



Multitom Rax

Operator Manual

VE20 or higher

SIEMENS

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concerning medical devices. The CE marking applies only to medical devices which have been put on the market according to the above-mentioned EC Directive. Unauthorized changes to this product invalidate this declaration.

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Please observe the Safety register.
This must be studied thoroughly before
starting up the system.

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Your opinion matters a lot to us!

We make every effort to continuously improve our product documentation. Therefore, we would like to offer you the opportunity of giving us your direct feedback concerning your requests, suggestions and criticism with respect to this operator manual.

- ☐ For feedback by fax, please use the following fax number:
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In this case, we request that you include the *complete print number in the footer of this page* in the subject line.

Thank you very much for supporting us in our efforts to improve our products.

My notes

Optional information	
Name	
Hospital	
City/country	
E-mail	
Telephone/fax	
Number of fax pages	

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Register 2: System Safety

Register 3: System Overview

Register 4: System Components

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General Information

To operate the Multitom Rax system accurately and safely, the operating personnel must have the necessary expertise as well as knowledge of the entire Operator Manual. It must be read carefully prior to starting up the Multitom Rax system.

Operator Manual layout

To improve readability, your complete Operator Manual has been broken down into several individual Operator Manuals with thematically distinct content:

- ❑ Operator Manual - Multitom Rax system
- ❑ Operator Manual - FLUOROSPOT Compact imaging system

Information about this Operator Manual

Area of application

This Operator Manual is valid for the following products:

- ❑ Multitom Rax (VE20)

Required documents

Reference is made in this Operator Manual to the following documents:

- ❑ Operator Manual - FLUOROSPOT Compact imaging system

Structure

Register	This Operator Manual includes various registers. The first header line shows the title of the register.
Chapter	Every register can contain one or more chapters. The chapter title is in the second header line.
Page numbers	The footer contains the page numbers and the number of pages in the register. Only the registers have consecutive page numbers.

Warnings and cautions

Warning	Warning is used to indicate the presence of a hazard which can cause personal injury or death to patients, operating personnel or others.
----------------	---



Warning

First the source of danger is mentioned.

Then possible consequences are pointed out.

◆ Finally, information on how to avoid the danger is provided.

Caution	Caution is used to indicate that minor injuries or damage to the system may occur if the system is not used properly.
----------------	---



Caution

First the source of danger is mentioned.

Then possible consequences are pointed out.

◆ Finally, information on how to avoid the danger is provided.

Text layout

A set of conventions has been observed in this Operator Manual that is intended to help you perceive the importance of a piece of text at a glance.

The following notations are used:

Instructions	guides you in the proper use of your system. ◆ A diamond precedes text of this type.
Lists	□ A square precedes text of this type.
Explanatory text	subdivides an instructional text or a list into further sub items. – A dash precedes text of this type.
Reference	refers you to further explanations on another page of your Operator Manual or in a separate document. → An arrow indicates texts of this type.
Note	is used in two different ways: □ emphasizes a safety-relevant piece of information without there being direct danger □ contains a summary of the most important information on a subject  <i>This text is indicated by the icon for note and is printed in italics.</i>
Information	text that provides additional useful explanations about a subject.  <i>This text is indicated by the icon for information and is printed in italics.</i>
Menus and buttons	Designations of software menus, buttons and dialog boxes are printed in bold .

Pictograms

The following are pictograms and their meanings as they may apply to your system (IEC standard).

	Alternating current
	Equipotential bonding
	Caution: Read Operator Manual
	Caution: Laser
	Pushing prohibited
	Off
	On
	Attention: Hot surface (at the X-ray tube)
	Degree of protection type B

Abbreviations

The following are abbreviations and their full description as they may apply to the manual.

Abbreviation	Full Description
ACSS	Automatic Collimation Size Selection
AP/APG	Anaesthetic-proof
DAP	Dose Area Product
DICOM	Digital Imaging and Communications in Medicine
DMG	Dead man's grip
DSA	Digital Subtraction Angiography
HVL	Half value layer
IEC	International Electrotechnical Commission
IQAP	Image Quality Assurance Program
IV	Intravenous
LCD	Liquid-crystal display
LED	Light-emitting diode
MPPS	Modality Performed Procedure Step
OEM	Original Equipment Manufacturer
OGP	Organ Program
PMMA	Polymethylmethacrylate
RHA	Rotation about horizontal axis
RVA	Rotation about vertical axis
SID	Source-Image Distance
SOD	Source-Object Distance
TOD	Table-Object Distance
TUI	Touchscreen User Interface
UPS	Uninterruptible Power Supply

Names and parameters

All names and data on patients and equipment that are used as examples in this Operator Manual are entirely fictional.

Any resemblance to names of real persons and institutions is entirely coincidental.

All parameters and images shown in this Operator Manual are examples. Only the parameters displayed on your system are relevant.



The Multitom Rax may be shown with expanded equipment or with optional accessories in some figures.

Illustrations

All illustrations of the equipment and of the user interface in this Operator Manual, are *examples* only.

Differences in detail may occur in your system due to the installed options, configuration and constant development of the system.

Reproduction of images can cause loss of detail. Pictures in this Operator Manual do not therefore provide any indication of image quality.

All names of patients in images or illustrations, are purely fictional. Any similarities with existing persons are entirely coincidental.

Value statements

All technical data are typical values unless specific tolerances are stated.

Values in pictures of the software user interface, have no clinical meaning.

- ◆ Only set the values preset in the exam sets provided or the values recommended by experienced application specialists.

Error messages and status indicators

The system displays warnings and error messages as well as information about current system status on the screen. It gives information on how to proceed in each situation.

For further details refer to *Register 4: System Components, Chapter **Ceiling-suspended X-ray tube with multileaf collimator***, or to the Operator Manual of the FLUOROSPOT Compact imaging system.

Usability

The systems must only be used by persons with the necessary specialist knowledge after training, for example physicians, radiologists, cardiologists, and medical specialists.

- ❑ Patient population: newborn to geriatric.
- ❑ Operator profile: The usage of the system described in this Operator Manual requires specific technical and medical knowledge and skills regarding, at a minimum, radiation protection, safety procedures, and patient safety. People using, moving, working with the system must have acquired such knowledge and skills during their curriculum.
- ❑ Language understanding: Users must understand the language of the Operator Manual before touching the system.
- ❑ Equipment training: Application training is supplied with the equipment according to the hand-over contract. It is mandatory to follow such application training supplied by Siemens Representative before any use of the system. The follow-up training, which is necessary due to change of personnel, is in the responsibility of the operator of the system. Any additional training can be requested from Siemens Healthcare.
- ❑ Operator Manual and precautions: Read and understand all the instructions in the Operator Manual before trying to use the system and request additional training from Siemens Healthcare if necessary. Keep the Operator Manual with the equipment at all times and periodically review the procedures and safety precautions.
Failure to follow the Operator Manual and safety precautions could result in serious injury to the patient, others or yourself.
- ❑ Patient safety: Give assistance for getting the patient on and off the table. Be sure all patient health lines (IV, oxygen, and so on) are positioned so they will not be caught when moving the equipment. Never leave the patient unattended while in the system room.
An unattended patient could fall from the table, start a movement control, or encounter other problems which could be hazardous.
- ❑ Radiation safety: Always use correct technique factors for each procedure to minimize X-ray exposure and to produce the best diagnostic results.
- ❑ Establish emergency procedures: It is not always possible to determine when some components, such as X-ray tubes, are nearing the end of their operating lives. These components could stop operating during a patient examination. Have an emergency plan in case of non-availability of the system, for example, to use a different system.

Establish procedures for handling the patient in case of the loss of fluoroscopic imaging or other system functions during an examination.



Caution

Operation of the system by untrained users

Risk of incorrect diagnosis or treatment due to misinterpretation of image information.

- ◆ The system must *only* be used by persons with the necessary specialist knowledge, for example, physicians, trained radiologists, or trained technologists, after an appropriate application training.
-

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General Safety Information



The organization responsible for the safety of the medical device according to IEC 60601 ff. is the user or the operator/operating company of the device.

Laws and regulations

If legally binding regulations govern the installation and/or the operation of the product, it is the responsibility of the installer or the operator to observe these regulations.

Modifications to the system

Modifying the medical product is not permitted.

Country-specific regulations

The legally established country-specific regulations must be followed in all countries. Deviating from this Operator Manual, values may be set according to country-specific regulations.

Regulations in the EU

Due to the Medical Device Directive 93/42/EEG, Multitom Rax complies with the standards of the IEC 60601-1 series.

Additional national regulations

To ensure safety for operators, patients, and third parties, we recommend compliance with the regulations listed here to the extent that local national laws allow.

Germany

RöV (X-ray Ordinance)	Legally required tests according to §16:
Before start-up	☐ Acceptance test ☐ Expert inspection
During operation	According to the time intervals specified ☐ Constancy test
MedBetreibV	Ordinance for system owners of medical equipment ☐ Safety check for technical construction at least every two years

USA and Canada

Corresponding to the Medical Device Directive in the EU, Multitom Rax complies in the U.S.A. and Canada with the applicable standards.

Federal law stipulates that this system may only be sold to a physician or by order of a physician.

This system is intended for use in radiographic examinations and under the guidance of a trained health care professional.

CE marking

This product is provided with a CE marking in accordance with the provisions of Directive 93/42/EEC of June 14th, 1993, concerning medical devices.

Data security

Personal data are subject to data protection.

- ◆ Please observe the relevant legal provisions.

Legally required tests

Legally required tests must be performed at the specified intervals. These tests include, for example,

- ❑ Constancy test according to the X-ray ordinance (§16 RöV) in the Federal Republic of Germany.
- ❑ Tests based on DHHS guidelines (Department of Health and Human Services) where applicable.

For more detailed information refer to Register 5: *System Operation*, Chapter **Functional and Safety Check**.

Fire safety

In the event of a fire, shut down the entire system immediately, that is, disconnect the system from the main power supply.

- ◆ Press the emergency SHUTDOWN button or actuate the main or disconnecting switch.
- ◆ Use a CO₂ fire extinguisher.



Do *not* use water!



Caution

Fire inside or in the vicinity of the system

**Risk of injury of patient and personnel and damage to property.
Risk of inhalation of fumes from burning plastics.**

- ◆ Switch off the system in the event of fire.
- ◆ Help the patient to escape from the system.
- ◆ Make sure that you know where the escape routes are.
- ◆ Make sure that you know where the fire extinguishers are located and familiarize yourself with the use of them.

-
- ◆ Contact SIEMENS Uptime Service before performing any refurbishing work and before starting the system up again.

Explosion protection

Multitom Rax is *not* designed for operation in explosion-endangered areas.



Caution

The system is not designed for operation in explosion-endangered areas. It does *not* fulfill the requirements for **AP/APG** classification.

Danger of explosion!

- ◆ Do *not* use the system where explosive atmospheres can arise.
-



Only products with the AP mark (AP = anesthetics test) may be used in explosion-endangered areas

Standby power supply (inside the hospital)

No radiation is possible in standby operation.

“Standby power supply active” appears on the system remote control console in the message line of the data menu and on the monitor.

A standby power supply (inside the hospital) switches on if the line voltage fails. However, this does not always happen without interruption and can take some time.

The system is switched off and must be switched on anew.

UPS (for the imaging system)

UPS = Uninterruptible Power Supply

A UPS is a battery-backed system which provides emergency power in the event of a mains power supply failure.

To prevent data/image loss, your system may have a UPS which shuts down the *imaging system* in a controlled way in the event of a power failure.



Caution

Inappropriate device connected to UPS

Risk of electrical hazard or damage to the system

- ◆ Do *not* connect any additional device to the UPS power outlets.
-

Functioning in the event of power failure

In the event of power failure, all indicators and displays are dark. Only the imaging system as well as the main monitor in the control room is still being powered by the UPS to end all active tasks, for example archiving of images.

- ◆ Stop the examination.
- ◆ Do *not* press any keys.

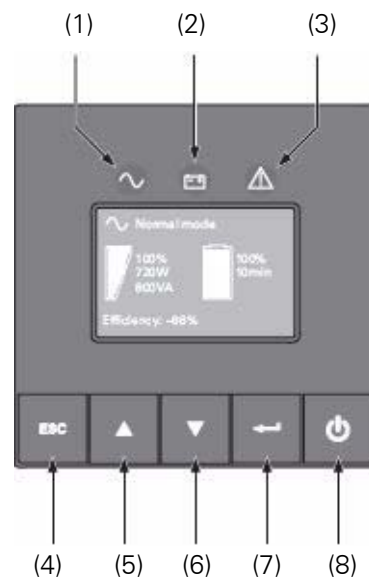
After a configurable time (typically 2 minutes), the imaging system shuts down to prevent the backup battery to be exhausted.

- ◆ Wait for power to return or start emergency power.
- ◆ Restart the system.

Description of UPS

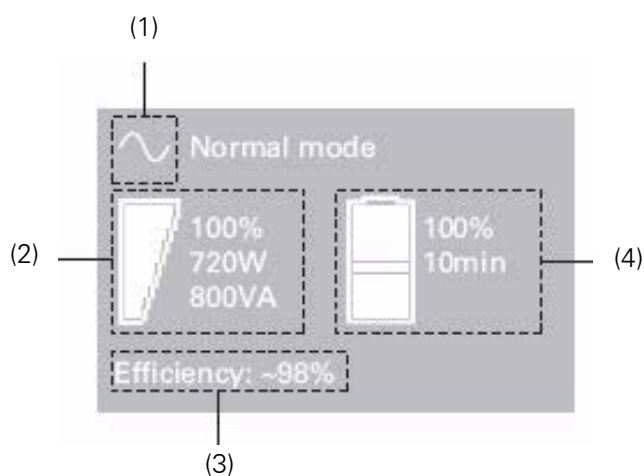
Overview

The UPS has a five-button graphical LCD. It provides useful information about the UPS itself, load status, events, measurements and settings.



- (1) Power ON indicator (green)
The UPS is operating normally
- (2) Battery ON indicator (yellow)
The UPS is on battery mode
- (3) Alarm indicator (red)
The UPS has an active alarm or fault
- (4) Escape
- (5) Up
- (6) Down
- (7) Enter
- (8) ON/OFF button

LCD description



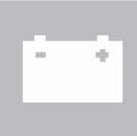
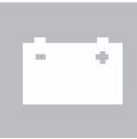
- (1) Operation status
- (2) Load/equipment status
- (3) Efficiency and load group information
- (4) Battery status

As default, or after 5 minutes of inactivity, the LCD displays the screen saver.
The backlight LCD automatically dims after 10 minutes of inactivity.

◆ Press any button to restore the screen.

The following table describes the status information provided by the UPS:

Operation status	Possible cause	Action
Standby mode 	The UPS is OFF, waiting for start-up command from user	System is not powered until power button is pressed.
Normal mode 	The UPS is operating normally.	The UPS is powering and protecting the system.
In AVR mode  No beep	The UPS is operating normally, but the system voltage is outside normal mode thresholds.	The UPS is powering the system through an Automatic Voltage Regulation device. The system is still protected normally.

Operation status	Possible cause	Action
On battery  Battery LED is on 1 beep every 10 seconds	A utility failure has occurred and the UPS is in battery mode.	The UPS is powering the system with the battery power. Prepare your system for shutdown.
End of backup time  1 beep every 3 seconds	The UPS is in battery mode and the battery is running low.	This warning is approximate and the actual time to shutdown may vary significantly. Depending on the UPS load, the "Battery low" warning may occur before the battery reaches 20% capacity.

Operation

Start-up and normal operation

To start the UPS:

- ◆ Verify that the UPS power cord is plugged in.
 - The UPS front panel display illuminates and shows EATON logo.
- ◆ Verify that the UPS status screen shows .
- ◆ Press the  button on the UPS front panel for at least 2 seconds.
 - The UPS front panel display changes status to "UPS starting..."
- ◆ Check the UPS front panel display for active alarms or notices. Resolve any active alarms before continuing.

See "Troubleshooting" → p. 17



If the  indicator is on, do *not* proceed until all alarms are clear.

- ◆ Check the UPS status from the front panel to view the active alarms.
- ◆ Correct the alarms and restart if necessary.

- ◆ Verify that the  indicator illuminates solid, indicating that the UPS is operating normally and any loads are powered and protected.
 - The UPS should be in normal mode.

Starting the UPS on battery



Before using this feature, the UPS must have been powered by utility power with output enabled at least once.

To start the UPS on battery:

- ◆ Press the  button on the UPS front panel until the UPS front panel display illuminates and shows the status "UPS starting...".
 - The UPS cycles through Standby mode to Battery mode.
 - The  indicator illuminates solid.
 - The UPS supplies power to your system.
- ◆ Check the UPS front panel display for active alarms or notices besides the "Battery mode" notice and notices that indicate missing utility power.
- ◆ Resolve any active alarms before continuing.

See "Troubleshooting" → p. 17

- ◆ Check the UPS status from the front panel to view the active alarms.
- ◆ Correct the alarms and restart if necessary.

UPS shutdown

To shut down the UPS:

- ◆ Press the  button on the UPS front panel for 3 seconds.
 - The UPS starts beeping and shows the status "UPS shutting OFF..."
 - The UPS then transfers to Standby mode and the  indicator turns off.

Operation on battery power

Transfer to battery power

- ☐ The connected devices continue to be supplied by the UPS when AC input power is no longer available.
 - The necessary energy is provided by the battery.
- ☐ The  and  indicators illuminate solid.
- ☐ The audio alarm beeps every 10 seconds.



The connected devices are supplied by the battery.

Low-battery warning

- ❑ The  and  indicators illuminate solid.
- ❑ The audio alarm beeps every 3 seconds.



The remaining battery power is low.

- ◆ Shut down all applications on the connected system because automatic UPS shutdown is imminent.

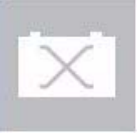
End of battery backup time

- ❑ LCD displays “End of backup time”.
- ❑ All LEDs go OFF.
- ❑ The audio alarm stops.

Return of AC input power

Following an outage, the UPS restarts automatically when AC input power returns and the load is supplied again.

Troubleshooting

Operation status	Possible cause	Action
Batteries disconnected 	The UPS does not recognize the internal batteries	◆ If the problem persists, contact Siemens service.
	The batteries are disconnected	◆ Verify that all batteries are properly connected. ◆ If the problem persists, contact Siemens service
Overload 	Power requirements exceed the UPS capacity (greater than 105% of nominal)	◆ Remove some of the devices from the UPS. – The UPS continues operation, but may shutdown if the load increases. – The alarm resets when the condition changes to normal.
End of battery life 	The end of the battery life is reached.	Contact Siemens service for battery replacement.
Event 	A UPS event occurs.	
	Example: Remote power OFF, the RPO contact has been activated to shutdown the UPS and now prevents restart.	Set the contact back to its normal position and press  button to restart.
UPS fault 	The UPS has an internal fault.	The UPS does not protect the system anymore. ◆ Note the alarm message and the UPS serial number, then contact Siemens service.

Information about the software

Network security



Caution

Unauthorized access to system

Hazards up to and including loss of patient data and non-operational system

The hospital is responsible for network security at the site.

- ◆ Set up firewalls and user account password protections.
 - ◆ Do not allow users to change configuration files.
 - ◆ Update virus protection software as required.
-



Please note that the following are changes to the network that may introduce new risks:

- ☐ Network configuration change;
- ☐ Connection of additional systems or equipment to the network;
- ☐ Disconnection of systems or equipment from the network;
- ☐ Update or upgrade of equipment connected to the network.

Third-party software

Only software authorized by Siemens for use with this product may be used.



Caution

Use of unapproved or manipulated software or hardware components

Risk of malfunctions posing a hazard to patients and equipment

- ◆ Only use software or hardware components approved by Siemens.
 - ◆ Perform repairs only with our expressed written approval.
-

Copyright

The system and user software used in this product is protected by copyright.

DICOM conformity

The imaging system software is conforming to the DICOM standard. A DICOM conformance statement is available from Siemens.

Virus scanner A virus scanner is part of the system software installed on your device and can be activated by Siemens Service.

If the virus scanner detects a virus, the following message is shown:



The information on the detected virus will automatically be forwarded to Siemens Uptime Services.

The necessary checking of virus patterns and scan software is done by remote updates during each start-up. It automatically checks whether new data is available and shows the dialog box **Software Distribution**.

- ◆ We recommend installing every new virus pattern and scan software by clicking the **Yes** button.



Caution

New viruses not recognized

System malfunction because of virus infection

- ◆ Confirm virus pattern file and scan engine updates at start-up time.
 - Updates are only available with remote update handling or by contacting Siemens Service.

Remote software update



Caution

Software installation will disturb system functions

Interruption of patient treatment and loss of patient data

- ◆ Do not start installation during patient treatment.
-



Caution

Installation of the Update package failed

Failed software installation will result in an undefined system state

- ◆ Do not use the system and call UPTIME Service Center
-

Checks, tests

Before the system is used for examinations, the user must ensure that all safety-relevant devices function correctly and that the system is ready for operation.

Important functional tests and checks must be made at certain time intervals.

See Register 5: *System Operation*, "Daily tests" → p. 7

Maintenance plan



Warning

Wear or material fatigue in the system or accessories

Risk of injury or system damage

- ◆ Follow the maintenance guidelines to maintain safety and proper function of the system.
 - ◆ Check accessories for wear before use.
-



Caution

Image artifacts due to unperformed maintenance

Incorrect diagnosis basis

- ◆ Check that the image quality criteria described in the installation and maintenance manual are met before using the system.
 - ◆ Maintenance work should be performed by trained technical personnel only.
 - ◆ Purchasing a maintenance contract will keep the system in optimum condition.
-



This maintenance plan includes the required tests according to IEC 62353

Periodic maintenance

Periodic maintenance includes:

- ☐ Safety inspection
- ☐ Preventive maintenance
- ☐ Quality and function tests
- ☐ Replacement of safety-relevant parts subject to wear

This work may be performed only by qualified and authorized service engineers. Qualified in this context means that the engineers have been trained accordingly or have acquired the necessary experience in practice. Authorized means that the engineers have been authorized by the operator of the system to perform maintenance work.

Prior to the first system startup, we recommend that you name a staff member who will be responsible for ensuring that routine checks and preventive inspection and maintenance work are performed. This employee has to archive all certificates in the folder for the "Technical Documentation".

In addition to our repair service, Siemens also offers you a complete range of services for preventive inspection and maintenance of your system. These services can be called on as required or agreed in a flexibly drafted service contract.

If you have not received a quotation from our **UPTIME Services** service organization, please contact the Siemens representative responsible for your facility.

Safety inspection

The following checks are intended to ensure the safety of the system. Where appropriate, preventive measures must be adopted or repairs performed. For the most part, the points to be checked are prescribed by laws and standards.

Maintenance interval 24 months for the entire system

Listing of work steps to be performed

Object or function	Reason	What is checked
General checks		
Overall system	Safety of patients and personnel	Visual check of the system (cover panels) for damage and sharp edges
Cables and how cables are laid	Protection of patient and personnel against electric shocks	Visual check of cables and how cables are laid for safety deficiencies
Accessories	Safety of patients	Check for safety deficiencies
System radiation protection devices	Protection of patient and personnel against radiation injuries	Check unit radiation safety devices as well as any additional safety devices that are configured, e.g. lower body radiation shield, upper body radiation shield, ceiling-mounted radiation shield, for installation and for damage.
Operator documents	Protection against incorrect operation and thus protection of patients, personnel and unit	Check for the presence of operator documents
Warning notices	Protection against incorrect operation and thus protection of patients, personnel and unit	Check for presence of the required warning labels visible to the user for operation of the system.
Insertable fuses	Protection of patients, personnel and unit	Check all insertable fuses that are accessible without tools to determine whether manufacturer data (nominal value and switch-off characteristics) are met.
User interfaces	Protection against incorrect operation and thus protection of patients, personnel and unit	Check for legibility and operating symbols.
Electrical checks		
Electrical safety	Protection of patient and personnel against electric shocks	☐ Measurement of ground wire resistance ☐ Device leakage current measurement ☐ Patient leakage current measurement of the complete system per national regulations

Object or function	Reason	What is checked
Mechanical checks		
Wall and floor mounting	Protection of patients, personnel and unit	Mounting (visual check)
Pull and support cables	Protection of patients, personnel and unit	Check for wear and fraying
Chain drives	Ensure power transmission and safety functions	Check for wear, tension, ease of movement and function of the guide rollers
System movements (manual)	Safety of the system latching mechanisms	Check of brake holding and end stops
Movable components	Protection of patients, personnel and unit	Cable lead-in, movement behavior and, if applicable, brakes
Accessories	Safety of patients, personnel	Check for functionality and for good condition
User interfaces	Protection against incorrect operation and thus protection of patients, personnel and unit	Check for damage
Safety-relevant parts subject to wear	Protection of patients, personnel and unit	Check for damage
Function check		
Emergency stop devices	Preventing the first malfunction caused by application errors and collapsing patients	Switch-off of system functions after activating the emergency stop device
Control devices and warning indicators	Inform the operator about relevant system conditions and overload situations	The functions of the following displays: ☐ Radiation ☐ X-ray tube load ☐ Blocking ☐ Unit movements at the collision limit
System movements (motorized)	Protection of patients, personnel and unit	Safety shutdown of the movements
Collision protection	Prevent damage to unit components	Automatic shutdown of system movements in the collision zone (for example ceiling, wall, floor)
Function test	Prevent damage to unit components	Final function test of all components

Preventive maintenance

The purpose of preventive maintenance is to reduce unforeseen failures to a minimum. Thus the prerequisites for the system to meet the assured characteristics in the long term are created.

The effects of different operating conditions (full or partial load operation, temperature, size of dust particles, humidity, gases, vapors) are checked and the condition of parts subject to wear is determined by recording and analyzing characteristic values. Preventive measures must be adopted or repairs must be undertaken as appropriate.

The specified maintenance intervals correspond to the minimum requirements. Compliance with stricter national legislation may be necessary

Maintenance interval 24 months for the entire system

Listing of work steps to be performed

Object or function	Reason	What is checked
Overall system	Preventive measures to avoid: ☐ Safety risks ☐ Overheating ☐ Wear and tear ☐ Image artifacts	☐ Check of operating data ☐ Check of cables, cable routing and cable connections for damage ☐ Cleaning contrast medium, blood, disinfectants from areas not accessible to the customer ☐ Inspection and cleaning of coolant and air circulation passageways ☐ Inspection and cleaning of optical transmission paths ☐ Removal of foreign objects, for example positioning aids and injection needles ☐ Touch-up of paint to prevent corrosion and infection ☐ Check of measurement values with tolerance ranges ☐ Check of the movement forces ☐ Check of the drive characteristics, acceleration and deceleration movements ☐ Measures to ensure that all components move smoothly ☐ Check and analysis of points of friction ☐ Reading and analyzing the error log files ☐ Repairing minor damage

Quality and function tests

Quality and function tests are used to check whether the system meets the assured characteristics. Image quality tests determine differences from the original status (for example resolution, contrast range, minimum contrast, image signal and, if applicable, check of Digital Subtraction Angiography).

If there are differences, preventive measures must be taken or repairs performed, whenever is appropriate.

Maintenance interval 24 months for the entire system

Listing of work steps to be performed

Object or function	Reason	What is checked
Overall system	Optimum operation on the basis of the specifications listed in the data sheet	Interaction of all system components according to the assured characteristics
Power line connection	Unrestricted power input from the line power source for the purpose of maximum system load. (The power input can be limited by oxidation and corrosion, which can result in exposure fluctuations and system shutdowns).	Internal line impedance
Vacuum components: ☐ X-ray tube assembly	Assuring the system specifications (vacuum components are subject to aging)	Image quality
Beam geometry, centering, beam collimation	Observance of the specifications and legal regulations* to minimize radiation exposure of patient and personnel	Centering the central beam onto the center of the image receptor. Coincidence of radiation field size and image receptor size or light field size and radiation field size.
Radiation dose	Compliance with specifications and legal requirements* to minimize radiation exposure of patient and personnel	Check of dose rate/cutoff dose [†] during ☐ Acquisition in all operating modes
Detail recognition	Compliance with specifications and legal requirements* Ensuring image quality	Resolution [†] during ☐ Acquisition in all operating modes
Image contrast	Compliance with specifications and legal requirements* Ensuring image quality	Minimum contrast and dynamic range [†] during ☐ Acquisition in all operating modes

Object or function	Reason	What is checked
Image display	Compliance with specifications and legal requirements* Ensuring image quality	Brightness, focus and the geometry of the configured monitors
Image artifacts	Compliance with specifications and legal requirements* Ensuring image quality	Image display for intolerable image artifacts in all existing application techniques
Dose measurement device [†]	Maintenance of specifications	Accuracy of the display
Image documentation systems	Compliance with specifications and legal requirements* Ensuring image quality	Gray scale reproduction, geometric imaging characteristics, resolution, optical density, artifacts

* DHHS and country-specific regulations must be observed

[†] Depending on the system configuration

Replacement of safety-relevant parts subject to wear

Safety-relevant parts which are subject to wear must be replaced in periodic intervals

Ceiling stands

Object or function	Reason	What is replaced?	Interval
X-ray tube stand / detector stand	Wear can cause springs to break and the support cable to split or fray.	Spring-loaded mechanism with steel cables	8 years

Installation, repair

Modifications of or additions to the product must be made in accordance with the legal regulations and generally accepted engineering standards.

Siemens does not accept responsibility for the safety features and for the reliability and performance of the equipment as the manufacturer, assembler, installer, or importer, in the following cases:

- ☐ Installation, equipment expansions, readjustments, modifications, or repairs are not carried out by persons authorized by us.
- ☐ Components affecting safe operation of the product are not replaced by original spare parts in the event of a malfunction.
- ☐ The electrical installation of the room does not meet the requirements of the VDE regulation or the corresponding national regulations.
- ☐ The product is not used in accordance with the Operator Manual.

Technical documents

On request, we can give you technical documents for the product for a charge.

These documents do not imply authorization to carry out repairs.



We recommend that you obtain a report showing the nature and the extent of the work performed from the persons carrying out such work. The report should include all changes in rated parameters or operating ranges as well as the date, the name of the company and a signature.



We accept no responsibility for repairs performed without our express written approval.

Installation

All information and installation requirements contained in the service documentation require strict adherence.

If you should require additional information, please contact the qualified people specified by the manufacturer.

Personal Safety Measures

Information about unit movements

Because of the possible speed of movement of the system, it must be operated very carefully.



Caution

System movements cause collision

Risk of injury or system damage

- ◆ Perform system movements only when it is certain that neither the operator, the patient, third parties nor pieces of equipment can be endangered by these movements.
 - ◆ Remove any objects or accessories, for example injector or infusion stand, from the collision area.
 - ◆ Make sure you are standing outside the dangerous area.
 - ◆ Always watch the patient when performing system movements.
-



Caution

Touching the telescoping column during movement

Risk of crushing

- ◆ Do not place your hands to moving or rotating parts.
 - ◆ Use the provided hand grips to move ceiling-suspended parts.
 - ◆ Whenever this is not possible, pay special attention to all crush zones on the column especially those involving the hands or fingers.
-



Caution

Manual movements of the tube and detector

Person trapped between parts of the system

- ◆ Be very careful when moving parts of the system manually.

Collisions between parts of the system are possible in order to allow a greater positioning flexibility of the system (for instance, so that the detector can be as close as possible to the table top).



Unit movements should be started only if neither a patient nor a third party may be endangered and if no object may hinder unit movements.

However, if an object (for example, during a down movement) was hindering a movement direction (for example seat) or the height of the detector unit or the X-ray tube was manually readjusted, the alignment control must be readjusted.

If this alignment is not performed, no acquisitions are possible!

Deadman function

All unit movements are controlled with a *deadman grip* (DMG), that is, movements are performed only while the operating element is operated. If there is a danger, stop the movement immediately by releasing the operating element.

Danger of crushing

The patient and operating personnel must grip only the handles which are intended for the correct handling of the equipment or positioning of the patient.

- ◆ Before performing unit movements make sure that the patients do not grasp the frame of the tabletop.

Abnormal movements

If any part of the system moves although movement was not released, there might be a fault.

Example

The monitor suspension system moves down by itself.

- ◆ Shut down your system and call Siemens Service.

Collision protection

The Multitom Rax has a collision calculator comprising all motor driven moving components like tube support, detector support and table top.



Attention: When organ programs are used in which the tube was programmed in the collision zone of the table, collisions of the tube and the table are possible.

Never leave the system unattended during system movements.

Red emergency STOP buttons

Triggering STOP

If a malfunction of a unit movement causes an emergency situation, danger to the patient, to operating personnel, or to the unit, do the following:



- ◆ Press one of the red emergency STOP buttons immediately.
 - All motorized movements of detector stand, tube stand, and table are stopped immediately. Movement can only be continued when STOP is canceled.
 - Radiation, fluoroscopy and acquisition are interrupted, but can be released again if you press the fluoroscopy or exposure release pedal again, even without canceling STOP.
 - Injections are interrupted, but can be continued without canceling STOP.

Canceling STOP

Only when the cause of the danger has been unequivocally identified and remedied, can the emergency STOP button be disengaged.

- ◆ To do so, turn clockwise and pull the red emergency STOP button.



In case of a system failure, press the emergency STOP button and unlock it again.

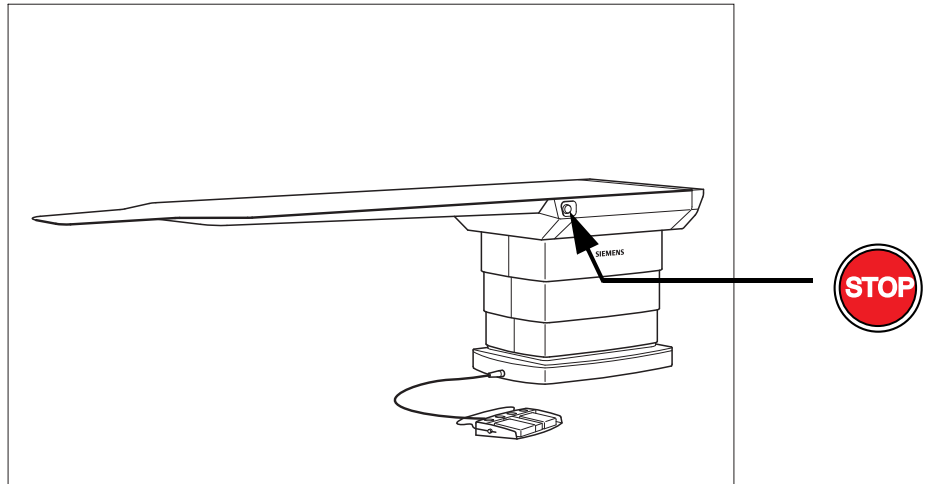
- The system is reinitialized.

Where are the emergency STOP buttons?

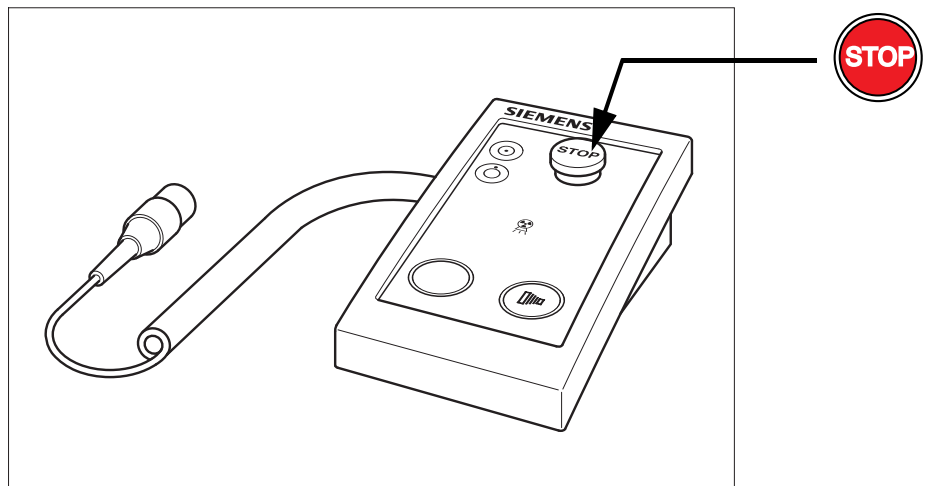


You find the emergency STOP buttons in the following locations:

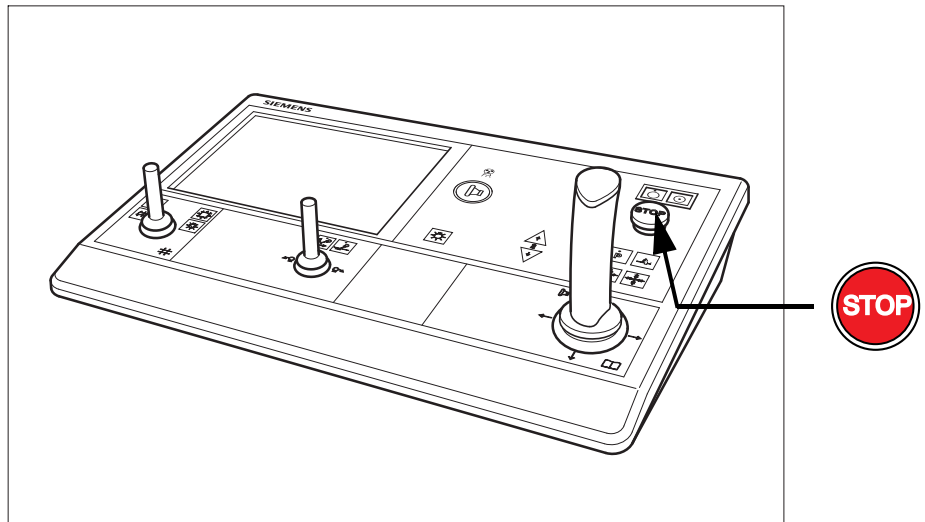
At the table (on both sides)



**At the generator ON/
OFF console**



**On the Fluoro remote
control console**



At the wall Optional

Emergency SHUTDOWN button (installed on-site)

Use this shutdown method *only in an extreme emergency* because it is an *uncontrolled* process!

Data could be lost, for example unsaved images, exporting and filming jobs, and so on. The tube cooling system is also disconnected from the power supply, and the tube can overheat.

If a flat detector is used, it is also disconnected from the power supply. After the power has been switched on again, an additional waiting time is required to ensure optimum image quality.



An emergency power supply, if one is connected, is not activated when emergency SHUTDOWN is pressed.

The UPS of the imaging system is not activated, too.

Shutdown in an emergency



Caution

Shutdown using the emergency SHUTDOWN button

Risk of data loss and/or damage to tube due to lack of cooling

- ◆ Use the emergency SHUTDOWN button only in case of emergency or when the system cannot be switched off normally.

Consequences:

- ☐ All unit movements are interrupted.
- ☐ Radiation is turned off.
- ☐ The current system program is interrupted.
- ☐ Current operating sequences are interrupted and cleared.
- ☐ All current acquisition data are cleared, unless they have been saved to non-volatile memory.

Switching on again

Only if the cause of the danger has been *unequivocally* identified and remedied, the emergency SHUTDOWN button can be released and the system operated again.

- ◆ In all other cases, for example system malfunction, contact Siemens Customer Service.
- ◆ If the stop function does not respond normally, immediately activate an emergency shutdown to turn off the entire system. If this happens, you may not continue to use the system. Contact the Siemens Customer Service.

Emergency procedures



Caution

Medical devices are not infallible and unexpected errors may occur

System is not available in an emergency or may stop working during an examination

- ◆ Have an emergency plan in case of non-availability of the system, for instance, to use a different system
 - ◆ Have an emergency plan for continuing or ending different types of examinations if the system stops working, for instance, during endoscopy, use the viewer of the endoscope to continue or end the examination.
 - ◆ Consider whether an uninterruptible power supply is necessary at your site.
-

Power failure

With UPS for imaging system

- ◆ In case of a short power failure, please try to switch on the system after some seconds.
- ◆ If it was possible to switch on the system, please wait until the system is ready.
- ◆ Then continue working or rescue the patient.
- ◆ If it was not possible to switch on the system or if the patient has collapsed, remove the patient immediately.

For more details on the UPS refer to "*UPS (for the imaging system)*" → p. 10

Danger zones / danger points



Danger points

The positions marked in the following illustrations show danger zones in which patients or operating personnel could suffer injury by crushing or colliding:

- ❑ Due to the mobility of the stands, there is a danger of injury in certain areas during unit movements.
- ◆ Make sure that there are neither persons nor objects in the swivel or rotation range of the stands.
- ◆ Make sure that there are neither persons nor objects in the lifting range of the patient table.
- ◆ Make sure that the knees of sitting staff members are not in an area under a stand or the patient table.
- ◆ Avoid standing or sitting immediately adjacent to the system.
- ◆ If it is necessary to position the patient with legs or knees under the cross-beam at the head or foot end of the table, avoid system movements.



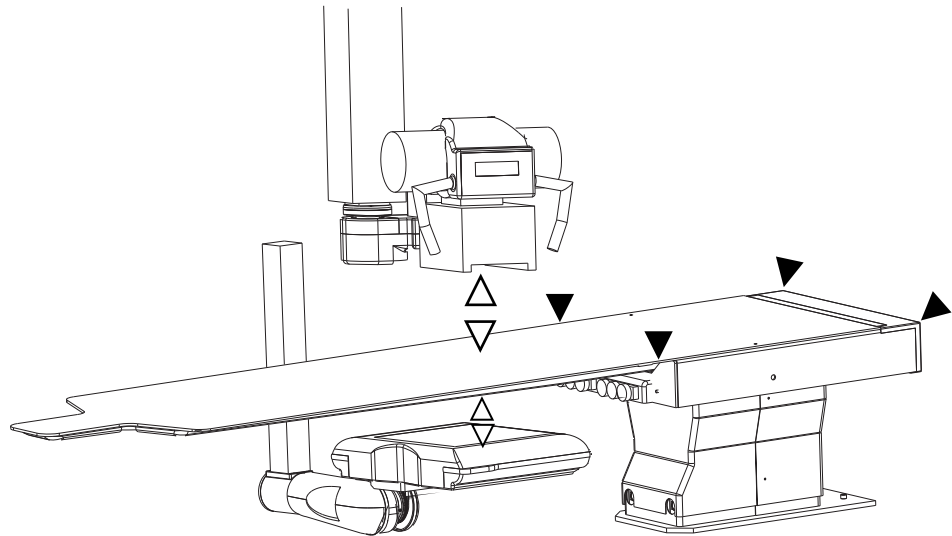
Warning

Unintended overtravel when lowering the table

Crushing of patient or operator seated next to the table (for example, a wheelchair patient)

- ◆ Avoid movements when somebody is within the dangerous movement zone.
 - Table movements do not stop immediately when the control elements are released.
 - Most axes perform a short overtravel movement.
-

Patient table



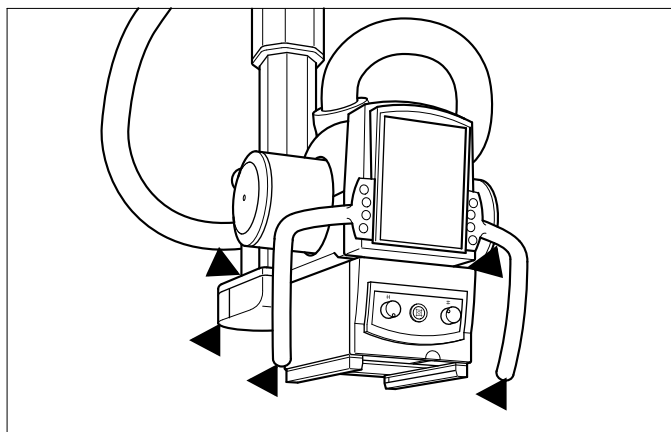
Warning

Lowering the table onto a seated patient

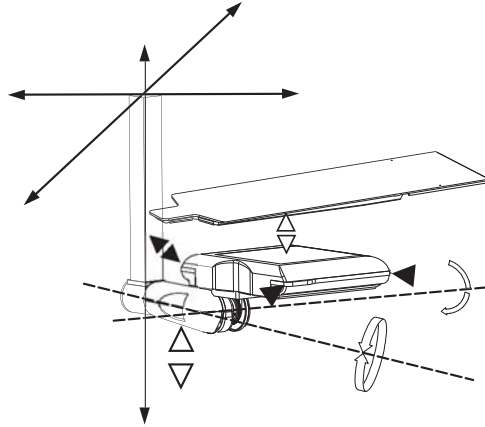
Crushing of patient or operator seated with legs under the table (for example, a wheelchair patient)

- ◆ Do not position a patient with legs under the table.
- ◆ Do not move the table while a patient is seated near the table.
 - System will stop when collision is detected, but there is still a risk of injury for the patient!
- ◆ Move the patient away from the table first.

Ceiling-mounted X-ray tube support



Detector stand



Grip locations



Downward movement stops at 12 cm distance to floor.

Movement can be continued manually.



When handling the system correctly and when positioning the patient, operators, and patients must use only the grip locations provided for this purpose.

The following grip locations are provided:

- Hand grips (front and back)
- ◆ Make sure that the hand grips are always attached.

If these grip locations cannot be used:

- ◆ Pay special attention to the mentioned possibilities of crushing between moving parts and their guide openings.
- ◆ Make sure during the examination that the patient does not hold on to the edges of the patient table under any circumstances.

Safety during patient examination



Warning

Examination or treatment of patients with implanted devices such as pace-makers or neurostimulators.

External influences (e.g. during pulsed fluoroscopy) can cause malfunctions in the implanted device.

- ◆ Find out whether there are known external influences upon the implanted device by the X-ray system (e.g. by checking the technical data or the operator manual of the implanted device).
-

Patient positioning

- All safety-related equipment must be installed and functioning, in particular the hand grips and the compression belt.
 - The hands, arms, legs, head, and hair of the patient must not extend unsecured beyond the edge of the tabletop.
 - ◆ Observe the patient during system movements.
-



Warning

Hand grips loosen or are not used

Injuries to patient from falling

- ◆ Check that the patient hand grips on the table are in the right position.
 - ◆ Ensure that hand grips are tightened prior to use.
 - ◆ Make sure that the patient uses the hand grips during system movements or when turning over.
 - ◆ Use other positioning aids for immobilizing weak or very unstable patients.
-



Warning

Patient cannot maintain position or becomes unconscious

Injuries to patient from falling

- ◆ Check that the patient is physically able to hold the examination position, especially when standing.
 - ◆ Choose a different position or use positioning aids for immobilizing weak or very unstable patients.
-

Correct image orientation - patient orientation

It is the responsibility of the operator to ensure correct image orientation on the monitor or film.



