GE Healthcare

OEC® 9900 Elite

Premium Digital Mobile C-arm Technical Data

The OEC 9900 Elite is the gold standard in mobile fluoroscopy applications and innovative X-ray imaging technology. Built on the leadership and experience of thousands of systems installed world-wide, GE has set the standard in mobile C-arm imaging with the OEC 9900 Elite.

- True $1k^2$ high resolution imaging technology on a mobile system.
- Featuring Precision Imaging Dynamic Range Management (DRM) for uncompromised image quality.
- Flat panel monitors on an articulating arm allow viewing of images from anywhere in the room.
- Simple user interface reduces procedure time to improve efficiency.
- Integrated surgical navigation (option).
- Preset imaging profiles optimize I.Q. by enhancing features of interest.
- Remote service connectivity.

X-ray System

Generator

- 60kHz high frequency
- 15kW power
- Up to 120kVp
- Up to 75mA for radiographic film exposure
- Continuous high level fluoro (HLF) up to 20mA
- Digital spot up to 75mA
- Digital cine pulse
  - 15 or 30 pulses per second, 60 Hz
  - 12 or 25 pulses per second, 50 Hz
  - Up to 150mA
  - 10ms pulse width
- Full power from standard wall outlet
- Patented battery buffered design

X-ray Tube

- Rotating anode X-ray tube
- 0.3mm and 0.6mm focal spots
- Anode heat capacity: 300,000 HU (per IEC 60613)
- Anode cooling rate: 85,000 HU/min.
- Housing heat capacity: 1,600,000 HU
- Standard housing cooling 15,000 HU/min.
- Passive housing cooling system: 22,500 HU/min. (Standard on all Vascular MTS and 12 inch (31 cm) I.I. systems. Optional on all other systems.)
- Active housing cooling system: 31,000 HU for Super C, motorized C-arm and Cardiac.

Digital Image Rotation

- Digitally adjusts image display
- Automatic image update
  - Image rotation
  - Image reversal (side-to-side)
  - Image invert (top-to-bottom)
- Image positioning without additional exposure

PreView™ Collimator

- On-screen collimator position indication
- PreView™ iris collimator
- PreView™ Tungsten rotatable double leaf collimator
- Adjusts collimators without X-ray exposure

Fluoro Mode

- kVp range: 40 -120
- mA range: 0.2 - 10 normal mode
  1.0 - 20 HLF (high level fluoro)
- Auto and manual fluoro modes
- AutoTrak™ ABS varies mA, kVp, camera gain

Pulsed Fluoro Mode

- kVp range: 40 - 120
- mA range: 0.2 - 10
- Pulse rate: 1, 2, 4, 8
- Pulse Width: 25 or 50ms
- AutoTrak™ ABS, mA, kVp, camera gain
- Reduces X-ray dose to patient and operator

High Level Pulsed Fluoro

- kVp range: 40 - 120
- mA range: 1 - 40
- Pulse rate: 1, 2, 4, 8
- Pulse Width: 25 or 50ms
- AutoTrak™ ABS, mA, kVp, and camera gain

Digital Cine Pulse Mode

- kVp range: 40 - 120
- mA range: up to 150
- Pulse rate: 15 or 30pps 60 Hz, 12 or 25pps 50 Hz (cardiac and endovascular systems)
- Pulse width: 10ms
- AutoTrak™ ABS, mA, kVp, camera gain

Digital Spot Mode

- kVp range: 40 - 120
- mA range: Up to 75
- Automatic exposure termination and automatic image save

Radiographic Mode

- mA range: up to 75
- mAs range: up to 300
- Computer controlled exposure time
- Optional film cassette holder
  - 10" x 12" (24cm x 30cm) for 9" I.I.
  - 14" x 14" (35cm x 35cm) for 12" I.I.

