Open up your possibilities

Philips GEMINI TF Big Bore PET/CT specifications

When it comes to streamlining staging, planning, therapy, and follow-up in oncology care, the Philips GEMINI TF Big Bore gives you a flexible solution that lets you do more for patients, efficiently. Combining a CT simulator with state-of-the art PET imaging allows for the integration of molecular information into the radiation therapy planning process. The full 85 cm bore diameter for both PET and CT allows patients to be positioned in the same manner for both simulation and therapy. The rigid table design meets AAPM TG-66 guidelines for positioning accuracy and the 60 cm true CT scan FOV gives you the same capabilities as a premium CT simulator. Astonish TF Time-of-Flight (TOF) technology improves contrast resolution up to 30% compared to non-TOF and provides reconstruction times as fast as 30 seconds per bed.

Key advantages

- Full 85 cm bore diameter for both PET and CT allows positioning consistency between simulation and therapy
- Rigid table design meets stringent AAPM TG-66 guidelines for positioning accuracy
- Astonish TF provides up to 30% improved contrast resolution compared to non-TOF PET

PHILIPS

sense and simplicity

GEMINI TF Big Bore PET

Superb insight throughout the care cycle

The GEMINI TF Big Bore is the only PET/CT system built with a CT simulator providing exceptional flexibility across the oncology care cycle. With a 60 cm true scan FOV and CT simulation protocols, you have the ability to conduct therapy planning scans utilizing both CT and PET.

Leverage the significant workflow and clinical advantages of our advanced applications, such as Tumor LOC. Further improve accuracy with the only PET/CT system with a table that meets the AAPM TG-66 positional accuracy requirements necessary for absolute patient marking.

Proprietary technology to streamline workflow

Philips Astonish TF Time-of-Flight technology helps improve image quality and reduce scan times by capturing the actual time difference between coincident events. Perform high-resolution, diagnostic whole-body PET scans quickly, even for large patients, across a range of applications.

System overview	
PET platform	Astonish TF
CT platform	Brilliance CT Big Bore
Patient port	85 cm for PET and CT
Gantry cooling	Air-cooled
Attenuation correction	CT
Patient handling system	
Maximum patient weight	227 kg (500 lb)
Vertical travel	47.1 cm
Patient scan range	190 cm
Horizontal speed	185 mm/s
Minimum table height	55.9 cm
AAPM TG-66 positional accuracy	Yes
PET detector design	
Detector design	PIXELAR
Number of crystals	28,336
Crystal size	4 x 4 x 22 mm
Crystal material	LYSO
Number of detector rings	44
Hygroscopic	No
Number of PMTs	420
Ring diameter	90 cm
Transaxial FOV	67.6 cm
Axial FOV	18 cm
Coincidence window size	3.8 ns[1]
Lower level discriminator	460 keV

[1] With 57.6 cm field of view

[2] PET performance specifications represent typical values measured following the methodology of NEMA standard publication NU 2-2007, unless otherwise noted

NEMA performance specifications[2]	
System sensitivity	6600 cps/MBq (center) 6700 cps/MBq (10 cm)
Trans spatial resolution @ 1 cm with LOR[3]	4.7 mm 4.3 mm
Trans spatial resolution @ 10 cm with LOR[3]	5.1 mm 4.7 mm
Axial spatial resolution @ 1 cm With LOR[3]	4.7 mm 4.3 mm
Axial spatial resolution @ 10 cm With LOR[3]	5.2 mm 4.7 mm
Peak noise equivalent count rate – 1R (NECR)	90 kcps @ 14 kBq/ml
Clinical noise equivalent count rate (NECR)[3]	60 kcps @ 5.3 kBq/ml
Max trues	210 kcps
Scatter fraction	26%
System energy resolution	11.7%
Time-of-Flight performance[2]	
Timing resolution	495 ps
Sampling rate	25 ps
Sensitivity gain[4]	2-5x, depending on patient size
System sensitivity	17800 cps/MBq (center) 18000 cps/MBq (10 cm)
Peak NECR	240 kcps @ 14 kBq/ml
Clinical NECR[5]	160 kcps @ 6 kBq/ml
TOF localization accuracy	7.43 cm

[3] Incorporating the effects of Line of Response (LOR) reconstruction

[4] Effective sensitivity gain defined as a ratio between patient size and Time-of-Flight localization accuracy

