

SHIP TO:
VA MEDICAL CENTER B70013
V.A. Medical Center
500 FOOTHILL BLVD
BLDG 7, WAREHOUSE
SALT LAKE CITY, UT 8414

, XR CT, VAMC SALT LAKE CITY, UT
PO# 660-B70013

Qty

Item Description

1

SOMATOM Definition AS (AS+)

The SOMATOM Definition AS (AS+, 128-slice configuration) is Siemens' state-of-the-art single source CT that provides the possibility to maximize clinical outcome and to minimize radiation dose. The unique STRATON X-ray source utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating 4,608 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' proprietary UFC (Ultra Fast Ceramic) detectors and the corresponding 128-slice detector electronics enable a virtually simultaneous readout of two projections for each detector element - resulting in a full 128-slice acquisition. This sampling scheme is identical to that of a 128 x 0.3 mm allowing for reconstruction of 384 slices using 0.1 mm reconstruction interval increment. The fast rotation time of 0.33 seconds (0.30 s optional) delivers excellent temporal resolution. The SOMATOM Definition AS is set to raise the standard of patient-centric productivity with FAST CARE Technology. With Siemens' FAST - Fully Assisting Scanner Technologies - the SOMATOM Definition AS can simplify typically time consuming and complex procedures during a CT examination: the scanning process gets more intuitive and the results become more reproducible. The CARE technology includes many unique features like CARE kV that sets the ideal voltage for every examination and adjusts the respective scan parameters or industry's first Adaptive Dose Shield that prevents clinically irrelevant over radiation in spiral scanning. Additionally, its large bore of 78 cm and a table load capacity of up to 307 kg (optional) opens CT to virtually all patients, meaning that virtually no patient is excluded.

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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 overall 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.

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CARE Child

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

Qty	Item Description
1	<p>FAST Planning #AWP Direct, organ-based setting of scan and recon ranges for a faster and more standardized workflow</p>
1	<p>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.</p>
1	<p>Workstream 4D #AWP WorkStream 4D further enhances the already superb workflow of the SOMATOM CT system by offering direct generation of sagittal, coronal, oblique or double-oblique reconstructed images directly from CT raw data as part of the CT protocol.</p>
1	<p>High Speed 0.30 s Rotation Fast rotation time of 300 milliseconds for unprecedented image quality and highest scan speed. Fast gantry rotation times are the prerequisite for highest temporal resolution and are therefore essential for brilliant, motion free cardiovascular imaging.</p>
1	<p>100 kW Power The 100 kW power allows the X-ray generator the use of maximum power of 100kW in fine adjustable steps.</p>
1	<p>CARE Contrast III Integrated solution for a simplified bolus injector coupling. It synchronizes scan and contrast injection and transfers the injector protocol data in the patient protocol, in the e-logbook and to MPPS (if configured).</p>
1	<p>syngo 3D BoneRemoval #AWP Simple, automated bone removal functionality for the syngo 3D application. Preconfigured algorithms for angiography and hip/pelvis fracture scenarios are included to facilitate fast removal of bone structure for three dimensional presentation and analysis of CT data.</p>
1	<p>FAST IRS Reconstruction computer for the preprocessing and reconstruction of the CT raw data. The reconstruction computer contains of a cluster of 4 high-performance GPU boards performing the preprocessing and reconstruction of the CT data. The raw data memory is 3.8 Tbyte. The peak reconstruction performance is up to 60 frames/sec.</p>
1	<p>SAFIRE #AWP The Sinogram Affirmed Iterative Reconstruction (SAFIRE) enhances spatial resolution, reduces image noise and increases sharpness by introducing multiple iteration steps in the reconstruction process. The resulting superior image quality enables to reduce dose by up to 60%*.</p>
	<p>*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-contast 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.</p>
1	<p>iMAR #AWP The iMAR metal artifact reduction algorithm combines three successful approaches (beam hardening correction, normalized sinogram inpainting and frequency split). This allows to reduce metal artifacts caused by metal implants such as coils, metal screws and plates, dental fillings or implants.</p>

Qty	Item Description
	<p>iMAR is compatible with extended FoV, the extended CT scale as well as the newest dose reduction feature.</p> <p>Along with the new algorithm comes the simple user interface of iMAR enabling easy reconstruction of clinical images with reduced metal artifacts.</p>
1	<p>Extended Field of View #AWP</p> <p>Software program with special reconstruction algorithms that allow for visualization of objects using a FOV up to 78 cm (non-diagnostic image quality). License to use software on a single unit.</p>
1	<p>syngo DE Scan for Single Source#AWP</p> <p>The syngo Dual Energy Scan for Single Source option offers the possibility to acquire two spiral data sets in sequence at different energies. The results are two data sets with diverse information.</p>
1	<p>FAST DE Results #AWP</p> <p>With FAST DE Results you can select Dual Energy applications at the AWP and the results will be sent directly to the PACS for a straight forward Dual Energy workflow.</p>
1	<p>UHR</p> <p>UHR mode delivers Ultra High resolution in plane of up to 24lp/cm for high defined imaging of small structures such as inner ear, joints or fractures of the bone</p>
1	<p>Rear cover incl. gantry panels</p> <p>Rear Cover including gantry control panels with control functionality from the backside.</p>
1	<p>Cooling System Water</p> <p>Water heat exchanger for the dissipation of heat loss generated in the gantry to an environmentally friendly cooling water circulation system.</p> <p>This optimizes system availability independently of the cooling water flow rate and temperature.</p> <p>System operation temperature 4 - 16 degrees C and 500 - 2500 l/h flow rate.</p>
1	<p>Cooling System Water/Air #split</p> <p>Water-to-air heat exchanger for the dissipation (to the air outside) of heat, generated in the gantry.</p>
1	<p>Trafo for Cooling system Water/Air</p> <p>The Trafo powers the Cooling System Water/Air</p>
1	<p>Flow Heater</p> <p>The flow heater allows to install the split chiller in climatic conditions which require an extended use of up to minus 40° Celcius (-40°F).</p>
1	<p>Service Switch</p> <p>Service switch to shut off the outdoor cooling unit for maintenance or in case of emergency</p>
1	<p>Patient Table 2000 mm</p> <p>Patient table to support 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: 2-200 mm/s, Distance between gantry front and table base 40 cm.</p> <p>Positioning aids: Mattress protector, head-arm support (inclusive cushion), and non-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, knee-leg support.</p>