Video Imaging System

9" Image Intensifier

- Tri-mode 9"/6"/4.5" (23cm/15cm/11cm) image intensifier
- Minimum central resolution (at the monitor):
  - 9" (23cm): 2.1 lp/mm
  - 6" (15cm): 2.9 lp/mm
  - 4.5" (11cm): 3.4 lp/mm
- DQE: 65% (typical)

12" Image Intensifier

- Tri-mode 12"/9"/6" (31cm/23cm/15cm) image intensifier
- Minimum central resolution (at monitor):
  - 12" (31cm): 1.5 lp/mm
  - 9" (23cm): 2.1 lp/mm
  - 6" (15cm): 2.6 lp/mm
- DQE: 65% (typical)

Precision Imaging with Dynamic Range Management (DRM) enhances features of interest while attenuating background noise.

- Preset Imaging Profiles
  - 9800
  - General
  - Cardiac
  - Orthopedic
  - Vascular
  - Bolus Chase
  - Spine

AutoTrak™
Automatic Brightness Stabilization (ABS)

- Automatically seeks the subject anatomy anywhere within the imaging field and selects the optimum imaging technique
- Automatically adjusts to anatomical size and location
- Provides uniform image quality throughout entire image
- Simplifies operation

Image I.Q.

- Smart Window
  - Dynamically senses the collimator position and automatically adjusts brightness and contrast to produce high image quality.
- Smart Metal
  - Allows user to adjust automatic brightness and contrast sensitivity levels to metal
  - Provides optimum image quality even when metal is introduced to the field
- Tungsten Collimator
  - Denser collimator limits X-ray exposure area
  - Reduces scatter radiation
  - Improves image detail

Video Camera

- High resolution 1k x 1k CCD camera
- Full frame capture
- Motorized rotation
- On-screen orientation indicator (real-time feedback without fluoro)
- Left-right image reversal
- Top-bottom image invert

Video Display

- Dual 18" (46cm) display anti-glare, LCD flat panel monitors mounted on an articulating arm
  - 22" horizontal travel
  - 7° up/10° down
  - Monitors viewable from all four sides of workstation
  - Horizontal and vertical viewing angle 170°
- 700 CD/M^2 maximum brightness
- Touch screen system control
- 1280 x 1024 high resolution monitors
- Ambient room-light compensation
- Integrated color monitor for display of VGA, DVI, DVI-D, S-VHS, and SDI-SD formats (optional)

Configurations

GSP Platform

- 1k x 1k x 16 bit image processing
- Preset Imaging Profiles
  - 9800
  - General
  - Orthopedic
  - Spine
- Noise filter with on-screen indicator
- Minimal difference spatio temporal noise filter (MDST)
- Real time dynamic range management (DRM)
- Automatic digital brightness and contrast control
- Manual digital brightness and contrast control
- Negate mode
- Save and auto-save feature
- Swap and auto-swap feature
- Patient information
  - Examination list
  - Customized patient information
- Customize functions
  - Workstation set-up
  - Mainframe set-up
  - Patient information set-up
  - Date/time set-up
  - DICOM 3.0 interface set-up
- Last image hold

- 63 image storage
- CD/DVD burner with dicom viewer for displaying images on PC platforms
  - 512 x 512 or 1k x 1k
- Integrated DICOM 3.0 interface (store, print, worklist, and query/retrieve)
- HIPAA Secure View
  - Password protection
  - Blank screen function
  - Delete all

ESP Platform

Includes all the GSP features and:

- 1000 image storage
- Zoom and roam function
- Image annotation
- Measurement software

ESP Platform with 15fps Digital Disk

Includes all the ESP features and:

- 15fps Dynamic digital disk (60 Hz) 12fps (50 Hz)
  - Recording/playback rate: 1, 2, 4, 8, 15fps (60 Hz) 12fps (50 Hz)
  - Automatic image playback capability
  - Frame-by-frame review
  - Recording time: 10 minutes @ 15fps (60 Hz) 12 fps (50 Hz)

PMCare Platform

Includes all the ESP features and:

- Real-time subtraction
- Digital subtraction (DSA) angio
- Peak opacification
- 8fps Dynamic digital disk
  - Recording/playback rate: 1, 2, 4, 8fps
  - Recording time: 5 minutes @ 8fps
  - Automatic image playback
  - Frame-by-frame review

