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Symbia Intevo Bold

System Specifications

Symbia Intevo Bold[1] System Specifications

System Hardware (Standard)
Open gantry design (70 cm/27.6 in)
Multislice Ultra Fast Ceramic™ (UFC) CT detector
Two high-definition digital SPECT detectors
Low-profile 3/8" or 5/8" detectors
Detector configuration, including 180°, 90°, 76°, gurney, standing, sitting, out-facing
Automatic body contouring
Detector touchpad sensors
Lightrail sensors and lightrail touchpads
Circular and non-circular body-contour orbit
Patient positioning monitor (PPM) – Patient positioning with window and persistence adjustment – Acquisition parameter display (elapsed time, time remaining, view number, count rate) – Detector and bed position information – Gantry control (reconfiguration, collimator change, offset zoom CT range planning
Patient bed with 227 kg (500 lb) capability
Integrated calibration source holder
Patient bed pivot for rail-free access of sitting/standing patients, wheelchairs, imaging tables, gurneys and hospital beds
Rear bed with pallet flex prevention
Carbon fiber pallet
Patient comfort accessories (SPECT head holder and cushion, SPECT armrest, whole-body armrest, set of patient restraint straps, set of body wraps)
Acquisition workplace with multilingual graphical user interface, monitor, keyboard and mouse plus full DICOM archiving, CD/DVD storage, external USB disk support and printing functionality
Dedicated reconstruction system with 64-bit architecture
Intuitive hand controller with easy-to-use descriptive controls, optional second hand controller
Monitor, 19" LCD DICOM (standard monitor, 19"/48 cm flat screen, 1,280x1,024 resolution, 1,024x1,024 image display matrix and 0.29 mm pixel size)
Operator manuals

System Hardware (Optional)
Caudal tilt
Low-energy, high-resolution collimator
Low-energy, all-purpose collimator
Low-energy ultra-high-resolution collimator
Medium-energy collimator
Low-penetration, high-resolution collimator
Fan beam collimator
High-energy collimator
Pinhole collimator (4, 6 or 8 mm aperture)
IQ•SPECT with **SMART**ZOOM collimator
IQ•SPECT armrest
Integrated Collimator Changer (ICC)
Automatic Collimator Changer (ACC)
Collimator cart
Automatic Quality Control (AQC)
AutoQC source kit
NIST-traceable precision calibration source (Co57 and/or Se75)
Internal ECG for Symbia™ scanners
ECG gate with strip chart recorder
Patient handling system (PHS) extended pivot
Extra hand controller
Dual monitor
e.Media for PPM
Radiation therapy pallet
Mammography pallet
Pediatric pallet
Under- or over-floor PHS cable
Seismic installation kit

System Specifications

System Software (Standard)	
xSPECT™[1] reconstruction with CT frame-of-reference	Automatic and manual motion correction
3D measured point spread function for xSPECT	Topogram, spiral, sequential acquisition modes
Multimodality viewing software	Extended field of view (FoV)
Planar (static) acquisition	CARE Dose4D™
Dynamic acquisition	SureView™
Whole-body acquisition	Flexible kV (80, 110, 130 kV)
Whole-body SPECT acquisition	DICOM structured dose report
Gated acquisition	*syngo*® archiving and network
Gated SPECT acquisition	Asynchronous reconstruction
Dynamic SPECT acquisition	Image display
Filtered back projection	Multiplanar reconstruction
Flash 3D iterative reconstruction	Video capture and editing tool
Scatter correction	CT scan protocol assistant
CT attenuation correction	WorkStream4D™ (direct 3D-reconstruction)
Cardiac half-time imaging	*syngo* Dynamic Evaluation
Remote diagnostic services	*syngo* Viewing
PPM display and interaction at acquisition workplace	*syngo* Filming
Gated study beat normalization	FAST kV

System Software (Optional)	
xSPECT Bone™[1] with zone map (tissue classification)	Scenium
xSPECT Quant™[1] ^{99m}Tc	*syngo* media viewer
xSPECT Quant ^{177}Lu[2]	FAST 3D Align
xSPECT Quant ^{123}I	IRIS
xSPECT Quant ^{111}In	Heartview CT
Broad Quantification™[1]	*syngo* Calcium Scoring
Dose calibrator cross-calibration capability for unbiased SUV quantification	*syngo* CARE Bolus
TrueCalc™[1] high count rate detector technology	*syngo* Perfusion CT
3D measured collimator characterization for IQ•SPECT (hole, shape and size)	*syngo* Pulmo CT
Organ Processing for Symbia	Advanced 3D features
Planar half-time imaging	*syngo* Fly through for Symbia
syngo MI Remote Scanner Status	Multi-series CT attenuation correction
syngo security package	iterative Metal Artifact Reduction (iMAR) (CT metal artifact reduction)
Corridor4DM	SAFIRE iterative CT reconstruction
Cedars Cardiology Engine	Dual Energy Scan
Neurology Engine	Interleaved Volume Reconstruction (IVR) (32-slice reconstruction)

