System specifications

Symbia Evo Excel SPECT

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Symbia Evo Excel SPECT System specifications

System hardware (standard)

Open gantry design (101.1 x 78.2 cm (39.8 x 30.8 in))

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 rail-free gurney and wheelchair access

Patient bed with 227 kg (500 lb) capability

Patient bed pivot for rail-free access of sitting/standing patients, wheelchairs, imaging tables, gurneys, and hospital beds

Integrated calibration source holder

Rear bed with pallet flex prevention

Aluminum pallet

Patient comfort accessories (SPECT head holder and cushion, SPECT armrest, whole-body armrest, set of patient restraint straps)

Acquisition workplace with multilingual graphical user interface, monitor, keyboard, and mouse plus full DICOM archiving, CD/DVD storage, external USB 2.0 disk support, and printing functionality

Intuitive hand controller with easy-to-use descriptive controls

Monitor, 19" LCD DICOM (standard monitor, 19"/48 cm flat screen, 1,280 x 1,024 resolution, 1,024 x 1,024 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)

Collimator cart

External ECG gate with strip chart recorder

External ECG gate without strip chart recorder

Extra hand controller

Dual monitor

e.Media for PPM

Under- or over-floor patient handling system (PHS) cable

Seismic installation kit

System specifications

System software (standard)
Multimodality viewing software
Planar (static) acquisition
Dynamic acquisition
Whole-body acquisition
General SPECT acquisition
Whole-body SPECT acquisition
Gated acquisition
Gated SPECT acquisition
Dynamic SPECT acquisition
Filtered back projection
Remote diagnostic services
Gated study beat normalization
Automatic and manual motion correction
syngo® archiving and network
Video capture and editing tool
SPECT DICOM structured dose report ¹
Dynamic planar real-time activity curve

System software (optional)
Organ Processing for Symbia™
syngo MI Remote Scanner Status
Flash 3D iterative reconstruction
Scatter correction
Cardiac half-time imaging
Planar half-time imaging
Corridor4DM™
Cedars Cardiology Engine
Neurology Engine
Scenium
syngo media viewer
syngo Security Package
PPM display and interaction at acquisition workplace
DICOM structured dose report viewer
syngo Expert-i ¹

Gantry dimensions	
Height	225 cm (7 ft 4.7 in)
Width	215.6 cm (7 ft 0.9 in)
Depth	194.7 cm (6 ft 4 in)
Axis of rotation (from floor)	104 cm (3 ft 5 in)
Weight	2,369 kg (5,224 lb)
Minimum/maximum patient opening (HE collimator)	12 cm (4.7 in)/65.4 cm (25.7 in)
Minimum/maximum patient opening (LEHR collimator)	19.2 cm (7.6 in)/72.6 cm (28.6 in)
Patient positioning monitor	38.1 cm (15 in) flat panel color LCD display
Tunnel opening	101.1 x 78.2 cm (39.8 x 30.8 in)
Tunnel length	34.1 cm (13.4 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

Nuclear medicine and SPECT acquisition parameters	Static
Time	50-32,000,000 ms
Counts	1-2,147,483,647
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64 x 64, 128 x 128, 256 x 256, 512 x 512, 1024 x 1024
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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole

Nuclear medicine and SPECT acquisition parameters	Dynamic
Time	50-32,000,000 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	64 x 64, 128 x 128, 256 x 256
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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole

Nuclear medicine and SPECT acquisition parameters	Gated
Time	1-32,000,000 ms
Counts	1-15,000,000 cts
Zoom	1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
Matrix	64 x 64, 128 x 128
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	1-100,000 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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE, pinhole

Nuclear medicine and SPECT acquisition parameters	Whole-body
Scan speed with autocontour	3-60 cm/min
Zoom	1.00
Matrix	256 x 512, 256 x 1,024, 512 x 1,024
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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE

SPECT
500-32,000,000 ms
1-100,000 kcts
1.00, 1.23, 1.45, 1.78, 2.00, 2.29, 2.67, 3.20
64 x 64, 128 x 128, 256 x 256
360 per head
Supine, prone
Head-in (only 180°), head-out (all configurations)
Detector 1, detector 2, both
180°, 90°, 76°
Circular (180°, 90°), NCO (180°, 90°, 76°), NCO-prescan (90°, 76°), cardio-centric
-179°-180°
Step and shoot, continuous, acquire during step
90° (only 90°), 104° (only 76°), 180° (90° and 180°), 360° (90° and 180°)
Clockwise, counterclockwise
LEHR, LPHR, LEAP, LEUHR, LEFB, ME, HE