Basic Vascular Platform

Includes all the PMCare features and:

- Vascular preset imaging profile
- Roadmapping
- Re-registration
- Variable landmarking
- Mask save/recall

Vascular MTS Platform

Includes all the Basic Vascular features plus Motion Tolerant Subtraction (MTS) and:

- Bolus chase preset imaging profile
- Digital cine pulse mode
  - 30 pulses/sec 60 Hz (25 pulses/sec 50 Hz)
  - Up to 150mA
  - 10ms pulse width
- 30fps Dynamic digital disk 60 Hz (25 pulses/sec, 50 Hz)
  - Recording/playback rate: 1, 2, 4, 8, 15, 30fps 60 Hz (1, 2, 4, 8, 12, 25, 50 Hz)
  - Recording time: 10 minutes @ 30fps 60 Hz (time depends on record frame rate) (25 fps, 50 Hz)

Cardiac Platform with Interventional Vascular Capability

Includes all the Vascular MTS features and:

- Cardiac preset imaging profile
- Super "C" configuration (9"/23cm I.I. only)
- Single leaf curved collimator
- Three pedal footswitch
- Cardiac menu

Additional Features

9900 Elite MD C-arm - 9" or 12" I.I.

- 9°/sec. Orbital Motorized Rotation
- 9°/sec. Lateral Motorized Rotation
- RUI (Remote User Interface - Table Side Control Panel)
  - All 9900 Mainframe Controls
  - Image Review Functions
  - C-arm Motion Joystick Control
  - Motorized Vertical Lift
- Contact/Collision Detection
- C-arm Angle Display - real-time and saved images
- Active X-ray tube cooling

Active X-ray Tube Cooling Option - Super C only

- Improves Anode Target (X-ray Tube) cooling capacity
- Improves X-ray tube housing (cooling)
- Increased daily patient load

Hardcopy Options

- Integrated film/paper printer
  - No film developing required
  - 8" x 10" (20.3 cm x 25.5 cm) laser quality film/paper
  - Multi-format, 1, 2, 4 on 1
  - Multi-copy capability
- Thermal printers
- Integrated DICOM 3.0 Interface (storage class/print class/query work-list)*

User Interface

- Entire system is computer controlled and software upgradeable
- Touchscreen control simplifies operation
- Automated system operation requires minimum operator interface
- Multi-functional controls
  - Footswitch
  - IR remote (optional)
  - Hand-held control
- Simplified keyboard with integrated touchpad
- Multi-purpose image directory
  - Retrieve and review images
  - Compose hardcopy films
  - Copy images
- X-ray dose summary

Image Guidance

Tracking

- Electromagnetic sensing, armless, six degrees of freedom
- Two instruments simultaneously

Electromagnetic Field

- 0.12 Gauss at 4cm distance from transmitter (approximately 1/3 strength of the normal earth magnetic field)

Instrument Display

- Line
- Actual (includes width to scale)
- 3D CAD
- User adjustable trajectory line

Software Features

- Automatic identification of connected instruments
- Screenshot images savable to memory
- Real time display of EM field distortion
- Accuracy verification

Display

- Integrated 18" (46cm) anti-glare color LCD flat panel monitor
- 1280 x 1024 pixels, True Color
- Two image display window

Internal Hard Disk Storage Capacity

- 36 images/snapshot

Receiver/Transmitter

- IPX7 (water-tight)
- 16 FT (5 meters) cable length

Uninterruptible Power

- Orderly shutdown

Available Languages for Operator Manuals

- English
- German
- French
- Spanish
- Italian
- Portuguese (Brazilian)
- Chinese
- Japanese

Regulatory Compliance

- U.S. 21 CFR Subchapter J
- NFPA 99
- UL 60601-1 (CSA/NRTL)
- IEC60601-1 (plus relevant Collateral and Particular Standards)
- CE Marking in accordance with 93/42/EEC (Medical Devices Directive)

*DICOM options vary outside the United States.

