

GE Healthcare

# Brivo CT325

## Product data sheet





## Introduction

The Brivo CT325 provides good patient care with high image quality and clinical flexibility for whole body imaging, and all at an economical price.

## High Image Quality across Entire Body and Dose Optimization

- **HiLight Solid State Detector** is designed to deliver consistent image quality with its 1416 individual elements
- **Venus tube** with 2.0 MHU of anode heat capacity with 500 KHU/min heat dissipation and 24 kW operation, delivering the power you need for routine image quality
- Wide range of technique factors (10 mA to 200 mA, in 5 mA increments) gives operator and physician flexibility to tailor technique to specific needs, optimizing patient dose, and providing the power needed to perform a broad spectrum of axial and helical examinations
- **Advanced Artifact Reduction (AAR)** is GE's proprietary reconstruction filter algorithm, which reduces streak artifacts caused by patient's arms downward in the scan plane
- **Advanced Noise Reduction (ANR)**, another filter algorithm, reduces noise without compromising spatial resolution
- **Asymmetric Scan** provides wide clinical examination methodology to diagnostics, contrastive images with the benefits from both thin and thick slices
- **Single Scout Auto mA:** Dose (mA) management by slice; based on X-ray attenuation
- **CTDI<sub>w</sub>, DLP** (Dose Length Product), and Dose Efficiency display during scan prescription provides patient dose information to the operator
- **Beam Tracking**, standard since from the HiSpeed Dual CT, provides advanced hardware and software for x-ray beam tracking to minimize patient dose

## Innovation in Workflow

- Utmost 0.7\* second for partial scan time (235 degree acquisition) or 1.0\* second scan time (360 degree acquisition)
- 30, 60\*, 90\* and 120\* seconds single helical scan time
- 10/100/1000M Base-T Ethernet network interface for fast images communication inside and outside the Medical Imaging Department
- Truly multi-tasking environment with simultaneous scan and reconstruction including data handling, filming and post processing
- 1024 Localizer for easy scan location set up
- Protocol-driven scan control and digital tilt with a reduced number of screen and clicks for easy of user operation
- Large on-screen control icons and user friendly color palette provide comfort to operator
- Interactive software user interface provides flexibility with ease of use
- Flexible editing tools allow operator to customize the exam parameters for patient
- Auto-Filming, AutoStore, Auto-Archive, Auto-Transfer
- Reconstruction and post-image-processing are finished on one common operating console hardware- no separated computer for post-image-processing.
- Large, 1280 x 1024 color LCD display
- Real-time image processing: MPR, MPVR (Standard), Color 3D\*, Navigator\*, Perfusion\*, DentaScan\* - powerful CT
- A wide range of clinical applications is available on Operating Console
- Installation: Minimum Suite size: 11.4 m<sup>2</sup>

## Scan Modes

Although the Brivo CT325 System can perform many clinical applications, scanning has been simplified to three basic modes:

### Helical

- Multiple 360 degree scans with no Inter-scan delay
- Scan can be acquired with (helical) or without (cine mode) table increment

\* Option



## Axial

- Single scans with the time between scans set by the user-selected inter-scan delay (ISD) or intergroup delay (IGD)
- Scans may be easily clustered in groups to allow multiple scans in a single breath hold
- Minimum ISD of only 1.5 sec. (1.0sec\*) with table moves of less than or equal to 10 mm

## Scout

- Single radiographic plane scan for localization
- Maximum scannable length up to 700 mm anatomy

## Helical Scan:

- The complex nature of helical multi-slice scanning has been simplified by grouping all critical acquisition parameters within 2 basic scan modes: 0.75:1 Pitch Mode and 1.5:1 Pitch Mode. These clinically derived multi-slice scan modes offer a wide range of selections that carefully balance acquisition speed, image thickness, artifact level and retrospective image reconstruction flexibility.
- The 0.75:1 Pitch Multi-slice Mode provides unique combinations of table speed and image thickness. In general, this scan mode provides helical images with image quality comparable to single-slice systems at 1:1 to 1.5:1 pitch, but at up to 1.5 times faster table speeds and approximately 50-60% of the mAs.
- The 1.5:1 Pitch Multi-slice Mode provides helical images at table speeds that are 1.5 to 3 times faster than for 1:1 pitch helical single-slice scans with image quality comparable to 1.5:1 to 3:1 pitch on a single-slice system. 1.5:1 Pitch mode acquisitions are twice as fast as those using the 0.75:1 Pitch mode.
- The simplified user interface guides the user in the choice of scan parameters. The user selects either 0.75:1 Pitch Mode or 1.5:1 Pitch Mode, a desired Image Slice Thickness and a Table Travel Per Rotation. The user interface also displays the resulting choice of retrospective image thicknesses available for each choice of acquisition parameters. Brivo CT325 allows the operator to set up for each group of helical scans, with equivalent acquisition parameters (slice thickness, scan time, KV, mA, scan FOV) and reconstruction parameters (Reconstruction FOV, reconstruction algorithm) or various parameters for each group depending on the clinical needs.
- Cine scans capability with no table incrimination and no inter scan delay for 30, 60\*, 90\* or 120\* sec with 1.5/1.0\* sec scan