Qty	Item Description
1	<p>Physiological Monitoring Module</p> <p>The Physiological Measurement Module allows to connect a 3 Channel ECG cable for ECG controlled cardiac acquisition.</p>
1	<p>ECG cable IEC2 #D</p> <p>ECG cable, IEC2 (AHA/US color coding).</p>
1	<p>Mattress with Spill Protection</p> <p>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.</p>
1	<p>Table Side Rails</p> <p>Side rails enable the quick and easy attachment of additional accessories such as an infusion bottle holder and i-control intervention module to the standard patient table.</p>
1	<p>Tiltable Head Holder</p> <p>Tiltable Head Holder for the fixation of the patient's head. Tilt range between +30 till - 15 degree.</p>
1	<p>Head-Arm Rest</p> <p>This head-arm rest allows placing the head and the arm of trauma patients and even unconscious patients reliably for CT scanning. It is very useful in emergency rooms, e.g. for whole body scans, as it extends the scan range by about 30 cm. It can be placed in the standard Multipurpose Table accessory holder.</p>
1	<p>Computer Desk #AWP</p> <p>New CT desk to accommodate the control components and color monitor.</p> <p>Width: 1200 mm, Depth: 800 mm, Height: 720 mm.</p>
1	<p>Computer Cabinet #AWP</p> <p>New cabinet to accommodate the computer system and UPS. Matched to the design of the control console table.</p> <p>Width: 800 mm, Depth: 800 mm, Height: 720 mm</p>
1	<p>syngo Security Package #AWP</p> <p>Security package for general regulatory security rules</p>
1	<p>HeartView CT</p> <p>Scanning technique and program for ECG controlled data acquisition and image reconstruction with SOMATOM.</p> <p>The package comprises:</p> <p>HeartView CT option on the syngo Acquisition Workplace console for the ECG-controlled acquisition and reconstruction of artifactfree images of the heart.</p> <p>The ECG signal is supplied by an ECG device integrated in the gantry.</p> <p>The use of the software of this option is restricted to a single system unit.</p>
1	<p>Cardio BestPhase Plus #AWP</p> <p>Cardio BestPhase, a software dedicated to automatically detect the optimal phase for motion-less coronary visualization. The phase is defined in either end-systole, end-diastole or both timepoints and automatically reconstructed.</p>
1	<p>syngo Calcium Scoring CT #AWP</p> <p>Dedicated application for the quantification of calcifications in CT images. For best results, CT images acquired with HeartView by ECG-synchronized imaging should be used. The Calcium</p>

Qty	Item Description
1	<p>Scoring software calculates various scores (Agatston score, volume score and calcium mass) to assess the risk of a cardiac infarct within user-defined regions for up to four coronary arteries.</p>
1	<p>Adaptive 4D Spiral With the unique Adaptive 4D Spiral, dynamic CT imaging moves beyond fixed detector limitations to provide larger coverage than the actual detector size.</p>
1	<p>syngo Volume Perfusion CT Neuro#AWP syngo Volume Perfusion CT - Neuro for syngo Acquisition Workplace only. Allows for 3 dimensional evaluation of volume perfusion CT data.</p>
1	<p>syngo Neuro DSA CT #AWP syngo(r) Neuro DSA CT is a dedicated postprocessing application which allows removing bone structures from CT-Angiography (CTA) datasets for improved visualization of the cerebral vasculature. It uses an additional nonenhanced CT (NECT) scan with the aim to automatically and quickly remove bone from cerebral CTA data. The algorithm works completely automated and makes this application easy to use. This improves visualization of vascular structures in the area of the skull base and helps to delineate aneurysms and other vascular diseases.</p>
1	<p>Adapt. 3D Intervent. Suite Wireless The complete solution for 2D and 3D non fluoroscopic and 2D fluoroscopic minimal invasive volume interventions. The Adaptive 3D Intervention Suite contains Adaptive 3D Intervention for 3D volume intervention. Intervention Pro for spiral and sequential non- fluoroscopic interventional procedures and complete organ coverage with maximal flexibility and with minimal single click effort i-Fluoro CT for CT allows for 2 dimensional interventional fluoroscopic procedures i-Control CT supports interventional procedures as independent remote unit Foot switch for radiation release (x-ray).</p>
1	<p>Dual 19" Monitor #AWP Second 19-inch monitor for the Acquisition workplace (AWP)</p>
1	<p>Dual Monitor Ceiling Support The dual monitor solution enables access to images and scan data while interacting with the patient in the scan room. The high resolution, flicker free, 19-inch (48 cm) color flat panel displays are mounted at the ceiling support. The space-saving ceiling installation along with the large movement range of the support allow maximum operating convenience when positioning the monitor.</p> <p>19" flat screen monitor (2x) The 19" monitors support CT interventions and CT fluoroscopy with a display in the examination room.</p> <p>Dual Monitor Ceiling Support The Dual Monitor Ceiling support consists of: video transmitter, video receiver, power supply cable and a 30 m fiber-optic cable set for connecting the flat screen monitors. Displays suitable for medical diagnostic applications (room class 1 and 2 acc. To DIN 6868-157).</p> <p>Ceiling Support Base Ceiling support for the accommodation and safe installation of one or two flat screen monitors in the examination room.</p>
1	<p>Additional User Manual Additional user manual for the above selected CT system.</p>

Qty**Item Description**

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CT Project Management

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.

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CT Standard Rigging and Installation

This quotation includes standard rigging and installation of your CT new system.

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.)

It remains the responsibility of the Customer to prepare the room in accordance with the SIEMENS planning documents.

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.

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.

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Initial onsite training 32 hrs

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.

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Initial onsite training 32 hrs GovOffset

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Additional onsite training 32 hours

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.

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8

AS+ configuration z-Sharp Technology

The unique STRATON X-ray source utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating 4,608 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' proprietary UFC (Ultra Fast Ceramic) detectors and the corresponding 128-slice detector electronics enable a virtually simultaneous readout of two projections for each detector element - resulting in a full 128-slice acquisition. This sampling scheme is identical to that of a 128 x 0.3 mm allowing for reconstruction of 384 slices using 0.1 mm reconstruction interval increment. z-Sharp Technology, utilizing the STRATON X-ray sources and the UFC detectors, 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.

