North Carolina Department of Health and Human Services
Division of Health Service Regulation

Pat McCrory
Governor

Aldona Z. Wos, M.D.
Ambassador (Ret.)
Secretary DHHS

Drexdal Pratt
Division Director

March 11, 2014

J. Anthony Rose
810 Fairgrove Church Road SE
Hickory, NC 28602

Exempt from Review - Replacement Equipment

Facility:	Catawba Valley Medical Center
Project Description:	Replace existing CT scanner
County:	Catawba
FID #:	933080

Dear Mr. Rose:

In response to your letter of January 30, 2014, the above referenced proposal is exempt from certificate of need review in accordance with N.C.G.S 131E-184(a)(7). Therefore, you may proceed to acquire, without a certificate of need, the Siemens Somatom Definition AS+ to replace the existing Siemens Sensation 16 (serial #50657). This determination is based on your representations that the existing unit will be removed from North Carolina and will not be used again in the State without first obtaining a certificate of need. Further please be advised that as soon as the replacement equipment is acquired, you must provide the CON Section and the Medical Facilities Planning Branch with the serial number of the new equipment to update the inventory, if not already provided.

Moreover, you need to contact the Construction and Acute and Home Care Licensure and Certification Section to determine if they have any requirements for development of the proposed project.

It should be noted that this Agency's position is based solely on the facts represented by you and that any change in facts as represented would require further consideration by this Agency and a separate determination. If you have any questions concerning this matter, please feel free to contact this office.

Sincerely,

Julie Halatek
Project Analyst

Martha J. Frisone, Interim Chief
Certificate of Need Section

cc: Acute and Home Care Licensure and Certification Section, DHSR
Construction Section, DHSR
Radiation Protection Section, DHSR

Certificate of Need Section
www.ncdhhs.gov
Telephone: 919-855-3873 • Fax: 919-733-8139
Location: Edgerton Building • 809 Ruggles Drive • Raleigh, NC 27603
Mailing Address: 2704 Mail Service Center •Raleigh, NC 27699-2704
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CATAWBA VALLEY MEDICAL CENTER

January 30, 2014

Mr. Craig Smith, Chief
Certificate of Need Section
Division of Health Service Regulation
2704 Mail Service Center
Raleigh, NC 27699-2704

RE: Catawba Valley Medical Center, Request Exemption to Replace Medical Equipment
FID#933080

Dear Mr. Smith:

Catawba Valley Medical Center (CVMC) is seeking to replace one of its three existing computed tomography (CT) scanners with a replacement unit due to the advancing age of the equipment. The equipment to be replaced, a Siemens Sensation 16 CT scanner, is located within the Radiology Department of CVMC where it has operated on a daily basis since its purchase in 2005. Recent advancements in CT technology have dramatically reduced the radiation to which patients are exposed who must receive complex imaging scans. The new CT will reduce the radiation dose by as much as 60 percent on most scans. The Sensation 16 can produce 32 images per second of acquisition with the new system acquiring up to 384 images a second. This will not only reduce the time required per scan, thereby increasing patient throughput, it will dramatically reduce the radiation to which CVMC's patients are exposed. For these reasons we are requesting that we be allowed to upgrade the existing Siemens Sensation 16 unit with comparable medical equipment as defined in N.C.G.S. 131E-176(22a).

CVMC is requesting approval to replace the existing Siemens Sensation 16 with a Siemens SOMATOM Definition AS+ system. Both are multifunctional scanners capable of performing multiple examinations, ranging from routine scans to high-end vascular (CTA) procedures. The new Definition AS+, however, maximizes the clinical outcome by allowing scanning and post-processing to be performed simultaneously. This means that the user is capable of performing multiple tasks on less hardware, thereby improving operator productivity and patient throughput. However, unlike the Sensation 16, the new Definition AS+ also provides the capability of cardiac imaging and imaging for bariatric patients. A table comparing the capabilities of the current and proposed equipment is provided in Exhibit 1.

The total capital expenditure of the new equipment is $970,651 which includes a feature that will allow us to scan bariatric patients weighing up to 676 pounds. This price includes delivery and installation by the Original Equipment Manufacturer (OEM), Siemens, along with a trade-in of the current Sensation 16 which will be removed from North Carolina. (See quotation included in Exhibit 2.) Renovations to the Radiology Department will not exceed $50,000 as documented in a breakdown of capital costs provided in Exhibit 2 and certified by a licensed architect.

A brochure describing the features of the Definition AS+ is provided in Exhibit 3. Exhibit 4 contains documentation that the Siemens Sensation 16 is currently in operation.

Catawba Valley Medical Center anticipates no increase in its charges for CT exams due to the acquisition of the replacement equipment.

Thank you in advance for your consideration of our exemption request to replace the Siemens Sensation 16 CT scanner with a Siemens SOMATOM Definition AS+. If you have questions regarding the request or require additional information, please direct them to Lisa Hamby at 828-326-3478.

Sincerely,

J. Anthony Rose, FACHE
President and CEO

JAR:mme

Attachments

cc: Scott Echelberger (w/o attachments)

EXHIBIT 1

Equipment Comparison Form:
Siemens Sensation and Siemens Destination AS+

EXHIIT 1
CVMC EQUIPMENT COMPARISON: CT REPLACEMENT EQUIPMENT

	EXISTING EQUIPMENT	REPLACEMENT EQUIPMENT
Type of Equipment (List Each Component)	CT	CT
Manufacturer of Equipment	Siemens	Siemens
Tesla Rating for MRIs	NA	NA
Model Number	Sensation 16	Definition AS+
Serial Number	50657	
Provider's Method of Identifying Equipment	Main CT (Site ID 120844)	
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	NA	
Date of Acquisition of Each Component	5/2004	
Does Provider Hold Title to Equipment or Have a Capital Lease?	Own	Own
Specify if Equipment Was/Is New or Used When Acquired	New	New
Total Capital Cost of Project (including Construction, etc.) <Use Attached Form>	$1,285,797.00	$1,077,151
Fair Market Value of Equipment	$47,000.00	$970,651
Net Purchase Price of Equipment	$1,269,197.00	$970,561.00
Locations Where Operated	CVMC Main Campus	CVMC Main Campus
Number Days in Use/To be Used in N.C. Per Year	365	365
Percent of Change in Patient Charges (by Procedure)	NA	0
Percent of Change in Per Procedure Operating Expenses (by Procedure)	NA	0
Type of Procedures Currently Performed on Existing Equipment	All routine CT exams, CTA, CT flouro biopsy guidance, CT interventional. CT colonography	
Type of Procedures New Equipment is Capable of Performing		All routine CT exams, CTA, CT flouro biopsy guidance, CT interventional. CT colonography, CT cardiac, Dual Energy single source scan technique. Dose Reduction Technique

EXHIBIT 2

Capital Costs of Replacement Equipment
Quotation of Siemens SOMATOM Destination AS+

EXHIBIT 2
PROPOSED TOTAL CAPITAL COST OF PROJECT

Project Name: Replace Siemens Sensation 16 CT Scanner
Provider/Company: Catawba Valley Medical Center

A.	**Site Costs**		
	(1) Full purchase price of land	$	NA
	(2) Closing costs	$	NA
	(3) Site Inspection and Survey	$	NA
	(4) Legal fees and subsoil investigation	$	NA
	(5) Site Preparation Costs	$	NA
	(6) Other (Specify)	$	NA
	(7) **Sub-Total Site Costs**	$	NA
B.	**Construction Contract**		
	(8) Cost of Materials	$	15,000
	(9) Cost of Labor	$	30,000
	(10) Other (Permits)	$	3,000
	(11) **Sub-Total Construction Contract**	$	48,000
C.	**Miscellaneous Project Costs**		
	(12) Building Purchase	$	
	(13) Fixed Equipment Purchase/Lease	$	970,651
	(14) Movable Equipment Purchase/Lease	$	
	(15) Furniture	$	2,000
	(16) Landscaping	$	
	(17) Architect and Engineering Fees	$	8,500
	(18) Financing Costs (e.g. Bond, Loan, etc.)	$	
	(19) Interest During Construction	$	
	(20) Other (Specify)	$	
	(21) **Sub-Total Miscellaneous**	$	
	(22) **Total Capital Cost of Project (Sum A-C above)**	$	1,077,151

See architect and hospital representative's attestation to above costs on following page.

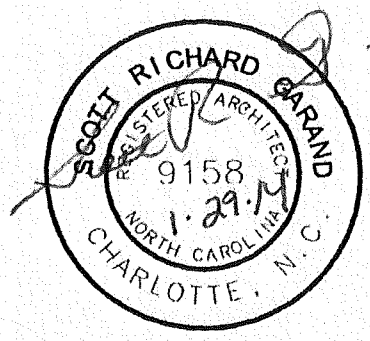
I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

(signature of Licensed Architect or Engineer)

I assure that, to the best of my knowledge, the above capital costs for the proposed project are complete and correct and that it is my intent to carry out the proposed project as described.