## Scan Technique:

- Scan Thickness: 0.6\*, 1, 2, 3, 5, 7 and 10 mm
- Scan Speed: Full 360° rotational scans in 1\*, 1.5, 2sec.
- kVp: 120, 140 kVp
- mA: 10 to 200 mA, 5 mA increments
- Power: 15kW for average; 40kW for momentary
- Single Helical Acquisition Max. Scan Time: 30 sec, 60\*, 90\*(100mA max.) and 120\*(80mA max.) sec
- Maximum Helical length: 120 cm
- Helical Scan Pitch: 0.75:1(High quality) and 1.5:1(High speed).
- Minimum Inter-Scan Delay (ISD): 1 sec @1 sec Scan; Minimum Inter-Group Delay (IGD): around 5 sec between adjacent helical scans
- Scan Fields of View:
  - 18 cm for pediatric head;
  - 25 cm for adult head;
  - 25, 35, 43 cm for body;
  - 43cm for shoulder-L;

## Note:

According with IEC-60601-2-44/ Edition 2, the definition of CT pitch factor will be:

## CT pitch factor = $\Delta d / (nT)$

$\Delta d$ : is the patient support travel in horizontal direction;

T: is the nominal tomography section thickness;

n: is the number of tomographic sections produced in a single axial scan of the x-ray source.

The new definition identified the difference from multi-slice to single-slice.

According with the new definition, for Brivo CT325, the pitch mode are 0.75:1 and 1.5:1 .

Follows the old definition, 0.75:1 pitch mode should be 1.5:1, the pitch of 1.5:1 pitch mode should be 3.0:1.

\* Option



**Table Speed (mm/rotation)**

Image Thickness	0.75:1 Mode	1.5:1 Mode
0.6 mm*	0.9*	1.8*
1 mm	0.9, 1.5	1.8, 3
2 mm	1.5, 3	3, 6
3 mm	3, 4.5	6, 9
5 mm	4.5, 7.5	6, 9, 15
7 mm	7.5, 10.5	9, 15, 21
10 mm	7.5, 10.5, 15	15, 21, 30

**Helical Image Decomposition:**

For all helical scan modes, the operator can choose to reconstruct images prospectively in any of the defined nominal image thicknesses.

Retrospective Image Decomposition: The operator has the option to retrospectively decompose the original raw data set and reconstruct additional images at any of the defined nominal image thicknesses available for a given table speed and scan mode.

This effectively facilitates later, more detailed image analysis without additional patient scans and subsequent dose and image registration concerns.

The following table illustrates the retrospective reconstruction image thicknesses available for each acquisition table speed and scans mode:

**Table Speed (mm/rotation)**

0.75:1 Mode	1.5:1 Mode	Retro-recon Thicknesses
0.9*	1.8*	. mm
1.5	3	1, 2 mm
3	6	2, 3, 5** mm
4.5	9	3, 5, 7*** mm
7.5	15	5, 7, 10 mm
10.5	21	7, 10 mm
15	30	10 mm

\*\*5 mm not available at 3 mm/rot

\*\*\*7 mm not available at 4.5 mm/rot

**Helical Scan Enhancements:**

Full simultaneity allows complete image display, processing and analysis, as well as image archival and filming concurrent with scanning and reconstruction -- even when acquiring helical images in a multi slice mode.

Anatomical Programmer: A ten-region anatomical selector allows quick and easy access to 15 user-programmable protocols per region. Separate selector for adult and pediatric exams with 150 protocols available in each.

10 user-defined regions. Each region has one default protocol displayed with the anatomical selector for very fast access to most commonly used protocols

Protocols include preset scan time, kVp, mA, scan mode, image thickness and spacing, table speed, scan FOV, display FOV and center, recon algorithm, and special image acquisition and processing options

Any scan parameters may be edited for each scan or all scans -- either before or during an exam. The number of scans may also be effortlessly changed.

**Helical Image Reconstruction:**

Reconstruction Algorithms: Soft Tissue, Standard, Standard+, Detail, Bone, Chest, Edge and Performance

- Reconstruction Matrix: 256, 512
- Display Matrix: 1024 (Maximum).
- Display FOV: Freely variable center/off-center, prospective and retrospective target selection.

**Helical Reconstruction:**

Helical Reconstruction Times:

- 0.5 seconds image to image
- Maximum image-to-image cycle time is +-10% for prospective and retrospective image display to image display for 512-matrix with any display FOV in AutoView (all layouts) with concurrent filming and image archival for all scan modes.
- Iterative bone processing increases time by 0.5-1.0 seconds. Iterative bone processing, which is always enabled for adult head scanning, reduces image artifacts in head scans stemming from X-ray beam hardening effects.

Minimum DFOV: 4.8 cm

Minimum Pixel Size: 0.09 mm

\* Option



**Queued Recon:** Requests will be processed continuously and simultaneously with other processes on the system including scanning. Prospective recon will be prioritized over retrospective recon.

**Priority Recon Queuing:** One touch selection marks most recent rotation for next available recon. Available during or after scanning.

Images annotated to indicate continuous scan acquisition with table incrementation:

- HE (helical)
- Table speed

**Prospective Multiple Reconstruction (PMR):** Up to 3 sets of reconstructions can be pre-programmed as part of the scan protocol prior to acquisition. The operator can select different reconstruction algorithms and display fields of view for each reconstruction. This frees the operator from sitting at the console and directly contributes to increased productivity.

**Prospective Recon:** Operator may initiate full recons at any table location in increments of 1/10 the image thickness; image thickness remains constant.

**Retrospective Recon:** Operator may initiate full recons at any table location in 0.1 mm increments; image thickness remains constant.

**Retrospective Image Decomposition:** The operator has the option to retrospectively decompose the original raw data set and reconstruct additional images at any of the defined nominal image thickness available for a given table speed and scan mode.

Retrospective image decomposition can generate images about 1/2 the original acquisition image thickness, depending upon the table speed and scan mode selected for the acquisition.

