

Symbia E and S

System Specifications

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Gantry Specifications

Gantry Dimensions	Symbia E	Symbia S
Height	193.0 cm (6 ft 4 in)	225 cm (7 ft 4.7 in)
Width	167.6 cm (5 ft 6 in)	225 cm (7 ft 4.7 in)
Depth	159.4 cm (5 ft 2.75 in)	193 cm (6 ft 4 in)
Axis of Rotation (from floor)	99.0 cm (3 ft 3 in)	104 cm (3 ft 5 in)
Weight with High-Energy Collimators	1755 kg (3900 lb)	2624 kg (5784 lb)
Min./max. Patient Opening (HE Coll)	9.0 cm (3.5 in) / 62.0 cm (24.4 in)	12 cm (4.7 in) / 65.4 cm (25.7 in)
Min./max. Patient Opening (LEHR Coll)	14.0 cm (5.5 in) / 67.0 cm (26.4 in)	19 cm (7.5 in) / 70 cm (27.5 in)
Patient Positioning Monitor	15" flat panel color LCD display	15" flat panel color LCD display
Tunnel Opening	71 x 86 cm (28 x 34 in)	102 x 78 cm (40.2 x 30.7 in)

SPECT Motions	Symbia E	Symbia S
Average Autocontour Distance	1.1 cm (0.45 in)	1.1 cm (0.45 in)
Max. Radial & Lateral Speed	120 cm/min (47.2 in/min)	72 cm/min (28.3 in/min)
Max. Lateral Position Left/Right	5.1 cm (2 in) / 22.9 cm (9 in)	37.5 cm (14.7 in) / 10 cm (4 in)
Max. CW/CCW Rotation on Detector 1	440°/30°	410°/140°
Ring Rotation Range	470°	550°
Rotational Accuracy	0.1°	0.1°
Rotational Speed	0.33 - 3.0 RPM	0.03 - 3.0 RPM
Center of Rotation	≤ 0.25 pixel (64 x 64 matrix)	≤ 0.25 pixel (64 x 64 matrix)
Max. Caudal Tilt	+90° / -20°	+16° / -16°

Patient Bed Specifications	Symbia E	Symbia S
Width	88.9 cm (35.4 in)	81.9 cm (32.2 in)
Length	251.5 cm (99 in)	248.0 cm (8 ft 1.6 in)
Weight	253 kg (562 lb)	861.8 kg (1900 lb)
Height	109.2 cm (43 in)	133.4 cm (4 ft 4.5 in)
Vertical Motion Range	48.3-110.5 cm (19.0 - 43.5 in)	53.3-119.4 cm (21.0 - 47.0 in)
Vertical Speed	120 cm/min (47.2 in/min) maximum	99 cm/min (39 in/min), average
Pallet Material	Aluminium	Aluminum
Pallet Thickness	2.6 mm (0.10 in)	2.6 mm (0.10 in)
Pallet Width	35.6 cm (14 in)	40.0 cm (15.8 in)
Attenuation @ 140 keV	< 7%	< 7%
Max. Patient Weight	180 kg (400 lb)	227 kg (500 lb)
Max. Deflection of Patient Pallet	< 3.2 mm (<0.125 in) for 92 kg (200 lb) patient	< 2.0 mm (< 0.08 in) for 92 kg (200 lb) patient
Max. Scan Length in Whole-Body Mode	202 cm (6 ft 7.5 in)	200 cm (6 ft 6.7 in)
Horizontal Motion Accuracy	0.4 mm (0.016 in)	0.5 mm (0.02 in)
Min. – Max. Horizontal Speed	0.1 - 240 cm/min (0.040 - 94.5 in/min)	3 - 600 cm/min (1.2 - 236 in/min)

Pediatric Pallet Support*	Symbia E	Symbia S
Width	25.4 cm (10 in)	N/A
Length	129.9 cm (51.1 in)	N/A
Max. Patient Weight	27 kg (60 lb)	N/A

Mammography Pallet Support*	Symbia E	Symbia S
Width	35.6 cm (14 in)	N/A
Length	170.2 cm (67 in)	N/A
Max. Patient Weight	135 kg (300 lb)	N/A