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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.

Qty	Item Description
1	Includes Stellant D, Dual Head, ceiling mounted injector; Certegra workstation; installation and warranty through Medrad.
1	D Medrad ISI900 interface,w/install
1	Riedel Chiller Start-up by SBT
1	Low Contrast CT Phantom & Holder
1	F_ Standard UPS for Definition AS <p>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.</p> <p>The UPS allows for a safe shutdown of the CT scanner in the event of power interruption. The 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.</p>
1	Lung Imaging <p>For well over a decade, CT has been recognized and used as the standard of care for lung nodule detection and sizing. This is due to CT's spatial resolution, geometric accuracy, and ability to create various reconstructions and 3D views. The high contrast environment in the chest between the lungs and the nodules makes for a relatively easy detection task for clinicians using CT images. Recent advances in CT technology have allowed these scans to be effectively performed at lower doses, higher resolutions, and faster scan times. The SOMATOM Definition AS+ CT is indicated for use in low dose lung cancer screening for high risk populations*. The AS+ is delivered with two specific scan protocols to provide low dose lung cancer screening exams at approximately 1.3 mGy CTDI for a standard size adult. These default protocols utilize Siemens proprietary dose reducing features such as CARE Dose4D(tm), automatic exposure control technology that modulates and adapts dose for every patient, for high image quality at low dose. *As defined by professional medical societies.</p>
1	Access Protection <p>Scan Protocols are password protected allowing only authorized staff members to access and permanently change protocols</p>
1	Adaptive Dose Shield <p>Adaptive Dose Shield for spiral acquisition to eliminate pre- and post-spiral over-radiation.</p>
1	CARE Analytics <p>Stand-alone tool, for installation in any PC in the hospital network, allowing evaluation of DICOM dose Structured Reports (DICOM SR)</p>
1	CARE Dashboard <p>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</p>
1	CARE Dose4D <p>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</p>
1	CARE Dose Configurator <p>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.</p>
1	CARE kV <p>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%.</p>

Qty	Item Description
1	<p>L</p> <p>CARE Profile</p> <p>CARE Profile: Visualization of the dose distribution along the topogram prior to the scan</p>
1	<p>DICOM SR Dose Reports</p> <p>DICOM structured file allows for the extraction of dose values (CTDIvol, DLP)</p>
1	<p>DoseLogs</p> <p>Whenever a limit exceeds of the set up reference dose levels (Dose Notification and Dose Alert) automatically a report is created on the system</p>
1	<p>T</p> <p>Dose Alert</p> <p>Dose Alert: As requested by the new release of the standard IEC 60601 3rd edition, the SOMATOM Definition 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.</p>
1	<p>I</p> <p>Dose Notification</p> <p>Dose Notification: As requested by the new release of the standard IEC 60601 3rd edition, the SOMATOM Definition AS 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.</p>
1	<p>T</p> <p>FAST Adjust</p> <p>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.</p>
1	<p>A</p> <p>FAST Scan Assistant</p> <p>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.</p>
1	<p>T</p> <p>Eaton 93PM-150 kW UPS</p> <p>Complete system backup without interruption. One UPS per CT.</p> <p>Includes the following:</p> <p>Eaton 93PM UPS Electronics Cabinet w/integrated maintenance bypass sidecar Eaton 93PM Single Battery Cabinet System (Full load back-up time @ 150kW of 7.1 minutes.) Network Card Eaton 24x7 start-up One year (24x7) warranty through Eaton Corp.</p> <p>Not approved for sites that require OSHPD.</p> <p>Optional Remote Monitoring Panel</p> <p>Shipment is to customer's dock. Customer is responsible for logistics from the dock to inside location.</p> <p>Eaton 93PM Remote Monitoring Device</p> <p>Eaton 93PM Remote Monitoring Device: Wall-mounted display panel for monitoring the UPS status in the imaging suite when the UPS is located elsewhere in the facility. Includes Power Xpert Gateway Mini-Slot Card for interface with the 93PM UPS.</p> <p>RMP Dimensions: 5.9"W x 0.8"D x 3.2"H RMP Weight: 0.5 Lbs.</p>

One complimentary biomedical tuition is included with the purchase of this system.

Offset Part 14408165 Additional User Manual

Offset Part CT_ADD_32 One Additional Onsite Training 32 hours

Detailed Technical Specifications

Description

SOMATOM Definition AS (AS+, 128-slice configuration)
Maximize Outcome. Minimize Dose.

The SOMATOM Definition AS (AS+, 128-slice configuration) is Siemens' state-of-the-art single source CT that provides the possibility to maximize clinical outcome and to minimize radiation dose.

Using Siemens' z-Sharp technology the SOMATOM Definition AS can provide the fastest sub-millimeter volume coverage at industry's highest spatial resolution. The high rotation time of 0.33 seconds (0.3 s optional) delivers excellent temporal resolution.

But the ultimate goal is to provide medical professionals more time for patients while taking best care of their well-being. With this, the SOMATOM Definition AS (AS+, 128-slice configuration) is set to raise the standard of patient-centric productivity with FAST CARE Technology.

Be FAST

With FAST (Siemens' new Fully Assisting Scanner Technologies) the new SOMATOM Definition AS (AS+ Edition, 128-slice configuration) can simplify typically time consuming and complex procedures during a CT examination: the scanning process gets more intuitive and the results become more reproducible. Integrating the capabilities of syngo.via the complete examination – from scan preparation to data evaluation – is streamlined, leading to a more reliable diagnosis with less patient burden.

Take CARE

The desire to deliver as little radiation exposure as possible – following the “As Low as Reasonably Achievable” (ALARA) principle – lies at the heart of our CARE (Combined Applications to Reduce Exposure) research and development philosophy. Over the years, Siemens has introduced many CARE innovations that significantly reduce radiation dose. With the SOMATOM Definition AS, Siemens again brings several innovative CARE features like CARE kV, the first automated, exam-specific voltage setting. This gives our customers the means to minimize dose and consequently take best care of their patients' well-being.

CT-guided Intervention:

Already included with the standard configuration of the scanner is 2D Basic Intervention, which enables sequential scans (i-Sequence) e.g. for CT-guided biopsy. Also included is HandCARE™, which reduces on-line radiation exposure to the user and the patient by switching the radiation off in the upper segment of the 360° tube-rotation. It switches off the x-ray exposure for a 100° angle between three user selectable positions (10:00, 12:00 and 2:00 o'clock).