[5] NEC at a 10 mCi clinical imaging dose for FDG whole body studies in an average patient (73 kg/160 lb)

PET acquisition and reconstruction

- 3rd generation Philips Time-of-Flight technology
- Static, dynamic, and gated acquisition
- List mode acquisition for all protocols
- List mode Time-of-Flight reconstruction
- Fully 3D Line of Response (LOR) processing
- High definition PET reconstruction
- Concurrent acquisition and reconstruction
- CT attenuation correction, including algorithms for metal and contrast artifact reduction

PET software processing

- Comprehensive PET/CT review tools
- Automated 3D contouring

Optional

- Advanced automated registration with CT, MR, and SPECT
- Cardiac perfusion and viability analysis
- Quantitative brain analysis

GEMINI TF Big Bore CT

Generator	
The Brilliance generator uses modern, low-voltage slip ring technology to provide constant high voltage to the CT X-ray tube assembly.	
Output capacity	60 kW
kV	90, 120, 140 kVp
mA	20-500 mA; 1 mA increment

MRC X-ray tube	
The exceptional heat management demands of multislice imaging calls for an exceptional tube. With its patented spiral groove bearing design, the Philips MRC tube dissipates heat as rapidly as it is collected, with an effective heat storage capacity far superior to a conventional ball bearing design. Additional features include: • Motion-free focal spot enhances image quality • Absolute noiseless design • 2nd generation of MRC tube technology built on proven record of performance and reliability	
Effective heat storage capacity	26 MHU
Anode storage capacity	8.0 MHU
Anode max cooling rate	1608 kHU/min
Large focal spot (IEC)	1.0 mm x 1.0 mm
Small focal spot (IEC)	0.5 mm x 1.0 mm
Anode diameter	200 mm
Anode rotation speed	105 Hz (6300 RPM)
Target angle	7°
Focus-detector distance	1183 mm
Focus-isocenter distance	645 mm

Dynamic focal spot
Enables ultra-high spatial resolution in axial and spiral scanning by sampling two fan beams alternately, doubling the reconstruction data samples.

Tach Technology
Our patented Tach Technology is a complete, high-speed, multichannel data acquisition system (DAS) in a single 8 mm x 8 mm chip. The chip replaces multiple cables and large computer cards seen in conventional multislice CT detector assemblies and delivers a virtually perfect direct digital signal.

Detector	
Our patented detector design enables high-quality images while reducing patient dose.	
Material	Solid-state GOS
Number of elements	19,584 (39,168 effective with DFS)
Dynamic range	1,000,000 to 1
Slip ring	Optical – 2.5 Gbps transfer rate

Data sampling rate	
Up to 5280 views/revolution/element	
360° rotation time	0.44s
Slice collimation	2 x 0.6 mm, 16 x 0.75 mm, 16 x 1.5 mm, 8 x 3.0 mm, 4 x 4.5 mm

Slice thickness	
Spiral mode	0.65 – 7.5 mm variable
Axial mode	0.75 – 12 mm
Scan angles	240°, 360°, 420°
Scan field of view	250, 350, 500, 600 mm
Display field of view	Up to 70 cm

Image quality	
Spatial resolution (high)	15.0 Lp/cm @ cut-off
Spatial resolution (standard)	12.0 Lp/cm @ cut-off
Noise	0.27% as measured on the Philips system phantom (21.6 cm water equivalent)
Low contrast resolution	4.0 mm @ 0.3% as measured on the 20 cm CATPHAN phantom
Absorption range	-1024 to +3072 Hounsfield units