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	64 x 64, 128 x 128
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°
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 ³	LEHR, LPHR, LEAP, LEUHR, LEFB, ME, HE

	Whole-body SPECT
Time	500-32,000,000 ms
First view by counts	1-100,000 kcts
Zoom	1.00
Number of bed positions	2-5 bed positions
Matrix	64 x 64, 128 x 128, 256 x 256
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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE

Nuclear medicine and SPECT acquisition parameters	Gated SPECT
Time	500-32,000,000 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	64 x 64, 128 x 128
Number of frames	2-32 frames
Body position	Supine, prone
Orientation	Head out
Detectors	Detector 1, detector 2, both
Detector configuration	180°, 90°, 76°
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 ³	LEHR, LPHR, LEAP, LEUHR, ME, HE

SPECT motions	
Average autocontour distance	1.1 cm (0.45 in)
Maximum radial and lateral speed	72 cm/min (28.3 in/min)
Maximum lateral position left/right	37.4 cm (14.7 in)/10.1 cm (4 in)
Maximum 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 (64 x 64 matrix)
Maximum caudal tilt	+16°/-16°

Patient bed	
Width	65.2 cm (25.7 in)
Length	233.2 cm (7 ft 7.8 in)
Weight	483 kg (1,065 lb)
Height	113.4 cm (3 ft 8.6 in)
Vertical motion range	53.9-103.7 cm (21.2-40.8 in)
Vertical speed	72 cm/min (28 in/min), maximum
Pallet material	Aluminum
Pallet thickness	2.6 mm (0.10 in)
Pallet width	40.3 cm (15.8 in)
Attenuation at 140 keV	<7%
Maximum patient weight	227 kg (500 lb)
Maximum deflection of patient pallet	<2.0 mm (<0.08 in) for 92 kg (200 lb) patient
Maximum scan length in whole-body mode	203 cm (6 ft 6.7 in)
Horizontal motion accuracy	0.7 mm (0.02 in)
Minimum/maximum horizontal speed	3-600 cm/min (1.2-236 in/min)

Rear pallet support	
Width	26.3 cm (10.3 in)
Length	104.3 cm (3 ft 5.1 in)
Weight	162 kg (357.1 lb)
ECG trigger	
Integration	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 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	181.4 kg (400 lb)
Detector dimensions	
Field of view (FoV)	53.3 x 38.7 cm (21 x 15.25 in)
Diagonal FoV	65.9 cm (25.9 in)
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Crystal	
Size	59.1 x 44.5 cm (23.25 x 17.5 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)
Туре	Bialkali high-efficiency box-type dynodes
Array	Hexagonal
Sampling rate	30.0 MHz
Detector shielding	
Back	Typical 1.5875 cm (0.625 in) Minimum 0.9525 cm (0.375 in)
Sides	12.7 mm (0.5 in)
Minimum/maximum in patient direction ³	27.9/36.4 mm (1.1/1.435 in)
Brain reach ⁴	7.6 cm (3 in)

Detector ⁵	3/8" (0.9525 cm)	5/8" (0.9525 cm)
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	ed)	
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%

Detector with collimator⁵	3/8" (0.9525 cm)	5/8" (1.5875 cm)
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 99mTc	202 cpm/μCi	225 cpm/μCi
System planar sensitivity (MELP at 10 cm)		
Absolute 111In	430 cpm/μCi	565 cpm/μCi
Detector with collimator tomographic ⁵	3/8" (0.9525 cm)	5/8" (1.5875 cm)
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 reconstru	uction
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 reconstru	uction
Center	≤5.8 mm	_
Radial	≤5.0 mm	_
Tangential	≤4.1 mm	_
Average volume sensitivity per axial centimeter		
LEHR, 99mTc	12,000 (cts/sec)/(MBq/cm ²)	_
Detector-to-detector sensitivity variation		
LEHR, 99mTc	≤5.0%	_

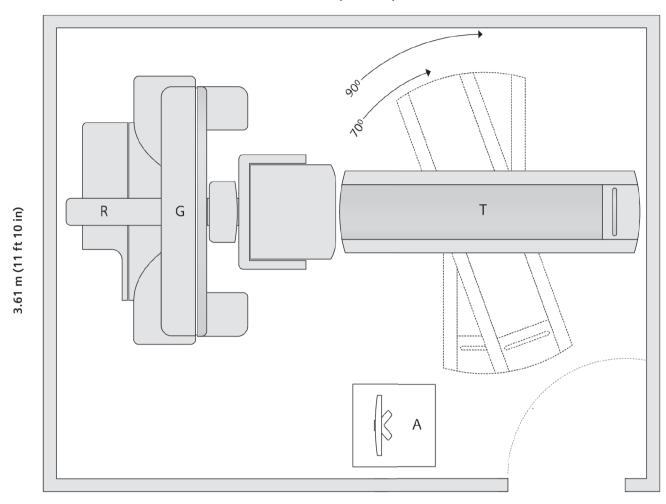
Detector with collimator whole-body scanning	3/8" (0.9525 cm)	5/8" (1.5875 cm)
Whole-body system spatial resolution without		
scatter at 10 cm/min scan speed (LEHR at 10 cm)		
FWHM perpendicular	≤7.5 mm	_
FWHM parallel	≤7.9 mm	-
FWTM perpendicular	≤14.0 mm	-
FWTM parallel	≤14.2 mm	_