SOMATOM Definition AS (AS+, 128-slice configuration)
System Overview

- **Definition Gantry**
The SOMATOM Definition AS (AS+, 128-slice configuration) is founded on Siemens' proprietary Definition scanner platform providing a very advanced gantry design with a large gantry bore of 78 cm diameter and a very fast rotation speed of up to 0.33 s (0.30 s optional).
- **STRATON MX-P Tube with z-Sharp Technology**
The SOMATOM Definition AS (AS+, 128-slice configuration) is built around Siemens' revolutionary STRATON X-ray source. Its direct oil cooling of the anode eliminates the need for heat storage capacity (equivalent 50 MHU). The resulting small and compact design enables an unprecedented cooling rate of 7.3 MHU/min as well as reliable performance even when operating at high rotation speeds.

In combination with Siemens' own 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 up to 192 mm/s (with optional 0.3

Description

s rotation) enabling whole body examinations within a few seconds - adapting to challenging patients such as poly-trauma and unconscious or uncooperative patients, leading to an improvement in image quality and patient comfort.

In addition, the STRATON Tube is equipped with the Adaptive Dose Shield: world's first dynamic tube collimation that protects the patient from clinically irrelevant radiation in every spiral scan.

- UFC Detector

The UFC (Ultra Fast Ceramics) detector of the SOMATOM Definition AS (AS+, 128-slice configuration) acquires 128 slices per rotation. In combination with z-UHR (optional), it delivers a spatial resolution of 0.24 mm voxel size, allowing to visualize extremely small anatomical structures with exceptional quality, for example the complex inner-ear bones, outstanding fine details of the coronary tree or intracranial, pulmonary, mesenteric, renal and peripheral vessels. It also helps to perform accurate stenosis measurements or stent planning with outstanding precision.

- Power Generator

The generator power of up to 100 kW (optional, depending on the available power infrastructure) 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 (optional) and a load capacity of up to 307 kg (optional) in combination with the 78 cm gantry diameter of the SOMATOM Definition AS (AS+, 128-slice configuration) virtually adapts to any patient independent of size or condition thus avoiding patient exclusions.

- FAST CARE Technology

With the introduction of Siemens' unique FAST CARE Technology, the SOMATOM Definition AS (AS+, 128-slice configuration) 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 (optional) automatically labels all vertebrae and discs after the data acquisition and prepares typical reconstruction ranges thus saving up to 30 minutes 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 Definition AS (AS+, 128-slice configuration) 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. Add SAFIRE, our raw-data-based iterative reconstruction (dose saving potential up to 60%)*.

- * 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.

- Clinical Applications

Adaptive 4D Spiral

With its unique Adaptive 4D Spiral scan mode (optional) the SOMATOM Definition AS (AS+, 128-slice configuration) overcomes the coverage limitations in dynamic CT imaging when using a static detector and allows for up to 41.5 cm (with optional 0.3 s rotation speed) coverage in dynamic CT imaging.

3D Interventional Suite

In addition the SOMATOM Definition AS (AS+, 128-slice configuration) optionally offers a built in 3D minimal invasive suite, enabling 3D guided interventions with full control of the radiologist due to the wireless in-room control.

Description

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 Definition AS (AS+, 128-slice configuration) can lower the temporal resolution down to 165 ms, allowing to reliably scan even high heart rates, e.g. in acute chest pain evaluation, in coronary visualization, and in functional analysis of the heart.

SOMATOM Definition AS (AS+, 128-slice configuration) System specification in detail

1. System Gantry and Detector:

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

Scanning system: Adaptive Array Detector (AAD) systems based on UFC (ultra fast ceramics) with 47,104 elements, 128 detector electronic channels (DAS) utilized for up to 128 slices/rotation acquisition, and 1,472 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.

Sequence acquisition modes: 128 x 0.6 mm, 64 x 0.6 mm, 32 x 0.6 mm, 20 x 0.6 mm, 8 x 0.6 mm (optional with UHR), 2 x 1 mm, 6 x 1.2 mm, 16 x 1.2 mm, 32 x 1.2 mm, 12 x 1.2mm, 1 x 5 mm, 1 x 10 mm.

Spiral acquisition modes: 128 x 0.6 mm, 64 x 0.6 mm, 32 x 0.6 mm, 20 x 0.6 mm, 10 x 0.6 mm, 16 x 1.2 mm, 8 x 0.6 mm (optional with UHR), 32 x 1.2 mm, 16 x 0.3mm (optional with z-UHR).

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

2. Tube Assembly:

Source: The STRATON high performance X-ray source provide direct oil cooling of the anode, eliminating the need for heat storage capacity (equivalent 50 MHU). The resulting small and compact design (120 mm diameter) enables an unprecedented cooling rate of 7.3 MHU/min as well as the reliable performance when operating at a fast rotation time of up to 0.33 s (up to 0.30 s optional).

- STRATON high performance X-ray source
- Tube current range: Single source 20-800 mA (optional with 100 kW generator; depends on the available power infrastructure)
- Tube assembly system heat storage capacity equivalent 50 MHU
- Cooling rate 7.3 MHU/min (5,400 kJ/min)
- Focal spot size according to IEC 60336: 0.7 x 0.7 mm/7° (optional), 0.9 x 1.1 mm/7°
- Computer controlled monitoring of anode temperature
- Multifan principle with flying focal spot
- Adaptive Dose Shield

3. z-Sharp Technology:

The unique STRATON X-ray source utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating 4,608 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' proprietary UFC (Ultra Fast Ceramic) detector and the corresponding 128-slice detector electronics enable a virtually simultaneous readout of two projections for each detector element – resulting in a full 128-slice acquisition. z-Sharp Technology, utilizing the STRATON X-ray source and the UFC detector, 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.

Description

4. High Power X-ray Generator:

Microprocessor-controlled, low-noise high-frequency generator with integrated, automatic self-testing system for continuous monitoring of operation. Settings: High-voltage range 70, 80, 100, 120 and 140 kV; power max. 100 kW (optional, depends on the available power infrastructure), adjustable in fine steps.

