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Multislice HELICAL CT SCANNER

Product Data
No. MPDCT0242EAJ

Aquilion

APPLICATION

The Aquilion™ 16-slice system is a multislice Helical CT system that supports whole-body scanning.
The Aquilion 16-slice system generates fast helical scanning of the whole body through the high performance MegaCool™ X-ray tube and advanced Quantum detector. To maximize workflow, the Aquilion 16-slice system comes standard with a scan and display console, and optimized scan protocols.

FEATURES

- **High-speed scanning**
  Utilizing all of the Quantum detector's 32 mm of volume coverage in combination with 0.5-s scanning allows up to 96 mm of coverage every second. Run-off exams up to 768 mm can be acquired in 10 seconds with 2 mm slice.

- **Long scanning range**
  The long scanning range of 1,800 mm and the high scanning speed together facilitate whole-body trauma examinations.

- **Excellent image quality**
  The system achieves a low-contrast detectability of 2 mm at 0.3% and a high-contrast resolution of 0.35 mm in the x, y, and z directions.
  Routine multislice helical CT examinations can be performed using thin slices, enabling high-precision 3D and MPR images to be generated from the fine isotropic voxel data.

- **Advanced image reconstruction**
  This system employs the TCOT (true cone-beam technology) helical reconstruction technique, which uses the Feldkamp method to precisely compensate for the cone angle, to minimize artifacts related to the cone angle and provide accuracy over the entire field of view.

- **Tilt helical scanning**
  TCOT cone-beam reconstruction, which uses the Feldkamp method to precisely compensate for the angulation of the beam, enables helical scanning with the gantry tilted in the range from 30° forward to 30° backward. Angled helical acquisition is useful for many applications, including obtaining the correct scan plan for routine brain scans. This ability makes it easy to avoid X-ray exposure to the patient's orbit.

- **SUREFluoro™ (option)**
  Conventional CT fluoroscopy shows only a single slice, but SUREFluoro (multislice CT fluoroscopy) permits realtime image reconstruction to display 3 images obtained by combining data from the Quantum detector. SUREFluoro significantly improves operability in biopsy and interventional procedures.

- **Upgradability (0.4-s scanning option)**
  0.4-s scanning option allows faster acquisition and reduced motion artifact. For cardiac examination, up to 40 images per second are acquired and scanning can be completed within 25 seconds with a temporal resolution down to 40 ms.

- **High patient throughput**
  Scan and display consoles maximize workflow. Both consoles can be operated independently enabling parallel processing, which significantly improves the efficiency of image processing and diagnosis.
  In addition, the high cooling rate of the 7.5-MHU tube, which reduces the cooling time required between scans, and the high scanning speed, which reduces the exposure time, both increase the patient throughput significantly.

COMPOSITION

Aquilion < 16-slice system >

Standard composition (Model: TSX-101A/G)

- Gantry 1
- Patient couch 1
- Console ..... 1 set
- Accessories
  - Inter-unit cables
  - Manuals
  - Set of phantoms
  - Acquisition support
  - Footswitch for the patient couch

Note: The console desk is not included in the standard configuration.

Optional items

- System transformer (CETF005C)
- Fast scan kit (CGS-33B)
- Pediatric scanning system (CHKS-002A)
- SUREFluoro (TSXF-003E)
- LCD monitor for SUREFluoro (48.1 cm (19-inch) type) (CMM-004A)
- ECG-gated scan system (CHEG-004C)
- ECG-gated reconstruction system (CHEG-004B)
- Injector synchronization system (CKIS-004A)
- Orbital synchronized scan system (CKOS-001A)
- Display system for dental application (CDP-07A)
- FlyThrough software (CFT-03A)
- Cardiac function analysis software (CSCF-002A)
- Cerebral blood-flow analysis system (CBP-study) (CSCP-002A)
- SURECardio™ scoring (CSCS-001A)
- Colon view (CSCV-001A)
- Fat index view (CSFM-001A)
- SUREPlaque™ (CSPV-002A)
- Vessel view (CVV-001A)
- Color printer interface (CCP-03A)
- DICOM storage SCP (COT-30D)
- DICOM MWM (COT-32D)
- DICOM MPPS (COT-33D)
- DICOM Q/R SCP (COT-34D)
- DICOM Q/R SCU (COT-35D)
- DICOM storage commitment SCU (COT-41D)
- DICOM PGP profile (COT-44A)
- DICOM fast transfer system (COT-45A)

Note: Please check with your local sales representative as some of these options may not be available in your local market.

PERFORMANCE SPECIFICATIONS

Scan parameters

- Scan regions: Whole body, including head
- Scan system: 360° continuous rotate/rotate
- Scan plan programming: Up to 360 different sequences can be pre-programmed.
- Scan time
  - CT scan: 0.4*1, 0.5, 0.6*1, 0.75, 1, 1.5, 2, and 3 s (partial: 0.25*1 and 0.32 s)
- Scan cycle time (for 0.5-s scan)
  - SCAN & VIEW mode: Min. 1.5 s (single image display)
  - SCAN & SCAN mode: Min. 1.5 s (rapid sequence scanning, couch-top movement 10 mm)

Note: The scan cycle time refers to the time between the start of one scan and the next.
SCAN & VIEW mode permits immediate viewing of images after acquisition of each individual row.

- Scan field
  - CT scan: ϕ180 mm (SS)
    ϕ240 mm (S)
    ϕ320 mm (M)
    ϕ400 mm (L)
    ϕ500 mm (LL)
  - Scanoscopy:

Axial direction	Longitudinal direction
240 mm (S)	Adjustable from 200 mm to 1,750 mm (1,450 mm*)
400 mm (L)	
500 mm (LL)	

*: For the short patient couch version

Note: The actual range that can be viewed is less than the couch-top movement range in scanoscopy.

- Slice thickness: 0.5, 1, 2, 3, 4, 6, and 8 mm

These slice thicknesses are implemented by stacking the data acquired in one of the following acquisition modes.