Vice President
(Title of Officer)

Signature of Office Authorized to Represent Provider/Company)



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Mathew Hayes - (336) 263-4273

Quote Nr:	**1-2APDWQ Rev. 0**
Terms of Payment:	00% Down, 80% Delivery, 20% Installation Free On Board: Destination
Purchasing Agreement:	PREMIER PURCHASING PARTNERS LP PREMIER PURCHASING PARTNERS LP terms and conditions apply to Quote Nr 1-2APDWQ

SOMATOM Definition AS (AS+ Configuration)

All items listed below are included for this system: *(See Detailed Technical Specifications at end of Proposal.)*

Qty	Part No.	Item Description
1	14434002	**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. Using Siemens' z-Sharp technology the system can provide high spatial resolution. The fast rotation time of 0.33 seconds (0.30 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 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 and even clinically challenging cases like in the ED or bariatric patients can be imaged rapidly from head to toe without difficulty. And even for CT-guided interventional procedures 2D Basic Intervention and HandCARE(tm) is already included. A 3D intervention suite is optional available.
1	14420773	**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.
1	14420771	**CARE Child** Dedicated pediatric CT imaging, including 70 kV scan modes and specific CARE Dose4D curves and protocols
1	14433993	**FAST Planning #AWP** Direct, organ-based setting of scan and recon ranges for a faster and more standardized workflow
1	14433820	**DoseMAP** DoseMAP - Siemens CT Dose Manage Program - creates transparency in dose values and makes it possible to assess the dose situation DoseMAP provides functionalities like CARE Analytics to report, document and analyze dose. It lets the user access dose values per case, per examination type, or per patient. DoseMAP may also help to protect our patients from over radiation - thanks to its alert function that warms the operator in case set dose thresholds are exceeded. Additionally, to protect the set dose levels, access to scan protocols can be restricted to prevent unauthorized changes to the scan parameters
1	14420996	**100 kW Power** The 100 kW power allows the X-ray generator the use of maximum power of 100kW in fine adjustable steps.

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Qty	Part No.	Item Description
1	14419142	**Workstream 4D #AWP** WorkStream 4D further enhances the already superb workflow of the SOMATOM Definition AS 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.
1	14419143	**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.
1	14419144	**DICOM SR Viewer #AWP** The DICOM SR (structured report) Viewer allows to read reports created with specific applications (e.g. Circulation, Lung Care, Calcium Scoring and Onco) without the application itself being on the respective computer.
1	14420855	**Standard IRS** Reconstruction computer for the preprocessing and reconstruction of the CT raw data. The reconstruction computer contains of a cluster of 3 high-performance GPU boards performing the preprocessing and reconstruction of the CT data. The raw data memory is 1.5 Tbyte. The peak reconstruction performance is up to 40 frames/sec.
1	14420766	**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%*. *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, homogenity, 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.
1	14433146	**FAST Iterative Reconstruction** FAST Iterative Reconstruction allows a fast reconstruction performance in clinical routine with Sinogram Affirmed Iterative Reconstruction (SAFIRE).
1	14428058	**Gantry tilt incl. tilted spiral** Allows for sequential scanning with a tilted gantry between +/- 30°, depending on the vertical position of the table. Using the gantry tilt sensitive organs (like eye lenses) can be moved out of the scan range or it eases access during interventional procedures. The tilted spiral allows to utilize the gantry tilt for spiral scan modes.
1	14408111	**Extended Field of View #AWP** 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.
1	14420811	**syngo DE Scan for Single Source#AWP** 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.
1	14408149	**UHR** 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
1	14408019	**ELEVATE O Definition AS+ Config.** Elevate from an old Siemens CT scanner to a new SOMATOM Definition AS+.
1	14408032	**Rear cover incl. gantry panels** Rear Cover including gantry control panels with control functionality from the backside.
1	14408094	**Keyboard English** Keyboard in the above-mentioned language.
1	14408023	**Cooling System Water** Water heat exchanger for the dissipation of heat loss generated in the gantry to an environmentally friendly cooling water circulation system. This optimizes system availability independently of the cooling water flow rate and temperature. System operation temperature 4 - 16 degrees C and 500 - 2500 l/h flow rate.

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Qty	Part No.	Item Description
1	14408026	**Hose pipe insulated 30 m** Hose pipes to connect the "Cooling System" with the gantry.
1	14408031	**Cable loom 25 m** Cable loom used to connect the power distribution system (PDS) with the gantry.
1	14420778	**Multi Purpose Table** Patient table to support up to 200cm scan range. Motor-driven table height adjustment from min. 48 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. Positioning aids: Positioning mattress, 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 with positioning mattress, knee-leg support.
1	14408219	**Physiological Monitoring Module** The Physiological Monitoring Module allows to connect a 3 Channel ECG cable for ECG controlled cardiac acquisition.
1	14408040	**ECG cable IEC2 #D** ECG cable, IEC2 (AHA/US color coding).
1	14420921	**Table Side Rails** 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.
1	14408217	**High Cap. Patient & Trauma Tab.Top** The high capacity and trauma table top offers the capability to support up to 307 kg/676 lbs of patient weight. It allows easy positioning and transfer from and to the table, due to its flat surface. Special accessories and an extended table top width of 530 mm ensure a safe and comfortable positioning for obese patients.
1	14408218	**High Cap. Patient & Trauma Acc Kit** The High capacity and Trauma accessory kit contains additional Patient restraint set with a width of 400mm and additional table extensions for feet and head.
1	14414734	**Mattress for Bariatric Table Top** This mat is used for scanning non-bariatric patients on the flat, bariatric table top. Placing this mat on the bariatric table top eliminates the need to exchange the table top when non-bariatric patients are scanned. This mat has a curved profile and enables comfortable positioning of non-bariatric patients.
1	14408037	**HeartView CT** Scanning technique and program for ECG controlled data acquisition and image reconstruction with SOMATOM. The package comprises: HeartView CT option on the syngo Acquisition Workplace console for the ECG-controlled acquisition and reconstruction of artifactfree images of the heart. The ECG signal is supplied by an ECG device integrated in the gantry. The use of the software of this option is restricted to a single system unit.
1	14408302	**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).
1	14408105	**Dual 19" Monitor #AWP** Second 19-inch monitor for the Acquisition workplace (AWP)
1	14408324	**Ceiling Kit for Second Monitor** 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. Consisting of: Two monitors, video transmitter, video receiver, power supply cable and a 30 m fiber-optic cable set for connecting the flat screen monitor.

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Qty	Part No.	Item Description
1	14408307	**Ceiling Support Intervention** Ceiling support for the accommodation and safe installation of one or two flat screen monitors in the examination room for room heights from 2640 mm to 3680 mm.
1	14408319	**19" flat screen monitor** The 19" monitor option supports CT interventions and CT fluoroscopy with a display in the examination room.
1	CT_PM	**CT Project Management** A Siemens Project Manager (PM) will be the single point of contact for the implementation of your Siemen's 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.
1	CT_STD_RIG_INST	**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.
1	CT_PR_AS128X_EO_BN	**AS 128 Elevate O Bonus**
1	CT_STD_DEINSTALL	**CT Standard De-Installation**
1	CT_INITIAL_32	**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.
1	CT_FOLLOWUP_12	**Follow-up training 12 hrs** Up to (12) hours of follow-up on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. 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.
2	CT_DEFSYNGO_BCLS	**Definition Systems Basic syngo Class** Tuition for (1) imaging professional to attend Siemens Classroom Course at Siemens Training Center. The objectives of this basic syngo class are to introduce the user to the Siemens SOMATOM CT Definition user interface of the syngo platform, scanning parameters and their effect on image quality, and instructions on building protocols, demonstration of software functions, and hands-on sessions. This class includes lunch, economy airfare, and lodging for (1) imaging professional. All arrangements must be arranged through Siemens designated travel agency. 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.
1	CT_ADD_32	**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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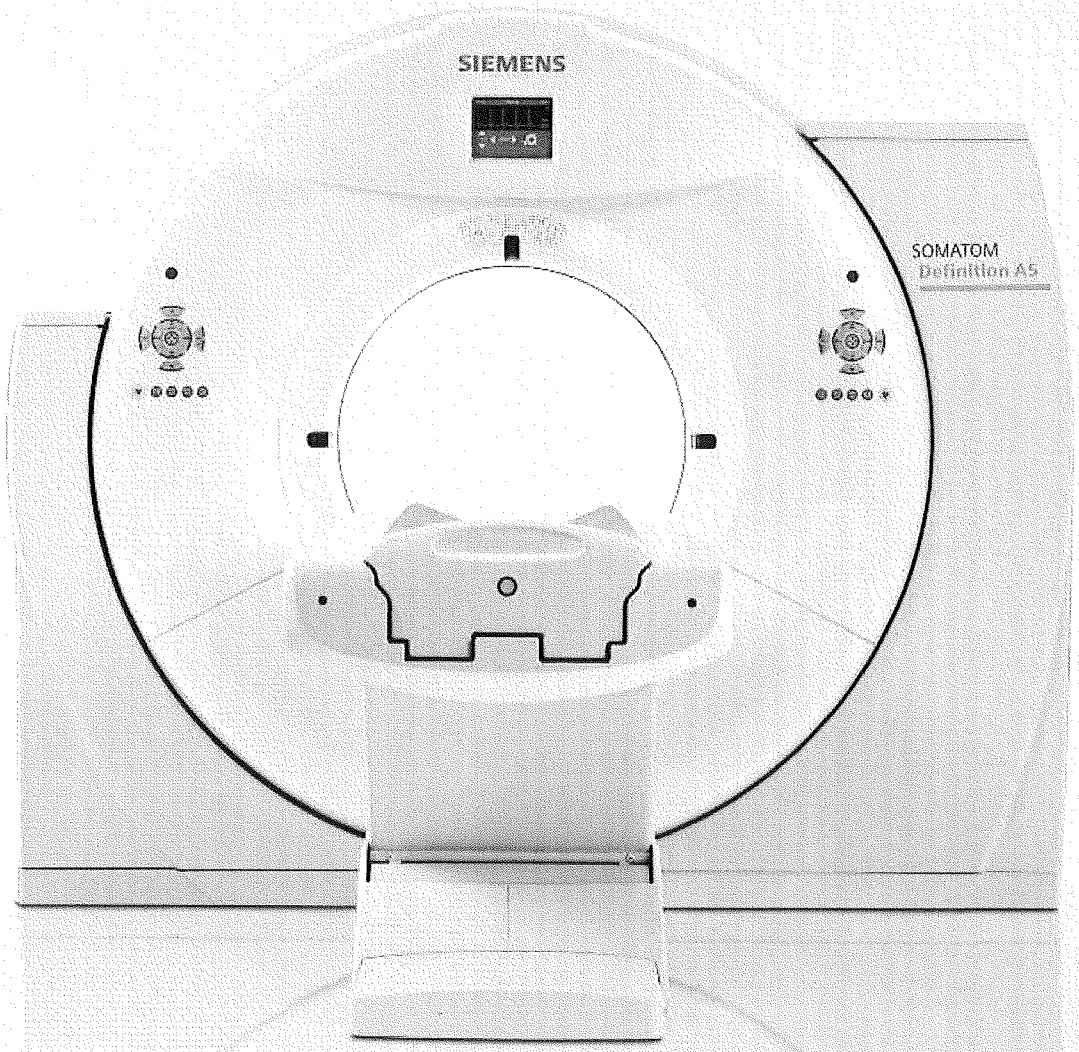
Qty	Part No.	Item Description
1	CT_RECON_384	**AS+ configuration z-Sharp Technology** The unique STRATON X-ray source utilizes an electron beam that is accurately and rapidly deflected, creating two precise focal spots alternating 4,608 times per second. This doubles the X-ray projections reaching each 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 recpnstruction 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.
1	PSPD250480Y3K	**Surge Protective Device (SPD)**
1	CTSP4002	**CT SLICKER; SENSATION AND VOLUME ZOOM**
1	4SPAS014	**Low Contrast CT Phantom & Holder**
1	FAST_ADJUST	**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.
1	FAST_SCAN_ASSIST	**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	CARE_KV	**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** CARE Profile: Visualization of the dose distribution along the topogram prior to the scan
1	CARE_DASHBOARD	**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	DOSE_NOTIFICATION	**Dose Notification** 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.
1	DOSE_ALERT	**Dose Alert** 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.
1	ADAPT_DOSE_SHIELD	**Adaptive Dose Shield** Adaptive Dose Shield for spiral acquisition to eliminate pre- and post-spiral over-radiation.
1	CARE_DOSE4D	**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	CT_BIOMED_TRN	**CT2DEFFAM - Definition Family including Definition AS/AS+, Definition Flash, Edge Systems - (13 days) $18,870**
1	CT_EXTEND_WARRANTY	**CT Extended Warranty @ 6 months $64,047**
1	CT_ADDL_RIGGING	**Additional Rigging CT $2,000**