Caution

Image is incorrectly flipped due to incorrect patient position information or right/left labeling

Risk of incorrect diagnosis or treatment because of left/right or up/down confusion

The examiner is responsible for using the image orientation functions and interpreting the images correctly.

- ◆ Make sure that the R/L labels have been placed correctly.
 - ◆ Compare the patient position data with the anatomic view when diagnosing images to exclude any errors.
 - ◆ If necessary, use lead letters or similar devices during acquisition.
-

Visual contact to patient

- ◆ Make sure that there is visual and acoustic contact with the patient. Thus, you stay informed about the condition of the patient at all times.

Room lighting

According to DIN 68 68-57¹, the lighting in rooms in which diagnoses are made on image display devices (monitors) must fulfill the following requirements:

- ☐ The lighting must be adjustable and glare-free.
- ☐ The setting of the illuminance must be reproducible (for example, dimmer with scale).
- ☐ No mirroring or reflections of windows, lights, view boxes, and so on. must occur in the operating position of the monitors.

¹ valid in Germany

Prerequisites for diagnosis and treatment planning

The Multitom Rax software has been designed and tested for use in diagnosis and treatment planning based on digital radiographic X-ray images and series.

To make sure that the imaging system produces monitor images suitable for these purposes, the monitor must meet certain criteria for image quality.

Checks Image quality can deteriorate over time because of aging and normal wear and damage of the monitor and other components.

- ☐ The image quality must be checked at regular intervals (*once per month*) after installation.
- ☐ Thus, you make sure that the system is still suitable for use in diagnosis and treatment planning.

For further information, refer to "*Maintenance plan*" → p. 21.



The operator must ensure that qualified personnel are chosen and that the criteria for image quality specified in the installation and maintenance instructions are fulfilled.

Test images Test images for calibration of the monitor and to test the quality output of the laser camera, are stored in the system.

For further information, refer to the **FLUOROSPOT Compact** Operator Manual.

Monitors

Please observe the following information:

- ☐ The operating indicator must light up.
- ☐ Please keep the ventilation slots of the monitors unobstructed at all times.



Caution

The standard 19" flat panel display is not intended for diagnosis.

Incorrect diagnosis possible

- ◆ For diagnosis use a diagnostic display or transfer the image to a workstation.



The Fluoro option is always equipped with a diagnostic display.



Monitors are suitable for medical on-line diagnosis only if special measures to assuring image quality are adopted (especially determining the brightness and contrast values).

- ◆ In case of doubt, film images on a hardcopy camera if you want to make a diagnosis.

Siemens assumes no liability for diagnoses which are performed on non-Siemens monitors or on monitors not calibrated by Siemens.

Generator



Caution

Objects on top of the generator cabinet block ventilation

Generator becomes inoperable because it is too warm.

- ◆ Do not store objects on top of the generator cabinet.

Use of hardcopy cameras

Only hardcopy cameras approved by Siemens may be used. Approvals by Siemens refer to DICOM image type XA. Siemens does not accept any liability for diagnoses made on the basis of images from non-approved hardcopy cameras.

Radiation protection

The X-ray equipment Multitom Rax with radiation protection complies with IEC 60601-1-3 :2008 and IEC 60601-2-54:2009.

Mode of operation Continuous

Important information

The automatic format collimation system for acquisition helps reduce the radiation dose to the patient and examiner considerably.

For radiation dose indication during normal use of the equipment, the system is equipped with a measurement system based on a ionization chamber calibrated in dose area product.

Please observe the following:

Radiation may be released only by authorized operators or persons with proper authorization to apply ionized radiation.

Radiation protection for the patient

- ◆ If possible, ensure the best possible protection of the patient during acquisitions in the vicinity of the reproductive organs (use gonadal shields, lead-lined rubber covers).
- ◆ Keep the radiation field as small as possible without reducing the active measuring field.
- ◆ Remove all radiopaque parts from the radiographic field, if possible.
- ◆ Set the X-ray tube voltage as high as required for optimum image quality (not forgetting the image quality; the optimum is 63 kV for iodine contrast).
- ◆ Set the X-ray tube to skin distance as large as is reasonable for each examination.
 - A larger focal spot distance leads to a lower air kerma.



Please pay attention to the fact that the air kerma is increased by the following settings:

- ☐ Higher kV
- ☐ Higher mAs
- ☐ Higher ms
- ☐ Smaller SID

**Radiation protection
for the examiner**

- ◆ If possible, release the acquisition series in the control room.
- ◆ Stay in the examination area as short as possible.
- ◆ If the exposure is to be released in the examination room, use an additional radiation shield (protection for upper and lower body) or radiation-proof window.
 - These measures contribute greatly to your personal radiation protection.
- ◆ If the protective shields are not used, wear radiation protection clothing with a 0.25 mm lead layer or similar clothing.
- ◆ Keep the maximum distance from the source of radiation.
- ◆ Check your personal dose by wearing a radiation monitoring badge or a pen dosimeter.



Caution

Failure to observe radiation protection regulations

Unnecessary radiation exposure to personnel

This system produces X-rays.

- ◆ Wear protective clothing such as lead aprons
- ◆ Monitor radiation exposure using personal dosimeters.

**Switching off in an
emergency**

If a problem, for example a defect, occurs during the examination and radiation can no longer be interrupted by letting go of the radiation release button:

- ◆ Press the nearest emergency STOP button.

Avoiding unwanted radiation



Caution

Tube is not directed toward the detector during acquisition.

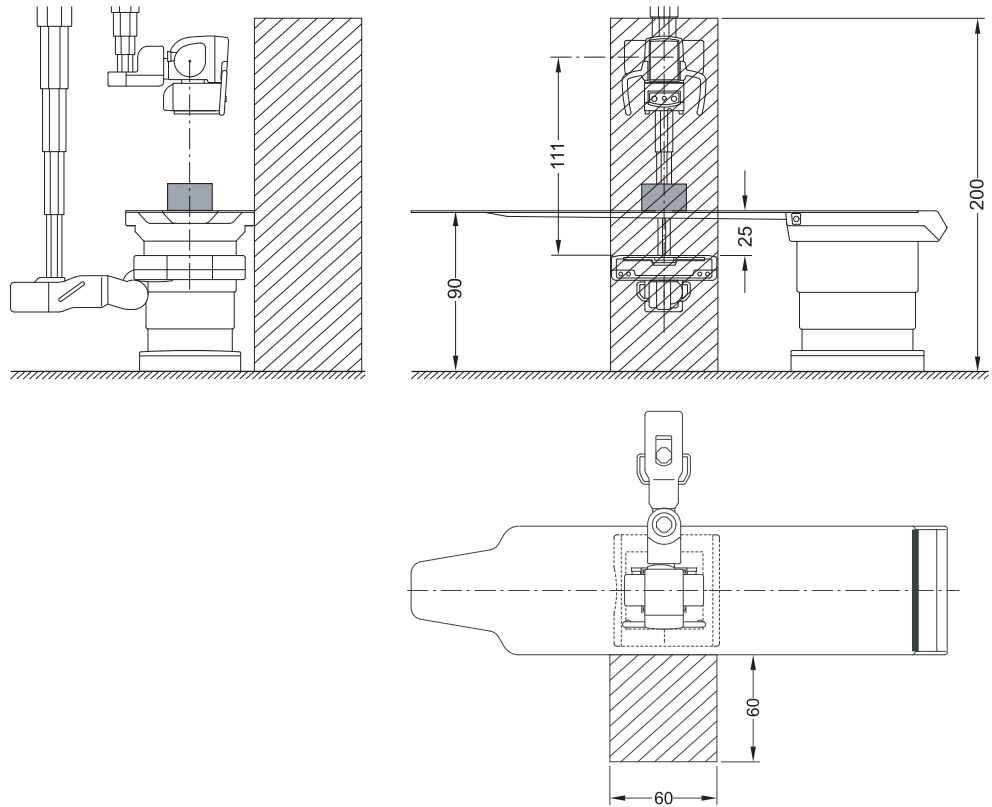
Unwanted radiation exposure

- ◆ Use the free exposure mode with care.
 - ◆ Check that the tube is active and use the light marker for positioning before releasing x-ray.
-

Radiation protection zones

Position and dimensions of the main operating areas

X-ray reference axis vertical

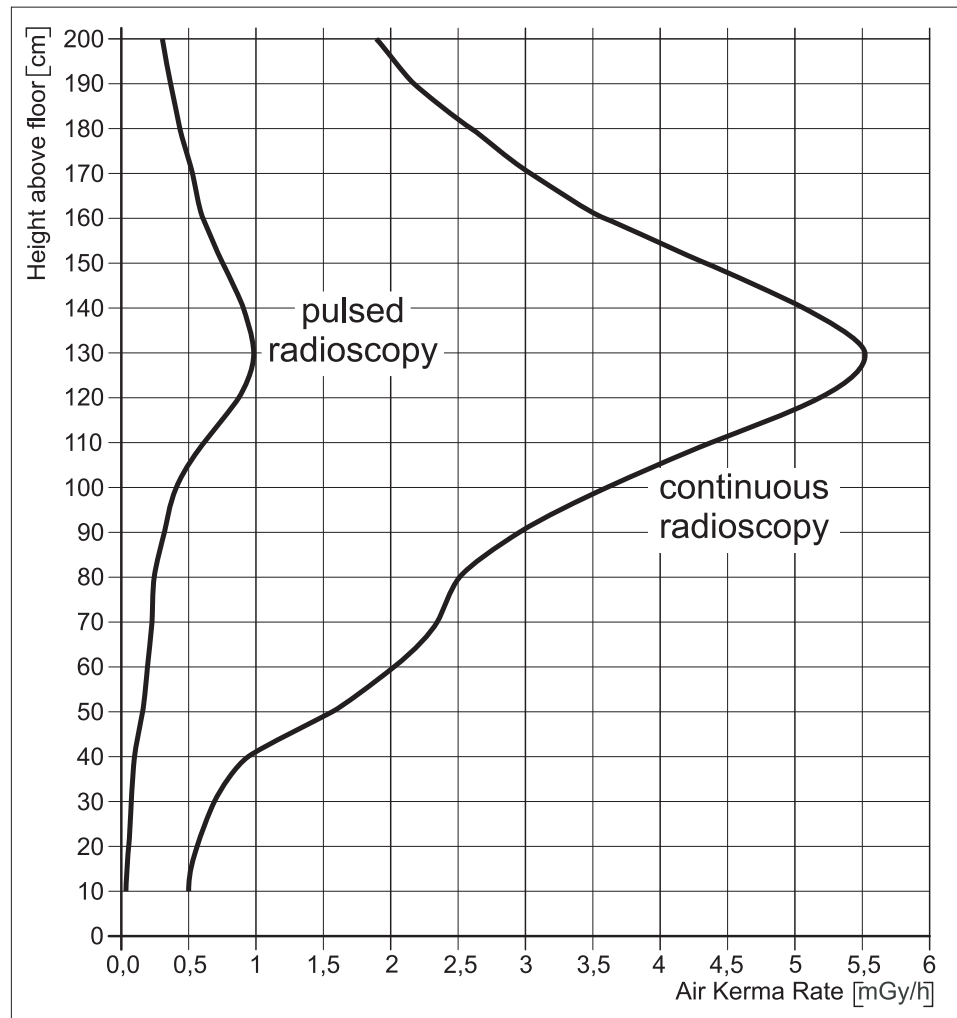


**Measurement -
continuous
radioscopy**

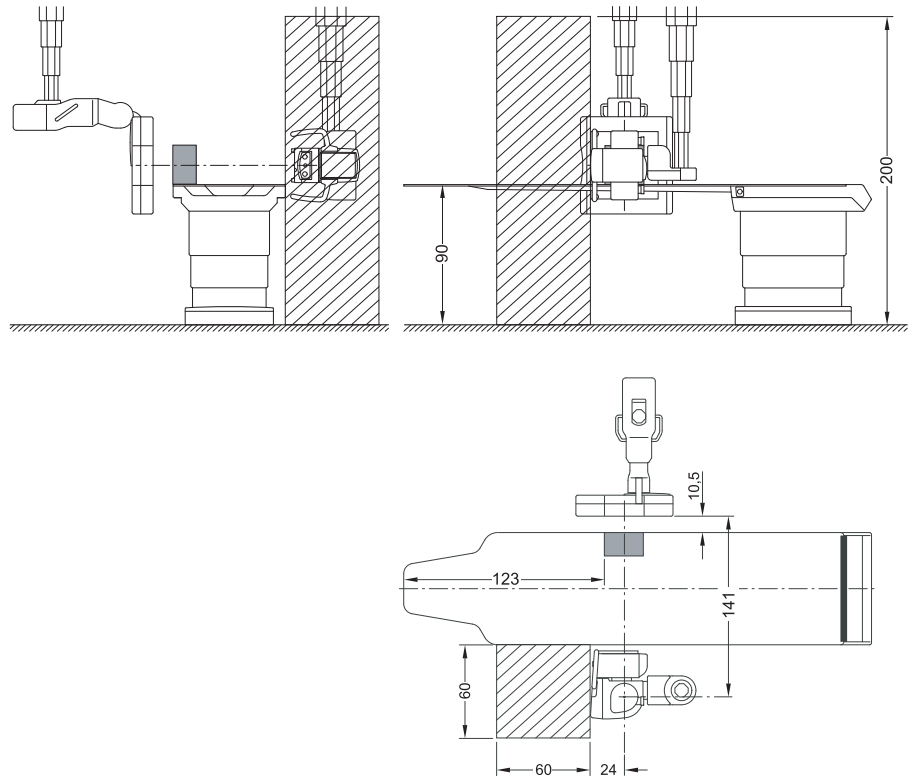
With anti-scatter grid (115 cm), X-ray reference axis vertical, X-ray tube above, continuous RADIOSCOPY, 110 kV, 3 mA, 24 cm x 24 cm, (18 cm x 18 cm at phantom exit), 0,2 mm Cu, SID = 115 cm

**Measurement - pulsed
radioscopy**

With anti-scatter grid (115 cm), X-ray reference axis vertical, X-ray tube above, pulsed RADIOSCOPY, 73 kV, 6,1 mA, 5,0 ms, 15 p/s, 24 cm x 24 cm, (18 cm x 18 cm at phantom exit), 0,2 mm Cu, SID = 115 cm



X-ray reference axis horizontal

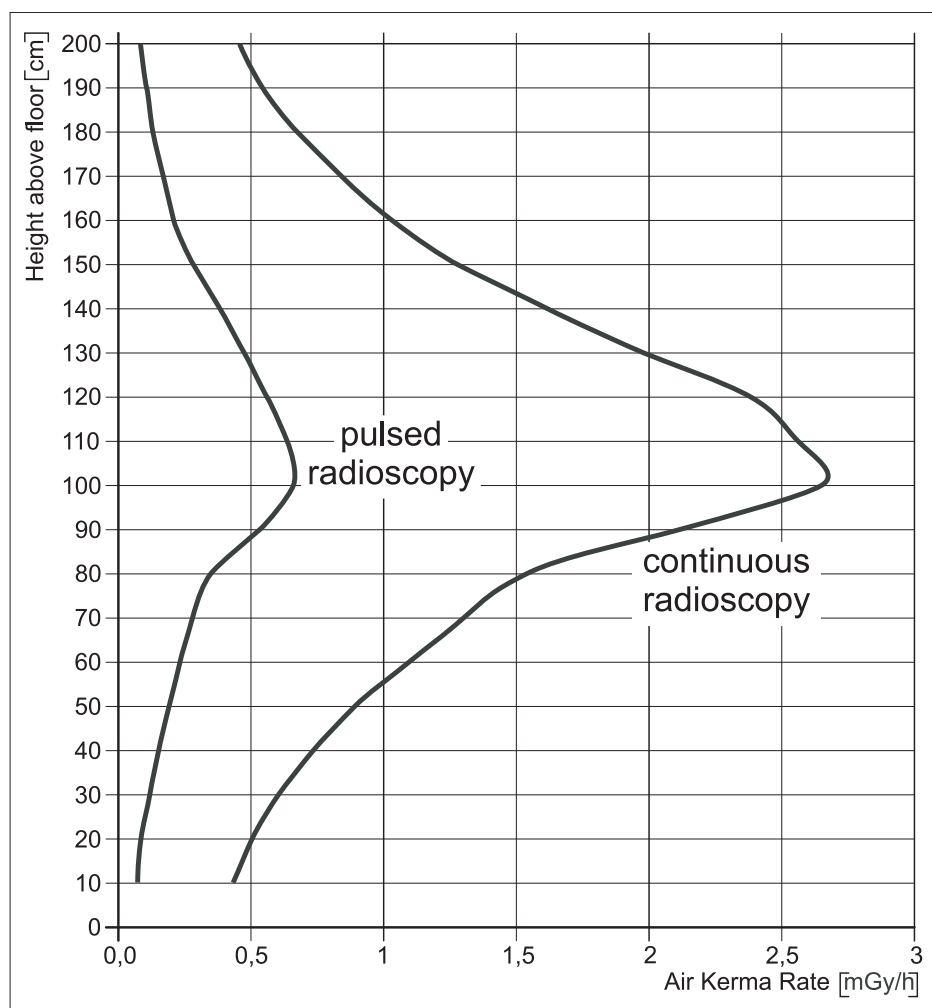


**Measurement -
continuous
radioscopy**

With anti-scatter grid (150 cm), X-ray reference axis horizontal, continuous
RADIOSCOPY, 110 kV, 3 mA, 20 cm x 20 cm (18 cm x 18 cm at phantom exit),
0,2 mm Cu, SID = 145 cm

**Measurement - pulsed
radioscopy**

With anti-scatter grid (150 cm), X-ray reference axis horizontal, pulsed
RADIOSCOPY, 73 kV, 12,0 mA, 6,2 ms, 15 p/s, 20 cm x 20 cm (18 cm x 18 cm
at phantom exit), 0,2 mm Cu, SID = 145 cm



Information about dose measurement

To provide you with perfect image quality for your daily work without additional operating effort, we install the most frequently used organ programs (preferred organ programs) in the factory.

Measurement configuration

The phantom consists of a 20 cm thick rectangular block of polymethylmethacrylate (PMMA) with side lengths greater than or equal to 25 cm.

The phantom should be positioned on the tabletop as closely as possible to the X-ray image receptor.

Loading parameters for radiology should be adjusted by the automatic intensity control. For the final measurement these automatically determined parameters should be locked. The measuring detector should be placed midway between the phantom's focus and entry surface.

The measurement values are then calculated for the location of the patient entry reference point (60 cm above the image receptor).

The maximum irradiation field at the image receptor plane is a square of 42.6 x 42.6 cm².

Deterministic effects

At the Air Kerma rate of approx. 44 mGy/min at the reference point, a reference dose of 2 Gy is reached after 2727 s fluoroscopy.

Deterministic effects are probable at this dose (2 Gy).

- Radioscopy**
- ☐ Normal application
 - ☐ Program: DFR_8fps
 - ☐ Program Set: CP Standard
 - ☐ Fluoro Curve: 73 kV Plateau

Dose Level	Zoom Level	Collimator [cm x cm]	Dose Level [nGy/p]	Dose Rate Index	SID [cm]	Pulse Rate [p/s]	U [kV]	I [mA]	Pulse width [ms]	Reference Air Kerma Rate* [mGy/min]
Vertical X-ray orientation										
Low	0	42.6 x 42.6	26	0	115	7.5	73	29	7.7	5
	1	30.3 x 30.3	26	0	115	7.5	73	39.2	8.3	8
	2	22.8 x 22.8	26	0	115	7.5	73	49.4	8.9	11
	3	15.2 x 15.2	26	0	115	7.5	73	71.8	9.9	19
Normal	0	42.6 x 42.6	32	0.3	115	15	73	32	8.5	12
	1	30.3 x 30.3	32	0.3	115	15	73	42.1	9.2	19
	2	22.8 x 22.8	32	0.3	115	15	73	53	10	27
	3	15.2 x 15.2	32	0.3	115	15	80.8	51.5	10	35
High	0	42.6 x 42.6	45	0.3	115	15	73	39.8	9	15
	1	30.3 x 30.3	45	0.3	115	15	73	53	10	27
	2	22.8 x 22.8	45	0.3	115	15	78.5	52.3	10	34
	3	15.2 x 15.2	45	0.3	115	15	86.9	50.8	10	44
Normal	0	42.6 x 42.6	32	0.3	150	15	73	43.4	9.3	7
Horizontal X-ray orientation										
Low	0	42.6 x 42.6	26	0	145	7.5	73	33.9	8.1	3
	1	30.3 x 30.3	26	0	145	7.5	73	44	8.7	4
	2	22.8 x 22.8	26	0	145	7.5	73	60.4	9.3	6
	3	15.2 x 15.2	26	0	145	7.5	75.3	74.9	10	9
Normal	0	42.6 x 42.6	32	0.3	145	15	73	38.1	9	7
	1	30.3 x 30.3	32	0.3	145	15	73	50.1	9.7	10
	2	22.8 x 22.8	32	0.3	145	15	76.8	52.3	10	13
	3	15.2 x 15.2	32	0.3	145	15	84.8	50.8	10	16
High	0	42.6 x 42.6	45	0.3	145	15	73	46.6	9.6	9
	1	30.3 x 30.3	45	0.3	145	15	75.3	53	10	13
	2	22.8 x 22.8	45	0.3	145	15	80.8	51.5	10	14
	3	15.2 x 15.2	45	0.3	145	15	92.3	50.1	10	20
Normal	0	42.6 x 42.6	32	0.3	200	15	75.5	53	10	5

* measured 60 cm above the image receptor

With grid; Copper Filter: 0.2 mm; Measuring field: 1 square

The highest possible Air Kerma Rate at the reference point (60 cm above image receptor) is approx. 70 mGy/min (with 111 kV, 47,3 mA, 10 ms, 15 pulses/sec, 0,2 mmCu and a SID=115 cm).

- Radioscopy**
- ☐ Pediatric application
 - ☐ Program: DFR_Pead.Barium
 - ☐ Program Set: CP Pead16
 - ☐ Fluoro Curve: 73 kV Plateau

Dose Level	Zoom Level	Collimator [cm x cm]	Dose Level [nGy/p]	Dose Rate Index	SID [cm]	Pulse Rate [p/s]	U [kV]	I [mA]	Pulse width [ms]	Reference Air Kerma Rate* [mGy/min]
Vertical X-ray orientation										
Low	0	42.6 x 42.6	15	0.3	115	3	79.3	9.7	7.1	0.6
	1	30.3 x 30.3	15	0.3	115	3	81.8	12.0	7.7	1
	2	22.8 x 22.8	15	0.3	115	3	84	14.5	8.4	2
	3	15.2 x 15.2	15	0.3	115	3	87.5	19.1	9.3	3
Normal	0	42.6 x 42.6	15	0.3	115	7.5	73.5	5.8	5.8	1
High	0	42.6 x 42.6	15	0.3	115	15	72.5	5.2	5.5	2
Horizontal X-ray orientation										
Low	0	42.6 x 42.6	15	0.3	145	3	80.5	10.9	7.5	0.3
	1	30.3 x 30.3	15	0.3	145	3	82.5	12.7	7.9	0.4
	2	22.8 x 22.8	15	0.3	145	3	84.5	15.1	8.5	0.7
	3	15.2 x 15.2	15	0.3	145	3	89.1	21.1	9.7	1
Normal	0	42.6 x 42.6	15	0.3	145	7.5	78.8	9.3	7.0	0.6
High	0	42.6 x 42.6	15	0.3	145	15	77.8	8.5	6.8	1

* measured 60 cm above the image receptor

No grid; Copper Filter: 0.2 mm; Measuring field: 1 square

Radiography

Application mode	SID [cm]	U [kV]	Q [mAs]	Time [ms]	Focus	Power [%]	DAP [$\mu\text{Gy} \times \text{m}^2$]	Reference Air Kerma* [mGy]
Vertical X-ray orientation								
80 kW	115	79	40	45.6	large	100	98.8	6.9
highest dose	115	150	200	490.6	large	100	1414.5	101
typical "Thorax"	115	108.8	8.8	8.8	small	80	40.3	2.8
typical "Ribs"	115	70	68.3	83.7	large	80	145.2	10.2
Horizontal X-ray orientation								
80 kW	145	79	40	48.9	large	100	67.6	3.1
highest dose	145	150	200	490.8	large	100	906.7	47.2
typical "Thorax"	145	108.8	9.2	28.6	small	80	26.7	1.3
typical "Ribs"	145	70	57.5	71.1	large	100	77.3	3.6

* measured 60 cm above the image receptor

With grid; Copper Filter: 0 mm; Collimator: 25 x 25 cm²

Organ programs

To optimize operation, protocols (Organ Programs - OGP) for the most common standard examinations are delivered with the system. In general, these protocols can be taken as examples to derive individual protocols for more specific examinations.

→ For editing protocols, refer to the chapter PEX editor in the **FLUOROSPOT Compact** operator manual.

Normal dose OGP Default Fluoro program set CP_Standard "Automatic 2"

Low dose OGP Default Fluoro program set CP_Standard "Automatic 1"

Protection against electric shock

Attention:

To avoid the risk of electric shock, a protective conductor must be implemented when connecting this device to mains power.

Power supply

For all products that are operated within an X-ray system, the power supply must be made through a contactor or other multipole circuit breaker installed on-site.

The room installation must comply with DIN VDE 0100-710 or the corresponding national regulations.

Covers

If socket covers (especially socket covers of the operating modules) are damaged, they must be replaced.

- ◆ In the event of defects, for example, if a covering cap has broken off, call the Siemens Service.

Protection class



The system belongs to protection class I with a type B applied part according to IEC 60601-1.

Protection against ingress of water:¹

- ☐ IPx8: Foot switches
- ☐ IPx2: Control room module
- ☐ IPx1: Fluoro control console
- ☐ IPx0: Rest of the system

Potential equalization

Systems for which potential equalization is recommended must only be operated in medical facilities where supplemental potential equalization has been installed and tested according to the specifications in DIN 57107/VDE 0107/6.81 section 5 (Federal Republic of Germany) or the relevant local and federal regulations.

Opening the units

Only authorized service personnel are permitted to open the units.

¹ IPx8 = Protection against long periods of immersion under pressure

IPx2 = Protection against dripping water when tilted up to 15°

IPx1 = Protection against dripping water from above the device for at least 10 minutes

IPx0 = No special protection

Electromagnetic compatibility (EMC)



Caution

Radio interference from the system affects nearby equipment

Risk of malfunction of nearby equipment.

- ◆ Reorient or relocate the equipment or system or shield its location.
 - ◆ Test the operation of the equipment in its new location.
-

Further information see in the separate EMC addendum.

Safety-relevant parts subject to wear

This system contains no safety-relevant parts subject to wear.

Product service life

Our medical engineering products are designed for operation under average conditions in accordance with the Operator Manual for a useful life of 10 (ten) years. If the products are operated for longer than this time, additional checks and possibly repairs beyond the usual maintenance procedures may be necessary in order to ensure the functional integrity and safety of operation of these products. Please talk to us about these measures early enough!

Mechanical safety

Maximum weight



Caution

Too much weight on system components

Risk of damage or patient injury

- ◆ Observe the maximum allowable patient weight including the weight of the accessories.



The permitted patient weight on your tabletop is stated on the label on the tabletop and in the technical data.

It is important that the load is distributed uniformly over the tabletop. Otherwise there is a risk of material deformation and system malfunction. The patient weight includes any parts permanently or loosely connected with the patient, such as equipment, prostheses, implants, plaster casts.

Example of incorrect use

A patient with a maximum weight sitting at the end of a fully extended tabletop.

Accessory load

The maximum accessory load at the collimator is 1 kg.

In the interest of safety of operation for the patient and unit, the permitted patient weight and accessory weight must not be exceeded.

Maximum load



The component, for example tabletop or accessory, must not be loaded with more weight than indicated.

Damage to the tabletop

A damaged tabletop is a potential hazard to the patient!

When the patient tabletop collides with an obstacle such as a bed or instrument table, hairline cracks can result.

- ◆ Call SIEMENS Uptime Service and let the tabletop be checked immediately if it is possible that it has been damaged (for example accidental collision with the bed of the patient)!

Avoiding equipment damage

- ◆ Before starting system movements, especially lowering the table, make sure that the movement range is free of obstructions.



Caution

System movements cause collision

Risk of injury or system damage

- ◆ Perform system movements only when it is certain that neither the operator, the patient, third parties nor pieces of equipment can be endangered by these movements.
- ◆ Remove any objects or accessories, for example injector or infusion stand, from the collision area.
- ◆ Make sure you are standing outside the dangerous area.
- ◆ Always watch the patient when performing system movements.

-
- ◆ Remove chairs, steps, stands, waste containers, and similar objects from the movement area.
 - No collision monitoring!
 - ◆ Do *not* place any objects or consumable material on the cover of the table support, on the detector cover and on the longitudinal guides of the stand carriage.
 - Considerable forces which can damage these objects in the area of movement of the systems occur during movements of the tabletop.
 - ◆ Do *not* stand at any place on the covers of the table support.
 - The covers can be deformed.
 - Components located underneath them can be damaged and thus lead to operating disturbances.



Caution

Movement without intentional activation of control elements.

Risk of collision, risk of injury to patient or operator, risk of damage to the system.

- ◆ If movement does not stop, press the nearest emergency STOP button.

-
- ◆ Do *not* place any objects on the operating areas of the control consoles.



Do not place folders next to the operating area of the control consoles.

Folders falling down might cause unwanted system movements.



Warning

Movement without intentional activation of control elements.

Risk of collision, risk of injury to patient or operator, risk of damage to the system.

- ◆ Remedy: Do not load the remote console with any objects, accessories, folders or documents.
 - ◆ If movement does not stop, press the nearest emergency stop button.
-

Collision protection

When the table top meets any obstacle during downward movement of the table, the table top is lifted and movement stops. The system displays an error message.

In this case, only upward movement is possible.

Warning signs

Special danger points are marked on the unit with a warning sign:

Risk of collision



Under certain circumstances, additionally installed components, for example lead protective screens, lamps, auxiliary equipment and so on. can cause collision with the system.

To protect these components and also the patient, such components are provided with the warning sign shown on the left.

We can provide you with these warning signs. The SIEMENS Uptime Service will also attach them to additionally installed components on request.

General danger



Caution, always observe the Operator Manual!

These warning sign indicates that special instructions can be found in the Operator Manual.

- ◆ Please read the Operator Manual.

Combination with other products/ components

To ensure the necessary safety, only products or components expressly approved by Siemens AG, Healthcare, may be used in combination with the system.



The person connecting additional equipment to the medical device is considered to be the system configurer and is therefore responsible for ensuring that the current system configuration complies with the relevant standards (for example system standard IEC/EN 60601-ff and/or other applicable standards).

In case of doubt, please consult your local contact person.

Interfaces

Accessories connected to the analog or digital interfaces must be certified according to the respective IEC standards.

Example: IEC 60950-1 for Information Technology Equipment and IEC 60601-1 for Medical Equipment.

Furthermore all configurations shall comply with the valid version of the system standard IEC 60601-1.

Everybody who connects additional equipment to the signal input part configures a medical system. This person is thus responsible that the system complies with the requirements of the valid version of the system standard IEC 60601-1.

- ◆ If in doubt, consult the Customer Services department or your local representative.

Use of the full-field light localizer



Caution

Photobiological effect of ultraviolet radiation

Eye injury

- ◆ Do not look into the light beam for longer than 15 seconds.
- ◆ Always keep enough distance to the collimator.

Disposal

On disposing of the complete system or parts thereof, currently valid environmental legislation must be observed.

Examples of environmentally relevant components are:

- ☐ Accumulators and batteries
- ☐ Transformers
- ☐ Capacitors
- ☐ Flat panel monitors
- ☐ Phantoms

For details contact your local customer service representative or your Siemens regional office.

NOTICE: System components which are hazardous to persons or the environment must be disposed of with care and in compliance with legally binding ordinances.

For all countries of the EU:

In the member states of the European Union (EU) Siemens will take back and will dispose of the packing material of your system.



Products bearing this symbol are subject to EC directive 2002/96/EC on waste electrical and electronic equipment (WEEE), amended by 2003/108/EC. This directive determines the framework for the return and recycling of used equipment as applicable throughout the EU.

For details about return and disposal of the product or its components or accessories please contact your local Siemens customer service or your Siemens regional office.

Cleaning and disinfection



Caution

Use of harsh cleaning agents, liquids, or sprays.

Risk of electrical hazard or damage to the system

- ◆ Use only substances for cleaning and disinfection, which are recommended.
 - ◆ Do not let cleaning liquids seep into the openings of the system (for example, air openings, gaps between covers).
 - ◆ Observe the cleaning and disinfection instructions.
-



Caution

Inadequate cleaning and disinfection

Risk of infection

- ◆ Clean and disinfect all contaminated surfaces and all parts which may come (or have come) into contact with patient after each examination.
 - ◆ Use the recommended cleaning agents and disinfectants.
 - ◆ Protect the portable detector with a single-use plastic bag.
-

Cleaning

- ◆ Clean all contaminated parts and all parts that can, directly or indirectly, come or have come into contact with the patient.
- ◆ Never use abrasive cleaners or cleaning agents with solvents (e.g. cleaning solutions, alcohol or spot removers), since they may damage housing surfaces.

Cleaning the system

- ◆ Wipe off the system with a cloth moistened in water or a diluted, lukewarm solution of water and dishwashing liquid.
- ◆ Remove any watery residues immediately.
- ◆ Keep the ventilation slots of all components unobstructed.



Caution

Objects on top of the generator cabinet block ventilation

Generator becomes inoperable because it is too warm.

- ◆ Do not store objects on top of the generator cabinet.
-



Caution

Cleaning liquids drip into the generator cabinet.

Electrical parts are damaged.

- ◆ Make sure that no liquids are used at the top of the generator cabinet.
 - ◆ Clean the generator cabinet covers very carefully, making sure that no liquid seeps into the cabinet.
-



Agents based on quaternary compounds, chlorine derivatives, alcohol and benzene can lead to material damage and are therefore not recommended.

Cleaning the touch user interfaces and monitors

- ◆ Do not spray screen surfaces or displays directly.
- ◆ Clean the screen surfaces or displays with a cotton cloth dampened with water.
- ◆ Remove stubborn stains with a mixture of 2/3 water and 1/3 alcohol.
- ◆ Immediately dry off the screen surfaces or displays with a soft cotton cloth.
- ◆ Wipe off contrast agent spots on the screen surfaces or displays as soon as possible.

Cleaning the mobile detector MAX wi-D

We recommend to clean the back of the detector first so that it has more time to dry while the front is being cleaned.

Special cleaning instructions for accessory parts

Please note that for some accessory parts special instructions on cleaning are given in the corresponding chapters.

See **Register** *Accessories and Auxiliary Devices*

Unless special instructions are given there, the cleaning instructions for the system are valid.

Parts mounted above the patient

- ◆ Remove dust on parts mounted above the patient regularly.

Disinfection

For surface disinfecting of the system, we recommend using liquid solutions of a commercially available surfactant disinfectant based on the following ingredient classes:

- ☐ Aldehydes
- ☐ Alkylamines
- ☐ Guanidine derivatives
- ☐ Peroxide compounds
- ☐ Pyridine derivatives
- ☐ Organic acids

The safety data sheets of the manufacturer provide detailed information on the composition of the disinfectants.



Disinfectants based on quaternary compounds, chlorine derivatives, alcohol and benzene can lead to material damage and are therefore not recommended.

As a general rule, disinfectant sprays must not be used since the spray mist may penetrate into the equipment. In this case, the safety of the equipment can no longer be ensured (damage to electronic components, formation of flammable air solvent vapor mixtures).

- ◆ Only use liquid disinfectants.



Some substances contained in disinfectants are known to be hazardous to health. Their concentration in the air must not exceed the legally defined limit.

We recommend that you follow the manufacturer's instructions for use of these products.

Sterilization

The system does not require sterilization.

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Introduction

Use of the product

Intended use

The digital (DR) system is used for making X-ray exposures of the head, spinal column, abdomen, thorax (lungs), internal organs and extremities. It's also possible to use conventional film/screen and CR-systems for free exposures.

The digital image is displayed and checked on the display of the image station and then transferred to:

- ☐ a diagnostic workstation for reporting,
- ☐ a viewing station for diagnostic
- ☐ a laser camera for printout

It is possible to examine trauma-patients.

The system, depending on the configuration, is suitable for all examinations possible in an examination room today.

This includes:

- ☐ under-table exposures (detector)
- ☐ onto-table exposures (detector, portable detector or cassette on the table)
- ☐ exposures with/without grid
- ☐ bi-lateral exposures (detector, portable detector or cassette upright and angulated against patient)
- ☐ exposures with standing patients
- ☐ portable detector (with/without grid) / cassette, for free examinations e.g. for examinations in bed.

The system allows the examination of a wide population, such as little babies up to adults. The health and condition of the examined patients comprises a wide range (first diagnosis, regular routine checks to determine the status of an existing disease or checkup after surgical procedures).

The technologist has unobstructed access to the standing, sitting (on bed or stool/chair) and lying patient. The adult patient can be examined up to ~ 190cm.

The condition depends on the health: could be e.g. walking patient in good condition or emergency patient, with tubus, in lying position, etc. The weight of patients is tendency growing up the last years: 200 to 240kg patients are more often.

Additional to the above mentioned rad cases the system is able to perform:

- ❑ System Variant Rad with positioning: This is a rad system with the additional possibility to position the patient with low dose fluoroscopy with acceptable low dose for the required IQ. This is used to check the right positioning before the rad examination to avoid re-takes.
- ❑ System Variant Rad with Fluoro option: This system can be used as a fluoroscopy system for certain applications. It's possible to do the following Fluoro applications:
 - Arthrography studies
 - ERCP studies
 - Swallow dynamic studies
 - Sialography studies
 - Speech pathology studies
 - Hysterosalpinography studies
 - Angio / DSA studies
 - Peripheral angio studies
- ❑ The following applications can be done with restrictions due to the fact, that the table is not tiltable:
 - Upper GI studies
 - Myelography studies
 - Phlebography studies

Patient group

The Multitom Rax system is designed for adult and pediatric (removable scattered radiation grid) patients.

The patient table is not approved for use with patients with a weight (incl. accessories) > 240 kg.

For the maximum patient weight of optional tables etc. please refer to Register 7: *Accessories and Auxiliary Devices*.

Contraindications

There are no known contraindications for use of the system.

Physical functionality

The Multitom Rax system may be used for projection of radiographic examinations of both adults and children (removable scattered radiation grid).

- ❑ On the patient table, X-rays can be taken on the recumbent or sitting patient from head to foot. Exposures in the region of the skull, of the spine, of thorax, lungs and abdomen as well as of the extremities are possible.
- ❑ In addition, exposures onto MAX wi-D and MAX mini in the form of free exposures are possible.

User profile

This Operator Manual is intended for qualified personnel with the necessary knowledge and expertise to operate X-ray equipment in accordance with the relevant country specific regulations.

Training

Application training is supplied with the equipment according to the hand-over contract. It is mandatory to follow such application training supplied by Siemens Representative before any use of the system.

The follow-up training, which is necessary due to change of personnel, is in the responsibility of the operator of the system. Any additional training can be requested from Siemens Healthcare.

Conditions of use

The system is suitable for medical facilities such as hospitals, doctor's offices, etc. The climatic conditions specified in Register 8: *Technical Description*, "Ambient conditions (operation)" → p. 19 must be complied with.

Maintenance, cleaning, and disinfection

Refer to Register 5: *System Operation* and Register 2: *System Safety*.

Service

The service must only be performed by qualified technical personnel.

Technical performance characteristics

Refer to Register 8: *Technical Description*.

Frequently used operating functions

Refer to Register 5: *System Operation*

Operating functions regarding safety

Refer to Register 2: *System Safety*.

Product description

The Multitom Rax system with MODEL NO. 10860700 bears the CE 0123 marking for the entire system. The label is attached to the back of the table frame.

Components

- ❑ Single side floor mounted table, adjustable in height.
- ❑ X-ray tube attached to a fully automatic ceiling stand, freely positionable in the examination room.
- ❑ Ceiling-mounted detector stand with motorized movements in x-, y- and z-axis
- ❑ Preprogrammed imaging positions enable quick and informative examination results.
- ❑ A total of three different MAX detectors are available:
 - MAX dynamic (integrated detector in detector stand)
 - MAX wi-D¹ (wireless mobile detector)
 - MAX mini¹ (wireless mobile detector)

The MAX wi-D and the MAX mini can be used for free exposures only.

Maximum one MAX wi-D and one MAX mini can be used with each system.

- ❑ Control room module
- ❑ Fluoro control console¹ (in the control room or on a trolley in the examination room)
- ❑ Monitor¹

Grids

- ❑ The detector stand is equipped with a stationary scatter radiation grid.
- ❑ For free exposures, the MAX wi-D and MAX mini can be equipped with a clip-on grid¹.

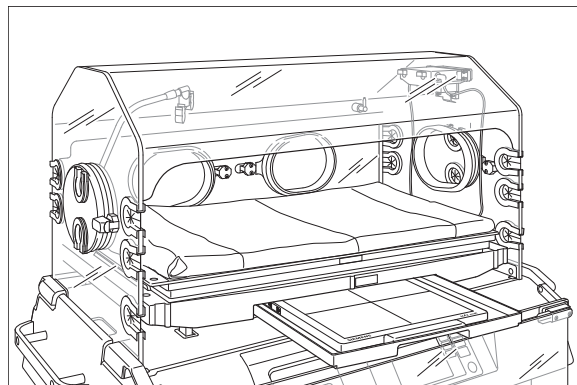
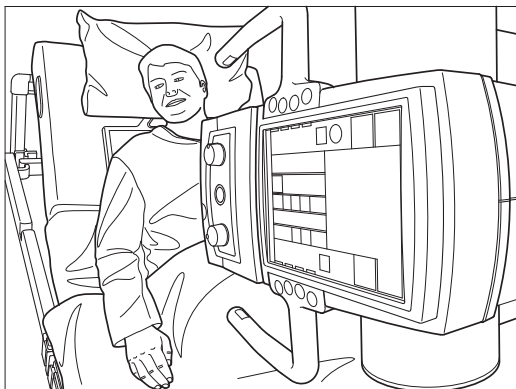
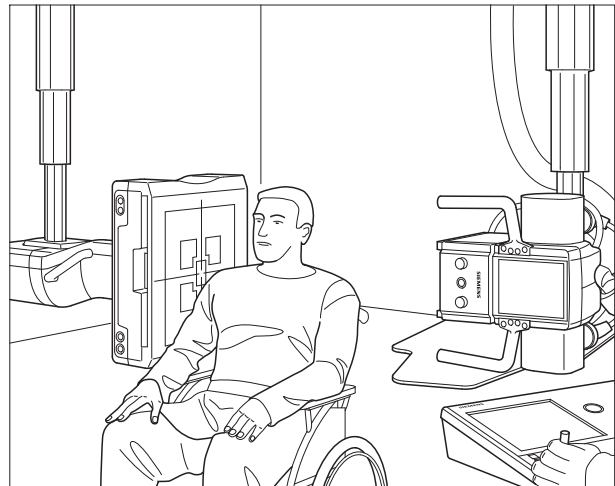
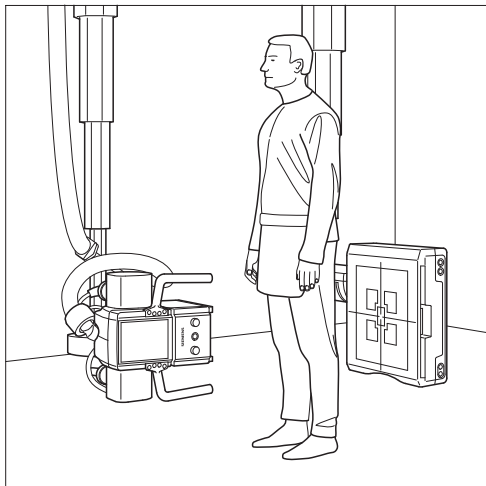
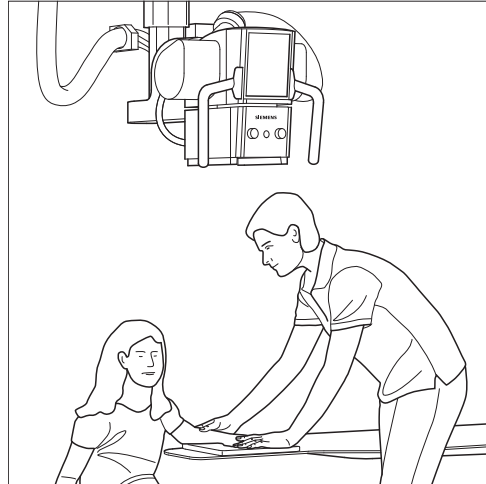
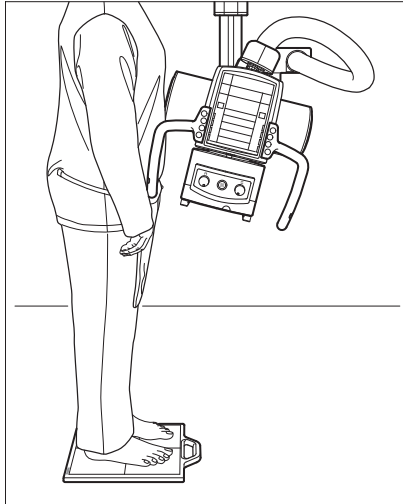
¹ Option

Application capabilities

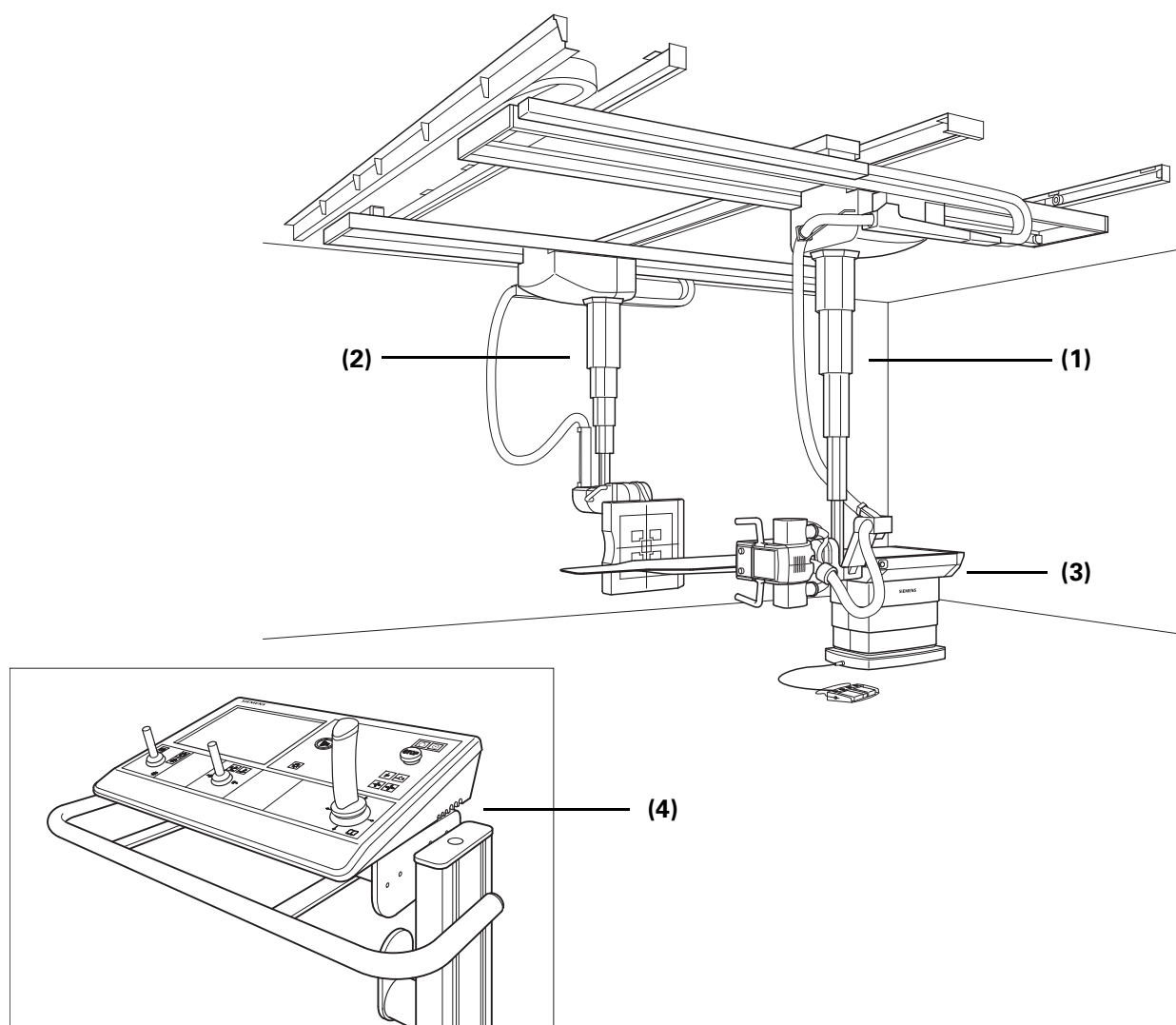
The Multitom Rax system may be used for projection of radiographic examinations of both adults and children (removable scattered radiation grid).

