion artifacts) and patient comfort (e.g. no breath hold.).

In addition, the Vectron Tubes are equipped with the Adaptive Dose Shields world's first dynamic tube collimation that protects the patient from clinically irrelevant radiation in every spiral scan.

- Stellar Infinity detector

The revolutionary Stellar detector, is designed to minimize electronic noise using Siemens' innovative TrueSignal technology. It thus significantly improves the signal-to-noise-ratio (SNR). In combination with Siemens' proprietary UFC scintillator the SOMATOM Force acquires 2 x 192 slices per rotation at outstanding dose efficiency.

Herein the new Stellar Infinity detector hardware minimizes electronic noise and cross-talk, through its TrueSignal technology.

By further applying Edge Technology the spatial resolution can now be increased to an unprecedented 0.30 mm (16.7 lp/cm) in daily clinical routine, which makes it finally suitable for clinical practice as the signal-to-noise ratio is adequate without an additional increase in dose.

In combination with UHR (optional), it delivers a slice width of unprecedented 0.4 mm allowing visualizing

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extremely small anatomical structures with exceptional quality, for example the complex inner-ear bones,.

- Power Generator

The generator power of up to 2 x 120 kW delivers sufficient resources for every clinical challenge and thus helps to acquire exceptional image quality and save precious time from scan to diagnosis.

- Patient table

The patient table with a scan range of up to 200 cm and a load capacity of up to 307 kg / 676 bs. (optional) in combination with the 78 cm gantry diameter of the SOMATOM Force virtually adapts to any patient independent of size or condition thus helping to avoid patient exclusions.

- FAST CARE

With Siemens' unique FAST CARE platform, the SOMATOM Force is set to raise the standard of patient-centric productivity. Utilizing FAST - Fully Assisting Scanner Technologies -, typically time-consuming and complex procedures during the scan process are extremely simplified and automated, not only improving workflow efficiency, but optimizing the overall clinical outcome by creating reproducible results, making diagnosis more reliable and reducing patient burden through streamlined examinations. For example FAST Spine automatically labels all vertebrae and discs after the data acquisition and prepares typical reconstruction ranges rapidly in spine examinations.

- Low Dose with CARE

Siemens has developed many significant products and protocols that follow the "As Low as Reasonably Achievable" (ALARA) principle to reduce radiation dose to the lowest possible level. This desire for as little radiation exposure as possible lies at the heart of our CARE - Combined Applications to Reduce Exposure - research and development philosophy. The SOMATOM Force consequently offers a unique portfolio of dose saving features; many of them being industry's first like the Adaptive Dose Shield, CARE kV or 70kV scan modes. Using Siemens' CARE solutions radiation dose can be significantly reduced compared to conventional CT systems.

Clinical Applications

The SOMATOM Force introduces the third generation of Siemens Dual Source Dual Energy imaging, proven by more than 1.500 installations worldwide and a wide range of clinical publications. With the all-new Selective Photon Shield II and a larger field of view (500 mm FoV visual, 350 mm full Dual Energy FoV), it offers up to 30% increased energy separation.

SOMATOM Force now allows DE scanning with 80 kV/150 kV, 90 kV/150 kV and 100/150 kV with Sn (tin) filtration. Thus is adjusted even for larger patients, all the while the additional diagnostic information of Dual Energy is available without additional dose

Adaptive 4D Spiral

With its unique Adaptive 4D Spiral plus scan mode (optional) the SOMATOM Force overcomes the coverage limitations in dynamic CT imaging when using a static detector and allows for up to 80 cm coverage in dynamic CT imaging. It even enables for 4D CT DSA evaluation.

3D Interventional Suite

In addition the SOMATOM Force optionally offers a built in 3D minimal invasive suite, enabling 3D guided interventions with full control of the radiologist due to the all-new wireless in-room control.

Neuro BestContrast

Neuro head image quality is significantly improved with Neuro BestContrast, by optimizing grey/white matter differentiation without increase in radiation dose.

HeartView

With the HeartView CT option the SOMATOM Force achieves the industry's lowest heart rate independent temporal resolution of 66 ms. It allows to reliably scan all heart rates - even highest and irregular heart rates (atrial fibrillation), e.g. in acute chest pain evaluation, in coronary visualization, dynamic myocardial stress perfusion imaging and in functional analysis of the heart.

Heart Perfusion

The optional Heart Perfusion mode, for quantitative, dynamic myocardial stress perfusion imaging, is a sequence shuttle mode to dynamically cover up to approximately twice the detector width for myocardial perfusion studies of

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up to 105 mm, with sufficient temporal resolution of 66 ms even for high heart rates. This it provides sufficient temporal resolution even for high heart rates.

SOMATOM Force

System specification in detail

1. System Gantry and Detector:

Aperture: 78 cm; power supplied via low-voltage slip ring.