System Total: $970,651

EXHIBIT 3

Siemens SOMATOM Destination AS+
Brochure



Maximize Outcome. Minimize Dose.

SOMATOM Definition AS

Datasheet for AS+ 128-slice configuration Excel Edition
syngo CT 2011A

Answers for life.

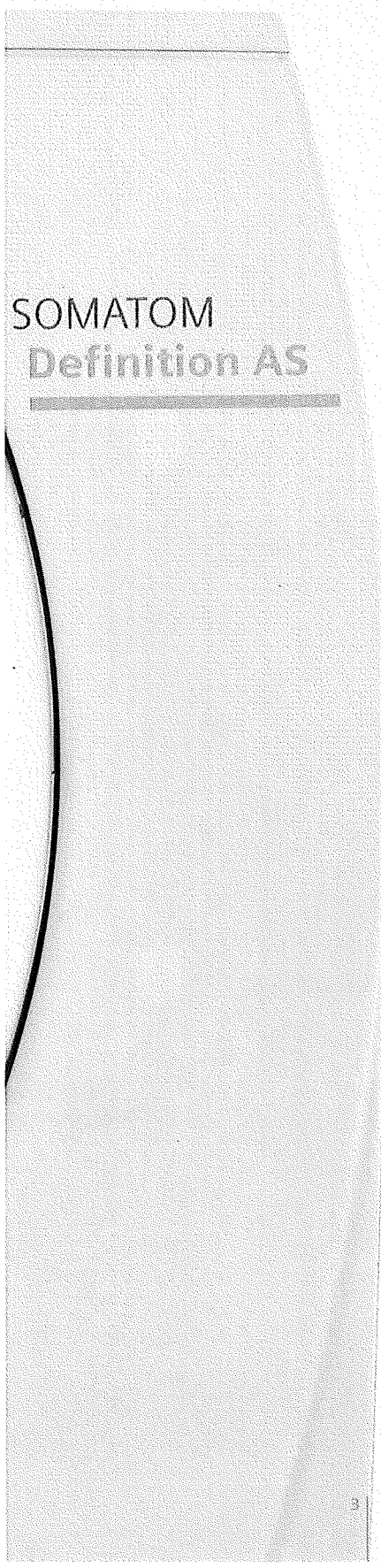
SIEMENS

Maximize Outcome.

Over the recent years Computed Tomography has found its way into almost every clinical discipline. Especially with the first generation of the SOMATOM® Definition AS from 2007, Siemens introduced a scanner that for the first time was capable of adapting to virtually every patient and every clinical question.

Now Siemens is again breaking barriers: With the new SOMATOM Definition AS Excel Edition you have the possibility to maximize your clinical outcome – meaning to have best clinical results, but with significantly less resources bound to the CT system. The ultimate goal is to provide you with more time for patients – or patient-centric productivity.

For this Siemens introduced its new FAST (Fully Assisting Scanner Technologies) research and development philosophy. These new FAST features available on the new SOMATOM Definition AS allow to 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.



Minimize Dose.

From the very beginning, one of the most important topics for Siemens CT has been patient safety. And in Computed Tomography, patient safety translates primarily into dose reduction. This is why since decades, Siemens has always been at the forefront to reduce radiation dose to the lowest possible level.

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. Over the years, Siemens has been highly successful in integrating many innovations into the Siemens scanners that significantly reduce radiation dose in comparison to other systems available on the CT market. For example, the Adaptive Dose Shield, introduced with the first SOMATOM Definition AS in 2007, or IRIS – the Iterative Reconstruction in Image Space – in 2009, with the capability to significantly reduce dose or improve image quality*.

With the new SOMATOM Definition AS Excel Edition, Siemens again introduces several innovative CARE features like CARE kV, the first automated, exam-specific voltage setting to optimize CNR and reduce dose by up to 60%. To give our customers every means to minimize dose and consequently take best care of their patients well-being.

* In clinical practice, the use of IRIS 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.

System Configuration

Standard System Hardware
0.33 s rotation time
0 MHU STRATON® X-ray tube
z-Sharp™ Technology
Adaptive Dose Shield
Multislice UFC™ (Ultra Fast Ceramic) Detector
80 kW generator
CT patient table (1,600 mm scan range, 212 kg/467 lbs table load)
40 fps image reconstruction
Optional System Hardware
0.3 s rotation time
100 kW generator*
UHR (Ultra high resolution)/ z-UHR (z-Ultra high resolution)
CT patient table (2,000 mm scan range, 227 kg/500 lbs table load)
Multi-purpose patient table (307 kg/676 lbs table load)
50 fps image reconstruction
Additional 19" (48 cm) flat screen monitor
Dual 19" (48 cm) flat screen monitor with dual display functionality
Standard Workplaces
syngo® Acquisition Workplace
19" (48 cm) flat screen monitor
CD/DVD storage
Optional Workplaces
syngo CT Workplace
syngo MultiModality Workplace
syngo.via
Additional 19" (48 cm) flat screen monitor
Dual 19" (48 cm) flat screen monitor with dual display functionality
Enhanced graphics card for *syngo* MultiModality Workplace

Standard System Software
syngo Examination
syngo Viewing
syngo Filming
syngo Archiving & Network
Standard FAST Applications
FAST Adjust
FAST Scan Assistant
Standard CARE Applications
CARE Filter
CARE Bolus CT
CARE Topo
CARE Dose4D
CARE kV
CARE Child – Pediatric Protocols
CARE Profile
CARE Dashboard
Standard Applications on *syngo* Acquisition Workplace
syngo 3D Real Time MPR
syngo 3D SSD (Surface Shaded Display)
syngo Volume Calculation
syngo Dynamic Evaluation
syngo VRT (Volume Rendering Technique)
CT-Angiography
Neuro BestContrast
Adaptive Signal Boost

For more information on applications please refer to the Clinical Engine and Clinical Applications Brochure.