SPECT Specifications

Gantry Dimensions	
Height	225 cm (7 ft 4.7 in)
Width	231 cm (7 ft 7 in)
Depth	203 cm (6 ft 8 in)
Axis of rotation (from floor)	104 cm (3 ft 5 in)
Weight[3]	3,506 kg (7,714 lb)
Min./max. patient opening (HE coll)	12 cm (4.7 in)/65.4 cm (25.7 in)
Min./max. patient opening (LEHR coll)	19.2 cm (7.6 in)/72.6 cm (28.6 in)
Patient positioning monitor	15” flat panel color LCD display
Tunnel opening	70 cm aperture (27.6 in)
Tunnel length	89 cm (35 in)
Distance between SPECT and CT field of view (FOV)	136 cm (53.3 in)

SPECT Acquisition	
Energy range (photopeak window center)	35-588 keV
Acquisition modes	Static, dynamic, gated, SPECT, gated SPECT, dynamic SPECT, whole-body, whole-body SPECT, SPECT/CT, xSPECT

Nuclear Medicine and SPECT Acquisition Parameters	Static
Time	50-32000000 ms
Counts	1-2147483647
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128, 256x256, 512x512, 1024x1024
Body position	Supine, prone
Orientation	Head-in, head-out, gurnee-right, gurnee-left, head-left, head-right, sitting, standing, open-right, open-left
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°, out-facing
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole

SPECT Specifications

Nuclear Medicine and SPECT Acquisition Parameters	Dynamic
Time	50-32000000 ms
Number of frames	1-2,048 frames
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128, 256x256
Number of phases	1-32 phases
Body position	Supine, prone
Orientation	Head-in, head-out, gurnee-right, gurnee-left, head-left, head-right, sitting, standing, open-right, open-left
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°, out-facing
Acquire with R-wave gate	Selectable
Acquire with statics	Selectable
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole
	Gated
Time	1-32000000 ms
Counts	1-15000000 cts
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128
Number of frames	2-32 frames
Body position	Supine, prone
Orientation	Head-in, head-out, gurnee-right, gurnee-left, head-left, head-right, sitting, standing, open-right, open-left
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°, out-facing
Heartbeats	1-100000 heartbeats
Heart beat framing	Forward, forward/backward by thirds
Beat window % width	0-200
Beat window center	256-2,000 ms/beat
Autocenter primary window	Selectable
Autotracking	Selectable
Reject PVC beats	Selectable
Beats to reject post PVC	0-6
PVC threshold (bpm)	1-99 beats
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole

SPECT Specifications

Nuclear Medicine and SPECT Acquisition Parameters	Whole-body
Scan speed with autocontour	3-60 cm/min
Zoom	1.00
Matrix	256x512, 256x1024, 512x1024
Scan length	1-203 cm
Body position	Supine, prone
Orientation	Head out
Detectors	Detector 1, detector 2, both
Detector configuration	180°
Autocontour	Selectable
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE
	SPECT
Time	500-32000000 ms
First view by counts	1-100000 kcts
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128, 256x256
Maximum number of views	360 per head
Body position	Supine, prone
Orientation	Head-in (only 180°), head-out (all configurations)
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°, IQ•SPECT
Orbit	Circular (180°, 90°), NCO (180°, 90°, 76°), NCO-prescan (90°, 76°), cardio-centric
Start angle	-179°-180°
Mode	Step and shoot, continuous, acquire during step
Degrees of rotation	90° (only 90°), 104° (only 76°), 180° (90° and 180°), 360° (90° and 180°)
Rotation direction	Clockwise, counterclockwise
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, LEFB, ME, HE, **SMART**ZOOM

SPECT Specifications

Nuclear Medicine and SPECT Acquisition Parameters	Dynamic SPECT
Time/cycle	10-900 sec.
Cycles/repeat	1-10 cycles/repeat
Repeats/phase	1-80 repeats/phase
Number of phases	1-16 phases
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128
Start angle	-179°-180°
Body position	Supine, prone
Detectors	Detector 1, detector 2, both
Orientation	Head-in (only 180°), head-out (all configurations)
Detector configuration	180°, 90°, 76°, IQ•SPECT
Orbit	Circular (180°, 90°), NCO (180°, 90°, 76°), NCO-prescan (90°, 76°), cardio-centric
Mode	Step and shoot, continuous
Rotation direction	Clockwise, counterclockwise
Degrees of rotation	90° (only 90°), 104° (only 76°), 180° (90° and 180°), 360° (90° and 180°)
Pause before phase	Selectable
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, LEFB, ME, HE, **SMART**ZOOM
	Whole-body SPECT
Time	500-32000000 ms
First view by counts	1-100000 kcts
Zoom	1.00
Number of bed positions	2-5 bed positions
Matrix	64x64, 128x128, 256x256
Orientation	Head out
Body position	Supine, prone
Detectors	Detector 1, detector 2, both
Detector configuration	180°
Orbit	Circular (180°, 90°), NCO (180°, 90°, 76°)
Mode	Step and shoot, continuous, acquire during step
Rotational direction	Clockwise, counterclockwise
Degrees of rotation	180°, 360°
Start angle	-179°-180°
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE

SPECT Specifications

Nuclear Medicine and SPECT Acquisition Parameters	Gated SPECT
Time	500-32000000 ms
Accepted beats/view	1-99 beats/view
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64x64, 128x128
Number of frames	2-32 frames
Body position	Supine, prone
Orientation	Head out
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°, IQ•SPECT
Orbit	Circular (180°, 90°), NCO (180°, 90°, 76°), NCO-prescan (90°, 76°), cardio-centric
Start angle	-179°-180°
Mode	Step and shoot
Degrees of rotation	90° (only 90°), 104° (only 76°), 180° (90° and 180°), 360° (90° and 180°)
Rotation direction	Clockwise, counterclockwise
Heart beat framing	Forward, forward/backward by thirds
Beat window % width	0-200
Beat window center	256-2,000 ms/beat
Autocenter primary window	Selectable
Autotracking	Selectable
Reject PVC beats	Selectable
Beats to reject post PVC	0-6
PVC threshold (bpm)	1-99 beats
Allowable collimators[4]	LEHR, LPHR, LEAP, LEUHR, ME, HE, **SMART**ZOOM

SPECT Specifications

SPECT Motions	
Average autocontour distance	1.1 cm (0.45 in)
Max. radial and lateral speed	72 cm/min (28.3 in/min)
Max. lateral position left/right	37.5 cm (14.7 in)/10 cm (4 in)
Max. clockwise/counter-clockwise rotation detector 1	405°/-135°
Ring rotation range	540°
Rotational uniformity	Yes
Rotational accuracy	0.1°
Rotational speed	0.03-3.0 RPM
Center of rotation	≤0.25 pixel (64x64 matrix)
Max. caudal tilt	+16°/-16°
Patient Bed	
Width	81.9 cm (32.2 in)
Length	248.0 cm (8 ft 1.6 in)
Weight without ICC/ACC	950 kg (2,096 lb)
Height	112.0 cm (3 ft 8 in)
Vertical motion range	48.0-112.0 cm (19-44 in)
Vertical speed	72 cm/min (28 in/min), maximum
Pallet material	Carbon fiber
Pallet thickness	15 mm (.6 in)
Pallet width	40.0 cm (15.8 in)
Attenuation at 140 keV	<10%
Max. patient weight	227 kg (500 lb)
Max. deflection of patient pallet	<2.0 mm (<0.08 in) for 92 kg (200 lb) patient
Max. scan length in whole-body mode	203 cm (6 ft 6.7 in)
Horizontal motion accuracy	0.7 mm (0.03 in)
Min./max. horizontal speed	3-600 cm/min (1.2-236 in/min)

SPECT Specifications

Optional Pallets		
Pediatric	Material	Carbon fiber composite
	Thickness	0.6 cm (0.25 in)
	Width	25.4 cm (10 in)
	Length	145 cm (57 in)
	Weight	7.3 kg (16 lb)
	Attenuation at 140 keV	<10%
	Max. patient weight	27 kg (60 lb)
Scintimammography	Material	Carbon fiber composite
	Thickness	1.6 cm (0.63 in)
	Width	35.6 cm (14 in)
	Length	190.5 cm (75 in)
	Weight	7.7 kg (17 lb)
	Attenuation at 140 keV	<10%
	Max. patient weight	135 kg (300 lb)
Radiotherapy planning	Material	Carbon fiber composite
	Thickness	1.5 cm (0.6 in)
	Width	53 cm (20.9 in)
	Length	203.5 cm (80.1 in)
	Weight	9 kg (20 lb)
	Attenuation at 140 keV	<10%
	Max. patient weight	227 kg (500 lb)
Rear Pallet Support		
Width	26.3 cm (10.3 in)	
Length	104.3 cm (3 ft 5.1 in)	
Weight	188.3 kg (415.2 lb)	