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 one Xeon Quad Core HT, 2.53GHz, NVIDIA Quadro 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 1,280 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, 8 GB RAM, 2 x 136 GB image storage for 520,000 uncompressed images, CD-R 700 MB for 1,100 images. DVD DICOM with 4.7 GB media for 8,400 images. External USB 2.0 devices for data storage are supported (recommended: Iomega 160 GB External Hard Drive Hi-Speed USB 2.0; Maxtor One Touch 160 GB External Hard Drive).

6. CT Image Computer System:

Reconstruction computer for the preprocessing and reconstruction of the CT raw data. The reconstruction computer contains a cluster two Quad Core of 2.4 GHz kernel high-performance processors performing the preprocessing and reconstruction of the CT data with up to 40 images per second. The raw data memory is 1.4 TB.

The FAST IRS (optional) allows for up to 60 images per second reconstruction performance and an extended storage capacity of raw data to 3.6 TB.

7. Cooling System:

SOMATOM Definition AS (AS+, 128-slice configuration) can be equipped with either air or water cooling adapting to your room requirements. This optimizes system availability independently of the ambient conditions and reduces expensive reconstruction costs. System operating temperature: 18-28°C, 18 - 75 % rel. 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 the patient registration or the 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 worklist via network. DICOM Worklist: Software module for accepting lists of patient data and exam requirements from a Radiology Information System (RIS) via DICOM Get Worklist 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 Definition AS (AS+, 128-slice configuration) 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 displays 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 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.

Description

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 rewinding 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.

3D card:

The 3D task card comprises the User Interface for the operation of the MIP (Maximum Intensity Projection), SSD (Surface Shaded Display) and MPR (Multi-planar Reconstruction), and syngo VRT (Volume Rendering Technique) three-dimensional post-processing tools. Up to three thin-slice image sets from different patients can be loaded simultaneously on the 3D card environment and post-processed with MIP, SSD and MPR. The 3D card also features an intuitive and fast bone removal function for CTA post processing and presentation.

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 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 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 – 1,559 mm (optional up to 1,970 mm), width of scan field: 512 mm, 1.5 - 16s (optional 20 s). The topogram can be switched off manually when the desired examination length is reached.

Tomogram:

Scan field size: 50 cm.

Standard rotation times (360°): 0.33, 0.5 and 1 seconds.

Slice thickness in sequence: 0.6, 0.75, 1, 1.2, 1.5, 2.0, 2.4, 3, 3.6, 4.0, 4.8, 5, 6, 7, 7.2, 8, 9, 10, 12, 14.4, 15, 20 mm

Spiral:

Scanning technique for continuous volume scans with continuous table feed in multirotation mode. Max. scan time

Description

80 seconds with full low-contrast resolution. Volume length 1,440 mm (optional 1,840 mm) with full low-contrast resolution (max. 200 cm scan range possible using multiple automatic ranges). Selection of the pitch factor between 0.3 and 1.5 depending on scan mode. Selection of up to 33 separately pre-definable examination ranges in a patient protocol. In addition individual anatomic sections can be successively combined and then scanned automatically. Storage of up to 10,000 examination protocols. Rotation times/cycle: 0.33 s, 0.5 s and 1 s (0.3 s optional).

Slice thickness in spiral: 0.4 (optional with z-UHR), 0.5 (optional with z-UHR), 0.6, 0.75, 1.0, 1.5, 2, 3, 4, 5, 6, 7, 8, 10 mm Real-time image display. Immediate image reconstruction and display without time delay simultaneously to data acquisition in 512 x 512 matrix size.

Iterative reconstruction: SAFIRE* (optional) enables dose savings potential up to 60%

- * 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.

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 with a coverage of up to 14 cm/5.51". Moreover it allows dynamic studies up to a scan range of 41.5 cm/16.3", e.g. after aortic stent graft operation or for dynamic vascular (filling) studies of the peripheral vessels.

Dynamic:

Program for functional dynamic examinations. Serial scanning technique in one slice position with variable scans cycle times.

Multiscan spiral examination without table feed: Continuous multirotational data acquisition in one slice position. Quantitative evaluation and graphical display of time-density curves.

The intelligent algorithm Neuro BestContrast improves native head image quality with a special focus on 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 up to 60 fps (optional), with full cone beam reconstruction, 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: 1,024 x 1024 display matrix; screen splitting configurable up to 64 image segments; CT value scale from -1,024 to +3,071 HU. For very dense objects, the CT value scale can be extended from -10,240 to +30,710 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 1,024 images can be displayed at a frame rate of at least 30 fps. 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 up to 40 fps (with full cone beam reconstruction and z-Sharp Technology).

Description

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:

Enables connection to a local Ethernet network for communication with network printers, diagnostic and therapy workstations, RIS systems and teleradiology routers.

Scope of function:

- Freely configurable network stations
- Unlimited selection of stations
- Support of DICOM 3.0 standard (Digital Imaging and Communications in Medicine) for the transfer of information between DICOM-compatible units from different manufacturers. The scope of functionality is described in detail in the DICOM Conformance Statement and comprises the following standard functions:
 - DICOM Send/Receive
 - DICOM Query/Retrieve
 - DICOM Print
 - DICOM Get Worklist (HIS/RIS)
 - DICOM Study Split
 - DICOM Storage Commitment
 - DICOM MPPS (Modality Performed Procedure Step)
- Image data exchange with MR and therapy units as well as workstations and teleradiology routers which support the DICOM 3.0 standard
- Exchange of CT images with other units of the Siemens SOMATOM CT family via the DICOM 3.0 standard
- Simultaneous documentation of images of any previously examined patient during the current examination on a selectable network printer that supports "DICOM Print"
- Connection to RIS/HIS systems (DICOM Worklist) for the transfer of patient lists
- 1-Gigabit Network Card

11. Integrated CARE Solutions:

UFC Detector

Dose reduction compared to conventional CT detectors. High efficiency for low mAs requirements enable best possible image quality with low patient dose.

Adaptive Dose Shield: world's first dynamic tube collimation that protects the patient from clinically irrelevant radiation in every spiral scan.

CARE Dose4D

With automatic, real-time X-ray dose management for all scan modes, CARE Dose4D provides the minimal X-ray dose level needed to obtain optimal image quality. The dose is determined from extensive computer analysis of the topogram image and also from the data collected on a real time basis during every scanned slice. This dual stage automatic approach enables optimal image quality at the lowest possible X-ray dose.

