GE Healthcare

Precision™ 600FP
Classical R&F System

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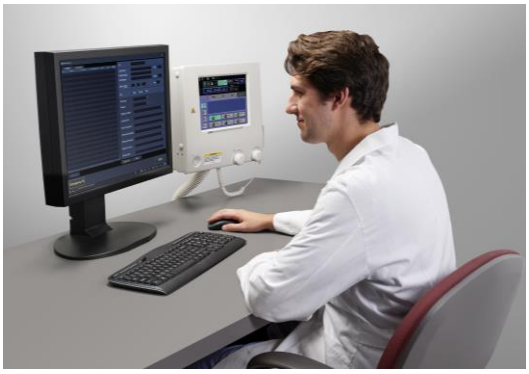
System Overview

The Precision™ 600FP is a classical, flat panel detector (FPD) based fluoroscopic and radiographic system with a list of features highlighted below:

- High quality images acquired with a high resolution flat panel detector.
- Small footprint that fits in various room sizes.
- Intuitive user interface to optimize clinical workflow.
- Supports a wide range of patient sizes and weights.
- Comprehensive image visualization, post-processing, and database management. Super Noise Reduction Filter to minimize noise.
- Comprehensive dose management, including adjustable framerate, dose settings, virtual collimation, grid controlled pulse fluoroscopy, DoseWatch (optional) and more.

System Specifications

Operating Console



Overview

The operating console is the input device in control room designed for providing user interfaces to set up protocols, adjust system parameters, and visualize images. It includes a 1600x1200, 21" color System Monitor with the associated computer tower, and a 11" Generator Control Panel.

The System Monitor is the primary user input device. It allows a user to set up patient information, import work list, manage protocol, adjust system parameters, display system information, visualize, process, and annotate images and image loops, export images and image loops to external media and database management interfaces.

The Generator Control Panel provides a convenient way to directly adjust generator configurations, such as mA and kV settings, fluoroscopy pulsing options, dose settings, density settings, and shutter modes. It also contains a hand switch for making radiographic X-ray exposures and the system power on/off button.

Features

- Contemporary Windows based user interface
- Highly configurable settings to meet each user's individual preference.
- Ease of use: Utilizes protocols to quickly load preset parameters while also allowing further adjustment of parameters on the fly. Supports multitasking between taking fluoroscopy images, image viewing, image export and patient information setup.
- Powerful software suite for image visualization, post-processing, annotation and database management.
- System log captures essential information on user activities and system errors.

Options

- Users can optionally choose a 1280x1024, 19" monochrome Live Monitor in the control room which replicates the live images displayed on the in-room Live Monitor. This 2nd Live Monitor provides a convenient way to observe imaging results in real time in the control room.

Patient Positioning

Overview

The tableside control panel makes it easy for

patient positioning. High weight capability, large clearance between tabletop and flat panel detector, and easy patient access from the back of table allow large patients to be imaged with ease.

The high patient weight foot step is an integral part of the table which can be easily unfolded for patient loading and folded back for table rotation. Various accessories such as foot rest and hand grips are also included to increase patient comfort.

Positioning - Table

Control buttons are conveniently located on the table side for easy table positioning, such as table centering, lateral & longitudinal movement, tilting with and without horizontal stop. Below is a list of specifications:

- Dimension: 35.6" H x 82.7" L x 30.1" W (90.4 x 210.0 x 76.5 cm)
- Movement: longitudinal ±31.5" (80 cm), lateral ±3.9" (10 cm)
- Distance between focus and table top: 20.7" (52.6 cm)
- Tilting: +90°/-45°. Speed is 1° to 5°/sec variable
- Weight capacity: 600 lb (270 kg) at the tabletop center with table in horizontal position, 400 lb (180 kg) for dynamic positioning at the center.

Positioning – FPD Tower

Image can also be positioned using the FPD tower. A power-assisted handle is available to help easily position the tower in all three dimensions. An additional handle is also available as a positioning guide.

- Longitudinal movement: ±29.5" (75 cm)
- Lateral movement: ±4.9" (12.5 cm)
- Vertical movement: 11.2" (28.4 cm). Distance to tabletop is adjustable between 9.3" (23.7 cm) and 20.5" (52 cm)

Foot Step

An integrated foot step is included for easy patient loading. Weight capacity is 600 lb (270 kg).

Myelographic Stop

A mechanical stop is provided on the side of the fluoro tower to help prevent accidental collision with the needle whenever myelography or needle biopsy is performed.

Lead Apron

Flexible apron panels align to help provide optimum radiation protection for vertical, angulated, and horizontal positions. Apron can be installed or removed in seconds.

Standard Table Accessories

Standard accessories include foot board (weight capacity 400 lb or 180 kg), handgrips, compression band, and shoulder rest.

Imaging System

The Precision 600FP imaging system consists of a 17" x 17" cesium iodide (CsI) based flat panel detector (FPD), advanced image processing algorithms and visualization software, and versatile image storage functionalities.