Patient Table: Standard table (200 cm) or Multi-purpose table (opt.) are available. The standard table consists of:

- Motor-driven table height adjustment from min. 49 cm to max. 92 cm
- longitudinal movement of the tabletop 200 cm in increments of 0.5 mm, positioning accuracy +/- 0.25 mm from any direction
- Horizontal scan range 200 cm
- Control elements on both sides on the front and rear panel of the gantry
- Table height can be controlled alternatively by means of foot switch (2 each on both sides of the patient table)
- Max. table load: 227 kg/500 lbs (optional 307kg/676 bs)
- Table feed speed: 2-800 mm/s
- Distance between gantry front and table base 40 cm, e.g. for convenient positioning of a mobile C-arm between gantry and table or for convenient access during CT-intervention.
- Positioning aids: Positioning mattress, mattress protector, head-arm support (inclusive cushion), tiltable head holders with positioning cushion set, patient restraining system for head fixation, restraining-strap set with body fixation strap that can be directly connected to the patient table top, headrest, table extension with positioning mattress, knee-leg support
- 4 pairs of optional Foot Pedals, available for high capacity table, conveniently allow table lifting and lowering from various positions
- Optional Multi-purpose table: Additional exchangeable table tops for High-capacity patient and trauma table top; RTP table top
- In the case of emergency stop or power failure, the tabletop can also be moved manually in horizontal direction

Scanning system: Adaptive Array Detector (AAD) systems based on UFC with 88,320 elements for measurement system A and 61,440 for system B. 2 x 192 detector electronic channels (DAS) utilized for up to 2 x 192 slices/rotation acquisition, and 1,840 for measurement system A and 1,280 for system B, measuring channels per slice (The measuring system can contain replacement components).

In cases of very low signal at the detector (e.g. when scanning bariatric patients), the Adaptive Signal Boost improves image quality by amplifying individual pixels based on an analysis of the surrounding image data. It reduces streaks and noise and maintains the correct HU values for large patients.

Spiral acquisition modes: 192 x 0.6 mm, 64 x 0.6 mm, 40 x 0.6 mm, 32 x 0.6 mm, 20 x 0.6 mm, 10 x 0.6 mm, 32 x 1.2 mm, 16 x 0.3 mm*, 8 x 0.3 mm*, 16 x 0.6 mm*, 8 x 0.6 mm*.

Sequence acquisition modes 64 x 0.6 mm, 32 x 0.6 mm, 32 x 1.2 mm, 12 x 1.2 mm, 1 x 5 mm, 1 x 10 mm, 8 x 0.3 mm*, 8 x 0.6 mm* (* optional).

The scan field diameter is 50 cm.

Three laser light markers: Horizontal, sagittal, and vertical laser light that shows the isocenter position of the scan plane.

2. Tube Assembly:

Source: The two Vectron sources provide cooling through an water-chilled e-catcher, closely mounted to the rotating anode, that significantly reduces extrafocal radiation, for reliable performance when operating two x-ray sources at an ultrafast rotation time of 0.25 sec.

Description

- 2 x Vectron high performance X-ray source
- Tube current range: Single source 20-1.300 mA
- Dual Source 40-2600 mA
- e-Catcher, catching extra-focal electrons off the anode, thus directly cooling the anode through its internal water cooling. - Focal spot size according to IEC 60336: 0.4 x 0.5mm/8°, 0.6 x 0.7 mm/8° and 0.8 x 1.1 mm/8°.
- Computer controlled monitoring of anode temperature
- Multifan principle with new diagonal flying focal spot (diagonal z-Sharp technology)
- 2 x Adaptive Dose Shields with ultrafast blade positioning and movement enabled through SiDaNet (Siemens Data Net Bus technology)

3. Diagonal z-Sharp Technology:

The unique Vectron X-ray source with diagonal z-Sharp technology utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating multiple thousand times per second. This doubles the X-ray projections reaching each detector element. The two overlapping projections result in an oversampling in z - direction. The resulting measurements interleave half a detector slice width, doubling the scan information without a corresponding increase in dose. Siemens' Stellar Infinity Detector hardware and the highly integrated 2 x 192-slice detector electronics enable a virtually simultaneous readout of two projections for each detector element - 2 x 2 x 96 slices for every viewing angle - resulting in a full 2 x 192-slice acquisition. Diagonal z-Sharp technology, utilizing the Vectron X-ray sources and the Stellar Infinity detector hardware, provides scan speed independent visualization of 0.33 mm isotropic voxels and a corresponding elimination of spiral artifacts in the daily clinical routine at any position within the scan field.

- 2 x 192-slice acquisition with diagonal z-Sharp technology
- routine 0.5 mm slice with 0.3 mm cross-plane resolution
- 0.4 mm slice with extra-large UHR comb (32 x 0.6 Collimation) (opt.) and a spatial resolution of 32 lp/cm (0.16 mm)
- Industry's highest isotropic and scan field position independent spatial resolution of 0.33 mm voxel size
- Visualization of the smallest anatomical structures with exceptional image quality in complex inner-ear bones, lungs or small sized vessels such as the intracranial, mesenteric and coronary system. Based on that accurate stenosis measurements or stent planning with outstanding precision are enabled.

4. High Power X-ray Generator:

2 microprocessor-controlled, low-noise high-frequency generators with integrated, automatic self-testing system for continuous monitoring of operation. Settings: High-voltage range 70, 80, 90, 100, 110, 120, 140 and 150 kV; power max. 2 x 120 kW (depends on clinic network) - for no compromises in obese imaging - adjustable in fine steps. The kV are automatically pre-selected through CARE kV in finest 10 kV steps based on patient body habitus and examination type for lowest possible dose at constant signal to noise ratio (image quality). The generator can maintain very high tube current (up to 2 x 1.300 mA) even during low-kV imaging thus allowing to benefit from radiation dose or contrast media concentration reduction - from pediatric to adult patients. ***"Early clinical experience based on imaging of the left ventricle and aortic root (TAVI studies) demonstrate that a reduction of contrast media administration may be possible using SOMATOM Force's Turbo Flash Mode and its low kV / High mA capabilities."***