SPECT Specifications

ECG Trigger	
Integration	Internal (inside patient bed) or external
Framing modes	Forward or forward/backward by thirds
Buffered beat window	Yes
Bad beat rejection	Yes
Criteria for framing images	Frames/R-R interval
Beat acceptance window	Automatic or manual selection
Collimator Exchanger Cart	
Height	101.4 cm (3 ft 3.9 in)
Width	82.8 cm (2 ft 8.6 in)
Depth	120.4 cm (3 ft 11.4 in)
Weight (without collimators)	181.4 kg (400 lb)
Detector Dimensions	
FOV	53.3x38.7 cm (21x15.25 in)
Diagonal FOV	65.9 cm (25.9 in)
Crystal	
Size	59.1x44.5 cm (23.25x17.5 in)
Diagonal	73.9 cm (29.1 in)
Thickness	9.5 mm (3/8 in) or 15.9 mm (5/8 in)
Photomultiplier Tubes	
Total number	59
Diameter	53-7.6 cm (3 in) and 6-5.1 cm (2.4-2 in)
Type	Bialkali high-efficiency box-type dynodes
Array	Hexagonal
Sampling rate	30.0 MHz
Detector Shielding	
Back	9.5 mm (0.375 in)
Sides	12.7 mm (0.5 in)
Min./max. in patient direction[5]	27.9/36.4 mm (1.1/1.435 in)
Brain reach[6]	7.6 cm (3 in)

SPECT Specifications

Detector[7]	3/8"	5/8"
Intrinsic spatial resolution		
Full width at half maximum (FWHM) in central field of view (CFOV)	≤3.8 mm	≤4.5 mm
FWHM in useful field of view (UFOV)	≤3.9 mm	≤4.6 mm
Full width at tenth maximum (FWTM) in CFOV	≤7.5 mm	≤8.7 mm
FWTM in UFOV	≤7.7 mm	≤8.9 mm
Intrinsic spatial linearity		
Differential in CFOV	≤0.2 mm	≤0.2 mm
Differential in UFOV	≤0.2 mm	≤0.2 mm
Absolute in CFOV	≤0.4 mm	≤0.5 mm
Absolute in UFOV	≤0.7 mm	≤1.0 mm
Intrinsic energy resolution		
FWHM in CFOV	≤9.9%	≤9.9%
Intrinsic flood field uniformity (uncorrected)		
Differential in CFOV	≤2.5%	≤2.5%
Differential in UFOV	≤2.7%	≤2.7%
Integral in CFOV	≤2.9%	≤2.9%
Integral in UFOV	≤3.7%	≤3.7%
Multiple window spatial registration	≤0.6 mm	≤1.0 mm
Intrinsic count rate performance in air		
Maximum count rate	≥460 kcps	≥460 kcps
Maximum count rate (@15% window)	≥310 kcps	≥310 kcps
Intrinsic spatial resolution at 75 kcps		
FWHM in UFOV	≤4.1 mm	≤4.6 mm
FWTM in UFOV	≤7.8 mm	≤8.9 mm
Intrinsic flood field uniformity at 75 kcps (uncorrected)		
Differential in CFOV	≤2.5%	≤2.5%
Differential in UFOV	≤2.7%	≤2.7%
Integral in CFOV	≤2.9%	≤2.9%
Integral in UFOV	≤3.7%	≤3.7%

SPECT Specifications

High Count Rate Performance[8]	3/8"	5/8"
Detector specifications at 310 kcps[9]		
Intrinsic flood field uniformity (uncorrected)		
Differential in CFOV	≤3.0%	–
Differential in UFOV	≤3.2%	–
Integral in CFOV	≤3.4%	–
Integral in UFOV	≤4.2%	–
Intrinsic energy resolution ^{99m}Tc		
FWHM in CFOV	≤11.9%	–
Stability of energy peak position		
Change of peak position (≤310 kcps)[9]	≤0.5%	–
System spatial resolution without scatter (LEHR at 10 cm)		
FWHM in CFOV	≤8.0 mm	–
FWTM in CFOV	≤14.6 mm	–
Detector with Collimator[7]	**3/8"**	**5/8"**
System spatial resolution without scatter (LEHR at 10 cm)		
FWHM in CFOV	≤7.5 mm	≤7.8 mm
FWTM in CFOV	≤13.6 mm	≤14.9 mm
System spatial resolution with scatter (LEHR at 10 cm)		
FWHM in CFOV	≤8.3 mm	≤8.9 mm
FWTM in CFOV	≤18.6 mm	≤19.5 mm
System planar sensitivity (LEHR at 10 cm)		
Absolute	202 cpm/µCi	225 cpm/µCi
System planar sensitivity (MELP at 10 cm)		
Absolute ^{111}In	430 cpm/µCi	565 cpm/µCi