* Pallet available only on Symbia E

Rear Pallet Support	Symbia E	Symbia S
Width	35.6 cm (14 in)	26.3 cm (10.3 in)
Length	124.5 cm (4ft 1 in)	104.3 cm (3 ft 5.1 in)
Weight	49 kg (109 lb)	136.1 kg (300 lb)

ECG Trigger	Symbia E	Symbia S
Integration	External	Internal (Inside Patient Bed) or External
Framing Modes	Forward or Forward/Backward by Thirds	Forward or Forward/Backward by Thirds
Buffered Beat Window	Yes	Yes
Bad Beat Rejection	Yes	Yes
Criteria for Framing Images	Frames/R-R Interval or Millisec/Frame	Frames/R-R Interval or Millisec/Frame
Beat Acceptance Window	Automatic or Manual Selection	Automatic or Manual Selection

Collimator Exchanger Cart	Symbia E	Symbia S
Height	132.1 cm (4 ft 4 in)	101.4 cm (3 ft 3.9 in)
Width	110.5 cm (2 ft 7.5 in)	82.8 cm (2 ft 8.6 in)
Depth	110.5 cm (2 ft 7.5 in)	120.4 cm (3 ft 11.4 in)
Weight*	120.2 kg (265 lb)	181.4 kg (400 lb)

Detector Specifications

Detector Dimensions	Symbia E	Symbia S
Field of View (FOV)	53.3 x 38.7 cm (21 x 15.25 in)	53.3 x 38.7 cm (21 x 15.25 in)
Diagonal FOV	65.9 cm (25.9 in)	65.9 cm (25.9 in)

Crystal	Symbia E	Symbia S
Size	59.1 x 44.5 cm (23.25 x 17.5 in)	59.1 x 44.5 cm (23.25 x 17.5 in)
Diagonal	73.9 cm (29.1 in)	73.9 cm (29.1 in)
Thickness	9.5 mm (3/8 in) or 15.9 mm (5/8 in)	9.5 mm (3/8 in) or 15.9 mm (5/8 in)

Photomultiplier Tubes	Symbia E	Symbia S
Total Number	59	59
Diameter	53 - 7.6 cm (3 in) and 6 - 5.1 cm (2 in)	53 - 7.6 cm (3 in) and 6 - 5.1 cm (2 in)
Type	Bialkali high-efficiency box-type dynodes	Bialkali high-efficiency box-type dynodes
Array	Hexagonal	Hexagonal

Detector Shielding	Symbia E	Symbia S
Back	9.5 mm (0.375 in)	9.5 mm (0.375 in)
Sides	12.7 mm (0.5 in)	12.7 mm (0.5 in)
Min./Max. in Patient Direction**	27.9 / 36.4 mm (1.1 / 1.435 in)	27.9 / 36.4 mm (1.1 / 1.435 in)
Brain Reach***	7.6 cm (3 in)	7.6 cm (3 in)

* Without collimators

** 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.

*** Distance from the edge of the detector housing to the edge of the FOV.

Detector Specifications	3/8"	5/8"
Intrinsic Spatial Resolution		
FWHM in CFOV	≤ 3.8 mm	≤ 4.5 mm
FWHM in UFOV	≤ 3.9 mm	≤ 4.6 mm
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	310 kcps	310 kcps
Intrinsic Spatial Resolution @ 75 kcps		
FWHM in UFOV	≤ 4.1 mm	≤ 4.6 mm
FWTM in UFOV	≤ 7.8 mm	≤ 8.9 mm
Intrinsic Flood Field Uniformity @ 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 %

Detector with Collimator Specifications	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 (ME at 10 cm)		
Absolute ¹¹¹ In	430 cpm/μCi	565 cpm/μCi

Detector with Collimator Tomographic Specifications		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	–
System Volume Sensitivity (LEHR)			
UFOV ± 7%		12,000 (cts/sec)/(MBq/cm ³)	–
Detector-Detector Sensitivity Variation (LEHR, ^{99m}Tc)		≤ 5.0% in	–