* Only ex factory, not available as an upgrade option

System Configuration

Optional System Software

- Adaptive 4D Spiral
- Extended FoV (Field of View)
- HD FoV (Field of View)
- *syngo* Security Package
- *syngo* Expert-i
- *syngo* HeartView CT (including Adaptive ECG-Pulsing and Adaptive Cardio Sequence)
- WorkStream4D™ (3D-Recon)

Optional Applications for CT Intervention

- Adaptive 3D Intervention Suite
- Adaptive 3D Intervention
- Intervention Pro
- i-Fluoro
- i-Control

Optional FAST Applications

- FAST Planning
- FAST Cardio Wizard
- FAST Spine

Optional CARE Applications

- Sinogram Affirmed Iterative Reconstruction (SAFIRE)**
- Iterative Reconstruction in Image Space (IRIS)*
- Adaptive ECG Pulsing™ and Adaptive Cardio Sequence (included in *syngo* HeartView CT)
- CARE Contrast III
- X-CARE

Optional Applications for *syngo* Acquisition Workplace

- *syngo* Cardio BestPhase Plus
- *syngo* Calcium Scoring
- *syngo* Fly Through
- *syngo* Dental CT
- *syngo* Osteo CT
- *syngo* Pulmo CT
- *syngo* Volume Perfusion CT Neuro
- *syngo* Volume Perfusion CT Body
- *syngo* Image Fusion
- Respiratory Gating and Triggering CT

Optional Applications for *syngo* CT Workplace and *syngo* MultiModality Workplace

- *syngo* InSpace4D™
- *syngo* InSpace EP
- *syngo* InSpace Lung Parenchyma Evaluation
- *syngo* Fly Through
- *syngo* Dental CT
- *syngo* Osteo CT
- *syngo* Pulmo CT
- *syngo* HeartView CT (including Adaptive ECG-Pulsing)
- *syngo* Circulation
- *syngo* Circulation Plaque Analysis
- *syngo* Circulation PE Detection***
- *syngo* Circulation PE Detection Basic*
- MI Hybrid Visualization
- *syngo* InSpace4D Advanced Vessel Analysis
- *syngo* Calcium Scoring
- *syngo* Volume Perfusion CT Neuro
- *syngo* Neuro DSA CT (Digital Subtraction Angiography)
- *syngo* Neuro PBV CT
- *syngo* Volume Perfusion CT Body
- *syngo* CT Oncology
- *syngo* Colonography CT (incl. Virtual Dissection)
- *syngo* Colonography CT with PEV (Polyp Enhanced Viewing)
- *syngo* LungCARE CT
- *syngo* LungCAD
- *syngo* Image Fusion
- *syngo* Expert-i
- *syngo* Security Package

syngo via

- Wide Range of individual applications
- CT Cardio-Vascular Engine
- CT Acute Care Engine
- CT Oncology Engine
- CT Neuro Engine

For more information on applications please refer to the Clinical Engine and Clinical Applications Brochure.

* For U.S. only
** The option requires 510(k) review and is not commercially available in the U.S.
*** Not available in the U.S.

System Hardware

Gantry	
Aperture	78 cm
Scan field	50 cm 65 cm with HD FoV* 78 cm with extended FoV*
Tilt	± 30°
Rotation time	0.30*, 0.33, 0.5, 1 s
Three laser light markers	Horizontal, sagittal, and vertical laser light showing the isocenter position of the scan plane
Integrated display panel	Gantry front display showing current scan parameters such as kV, mA, scan time, table position, gantry tilt, and ECG trace**
Gantry front and rear* control panels	For convenient patient positioning (e.g. in case of trauma or interventional exams) Gantry tilt control from the operator's console
Continuously rotating tube-detector unit with optimized geometry for high-resolution data acquisition across the entire scan field	
Tube Assembly	
Tube	STRATON MX P High-performance CT X-ray tube
Tube current range	60–666 mA, up to 800 mA (with 100 kW generator)*
Tube voltage	70, 80, 100, 120, 140 kV
Tube anode heat storage capacity	0 MHU (0.6 MHU capacity combined with 7.3 MHU/min (5,400 kJ/min) cooling rate is comparable to the performance of a conventional tube with approximately 50 MHU (37,000 kJ) anode heat storage capacity)
Cooling rate	7.3 MHU/min
Focal spot size according to IEC 60336	0.7 x 0.7 mm/7°* 0.9 x 0.9 mm/7°
z-Sharp Technology	The unique STRATON X-ray tube utilizes an electron beam that creates two precise focal spots alternating 4,608 times per second. This doubles the X-ray projections at each detector element. The corresponding detector electronics enable a virtually simultaneous readout of two projections for each detector element, resulting in a full two-slice acquisition per detector row. The two projections are overlapping, what results 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. This provides scan speed independent visualization of 0.33 mm isotropic voxels and a corresponding minimization of spiral artifacts at any position within the scan field.
Adaptive Dose Shield	
The first dynamic tube collimation that protects the patient from clinically irrelevant radiation in Spiral CT	
Computer-controlled monitoring of anode temperature	
CARE Filter	
Al equivalent	tube: 6.8 mm Al
Beam limiting device	collimator: 0.5 mm Al, 0.3 mm Ti (equivalent to 2.0 Al)
Generator	
Max. power	80 kW, 100 kW***

* Optional
** Optional for *syngo* HeartView CT
*** Optional (only ex factory, not available as an upgrade option)

System Hardware

Data Acquisition System	
UFC Detector	Ultra short afterglow. Optimal for sub-second and multislice acquisition.
Max. number of slices/rotation	128 (acquired slices); 384 (reconstructed slices)
Number of detector rows	64
Number of detector electronic channels	128
Number of detector elements	47,104
Total channels per slice	1,472
Number of projections	up to 4,608/360°
Sequence acquisition modes	128 x 0.6 mm, 64 x 0.6 mm, 8 x 0.6 mm (UHR), 2 x 1 mm, 6 x 1.2 mm, 32 x 1.2 mm, 12 x 1.2 mm, 1 x 5 mm, 1 x 10 mm
Spiral acquisition modes	16 x 0.3 mm (z-UHR), 128 x 0.6 mm, 20 x 0.6 mm, 64 x 0.6 mm, 8 x 0.6 mm (UHR), 32 x 1.2 mm
Adaptive Signal Boost	The Adaptive Signal Boost amplifies low signal areas of the CT data and further reduces streaks and noise in the image especially for larger patients
Adaptive 4D Spiral mode*	Spiral scan mode for a larger perfusion range than the detector width
z-UHR (Ultra High Resolution)*	Siemens' proprietary z-UHR enables previously unachievable image detail with an isotropic resolution of 30 lp/cm (0.17 mm) at 0% MTF (±10%). The combination of z-Sharp Technology and z-UHR offers an isotropic detail in the range of flat panel or Micro CT technology.
Standard Patient Table	
Max. table load	212 kg/467 lbs
Table feed speed	1–200 mm/s
Vertical table travel range	51–92 cm (at table top)
Vertical travel speed	20–50 mm/s
Scannable range	160 cm
Distance between gantry front and table base	40 cm
Optional Patient Table 2,000 mm	
Max. table load	227 kg/500 lbs
Table feed speed	1–200 mm/s
Vertical table travel range	48–92 cm (at table top)
Vertical travel speed	20–50 mm/s
Scannable range	200 cm
Distance between gantry front and table base	40 cm
Optional Multi-purpose Patient Table	
Max. table load	307 kg***/676 lbs***
Table feed speed	1–200 mm/s
Vertical table travel range	55–92 cm
Vertical travel speed	20–50 mm/s
Scannable range	200 cm
Distance between gantry front and table base	40 cm
Additional exchangeable table tops*	High-capacity patient and trauma table top; RTP table top
Optional Foot Pedals**	
4 pairs of foot pedals are provided on the bottom edge of the patient table allowing table lifting and lowering from various positions	

* Optional
** Not available for standard patient table (1,600 mm scan range)
*** Optional with high-capacity table top

syngo Workplaces

syngo Acquisition Workplace (AWP)

The *syngo* Acquisition Workplace provides an intelligent and reliable workflow for data acquisition, image reconstruction, and routine postprocessing at the CT scanner. Built on the unique *syngo* platform, the *syngo* Acquisition Workplace is intuitive and user friendly.

syngo CT Workplace (CTWP)*

The *syngo* CT Workplace is a dedicated CT processing workplace that provides instant access to image and scan data via a shared database with the *syngo* Acquisition Workplace. With access to our comprehensive portfolio of CT clinical applications, the *syngo* CT Workplace can be customized to further enhance clinical performance.

syngo MultiModality Workplace (MMWP)*

syngo MultiModality Workplace provides the unique advantage of an efficient multi-modality diagnostic workflow at a single workplace. Based on the unique *syngo* platform, it manages the clinical diagnostic workflow anywhere within the clinical environment. With the *syngo* MultiModality Workplace radiologists and clinicians benefit from access to our comprehensive *syngo* applications for Computed Tomography, Magnetic Resonance, PET and SPECT imaging, Angiography, and Radiation Therapy Planning.