SPECT Specifications

Detector with Collimator Tomographic[7]	3/8"	5/8"
Reconstructed spatial resolution without scatter at 15 cm radius (LEHR)	**Filtered back projection**	
Central transaxial	≤10.2 mm	–
Central axial	≤10.8 mm	–
Peripheral radial	≤9.8 mm	–
Peripheral tangential	≤8.4 mm	–
Peripheral axial	≤9.0 mm	–
Reconstructed spatial resolution without scatter at 15 cm radius (LEHR)	**Flash 3D iterative reconstruction**	
Central transaxial	≤4.4 mm	–
Central axial	≤4.4 mm	–
Peripheral radial	≤4.0 mm	–
Peripheral tangential	≤3.9 mm	–
Peripheral axial	≤4.2 mm	–
Reconstructed spatial resolution with scatter (LEHR)	**Filtered back projection**	
Center	≤10.7 mm	≤11.5 mm
Radial	≤10.9 mm	≤12.0 mm
Tangential	≤7.9 mm	≤8.8 mm
Reconstructed spatial resolution with scatter (LEHR)	**Flash 3D iterative reconstruction**	
Center	≤5.8 mm	–
Radial	≤5.0 mm	–
Tangential	≤4.1 mm	–
Average volume sensitivity per axial centimeter		
LEHR, ^{99m}Tc	12,000 (cts/sec)/(MBq/cm^2)	–
Detector-to-detector sensitivity variation LEHR, ^{99m}Tc	≤5.0%	–
Detector with Collimator Whole-body Scanning[10]	**3/8"**	**5/8"**
Whole-body system spatial resolution without scatter at 10 cm/min scan speed (LEHR at 10 cm)		
FWHM perpendicular	≤7.5 mm	–
FWHM parallel	≤7.9 mm	–
FWTM perpendicular	≤14.0 mm	–
FWTM parallel	≤14.2 mm	–

SPECT Specifications

Collimators	LEHR	LPHR	LEAP	LEUHR	LEFB	MELP	HE	SMART-ZOOM
	Low Energy High Resolution	Low Penetra-tion High Resolution	Low Energy All Purpose	Low Energy Ultra-high Resolution	Low Energy Fan Beam	Medium Energy Low Penetration	High Energy	IQ•SPECT
Isotope	^{99m}Tc	^{123}I	^{99m}Tc	^{99m}Tc	^{99m}Tc	^{67}Ga	^{131}I	^{99m}Tc
Hole shape	Hex	Hex	Hex	Hex	Hex	Hex	Hex	Hex
Number of holes (x1000)	148	86	90	146	64	14	8	48
Hole length	24.05 mm	35.0 mm	24.05 mm	35.8 mm	35 mm	40.64 mm	59.7 mm	40.25 mm
Septal thickness	0.16 mm	0.2 mm	0.2 mm	0.13 mm	0.16 mm	1.14 mm	2 mm	0.2-0.4 mm
Hole diameter across the flats	1.11 mm	1.5 mm	1.45 mm	1.16 mm	1.53 mm	2.94 mm	4 mm	1.9 mm
Sensitivity at 10 cm[10]	202 cpm/ µCi	330 cpm/ µCi	330 cpm/ µCi	100 cpm/ µCi	280 cpm/ µCi	275 cpm/ µCi	135 cpm/ µCi	285 cpm/ µCi[11]
								810 cpm/ µCi at 28 cm[11]
Geometric resolution at 10 cm	6.4 mm	6.4 mm	8.3 mm	4.6 mm	6.3 mm	10.8 mm	13.2 mm	6.95 mm
System resolution at 10 cm	7.5 mm	8.0 mm	9.4 mm	6.0 mm	7.3 mm	12.5 mm	13.4 mm	7.4 mm[12]
Calculated penetration	1.5%	1.2%	1.9%	0.8%	1.0%	1.2%	3.5%	N/A
Weight	22.1 kg (48.7 lb)	33.1 kg (73 lb)	22.6 kg (49.8 lb)	28 kg (61.8 lb)	28.4 kg (62.5 lb)	63.5 kg (140.1 lb)	124.7 kg (275 lb)	47.2 kg (104 lb)

SPECT Specifications

Pinhole Collimator[10]	Isotope		
	^{99m}Tc	^{123}I	^{131}I
Hole shape	Round	Round	Round
Number of holes	1	1	1
Cone aperture	4 mm 6 mm 8 mm	4 mm 6 mm 8 mm	4 mm 6 mm 8 mm
Cone length	219.3 mm	219.3 mm	219.3 mm
Diameter at base of cone (approximate)	220 mm	220 mm	220 mm
Sensitivity at 10 cm with 4 mm	123 cpm/µCi	111 cpm/µCi	67 cpm/µCi
Sensitivity at 10 cm with 6 mm	271 cpm/µCi	243 cpm/µCi	133 cpm/µCi
Sensitivity at 10 cm with 8 mm	478 cpm/µCi	426 cpm/µCi	221 cpm/µCi
Geometric resolution at 10 cm with 4 mm	6.2 mm	6.3 mm	7.5 mm
Geometric resolution at 10 cm with 6 mm	9.3 mm	9.3 mm	10.6 mm
Geometric resolution at 10 cm with 8 mm	12.3 mm	12.4 mm	13.6 mm
System resolution at 10 cm with 4 mm	6.6 mm	6.6 mm	7.6 mm
System resolution at 10 cm with 6 mm	9.5 mm	9.5 mm	10.7 mm
System resolution at 10 cm with 8 mm	12.5 mm	12.5 mm	13.7 mm
Weight	80.3 kg (177 lb)	80.3 kg (177 lb)	80.3 kg (177 lb)

