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

Pat McCrory
Governor

Richard O. Brajer
Secretary DHHS

Drexdal Pratt
Division Director

November 19, 2015

Dee Jay Zerman
211 Friday Center Drive
Suite G015
Chapel Hill, NC 27517

Exempt from Review – Replacement Equipment

Record #:	**1793**
Facility Name:	UNC Hospitals
FID #:	923517
Business Name:	University of North Carolina Hospitals
Business #:	1940
Project Description:	Replace existing vascular interventional radiology unit
County:	Orange

Dear Ms. Zerman:

The Healthcare Planning and Certificate of Need Section, Division of Health Service Regulation (Agency), determined that based on your letter of November 6, 2015, the above referenced proposal is exempt from certificate of need review in accordance with G.S 131E-184(a)(7). Therefore, you may proceed to acquire, without a certificate of need, Siemens Artis Q Ceiling System fixed vascular interventional radiology unit. This determination is based on your representations that the unit will be removed from North Carolina and will not be used again in the State without first obtaining a certificate of need.

Moreover, you need to contact the Agency's 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 the 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 office and a separate determination. If you have any questions concerning this matter, please feel free to contact this office.

Sincerely,

Bernetta Thorne-Williams

Bernetta Thorne-Williams
Project Analyst

Martha J. Frisone

Martha J. Frisone,
Assistant Chief, Certificate of Need

cc: Construction Section, DHSR
Kelli Fisk, Program Assistant, Healthcare Planning
Acute and Home Care Licensure and Certification Section, DHSR

UNC HOSPITALS

James T. Hedrick Building
211 Friday Center Drive, Ste G015
Chapel Hill, NC 27517

November 6, 2015

Ms. Bernetta Thorne-Williams
Healthcare Planning and Certificate of Need Section
Division of Health Service Regulation, DHHS
2704 Mail Services Center
Raleigh, NC 27699-2704

RE: Request for Exemption / Replacement of Vascular Interventional Radiology Equipment / UNC Hospitals / Orange County

Dear Ms. Thorne-Williams:

UNC Hospitals is planning to replace one of its vascular interventional radiology (VIR) units and is requesting confirmation that the replacement of this equipment is exempt from review pursuant to 131E-184(a)(7). The equipment to be replaced is located in UNC Hospitals at 101 Manning Drive in Chapel Hill, NC. The VIR equipment will be replaced for less than the $2M CON threshold for replacement equipment and will be replaced with equipment comparable to the existing equipment, in accordance with NCGS 131E-176(22a). The existing lab was placed in service in 1999, and is used on a daily basis. The existing equipment requires replacement due to its age and declining image quality. This type of situation leads to added costs, operational delays, and patient, staff and physician dissatisfaction.

We are supplying the following information that the CON Section has requested in the past as a part of its general information request for an equipment replacement.

1. A comparison of the existing and replacement equipment, using the format in the following table:

Equipment Comparisons

	Existing Equipment	*Replacement Equipment*
Type of Equipment (List each component)	Vascular Interventional Radiology unit	Vascular Interventional Radiology unit
Manufacturer of Equipment	Siemens Multistar-D	Siemens Artis Q Ceiling System
Tesla Rating for MRIs	Not applicable	Not applicable
Model Number	3772501	Not yet available
Serial number	1612	Not yet available
Provider's Method of Identifying Equipment	By model & serial #s	By model & serial #s
Specify if Mobile or Fixed	Fixed	Fixed
Mobile Trailer Serial Number/VIN #	Not applicable	Not applicable
Mobile Tractor Serial Number/VIN #	Not applicable	Not applicable

Date of Acquisition of Each Component	6/1999	Not yet available
Does Provider Hold Title to Equipment or Have a Capital Lease?	UNC Hospitals owns the equipment	UNC Hospitals will own the equipment
Specify if Equipment Was/Is New or Used When Acquired	New	Will be new
Total Capital Cost of Project (Including Construction, etc.) <See Exhibit 1>	Not available	$1,826,300
Total Cost of Equipment	$1,131,000	$894,000
Fair Market Value of Equipment	*NA ($0-no trade in value)*	$894,000
Net Purchase Price of Equipment	$1,131,000	$894,000
Locations Where Operated	UNC Hospitals	UNC Hospitals
Number of Days In Use/To be Used in N.C. Per Year	365 days	365 days
Percent of Change in Patient Charges (by Procedure)	*NA*	No change
Percent of Change in Per Procedure Operating Expenses (by Procedure)	*NA*	No change
Type of Procedures Currently performed on Existing Equipment	Vascular interventional radiology procedures	*NA*
Type of Procedures New Equipment is Capable of Performing	*NA*	Vascular interventional radiology procedures

2. A description of the basic technology and functions of the existing and replacement equipment, including the diagnostic and treatment purposes for which the equipment is used or capable of being used.

Response: The machine to be replaced is a Siemens Multistar-D system which UNC Hospitals plans to replace this unit with a Siemens Artis Q Ceiling system. The current equipment and the replacement equipment will perform the same basic functions including, minimally invasive diagnostic and therapeutic interventional techniques.

During procedures, small tubes, such as catheters and other very small instruments, are guided through the blood vessels or other pathways to a targeted site, to treat of a variety of medical disorders and diseases. This clinical subspecialty performs many types of percutaneous-procedures, including biopsies, fluid draining, catheter insertions, embolizations, ablations, and dilating or stenting of narrowed vessels.

The studies most frequently performed in the Vascular Interventional Radiology Section at UNC Hospitals include: abdominal aortagram, aorto-femoral angiogram, arch aortagram, renal angiogram, pulmonary angiogram, visceral angiogram, neuro angiogram, venous catheter placement, drainage catheter placement, myelogram/lumbar puncture, thoracentesis, chest tube placement, stent placement, tumor ablation, vessel embolism, angioplasty, etc. The Vascular Interventional Radiology Section's Radiologists treat aneurysms, arteriovenous malformations, internal bleeding, blood clots (using clot dissolving thrombolytic therapy), vena cava filter insertions, chemoembolizations, renal hypertension, infections and abscesses, urinary tract obstructions, and many other conditions without using surgery.

3. Brochures or letters from the vendors describing the capabilities of the existing equipment and the replacement equipment.

Response: A product brief of a VIR unit *similar* to the existing Siemens Multistar-D is attached as Exhibit 2. A copy of a brochure from the vendor describing the proposed replacement Siemens Artis Q Ceiling system is attached as Exhibit 3.

4. A copy of the purchase order for the existing equipment, including all components and original purchase price.

Response: A copy of the original purchase order and quote is not available. However, staff was able to confirm through another method the original purchase price, which is reflected in the equipment comparison table above. Additionally, a product brief of a VIR unit *similar* to the existing Siemens Multistar-D is attached as Exhibit 2.

5. A copy of the title, if any, for the existing equipment or the capital lease for the existing equipment.

Response: Not applicable. The equipment does not have a title and will not be leased.

6. If the replacement equipment is to be leased, a copy of the proposed lease that transfers substantially all the benefits and risks inherent in the ownership of the equipment to the lessee of the equipment, in accordance with criteria in Generally Accepted Accounting Principles (GAAP).

Response: Not applicable. The replacement equipment will not be leased.

7. If the replacement equipment is to be purchased, a copy of the proposed purchase order or quotation, including the amount of the purchase price before discounts and trade-in allowance.

Response: A copy of the quote received from Siemens for the replacement VIR unit is attached as Exhibit 4.

8. A letter from the person taking possession of the existing equipment that acknowledges the existing equipment will be permanently removed from North Carolina, will no longer be exempt from requirements of the North Carolina Certificate of Need law, and will not be used in North Carolina without first obtaining a new certificate of need.

Response: The vendor Siemens and it's associate Mylin Medical Systems will take possession of the unit and remove it from the site as Siemens installs the replacement unit. The unit will be taken out of state and will not be used in NC without obtaining certificate of need approval. See Exhibit 5 for a confirmation letter from Siemens.

9. Documentation that the existing equipment is currently in use and has not been taken out of service.

Response: UNCH's existing operational vascular interventional equipment is clearly identified on the most Licensure Renewal Application form on file with DFS. A copy of the 2015 LRA can be provided upon request.

Also, on the following page and attached as Exhibit 1, is a completed 'Proposed Total Capital Cost of Project' form which projects the total capital cost of this replacement project to be $1,826,300 for the Siemens Artis Q Ceiling System, including removal of the existing unit and the installation of the replacement unit. The total capital cost includes all costs required to make the unit operational. Also contained in Exhibit 1 is a copy of the line drawing for the project. Since

the room already exists, equipment and furniture will be reused. Beyond the items included in this estimate, no additional renovations, equipment or furniture will be required for this project.

Should you require any additional information regarding the replacement of this equipment, please do not hesitate to contact me at 984-974-1243

Sincerely,

Dee Jay Zerman

Dee Jay Zerman, Director of Regulatory Planning
UNC HCS

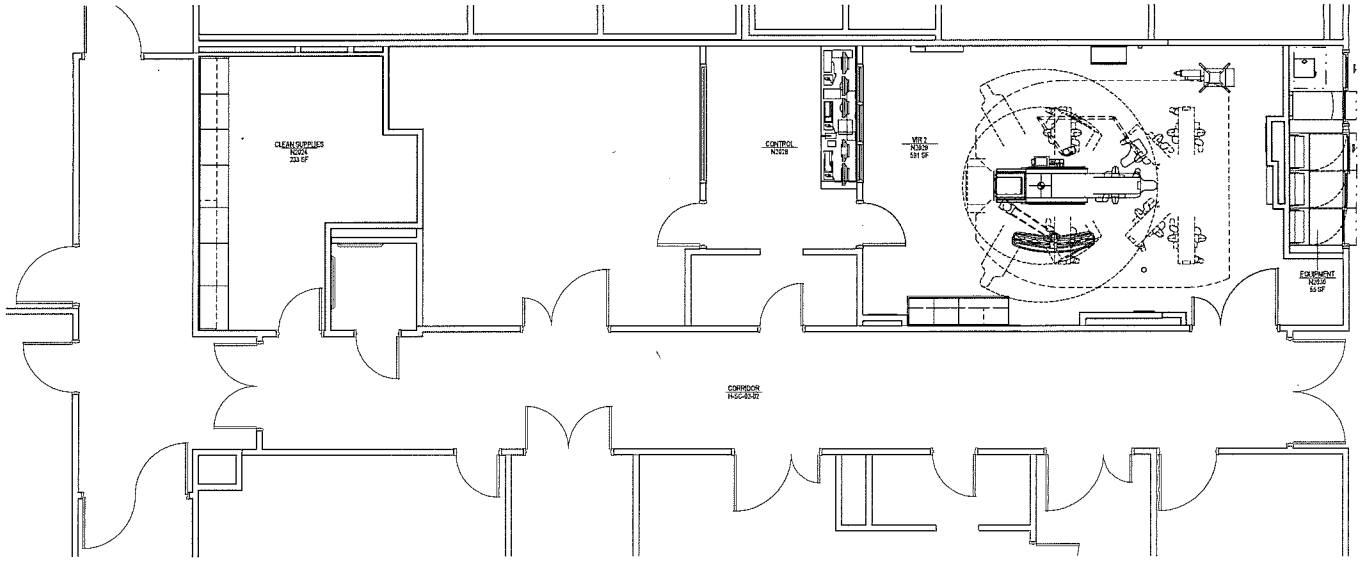
PROPOSED TOTAL CAPITAL COST OF PROJECT

A. **Site Costs**				
(1) Full purchase price of land			$0	
Acres _____ Price per Acre $_____				
(2) Closing costs			$0	
(3) Site Inspection and Survey			$0	
(4) Legal fees and subsoil investigation			$0	
(5) Site Preparation Costs				
Soil Borings	$0			
Clearing - Earthwork	$0			
Fine Grade for Slab	$0			
Roads - Paving	$0			
Concrete Sidewalks	$0			
Water and Sewer	$0			
Footing Excavation	$0			
Footing Backfill	$0			
Termite Treatment	$0			
Other (Specify)	$0			
Sub-Total Site Preparation Costs			$0	
(6) Other (Specify)			$0	
(7) **Sub-Total Site Costs**				$0
B. **Construction Contract**				
(8) Cost of Materials				
General Requirements	$3,670			
Concrete/Masonry	$2,895			
Woods/Doors & Windows/Finishes	$22,500			
Thermal & Moisture Protection	$0			
Equipment/Specialty Items	$23,020			
Mechanical/Electrical	$92,720			
Other ()	$24,440			
Sub-Total Cost of Materials		$169,245		
(9) Cost of Labor		$420,405		
(10) Other: Construction Contingency		$141,900		
(11) Sub-Total Construction Contract			$731,550	
C. **Miscellaneous Project Costs**				
(12) Building Purchase		$0		
(13) Fixed Equipment Purchase		$894,000		
(14) Movable Equipment Purchase		$0		
(15) Furniture		$0		
(16) Landscaping		$0		
(17) Consultant Fees				
Architect and Engineering Fees	$129,690			
Legal Fees	$0			
Market Analysis	$0			
Other (Specify)	$0			
Sub-Total Consultant Fees		$129,690		
(18) Financing Costs (e.g. Bond, Loan, etc.)		$0		
(19) Interest During Construction		$0		
(20) Other: Project Contingency		$71,060		
IT Costs		$0		
(21) Sub-Total Miscellaneous			$1,094,750	
(22) Total Capital Cost of Project (Sum A-C above)				$1,826,300

TERENCE P. McCABE REGISTERED ARCHITECT 10315 10-23-2015 NORTH CAROLINA RALEIGH, N.C.

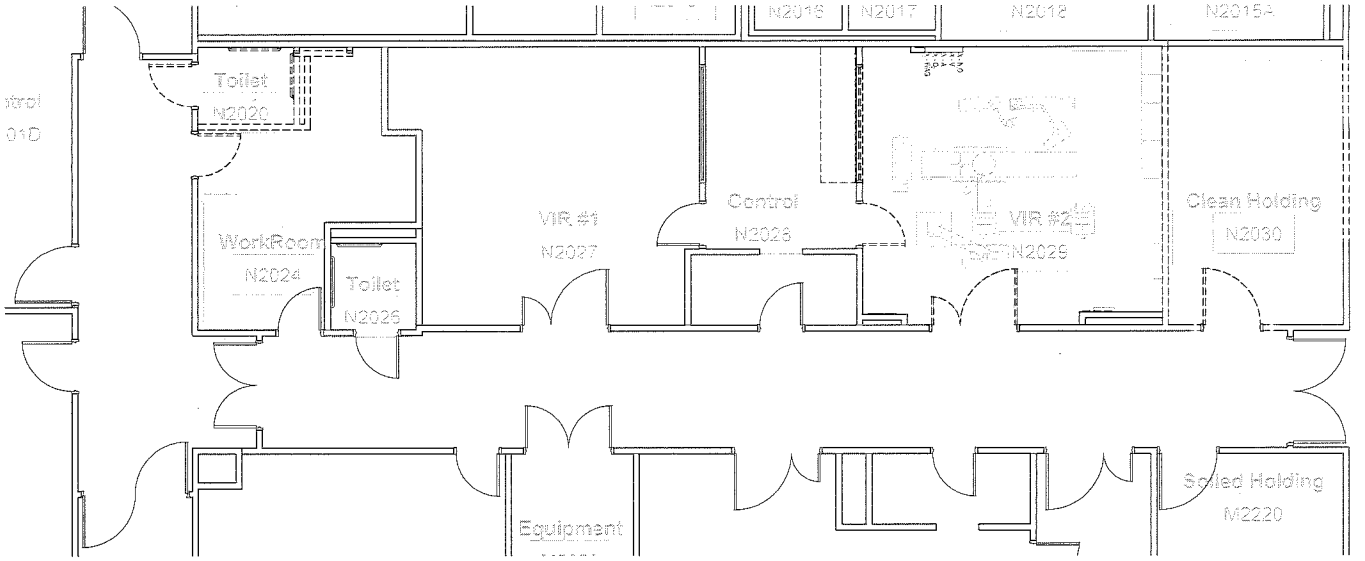
I certify that, to the best of my knowledge, the above construction related costs of the proposed project named above are complete and correct.