Standard C 9" (23cm) I.I.

Standard C 12" (31cm) I.I.

Super C 9" (23cm) I.I.

OEC® 9900 Elite Configuration Options

The OEC 9900 Elite is available in a number of configurations, allowing you to select the product features that best meet your clinical needs:

9900 GSP
9900 ESP
9900 PMCare 8 F/S Digital Subtraction
9900 ESP 15 F/S (12 F/S @ 50 Hz)

- For orthopedics, general surgery, GI, pain management and other general applications.

Endovascular

9900 Basic vascular 8 F/S
9900 Vascular MTS 30 F/S (25 F/S @ 50 Hz)

- For vascular surgery and interventional vascular applications.
- 12/9/6" (31/23/15 cm) tri-mode image intensifier: A larger field of view than our standard 9/6/4.5" (23/15/10 cm) image intensifier, for many vascular applications or wherever a larger field of view is required.

Cardiac Surgery and Mobile Cardiac Cath lab/EP lab

9900 Cardiac 30 F/S (25 F/S @ 50 Hz)

- For complex coronary, peripheral or abdominal angiography.
- Super-C design: Larger than our standard C, the Super C design provides greater clearance and greater range of overscan for the oblique angulations required in both cardiac and spine work (9" (23 cm) I.I. only).

9900 MD C-arm

- 9°/sec. Lateral Motorized Rotation.
- 9" (23 cm) I.I., 12" (31 cm) I.I.
- RUI (Remote User Interface - Table Side Control Panel
  - All 9900 Mainframe Controls.
  - Image Review Functions.
  - C-arm Motion Joystick Control.
  - Motorized Vertical Lift.
- Contact/Collision Detection.
- C-arm Angle Display - realtime and saved images.
- Enhanced X-ray tube housing cooling system.

Integrated Surgical Navigation

- Realtime electro magnetic tracking of instruments on fluoroscopic images.
- Available on all configurations except Cardiac, MD and 12 inch.
- Ability to track two instruments simultaneously

Motorized C-arm 9" (23cm) I.I.

Motorized C-arm 12" (31cm) I.I.