- ❑ On the *patient table*, X-rays can be taken on the recumbent or sitting patient from head to foot. Exposures in the region of the skull, of the spine, of thorax, lungs and abdomen as well as of the extremities are possible.
- ❑ It is also possible to acquire X-rays without patient table on the standing or sitting patient (chest, etc.) as well as exposures on emergency stretchers.
- ❑ In addition, exposures onto MAX wi-D and MAX mini in the form of *free exposures* are possible.
- ❑ Fluoro applications:
 - Arthrography studies
 - ERCP studies
 - Swallow dynamics studies
 - Sialography studies
 - Speech pathology studies
 - Hystero-Salpingo-Graphy studies

Examples



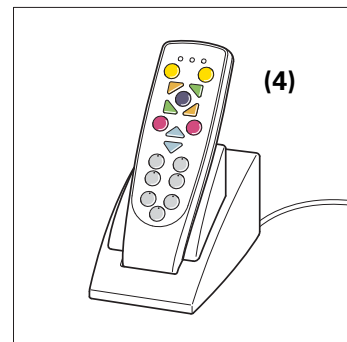
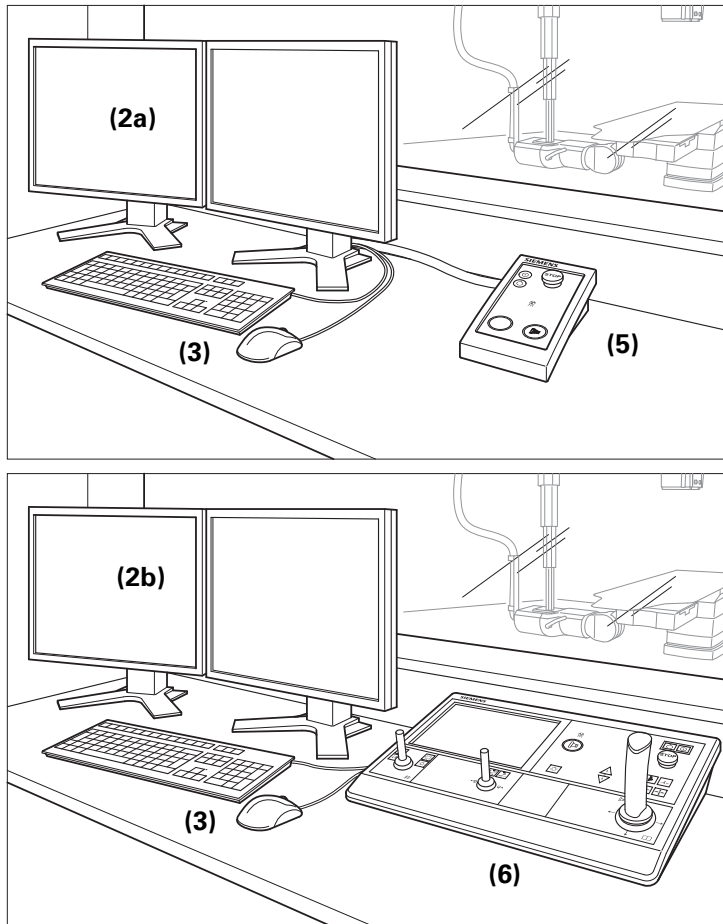
Basic System

The examination room

- (1) Ceiling support with X-ray tube assembly, collimator and MAXtouch
- (2) Ceiling support with detector (MAX dynamic)
- (3) Patient table
- (4) Fluoro control console¹

¹ Option

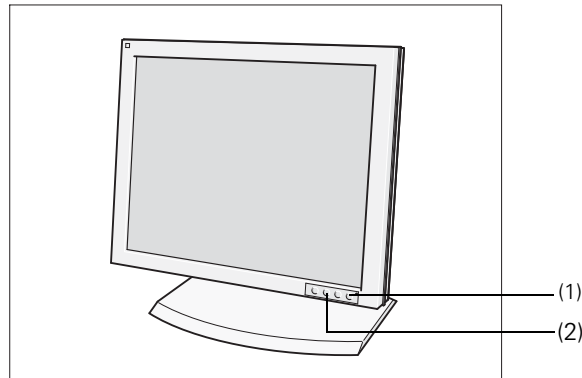
The control room



- (1) Imaging System PC (not shown)
- (2) Monitors
 - a) Control or Diagnostic (for radiography)
 - b) Diagnostic (with fluoroscopy option)
- (3) Keyboard and mouse
- (4) Wireless Remote Control
- (5) Control room module with radiation release button
- (6) Fluoro control console¹

¹ Option

Monitor



- (1) LED
- (2) Keys (locked)

Operating elements	The display has already been configured for optimal performance by Siemens Customer Service. For this reason, the keys on the side of the display are locked.
Power on/off	The unit has on the bottom a mains switch which you must operate if the display is not switched on through a system.
Operating indicator	The display has a green LED operating indicator above the setting elements.
Errors	☐ If the display displays no image or a blurred image, vertical lines or other defects, notify the SIEMENS Customer Service. ☐ If no input signal is present, the 'No Signal' message appears.



*Do not touch the surface of the screen using sharp, pointed objects.
Do not open the display under any circumstances.*



Caution

The standard 19" flat panel display is not intended for diagnosis.

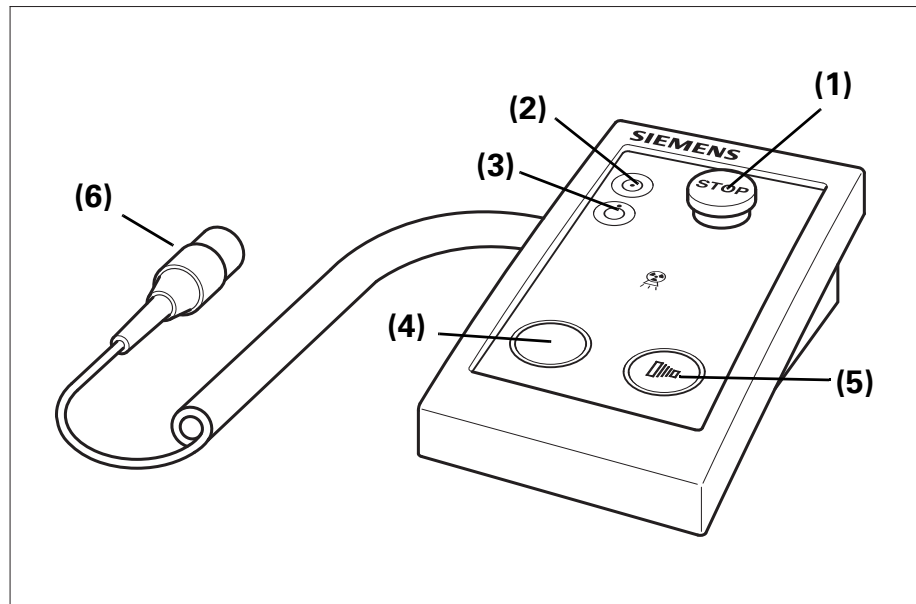
Incorrect diagnosis possible

- ◆ For diagnosis use a diagnostic display or transfer the image to a workstation.



The Fluoro option is always equipped with a diagnostic display.

Control room module

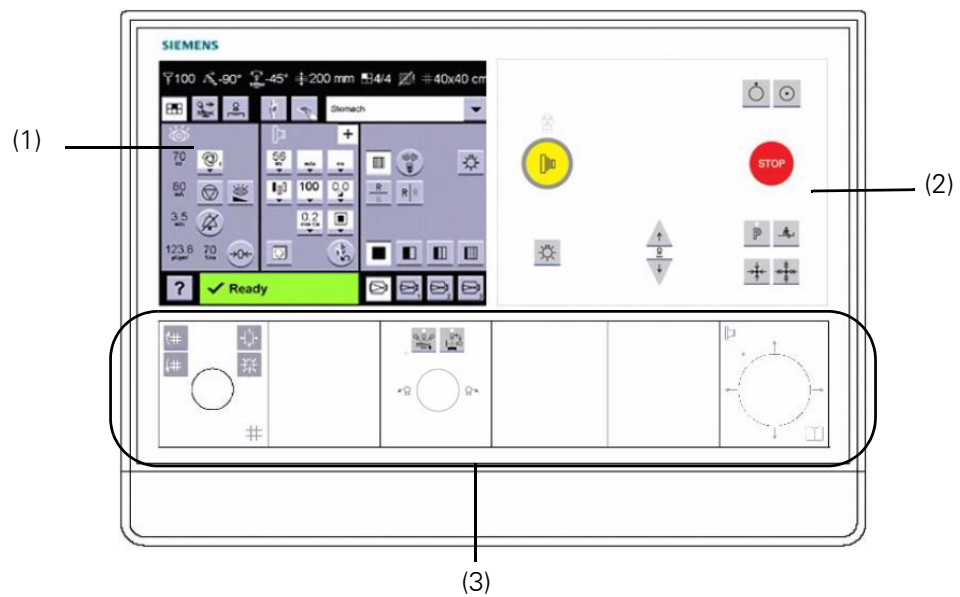


- (1) Emergency STOP button
- (2) Generator ON button
- (3) Generator OFF button
- (4) Positioning button (Fluoro)
- (5) Acquisition button
- (6) Manual radiation release¹
 - An acoustic signal sounds²

¹ Option

² This signal can only be set by the SIEMENS Service

Fluoro remote control console¹



The Fluoro remote control console consists of three main parts:

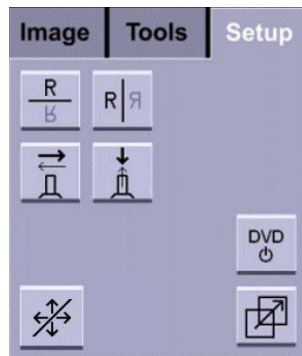
- (1) Touchscreen User Interface (TUI)
- (2) Hardware buttons panel User Interface
- (3) Modular joystick User Interface

¹ User Interface is identical for the mobile tableside control console

Touchscreen User interface (TUI)

Most of the functions of the TUI are related to the digital imaging system and are therefore described in the corresponding Operator Manual, except for:

Setup tab card



Flip horizontal



Flip vertical



Reverse transversal movement



Reverse longitudinal movement



DVD recording

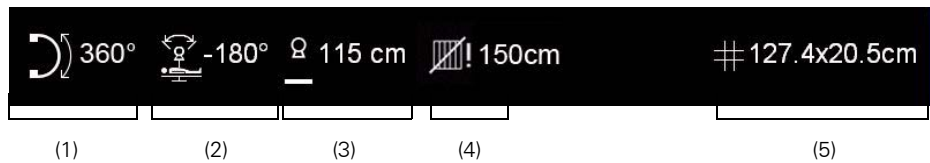


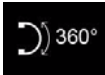
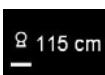
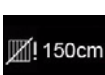
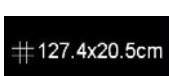
Block system movement



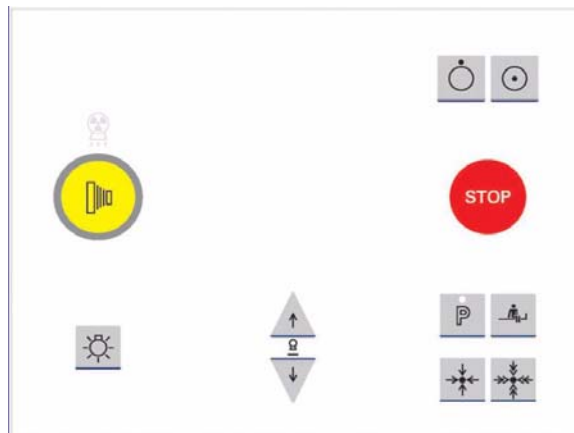
Care position

Status area



Icon number	Icon	Description
(1)		C-arm angle
(2)		Oblique projection angle
(3)		SID display
(4)		Grid status
(5)		Collimated field of view
(6)		Radiation blocked Movement blocked
(7)		Segmentation

Hardware buttons panel user interface



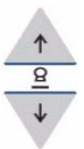
"Radiation ON" indicator
– Symbol lights up orange



Exposure release button with pre- and main contact
– An acoustic signal sounds¹



Room light on or off (on-site installation required)



Button for increasing the SID

Button for decreasing the SID



ON button



OFF button



Red emergency STOP button



Parking position



Automatic system positioning for patient transfer

¹ This signal can only be set by the SIEMENS Service



Buttons for starting movement control:

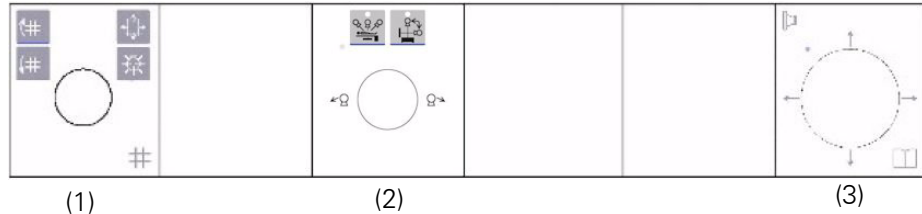
Moves system slowly into predefined OGP positions.



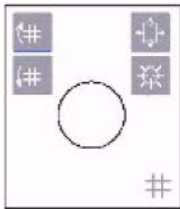
Moves system fast into predefined OGP positions.

Modular joystick user interface

User interface with ST filter control

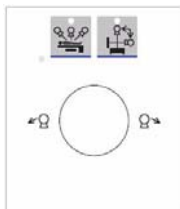


(1) Collimator functions



- ☐ Button for rotating the collimator blades clockwise (to the right)¹
- ☐ Button for rotating the collimator blades counterclockwise (to the left)¹
- ☐ Home button for collimator blades
- ☐ Button for switching on or off the laser light localizer
- ☐ Joystick module:
 - Horizontal deflection opens or closes width blades (left: opens; right: closes)
 - Vertical deflection opens or closes height blades (up: opens; down: closes)
 - Diagonal deflection up left opens width and height blades
 - Diagonal deflection down right closes width and height blades

(2) Tube angulation and tilt

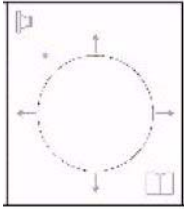


- ☐ Left button with LED: selection of oblique beam mode angulation
 - Pressed button moves the system to the position where oblique beam mode is possible.
- ☐ Right button with LED: selection of tube tilt mode
 - Pressed button moves the system to the position where lateral projection is possible
 - Tube rotation with centered detector following
- ☐ Joystick for tube tilting

In the upper left corner is a blue LED for the activation state of the dead man's grip (DMG)

- LED is on: DMG is active

¹ For examinations at the table



(3) System movement and exposure release

- ❑ Exposure release (button on front side of joystick shaft)
 - An acoustic signal sounds¹
- ❑ Joystick module:
 - Horizontal deflection to the left or right moves system transversely.
 - Vertical deflection up or down moves system longitudinally.

In the upper left corner is a blue LED for the activation state of the dead man's grip (DMG)

LED is on: DMG is active

¹ This signal can only be set by the SIEMENS Service

Unit overview

Patient table

See Register 4: *System Components*, Chapter **Patient Table**

Overhead support with X-ray tube and multileaf collimator

See Register 4: *System Components*, Chapter **Ceiling-suspended X-ray tube with multileaf collimator**

Detector stand

See Register 4: *System Components*, Chapter **Ceiling-suspended detector stand**.

Register 4 System Components

Chapter: Patient Table

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Using a trolley instead of the table top	6
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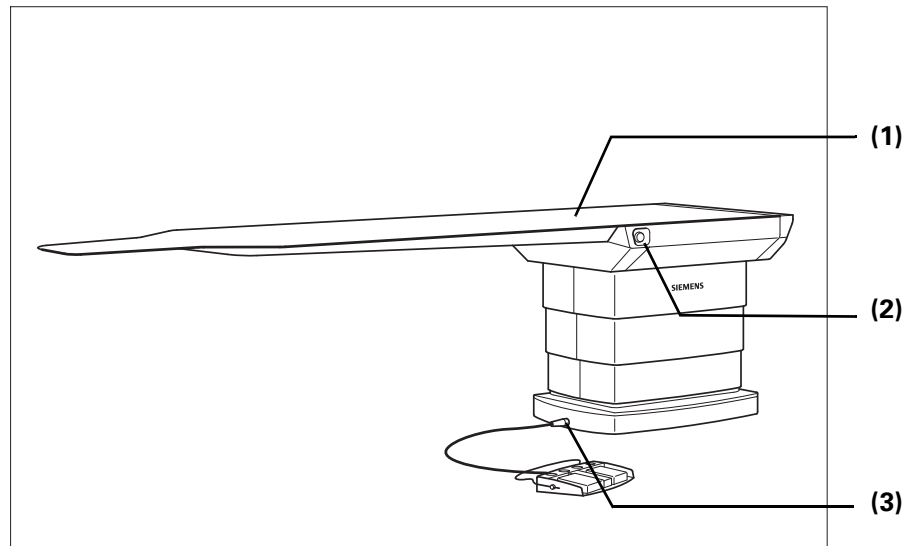
Chapter: Wireless detectors (MAX wi-D or MAX mini)

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Patient Table

Overview

- (1) Table top (removable)
- (2) Emergency STOP pushbutton (on both sides)
- (3) Connector for footswitch

Hand grips

Attachable hand grips offer the patient a secure grip and thus increase their feeling of safety.

Refer to Register 7: *Accessories and Auxiliary Devices*, "Hand grip" → p. 12

Connector

There is a connector (3) for a foot switch at the foot of the table.

**Caution**

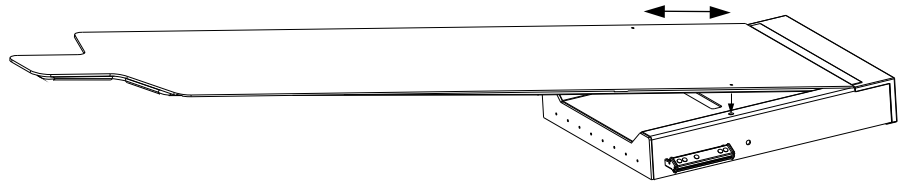
Damage to the tabletop due to overloading, collision or sharp objects

Risk of injury if the table top splinters or breaks

- ◆ Do not exceed the maximum weight allowance for the table.
- ◆ Do not allow the patient to sit at the head end of the table.
- ◆ Call Siemens Service and have the tabletop checked immediately if it is possible that it might have been damaged.

Removable table top

The table top can be removed and reinserted to the table column. You can take it off, if it is not required for the examination.



Caution

Table top not properly hooked in

Cuts and other injuries to the patient

- ◆ Make sure the protruding rim safely engages underneath the crossbar



Caution

Table top falls down during transfer

Injury to feet or legs

- ◆ Use two persons to remove or install the table top.
- ◆ Handle the table top with care.

Using a trolley instead of the table top

When the table top is removed, *no collision zone* (no collision survey) at the place of the table top is taken into account during unit movements.

- ◆ Carefully define special positions using a trolley.
- ◆ Test the trolley system positions first *without* a patient.

Emergency STOP push buttons

One red emergency STOP push button is located at the front and one at the back of the patient table.



It interrupts *all motor driven* system movements.

For more details, please refer to Register 2: *System Safety*.

Multifunctional foot switch



- (1) OGP push button
- (2) Push button for moving the table up
- (3) Push button for moving table down
- (4) Push button for centering the tube to the detector
- (5) Pedal switch for releasing acquisition
- (6) Pedal switch for releasing fluoro

The buttons on the multifunctional foot switch can only be activated by pushing them twice.



Caution

Operator or patient trips over the foot switch cable or the foot switch itself

Risk of injury

- ◆ Position the foot switch and the associated cable on the floor so that nobody trips.
-

Table movements



Caution

System movements cause collision

Risk of injury or system damage

- ◆ Perform system movements only when it is certain that neither the operator, the patient, third parties nor pieces of equipment can be endangered by these movements.
- ◆ Remove any objects or accessories, for example injector or infusion stand, from the collision area.
- ◆ Make sure you are standing outside the dangerous area.
- ◆ Always watch the patient when performing system movements.



Caution

Patient does not use the hand grips and gets fingers caught in moving parts.

Risk of crushing

- ◆ Make sure that patient always uses the hand grips.
- ◆ If this is not possible, make sure that the patient's hands cannot get caught in the moving parts of the system.

Collision protection

The table can be moved up and down with the multifunctional foot switch.

The table has a collision detection that stops downward motorized movements in case the tabletop is lifted.

In case of a collision there is a collision signal and a collision information at the MAXtouch.

The tabletop can nevertheless be moved upwards.

Adjusting table height



Warning

Lowering the table onto a seated patient

Crushing of patient or operator seated with legs under the table (for example, a wheelchair patient)

- ◆ Do not position a patient with legs under the table.
- ◆ Do not move the table while a patient is seated near the table.
 - System will stop when collision is detected, but there is still a risk of injury for the patient!
- ◆ Move the patient away from the table first.



Moving the table up

- ◆ Actuate the second push button from the left (2) for table up movement.



Moving the table down

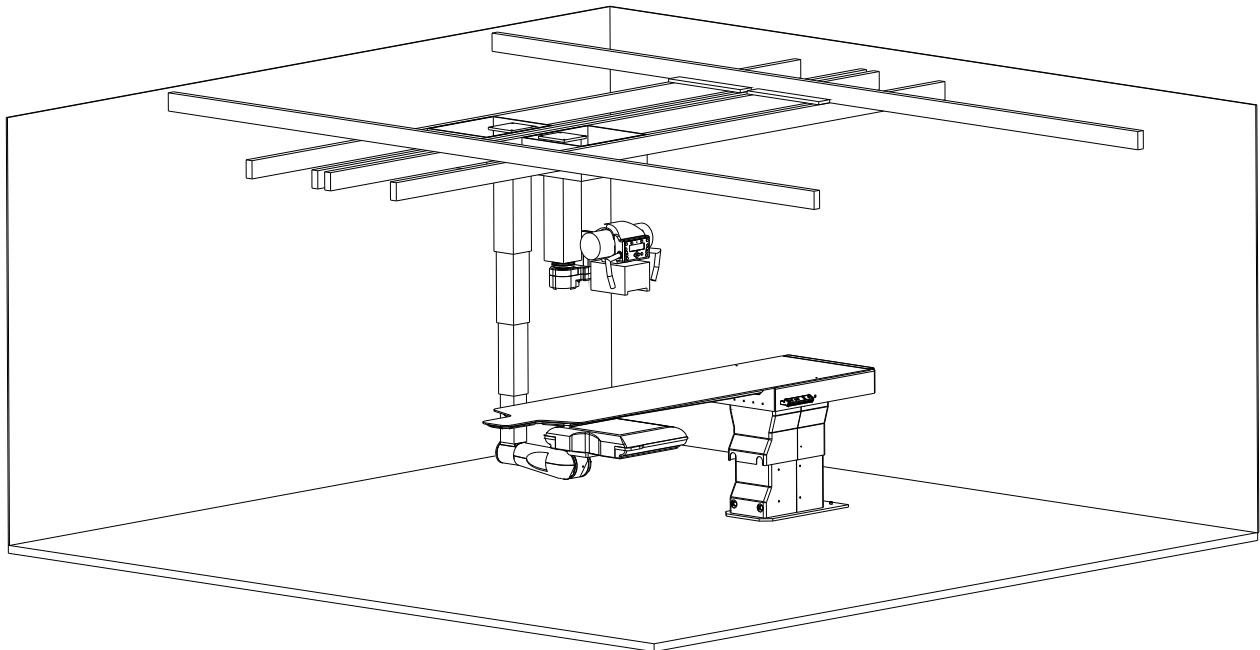
- ◆ Actuate the second push button from the right (3) for table down movement.



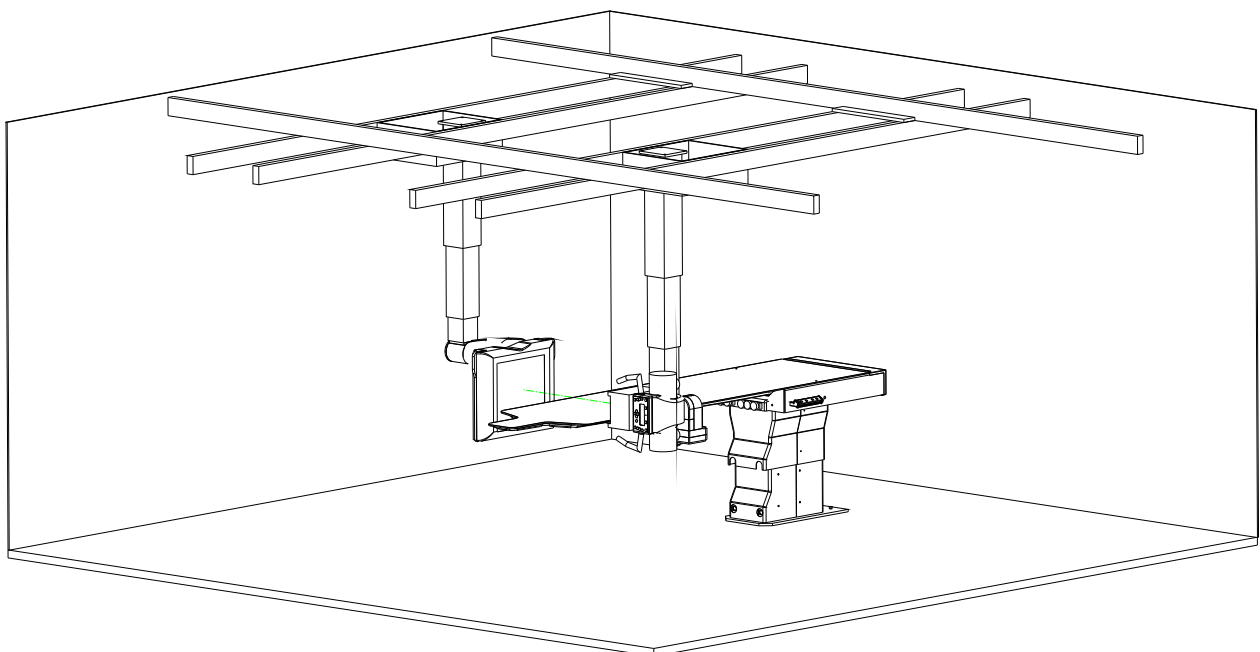
The table stops automatically at a certain height which can be programmed by Service.

- ◆ To continue movement, release the control and actuate it new.

Positioning examples



Exposure on the patient table, vertical projection (table mode)



Exposure on the patient table, horizontal projection (lateral)

System Components

Patient Table



Ceiling-suspended X-ray tube with multileaf collimator

General safety information



Warning

Damaged cables inside the lifting column of the overhead tube or detector.

Overhead tube or detector can fall down.

Risk of patient or user injury

- ◆ If the overhead tube or detector cannot be moved vertically, do not force the movement.
 - ◆ Call Siemens Service.
-



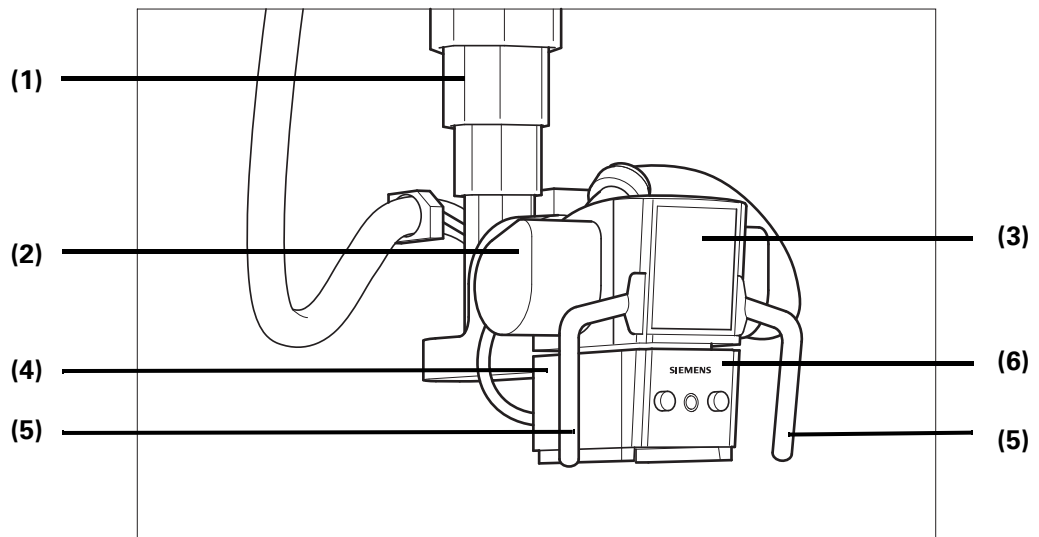
Caution

Heavy items (such as lead aprons) hung on ceiling-mounted devices.

Parts could be damaged or fall down

- ◆ Do not place any additional load on the ceiling mounted devices.
-

Overview



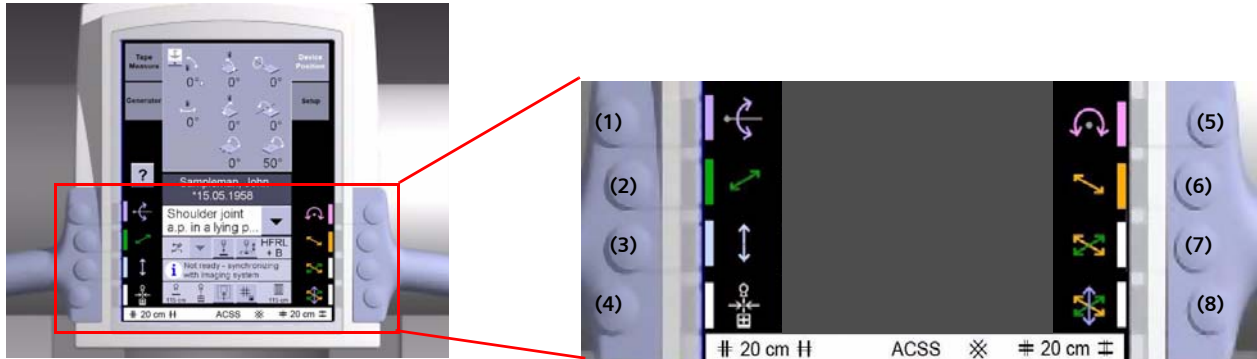
The 3D overhead support consists of the following components:

- (1) Lifting column
- (2) X-ray tube unit
- (3) Touch User Interface (MAXtouch)
- (4) Multileaf collimator
- (5) Handles with buttons
 - Use the handles if you want to bring the tube unit manually into another position (vertical, longitudinal, transverse or rotation).
- (6) Collimator control panel

You control the movements of the 3D overhead support with the aid of the handles and the MAXtouch.

The display on the MAXtouch informs you about the position of the support (SID, tube angle), the generator settings, patient name, organ programs, and so on.

Movement control elements



Button number	Icon	Description
(1)		Rotation around vertical axis
(2)		Longitudinal tube movement
(3)		Vertical tube movement up and down
(4)		Centering detector to tube
(5)		Rotation around horizontal axis
(6)		Transverse tube movement
(7)		Tube movement longitudinal and transverse
(8)		Floating tube movement (longitudinal, transverse, vertical)

Touch User Interface (MAXtouch)

The MAXtouch is a color touch screen user interface for control of multiple functions. The touch screen corrects its display orientation from portrait to landscape, when the X-ray tube is tilted by 90°.



Examples: MAXtouch portrait orientation (left)



MAXtouch landscape orientation (right)

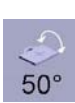
General functions

Icon	Short description
	Round buttons start an action immediately
	Square buttons toggle a function or open a pop-up menu
	Help button
	Important message with confirmation

Tape Measure *tab card*

Icon	Short description
	Select SID measurement (Source-Image Distance)
	SID display (value in cm or inch)
	Select SOD measurement (Source-Object Distance)
	SOD display (value in cm or inch)
	Magnification display – calculated magnification result of SID and SOD $\text{Mag} = \text{SID}/\text{SOD}$

Device position *tab card*

Icon	Short description
	Tube rotation, horizontal
	Tube rotation, vertical
	Tube-Detector, longitudinal
	Tube-Detector, lateral
	Detector rotation
	Detector tilt
	MAXalign detector tilt about landscape axis

System Components

Ceiling-suspended X-ray tube with multileaf collimator

Icon	Short description
	MAXalign detector tilt about portrait axis



Workplace indicators

The workplace indicators appear in a pop up menu.

Icon	Short description
	Table mode
	Wall mode
	Portable detector
	Cassette

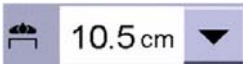
Generator *tab card*

Refer to the **FLUOROSPOT Compact** Operator Manual for further information.

Setup *tab card*

Icon	Short description
	Block system movement
	Block and unblock exposure release  <i>We recommend that this button is used at all times, except when a procedure is in progress. This is to prevent the possibility of radiation being emitted through the inadvertent actuation of an exposure release button.</i>
	CAREPOSITION
	Drop down menu for speed and sensitivity of the ceiling stand movements. < Q > Low speed and high sensitivity « Q » Moderate speed and sensitivity «« Q »» High speed and low sensitivity

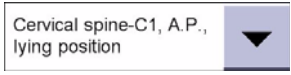
Ortho *tab card*

Icon	Short description
	Select TOD (Table-Object Distance)
	Confirm Ortho start position. A check mark is displayed when the position has been confirmed.
	Confirm Ortho end position. A check mark is displayed when the position has been confirmed.

System Components

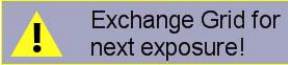
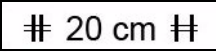
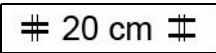
Ceiling-suspended X-ray tube with multileaf collimator

Directly accessible functions

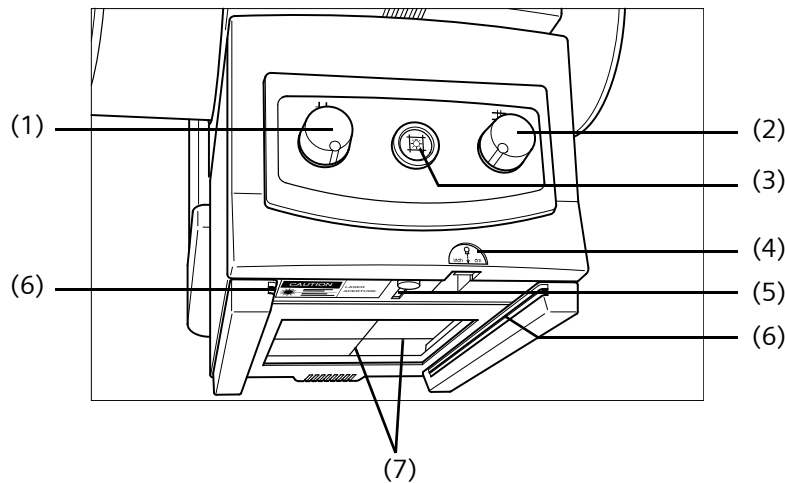
Icon	Short description
	Organ program list (popup menu)
	Tracking tube/detector on/off ; In state on "tracking not possible" is indicated in red
	SID tracking on/off ; In state off "SID tracking not possible" is indicated in red
	Top alignment on/off
	Restore collimator
	Help on/off
	Repeat OGP
	Page wireless remote control button*
	Switch between active detectors for free exposure – Currently selected detector (MAX wi-D or MAX mini) displayed

* only if Wireless Remote Control is available

Directly accessible displays

Icon	Short description
	Patient name and additional configurable filing parameter
	Patient position
	Status Ready
	Status Not ready
	SID display in cm or inch
	Centering display – red, if not centered
	Grid status – grid SID in cm or inch
	Collimator width – in cm or inch
	Collimator height – in cm or inch
	Collimator mode – ACSS or Manual
	Collimator rotation

Multileaf collimator



- (1) Manual vertical collimation
 - (turning counterclockwise closes the collimator, turning clockwise opens the collimator)
- (2) Manual horizontal collimation
 - (turning counterclockwise closes the collimator, turning clockwise opens the collimator)
- (3) Button for full-field light localizer and laser line light localizer
 - switches off automatically after 10 - 90 s (configurable)
- (4) Tape measure for SID/SOD measurement
- (5) Laser line light localizer with sliding cover.
- (6) Accessory rails
- (7) Crosshairs in the light localizer window
- (8) Optional cross laser (to be inserted in the accessory rails) - not shown

Tape measure for SID/SOD measurement (4)



The tape measure (4) has two scales:

Inches (left scale) and **cm** (right scale).

Laser line light localizer (5)

The laser line light localizer projects the axis mark for longitudinal centering, which is aligned with the centering mark on the receptor.



The laser line light localizer is switched on and off jointly with the full field light localizer.

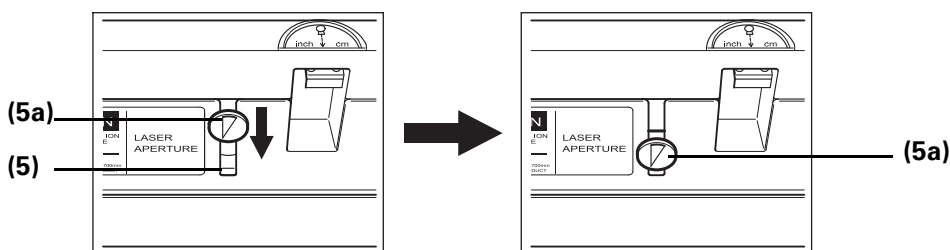


Laser light

- ◆ Do *not* use optical lenses, mirrors and similar instruments if working with laser light. The optical instruments within the laser beam may amplify the laser intensity to dangerous values for eyes and skin.
- ◆ Switch off the laser light when optical instruments are used.



*To protect the eyes of the patient or any other person, the laser radiation outlet (5) of the laser line light localizer can be closed with the **sliding cover (5a)**.*





Caution

Looking into the laser light

Eye injury

- ◆ Take care that neither you nor anybody else looks directly into the laser beam.
- ◆ Close the sliding cover over the laser light to protect the eyes of the patient and other people.
- ◆ Note that the collimator can heat up when the light localizer is used for a longer period of time.



Caution

If the LED of the light localizer burns for a long time, parts of the light localizer can heat up.

Danger of burns

- ◆ Avoid contact with the light localizer to avoid burns.



- ◆ To switch on the laser line light localizer, press the button at the front of the collimator.
- ◆ To switch off the laser line light localizer, press the button again.
 - The laser line light localizer can also be switched off automatically by an internal time switch.

Accessory rails (6)



The accessory rails may be loaded with maximum 70N (7kp).

Crosshairs (7)



- The crosshairs project the longitudinal and transverse axis of the radiation field onto the cassette or directly onto the patient.
- ◆ The full field light localizer for projecting the crosshairs is switched on with the button at the front of the collimator.
- ◆ To switch it off press the button again.
 - The full field light localizer can also be switched off automatically by an internal time switch.
- The laser line light localizer and the full field light localizer **cannot** be switched independently of one another.

Locking spring

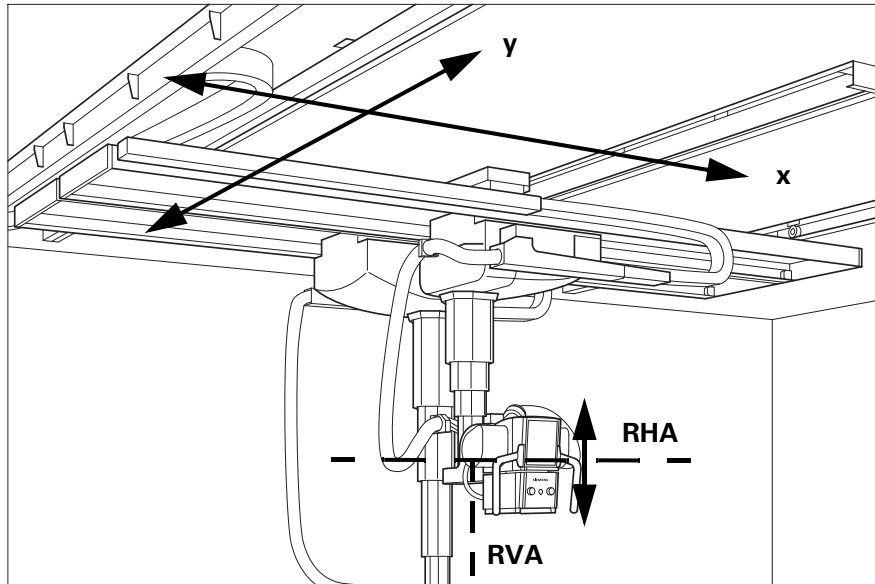
The locking spring is located on the left guide rail at the underside of the collimator.

The locking-spring locks the compensating filters, templates and so on, inserted in the accessory rails of the collimator, thus securing them against falling out.

- ◆ To remove the accessories, press the locking spring to the left until the compensating filter, template and so on, can be removed from the collimator.

Movement of overhead support

Directions for moving and rotating the tube



Directions for moving

The 3D overhead support can be moved in the following directions:

- ☐ x direction: longitudinal movement (with respect to the table)
- ☐ y direction: transverse movement
- ☐ z direction: height movement (SID)

Directions for rotating

The X-ray tube unit can be rotated in the following directions:

- ☐ about the horizontal axis (RHA = rotation horizontal axis)
- ☐ about the vertical axis (RVA = rotation vertical axis)

Positioning the 3D overhead support with tube unit

Adjusting height (z direction)



Warning

Damaged cables inside the lifting column of the overhead tube or detector.

Overhead tube or detector can fall down.

Risk of patient or user injury

- ◆ If the overhead tube or detector cannot be moved vertically, do not force the movement.
- ◆ Call Siemens Service.



Caution

Manual movements of the tube and detector

Person trapped between parts of the system

- ◆ Be very careful when moving parts of the system manually.

Collisions between parts of the system are possible in order to allow a greater positioning flexibility of the system (for instance, so that the detector can be as close as possible to the table top).



- ◆ Grasp the handles of the 3D overhead support with both hands
- ◆ Press the button to release the brake for vertical movement.
 - Releasing the button will stop the movement.
- ◆ Pull the overhead support into the required position.

Adjusting longitudinal position (x direction)



- ◆ Grasp the handles of the 3D overhead support with both hands
- ◆ Press the button to release the brake for longitudinal movement.
 - Releasing the button will stop the movement.
- ◆ Pull the overhead support into the required position.



Stops are provided in the longitudinal and transverse direction of the 3D overhead support, i.e. the support can be moved only by applying increased force or by releasing the button and pressing it again to go through certain positions (e.g. table center in longitudinal and transverse direction or defined SID values in longitudinal direction).