Signature of Licensed Architect or Engineer



ARCHITECTURAL FLOOR PLAN

SCALE: 1/4" = 1'-0"



ARCHITECTURAL DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

SCHEMATIC DESIGN - ARCHITECTURAL PLANS

SCALE: 1/4" = 1'-0"
JOB NO.: H15055-00
DATE: 10/29/2015

UNC HEALTH CARE

VIR 2 REPLACEMENT

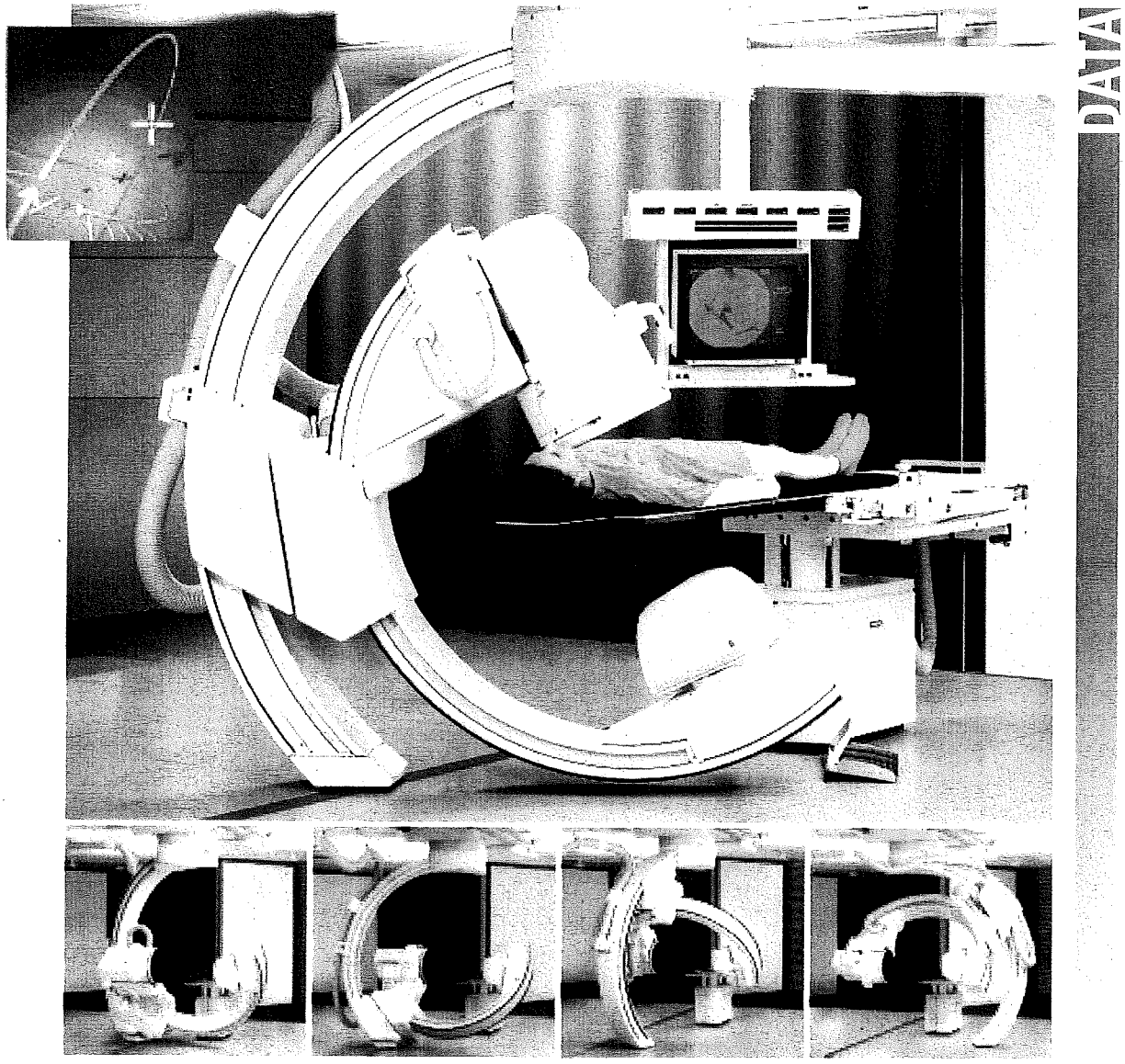
WHR ARCHITECTS

811 West Hargett Street
Raleigh, NC 27603
T 919.833.8818 whrarchitects.com

SIEMENS

Similar to existing
Multistar D

MULTISTAR Plus
Universal System for Angiographic Diagnostics and Interventions



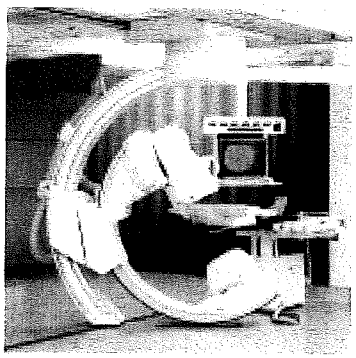
DATA

Leader in Angiography MULTISTAR

MULTISTAR Plus
Angiography System for Diagnostics and Interventions

MULTISTAR Plus – Vascular diagnostics and interventions, simple, fast, and safe, and with optimal flexibility through its unique double C-arm design.

A secure long-term investment which prepares you for tomorrow's requirements.



General

MULTISTAR Plus represents a Siemens innovation in the field of angiography.
Close co-operation with numerous users and decades of experience with medical X-ray equipment formed the basis for the development of this new angiographic system, MULTISTAR Plus.

The MULTISTAR Plus system concept was designed to support the most modern diagnostic examination methods and interventional techniques. Its ergonomic design permits high patient throughput.

MULTISTAR Plus was designed with the user in mind; it is logically organized and simple to use. High patient comfort and ergonomic operating procedures for the clinician contribute to a calm, stress-free atmosphere, particularly desirable for interventional procedures.

MULTISTAR Plus has been optimally adapted to today's clinical requirements.

MULTISTAR Plus is the perfect choice for the following applications:

- Angiography:
  Vascular diagnositics from head to toe
- Interventional procedures:
  Vascular and cardiovascular (e.g dilatation, embolization, atherectomy)
- Nonvascular (e.g. biopsies, drainages, nucleotomy, TIPS)

* Optional

[1] see page 7

System Components

Gantry system

Double C-arm:
MULTISTAR D

Patient table:
KOORDINAT M/O.R.

Monitor suspension:
MTS

Injector:
ANGIOMAT Illumena*/
MEDRAD MARK V ProVis*

Radiation generation

High-frequency generator:
POLYDOROS IS-AF
with automatic exposure control via CAREMATIC

X-ray tube [1]:
MEGALIX Cat

Image acquisition system

Image intensifier [1]:
SIRECON 40-4 HDR/S,
SIRECON 33-4 HDR

TV system:
VIDEOMED S-D

Image processing system

Digital imaging system:
POLYTRON T.O.P.

Image display:
DISPLAY 2000

Monitors:
SIMOMED HM

Documentation:
Digital laser camera*,
analog laser camera* or
monitor camera*,
S-VHS-Rec.*, video printer*,
printer* for reports

Digital Archival
CD-Rec*, CD-MEDICAL*

Networking:
POLYTRON.NIU interface*,
SIENET interface*,
DICOM 3-, PACS interface*

Communication system

Data communication:
T.O.P.-net and remote service diagnostics via modem

System Highlights

POLYTRON T.O.P.
Highly automated digital imaging system

DISPLAY 2000
High-resolution, flickerfree monitor images

POWERGRIP
Power-assisted manual C-arm movement, directly at the image intensifier.

POLYDOROS IS-AF with CAREMATIC
Automatically correct exposure parameters without test shots and without manual setting.

NEW SESSION
Permits problem-free appending of an additional examination to an existing one (even with images loaded from a CD*).

DYNAVISION Plus*
Angle-triggered rotational angiography with dose-saving subtracted display and a 3D effect (including AUTOMAP*)

PERIVISION*
Highly automated technique for peripheral DSA with a single contrast medium injection

DCM*
Digital acquisition for cardiac angiography with 15 and 30 f/s, also possible in parallel operation with cine camera*.

Digital Archival
Digital archiving of entire angiographic or cardiac* studies onto compact disks (CD-R* and CD-MEDICAL*), or into networks (POLYTRON.NIU*).

Image archival to DICOM 3 networks (SIENET/DICOM*)

HIS/RIS connection*
Import of patient demographic data out of Hospital Information Systems (HIS) or Radiology Information Systems (RIS)

High Speed DSA*
DSA exposures at 10 frames/second (1024 x 1024)

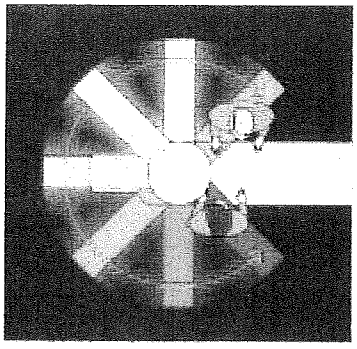
CO_2 Display*
Special software for optimal display of CO_2 angiography

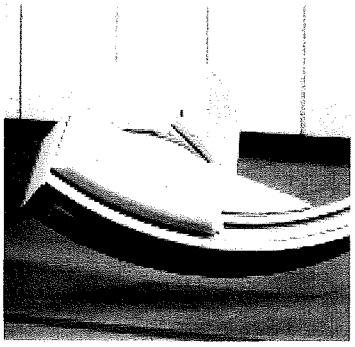
DAZ*
Digital Acquisition Zoom for dose saving enlargement of image portions.

AUTOMAP*
Automatic gantry positioning depending on the reference image selected (excluding DYNAVISION Classic)

MULTISPACE* with DIRECT-Drive
Free patient access through increased flexibility in gantry positioning. Automatic rotation of the TV camera and collimator unit provides greater examination comfort for the patient and physician (e.g. for arm angiography).

Multitasking
Parallel Fluoro Mode* (PFM) and Dual Patient Processing* (DPP) for image evaluation in the control room during an ongoing examination.





*MULTISPACE**

DIRECT-Drive

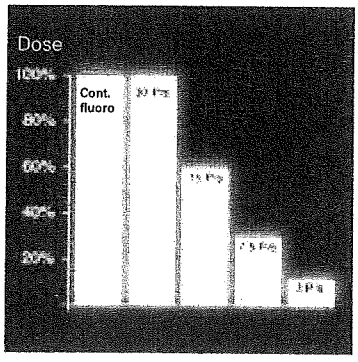
MULTISTAR Plus
Angiography System for Diagnostics and Interventions

Radiation protection

A variety of measures provide a significant dose reduction while maintaining outstanding image quality. Additional options are also available to provide even greater protection.

CAREVISION*

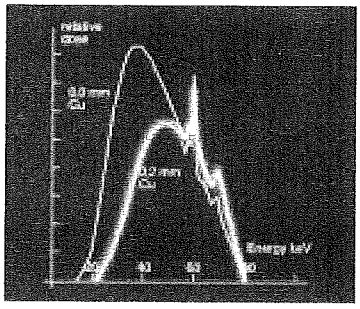
Pulsed fluoroscopy (3, 7.5, 15, 30 f/s) provides considerable dose savings while maintaining excellent image quality (up to 90% dose reduction when compared to continuous fluoroscopy). Primary collimation and radiation-free collimation: universal collimator with CAREFILTER, CAREPROFILE. The collimator comprises an iris collimator, square collimator, and filters for DSA and cardiac applications as well as a semi-transparent finger filter. The filters can be rotated and moved independently.



CAREVISION

CAREFILTER

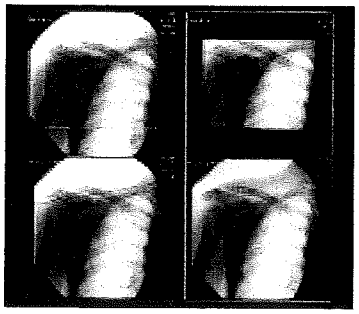
This function is integrated in the universal collimator and enables up to 50% dose reduction during fluoroscopy and radiography.
In addition, the 0.2 mm Cu filter is automatically adjusted depending on absorption by object.



CAREFILTER

CAREPROFILE

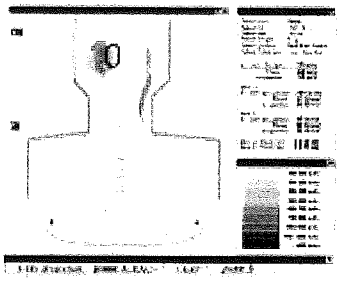
Through integration with the imaging system, CAREPROFILE permits radiation-free collimation. It does so by displaying the position of the collimator and filters graphically on the image monitor using the LIH image, contributing to dose reduction.



CAREPROFILE

CAREGRAPH*

Software for displaying the dose distribution on the PC with online updating through continuous transfer of measurements.



CAREWATCH*

Measurement and display of the accumulated skin dose in the examination room: CAREWATCH* (incl. DIAMENTOR)

Upper and lower body radiation protection*

Radiation protection for the user and the patient is particularly important for longer interventional procedures.
In addition to general radiation protection (lead aprons*, lead-glass eyewear*, and thyroid protection*) direct scatter radiation shields are also available.

* Optional

Technical Description

MULTISTAR System

MULTISTAR Plus optimally fulfills the requirements of general angiography as well as cardiac angiography. It allows diagnostic and interventional procedures to flow quickly and smoothly. The system provides a high degree of optimization for virtually all types of procedures.

T.O.P.-net

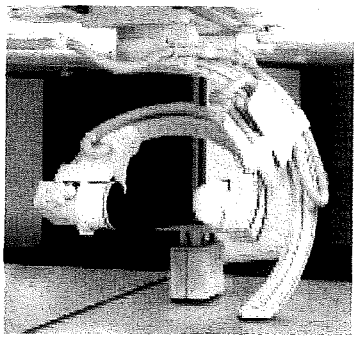
T.O.P.-net is an ultrafast, digital fiber optic network for rapid processing and exchange of data.

- It provides intelligent and flexible system control with an extremely high level of reliability.
- It also permits a modem connection allowing remote diagnostics for faster service response, an increased service quality, and longer system uptime.
- T.O.P.-net also simplifies future system expansions.

MULTISTAR Gantry

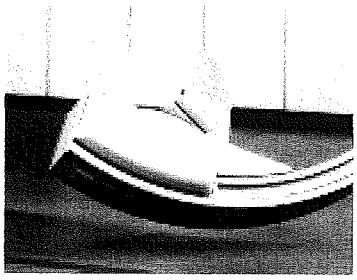
Multi-directional projections – without limitations

The ceiling-suspended MULTISTAR gantry features a double C-arm with an adjustable isocenter angle, referred to as "orbital lift". This feature offers many application benefits through a wide range of angulation, e.g. hyper-projections. The intelligent system control as well as the light, compact design of the MULTISTAR gantry enables motorized, vibration free movement along the patient table. As a result, highly accurate positioning for PERIVISION* is possible. Even with the image intensifier in the undertable position, angulation is practically unlimited.



MULTISPACE* – for optimal patient access

The flexible positioning of the MULTISTAR gantry, with a rotation range of 270° around the patient, enabling free access to the patient from all sides. Even in the intermediate positions, most projections are possible. In addition, monitor positioning has been improved significantly. The image on the monitor is always displayed in the head-to-toe direction, regardless of the gantry position. This is accomplished through automatic rotation of the TV camera and collimator unit. This feature also optimizes the image direction for arm angiography. Without the MULTISPACE* feature, the gantry can be positioned and used at 0°, + 90° and – 90°.



High-speed C-arm – for faster workflow

The high-speed C-arm drives at 15°/s (LAO/RAO as well as cranial/ caudal) for manual positioning and up to 25°/s to access programmed projections, making it possible to change quickly from one projection to another. The maximum speed for rotational angiography is 25/s.

Active angle programming – for reproducible projections

To facilitate rapid selection of the C-arm angle, up to three gantry angle positions can be stored and recalled at the touch of a button, even during an interventional procedure. The memory can be expanded for 25 positions*.

Motorized longitudinal gantry movement

Examinations from head to toe can be performed while the patient remains stationary. Longitudinal gantry positioning is possible without any additional assistance.

Gantry stepping* – with a stationary patient

The C-arm system can be stepped for peripheral angiography. The advantages are reduced stepping times and precise positioning. When using PERIVISION*, the user initiates each step during the DSA examination while monitoring the flow of contrast medium. Without PERIVISION, PERISCANNING is performed by continuously moving the table or the gantry during unsubtracted imaging.

* Optional

MULTISTAR Plus
Angiography System for Diagnostics and Interventions

Intelligent Collision Protection (ICP) – assuring a high level of safety

The collision computer knows the gantry contours and constantly monitors their positions. When approaching a collision zone, the system automatically reduces the speed of the gantry movement. The mechanical proximity switches on the image intensifier, universal collimator, and C-arm provide additional safety for the patient, operating personnel, and equipment.

Ceiling-mounted installation – adaptable to different room heights

The sturdy, light metal construction ensures low ceiling load. The gantry can be adapted to different room heights.

DYNAVISION Classic

Rotational angiography with 3D effect. Can be selected directly via the "DYNAVISION" key on the system operating console in the examination room. This 3D effect is achieved through unsubtracted imaging with low acquisition frame rates that result in lower dose. Manual subtraction of individual image pairs is possible as well.

KOORDINAT M

Patient table for all angiographic examinations

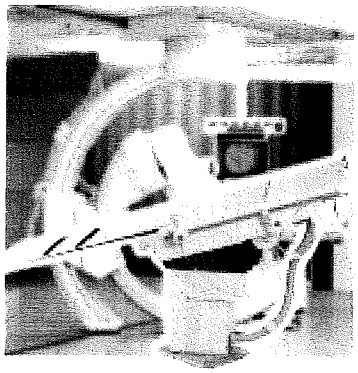
The floor-mounted table with height-adjustable telescoping base simplifies patient positioning. The anatomically contoured floating tabletop is constructed of carbon fiber. The extended longitudinal travel of 1250 mm (49") offers flexible patient positioning. The cantilevered end allows for examinations from head to toe. The large table pivot range of ± 90° simplifies patient transfer and permits optimized positioning for arm angiography as well.

Variable positioning of support rails

The tableside accessory / operating console rail can be pulled away from the patient for easy patient positioning, or it can be positioned near the patient for optimum user-friendliness.

KOORDINAT O.R.

Patient table for O.R. environment



The KOORDINAT O.R. was specifically designed for complex endovascular types of applications. It features a radiolucent floating tabletop which covers the entire length of the patient. If surgical intervention is required, the table can be tilted in Trendelenburg and lateral positions – just as a traditional O.R. table. In addition, the table can be operated with a standalone power supply and has a backup battery that is not dependent on the hospitals's power.

- floor-mounted, compact table with telescopic base
- motor-driven tabletop height adjustment from 77.5 cm to 115 cm
- floating tabletop, table tilt 15° Trendelenburg, 15° reverse Trendelenburg, ± 15° lateral
- high-stability, low-absorption carbon fiber tabletop

POLYDOROS IS-AF with CAREMATIC

Multipulse X-ray generator

The generator's performance fulfills the requirements of the most modern angiographic systems. It permits precise and reproducible exposures. The CAREMATIC continuously monitors patient transparency by analyzing the fluoroscopic values via adaptive measurement fields. These values are then converted into the exact exposure parameters required.

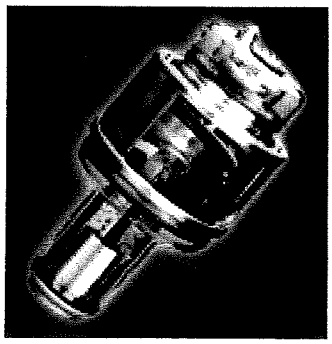
The CAREMATIC calculates the optimum exposure parameters online, based on the ideal parameters. This permits the series to be started immediately without requiring test exposures.

MEGALIX Cat

High-performance X-ray tube [1]

The MEGALIX Cat 125/15/40/80 121 GW features liquid-metal lubricated spiral groove technology.

- silent and durable continuous rotating anode at approx. 9,000 min^{-1}
- long tube life and high reliability
- reduced extrafocal radiation components for better image quality through metal center technology



SIRECON 40-4 HDR and SIRECON 33-4 HDR

High definition image intensifiers [1]

The SIRECON 40-4 HDR as well as the SIRECON 33-4 HDR is a large format image intensifier for survey and super-selective object display.
Four input fields can be selected. Contrast and resolution are optimally adjusted for the functions of the POLYTRON T.O.P.
The anti-glare screen with veiling glare trap ensures a high dynamic contrast and avoids scattered light effects.
Measurement dominants can be selected for the specific organ to optimize image quality.
The smallest possible housing diameter permits large gantry angle settings, for example for cardiac angiography with outstanding exposure geometry.

VIDEOMED SD

TV system – with image position correction and digital image quality control

The image display on the monitor always appears in the head-to-toe direction through motorized rotation of the TV camera.
The newly developed TV system with fiber optic output can be optimally implemented for all types of image acquisition.
The automatically selected preprogrammed image characteristics are specific for different clinical applications.
The processor controlled automatic self-calibration ensures consistently optimal image quality.