5. Control and Evaluation Unit:

Control box: CT control with patient intercom, user-recordable patient instruction system, 30 automatic patient instruction (API) text pairs are available in nine languages.

syngo Acquisition Workplace: The *syngo* Acquisition Workplace provides an intelligent and reliable workflow for data acquisition, image reconstruction and routine post-processing at the CT scanner. Built on the unique *syngo* platform, the *syngo* Acquisition Workplace is intuitive and user friendly. Computer system: High-performance computer with DVI graphics card for fast 3D post-processing. High resolution, flicker free, 19-inch (48 cm) color flat panel display for medical diagnostic applications combining the demanding requirements of medical imaging with the advantages of liquid crystal displays. This display provides a resolution of 1280 x 1024 and has a wide viewing angle, features high contrast even under high ambient light conditions. Display light output stability is enabled by controlled backlight throughout the whole lifetime. Keyboard and mouse, External USB 2.0 devices for data storage are supported

Description

6. CT Image Computer System:

Reconstruction computer for the preprocessing and reconstruction of the CT raw data. The reconstruction computer contains a cluster of high-performance processors performing the preprocessing and reconstruction of the CT data

External USB 2.0 disks for quick and easy raw data storage are supported

Reconstruction fields of 5 cm to 50 cm through raw data zoom with the possibility of freely selecting the image center either prospectively before each scan or retrospectively. Reconstructions of different slice thicknesses from a single raw data record, e.g. lung soft tissue and lung high-contrast with CombiScan, with simultaneous suppression of partial volume artifacts.

Up to 8 reconstructions per scan range can be predefined with the examination protocol. Patient-related storage of the image and raw data.

Image display: 1024 x 1024 display matrix; screen splitting configurable up to 64 image segments. CT value scale from -1024 to +3071 HU. For very dense objects, the CT value scale can be extended from -10240 to +30710 HU (extended CT scale) e.g. for suppressing metal artifacts. 10,000 pre definable examination protocols

7. Cooling System:

Gantry is cooled with a water/water cooling system. An optional split cooling (water/air) is available to reduce reconstruction efforts and costs.

System operating temperature: 18-28°C, 20 - 75 % rel. air humidity (not condensing).

8. syngo User Software:

syngo features an intuitive and thus easy-to-learn user interface developed from prototypes in close cooperation with users. *syngo* visualizes the examination in individual process steps on so-called task cards, such as patient registration or examination card. A large number of functions and input parameters as well as the language used can be selected according to individual requirements. Frequently repeated processes can be automated and saved.

Patient registration:

The system can accept patient data in different ways. These include entering the data via keyboard or transfer of a work list via network. DICOM work list: Software module for accepting lists of patient data and exam requirements from a Radiology Information Systems (RIS) via DICOM Get Work list functionality. The program enables very efficient working and enables consistent patient data. In emergency cases, fast registration is possible. Here the system automatically assigns an emergency number which can later be replaced by the actual patient number. The input profile can be designed individually.

Examination card:

The SOMATOM Force is delivered with a large number of predefined examination protocols (e.g. for pediatric applications), making examination planning a very fast and efficient procedure. Example: A three-phase examination of the liver available as independent protocol only needs to be adapted to the patient's individual situation. Each examination is represented pictorially as a so-called "chronicle", which views the individual phases of the examination separately. This has the advantage that the individual phases of the examination can be accessed quickly and selectively and changes to the protocol can be made easily in graphical mode via drag-and-drop using the mouse. With a so-called routine window, it is possible to adapt individual examination parameters, representing a submenu of the essential parameters and giving information at a glance about the parameterization of the examination.

Viewing card:

On the viewing card it is possible to move interactively with the mouse through the image volume of the ongoing examination. The images of different examinations can be displayed simultaneously for comparison. A large number of functions are available for evaluation, documentation and archiving.

Filming card:

A virtual film sheet shows a 1:1 display of the film sheets to be printed out, thus enabling an effective preview of filming jobs and rewindowing of the images, as well as providing a large number of evaluation functions. Layout changes are possible interactively with up to 64 images. The printout parameters for the autofilming process running in parallel to acquisition or reconstruction are also defined with the filming card. Freely selectable positioning of images onto film sheet, configurable image text.

Description

3D card:

Secondary reconstruction calculation: Real-time MPR for real-time reformatting of secondary reconstructions. Slice orientation: coronary, sagittal, oblique and double-oblique. Secondary reconstructions can be determined from the topogram, other MPR views or from a 3D surface reconstruction. Reconstruction with selectable slice thickness.

WorkStream4D with Asynchronous Recon (also possible with Dual Energy Data: FAST DE (opt.):

syngo WorkStream 4D, now also for Dual Energy Data (Called FAST DE) is the standardized workflow guide for confident patient management. Up to 8 pre definable axial, coronal, sagittal and oblique MPR and MIP up to sub mm recon jobs possible. The Asynchronous Recon allows for multiple image reconstructions and reformats, parallel to scanning. With this feature, up to eight reconstruction job requests can be loaded into a scan protocol. Immediately upon completion of the scan acquisition, these reconstruction jobs are automatically executed in the background without delaying the start of next patient examination. WorkStream4D eliminates manual reconstruction steps and reduces the data volume up to a factor of 10, since virtually all diagnostic information is captured in 3D slices.