Image Reconstruction	
Real-time display	Real-time image display (512 x 512) during spiral acquisition
Slice thickness	0.6–15 mm
Recon field	5–50 cm 5–65 cm with HD FoV*/** 5–78 cm with extend FoV*/**
Recon time	up to 40 images/s up to 50 images/s (with FAST IRS)*
Recon matrix	512 x 512
HU scale	–1,024 to +3,071
Extended HU scale	–10,240 to +30,710
Wide range of selectable slice thickness for prospective and/or retrospective reconstruction	
Raw Data	
Capacity	1.5 TB 3.8 TB (with FAST IRS)*
External USB 2.0 disks for quick and easy raw data storage are supported	

* Optional

** 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 and image artifacts may appear, depending on the anatomy scanned

syngo Workplaces

Workplace	AWP	CTWP	MMWP
High performance computer	Quad Core 2.66 GHz*	2 x Xeon 3.0 GHz*	2 x Dual Core Xeon 3.0 GHz*
Graphics Accelerator	NVIDIA Quadro FX 1700 for fast 3D postprocessing	NVIDIA Quadro FX 3500 for fast 3D postprocessing	NVIDIA Quadro FX 3500 for fast 3D postprocessing
	–	Enhanced graphics card* additionally accelerates applications	Enhanced graphics card* additionally accelerates applications
Standard Monitor	19" (48 cm) flat screen	19" (48 cm) flat screen	19" (48 cm) flat screen
	1,280 x 1,024 resolution	1,280 x 1,024 resolution	1,280 x 1,024 resolution
	1,024 x 1,024 image display matrix	1,024 x 1,024 image display matrix	1,024 x 1,024 image display matrix
	0.29 mm pixel size	0.29 mm pixel size	0.29 mm pixel size
Additional Monitor**	Yes	–	–
Dual Monitor***	Yes	Yes	Yes
RAM Storage	8 GB	12 GB	8 GB
RAID	Software RAID 0 for enhanced read/write performance	Software RAID 0 from AWP via Gigabit Link for enhanced read/write performance	–
Image Storage	147 GB; 260,000 uncompressed images	Shared database with *syngo* Acquisition Workplace	147 GB; 260,000 uncompressed images
Additional Storage	DVD DICOM drive: 4.7 GB DVD media 8,000 images Write-RW/+RW/-DL/Read CD-R: 700 MB 1,100 images	DVD DICOM drive: 4.7 GB DVD media 8,000 images Write-RW/+RW/-DL/Read CD-R: 700 MB 1,100 images	DVD DICOM drive: 4.7 GB DVD media 8,000 images Write-RW/+RW/-DL/Read CD-R: 700 MB 1,100 images
	External USB 2.0 disks for quick and easy raw data storage are supported. External USB memory stick for image data.	–	–
DICOM Viewer	Included on each CD; automatically started on the viewer's PC	Included on each CD; automatically started on the viewer's PC	Included on each CD; automatically started on the viewer's PC

* Or equivalent

** Optional. Additional monitor for replication of primary monitor at remote location. Distance from host up to 30 m.

*** Optional. Dual monitor enables the simultaneous display of two scans on two monitors within the 3D task card, ideally used for comparison of follow-up studies or native and contrast-enhanced scans.

Standard System Software: *syngo* Examinations

Scan Protocol Assistant	
Up to 10,000 protocols can be edited, modified, and stored	
Easy and intuitive way to change and manage scan protocols	
Automatic Patient Positioning	
Two user-configurable buttons on the gantry panel	
One touch, quick patient positioning for preselected clinical protocols – e.g. head, thorax	
Topogram	
Length	128–1,559/1,970* mm
Scan times	1.5–16/20* s
Views	a.p., p.a., lateral
Real-time topogram	
Manual interruption possible once desired anatomy has been imaged	
Patient Communication	
Integrated patient intercom	
Automatic Patient Instruction (API)	freely recordable; 30 API text pairs; presets in nine languages available
Views	a.p., p.a., lateral
Sequence Acquisition	
Reconstructed slice widths	0.6, 0.75, 1, 1.2, 1.5, 2, 2.4, 3, 3.6, 4, 4.8, 5, 6, 7, 7.2, 8, 9, 10, 12, 14.4, 15, 20 mm
Temporal resolution	150* ms, 166 ms, 250 ms, 500 ms, down to 75 ms (with 0.3 s rotation time* and *syngo* HeartView CT*)
Partial scan times (260°)	0.22*, 0.24, 0.36, 0.72 s
No. of uninterrupted scans per range	100
No. of ranges per protocol	33
Scan cycle time (min. scan cycle time depending on rotation time)	0.5 s*/0.75 s–60 s (± 10%)
Acquisition with or without table feed	
Automatic clustering of scans	
Dynamic Multiscan: Multiple (continuous) sequence scanning without table movement for fast dynamic contrast studies with maximum slice thickness of 20 mm	
Multislice Spiral Acquisition	
Reconstructed slice widths	0.4**, 0.5**, 0.6, 0.75, 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 10 mm
Scan times full scan (360°)	0.3 s*. 0.33, 0.5, 1 s
Slice increment	0.1–10 mm
Pitch factor	0.35–1.5, down to 0.15 (*syngo* HeartView CT)*, down to 0.09 (Respiratory Gating and Triggering CT)*
Spiral scan time	max. 80 s
Scan length	max. 1440 mm/1840 mm*
No. of ranges per protocol	33
Automatic clustering of scans	
Optimized special reconstruction algorithm (PFO: Posterior Fossa Optimization) for reduction of beam hardening artifacts in head images	

* Optional

** Optional, with z-UHR option

Standard System Software: *syngo* Examinations

Patient Registration	
Direct input of patient information on *syngo* Acquisition Workplace immediately prior to scan	
Pre-registration of patients at any time prior to scan	
Special emergency patient registration (allows examination without entering patient data before scanning)	
Transfer of patient information from HIS/RIS via DICOM Get Worklist	
Transfer of examination information from scanner into HIS/RIS via MPPS (Modality Performed Procedure Step)	
SureView: Siemens' Patented Solution for Multislice CT Reconstruction	
Excellent for clinical workflow: Forget about compromises in your clinical workflow. Just specify the slice thickness in your protocols according to your clinical needs. SureView automatically takes care of providing excellent volume image quality – with exceptional performance.	
Multiply your clinical performance with SureView: High-quality imaging at any scanning speed. SureView allows the CT scanner to automatically select the necessary pitch value to achieve the coverage and scan time defined by you, while keeping selected slice thickness and image quality.	
Includes advanced cone beam reconstruction algorithms for elimination of cone beam artifacts	
Auto Field of View Adaption	
When positioning the scan range, the width of the range is automatically adapted to cover the whole body of the patient	
CINE Display	
Display of image sequences	
Automatic or interactive with mouse control	
Max. image rate	30 frames/s
Image Filter	
Advanced image algorithms	• LCE: Low Contrast Enhancement for improving low contrast detectability • HCE: High Contrast Enhancement for increased sharpness of high contrast structures • ASA: Advanced Smoothing Algorithm edge preserving smoothing filter, dedicated to Cardiac exams
Neuro BestContrast	
Achieve a significant increase in contrast without an increase in noise or dose	
e-Logbook	
Tool to collect patient information for statistics, documentation, and research	• view • archive • print • export
***syngo* Dynamic Evaluation**	
Evaluation of contrast enhancement in organs and tissues	
Calculation of	• time-density curves (up to 5 ROIs) • peak-enhancement images • time-to-peak images

Standard System Software: *syngo* Viewing

Windowing
Window width and center freely selectable
Single window
Double window (e.g. bone/soft tissue)
Multiple window settings for multi-image display
Organ-specific window settings, e.g. for soft tissue and bones
2D Postprocessing
Image zoom and pan
Image manipulations • averaging, subtraction • reversal of gray-scale values • mirroring
Evaluation Tools
Parallel evaluation of more than 10 Regions of Interest • circle • irregular • polygonal
Statistical evaluation • area/volume • standard deviation • mean value • min./max. values • histogram
Profile cuts • horizontal • vertical • oblique
Distance measurement
Angle measurement
Online measurement of a 5 x 5 pixel size ROI
Freely selectable positioning of coordinate system
Crosshair
Image annotation and labeling

Standard System Software: *syngo* Filming and *syngo* Archiving & Networking

Filming
Digital film documentation, connection to a suitable digital camera
Connection via DICOM Basic print
Automatic filming
Interactive virtual film sheet
Customizable film formats with up to 64 images
Filming parallel to other activities
Independent scanning and documentation
Freely selectable positioning of images onto film sheet
Configurable image text
Printing
Documentation on postscript printer supported
Video Capture and Editing Tool
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 are supported, e.g. AVI, Flash (SWF), GIF, QuickTime (MOV), streaming video.
Image Transfer/Networking
Interface for transfer of medical images and information using the DICOM standard. Facilitates communication with devices from different manufacturers.
DICOM Storage (Send/Receive)
DICOM Query/Retrieve
DICOM Basic print
DICOM Get Worklist (HIS/RIS)
DICOM MPPS
DICOM Storage Commitment
DICOM Viewer on CD

Optional System Software

WorkStream4D
4D workflow with direct generation of axial, sagittal, coronal, or double-oblique images from standard scanning protocols
Elimination of manual reconstruction steps
Reduction of data volume up to a factor of 10, since virtually all diagnostic information is captured in 3D slices
Adaptive 4D Spiral Plus
Facilitates volume perfusion studies in head and body applications for a perfusion range of up to 8 cm
Continuously repeated bi-directional table movement during spiral acquisition enables an extended range for 4D information
Facilitates dynamic studies up to a scan range of 41.5 cm**
Extended FoV (Field of View)
Special image reconstruction algorithms that provide visualization of objects using an FoV up to 78 cm*
HD FoV (Field of View)
Special image reconstruction using an FoV up to 65 cm algorithms that provide visualization of objects with an accuracy sufficient for RTP and bariatric scanning*
***syngo* Security Package**
Provides functionality for user management and flexible access control for patient data
Siemens Virus Protection
Offers top-level defense in safeguarding CT systems against viruses
***syngo* Expert-i**
Enables the physician to interact with the *syngo* CT Workplace from virtually anywhere in your hospital
***syngo* HeartView CT**
syngo HeartView CT with ECG-synchronized true isotropic volume acquisition using prospective ECG-triggered or retrospective ECG-gating mode
Basis for 3D cardiac scanning and reconstruction, e.g. CT-Angiography of the coronary and thoracic vessels or Calcium Scoring
The ECG signal used for gating the CT images is acquired by an integrated ECG device. The ECG signal is displayed on the gantry front cover and the scan interface.
Temporal resolution of down to 83 ms temporal resolution
Adaptive ECG-synchronized dose modulation (pulsing) allowing additional dose savings
Adaptive ECG-synchronized Cardio Sequence scan allowing additional dose savings
Quality control tools enable retrospective ECG viewing and interaction as well as computer-assisted heart phase definition
Automatic detection of irregular heartbeats with intuitive ECG-editing functionality to assure artifact-free data reconstruction

* 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 and image artifacts may appear, depending on the anatomy scanned.