Reconstruction across the boundary between multiple helical scans is not available. Prospective overlapping prescription effectively achieves contiguous reconstruction across boundaries.

**Helical Scan Protocols:**

All protocols assume 120 kVp scans from Cold start

**Single Helical Scans:**

Scan	No. of Rot. for 1s*/1.5s	Max. mA
30	30*/20	200
60*	60*/40	140
90*	90*/60	100
120*	120*/90	80

\* Option

**Multiple Helical Scans** (contiguous helical coverage with prospective overlapping recon) with 10-second IGD:

Scan Time	IGD	No. Scans	Max mA
10 sec	10sec	6	130
20 sec	10sec	3	130

**Contiguous Helical Coverage**

Multiple helical scans can be performed in succession with only 5 second delays between helical scans, providing up to 1000 contiguous rotations (with up to 1499 images in one series).

**Axial Scan:**

Multi-slice acquisitions and short inters can delays significantly reduce potential misregistration between scans by increasing the number of scans possible in a patient breath hold. Contrast agents may be better utilized as well due to significantly faster scan acquisition.

**Axial Multi-slice Prescription:**

Simplified scan prescriptions and easy-to-use default protocols make the Brivo CT325 System fast and efficient in patient set-up. Axial protocols are nearly identical to helical scan protocols.

**Axial Multi-slice Modes:**

The Brivo CT325 System acquires axial scans in sets of up to two contiguous images in one 360° rotation.

The Brivo CT325 System acquires axial images up to 2 times faster than single-slice scanners with the same or better image quality. Axial scans actually approach acquisition speeds of 1:1 helical pitch on single-slice scanners. Additionally, thin-slice acquisition reduces partial-volume artifacts and improves image quality versus conventional single-slice axial scans.

For each rotation of the gantry, the Brivo CT325 System collects two rows of scan data. There are two reconstruction modes available for creating images from the multi-slice scan data (1i and 2i). By using 1i reconstruction mode, scan data can be combined prior to image reconstruction to create slices with reduced partial-volume artifacts. This is particularly useful for posterior-fossa imaging.

1i Mode:

Produces a single image per rotation

Nominal Image Thickness: 1, 1.2\*, 2, 4, 6, 10 mm

2i Mode:

Produces 2 images per rotation Nominal Image Thickness: 0.6\*, 1, 2, 3, 5, 7, 10 mm

**Asymmetric Scan:**

Produces 2 images per rotation with different slice thickness, 3 kinds of schemes can be selectable before installation (Choose one from followed)

**Acquisition thickness for Asymmetric Scan:**

- 10mm & 1mm;
- 10mm & 2 mm;
- 6mm & 1mm.

In summary, the image thicknesses available are:

Image Thickness	No. of Images per Rotation
0.6*mm	2
1 mm	2
1.2*mm	1
2 mm	1, 2
3 mm	2
4 mm	1
5 mm	2
6 mm	1
7 mm	2
10 mm	1, 2

**Scan Technique:**

- Partial Scan Time (235 degree acquisition) : 0.7\* sec.
- Full scans (360 degree acquisition) : 1\*, 1.5, 2, 3, 5 sec
- kVp: 120, 140kVp
- mA: 10 to 200mA @ 120 kVp  
10 to 160 mA @ 140 kVp
- Power: 15kW for average; 40kW for momentary
- Scan Thickness : 0.6\*,1, 2, 3, 5, 7, and 10 mm
- Scan Fields of View:
  - 18 cm for pediatric head
  - 25 cm for adult head
  - 25, 35, 43 cm for body
  - 43 cm for shoulder-L
- Digital Tilt: +/- 30° angulation for helical based on vertical scan data on operating console
- Longitudinal positioning from 0 mm to 1200mm with 0.5 mm resolution
- Minimum InterScan Delay with table moves of 0 to 10 mm

Scan Time	Min ISD
1.0 sec*	1. 1.0 sec*
1.5 sec.	1.5 sec.
2.0 sec.	1.0 sec.
3.0 sec.	1.5 sec.
5.0 sec	2.5 sec.

- InterScan Delay (ISD) user selectable
- Minimum Inter-Group Delay (IGD) same as ISD and also user selectable
- Scan To Scan Cycle: Minimum scan-to-scan cycle of 2 or 3 sec possible for 1 sec scan speeds with minimum ISD's

**Axial Image Reconstruction:**

Reconstruction Algorithms: Soft Tissue, Standard, Standard+, Detail, Bone, Chest, Edge, and Performance.

Reconstruction Matrix: 256, 512

Display Matrix: 1024 (Maximum).

Display FOV: Freely variable center/off-center, prospective and retrospective target selection.

**Axial Image Reconstruction:**

- 2i mode: 972 views are reconstructed; reconstruction time is 0.5 seconds

- 1i mode: 1944 views are reconstructed; reconstruction time is 1 seconds

- Maximum cycle time is ± 10% for prospective and retrospective image display to image display for 512 matrix with any display FOV in AutoView (all layouts) with concurrent filming and image archival for all scan modes.

- Iterative bone processing increases time by 0.5-1.0 seconds

**Prospective Multiple Reconstruction (PMR):** Up to 3 sets of reconstructions can be pre-programmed as part of the scan protocol prior to acquisition. The operator can select different reconstruction algorithms and display fields of view for each reconstruction. This frees the operator from sitting at the console and directly contributes to increased productivity.

**Retrospective Image Decomposition:** The operator has the option to retrospectively decompose the original raw data set and reconstruct additional images at any of the defined nominal image thicknesses.