- Acquisition
  - 16-row: 0.5 mm × 16 rows
    1 mm × 16 rows
    2 mm × 16 rows
  - 4-row: 0.5 mm × 4 rows
    1 mm × 4 rows
    2 mm × 4 rows
    3 mm × 4 rows
    4 mm × 4 rows
    6 mm × 4 rows
    8 mm × 4 rows
  - 1-row: 1 mm × 1 row
    2 mm × 1 row
    4 mm × 1 row
    6 mm × 1 row
    8 mm × 1 row

*1: Option

- Gantry tilt angle: From forward 30° to backward 30° (in 0.5° increments) Remote control from the console is possible.
- Tube position for scanoscopy: 0°, 90°, 180°, and 270° Any arbitrary angle can be specified (in 5° increments).
- Gantry aperture: 720 mm in diameter

Patient couch

- Load limit
  - Max. allowable load: 205 kg (450 lb)
- Footswitch: Either the vertical movement or Auto set/Auto home function can be selected.
- Vertical movement
  System: Hydraulically driven
  - Speed of vertical movement: Up: 16 to 24 mm/s (50 Hz), 19 to 28 mm/s (60 Hz); Down: 20 to 30 mm/s
  - Stroke: Approx. 644 mm
  - Minimum couch-top height: Approx. 300 mm
  - Maximum couch-top height: Approx. 944 mm
- Couch-top movement
  System: Motor-driven or manual
  - Speed of movement: 130 mm/s (fast), 10 mm/s (slow)
  - Stroke: 2,190 mm (for the long patient couch version), 1,890 mm (for the short patient couch version)
  - Scannable range: (with headrest) 1,800 mm (for the long patient couch version), 1,500 mm (for the short patient couch version)
  - Step feed pitch: 0.5 to 600 mm in 0.5-mm increments
  - Reproducibility: ±0.25 mm
    (Accuracy) Repeatable to within ±0.25 mm after 600-mm movement
- Couch-top width: 470 mm
- Remote control from the console is possible.

  Note: This function allows the user to check the image on the console and to adjust the couch top without leaving the console. Adjustment is possible in 10-mm increments at the console.

Voice-recorded instruction and scan system (VoiceLink)

Voice instructions to the patient can be recorded electronically by the operator and automatically played back during scan sequences as part of the eXam Plan.

- Number of messages: Max. 32 messages
- Number of seconds: Max. 128 s for a total of 32 messages
- Recording time: Max. 30 s per message
- Delay time setting: The delay time between the end of the message and the start of scanning can be set up to 10 s in increments of 1 s.

Helical scan

- X-ray tube rotation speed: 0.4*1, 0.5, 0.6*1, 0.75, 1, 1.5 s/360°
- Continuous scan time: Max. 100 s
- Scan start time delay: Min. 1 s
  Setting is possible in increments of 0.1 s.
- Image slice thickness:
  - For 16-row scanning (TCOT): A value of up to 10 times the scan slice thickness can be set.
  - For 4-row scanning (MUSCOT): A value of up to 5 times the scan slice thickness can be set.

  (Note that the maximum image slice thickness is 10 mm.)
- Scan field in the longitudinal direction: Max. 1,750 mm/scan (for the long patient couch version) Max. 1,450 mm/scan (for the short patient couch version) Up to 10 scan plans are programmable in one eXam Plan. (Multiple and/or Multi-directional Helical)
- Gantry tilt: Helical scan is possible in the range from 30° forward to 30° backward (only for 16-row acquisition).
- Couch-top speed: The couch-top speed can be specified in the range from 0.8 mm/s to 96 mm/s.
- Helical pitch:
  For 16-row scanning (TCOT): Setting is possible in the ranges from 10 to 16 and from 18 to 24 (in increments of 0.1).
  For 4-row scanning (MUSCOT): Setting is possible in the range from 2.5 to 3.5 and from 4.5 to 6.0 in increments of 0.5.

$$\text{Helical pitch} = \frac{\text{Couch-top movement (mm/rot.)}}{\text{nominal scanning slice thickness (mm)}}$$

$$\text{CT pitch factor} = \frac{\text{Helical pitch}}{\text{number of slices scanned in a single rotation}}$$

Note: The CT pitch factor is defined by IEC 60601-2-44 Amd.1: 2002

*1: Option

- SUREExposure™3D: Function for continuously varying the X-ray tube current to ensure the optimal X-ray dose during helical scanning.
- Image reconstruction time: Up to 10 images/s (0.1 s/image)
- Real-time helical reconstruction time: 12 images/s (0.083 s/image) (1 slice, 512 × 512 matrix)
- SUREStart™:
  - Continuous scan time: Max. 100 s
  - Region of interest (ROI): Max. 3 ROIs
  - CT number measurement interval: 0.083 s (12 measurements/s)
  - Scan start delay time: Min. 3 s
  - Display function: Mean CT number and elapsed time
- Specification of reconstruction position: By entering the couch-top position or using the scanogram
- Reconstruction method: TCOT reconstruction (applicable to 16-row acquisition data)
  MUSCOT reconstruction (applicable to 4-row acquisition data)
- Reconstruction mode: Full image
  Half image
  Detail image

Dynamic scan

- Scan time: 0.4*1, 0.5, 0.6*1, 0.75, 1, 1.5 s/360°
- Programmable time: Max. 1 hour
  This refers to the maximum time within which a series of scans is performed following a predetermined eXam Plan.
- Number of programmable scans: Max. 10
  Max. time of one continuous scan is 100 s.
- Scan plan
  - Scan interval: Min. interval is 1 s.
    Setting is possible in increments of 0.1 s in a scan interval of more than 1 s.

Note: When a scanning mode with patient couch movement is used, the minimum scan interval is limited by the time required for movement.