** Requires optional 0.3 s rotation speed.

Optional Applications for CT Intervention

Adaptive 3D Intervention Suite
Complete solution for non-fluoroscopic and fluoroscopic minimally invasive 3D volume interventions. Includes Adaptive 3D Intervention, Intervention Pro, i-Fluoro, i-Control (wireless or cable), foot switch.
Adaptive 3D Intervention
Near to real-time coronal, sagittal, and oblique image guidance
Layout Editor 3D: user-configurable screen layouts in 3D
Display of coronal, axial, and sagittal MPRs and VRT
Interventional Toolbar with path planning tools such as Auto Needle Detection
i-NeedleSharp: avoids needle artifacts during a sequential intervention
Intervention Pro
Spiral and sequential non-fluoroscopic interventional procedures
i-Sequence biopsy mode with user-configurable dose and windowing display
i-Spiral mode for complete organ coverage
Switching scan modes on the fly during intervention with one single click
Up to 8 image display for better navigation in the volume
Layout Editor with user-configurable screen layouts
Interventional Toolbar with measurement tools and automatic table positioning via buttons or joystick with auto-stop function
Switch between continuous and incremental table movement with user-configurable increment
i-Precision view: increases or decreases the predefined mAs value
HandCARE for i-Sequence: Real-time dose modulation during the CT-guided intervention avoids direct X-ray irradiation of the radiologist's hand
i-Fluoro
Real-time fluoroscopic image guidance with up to 10 frames/s
Image matrix 512 x 512
Fluoroscopy mode with X-ray up to 100 s (dependent on hardware configuration)
Dose & Time Watch for continuous observation of dose and scan time
Up to 8 image display for better navigation in the volume
Intelligent inheritance and adaptation of interventional scan parameters
Interventional Toolbar with measurement tools and automatic table positioning via buttons or joystick with auto-stop function
Switching scan modes on the fly during intervention with one single click
Switch between continuous and incremental table movement with user-configurable increment or "move table top only" mode
Additional flat screen monitor 19" (48 cm) for parallel image display in the examination room
Foot switch: Radiation release directly at the gantry
HandCARE: Real-time dose modulation during the CT-guided intervention. The tube current is automatically switched off to avoid direct X-ray exposure to the physician's hands. HandCARE yields dose savings of up to 70% for the physician and up to 30% for the patient.
i-Control
In-room intervention module for full remote control of gantry, table, and user interface

FAST Applications

FAST Scan Assistant

Easy and intuitive scan parameter setting

FAST Adjust

Direct scan parameter adjustment at the push of a button

FAST Planning*

Direct, organ-based setting of scan and recon ranges for a faster and more standardized workflow

FAST Cardio Wizard*

On-screen step by step guide to cardiac scanning for higher reliability and reproduceability in cardiac CT

FAST Spine*

Accurate and automatically aligned preparation of spine recons with just a single click

CARE Applications

CARE Filter

Specially designed X-ray exposure filter installed at the tube collimator. Up to 25% dose reduction with increased image quality.

CARE Bolus CT

Scan mode for contrast bolus triggered data acquisition

Significant improvement of the planning procedure by enabling an optimum spiral scan start after contrast injection

The procedure is based on repetitive low dose monitoring scans at one slice level and analysis of the time density curve in an ROI (Region of Interest)

CARE Topo

Real-time topogram

Manual interruption possible once desired anatomy has been imaged

CARE Dose4D

Automated real-time tube current adjustment for best diagnostic image quality at lowest possible dose, independent of patient size and anatomy

Fully automated dose management for adults and children with up to 68% dose reduction

Manual interruption possible once desired anatomy has been imaged

CARE kV

First automated, organ-sensitive voltage setting to optimize contrast-to-noise-ratio and reduce dose by up to 60%

* Optional

CARE Applications

CARE Child – Pediatric Protocols
Dedicated pediatric CT imaging, including 70 kV scan modes and specific CARE Dose4D curves and protocols
Special clinical protocols with 70 or 80 kV selection and a wide range of mAs settings. The X-ray exposure is adapted to the child's (and small adult's) weight and age, substantially reducing the effective patient dose.
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
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
Adaptive ECG-Pulsing* and Adaptive Cardio Sequence*
Dose-modulated cardiac spiral for dose reduction during the selectable heart phase (part of *syngo* HeartView CT*). Up to 50% dose savings for the patient. Adaptive ECG-synchronized Cardio Sequence scan allows for additional dose saving.
MinDose*
Allows to lower the tube current down to 4% in the phases not intended for reconstruction use, resulting in additional dose savings of 20–30%
Iterative Reconstruction in Image Space (IRIS)**
Significant dose reduction or image quality improvement*****
Sinogram Affirmed Iterative Reconstruction (SAFIRE)***
Siemens' next generation iterative reconstruction with superior raw-data based image quality improvement or significant dose reduction*****
CARE Contrast*
Synchronized scanning and contrast injection through integration of CT scanner and injector facilitates enhanced CT examinations and improved workflow
4D Noise Reduction****
4D Noise Reduction significantly improves image quality or reduces radiation dose by up to 50% for perfusion examinations
Synchronized scanning and contrast injection to optimize workflow and contrast media application

* Optional
** Optional. For U.S. only
*** Optional. The option requires 510(k) review and is not commercially available in the U.S.
**** Optional as part of Volume Perfusion CT
***** In clinical practice, the use of IRIS/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.

syngo CT.3D

syngo CT.3D* (on *syngo* CT Workplace)
syngo CT Workplace
19" (48 cm) flat screen monitor
Enhanced graphics accelerator
syngo Expert-i
syngo 3D Basic
syngo VRT
syngo Fly Through
syngo InSpace4D
syngo Volume Calculation
syngo Dynamic Evaluation
WorkStream4D (3D-Recon and Recon card CT Workplace)

syngo CT.3D* (on *syngo* MultiModality Workplace)
syngo MultiModality Workplace
19" (48 cm) flat screen monitor
Enhanced graphics accelerator
syngo Expert-i
syngo 3D Basic
syngo VRT
syngo Fly Through
syngo InSpace4D
syngo Volume Calculation
syngo Dynamic Evaluation

CT Engines**

CT Acute Care Engine*
Table side rails
Extended FoV
syngo HeartView CT (incl. Adaptive ECG-Pulsing and Adaptive Cardio Sequence)
syngo Cardio BestPhase Plus
syngo Circulation
syngo Circulation Plaque Analysis
syngo Circulation PE Detection***
syngo Circulation PE Detection Basic****
syngo InSpace4D Advanced Vessel Analysis
syngo Calcium Scoring*****
syngo Volume Perfusion CT Neuro*****
syngo Neuro PBV CT
syngo Neuro DSA CT • Autopreprocessing CT DSA

CT Cardiac Engine*
syngo HeartView CT (incl. Adaptive ECG-Pulsing and Adaptive Cardio Sequence)
syngo Cardio BestPhase Plus
syngo Circulation
syngo Circulation Plaque Analysis
syngo InSpace4D Advanced Vessel Analysis
syngo Calcium Scoring*****

CT Neuro Engine*
syngo Volume Perfusion CT Neuro*****
syngo Neuro PBV CT
syngo Neuro DSA CT • Autopreprocessing CT DSA

CT Oncology Engine*
syngo CT Oncology
syngo Colonography incl. Virtual Dissection
syngo Colonography CT with PEV
syngo Prefetching

For more information on applications please refer to the Clinical Engine and Clinical Applications Brochure.

* Optional
** *syngo* software feature of CT Clinical Engines available within *syngo* MultiModality Workplace
*** Not available in the U.S.
**** For U.S. only
***** *syngo* software feature of CT Clinical Engines available within *syngo* Acquisition Workplace and *syngo* MultiModality Workplace

syngo.via

syngo.via**

syngo.via is the new imaging software, creating an exciting experience in efficiency and ease of use – anywhere***

syngo.via is intended to be used for viewing, manipulating, communicating, and storing medical images. It can be used as a stand-alone device or together with a variety of cleared**** and unmodified *syngo*.via based software options.