CT Angio: Software for the reconstruction of angular projections from the images of a spiral data record for the display and diagnosis e.g. of aneurysms, plaques, stenoses, vascular anomalies or vascular origins. MIP: Maximum Intensity Projection, MinIP: Minimum Intensity Projection and Thin MIP available. Interfering or irrelevant parts of the image can be eliminated with the integrated volume editor. The angular projections are reconstructed around a definable axis, whereby the maximum CT values in this direction are selected for each angular projection. The resulting images can be viewed with the CINE function as a series of images with a 3D image effect.

3D Display: Software for the three-dimensional display of surfaces of a body region from a series of continuous slices, for display and analysis of complex anatomies, e.g. the visceral cranium, pelvis, hips, for the purpose of planning surgical interventions. The 3D objects can be tilted and rotated interactively on the monitor and can also be displayed in relation to multiplanar reconstruction (MPR).

Volume card: Volume scans of tissues and organs, based on a "region-growing" algorithm and interactive ROI definition.

DynEva card: Software for dynamic evaluation of the contrast enhancement in organs and types of tissues, enabling the reconstruction of

- Time-density curves (up to 5 ROIs)
- Peak-enhancement images
- Time-to-peak images.

Video Capture and Editing Tool: Software contains integrated solution for imaging and visualization of 4D information, allowing the generation and editing of video files for improved diagnoses, recording and teaching. A wide range of multimedia formats is supported, e.g. AVI, Flash (SWF), GIF, QuickTime (MOV), streaming video.

Additional task cards available as an option.

9. Examination and Evaluation Functions:

Topogram: scanning perspectives: a.p., p.a., lat.; length of scan field: 128 - 2000 mm; width of scan field: 512 mm, 2.0 - 21 s. The topogram can be switched off manually when the desired examination length is reached.

Scan field size: 50 cm. Rotation times (360°): 0.25 s (opt.), 0.285, 0.33, 0.5, 1.0 s.

Slice thickness in sequence: 0.4 (UHR*), , 0.5, 0.6, 0.75, 1.0, 1.2, 1.5, 2.0, 2.4, 3.0, 4.0, 4.8, 5.0, 6.0, 7.0, 7.2, 8.0, 10.0, 14.4, 15.0, 20.0 mm (* optional).

The Dynamic Multiscan allows continuous sequence scanning without table movement for fast dynamic contrast studies with maximum slice thickness of 57.6 mm. Scan times (full scan) 0.25 (opt.), 0.285, 0.33, 0.5, 1.0 s.

Slice thickness in spiral: 0.4 (UHR*), 0.5, 0.6, 0.75, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 10.0 mm (* optional) real-time image display.

Real-time image display for immediate image preview when every second counts. Immediate image reconstruction and display without time delay simultaneously to data acquisition in 512 x 512 matrix size.

Spiral Scanning technique for continuous volume scans with continuous table feed in multirotation mode possible.

Description

Max. scan time 100 seconds with full low-contrast resolution. Volume length ~ 197 cm with full low-contrast resolution (max. 200 cm scan range possible using multiple automatic ranges). Selection of the pitch factor between 0.35 and 3.2 depending on scan mode. Selection of up to 33 free definable scan ranges per protocol and individual anatomic sections can be successively combined and then scanned automatically. In addition individual anatomic sections can be successively combined and then scanned automatically. Storage of up to 10,000 examination protocols. Rotation times/cycle (360°): 0.25 s (opt.), 0.285, 0.33, 0.5, 1.0 s.

Dynamic Multiscan spiral examination without table feed: Continuous multirotational data acquisition in one slice position with up to 100 scans in uninterrupted, continuous sequence without table feed. Scan cycle time: 0.75 - 60 seconds with quantitative evaluation and graphical display of time-density curves.

Adaptive 4D Spiral (optional): Continuous multirotational data acquisition with continuous smooth bi-directional table movement for quantitative evaluation and graphical display of time-density curves over entire organs. It facilitates volume perfusion studies in head (Stroke) and body applications (e.g. liver, kidneys, etc.) for a perfusion range of up to 22 cm. Moreover it allows dynamic studies up to a scan range of 80 cm, e.g. after aortic stent graft operation or for dynamic vascular (filling) studies of the peripheral vessels.

The intelligent algorithm Neuro BestContrast improves native head image quality especially grey/white matter differentiation. Images are decomposed into high and medium/low spatial frequencies. While relevant tissue information is contained in medium and low frequencies noise is dominated by high frequencies. Separate processing of medium and low frequency information improves the tissue contrast without amplifying image noise resulting in a better signal to noise ratio.

Image reconstruction and storage: Image reconstruction in full resolution (512 x 512 matrix) takes place during the examination, with full cone beam reconstruction, diagonal z-Sharp Technology and full image quality. Reconstruction fields of 5 cm to 50 cm through raw data zoom with the possibility of freely selecting the image center either prospectively before each scan or retrospectively. Reconstructions of different slice thicknesses from a single raw data record, e.g. lung soft tissue and lung high-contrast with CombiScan, with simultaneous suppression of partial volume artifacts. Up to 8 reconstructions per scan range can be predefined with the examination protocol. Patient-related storage of the image and raw data.

Image display: 1024 x 1024 display matrix; screen splitting configurable up to 64 image segments; CT value scale from -1024 to +3071 HU. For very dense objects, the CT value scale can be extended from -10240 to +30710 HU (extended CT scale) e.g. for suppressing metal artifacts.

Image evaluation: Complete software-controlled image evaluation program for all diagnostic requirements.