Adjusting transverse position (y direction)



- ◆ Grasp the handles of the 3D overhead support with both hands
- ◆ Press the button to release the brake for transverse movement.
 - Releasing the button will stop the movement.
- ◆ Pull the overhead support into the required position.



Stops are provided in the longitudinal and transverse direction of the 3D overhead support, i.e. the support can be moved only by applying increased force or by releasing the button and pressing it again to go through certain positions (e.g. table center in longitudinal and transverse direction or defined SID values in longitudinal direction).

“Floating” support movement



If you want to move the support in longitudinal, transverse and vertical direction simultaneously, press one of the buttons on the handles or the button on the support control panel for ‘floating’ support movement.

Rotating the tube unit (RHA/RVA)

The tube unit (with multileaf collimator) can be rotated manually about two axes:

- ☐ about the horizontal axis (RHA)
- ☐ about the vertical axis (RVA)



Caution

In extreme operating mode, the temperature of the X-ray tube assembly can heat up.

Danger of burns

- ◆ Avoid contact with the tube housing to avoid burns.



*The temperature of the tube surface during normal use reaches 50°C.
In case of high energy radiation the temperature may exceed the 50°C.*

- RHA** ♦ Grasp the handles of the 3D overhead support with both hands.



- ♦ Press the button for the brake for rotating the tube unit about the horizontal (support arm) axis with your right thumb.
- ♦ Turn the tube unit into the required position.
- The angle of rotation is displayed in degrees on the **Device Position** tab card of the **MAXtouch**.



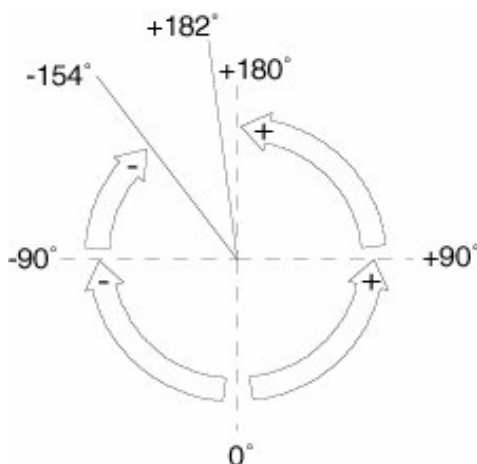
The tube unit can be rotated about the horizontal axis continuously, at a maximum by $\pm 120^\circ$. There are stop positions at 0° and at $\pm 90^\circ$.



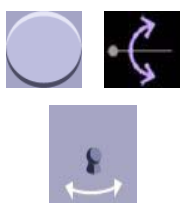
The accuracy of the stop positions of the tube unit might decrease to $\pm 3^\circ$, due to hard wear for example. Lateral image information might be "cut".

- ♦ Always check the alignment of the tube unit with the light localizer.

- RVA** The tube unit can be rotated about the vertical axis from -119° to $+217^\circ$ manually, -115° to $+215^\circ$ motorized, with stop positions at -90° , 0° and $+90^\circ$ (see drawing).



Rotation of the tube unit about the vertical axis (view from above: from the ceiling to the floor)



- ♦ Grasp the handles of the 3D overhead support with both hands.
- ♦ Press the button to release the brake for rotating the tube unit about the vertical (overhead support) axis with your left thumb
- ♦ Turn the tube unit into the required position.
- The angle of rotation is displayed in degrees on the **Device Position** tab card of the **MAXtouch**.

Tube tracking in wall mode

Prerequisite:



- ✓ System is in wall mode and centered
- ✓ Tracking is selected

When rotating the tube about the horizontal axis outside the 90° position, the tube support follows vertically; the central beam is locked on the detector.

This works in both directions up to 45°.

SID tracking

In addition to the tracking control perpendicular to the beam direction (in x direction), a further tracking control (in z direction) can be activated for keeping the SID (source-image distance) constant:



- ◆ Touch the SID tracking button at the MAXtouch.



Caution

Parts of the system move unexpectedly during automatic positioning or tracking

Risk of injury to the patient or user

- ◆ Keep the patient within visual contact whenever performing any positioning functions.
- ◆ Use the emergency stop if motion needs to be stopped quickly.

Deactivation of a tracking control

If the state of the system is changed so that one or several of the conditions for active tracking control are not fulfilled, then the tracking control is automatically switched off.

SID display

The SID (source-image distance) is displayed (in cm or inch according to configuration) at the MAXtouch (tab card **Tape Measure**).



During oblique projections the angle in degrees is displayed on the overhead support control panel instead of the SID.

- ◆ You must therefore absolutely measure the SID with the tape measure.

Rotating the multileaf collimator



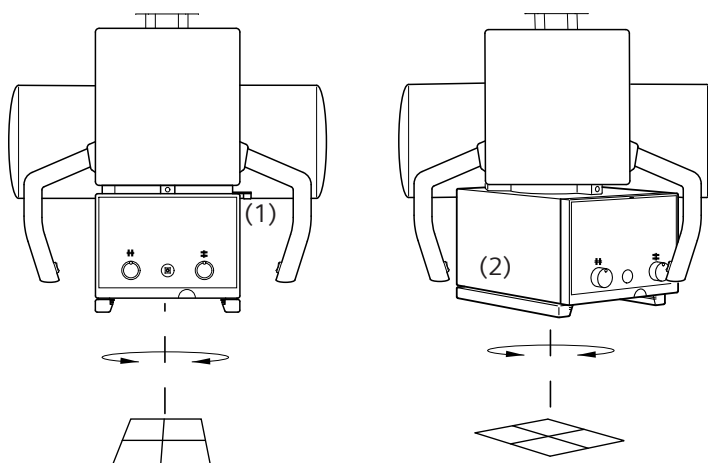
Caution

Hands between the collimator and the overhead column

Risk of injury

- ◆ Grasp the collimator on the sides when turning it so that there is no risk of crushing your hands.

If collimation not parallel to the table edges is required, the multileaf collimator can be rotated by $\pm 45^\circ$ about the vertical axis.



Rotating the collimator

- (1) Lock-in lever
- (2) Lamp housing



If the collimator is NOT in the 0° position, it will be indicated at the display of the MAXtouch with this symbol.

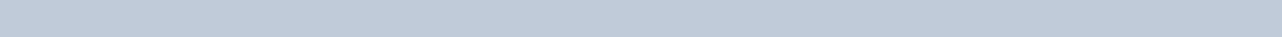
- ◆ Press the lock-in lever (1) on the multileaf collimator in the direction of the front panel.
 - The 0° lock of the multileaf collimator is released.
- ◆ Grasp the collimator and turn it by the required angle in the intended direction.

Rotating back into the 0° lock-in position

- ◆ Grasp the collimator and turn it into the centered 0° lock-in position.

System Components

Ceiling-suspended X-ray tube with multileaf collimator



Ceiling-suspended detector stand

General safety information**Warning**

Damaged cables inside the lifting column of the overhead tube or detector.

Overhead tube or detector can fall down.**Risk of patient or user injury**

- ◆ If the overhead tube or detector cannot be moved vertically, do not force the movement.
- ◆ Call Siemens Service.

**Caution**

Detector unit overloaded because patient is sitting on it or falling/leaning against it

Risk of damage to the detector and injury of the patient.

- ◆ Make sure that the detector is not mechanically overloaded as for example by patient sitting on it.

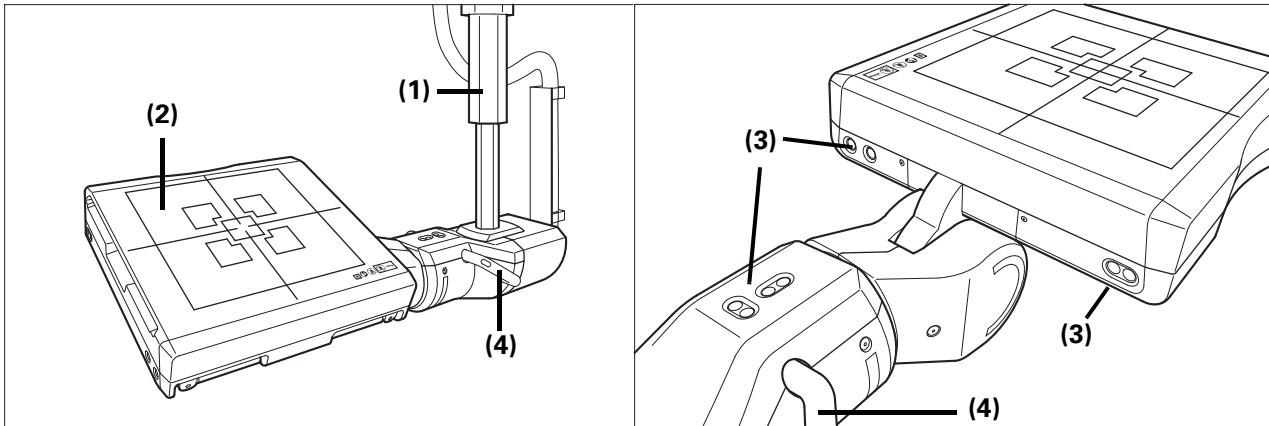
**Caution**

Detector stand is free-floating even if brakes are not released

Patient can slip or fall down

- ◆ Do not allow the patient to lean on the ceiling-mounted detector.

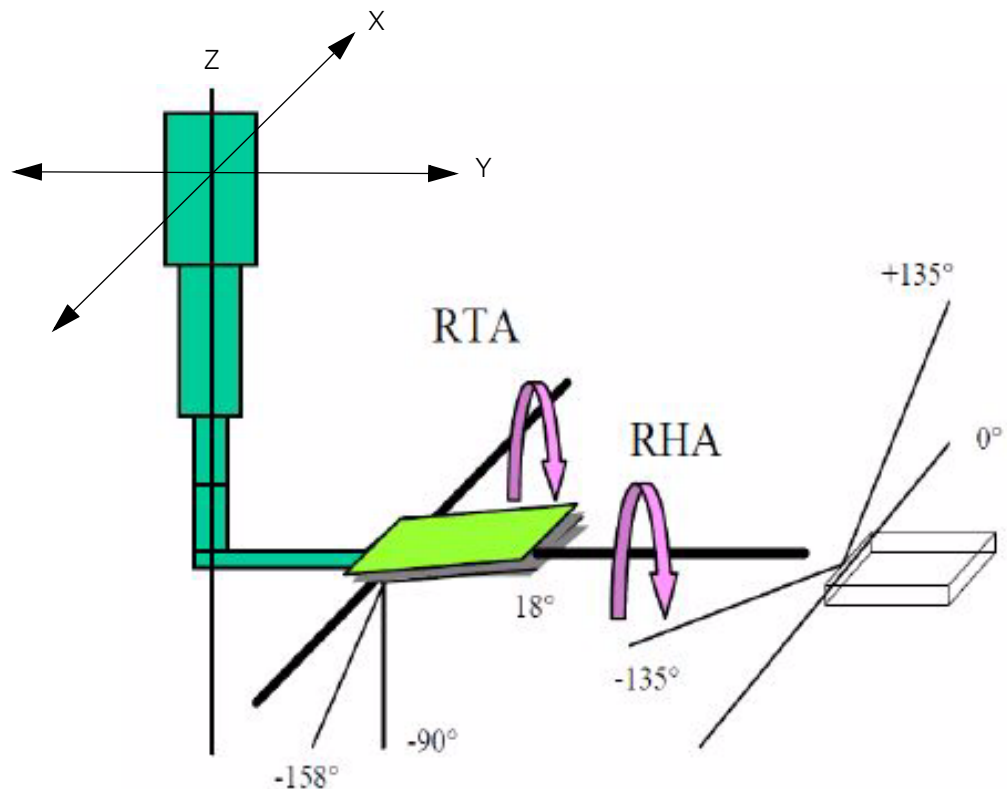
Overview



The ceiling mounted detector support consists of the following components:

- (1) Lifting column
- (2) Detector unit, tiltable
- (3) Movement controls
- (4) Hand grips for manual movement

Directions for moving and rotating the detector



Directions on the detector support

Directions for moving

The detector support can be moved in the following directions:

- ☐ x direction: longitudinal movement (in respect to the patient table)
- ☐ y direction: transverse movement
- ☐ z direction: height movement

Directions for rotating

The detector unit can be rotated in the following directions:

- ☐ about the transverse detector axis (RTA)
- ☐ about the longitudinal detector axis (RHA)



Caution

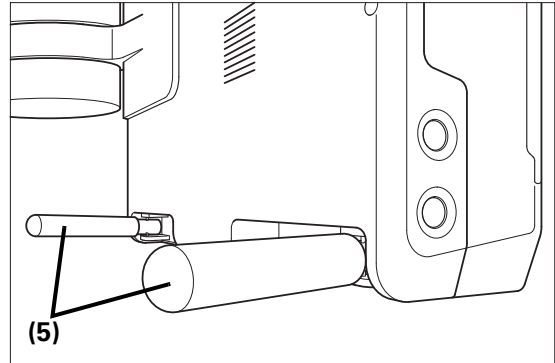
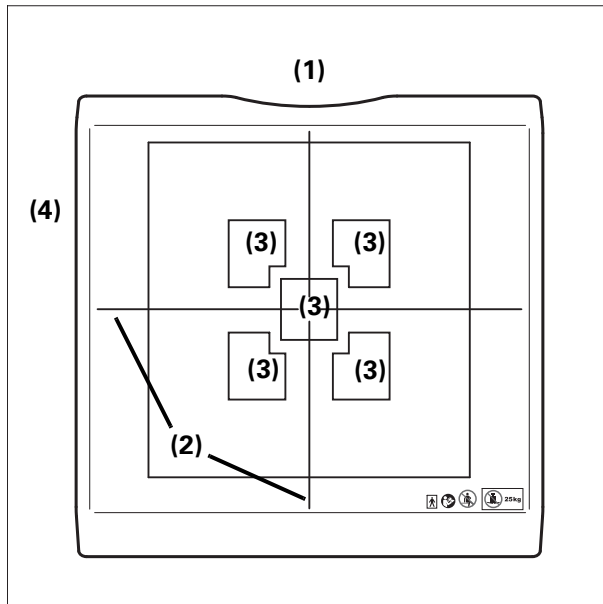
Manual movements of the tube and detector

Person trapped between parts of the system

- ◆ Be very careful when moving parts of the system manually.

Collisions between parts of the system are possible in order to allow a greater positioning flexibility of the system (for instance, so that the detector can be as close as possible to the table top).

Detector unit



- (1) Patient chin support
- (2) Reference cross
- (3) Position of the Iontomat measuring chambers
- (4) Grid slot
- (5) Hand grips (on the backside)



*The hand grips are not included in the collision control.
Therefore, take care that the hand grips do not collide with the table when they are in workposition.*



Caution

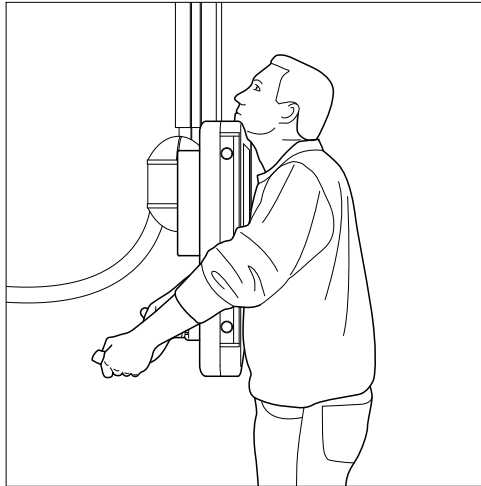
Patient exerts too much weight on the ceiling-mounted detector

Risk of injury to the patient and damage to the detector

- ◆ Do not let the patient hang on the patient hand grip.
- ◆ Do not exert more than 25kg weight on the ceiling-mounted detector.

Handgrips

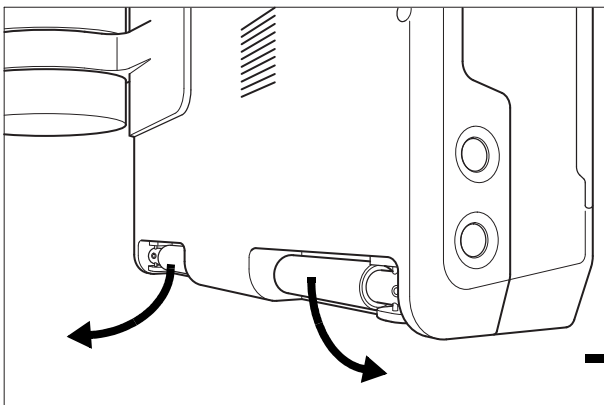
The patient should use the hand grips on the backside of the detector to hold on during chest exposures.



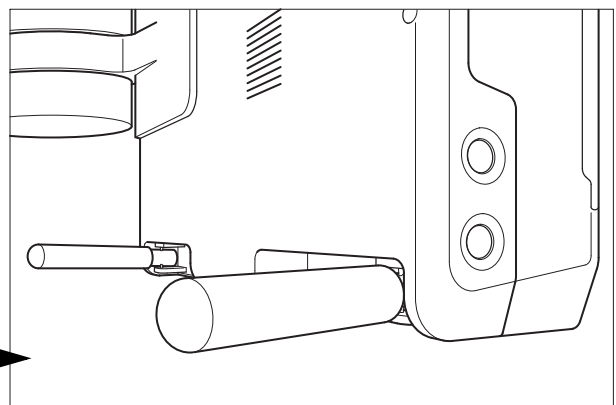
The handgrips retract automatically during automatic detector movement.



Do not retract the handgrips manually.

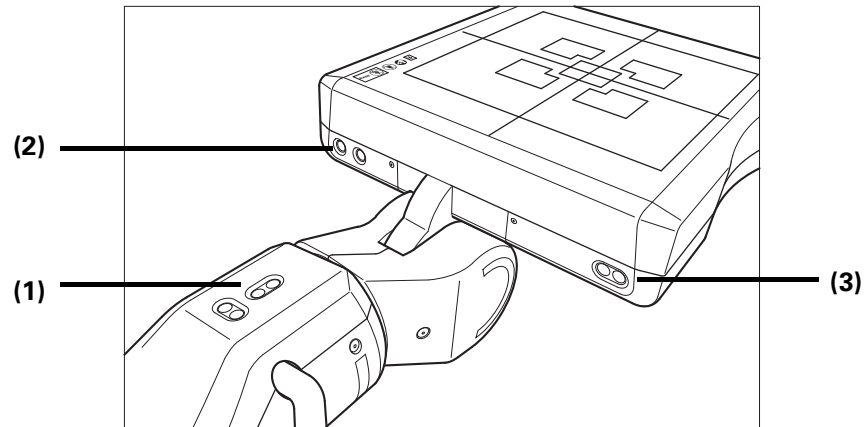


Park position



Work position

Detector stand movement controls



- (1) Buttons for detector rotation and tilting (on the detector stand)
- (2) Buttons for moving the detector manually up and down, and for centering the tube to the detector (on the detector housing)
- (3) Buttons for moving the detector motorized up and down (on the detector housing)

(1) Rotation and tilting of detector



Buttons for rotating the detector about the longitudinal detector axis (RHA)



Button for tilting the detector up about the transverse detector axis (RTA)

Button for tilting the detector down about the transverse detector axis (RTA)

(2) Manual up and down movement and centering



Button for moving the detector manually up and down



Button for centering the tube to the detector

(3) Motorized up and down movement



Buttons for moving the detector motorized up (3a) and down (3b)

(3a)

(3b)

Scattered radiation grid



Caution

Grid is dropped or not handled properly

Risk of invisible damage and impaired image quality

- ◆ Handle the grid with special care.
- ◆ Be especially careful changing the grid when the detector is rotated to the - 90° position.



Caution

Changing the grid.

Crushing between the housings of the detector case.

- ◆ Pay attention to danger zones / danger points of crushing between the housing of the detector case.



Caution

Image made with incorrect grid status

Poor image quality leading to repeated x-ray exposure

- ◆ The expected grid status (inserted, removed) is indicated at the image system.
- ◆ Manually remove or insert the grid as required before making the X-ray exposure.

For different focus distances you must use different grids. If required for pediatric exposures, it is possible to put the grid out of the beam path.

It is indicated at the imaging station whether the grid is inserted or withdrawn.

Part **Acquisition and Postprocessing**, Chapter **Acquisition**, "Grid indication and selection"



The examiner is responsible for use of the scattered radiation grid.

- ◆ You must change/remove or insert the grid in the detector unit *manually* as required.
- ◆ Take care of the correct scattered radiation grid. Non-imaging radiation leads to unnecessary X-ray exposure.

Removing and inserting the grid

- Removing**
- ◆ Press the locking lever at the left side of the grid and, keeping it straight, pull the grid out towards the front.
 - ◆ Remove the grid.
 - The insertion slot is automatically closed by a cover.
- Inserting**
- ◆ Insert the grid into the grid slot.
 - ◆ Holding it horizontally and straight, push the grid all the way in.
 - When the grid has reached the end position, the locking lever engages.



Warning

Inserting the grid

Risk of squeezing between case and guide rails

- ◆ You can avoid squeezing fingers by gripping the grid on the top most frame of the grid.
-

Wireless detectors (MAX wi-D or MAX mini)

General safety information

Do not install the detector close to facilities where water is used.

Do not spill liquid or chemicals onto the detector or, in cases where the patient is injured, allow it to become wet with blood or other body fluids, as doing so may result in fire or electric shock.

- ◆ In such situation, protect the detector with a single use plastic bag.



- ◆ Do not spray the detector directly for cleaning and disinfection purposes.

**Interference with other devices**

The portable wireless detectors may be interfered with by other equipment, including portable and fixed RF communication equipment, even if such equipment meets the applicable emissions requirements.

Image transfer may be interrupted sporadically.

- ☐ The operator must ensure that other wireless devices in the 2.4 GHz or 5 GHz ISM band should not be operated in the vicinity of the Multitom Rax Radiography/Radioscopy X-ray system.
- ☐ Please observe and verify normal operation of the portable wireless detectors prior to using it.

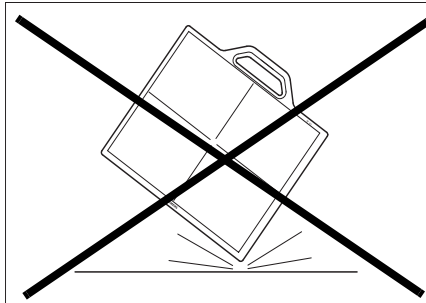
Backup cable**Warning**

Magnetic connector on backup cable of portable detector causes malfunction of implantable device

Injury of patient

- ◆ Do not use the backup cable in patient operation as the magnet could impair the action of an implantable device such as a pacemaker, neurostimulator or implantable defibrillator.

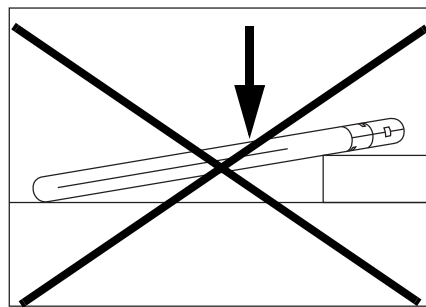
Notes on handling the detector



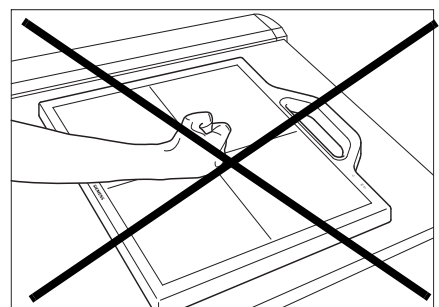
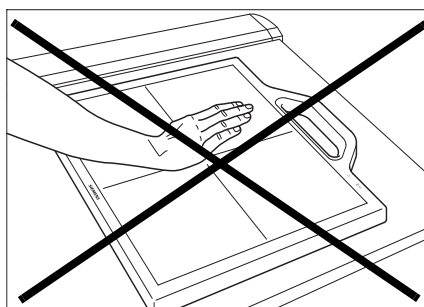
Handle the detector carefully, as it may be damaged if something is hit against it, if it is dropped from high altitude, or if it receives a strong jolt.

A drop from a height up to 70 cm will not damage the detector.

The detector is monitored by integrated sensors, so that data can be read out by a technician.



Be sure to use the detector unit on a flat place so it will not bend. Otherwise, the detector may be damaged.



Do *not* hit the detector surface in any way.



Caution

Improper or careless detector handling

Damage to the detector or detector surface

- ◆ Do not drop the detector.
- ◆ Only use the detector on a level surface to avoid sagging.
- ◆ Exercise absolute care in avoiding pressure or sudden impact on the detector surface.



Caution

Detector cover broken

Toxic contamination

- ◆ Handle portable detector with care!
- ◆ If the detector is broken do *not* use it.
- ◆ Inspect if any particles are spilled.
- ◆ Leaked particles could be toxic - do *not* touch them!
- ◆ Use protective gloves to collect and keep them in a sealed container.
- ◆ Return spilled particles to Siemens.



Caution

Detector cover breaks because patient is too heavy

Possible injury of patient or personnel by carbon or glass splinters or electrical shock.

- ◆ Use the FD protector for patients heavier than 100 kg (maximum 250 kg).
- ◆ Handle the portable detector with care!
- ◆ When the detector is broken, do not use it.



Caution

Hot surface of detector

Patient injury

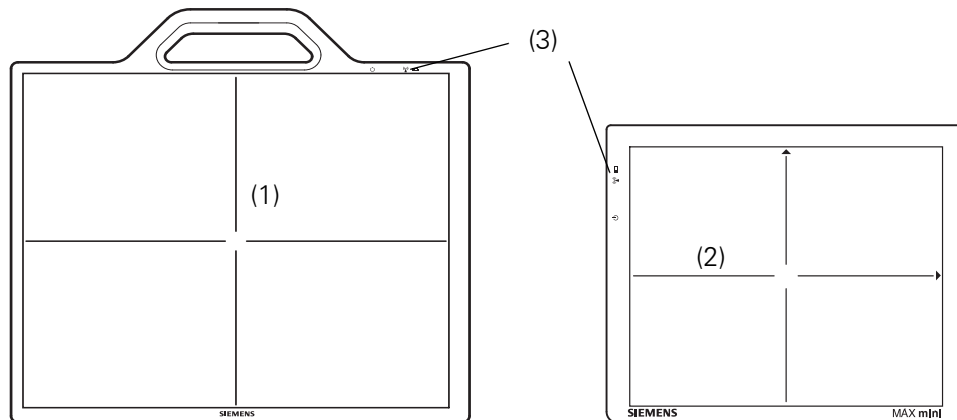
The surface of the portable detector can reach 43°C (109°F), which may be too hot for high risk patients, such as infants.

- ◆ Protect such patients from exposure to the surface of the detector.

System Components

Wireless detectors (MAX wi-D or MAX mini)

Description



(1) Detector MAX wi-D, for free exposure only

(2) Detector MAX mini, for free exposures only

(3) Detector indicators

General Description

The wireless detector is part of a digital image acquisition chain in an overall radiological System. It features a portable equipment designed for mobile applications.

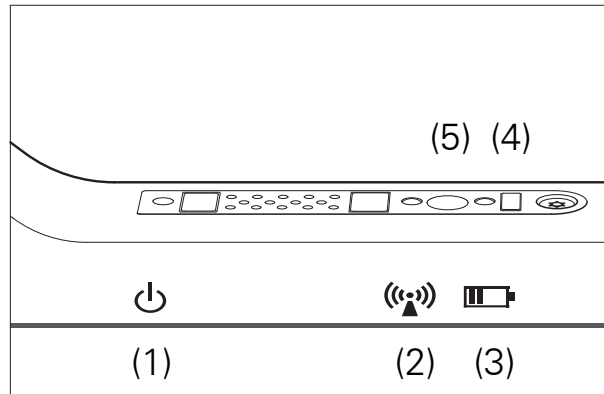
The communication is managed through a WiFi interface.

Detector description

MAX wi-D

The MAX wi-D has a handle within the housing for easy manipulation, LED indicators for internal status, and connector for service issues. The back side (with respect to the active sensitive array) includes electrical contacts to recharge the replaceable battery.

Detector indicators



- (1) Detector status LED
- (2) Wi-Fi status LED
- (3) Battery status LED
- (4) Infrared sensor
needed for attachment of a detector (MAXswap)
- (5) Power button
Short push (wake up)
Long push (switch off/on)



It may be possible that even when the Wi-Fi Status LED and the detector Status LED are green, the release of radiation is blocked by the system.

◆ Please check information at the user interface (MAXtouch).

LEDs are provided on the detector (close to handling), to give basic information on the detector behavior.

LED color / status	Detector status LED (1)	Wi-Fi status LED (2)	Battery status LED (3)
LED off	OFF state	Wi-Fi disabled	No battery
LED green / blinking slow	Operating state and online / Listen state	Wi-Fi available (de- tector connected to an Access Point)	Battery OK
LED orange	Offline or download state	Wi-Fi not ready (de- tector not connected to an Access Point)	Battery getting low
LED orange - blinking slow	Error state or switching ON	n.a.	n.a.
LED orange - blinking fast	n.a.	n.a.	Battery low

System Components

Wireless detectors (MAX wi-D or MAX mini)

LED color / status	Detector status LED (1)	Wi-Fi status LED (2)	Battery status LED (3)
LED orange - <i>blinking fast, then red flashlight on the 3 LEDs, then OFF</i>	Switching OFF (going to OFF state) when requested by message or by time-out	n.a.	n.a.

Charging the battery of the detector

- ◆ The battery of the detector can be charged in the battery charger.



If the battery of the detector is completely empty, charge it and wait at least 60 minutes. The detector needs a warm-up time between 60 and 120 minutes to achieve good image quality, depending on environmental temperature and switch-off time.



Caution

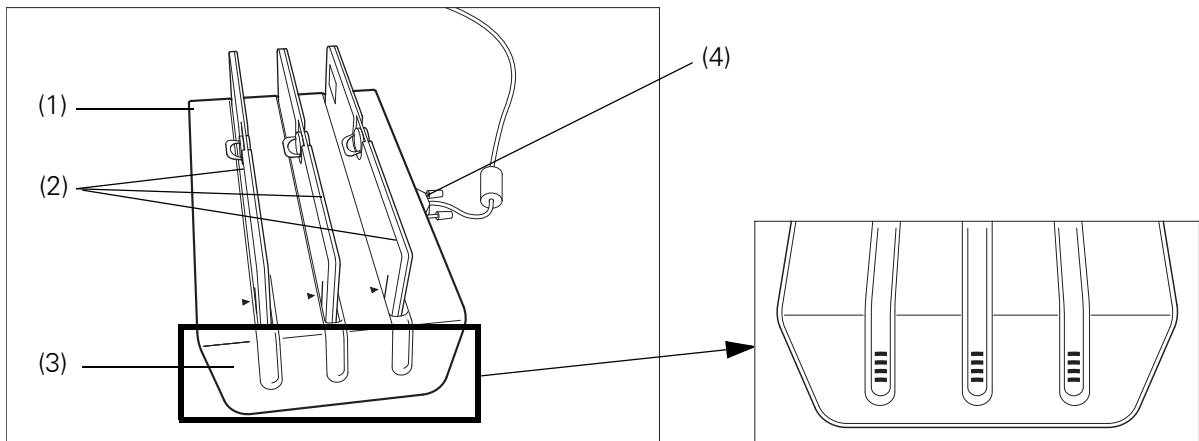
Incorrect handling of detector battery

Explosion or fire

- ◆ Handle the battery pack carefully.
- ◆ Do not drop, heat, open or mishandle it.

Battery charger

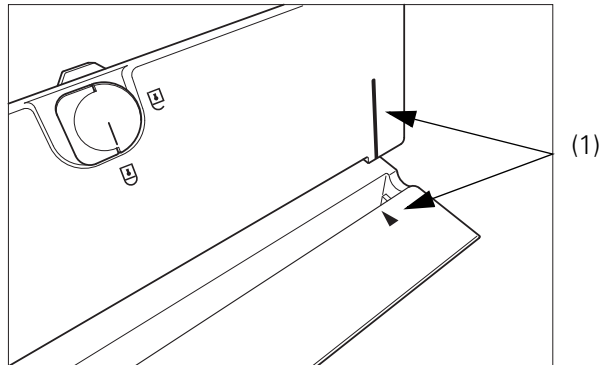
Overview



- (1) Charger
- (2) Batteries
- (3) 4 charging LEDs for each battery
- (4) Power input with green power indicator
 - Green LED is illuminated when power is on.

Inserting battery into charger

The battery charger is designed to insert a battery in only one direction.



- ◆ Insert the battery into the charger as shown above.
- ◆ Pay attention to the alignment identification (1) on the battery and the charging slot (see above).
- ◆ Gently push the battery onto the connector.

Once the battery is in place correctly, the bottom green LED starts blinking.



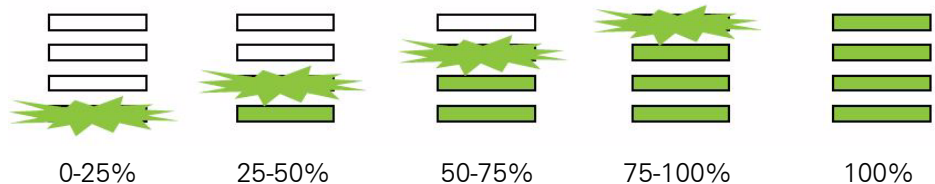
Charging a fully discharged battery will take a maximum of 3.5 hours. Up to three batteries can be charged at a time in the charger.

Status LEDs

For each charging slot, there are 4 LEDs. When there is no battery to be charged, all LEDs should be off.

There is 1 bottom LED (orange or green) and 3 green LEDs.

Charging levels



Fault signal



Trouble shooting

ORANGE Fault LED on

- ❑ The battery is not inserted correctly.
 - ◆ Remove battery and insert it again correctly.
 - If the problem remains, the battery may be damaged.
- ❑ Battery temperature too high:
 - The charger slot will remain in a fault condition until the battery is removed and inserted again with a normal temperature.

No green power LED active

- ◆ Check that the power supply is working.

No charging LEDs active

- ❑ No battery inserted
- ❑ Battery not inserted correctly.
 - ◆ Remove battery and insert it again correctly.
- ◆ If problem remains, check that connectors are not damaged or battery is not faulty.

Battery change

The procedure is as follows:

- ✓ Let the battery run down completely.

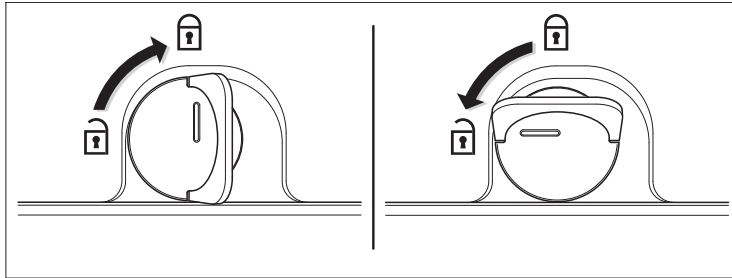


Fig. 1

- ◆ Open the locking system of the battery as shown in Fig. 1.
- ◆ Remove the discharged battery.

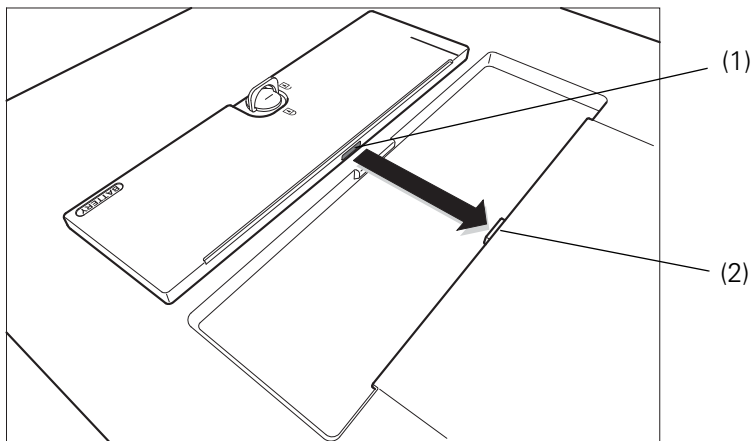


Fig. 2

- ◆ Orientate the charged battery in the correct position: battery connector (1) facing the device connector (2).

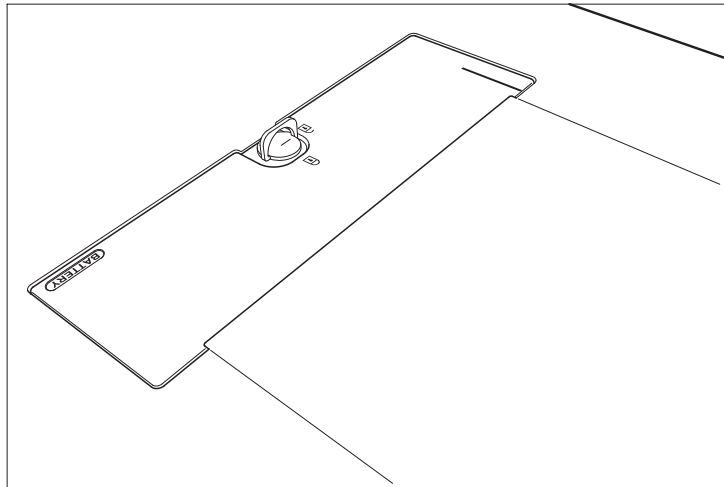


Fig. 3

- ◆ Slide battery in the recess area of the device.
- ◆ Push down the battery in the recess area.

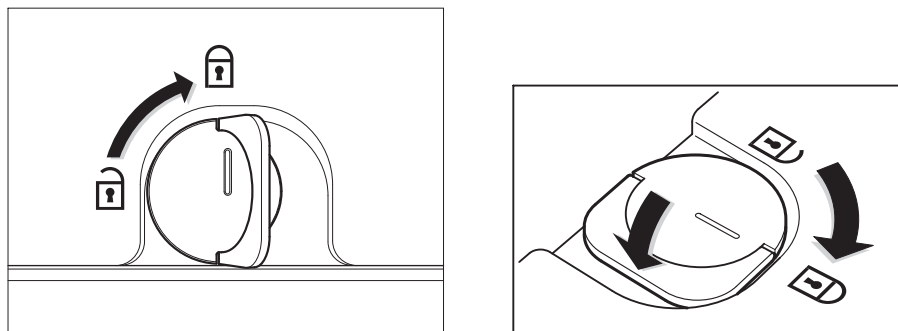


Fig. 5

- ◆ Close the locking system of the battery and push down the latch to ensure no protrusion of the locking system.

When the battery is inserted correctly, the detector starts automatically.

- ◆ Before using the detector, wait until all LEDs are green.

Attaching the clip-on grids

Refer to Register 7: *Accessories and Auxiliary Devices*, "Clip-on grids" → p. 53.

Operation



Warning

The portable detector generates an electromagnetic field so high that it disturbs life-supporting device.

Interference with life supporting device resulting in possible malfunction

- ◆ Keep a safety separation distance of more than 90 cm between the portable detector and the life-supporting device.

In case of interference with other equipment increase the distance between the interfering devices.



Caution

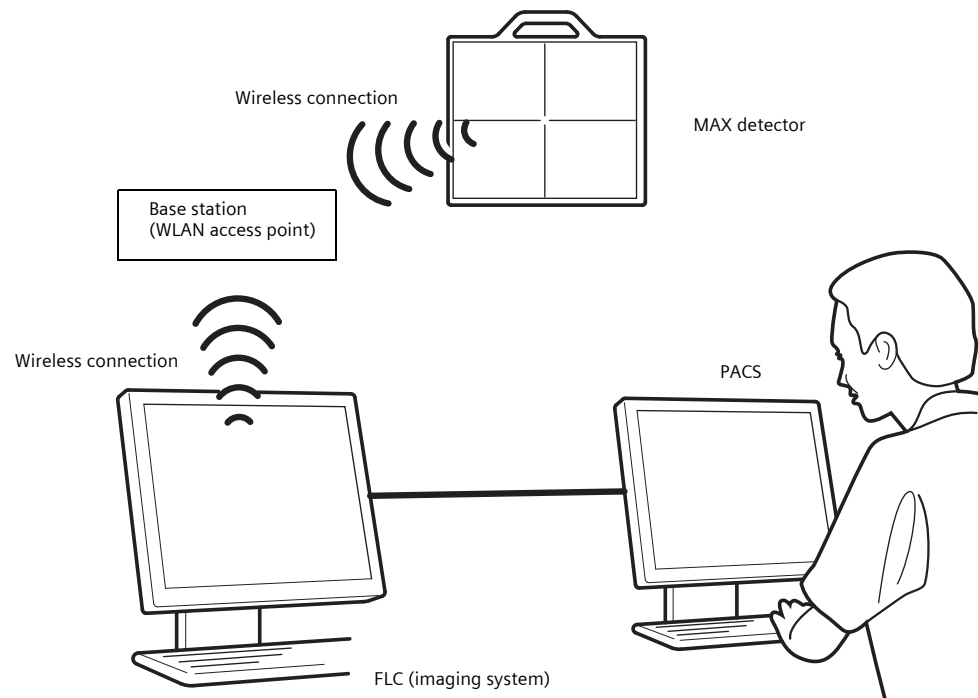
Image cannot be made because the battery in the portable detector is low

Portable detector not available for use

- ◆ Connect the portable detector to a loading port when it is not in use.
 - ◆ Consider purchasing the battery loading station and additional batteries if portable detector availability is important.
-

Operation and setting of WLAN

Introduction



The wireless connection of the mobile detector is established between the X-ray detector and the system.

Therefore, the phase of wireless connection and transfer does not utilize the existing wireless network that may be installed in the clinic. However, some precautions should be taken that both can coexist without interferences.

Properties of wireless connection

The system uses its own WLAN access point which is connected to the system and the X-ray detector as its sole client.

The communication is based on the WLAN standard 802.11. Within this standard, in most countries, there is the choice between the standards 11b, g, n (operating at 2,5 GHz) and the standards 11a, n (operation between 5 and 6 GHz).

Within these standards (11a, b, g, n), several channels (frequencies) are available. A specific channel (frequency) can be selected by the site for use.

However, the available channels depend on legal regulations and requirements of the country with the installed system (wireless detector). The wireless connection is encrypted. For this the widely used and very secure WPA2 is applied.

The standard (11a, g, n) and the channel can be set by a Siemens service technician via the service SW installed on the FLC (imaging system). For a list of available channels in your country please contact your Siemens project manager or sales representative.

System Components

Wireless detectors (MAX wi-D or MAX mini)

The front end utilizes a power dependent on the standard and channel of the typical order of 32-79mW (always below 100mW). As the emission is not purely isotropic, more power is emitted in some directions and less in other directions. The maximum power emitted in a direction (max. EIRP) is 150 mW. This is defined based on the assumption that power would be emitted in all directions.

Coexistence with other wireless connection

Wireless devices (e.g. your wireless hospital network and the mobile detector of the system) can influence each other if they are operated at the same frequency.

For the mobile detector, this can lead to a slowdown or disruption of the wireless connection.

To avoid such a situation, it is necessary to enquire about wireless devices that are used in or within the vicinity of the installed system. The contact person for enquiries regarding wireless network and devices inside your hospital regarding is probably your network or IT expert.

In case a WLAN-network is present in your work environment, the channels of the access points can be detected in the room where the system will be installed. The frequencies in use (channels if you have WLAN) should be communicated to the Siemens project manager.

Alternatively, select the channel to be utilized by the mobile detector and inform the service technician/project manager of the channel (frequency) accordingly.



It is important to ensure that this channel (frequency) will not be used at a later stage by other wireless devices.

Status and system messages

In the following situations, the battery will probably be empty or the voltage will be too low:

- ❑ The wireless detector has been accidentally left outside one of the charging locations for too long, for example over night.
- ❑ The wireless detector is outside the room.
- ◆ Proceed as indicated in the system messages to solve the problem.

Maintenance

No other maintenance action is required except the calibration needed for image quality, whose frequency is defined by the system program.

There are no parts that need to be replaced due to limited lifetime, except for the battery. In case of malfunction, the detector will be returned to the manufacturer for repair.

Recommendations

Temperature



Caution

If the system has been completely without power by mistake or due to a power failure, the detector will not be at its operating point.

Poor detail resolution with all types of radiation!

- ◆ Note that image quality is unreliable under such circumstances.
 - It is the physician's responsibility to decide whether to continue work on the basis of such image quality.



Caution

Detector temperature out of range.

X-ray without diagnostic value

- ◆ Check the detector temperature icon on the display regularly.



If one of the following messages appears:

"Detector temperature below valid range" or

"Detector temperature above valid range"

*please check if the warm-up time from a cold start (120 minutes) is respected.
If yes, we recommend a recalibration.*

EMC compliance

Portable and mobile RF communication equipment can affect the detector operation.

