

GE Healthcare

DR - F

Digital Radiographic System



System Applications

The DR-F Digital Radiographic System is designed as an excellent system with improved workflow, high reliability – all in a cost-effective and easy-to-use system.

The DR-F is a **general purpose digital radiographic system** with single detector, high frequency generator, integrated table and wallstand, providing you the latest technology.

- Single detector system provides you the largest flexibility for all applications on wallstand and table.
- Free-standing system small footprint with minimum room preparation time. No ceiling support allows it to fit almost any room configuration.
- Large travel range of tube, wide range of tube rotation, large patient coverage of table allows the DR-F to meet all of your clinical requirements.
- One Acquisition Review Workstation for image post-processing, short-term storage, and quick in-room viewing of images is included as part of the system. Images may be transferred manually or automatically via a DICOM network for printing, long-term storage/archive, and detailed review.

Features

- Floor mounted highly integrated system
- Non-tiled digital detector with excellent image quality and dose efficiency
- Digital portable application
- Fast preview image
- Multi-resolution image processing
- Post acquisition reprocessing for multiple "looks" from single exposure
- Automated and customizable image transfer and printing
- Auto tracking with mechanical linkage between the tube stand and the table detector housing
- Auto centering detector makes you easy to use
- Automated Quality Assurance Program
- Automated image shuttering and cropping tool
- Automated brightness/contrast setting (Smart Windowing)
- Tissue Equalization used to correct over-penetrated and under-penetrated areas within the image
- Multiple patients print on one film (option)
- Multi language user interface
- Support multi-language input and edit including Chinese
- DICOM 3.0 and IHE Compliant
- * DAP meter for dose monitoring with integrated display

Specifications

GE Digital flat panel detector

The new GE digital flat panel detector is a non-tiled detector with high quality scintillator. This approach delivers very high quantum efficiency/low noise characteristics.

Detector Area (Size)

Nominal (addressable) 41 cm x 41 cm (16 in. x 16 in.)

Active Image Area 40.44 cm x 40.44 cm (15.9 in. x 15.9 in.)

Detector Matrix

Nominal (addressable) 2048 x 2048 pixels

Active Image Area 2022 x 2022 pixels

Image Depth 14 bits

Pixel Pitch 200 microns

Detectable signal 200uR- 9 mR

Thickness 27mm

Uniform load 160Kg

Operating temperature 15-35 degree Celsius

Non operating temperature 0-50 degree Celsius

Table base

- Integrated tube-stand support rails (2300mm length x 370mm height), that combined with table frame
- Table height 700mm
- Front pedals with EM brake to lock and release the tabletop
- Detector travel range 530mm
- Tabletop to detector distance (OID) <55mm
- Hi-line rate fixed grid for optimum scatter cleanup and aluminum interspacing for image quality uniformity: 70 lp/cm, 13:1 ratio, 100cm(40") focus (range 88cm~115cm)
- Optional patient compression band

Tabletop

- Tabletop outside dimension 2100mm x 820mm
- Patient coverage 1790mm x 580mm
- Maximum tabletop filtration <1mmAl @100KV aluminum equivalent
- Four way floating tabletop with +/-425mm longitudinal and +/-110mm lateral travel range
- The maximum load of tabletop 180kg
- Table top lock electromagnetic

Tube stand

- Cassette movement track the tube stand within the range of cassette travel, automatic centering.
- Longitudinal motion 1710mm
- Tube focus min height to ground 555mm
- Tube focus max height to ground 1760mm

- Tube stand with rotation +/-180 deg for stretcher exams
- Tube tilt -17deg to +20deg
- Tube rotation (+/-) 120degree locked @ any angles
- The tube vertical travel range / the tube focus to detector distance (SID) Min<500mm, Max> 1100mm

Wallstand standard

- Vertical range of the carriage with detector housing 1260mm
- Vertical motion (from cassette center to ground) 500mm to 1760mm
- Detector vertical travel can be locked at any position by an EM brake
- Column Maximal Height 2060 mm
- Front panel to detector distance (OID) <45mm
- The Wallstand is compatible with a hi-line rate fixed grid for optimum scatter cleanup and aluminum interspacing for image quality uniformity:
70 lp/cm, 10:1 ratio, 130cm focus (range 90~190cm)

Acquisition Workstation

DR-F digital radiographic system provides you the simplest multi-language user interface to improve the throughput of the digital rad room. Single LCD monitor displays the best image and screens with minimal operator interactions. It contains overall system operation and image acquire, image display, image process capabilities.