Detector with Collimator Whole Body Scanning Specifications		3/8"	5/8"
Whole-body System Spatial Resolution Without Scatter @ 10 cm/min Scan Speed (LEHR at 10 cm)			
FWHM Perpendicular		≤ 7.9 mm	–
FWHM Parallel		≤ 7.5 mm	–
FWTM Perpendicular		≤ 14.2 mm	–
FWTM Parallel		≤ 14.0 mm	–

Values are determined at the manufacturer's facility using methods described in NEMA Standards Publications NU 1-2007 "Performance measurements of Scintillation Cameras." The specialized phantoms and software required to reproduce these measurements are available from Siemens.

BiCore™ Collimators Specifications

Collimators	LEHS	LEAP	LEHR	LEUHR	LEFB	ME	HE	EHE	SMARTZOOM
	Low Energy High Sensitivity	Low Energy All Purpose	Low Energy High Resolution	Low Energy Ultra High Resolution	Low Energy Fan Beam	Medium Energy	High Energy	Extra High Energy**	IQ•SPECT
Isotope	^{99m} Tc	^{99m} Tc	^{99m} Tc	^{99m} Tc	^{99m} Tc	⁶⁷ Ga	¹³¹ I	¹⁸ F	^{99m} Tc
Hole Shape	Hex	Hex	Hex	Hex	Hex	Hex	Hex	Hex	Hex
Number of Holes (x1000)	28	90	148	146	64	14	8	4	48
Hole Length	24.05 mm	24.05 mm	24.05 mm	35.8 mm	35 mm	40.64 mm	59.7 mm	50.5 mm	40.25 mm
Septal Thickness	0.36 mm	0.2 mm	0.16 mm	0.13 mm	0.16 mm	1.14 mm	2 mm	3.4 mm	0.2– 0.4 mm
Hole Diameter Across the Flats	2.54 mm	1.45 mm	1.11mm	1.16 mm	1.53 mm	2.94 mm	4 mm	2.5 mm	1.95 mm
Sensitivity @ 10 cm*	1020 cpm/μCi	330 cpm/μCi	202 cpm/μCi	100 cpm/μCi	280 cpm/μCi	310 cpm/μCi	147 cpm/μCi	185 cpm/μCi	N/A
Geometric Resolution @ 10 cm	14.6 mm	8.3 mm	6.4 mm	4.6 mm	6.3** mm	10.8 mm	13.2 mm	10.6 mm	N/A
System Resolution @ 10 cm	15.6 mm	9.4 mm	7.4 mm	6.0 mm	7.3** mm	12.5 mm	13.4 mm	19.0 mm	N/A
Septal Penetration	1.5 %	1.9 %	1.5 %	0.8 %	1.0%	1.2 %	3.5 %	3.4 %	N/A
Exit Surface	N/A	N/A	N/A	N/A	445 mm	N/A	N/A	N/A	52 x 60 cm
Weight for Symbia E	18.9 kg (42lb)	22.1 kg (49 lb)	20.4 kg (45 lb)	25.2 kg (56 lb)	30.5 kg (67 lb)	61.8 kg (136 lb)	134.5 kg (296 lb)	117.0 kg (260 lb)	N/A
Weight for Symbia S	22.4 kg (49.4 lb)	22.6 kg (49.8 lb)	22.1 kg (48.7 lb)	28 kg (61.8 lb)	28.4 kg (62.5 lb)	63.5 kg (140.1 lb)	124.7 kg (275 lb)	120.2 kg (265 lb)	47.2 kg (104 lb)

* Values measured in accordance with NEMA Standards Publication NU-1 2007 using 3/8" crystal.