Warm-up time from a cold start

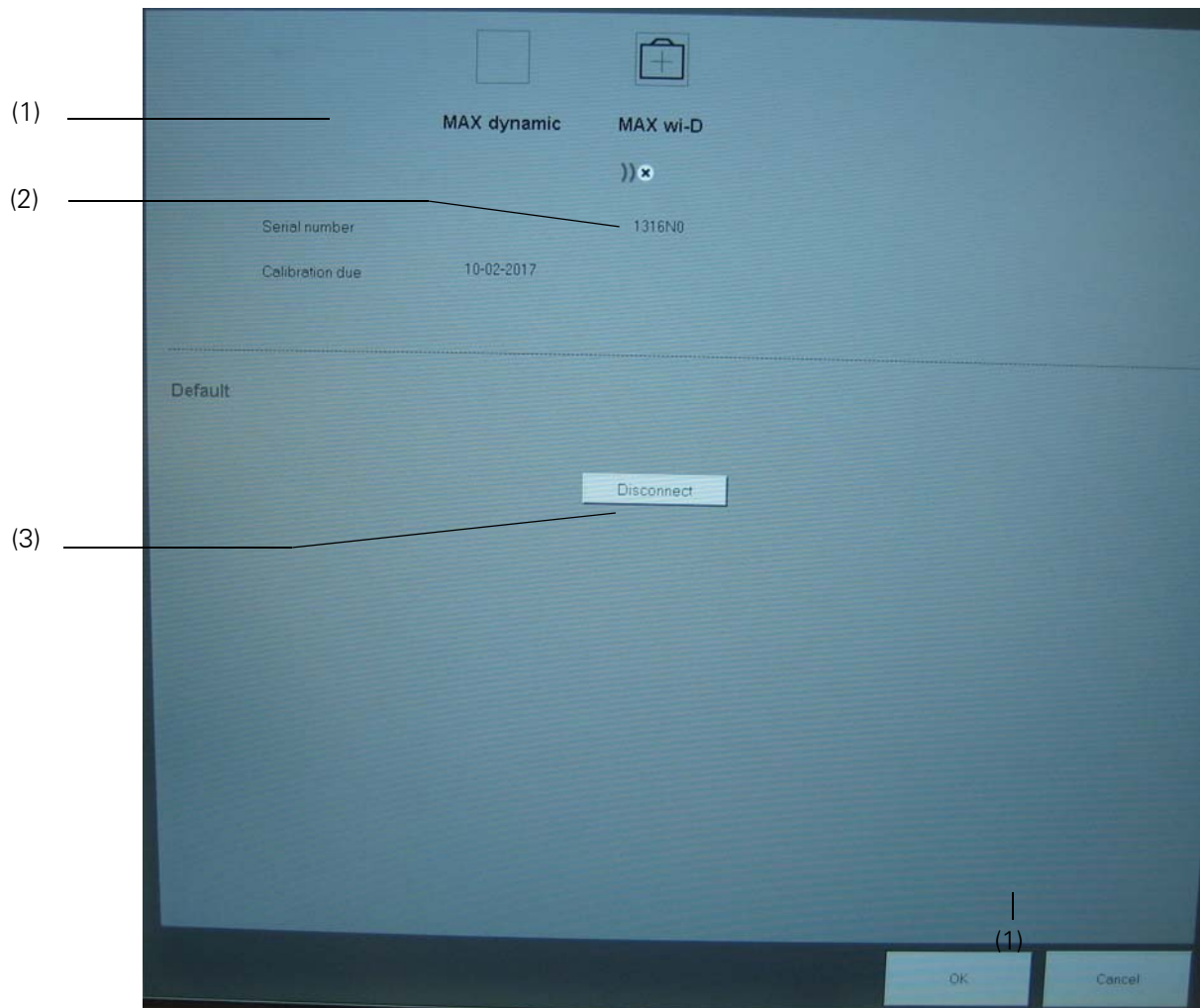
After a cold start (battery completely empty), it is possible to operate the detector, but with reduced image quality. Therefore, avoid the battery getting empty.

The detector reaches good image quality again after a maximum of 120 minutes (typically 60 minutes).

MAX detection

The MAX detector overview window at the imaging system shows the detector configuration of the system.

The MAX detector overview is opened by clicking on the blue detector symbol in the status bar of the Patient tab card.



- (1) All available or connected detectors are shown; the wireless detectors are shown with Wi-Fi and battery status
- (2) The serial numbers of the detectors help to identify the right detector.
- (3) The wireless MAX detectors can be detached from the system for usage with another system.

System Components

Wireless detectors (MAX wi-D or MAX mini)



Caution

Wrong detector size connected or wrong detector used

Radiation not usable

- ◆ Check that detector identification on the detector label matches the detector identification shown on the user interface.
 - ◆ Check that the green ready light on the correct detector is lighted before releasing radiation.
-

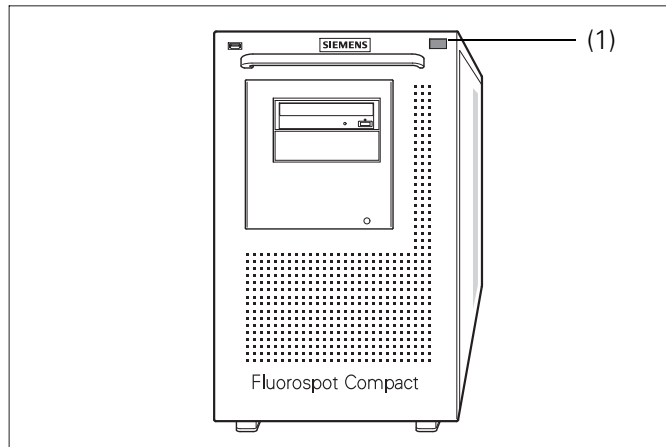
MAXswap

With the functionality "MAXswap", it is possible to share several wireless MAX detectors between different systems (Ysio Max, Luminos dRF Max, Luminos Agile Max, Mobilett Mira Max, Multitom Rax).

You can detach a wireless MAX detector at the system where it is not needed and attach it to another system.

Attaching the detector

- ✓ The detector has been registered before to this system by the Siemens Service.
- ✓ The FLC is in **Max Detector Overview**.

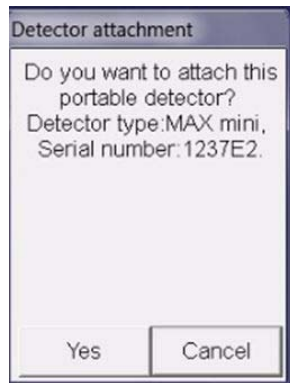


- ◆ Hold the detector (in this example MAX mini) with the side of the LEDs to the infrared sensor (1) of the imaging system.
 - All LEDs at the detector start blinking orange and then green.
 - When the LEDs stop blinking, the detector can be taken away

System Components

Wireless detectors (MAX wi-D or MAX mini)

- The following message appears at the imaging system:



- ◆ Click on **Yes** to attach the detector.
- ◆ Wait a short time.
 - A message appears stating that the detector is attached successfully.
 - If the detector attachment was not successful, the detector has to be registered once to the system by the Siemens Service.

Detaching the detector

- ◆ Click on **Disconnect** at the detector overview window.
 - A message appears asking if you want to detach the detector.
- ◆ Click on **Yes** to start the detachment procedure.
 - A message appears stating that the detachment was successful.
 - The detached detector is removed from the detector overview window.

Register 5 System Operation

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Chapter: Emergency Operation

System operating status

The Multitom Rax system may be in one of the following operating status:

- | | |
|---------------------------|--|
| Off | ☐ All the components of the system and the imaging station are turned off except for the detectors which remain in standby mode. |
| On | ☐ All the components of the system are turned on and may be supplied from the power line. When the start-up phase is completed, examinations and post-processings may be performed. |
| Emergency SHUTDOWN | ☐ All the units <i>and</i> the display station are disconnected from the mains using the main breaker. |

System switch-on

- ◆ Perform a visual inspection on the system.
- ◆ Make sure that there is nothing to hinder stand movements.



If the following message appears directly after the system is switched on:

“Wireless Remote Control not reachable”

it may be that during the switching on of the system, a button on the Wireless Remote Control has been actuated permanently by accident (for example something lying on it or button jammed).

Switching on a switched-off system

No indicators on the generator **ON/OFF** console are lit.



- ◆ Press the **ON** button.
 - The **ON** indicator switches on.
 - All components are supplied with power; the start process begins.
 - The system performs a self-test.



If the battery of the detector is completely empty, charge it and wait at least 60 minutes. The detector needs a warm-up time between 60 and 120 minutes to achieve good image quality, depending on environmental temperature and switch-off time.

During warm-up time acquisitions are possible but reduced image quality may occur.

(This is the case if the system has been turned off completely via the mains switch and has not been in standby mode. If it has been turned off at the On/Off control console, no warm-up time is necessary.)

Start of the FLUOROSPOT Compact imaging system

The Fluorospot Compact imaging system starts when the whole system is switched on.

Switching on after power failure or after an emergency SHUTDOWN switch is activated

When the on-site emergency SHUTDOWN switch is activated, the whole system is cut-off from the power supply.

Unstored images of the patient currently being examined may be lost. Images and data of terminated examinations of previous patients are stored to the hard disk of the image processor.

- ◆ After a power failure or an emergency SHUTDOWN switch is activated, check the images of the last examined patient!
- ◆ After removing the reason for activating the emergency SHUTDOWN switch, deactivate the emergency SHUTDOWN switch and then switch on the system.
- ◆ If the imaging system does not start any more or if a serious error is indicated, call Siemens Customer Service.

System switch-off

If no more acquisitions are required, you can switch the system off completely.



Do not press the keys Ctrl+Alt+Del.

Pressing this key combination is on your own risk.

If you do so, problems may occur.

- The complete system and the imaging system automatically shut down.
- If the ON button is pressed again within 10 seconds, only the system shuts down, not the FLUOROSPOT Compact.

- ◆ Switch off the main switch of the x-ray unit (or room), if necessary.

Emergency SHUTDOWN switch activation

- ◆ *Only* (exclusively) if patients, operators, third parties, or the unit are in danger, press (activate) the on-site emergency SHUTDOWN switch.

Rebooting the system

We recommend a daily reboot of the system or at least one reboot a week.

- ◆ Press the OFF button on the console.
- ◆ When the Fluorospot Compact imaging system has shut down (dark monitor), press the ON button again.



Functional and Safety Check

Daily tests

After system switch-on

- ◆ Perform a visual inspection of all displays and signal lamps on the operating units.
 - No errors must be indicated.
 - If radiation is released, all radiation ON indicators which may be present must light up.

Collimator check



At least one edge of the collimator leaves has to be visible in the fluoro image.

Use exclusively foot switches from SIEMENS (original parts with approval) for radiation release.

Prior to examination

- ◆ Remove unnecessary objects and equipment from the area of action of the system.
- ◆ Remove unnecessary accessories from the accessory rails of the table and the primary collimator.
- ◆ Attach the devices required for patient positioning and immobilization securely to the system.
- ◆ Attach all safety-related accessory parts correctly (for example, footboard, grip protection strip, hand grip, hand grip strip) and make sure that they are properly secured.
- ◆ Clean any contrast agent residues from the patient table, protective plate, and spotfilm device cover.

- Recommendation:** As a test, take a full-format exposure using the largest possible format.
- ◆ Run a functional test of the STOP buttons by performing an arbitrary system movement and pressing the STOP button during the movement.
 - The movement concerned must stop immediately.
 - ◆ Then unlock the button turning it clockwise.
 - ◆ Lift table top at head end during table downward movement.
 - The downward movement is stopped before the table top positioning bolts are fully extracted from table base.
 - Other movements (including table upward) are still possible..

Checking system movements

3D overhead support

See also Register 4: *System Components*, "Positioning the 3D overhead support with tube unit" → p. 27.

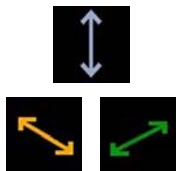


Warning

Abnormal sinking of the overhead column

Injury of persons

- ◆ Perform maintenance at regular intervals (at least every 24 months) to maintain the safety and proper functioning of the product.



- ◆ Check manual longitudinal, transverse and vertical movements of the overhead support.



- ◆ Check 'floating' overhead support movement.



- ◆ Check tube unit rotation.



- ◆ Check the centering.

Patient table

See also Register 4: *System Components*, "Table movements" → p. 9.



- ◆ Check motor driven table height adjustment with the multifunctional foot switch.

Checking the light localizer and centering/collimation

Check the center position of radiation unit with the light localizer and check the collimation.

Light on



- ◆ Press the multileaf collimator's button.
 - The light beam for collimation appears (time limited).

Centering



The accuracy of the stop positions of the tube unit can decrease to ± 3 degrees due to hard wear. Lateral image information may be cut off.

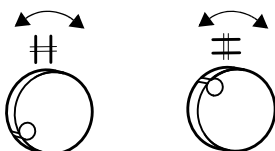
- ◆ Always check the alignment of the tube unit to the detector with the light localizer.

Collimation



Collimation close to the object reduces the scattered radiation and thus improves image quality. The radiation exposure to the patient is also reduced.

- ◆ To protect the patient from unnecessary radiation, always check the collimator position with the light localizer.



- ◆ Open and close diaphragm.
 - The light beam changes its height or width.

Light off



- ◆ Press the button again if light is on.
 - The light beam is turned off.

Checking the automatic collimation (ACSS)

When ACSS lights up at the display of the MAXtouch, the automatic collimation is active.

During examination



- ◆ Check the radiation ON indicator.
 - It should light up only if one of the fluoroscopy switches has been pressed or for the duration of an X-ray exposure.



Caution

X-ray does not stop due to a technical defect or unintentional exposure.

The radiation indicator or a radiation warning lamp lights up without a button/switch being activated.

Risk of unnecessary radiation exposure

- ◆ In case of unwanted radiation, press the nearest emergency STOP button.
- ◆ If no cause can be found, contact Siemens Service and discontinue use of the system.

- ◆ Check the patient positioning devices, for example the grip protection strip and hand grips.
- ◆ Initiate system movements only under the following conditions:
 - There is no danger of injury to the patient or third parties.
 - There are no objects blocking the path of system movements.

Monthly tests

- ◆ Run a functional test of the automatic dose rate control and automatic format collimation as described in "*Functional check of the automatic systems*" → p. 12.

SID The three-digit digital SID display = source-image distance can be checked for agreement with the tape measure in the multileaf collimator.

We recommend you to make this check at regular intervals - approximately monthly.



Incorrect SID values can cause overframing.

- ◆ In this case please call the Siemens Service.

Functional check of the automatic systems

Automatic exposure control - RAD mode¹

- ◆ Select the **RAD Standard** organ program.
- ◆ Close the collimator on the tube assembly to a format of 10 cm x 10 cm.
- ◆ Place a lead rubber apron, folded four times, in the beam path as a cover.
- ◆ Release an exposure and keep the exposure switch pressed down.
 - The automatic exposure control automatically switches off when the limit is reached. A message appears: "Acquisition abort on limit excess".
- ◆ Release the exposure switch.
- ◆ Open the collimator on the tube assembly and remove the lead rubber apron.
- ◆ Press the exposure switch.
 - The automatic exposure control switches off automatically at < 1 mAs.

Checks concerning radiology

- ☐ IQAP check at delivery
- ☐ Maintenance every 24 months
- ☐ Daily image check by customer, for example, for artefacts.

¹ If the values obtained in the following tests deviate from those specified, switch the system off and contact Siemens Service immediately

DAP display test

The phantom for the test of the dose area product display consists of a 20 cm thick rectangular block of polymethylmethacrylate (PMMA) with side lengths greater than or equal to 25 cm.

- ◆ Measure the air kerma at a distance of 60 cm from the focal spot (approx. 55 cm above the tabletop for an SID of 115 cm) and multiply this dose value by the cross-sectional area of the useful beam in this plane.
- ◆ Convert the result into units of [$\mu\text{Gy} \times \text{m}^2$] and compare it with the value displayed.
- ◆ In case of inconsistent DAP values, call service.

Setting the Image Geometry

Additional Cu filter

There are **four** possibilities of selecting internal additional Cu filters:

- ☐ 0.0 mm (**no**) Cu
- ☐ 0.1 mm Cu
- ☐ 0.2 mm Cu
- ☐ 0.3 mm Cu

Selecting additional filters

The selection of additional filters is specified in the organ program. However, you can change this setting at the imaging station or on the generator tab card of the MAXtouch.

- ◆ Touch this button on the generator tabature of the MAXtouch.
 - A popup menu appears where you can select the required filter
 - The additional filter which is selected is displayed at the imaging station.
 - When changing the additional filters with respect to the organ program selected, this is marked with a star * at the imaging station, denoting the change.

Or

- ◆ Select the filter at the imaging station.

For further information, refer to the Operator Manual of the **FLUOROSPOT Compact**.

Switchover of zoom format

Refer to the Operator Manual of the **Fluorospot Compact**, Chapter **Touch-screen User Interface (TUI)**.

Image reversal



Caution

Image is incorrectly flipped due to incorrect patient position information or right/left labeling

Risk of incorrect diagnosis or treatment because of left/right or up/down confusion

The examiner is responsible for using the image orientation functions and interpreting the images correctly.

- ◆ Make sure that the R/L labels have been placed correctly.
 - ◆ Compare the patient position data with the anatomic view when diagnosing images to exclude any errors.
 - ◆ If necessary, use lead letters or similar devices during acquisition.
-

Reasons for a detector calibration

The detector (mobile or integrated) has to be calibrated:

- ☐ after implementation in the system
- ☐ after modification of detector software
- ☐ after loss of image quality
- ☐ every 24 months to maintain the image quality

The detector calibration should be done by the hospital service technician.



Caution

Calibration procedure is started although there is somebody in the exam room.

Unwanted radiation

- ◆ Check if there is somebody in the exam room before starting the calibration.
- ◆ Do not leave the system unattended during calibration.
 - If necessary, the calibration procedure can be easily stopped via the user interface.



Caution

Incorrect calibration parameters.
Reduced image quality

Risk of unnecessary X-ray exposure due to wrong calibration parameters

- ◆ Make sure that the detector is recalibrated every 24 months to maintain image quality.
-

Calibration procedure

Preparation



- ✓ The detector should be thermalized and charged before calibration.
- ◆ Keep the detector in the detector tray for approx. one hour to heat it up to operating temperature.
- ◆ Call the **Service** sub task card in **Patient Mode** at the imaging system.
- ◆ Click on the Service icon.
- ◆ Fill in the password (default: admin2¹)
- ◆ Click on the button **Tune up**.
 - The **Tune up** window appears.
- ◆ Select **FD calibration**.
- ◆ Select which detector you want to calibrate².

Calibrating the mobile MAX wi-D and MAX mini detectors



- ◆ Select **wi-D**.
 - The system checks the detector parameters and, if necessary, orders to change certain settings.

The following prerequisites must be fulfilled prior to starting the calibration:

- ✓ Tube and detector must be centered .
- ✓ The SID must be 150 cm.
- ◆ Click on **Next**.
- ◆ Select the calibration mode.(s)
- ◆ Click on **Go**.
 - The following message appears:

<"Is the 0.6 mm Cu filter inserted?" Click Cancel to abort the calibration>

- ◆ Insert the required filter.
- ◆ Confirm with **OK**.
 - The following message appears:

<Caution: X-ray will be automatically released during calibration! You can stop the calibration at any time by clicking "Abort">

- ◆ Confirm this message with **OK**.

¹ Can be changed by customer/technician

² Only if more than one detector is available

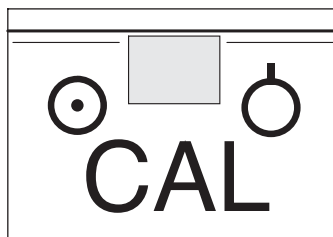
- ◆ Click **Next**.
 - The following message appears:

<“Are the following switch(es) turned on? Calibration switch on console”>

- ◆ Turn on the switch.



The calibration switch can be found at the back side of the Fluoro control console or the control room module.



- ◆ Click **OK**.
 - The calibration is started. It may take up to approximately 15 minutes.



The progress and the current status are displayed next to the selected calibration mode.

Do not switch the calibration switch when the calibration is in progress!

- ◆ Follow the instructions on the screen.



It is very important to turn off the calibration switch for normal operation, otherwise, no radiation is possible!



If the calibration has not succeeded, the previous calibration remains valid.

Calibrating the MAX dynamic in the detector stand

◆ Select **FD in detector stand**.

- The system checks the detector parameters and, if necessary, orders to change certain settings (for example, SID).

The following prerequisites must be fulfilled prior to starting the calibration:

- ✓ Tube and detector must be centered .
 - When it is centered, this symbol lights up green at the MAXtouch.
- ✓ The SID must be 130 cm.

The following message may appear:

<“SID room restriction is ignored.”>

- ◆ Confirm this message with **OK**.
- ◆ Click on **GO**.
- ◆ Select the calibration mode.
- ◆ Click on **GO**.
 - The following message appears:

<“Caution: X-ray will be automatically released during calibration!”>

- ◆ Confirm this message with **OK**.
 - The following message may appear:

<“Please remove all filters!”>

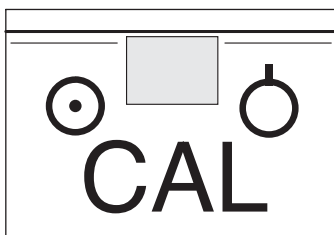
- ◆ Confirm with **OK**.
- ◆ Click **Next**.
 - The following message appears:

“Are the following switch(es) turned on? Calibration switch on console”

- ◆ Turn on the switch.



The calibration switch can be found at the back side of the Fluoro control console or the control room module.



- ◆ Click **OK**.
 - Now, calibration starts. It may take up to approx. 45 minutes.



The progress display always shows 0% until the last series is finished.

The current status is displayed in the bottom left corner of the monitor.

Do not switch the calibration switch when the calibration is in progress.

- ◆ Follow the instructions on the screen.



It is very important to turn off the calibration switch for normal operation, otherwise, no radiation is possible!



If the calibration has not succeeded, the previous calibration remains valid.

Emergency Operation

For emergency operation (e.g., if the detector not working) you can also use normal cassettes (CR systems only).



Caution

Portable detector cannot be connected to system due to hardware or software problems

Portable detector not available for use

- ◆ Maintain procedures and equipment so that cassettes can be used in place of the portable detector if necessary.

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Preparing the system

*Examinations on or at the table**General information*

- ◆ Be sure to have attached the hand grip.
- ◆ Use only positioning aids expressly approved by Siemens. Contact your local Siemens representative if you have any questions.

Refer to Register 7: *Accessories and Auxiliary Devices* for all accessories available for positioning. Attaching the accessories is also described there.

- ◆ Ensure that these devices and positioning aids are secured correctly and are functioning properly.
- ◆ Make sure that the body parts of the patient, especially arms and legs, do *not* extend over the edge of the tabletop.
- ◆ Make sure that the patient uses the provided grip locations.
- ◆ Let the patient get on or off the table only in the central area.

**Caution**

Incorrect positioning of the patient.

Risk of injury

- ◆ Ensure correct positioning of the patient. This applies in particular when using the different accessory parts.
-

Damaged grid**Caution**

Damage to the tabletop (e.g. accidental collision with the patient's bed)!

A damaged tabletop is a potential hazard to the patient!

- ◆ Call Siemens Service and have the tabletop checked immediately if it is possible that it might have been damaged.
-

**Caution**

Damage to the tabletop!

A damaged tabletop is a potential hazard to the patient!

- ◆ Take care that the patient does *not* sit on the head end of the tabletop.
-



Caution

Grid is dropped or not handled properly

Risk of invisible damage and impaired quality

- ◆ Handle the grid with special care.
- ◆ Be especially careful changing the grid when the detector is rotated to the - 90° position.

Hand grips



Warning

Hand grips loosen or are not used

Injuries to patient from falling

- ◆ Check that the patient hand grips on the table are in the right position.
 - ◆ Ensure that underlips are tightened prior to use.
 - ◆ Make sure that the patient uses the hand grips during system movements or when turning over.
 - ◆ Use other positioning aids for immobilizing weak or very unstable patients.
-

Preparing the table

Hygiene

- ◆ Check the unit for cleanliness.

If necessary

- ◆ Cover the tabletop with fresh paper.

Preparing the patient

Table position

Lower the patient table to a position which is easy for the patient to get on.



- ◆ Adjust the table height.

See Register 4: *System Components*, "Table movements" → p. 9

Radiation protection

- ◆ Apply the necessary radiation protection to the patient.

Important notes

3D overhead support rotation RVA

If the tube unit has been rotated about the vertical axis (RVA), the image cut-out may not be performed correctly.

- ◆ If necessary, correct the image collimation on the **Pre-Processing** task card.

Grid

If necessary, remove or insert/change the grid in the detector unit.

"Scattered radiation grid" → **Reg. 4** p. 39

Collimation and grid

In **ACSS** mode, collimation is automatically restricted to its maximum possible size. This is not the case in **Manual** mode.

- ◆ Please make sure, not to open the collimator beyond the grid range in "manual" mode (for example, with oblique projections).

Grid and SID

The grid focus (f_0) and the source image distance SID must always be identical.

- ◆ Check the correct grid focus (f_0) on the grid label before making acquisitions.

Manual SID

In cases when the system cannot determine the SID (for example, with oblique projections), the SID must be measured manually using the **Measure SID** function on the **Tape Measure** tab card at the MAXtouch.

- ◆ If necessary, correct the image collimation on the **Pre-Processing** task card.

Examinations in wall mode

Information about positioning without patient table

The wall mode corresponds to acquisitions usually made on a Bucky wall stand. Using the Multitom Rax, no extra detector for the wall stand positions is required. It is sufficient to select an organ program in wall mode.



Auto tracking in wall mode is slightly different due to the rotated X-ray.

See Register 4: *System Components*, "Tube tracking in wall mode" → p. 30

Important notes

3D overhead support rotation RVA

If the tube unit has been rotated about the vertical axis (RVA), the image cut-out may not be performed correctly.

- ◆ If necessary, correct the image collimation on the **Pre-Processing** task card.

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In cases when the system cannot determine the SID (for example, with oblique projections), the SID must be measured manually using the **Measure SID** function on the **Tape Measure** tab card at the MAXtouch.

- ◆ If necessary, correct the image collimation on the **Pre-Processing** task card.

Radiation Protection

- ◆ Lay the required radiation protection on the patient.

IONTOMAT automatic exposure control

The detector unit is equipped with a IONTOMAT measuring chamber for automatic exposure measurement.

All exposures which are taken **on the detector** in the detector unit can be exposed with the IONTOMAT automatic exposure control. The released exposure is then switched off automatically by the IONTOMAT automatic exposure control (**1-point technique**).

When selecting a IONTOMAT dominant, take care that the patient is positioned anatomically correct in relation to the IONTOMAT dominant to avoid faulty exposures.

- ◆ Select the IONTOMAT dominant corresponding to the object to be exposed.
- ❑ The part of the object which is most important for the image must lie **exactly** over the dominant.
- ❑ When collimated narrowly in width, the system switches automatically to the center measuring chamber.
- ❑ When collimated narrowly in height, no automatic switch-over of the measuring chamber is done. In this case, a smaller amount of imaging radiation will target the lateral measuring chambers.
- ◆ If necessary, switch to the center measuring chamber.
- ❑ No direct radiation may occur close to the measuring field, because the premature shut-off caused by this would lead to underexposure.
- ◆ Pay attention to good collimation.



*Take care that the **correct** dominant is selected before the exposure.*

*For selection of the measuring chamber refer to the **FLUOROSPOT Compact** operator manual.*

Light localizer and collimation



Ensure that the procedures described in this chapter are performed only by qualified operating personnel.



Collimation close to the object reduces the scattered radiation and thus improves image quality.

The radiation exposure to the patient is also reduced.

To protect the patient from unnecessary radiation, always check the collimation position with the light localizer.

Automatic switching on and off of the light localizer

Automatic switching on

The light localizer / line light localizer is switched on automatically if

- ☐ the collimation size (in the image receptor plane) is changed in width or in height,
- ☐ the overhead support is moved in longitudinal and transverse direction or in height,
- ☐ the detector unit is moved.

The Siemens Customer Service can configure when which function is activated individually or together.



Caution

Looking into the laser light

Eye injury

- ◆ Take care that neither you nor anybody else looks directly into the laser beam.
- ◆ Close the sliding cover over the laser light to protect the eyes of the patient and other people.
- ◆ Note that the collimator can heat up when the light localizer is used for a longer period of time.



*To protect the eyes of the patient or any other person, the LASER radiation exit of the LASER line light localizer can be closed with the **sliding cover**.*

See Register 4: System Components, "Multileaf collimator" → p. 63

Automatic switching off

The light localizer is switched off, independently of how it was switched on, after a configurable time. This time is maximum 100 s.

Switching on/off manually

You can switch the light localizer on or off at any time independent of automatic switching on and off:



- ◆ Press the button.

Restoring the last collimation



This button on the MaxTouch serves for memory recall of the last used format. If you touch this button, then the collimation set for the last exposure is restored.



Please note that the memory recall can take place only if the preceding exposure was actually released.

Collimation / Automatic Collimation Size Selection

Multitom Rax supports **ACSS** (**A**utomatic **C**ollimation **S**ize **S**election).

ACSS limits the maximum opening of the collimator to the borders of the detector in the detector unit. ACSS is indicated by the letters **ACSS** in the collimator display. In case ACSS is not possible, **Manual** will be displayed. In this case you have to take care that the X-ray field will not go beyond the border of the FD detector.

The collimation format can be set in the OGP. If the selected OGP requires a new position of the tube and/or the detector, the collimation is set when the detector and the tube have reached the final position stored in the OGP.

- ◆ Press the OGP position button until the message "Final position reached" is displayed.
 - A sound will be played on the TUI, and the collimation is set to the one stored in the OGP.
- ◆ Manually move the detector and the tube to its final positions.

Even when the SID is changed, the collimator position in the multileaf collimator is adapted with active ACSS so that the collimation of the organ remains the same.

Prerequisites

Conditions for ACSS:

- ☐ All system components (collimator, generator, tube stand, imaging system, detector) are ready for use.
- ☐ The central beam is perpendicular to the solid state detector/cassette with a tolerance of not more than +/- 3 degrees.
- ☐ The collimator is not rotated.
 - The respective icon in the collimator status bar is *not* visible.



ACSS is not supported for free mobile detectors or free cassette operation.

- ☐ The SID is between 90 cm and 300 cm.

Centered exposure in table mode



Workstation "table" (**table mode**)

Centering the tube unit

Using the handles bring the X-ray tube unit into mid-position corresponding to the stop and into vertical beam path (RHA=0° and RVA=0°):



- ◆ Release the brakes with the push buttons on the control panel or with the buttons on the handles and position the tube unit.
- ◆ Bring the tube unit into the centered mid-position.
- ◆ Press the centering button to center the tube to the detector.

SID

Adjust SID by tube unit or vertical table movement:



- ◆ Press button on the tube unit control panel.
- or
- ◆ Actuate the table height adjustment.
 - ◆ If required, switch on the tracking control for SID with the SID tracking button.

Light localizer

Switch the light localizer on the multileaf collimator on if required:



- ◆ Press the button, if necessary.

Collimation

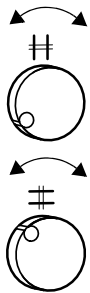
Automatic

ACSS

- ❑ Automatic Collimation Size Selection (ACSS) controls the collimation by the multileaf collimator for *constant* collimation onto the format determined in the organ program with variable SID within the SID range.

Manually

Manual



- ❑ You can collimate further close to the object additionally if required with the control knobs for format collimation on the multileaf collimator:

◆ Rotate the diaphragm knob to adjust the format height.

◆ Rotate the diaphragm knob to adjust the format width.

Acquisition

Refer to the **FLUOROSPOT Compact** Operator Manual for further information.

◆ Rotate the diaphragm knob to adjust the format width.

Free exposure onto the mobile detector



Caution

Tube is not directed toward the detector during acquisition

Unwanted radiation exposure

- ◆ Use the free exposure mode with care.
- ◆ Check that the tube is active and use the light marker for positioning before releasing x-ray.



Workstation "Detector"



For free exposures **onto detector**, Automatic Collimation Size Selection (ACSS) and automatic exposure control are **not available**.

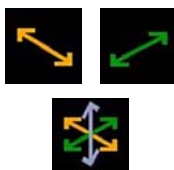
You must therefore collimate manually and expose in 2-point or 3-point technique. If necessary, the clip-on grid must be attached to the detector.

Manual



- ◆ At the MAXtouch or on the imaging system select an organ program for a free exposure onto mobile detector or for an exposure onto the bed.
- ◆ If a MAX wi-D as well as a MAX mini are available for free exposure, select at the MAXtouch or at the FLUOROSPOT Compact which of both wireless MAX detectors you want to use.
- ◆ Check which detector is selected either on the MAXtouch or at the FLUOROSPOT Compact.
- ◆ Make sure that the serial no. of the wireless MAX detector to be used is identical to the one displayed on the MAXtouch or the FLUOROSPOT Compact.
- ◆ In case that 2 MAX wi-D detectors are available, put the detector which shall not be used in a detector tray, so it is recognized as not available for free exposure or detach it from the system.
 - Otherwise, radiation is blocked.

Positioning the tube unit



Using the handles, bring the X-ray tube unit into position:

- ◆ Release the brakes with the push buttons on the control panel or with the buttons on the handles and position the tube unit.

"Positioning for vertical projection" → p. 19

"Positioning for oblique projection" → p. 20

SID Set the SID by tube unit or table vertical movement:



- ◆ Press the button on the tube unit control panel.

or

- ◆ Actuate the table height adjustment.
- ◆ **Measure** the SID with the tape measure: Distance up to the detector.

Light localizer

Switch on the light localizer at the multileaf collimator if necessary:

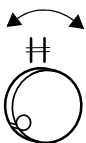


- ◆ Press the button, if necessary.

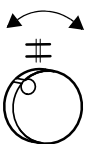
Collimation

Only manual collimation is possible in free exposure.

Set the format with the control knobs on the multileaf collimator according to illumination with the light localizer and collimate *close to the object*.



- ◆ Rotate the diaphragm knob to adjust the format height.



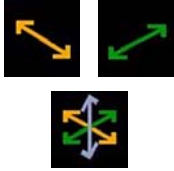
- ◆ Rotate the diaphragm knob to adjust the format width.
 - The format which results in the exposure plane corresponding to the predetermined SID appears in the indication for the radiation field size in the display of the multileaf collimator.
- ◆ *Check* illumination of the format and collimate as close as possible to the object.

Acquisition

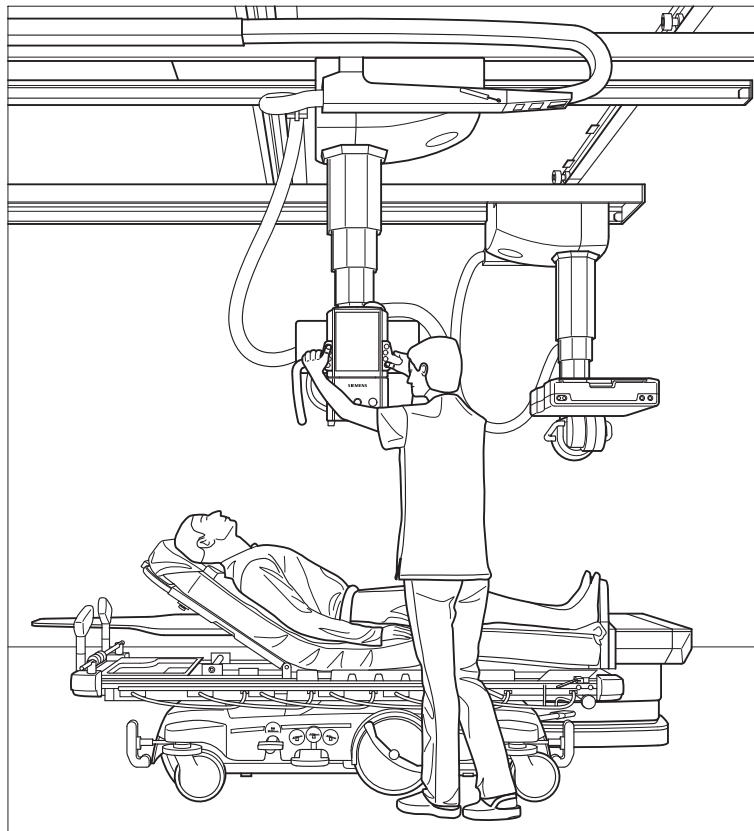
Refer to the **FLUOROSPOT Compact** Operator Manual for further information.

Positioning for vertical projection

If necessary set the tube unit *vertical*:



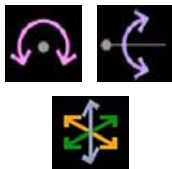
- ◆ Release the brakes with the push buttons on the control panel or with the buttons on the handles and position the tube unit.



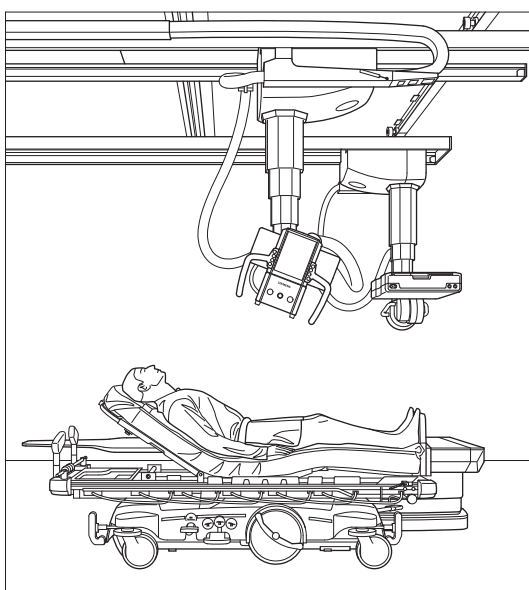
Example: emergency exposure on patient transport table

Positioning for oblique projection

Rotate the tube unit about the horizontal axis (RHA) and about the vertical axis (RVA) into the required direction:



- ◆ Release the brakes with the push buttons on the control panel or with the buttons on the handles and position the tube unit.
 - The *angle* of the rotation about the horizontal axis (RHA) is displayed in degrees in the display of the MAXtouch.
 - You can read off the angle of the rotation about the vertical axis (RVA) at the MAXtouch, too.



Free oblique exposure



Pay special attention in the diagnosis to distortions of the image geometry due to the oblique projection!



Caution

Distortion due to exposure geometry

Incorrect basis for diagnosis

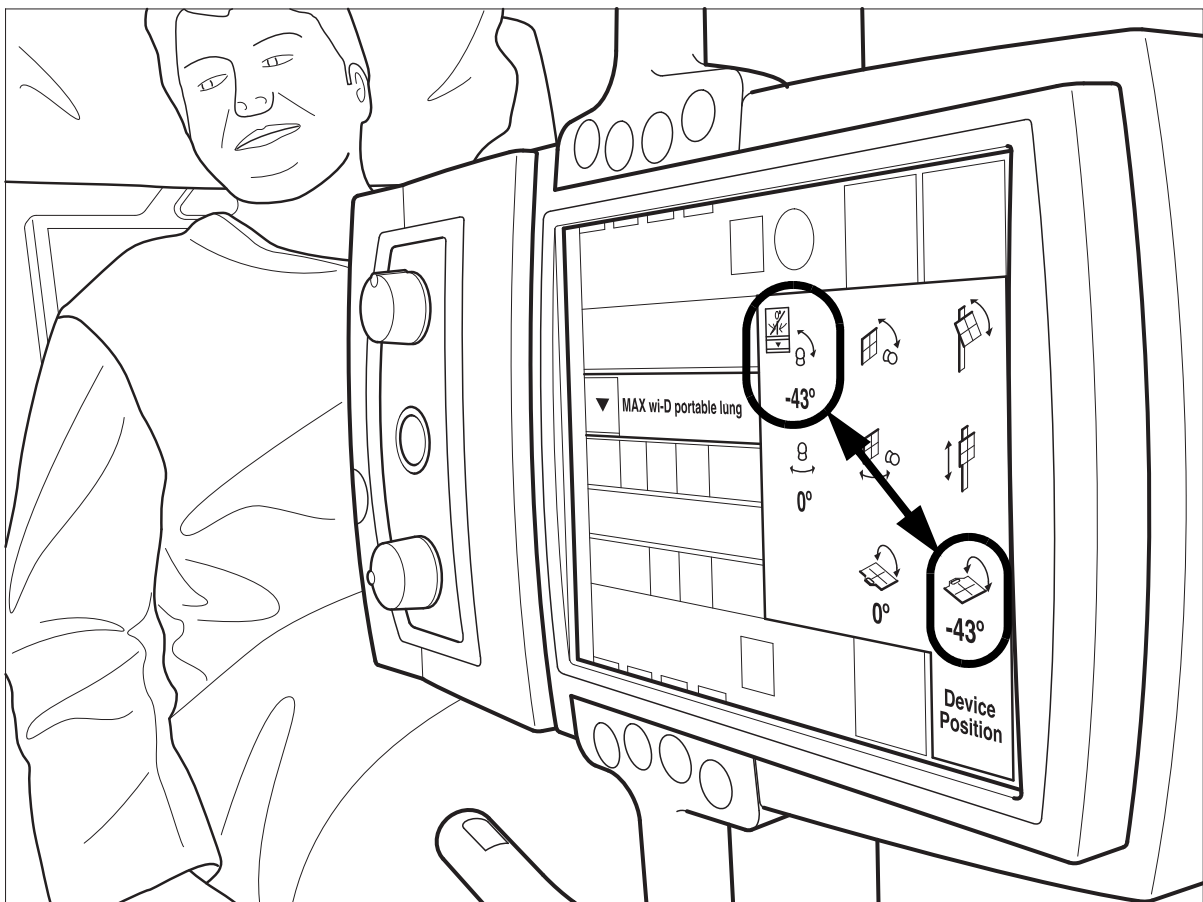
- ◆ Pay special attention in the diagnosis to distortions of the image geometry when using oblique projections.

MAXalign

MAXalign is a feature to make free exposures easier and more accurate. It works with MAX wi-D and MAX mini.

This feature displays the current detector angle on the MAXtouch screen. So, you do not have to guess the tube angle. You just have to align the tube according to the detector angle shown.

- Procedure:**
- ◆ Position the MAX wi-D or MAX mini (tilted up to 90°).
 - The detector angle is shown at the MAXtouch.
 - ◆ Rotate the tube until the angle corresponds to the shown detector angle.



Exposures in wall mode

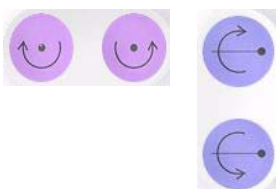


❑ Workstation "wall stand" (**wall mode**)

- ◆ Select an appropriate organ program (OGP) at the MAXtouch for an exposure in wall mode.
- ◆ Push the OGP button on the foot switch, the Wireless Remote Control or the optional Fluoro control console to move the system to the required OGP position.

Centering the detector/tube assembly manually

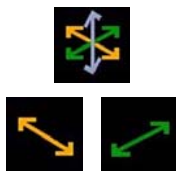
Horizontal alignment



Bring the detector unit into position, if necessary.

- ◆ Press buttons on the detector stand.

Refer to Register 4: *System Components*, "Detector stand movement controls"
→ p. 38



Using the handles to bring the X-ray tube assembly into position, if necessary.

- ◆ Position the tube unit pressing these buttons at the MAXtouch.

Refer to Register 4: *System Components*, "Movement control elements"
→ p. 15.

- ◆ Observe messages on the MAXtouch.

Vertical alignment



Height adjustment to patient size.

- ◆ Press buttons on the detector housing.

Refer to Register 4: *System Components*, "Detector stand movement controls"
→ p. 38

Light localizer

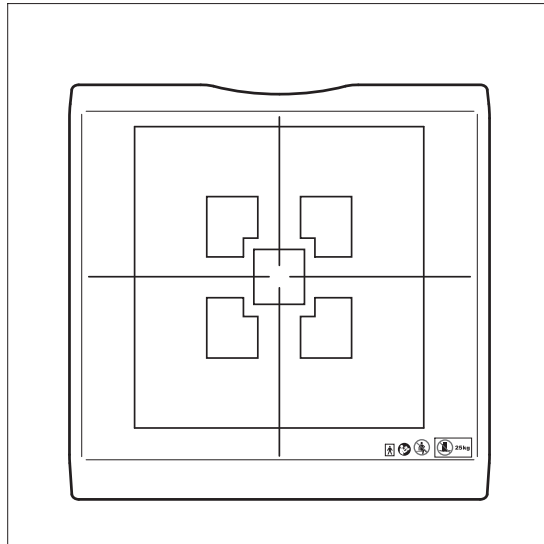


Switch on the light localizer / line light localizer if necessary on the multileaf collimator:

- ◆ Press the button.

Auto Exposure Timer

- ◆ Pay attention to the positioning with respect to the Iontomat measuring chambers.



Position of the Iontomat measuring chambers



The full wall mode functionality is only available when the system has reached its programmed final OGP position (beep sounds if configured).

When the left and/or right chamber is/are selected and one or both of them is covered during collimation, the system automatically switches to the middle chamber.

An incorrect selection of measuring chambers by the user or by communication network disturbances leads to unnecessary X-ray exposure.

- ◆ Always select the measurement chambers carefully.
- ◆ Always check the selection of the measurement chambers before starting the measurement.
- ◆ If several measuring chambers were selected simultaneously, check the selection carefully.
- ◆ The display of the chambers is always related to the chin rest of the detector. Therefore, take the position of the detector in the room into account.

Checking collimation

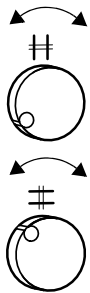
Automatic

ACSS

- ☐ Automatic Collimation Size Selection (ACSS) controls the collimation by the multileaf collimator for *constant* collimation onto the format determined in the organ program with variable SID within the SID range.

Manually

Manual



- ☐ You can collimate further close to the object additionally if required with the control knobs for format collimation on the multileaf collimator:
 - ◆ Rotate the diaphragm knob to adjust the format height.
 - ◆ Rotate the diaphragm knob to adjust the format width.

Checking image parameters for exposure

- ◆ Check the following parameters to comply with the settings in the organ program.
 - ☐ Correct mode? (**wall mode**)
 - ☐ X-ray parameters?
 - ☐ Grid?

Acquisition

Refer to the **FLUOROSPOT Compact** Operator Manual for further information.

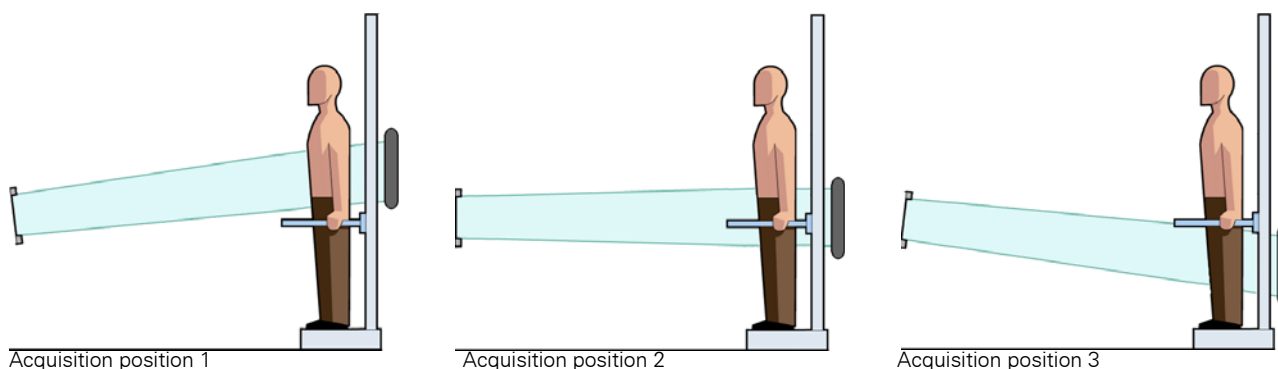
SmartOrtho

Automatic Ortho imaging

Automatic Ortho imaging is available for fully automated and fully synchronized configurations.