License Model

The number of installed clients can be unlimited. Thereby 10 concurrent clients can be opened, 5 with advanced and 5 with standard applications.

syngo.via Server

The HW configuration depends on the server that has been chosen

Workstation-based Server
Server HW Config. M
Server HW Config. L
Server HW Config. XL

Please see the *syngo*.via datasheet for more details

syngo.via Clients*

Minimum requirements:
- Processor: Pentium IV, 2.4 GHz or higher
- RAM: 1 GB
- Hard drive (free space): 500 MB
- Graphic card: OpenGL 1.1 (min. 1024 x 768)
- Server connection: 100 Mbit/s
- Network connection: 100 Mbit/s
- Client remote connection: 6 Mbit/s

syngo.via Applications

syngo.via supports the following:
- CT, MR, and PET images
- Computed radiography images
- Digital X-ray, X-ray angiographic, and X-ray radio-fluoroscopic images
- Ultrasound images
- Secondary capture images
- Encapsulated PDFs

Connectivity and Data Exchange

syngo.CT Vascular Analysis

syngo.CT Vascular Analysis – Autotracer

syngo.CT CaScoring

syngo.CT Coronary Analysis

syngo.CT Cardiac Function

syngo.CT Cardiac Function – Enhancement*

syngo.CT Cardiac Function – Right Ventricle*

syngo.CT Neuro DSA

syngo.CT Segmentation

syngo.PET&CT Cross-Timepoint Evaluation

syngo.CT Colonography

syngo.CT Colonography – PEV

syngo.Lung CAD

syngo.CT Colonography Advanced

To complement the *syngo*.via configuration of applications, clinically-tailored Engines are available. Also *syngo* MMWP applications can be part of these and since they can run on the *syngo*.via server through Expert-i they can be accessed as well

For more information on applications please refer to the Clinical Engine and Clinical Applications Brochure.

* Optional

** *syngo*.via can be used as a standalone device or together with a variety of *syngo*.via based software options, which are medical devices in their own rights

*** Prerequisites include: Internet connection to clinical network, DICOM compliance, meeting of minimum hardware requirements, and adherence to local data security regulations

**** The software options are medical devices on their own rights, partially not available for US

CT Acute Care Engine/Engine Pro (for *syngo*.via)

Applications	CT Acute Care Engine	CT Acute Care Engine Pro
***syngo*.CT Vascular Analysis:** Curved & cross-sectional ranges, VesselSURF and Best Plane, measurement and reporting tools for stent planning in case of AAA, one-click Calcium/Plaque Removal (Single Energy)*, stenosis measurement and Profile Curve	○	
***syngo*.CT Coronary Analysis:** Curved & cross-sectional ranges, Angio View, VesselSURF, automatic coronary tracking and labeling (RCA, LM, CX), single click stenosis measurement, image sharpening for stent and calcified lesion evaluation and Profile Curve	○	
***syngo*.CT CaScoring:** Total & relative Calcium Scoring with Coronary Age calculation based on trial data	○	
***syngo*.CT Cardiac Function:** Automatic Left Ventricular Analysis (LVA) for evaluation of ventricular function	○	
***syngo*.CT Neuro DSA:** Automated 3D assessments of infarcted tissue and tissue at risk, Automatic Table and Bone Removal, Best Plane, fast toggling, lesion picking, recalculation mode, follow-up workflow	○	
***syngo* Volume Perfusion CT Neuro:** Automatic registration, motion correction, slab-based perfusion, automatic segmentation, 4D noise reduction, MTT, TTP, CBF, CBV	△	
***syngo* Calcium Scoring:** Total & relative Calcium Scoring	△	
Cardio BestPhase: Automatic best systolic & diastolic phase selection	△	
***syngo* Neuro Perfusion Weighted Map:** Automatic Registration, static 3D PWM map	□	
HeartView: Scanning technique and program for ECG controlled data acquisition and image reconstruction	Ω	
Extended FoV: For scanning, for example, obese patients	Ω	
***syngo* Volume Perfusion CT Neuro:** Automatic registration, motion correction, slab-based perfusion, automatic segmentation, 4D noise reduction, MTT, TTP, CBF, CBV		□
***syngo*.CT Vascular Analysis – Autotracer:** Automatic tracking and labeling of main vessels (zero-click)		○
***syngo*.CT Cardiac Function – Enhancement*:** First pass myocardial enhancement based on Single Energy CT data		○
***syngo*.CT Cardiac Function – Right Ventricle*:** Automatic Right Ventricular Analysis (RVA) for evaluation of ventricular function		○
Adaptive 4D Spiral: Enables whole organ perfusion scanning		Ω
Inclinable Headholder: For optimal positioning of stroke patients		Ω
z-UHR: Ultra high isotropic resolution for imaging of the inner ear, for instance		Ω

○ Available as 1, 2, 3 or 5 user licenses on *syngo*.via
□ Available as one user license on *syngo* MMWP Client (MultiModality Workplace)
△ Available as one user license on AWP (Acquisition Workplace)
Ω Scanner Feature

*The information about this product is being provided for planning purposes.
The product requires 510(k) review and is not commercially available in the U.S.

CT Cardio-Vascular Engine/Engine Pro (for *syngo*.via)

Applications	CT Cardio-Vascular Engine	CT Cardio-Vascular Engine Pro
***syngo*.CT Vascular Analysis:** Curved & cross-sectional ranges, VesselSURF and Best Plane, measurement and reporting tools for stent planning in case of AAA, one-click Calcium/Plaque Removal* (Single Energy), stenosis measurement and Profile Curve	○	
***syngo*.CT Coronary Analysis:** Curved & cross-sectional ranges, Angio View, VesselSURF, automatic coronary tracking and labeling (RCA, LM, CX), single click stenosis measurement, image sharpening for stent and calcified lesion evaluation and Profile Curve	○	
***syngo*.CT Cardiac Function:** Automatic Left Ventricular Analysis (LVA) for evaluation of ventricular function	○	
***syngo*.CT CaScoring:** Total & relative Calcium Scoring with Coronary Age calculation based on trial data	○	
Cardio BestPhase: Automatic best systolic & diastolic phase selection	△	
***syngo* Calcium Scoring:** Total & relative Calcium Scoring	△	
HeartView: Scanning technique and program for ECG controlled data acquisition and image reconstruction (RCA, LM, CX)	Ω	
***syngo*.CT Vascular Analysis – Autotracer:** Automatic tracking and labeling of main vessels (zero-click)		○
***syngo*.CT Cardiac Function – Enhancement:** First pass myocardial enhancement based on Single Energy CT data		○
***syngo*.CT Cardiac Function – Right Ventricle:** Automatic Right Ventricular Analysis (RVA) for evaluation of ventricular function		○
***syngo* Volume Perfusion CT Body – Myocardium*:** Dynamic assessment of volumetric myocardial perfusion yielding quantitative values for myocardial blood flow and blood volume (this optional feature is not part of the CT Cardio-Vascular Engine)	optional □	optional □

○ Available as 1, 2, 3 or 5 user licenses on *syngo*.via
□ Available as one user license on *syngo* MMWP Client (MultiModality Workplace)
△ Available as one user license on AWP (Acquisition Workplace)
Ω Scanner Feature

CT Neuro Engine/Engine Pro (for *syngo*.via)

Applications	CT Neuro Engine	CT Neuro Engine Pro
***syngo*.CT Neuro DSA:** Direct Image Transfer, Automated Table Removal, Automated Bone Removal, Preferred layout automatically applied, Neuro Best Plane, Fast Toggling, One Click Aneurysm Evaluation, Recalculation Mode, Follow-up Workflow, Reporting	◎	
***syngo* Volume Perfusion CT Neuro:** Auto-Stroke Functionality for automated display of all perfusion parameters MTT, TTP, CBF, CBV and permeability, Automated motion correction, Automated 3D assessments of infarcted tissue and tissue at risk, perfusion plus tumor evaluation model included	△	
***syngo* Neuro Perfusion Weighted Map:** *syngo* Neuro Perfusion Weighted Map (PWM) for static 3D visualization of cerebral blood volume in ischemic areas	□	
***syngo* Volume Perfusion CT Neuro:** Auto-Stroke Functionality for automated display of all perfusion parameters MTT, TTP, CBF, CBV and permeability, Automated motion correction, Automated 3D assessments of infarcted tissue and tissue at risk, perfusion plus tumor evaluation model included		□
Adaptive 4D Spiral: Extends the dynamic range beyond detector width, enables whole organ perfusion		Ω
Inclinable Headholder: For optimal positioning of stroke patients or to protect the patient's eyes		Ω

◎ Available as 1, 2, 3 or 5 user licenses on *syngo*.via
□ Available as one user license on *syngo* MMWP Client (MultiModality Workplace)
△ Available as one user license on AWP (Acquisition Workplace)

Ω Scanner Feature

CT Oncology Engine/Engine Pro (for *syngo*.via)

Applications	CT Oncology Engine	CT Oncology Engine Pro
***syngo*.CT Segmentation:** Segmentation Liver lesions, Segmentation Lung nodules, Segmentation Lymph nodes, General segmentation, Volume rendering of segmentation, Segmentation editing (correction)	●	
***syngo*.PET&CT Cross-Timepoint Evaluation:** Quantify tumor growth rates between time points	●	
***syngo*.CT Colonography:** Multi Monitor Layouts, 2D Reading, 3D Reading (Fly through), Global view (solid/semi transparent), Registered navigation (prone/supine), Hide small intestine, Distance to rectum, Panoramic view, Perpendicular Flight	●	
***syngo*.CT Colonography – PEV:** Autoprocessing, Polyp Enhanced Viewing (PEV)		●
***syngo*.Lung CAD:** Autoprocessing, Lung Computer Aided Detection (CAD)		●
***syngo*.CT Colonography Advanced:** Polyp Lens		●
***syngo* Colon Virtual Dissection:** Virtual Dissection (displays an unfolded view of the entire colon)		optional ☐
***syngo*.PET Segmentation*:** PET segmentation and evaluation functionality	optional ●	optional ●
***syngo* Volume Perfusion CT Body**:** Quantitative 3D evaluation of dynamic CT data: blood flow, blood volume and permeability, Assessment of perfusion changes during therapy. Whole organ perfusion requires Adaptive 4D Spiral (optional feature – not part of CT Oncology Engine).	optional ☐	optional ☐