SIMOMED HM

Monitors – brilliant images for diagnosis

The SIMOMED HM monitors automatically adjust to the ambient brightness in the room. The TV tubes feature dispenser cathode technology, delivering very high contrast and brightness values and long product life.

POLYTRON T.O.P.

Digital imaging system – for image acquisition, storage and display in 1024 x 1024 image matrix and 10 bit

POLYTRON T.O.P. is a high-resolution imaging system specially designed for vascular and nonvascular interventional and diagnostic procedures.
The innovative technology used in this highly integrated system ensures rapid, user-friendly operation (via a touch-screen and a joystick).
The highly automated image processing guarantees optimum image quality. This innovative concept enables maximum dose reduction and image processing functions such as:

MULTIMAP – complete scene surveys or reference images at a glance.

AUTO MAXFILL – automatic image display with a maximum degree of contrast medium fill.

AUTO WINDOW – automatic window settings for optimal image display.

[1] To ensure the environmental friendliness of our X-ray and I.I. tubes (i.e. to protect natural resources and minimize discarded materials) and to comply with future regulations, we endeavor to recycle components and, whenever possible, to reuse them in the production cycle. We guarantee the function, quality and life of these components through extensive quality assurance measures.

MULTISTAR Plus
Angiography System for Diagnostics and Interventions

AUTO PIXELSHIFT – automatic pixelshift with selectable ROI.

SCENE COMPARE – dynamic simultaneous comparison of two different series.

SPLIT SCREEN** – adjacent display of reference image and fluoroscopic image with variable split sizes.

OVERLAY FADING – patented superimposition of fluoroscopic and reference images or roadmapping with freely selectable segments.

PERISCANNING – peripheral DA through tracking of the contrast medium bolus.

PERIVISION* with PERMAP – peripheral online-DSA with stepping, optimized image presentation, and image display.

CO_2 DISPLAY* – optimized display of CO_2 angiography.

CAREVISION* – dose reduction values of up to 90% in fluoroscopy.

Operating modes:

- Digital Subtraction Angiography, realtime subtraction with 1024 x 1024 image matrix and digital realtime image filtration
- Digital Angiography without subtraction with digital real-time image filtration, dynamic instant image display, reduced dose
- Digital Radiography, digital spotfilm technique
- Selectable frame rates of 0.5 to 6 F/s
- HIGH SPEED ACQUISITION*, DA/DSA with 8 and 10 frames/second (1024 x 1024)
- Up to 4 variable acquisition frame rates per series, either manually switched or self-timed
- Digital continuous fluoroscopy with 1024 x 1024 matrix and digital real-time filtration
- Digital pulsed fluoroscopy* with 30, 15, 7.5 and 3 pulses / second at 1024 x 1024 matrix and realtime filtration
- Roadmapping with MAX PEAK OPACIFICATION – rapid access to reference images via "reference image file"
- Roadmapping with OVERLAY FADING function
- Reference image display on segmented monitor screen (SPLIT SCREEN**) in 1344 x 1024 matrix display
- Reference image display on second monitor*
- Rotational angiography (DYNAVISION Classic and DYNAVISION Plus*) with up to 25°/second
- 16 freely user editable organ programs per exposure type

Image processing

Image processing is performed for all types of image acquisition and image display in realtime. In addition to all the standard image processing functions that are available, POLYTRON T.O.P. offers innovative automatic image processing procedures such as AUTO MAXFILL, SCENE COMPARE, AUTO WINDOW, AUTO CALIBRATION, automatic collimation, etc.

Image evaluation

A number of quantification programs* with automatic calibration permit the user to perform calculations during the examination. The system can measure distances and determine the degree of stenosis with geometric and densitometric calculations. These functions can be executed directly from tableside.

Image documentation

Documentation is rapid and simple to execute, either directly or via a "Photofile". Patient data entry can be done in background. Images can be transferred either to a laser camera* or to a DICOM 3 (SIENET) network*, complete studies to a CD-R*, CD-MEDICAL* or DICOM 3 network via the POLYTRON.NIU*.

DISPLAY 2000

Image display for fatigue-free work

DISPLAY 2000 produces a steady and homogeneous image through high resolution, flickerfree display (2249 lines, 120 Hz).

MULTIMAP

The complete overview of scenes or reference images permits the rapid and direct display of previously acquired image information. Images can be selected nonsequentially directly at the monitor using the joystick. After each exposure series, a MAXFILL image is automatically generated which represents the corresponding scene.

* Optional
** For configurations with one monitor

MTS

Monitor suspension system

The monitor suspension system is installed transverse to the floor-mounted KOORDINAT examination table and longitudinal to the ceiling-mounted KOORDINAT examination table.
The adjustment arm permits optimal positioning of the TV monitors with respect to the position of the user.
The MTS can accommodate 1 to 4 monitors.
The integration of an ECG monitoring system is possible.

Contrast Medium Injectors

ANGIOMAT Illumena* and MEDRAD MARK V ProVis*

These high-pressure injectors are fully integrated into the system. Injection release can be either automatic (X-ray synchronized) or manual.
The injector head can also be mounted on a ceiling suspension as a Rack Mount Version* with either a swivel feature or a swivel and travel feature.
The injector can then be activated from the control room. As an alternative, the injector operating console is plugged into a wall connector with the console located nearby. These options provide the physician with more room to move around the examination table.

System Extensions

Multitasking

Evaluation of studies in the control room during the examination:
PFM (Parallel Fluoro Mode)* or DPP (Dual Patient Processing)*.

PFM* (Parallel Fluoro Mode)

Permits postprocessing, background filming and archiving parallel to a fluoroscopic examination with digital fluoroscopy. Roadmap and acquisition automatically activate the current patient for post-processing. Second monitor* in the examination room is required.

DPP* (Dual Patient Processing)

Full utilization of the imaging system, i.e. post-processing of image data with all possible functions in the control room and simultaneous examination of another patient in the examination room. Only during acquisition the post-processing is paused.

DYNAVISION Plus*

This rotational angiography provides angle-triggered image acquisition during C-arm rotation (up to 25°/s) for all applications in rotational angiography.
This significantly speeds up examinations and improves images quality, while also minimizing patient dose.
Special image processing software enables dynamic display of two stereo image pairs at a time for systems with a reference image monitor*.

PERIVISION* with PERIMAP

Peripheral angiography with stepping in DSA technique with a single injection of contrast medium (including PHLEBOVISION).
During the peripheral angiography examination, the patient remains stationary and the MULTISTAR gantry steps.
Exact reproducibility of the step positions simplifies angiography with on-line subtracted display.
The PERIMAP feature allows PERIVISION images to be appended automatically for optimal image presentation.
PHLEBOVISION permits an automated acquisition procedure from head to toe for subtracted venographic examinations.

DIGITAL CINE MODE – DCM*

Digital image acquisition and storage for cardiac angiography. Digital image acquisition for cardiac angiography at 15 or 30 f/s, acquisition, processing, and display are all done in 1024 matrix. Internal storage in DICOM compatible 512 matrix. Cine parallel mode or purely digital acquisition range is possible in connection with a cine camera (only with SIRECON 33-4 HDR).

ARRITECHNO IS*

35 mm cine camera for radiological cine technique with rapid change cassette system. For frame rates of 15 and 30 f/s (50/60Hz). Includes intermediate image display and image filtration.

MULTISTAR Plus
Angiography System for Diagnostics and Interventions

External Post-processing Options

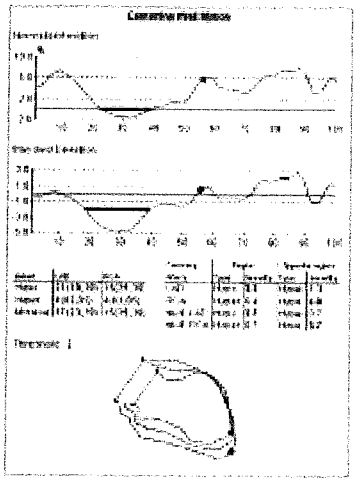
InSpace 3D*

Three dimensional reconstruction and visualisation workstation for post-processing of DYNAVISION runs.
With the online image transfer the acquired images are directly sent to the 3D Virtuoso workstation, where they are recalculated to slices and then displayed with various display processes.
InSpace 3D can generate views from all angles, even those ones not possible with the C-arm.
Thus, 3D displays provide the physician with valuable information to aid in a fast and sure diagnosis for the assessment of possible courses of treatment.

ACOM.PC* – Cardiac Viewer

ACOM.PC* is the cost-effective software for the display of cardiac scenes on a PC.
The quick display of patient scenes is supported by diverse image processing functions.
The export of individual images to other PC applications is another useful feature.
With ACOM.PC.Plus*, direct reading from the CD-M, the local hard drive, or the network is possible in real time. And the acceleration board also makes edge enhancement in real-time possible.

QUANTCOR.LVA*
Left Ventricular Analysis



QUANTCOR.LVA* is the cardiac quantification PC-software with the following functionality:

- Automated and manual contour detection
- Volume calculations:
  EDV (end diastolic volume),
  ESV (end systolic volume),
  EF (ejection fraction),
  SV (stroke volume), cardiac output with indices based on BSA (body surface area) or weight
- Volume calculations (Simpson, area length method)
- Wall motion (centerline method, regional, radial method)
- Distance measurement

QUANTCOR Image Transfer*

During the examination, images from the POLYTRON that are to be analyzed can be transferred to QUANTCOR. In addition, independent evaluation of CD-M images is also possible – simply select them with the ACOM.PC*.

For recommended minimum PC configuration for ACOM.PC and QUANTCOR, please see ACOM.PC brochure.

Documentation and Archiving

Accurate documentation with maximum quality

- Digital laser camera* (system equipped with connection)
- Analog laser or monitor camera*
- Video printer*
- S-VHS recorder*
- Compact disk* (CD-R) with up to 700 images in 1024 x 1024 matrix
- CD MEDICAL* (CD-M) with up to approximately 4000 CARD images in 512 x 512 (needed to store DCM* scenes)
- POLYTRON.NIU* is the gateway to Multiframe DICOM networks.
  Also available with built in CD-Recorder to store to CD. (CD-M option needed to store DCM* scenes to the network and/or CD)
- DICOM 3 / SIENET interface* makes it possible to store images to a DICOM 3 compatible network, like PACS or SIENET networks.

* Optional

Operation

Operation of the MULTISTAR Plus is as efficient as possible. Operation at tableside is just as comfortable as at the second console* in the control room. Image display is controlled directly via the POLYTRON T.O.P. joystick or the touch-screeen.

MULTISTAR double C-arm

The C-arm system was designed for simple, logical operation. All C-arm movements are motorized, allowing effortless control by the user. MULTISTAR variable speeds permit sensitive, precise and rapid operation.
As an alternative, all gantry movements can be performed using the POWERGRIP control on the image intensifier.

Operating Console – tableside system operation

All functions necessary for an examination are integrated in the tableside control.

- collimator selection (square, iris, semitransparent filters)
- gantry programs
- collimator and filter settings
- zero position of the gantry
- vertical table movement
- peripheral angiography*
- image intensifier zoom

The multifunction joystick controls

- motorized longitudinal movement of the gantry
- movements of the double C-arm
- motorized I.I. lift

POWERGRIP for positioning of the image intensifier

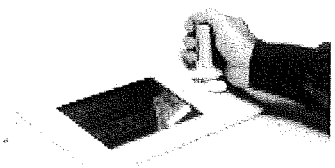
With the POWERGRIP, the user can set the required angle, up to approximately ± 30°, during an interventional procedure without having to move from his/her work position.
The C-arm motor control makes this effortless. In addition, manual I.I. lift is also possible.

Handgrip – for gantry movements

The additional handgrip on the back of the gantry can be used for longitudinal travel and positioning of the system about the patient's head. Switches on this handgrip allow the I.I. to be moved to the undertable position.

POLYTRON T.O.P.

Operation is performed via a touch-screen and a joystick. All generator and imaging system functions required during an examination are available via this tableside control. The user is guided through operation via simple to understand symbols on the image monitor and easily recognizable function keys on the touch-screen. Keys not available for selection are dimmed. The control can be operated with a sterile cover without influencing the functions.



POLYTRON T.O.P. operating console

System data displays

All important system data for the examination are displayed in a well legible data display on top of the monitor support system. Notices about important measures that may be necessary or service messages appear in the text lines.

Displays:

Angle setting, SID, magnification factor, notices, CAREWATCH*, gantry rotation, gantry position, table position. An intercom to the control room is also integrated in the display.

Control room operation

A text monitor with a keyboard and mouse is used to manage the patient data and to operate the archiving functions, display system status messages, and display examination reports.
A POLYTRON T.O.P. control with the same functionality as the one at tableside is available for the control room.

Acquisition parameter display

Key parameters for the current examination, like currently selected fluoroscopy settings, acquisition programs and frame rates are displayed in the live image monitor.
This gives the operator the possibility to always know about his x-ray parameters without looking away from his diagnostic image.

MULTISTAR Plus
Angiography System for Diagnostics and Interventions

Accessories

System accessories

The following accessories are standard on all systems:

- 1 patient matrace
- 2 curved arm supports

On systems with KOORDINAT O.R. there are the following standard accessories:

- 1 patient matrace
- 1 articulated arm support
- 2 slide-on accessory rails
- 3 patient fixation belts

Optional accessories:

- Air cushions*
- Arm restraints behind the head*
- IV holder*
- Handgrips behind the head*
- Transparent armrest*
- Accessory lights*

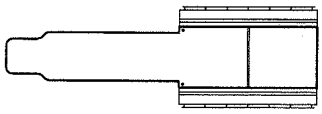
Optional System Accessories

Sterile covers*

Available with different sizes for

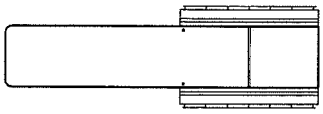
- Operating consoles
- Image intensifier with POWERGRIP
- Sterilizable control handgrip on the examination table

KOORDINAT M* – Standard tabletop



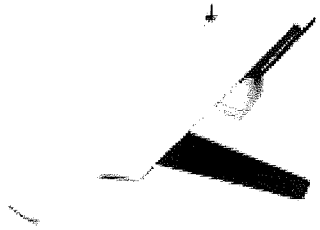
The standard tabletop has a cutout at the head-end and is narrower in the upper body section than at the foot-end. This makes it especially well-suited for cardiological applications as well as for neuroradiology.

KOORDINAT M* – Comfort tabletop



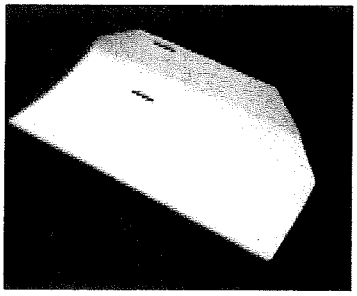
The comfort tabletop is suitable for universal angio systems with KOORDINAT M. The width from head to toe is 525 mm. The head portion is not cut out with this tabletop.

Armrest*



The armrest is constructed of radiolucent carbon fiber, and was specially designed for use with arm angiography. The armrest can be used on either the left or right side, and is held in place by pushing it under the patient's body.

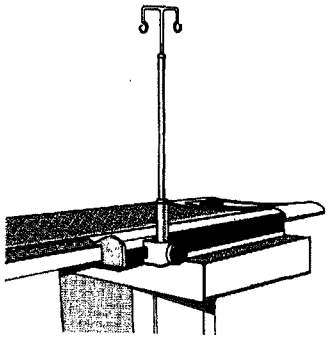
Curved arm supports*



These provide support for lateral arm positioning, especially for narrow tabletops. The supports are delivered as a pair, one left and one right. They are pushed underneath the patient at arm level, and are held in place by the patient's body, independent of the accessory rails (the basic configuration includes two pieces).

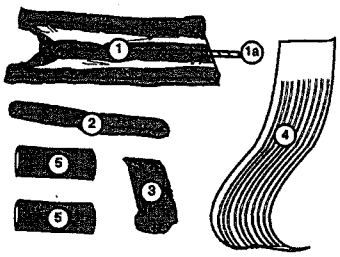
* Optional

IV holder*



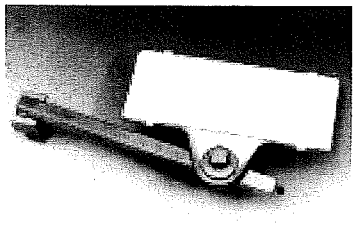
The IV holder is used for cardiology applications and interventional examinations.
It is heightadjustable, and can hold two IV containers.

Transparency compensation*



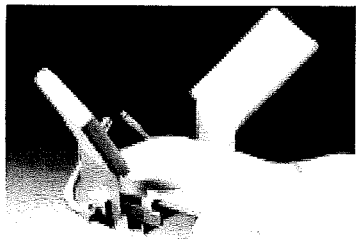
This accessory serves to compensate direct radiation at the side and between legs, as well as for positioning legs. The set comprises the transparency compensation, (1), a long sack (2) and a cushion (3). These parts are filled with rice flour. Also included is a ruler (1a) which is inserted in the transparency compensation, two yellow foam cushions (5) and an elastic band (4) (tricodur abdominal) for leg positioning.

Articulated arm support*



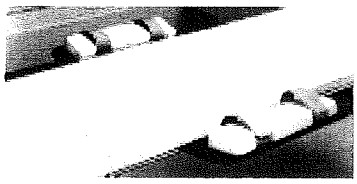
The articulated arm support is attached to the accessory rails. The arm support can be moved longitudinally and rotated. A set screw locks it into the desired position. The articulated arm can be locked into several tilt positions.

Handgrips and supports*



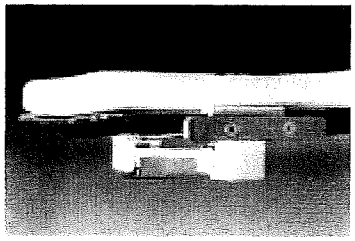
The handgrips and supports provide comfortable patient positioning for cardiology examinations, since the patient's arms are generally positioned above the head.

Table extension*



The table extension is an additional aid for comfortable positioning of the patient's arm. Two cushions and bands are included for positioning the arms. This accessory is suitable for situations requiring free access to the patient's arms.

Head-end support*



There are two short accessory rails located at the head-end; the handgrips or shoulder supports can be mounted on these.