CT Specifications

Gantry Dimensions	
Aperture	70 cm
Scan field	50 cm
Rotation time	0.5 s 0.6 s 1.0 s 1.5 s
Temporal resolution (min.)[13]	125 ms
Data Acquisition System	
Max. number of slices/rotation	16
Number of physical detector rows	24
Number of physical detector channels/slice	736
Number of detector elements	17,664
Total channels per slice	1,472
Number of projections	Up to 2,500 (1 s/360)
Sequence acquisition modes	4x0.6 mm 12x0.6 mm 16x0.6 mm 2x5 mm 12x1.2 mm 2x8 mm 16x1.2 mm
Spiral acquisition modes	4x0.6 mm 16x0.6 mm 16x1.2 mm

CT Specifications

Tube Assembly	
Tube	DURA 422 MV high performance CT X-ray tube
Tube current	25-345 mA
Tube voltage	80, 110, 130 kV
Tube anode heat storage capacity	5 MHU; equivalent to 12 MHU with SAFIRE option
Focal spot size according to IEC 60336	0.8x0.5 mm/7° 0.8x0.7 mm/7°
CARE Filter	
CARE filter tube	Equivalent to 5.5 mm Al at 140 kV
CARE filter beam limiting device	0.5 mm Al
Generator	
Max. power	50 kW

CT Specifications

Topogram	
Length (max.)	184 cm (6 ft)
Scan times	2.1-19.3 s
Views	a.p., p.a., lateral
Sequence Acquisition	
Reconstructed slice widths	0.6, 1.2, 2.4, 3.6, 4.8, 5.0, 8.0, 9.6, 10.0, 16.0[12], 19.2 mm
Scan times full scan (360°)	0.5[12], 0.6, 1.0, 1.5 s (±5%)
Partial scan times (240°)	0.33, 0.4 s (±5%)
Number of uninterrupted scans per range	99
Number of ranges in autorange	8
Standard scan cycle time (±10%)	1.8 s at 0.6 s scan time, 1.75 s at 0.5 s scan time[13]
Multislice Spiral Acquisition	
Reconstructed slice widths	0.6, 1.2, 2.4, 3.6, 4.8, 5.0, 8.0, 9.6, 10.0, 16.0, 19.2 mm
Scan times full scan (360°)	0.5, 0.6, 1.0, 1.5 s
Reconstruction increment	0.1-10 mm
Pitch factor	0.4-2.0 (with cone beam correction), 0.4-2.0 (without cone beam correction), 0.33 (ECG-gated studies)
Spiral scan time max.	100 s
CT scan range	0-200 cm
Continuous scan length and SPECT/CT co-scan range	186 cm (6 ft 1 in)

CT Specifications

Dynamic Multiscan	
Dynamic scan cycle time (±10%)	Multiple (continuous) sequence scanning without table movement for fast dynamic contrast studies with maximum slice thickness of 19.2 (16 x 1.2) mm.
Image Reconstruction	
Real-time display[13]	512x512
Slice thickness	0.6-19.2 mm
Scan field	50 cm
Recon field	5-50 cm, 5-70 cm[14]
Recon time	up to 16 images/s
Recon matrix	512x512
HU scale	-1,024 to +3.071
Extended HU scale	-10,240 to +30,710
Phantom CATPHAN (16 cm)	
Object size	3 mm
Contrast difference	3 HU
Dose at surface	21.5 mGy[14] at 102 mAs
Technique	0.6 s, 10 mm, 130 kV
Phantom CATPHAN (20 cm)	
Object size	5 mm
Contrast difference	3 HU
Dose at surface	16.6 mGy[15] at 100 mAs
Technique	0.6 s, 10 mm, 130 kV

CT Specifications

High-contrast Resolution			
0% MTF (±10%)		17.5 lp/cm, 0.29 mm	
2% MTF (±10%)		15.8 lp/cm, 0.32 mm	
Technique: Tungsten wire in air		160 mAs, 130 kV, 1 s, 2.4 mm	
Homogeneity			
Cross-field uniformity in a 20 cm water phantom positioned near the center of rotation		Typical ±2 HU (max. ±4 HU)	
Dose, $CTDI_{100}$ Values[16]			
Phantom Ø		kV	kV
		110	130
16 cm	A	12.7	18.7
	B	13.4	19.5
32 cm	A	3.7	5.8
	B	7.3	10.9
A: at center	B: 1 cm below the surface		
Technique	PMMA Phantom		
	Absorbed dose for reference material air		
	Max. deviation ±30%		
	Expected deviation ±20%		
	2x5 mm		

