

Discovery XR656

Digital Radiographic System



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System Application

The Discovery* XR656 is a digital radiographic imaging system that provides excellent image quality and advanced clinical applications.

The Discovery XR656 is designed to handle standard 2D exams and advanced radiographic applications using GE's wireless flatpanel digital detector. Various system configurations are available to align to your department's radiographic requirements.

All systems include: at least a single detector, table and/or wall stand, systems cabinet, ceiling mounted tube support, acquisition review workstation, image processing, short-term storage, and quick in-room viewing of images.

The Discovery XR656 also offers a wide range of advanced clinical applications that are optional at the time of purchase or can be easily added to the system in the future. GE's Dual Energy Subtraction, VolumeRAD* and Auto Image Paste offer GE's latest in X-ray imaging that extend the utility of the X-ray room.

Discovery XR656 Available in 4 Configurations

- Wall stand only system (with standard or extended arm)
 - One GE FlashPad* wireless or tether detector
- Table only system
 - One GE FlashPad wireless or tether detector
- Table and wall stand (standard or extended arm)
 - One Shared GE FlashPad wireless or tether detector
- Table and wall stand (standard or extended arm)
 - Two GE FlashPad wireless or tether detectors

A full range of accessories is also available, such as; mobile Stretchers, weight bearing exam tools, patient table accessories and grids.



Figure 1: Discovery XR656 Table and Wallstand system.

Features

System and Positioner

- Wireless amorphous silicon non-tiled digital detector
- High DQE providing excellent image quality and dose efficiency
- Motorized ceiling mounted 5-axis tube suspension with manual override
- Patient-side collimator and technique controls with touch screen digital display
- Automated vertical and longitudinal tracking maintains SID and tube/detector alignment with the table receptor
- Elevating table with 320 kg (705 lbs.) weight limit with removable 100 cm focus grid
- Motorized tilting wallstand
- Automated vertical tracking of the digital wallstand
- Wallstand Grids - 100cm, 130cm (optional), 130cm rotated (long arm only), 180cm
- System Access & Authorization Control to support HIPAA
- Compliance
- Integrated Quality Procedure

Workflow and Networking

- Auto-Protocol Assist (optional)
- Auto-Field of View (optional)
- Auto-Positioning and Auto-Detents
- Fast preview images
- Post acquisition reprocessing for multiple "looks" from single exposure
- Patient edit/auto-folding (Copy exam)
- Modality Perform Procedure Step (MPPS; SPS/PPS)
- Automated and customizable image transfer and printing
- DICOM 3.0 and IHE Compliant

Image Quality and Dose

- Multi-resolution image processing capability
- Tissue Equalization used to correct over-penetrated and under-penetrated areas within the image
- Auto and manual image shuttering cropping tool
- Automated brightness/contrast setting (Smart Windowing)
- Orthopedic Magnification/Print
- Detector Exposure Index (DEI) – dose tracking and QC metric
- Dose Area Product (DAP) – entrance dose metric
- Grid Line Reduction (selectable)

Advanced Clinical Applications

- Dual Energy Subtraction – chest and abdomen (optional)
- Auto Image Paste – scoliosis and long bone (optional)
- VolumeRAD - retrospective reconstruction of a number of planes (slices) from a series of low dose exposures acquired within a limited angular range (optional)

Digital Imaging System

The GE digital image chain provides high-resolution digital imaging technology for general radiography. Digital image acquisition supports fast and efficient exam procedures, eliminating time spent handling film and cassettes, as well as reliability issues inherent in cassette tray systems, thus helping to reduce overall exam times and improve patient satisfaction.

Image System General Features

- Set of default adult and pediatric protocols allows quick selection of the appropriate techniques for common procedures/exams with the ability to define unlimited number of custom protocols
- Set of 4 Factory (GE pre-set) image processing selections (looks) optimized for each anatomical view with the ability to define multiple Custom looks for each anatomical view/patient size combination
- Discovery XR656 is compatible with DICOM** 3.0 and IHE, the image can be tagged and automatically sent to PACS for storage and to printer for print. This capability is further increasing exam throughput and decreasing examination times for patients.

FlashPad: GE's Flat-Panel Wireless Digital Detector

GE's digital detector is a single panel (non-tiled) amorphous silicon detector with a Cesium Iodide scintillator. This approach delivers very high quantum efficiency/low noise characteristics.