Retrospective image decomposition can be prescribed down to 1/2 the original acquisition image thickness for images acquired in the 1i scan mode.

\* Option

Similarly, retrospective reconstruction supports partial-volume artifact reduction by reconstructing images with 2 times the acquisition image thickness.

These reconstruction features effectively facilitate additional and detailed image analysis without supplementary patient scans and subsequent dose and image registration concerns.

The following table illustrates the retrospective reconstruction image thicknesses available for each acquisition thickness and mode:

Acquisition Thickness	Image & Mode	Retro Image Thicknesses
0.6*mm	2i	0.6*, 1.2*mm
1mm	2i	1, 2mm
1.2*mm	1i	0.6*, 1.2*mm
2mm	1i 2i	1, 2 mm 2, 4 mm
3 mm	2i	3, 6 mm
4 mm	1i	2, 4 mm
5 mm	2i	5, 10 mm
6 mm	1i	3, 6 mm
7 mm	2i	7 mm
10 mm	1i 2i	5, 10 mm 10 mm

### Scout Scan:

- ScoutView scans provide excellent detail for anatomical localization in conjunction with scan prescription
- Axial or helical scan locations may be prescribed explicitly (manual entry), or graphically (by mouse) from a Scout scan

### Scan Technique:

- Scan Aperture: 1 mm X 2i
- Scan Range: upto 700 mm
- 1024 Localizer for easy scan location set up even for small anatomy
- Table Speed: 75 mm/sec
- kVp: 120 kVp or 140kVp
- mA: 10 to 200 mA @ 120 kVp; 10 to 160 mA @ 140 kVp with 5mA increments

Orientation: AP, RLAT, PA, LLAT (preset); or any angle from 0° - 355° degree in 5° increments (manually selected)

Axial scan prescription lines indicate scan location to nearest 1 mm table position

### Single Scout AutomA

- Dose (mA) management by slice based on X-ray attenuation. Improvement on signal-to-noise ratio
- Only one single scout will be necessary for AutomA
- Low Dose Technology
- Automatic change between low range & high range in one series (5mA increments)

Four modes of IQ, Normal, Low Dose, Max mA

### Image Reconstruction:

Minimum cycle time is 3 sec and 1\* sec for prospective or retrospective image display to image display for 512 recon with any scan time and any display FOV in AutoView with concurrent filming and image archival.

Iterative Bone Option (IBO) add 0.8-1.0 sec. to minimum recon cycle time.

**ANR** (Advanced Noise Reduction) filter reduces image noise with compromising spatial resolution.

**AAR** (Advanced Artifact Reduction) filter reduces artifacts caused by arms, hips and shoulders in the scan beam.

Reconstruction Algorithms: Soft Tissue, Standard, Standard+, Detail, Chest, Bone, Edge and Performance

Edge and Performance are not available for partial scans or segmented recons

Reconstruction Matrix: 512 x 512, 256 x 256.

Display Matrix: 512 x 512 (up to 4 images), 768 x 768 (1 image), 1024 x 1024 (1 image).

Display FOV: 48 to 430 mm, 1mm increment

Minimum Pixel Size: 0.094 mm for 48 mm DFOV @ 512 x 512 matrix

Flexible center / off-center, prospective / retrospective target selection.

CT Number Range: -1000~4000 (typical), -32767 to 32767 (Capability)

**Segmented Recon:** Up to six images from single 360 degree scan rotation CT

**Queued Recon:** Reconstruction requests will be processed simultaneously with other processes on the system including scanning.

**Priority Recon:** One click selection from scan screen marks most recent rotation for next available reconstruction. Available during, or after scanning

**Prospective Multiple Reconstruction (PMR): Up to 3 sets of reconstructions can be pre-programmed as part of the scan protocol prior to acquisition.**

The operator can select different reconstruction algorithms and display fields of view for each reconstruction. This frees the operator from sitting at the

\* Option

console and directly contributes to increased productivity.

Helical Prospective or Retrospective Recon at any table location in increments of 1/10 cradle interval or at any temporal location with minimum increment of 1/10 x scan time for cine scans (stationary cradles).

Reconstruction across the boundary between multiple helical scans is not available. Prospective overlapping prescription effectively achieves contiguous reconstruction across boundaries.

## Image Quality:

### High-Contrast Spatial Resolution

GE Performance Phantom (20cm)

Scan Technique: 120 kVp, 160 mA, 1.0 sec. scan time, **3 mm** thickness, 25 cm head scan FOV, 10 cm display FOV, 512 recon, Performance algorithm, Axial Scanning:

- 9.5 lp/cm @ 50% MTF
- 11.6 lp/cm @ 10% MTF
- 11.9 lp/cm @ 5% MTF
- 15.0 lp/cm @ 0.5% MTF

Helical Scanning:

- 10.0 lp/cm @ 5% MTF

Measurement Basis: Limiting resolution is demonstrated on GE Performance Phantom.

### Low Contrast Detectability (Visual)

Radcal 9015 & 9060

### CATPHAN phantom (20cm)

3.0 mm @ 0.3 % contrast @ 30 mGy

Scan Technique:

120 kVp, **225 mAs** as measured on 20 cm CATPHAN phantom with 20 cm head Scan FOV, 25 cm DFOV, 10mm thickness @ 2i mode, Standard Algorithm 512 recon matrix, axial and helical scanning.

### CATPHAN phantom (16 cm)

3.0 mm @ 0.3% contrast @ 9.57mGy

Scan Technique:

120 kVp, **60 mAs** as measured on 16 cm CATPHAN phantom with small SFOV, 15 cm DFOV, 10mm thickness @ 2i mode, Standard Algorithm 512 recon matrix, axial scanning.