With this method of dose control, the initial tube current for every axial slice position is determined from the single topogram image. Then, during the data acquisition for each axial slice, the X-ray attenuation values are closely monitored and the tube current is adjusted, on a real time basis, to optimize the X-ray dose level for the specific organs and anatomy in the X-ray path.

CARE Dose4D provides a number of clinical benefits:

- Significant X-ray dose reduction possible for all body regions scanned compared with standard sequence or spiral scanning. Dose savings are possible with CARE Dose4D.
- Consistent, optimal image quality with the X-ray dose level uniquely tailored for every patient and for every anatomical region.
- Thinner axial slices and longer scan ranges possible because of reduced tube loading through optimized

Description

dose delivery.

- low dose examinations for pediatric patients.

CARE Dose Configurator

More precise and simplified configuration of Siemens' real-time dose modulation CARE Dose4D, introducing new reference curves for each body region and for each body habitus allowing to set the parameters even better to the patient's anatomy.

CARE kV

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

CARE Child

Dedicated pediatric CT imaging, including industry's first 70 kV scan modes and specific CARE Dose4D curves and protocols to significantly lower radiation.

Pediatric Protocols

Special examination protocols with 70 or 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 Profile

Visualization of the dose distribution along the topogram for precise dose assessment prior to the scan.

CARE Dashboard

Visualization of activated dose reduction features for each scan range to actively analyze and manage the dose saving potential.

CARE Filter

Specially designed X-ray exposure filter installed at the tube collimator. Dose reduction with increased image quality.

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 automatically. License for software use on one modality.

12. Siemens Remote Service:

Siemens Remote Service (SRS) offers 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 are included for all service agreement customers and during warranty period:

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

Event Monitoring: Event Monitoring screens the performance of the system. If a parameter deviates from a predefined value, a status message is automatically sent to the Siemens UPTIME Service Center. Service Engineers may evaluate the status message at periodic intervals and may initiate appropriate action within the scope of the service agreement.

Note on software use:

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

Description

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.

Welcome Package

The delivery includes a Siemens' Welcome Package

- * 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.

Siemens has always been at the forefront to deliver highest image quality and reduce radiation dose at the same time to the lowest possible level. 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 of 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 edition, the SOMATOM Definition AS (AS+ Excel Edition, 128-slice configuration) 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 edition, the SOMATOM Definition AS (AS+ Excel Edition, 128-slice configuration) 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.

With Siemens' unique STRATON 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
- new CARE Dose4D curves for children

Description

- respective Children Protocol utilizing these features

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), optimized FOV and automatic iso-center adaptation for Head scans.

DoseMAP consists of three parts.

These three parts in combination with each other deliver a complete and comprehensive dose management.

Report Dose: Create transparency and document dose values.

- DICOM SR Dose Reports: DICOM structured file allows for the extraction of dose values (CDTIvol, DLP)

- DoseLogs: Whenever a limit exceeds the set up reference dose levels (Dose Notification and Dose Alert) automatically a report is created on the system.
The report can for example be used for audit purposes.

Analyze Dose: Assess the dose situation.

- CARE Analytics: makes it possible to 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 to get an insight in radiation dose per case or examination type, cumulative dose per patient or to start in-house dose reporting.

Exported and structured dose information makes it possible to monitor the dose over time and gives an insight in the radiation values per examination type. Based on that outcome, measures may eventually be defined to reduce dose.

- CARE Dashboard: Pre-examination dose check-up by showing an overview of all the used dose reduction features per scan.

- CARE Profile: Pre-examination dose check-up by displaying the dose distribution prior to the scan at every z-position.

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

- Access protection: by setting a password it is only possible to change and access the scan protocols in the Scan Protocol Assistant by authorized staff members only.

- Dose Notification and Dose Alert: Both functionalities may help to protect from over-radiation and warn the operator in case set dose thresholds are exceeded.

Dose Notification checks the dose values per chronicle entry.

Dose Alerts checks the accumulated dose per z-position.

Unlike other automated MPR offerings, WorkStream 4D does not require thin slice data to be reconstructed prior to the production of reformatted images. This enhancement saves time when compared to alternative MPR techniques.

In Addition, WorkStream 4D allows the user to produce oblique and double oblique reformats as either MPR or MIP images which substantially improves workflow both for routine and CTA examination when compared with alternative techniques.

Further advantages are the elimination of manual reconstruction steps and the reduction of data volume up to a factor of 10, since virtually all diagnostic information is captured in 3D slices.

CARE Contrast III supports a smart coupling of the CT system and the contrast medium injector to provide an

Description

easier, faster and safer contrast workflow in CT scanning. It facilitates contrast enhanced clinical workflow by synchronizing CT scan and contrast media injection using a single button control from either the scanner or the injector. It speeds up clinical workflow and allows efficient and confident monitoring of patients for extravasation during contrast media injection and scan delay countdown, even if only one Technologist/Radiographer is present.

Scanner and power injector have CE approval according to Medical Device Directive, Art. 12 for combined medical devices. The CE approval is valid for specific combinations of scanner and injector models and their respective software versions.

CARE Contrast III is based on the international standard for the communication between CT and injector (CANopen Application profile for medical diagnostic add-on modules, Part 2: Injector). Due to its open interface technology it is ready for future applications.

In addition, the injection parameters are automatically transferred to the patient protocol, the e-logbook and to MPPS (if configured) thus completing the data for the examination therein. With this, no separate documentation is needed resulting in significant workflow improvements: e.g. the injector information is available from the PACS when reading the images or it is accessible from the HIS/RIS. The injection parameters are also displayed on the contrast card.

CARE Contrast III also fulfils CANopen 425, class 4. This includes contrast protocol definition on the CT scanner (via Scan Protocol Assistant) and linking of contrast protocols with scan protocols. Next to the synchronized start of scan and injection from either the scanner's user interface or the injector's user interface, CARE Contrast III automatically transfers the injection parameters from the CT scanner to the injector.

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 Sinogram Affirmed Iterative Reconstruction (SAFIRE), correction loops are introduced into the image generation process. These iteration loops utilize raw-data information to significantly improve image quality. Additionally, image noise is removed in the iterative corrections the without degrading image sharpness. The noise texture of the images is comparable to standard well-established convolution kernels. The new technique results in an image quality with reduced noise and increased image sharpness that can be translated to dose savings of up to 60 %* for a wide range of clinical applications.