Description	GSP	ESP	PMCare 8fps	Basic 8fps Vascular	Vascular (MTS) 30fps	Cardiac 30fps
Standard C-Arm Assembly with 9"/6"/4.5" (23/15/11cm) I.I.	●	●	●	●	●	
Standard C-Arm Assembly with 12"/9"/6" (31/23/15cm) I.I.	■	■	■	■	■	
Super C-Arm Assembly with 9"/6"/4.5" (23/15/11cm) I.I. ***ONLY***	■	■	■	■	■	●
Motorized Super C-Arm Assembly with 9"/6"/4.5" (23/15/11cm) I.I.	■	■	■	■	■	■
Motorized C-Arm Assembly with 12"/9"/6" (31/23/15cm) I.I.	■	■	■	■	■	■
Rotating Anode X-ray Tube	●	●	●	●	●	●
Tungsten Dual-Leaf Collimator	●	●	●	●	●	
Iris Collimator	●	●	●	●	●	●
Single-Leaf Curved Collimator						●
Pulsed Fluoro (up to 8 PPS)	●	●	●	●	●	●
Digital Subtraction (DSA)			●	●	●	●
Roadmapping				●	●	●
Peak Opacification			●	●	●	●
Re-Registration (Pixel Shift)				●	●	●
Variable Landmark				●	●	●
Digital Cine Pulse (15 PPS, Up to 150mA 60 Hz) (12 PPS, Up to 150mA 50 Hz)					●	●
Digital Cine Pulse (30 PPS, Up to 150mA 60 Hz) (25 PPS, Up to 150mA 50 Hz)					●	●
Digital Spot	●	●	●	●	●	●
High Level Pulsed Fluoro (Up to 40mA)	●	●	●	●	●	●
Radiographic Film Mode	●	●	●	●	●	●
9800 Preset Imaging Profile	●	●	●	●	●	●
General Preset Imaging Profile	●	●	●	●	●	●
Orthopedic Preset Imaging Profile	●	●	●	●	●	●
Spine Preset Imaging Profile	●	●	●	●	●	●
Vascular Preset Imaging Profile				●	●	●
Bolus Chase Preset ImagingProfile					●	●
Cardiac Preset Imaging Profile						●
1k x 1k x 16 Bit Image Processing	●	●	●	●	●	●
Image I.Q. (Smart Window/Smart Metal)	●	●	●	●	●	●
Measurement Software		●	●	●	●	●
Digital Image Rotation	●	●	●	●	●	●
Noise Filtering (Averaging)	●	●	●	●	●	●
Minimal Difference Spatio Temporal Noise Filter	●	●	●	●	●	●
Digital Zoom & Roam		●	●	●	●	●
Real-Time Dynamic Range Management (DRM)	●	●	●	●	●	●
Image Annotation Function		●	●	●	●	●
Multi-Purpose Image Directory	●	●	●	●	●	●
X-ray Summary	●	●	●	●	●	●
Static Image Storage	63	1000	1000	1000	1000	1000
8fps Dynamic Disk			●	●		
15fps Dynamic Disk (60 Hz) 12fps Dynamic Disk (50 Hz)		■			●	●
30fps Dynamic Disk (60 Hz) 25fps Dynamic Disk (50 Hz)					●	●
9" I.I. (23cm) Laser Aimer/Image Localizer (not available with Motorized C-arm)	■	■	■	■	■	■
12" I.I. (31cm) Laser Aimer/Image Localizer (not available with Motorized C-arm)	■	■	■	■	■	▲
IR Remote Control		■	■	■	■	■
Sony UP970 Thermal Printer (prints dose summary)	■	■	■	■	■	■
Sony UP990 Thermal Printer (prints dose summary)	■	■	■	■	■	■
Integrated CD/DVD burner with Dicom Viewer	●	●	●	●	●	●
Instant Film/Paper Printer	■	■	■	■	■	■
Integrated DICOM 3.0 Interface (store, print, worklist query)*	●	●	●	●	●	●
Two Pedal Footswitch	●	●	●	●	●	■
Three Pedal Footswitch						●
Four Pedal Footswitch	■	■	■	■	■	
Hand Control	■	■	■	■	■	■
MedRad Injector Interface Capability			■	■	■	■
Room-In-Use Indicator Interface	●	●	●	●	●	●
Integrated Flat Panel Color Monitor	■	■	■	■	■	■
HIPAA SecureView®	●	●	●	●	●	●

*DICOM options vary outside the United States.

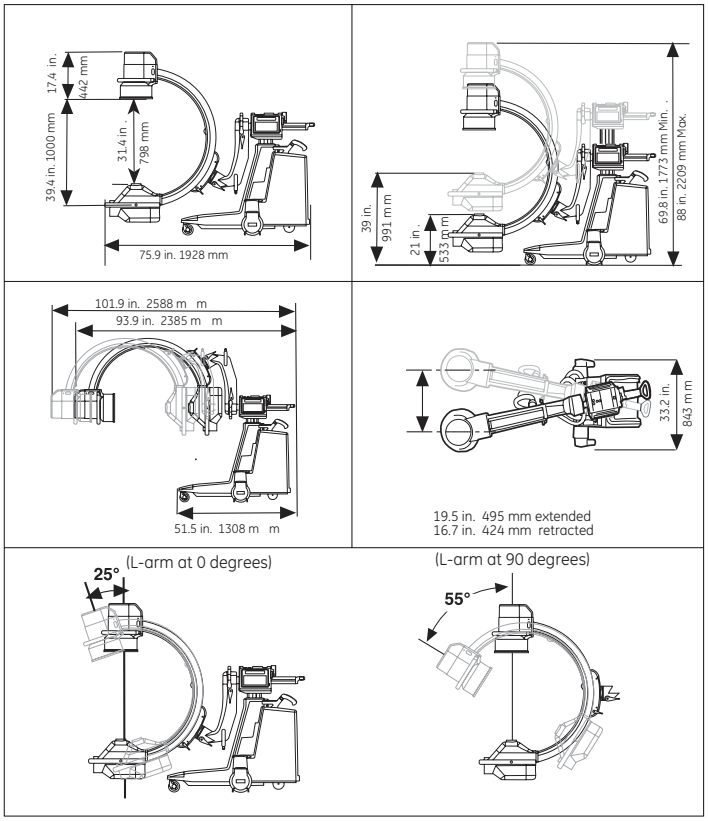
● = Standard feature
■ = Optional feature
▲ = 12" (31 cm) I.I. is not available with non-motorized Super C
Blank = Feature not available