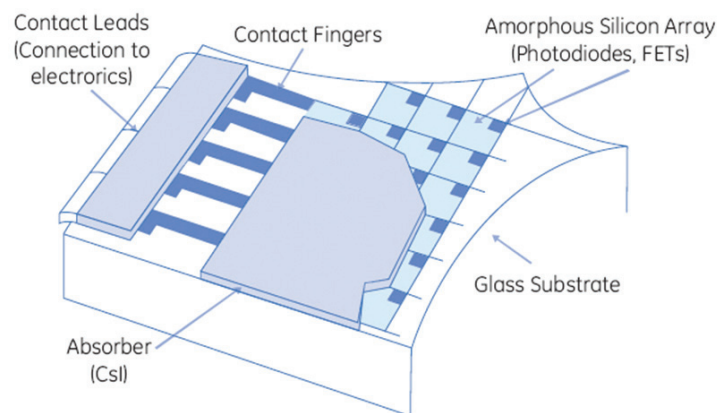


Figure 2: Schematic of the GE flat-panel digital detector.

Wireless Detector Specifications

- Detector Size 40.4 cm x 40.4 cm
- Active Matrix 2022 x 2022 pixels
- Image Depth 14 Bit
- Pixel Pitch 200 microns
- Image transfer time: <1s (wired connection), <5s (wireless connection)
- Typical Dynamic Range 0.6 uR – 7.8 mR @ RQA5
- Typical DQE 68% (@ 0lp and RQA5, per IEC 62220-1)
- Available options include: Wireless, Docked, or tethered
- Detector Health Page
- Export QAP results
- Detector Association Utilities
- Detector Battery Indicator and Charger
- Patient Load: 160 Kg (352 lb) distributed weight, 110 Kg (242 lb) concentrated weight (45mm area)

Acquisition Workstation

The Acquisition Workstation is the primary interface to the network and provides image post-processing capabilities. The System Controller Module provides single point control, directing and coordinating overall system operation, while monitoring all system modules automatically through software.



Figure 3: Acquisition workstation with 2 flat panel monitors to minimize desktop space required.

Workstation Specifications

- 2 - 19 in (48 cm) LCD Color Monitors (1280 x 1024 pixels)
- Hard Disk Storage 320 GB < 19,500 images
- RAM 6 GB
- Image processing times for single exposure exams – times include acquisition and image processing:
 - Fast preview images < 3 seconds
 - Final Conditioned Image
- Including Auto-Shuttering < 9 seconds
 - Expose to expose time < 5 seconds @ 70% HU
- Time to boot the system after normal shutdown: <= 180 seconds.
- System reset time: <= 230 seconds.
- Image processing times for multiple exposure exams – times include acquisition and image processing:
 - Dual Energy Subtraction all images < 16 seconds
 - Auto Image Paste (3 images) < 22 seconds

Note: Specifications processing times may vary depending on how the detector is connected to the system. (i.e. docked, tether, or wireless modes. Additionally, time may be extended if GLR or EMI is turned on.)

Image Display Tools

- Window width and level
- Gray scale invert
- Interpolated zoom with roam
- Image flips (horizontal, vertical) with automatic indicator
- Image Rotate - 90° increments

- Free rotation - 360°
- Image orientation management
- L/R markers
- Free text annotation
- Manual shuttering

Image Processing and Annotation Functions

- Tissue Equalization (standard) - algorithm to enhance contrast in under-penetrated or over-penetrated areas
- Multi-resolution processing
- Multiple customizable looks - 4 factory default and 5 custom looks
- Smart Windowing – automated, image-based, and technique-independent method of determining brightness and contrast for image display
- ACED – Automated collimator edge detection providing masking of the image.
- ICED – Intelligent collimator edge detection utilizing an algorithm when collimator is turned.
- Full range of measurements tools
- Image reprocessing based on anatomy, patient size and view
- VOI LUT burn on send
- System text annotations with configurable font size and display on/off:
 - Hospital/Institution Name
 - Date, Time (hh:mm:ss) of Acquisition
 - Laterality
 - Scale
 - Measurements (when activated)
 - Contrast, Brightness Values (window, level)
 - Processing Look
 - Anatomical View
 - Exposure Technique including kVp, mA, mAs, and time
 - Estimated Exposure Dose (Dose area product (DAP)) read out in dGy-cm² units
 - Operator Entered Annotations
 - Patient ID, Patient Name
 - Patient Age and DOB (date of birth)
 - WW/WL annotations
 - Edge annotations

Auto Shuttering

Algorithm that automatically detects collimator edges and adjusts to the selected field of view

Detector Exposure Index (DEI)

- Detector Exposure Index (DEI) is a tool for tracking patient over/under-exposure by estimating radiation exposure behind the patient and is a relative measure of exposure to the detector. (Note: DEI is not displayed for derived images such as Dual Energy Subtraction, Auto Image Pasting acquisitions or VolumeRAD)

- EI (or Kind) is proportional to detector exposure assuming that the x-ray technique used is the same as that of the calibration technique.
- DI estimates the deviation of actual detector exposure from target detector exposure.

