

**SIEMENS**



Data Sheet

# MAMMOMAT Inspiration

Digital Mammography Platform for Screening, Diagnostics,  
Biopsy and Tomosynthesis Option

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# MAMMOMAT Inspiration

## Digital Mammography Platform for Screening, Diagnostics, Biopsy and Tomosynthesis Option

Much more than a mammography system, MAMMOMAT Inspiration is a highly flexible mammography platform for screening, diagnostics, stereotactic biopsy\* and breast tomosynthesis\*.

High Definition Breast Tomosynthesis\* has the widest angle of 50°, the highest number of projections, and full detector readout, and is now the first tomosynthesis system to incorporate EMPIRE Technology.

### Screening & Diagnostics

MAMMOMAT Inspiration is ideal for screening and diagnostic workflow. It provides a high degree of comfort and care for the patient and a unique low dose concept.

Intelligent details like one-click-to-image, – now even for special views, and single-touch positioning result in a system that is easy to use.

It meets the strategic needs of today's clinical facilities thanks to the high patient throughput as well as its upgradability, which translates into excellent security of investment.

### PRIME Technology\*

The unique PRIME Technology allows up to 30 % less dose<sup>1)</sup> with uncompromised image quality. PRIME Technology, Progressive Reconstruction Intelligently Minimizing Exposure, is the world's first software-based anti-scatter solution for mammography. Sliding back the mechanical grid means there is no longer a fixed object absorbing radiation between the breast and detector, so you can utilize 100 % of the primary radiation – and achieve lower overall dose levels.

### Stereotactic Biopsy\*

MAMMOMAT Inspiration reduces the necessary workflow steps and guides the operator through the procedure with its stereotactic biopsy solution.

More flexibility thanks to vertical and lateral access and a wide range of compatible biopsy devices.

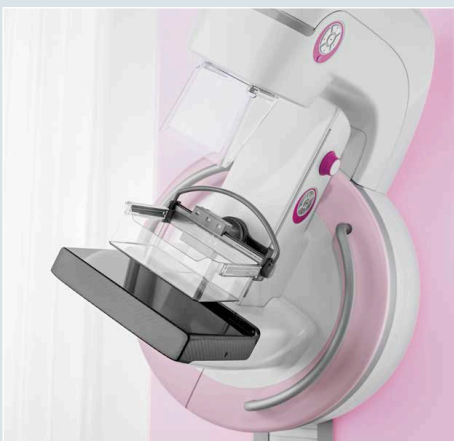
### High Definition Breast Tomosynthesis\*

MAMMOMAT Inspiration with tomosynthesis is already superior, with the widest angle, the highest number of projections, and full detector readout. It is now the world's first to incorporate EMPIRE Technology for reconstruction, and Insight, the first synthetic visualization of tomosynthesis volumes in both 2D and 3D.

\* Option

<sup>1)</sup> Compared to grid-based acquisition with MAMMOMAT Inspiration, depending on breast thickness

The system is available in the following colors:



pink



lime



silver



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## Basic unit

Digital mammography system for screening, diagnostic and biopsy procedures on standing, seated or recumbent patients

The system consists of a free-standing examination stand with integrated, microprocessor-controlled, high-frequency generator as well as an optional radiation shield with height-adjustable control desk in which the Acquisition Workstation (AWS) can be integrated

Swivel arm system consisting of X-ray tube unit, compression device and object table with integrated detector

Motorized, isocentric rotation of the swivel arm with preset rotation angle (Single Touch), other angles preselectable

The motorized, height-adjustable object table can be adjusted from the examination stand as well as via the foot switch

Motorized and manual compression with preselectable compression force

Digital display of compression force and compression thickness

Automatic collimation to the required radiation field size according to the compression plate selected

Integrated positioning/collimator light

OpComp – function for optimizing compression force

OpDose – pre-programmable exposure parameters for optimized patient dose

AEC (Automatic Exposure Control) – uses the entire breast surface on the detector, thereby providing an optimum dose

The generator console is integrated in the AWS; radiation is released from a separate control box