In wall mode (standing patient)

Automatic Ortho acquisitions in wall mode can be performed with large SID (3 m) and short SID (1.8 m).



Example

An Ortho automated acquisition is done by tilting the X-ray tube unit and moving the detector unit. The X-ray tube unit is positioned in the middle of the Ortho cover range. When an Ortho sequence is started, the detector moves, and the tube is automatically tilted to the next position.



The detector unit must be in 0° position.



Caution

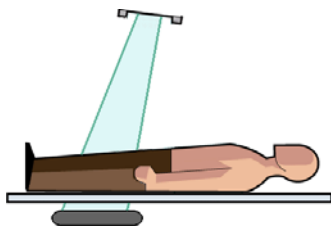
Use of Ortho functionality without Ortho Support

Risk of injury to patient

- ◆ Always use the Ortho Support if you are doing an ortho study.

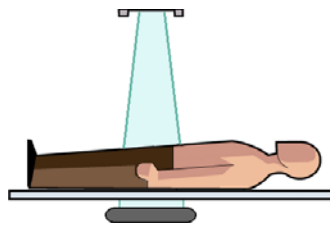
On the patient table

Automatic Ortho acquisitions on the table can be performed with an SID of 1.5 m.

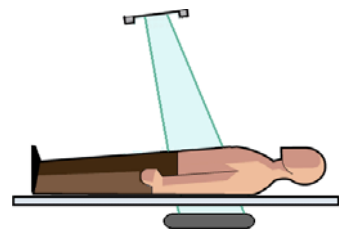


Acquisition position 1

Example



Acquisition position 2



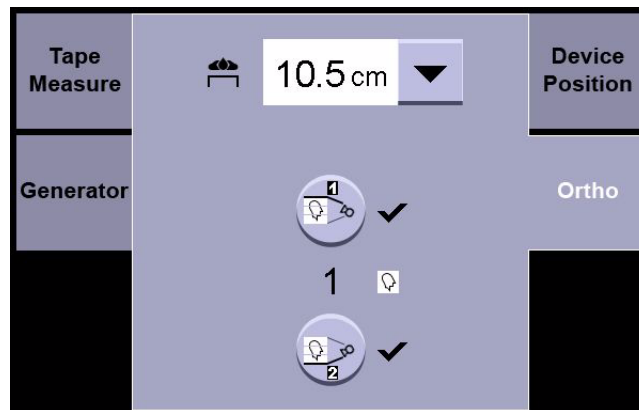
Acquisition position 3

An Ortho automated acquisition is done by tilting the X-ray tube unit and moving the detector unit. The X-ray tube unit is centered over the table. When an Ortho sequence is started, the detector moves and the tube is automatically tilted to the next position.

For the detailed description of the automatic Ortho imaging workflow, please refer to the **FLUOROSPOT Compact** Operator Manual.

Performing an Ortho acquisition

- ◆ Select an Ortho organ program.
 - The specific Ortho parameters are displayed on the console.
 - The LED on the **SmartMove** button is blinking.
 - The **Ortho** tab card is displayed on the Fluorospot Compact.



Positioning the patient

- ◆ Position the patient on the table.
- ◆ Press the **SmartMove button** to move the X-ray tube assembly and the detector to the start position.
 - On the Fluorospot Compact, a user message is displayed.
- ◆ Move the X-ray tube assembly to the first position (start position).
- ◆ Press this button.
 - The position is stored and the button is marked by a check mark.
- ◆ Move the X-ray tube assembly to the second position (end position).
- ◆ Press this button.
 - The position is stored and the button is marked by a check mark.



All these actions can be executed either directly at the system (via MAXtouch or table side control) or from the control room using fluoroscopy.



The system automatically calculates any intermediate acquisition positions required for coverage of the acquisition range.

If more than four acquisition positions would be required to cover the acquisition range, a message is displayed. The procedure must then be repeated.

- ◆ Press the acquisition push button half (pre-contact) and hold it in that position.
 - The units move to the first acquisition position.

- ◆ Press the acquisition push button fully down and hold it pressed until all the acquisitions are finished.
 - The image at the first position is acquired and displayed.
 - The units move to next acquisition position.
 - The image of the next position is acquired and displayed.and so on

Or

- ◆ Press the acquisition push button fully down and hold it pressed until all the acquisitions are finished.
 - The images of all positions are acquired and displayed.



Please pay attention to the system messages displayed on the monitor. These messages indicate the progress of the Ortho acquisitions.

If an Ortho series acquisition is interrupted, the whole sequence must be started again from the beginning!

For further information, refer to the Operator Manual of the **Fluorospot Compact** imaging system.



Caution

Wrong organ program used in ortho

Delayed diagnosis or repeated examination because results cannot be composed

- ◆ Use the correct organ program for ortho.
 - ◆ Make a test run.
-

Ortho support

See Register 7: *Accessories and Auxiliary Devices*, "Ortho support" → p. 24

Ortho Stand, fold-up footstep

See Register 7: *Accessories and Auxiliary Devices*, "Ortho Stand, fold-up footstep" → p. 31

Fluoroscopy (Option)

General information

Operating modes

- ❑ Primary pulsed fluoroscopy (CAREVISION)
 - In pulsed fluoroscopy, the radiation is pulsed at 15 (Standard) or CAREVISION at 10, 7.5, or 3 pulses per second. In this way, a corresponding dose saving with a lower temporal resolution is possible.
 - Pulsed fluoroscopy with high frame rate at 30 p/s (only in zoom 0 and zoom 2)
- ❑ Roadmap (only with DSA)
 - Roadmap is a special fluoroscopic mode with subtraction display

Selection of operating mode

All parameters necessary for fluoroscopy are stored in organ programs.

- ◆ Select a corresponding organ program at the imaging system or on the TUI.



For each acquisition organ program, a corresponding fluoroscopy program can be assigned.

See the FLUOROSPOT Compact Operator Manual for more details.

Changing the selection of the operating mode

It is possible to change the selection of the operating modes in connection with CAREVISION.

The current operating mode is displayed in the operating menu of the live monitor.



You can also switch from one operating mode to another during fluoroscopy.

CAREVISION



- ◆ Press this key on the TUI of the Fluoro remote control console briefly to select:
 - Pulsed fluoroscopy with a pulse rate of 3 p/s, 7.5 p/s, 10 p/s, or 15 p/s

A pulse rate of 3 p/s is the lowest setting and 15 p/s is the highest setting.



You can also switch over from one operating mode to another during fluoroscopy.

Roadmap¹



Roadmap can be combined with all fluoroscopic modes. There is a corresponding Roadmap Fluoro program for every combination.

- ◆ Press this button on the TUI of the Fluoro remote control console to select or deselect Roadmap.



You can select or deselect this function only when radiation is not being released. Roadmap is automatically deselected when the organ program is changed or when the patient list is displayed.

Refer to the **FLUOROSPOT Compact Operator Manual** for information on the operating sequence.

¹ only with DSA

Releasing fluoroscopy

- ◆ Create and select a patient study in the **FLUOROSPOT Compact**.
- ◆ Release fluoroscopy with the foot switch, with the optional hand switch or with the release button at the fluoro control console.
- ❑ Radiation is released as long the release switches or buttons for fluoroscopy are pressed. When the switches or buttons are released, the last image is retained and displayed on the monitor (LIH).
- ❑ When the red emergency STOP button is actuated, fluoroscopy can be switched back on consciously after releasing the fluoroscopy switch and pressing it again.
- ❑ No processing functions apart from storing the image are possible during fluoroscopy.
- ❑ The radiation ON indicators must light up.

Fluoroscopic data

The fluoroscopic data of kV, mA, time, and dose area product are displayed on the touchscreen user interface of the system remote control console.

Display of kV and mA values

During fluoroscopy: ☐ Real-time display of the momentary kV and mA values

After fluoroscopy: ☐ kV and mA mean value of the examination

Display of fluoroscopic time

Continuous display of the time accumulating in the examination in minutes.

Display of dose area product

Continuous display of the dose area product accumulating in the examination.

Reset of fluoroscopic data

Once the examination is ended, note the displayed fluoroscopic data.

The displays for the fluoroscopic data and the dose area product are reset to zero when the patient list is displayed.

Automatic fluoroscopic control

Selecting automatic fluoroscopic control

Refer to the Operator Manual of **Fluorospot Compact**.

Fluoroscopic curves

Depending upon the system configuration, the following fluoroscopic curves are assigned to the automatic programs:

Three fluoro programs can be configured for each organ program. Normally the first program should be low dose, the second standard, and the third high image quality.

Fluoroscopy elapsed time

Display of the elapsed fluoroscopy time for the current patient.

Turning off fluoroscopy warning signal



The fluoroscopy warning signal sounds when the elapsed fluoroscopy time has reached a configurable limit (maximum 5 minutes). The warning signal can be reset by selecting this button on the TUI. The signal will sound again when the time limit has expired again.

Refer to the Operator Manual of **Fluorospot Compact**.

Automatic format collimation in fluoroscopy

Automatic format collimation is also switched on automatically when fluoroscopy is released.

That is, the fluoroscopic field is never larger than the selected zoom format.

You can limit the fluoroscopic field within the area to the required size with the corresponding operating elements.

Fluoroscopy programs

All parameters necessary for fluoroscopy are stored in programs.

The following programs can be stored:

- ☐ Pulsed fluoroscopy (CAREVISION)
- ☐ Roadmap pulsed fluoroscopy

Refer to the **Fluorospot Compact** Operator Manual.

Dose reduction¹

In fluoroscopy with CAREVISION (pulsed fluoroscopy) the following dose reductions configured in the factory result related to standard fluoroscopy:

Automatic program	CAREVISION 15 P/s	CAREVISION 7.5 P/s	CAREVISION 3 P/s
1	- 50%	- 75%	- 90%
2	- 33%*	- 55%*	- 75%*
3	- 30%	- 50%	- 65%

* Deviating factory setting for USA

¹ for image receptor input dose rate



Caution

Medical devices are not infallible and unexpected errors may occur

System is not available in an emergency or may stop working during an examination

- ◆ Have an emergency plan in case of non-availability of the system, for instance, to use a different system.
- ◆ Have an emergency plan for continuing or ending different types of examinations if the system stops working, for instance, during endoscopy, use the viewer of the endoscope to continue or end the examination.
- ◆ Consider whether an uninterruptible power supply is necessary at your site.

Contrast medium



Some contrast media are very aggressive and can react with some materials of the system (for example tabletop).

To prevent this, please double-check the used contrast media with your Siemens representative.



Avoid contact between contrast media and tabletop.

- ☐ Certain contrast media can harm the surface of the tabletop.
- ☐ For more information and details, refer to your Siemens contact person.

Prerequisites

- ✓ DSA
- ✓ CAREMAX (Mandatory in EU, USA and Canada)
- ✓ For interventional examinations, the system must be horizontal.
- ✓ The tabletop must be centered.

Application

With "DSA for interventional applications", the Multitom Rax X-ray system fulfills the "Particular Requirements for the Safety of X-ray Equipment for Interventional Procedures" according to IEC 60601-2-43.

The system is designed for cardiopulmonary resuscitation (CPR) with a pressure compression of up to 500 N (50 kg) for patients up to 240 kg.

Intended use

- ☐ Transjugular intrahepatic portosystemic shunt (TIPS)
- ☐ Embolization treatment
- ☐ Non-cardiac vascular reconstruction.

Be aware that these procedures may involve high air kerma values which can result in deterministic effects.

Important labels



The permitted patient weight on your tabletop is stated on the label on the tabletop and in the technical data.



This warning sign shows the position of the patient table for cardio-pulmonary resuscitation (CPR) with a pressure compression of up to 500 N (50 kg).



Please center the table top before performing CPR.

Disabling radiation

External buttons

To prevent the unintentional release of radiation, for example during cleaning or patient positioning, radiation can be disabled by a button on the remote control console without impairing other system functions.

If the button is activated, the message line of the touchscreen on the remote control console shows the message "Radiation disabled".

Door contact switch

For interventional procedures, no door contact switch for interrupting radiation should be connected.

Avoiding unnecessary interruptions of system movements

- ◆ Before starting system movements, ensure that there are no obstacles in the movement area.
- For further information refer to Register 2: *System Safety*.

Cardiopulmonary Resuscitation" (CPR)

The Multitom Rax system is designed for cardiopulmonary resuscitation (CPR=**C**ardio-**P**ulmonary **R**esuscitation).



Caution

System cannot be placed in position for CPR

Resuscitation (CPR) cannot be performed

- ◆ For interventional procedures, the system must be horizontal.
- ◆ Cardiopulmonary resuscitation can only be performed with the following settings:
 - Horizontal tabletop
 - The pressure point (patient thorax) must be between the head-end and foot-end tabletop support.

Cardiopulmonary resuscitation may be performed only with the following additional prerequisites:

- ☐ Sufficient free space
- ◆ Remove any objects, such as chairs, from the examination area.

Automatic movement to the CPR position



- ◆ Press the key until all movements, except table lowering, have been completed.
 - The system moves to the patient transfer position with horizontal tabletop.
 - The system moves to the configured table height.
 - The system moves into the orthogonal beam path.
 - The system moves to the foot-end position of the tube assembly stand respectively the image receptor unit.
- ◆ Lower the table to a comfortable height.

Fluoroscopy

Changing the fluoroscopy mode

Using the pulse rate button on the touchscreen of the remote control console you can select the low dose values with pulsed fluoroscopy (Carevision).

→ For further information refer to "*Fluoroscopy (Option)*" → p. 29 and to the **FLUOROSPOT Compact Operator Manual**.

Releasing fluoroscopy

Use the system foot switch for fluoroscopy and acquisition in the examination room.

DSA exposures

For DSA exposures select the organ programs for DSA. For DSA acquisitions select a DSA organ program at the Fluorospot Compact or at the touchscreen on the remote control console.

Radiation protection

High air kerma values

The system is intended for procedures that, with correct use of the system, involve high air kerma values due to the long examination times. This fact presents a risk of radiation injury.

Exam Sets

The dose is given in the exam sets (fluoro or roadmap and acquisition programs).



The available exam sets depend on the system type and the profile set.

The system comes preinstalled with a number of exam sets.

For further information on the preinstalled examination sets ask your applications specialist.

- ◆ Select only suitable examination sets for the examination.
- ◆ If possible, select a dose-saving fluoro or acquisition program.
 - Fluoro programs with a lower dose are further to the left.

Door contacts	Recommended: In case of interventional applications, a current procedure should neither be interruptible by door contacts nor by other measures.
Remedy:	Install door contacts (or have them installed) in such a way that an interruption can be disabled.
Programs for interventions	Contact your Siemens service engineer in this regard.

Patient entrance reference dose

Reference air kerma strength (= measured value) according to IEC 60601-2-43:2000 (51.101.4 and Appendix EE) and IEC 60601-2-43:2010.

characteristic curve		20 cm PMMA phantom, with anti-scatter grid Zoom 1 20.5 cm x 20.5 cm	20 cm PMMA phantom, with anti-scatter grid Zoom 2 15.5 cm x 15.5 cm	20 cm PMMA phantom, with anti-scatter grid Zoom 3 10.25 cm x 10.25 cm
Antiisowatt Automatic 1 (7.5 P/s) 26 nGy/P “low mode”	values of automatic exposure control measurement: dose in 30 cm distance above patient support	0.2 mm Cu 84.8 kV, 18.0 mA 43.6 µGy/s	0.2 mm Cu 89.1 kV, 19.3 mA 55.1 µGy/s	0.2 mm Cu 96.0 kV, 21.7 mA 77.8 µGy/s
Antiisowatt Automatic 2 (15 P/s) 32 nGy/P “normal mode”	values of automatic exposure control measurement: dose in 30 cm distance above patient support	0.2 mm Cu 87.5 kV, 17.2 mA 93.2 µGy/s	0.2 mm Cu 91.5 kV, 18.3 mA 118.3 µGy/s	0.2 mm Cu 98.6 kV, 20.2 mA 158.9 µGy/s
Maximum dose rate (covered with Pb until max. kV and mA)				
Antiisowatt Automatic 2 (15 P/s) 32 nGy/P	values of automatic exposure control measurement dose / image	0.2 mm Cu 111 kV, 23.7 mA 283 µGy/s / 15 P/s = 18.9 µGy / P (Image)		
DSA				
Characteristic curve: DSA Sub (Antiisowatt Automatic 2)				
DSA program 4 P/s, Scene 10s Dose/P 1.74	values of automatic exposure control measurement (dose / image)	0.1 mm Cu 76.6 kV, 13.5 mAs 2652 µGy/s / 4 P/s = 663 µGy / image	0.1 mm Cu 76.6 kV, 19.3 mAs 3592 µGy/s / 4 P/s = 898 µGy / image	0.1 mm Cu 83.2 kV, 23.0 mAs 5000 µGy/s / 4 P/s = 1250 µGy / image

Measuring Conditions

Interventional reference point in 30 cm distance above patient support radiation field size in plane of patient support see table above 25 cm x 25 cm x PMMA-Phantom centered in beam on patient support small focus, SID 115 cm.

Reduction of patient entrance reference dose

Reduction of the air kerma strength as a function of the Cu prefiltration with 20 cm PMMA object thickness.

Tube voltage (kV)	Cu prefiltration (mm)	Relative reduction to
60	0	1
	0.1	0.58
	0.2	0.43
	0.3	0.35
70	0	1
	0.1	0.6
	0.2	0.45
	0.3	0.37
80	0	1
	0.1	0.62
	0.2	0.48
	0.3	0.4
100	0	1
	0.1	0.67
	0.2	0.56
	0.3	0.48

Concept of the interventional patient entrance reference point

The interventional patient entrance reference point for the measurement of the air kerma strength was defined in the central ray 30 cm above the tabletop as the location of the patient entrance reference dose for a medium patient thickness.

Isodose curves

According to IEC 60601-2-43:2010.

The measurements were performed at the Multitom Rax with a fixed table height of 89 cm.

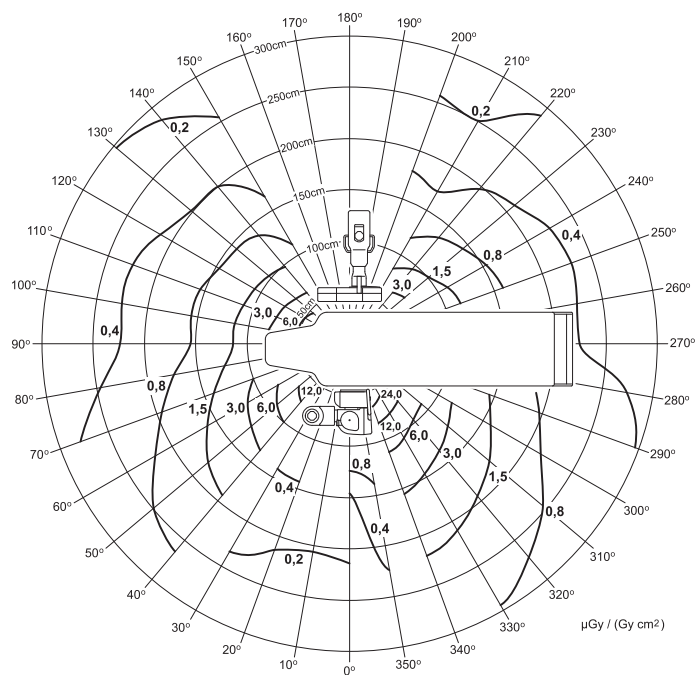
Measuring conditions

- ☐ PMMA cube phantom with a side length of 25 cm
- ☐ X-ray field 10 cm x 10 cm
- ☐ CPR setting, tabletop in center position
- ☐ Source - phantom surface 79 cm
- ☐ Small focus, SID 115 cm, without Cu prefilter
- ☐ Vertical, downward projection.

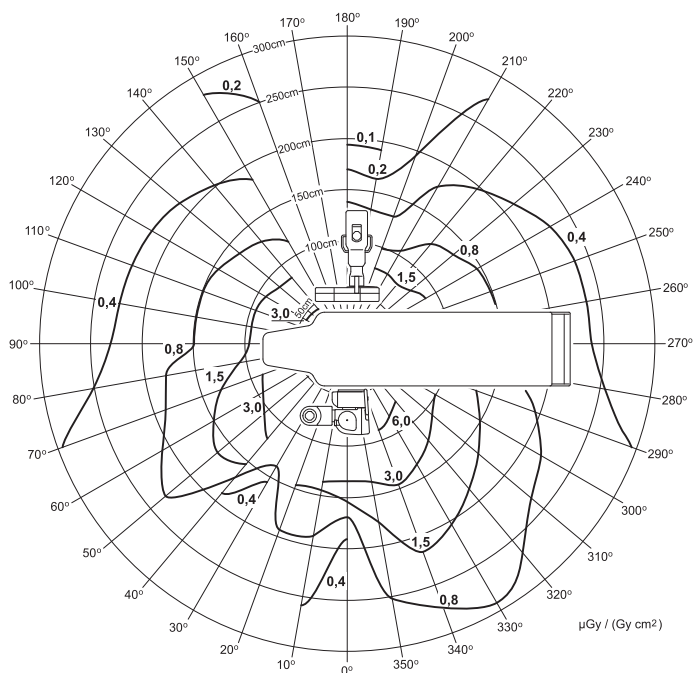
Horizontal projection

- ☐ Without mobile radiation protection
- ☐ Scattered radiation of isodose curves in $\mu\text{Gy}/(\text{Gy cm}^2)$ at 110 kV, 2.7 mA
- ☐ The conversion factor to the unit ($\mu\text{Gy}/\mu\text{Gy m}^2$) according to IEC 60601-2-43:2000 is 1/100

Isodose 100 cm above
the floor



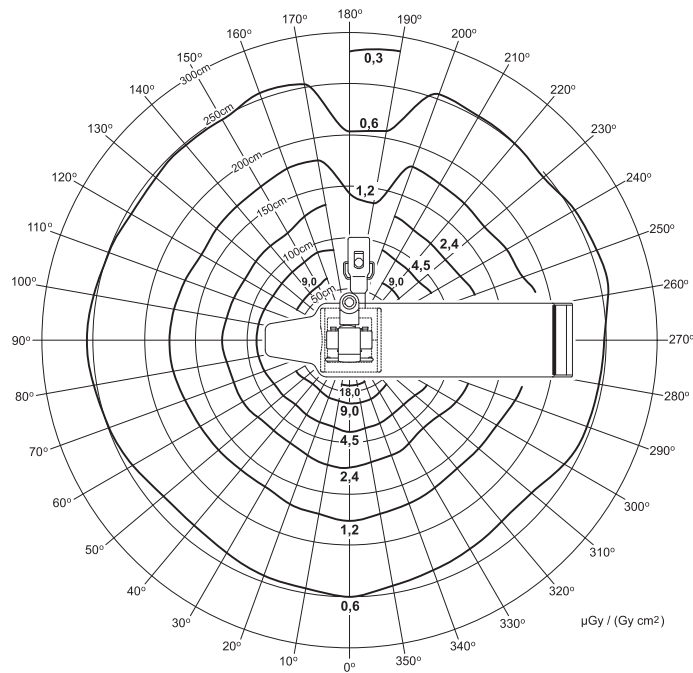
Isodose 150 cm above
the floor



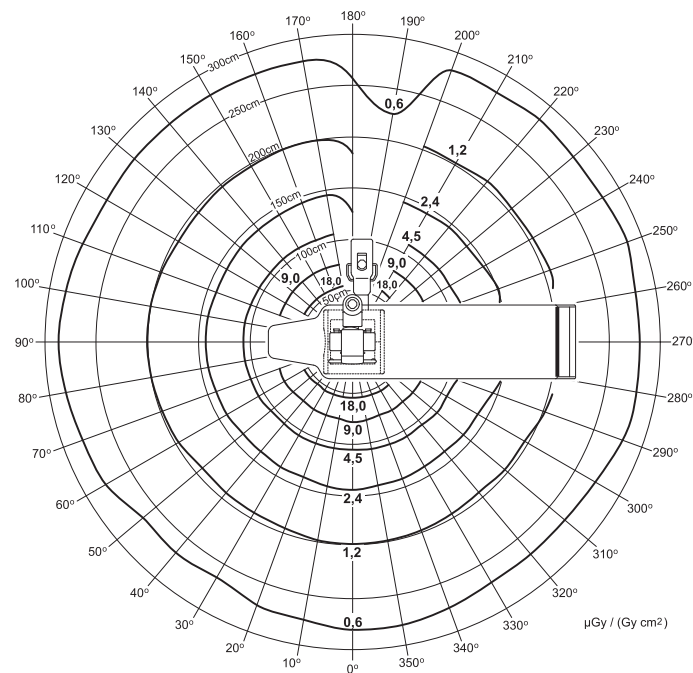
Vertical projection

- ☐ Without mobile radiation protection
- ☐ Scattered radiation of isodose curves in $\mu\text{Gy}/(\text{Gy cm}^2)$ at 110 kV, 2.7 mA
- ☐ The conversion factor to the unit ($\mu\text{Gy}/\mu\text{Gy m}^2$) according to IEC 60601-2-43:2000 is 1/100

Isodose 100 cm above
the floor



Isodose 150 cm above
the floor



Cleaning and disinfection



Avoid contact between contrast media and tabletop.

- ☐ Certain contrast media can harm the surface of the tabletop.
- ☐ For more information and details, refer to your Siemens contact person.

Prevention ♦ Use sterile covers.

System parts The following system parts can come into contact with body fluids, contrast medium and so on:

System part	Special cleaning measures
☐ Patient table ☐ Tabletop	♦ If necessary, remove the tabletop
Control modules	♦ To prevent system movements, press an emergency STOP button.
Flat detector	♦ Protect by sterile covers.
☐ Hand switch ☐ Foot switch	♦ To prevent radiation release, activate Block Radiation in the Exam task card on the touchscreen control.
Injector	See Operator Manual of the injector

Register 7 Accessories and Auxiliary Devices

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Preliminary Remarks

Proper use of the product

This part of the Operator Manual describes all the accessories provided by Siemens for the Multitom Rax system.

Proper use of the accessories presupposes that the user has read and understood this part of the Operator Manual in detail.

In addition, the user must be thoroughly familiar with the rest of the Operator Manual.

Finally, detailed knowledge of the applicable safety regulations for the medical equipment being used is indispensable. These regulations are listed in part **Safety** of this Operator Manual.

Explanation of "proper use" consists of illustrated descriptions of attaching, using and removing the accessory component.



Caution

Accessories not firmly attached or not used

Accessories overloaded

Patient injury

- ◆ Make sure that accessory parts are attached firmly by pulling and pushing them.
 - ◆ Follow the instructions in the Operator Manual.
 - ◆ Observe the information regarding storage and maximum weight when using the accessories.
-

Safety



Warning

Wear or material fatigue in the system or accessories

Risk of injury or system damage

- ◆ Follow the maintenance guidelines to maintain safety and proper function of the system.
 - ◆ Check accessories for wear before use.
-



Warning

Movement of the overhead detector positioned near a patient trolley. The patient trolley is not included in the collision calculation.

Danger of injuring the patient

- ◆ Move the detector as little as possible when it is positioned near a patient trolley.
 - ◆ Move the trolley away from the detector before choosing the next organ program position.
 - ◆ Use emergency stop to halt any undesired motion.
-



Caution

Use of accessories not intended for the system

Risk of injury to patient or user

Risk of damage to the system

- ◆ Use only accessories approved by Siemens with this system.
 - ◆ All accessories are labeled and described in the Operator Manual.
-

For reasons of safety for patients, operators and the equipment, only original accessories manufactured and sold by Siemens or Siemens-approved accessories from another manufacturer may be used.

Siemens cannot assume any responsibility for accessories not approved by us.



Caution

Trolley or wheeled accessory tips over or suddenly stops while being rolled

Injury of persons

- ◆ Please be careful when pushing trolleys or wheeled accessories. They are not designed to be pushed over a step, cable or other hindrance because they can tip over or suddenly stop.
 - ◆ Take special care when wheeling the Babix cradle trolley with a baby in the Babix cradle.
-

Orientation



When using the accessories and to simplify the description, the following directional indications shall apply in this Operator Manual with regard to the working position of the user.

- ☐ **In front** means in front of the patient table looking in the direction of the X-ray tube
- ☐ **Left** is the head end of the patient table
- ☐ **Right** is the foot end of the patient table
- ☐ **Frontal** means the longitudinal side of the patient table close to the operating panel
- ☐ **In back** means the longitudinal side of the patient table away from the operating panel
- ☐ **Turn toward the right** means tighten accessory with knurled screws or levers (clockwise)
- ☐ **Turn toward the left** means remove accessory with knurled screws or levers or other fastening devices (counterclockwise)

Example:

- ◆ Turn both knurled screws toward the left.
- ◆ Push the grip protection bar on the head end into both accessory rails.
- ◆ Turn both knurled screws toward the right.
- ◆ Check that the grip protection bar is seated securely.

Description

*Patient positioning mattress**Application*

The mattress is used for comfortable patient positioning and is attached to the protection strip of the tabletop.

Attachment

- ◆ Attach the protection strip at the head end.
- ◆ Place the mattress on the tabletop and pull the loops over the hand screws of the protection strip.

**Radiation protection
value**

The attenuation equivalent is ≤ 0.5 mm Al.

Hand grip

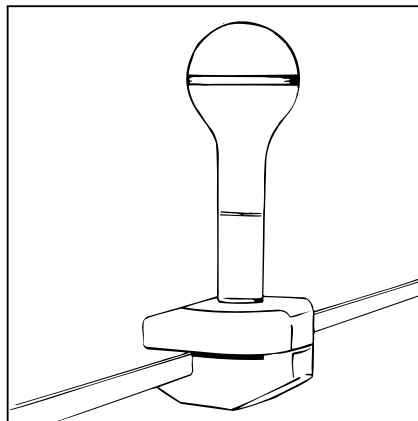


Warning

Hand grips loosen or are not used

Injuries to patient from falling

- ◆ Check that the patient hand grips on the table are in the right position.
- ◆ Ensure that hand grips are tightened prior to use.
- ◆ Make sure that the patient uses the hand grips during system movements or when turning over.
- ◆ Use other positioning aids for immobilizing weak or very unstable patients.



Application

The detachable hand grips offer the patient a secure grip and thus increase their feeling of safety.

Attachment

- ◆ Hold the base of the hand grip and loosen the hand grip by turning it.
- ◆ Attach the hand grip in the guide groove on the bottom of the tabletop and bring it into position.
- ◆ Tighten the hand grip by turning it.
- ◆ Check the hand grip for firm location by pulling and pushing.
- ◆ Press both tension levers (2) outward.
- ◆ Check that the tensioning part is firmly seated by pulling on it.
- ◆ Press the ratchet handle (1) downward.
 - The belt is released.
- ◆ Using the ratchet handle, set a lower belt tension.

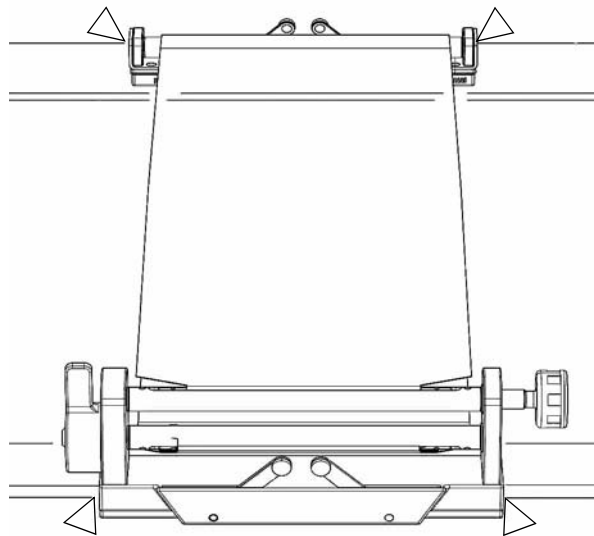
Compression Belt

Safety

Risk of crushing

It is the responsibility of the operator to attach and remove the equipment only if it is ensured that neither the patient nor third parties can be endangered.

The parts of the unit marked in the drawing show possible danger zones where fingers can be crushed.



Risk of injury for the personnel when attaching compression belt.

Functional and safety check

Daily checks

- ◆ Check tension lever.
- ◆ Check cap screw.
- ◆ When the cap screw and tension levers are in locked status, check if the compression belt is locked.



Remove all traces of contrast agent from the compression belt. Otherwise, the X-ray image shows artifacts.

Cleaning and disinfection

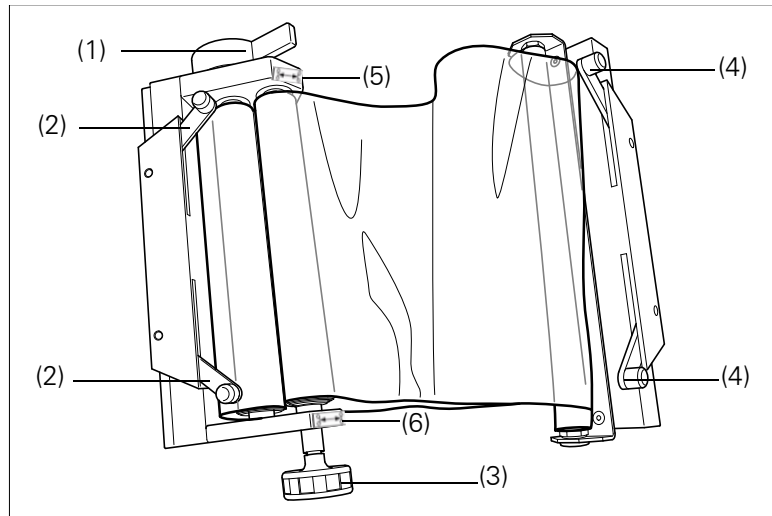
Cleaning

- ◆ The compression belt is made of transparent plastic and can be cleaned with a damp cloth.
- ◆ Do not use corrosive, soluble or abrasive cleaning materials for cleaning.
- ◆ For sprayed paint, plastic and chromium alloy surface, make sure to use clean and dry soft cloth to wipe clean.

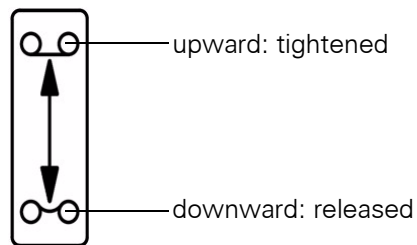
Disinfection

- ◆ Disinfect all components of the compression belt only with a soft cloth soaked in disinfectant.
- ◆ Do not use spray disinfectant.

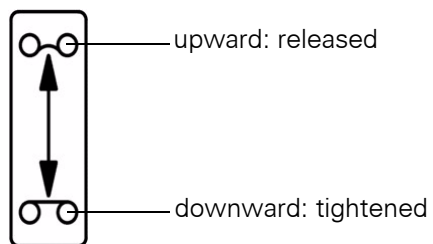
Product description



- (1) Ratchet handle
- (2) Tension lever
- (3) Cap screw
- (4) Tension lever
- (5) Tag for ratchet handle



- (6) Tag for cap screw



Intended use

The compression belt is a mechanical component for X-ray exposures.

It is used to quickly fix the patient on the table or BWS.

In addition, it can reduce the thickness of the patient which leads to better image quality for some examinations, especially abdominal.

Product features

- ☐ High reliability
- ☐ Easy attachment
- ☐ Fasten frail patient
- ☐ Increase image quality

Operation

Requirements

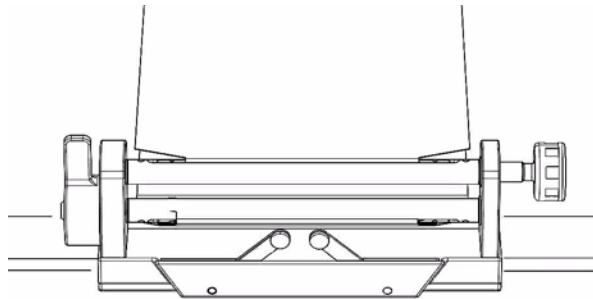
The X-ray imaging system must be operated by trained and qualified personnel. In addition, make sure to follow the requirements of relevant laws and regulations during the operating process.

How to operate the compression belt

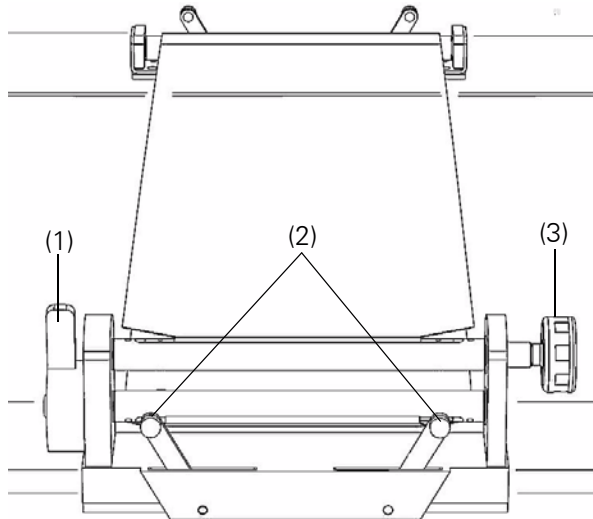
For use on the table

Attachment

- ◆ Move the patient table to the horizontal position.
- ◆ Position the patient on the table.



- ◆ Push the tensioning part of the compression belt into the required position over the front accessory rail.

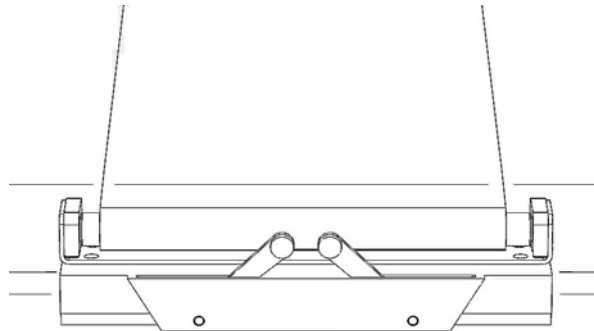


- ◆ Press both tension levers (2) outward.
- ◆ Check that the tensioning roller is firmly seated by pulling on it.
- ◆ Press the ratchet handle (1) downward.
 - The belt is released.

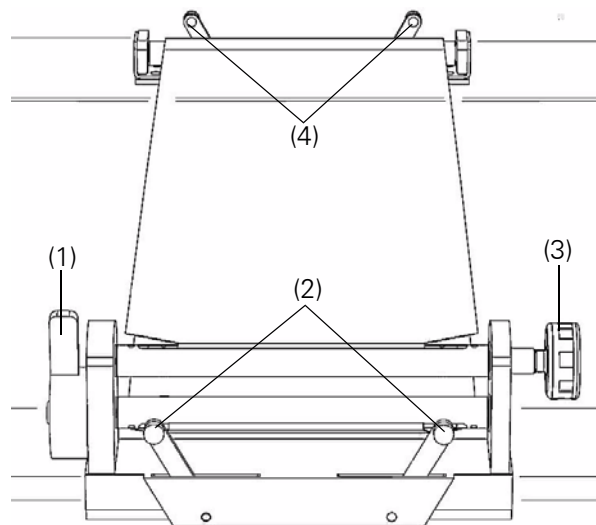


For obese patients, the belt holder is easier to secure if you are standing at the back of the patient table. In this case, and for restless or frail patients, we recommend that someone assist you in attaching the compression belt

- ◆ Lift the holder with the belt across the patient.



- ◆ Push the holder over the back accessory rail. Make sure that the compression belt attaches straight across the tabletop and not at an angle.



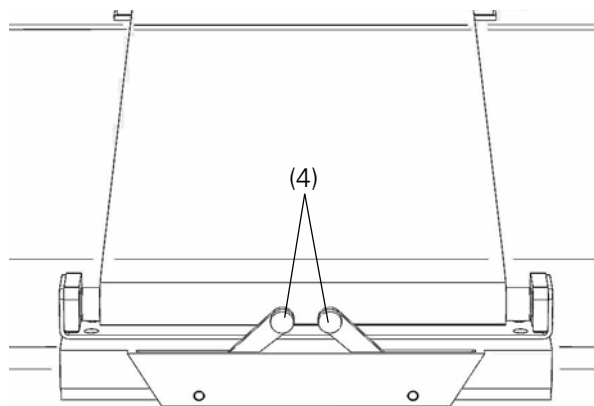
- ◆ Press the tension levers (4) outward.
- ◆ Check that the holder is seated firmly by pulling on it.
- ◆ Turn the cap screws (3) on the tensioning roller toward the left to tighten the belt.
- ◆ Push and pull back on the ratchet handle (1), until the belt tension is optimal.
- ◆ Check the belt tension on the patient once again.

**Loosening the
compression belt**

- ◆ Move the patient table to the horizontal position.
- ◆ Press the ratchet handle (1) back.
- ◆ Turn the cap screw (3) on the tensioning roller toward the right.
 - The compression belt unclenches.
- ◆ Use the ratchet handle to set a lower belt tension.

Removal

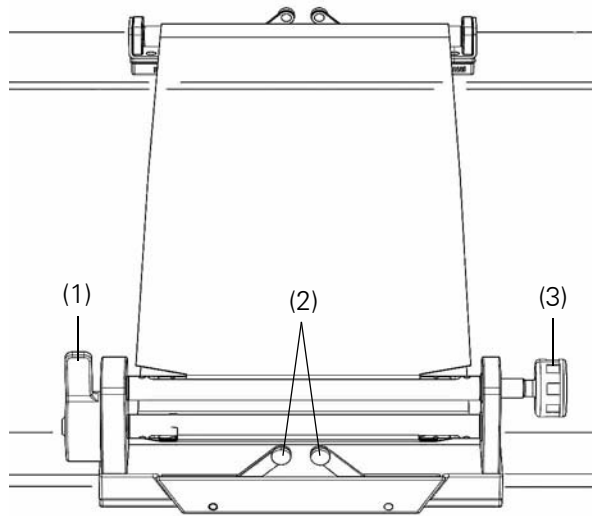
- ◆ Move the patient table to the horizontal position.
- ◆ Press the ratchet handle (1) back.
- ◆ Turn the cap screw (3) on the tensioning roller toward the right.
 - The compression belt unclenches.



- ◆ Press both tension levers (4) on the belt holder inward.
- ◆ Pull the belt holder backward off the accessory rail.
- ◆ Lift the belt holder over the patient.
- ◆ Roll up the compression belt halfway using the cap screw.
- ◆ Place the belt holder next to the tensioning roller.

Accessories and Auxiliary Devices

Description



- ◆ Press both levers (2) inward on the tensioning roller.
- ◆ Pull the tensioning roller from the front accessory rail.
- ◆ Help the patient to get off the patient table.
- ◆ Use the cap screw (3) to roll up the belt on the tensioning roller.

Technical description

Technical data

Dimensions

Width $\leq 100 \text{ mm}$

Length $\leq 400 \text{ mm}$

Height $\leq 150 \text{ mm}$

**Ambient conditions
(Operation)**

Temperature: $+10^{\circ}\text{C}$ to $+35^{\circ}\text{C}$

Relative humidity: 20% to 75% rel. air humidity without condensation

Barometric pressure: 700 hPa to 1060 hPa

**Ambient conditions
(Transport and
storage):**

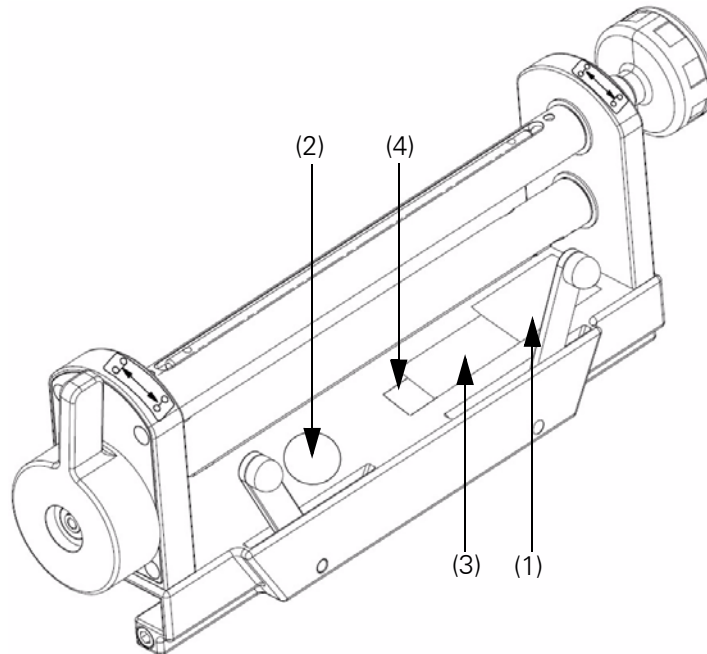
Temperature: -20°C to $+70^{\circ}\text{C}$

Relative humidity: 10% to 95% rel. air humidity without condensation

Barometric pressure: 500 hPa to 1060 hPa

Aluminum equivalent $\leq 0.8 \text{ mm Al}$

Location of labels



(1) Identification label for compression belt



(2) Warning label



(3) UR label/ UR



(4) Type B equipment label



Complying standards

- ❑ UL 60601-1, 1st Edition, 2006-04-26 (Medical Electrical Equipment,Part 1: General Requirements for Safety)
- ❑ CAN/CSA-C22.2 No. 601.1-M90, 2005 (Medical Electrical Equipment,Part 1: General Requirements for Safety)
- ❑ CAN/CSA-C22.2 No. 60601-1, Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance
- ❑ ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10), Medical Electrical Equipment,Part 1: General Requirements for Basic Safety and Essential Performance
- ❑ IEC 60601-1:1988 + A1:1991 + A2:1995
- ❑ IEC 60601-1: 2005

Ortho support

The Ortho support is necessary to position the patient correctly for Ortho imaging in wall mode (standing).