- Scan start delay time: Min. 0.5 s
  Setting is possible in increments of 0.1 s.
- Scan rate: Max. 200 scans/100 s
  (0.5 s scan, 200 rotations)
- Image reconstruction
  - Number of images: Max. 4 images/scan
  - Image interval: Reconstruction is possible in increments of 0.1 s.
- Reconstruction time: Min. 0.5 s
- Real-time reconstruction time: 12 images/s (0.083 s/image)
  (1 slice, 512 × 512 matrix)
- Rapid sequence scan: Min. scan cycle time
  Approx. 1.5 s at 10-mm pitch for 0.5-s scan
- Multi-position dynamic scan: Max. 8 positions

X-ray generation

- X-ray beam shape: Fan-shaped, fan angle 49.2°
- X-ray exposure: Continuous
- Rated output: Max. 60 kW
- X-ray tube voltage: 80, 100, 120, and 135 kV
- X-ray tube current: 10 mA to 500 mA (adjustable in 5-mA increments from 10 to 50 mA and in 10-mA increments for tube currents greater than 50 mA)
- X-ray tube heat capacity: 7.5 MHU
- X-ray tube cooling rate: 1,386 kHU/min (max.)
  1,008 kHU/min (actual)
- Focal spot size
  - IEC 60336: 1993, nominal: 0.9 mm × 0.8 mm (small)
    1.6 mm × 1.4 mm (large)

X-ray detection

- Detection system: Solid-state detectors
- Main detector: 896 channels × 40 elements
- Number of elements: 35,840
- Data acquisition: 896 channels × 16 rows
- Reference detector: 1 set
- View rate: 1,800 views/s
  (0.25*1, 0.32, 0.4*1, 0.5-s scan)
  1,200 views/s
  (0.75, 1, 1.5, 2, 3-s scan)
  800 views/s (Scanoscopy)

Data processing

- Reconstruction matrix: 512 × 512
- Picture element (pixel) size
  - CT image: Unit: mm

Scan field	SS	S	M	L	LL
Pixel size	* to 0.35	* to 0.47	* to 0.63	* to 0.78	* to 0.98

*: Depending on the Vari-Area or Zoom factor

  - Scanogram: Unit: mm

Enlargement ratio (area)		Standard	4 ×
Pixel size	LL	4.00	2.00
	L	2.00	1.00
	M	1.0	0.5
	S	0.50	-

*1: Option

- Reconstruction filter functions
  - Functions for the abdomen with BHC
  - Functions for the abdomen without BHC
  - Functions for the brain with BHC
  - Functions for the brain without BHC
  - Functions for the inner ear and bone
  - Functions for the lung
  - Functions for high-resolution mode
  - Functions for super-resolution mode for the inner ear, bone, and lung
  - Functions for maintenance
- Image reconstruction time
  - CT scan: Min. 0.1 s
  - Scanoscopy: Reconstructed and displayed simultaneously with scanning (real-time reconstruction)
- Data processor (scan console)
  - Central processing unit: 64-bit CPU
  - Memory size: 2 Gbytes
  - Magnetic disk unit: Raw data, 144 Gbytes
Image data, 73 Gbytes
- Data processor (display console)
  - Central processing unit: 64-bit CPU
  - Memory size: 3 Gbytes
  - Magnetic disk unit: Image data, 73 Gbytes

Data storage

- Magnetic disk*1
  - Raw data: Max. 3,600 rotations (0.5-s helical scan)
  - Image data: Max. 100,000 (per each console)
- DVD/DICOM media
  - DVD-RAM
    - · Storage capacity: 9.4 Gbytes (double-sided)
    - · Image data: Max. 16,000 images (for a double-sided disk, DICOM format)
  - DICOM media

    <DVD-R (example)>
    - · Storage capacity: 4.7 Gbytes
    - · Data format: DICOM format (in conformance with DICOM standards PS3.10)
    - · Image data: Max. 7,500 images (assuming that images [512 Kbytes/image] are recorded on a disk at one time)

    <CD-R (example)>
    - · Storage capacity: 650 Mbytes (formatted)
    - · Media: CD-R disk (in accordance with Orange Book part II)
    - · Data format: DICOM format (in conformance with DICOM standards PS3.10)
    - · Image data: Max. 1,000 images (assuming that images [512 Kbytes/image] are recorded on a disk at one time)

Image display

- Display monitor: 48.1 cm (19-inch) color LCD × 2 units
- Monitor matrix: 1,280 × 1,024
- Image matrix: 1,024 × 1,024 (max.)
- CT number
  - Display range: From -1,536 to +8,191

  Note: The CT number measurement range is from -32,768 to +32,767.
- Window width/level: Continuously variable (adjustable at variable speed)
- Preset window: Three types of window settings can be preset for each image.
- Window types: Linear, non-linear (6 user-programmable), and double windows
- Image retrieval
  - Method: On-screen menus and keyboard
  - Mode: Image, series, and patient
- Autoview function: Software control, function key
- Multi-frame display: Reduction/cut-off display, ROI processing
- Inset scanogram display
- Selective related information display
- Cine display
  - Image display speed: Variable
- Scanogram/CT image switching: Show scano line, zoom, hide scano line
- Slice-feed playback (CineView): High-speed image feeding using the mouse or keyboard

Image processing

- Scanogram processing
  - Slice position display (display of planned slice, preset slice, and last scanned slice)
  - Anatomical scale (display of position, relative to selected zero position)
  - Slice position setting
  - Enlargement (4× for L or LL size)
- CT image processing
  - ROI setting and processing
    - · ROI shape: Point, rectangular, polygonal, elliptical, irregular
    - · ROI processing: Mean value, standard deviation, area, number of pixels, maximum value, minimum value
    - · ROI display: Ten ROIs can be displayed on an image.
    - · ROI control: Size, position, rotation
  - Measurement of distance and angle between two points
  - Profile (oblique profile also available)
  - Histogram
  - CT number display
  - Mark display (grid display, scale display)
  - Volume calculation

*1: Option

– Enlargement, reduction, panning
– Addition/subtraction between images
– Band display (non-linear windowing)
– Comment and arrow insertion
– Top/bottom, right/left, black/white reversal of image
– Image filtering
– Image rotation (arbitrary rotation)
– Screen save
– High-speed axial interpolation
– MultiView (Auto MPR)
– Quantum denoising software (QDS)
– Z-sharpening

• Raw data processing
– Zooming reconstruction
– Stack reconstruction
– Protect/Unprotect
– Half-view reconstruction of helical scan raw data
– Play/Reverse reconstruction (Helical & Dynamic scan)
– Priority reassignment in reconstruction queue

• System management
– Warm-up
– Calibration data acquisition
– Picture retouching
– Operating environment setting function
– Examination record

• Display of exposure dose: $CTDI_{vol}$ (or $CTDI_w$) /DLP/ Geometric eff.