Workflow Features

- Emergency patient feature – allows user to open exam and acquire images without a worklist entry
- Copy Patient - allows user to copy patient images into a second patient entry
- Off center imaging with automatic cropping and manual shuttering capabilities
- Orthopedic Magnification/Print
- Worklist auto-refresh
- Multi-format printing – 1:1, 2:1 (horizontal and vertical if printer supports) and 4:1
- Print Preview function
- “Patient Directory” provides fast access to the image and exam database for case reviews and file management
- Bar code reader for patient data entry- can be used for patient selection from the work list
- Read/Write (write once, multiple access) CD-ROM to be used as an image exchange medium. Images are written to an archive CD/ DVD along with a DICOM viewer

Repeat/Reject Analysis (optional)

- An automated quality assurance tool that allows for repeat or reject images to be captured and categorized by technologist
- Reports can be exported in DVD, CD or USB format for ease of use



Figure 4: Overhead Suspension demonstrating single series VolumeRAD sweep

Advanced Clinical Applications

The non-tiled flat panel detector with high DQE, low noise and high detector acquisition speed allows the Discovery XR656 to offer the following advanced clinical applications:

VolumeRAD (optional):

VolumeRAD is an advanced application in radiographic X-ray imaging, which allows the retrospective reconstruction of a number of planes (slices) from a series of ultra-low dose exposures acquired within a limited angular range. These slice images show anatomical structures at different depths within the patient.

VolumeRAD is a low dose diagnostic imaging technique that is superior to chest X-ray for lung nodule detection. VolumeRAD improves the ability of the radiologist to detect 3.6 times more small (3mm-20 mm) lung nodules in all diagnostically significant size ranges, without increasing the number of false positive findings[†].

Compared to chest x-ray, VolumeRAD is more effective in supporting a radiologist to manage patient follow-up according to Fleischner Society guidelines[†].

The average effective dose of a thoracic VolumeRAD tomosynthesis sweep is less than 0.1 mSv, 1.6 times more than a 2-view chest x-ray exam[†].

VolumeRAD is available in various sweeps:

- Horizontal sweep of the tube over the table for supine imaging
- Vertical tube sweep at the wallstand for upright imaging
- Horizontal sweep of the tube over a stretcher for supine imaging at the wallstand (requires extended arm)
- Cross table sweep of tube for supine stretcher patients at the wallstand
- VolumeRAD acquisition technique controlled via a single energy scout image or user configurable
- Automated acquisition of 25, 30, 40 or 60 images depending on the anatomical view selected
- Slice interval is user selectable within the range of 1 mm to 50 mm
- Customized printing options

Anatomical views supported: Some views are not available based on system configuration or VolumeRAD option selected:

- Facial Bones PA/Lateral
- Paranasal Sinus PA/Lateral
- Temporo-mandibular Joint Lateral
- Cervical Spine AP/ Lateral
- Thoracic Spine AP/ Lateral
- Lumbar Spine AP/Lateral
- Shoulder AP
- Chest AP/PA
- Abdomen AP
- Abdomen IVP
- Pelvis AP

- Hand PA/Lateral
- Wrist PA/Lateral
- Hip AP/Lateral
- Knee AP/Lateral
- Ankle AP/Lateral
- Foot Oblique/Lateral

[†] No clinical evidence has been established supporting the lung nodule detection claims in patients with active lung or pleural disease that could obscure pulmonary nodules, including fibrosis, emphysema, compressed lung, scarring, severe lung disease, and in patients with objects in or around the lungs that could obscure pulmonary nodules. The effectiveness of the device may vary depending on nodule prevalence and type.

Dual Energy Subtraction (optional) – Chest and Abdomen

- 1 acquisition with 2 exposures resulting in 3 displayed images: standard, soft tissue only and bone only
- Exposure techniques:
 - Low energy from 60 to 80 kVp (Chest) or 70 to 85 kVp (Abdomen) (1 kVp increments)
 - High energy from 110 kVp to 150 kVp (1 kVp increments)
 - AEC techniques
 - 200 ms interval between low and high exposures