CINE Display: Dynamic display technique for the visualization of time or volume series. A series of up to 1024 images can be displayed at a frame rate of at least 30 f/s. Automatic or interactive mouse-operated control.

Multitasking functions: Simultaneous processing during operation of the scanner.

Real-time Display: Image reconstruction in pace with the examination in full image quality (512 x 512 matrix) (with full cone beam reconstruction and diagonal z-Sharp Technology).

Metro Display: Simultaneous display, processing and evaluation of images from other patients while the current patient is being scanned.

Metro Documentation: Simultaneous documentation of images from any previously examined patient while the current patient is being scanned.

Metro Copy: Automatic transfer of image data to the *syngo* CT Workplace (optional) or a DICOM network node.

10. Network Module:

For the connection to a local Ethernet (10, 100 Mbit or 1-Gigabit) in order to communicate with networked printers, diagnostic and therapy workstations, RIS or HIS systems and teleradiology routers.

Scope of functions:

- Configurable network stations.
- Unlimited selection of stations.
- DICOM Standard (Digital Imaging and Communications in Medicine) for the transfer of information between DICOM-compatible units from different manufacturers. The scope of functions is described in detail in the

Description

DICOM Conformance Statement, and the standard version comprises the functions Send/Receive, Query/Retrieve and BasicPrint, Work list, Storage Commitment, MPPS (Modality Performed Procedure Step).

11. Integrated CARE Solutions:

UFC based Stellar Infinity Detector: Dose reduction compared to conventional CT detectors. High efficiency for low mAs requirements enable

best possible image quality with low patient dose at increased resolution and ~50% increased z-coverage, in comparison to Definition Flash

The new and ultra-fast Adaptive Dose Shield, powered by SiDaNet (Siemens Data Network Bus): world's first dynamic tube collimation that protects the patient from clinically irrelevant radiation in every spiral scan and newly also in Perfusion scans, such as the Adaptive 4D Spiral for significant additional dose reductions. Both tubes are equipped with an Adaptive Dose Shield, that is controlled and positioned through SiDaNet, and X-CARE, allow to reduce direct peripheral exposure in Spiral CT for the most dose-sensitive body regions while preserving constant high image quality e.g. the breast during a chest CT exam or the eye lenses during neuro CT exams. Adaptive Dose Shield becomes now also available for 4D dynamic imaging through ultrafast blade drives and the fast control of SiDaNet bus communication.

X-CARE: Partial scanning to reduce direct X-ray exposure for the most dose-sensitive body regions, e.g. the breasts, thyroid gland or eye lens.

Turbo Flash Spiral scanning: Ultra-fast spiral scanning in Dual Source mode with up to 737 mm/s, allows for additional dose saving especially in ECG-triggered scans*, e.g., cardiac or chest scanning (* optional)

CARE Dose4D uses at first an automated adjustment of the dose level depending on patient size based on the attenuation values obtained from the standard (singular) topogram along the patient z axis. In addition CARE Dose4D uses a real-time adaptation of the tube current during the scan based on the actual attenuation of the X-ray beam measured around the patient. It delivers significant x-ray dose reduction for all body regions scanned compared with standard sequence or spiral scanning;

The projections are evaluated per second to optimize the mA level instantaneously. In combination with the extreme adjustment speed of the tube current, CARE Dose4D enables consistent high quality images in every anatomical position. Thinner axial slices and/or longer scan ranges become possible because of reduced tube loading; It also enables ultra-low dose examinations for pediatric patients.

CARE Filter: Specially designed X-ray exposure bow-tie filter installed at the tube collimator. Dose reduction with optimized image quality. Additional protocol dependent bow-tie filtration e.g. cardiac and pediatric body protocols.

CARE kV

Industries first automated, exam-specific voltage setting to optimize contrast-to-noise-ratio and significantly reduce dose.

Pediatric Protocols: Special examination protocols with 70 and 80 kV and a large range of adjustable mAs values for optimum adaptation of the radiation exposure to the age and weight of the child to be examined.

CARE Topo: Real-time topogram, Manual interruption possible once desired anatomy has been imaged.

CARE Bolus: Operating mode for CM-enhancement triggered data acquisition. The objective is optimum utilization of the contrast medium bolus in its "plateau" phase in the target organ. This option has been especially adapted to the increased speed and timing requirements resulting from the multirow capability and faster rotation. The CM enhancement is observed via monitoring scans in a user-defined ROI with a trigger threshold. As soon as the enhancement reaches its predefined threshold, the spiral scan is triggered as quickly as possible. License for software use on one modality.

12. Siemens Remote Service:

Siemens Remote Service (SRS) enables a wide range of medical equipment-related remote services resulting in increased system availability and efficiency. SRS employs sophisticated authentication and authorization procedures, state-of-the-art encryption technologies and logging routines together with strictly enforced organizational measures that provide optimal patient data security and access protection. The following SRS services can be ordered for all service agreement customers:

Remote Diagnosis & Repair: In case of an unforeseen system malfunction, Siemens competent experts may directly connect with the CT system in order to identify the problem quickly. Moreover the remote repair function enables Siemens to often correct software errors immediately. Should an engineer on site be required, Remote

Description

Diagnosis & Repair allows Siemens to identify defective parts efficiently and accelerate their delivery, thereby keeping repair times to a minimum.

Notes on software use: Use of the entire integrated software, including optional software programs, is restricted exclusively to the application with this system.