Physical Specifications

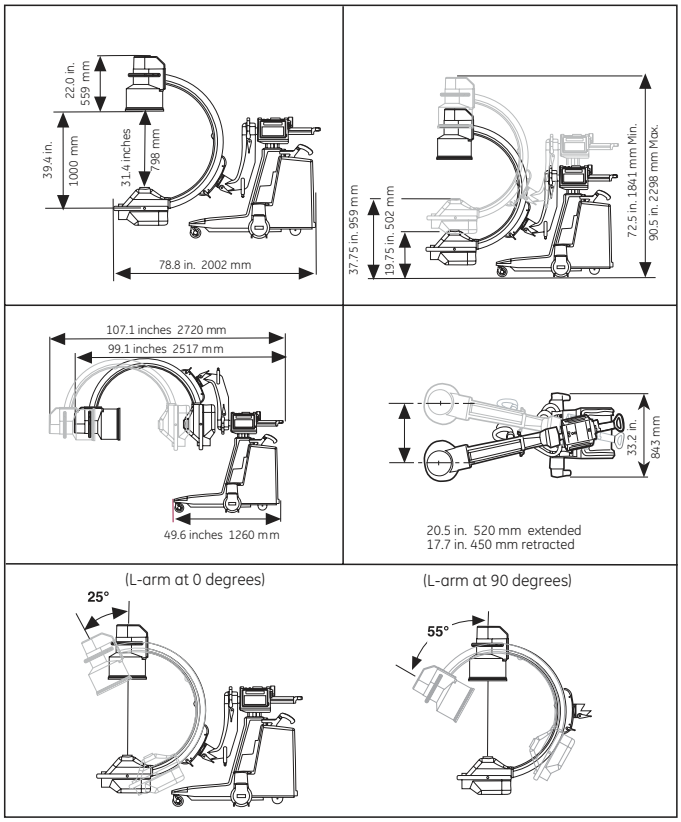
	9" I.I. (23cm)	12" I.I. (31cm)	Super C 9" I.I. (23cm)	Motorized Super C 9" I.I. (23cm)	Motorized C-am 12" I.I. (31cm)
Mainframe					
System length	75.9" (193cm)	78.8" (200cm)	78.3" (199cm)	78.3" (199cm)	79.4" (202cm)
System height	69.8" (177cm)	72.5" (184cm)	70.5" (179cm)	71.25" (181cm)	73.8" (187cm)
System width	33" (84cm)	33" (84cm)	33" (84cm)	33" (84cm)	33" (84cm)
Weight	610 lbs (276 kg)	659 lbs (299 kg)	630 lbs (286 kg)	661 lbs (300 kg)	702 lbs (318 kg)
C-arm					
SID	39.4" (100cm)	39.4" (100cm)	39" (99cm)	39" (99cm)	39" (99cm)
Free space in arc	31" (79cm)	31" (79cm)	31" (79cm)	31" (79cm)	31" (79cm)
Depth in arc	26" (66cm)	28" (71cm)	33" (84cm)	33" (84cm)	33" (84cm)
Orbital rotation	115° (90°/25°)	115° (90°/25°)	148° (93°/55°)	142° (90°/52°)	123° (90°/33°)
Lateral rotation	360° (180°/180°)	360° (180°/180°)	360° (270°/90°)	360° (90°/270°)	360° (90°/270°)
Flip/flop	180°/90°	180°/90°	N/A	N/A	N/A
Wig/wag	20°	20°	20°	N/A	N/A
Horizontal travel	8" (20cm)	8" (20cm)	8" (20cm)	8" (20cm)	4" (10cm)
Vertical travel	18" (46cm)	18" (46cm)	18" (46cm)	15" (38cm)	15" (38cm)
Workstation					
Height	68" (173cm)	68" (173cm)	68" (173cm)	68" (173cm)	68" (173cm)
Width	35.5" (90cm)	35.5" (90cm)	35.5" (90cm)	35.5" (90cm)	35.5" (90cm)
Depth	27.25" (69.2cm)	27.25" (69.2cm)	27.25" (69.2cm)	27.25" (69.2cm)	27.25" (69.2cm)
Weight	503 lbs (228 kg)	503 lbs (228 kg)	503 lbs (228 kg)	503 lbs (228 kg)	503 lbs (228 kg)
Weight (NAV)	529 (240 kg)	529 (240 kg)	529 (240 kg)	N/A	N/A
Operating Range					
Temperature	10° to 35°C 10° to 25°C (NAV)	10° to 35°C 10° to 25°C (NAV)	10° to 35°C 10° to 25°C (NAV)	10° to 35°C	10° to 35°C
Humidity	20% - 80%	20% - 80%	20% - 80%	20% - 80%	20% - 80%
Electrical Service					
100V	20A*	20A*	N/A	N/A	N/A
120V	12A	12A	16A	16A	16A
200V	10A*	10A*	10A*	10A*	10A*
220V, 230V. 240V	10A	10A	10A	10A	10A