Wallstand Auto Image Paste (optional) – Spine and Long Bone Imaging

- Fully automated acquisition and processing of a series of images with user defined start and stop locations on the anatomical regions of interest
- Average acquisition time for a 3-image exam (90 cm coverage) is <10 seconds. Image pasting and processing time for a 3-image exam is <15 seconds from last exposure.
- Allows 2 to 5 images to be pasted together with a maximum range of 150 cm
- Includes imaging of the spine for scoliosis evaluation and imaging of the legs for orthopedic evaluations
- Supports anatomies/view combinations of Spine Antero-posterior, Spine Postero-anterior, Spine Lateral, Leg Antero-posterior, Leg Postero-anterior
- Includes a patient stand with screen help to keep the patient comfortable during acquisition

Table Auto Image Paste (optional) – Spine and Long Bone Imaging

- Fully automated acquisition and processing of a series of images with user defined start and stop locations on the anatomical regions of interest
- Average acquisition time for a 3-image exam (90 cm coverage) is <10 seconds. Image pasting and processing time for a 3-image exam is <15 seconds from last exposure
- Allows 2 to 3 images to be pasted together with a maximum range of 100 cm
- Includes imaging of the spine for scoliosis evaluation and imaging of the legs for orthopedic evaluations
- Supports anatomies/view combinations of Spine Anteroposterior, Spine Postero-anterior, Spine Lateral, Leg Anteroposterior

Overhead Tube Suspension

The Overhead Tube Suspension (OTS) system with motorized movement delivers excellent levels of operational support designed for efficient operation and precise positioning.

- 5 axis servo motion control for completely automated movement of the OTS – longitudinal, lateral, vertical, tube angulation and column rotation. All those movements could be simultaneously depending on the site conditions and default settings.
- OTS also features manual override capability allowing the user to assume complete control for complex positioning
- Auto-Detents – OTS uses the motors to drive each axis into position, assisting the user with locating and securing detents
- Patient Side Touch Screen User Interface - the OTS is equipped with an LCD touch screen, providing the following functions to the user:
 - Lock, Detent Control
 - Field of View Image Size Selection
 - Collimator Field Light Selection
 - Technique Adjust (kVp, mAs)
 - Receptor Selection (table, wallstand, wireless or cassette)
 - Exam Inhibit Display
 - Collimator Manual Override
 - Anode rotation speed: 10,000 rpm
 - Small focal spot power: 32 KW
 - Large focal spot power: 80 KW
 - Position Display (Source-to-Image Distance, X-ray Tube Angle, Column Rotation Angle)
 - Display of Patient Name for In-Room Verification (this feature can be disabled)
- Field of View selections (all images are centered on the detector, except when using asymmetric collimation) including:
 - 41 cm x 41 cm (16 in x 16 in)
 - 35 cm x 41 cm (14 in x 16 in)
 - 24 cm x 30 cm (9 in x 12 in)
 - 18 cm x 24 cm (7 in x 9 in)

*All the above available in both portrait and landscape



Figure 5: Ceiling mounted overhead tube suspension, with touch screen user interface for patient side control.

- Dual cable safety system
- High precision telescoping column
- Self-aligning bearings
- Vertical travel 180 cm
- Motorized vertical tracking in digital mode
- Motorized longitudinal detector tracking in digital mode
- Tube rotation capabilities:
 - Tube angulation about Horizontal axis: +135/-180 degrees continuous rotation with locking at any position. Fix detents at 0, +90 and -90 when selected
 - Column rotation about Vertical axis: +/-135 degrees continuous rotation with locking at any position.
- OTS longitudinal travel varies depending on longitudinal stationary rail which vary between a minimum of 3400 mm and a maximum of 5790 mm. OTS travel range is 2330 mm max.4700 mm for 3400 mm and maximum 5790 mm rail.
- Lateral travel range for 2m rail is 1m, 3m rail the lateral travel range is 2m and for 4m rail the lateral travel range is 3.3m.
- Lateral and longitudinal cable concealment
- Two-position key switch remains in NORMAL position for automatic functioning. OVERRIDE provides emergency manual control.
- States of Operation
 - Exposure enabled
 - Manual collimation
 - Exposure OK, manual collimation
 - Exposure hold
 - Override (emergency manual control)
- Auto-Positioning Package (included in base)
 - Auto-Positioning enables the users to select a predefined system position from the system console and automatically move the equipment by simply holding the “Auto Positioning” buttons. This feature is designed to help reduce user fatigue and increase the productivity of the operator.
 - Auto-Positioning is controlled at the acquisition workstation or with the IR remote control, allowing the user to remain in the room while moving the system
 - Pre-set positions at the table, wallstand and park position at various SIDs and vertical and horizontal orientations
 - Auto-Positioning will incorporate angulation of the tube, longitudinal, lateral, rotational and vertical positioning of OTS, table detector longitudinal positioning, wallstand detector vertical positioning
 - Auto-Positioning comes with 9 default positions. The user can create additional defined positions as needed.
 - Simultaneous movement of the OTS might be limited in some situations due to safety considerations during auto-positioning
- Minimum exposure time with automatic exposure control is as low as 2 ms