3D color image processing

High-quality 3D images can be obtained rapidly by easy operation.

• 3D surface rendering
– Clipping, texture or non-texture

• 3D volume rendering
– Maximum intensity projection (Max-IP)
– Minimum intensity projection (Min-IP)
– X-ray volume rendering
– Intensity volume rendering
– Shaded volume rendering (an arbitrary opacity curve can be set)

• Display/processing function
Zooming, panning, measurement (distance, angle), annotation, cutting, drilling

• Cine display

• MPR
3 orthogonal planes/oblique image
Curved MPR

Image transfer

• 1000BASE-T, 100BASE-TX, 10BASE-T
• Toshiba protocol
• DICOM storage SCU
• TIFF conversion

Filming

• Ethernet: Toshiba protocol
DICOM PRINT
• Sheet editing function using virtual film
• T-mode: Related information items such as the patient name are displayed in the footer area using a larger font.

Note: To use T-mode, the laser imager must support 2048 pixels x 2404 pixels for a 1 x 1 frame.

• Auto filming in eXam Plans

IMAGE QUALITY

• Noise
– Standard deviation: Less than 0.5%
– Scan parameters
· Tube voltage: 120 kV
· Tube current: 500 mA*
· Scan time: 1 s
· Reconstruction function: FC70
· Slice thickness: 8 mm
· Scan field: S
– Phantom: ϕ24 cm water

* Corresponds to 400 mA at a 10-mm slice thickness.

• Spatial resolution: 14.5 lp/cm at MTF 2%
18 lp/cm at cutoff (reference)
8.0 lp/cm at MTF 50% (MTF calculation value)
– Scan parameters
· Tube voltage: 120 kV
· Tube current: 200 mA
· Scan time: 1 s
· Slice thickness: 2 mm
· Scan field: S
· Reconstruction function: FC90
– Phantom: ϕ16 cm CATPHAN

• High contrast resolution
X-Y plane
– High-resolution mode (FC90): ϕ0.35 ± 0.05 mm
– Standard mode (FC30): ϕ0.55 ± 0.05 mm
– Scan parameters
· Tube voltage: 120 kV
· Tube current: 300 mA
· Scan time: 0.5 s
· Slice thickness: 2 mm
· Scan field: S (30 mm: zooming used)
– Phantom: Toshiba standard
Z-direction
– Standard mode (FC10): ϕ0.35 ± 0.05 mm

– Scan parameters
  · Tube voltage: 120 kV
  · Tube current: 50 mA
  · Scan time: 0.5 s
  · Slice thickness: 0.5 mm × 16
  · Helical pitch: 11
– Phantom: Toshiba ladder phantom

• Low contrast detectability

	2 mm at 0.3%	3 mm at 0.3%
Slice thickness	10 mm (calculated)	10 mm (calculated)
Surface dose	26.7 mGy	16.7 mGy
Phantom	ϕ20 cm CATPHAN	ϕ20 cm CATPHAN

• $CTDI_{vol}$ (Volume $CTDI_w$, Unit: mGy/100 mAs)
– Head mode: 20.5 mGy*
– Body mode: 12.1 mGy*

*: Measured on Standard Head and Body CTDI phantoms.

SYSTEM COMPONENTS AND THEIR FUNCTIONS

Gantry

The gantry includes the main body and its support mechanism. The X-ray tube and the detector are mounted facing each other on either side of the gantry aperture and rotate continuously. A slipring is employed to transmit power between the gantry and the rotating X-ray high-voltage generator assembly.
The gantry can be tilted forward and backward to perform tilt scanning. Three-dimensional alignment lights are provided for setting slice positions. Gantry and patient couch operating controls are provided on both sides of the front of the gantry housing. The patient guide display indicates the scan status to the operator and the patient. The X-ray high-voltage generator is built into the gantry, and the system employs a high-frequency inverter for generating and stabilizing the high voltage supplied to the X-ray tube. The generator includes electronic circuits for controlling the speed of the rotating anode in the X-ray tube. Use of a high-frequency inverter system results in high power output combined with excellent stability. In addition, the system is compact and light weight.

Patient couch

The patient couch is positioned in front of the gantry and supports the patient. The entire unit moves vertically and the top moves longitudinally. In an emergency, the couch top can be pulled out manually with very little effort. The couch top can also be lowered to a minimum height of 30 cm from the floor, facilitating transfer of the patient from a low bed or stretcher.
The construction of the couch allows the use of a mobile C-arm for combined CT-Angio examinations.

Console

The two consoles are provided with two sets of hybrid keyboards, monitors, and mouses. The scanning console and the display console can be operated independently, enabling parallel processing, which significantly improves the efficiency of image processing and diagnosis.

OPERATING FEATURES

Patient handling and positioning

- The couch top can be lowered to 300 mm (at the center of the couch top) from the floor, making it easier to transfer the patient to and from a bed or stretcher.
- Alignment lights are provided in the gantry aperture for fast and accurate patient positioning.
- High-precision couch-top positioning is possible from the integrated console or by manual operation from the control panel and clear digital readouts are provided on the gantry.
- The couch top can be pulled out manually in an emergency.