Source-image distance	65 cm (25.6"), for high geometric resolution and optimum patient access during positioning
Compression	3 kg (6.5 lbs) to 20 kg (44 lbs), automatic (OpComp) and manual adjustment
Collimation	Automatic for all sizes
Grid	Reciprocating, grid ratio 5:1, 31 lines/cm
Magnification factors	1.5 / 1.8, geometric
Swivel range	+ 180° to – 180°, motorized, isocentric rotation with preselectable rotation angle
Height adjustment (motorized)	69 cm (27.2") to 150 cm (59.1") (object table)

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## X-ray generator

Microprocessor-controlled high-frequency generator

Power output	5 kW (30 kV, 1 s acc. to IEC 60601-2-45)
kV range	23 kV to 35 kV (adjustable in 1 kV increments)
<u>mAs range</u> (at 25 kV and maximum power)	
Mo anode	2 mAs to 500 mAs in mAs mode 5 mAs to 500 mAs in AEC mode
W anode	2 mAs to 630 mAs in mAs mode 5 mAs to 630 mAs in AEC mode
Exposure times, automatic	10 ms to 4 s (large focus), 60 ms to 6 s (small focus)

## X-ray tube unit

Mammography X-ray tube unit with quadruple-focus rotating-anode tube (molybdenum/tungsten)

Focal spot nominal value	Molybdenum focal spot: 0.1 / 0.3 (star pattern test) 0.15 / 0.3 (IEC 60336) Tungsten focal spot: 0.1 / 0.3 (star pattern test) 0.15 / 0.3 (IEC 60336)
Anode-filter combinations	Mo/Mo, Mo/Rh, W/Rh
Nominal voltage	40 kV
Heat storage capacity (tube unit)	1,800,000 J; 2,430,000 HU
Heat storage capacity (anode)	120,000 J; 162,000 HU
Optical anode angle	20°
Inherent filtration	1 mm Be
Anode speed	8,800 rpm/147 Hz

## Flat detector

Solid-state detector of amorphous selenium (aSe)

Detector size	24 cm x 30 cm (9.5" x 12")
Material	Amorphous selenium (aSe)
Pixel size	85 µm x 85 µm squared
Image matrix	2816 x 3584 (24 cm x 30 cm / 9.5" x 12")
Uncertainty index	$U \leq 1.5 \times 10^{-3}$

## Exposure formats

Survey exposure	24 cm x 30 cm (9.5" x 12")
	18 cm x 24 cm (7" x 9.5")
Detail exposure	9 cm x 9 cm (3.5" x 3.5")
	6 cm x 6 cm (2.4" x 2.4")
Axilla exposure	8 cm x 20 cm (3" x 8")

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## PC hardware / software

Basic	Intel Xeon E5 CPU, 4 cores, 3.50 GHz, 16 GB RAM 1 TB hard disc for image data ~ 50,000 images
Tomosynthesis	Intel Xeon E5 CPU, 4 cores, 3.50 GHz, 24 GB RAM 2 TB hard disc for image data ~ 100,000 images or ~ 1300 tomosynthesis scans
Operating system	Windows 7 operating system with syngo-based applications and proactive virus protection (whitelisting)

## Displays

### 19" TFT color display

Screen size	19" (48 cm)
Image matrix	1280 x 1024
Maximum brightness, typical	300 cd/m <sup>2</sup>
Horizontal/vertical viewing angle	170° / 170°
Contrast ratio, typical	1000 : 1

Alternatively:

### 3 MP 21" TFT color display\*

Screen size	21" (54 cm)
Image matrix	1536 x 2048
Maximum brightness, typical	900 cd/m <sup>2</sup>
Horizontal/vertical viewing angle	170° / 170°
Contrast ratio, typical	1000 : 1

# MAMMOMAT Inspiration

<b>Patient data administration</b>	
Patient directory	Input of patient data (e.g. patient name, patient ID, date of birth), patient search Input via keyboard or directly via DICOM Modality Worklist <sup>2)</sup>
<b>Image acquisition/display/processing</b>	
Digital radiography	Digital technique with 2816 x 3584/14-bit matrix, digital filtration
Image processing – OpView	Application-oriented LUTs (lookup tables) for contrast/brightness Edge enhancement Dynamic range control Noise reduction Detection of breast border Electronic shuttering
Text/graphic functions	Image orientation label Image annotation and comment Length and angle measurement Interactive zoom and pan Gray-scale inversion Split screen (2/4/16 on 1)
Integrated system operation	Preselection of patient orientation for automatic image orientation User programs with customized predefined parameter sets
Images lossless compression algorithm	JPEG Lossless Process 14 (selection value 1)
<b>Image storage</b>	
2D images	DICOM MG for processing and presentation
Tomo projection images	DICOM MG for processing and presentation
Tomo slices	DICOM CT or DICOM BTO*
Insight 2D	DICOM MG for presentation