Collimators	LEHR	LPHR	LEAP	LEUHR	LEFB	MELP	HE
	Low Energy High Resolution	Low Penetration High Resolution	Low Energy All Purpose	Low Energy Ultra-high Resolution	Low Energy Fan Beam	Medium Energy Low Penetration	High Energy
Isotope	^{99m} Tc	123	^{99m} Tc	^{99m} Tc	^{99m} Tc	⁶⁷ Ga	131
Hole shape	Hex	Hex	Hex	Hex	Hex	Hex	Hex
Number of joles (x1,000)	148	86	90	146	64	14	8
Hole length	24.05 mm	35.0 mm	24.05 mm	35.8 mm	35 mm	40.64 mm	59.7 mm
Septal thickness	0.16 mm	0.2 mm	0.2 mm	0.13 mm	0.16 mm	1.14 mm	2 mm
Hole diameter across the flats	1.11mm	1.5 mm	1.45 mm	1.16 mm	1.53 mm	2.94 mm	4 mm
Sensitivity at 10 cm ⁶	202 cpm/μCi	251 cpm/μCi (167 cpm/ μCi (^{99m} Tc)	330 cpm/μCi	88 cpm/µCi	280 cpm/μCi	275 cpm/μCi	135 cpm/μCi
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
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
Calculated penetration	1.5%	1.2%	1.9%	0.8%	1.0%	1.2%	3.5%
Weight	22.1 kg (48.7 lb)	33.6 kg (74 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)

Pinhole collimator ⁷	Isotope		
	^{99m} Tc	123	131
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)

Minimum room size⁸

4.58 m (15 ft 0 in)



Scanner room size	3.61 m (11 ft 10 in) x 4.58 m (15 ft 0 in)
Ceiling height	2.44 m (8 ft 0 in)
Hung ceiling height	2.29 m (7.5 ft)
System length	4.48 m (14.7 ft)
System width	2.16 m (7.1 ft)

Installation and quality control specifications

Room diagram label	Item name	Weight	Heat output
G	Symbia Evo™ Excel gantry	2,369 kg (5,224 lb)	3,400 BTU/h, 1.0 kW
Т	Symbia Evo Excel imaging table	483 kg (1,065 lb)	-
R	Symbia Evo Excel rear PHS	162 kg (357.1 lb)	_
A	Acquisition computers	_	1,000 BTU/h, 0.3 kW

Power requirements	
SPECT input voltage	Single-phase 200/208/220/230/240 VAC ~50/60Hz
Electrical supply	2.5 kVa

Environment	
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
Maximum altitude	2,438 m (8,000 ft)
Floor loading	3.37 kg/sq cm (84 lb/sq in) maximum under the ganty
Heat dissipation ⁹	4,800 BTU/hr
Temperature range	18°-30°C (64°-86° F)
Maximum temperature gradient	4.4° C/hour (8° F/hour)

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

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- ¹ Not commercially available in all countries. Future availability cannot be guaranteed.
- ² All collimators may not be supported by all detector configurations.
- ³ 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.
- ⁴ Distance from the edge of the detector housing to the edge of the FOV.
- Values are determined at the manufacturer's facility using methods described in NEMA Standards Publications NU 1-2018 "Performance measurements of Scintillation Cameras."
- ⁶ Values measured in accordance with NEMA Standards Publication NU-1 2018 using 3/8" crystal.
- ⁷ Values measured in accordance with NEMA Standards Publication NU-1 2018 using 3/8" crystal. Sensitivities for pinhole collimators measured using a 9 cm diameter phantom. Resolution for pinhole collimator measured using a line separation of 6 cm (4 mm and 6 mm aperture) and 4 cm (8 mm aperture).
- 8 Example layout. Please request site-specific plans for your project.
- ⁹ Includes gantry, detectors, patient bed, acquisition workstation, LCD monitor, PPM, and UPS. Values in idle mode. Operating mode would produce higher values.

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