Scanning

- Toshiba's Scanoscope function provides a projection image of the patient for high-precision advance planning of the slice positions.
- The longitudinal length of the scanning field for the scanogram can be adjusted up to 1,750 mm (1,450 mm for the short patient couch version). Because the image is reconstructed in real time, the scan can be aborted at any time. This minimizes the patient exposure.
- The auto index function allows automatic incremental couch-top movement based on the slice positions determined through the scanogram.
- The eXam Plan function allows simple selection of preprogrammed scanning parameters for routine examinations, maximizing patient throughput.
- The Vari-area function allows the user to pre-select a region of interest for zooming using raw data, permitting immediate post-scan analysis. Zooming using raw data yields higher resolution than enlarging an image that has already been reconstructed.
- Dynamic and rapid sequence scan modes are provided.
- Multislice Helical Scan acquires raw data by rotating the X-ray tube continuously while moving the patient continuously through the scanner. The volume data acquired can be used to reconstruct slices at any desired axial positions. This scan mode is best used for rapid patient scanning during a single breath-hold and for high-definition three-dimensional and MPR imaging.
- Real-time helical reconstruction mode makes it possible to observe the images being scanned in real time at a maximum at 12 frames per second. This mode shows any shift in the slice position in real time and helps the operator to check the scan field on the image, the contrast study timing, the presence of patient body motion, etc. The patient can therefore be released immediately after scanning.
- The SUREStart function allows the operator to start helical scanning at the timing of maximum enhancement in contrast studies. SUREStart monitors the scan from the start of a contrast study at a certain slice position while measuring the changes in CT number on the image being displayed in real time. When the contrast reaches the predefined threshold, helical scan automatically starts. This technique ensures optimal contrast enhancement, independent of individual differences in blood flow speed, and at the same time minimizes the dose of contrast medium.

Data processing

- A variety of reconstruction algorithms are available and can be selected according to the anatomical region to be examined and the clinical objective of the study. These include algorithms for the abdomen, head, bone, lung, small structures, soft tissues, etc.

Image display and processing

- Reconstructed images are automatically displayed according to the window settings preset in the eXam Plan.
- The window save function allows the user to store an image with window settings different from the ones set in the eXam Plan.
- Filter parameters can be customized through simple on-screen menu selections. These parameters include the number of filtering passes, matrix size, and filter coefficients.
- Images can be rotated and reversed either right/left, top/bottom, or black/white.
- The Multi-frame feature allows up to 16 images to be retrieved and displayed simultaneously on the screen.
- The three-dimensional image display function allows color three-dimensional and real-time MPR images to be generated from the volumetric scan data acquired by helical scanning. This results in higher definition and image quality than images reconstructed from conventional single-slice scanning. This is because helical scanning provides superior data continuity along the patient axis compared with conventional scanning.

Image filming

- Filming of images can be performed manually or automatically from the console.
- Automatic filming sends an entire study to the laser camera. Filming is performed in background mode so that other scanner and image processing functions can be performed without interruption or delay.
- When T-mode is used, related information items displayed together with an image (surrounding the image, in a small font) are displayed in the footer area using a larger font, permitting not only easier reading but also simpler film management.

Note: To use T-mode, the laser imager must support 2048 pixels x 2404 pixels for a 1 x 1 frame.

Patient throughput

Patient throughput and cost effectiveness were major objectives in the design and production of the Aquilion CT scanner.

- The system incorporates a 7.5-MHU X-ray tube with a very fast cooling rate of 1,008 kHU/min in actual use.
- Real-time reconstruction is possible during helical acquisition and scanoscopy.
- Up to 10 CT images per second can be reconstructed from a helical CT acquisition.
- The non-helical scan cycle time is as short as 1.5 seconds (Conventional Scan & View mode).
- Ease of operation is ensured by incorporating use of a hybrid keyboard, mouse-driven menus, and large color LCD screens.
- The couch top can be lowered very near the floor, simplifying patient transfer.

COMPLIANCE

Council Directive 93/42/EEC and subsequent amendments

- IEC:
  IEC 60601-1: 1988+Amd.1: 1991+Amd.2: 1995
  IEC 60601-1-1: 2000
  IEC 60601-1-2: 2001+Amd.1: 2004
  IEC 60601-1-3: 1994
  IEC 60601-1-4: 1996+Amd.1: 1999
  IEC 60601-1-6: 2006
  IEC 60601-2-28: 1993
  IEC 60601-2-32: 1994
  IEC 60601-2-44: 2001+Amd.1: 2002
  IEC 60825-1: 2007
  IEC 62304: 2006
  IEC 62366: 2007

DIMENSIONS AND MASS

Unit		Dimensions W × L × H mm (in)	Mass kg (lb)
Gantry		2,330 × 960 × 1,950 (91.7 × 37.8 × 76.8)	1,750 (3,857)
Patient couch	Long patient couch version	630 × 2,690 × 450 (24.8 × 105.9 × 17.7)	450 (992)
	Short patient couch version	630 × 2,390 × 450 (24.8 × 94.1 × 17.7)	420 (926)
Console (when a recommended dedicated desk* is used)		2,050 × 815 × 1,255 (80.7 × 32.1 × 49.4)	240 (529)
CPU cabinet		450 × 815 × 700 (17.7 × 32.1 × 27.6)	120 (265)
REC cabinet		450 × 815 × 700 (17.7 × 32.1 × 27.6)	85 (187)

* Toshiba recommends a width of at least 1,600 mm.

SITING REQUIREMENTS

Power requirements

- Phase: Three-phase
- Voltage: 200 V*
- Frequency: 50 Hz or 60 Hz ±0.5 Hz
- Line capacity: 100 kVA
- Voltage fluctuation due to load variation: Less than 5%
- Power voltage fluctuation: Less than 10%**

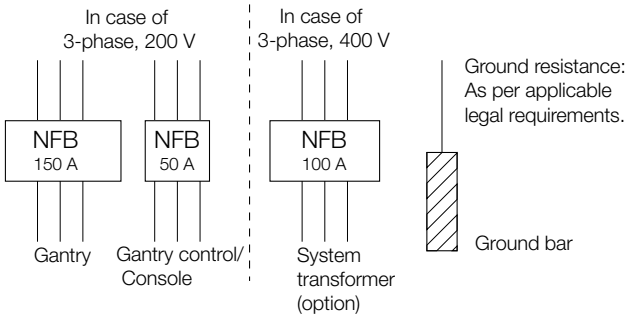
* Please consult Toshiba in the case of other voltages or excessive power fluctuation.

** Represents the total voltage fluctuation due to load and power variation.

Grounding

Grounding must be provided in accordance with local regulations for medically used electrical equipment.