*Japan supported configuration

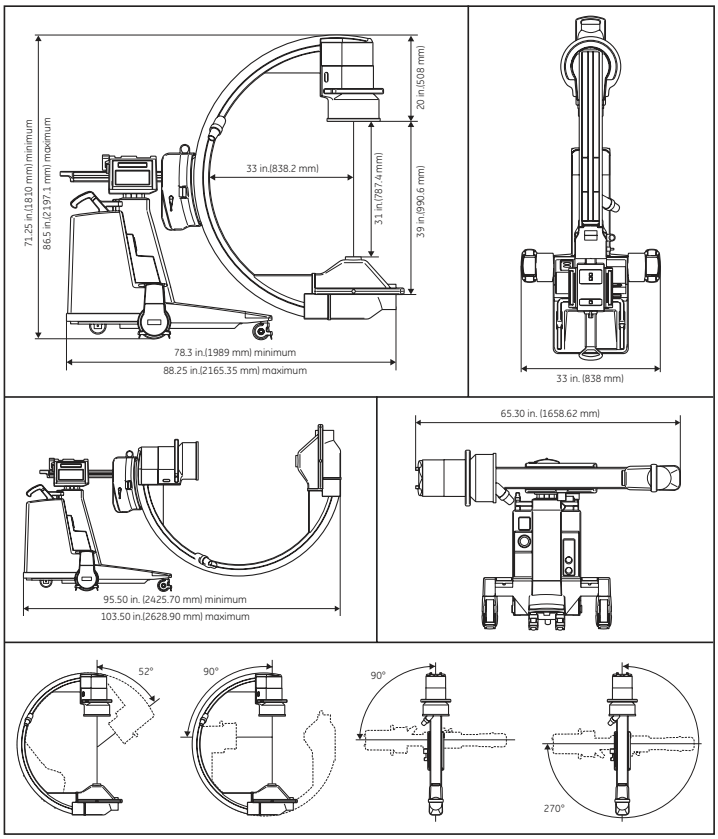
Mobile C-arm (9”, 23cm I.I.)



Mobile C-arm (12”, 31cm I.I.)



Super C-arm (Motorized) 9” (23cm) I.I.



Super C-arm