Note: This product is in compliance with IEC60601-1-2 and fulfills CISPR 11 Class A. Note: In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

13. The Welcome Package

The package contains a welcome letter, three current versions of the customer magazine SOMATOM Sessions, CARE Analytics CD (dose analysis and evaluation software), three Siemens Mouse Pads, pens and an e-Learning CD

The **CT Acute Care Engine Scan Options** include:

- **HeartView** for the industry's lowest heart rate independent temporal resolution.

- Fully integrated ECG device facilitates ECG gating and **Adaptive ECG pulsing** for maximum dose reduction.

- Fastest rotation speed of **0.25 s per rotation** delivers the highest native temporal resolution and fastest volume coverage.

- Constant **highest native temporal resolution of 66 ms** to freeze any motion, which could lead to motion artifacts (e.g. cardiac motion).

- ECG-gated, prospectively triggered **high-pitch Turbo Flash Spiral** for scanning at highest volume coverage:

- For high speed whole body examinations with up to 737 mm/s scan speed

- For fast thorax scans visualizing the aorta and the coronaries in one scan at very low contrast dose (e.g. for TAVI/TAVR planning) *

- Fast whole-body scanning of patients who cannot lie calm for longer time, e.g. geriatric and pediatric patients - For coronary CTA scanning of the heart in a quarter beat with a Dual Source acquisition mode at a temporal resolution of 66 ms, acquired within a single diastolic phase (monophasic) allowing for lowest possible doses down to <1 mSv

- With split-second thorax imaging of heart, chest, or both, for ultra-low dose triple-rule-out examinations with a temporal resolution of 66 ms

* **"Early clinical experience based on imaging of the left ventricle and aortic root (TAVI studies) demonstrate that a reduction of contrast media administration may be possible using SOMATOM Force's Turbo Flash Mode and its low kV / High mA capabilities."**

- The **Cardio Sequence** is an intelligently triggered sequence, fast enough (66 ms) to freeze the heart and robustly visualize the coronary arteries even at high and arrhythmic heart rates (Arrhythmia Compensation). It also introduces the Siemens-only, dual-step pulsing, with a low dose level during the systolic phase and a short peak for acquiring the data for coronary imaging.

- The intuitive **ECG editing** tool allows adapting for extra beats in arrhythmic situations providing optimal retrospective image reconstruction.

- **z-Sharp technology** provides the high spatial resolution required for exceptional visualization of the complex coronary and vascular anatomy.

- With **Edge technology** the spatial resolution can now be increased to an unprecedented 0.30 mm in daily clinical routine, which makes it finally suitable for clinical practice as the signal-to-noise ratio is adequate without an additional increase in dose.

- **Adaptive Dose Shield** for spiral acquisition to eliminate pre- and post-spiral over-radiation.

- **BestPhase Plus**, a software dedicated to automatically detect the optimal phase for motionless coronary visualization. The phase is defined in either end-systole, end-diastole, or both time points and automatically

Description

reconstructed

- The **MinDose algorithm** lets the user save even more dose for coronary CT angiography. A special algorithm decreases tube current during ECG-Pulsing, thus decreasing dose, compared to conventional ECG scanning. Only in combination with syngo.CT Cardiac Function these data can be additionally used for full functional assessment over all cardiac phases.
- **DirectViewing** is a tool for real time navigation through full volumes of up to 24 heart phases by using an integrated, fast 3D volume viewer. DirectViewing completes the workflow of Cardio BestPhase by giving you the flexibility to individually visualize phases for all coronary arteries.
- **CARE Dose4D** delivers the highest possible image quality at the lowest possible dose for patients - maximum detail, minimum dose.
- Extended FoV of 78 cm allows you to capture more information in just one exam, saving valuable time with emergency patients.
- 200 cm scan range for full-body trauma imaging without compromise.
- Fast and accurate visualization of complex neurological disorders of head, neck, and spine using dedicated X-ray filters, e.g. Posterior Fossa Optimization (PFO), image reconstruction, and beam hardening correction algorithms for artifact elimination.

CT Acute Care Engine Pro Scan Options include:

- **Adaptive 4D Spiral Plus** for whole organ perfusion, e.g. liver or brain perfusion
With its unique Adaptive 4D Spiral Plus, the SOMATOM Force moves beyond fixed detector limitations to provide full coverage of any organ in 4D. It introduces up to 80 cm range for dynamic CTA imaging and 4D Noise Reduction to significantly improve image quality with no increase in dose or, alternately, reduce dose without compromising image quality (4D Noise Reduction requires Volume Perfusion CT Neuro or Body).
- **UHR with extra wide comb** delivers ultra-high in plane resolution of up to 32 lp/cm for highly defined imaging of small structures, such as the inner ear or lung.
- **Tilttable (adjustable) head holder** for optimal positioning of stroke patients or to protect the patient's eyes.

Patient table to support ultra-fast spiral scanning and up to 200cm scan range. Motor-driven table height adjustment from min. 49 cm to max. 92 cm, longitudinal movement of the tabletop 200 cm in increments of 0.5 mm, positioning accuracy +/- 0.25 mm from any direction. Horizontal scan range 200 cm. Table height can be controlled alternatively by means of foot switch (2 each on both sides of the patient table). In the case of emergency stop or power failure, the tabletop can also be moved manually in horizontal direction. Max. table load: 227 kg/500 lbs, Table feed speed: 2-800 mm/s. Positioning aids: Mattress protector, head-arm support (inclusive cushion), tilttable head holder with positioning cushion set, patient restraining system for head fixation, restraining-strap set with body fixation strap that can be directly connected to the patient table top, headrest, table extension, knee-leg support. The included Physiological Measurement Module allows connecting a 3 channel ECG cable (included) for ECG controlled cardiac acquisition.