Power distribution board



Ambient conditions

	Temperature	Humidity	Heat generation
Scan room			
Gantry	20°C to 26°C	40% to 80%	Approx.
	Tolerance: ±2°C	No	14,400 kJ/h (*1)
		condensation	36,000 kJ/h (*2)
Patient couch	20°C to 26°C	40% to 80%	Approx.
	Tolerance: ±2°C	No	1,080 kJ/h (*1)
		condensation	1,800 kJ/h (*3)
Operator's room			
Console	16°C to 28°C	40% to 80%	Approx.
		No	10,800 kJ/h (*1)
		condensation	

*1: When scanning is not performed.

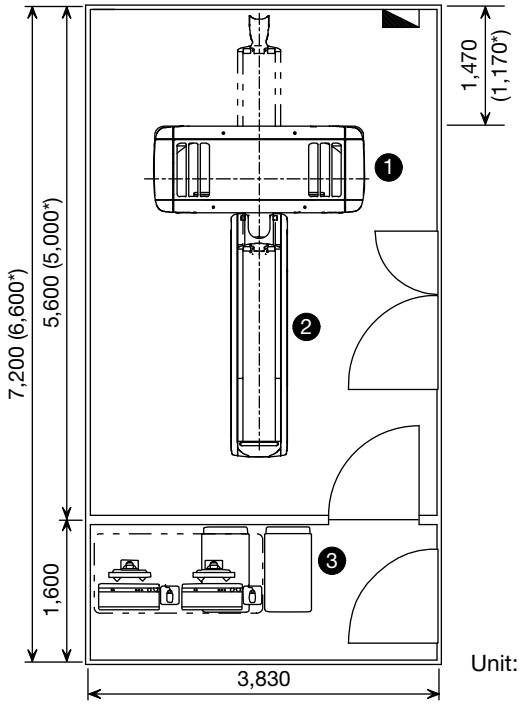
*2: When scanning is performed continuously at maximum rated output (system with MegaCool tube).

*3: When scanning is performed continuously at the maximum rated output of the system.

Minimum area for installation

- For the long patient couch version: 27 m^2
  - CT room area: 21 m^2
  - Control room area: 6 m^2
- For the short patient couch version: 25 m^2
  - CT room area: 19 m^2
  - Control room area: 6 m^2

Room layout example



Unit: mm

1 Gantry
2 Patient couch
3 Console

*: For the short patient couch version

Installation requirements

Scan room

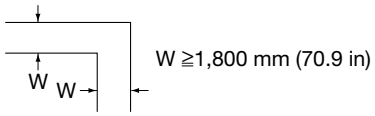
- Before installing the gantry, check the maximum permissible floor load.
- The scanner emits radiation. X-ray shielding must be provided around the scan room and the entrance in accordance with all local requirements and regulations.
- The ceiling should be at least 2,500 mm high to permit the use of a contrast medium injector.
- Wiring pits and ducts are required for routing cables that connect the various units.

Operator's room

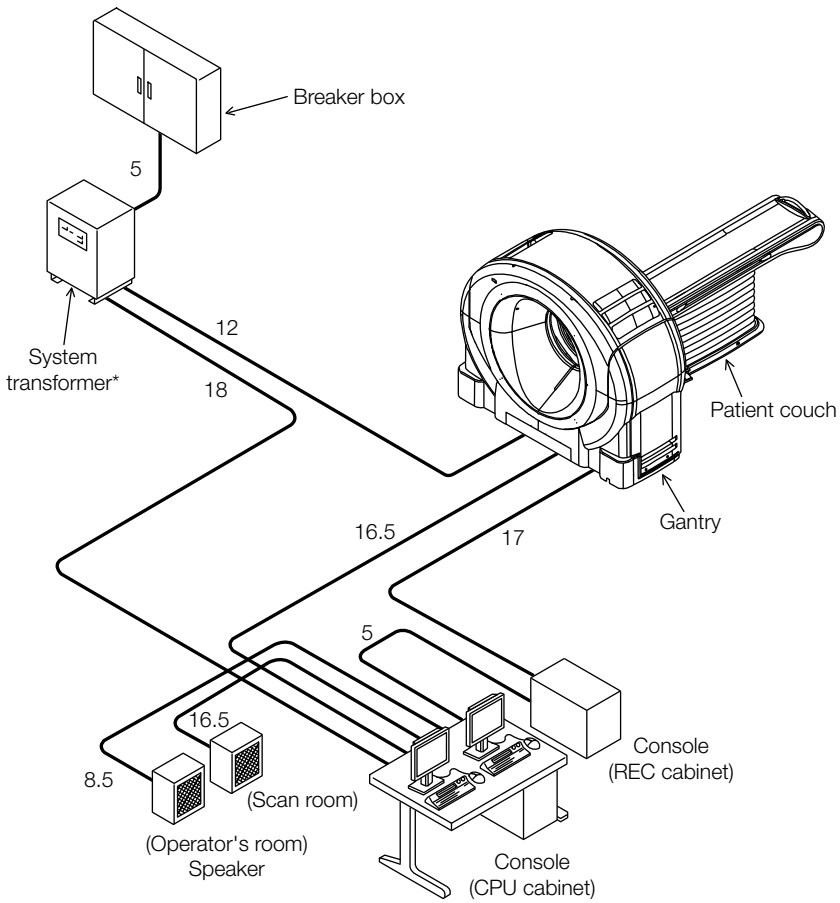
- An observation window is required for monitoring the scan room. X-ray shielding of the window glass must be provided in accordance with all local requirements and regulations, and the bottom of the window frame should be 90 cm from the floor.
- Wiring pits and ducts are required for routing cables that connect the various units.
- The operator's room should have entrances for access to the corridor and the scan room.