### Low Contrast Detectability (Statistical)

5.0 mm @ 0.3 % contrast @ 9 mGy (0.9 Rad)

Scan Technique:

120 kVp, **80 mAs** (1 sec) as measured on 20 cm CATPHAN phantom with 22.7 cm FOV, 10mm thickness @ 2i mode, Standard Algorithm 512 recon matrix, axial and helical scanning, Radcal 19015 & 19060.

### Noise

Radcal 9015 & 9060

GE Performance Phantom (20cm)

**0.35%** at less than or equal to 25 mGy (2.5 Rad)

Scan Technique:

120 kVp, **225 mAs**, 25 cm body scan FOV, 25 cm display FOV, 10mm thickness @ 2i mode, 512 recon, standard algorithm.

Measurement Basis: Noise is demonstrated on the phantom. Dose is measured on top surface of the phantom using a pencil probe with a 10 cm chamber length (+/- 15% tolerance).

### CTDI Dose

Scan techniques for all CTDI dose expressed in mGy (Rad)/100mAs

### Head

center:14.4mGy/100mAs

periphery:14.5mGy/100 mAs

### Body

center:4.23mGy/100mAs

periphery:7.72 mGy/100 mAs

Scan Technique:

120 kVp, 10 mm nominal image thickness, 2i mode reconstruction, Small Body scan FOV and 25-cm display FOV for Head CTDI, Large Body scan FOV and 43-cm display FOV for Body CTDI, 512 recon, and standard algorithm.

Measurement Basis: Dose is demonstrated with CTDI methodology in compliance with Federal Regulation 21 CFR 1020.33(c)

\* Option



imagination at work



## Operating Console:

The Brivo CT325 System Operating Console includes:

- IA32 Computer, Linux OS
- Digital Filming and Digital Interface available
- DVD drive
- 19 inch LCD Color Monitor
- Scan control keyboard assembly with intercom speaker, microphone and volume controls
- Three-button mouse

The Brivo CT325 System computer, peripherals, image processing, image reconstruction hardware, and camera interface are completely integrated into the base of the console for ease in siting and comfortable operator access to image archive drives.

The user interface utilizes the paradigm of managed work environments for a more intuitive clinical workflow. The 3 main virtual Operating Console user interfaces:

- **Scan desktop** mainly for scan and recon control with no image display
- **Display desktop** mainly for image display, analysis, processing, and management
- **Image works desktop** mainly for advanced application processing and image data archiving/networking control

Virtually all clinical operations are managed through three "virtual desktops" or applications managers - **Scan Desktop, Display Desktop and Image Works**. Operators can effortlessly move back and forth between these environments simply by clicking on an icon. An enhanced multi-tasking architecture maintains all processes so no work is lost or disrupted as desktops are switched.

Up to 1280 x 1024 high resolution, flicker-free display.

Scan control board assembly with intercom speaker, microphone and volume controls.

All these devices are freestanding and can be easily moved to accommodate a large variety of working conditions and individual operator preferences.

Each work surface can be adjusted at installation to help accommodate a variety of sitting requirements.

## Desktop Overview

### Scan Desktop

The scan desktop environment provides the clinical tools necessary for comfortable, efficient control of patient studies.

### Patient Scheduling:

Patient demographics and exam protocols can be pre-programmed in advance of patient arrival. This productivity enhancement allows entry of all or some of a patient's demographic data, as well as pre-selection of the exam protocol.

This feature uses the same interface as New Patient selection for simplified, consistent programming.

Pre-programmed patient exams can be recalled from the New Patient screen automatically by entering the patient ID number.

### Patient Data Entry:

Patient data can be entered as part of New Patient set-up, or can be recalled from the list of pre-scheduled patients.

Trauma Patient ID allows patient scans and image display/analysis without entering patient data before scanning.

### Exam Protocol Selection:

One of the main contributions of the Brivo CT325 System to department productivity is its simplified exam set-up.

- Exam parameter set-up has been greatly simplified through the exclusive use of protocols
- Protocols can be easily selected in one of three convenient ways:
  - A large, graphical Anatomical Programmer located on the Patient screen
  - A default list of the top 10 most commonly used protocols are listed by the anatomical programmer
  - A numerical entry
- Two Anatomical Programmers - one for adults and one for pediatrics - provide quick and easy access to most 300 user-programmable protocols. Each programmer has ten anatomical regions with 15 protocols for each region.

\* Option

**Each Protocol includes:**

- Acquisition Mode
- kVp, mA, Scan Time
- Acquisition slice Thickness
- Slice Locations with or without adjustment on 1024 Localizer.
- Inter scan Delay and Inter Group Delay.
- Scan field-of-view.
- Display field-of-view and center with or without adjustment on 1024 Localizer.
- With or without digital tilt angle
- Recon types
- Breath timing parameters
- AutoVoice
- Prospective Multiple Reconstruction (PMR): Up to 3 sets of reconstructions can be pre-programmed as part of the scan protocol prior to acquisition. The operator can select different Retro Recon Slice Thickness, Retro Recon Slice Location, Recon algorithms, and display fields of view for each reconstruction.
- AutoFilm with pre-selection of two different window / level settings per image for AutoFilm
- AutoStore
- AutoTransfer

Any scan parameter can be edited for each scan or all scans either before or during an exam. Scans can be easily added or removed from the prescription