Slide-On Accessory rails*

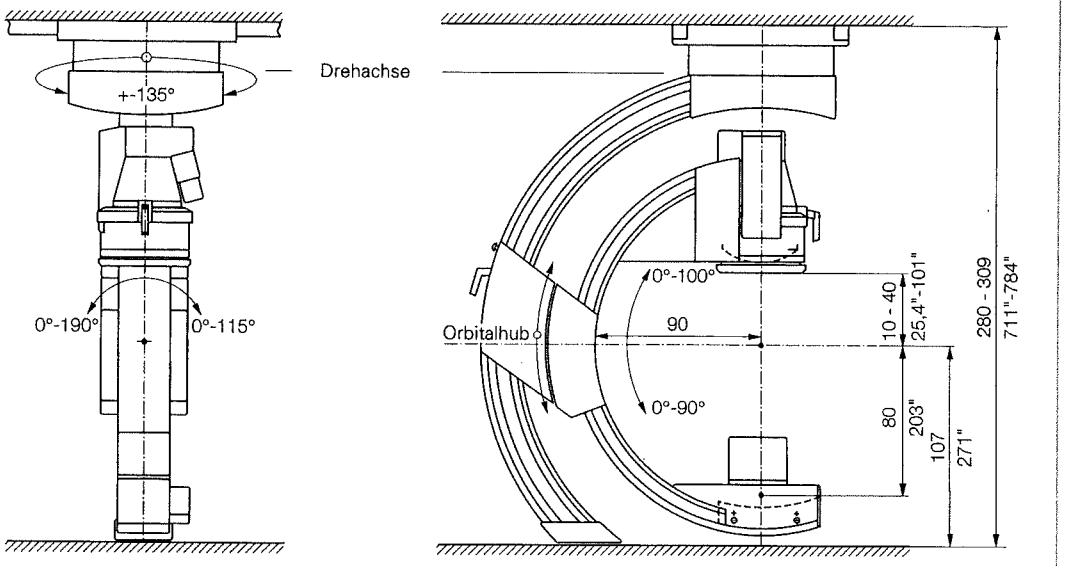
Rails for use in an O.R. environment to attach additional accessories to the KOORDINAT O.R. table. Maximum load 40 kg (91 lbs).

* Optional

MULTISTAR Plus
Technical Data

The system

MULTISTAR



Mass in cm (" = inches)

Gantry rotation	Manual, gantry can be positioned as follows: – with MULTISPACE – without MULTISPACE	± 135 ° 0°, + 90°, – 90° (head-end gantry position = 0°)				
C-arm angle position	Head-end gantry position (0°)		LAO cranial	115° 90°	RAO caudal	190° 100°
	Lateral gantry position	+ 90° with OT-I.I.	LAO cranial	90° 190°	RAO caudal	100° 115°
		+ 90° with OT-I.I.	LAO cranial	100° 115°	RAO caudal	90° 190°
	Lateral gantry position	– 90° with OT-I.I.	LAO cranial	100° 115°	RAO caudal	90° 190°
		– 90° with OT-I.I.	LAO cranial	90° >190°	RAO caudal	100° > 115°
	The angle positions may be limited by the patient table and the patient. Angles greater than 90° are displayed as LAO/RAO, despite the fact that it is a RPO/LPO angle if the patient is in the standard position.					
C-arm speed	Variable positioning speed: DYNAVISION CLASSIC/Plus*	max. 15°/s max. 25°/s				
C-arm immersion depth	Head-end position 0°: Lateral position + 90°, – 90°:	C-arm radius = 900 mm (35.4") Unlimited				
Image intensifier	Lift Motorized or manual	300 mm (11.8") ± 5 mm (0.2") max. 60 mm/s				

* Optional

The system

Isocenter	Isocenter height	1070 mm + 10 – 5 mm (42.1")**
	Focus-isocenter distance	800 mm (31.5") ± 10 mm (0.4")
	Isocenter/I.I. proximity switch	100 – 400 mm ± 10 mm (3.9" – 15.7" ± 0.4")
	Focus-I.I.-proximity switch	900 – 1200 mm ± 20 mm (35.4" – 47.2" ± 0.8")
Geometric magnification	When patient is positioned in isocenter	max. 1.4
	When patient is not positioned in isocenter	max. 2.2
Longitudinal gantry travel	Length of rails	4250 mm ± 5 mm (0.2")***
	Travel range	2100 mm
	Movement	motorized
Motorized longitudinal travel*	Continuously variable speed	max. 250 mm/s (9.8"/s)
Gantry stepping*	Step length programmed at installation	min. 130 mm (5.1") to 250 mm (9.8")
	Number of steps	max. 7 (8 exposure fields)
Room height	Adjustable	2800 mm to 3100 mm** (110.4" to 121.9")
Image reversal (depending on input at the imaging system or automatic depending on the C-arm position)	When patient is not in standard position	horizontal and vertical
	When patient is in prone position	horizontal
Safety devices	Electro-mechanical proximity switch	Image intensifier, POWERGRIP universal collimator, C-arm and KOORDINAT M
	Intelligent Collision Protection - ICP	With recognition of table position, movement speed is reduced in case of potential collision

KOORDINAT M

Floor-mounted table	Table height	min. 775 mm to max. 1150 mm
	Tabletop (free overhang)	Length: max. 2306 mm
	Tabletop, width in thoracic region	Width: 450 mm ± 5 mm
	Carbon fiber tabletop in sandwich construction	
	Aluminum equivalent value	1.0 mm (100 kV, HVL: 2.7 mm Al)
	Longitudinal travel	1250 mm ± 5 mm
	Transverse travel	± 200 mm ± 5 mm
	Table pivoting	± 90°, 5° increments***
	Maximum patient weight	200 kg
	Accessory rails	40 kg (incl. radiation protection devices)

KOORDINAT 6.R

Floor-mounted table	Table height	min. 775 mm to max. 1100 mm ± 10 mm
	Tabletop, cantilever length	max. 2300 mm
	Trendelenburg tilt	head up max. 15°
		head down max. 15°
	Lateral tilt	± 15°
	Carbon fiber tabletop in sandwich construction	
	Al equivalence	≤ 1.0 mm (100 kV, HVD 2.7 mm Al)
		≤ 1.25 at 100 kV, HVD 3.7 mm AL (acc. to CFR)
	Longitudinal travel	max. 1250 mm (± 10 mm)
	Lateral travel	max. 175 mm (± 10 mm)
	Table rotation	± 120° (relative to "normal" position)
	Max. patient weight	200 kg

*optional; ** without floor tolerance; ***depending on installation

MULTISTAR Plus
Technical Data

MTS (Monitor suspension system)		
Prepared for	SIMOMED HM monitors	1 or 2 image monitors (54 cm) + up to 2 physiological
Monitor adjustment range	Swivel arm	1200 mm long, ± 10 mm (47" ± 0.4") max. 270° swivel***
ANGIOMAT Illumena*		
Injector	Contrast medium cylinder	150 ml
	Flow rate	10 ml/s to 40 ml/s 0.1 ml/min to 9.9 ml/min 0.1 ml/s to 9.9 ml/s 10 ml/min to 999 ml/min
	Pressure limit	20.5 bar to 82 bar
	Feedback of actual injection parameters	
	Mechanical design	mobile stand removable injector head
Rack Mount Version*	Injector head suspended from ceiling; version with swivel feature and version with swivel and travel features.	
MEDRAD MARK V ProVis*		
Injector	Contrast medium cylinder	150 ml
	Flow rate	0.3 – 10.0 ml/s; ml/min; ml/h 10 – 50 ml/s 10 – 59 ml/min; ml/h
	Pressure limit	150 ml cylinder: to 81 bar
	ECG trigger*	
	Mechanical design	mobile stand removable injector head
Rack Mount Version*	Injector head suspended from ceiling; version with swivel feature and version with swivel and travel features	
Injector wall connection*	Alternative to table installation with full access to the examination table, however, only one connection location is possible	

*optional; **without floor tolerance; ***depending on installation

Image acquisition system

SIRECON 40-4 HDR, -33-4 HDR

Image intensifier	Nominal diameter and zoom fields (IEC 1262)	40-4 HDR	(mm)	400	280	200	140
			(inches)	15.7"	11.0"	7.9"	5.5"
	Resolution	min. value	LP/mm	3.6	4.2	5.0	6.0
		mean value	LP/mm	4.2	4.8	5.6	6.6
	Nominal diameter and zoom fields	33-4 HDR	(mm)	330	220	170	133
			(inches)	13.0"	8.7"	6.7"	5.1"
	Resolution	min. value	LP/mm	3.8	4.6	5.0	5.8
		mean value	LP/mm	4.2	5.0	5.6	6.0
Proximity switch	Integrated, electromechanical diameter:						
	40-4 HDR	478 mm ± 2 mm (18.8" ± 0.08")					
	33-4 HDR	398 mm ± 2 mm (27.5" ± 0.08")					

VIDEOMED S-D

Digitally controlled image quality		
Digital fiber optic link to POLYTRON T.O.P.		
TV system	Multiple TV scanning techniques for optimum signal-to-noise ratio	
	Bandwidth	> 25 MHz (– 4 dB)
	Pick-up tubes	SATICON

SIMOMED HM

Image monitors for diagnostic purposes	Multi-sync, room lighting sensor	
	Dispenser cathode technology	
	Antiglare flat screen	54 cm (21") measured diagonally for examination room 44 cm (17") measured diagonally for control room
	Refresh rate	120 MHz — 3 dB

ARRITECHNO IS* (only with SIRECON 33-4 HDR)

Cine camera incl. image gap filling and image filtration	ARRITECHNO 35	
	Film format	35 mm
	Frame rates	15 and 30 f/s (50/60 Hz)
	Lens	1:1, 6/100 mm
	Cassette	Two 90 m (220 ft.) rapid change cassettes

Image processing system

POLYTRON T.O.P.

Frame rates	0.5...6 f/s with 1024 x 1024 matrix (up to 10 f/s with high-speed DSA*) variable frame rates: Pause, 0.5...6 f/s, up to 4 different frame rates per series 15 f/s and 30 f/s with 512 x 512 matrix (DCM*)
Image storage capacity	Image memory: up to 16,000 images including „reference image file" and „Photofile" (256 images per patient) in 1024 matrix; up to 64,000 images in 512 matrix with DCM* (cardiac option*)
Image storage extensions	up to 22,500 images* (= 90,000 DCM* images) up to 45,000 images* (= 180,000 DCM* images)

*optional

MULTISTAR Plus
Technical Data

Acquisition and display modes	Fluoroscopy (with/without reference image) on SPLIT SCREEN** or dedicated monitor	Digital Subtraction Angiography
	Fluoroscopy (with reference image in OVERLAY mode)	Digital Angiography
	Roadmapping (with/without OVERLAY) and reference image on SPLIT SCREEN**	PERIVISION* PERI SCANNING*
	Roadmapping (with/without OVERLAY) and reference image or unsubtracted fluoroscopic image on separate monitor	Rotational angiography: DYNAVISION*
Fluoroscopy	Continuous fluoroscopy	
CAREVISION*	Digital pulsed fluoroscopy* (3, 7.5, 15, 30 pulses/s)	
Image processing	– Real-time digital image filtration (with adjustable degree of filtration) – Image reversal – Image zoom, static and dynamic (2 x) with roaming – Magnifying glass with variable size and position – Windowing (automatic and manual) – Electronic shutter (automatic and manual) – Variable replay speed – Pixel shift (automatic and manual) – Remasking – Marking of the MAX FILL image (automatic and manual) – Replay of the MAX FILL images (MAX FILL Loop) – Blending of anatomical background – For PERIVISION* optimized image display (LONG LEG DISPLAY) – Special software for optimal display of CO_2 angiography* – Simultaneous dynamic display of two scenes on one monitor with adjustable view region (SCENE COMPARE) – Visual scene and reference image directory (MULTIMAP) – Selectable Max Peak Opacification – Selectable Min Peak Opacification (only with CO_2*) – Image annotation with automatic indication of scene name – Free text annotation with user-specific programmable labeling – Image preparation in „Photofile" – Digital Acquisition Zoom*	
Patient data management	– Integrated – Patient data import from RIS/HIS*	
Scene data	All relevant patient and exposure data accessible via report function	
Evaluation software	– Calibration (automatic and manual) – Distance measurement – QUANTCOR* LV analysis at separate workstation – ACOM.PC*	
Interfaces (network)	– SIENET* with ACR/NEMA-SPI protocol – SIENET/DICOM* (single frames) – POLYTRON.NIU* (scenes) – DICOM 3 interface* (PACS)	
Documentation	– Digital hardcopy on laser camera*, analog on laser or monitor camera* – Video recorder* – Video printer* – Printer* for reports – Archiving on compact disk (CD-Rec.*) for approx. 700 images in 1024^2 matrix – Archiving on compact disk (CD-Medical*) for approx. 4,000 images in 512^2 matrix in DICOM 3 standard for cardiology	

* optional; ** for configurations with one monitor

Radiation Generation

POLYDOROS IS-AF with CAREMATIC

Multi-pulse X-ray generator	Maximum output	100 kW at 100 kV and 1000 mA,
	Frame rate	max. 120 f/s (IEC 601-1)
	minimum frame rate	0.5 ms (IEC 601-1)
	Frame rates used	0.5 to 30 f/s depending on options
	Tube load calculator	
Fully automatic exposure regulation CAREMATIC	– with fluoroscopy, the water equivalent value is determined for the exposure – with radiography, the kV, mA, pulse width, ADF filter and iris diaphragm are preset – Photo timer during the acquisition	

MEGALIX X-ray tube (according to IEC 601-2-28)

Metal center tubes with lubricated spiral groove bearing technology and closed loop cooling system	MEGALIX Cat 125/15/40/80-121 GW				Continuous rotation 9000 min^{-1}
	kW	15	40	80	fluoro power: 2500 W no time limitation
	focal spot (IEC)	0.3	0.6	1.0	4000 W for 10 min
Heat storage capacity of the anode:	1,140,000 Joule (2,000,000 HU)				
Heat dissipation	405,000 HU/min (IEC 613)				

Universal collimator

	– Iris collimator – Square collimator – Filter for DSA, DA and cardiology – Semi-transparent finger-shaped filter – CAREFILTER with 0.2 mm Cu pre-filtration – Digitally controlled and programmable – Collimator rotation compensation in oblique gantry position
CAREWATCH with DIAMENTOR*	– Acquisition and display of radiation – Measurement chamber in the collimator – Display in the control panel – Configurable display modes: dose area product, dose rate, percentage of configurable maximum dose

Installation data

	Nominal power consumption voltage[1] ± 10% (V)	Frequency (Hz) ± 1 Hz	Fuse internal (A)	Fuse external (A)	Power (kVA)
POLYDOROS IS-AF	400/ 415	50/60 50	63	80 A/C	18 for fluoroscopy 160 for radiography
	440/ 480	50/60 60	63	80 A/C	18 for fluoroscopy 160 for radiography
Power distributor	400/ 415	50/60 50	35	50 A/C	max. 14.0
	440/ 480	50/60 60	35	50 A/C	max. 14.0

* optional;
[1] max. permissible rated voltage between phases (L1, L2, L3) and PE 300 V

MULTISTAR Plus
Technical Data

Rated values for POLYDOROS IS-AF

U_N / P		100 kW	80 kW
	400 V**	≤ 0.10 Ohm	≤ 0.14 Ohm
	415 V**	≤ 0.14 Ohm	≤ 0.17 Ohm
	440 V**	≤ 0.16 Ohm	≤ 0.21 Ohm
	480 V**	≤ 0.20 Ohm	≤ 0.27 Ohm

* Resistance values in Ohm at U_N – 15%, ** Resistance values in Ohm at U_N – 10%

		Approx weight	Heat
Examination room:	Ceiling – MULTISTAR	750 kg (1650 lbs)	max. 800 W
	Ceiling – MTS (3 monitors)	320 kg (705 lbs)	
	Floor – KOORDINAT M	385 kg (847 lbs)	
	Floor – KOORDINAT O.R.	585 kg (1287 lbs)	
Control room:	Table (including user interface and options without laser camera)	285 kg (627 lbs)	max. 1500 W
Computer room:	POLYTRON T.O.P. cabinet	491 kg (1080 lbs)	max. 5200 W
	Tube cooling	42 kg (92 lbs)	
	POLYDOROS IS-AF	350 kg (771 lbs)	
	2 electronics cabinets	550 kg (1212 lbs)	
	Optional cabinet*	136 kg (299 lbs)	
	Electronic cabinet KOORDINAT O.R.	230 kg (506 lbs)	

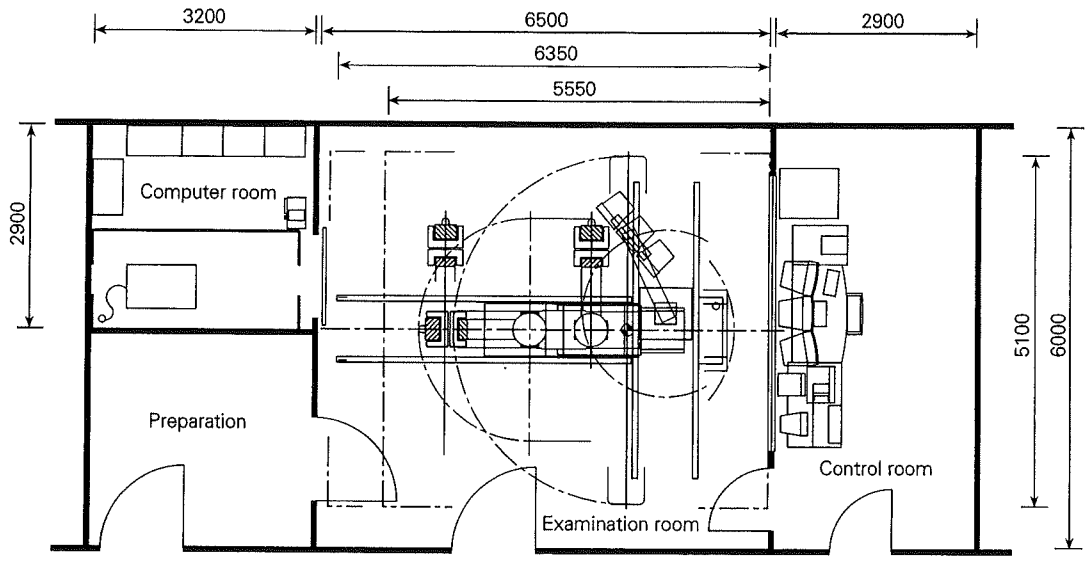
Ambient conditions

Examination and control room	Temperature range:	+ 15°C ... + 35°C (+ 59°F ... + 95°F) (recommended temp. 22°C (72°F)) Rel. humidity 20 – 75% below dewpoint
Imaging system POLYTRON T.O.P.	Temperature range:	+ 15°C ... + 35°C (+ 59°F ... + 95°F)
	Relative humidity:	20 – 75% below dewpoint
	Temperature gradient:	20 K/h
	Air flow rate:	2378 m³/h [SKR3](84000 ft³/h)
	Noise generation:	max. 57 dB (A)
X-ray generator POLYDOROS IS-AF	Temperature range:	+ 10°C ... + 40°C (+ 50°F ... + 104°F)
	Relative humidity:	20 - 75% below the dewpoint
	Temperature gradient:	5 K/h
	Air flow rate:	800 m³/h (28251 ft³/h)
	Noise generation:	max. 55 dB (A)
Cooling unit (MEGALIX X-ray tube)	Air conditioning:	+ 5°C ... + 40°C (+ 41°F ... + 104°F) (frost-free room)
	Air flow rate:	1000 m³/h (35315 ft³/h)
	Noise generation:	max. 60 dB (A)

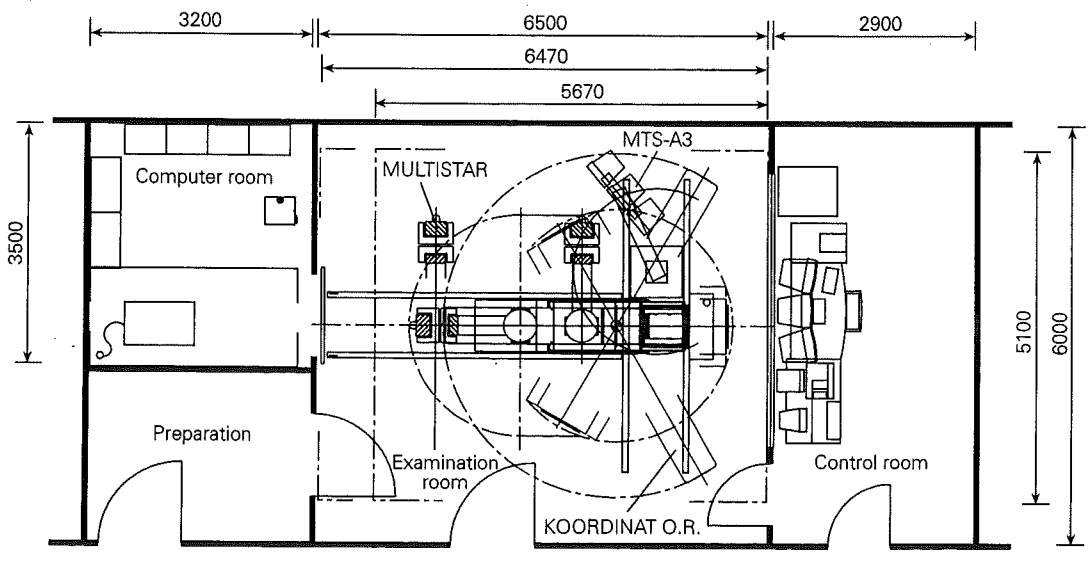
* optional

Examples of room layouts (mm)

MULTISTAR Plus with KOORDINAT M



MULTISTAR Plus with KOORDINAT O.R.