Checks before bringing in the unit

- Check in advance the width of the corridor, the dimensions of the entrance, and the dimensions and maximum allowable load of the stairs and elevators to ensure that it is possible to bring in the unit safely and without difficulty.
- Minimum external dimensions of the entrance used for bringing in the unit are as follows:
  Width: 1,100 mm (43.3 in)
  Height: 2,050 mm (80.7 in)
- The corners of corridors should be as illustrated below.
- Elevator minimum load: 2,000 kg (4,400 lb)



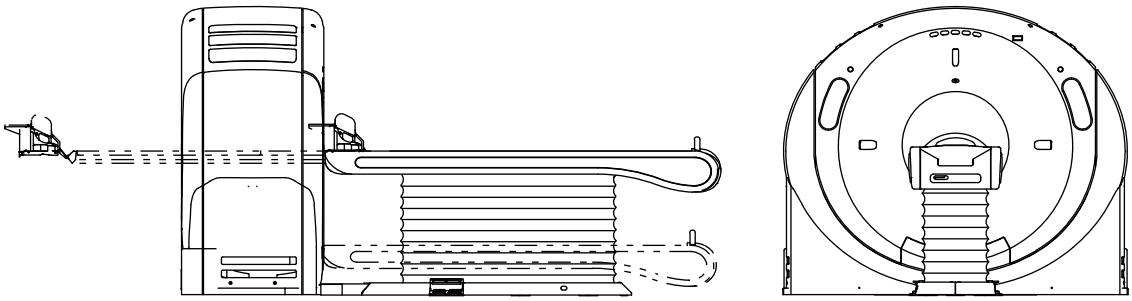
Cable connections between units



*: When line voltage is 200 V ±10 V, the system transformer is not required.

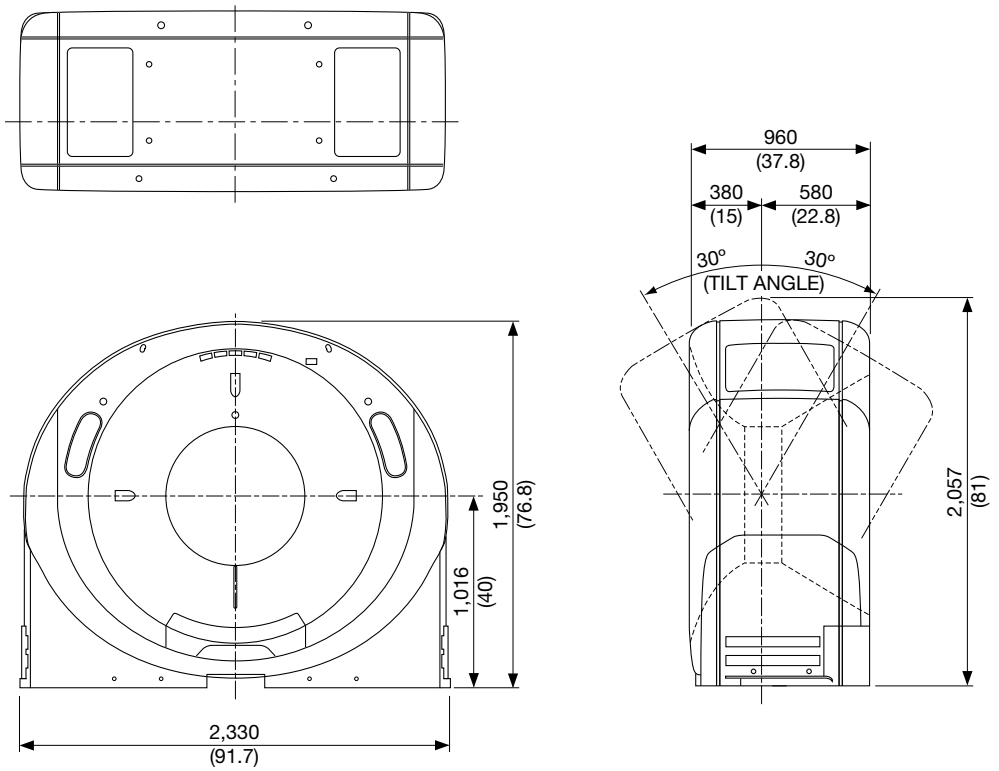
Unit: m

OUTLINE DRAWINGS



Gantry and Patient Couch

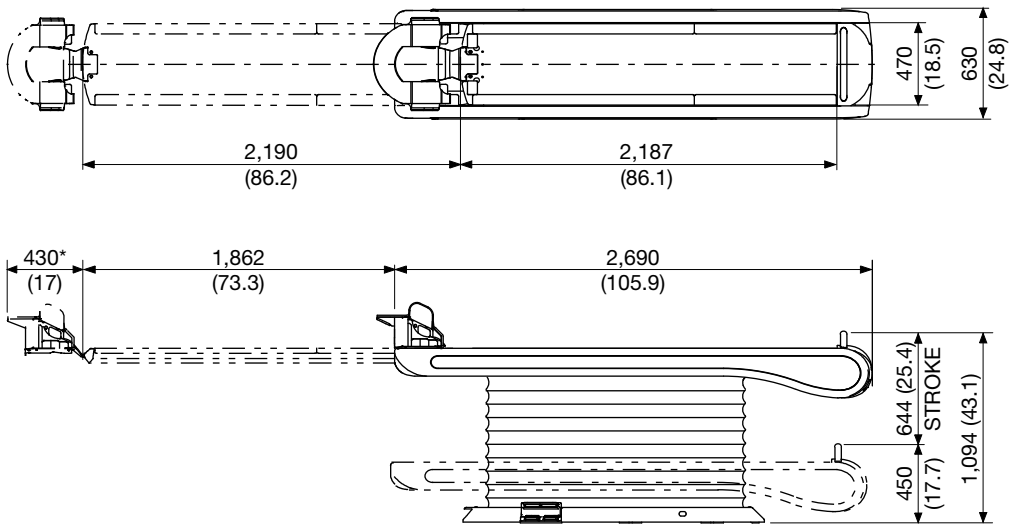
OUTLINE DRAWINGS



Gantry

Unit: mm (in)