Specifications

CPU Intel Dual 2.53GHz Dual Core Xeon
HD SATA HDD
CD RW + DVD RW
Image backup on CD & DVD
Memory 2GB

Features

The Acquisition Workstation is the primary interface to control the generator, the overall system operation and the network:

- Worklist management
- Simplified auto protocol recognition (optional)
- Patient information management
- 240 User programmable APR
- Radiographic exposure control kV, mA, mAs
- AEC/Non-AEC selection
- Digital image / CR, film image selection
- Wallstand & table mode
- Emergency & cassette exam workflow
- Tissue Equalization
- Image Push
- Image Reprocessing
- Image transfer
- Dicom print

The workstation provides image preview and post-processing capabilities.

- | | |
|---------------------------|----------------------|
| • Flat screen monitor | 1280 x 1024 |
| • Monitor Size | 48cm (19 inch) |
| • Hard Disk Storage | 160GB ->15000 Images |
| • Preview Image | <10 sec |
| • Final Conditioned Image | <12 sec |

Image Display Functions:

- Window Level
- Gray scale invert
- Interpolated zoom with roam
- Image flips (horizontal, vertical) with automatic indicator.
- Image Rotate - 90 degrees increments
- Free rotation - 360 degree

Image Processing Functions:

- Soft and Hard Tissue Equalization (standard) - algorithm to enhance contrast in under-penetrated or over-penetrated areas
- 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
- Free text Annotation
- Full range of measurement tools
- Image reprocessing based on anatomy, patient size and view
- VOI LUT burn on send
- Smart manual shuttering

System text Annotations with configurable 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
- Operator Entered Annotations
- Patient ID
- Patient Name
- Patient Age and DOB (date of birth)
- WW/WL annotations
- Edge annotations

Acquisition Workstation Accessories

Optional barcode reader for patient data entry can be used for patient selection from the work list. Optional multi-language kits are available for ease of use.

Auto-protocol Recognition (optional)

System automatically transits 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 eliminates the user steps required to select patient exam types and initiate an exam.

HF Generator

This system is available with a high frequency 50KHz generator.

Normal Output Power: 50 kW

KV 40 to 150 in 1 KV increments (Unless Tube Limited)

mAs: 0.50- 625 (mAs is 512 or less with AEC) in Renard scale.

mA: mA selection consists of the following: 10-630 in Renard scale

High Voltage Signal Characteristics:

- Excellent exposure reproducibility
- Low ripple, less than 4% low frequency ripple
- Minimum exposure time, with automatic exposure control, as low as 1 msec.

Primary Source Input Power

- Primary source is required for all installations.
- Allowed nominal input voltages: 380, 400, 440 and 480VAC+/- 10%, Three phase with or without neutral, normal frequency 50/60Hz.
- Input current: 110A (Momentary), 9A (Continuous)

Tube Housing Features

- Shock proof housing is to minimize leakage radiation.
- Housing filled with insulating oil specially formulated to meet the requirements of high-voltage X-Rays.
- Ambient Operating Temp 10 ~ 40°C
- Ambient Transport Temp -20 ~ 70°C
- Natural air cooling
- Pressure switch inhibits exposure if oil pressure reaches a preset limit
- IEC 60526 standard high-voltage cable receptacle labeled anode and cathode.
- Integrated system design and Collimator minimizes off-focal spot radiation

Tube Insert Features

- Specially processed Rhenium-tungsten faced molybdenum 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" unidirectional 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

Tube Specifications

- Focal Spot Sizes 0.6 mm/1.2 mm
- Target Angle 12°C
- Maximum Voltage:
 - anode to cathode 150 KV rectified
 - anode or cathode to ground 78 KV
- Minimum tube permanent Filtration @ 75 KV: 1.3 mm aluminum equivalent
- Leakage Technique: 150 kV, 3.4 mA