**Protocol View/Edit:**

- A single, full screen View/Edit table allows fast and easy examination and modification of exam parameters before scanning begins
- Exam parameters can be changed for just one scan, or for all scans in a series
- When used in conjunction with the 1024 Localizer, changes made in the View/Edit table that affect the number of scans, image interval, starting/ending locations, or display FOV are automatically shown on the 1024 Localizer
- Any changes made directly on the 1024 Localizer display using the mouse and the on-screen cursor controls are also reflected automatically in the View/Edit table
- View/Edit Wizard intuitively adjusts dependent parameters automatically in response to operator-initiated changes and highlights them for quick review; also alerts the operator to incompatible dependencies requiring operator intervention
- Tab card groupings for Timing, Recon and Filming help organize the large number of parameters available within each protocol

**Scan Data Acquisition:**

- Full screen DynaPlan Plus display illustrates scan status graphically, with real-time feedback while the exam is underway. Scans, programmed delays (prep, breathing, inter-group), and even AutoVoice announcements are clearly shown before and during scanning.
- AutoScan: Fully automates longitudinal table movement and the start of each scan
- AutoVoice: Preset (Chinese and English) and user-recorded messages automatically deliver patient breathing instructions; especially useful for multiple or multi-pass helical scans

**Full Simultaneity** allows scan and recon to work concurrently with image display, processing and analysis (including computationally intensive features like MPR, MPVR and 3D\*/MIP) while still running image archival, filming, and networking processes

**Dose Computation & Display Desktop**

CTDI<sub>w</sub> (Weighted CTDI<sub>100</sub>), CTDI<sub>vol</sub>, DLP (Dose Length Product) computation and display during scan prescription provides patient dose information to the operator.

CTDI<sub>w</sub> is a dose index defined by IEC60101-2-44 CDV. This index is computed automatically by the Brivo CT325 Scanner System and reported on the Exam Rx screen. CTDI<sub>w</sub> is a single number that consists of 2/3 of the CTDI<sub>100</sub> peripheral dose plus 1/3 of the CTDI<sub>100</sub> central dose.

CTDI<sub>100</sub> is a dose index based upon CTDI dose measurements over a 100mm volume, as defined in IEC60101-2-44 CDV.

DLP is given in mGy \* cm and is computed and displayed for each group prior to the scan. Additionally, an accumulated DLP is displayed for the entire exam, as the exam prescription progresses. The final exam accumulated DLP provides a convenient measure for maintaining patient or procedure dose management statistics.

**AutoView Layouts:**

- AutoView Layouts provide great flexibility in tailoring the 1024

image display to the user or the application at hand.

- AutoView Layouts include:
  - 1024 AutoView image
  - 768 AutoView image
  - 512 AutoView image + 512 Localizer Scout with cut lines automatically showing the location of the AutoView image on the Scout

\* Option

- Two 512 AutoView images (same image but at different window/level settings) + 512 Localizer Scout with cut lines automatically showing the location of the AutoView images on the Scout
- 512 AutoView image + 512 AutoFilm image
- Last two 512 AutoView images
- Last four 512 AutoView images
- AutoLink which links the current series to a view port
- Basic image review features like window/level, magnification and flip/rotate are available for AutoView images
- Any 512 windows not used for AutoView are available to independent, simultaneous review of other exams

### Image Review Layouts:

- Image Review Layouts include:
  - 1024 single image display
  - 768 single image display
  - Two 512 image display, horizontal format
  - Two 512 image display, vertical format
  - Four 512 image display
- Each image display window can be further subdivided into four more images, increasing to 16 the total number of images that can be displayed at once

### Image Access:

- Point and click interface along with a pictorial directory (browser) allows for easy selection by exam, series or image

### Routine Image Display:

- Image display features provided within Exam Rx:
  - Zoom / Roam
  - Explicit Magnify
  - Flip / Rotate
  - ProView
  - Display Normal
  - List / Select
  - Ellipse ROI
  - Measure Distance
  - Grid On / Off
  - Cross Reference
  - User Annotation
  - Exam / Series Page
  - Hide Graphics
  - Erase
  - Screen Save
  - Gray Scale Enhancement

- ProView visualization algorithms are available to enhance anatomical structures without additional reconstruction time:
  - 6 Selections for enhancement of high contrast objects where fine detail is required
  - 5 Selections for modifying perceived levels of noise and low contrast discrimination
  - 3 Selections for lung
- Three ways are provided to adjust window and level of images:
  - Functional keys on the scan control keyboard (F6 - F11), plus one key for returning to prior setting (F5)
  - On-image through middle mouse button
  - Type in accelerator bar

### Routine Measurements:

- Image measurement features provided within Exam Rx:
  - Box ROI
  - Ellipse ROI
  - Trace ROI
  - Measure Distance
  - Measure Angle
  - Grid On / Off
  - Hide Graphics
  - Erase
  - Screen Save

### Display Preferences:

- A set of 8 Display settings are available to tailor the overall display (settings apply to all images in all exams):
  - Annotation Levels
  - Maintain User Annotation
  - Auto Minify
  - Auto Enlarge
  - Inverse Video
  - Next / Prior Each View Port
  - Next / Prior Series Binding
  - Continuous Report Cursor

### Auto Image Management:

The Exam Rx work environment conveniently provides for selection of AutoFilm, AutoStore (to local DVD or USB), and AutoTransfer (across a network).

An AutoFilm Composer provides a simple programming interface for automated filming set-up.

Batch Filming is accomplished through a single keystroke that automatically prints an entire series at a time.