\* Option

<sup>2)</sup> Requires an information system that can provide a DICOM Modality Worklist

# MAMMOMAT Inspiration

## Data transfer and documentation

### DICOM network interfaces

DICOM interface for image data communication based on the DICOM 3 standard

DICOM Basic	<u>DICOM Storage (Send/Receive)</u> Sending and receiving of images
	<u>DICOM Query/Retrieve</u> Retrieval of studies from a digital archive, a workstation or other imaging systems
	<u>DICOM Storage Commitment</u> Archiving confirmation from the image archive
DICOM Basic Print	<u>DICOM Print</u> For connection to a DICOM-compatible camera or DICOM-compatible printer
DICOM HIS/RIS	<u>DICOM Worklist Management</u> For importing patient/examination data from an independent HIS/RIS system, including HIS/RIS queries via special search criteria
	<u>MPPS (Modality Performed Procedure Step)</u> For exporting examination data, including dose parameters, to an independent HIS/RIS system

### Documentation

DVD / CD burner	Writing of images in DICOM format to DVD/CD (multisession)
DICOM Basic Print	See DICOM 3 functions
Connection for paper printer (local or network printer)	Suitable for image documentation on paper Requirement: PostScript Level 2 Formats: DIN A 4, US Letter or US tabloid For connection within network: network-compatible printer required Note: Paper printer is not suitable for diagnostic purposes Only in connection with further documentation device

## IHE Integration Statement

Mammography Image	The images contain all the relevant information for optimal display on workstations supporting this profile
Scheduled Workflow	Consistent data flow, from planning at the RIS through examination to storage in the PACS
Portable Data for Imaging	Reliable exchange of image data via CD
Access to Radiology Information	Connection to the DICOM archive, typically used for fetching prior studies from the PACS
Consistent Presentation of Images	Print Composer is implemented
Mammography Acquisition Workflow	Handles mammography-specific exceptions like correction of view and laterality, and rejection of images

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## Biopsy unit\*

The biopsy unit is used for automatic stereotactic biopsy with MAMMOMAT Inspiration

The biopsy unit comprises a handbox for controlling the needle positioning device, a standard needle holder, a face shield to protect the patient from swivel arm movements, and calibration accessories

Needle guides for fine needles and needles for core and vacuum biopsy from the main manufacturers are available additionally

The biopsy unit is simply slid onto the object table

Full motorized needle movement in X, Y and Z axis

It is automatically detected by MAMMOMAT Inspiration and can immediately be used for biopsies from any projection (e.g. CC, MLO). Compatible with a wide range of different biopsy devices

The workflow is automated due to the remote tube movements of the stereo pair acquisition controlled from the AWS, and automatic needle positioning

Stereotactic biopsy can be performed on seated and recumbent patients

Due to image processing with OpView, the image impression for biopsy images and screening/diagnostic images is identical

Biopsy volume (vertical needle guidance)	50 mm x 40 mm x 110 mm (2" x 1.6" x 4.3")
Biopsy volume (lateral needle guidance)	50 mm x 40 mm x 60 mm (2" x 1.6" x 2.4")
Tube swivel range in stereo mode	- 15° and + 15°
Biopsy compression plate with window	96 mm x 100 mm (3.8" x 3.9") (window size 52 mm x 42 mm [2" x 1.7"], vertical needle guidance)
Biopsy compression plate without window	96 mm x 100 mm (3.8" x 3.9") (lateral needle guidance)
Weight of biopsy unit	< 5 kg
Biopsy unit measures	46 cm x 26 cm x 40 cm (18.1" x 10.2" x 15.7")



\* Option

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## Tomosynthesis\*

Unlike conventional mammography, where the entire breast is projected onto a single plane, tomosynthesis enables 3D volumes to be displayed in individual slices

With tomosynthesis, 25 exposures are acquired during a scan from various angles within a range of  $\pm 25^\circ$

Only a fraction of the dose of conventional mammography is required for each exposure

Optimized reconstruction algorithms are used to calculate the individual slices for display on the Acquisition Workstation