Flat Panel Detector (FPD)

- Easy switch between 4 field of view (FOV) levels: Normal/Mag1/Mag2/Mag3. These levels are pre-programmed and mapped to control buttons on the FPD tower and the FOV can range from 17" (42 cm) to 5" (12 cm).
- Effective number of pixels: 2840 x 2840
- Pixel size: 148 µm (non-binning)
- DQE: ≥ 60%
- Sensitivity: 0.38 to 0.75 LSB/nGy (non-binning)
- Dynamic range: ≥ 80 dB
- Spatial resolution: ≥ 4.0 lp/mm

FPD Control Panel

FPD control panel is located on the FPD tower to provide convenient tableside adjustment and image review options, which include:

- Generator settings
- Collimation control
- Dose level
- Super Noise Reduction Filter (SNRF) level
- Image rotation
- Last Image Hold
- Last Fluoro Hold (Optional)
- Switch between patients/exams/series
- Image and image loop replay

Image Acquisition

Images can be acquired in two ways: Digital record (often called spot images) and fluoroscopy. For digital record, user can choose between single shot (up to 3072 x 3072) and serial (up to 1536 x 1536, max 7.5 fps) modes. For fluoroscopy, user can choose between Continuous (1024 x 1024, 16 to 30 fps, FOV dependent) and Pulsed Fluoroscopy modes (1024 x 1024, 1 to 15 fps).

Image Processing

Several advanced image processing features are available to provide optimal final images. Notably, a Super Noise Reduction Filter (SNRF) is used to minimize image lag in fluoroscopic images. Unlike conventional temporal filters, the SNRF is a method that does not simply average previously acquired images or reduce noise based on frequency conversion. As a result, the SNRF maintains the sharpness of FPD images while reducing image lag in radiography and fluoroscopy.

Below is a list of image processing techniques used in Precision 600FP:

- Super Noise Reduction Filter (SNRF)
- Recursive filter
- Spatial filter
- Digital Compensation Filter (DCF)

Image Visualization

- Auto window
- Positive and negative contrast
- Image rotation and flipping
- Multi-image display
- Digital shutter
- Image annotation

Image Storage

- Built-in hard drive: 140 GB, or about 70,000 images for 1024 x 1024 image size
- External storage media: USB flash drive, CD-R, DVD-R, printing (through a laser imager)
- Image format: DICOM, Bitmap, JPEG

Connectivity

- MWM and MPPS
- Data format: DICOM 3.0
- DICOM storage Commitment (Optional)
- Communication protocol: TCP/IP

Dose

The Precision 600FP provides an array of features to help manage dose for both patients and operators:

- Grid controlled pulse: reduces dose due to removal of unnecessary pulse waveforms
- Adjustable dose level and framerate
- Last image hold (LIH) used for virtual collimation
- Fully enclosed table to reduce scatter radiation
- Real time dose reporting
- Dose Structured Reporting
- Comprehensive dose management through DoseWatch (optional)

Generator/Power Distribution

The system has a high-frequency, 80 kW, inverter generator with the following specifications:

Rating

Modes	Ratings
Radiography and Digital Record	1000 mA at 80 kV, 800 mA at 100 kV, 630 mA at 125 kV, 500 mA at 150 kV
Continuous Fluoro	4 mA, 125 kV
Pulsed Fluoro	Max 20 mA, 110 kV

Functions – Digital Record

- kV and mA settings

Modes	kV		mA	
	Range	Step	Range	Step
Digital Record	40-150	1 kV	10-1000	24 steps

- Exposure
  - Time Setting: 1 ms to 900 ms in 60 steps; 1 s to 10 s in 21 steps
  - Max serial exposure rate: 7.5 fps

- Automatic exposure control (AEC)
  - Min exposure time: 5 ms
  - AEC detector: Fiber-type detector

Functions – Fluoroscopy

- kV and mA settings

Modes	kV		mA	
	Range	Step	Range	Step
Continuous Fluoroscopy	50-125	1 kV	0.5-4	0.1 mA
Pulsed Fluoroscopy	50-110	1 kV	N/A	N/A

- Pulse rate settings for Pulsed Fluoroscopy
  - 1, 2, 3.75, 7.5, 15 fps

Power Distribution Unit (PDU) and Uninterrupted Power Supply (UPS)

The Precision 600FP uses a PDU for all the major subsystem power. In the event of a facility power failure the UPS manages the power-down of the system computer.

X-Ray Tube, Grid, and Beam Limiting Device

The Precision 600FP system comes with a radiographic and fluoroscopic tube under the table and a radiographic tube with the overhead tube support (OTS). Below are the specifications:

Specifications	Tube Assembly in the Table	Tube Assembly in OTS
Focal Spot	0.6 / 1.0 mm	0.6 / 1.2 mm
Max Rating	40 / 60 kW	40 / 100 kW
Anode Heat Storage Capacity	600 Khu	300 Khu

Specifications for X-Ray grid and beam limiting device are given below:

Specifications	Fluoroscopy or Digital Record	Radiography
X-Ray Grid Spec	15:1, 80 lines/cm, FFD 35.4" (90 cm)	10:1, 40 lines/cm, FFD Table: 39.4" (100 cm), Wall stand: 51.2" (130 cm)
Beam Limiting Device	Auto Collimation	Manual Collimation

Overhead Tube Support (OTS)

OTS is used for radiography on the table or an additional wall stand.