Caution

Mounting the Ortho support

Patient can slip or fall down

- ◆ Position the patient hand grips at the lowest possible position when the patient is mounting or dismounting.



Caution

Positioning the Ortho support

Injury of the user

- ◆ Follow the instructions in the Operator Manual.
- ◆ Be careful not to pinch your fingers, hand or legs during positioning.



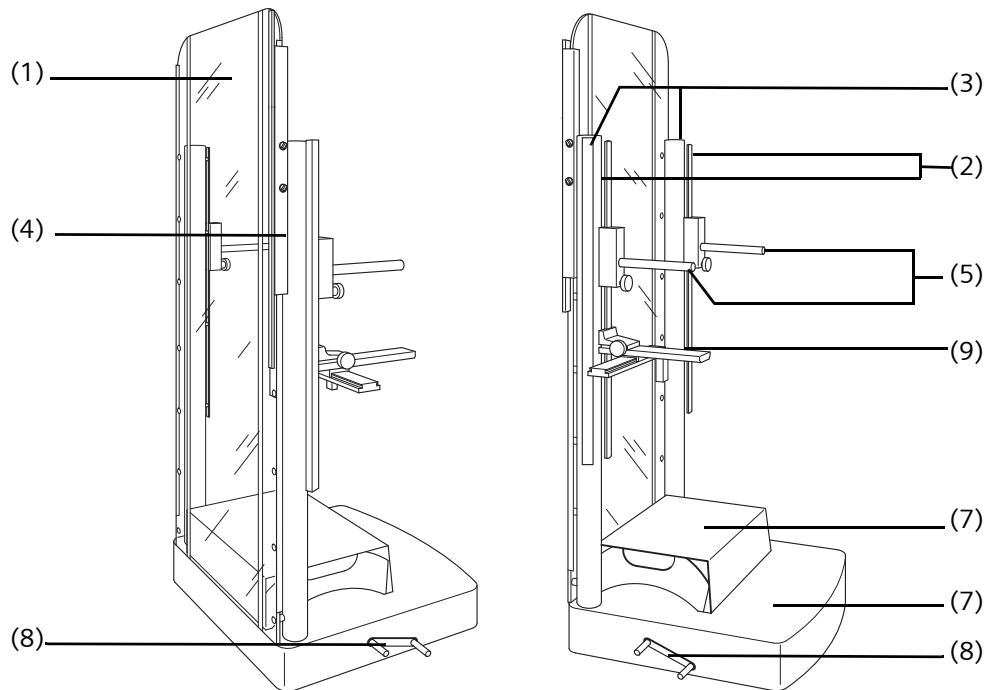
Caution

Collision of the detector with the Ortho support

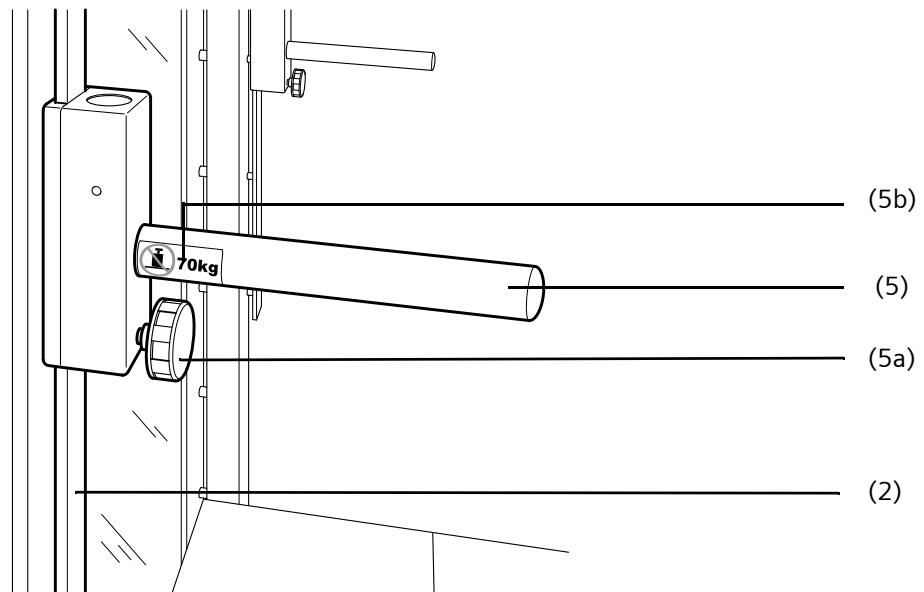
Risk of damage to the detector and injury of the patient.

- ◆ Re-position the detector only when no patient is on the Ortho support.
-

Overview



- (1) Transparent protection plate (acrylic glass)
- (2) Guide rails for height adjustment of hand grips and plugging holder for the ruler
- (3) Guide rails for plugging the compression belt (part-no. 10847650; please refer to the accessories catalog)
- (4) Manually height adjustable rail for the detector positioning stop
- (5) Hand grips
- (6) Additional platform for smaller patients (e.g. children) and to make sure that the whole patient body can be mapped - removable
- (7) Patient standing platform
- (8) Brake levers on both sides of the standing platform
- (9) Holding device for the ruler



- ❑ The hand grips (5) are intended to support the patient during the examination.
- ❑ The hand grips are height-adjustable.

Adjusting the hangrips

The hand grips can be moved up and down in the guide rails (2).

- ◆ Release the hand grips by turning the locking screw (5a) counterclockwise.
- ◆ Move the hand grips to the desired position.
- ◆ Fix the hand grips by turning the locking screw (5a) clockwise.



Check that the locking screws on both hand grips are properly fixed. Thus, you prevent the hand grips from disengaging while the patient is leaning on them.

Disengaging hand grips might cause injuries to the patient and/or damage to the support!

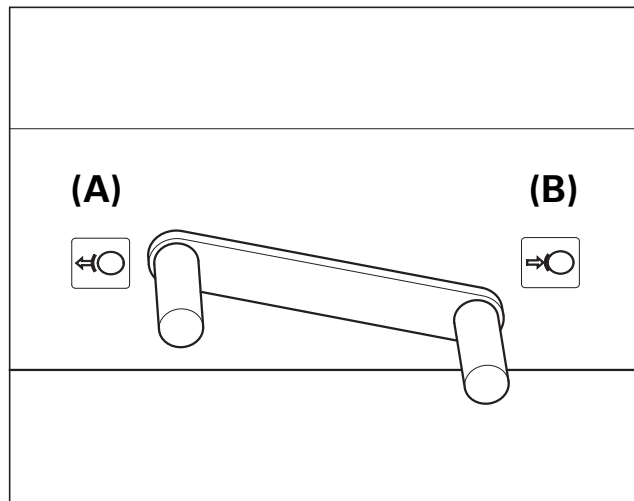


This label (5b) is placed on the handgrips.

The maximum load of the handgrips is 70 kg.

Brake levers

The Ortho Support is equipped with brakes to enable the secure stand of the support. For transport of the support you have to release the brake.



Releasing the brakes



- ◆ To release the brakes push the lever down towards this symbol (A).

Locking the brakes



- ◆ To lock the brakes push the lever down towards this symbol (B).

Cleaning



Caution

Patient hand grips slip because the guide rails are contaminated

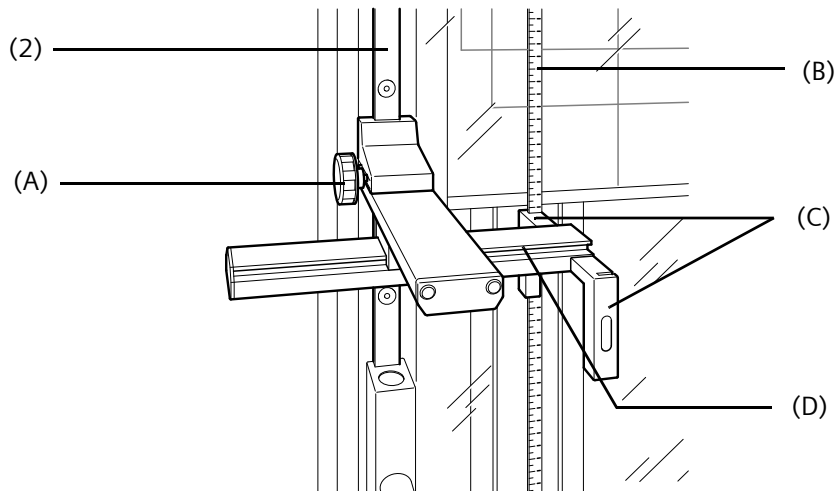
Patient injury

- ◆ Clean the Ortho support with a suitable agent.
- ◆ Check that there is no oily residue on the guide rails.

Accessories

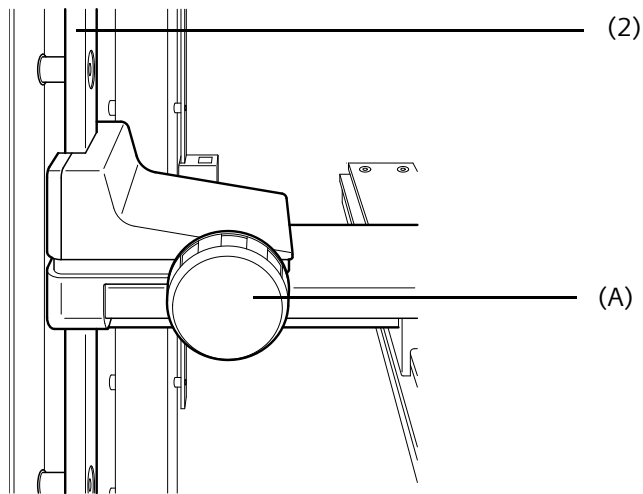
Holding device for the ruler

The holding device is used to position the ruler on the image.

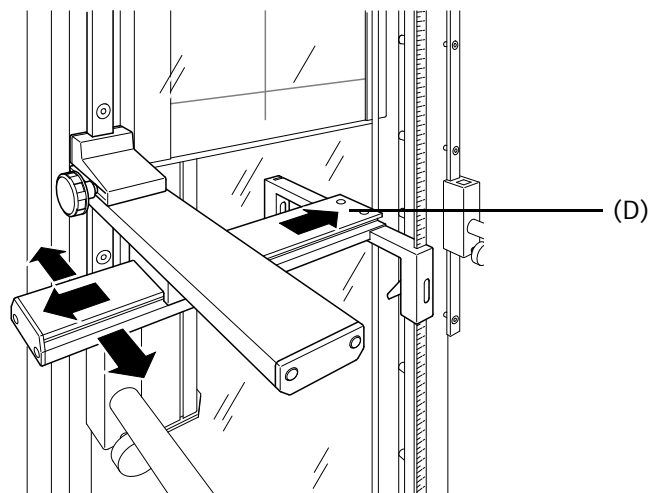


- (A) Locking screw
- (B) Ruler
- (C) Positioning slots
- (D) Movable holding arm
- (2) Guide rail

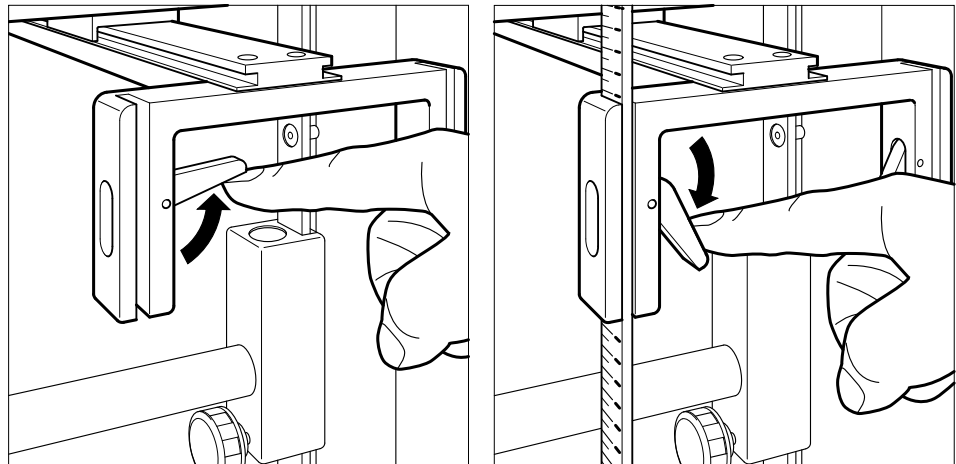
How to use the holder for the ruler:



- ◆ Attach the holding device to one of the guide rails (2) and fix it by turning the locking screw (A) clockwise.
- ◆ To move the holder vertically, release the locking screw (A).



- ◆ The holding arm (D) can be moved horizontally as shown above.



- ◆ To position the ruler in one of the two holding slots first of all open the fixing clamp as shown above left.
- ◆ Position the ruler in the slot and fix it with the fixing clamp as shown above right.

Technical data

Height	202 cm
Depth	75 cm
Width	75 cm
Weight	85 kg
Max. patient weight	180 kg
Max. usable height	26 - 173 cm central beam
Max. patient size	184 cm
Attenuation equivalent of the transparent protection plate acc. to IEC 60601-1-3: ≤ 1.70 mm Al equal - 100 kV 3.7 HVL	

Ortho Stand, fold-up footstep

General information

The Ortho stand is a mechanical component for X-ray exposures, such as long leg and long spine. It is necessary to stabilize the patient during the Ortho examination in a way that any movement during the whole Ortho sequence is prohibited. It guarantees optimal images without movement.

It places the patient in an upright position for long spine series and allows exposures of the legs (long leg series). The geometry aligns with the BWS and ensures movement of the detector from the lowest to the highest position.

Product features

- ☐ Wide application scope
- ☐ High reliability
- ☐ Easy to move
- ☐ Platform for smaller patients (for example, children)
- ☐ With the brake control device, it is easy to position the Ortho stand.



The Ortho stand must not be used to carry patients, it is only to be used as auxiliary supporting device when taking exposures.

When the patient moves onto or leaves the Ortho stand, the brake pedals must be locked. Besides, give assistance to the patient to avoid any hazards.

Other information

Illustration

All illustrations of the equipment and of the user interface in this Operator Manual are examples only.

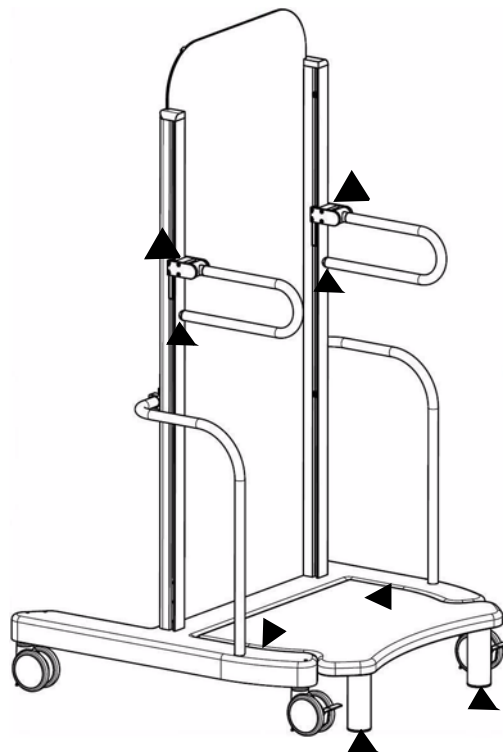
Differences in detail may occur in your system due to the installed options, configuration and constant development of the system.

Reproduction of images can cause loss of detail. Pictures in this Operator Manual do not therefore provide any indication of image quality.

Safety and check

Danger zones / danger points

The parts of the equipment, which are marked in the drawing, indicate possible danger zones where the patient or staff can crush their fingers or be struck:



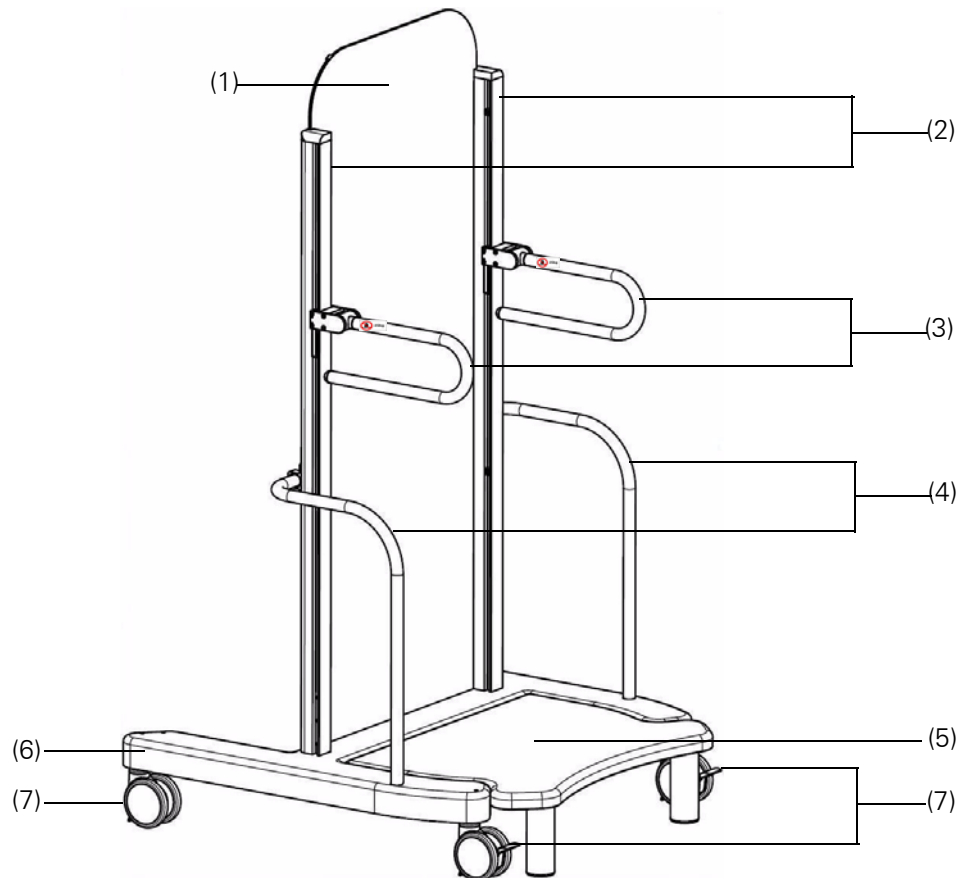
▼ Risk of injury by crushing or collision.

Daily checks

- ◆ Check the unit movement.
- ◆ Check the brakes.
- ◆ Check the mobility of the castors.
- ◆ Check that the necessary devices for patient holding and immobilisation are attached properly to the unit.
- ◆ When brake pedal of the castor is in locked status, check if the Ortho stand position is locked.

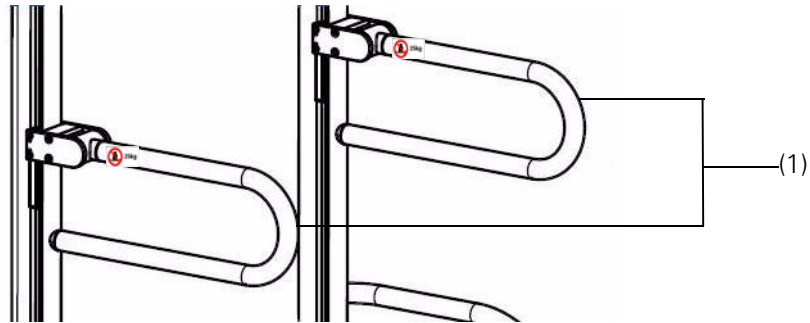
System overview / system operation

System overview



- (1) Transparent protection plate (back board)
- (2) Guide rails for height adjustment of handgrips
- (3) Patient handgrips
- (4) Handles
- (5) Patient step
- (6) Base frame
- (7) Castors with brake pedals

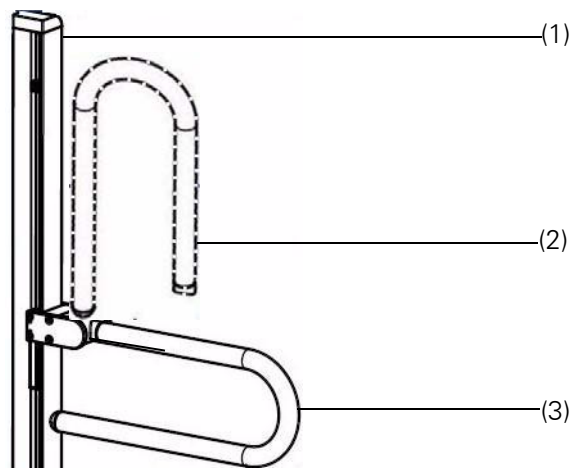
Patient handgrips



(1) Handgrips

- ◆ The handgrips are intended to support the patient during the examination.
- ◆ They are height-adjustable.

Adjusting handgrips



(1) Guide rails

- The handgrips can be moved up and down in the guide rails.

(2) Unlocked position

(3) Locked position

- ◆ To release the handgrip, rotate it counterclockwise 90° against guide rail.
- ◆ Move handgrips to the desired position.
- ◆ To fix handgrips, rotate handgrips clockwise 90° and back to the locked position.



Check that both handgrips are locked properly .

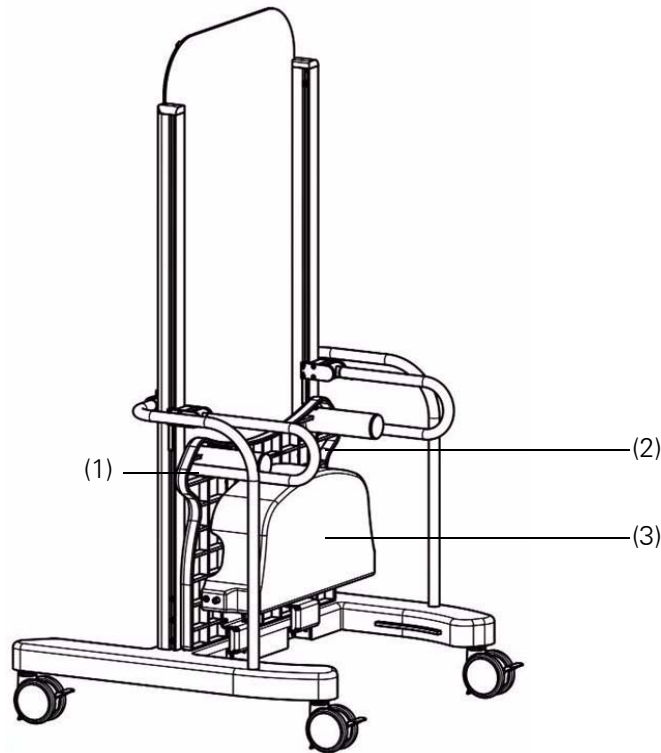
Thus, you prevent the handgrips from disengaging while the patient is holding or leaning on them.

Disengaging handgrips can cause injuries to the patient and/or damage to the equipment.

Castor brake pedal

To enable the Ortho stand to be fixed at any location, the four castors of the Ortho stand are equipped with brake pedals.

When the patient moves onto or leaves the Ortho stand, this device can be locked to enable the secure stand of the Ortho stand.



- (1) Lower part of handgrips
- (2) Patient step
- (3) Additional foot step

**Folding up patient
step**

Patient step can be folded up.

- ◆ To fold the patient step up, please lift it up and put it close to the protection plate.
- ◆ Move handgrips above the folded patient step.
 - Make sure that the lower part of handgrips can protect patient step from falling down.

Patient step unfolding

- ◆ Remove the additional foot step¹.

Refer to "*Additional foot step*" → p. 44 for further information.

- ◆ Hold the patient step then unlock both handgrips.
- ◆ Lay down the patient step.

Moving the Ortho stand

The Ortho stand can be easily moved to any place.

- ◆ Unlock brake pedals of castors.
- ◆ Stand between base frames.
- ◆ Hold handles and move the Ortho stand.

¹ If it is equipped.

System operation

Requirements

As part of the X-ray imaging system, the Ortho stand is used for the examination of body parts such as long leg and long spine.

The X-ray imaging system must be operated by trained and qualified personnel. In addition, make sure to follow the requirements of relevant laws and regulations during the operating process.

How to use the Ortho stand

When using the Ortho stand, please follow the steps below. In addition, make sure to avoid collision with X-ray detectors or other devices:

- ◆ Before exposure, place the detector and the tube at the required exposure position.
- ◆ Adjust the height of the detector moving it at pre-set height matching the Ortho stand height.
- ◆ Fold the patient step up and release the brakes on all castors.
- ◆ Move the Ortho stand to the required position.
- ◆ Check that there is no collision between Ortho stand and detector.
- ◆ Lock all castors and ensure that the Ortho stand is fixed.
- ◆ Fold the patient step down and assist the patient to stand on it.
- ◆ Switch on the light localizer at the collimator, and prepare the final exposure position.
- ◆ Adjust the light field of the collimator and release an exposure.
- ◆ Help patient to leave the patient step of the Ortho stand.
- ◆ Fold the patient step up and release the brakes on all castors.



Do not use patient handgrips to move the Ortho stand.



Caution

Positioning the Ortho support

Injury of the user

- ◆ Follow the instructions in the Operator Manual.
- ◆ Be careful not to pinch your fingers, hand or legs during positioning.

Accessories and Auxiliary Devices

Description



Caution

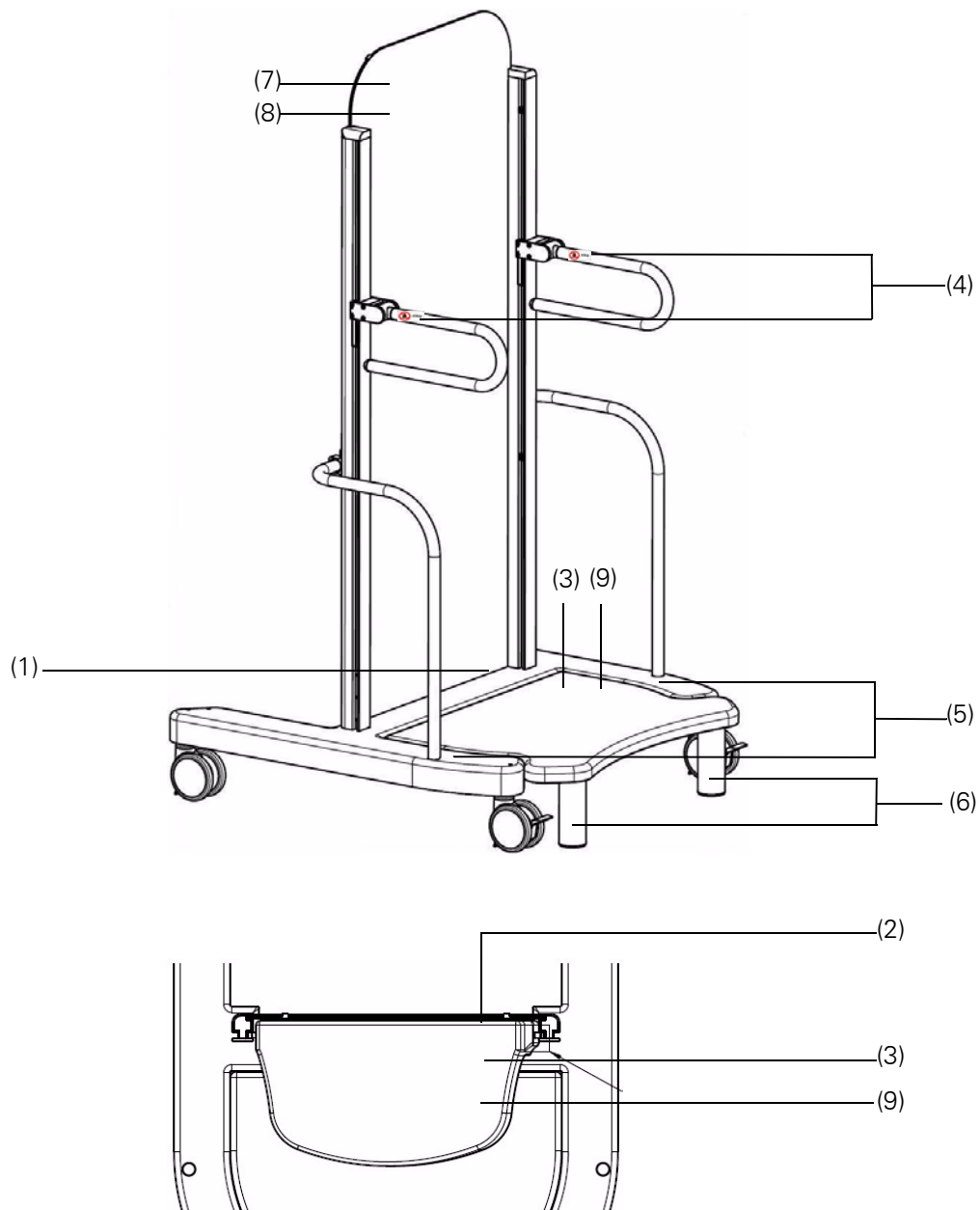
Mounting the Ortho support

Patient can slip or fall down

- ◆ Position the patient hand grips at the lowest possible position when the patient is mounting or dismounting.
-

Technical description

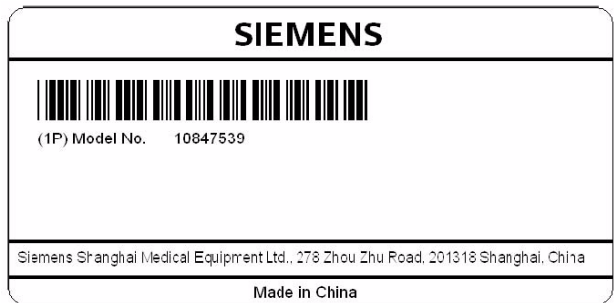
Location of labels



(1) Identification system label



(2) Identification additional step label



(3) Max. weight-bearing label 180kg



(4) Max. weight-bearing label 25kg



(5) Anti-grip label



(6) Crushing Hazard foot label



(7) AL Equal label

≤ 1.7 mm Al equal
-100 kV 3.7 mm HVL

(8) Protection class of Type B applied parts label



(9) Follow the instructions in the operator manual



Technical data

Dimensions

Total height of the Ortho stand 1950 mm +/- 10 mm

Length of the Ortho stand (base frame) 989 mm +/- 5mm

Width of the Ortho stand (base frame) 1072 mm +/- 10 mm

Maximum load

Maximum patient weight 180 kg

Maximum load of handgrips 25 kg

Ambient conditions

Operation: + 10 °C to + 35°C
20% to 75% rel. air humidity without condensation
700 hPa to 1060 hPa

Storage and transport: - 20 °C to + 70°C
10% to 95% rel. air humidity without condensation
500 hPa to 1060 hPa

Aluminum equivalent of transparent protection plate ≤ 1.7 mm Al equal (100 kV/3.7 mm HVL)
(according to IEC 60601-1-3:1994 and IEC 60601-2-54: 2009)

Cleaning and disinfection

Before cleaning and disinfecting the equipment, make sure that no liquids can seep into the interior of the equipment.

Cleaning

- ◆ Do not use water to clean the equipment, otherwise it might bring rust to the mechanical structure.
- ◆ Do not use corrosive, soluble or abrasive cleaning materials for cleaning.
- ◆ For sprayed paint, plastic and chromium alloy surface, make sure to use clean and dry soft cloth to wipe clean.



Caution

Patient hand grips slip because the guide rails are contaminated

Patient injury

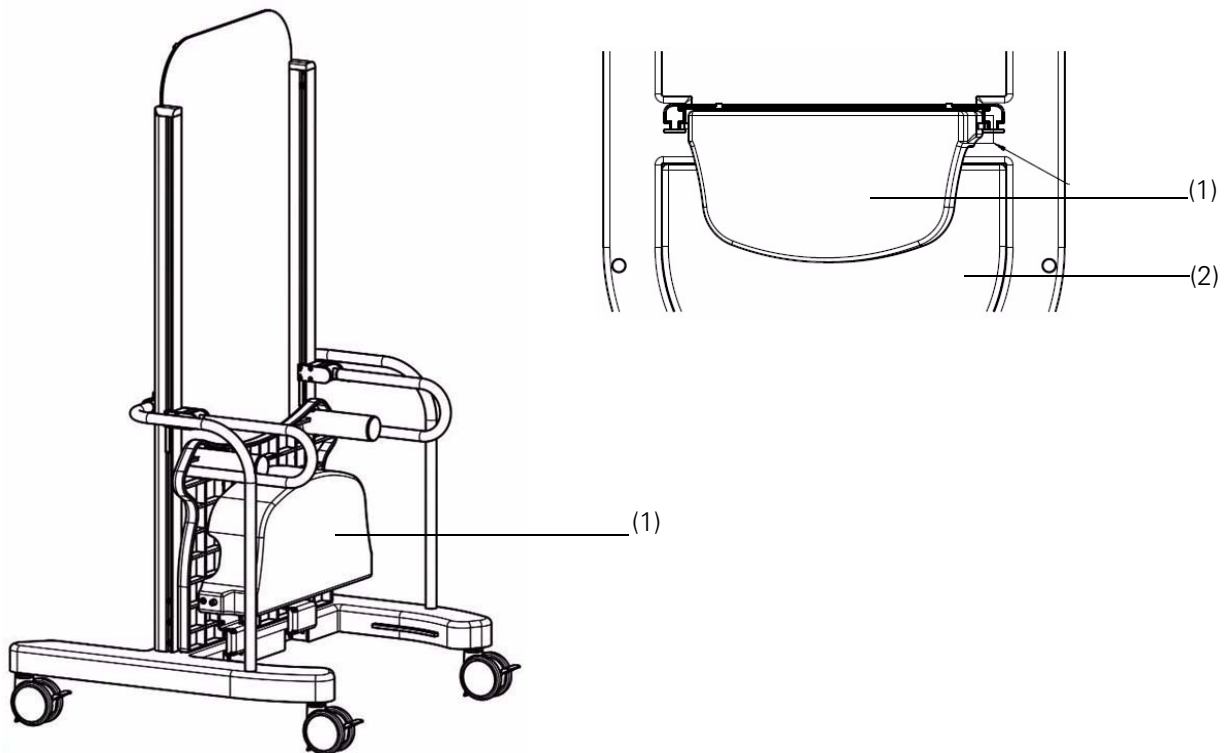
- ◆ Clean the Ortho support with a suitable agent.
- ◆ Check that there is no oily residue on the guide rails.

Disinfection

- ◆ Disinfect all components of the equipment, including accessories, only with a soft cloth soaked in disinfectant.
- ◆ Do not use spray disinfectant.

Accessory

Additional foot step



(1) Additional foot step¹

(2) Patient step

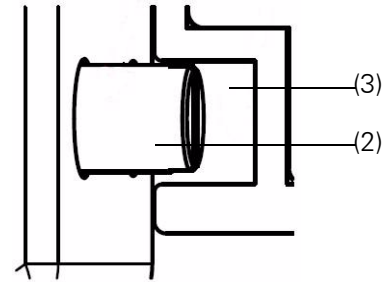
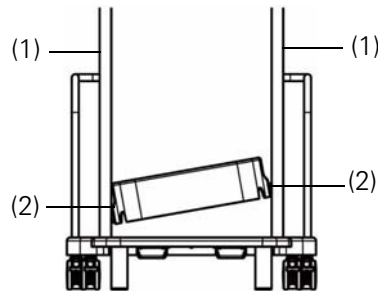
The additional foot step is mounted with guide rails and can be hanged on the folded patient step for movement.

Application

Additional foot step for smaller patients (for example, foot, ankle or small size patients) and to make sure that the whole patient body can be mapped.

¹ Optional

Attachment



- (1) Guide rails
- (2) Assembly bolt
- (3) Assembly slot

- ◆ Hold additional foot step with both hands and insert it into the guide rails.
- ◆ Slide it into the required position.
- ◆ Make sure that assembly bolts are inserted into assembly slot.
- ◆ Check the step is attached firmly by pulling on it.



If the additional foot step is not securely fastened, the patient can fall down and be injured ; the Ortho stand can be damaged.

- ◆ Make sure the additional foot step is securely fastened

Removal

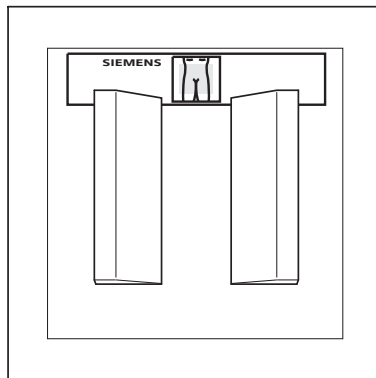
- ◆ Take the the additional foot step holder with both hands and remove it from the guide rails.

Compensation filters

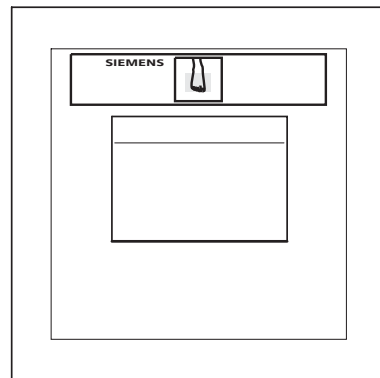
Application

Absorption compensation for acquisitions of:

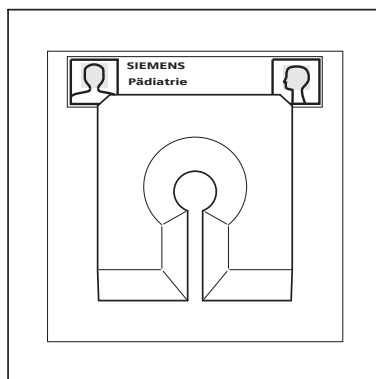
- ☐ Pelvis
- ☐ Foot
- ☐ Infant skull
- ☐ Adult skull
- ☐ T-spine, L-spine
- ☐ Shoulder



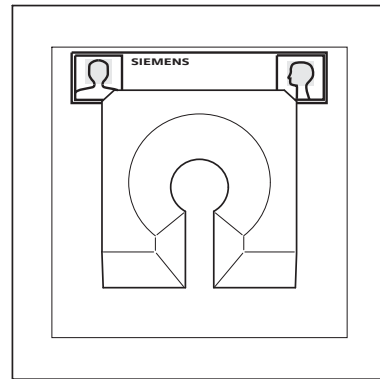
Compensation filter for pelvis



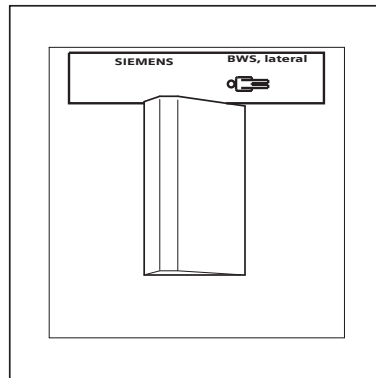
Compensation filter for foot



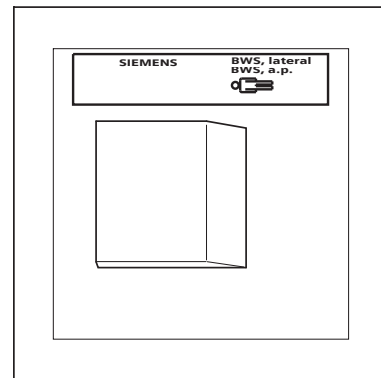
Compensation filter for infant skull



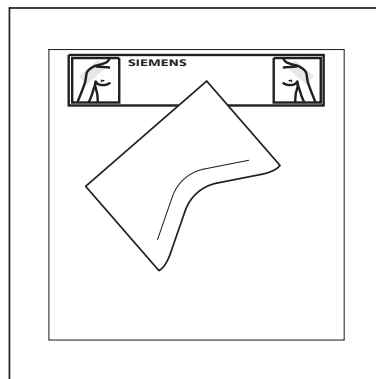
Compensation filter for adult skull



Compensation filter for thoracic spine, lat.



Compensation filter for thoracic or lumbar spine, lat.



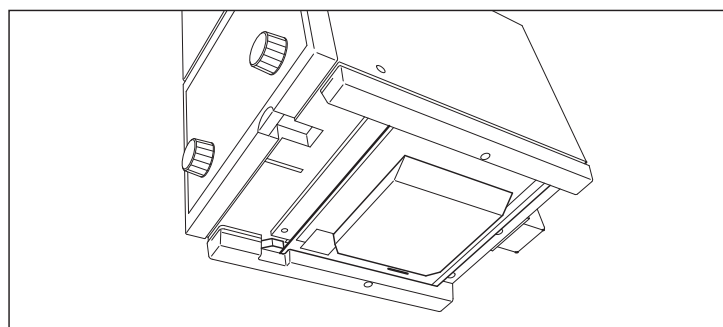
Compensation filter for shoulder

Attachment



The operating personnel has to take care that the filters are appropriately attached.

- ◆ Push the filter with the aluminum part *downwards* into the two accessory rails of the multileaf collimator.
 - The safety spring in the left rail is pushed beside in this case.
- ◆ Push the filter up to the stop.





Warning

Falling objects because too much weight is hung on the collimator

The rails could be damaged by the use of excessive force.

A proper seating of the accessories or auxiliary devices can no longer be guaranteed and can lead to patient injury.

The position of the tube assembly can change.

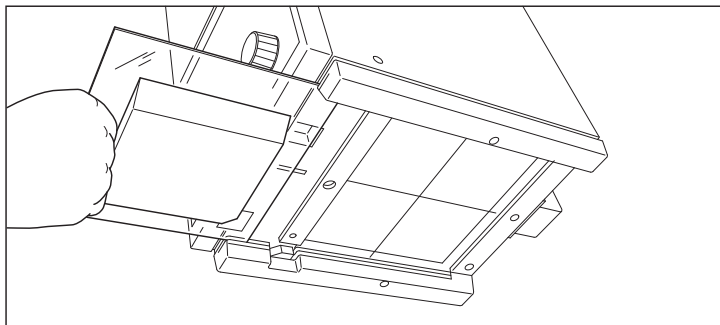
- ◆ Do not hang more than 7 kg on the collimator accessory rails.
- ◆ Do not exert any force on the multileaf collimator or its rails when inserting the accessory or auxiliary device.
- ◆ Check that the accessory is firmly anchored in the collimator rails.



If you exert too strong a pressure on the accessory rails, you might have to change the settings of the RHA because of a change in the position of the tube assembly.

Removal

- ◆ Pull filter out of the accessory rails of the multileaf collimator
 - The safety spring in the left rail has to be pushed beside in this case.

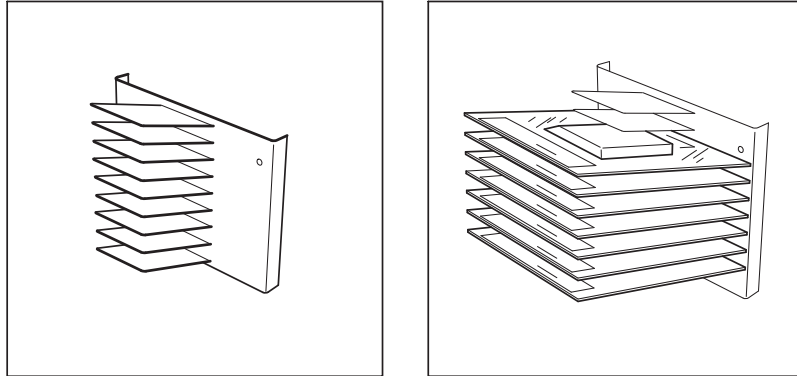


- ◆ Keep filter secured in the holder.



Please be careful when handling the compensation filters. They are thin, scratch-sensitive, and may become unusable due to rough handling.

Filter holder for eight filters



Application

For storing a maximum of eight compensation filters.

Fastening the wall holder

- ◆ Have the holder fastened to the wall at working height at a suitable place with the enclosed wall plugs and screws.

Equipping the wall holder

- ◆ Remove compensation filters from the packaging.
- ◆ Turn the filter so that you can read the designation on the filters reading normally from above.
- ◆ Place the filters in the upwards angled compartments.

Storing the compensation filter

- ◆ Place the filter in a free compartment of the wall holder, turn the filter so that you can read the designation on the filter reading normally from above.

Five-field template, set

Application

For exposing the IONTOMAT ionization chambers on the object to be exposed.

The five-field templates are available as a complete set or individually for the following SIDs:

- ☐ 90 cm - 110 cm
- ☐ 110 cm - 130 cm
- ☐ 130 cm - 175 cm
- ☐ 175 cm - 220 cm

Usage

- ◆ Push the locking lever on the left accessory rail to the left.
- ◆ Slide the template into the collimator accessory rail in the correct direction for exposing the ionization chamber.
 - The locking lever on the accessory rail springs to the right.
- ◆ Check that the template sits firmly in the collimator.
- ◆ Expose the ionization chambers. To do so, switch on the light of the collimator.

Storage

- ◆ Push the locking lever on the left accessory rail to the left.
- ◆ Pull the template out of the accessory rails.
 - The locking lever on the accessory rail springs to the right.

Store the five-field templates in a suitable location.

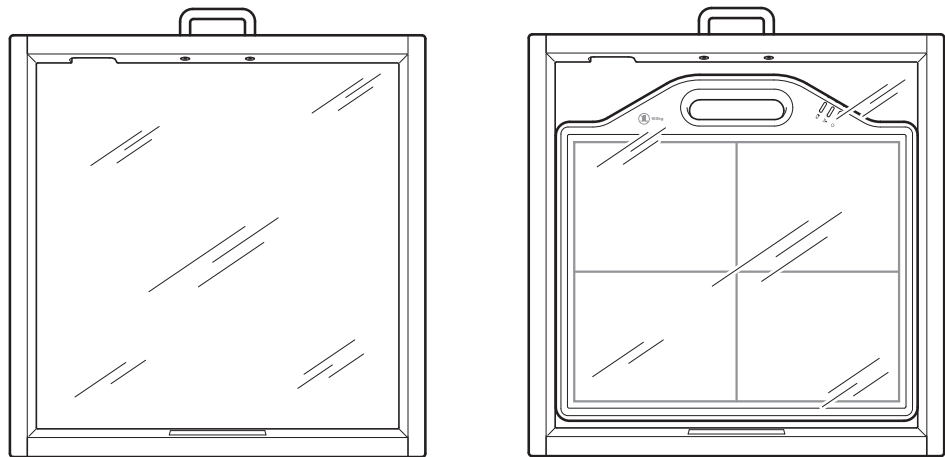


Please be very careful with the five-field templates. They are thin, sensitive to scratching and can become useless if handled carelessly.