Room height: 2805 – 3095 mm

All technical data represent typical values, unless specific tolerances are indicated.

Siemens reserves the right to change designs and specifications without prior notice.
Please contact your local Siemens sales representative for the latest information.

Siemens medical
Solutions that help

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Answers for life.

Exhibit 3

Experience the future of interventional imaging

Artis Q

Visionary in performance.
Visionary in precision.

The Artis Q product line for interventional imaging is a visionary breakthrough in X-ray generation and detection that takes **performance** and **precision** to the next level.

Artis Q offers unparalleled **performance** with the new powerful GIGALIX X-ray tube for high contrast resolution at any angle and any patient size while the high-dynamic range detector enables enhanced image quality in advanced 3D imaging.

In the fight against the most threatening diseases such as coronary artery disease, stroke, and tumors, Artis Q delivers innovative applications offering **precision** for enhanced guidance during interventional procedures in cardiology, radiology, and surgery.

Experience the future of interventional imaging.

Not all features shown are necessarily standard and available in all countries.

Visionary in ...
performance

To see any device and anatomical structure in any patient and at any angulation is one of the main challenges in interventional imaging. For better performance and image quality, Artis Q provides enhanced visualization to see small devices. It offers high contrast resolution even at steep angulations. And it enables sharp images of moving objects such as coronary arteries while the optimized X-ray pulse helps to reduce radiation by up to 60%. The new large HDR detector offers high dynamic range for excellent soft-tissue resolution in 3D.

CARE + CLEAR

GIGALIX

Focused power

The GIGALIX X-ray tube has been designed around a unique flat emitter technology that generates powerful short pulses. Compared to filament technology, the higher maximum current of the flat emitter enables CLEARpulse and enhances image quality in challenging situations such as with obese patients or in steep angulations. The small square focal spots of the GIGALIX result in higher spatial resolution for all clinical applications and help to better visualize small devices and vessels.

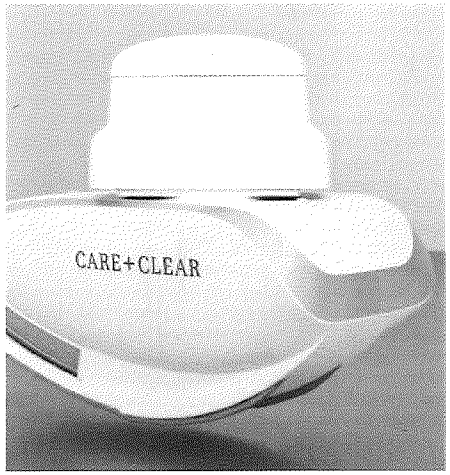
Together with the higher contrast resolution, this results in up to 70% better visibility of small devices.*

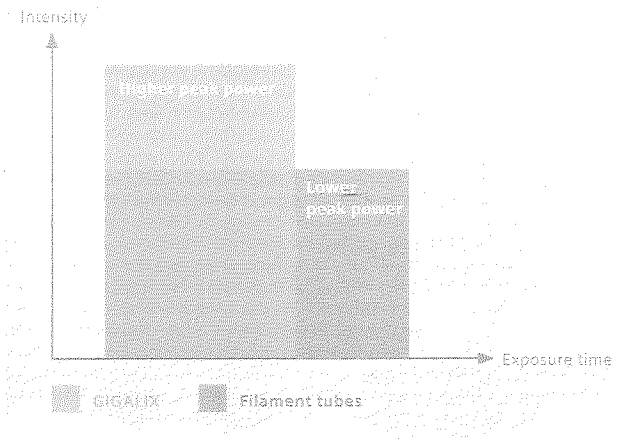
With CLEARpulse, the pulse length can be shortened. This allows visualizing moving objects such as coronary vessels more sharply.

CLEARpulse also optimizes the X-ray spectrum by lowering the required tube voltage and allowing for additional filtration.

Together with small focal spots, this generates equal image quality with up to 60% less dose*.

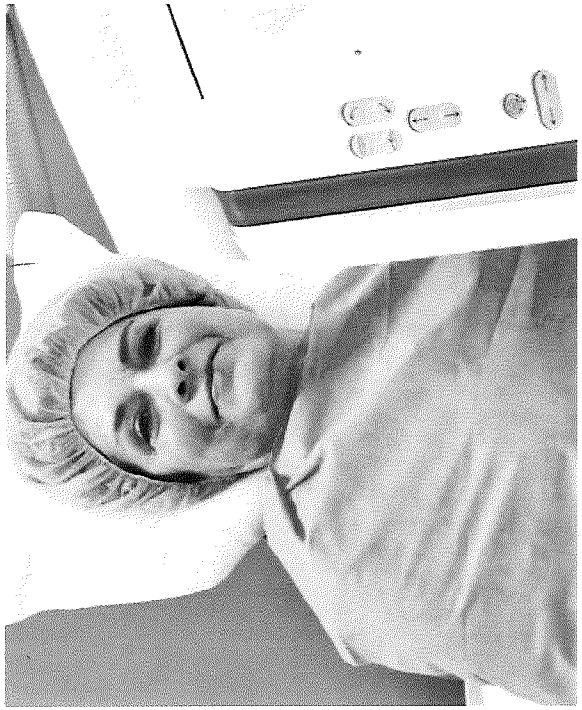
The GIGALIX X-ray tube in the Artis Q product line scores a double win: enhanced image quality at a significantly lower dose for both patients and staff.

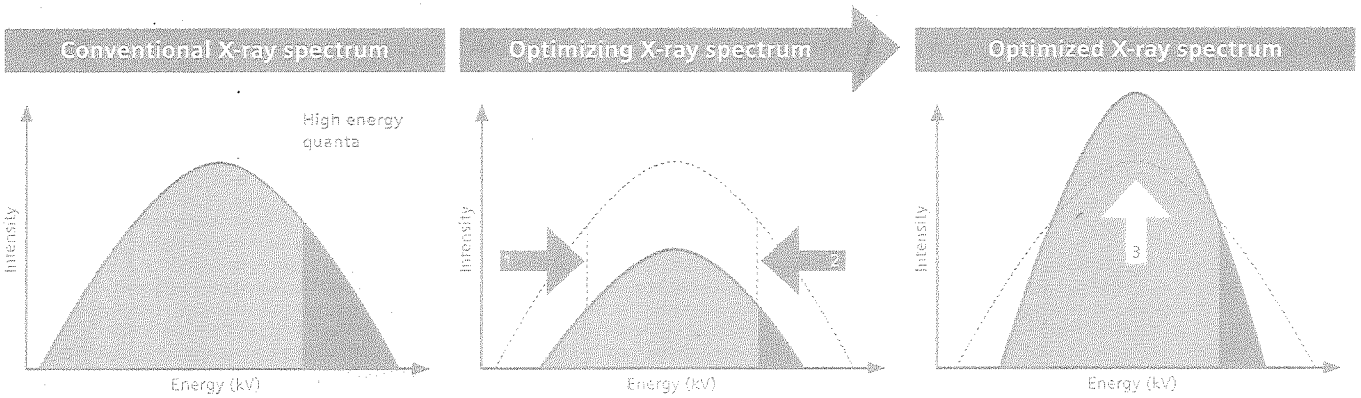




CLEARpulse – sharp images and low dose

- Flat emitter technology for high contrast resolution even at steep angulations
- Small square focal spots for excellent spatial resolution to see more details
- CLEARpulse for sharp images and low dose





Pulse spectrum with standard filament tube

Reducing 1) low energy quanta by inserting additional copper filters, reducing 2) high energy quanta by lowering required kV.

3) Flat emitter technology allows for significant increase of overall intensity

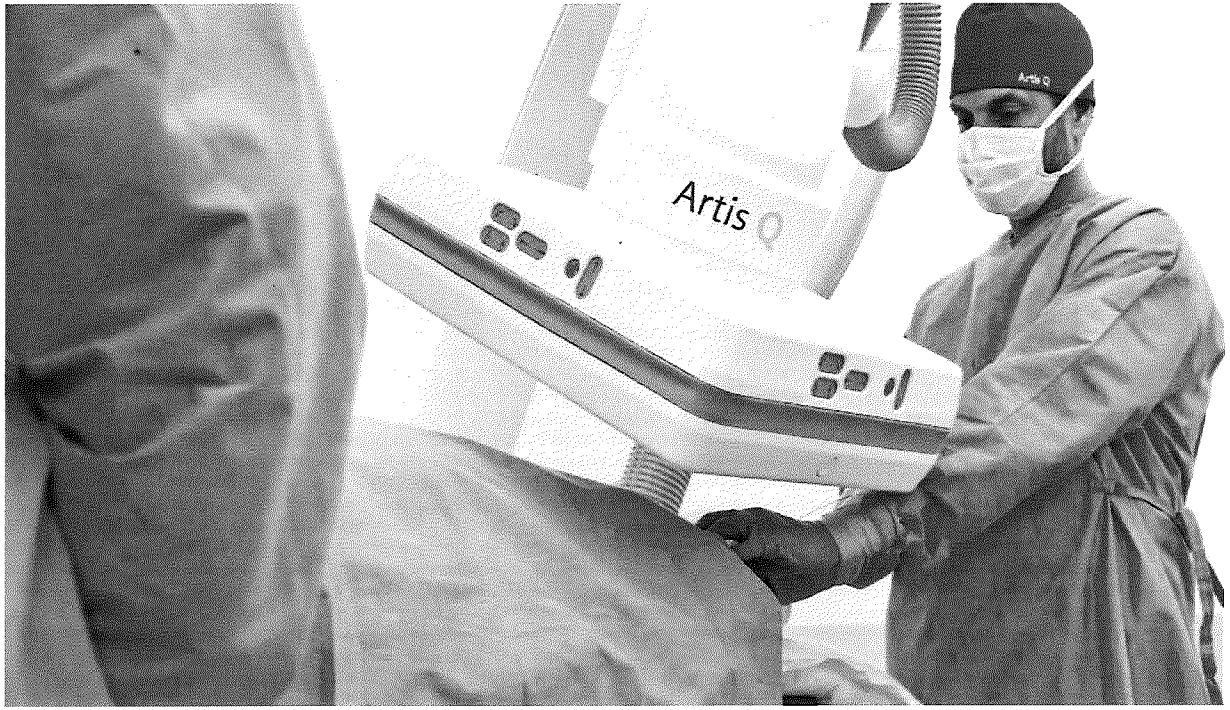
Low and high energy quanta: increasing skin dose

Optimal energy quanta: generating X-ray image

Up to 70% better visibility of small vessels*

Up to 43% shorter pulses for better images and optimized dose*

* Compared to previous X-ray tube technology. Data on file.



- High dynamic range for enhanced soft-tissue resolution in 3D imaging
- High dose efficiency enables better image quality at less radiation
- Water cooling to meet the demands of high hygienic standards and to provide stable image quality

New large HDR detector

High dynamic range and dose efficiency

In addition to X-ray generation, X-ray detection is crucial for high image quality. The new large detector comprises a 16-bit read-out generating more than 65,000 gray scale values leading to enhanced soft-tissue contrast in 3D imaging, especially at image borders (e.g. close to bones like the skull).

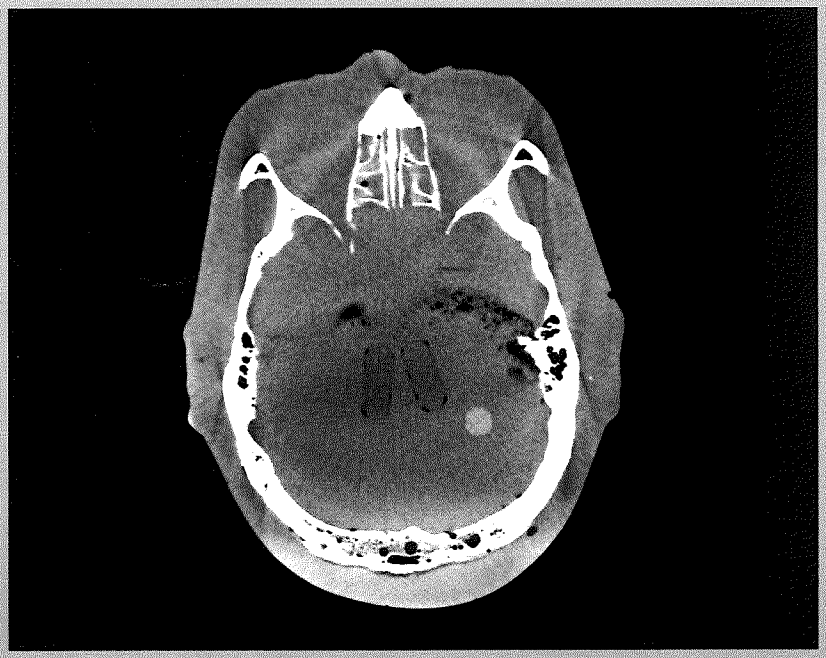
Increased scintillator thickness enables higher detective quantum efficiency. This provides imaging excellence even in challenging situations and helps to reduce radiation.

The water-cooled design meets high hygienic requirements, especially in hybrid operating rooms. In addition, it supports a stable image quality even in long-lasting procedures.

syngo DynaCT with large HDR detector – Increased soft-tissue resolution

syngo DynaCT (14 bit read-out)

syngo DynaCT with large HDR detector (16 bit read-out)



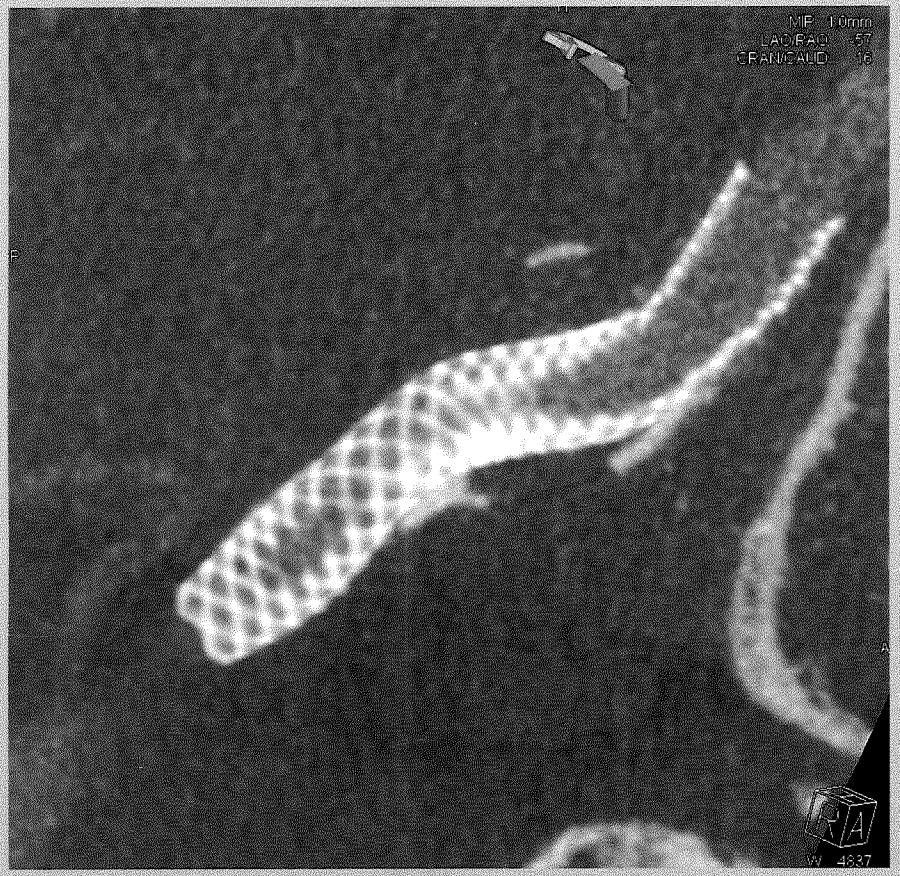
Enhanced soft-tissue resolution, especially close to the skull (phantom images using CATPHAN CTP 515 phantom)


Artis
Artis Q

Visionary in … precision

Precise guidance is needed to help improve clinical outcomes during interventions. Artis Q offers applications for cardiology, interventional radiology and image-guided surgery.