** The effective FOV of the EHE collimator is 53.3 x 20.3 cm (21 x 8 in).

Pinhole Collimator	Isotope		
	^{99m} Tc	¹²³ I	¹³¹ I
Hole Shape	Round	Round	Round
Number of Holes	1	1	1
Cone Length (approximate)	4 mm, 6 mm, 8 mm	4 mm, 6 mm, 8 mm	4 mm, 6 mm, 8 mm
Diameter at Base of Cone (approximate)	300 mm	300 mm	300 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 Res. at 10 cm with 4 mm	6.2 mm	6.3 mm	7.5 mm
Geometric Res. at 10 cm with 6 mm	9.3 mm	9.3 mm	10.6 mm
Geometric Res. at 10 cm with 8 mm	12.3 mm	12.4	13.6
System Res. at 10 cm with 4 mm	6.6 mm	6.6 mm	7.6 mm
System Res. at 10 cm with 6 mm	9.5 mm	9.5 mm	10.7 mm
System Res. at 10 cm with 8 mm	12.5 mm	12.5 mm	13.7 mm
Weight for Symbia E	74.3 kg (165 lb)	74.3 kg (165 lb)	74.3 kg (165 lb)
Weight for Symbia S	80.3 kg (177 lb)	80.3 kg (177 lb)	80.3 kg (177 lb)

c.clear Attenuation Correction*	Symbia E	Symbia S
Transmission Source Configuration	Multiple Line Array (MLA)	N/A
Number of Arrays per System	2	N/A
Number of Line Sources per Array	14 (7 pairs)	N/A
Transmission Isotope	¹⁵³ Gd	N/A
Transmission Energy	100 keV	N/A
Transmission Activity (Total)	7.1 GBq (192 mCi) Per System	N/A
Replenishment Interval	6 months	N/A
Replenishment Activity	4 Line Sources of 740 MBq (20 mCi)	N/A
Effective Source Life	3.5 years	N/A
Shutter Mechanism (Automatic)	Electric (Fail-Safe)	N/A
Cardiac FOV	53.3 x 19.7 cm (21 x 7.75 in)	N/A
Acquisition Type	90° SPECT and Gated SPECT	N/A
Acquisition Mode	NCO with Pre-scan	N/A
Supported Collimators	LEHR	N/A
^{99m} Tc Protocol	Simultaneous Emission/Transmission	N/A
²⁰¹ Tl Protocol	Pseudo-Sequential (Single Rotation)	N/A
Acquisition Matrix	128 x 128 (no zoom)	N/A
Sampling Size	4.80 mm/pixel	N/A
Reconstruction Method	Flash Iterative Reconstruction	N/A
Resolution Recovery	Yes (Collimator Deblurring)	N/A
Transmission Scatter Correction	Yes, 3-Window Method	N/A
Emission Scatter Correction	No	N/A
Supported Patient Weight	Up to 180 kg (400 lb)	N/A

Symbia Room Layouts

System Environmental Requirements	Symbia E
Minimum Room Size	345 x 425 cm (11 ft 4 in x 14 ft)
Floor Loading	0.073 kg/sq cm (1 lb/sq in) Maximum Under the Floorplate
Electrical Supply	Single Phase 200/208/220/230/240 V, 50/60 Hz, 2.9 kVA
Heat Dissipation	7368 BTU/hr
Temperature Range	18°-30° C (64°- 86°F)
Maximum Temperature Gradient	4.4°C/hour (8°F/hour)
Humidity Range	20-80 % non-condensing

System Environmental Requirements	Symbia S
Minimum Room Size	360 x 475 cm (11 ft 10 in x 15 ft 7 in)
Floor Loading	3.37 kg/sq cm (48 lbs/sq in) Maximum Under the Gantry
Electrical Supply	Single Phase 200/208/220/230/240 V, 50/60 Hz, 3.0 kVA
Heat Dissipation	6500 BTU/hr
Temperature Range	18°-30° C (64°- 86°F)
Maximum Temperature Gradient	4.4° C/hour (8° F/hour)
Humidity Range	20-80 % non-condensing

* Floor loading based on utilization of a floor plate.

Conformance to Standards

The Symbia family conforms to the Medical Device Directive Quality System and the Essential Requirements of the Medical Device Directive. The product is designed and tested for safety in accordance with IEC 60601 and for Electro-Magnetic Compatibility (EMC) in accordance with the European Union's EMC Directive, 89/336/EEC. Labeling for these requirements as well as ISO 9001 and Class II Laser Product appears at appropriate locations on the product and in its literature. The software is DICOM compliant. The scanner is CSA compliant.

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