System operating temperature (outside the building): -30°C to 50 degree C, 0-100% rel. humidity (not condensing), Ideal for high distance installation (scan room).

Cooling system contains two units (indoor + outdoor unit):

1. water/water exchanger close to the scan room and
2. an additional remote water/air exchanger

The indoor unit of the cooling system may be up to 30m away from the gantry with a height difference of not more than +10m. Additional hoses for 10m and 20m distance are available to extend the distance between the CT

Description

gantry and the indoor unit to 50m.

If the distance between the cooling-system and the gantry is longer than 50m an optional additional pump unit is needed.

Standard distance between water/water unit and remote water/air exchanger is 40m with a height difference of not more than +20m. For longer distance between water/water unit and remote water/air exchanger the tube diameter must expand or an optional additional pump is needed.

With Siemens' unique Vectron tubes, the tube voltage can now be reduced to 70kV which helps to reduce radiation exposure to patients. With prior tube technology, the minimum tube voltage setting was 80 kV. The new tube voltage setting of 70 kV helps to further reduce the radiation dose to small pediatric or neonate patients.

CARE Child consists of:

- dedicated 70 kV scan modes, now also applicable for adults, with low-kV imaging at higher mA through Vectron tube
- new CARE Dose4D curves for children
- respective Children Protocol utilizing these features

Siemens has always been at the forefront to deliver highest image quality and reduce radiation dose to the lowest possible level at the same time. But today, an additional barrier has to be mastered to maximize clinical outcome: overcome the growing restrictions and limitation of resources. With FAST CARE, Siemens opens a new chapter in CT, explicitly focusing on the optimization of patient-centric productivity in modern healthcare delivery. With FAST CARE, time-consuming and complex procedures such as scan or recon preparations are extremely simplified – ideally reduced to a single click. The scanning process gets more intuitive and the results become more reproducible.

The FAST CARE platform consists the following features:

FAST Scan Assistant: An intuitive user interface for solving conflicts by changing the scan time, resp. the pitch and/or the maximum tube current manually.

CARE kV: First automated, organ-sensitive voltage setting to improve image quality and contrast-to-noise-ratio while optimizing dose and potentially reducing it by up to 60%.

CARE Child: Dedicated pediatric CT imaging, including 70 kV scan modes and specific CARE Dose4D curves and protocols

CARE Profile: Visualization of the dose distribution along the topogram prior to the scan

CARE Dashboard: Visualization of activated dose reduction features and technologies for each scan range of an examination to analyze and manage the dose to be applied in the scan

CARE Dose Configurator: Enhancement of Siemens' renowned real-time dose modulation CARE Dose4D, introducing new reference curves for each body region and for each body habitus allowing to adjust the configuration even more precisely to the patient's anatomy.

Dose Notification: As requested by the new release of the standard IEC 60601 3rd editions, the SOMATOM Definition Flash provides the ability to set dose reference values (CTDIvol, DLP) for each scan range. If these reference values are exceeded the Dose Notification window informs the user.

Dose Alert: As requested by the new release of the standard IEC 60601 3rd editions, the SOMATOM Definition Flash automatically adds up CTDIvol and DLP depending on z-position (scan axis). The Dose Alert window appears, if either of these cumulative values exceeds a user-defined threshold.

FAST Planning assists the scan and reconstruction planning, based on a topogram, to provide an easier, faster and standardized workflow in CT scanning. FAST Planning features the selection of the anatomical region of interest from a list prospectively defined scan and reconstruction ranges, automatic detection of the scan region(s) of interest and proposal of corresponding scan range(s) in the topogram (in a narrow or wide lateral FoV),

Description

optimized FoV and automatic iso-center adaptation for Head scans.

DoseMAP - The Siemens CT Dose Management Program

DoseMAP has three components for complete and comprehensive dose management: Report, Analyze, and Protect.

Report Dose: Create transparency and document dose values

- DICOM SR Dose Reports: DICOM-structured file allows for the extraction of dose values (CTDIvol, DLP) to RIS via MPPS or convertible into PDF.
- Patient Protocol: complete dose information of the examination for every patient. It includes kV, ref.mAs, CTDIvol, DLP and contrast media data, if applicable.
- Dose Logs: A report is automatically created whenever a limit exceeds of the set dose levels (Dose Notification and Dose Alert), these reports can be used for audit purposes.

Analyze Dose: Assess the dose situation

- teamplay Dose (*): Connect teamplay to your scanner or PACS for all insights in teamplay Dose that are based on data extracted from your scanner's radiation reports. teamplay Dose gives you a clear picture of dose levels used at your institution. This makes it possible to monitor dose over time. Based on these statistics, measures can be implemented to reduce dose.
- CARE Analytics (**): Set a query and retrieve DICOM SR Dose Reports. With CARE Analytics it is possible to assess DICOM SR Dose Reports from different DICOM nodes and document dose data for insights into radiation dose per case or examination type, cumulative dose per patient, or for in-house dose reporting.

Exported and structured dose information makes it possible to monitoring dose over time. Based on these statistics, measures can be implemented to reduce dose.