Applications for advanced interventional imaging



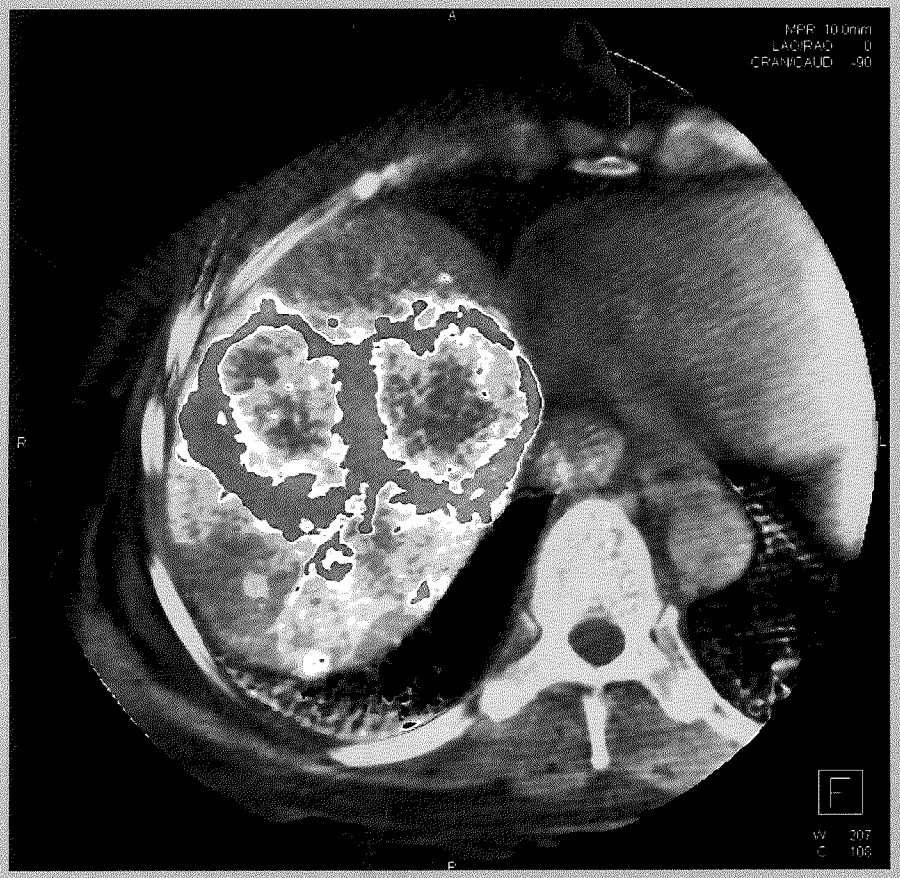
syngo DynaCT Micro –
Boosting the level of detail

- 40% increased spatial resolution compared to standard *syngo* DynaCT
- Better visualization of finest structures
- Enhanced evaluation of e.g. stents, flow diverters or stapes prosthesis

syngo Dyna3D HighSpeed* –
Freeze the motion for better treatment

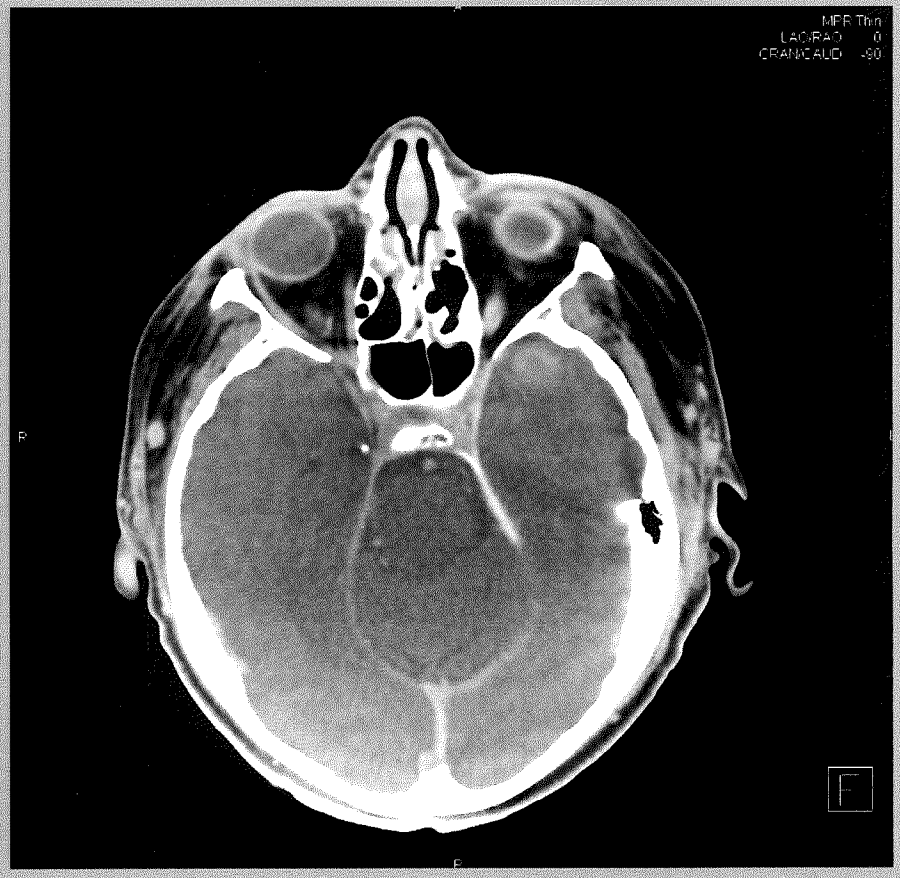
- The fastest 3D protocol on the market – in less than 3 seconds
- Fewer motion artifacts, less contrast media
- Better visualization of moving organs

*For Artis zeego only



syngo DynaPBV Body –
Evaluate perfusion for personalized therapy

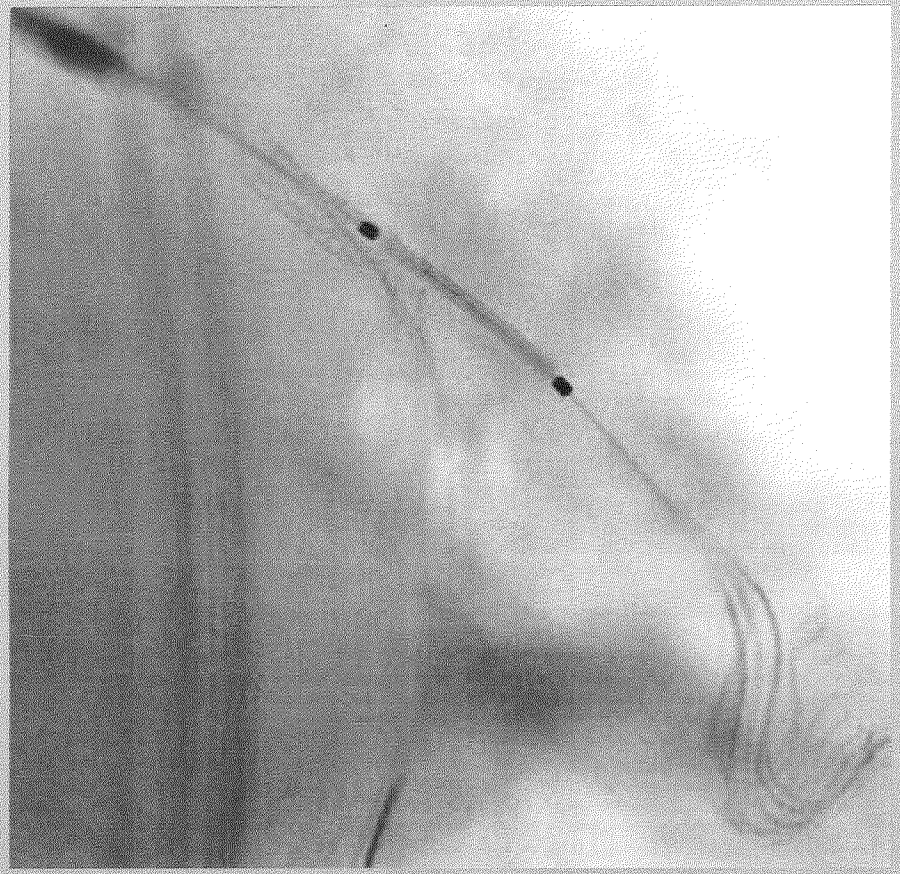
- Provides physiological information about lesions directly in the angio-suite
- Supports endpoint determination during embolization
- Potential to identify non-responders directly after interventional therapy



syngo DynaCT with new large HDR detector –
Increasing soft-tissue resolution

- 4 times the gray-value information
- Enhanced soft-tissue resolution
- Homogeneous image quality

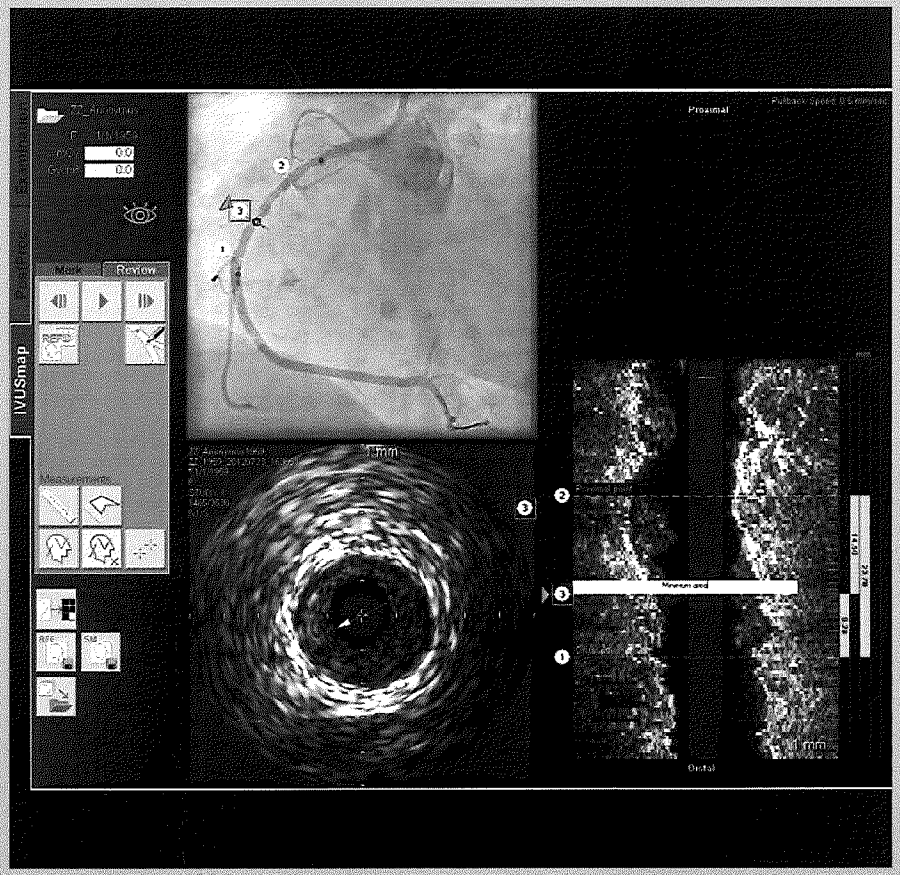
Applications for advanced interventional imaging



CLEARStent Live –

Real-time stent enhancement software

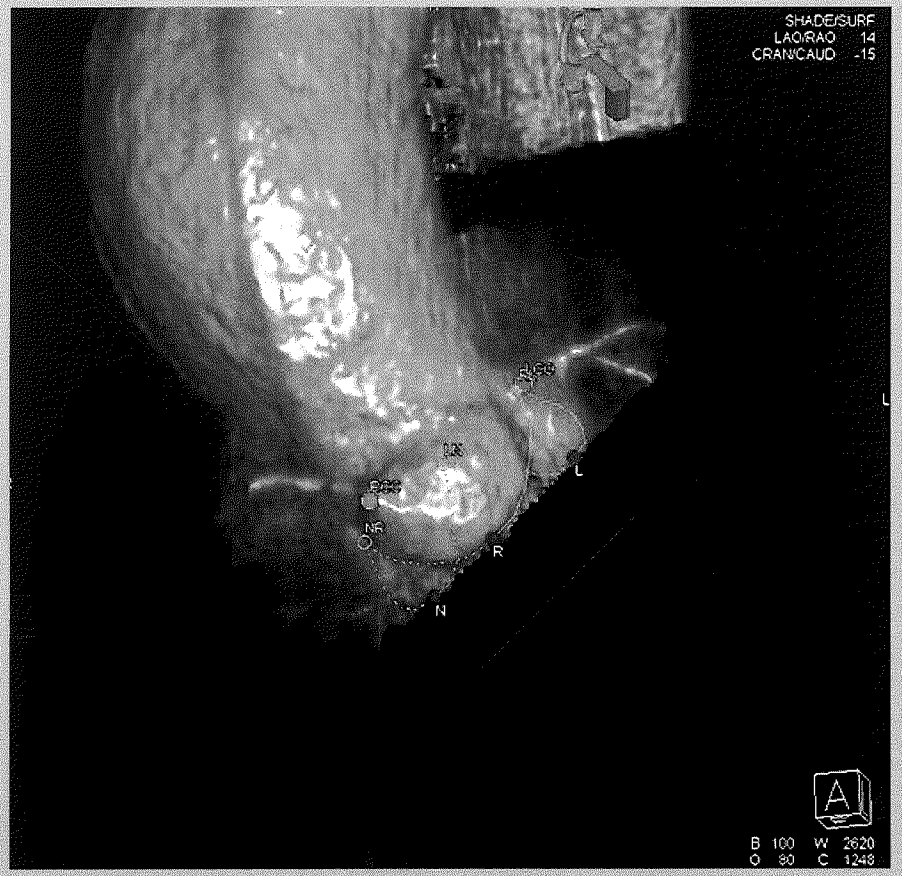
- Support of complex procedures
- Real-time verification of stent positioning while moving the device
- Potential to speed up procedures and to save contrast agent



IVUSmap –

Integrated co-registration of IVUS images with angiography

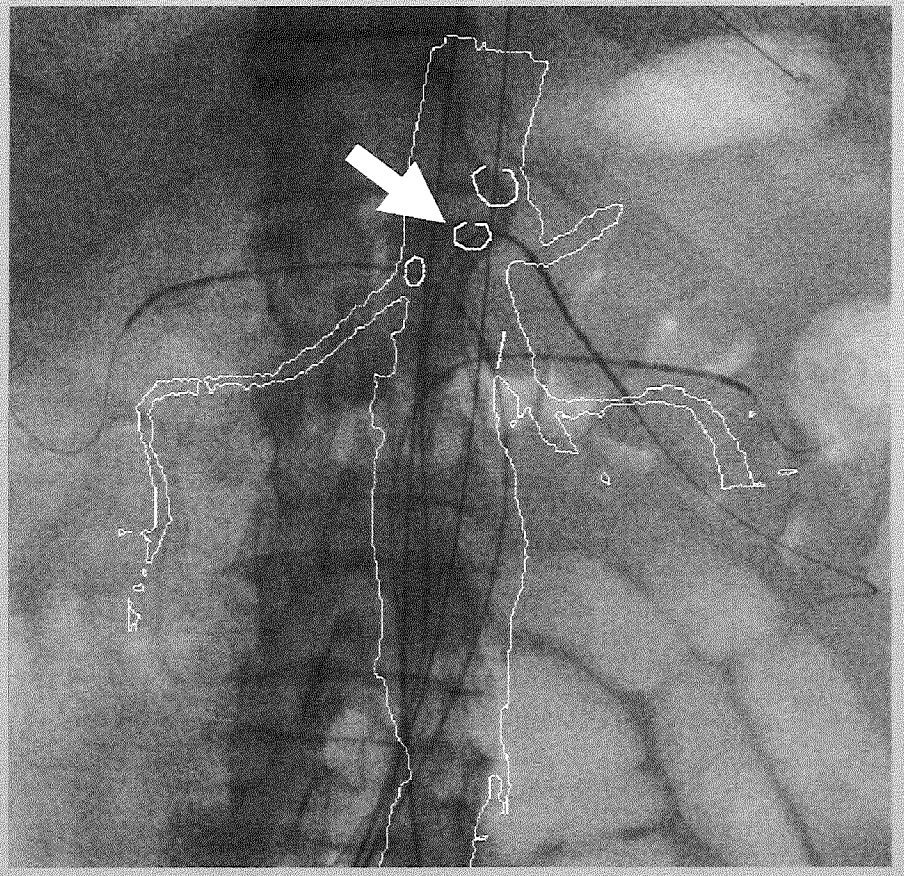
- Combined information of angiography and IVUS imaging
- Bookmarks guide stent positioning and deployment
- Automated workflow integrated into procedure



syngo Aortic ValveGuide –

A new level of valve positioning convenience

- Automated aortic root segmentation and visualization of anatomical landmarks in seconds
- Automated C-arm positioning to orthogonal view without fluoroscopy allowing for dose and contrast medium savings
- Improved guidance through overlay of aortic contour and landmarks onto live 2D image



EVAR-3D Guidance –

New comfort for precise graft deployment

- Segmentation of aortic aneurism and marking of anatomical landmarks like renal arteries
- Automated C-arm positioning to orthogonal view without fluoroscopy allowing for dose and contrast medium savings
- Improved guidance through overlay of aortic contour and landmarks onto live 2D image

When vision becomes reality ...

Experience the future of interventional imaging and learn more about Artis Q system configurations and options.


SIEMENS
Artis Q

Artis Q

Floor-mounted system

The Artis Q floor-mounted system offers high positioning flexibility on a very small footprint.

The C-arm features a floor rotation point with motorized swivel – from the head-end position to a left-side position. This ensures optimum access to the patient's head as well as extensive coverage from head to toe.

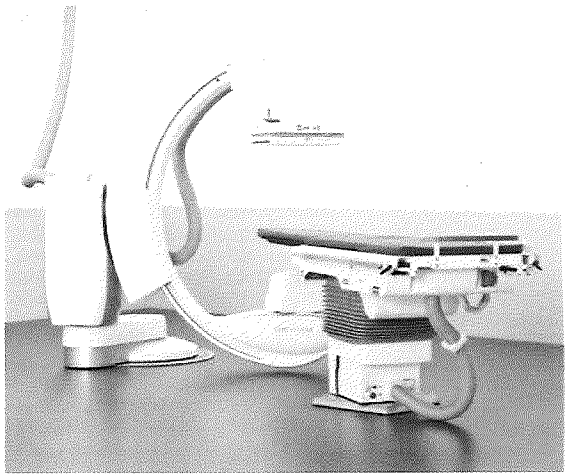
Flexible positioning of the C-arm relative to the table is possible, e.g. allowing access to the patient's left side for pacemaker implantations.