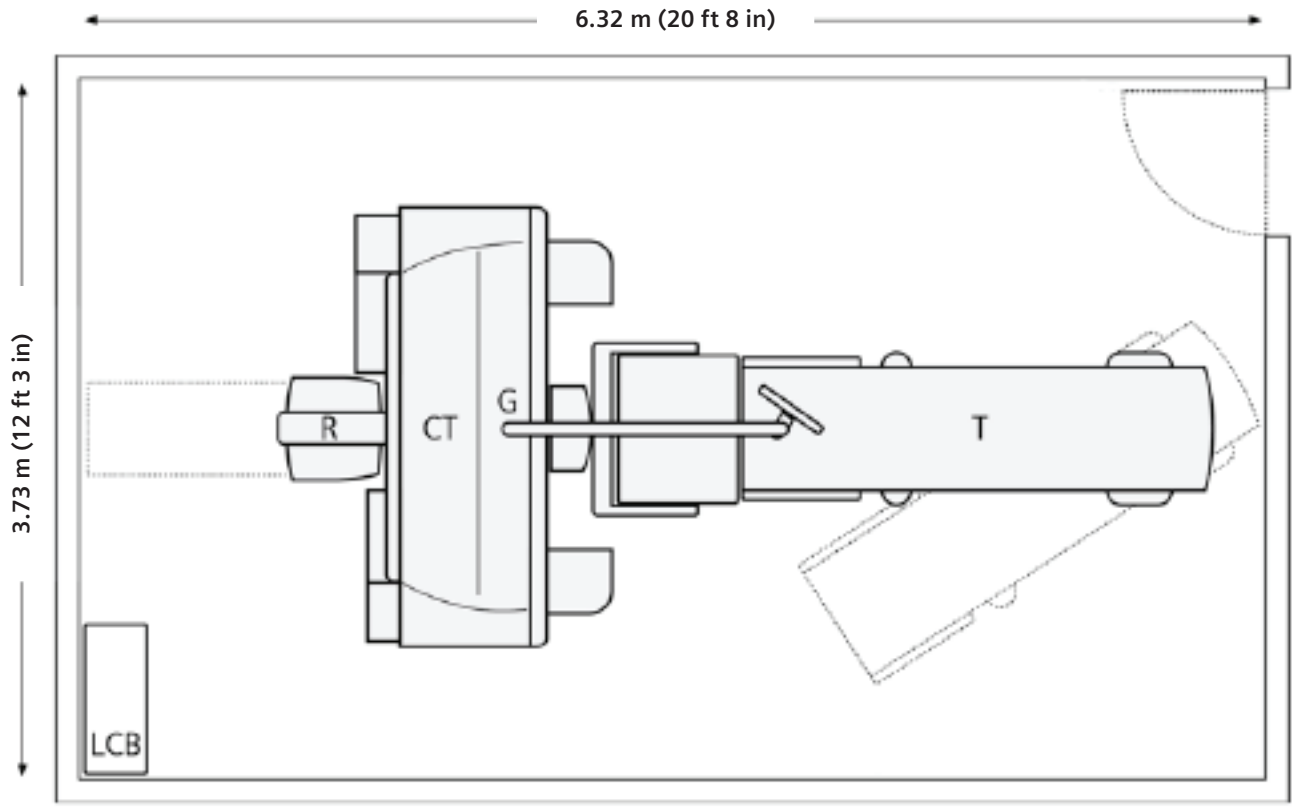
xSPECT Advanced Specifications

Advanced Bone Imaging	
Context-based information	Yes, applied to ^{99m}Tc diphosphonate bone SPECT
Extra modality information	Zone map (a map with up to 6 tissue zones)
CT zone classification	Cortical bone, spongious bone, soft tissue, air, adipose (fat), metal
Reconstruction software	xSPECT Bone
Reconstruction matrix size	256x256
Attenuation map	Linear attenuation coefficients @ 140 keV
Quantification	
System calibration source	3% NIST-traceable precision ^{57}Co source, ^{75}Se source
System calibration procedure	Monthly
Data format	Data is saved in PET format
Reconstruction software	xSPECT Quant
Volumetric analysis software	*syngo*.via, Symbia.net
Quantitative volumetric analysis	In units of Bq/ml, SUV or count-rate-per-voxel
Absolute quantification	xSPECT Quant ^{99m}Tc, ^{123}I, ^{111}In and ^{177}Lu
Quantitative SPECT studies for common SPECT radiopharmaceuticals in combination with all parallel hole collimators	Broad Quantification (in units of Bq/ml, SUV or count-rate-per-voxel)
xSPECT Quant: Accuracy of Bq/ml Quantification in Reference to NIST, Measured Using NEMA NU2-94 Test Phantom	
Isotope/collimator	**Uncertainty (95% confidence)**
^{99m}Tc LEHR	≤5%
^{99m}Tc LPHR	≤10%
^{123}I LPHR	≤10%
^{123}I MELP	≤10%
^{111}In MELP	≤10%
^{177}Lu MELP	≤5%
^{177}Lu MELP at 310kcps incident count rate[8]	≤10%
Broad Quantification: Reproducibility of Bq/ml Quantification in Reference to a Dose Calibrator, Measured Using NEMA NU2-94 Test Phantom	
Isotope/collimator	**Reproducible within**
^{131}I HE	≤10%
^{67}Ga MELP	≤10%