Elevating Table

The Discovery XR656 radiography table is available in three configurations:

- (1) Table ONLY with wireless detector
- (2) Table and wallstand system with shared wireless detector
- (3) Table and wallstand system with individual wireless detectors

Table Base

- Motor driven elevating table
- Fully enclosed pedestal base
- Footprint = 126 cm x 69 cm (50 in x 27 in)
- 126 cm x 94 cm (50 in x 37 in) including foot pedals
- Elevating range = 57 cm – 82 cm (22 in – 32 in) (± 1 cm)
- Elevation from minimum to maximum height < 10 seconds
- Max. load:
 - 220 kg (485 Lbs.) dynamic load center
 - 320 kg (705 Lbs.) static non elevating load center
- Front and rear foot pedals
- Two-Press Safety Foot Pedal
- Two safety switches to disable motion during patient transfer
- Two emergency stop buttons

Table Top

- Foam core fiber reinforced laminate skin
- 8-way tabletop motion
- Inherent filtration <0.7 mm Al equivalent at 100 kVp
- 89 cm width x 225 cm length (35 in x 88.6 in)
- Longitudinal travel: 770 mm
- Transversal travel: 232mm
- Non-protruding edge rails for attachments

Removable, High Line Rate Stationary GridUsers

- 100 cm (40 in) focus grid with a SID range of 90 cm - 120 cm (70 lines/cm, 12:1 ratio)
- Aluminum Interspacing Material

Table Detector Servo Mechanics

- Longitudinal tracking of Detector to Tube when the tube is over the tabletop
- Detector Travel 70 cm (27.5 in) (± 1 cm)
- Patient Coverage
 - Lateral 60 cm (24 in) (± 1 cm)
 - Longitudinal 175 cm (72 in) (± 1 cm)

Table Accessories

- Tabletop FlashPad digital detector holder
- Patient Hand Grips
- Compression Band

Digital Tilting Wallstand

Wallstand Features

- The wallstand is motorized. Electromagnetic braking secures vertical motion.
- Motorized receptor tilting controlled with either IR remote control or hand switches located on the arm
- Vertical motorization of the wallstand with foot switch or IR remote control
- Auto-tracking from the overhead tube suspension
- Graphic outlines of image sizes and ion chamber scan areas on the front panel enhance accuracy and safety. Preparation is fast and simple for better patient throughput.
- The wallstand tilts from -20° to 90°
- The wallstand grids are removable from the side
- It is configurable for either left or right side insertion
- The wallstand comes standard with two removable hi-line rate fixed grids for optimum scatter cleanup and aluminum interspacing for image quality uniformity:
 - 100 cm (40 in) focus grid with a SID range of 90 cm - 118 cm (70 lines/cm, 12:1 ratio)
 - 180 cm (72 in) focus grid with a SID range of 145 cm - 245 cm (70 lines/cm, 13:1 ratio)
- Optional removable mid-range grid with a 130 cm focus and a SID range of 90 cm - 190 cm (70 lines/cm, 10:1 ratio)
- Optional removable cross table mid-range grid with a 130 cm focus and a SID range of 90-190 cm (70 lines/cm, 10:1 ratio). This grid has the grid lines in the horizontal orientation allowing for stretcher, cross table and angulated exams. (This grid is standard with extended arm configurations.)
- Automatic Exposure Control (AEC) utilizes three ion chamber sensors, which are mounted between the patient and digital detector.
- For extended arm wallstands: A 4-Ion Chamber Automatic Exposure Control (AEC) mounted between the patient and digital detector on the wallstand. The addition of the 4th ion chamber provides for supine chest and abdominal imaging when a stretcher is used (anytime the wallstand housing is horizontal). The standard right, left and center ion chambers are available when the wallstand is in the vertical position.
- With its streamlined design, the wallstand fits neatly into small examination rooms.

Wallstand Key Specifications

- Wallstand is designed for use with the wireless digital detector, overhead tube suspension, ion chamber and removable non-reciprocating grid
- Wall Stand detector housing dimensions: (with Detector vertical and covers installed)
 - Height < 53 cm
 - Width < 69 cm
 - Minimum height from floor to center of panel 28.5 cm (± 0.5 cm)
 - Maximum height from floor to center of panel 178.5 cm (± 1.5 cm)
 - Wallstand vertical travel 150 cm (± 1 cm)



Figure 6: Motorized Tilting Wallstand

Extended Arm Option

The extended arm wallstand is 32.4 cm (12.8 in) longer in length to accommodate stretcher work

Wallstand Accessories

Complete stabilization is important for patient comfort and image quality.