(*)teamplay Dose: teamplay is a cloud-based network, running independent from the CT Scanner, that brings together your imaging modality users, the systems' dose and utilization data, and the users' expertise to help you improve the delivery of care to your patients. Basic features are provided free of charge. Premium features are provided on a trial basis for a certain time frame at no charge, and may be used thereafter on a subscription fee basis.

(**)CARE Analytics is a non-medical software tool designed to query dose information from Structured Dose Report objects.

- CARE Dashboard: Pre-examination dose check-up by showing an overview of all the dose reduction features used per scan.
- CARE Profile: Pre-examination dose check-up by displaying the dose distribution prior to the scan at each z-position.

Protect Dose: Manage access to protocols and potentially protect patients from unnecessary radiation

- Access protection: Password protection means that only authorized staff can access and change the scan protocols.
- Dose Notification and Dose Alert: Both functionalities can help to protect from over-radiation and warn the operator whenever dose thresholds are exceeded. Dose Notification checks the dose values per chronicle entry. Dose Alerts check the accumulated dose per z-position.

Dose reduction with CT has been limited by the currently used filtered back projection (FBP) reconstruction algorithm. When using this conventional reconstruction of acquired raw data into image data, a trade-off between spatial resolution and image noise has to be considered. Higher spatial resolution increases the ability to see the smallest detail; however, it is directly correlated with increased image noise in standard filtered back projection reconstructions as they are used in CT scanners today.

Iterative reconstruction approaches allow decoupling of spatial resolution and image noise.

With the next generation of iterative reconstruction, ADMIRE (Advanced Modeled Iterative REconstruction)

correction loops are introduced into the image generation process next to a more precise modeling of geometry

Description

and hardware components.

Superb details and positive impact on reconstructed image quality in comparison to SAFIRE.

These iteration loops utilize raw-data information to significantly improve image quality.

A statistical weighting of all projections and measuring points in the raw data domain improve the reconstructed image quality.

Additionally, intelligent model based noise cancellation iteration will take place in the image domain. This iteration distinguishes anatomical structures from noise and results in a natural image impression* and excellent IQ.

*In terms of pixel noise structure

Thick slice reconstruction allows for PACS-ready workflow.

This new iterative reconstruction technique results in an excellent image quality with reduced pixel noise in comparison to SAFIRE and increased image sharpness that can be translated to dose savings for a wide range of clinical applications. ADMIRE shows a benefit in higher noise reduction performance in thicker than 3mm in comparison to SAFIRE and therefore the impact of ADMIRE is visible on the PACS-station.

Reader-ready reconstructions deliver the desired image impression on the fly

The new IRS will support the reconstruction performance so that ADMIRE is suitable for the daily routine and it creates Reader-Ready Reconstructions with a reconstruction speed of up to 20 images/second.

Different ADMIRE kernels and five reconstruction strengths can be chosen to tailor the results of ADMIRE to the personal requirements.

To experience which strength fits to the clinical need or personal demand, a preview functionality is available.

*In clinical practice, the use of ADMIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.

Utilizing Siemens unique Workstream 4D functionality, FAST Spine provides various modes that automatically create anatomically orientated spine reconstructions based on a 3D volume. It provides a fast and standardized workflow in routine spinal CT scanning. FAST Spine features automatic segmentation of the spinal canal, automatic labeling of the vertebrae, anatomically oriented slices - (orthogonal to the spinal canal), coronal and sagittal reconstructions which refer to the curvature of the spinal column and more. All modes offer the possibility to adapt the results manually.

FAST 3D Align automatically corrects misalignment of anatomic structures, organs of the patient. It aligns those to fit it to the selected reconstruction plane for a highly automated reconstruction workflow. Additionally it minimizes the black area in the image through automatically adjusts recon field of view selection.
FAST 3D Align requires Workstream 4D.

The Asynchronous Recon in FAST DE allows for multiple image reconstructions and reformats, parallel to Dual Energy scanning. With this feature reconstruction job requests can be directly loaded into a scan protocol. Immediately upon completion of the scan acquisition, these reconstruction jobs are automatically executed in the background without delaying the start of next patient examination.

The X-ray tube's kilo voltage (kV) determines the average energy level of the X-ray beam. Changing the kV setting results in an alteration of photon energy and a corresponding attenuation modification of the materials scanned. In other words, X-ray absorption is energy dependent, e.g. scanning an object with 80 kV results in a different attenuation than with 140 kV. In addition, this attenuation depends also on the type of tissue scanned. Iodine, for instance, has its maximum attenuation at low energy, while its CT-value is only about half in high-energy scans. The attenuation of bones, on the other hand, changes much less when exposed to low-energy scans compared to high-energy examinations. syngo Dual Energy Scan exploits this effect: Two X-ray sources running simultaneously at different energies (80/140 kV, 100/140 kV or 80/150 kV) acquire two spiral data sets showing different attenuation levels.

Description
Software license enabling system to support Enhanced User and System management, including: <ul style="list-style-type: none">- User authentication to prohibit unauthorized access- Privileges to define user/role based functionality- Permissions to control data access- Audit trails to log system and data access.
Eaton Surge Protective Device (SPD) Panel, 250kA per phase rating, 277/480VAC Wye, Three Phase (4W+G), Surge Counter, Dimensions 12.05"H x 7.47"W x 6.69" D, Weight: 13.5 lbs, 10 Year Limited Warranty

Description
Please note that currently max. 5 simultaneous users are possible. Upgrade requires extension of the <i>syngo.via</i> service contract.
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