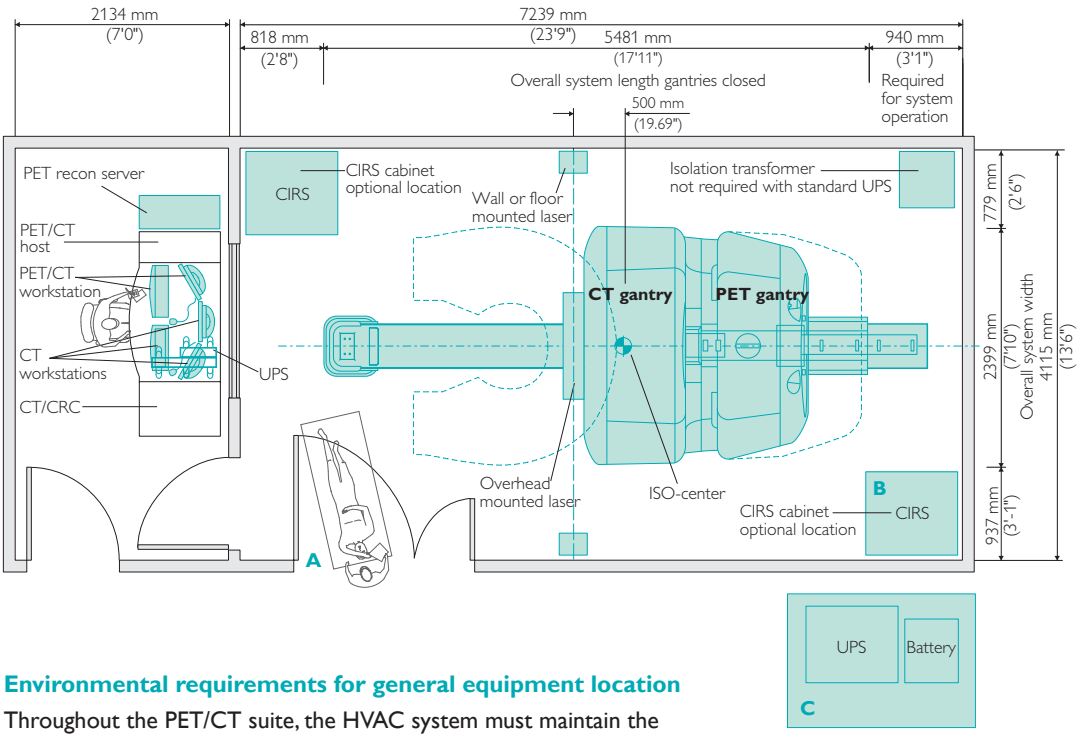
Dose levels	
CTDIvol – head	10.17 mGy/100 mAs
CTDIvol – body	5.27 mGy/100 mAs

Exclusive OpenView gantry

- Designed to enhance the patient experience, especially for claustrophobic and pediatric patients, and provide patient access to clinicians
- Gantries further separate for expanded access and other clinical applications

Philips GEMINI TF Big Bore makes molecular imaging in radiation therapy a reality.

GEMINI TF Big Bore gantry and site planning



A. Recommended scanner room openings

1829 mm (6'0") opening off a 1829 mm (6'0") corridor.
1524 mm (5'0") opening off a 2438 mm (8'0") corridor.

B. CIRS cabinet

May be remotely located within 22860 mm (75 cable feet) of the workstation assemblies and the gantry.

C. UPS system and battery

Minimum area for any Philips approved version UPS is 2134 mm (7'0") x 1524 mm (5'0"). UPS HVAC: 6000 BTUs. Standard UPS system, exact UPS, and battery location shall be determined by customer. Largest UPS (50 Hz version) shown.

Environmental requirements for general equipment location

Throughout the PET/CT suite, the HVAC system must maintain the temperature between 15°C (59°F) to 24°C (75°F). Humidity must be between 35% and 70%, non-condensing. These requirements are 24 hours per day, 7 days per week.

Power requirements	
Main type	Three phase
Room supply voltage	200 – 500 VAC
System voltage, PET/CT (after LM transformer or UPS)	480 VAC +/- 10%
Frequency	50 or 60 Hz, nominal
Power quality	Refer to IEC 61000-4-4 and IEC 61000-4-5
Distribution transformer	100 kVA (minimum)
Minimum room size	
Exam room	7239 x 3810 mm (23´9˝ x 13´6˝)
Control room	2134 x 3810 mm (7´0˝ x 12´6˝)

Scanner characteristics	
Gantry dimensions (couch home), H x W x D	219 x 239 x 548 cm (86 x 94 x 215 in)
Weight	3863 kg (8500 lb)
Power requirements, PET/CT	100 kVA (maximum)
Heat load (all components)	35,750 BTU/hr
PET/CT system	25,950 BTU/hr
Reconstruction cabinet	5,300 BTU/hr
Control room computers	4,500 BTU/hr

Detailed site planning requirements are documented in the Planning Reference Data (PRD) guide and are available upon request.

Please visit www.philips.com/geminitfbigbore

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