Patient hand grips and lateral support bar are integrated into the design of the wallstand

Networking

Images may be transmitted manually or automatically through the DICOM interface to printers, archival devices, servers, or review workstations.

Please refer to the DICOM Conformance Statement for complete definition of supported DICOM connectivity services.

Network Specifications

- IHE Compliance for Scheduled workflow Integration Profile
- DICOM 3.0 Services
 - DICOM IOD Generated – DX or CR
Image Auto Send/Transfer – DX or CR (supports multiple destinations)
 - DICOM Storage – SCU
 - DICOM Storage commitment – SCP (with programmable auto delete function)
 - DICOM Query/Retrieve – SCU (gets images back from the PACS)
 - DICOM Modality Worklist for HIS/RIS – SCU (with programmable auto refresh)
 - DICOM Grayscale Print – manual and auto (with print layout options at the console)
 - DICOM CD-R/DVD-R Media Exchange (DX only)
 - Verification services SCU & SCP
 - DICOM Modality Perform Procedure Step (MPPS) feedback to the HIS/RIS (SPS PPS)
 - System Access & Authorization Control to support HIPAA Compliance
- Minimum Printer Requirements:
 - 10 and 12-bit printers
 - Printed images are not intended for diagnostic use unless produced with a printer capable of at least 1,000 gradations of gray scale (or at least 10 bits)
 - Several popular printers have been validated for connectivity and image quality. Recommendations are available from your sales representative.

- Non-DICOM laser cameras will require an upgrade to DICOM connectivity
- GE Healthnet Services can provide physical network connectivity solutions - Layer 1 and 2 Ethernet (IEEE 802.3) interoperability - and include network components and physical installation
- InSite* remote system tool that supports remote communications between customer and GE.
- TVA (Tip Virtual Assist) is a tool that realizes remote desktop sharing; it can support remote application training. (Option)

Auto-Protocol Assist (optional)

Auto-Protocol Assist – system will automatically transition directly to the Acquire screen when the protocol code downloaded from the HIS/RIS (automatically performed with worklist refresh) matches the exam code contained in the protocol database. This tool eliminates the user steps required to select patient exam types and initiate an exam.

Auto-Positioning Protocol Link

Auto-Positioning protocol link enables pre-determined receptor and corresponding auto-positioning protocol per view.

Auto Field of View (optional)

Auto Field of View enables the user to pre-define the collimation size on an individual view basis.

Power Unit/Generator

Ratings

The digital radiographic imaging system is available with a high frequency generator.

- Power (kW) 50, 65 or 80
- kVp 40 to 150
- mA 10 to 800 (1000 mA for 80 kW systems)
- mAs 0.25 to 630 for 50 KW, 65 KW or 80 KW
- Large focus Spot: 10-1000 mA 0.25-630 mAs
- Small focus Spot:,10-400 mA, 0.25-500 mAs
- Minimum exposure time with automatic exposure control is as low as 2 ms

High Voltage Signal Characteristics

- Excellent exposure reproducibility
- Low Ripple. Less than 1% low frequency ripple.

X-ray Source

The Digital Radiographic Imaging System utilizes the Maxiray 100 radiographic tube.

Maxiray 100 Tube Housing Features

- Shockproof housing to minimize leakage radiation. The housing is filled with insulating oil specially formulated to meet the requirements of high-voltage X-ray operation.
- Ambient Operating Temperature 10 °C to 40 °C
- Ambient Transport Temperature > -30 °C
- External blower
- Pressure switch inhibits exposure if oil pressure reaches a preset limit

- Amber indicating lamp installed in the blower housing identifies selected tube unit prior to exposure initiation
- NEMA standard high-voltage cable receptacles labeled anode and cathode
- Integrated system design and collimator minimizes off-focal spot radiation

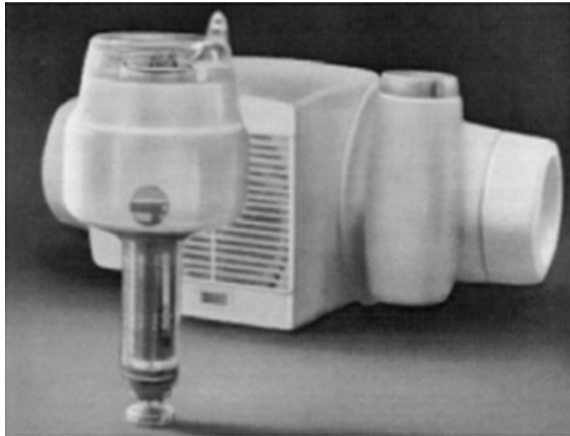


Figure 7: Maxiray 100 X-ray tube and housing.