\* Option

## Manual Image Filming:

- Images may be individually filmed manually via “drag and drop” to the on-screen Film Composer.
- Print Series permits automatic printing of an entire series with one keystroke.
- Page filming permits creation of an entire film with one keystroke.
- Multiple Image formatting allows filming of multiple images in a single film frame.
- Film Formats supported are 1:1, 2:1, 4:1, 6:1, 8:1, 9:1, 12:1, 15:1, 16:1, 20:1, 24:1 25:1, 30:1, 35:1, 42:1 and 35-mm slide (available film formats made be limited by the laser camera).

**Important note: Filming requires a DICOM filming interface. So DICOM print is an unique dedicated standard with Brivo CT325.**

## Image Works

This desktop environment includes image management and networking.

Because some of the image analysis and display features of Image Works replicate those in Exam Rx, the next section describes only features that are incremental or significantly different.

## Image Analysis:

Multi-Projection Volume Reformat (MPVR) is a selective volume’s projection on a cut plane. This technique allows to create oblique slices with variable thickness and orientation, and select a volume of interest. This volume can be treated by 3 algorithms. MPVR is a 3D technique study which preserves the entire acquisition densities. It allows however the visualization from the same oblique with 3 possibilities of densities reinforcement.

- MIP - enhances contrast and improves visualization of calcifications
- Average - generates 2D radiographic images
- MinIP - enhances low contrast
- Multi-planar Reformation (MPR): Provides real-time assessment of anatomy in off-axis planes. Sagittal, coronal, and oblique planar reformations available.
- Batch reformatting can also be defined and executed for later viewing if desired.
- Image Addition and Subtraction: Includes image addition of more than two images at a time
- Comparison mode allows display of two series simultaneously

## Image Display:

- Image Scroll moves an image within its own window
- Groupings allow application of window / level values,

magnification / minification, image scroll or flip and rotate to a user-defined image set

- Save State stores user-selected image orientation and window / level with each data set
- Window / level values allow:
  - 6 preset on-screen instant window / level settings
  - Set independently for up to 16 images on the screen
  - User-modified in discrete or variable steps
  - Adjusted real-time on-image by holding down the middle mouse button and moving the mouse
- Cine mode provides paging in up to 4 windows of up to 128 previous-stored CT images at full selected display frame rate. For more than 128 images, display frame rate may be reduced.
- Cine mode also provides temporal, spatial or manual playback loops
- Text Page of exam and / or series information is available

## Image Management:

- Images may be stored and retrieved via DVD media using DICOM 3.0 format. This allows interchange with other imaging systems supporting DICOM 3.0 DVD media. Not all vendors’ implementations of DICOM 3.0 are identical, so please check with the manufacturer for compatibility.
- Off-line retrieval of all image files. Images may be viewed as soon as they are restored from DVD.
- Images may be retrieved via DVD media from any imaging system supporting the proprietary Genesis format or GEYMS format.(Read only).

## Image Networking:

- Exams can also be selected and moved between the Brivo CT325 System and any imaging system supporting the DICOM 3.0 protocol for network send, receive and pull/query.

## Industry Standards

The Brivo CT325 System complies with a wide variety of industry standards to facilitate more rapid adoption of features and performance improvements as the computing and medical imaging industry evolves.

Computer Industry Standards for Workstation:

- POSIX (1003.1, 1003.2, 1003.4)
- X-Windows (X11/R5)
- Motif (1.2)
- ANSI C
- ANSI Draft Standard C++

\* Option



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**DICOM Conformance Standards:**

- DICOM 3.0 Storage Service Class
  - Service Class User (SCU) for image send
  - Service Class Provider (SCP) for image receive
  - Service Class User (SCU) for Storage Commitment Class
- DICOM 3.0 Query / Retrieve Service Class
- DICOM Print

**System Components**

**Gantry:**

Advanced slip ring design continuously rotates generator, tube, detector and data acquisition system around the patient.

- Aperture: 65 cm
- Focus to Detector: 949 mm
- Focus to Iso-center: 541 mm
- Maximum SFOV: 43 cm
- Rotational Speeds: 360° in 1.0\*, 1.5, 2.0, 3.0 and 5.0 sec.

**Alignment Lights:**

External alignment lights.  
Stand alone visual readout.

**Table:**

- Single table with settled height, metal free cradle, 135mm below ISO center.
- Cradle Width: 32 cm
- Horizontal Move Range: 152cm
- Horizontal Scan Range: 120 cm with Extender
- Horizontal Speed: Slow 20 mm/sec. or Fast 100 mm/sec
- Table Load Capacity: 180 kg maximum allowed with normal operation Cradle position controlled from OC for prescribed scans.

**X-Ray Tube:**

Design optimized for exams requiring a large number of scans without tube cooling.

- Heat Storage Capacity: 2 MHU
- Heat Dissipation:
  - Anode (max) 500 KHU/min
  - Casing (cont) 275 KHU/min
- On-board oil-to-air heat exchanger
- Single Focal Spot: 0.7 mm x 0.6 mm (IEC)
- Maximum Power: 24 kW
- Beam collimated to 62° fan angle.

**HiLight Matrix Detector:**

- 2 rows of 10mm thickness, each with 708 elements(685 active patient elements)

- 1.15 mm detector element spacing
- 972 views/rotation
- 7 modes of data output:
  - 2 x 0.6 mm\* (uses 1.2 mm beam\*)
  - 2 x 1 mm (uses 2 mm beam)
  - 2 x 2 mm (uses 4 mm beam)
  - 2 x 3 mm (uses 6 mm beam)
  - 2 x 5 mm (uses 10 mm beam)
  - 2 x 7 mm (uses 14 mm beam)
  - 2 x 10 mm (uses 20 mm beam)

**Data Acquisition System:**

- 1370 available input channels
- 1296 Hz max. sample rate
- Effective low noise analog to digital conversion range greater than one million to one

**Operating Console:**

Including host computer, monitor, SCB keyboard Assembly and mouse.