xSPECT Advanced Specifications

Advanced Reconstruction System	
Computer name	Dedicated reconstruction system
Manufacturer	HP
Workstation series	HPZ420
Processing unit	GPU (graphics processing unit)
Operating system pre-installed	Windows® 7
Software architecture	64-bit
Power supply	600 W
Data handling matrix size	256x256, 128x128, 64x64
Standard advanced reconstruction	xSPECT iterative (for advanced data), Flash 3D iterative reconstruction (for basic data)
Optional advanced reconstruction	xSPECT Bone, xSPECT Quant (^{99m}Tc, ^{123}I, ^{111}In, ^{177}Lu), Broad Quantification, IQ•SPECT

Minimum Room Size[17]



Scanner room size	3.73 m (12 ft 3 in)x6.32 m (20 ft 8 in)
Ceiling height	2.44 m (8 ft 0 in)
Hung ceiling height	2.29 m (7 ft 6 in)

Installation and Quality Control Specifications

Room Diagram Label	Item Name	Weight	Heat Output
G	Symbia Intevo Bold™ gantry	2,369 kg (5,224 lb)	3,413 BTU/h, 1.0 kW
CT	CT components	1,129 kg (2,490 lb)	<3,413 BTU/h, <1.0 kW
T	Symbia Intevo Bold imaging table	950 kg (2,096 lb)	
R	Symbia Intevo Bold rear PHS	188.3 kg (415.2 lb)	
LCB	Line connection box		1,365 BTU/h, 0.4 kW
Control Room Heat Output			
Acquisition computers			2,389 BTU/h, 0.7 kW
Advanced reconstruction workstation			2,142 BTU/h, 0.8 kW
Power Requirements			
SPECT input voltage	Single-phase 200/208/220/230/240 VAC ~ 50/60 Hz		
CT input voltage	Three-phase 380/400/420/440/460/480 VAC ~ 50/60 Hz		
Electrical supply	68 kVA		
Environment			
Floor loading	5.1 kg/sq cm (72 lb/sq in) maximum under the gantry		
Ambient operating temperature	18-30° C (64-86° F)		
Allowable temperature change	4.4° C (8° F) per hour		
Humidity range	20-80% non-condensing		
Allowable humidity change	5%/hour		
Heat dissipation (gantry and table)	≤5.3 kW scanning		
Heat dissipation (computer)	≤1.1 kW		
Maximum altitude	2,438 m (8,000 ft)		
Standard Quality Control Procedures			
Nuclear Medicine			
Daily	Intrinsic verification or extrinsic verification		
Weekly	Intrinsic verification with tune		
Monthly	Intrinsic verification with tune, multiple head registration (MHR) 180° head alignment verification		
Monthly for users performing quantitative studies	Sensitivity calibration		
Every 6 months or per regulatory/license requirements (if applicable)	Leak test of the automated quality control device sources		
Computed Tomography			
Daily	CT checkup every 12 hours, CT quality check daily, CT calibration after 1 hour or if ring artifacts occur		
Monthly	CT constancy test		

Footnotes

[1] Symbia Intevo Bold, xSPECT, xSPECT Bone, xSPECT Quant, Broad Quantification and TrueCalc are not commercially available in all countries. Due to regulatory reasons, their future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

[2] xSPECT Quant ^{177}Lu is not commercially available in some countries, including the US. ^{177}Lu is not currently recognized by the US FDA as being safe and effective, and Siemens does not make any claims regarding its use. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

[3] Gantry weight: NM gantry 2,374 kg (5,224 lb) + CT gantry 1,132 kg (2,490 lb).

[4] All collimators may not be suported by all detector configurations.

[5] For any point on the pallet at maximum 183 cm (6 ft) from the detector while the detector is at 25.4 cm (10 in) radial position.

[6] Distance from the edge of the detector housing to the edge of the FOV.

[7] Values are determined at the manufacturer's facility using methods described in NEMA Standards Publications NU 1-2012 "Performance measurements of Scintillation Cameras."

[8] With TrueCalc option.

[9] Incident count rate.

[10] Values measured in accordance with NEMA Standards Publication NU-1 2012 using 3/8" crystal.

[11] Values measured using a 5 cm diameter phantom.

[12] Values measured with lines spaced 2 cm apart at the center of the collimator.

[13] Requires *syngo* Heartview CT option.

[14] The reconstruction area outside the standard 50 cm FOV is for visualization purposes only and is not of diagnostic image quality.

[15] Air KERMA, measured on the surface of the phantom with max. deviation ±30%.

[16] PMMA Phantom. Absorbed dose for reference material air. Max. deviation ±30%. Expected deviation ±15%. Slice >1 mm. Please note that these specifications are CTDI100 values.

[17] Example layout. Please request site-specific plans for your project.

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