Maxiray 100 Tube Insert Features

- Polyrhenum target minimizes surface distortion for consistent image quality, and provides increased radiation output
- Special treatment of inner surface of glass envelope improves high-voltage stability for consistent techniques
- Glass envelope facilitates “near” omnidirectional heat radiation from target to the interior of the housing for improved heat dissipation
- High thermal emittance oxide coating on anode and rotor provides high anode heat dissipation rate for improved loading, cooler bearings, and increased tube life
- Bearing assembly and bearing lubricant system are specifically designed for long life under extreme X-ray operating conditions. Bearing design allows longitudinal thermal expansion of shaft with no increase in friction.
- Special anode and cathode design minimizes metal deposits

Maxiray 100 Specifications

- Focal Spot Sizes: 0.6 mm/1.3 mm
- Target Angle: 12.5°
- Anode rotation speed: 10,000 rpm
- Small focal spot power: 32 KW
- Large focal spot power: 80 KW
- Maximum Voltage:
 - Anode to Cathode 150 kVp rectified
 - Anode or Cathode to ground 82 kVp
- Minimum Inherent Filtration @ 150 kVp and 75kVp
 - Tube Insert: 0.8 mm Al equivalent
 - Tube Housing: 0.3 mm Al equivalent
 - Leakage Technique: 150 kV, 4 mA

Maxiray 100 Thermal Ratings

- Heat Storage Capacity
 - Anode: 260,000 Joules (350,000 heat units)
 - Tube Unit: 1,110,000 Joules (1,500,000 heat units)
- Maximum Heat Dissipation Rate
 - Anode: 75,000 heat units per min. (925 watts)
 - Tube Unit: 60,000 heat units per min., blower operating (740 watts)
- For three phase, 12 pulse equipment heat units equal kVp x mA x seconds x 1.35

Automatic Collimator

Collimator Features

- Fully interlocked, designed to prevent exposures or unnecessary radiation
- Control knobs allow X-ray field to be adjusted to any size, up to a maximum of the full detector size during automatic operation
- Two tiers of shutters plus finger extensions in the X-ray tube port provide field definition and low off-focal scatter radiation Rating - maximum 150 kVp
- Minimum inherent filtration is 2.7 mm aluminum equivalent @ 71 kVp at a system level (tube + collimator)
- Field light button enables high intensity low-voltage halogen lamp. Timer automatically controls light ON time (service selectable at time of installation for 30 or 90 seconds)
- Digital readout of collimator size and SID for all sizes and SIDs A measuring tape mounted on the collimator housing is available for convenient, precise measurement of the Source-Image-Distance (SID)
- Centering indication: Shadow crosshair and longitudinal centering laser line
- Response time from maximum to minimum blade opening is less than or equal to one second

Collimator General Operation

- Optional patient dose reduction can be provided with the collimator with the use of 0.1 mm, 0.2 mm or 0.3 mm copper filters. The copper filters can be added manually or automatically through procedure edit set up
- Dose Monitoring: predicted patient dose for each exposure. The exposure dose is displayed as dose area product (DAP; dGy cm²). DAP is automatically annotated onto the digital image for the exposure, and is displayed on the acquisition screen post exposure
- Because this is a predictive method, any additional filtration used in the beam, aside from that provided with the system, will introduce an error in the reported dose. It is recommended that additional filtration not be used when dose reporting is enabled

Service Options

- InSite Remote Service – IIP (Integrated Insite Platform)
- Problems may be diagnosed, resolution expedited, or problem fixed remotely with IIP without the need for a Field Service Engineer be onsite
- Optional Image Performance Manager (IPM)
- eLicensing support

Quality Control/System Reliability Features

Preventing customer experienced system failures and reducing unplanned system downtime are critical. The following features help to achieve these goals

- Using the integrated system Quality Assurance Procedure (QAP), image quality checks can be easily performed by the customer
- The QAP includes a phantom, optimized for Digital Image Quality testing and is included with the system. System changes are highlighted and can be corrected before they become a problem

Primary Source Input Power

- Primary source is required for all installations.
- Allowed nominal input voltages: 380, 400, 420, 440, 460 and 480. Three phase with or without neutral
- Maximum daily voltage variation must fall within $\pm 10\%$ of nominal input
- Jedi HF 65/80 generators are adaptable to both 50 Hz and 60 Hz supplies

Accessories:

- Compression band



- Hand grips



- Lateral detector holder



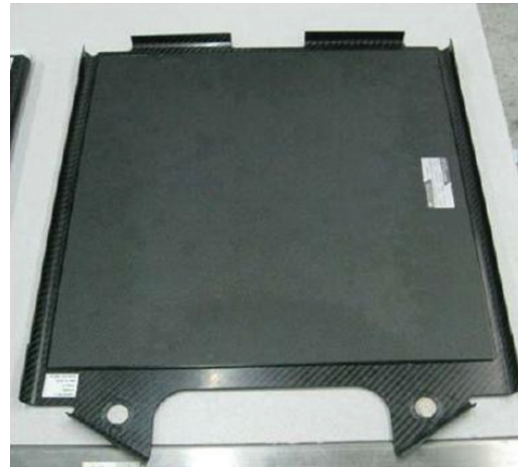
- Desktop Battery charger



- Detector Charging bin



- Clip-on grid (weight 1.3Kg or 2.9 lb)



- Patient barrier for Image pasting



- Stretchers



For optimum generator performance, line resistance (twice the resistance of one wire) must not be greater than the values in the table below:

Maximum Line Impedance (Ω) According to Main Voltage

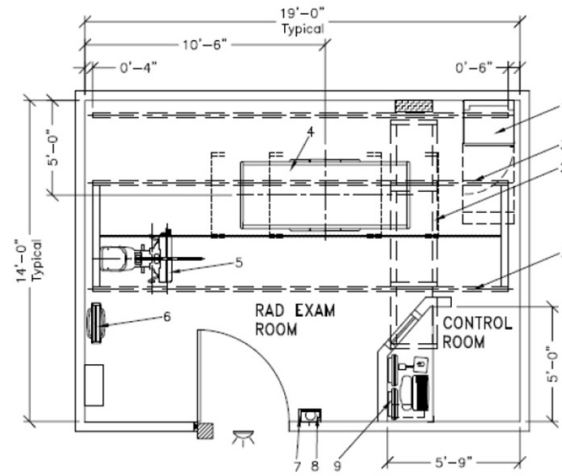
	400 V	415 V	440 V	480 V
50KW	0.13	0.14	0.15	0.18
65KW	0.13	0.14	0.15	0.18
80KW	0.10	0.11	0.125	0.15

- Demand includes power for the entire digital radiographic imaging system

Nominal line voltage (V)	380	400	420	440	460	480
Maximum instantaneous power (kVA)	118	118	118	118	118	118
Power factor	0.73	0.73	0.73	0.73	0.73	0.73
Momentary line current (A)	180	170	162	155	148	144
Continuous line current (A)	15.8	15	13.3	13.6	13	12.5
Inrush current (A)	1000	1000	1000	1000	1000	1000

Room Considerations

Typical Room Layout



1	System Cabinet	6	Detector Bin
2	OTS & Bridge	7	SBC & Antenna
3	Longitudinal Station Rails	8	Tether Interface Box
4	URP+ Table	9	Magic PC
5	URP+ Wallstand		

Environmental Conditions

Temperature

Operating	15 °C to 35 °C	0.15	0.18
(maximum change 10 °C per hour)	Non-Operating Detector	5 °C to 45 °C	0.18
		Non-Operating System	0.15
(except detector)	-20 °C to 60 °C		
(maximum change 20 °C per hour)			

Humidity

Operating	30% to 60% RH, non-condensing		
(maximum change 30% per hour)	Non-Operating	10% to 85% RH, non-condensing	(maximum change 30% per hour)

Altitude

Operating	-30 m to +3,000 m relative to sea level	Non-Operating	-30 m to 3,000 m relative to sea level to support nonpressurized air transport
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Atmosphere Pressure

Operating	106 kPa to 70 kPa	Non-Operating	106 kPa to 70 kPa
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Audible Noise

Operating	60 dBA maximum audible noise at any point 1 meter from system	Idle	50 dBA maximum audible noise at any point 1 meter from system
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Compliance to Standards

The Discovery XR656 digital radiographic imaging system is designed to meet applicable performance standards for diagnostic X-ray equipment enunciated by the U.S. Department of Health and Human Services pursuant to the Radiation Control for Health and Safety Act. In addition, the system complies with UL, IEC requirements.

Warranty

The published company warranty in effect on date of shipment shall apply. Right reserved to make changes.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world. GE (NYSE: GE) works on things that matter - great people and technologies taking on tough challenges. From medical imaging, software & IT, patient monitoring and diagnostics to drug discovery, biopharmaceutical manufacturing technologies and performance improvement solutions, GE Healthcare helps medical professionals deliver great healthcare to their patients.

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