● Available as 1, 2, 3 or 5 user licenses on *syngo*.via
☐ Available as one user license on *syngo* MMWP Client (MultiModality Workplace)

*Optional to CT Oncology Engine / Engine Pro
**Optional as one user license on *syngo* MMWP Client

Installation

Dimensions	Height (mm/inch)	Width (mm/inch)	Length (mm/inch)	Weight (kg/lbs)
Components				
Gantry	≤ 1,980/78.0	≤ 935/36.8	≤ 2,380/93.7	≤ 2,300/5,070
Patient table	≤ 1,000/39.4	≤ 750/29.5	≤ 2,445/96.3	≤ 500/1,102
Multi purpose table*	≤ 1000/39.4	≤ 690/27.2	≤ 2445/96.3	≤ 600/1,323
Operator's console	≤ 720/28.3	≤ 800/31.5	≤ 1,200/47.2	≤ 65/143
Power cabinet	≤ 1,960/77.2	≤ 900/35.4	≤ 700/27.6	≤ 600/1,322
Water/air cooling system**				
Indoor unit	≤ 1,960/77.2	≤ 700/27.6	≤ 700/27.6	≤ 360/794
Outdoor unit	≤ 1,050/41.3	≤ 1,150/45.3	≤ 2,500/98.4	≤ 185/408
Image Recon. System	≤ 550/21.7	≤ 350/13.8	≤ 755/29.7	≤ 100/220
***syngo* Workplaces**				
syngo Acquisition Workplace	≤ 500/19.7	≤ 250/9.8	≤ 650/25.6	≤ 30/66
syngo CT Workplace*	≤ 500/19.7	≤ 250/9.8	≤ 650/25.6	≤ 30/66
syngo MultiModality Workplace*	≤ 500/19.7	≤ 250/9.8	≤ 650/25.6	≤ 30/66
syngo*.via				
syngo.via*	≤ 508/20.0	≤ 282/11.1	≤ 732/28.8	≤ 70/154

* Optional
** Optional split cooling available

Installation

Power Supply	
Nominal voltage 3/N~	380–480 V in 20 V steps
Nominal line frequency	50; 60 Hz
Line impedance at 80 kW	90–140 mOhm dependent on line voltage
Line impedance at 100 kW*	80–125 mOhm dependent on line voltage
Line fuse protection	3 x 125 A (NH)
Power Consumption	
Computer on	2.5 kVA
System on standby	4.0 kVA
Scanning operation	125 kVA (at 80 kW)
Protection Against Input Power Fluctuation/Interruptions	
Gantry with X-ray	≤ 5 ms
Gantry without X-ray	≤ 10 ms
Image Reconstruction	≤ 300 s
System, *syngo* Acquisition Workplace, *syngo* CT Workplace	optional with UPS
Fluctuation	
Nominal voltage	+10/-16%
Nominal frequency	2 Hz
Electromagnetic Compatibility	
This product is in compliance with IEC 60601-1-2 and fulfils CISPR 11 Class A	
Cooling	
Heat dissipation to cooling environment (air-cooled) including gantry, table, power supply and computer periphery	min. 6.5 kW max. 12 kW
Heat dissipation to water cooling environment (water-cooled) including gantry, table, power supply and computer periphery	min. 6.5 kW max. 12 kW
Heat dissipation computing periphery only	max. 2.5 kW
Room Environment	
Temperature range	18–28 °C
Temperature gradient	max. 6 K/h
Relative air humidity without condensation	20–75%
Surface Area for Installation	
System	18 m²

* Optional

Image Quality

Low-contrast Resolution

Low-contrast resolution is the ability to see
- a small object (mm)
- with a certain contrast difference (HU)
- on a particular phantom (Ø)
- at a certain mAs value (mAs)
- with a particular patient dose (mGy)

Spiral	
Phantom	CATPHAN (20 cm)
Object size	5 mm
Contrast difference	3 HU
CTDIvol (Ø 32 cm)	13.1 mGy at 180 eff. mAs
Technique	10 mm, 120 kV

Sequence	
Phantom	CATPHAN (20 cm)
Object size	5 mm
Contrast difference	3 HU
CTDIvol (Ø 32 cm)	10.7 mGy at 180 eff. mAS
Technique	10 mm, 120 kV

High-contrast Resolution

x-y-plane*	0% MTF (±10%) 30 lp/cm 2% MTF (±10 %) 24 lp/cm 10% MTF: 13.4 lp/cm (±10%) 50% MTF: 11.5 lp/cm (±10%)
Technique	160 mA, 120 kV, 1 s, 0.4 mm

Homogeneity

Cross-field uniformity	max. ± 4 HU
in a 20 cm water phantom	typ. ± 2 HU

Dose, $CTDI_{100}$ Values

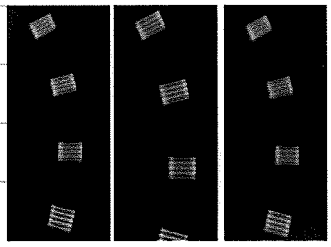
Phantom		kV	kV	kV	kV	kV
Ø		70	80	100	120	140
16 cm	A	2.6	4.6	9.3	15.2	22.3
	B	2.8	4.9	9.6	15.7	22.9
32 cm	A	0.6	1.2	2.7	4.7	7.2
	B	1.4	2.5	5.1	8.6	12.8

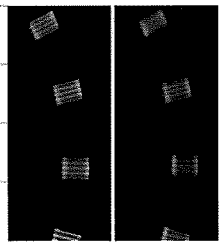
A: at center B: 1 cm below surface

Technique	Collimation 16 x 1.2 mm 100 mAs 360° rotation PMMA-Phantom Absorbed dose for reference material air Max. deviation ±40% for 70 kV Typically less than 15% Values according to IEC 60601-2-44

Phantom Validation of z-Sharp Technology

CATPHAN measurement demonstrates clearly industry's highest routine isotropic resolution of 0.33 mm
- 0.33 mm x 0.33 mm x 0.33 mm
- in daily clinical routine
- at any scan speed (any pitch)
- at all positions of the scan field

Pitch	0.55	1.0	1.5
z-axis			
0.33 mm			
0.36 mm			
0.38 mm			
0.42 mm			

Pitch	1.0 Center	1.0 100 mm Off-center
z-axis		
0.33 mm		
0.36 mm		
0.38 mm		
0.42 mm		

Phantom Validation of z-UHR**

CATPHAN measurement results in industry's highest isotropic resolution of 0.24 mm in all three planes (x, y, and z)
- 0.24 mm x 0.24 mm x 0.24 mm
- for ultra-high resolution bone-imaging
- isotropic detail in the range of flat panel or Micro CT technology
- 0.3 mm collimation

* Optional. Standard high-contrast resolution 17.4 lp/cm at 0% MTF and 16.4 lp/cm at 2% MTF
** Optional

Selected Scientific Publications

Adaptive 4D Spiral:

Goetti R, Leschka S, Desbiolles L, Klotz E, Samaras P, von Boehmer L, Stenner F, Reiner C, Stolzmann P, Scheffel H, Knuth A, Marincek B, Alkadhi H.
Quantitative computed tomography liver perfusion imaging using dynamic spiral scanning with variable pitch: feasibility and initial results in patients with cancer metastases.
Invest Radiol. 2010 Jul;45(7):419-26.

Morhard D, Wirth CD, Fesl G, Schmidt C, Reiser MF, Becker CR, Ertl-Wagner B.
Advantages of extended brain perfusion computed tomography: 9.6 cm coverage with time resolved computed tomography-angiography in comparison to standard stroke-computed tomography.
Invest Radiol. 2010 Jul;45(7):363-9.

Helck A, Sommer WH, Klotz E, Wessely M, Sourbron SP, Nikolaou K, Clevert DA, Notohamiprodjo M, Illner WD, Reiser M, Becker HC.
Determination of glomerular filtration rate using dynamic CT-angiography: simultaneous acquisition of morphological and functional information.
Invest Radiol. 2010 Jul;45(7):387-92.

Adaptive Dose Shield:

Deak PD, Langner O, Lell M, Kalender WA.
Effects of adaptive section collimation on patient radiation dose in multisection spiral CT.
Radiology. 2009 Jul;252(1):140-7.

Christner JA, Zavaletta VA, Eusemann CD, Walz-Flannigan AI, McCollough CH.
Dose reduction in helical CT: dynamically adjustable z-axis X-ray beam collimation.
AJR Am J Roentgenol. 2010 Jan;194(1):W49-55.

Adaptive Cardio Sequence:

Arnoldi E, Johnson TR, Rist C, Wintersperger BJ, Sommer WH, Becker A, Becker CR, Reiser MF, Nikolaou K.
Adequate image quality with reduced radiation dose in prospectively triggered coronary CTA compared with retrospective techniques.
Eur Radiol. 2009 Sep;19(9):2147-55. Epub 2009 May 5.

Duarte R, Fernandez G, Castellon D, Costa JC.
Prospective Coronary CT Angiography 128-MDCT Versus Retrospective 64-MDCT: Improved Image Quality and Reduced Radiation Dose.
Heart Lung Circ. 2011 Feb;20(2):119-25. Epub 2010 Oct 13.

CT angiography, other than cCTA:

Hinkmann FM, Voit HL, Anders K, Baum U, Seidensticker P, Bautz WA, Lell MM.
Ultra-fast carotid CT-angiography: low versus standard volume contrast material protocol for a 128-slice CT-system.
Invest Radiol. 2009 May;44(5):257-64.

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