The large angle range of  $\pm 25^\circ$ , combined with 25 projections and full detector read out, enables optimum depth resolution

Optimized workflow through

- fast quality control: individual projections and reconstructed slices are displayed during the examination
- conventional and tomosynthesis exposures are possible during the same examination
- immediate quality control: the first pulse is used for the calculation of the AEC (Automatic Exposure Control) and instantly displayed as an image
- automatic removal of the grid for tomosynthesis exposures

## High Definition Breast Tomosynthesis\*

For superior contrast and detail visualization, enabling high detection rates, confident diagnosis and easy reading

- EMPIRE Technology: Unique, multiple algorithms, providing superior image quality in both contrast and detail
- Insight: More than a view. High Definition Breast Tomosynthesis visualized in 2D or 3D

Tube angulation	$\pm 25^\circ$
Scan time	< 25 seconds
Number of projections	25
Pixel size tomosynthesis	85 $\mu\text{m}$
Distance between reconstructed slices	1 mm
Reconstruction algorithms	Analytical or a unique combination of iterative and machine-learning algorithms for EMPIRE*
Data volume	20 MB per projection max. 20 MB per slice, depending on breast size
Display on AWS	Projections Reconstructed slices Cine mode Dose / projection Dose / scan



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## Overview of options

Compression plates	Compression plate with low edge, 18 cm x 24 cm (7" x 9.5")
	Compression plate with high edge, 18 cm x 24 cm (7" x 9.5")
	Compression plate with low edge, 24 cm x 30 cm (9.5" x 12")
	Compression plate with high edge, 24 cm x 30 cm (9.5" x 12")
	Flexible compression plate with high edge, 18 cm x 24 cm (7" x 9.5")
	Flexible compression plate with high edge, 24 cm x 30 cm (9.5" x 12")
	Shifting paddle with high edge, 18 cm x 24 cm (7" x 9.5") <sup>3)</sup>
	Shifting paddle with low edge, 18 cm x 24 cm (7" x 9.5") <sup>3)</sup>
	Spot Plus compression plate
	Spot Focus compression plate, 6 cm x 6 cm (2.4" x 2.4")
	Detail / spot compression plate, 9 cm x 9 cm (3.5" x 3.5")
	Axilla compression plate, 8 cm x 20 cm (3" x 8")
	2D biopsy compression plate
Magnification attachment	Magnification table 1.5
	Magnification table 1.8
	Magnification compression plate, 16 cm x 20 cm (6.5" x 8")
	Mag Spot compression plate, 9 cm x 9 cm (3.5" x 3.5")
	Mag Focus compression plate, 6 cm x 6 cm (2.4" x 2.4")
Control desk	Operator console with radiation shield, 0.5 mm lead equivalent
Illuminated front glass pane	MoodLight
Radiation release	Foot switch
	Hand switch
Bus installation	Installation kit
	Radiation shield
Wall holder	Compression plates
Display	19" TFT color display
	3 MP 21" TFT color display
Software packages	Security package
	VMWare for RIS integration
Biopsy	Biopsy unit
	Stereo biopsy compression plate
	Horizontal needle holder (Mammotome)
	Vertical needle holder (Mammotome)
	Biopsy attachment with crosshair assembly
Tomosynthesis	3D tomosynthesis
	Tomo compression plate with high edge, 25 cm x 36 cm (9.8" x 14.2")
	High Definition Breast Tomosynthesis with EMPIRE and Insight
PRIME Technology	Software-based anti-scatter solution for mammography

\* Option

<sup>3)</sup> Not commercially available in the USA

# MAMMOMAT Inspiration

## Operating data

Power requirements	208 V, 230 V, 240 V, 277 V, $\pm 10\%$ , single-phase; 208 V, 230 V, 240 V, 277 V, 400 V $\pm 10\%$ , two-phase, 50/60 Hz $\pm 1$ Hz
Power requirements (for US and Canada)	208 V, 230 V, 240 V, 277 V, $\pm 10\%$ , single-phase; 208 V, 230 V, 240 V, 277 V, $\pm 10\%$ , two-phase, 50/60 Hz $\pm 1$ Hz

## Power consumption

Mains Power	7.5 kVA (short term)
	0.5 kVA (continuous)

