

Mobile C-Arm Fluoroscopy System

1. General Information

Equipment: Mobile C-Arm Fluoroscopy System (ERCP / Gastroenterology Use)

Clinical Purpose:

To provide continuous, real-time fluoroscopic imaging during gastroenterology procedures for visualization during endoscopic interventions.

Clinical Application / Departments:

Gastroenterology Unit, Endoscopy Suite, ERCP Rooms

2. X-Ray Generation & Tube System

- **Generator Type:**

High-frequency generator (minimum 20 kHz), integrated monoblock design suitable for continuous fluoroscopy

- **Power Output:**

Minimum 1.4 kW (optimized for low-dose continuous exposure)

- **Fluoroscopy Control:**

- Anode Potential (kVp): 40 to 110 kVp, adjustable in 1 kVp increments
- Tube Current (mA):
 - Continuous fluoroscopy mode: 0.3 to 3.0 mA
 - Pulsed fluoroscopy (optional): Manufacturer-specified

- **Fluoroscopy Modes:**

- Continuous fluoroscopy (mandatory for ERCP)
- Low-dose fluoroscopy mode

- Last Image Hold (LIH)
 - **X-Ray Tube:**
 - Anode Type: Stationary or rotating anode (high thermal capacity, reputed make)
 - Focal Spot: Dual focal spot (Small: approx. 0.6 mm / Large: approx. 1.8 mm)
 - Radiation Safety:
 - Minimum 20 cm Source-to-Skin Distance (SSD)
 - Tube housing leakage radiation within IEC limits
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3. Imaging Chain & Display

- **Image Receptor:**
 - Image Intensifier (II) or Flat Panel Detector (FPD)
 - Field Size: Minimum 9-inch (or equivalent active area) suitable for ERCP imaging
 - **Anti-Scatter System:**
 - Integrated anti-scatter grid optimized for abdominal imaging
 - **Imaging Sensor / Camera:**
 - High-resolution digital camera (minimum 1K × 1K matrix)
 - **Image Storage & Export:**
 - Internal memory for minimum 100 images
 - USB port for image export (DICOM-compatible preferred)
 - **Display Console:**
 - Dual monitors, minimum 19-inch LED each
 - Configuration:
 - One monitor for live fluoroscopy / LIH
 - One monitor for reference and stored images
 - Viewing Angle: $\geq 170^\circ$ wide-angle
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4. C-Arm Maneuverability & ERCP Bed Compatibility

The system must allow unobstructed positioning around **ERCP-compatible endoscopy tables**.

- **Source-to-Image Distance (SID):** Approx. 880 mm
 - **C-Arm Depth:** Minimum 600 mm to allow access over wide endoscopy beds
 - **Orbital Movement:** Minimum 115° (e.g., 90° / 25°)
 - **Rotational Movement:** $\pm 180^\circ$ for oblique GI views
 - **Horizontal Travel:** ≥ 200 mm
 - **Vertical Travel:** ≥ 400 mm (manual or motorized)
 - **Panning Movement:** $\pm 10^\circ$
 - **Mobility & Steering:**
 - Smooth rolling castors with steering control
 - Easy positioning around ERCP beds with fixed or detachable side rails
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5. Image Processing & Fluoroscopy Features

- **Automatic Exposure Control:**
 - Automatic Brightness Stabilization (ABS) for continuous fluoroscopy
- **Real-Time Image Processing:**
 - Noise reduction for low-dose imaging
 - Contrast enhancement for ductal visualization
- **Post-Processing (Non-Radiative):**
 - Digital image rotation (360°)
 - Horizontal and vertical image inversion
 - Zoom and pan on LIH and stored images
- **Collimation:**
 - Motorized iris collimator or independent shutters
 - Collimator rotation for field alignment
- **Radiation Safety Indicators:**

- Cumulative fluoroscopy time display
 - Audible and visual X-ray ON indicators
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6. Endoscopy-Specific Safety & Workflow

- Designed for **prolonged continuous fluoroscopy** during ERCP procedures
 - Stable image quality without overheating during extended cases
 - Low-dose operation to minimize patient and staff radiation exposure
 - Compatible with endoscopic accessories and metallic devices without image artifacts
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7. Accessories & Radiation Protection

- **Radiation Protection:**
 - Minimum five (5) lead aprons, 0.5 mm Pb equivalent
 - Integrated thyroid shields with secure fastening
 - **Sterility & Infection Control:**
 - Sterile disposable or reusable drapes for C-arm, tube head, and detector
 - **Imaging Accessories:**
 - Cassette holder or image capture accessory (if applicable)
 - **Power Stability:**
 - Dedicated voltage stabilizer suitable for Single Phase, 230 VAC, 50 Hz
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8. Electrical Requirements

- Power Supply:
 - 230 VAC $\pm 10\%$, Single Phase, 50 Hz
- Hospital-grade power cord and plug
- Low power consumption suitable for endoscopy suites

9. Compliance & Regulatory

- **Regulatory Approval:**
 - AERB Type Approval for C-arm system and X-ray tube
- **Standards Compliance:**
 - IEC 60601-1 (Electrical Safety)
 - IEC 60601-1-2 (EMC)
 - IEC 60601-2-43 (X-ray equipment for interventional procedures)

10. Warranty & Support

- **Warranty:**
 - Comprehensive minimum 24 months from installation and commissioning
- Local authorized service support
- Availability of spare parts and consumables