**Host Computer:**

IA32 Computer, Linux OS  
2.83 GHz Intel Core2 Duo E7400 CPU x 1  
2 GB x 2 DDR2-800 RAM  
320GB x 2 SATA HDDs  
Size: 212 mm (wide) x 538mm (deep) x 445 mm (high) (without LCD or Keyboard)

Peripherals:

- Main system disk drive:
  - High Performance Drive
  - 3.5 inch SATA HDD, 320GB X 2
  - Assigned to 5,000 scan data files
  - Assigned to 150,000 image files
- Optical disk drive:
  - 5.25 inch DVD+-RW/DVD-RAM
  - Support upto 9.4 GB DVD-R, 650 MB CD-R for DICOM3.0 image interchange
  - Support upto 9.4GB DVD-RAM for scan data or system state backup.
- Removeable disk drive support:
  - Front pannel USB interface, support USB storage for DICOM image interchange and scan data or system state backup.

**Color monitor:**

- 19 inch diagonal width
- 1280 x 1024 dot resolution

\* Option

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**Scan control board assembly:** integration of scan control, intercom speaker, microphone, volume control and English language keyboard.

### 3-Button Mouse

#### Image Networking:

- Standard auto-configuring 10/100/1000MB Base-T Ethernet NIC.
- Direct network connection; multi-suite Ethernet card not required for gateway out of suite
- Protocols supported:
  - DICOM 3.0 network send (one IP address at a time) & receive, pull/query
  - InSite point-to-point
  - TCP/IP (for system administration)

#### Accessories:

- Step stool near table,
- Operator manual,
- Phantom holder,
- Service tool set,
- Body strap,
- Cradle pad,
- Cradle extender,
- Knee pad,
- Arm support,
- GE QA phantom 20cm water,
- Head holder
- Operator's desk,
- Chair for console,
- RTP flat pad

Note:

It's needed to clarify the type of the desk & chair before placing an order.

#### Compatible Options

Newly available. S/W

- Volume Viewer option  
Including Volume Analysis II, Volume Rendering II and Navigator II
- Advanced Vessel Analysis II (AVA2) option  
VA2 is required.

\* Option

- Smart Prep option  
It is used for contrast scan.
- Colon (CTC) option  
It is used for colon application.
- Denta Scan option
- 1sec Scan option
- 0.6mm slice thickness option
- 60s Helical Scan option
- 90s Helical Scan option
- 120s Helical Scan option

#### Warranty

The published Company warranty in effect on the date of shipment shall apply. The Company reserves the right to make changes.

General Electric Company reserves the right to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation.

#### Regulatory Compliance

This product is designed to comply with applicable standards under the Radiation Control for Health and Safety Act of 1968.

The product complies with the applicable IEC60601-1 series.

Laser alignment devices contained within this product are appropriately labelled according to the requirements of the centre for Devices and Radiological Health.



#### Siting Requirements

Minimum Suite Size: 11.4 m<sup>2</sup>

#### System Components

Gantry with PDU, Table, Operating Console and Monitor.

# Brivo CT325

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## Recommended Suite Size

Equipment Room: Not required. Power Distribution Unit heat and noise output under all operating conditions with all available options is low enough to allow inclusion in the patient-scanning suite with the table and gantry.

## Temperature and Humidity

Scan Room: 20 to 28°C (68 to 82°F) at 30%-70% RH (non-condensing).

Operation Room: 15 to 30°C (59 to 86°F) at 20%-80% RH (non-condensing)

## Cooling Requirements

The cooling requirements do not include cooling for the room lighting, personnel or non-CT equipment present. Cooling requirements are listed by subsystem to allow planning for each room of the CT suite

Cooling requirements are given for minimum, recommended and growth allowance scenarios.

## Power Requirements

There are 2 configurations:

1. The input to the system is a 380VAC nominal, 3 phase Wye with neutral, 50/60 Hz, 50 kVA service, 15 kVA average power.
2. One adapter is equipped as option, so that the 3-phase Delta with diversified 200, 220, 240, 380, 400, 420, 440 and 480VAC without neutral can be obtained via jump setting, 50/60 Hz, 54kVA service, and 15kVA average power.

Complete, detailed specifications of all power requirements are available upon request.

For many installations, the Brivo CT325 System does not require any power conditioning equipment to be used in conjunction with the system.

For those sites with known large power line transients, a suppressor filter for the system computer and peripherals may be useful.

In general, suppressor filters are not recommended.

Power/ground is available for GE-supplied peripheral options (e.g. VCR, remote monitor, video printer and line printer).

Subsystem	Width	Depth	Height	Weight
Gantry + PDU	1784 mm+/-10%	967 mm+/-10 %	1749 mm+/-10 %	<1200kg
Table	550+/-5 mm	2525+/-5 mm	836+/-5 mm	<200kg
Operating Console	212 mm	538 mm	445 mm	<30kg
19" LCD Monitor	425 mm	206.5 mm	435 mm	<7.0kg

Subsystem	Watts	Growth Allowance (W)
Gantry	4758	5000
Table	100	120
PDU	180	200
Operating Console	860	900

\* Option



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## About GE Healthcare

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

Our “healthymagination” vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality and efficiency around the world.

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\* Option



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