OUTLINE DRAWINGS

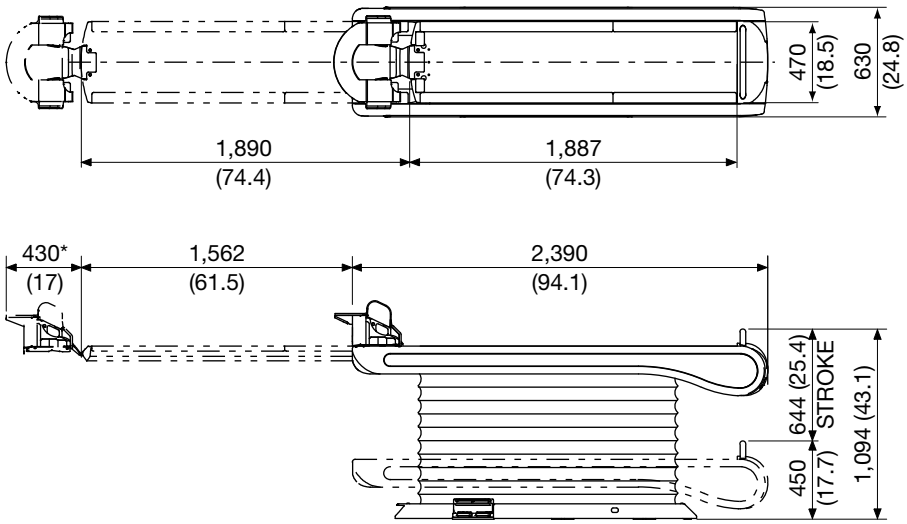


* When the arm up holder is mounted.

Patient Couch (for the long patient couch version)

Unit: mm (in)

OUTLINE DRAWINGS

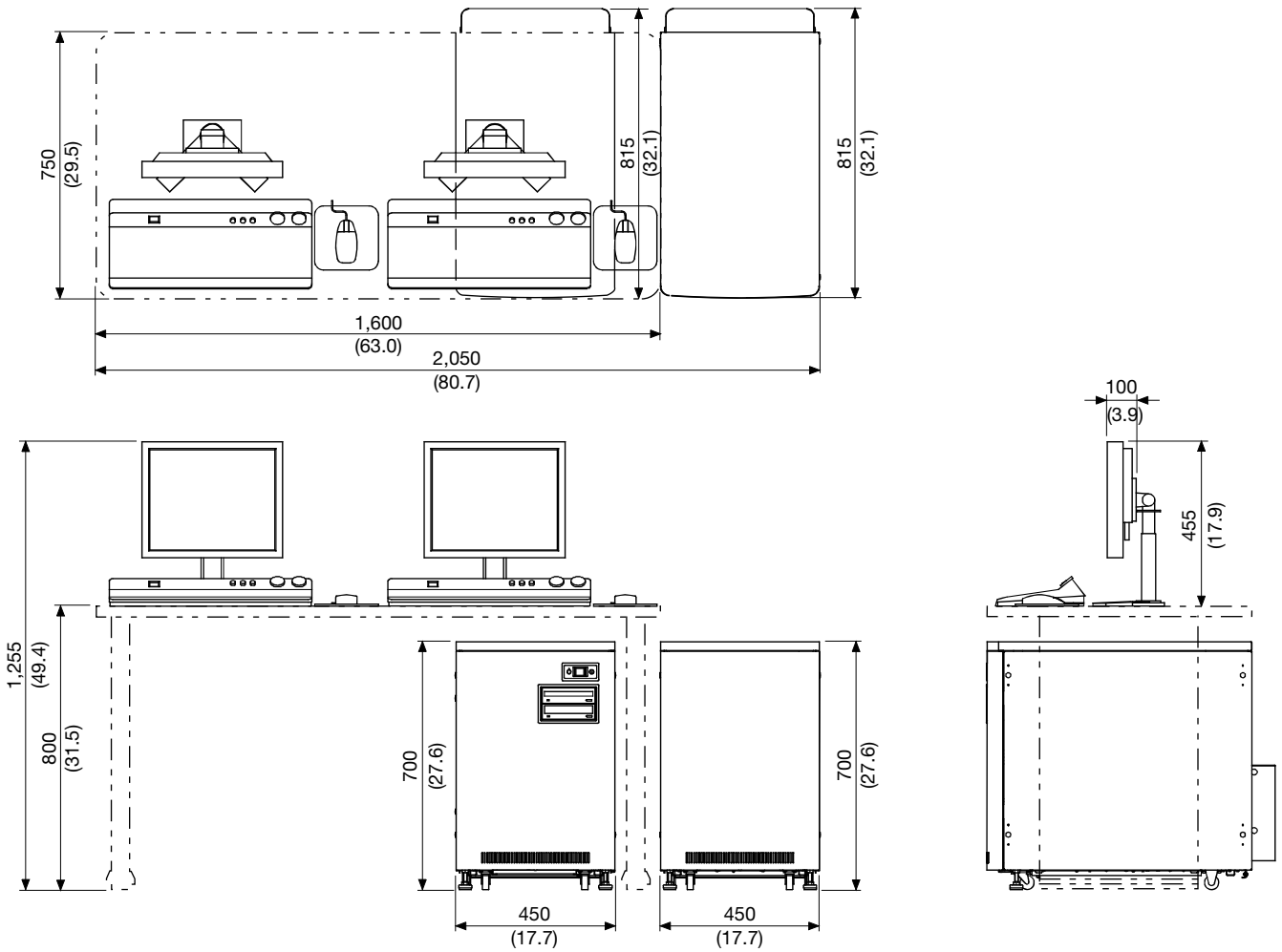


* When the arm up holder is mounted.

Patient Couch (for the short patient couch version)

Unit: mm (in)

OUTLINE DRAWINGS



Console

Note: The console desk is not included in the standard configuration.
Some of the units shown in the photograph on the front page differ from those shown in the drawings above.

Unit: mm (in)

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Model number: TSX-101A 2010-4 TME/KI

Toshiba Medical Systems Corporation meets internationally recognized standards for Quality Management System ISO 9001, ISO 13485.

Toshiba Medical Systems Corporation Nasu Operations meets the Environmental Management System standard, ISO 14001.

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