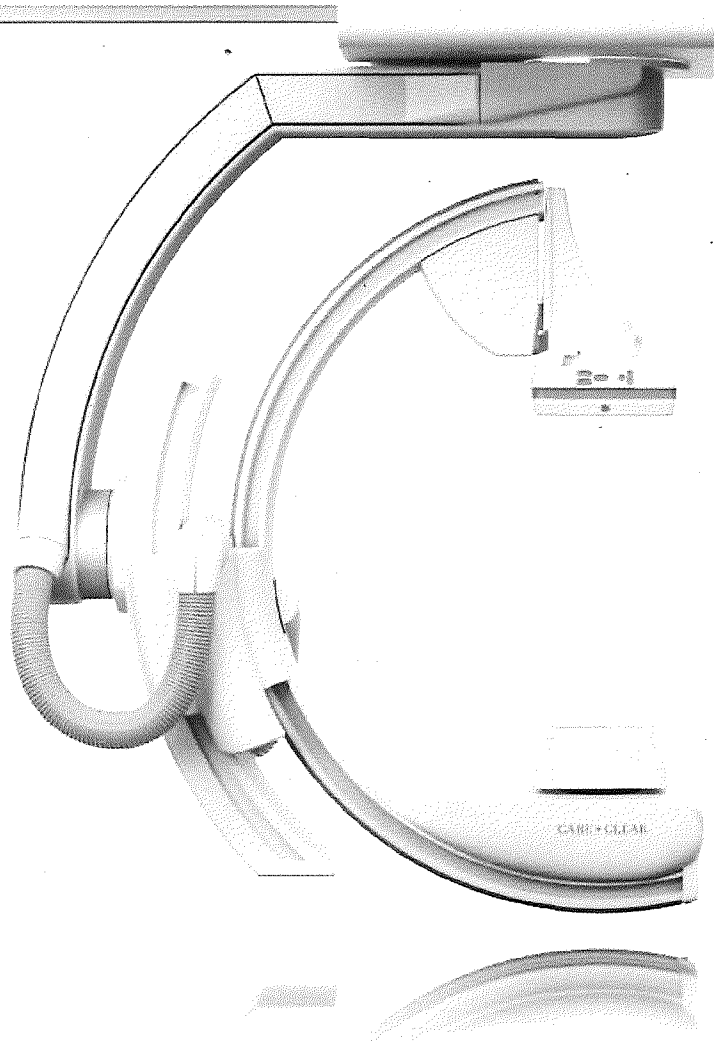
A special orthogonal position with rotated table enables easy access to the patient's head and sides for hybrid procedures.

Artis StraightView maintains upright images for all C-arm and table positions.

The compact and slimline C-arm design has a small footprint requiring an examination room size of only 25 m².

- High positioning flexibility on a very small footprint
- Excellent access to the patient's head for complex procedures under anesthesia
- Extensive coverage from head to toe





Artis Q

Ceiling-mounted system

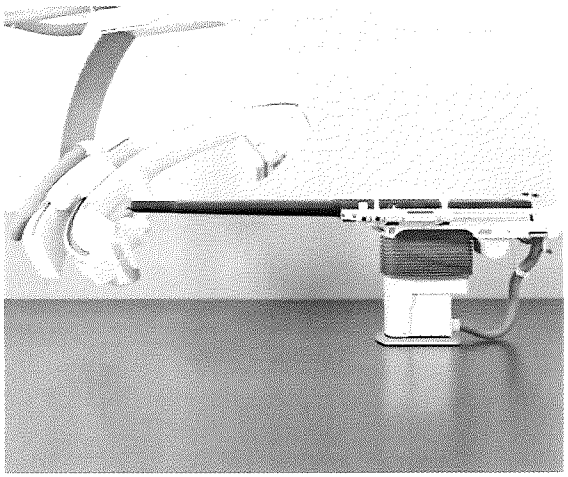
The Artis Q ceiling-mounted system offers high positioning flexibility for the C-arm at any angle.

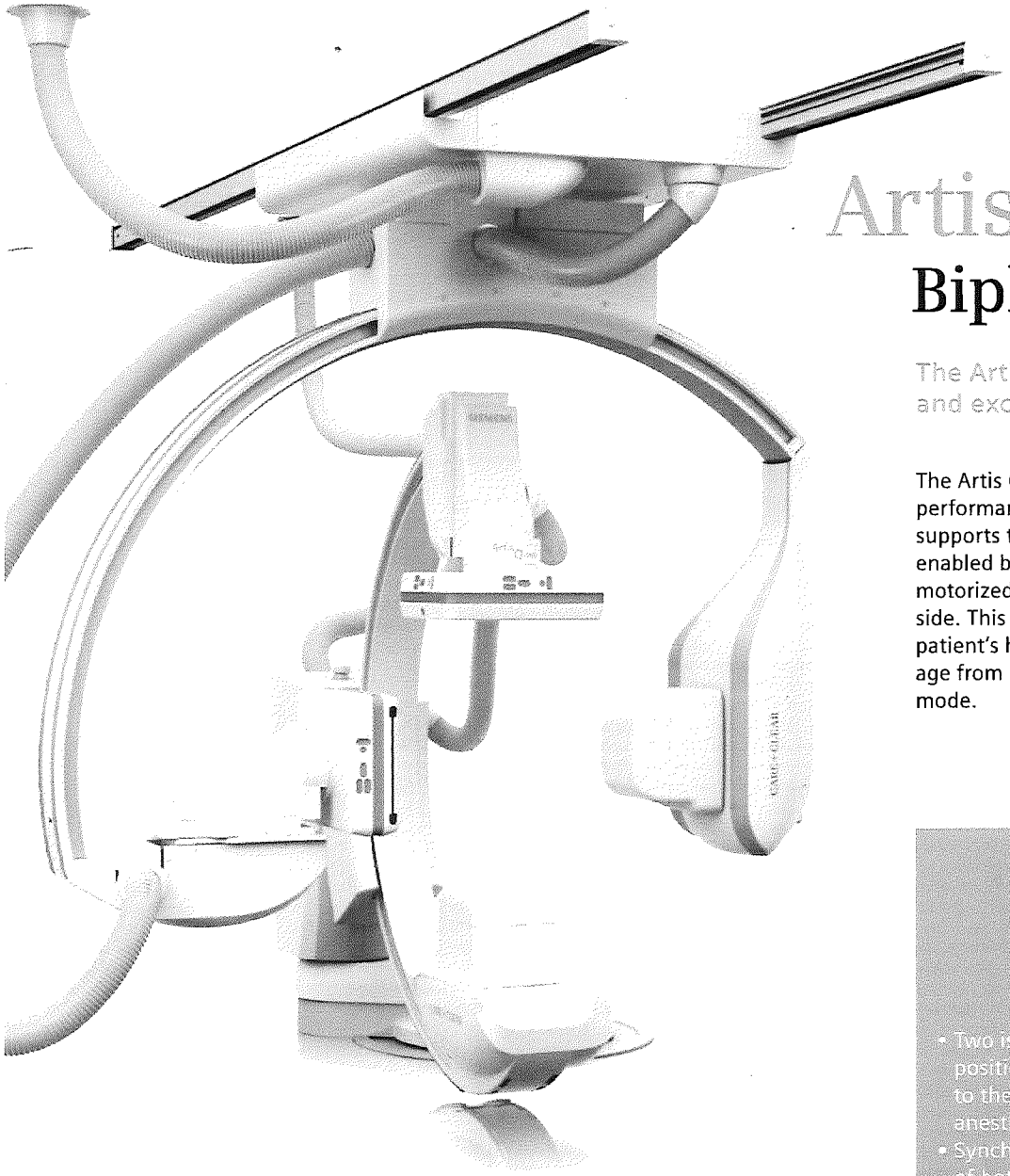
The C-arm can be conveniently positioned around the patient's left, right or head side, and any angle in between. This enables optimum patient access. The longitudinal ceiling travel offers maximum coverage from head to toe as well as easy parking away from the table.

For increased imaging accuracy, InFocus maintains the projection angle during stand rotation, IsoTilt the projection angle during table tilting, and StraightView upright images for all positions of the C-arm and table.
In addition, the system provides the uncompromised image quality of *syngo* DynaCT in the lateral position.

Not only the Artis tables, but also surgery tables from Maquet and Trumpf can be integrated into the system.

- High positioning flexibility of the C-arm at any angle
- Easy parking away from the table
- Maximum patient coverage from head to toe
- High 3D image quality also in lateral acquisition





Artis Q

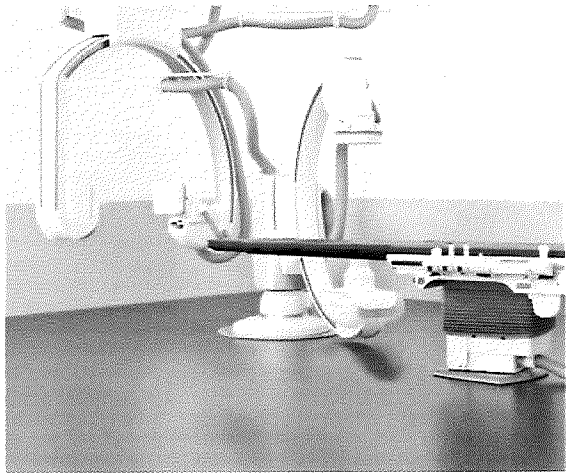
Biplane system

The Artis Q biplane system offers high positioning flexibility and excellent patient access for biplane imaging.

The Artis Q biplane system combines high performance and positioning flexibility. It supports two isocentric imaging positions enabled by the floor rotation point with motorized swivel from head end to left side. This allows optimum access to the patient's head as well as extensive coverage from head to toe in biplane imaging mode.

In single plane mode, the table and stand rotation allows access even to the patient's left side. A special orthogonal position with rotated table enables easy access to the patient's head for complex procedures under anesthesia. For increased imaging accuracy, IsoTilt maintains the projection angle during table tilting and Artis StraightView upright images for all C-arm and table positions.

- Two isocentric imaging positions enabling access to the patient's head for anesthesia in biplane mode
- Synchronized movements of both planes
- Extensive coverage from head to toe



Artis zeego

Artis zeego offers unparalleled positioning flexibility with a variable isocenter.

The unique multiple-axis design of Artis zeego enables unparalleled positioning flexibility and makes it the optimal system for hybrid operating rooms and all procedures where coverage and advanced 3D imaging are key.

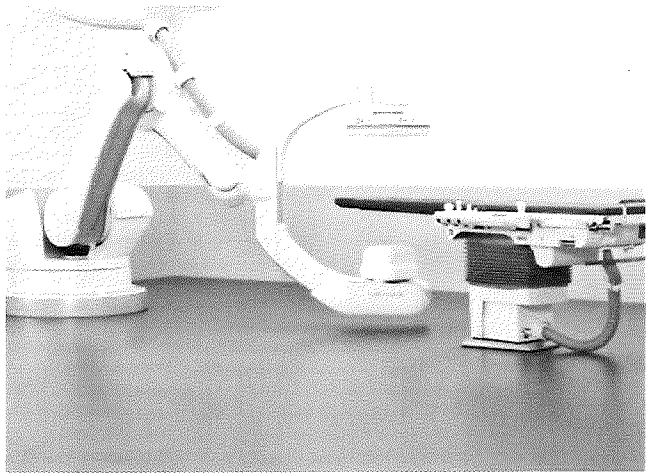
3D rotational imaging can be performed from five different system positions: at the patient's left, right, and head, and with the table rotated to the left or right. Artis zeego offers unique 3D imaging protocols such as *syngo* DynaCT 360 and *syngo* Dyna3D HighSpeed.

Thanks to its unique variable isocenter, the working height of the Artis zeego system can be adjusted to a comfortable level according to user height.

Flexible parking positions provide operators with ample work space around the table when imaging is not required.

Artis zeego meets the highest hygienic standards in the OR, allowing laminar air flow and maintaining sterility requirements.

- Variable isocenter for comfortable working height
- Enables 3D rotational imaging from five different system positions
- Meets the highest hygienic standards in the OR

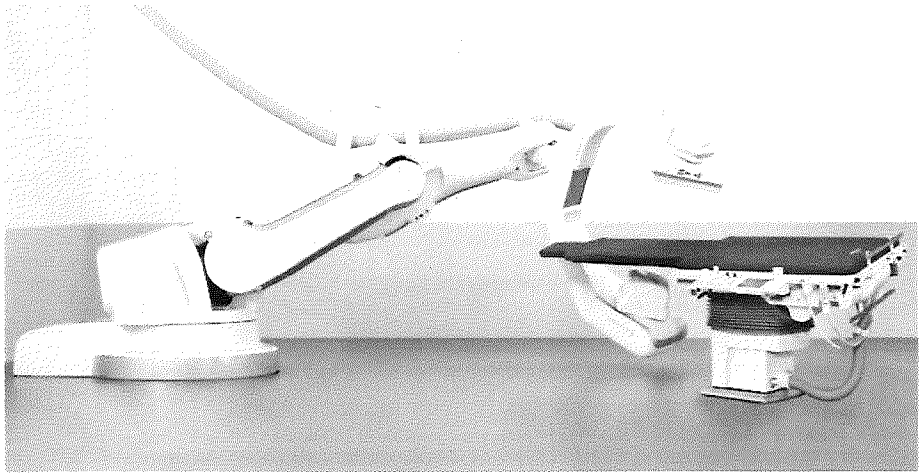


The broadest portfolio of surgical tables on the market

With the Artis OR table and integrated surgical tables from Maquet and Trumpf, Siemens gives you the broadest choice of table systems for your hybrid and operating rooms.

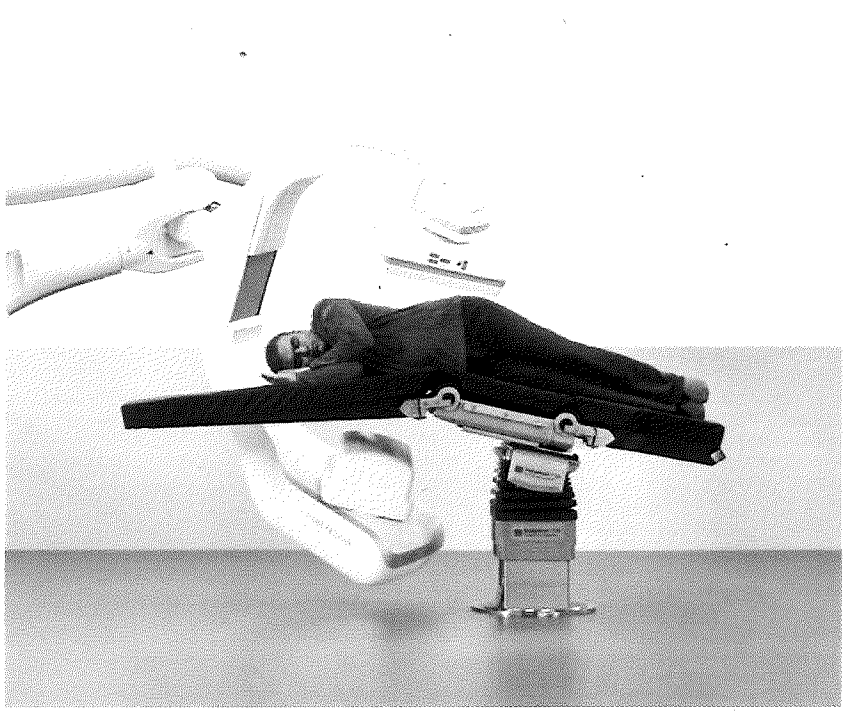
Artis OR table

Designed for easy patient access, superb positioning and total body coverage, the integrated Artis OR table is a proven and reliable interventional table with tilt and cradle functionality. Featuring a radiolucent free-floating tabletop that allows for artifact-free 3D imaging, it is particularly well suited for procedures in cardiac and vascular surgery. This is the table of choice, particularly if the room is shared with interventionalists.