## Weight

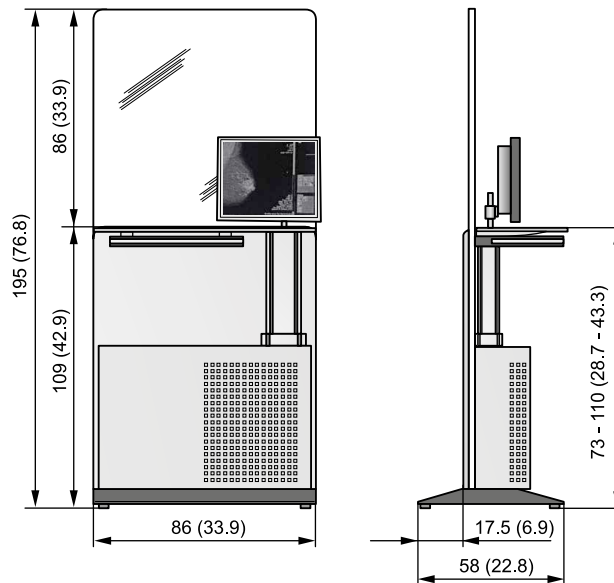
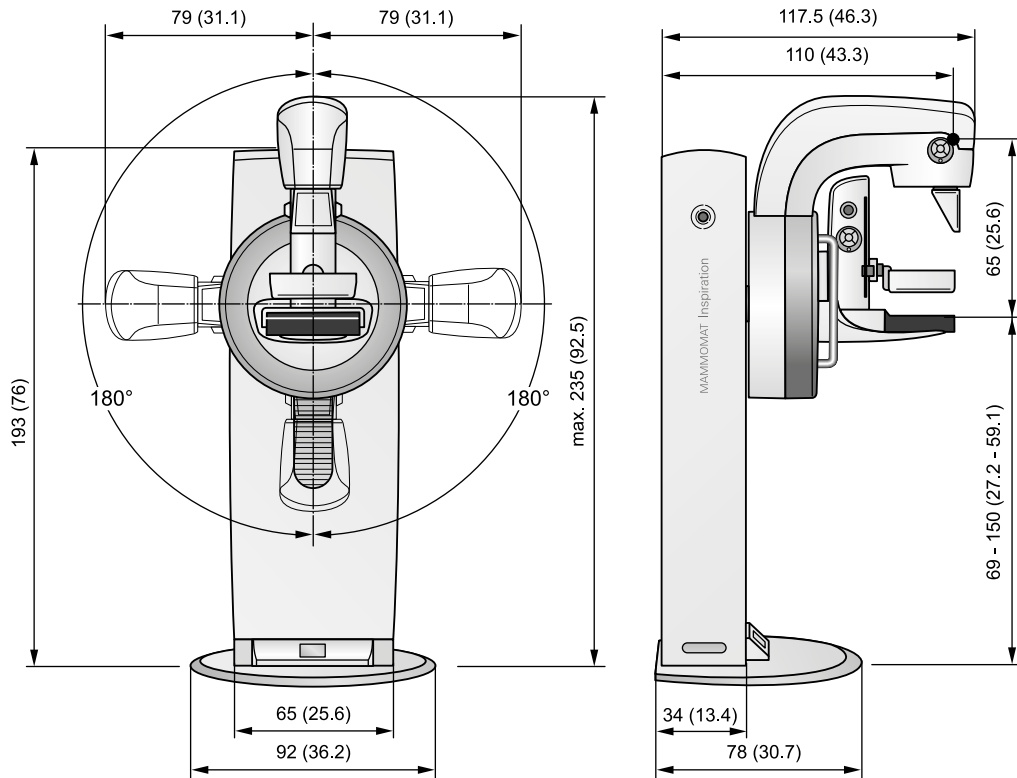
Examination stand and generator	350 kg (770 lbs)
Control desk with radiation shield	124 kg (275 lbs)

## Environmental conditions (operation)

Temperature range	+ 12 °C to + 35 °C, maximum fluctuation of temperature < 10 °C / 60 min.
Relative humidity	30 % to 75 %, non-condensing
Atmospheric pressure	700 hPa to 1060 hPa

# MAMMOMAT Inspiration

Dimensions in cm (inches)



High Definition Breast Tomosynthesis, EMPIRE Technology and Insight 2D/3D are currently under development and not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed.

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