Tube Thermal Ratings

- Heat Storage Capacity:
 - Anode 210,000 Joules, (300,000 heat units)
 - Tube Housing 900,000 Joules (1,250,000 heat units)
- Maximum Heat Dissipation Rate
 - Anode 73,560 heat units per min. (870 Watts)
 - Tube Housing 15,000 heat units per min., blower operating (180 watts)
- For three phase, 12 pulse equipment heat units equal KV x mA x seconds x 1.35

Room Considerations

Recommended room length 6000mm

Minimum room length 5300mm

(w column +/-180 degree rotation)

Minimum room length 5000mm

(w/o column +/-180 degree rotation)

Recommended room width 6000mm

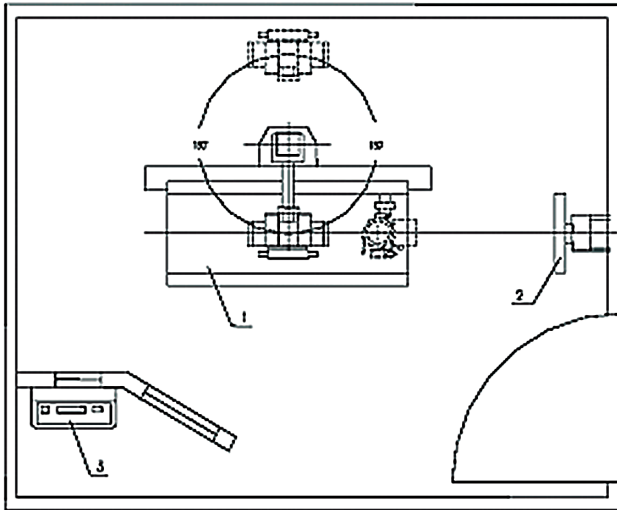
Minimum room Width 4000mm

(w column +/-180 degree rotation)

Minimum Room Width 3000mm

(w/o column +/-180 degree rotation)

- 1 - Table
- 2 - Wall Stand
- 3 - Console



Environmental Conditions

Audible Noise

- Operating noise: does not exceed 60 dBA when measured at a distance of one meter from any subsystem or component with an ambient noise level of 40 dBA.
- Idle state noise: not exceed 55 dBA when measured at a distance of one meter from any subsystem or component with an ambient noise level of 40 dBA.

Temperature

- Operating ambient temperature range: +10°C~ +30°C. Maximum allowable temperature gradient of 10°C per hour.
- Non-operating ambient temperature range(except detector and monitor): -20°C ~ +70°C. Maximum allowable non-operating temperature gradient 20°C per hour.

Humidity

- Operating ambient humidity range: 30% to 80% relative humidity, non-condensing. Maximum allowable humidity gradient 30% RH per hour.
- Non-operating ambient humidity range: 20% to 90% relative humidity, non-condensing. Maximum allowable non-operating humidity gradient 30% RH per hour.

Atmospheric Pressure

- Operating ambient atmospheric pressure range : 700 hPa to 1060hPa.
- Non-operating ambient atmospheric pressure range: 500hPa to 1060 hPa.

Altitude

- Operating altitude range -100 meters to +3,000 meters relative to sea level.
- Non-operating altitude -100 feet to 15,000 feet to support non-pressurized air transport.

Compliance To Standards

Meets the SFDA, CCC and CE mark requirement

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GE Medical Systems, a General Electric company, going to market as GE Healthcare.

Healthcare Re-imagined

GE is dedicated to helping you transform healthcare delivery by driving critical breakthroughs in biology and technology. Our expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, and biopharmaceutical manufacturing technologies is enabling healthcare professionals around the world to discover new ways to predict, diagnose and treat disease earlier. We call this model of care “Early Health.” The goal: to help clinicians detect disease earlier, access more information and intervene earlier with more targeted treatments, so they can help their patients live their lives to the fullest. Re-think, Re-discover, Re-invent, Re-imagine.

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imagination at work