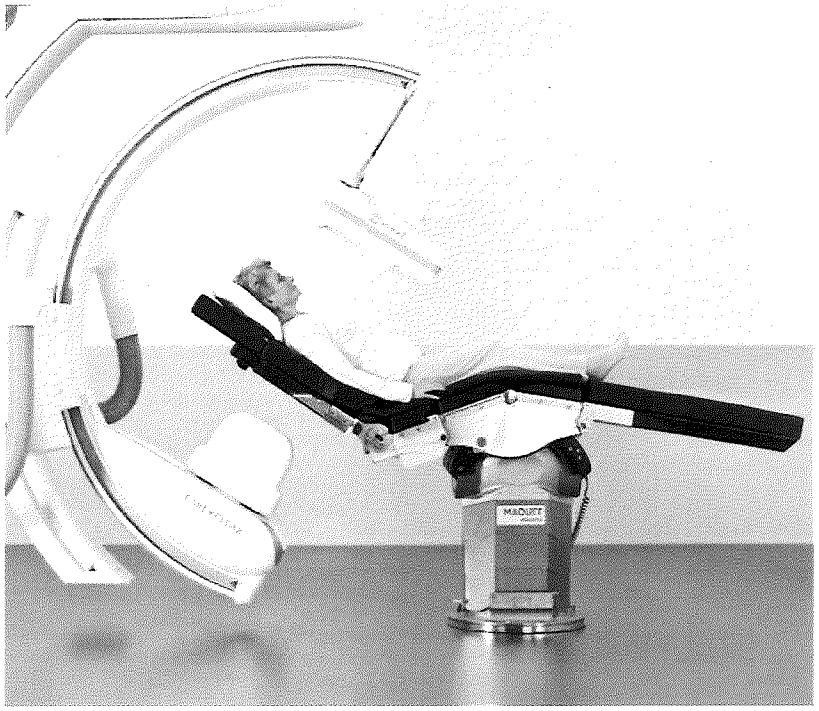


Artis OR table

- Available with the entire Artis family
- Suitable for 3D imaging
- Free floating
- Tilt and cradle functionality ±15°
- Overhang 224 cm (102.36")
- Maximum weight 200 kg (440.9 lbs)



Trumpf TruSystem 7500



Maquet Magnus

Trumpf TruSystem7500 and Maquet Magnus

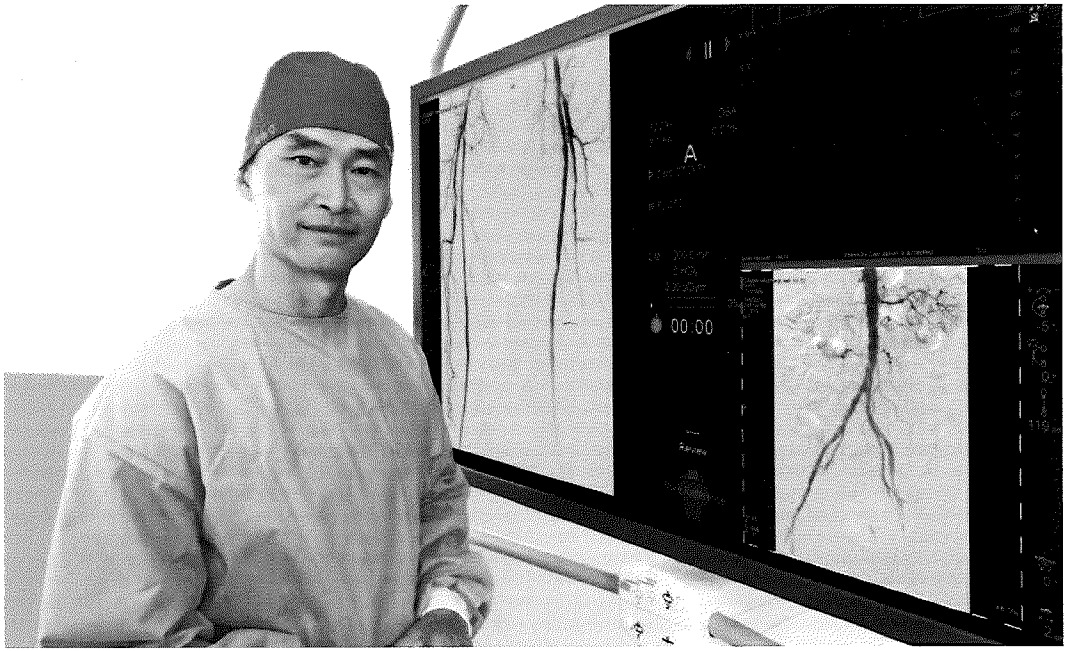
These surgery tables come with one-piece carbon or with segmented, radiolucent tabletops. These breakable tabletops are highly flexible and the segments are partially motorized. Shuttling allows convenient use of whichever tabletop best matches the requirements of a procedure. Therefore, the integrated surgery tables are optimally suited for multidisciplinary use or rooms with a high percentage of open surgical procedures. Most surgical disciplines require sophisticated patient positioning, i.e. neurosurgery, urology, trauma surgery, orthopedic surgery, abdominal surgery, and thoracic surgery. These integrated surgery tables provide the flexibility necessary.

Artis Large Display

It's time to see the whole picture on one monitor.

With the Artis Large Display, 9, 18, or 24 video signals can be connected to the screen. The screen layout can be changed from the tableside.

With its built-in backup concept, additional back-up monitors are no longer necessary. Also, a special algorithm ensures sharp display of ECG signals in zoomed formats, which is especially important to precisely visualize intracardiac ECG signals.



- Scaleable from 9 to 24 inputs
- Tableside control
- Special ECG signal optimization algorithm

- Control up to 9 systems from one workplace and clean up your control room
- Configure the Cockpit to your needs with one or two keyboards and monitors

Artis Cockpit

It's time to clean up the control room.

Stop running from one system to the next – let the Artis Cockpit consolidate all your information in one workplace. The 30-inch medical-grade monitor offers 4 megapixel resolution and high brightness for excellent image display. Up to 9 inputs can be simultaneously displayed and controlled, with a choice of four different layouts. The position of the system inputs on the screen can be easily rearranged using the unique drag & drop functionality.

Artis Cockpit offers one single workplace that can be equipped with one or two keyboards and monitors. With so much more efficiency in the control room, you can focus on your procedure and your patient.

CARE & CLEAR

Artis Q includes the CARE and CLEAR packages to complement the imaging chain for optimized post-processing and dose reduction. The CARE package helps reduce radiation for the operator and patient. The CLEAR package offers a comprehensive range of applications to enhance image quality. CARE and CLEAR are standard with all Artis Q systems.

We think beyond technical hardware improvements. Introduced in 1994, our ever growing CARE portfolio (Combined Applications to Reduce Radiation Exposure) continues to reduce radiation dose for patients and clinical staff while maintaining high image quality for diagnostic confidence.

Dose saving

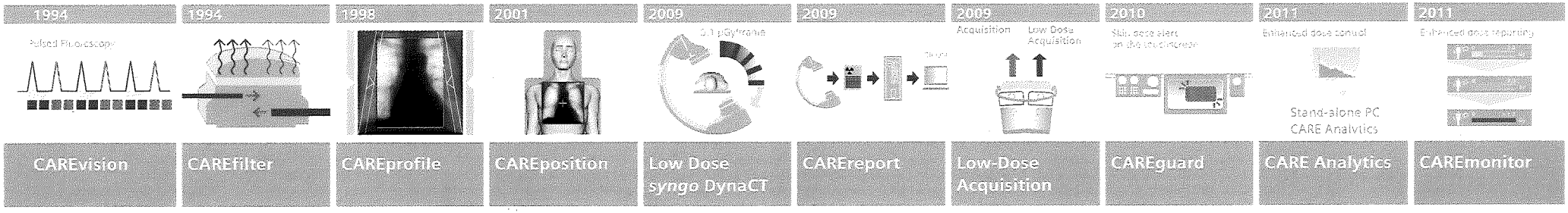
- **CAREvision** provides variable fluoroscopy frame rates, pulse frequencies can be adapted to clinical needs
- **CAREfilter** is a specially designed copper prefiltration system that automatically adjusts the filter to the patient's anatomy
- **CAREprofile** allows radiation-free collimator and semitransparent filter adjustment using the last image hold (LIH) position as reference
- **CAREposition** enables radiation-free object positioning, i.e. allows the table or C-arm position to pan without using fluoroscopy
- **Low-Dose Acquisition,** a dedicated acquisition protocol, helps to achieve dose reductions
- **Low-Dose *syngo* DynaCT** provides 3D images at the lowest possible dose levels

Dose monitoring

- **CAREguard** allows three threshold values to be defined for the accumulated skin dose and signals when a skin dose level is exceeded
- **CAREwatch** displays the dose area product and dose rate at the interventional reference point on the live display in the examination and control rooms
- **CAREmonitor** shows in real-time the accumulated peak skin dose according to the current projection in the form of a fill indicator on the live monitor

Dose reporting

- **CAREreport** is a DICOM-structured radiation report containing all patient demographic, procedure, and dose information
- **CARE Analytics** is a stand-alone tool for installation on any PC in the hospital network, allowing evaluation of DICOM dose structured reports



CLEAR offers a comprehensive range of applications with real-time processing to enhance image quality – without increasing the dose.

- **CLEARpulse** shortens the pulse length and optimizes the X-ray spectrum, which leads to overall image quality improvements
- **CLEARcontrol** enhances the image creation process with a unique histogram analysis and optimizes image brightness and contrast
- **CLEARview** enhances overall image quality, especially when using low-dose imaging protocols with dose-adaptive noise reduction
- **CLEARmotion** helps detect small structures and efficiently compensates for motion artifacts
- **CLEARchoice** enables preferred image quality selection during application

Almost 20 years of Siemens innovations to reduce, monitor, and report dose in angiography

On account of certain regional limitations of sales rights and service availability, we cannot guarantee that all products included in this brochure are available through the Siemens sales organization worldwide. Availability and packaging may vary by country and are subject to change without prior notice. Some/All of the features and products described herein may not be available in the United States or other countries.

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In the interest of complying with legal requirements concerning the environmental compatibility of our products (protection of natural resources and waste conservation), we recycle certain components. Using the same extensive quality assurance measures as for factorynew components, we guarantee the quality of these recycled components.

Global Siemens Headquarters
Siemens AG
Wittelsbacherplatz 2
80333 Muenchen
Germany

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For accessories, go to:

www.siemens.com/medical-accessories

Legal Manufacturer
Siemens AG
Wittelsbacherplatz 2
DE-80333 Muenchen
Germany

Order No. A91AX-01343-33C1-7600 | Printed in Germany | CC AX 1193 03133. |

www.siemens.com/healthcare

SIEMENS

Exhibit 4

Siemens Medical Solutions USA, Inc.
51 Valley Stream Parkway, Malvern, PA 19355
Fax: (336) 856-9995

SIEMENS REPRESENTATIVE
Edwin Winicki - (336) 688-0978

Customer Number: 0000010805

Date: 10/15/2015

UNIVERSITY OF NORTH CAROLINA HOSPITALS
101 MANNING DRIVE
CHAPEL HILL, NC 27517

Siemens Medical Solutions, USA, Inc. is pleased to submit the following quotation for the products and services described herein at the stated prices and terms, subject to your acceptance of the terms and conditions on the face and back hereof, and on any attachment hereto.

Quote Nr:	**1-B07SGU, Rev. 0**
Trade:	**Siemens Multistar-D : Project 2015-1510**
Terms of Payment	**00% Down, 80% Delivery, 20% Installation** **Free On Board: Destination**
Purchasing Agreement	**MedAssets**
Terms and Conditions	**MedAssets terms and conditions apply to Quote Number 1-B07SGU**
Proposal Valid Until	**12/30/2015**
Notes:	**Systems comes with 6 months of warranty and reflects pricing adjustment due to removal of 6 months of warranty. Pricing is conditioned on Customer's purchase of a five (5) year Service agreement contemporaneous with purchase of the items quoted herein. This offer may not be combined with any other special offers.**

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Siemens Artis Q Ceiling System

All items below are included for this system:

Qty	Part No.	Item Description
1	14434094	**Artis Q ceiling with DCS-4 Monitor Boom** Artis Q ceiling radiology The Artis Q product line is setting new standards in interventional imaging. The GIGALIX X-ray tube, which has been completely redeveloped, is based on flat emitter technology which provides small focus sizes and strong, short X-ray pulses. CLEARpulse uses flat emitter technology to generate optimized short X-ray pulses, thereby providing an improved sharp display of moving vessels. Configuration: The ceiling-mounted C-arm offers highly flexible positioning of the C-arm around the patient table. The motorized movement of the C-arm from a head-end position to a lateral position provides free access to the patient's head and can reach from their head to their foot. The patient table with telescopic foot is fitted with a freely movable patient positioning tabletop, which can bear a maximum patient weight of 250 kg. The table can be rotated to ensure quick access to the patient even in emergency situations. The as40HDR flat detector is optimized for the requirements of radiology and allows for steep angulations. The CLEAR package for optimizing image post-processing and the CARE package for dose reduction are included. This basic configuration includes digital acquisition technology and Digital Subtraction Angiography up to 7.5 f/s in 1k matrix. Images are displayed using a display suspension system with two 19" flat displays for live and reference image display in the examination room and a monitor in the control room. DICOM standards are supported and the system is prepared for remote maintenance.
1	14432925	**PERISTEPPING / PERIVISION** Motorized stepping for real-time bolus chasing. C-arm stepping with ceiling mounted systems, table stepping with floor mounted and biplane systems. Peripheral digital angiography with stepping and online subtraction display.
1	14434143	**wide TT thick mat. ins. of std. TT** Patient positioning tabletop made of carbon fiber in wide, straight design for interventional, radiological examinations. The tabletop is straight all the way to the head area. Matching the wide patient positioning tabletop, special-foam mattress, 7 cm, made of open-pore polyurethane material and a latex-free cover. Note: The wide patient positioning tabletop with the thick mattress replaces the narrow or wide tabletop with the thin mattress described in the basic configuration. The head-end holder, handles, and shoulder supports (if part of the basic configuration) are eliminated because they can only be used with the narrow tabletop.
1	14432905	**4P wireless footswitch inst. of cbl** Wireless footswitch connection Note: Wireless replaces the wired connection.
1	14432943	**Vascular analysis** Vessel analysis with determination of degree of stenosis, distance measurement and calibration.
1	14432947	**Fluoro Loop** Storage and review of dynamic fluoroscopic sequences (Fluoro Loop). This saves an additional acquisition and reduces dose. The maximum storable fluoroscopic time depends on the selected pulse rate, e.g. 34 s at 30 p/s, 68 s at 15 p/s.
1	14432948	**Automap** Automatic stand positioning depending on the selected reference image and automatic reference image selection depending on the stand positioning.
1	14432950	**DICOM RIS-Modality Worklist** Import of patient/examination data from an external RIS/HIS patient management system with DICOM MWL (Modality Worklist).

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Qty	Part No.	Item Description
2	14432953	**Lower body radiation protection** For shielding the lower body against scattered radiation within the examiner's moving range. Specially designed for avoiding collisions with the tube during oblique projections, therefore especially suited for cardiology.
1	14434157	**Moveable upper body rad. protection** To protect the upper body against scattered radiation within the operating range of the examiner, e.g. during interventional procedures.
1	14440512	**LED Exam Light** Ceiling-mounted, flexibly positionable examination light for diagnostic interventional applications.
1	14434171	**Roadmap Plus / Dual-Ref (monoplane)** One additional 19" monochrome flat display for enhanced Roadmap functionality and dual reference function. Use of the Roadmap Plus function requires the DSA option
1	14434167	**19" color display w/ video cable** One additional 19" color display including 36 m cable with DVI-D connection for installation in display ceiling suspension. LCD color display with high luminance and extended field of view.
1	14434184	**4x1 video signal distribution** With this item you can show one video signal each from up to 4 units (such as a cardiac catheter recording system, workstation, ultrasound unit, PACS, etc.) on up to two displays (not a Large Display) in the display holder in the examination room. Note the following conditions if video signals are to be shown on a third-party provider display: - The display of external video signals depends on the operational state of the Artis system. If the Artis system has a malfunction or is shut down, the display of external video signals is no longer possible. For this reason, do not feed the video signal into the Artis system if lacking the external video signal could result in a hazardous situation. - A third-party provider's unit may be connected only if it corresponds to the specifications of the video interface on the Siemens system. - The connection may only be established by a Siemens service technician. Note: The connection must be made with fiber-optic cables to ensure that the unit's galvanic isolation is maintained. - A third-party provider's unit must be connected by a technician from the third-party provider or by a hospital technician responsible for the equipment. - It is strongly recommended that a test of image quality be performed by the third-party provider prior to start-up. This test ensures that the required image quality is achieved. - The system configurator is responsible for ensuring that applicable standards are maintained in the current version, e.g. 4 kV insulation Siemens will not be held liable for the inclusion of third-party provider units with respect to image quality and their suitability for clinical diagnosis.
1	14434231	**Sec. operation in the control room** Interface for connecting the additional system control from the control room. Rail profile for hanging control modules (e.g. the table module) in the control room. Safety button for switching off all system functions from the control room.
1	14440510	**Secondary Hand Switch Ctrl (C Room)** Additional hand switch for radiation release and additional control functions.
1	14434232	**Injector conn. in the control room** Interface for controlling the contrast medium injector in the control room. Injectors can be offered by Siemens Healthcare Accessory Solutions
1	14434135	**DVD Recorder+Display (A)** A digital video recorder using DVD-RAM/R disks for high quality images and high quality audio including one (1) 19" (48 cm) color TFT flat-screen display.

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Qty	Part No.	Item Description
1	14440411	**Intercom - Comfort** Intercom system for communication between examination room and control room. It includes a microphone and a control box in the control room, and a microphone with an adaptive acoustic filter for background noise suppression and footswitch for conversation selection in the examination room. The microphone in the examination room is installed on the ceiling.
1	AXA_ADD_12	**Additional onsite 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.
1	AXA_ADD_24	**Additional onsite training 24 hrs** Up to (24) 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.
1	AXA_PR_BLUE 1	**Special System Configuration I** Siemens is pleased to offer this special incentive to customers purchasing Siemens interventional imaging solutions.
1	AXA_TRADE_I N_ALLOW	**AXA Trade-in-Allowance Mutistar D with the project number 2015-1510**
1	AXA_RIG_QSP _STD	**Standard Rigging Q Q.Zen SP**
1	AXA_BUDG_A DDL_RIG	**Add'l Rigging AXA $19,796**
1	MART700PEDL	**Mark 7 Arterion, Pedestal System** The Arterion Mark 7 Pedestal contrast medium injector can be positioned anywhere at the patient positioning table on a mobile unit, for direct operation of all functions in the examination room. The injector system includes: A mobile pedestal stand with electronics unit, a contrast medium heater and a connection cable to the manual release. A support arm with injector head and a control lever for moving the injector head. A user control console with large touch screen and corresponding additional monitoring display on the injector head. Functions Pressure limitation: for 150 ml syringes 689 to 8273 kPa, corresponds to 100 to 1200 psi. . Flow rates for 150 ml syringes: 0.1 to 45 ml/s in increments of 0.1 ml/s 0.1 to 59.9 ml/min in increments of 0.1 ml/min rise/fall: 0 to 9.9 s in increments of 0.1 seconds Release delay for injection or radiation: 0 to 99.9 s in increments of 0.1 s. Adjustable volume for 150 ml syringes: 1 ml to the max. syringe capacity in increments of 1 ml. Fill rate: Variable syringe filling speed 1-20ml/s. Injection protocols: Up to 40 injection protocols possible. Parameters currently displayed on the touch screen display and on the head display: Injection speed Injection volume Remaining volume Injection duration Applied pressure Contrast medium heating: Nominal 35°C (95°F)+-5°C (9°F) Injection data memory Up to 50 injection data items stored Included in the scope of delivery Injector standard configuration 150 ml SIEMENS interface cable Operator Manual Service manual
1	14432839	**syngo 2D Processing Engine** syngo X Workplace high-end workstation for 2D viewing and post-processing, with syngo-based user software and network modules.
1	14432982	**syngo Angio Leg Composing SW lic.** Module for creating native full-format images of the peripheral vascular tree.

System Total: $894,000

PHILIPS

Exhibit 5

Philips Healthcare
595 Miner Road
Cleveland, OH 44143

September 23, 2015

UNC Health and Hospitals 37259
101 Manning Drive
Chapel Hill, NC 27514

To Whom It May Concern:

This letter is to confirm that the 2003 Toshiba CAS10A CV Lab, Trade-in Opportunity 37259 located at UNC Health and Hospitals located in Chapel Hill, North Carolina will be traded-in to Philips Healthcare. Philips will re-sell this system to Mylin Medical Systems. Mylin Medical Systems will de-install and remove the equipment out of the State of North Carolina. The cost of removing the equipment is included in the purchase price of the new equipment.

If you have any questions, please feel free to contact me.

Thanks

Mike

Michael Vitagliano
Director, Trade-in and Asset Management
Refurbished Systems
Philips Healthcare
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