*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 iMAR metal artifact reduction algorithm combines three successful approaches to reduce metal artifacts: beam hardening correction (in sinogram regions of less severe metal attenuation), normalized sinogram inpainting (in sinogram regions of high metal attenuation), and frequency split (to mix back noise texture and sharp details that are potentially lost during inpainting).

The correction process is then iteratively refined by repeating the normalized sinogram inpainting and the mixing steps thanks to the Adaptive Sinogram Mixing.

Along with the new algorithm comes the simple user interface of iMAR. Besides the typical reconstruction parameters it only requires to select the desired protocol from a drop down menu which contains the following type of implants: dental fillings, neuro coil, thoracic coil, hip implants, extremity implants, pacemakers, spine implants and shoulder implants.

Description

In today's clinical environment, there are cases for which it is important to visualize areas outside of the normal 50 cm CT scan field. For this reason, special reconstruction algorithms have been created to allow for visualization of objects using a FOV up to 78 cm. This extra versatility was primarily created to assist with radiation treatment planning applications. The image quality for the area outside the standard 50 cm scan field does not meet the image quality specifications shown in the technical data sheet (non-diagnostic image quality). Image artifacts may be common in the area outside the normal 50 cm scan field, depending on the anatomy scanned.

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 for Single Source exploits this effect: Two spiral data sets acquired in sequence at different energies show different attenuation levels.

FAST DE Results enables a straight forward Dual Energy workflow. You can select dedicated Dual Energy applications at the AWP and they will be sent directly to the PACS without any interaction needed. Available applications for FAST DE Results are:

- DE Monoenergetic (40 keV, 50 keV, 70 keV, 100 keV, 120 keV, 140 keV, 190 keV)
- DE Mixed images

FAST DE Results is as easy as selecting a recon job and will enhance your daily workflow significantly.

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 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.

Software license enabling system to support Enhanced User and System management, including:

- User authentication to prohibit unauthorized access
- Privileges to define user/role based functionality
- Restricts access to functions and data through privileges and permissions
- Logs relevant data security information in audit trail

The option supports adaptive prospective ECG-triggered sequence scanning and adaptive retrospective ECG-gated spiral scanning to obtain CT images of the heart in defined phases of the cardiac cycle at a minimum rotation time of 0.33 s. With prospective ECG-triggered sequence scanning, quick scans are triggered by ECG signals. A temporal resolution of up to 165 ms can be achieved. Retrospective gating is based on a continuous spiral scan with simultaneous ECG recording. The cardio spiral reconstruction allows volume imaging in selectable phases of the cardiac cycle.

With retrospective ECG-gated spiral scans the ECG signal can be edited for improved image quality in the case of

Description

severe arrhythmia. A dedicated "Preview" tool enables the planning of the volume reconstruction during an optimal cardiac phase on the basis of axial single slices. With ECG-pulsed control of the tube current a dose reduction of approx. 50% can be achieved with retrospective ECG-gated spiral scans. The special scan protocols "Cardio-Care" and "Cardio-Sharp" offer a special filter technique for cardiac examinations for improved sharpness and a lower dose.

ECG-controlled imaging techniques are the basis for both the quantification of calcified plaques in the coronary arteries (calcium scoring) and 3D reconstructions of the heart and coronary arteries in contrast media studies (CT angiography of the heart). Retrospective ECG gating also allows functional imaging of the heart. Moreover, these techniques suppress pulsation or motion artifacts in the lung and in vessels close to the heart (e.g. ascending aorta). The ECG signal is supplied by an ECG device integrated in the gantry.

syngo Calcium Scoring supports easy volumetric processing of the data and treats individual calcified lesions as 3D objects. For effective visualization *syngo* Calcium Scoring allows axial images to be displayed together with fast, interactive MIPs. On each image the user can mark calcified regions in up to four coronary arteries. The tabular display showing the score of the four arteries is updated automatically. The software supports all the usual quantification algorithms: Agatston scoring, volumetric scoring and calcium mass quantification. The effect of overlapping slices is compensated. The volume and mass can be determined on the basis of basic volumetric scoring or volumetric scoring with continuous interpolation. The calcium mass is determined in equivalent CaHA units and is calibrated automatically for SOMATOM systems via the scan mode. The threshold for identifying coronary calcifications is configurable.

- User input of calibration factors (allows evaluation of calcium mass for non - Siemens images, if the factors are known)
- Automated selection of coronary calcifications by "3D picking" functionality, which allows automatic volumetric region growing of connected lesions in successive slices.
- Interactive selection/deselection of regions which contribute to calcium scoring.
- User-defined assignment of lesions to one of the four arteries (LM, LAD, CX, RCA) or to other lesions or structures.
- 3D editing of lesions.
- Image annotation
- Built in Framingham Risk calculator
- Built in Procam Risk calculator
- Patient size adjusted calculation of calcium mass, based on the recommendations of the "International Consortium for Multi-Detector CT Evaluation of Coronary Calcium"

Report Generation via List & Label including free text and clinical images

- Saving on floppy disk/hard disk and/or printing
- Interface to user-defined reference table can be used for risk
- Stratification. The corresponding risk percentile information can be included in the report
- Easy and fast Report Configuration for customized hospital/office information on the final report
- Printing of results on laser film and paper printer.
- Export of results to RTF, PDF, JPEG, etc.
- Export of results as Dicom SR

Prerequisites:

Correct operation of the software option is guaranteed only for image data collected using SOMATOM scanners with HeartView Option.

Adaptive 4D Spiral applies a continuously repeated bi-directional table movement, moving the patient smoothly in and out of the gantry over the desired scan range. This allows dynamic CT imaging over a larger range than the physical detector size.

This assures a reliable assessment of the type and extent of cerebral perfusion disturbances in stroke cases by providing information that is not limited by the detector coverage. It allows performing body perfusion studies beyond the physical detector size enabling the assessment of the entire extent of the disease and visualizing the

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function of potential metastasis.

SW upgrade to *syngo* Volume Perfusion CT- Neuro, The following features are included FOC with this upgrade to *syngo* Volume Perfusion CT Neuro

Stroke Evaluation

- 3D analysis of Perfusion data
- New automated guided workflow
- Auto-Stroke for automated display of all perfusion parameters
- New integrated display of Mean Transit Time perfusion parameter
- Overview of all perfusion parameters in one window set (CBF,CBV, MTT, TTP)

Brain Tumor Evaluation

Fully automated *syngo* Volume Perfusion CT facilitates quantitative 3D evaluation of brain tumors.