Ceiling Suspended Tube Support

- Movement: longitudinal 175.2" (445 cm), lateral 90.6" (230 cm), vertical 59.1" (150 cm)
- Ceiling to tube focus distance: 32.7" (83 cm) to 91.7" (233 cm)
- X-ray tube rotation about vertical axis: ±180° and detents every 90°
- X-ray tube rotation about horizontal axis: ±180° and detents every 15°

Tube Assembly and Grid

See the "X-Ray Tube" section for detailed specifications.

OTS Options

- Column extension (optional). For use in rooms with high ceilings. Ceiling to tube focus distance increased to 99.6" (253cm)
- Tube Angle support (optional). For use in rooms with low ceilings.
- Unistrut adaptor (optional)

Table Bucky

The Precision 600FP system includes a bucky device in the table for digital radiography with the OTS. The bucky is compatible with Konica Minolta AeroDR 14" x 17" RAD detectors and can be easily switched between landscape and portrait formats by simply rotating the bucky. Switching formats without having to pull out detectors improves workflow, user ergonomics and reduces chances of detector damage.

Wall Stand

The Precision 600FP includes a wall stand for digital radiography with the OTS.

Wall Stand Features

- Accepts 14" x 17" (35 x 43 cm) digital detector
- The detector can be switched to landscape or portrait position by simply rotating the Bucky. The detector can stay inside Bucky while Bucky is rotated.
- EZ-Glide hand control for easy and precise movement.
- Low absorption front cover material with receptor and AEC indicators
- Vertical movement: 152.4 cm (60.0") with a 35.6 cm (14.0") minimum Focal Spot-to-Floor distance
- Fail safe electromagnetic braking system plus integral counterbalancing for safe and easy use
- Choice of right or left hand loading

Wall Stand Options

- Side Handgrips for additional patient comfort
- Overhead Handgrips for additional patient comfort

14"x17" Radiography Detector

Precision™ 600FP comes standard with the Konica Minolta AeroDR XE 14" x 17" wireless detector which can be used in the table bucky or wall stand for digital radiography. The AeroDR is a light-weighted, digital flat panel detector designed to withstand loads, bends, bumps and liquids. Below is a list of detailed specifications:

- Weight: 5.7 lb (2.6 kg)
- Battery life: max 8.2 hours
- Face load: 300kg@effective image area
- IPX 6 liquid resistance

Other AeroDR products may be compatible. Consult your local GE Healthcare or Konica Minolta service engineer to validate.

Recording Options

The Precision™ 600FP system is compatible with various image recording options, including CD-R, DVD-R and USB drive. It is also compatible with the TIMS DICOM option (detailed below).

TIMS DICOM System™

TIMS™ 2000 SP DICOM Systems for high-resolution (1024 x 1024 pixels) image quality. Designed for speech pathology and long format recording, the TIMS™ 2000 DICOM solution captures both static images and motion video at 30 fps including high-resolution fluoroscopy. It records the entire procedure and provides special features for the instant review and analysis of studies. Below is a list of features:

- For all analog & DICOM medical modalities
- Static & streaming capture; scanner input
- Synced audio capture (TIMS™ 2000 SP)
- DICOM send & receive
- Convert JPG, BMP, PNG and AVI files to DICOM
- DICOM & Windows print
- CD/DVD/USB export
- Small footprint computer with CD/DVD-RW
- LCD touch screen monitor

Accessory Options

The Precision™ 600FP R&F system is compatible with the following accessories:

- Control Room Live Monitor
- Cable Kit for Live Monitor
- Single Monitor Suspension Kit
- Dual Monitor Suspension Kit
- Single Monitor Cart
- Lateral Cassette Holder
- Knee Support
- Last Fluoro Hold Package
- DICOM Media Storage Kit (software)
- DICOM Storage Commitment Kit (software)
- TIMS 2000 SP with Cart

Room Size

Pre-Installation room and environment information is provided in the Precision 600FP Site-Planning Manual 5756081-1EN.

Typical size:

LENGTH	WIDTH	CEILING HEIGHT
18 ft. 6 in (5.64 m)	15 ft. 0 in. (4.57 m)	9 ft. 6 in. (2.90 m)

Minimum size:

LENGTH	WIDTH	CEILING HEIGHT
16 ft. 5 in. (5.00 m)	12 ft. 2 in. (3.70 m)	8 ft. 8 in. (2.64 m)

Consult GEHC Installation Services for your specific room layout.

Compliance to Standards

The Precision™ 600FP 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

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 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, and biopharmaceutical manufacturing technologies 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. Headquartered in Chicago, GE Healthcare is a unit of General Electric Company (NYSE: GE).

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