- Visualization and evaluation of extra-vascular leakage in 3 D
- Dedicated 3D blood-brain-barrier imaging.
- Enhance the ability to grade tumors.
- Plan biopsies and monitor therapy.

* for AWP only requires *syngo* 2008 B version with 8 GB RAM

The application computes a bone subtracted volume dataset maintaining all information about vascular and soft tissue structures for further processing. The result of the application is a new CTA volume without bones but maintaining all other information for further processing in the Neuro DSA (Digital Subtraction Angiography) CT application or any other suitable application.

Workflow

- The completely automated algorithm makes this application easy to use
- The NECT dataset can either be reconstructed from a standard spiral CT scan acquired for diagnostic purposes or from an additional low dose NECT scan
- CTA dataset will be loaded first, followed by either a volume dataset without contrast media (NECT) or a calculated dataset (Neuro DSA dataset)
- Calculation subtracts both scans
- During evaluation, toggling between CTA dataset and Neuro DSA dataset is possible

Image display

- Display settings in VRT and MPR modes (thick and thin MPR, MIP, thin MIP) are supported

Documentation

- *syngo* filming and saving can be used to save result images in the database.

Siemens proprietary *syngo* software visualizes the examination workflow in individual process steps on so-called task cards, such as the patient registration, examination, viewing or 3D task card. The dual monitor feature enables the split of the *syngo* task cards on two monitors in two different ways. This option includes the *syngo* dual monitor software and a second high resolution, flicker-free, 19-inch (48 cm) color flat panel display for medical diagnostic applications. 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 ensured by controlled backlight throughout the whole lifetime.

Possibility one: One monitor displays the viewing task card, for instance for the interactive review of image data. All other *syngo* task cards are displayed on the second monitor.

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Possibility two: Both monitors display the 3D-Basic task card, enabling the viewing and manipulation of two different datasets on two monitors. It enables the comparison of two series from the same patient e.g. pre and post contrast or the comparison of two studies from the same patient e.g. pre and post surgery.

19" Monitors, Scope of delivery and functions: High-resolution, flicker-free monitor with 48 cm (19 in) flat screen, 1280 x 1024 resolution, 75 frames/s for parallel viewing and visual checking during the examination. The max. depth of the monitor is only 111 mm. Display suitable for medical diagnostic applications (room class 1 and 2 acc. To DIN 6868-157).

The dual monitor ceiling support consists of: a Ceiling support with installation kit and voltage supply.

Available for room heights (unfinished concrete floor) from 2600mm to 3700mm.

Note: If the room height is not included in the recommended range, an ergonomic monitor viewing height might not be possible, in this case the use of a monitor cart is recommended. Please refer to the Planning Guide regarding further details.

The unique STRATON X-ray source utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating 4,608 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' proprietary UFC (Ultra Fast Ceramic) detectors and the corresponding 128-slice detector electronics enable a virtually simultaneous readout of two projections for each detector element – resulting in a full 128-slice acquisition. This sampling scheme is identical to that of a 128 x 0.3 mm allowing for reconstruction of 384 slices using 0.1 mm reconstruction interval increment. z-Sharp Technology, utilizing the STRATON X-ray sources and the UFC detectors, 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.

Lung Imaging

This SOMATOM Definition scanner offers two specific scan protocols to provide Lung Imaging at 1.3 mGy CTDI or greater and for use with post-processing applications

LungLowDose Uses CARE Dose 4D in conjunction with CARE kV and adaptive dose shield to provide imaging of the lung with a default scanner protocol set at 1.3 mGy CTDI. This protocol provides images from .6 mm and are acquired using .6 mm collimation and a z-sharp mm of 128X0.6 mm off. Default settings of a reference kVp of 120 and quality Reference mAs of 20 with rotation speed of .50 are used to achieve this dose. This protocol is set using a Kernel of B70f, B31F and B70F for axial viewing.

LungCARE Uses CARE Dose 4D in conjunction with CARE kV and adaptive dose shield to provide imaging of the lung with a default scanner protocol set at 1.3 mGy CTDI. This protocol provides images from .6 mm and are acquired using .6 mm collimation and a z-sharp mm of 128X0.6 mm off. Default settings of a reference kVp of 120 and quality Reference mAs of 20 with rotation speed of .50 are used to achieve this dose. This protocol is set using a Kernel of B80f, B31F and B60f to be automatically transferred and post-processed on a Siemens workstation.

Eaton 93PM-150/150 4-Wire UPS Electronics Cabinet: 150kW Frame cabinet with three (3) Power Modules (UPM) configured as a 150kW capacity system specifically for a medical imaging application. 480 volts input / 480 volts output, 4-Wire + Gnd. Double Conversion Topology, Unit efficiency up to 97% (up to 99% with ESS), Unit output rating @ Unity Power Factor, Input current distortion < 3% @ 100% load, Patented ABM Technology, Patented HotSync parallel firmware control, Scalable Architecture, Parallel Redundancy and Capacity capable.

Description

Onboard monitoring of UPS status via front panel display is standard. Includes single feed input with three (3) circuit breaker (BIB, MBP, MIS) integrated maintenance bypass in a 14.7" wide right-mounted sidecar. Four (4) internal min-xslot communication card bays.

Included Services: Start-up (7x24): PLUS One (1) year on-site labor coverage (7x24).

UPS Cabinet Dimensions: 36.7"W x 42.0"D x 74.0"H

UPS Cabinet Weight: 1,566 Lbs.

Eaton 93PM 480Vdc Battery System: One (1) IBC-L Integrated Battery Cabinet consisting of one (1) string of 240 cells (@480Vdc), 40 Batteries, and 500A Circuit Breaker in cabinet. Full load back-up time @ 150kW of 7.1 minutes.

Battery Cabinet Dimensions: 32.3"W x 42.0"D x 74.0"H

Battery Cabinet Weight: 4,225 Lbs.

Eaton Power Xpert Gateway UPS Mini-Slot Card (PXGMS): This card can provide Web/SNMP and Modbus TCP/IP connectivity and functionality for the 93PM UPS system for the purpose of remotely monitoring the status of the UPS via an Ethernet network connection.