Laser light localizer

An additional localizer template can be used to generate a 90° offset laser light. This ensures a radiation-free adjustment of the exposure projection and patient positioning.

FD protector (patient support)



Application

The FD protector is a protective cover for the detector. It is used for examinations where the patient has to stand on the detector if the patient body weight exceeds 100 kg.



The FD protector may only be used without clip-on grids.

The FD protector is made of acrylic glass.

If the detector back-up cable is used, make sure the cable runs through the intended cable slots.

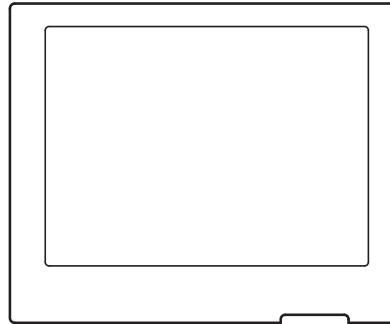


The maximum load on the FD Protector must not exceed the specified value on the label.

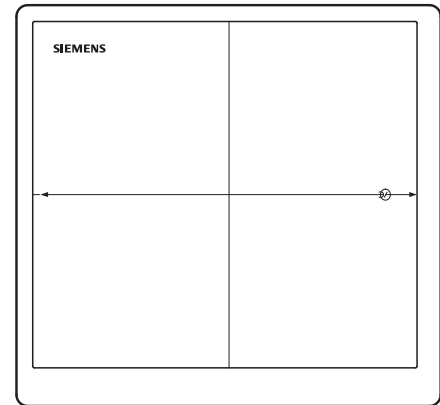
AI equivalent

The AI equivalent value is 1.39 (for 3.7 mm Al).

Clip-on grids



for MAX mini



for MAX wi-D

The following clip-on grids are available:

- ☐ 15/80 F115 for MAX wi-D
- ☐ 5/85 F15 for MAX wi-D
- ☐ 5/85 F115 for MAX mini

Application

The clip-on grids are used for free exposures on the mobile MAX detectors.

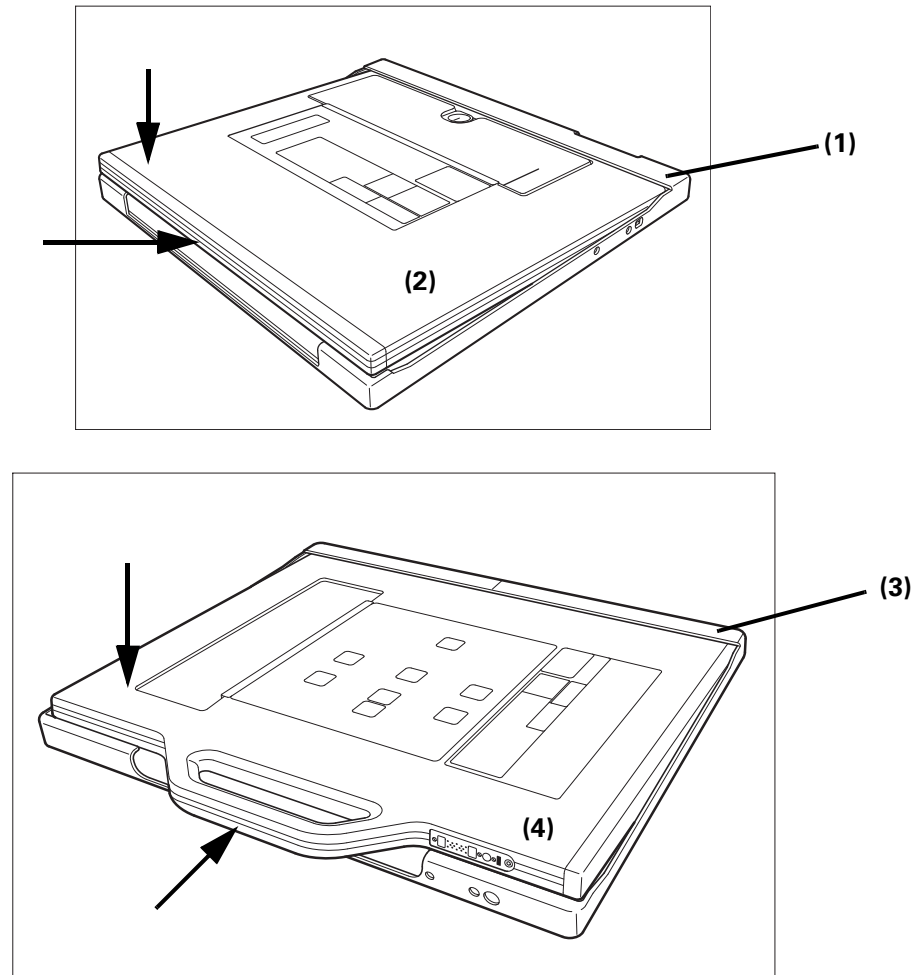
For exposures on the patient table or on the wallstand, use the corresponding internal grid.



When the clip-on grid is not in use, remove it from the detector and store it in a safe place where it cannot fall, for example in the grid holder.

Even if it is not extremely damaged, maybe its characteristics are changed, which may cause a problem in image quality.

Attaching the clip-on grids



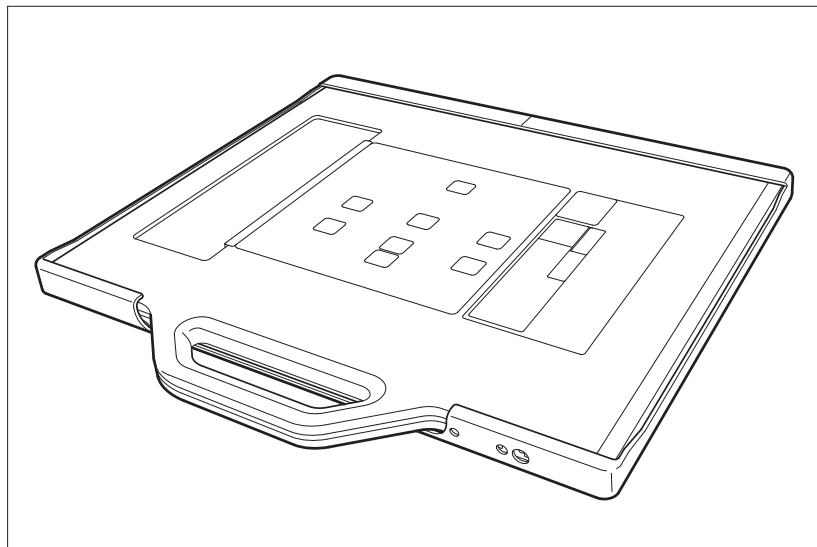
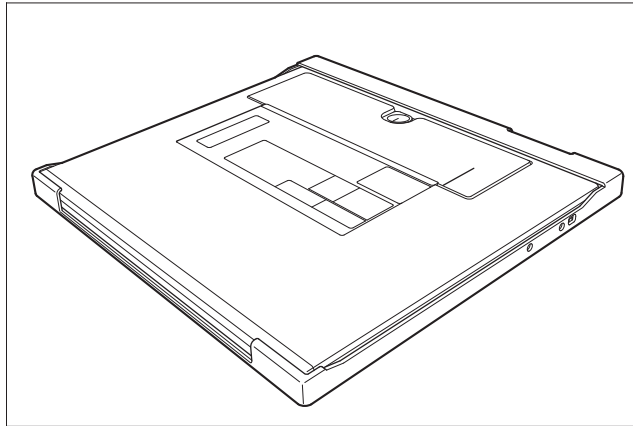
(1) Clip-on grid for MAX mini

(2) Detector MAX mini

(3) Clip-on grid for MAX wi-D

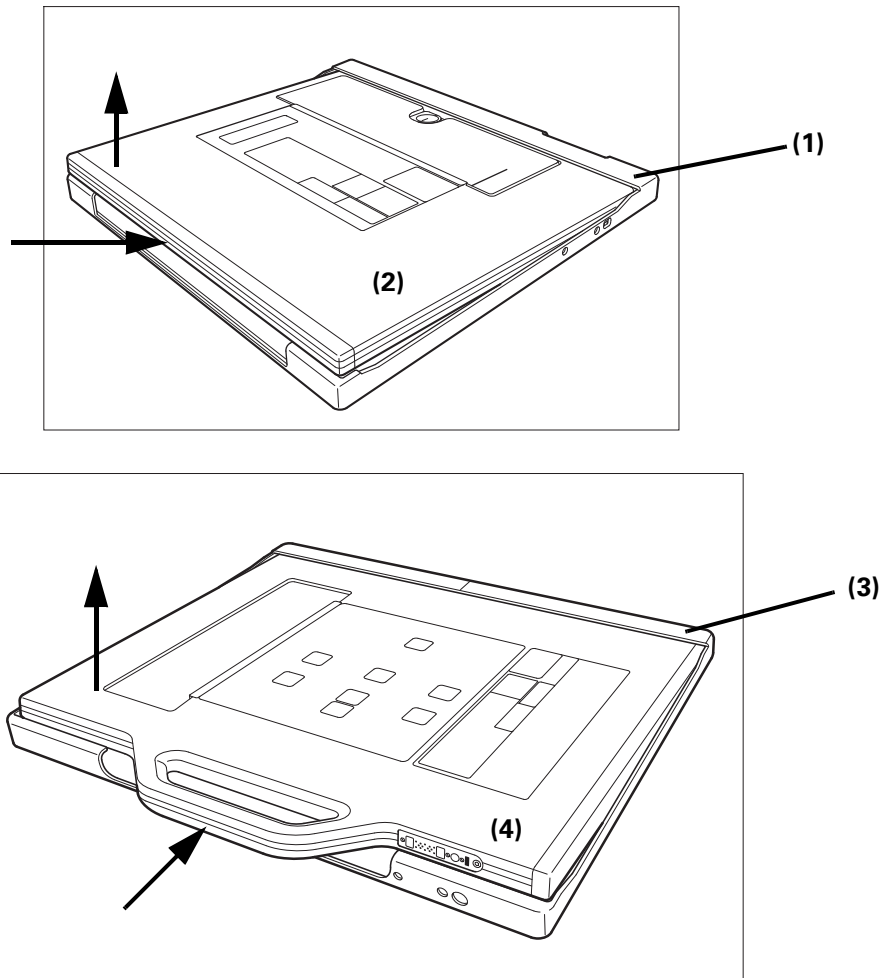
(4) Detector MAX wi-D

- ✓ Detector front must face the backside of the clip-on grid.
- ◆ Put the detector with the bottom in the the clip-on grid as show in above figure.
- ◆ Push the detector gently down against the loading spring of the clip-on grid and let it slide smoothly into the clip-on grid and let go.



Ensure that the grid unit is locked before lifting the detector unit. Otherwise, the grid unit can fall and be damaged.

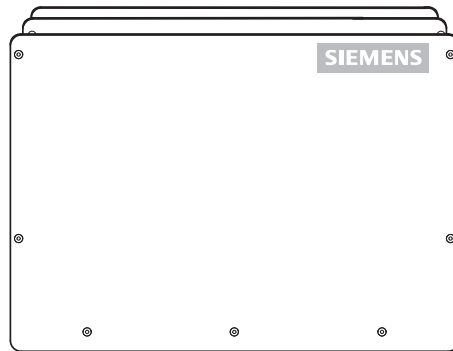
Removing the clip-on grid



- ◆ Push the detector gently down against the loading spring of the clip-on grid and then pull the detector out of the clip-on grid and let go.

Wall holder for grids

This holder is used for storage of exchangeable grids or cassette trays. You can mount it to the wall.



Trolley for BABIX cradle



Safety information

Do not push the trolley!

Application

The trolley is an aid for X-raying infants in upright position. The BABIX cradle is suspended in this case on a hook on the trolley. It can thus be brought simply and quickly into the exposure position.

You can use it in wall mode only.



*Use the BABIX trolley exclusively for moving and positioning the BABIX cradle.
Incorrect use of the trolley can lead to damage and injuries!*



Leave the detector in the wall position. The tilted detector can collide with the BABIX trolley and be damaged.

Operating sequence

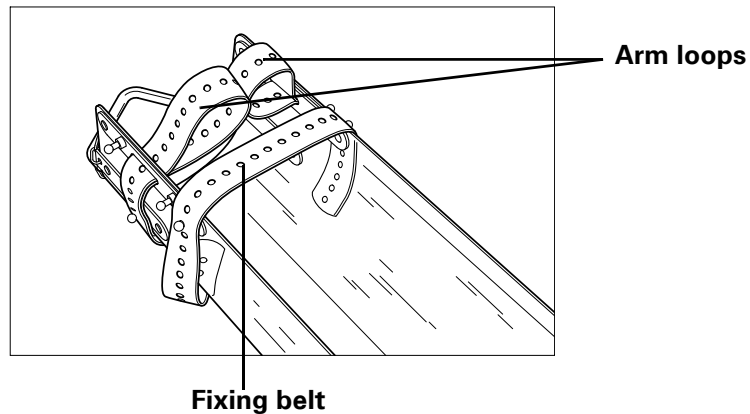
- ◆ Position the Multitom Rax in the "wall position".

There are two versions of the operating sequence:

1. Suspending the BABIX cradle with infant after positioning the empty trolley.
2. Positioning the trolley with the BABIX cradle already suspended.

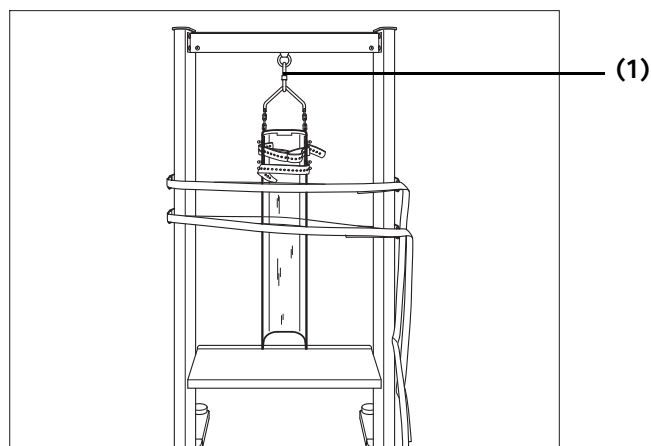
Version 1: Suspending the BABIX cradle after positioning the empty trolley

- ◆ Position the empty trolley in front of the detector.
- ◆ Fix the trolley with the locking brakes.



- ◆ Place the infant in the BABIX cradle, fix it with the corresponding cushions and wedges and strap is firmly with the belts provided for this purpose.

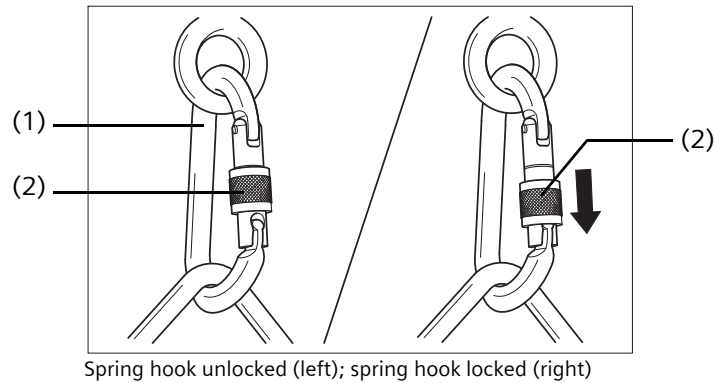
Refer to the corresponding literature or hospital regulations.



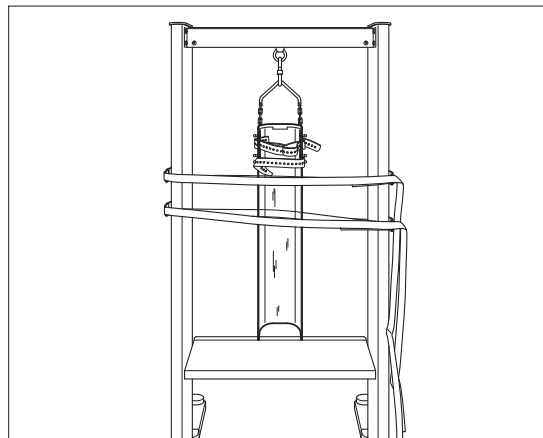
- ◆ Suspend the BABIX cradle with the infant in the spring hook (1).
- ◆ Turn the hook as required for lateral or a.p. exposures.

Accessories and Auxiliary Devices

Description



- ◆ Lock the spring hook (1) against unintended opening by turning down the knurled screw (2) to the stop.

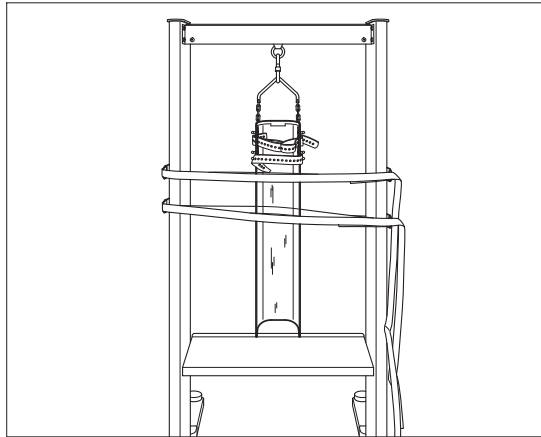


- ◆ Fix the BABIX cradle with the infant in the exposure position with belts drawn through the loops on the sides of the trolley.
- ◆ Take the exposures as required.
- ◆ Unhook the BABIX cradle and free the infant from the BABIX cradle.
- ◆ Remove the trolley and move it to its storage place.

Version 2: Positioning with the BABIX cradle already suspended

This version differs from version 1 only in that the trolley is positioned in front of the detector with the BABIX cradle including infant already suspended.

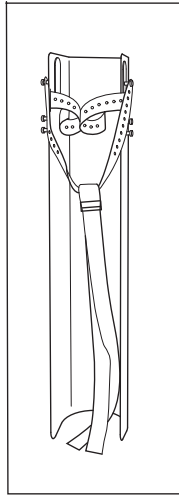
Please note the following when moving and positioning the trolley with already suspended BABIX cradle:



Fixing the cradle

- ◆ Before moving and positioning, fix the BABIX cradle with the infant in the exposure position with belts.
- ◆ Draw these belts through the loops on the sides of the trolley.
 - In this way, you avoid the infant swinging to and fro and thus being injured during moving and positioning.

BABIX cradle, U-shaped, 700 mm



Application

Pediatric examinations with the table and the wallstand in which you must firmly envelop the child's body in a straight posture.

The BABIX cradle is made of translucent and radiolucent plastic.

Restriction The BABIX cradle is not suitable for use in magnetic resonance tomography.

Attachment

- ◆ Position the BABIX holder.
- ◆ Check that the BABIX holder is securely attached.
- ◆ Hook the BABIX on the hook of the holder and align it for the exposure.



Warning

Assembly of babix holder not correctly done

Injury of persons

- ◆ Follow the instructions in the Operator Manual.
-

Removal

- ◆ Remove the BABIX from the holder.
- ◆ Take the BABIX with the infant out of the examination room and attend to the infant.
- ◆ Hang the BABIX on the corresponding BABIX retainer and store appropriately.

Radiation protection value

The attenuation equivalent of the BABIX is ≤ 1.6 mm Al.

Permissible load

10 kg

Information on the possibility of wear

In addition to part **Safety**, please note the following information concerning the possibility of wear on **BABIX** and their **immobilizing straps**.

- ☐ After prolonged use, cracks may form in the PVC plastic material.
- ☐ The immobilizing straps may show wear.
- ◆ Following a visual check, replace the defective parts, if necessary, or dispose of the entire BABIX.
- ☐ The tensile/shear strength of the welded chains, brackets and fittings has been designed so as to ensure a safety factor of 20.
- ◆ If any external damage can be seen on these parts, replace them.

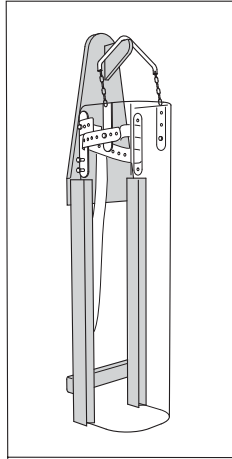
Cleaning

The BABIX can be cleaned using commercially available detergents and disinfectants.



Do not use chemical-based solvents!

BABIX retainer, for U-shaped BABIX



Application

Storage and stretching of BABIX

Attachment

Have the wooden holder fastened to the wall with the attached screws and wall plugs at a suitable location and the correct working height.

Removal

- ◆ Carefully pull the BABIX out of the groove of the BABIX retainer.
- ◆ Hold the BABIX securely.
- ◆ Lift the BABIX off the wooden hook of the retainer.
- ◆ Place the BABIX on a safe supporting surface.
- ◆ Carefully place the child in the BABIX in a comfortable position.
- ◆ Secure the child in the BABIX.
- ◆ Check to make sure the child is correctly and safely positioned in the BABIX.
- ◆ Take the child into the prepared X-ray room.

Storing

- ◆ Remove the child from the BABIX and attend to its needs.
- ◆ Hang the BABIX on the wooden hook with the opening in the BABIX facing the retainer.
- ◆ Press the two longitudinal sides of the BABIX into the grooves of the retainer.
- ◆ Check to make sure that the BABIX is securely seated in the retainer.

Trolley UM mobile patient table



Warning

Movement of the overhead detector positioned near a patient trolley. The patient trolley is not included in the collision calculation.

Danger of injuring the patient

- ◆ Move the detector as little as possible when it is positioned near a patient trolley.
 - ◆ Move the trolley away from the detector before choosing the next organ program position.
 - ◆ Use emergency stop to halt any undesired motion.
-

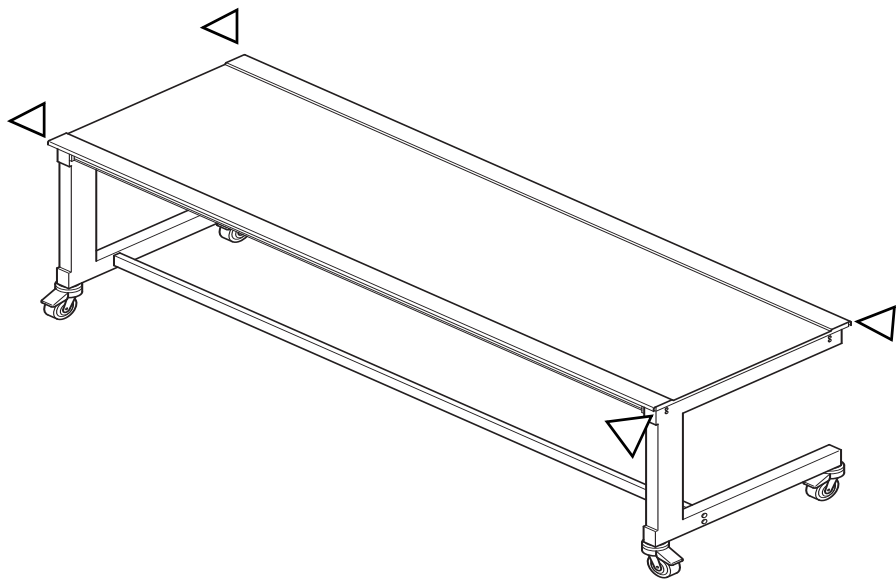
Safety

Risk of crushing

When the equipment is handled properly and when patients are positioned, the staff may only grasp the handles provided with their hands.

It is the responsibility of the operator to initiate movements of the equipment only if it is ensured that neither the patient nor third parties can be endangered by these movements.

The parts of the unit marked in the drawing indicate possible danger zones where the patient or staff could crush their fingers or be struck.



▽ Risk of injury for the operating staff when placing the table top in position.

Functional and safety check

Daily checks

- ◆ Check the unit movement
- ◆ Check the brakes
- ◆ Check the mobility of the castors
- ◆ Check that the necessary devices for patient holding and immobilisation are attached properly to the unit.
- ◆ When the castor brake pedal is in locked status, check if the patient table position is locked.

Cleaning and disinfection

Before cleaning and disinfecting the equipment, make sure no liquid can seep into the interior of the equipment.

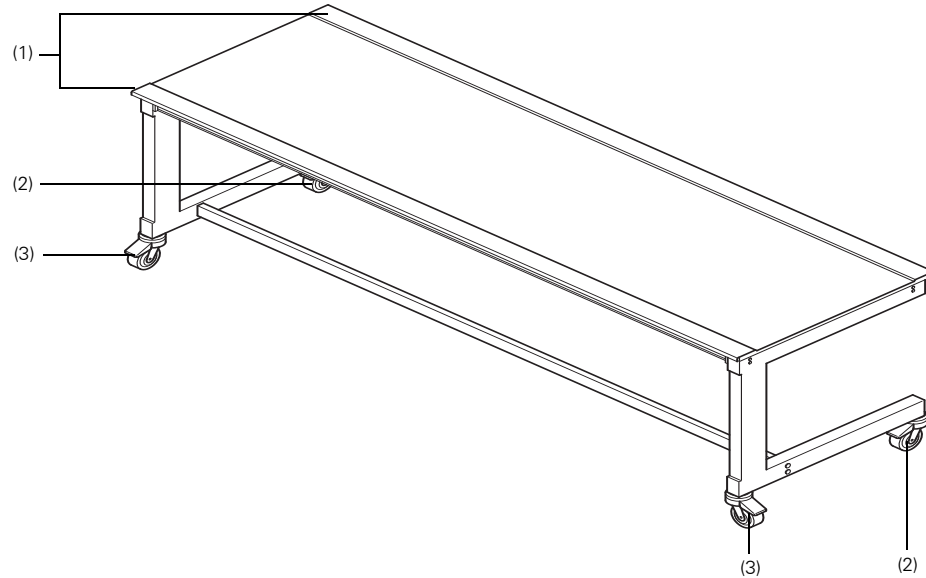
Cleaning

- ◆ Do not use water to clean the table, otherwise it might bring rust to the mechanical structure.
- ◆ Do not use corrosive, soluble or abrasive cleaning materials for cleaning.
- ◆ For sprayed paint, plastic and chromium alloy surface, make sure to use clean and dry soft cloth to wipe clean.

Disinfection

- ◆ Disinfect all components of mobile patient table, including accessories, only with a soft cloth soaked in disinfectant.
- ◆ Do not use spray disinfectant.

Product description



- (1) Accessory rails
- (2) Castors without brakes
- (3) Castors with brake pedal

Castor brake pedal

To enable the patient table to be fixed at any location, the two castors at the front of the table are equipped with brake pedals (as shown in the picture).

When the patient is moving onto or leaving the patient table, this device can be locked to fix the table position.

Intended use

As a patient supporting device of the X-ray imaging system, Trolley UM mobile patient table can facilitate X-ray imaging of the recumbent patient, for instance the examination of stomach and lower limbs.

Product features

- ☐ Wide application scope
- ☐ High reliability
- ☐ Easy mobility of the patient table
- ☐ Table top has high level of X-ray permeability and stiffness
- ☐ Large table top facilitates emplacement of patients
- ☐ The thin table top surface can narrow the distance between the cassette and the object to be exposed;
- ☐ By using the brake control device, it is easy to position the patient table.



Trolley UM patient table must not be used to carry patients, it is only to be used as auxiliary supporting device when taking exposures.

When the patient is moving onto or leaving the patient table, the brake pedal must stay locked. Besides, give assistance to the patient, otherwise the table might slide to create hazard.

Operation

Requirements

As a part of the X-ray imaging system, the mobile patient table is used for the examination of body parts such as abdomen and lower limbs.

The X-ray imaging system must be operated by trained and qualified personnel. In addition, make sure to follow the requirements of relevant laws and regulations during the operating process.

How to operate the patient table

When using the patient table, please follow the steps below. In addition, make sure to avoid collision with X-ray cassettes or other devices:

- ◆ Before exposure, place the cassette and the tube at the required exposure position.
- ◆ Adjust the height of the cassette moving it at pre-set height matching the patient table height.
- ◆ Move the table to a position above the cassette, make sure the table cannot collide with the cassette and the post.
- ◆ Move the table to an appropriate position.
- ◆ Lock both castors and ensure the table is fixed.
- ◆ Help the patient onto the bed and adjust the position as required.
- ◆ Release the brakes of both castors, move the table to obtain the required exposure position, and then lock the brakes again.
- ◆ Switch on the light localizer at the collimator, and prepare the final exposure position.
- ◆ Adjust the light field of the collimator and release an exposure.
- ◆ Release the brakes on both castors and move the table to a position convenient for the patient to leave the table;
- ◆ Lock both castors and help the patient from the table.



When moving the table, make sure to notice and avoid squeezing of hands and similar incidents.

When moving the table, make sure that both the patient and the operating personnel stay inside controllable safety zone.

Before using the table, make sure to remove all nearby objects such as chairs which might collide with the table.

When moving the table, make sure to take care, and avoid bringing any unnecessary harm to patients, operators or other personnel, and also tube and cassette.



Technical description

Technical data

Dimensions

Table top	2000 mm (+/- 5 mm) X 660 mm (+/- 5 mm)
Distance from table top to the ground	700 mm (+/-10mm)
Usable width of table top between standing posts	1900 mm
Maximum load of the table top	135 kg
Aluminum equivalent of table top	<0.8 mm Al (according to measurement results based on GB 9706.12(IEC60601-1-3:1994) (100 kV/3.7 mm Al)

Environmental conditions

Temperature	+10 °C to +35°C
Relative humidity	30% to 70%
Atmospheric pressure	700 hPa to 1060 hPa

Complying Standards

- ❑ GB 9969.1-1998 General principles for preparation of instructions for use of industrial products;
- ❑ GB/T 191-2000 Packaging-Pictorial markings for handling of goods;
- ❑ YY 0076-1992 Coating classification and technical conditions for metal fabrication;
- ❑ YY 91099-1999 Medical X-ray equipment – Designation, packaging, transportation and storage;
- ❑ YY/T 0291-1997 Environmental requirements and test methods for medical X-ray equipment;
- ❑ YY/T 91055-1999 Paint coating for medical devices-Classification and specification;
- ❑ UL 60601-1, 1st Edition, 2006-04-26 (Medical Electrical Equipment, Part 1: General Requirements for Safety);
- ❑ CAN/CSA-C22.2 No. 601.1-M90, 2005 (Medical Electrical Equipment - Part 1: General Requirements for Safety);
- ❑ IEC 60601-1:1988 + A1:1991 + A2:1995;
- ❑ IEC 60601-1-3 MEDICAL ELECTRICAL EQUIPMENT. Part 1: GENERAL REQUIREMENTS FOR SAFETY ;COLLATERAL STANDARD: General Requirements for Radiation Protection in Diagnostic X-Ray Equipment-Edition 1-Issue date1994/07/01;
- ❑ IEC 60601-2-32 Medical electrical equipment Part 2: Particular requirements for the safety of associated equipment of X-ray equipment-Edition 1-Issue Date 1994/03/01;
- ❑ IEC 60601-1-3 MEDICAL ELECTRICAL EQUIPMENT. PT. 1-3, GENERAL REQUIREMENTS FOR SAFETY – COLLATERAL STANDARD: RADIATION PROTECTION IN DIAGNOSIS X-RAY EQUIPMENT - Edition 2 - Issue Date 2008/01/01;
- ❑ IEC 60601-2-54 Medical electrical equipment –Part 2-54: Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy-Edition 1-Revision Date 2010/03/01;
- ❑ AAMI ES60601-1 MEDICAL ELECTRICAL EQUIPMENT, PART 1: GENERAL REQUIREMENTS FOR BASIC SAFETY AND ESSENTIAL PERFORMANCE - Edition 1 - Revision Date 2010/04/01;
- ❑ CSA C22.2 NO. 60601-1 MEDICAL ELECTRICAL EQUIPMENT. PT. 1, GENERAL REQUIREMENTS FOR BASIC SAFETY AND ESSENTIAL PERFORMANCE - Edition 2 - Revision Date 2011/06/01;
- ❑ IEC 60601-1 MEDICAL ELECTRICAL EQUIPMENT PART 1: GENERAL REQUIREMENTS FOR BASIC SAFETY AND ESSENTIAL PERFORMANCE - Edition 3 - Revision Date 2009/01/01

Patient table Prognost XP



Warning

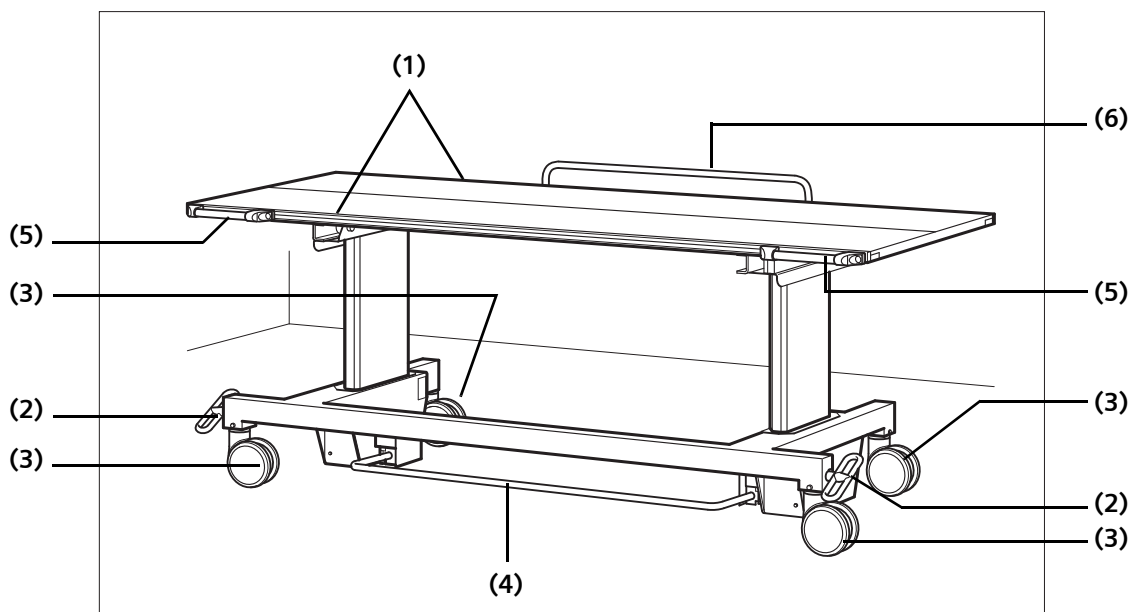
Movement of the overhead detector positioned near a patient trolley. The patient trolley is not included in the collision calculation.

Danger of injuring the patient

- ◆ Move the detector as little as possible when it is positioned near a patient trolley.
- ◆ Move the trolley away from the detector before choosing the next organ program position.
- ◆ Use emergency stop to halt any undesired motion.

This patient table is a mobile easy to move patient table with floating table top for digital or conventional exposures with U/L-arm units.

The open table frame allows fast positioning of the table with the patient on top directly above the corresponding image receptor.



- (1) Accessory rails
- (2) Parking brakes
- (3) Castors
- (4) Foot pedal for release of mechanical table brake
- (5) Handgrips, short (at user side, two pieces recommended)
- (6) Handgrip, long (at receptor side)

Handling

Prepositioning of the table is performed through castors (3).

Parking brakes (2) are operating on two castors and their vertical axis for a sturdy position of the table.

- ◆ For exact centering of the patient to the exposure field, release the mechanical brake of the floating table top by foot pedal (4).
- ◆ Then, move the table top with patient to the desired position.

Technical data

Table top	Carbon fiber with low attenuation (typical 0.7 mm Al)
Thickness	2.5 cm
Length	200 cm
Width	75.5 cm 65.5 cm
Table height	73.8 cm
Usable width between the columns	112 cm
Table top movement	
longitudinal	± 33 cm
transverse	± 10 cm
Table weight	92 kg
Max. permissible patient weight	150 kg

Mobile Patient Tables Prognost XPE and XPE-Akku



Warning

Movement of the overhead detector positioned near a patient trolley. The patient trolley is not included in the collision calculation.

Danger of injuring the patient

- ◆ Move the detector as little as possible when it is positioned near a patient trolley.
- ◆ Move the trolley away from the detector before choosing the next organ program position.
- ◆ Use emergency stop to halt any undesired motion.

Intended use

The Prognost XPE/XPE-Akku is a patient table for examinations with X-ray units for general radiography in diagnostic human medicine use. It must only be used in medically rooms.



The Prognost XPE/XPE-Akku is not suitable for patient transportation.

Features

- ☐ Wide range of application
- ☐ Motor driven elevation table for heights from 575 up to 840 mm with smooth start and stop and convenient patient access
- ☐ Automatic stop at pre programmed working heights
- ☐ High reliability
- ☐ Easy movement
- ☐ Floating flat table top, carbon fiber type, high transparency with high rigidity
- ☐ Hand grip, long (at rear side)
- ☐ Hand grips, short (at user side)
- ☐ Large range of table top displacement for convenient patient positioning

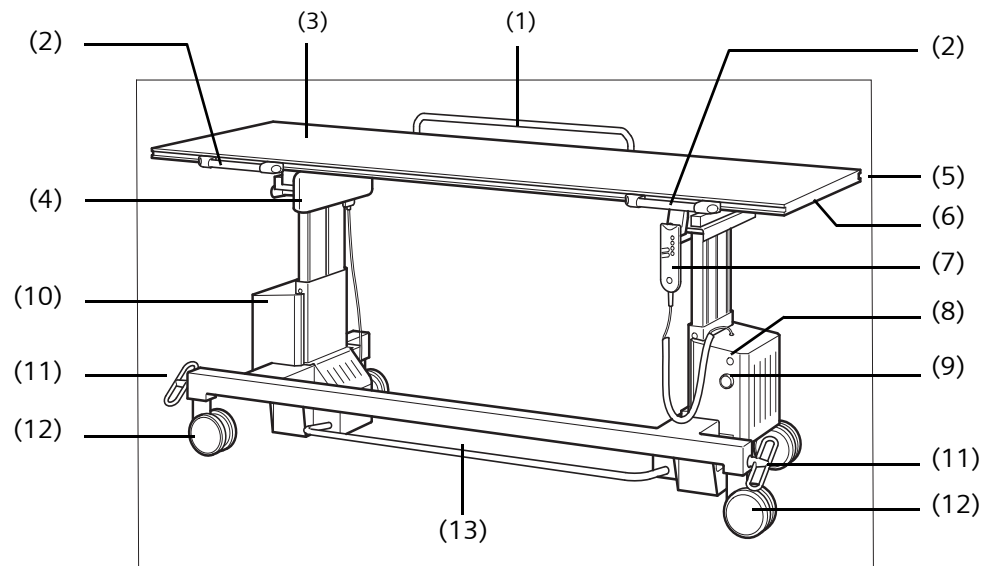
- ❑ Minimized table top thickness for short image receptor to object distance
- ❑ Control elements are arranged for easy access
- ❑ Power line independently battery powered usage with two exchangeable accumulator-boxes¹.
- ❑ Separate accumulator-box charging station¹.

Components

- ❑ **Hand grip, long**, (ID: 03010600), mounted on the long side of the table top in order to ease the patients getting on and off
- ❑ **Hand grips, short**, (ID: 03031100), mounted on the long side of the table top in order to ease shifting of the table or of the table top
- ❑ **Fixing mechanism** (ID: 03031450), left or right mountable, for moving the table around the corresponding elevating column axis
- ❑ **Deflector** (ID: 03030190), for easier positioning of the table over the digital detector
- ❑ **Side edge guard** (ID: 03030182), for protection of the detector
- ❑ **Bumper profile** (ID: 03030187), for rear accessory rail of table top
- ❑ **Protection foil** (ID: 03030184), for internal covers
- ❑ **Center stop** (ID: 05190000), for transverse table top movement

¹ For XPE Akku only

Control elements and indicators



- (1) Handgrip, long (at rear side)
- (2) Handgrips, short (at user side, two pieces recommended)
- (3) Table top
- (4) Protection foil
- (5) Bumper profile
- (6) Side edge guard
- (7) Hand-held control including holding device
- (8) Indicator lamp (Ready for use)
- (9) Emergency stop button
- (10) Power supply¹
- (11) Parking brakes for front castors
- (12) Front castors (fixable)
- (13) Foot pedal for release of mechanical table brake

¹ For XPE-Akku only

Handgrips (1)(2)

The following handgrips are available:

- ☐ Handgrip, long, for attachment at the rear side of the table top
 - Used for the patient to get On and OFF the table top easier.
- ☐ Handgrips, short, for attachment at user side
 - For easier movement of table and table top

Protection foil (3)

The protection foil on internal covers increases the slippage at contact with the detector housing.

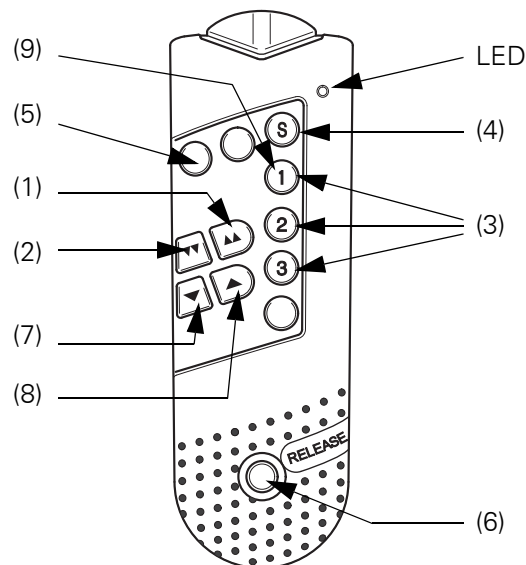
Bumper profile (5)

The bumper profile avoids a direct contact of the rear accessory rail of the table with the stand or the detector support.

Side edge guard (6)

The side edge guards avoid direct contact of the detector housing with the z-angle.

Hand-held control (7)



- (1) Table top upwards movement, fast, together with push button (6)
- (2) Table top downwards movement, fast, together with push button (6)
- (3) Memory 1, 2 and 3, for stored heights
- (4) Store, intermediate height
- (5) Push button to drive the table down, used in combination with push button (4) for column synchronization
- (6) Up/down motion-release
- (7) Table top downwards movement, slow, together with push button (6)
- (8) Table top upwards movement, slow, together with push button (6)
- (9) Special function: error and error log reset (for service only)

LED flashes if a button is pressed.



To move the table top up/down, it is necessary to press the motion-release push button (6) before any other motion push button.

To stop movement it is necessary to release the motion push button before the motion-release push button (6).

Place the hand-held control in the holding device when you do not use it.

Emergency stop button (9) and Power On indicator lamp (8)



Attention: If the emergency stop button is activated and the Power On indicator is off, the table input power line connector can still be under line voltage. The table is disconnected from the power line only by disconnecting the power cord from power line receptacle connector.

Emergency stop button

Press the emergency stop button to switch off the controller and the motor for the height adjustment of the table top.

Release the emergency stop button by turning it clockwise.

Power On indicator lamp

The 3-color indicator lamp is placed near the emergency stop button.

It indicates

- ☐ that the table elevation controller is ready for use.
- ☐ the actual status of the table.

Visual status of indicator lamp

Status low green: Energy-saving mode¹

- ◆ Press the motion-release push button to activate full power mode.

Status bright green: Ready for operation

Status orange: Accumulator discharged to first level, normal operation possible¹.

Status red: Accumulator discharged, only slow movements possible¹.

- After **low-power** mode is reached, it is not possible to switch to full power mode.

- ◆ Replace discharged accumulator with a charged one.

¹ For XPE-Akku only

Accessories and Auxiliary Devices

Description

Further status messages are displayed with red blinking cycles

Status	Red blinking cycle	Description	Action
1	1x 	Overttemperature of power amplifier caused by to frequent up and down moving or too heavy patient load.	◆ Cool down unit in standby until the red blinking cycle is finished and indicator lamp is bright green again. ◆ Reduce the patient load
2	2x 	Drive blocked	◆ Remove the blockage reason. ◆ Reset status message by pressing the motion-release push button (6) ◆ Call service if the failure status is indicated again during next movement.
3	3x 	Drive blocked* Drive overload†	◆ Cool down unit in standby. ◆ Reduce the patient load. ◆ Reset the status message by pressing the motion-release push button (6).
4	4x 	Unintentional moving down	◆ Reduce the patient load. ◆ Reset status message by pressing the motion-release push button (6) ◆ Call service if the failure status is indicated again during next movement.
5	5x 	Internal voltage breakdown	◆ Call service if the failure status is indicated again during next movement.
6	6x 	Discharged accumulator	◆ Change accumulator.
7	7x 	Internal limit switch error	◆ Call service

* For XPE only

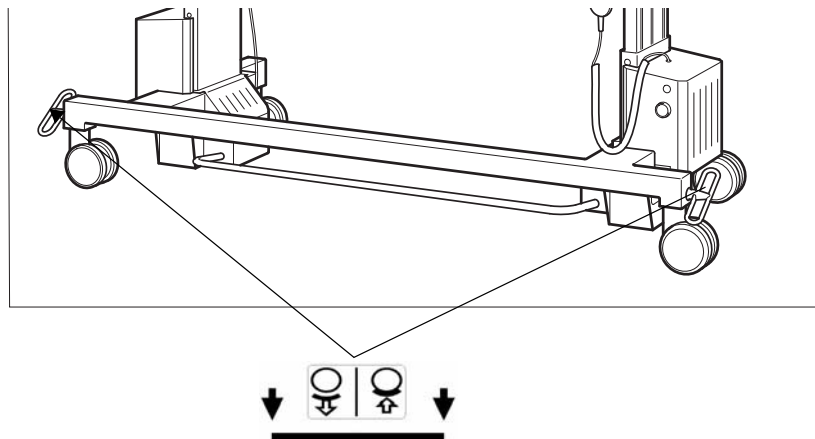
† For XPE-Akku only

Acoustic status
message

With all visual indicator lamp messages, an acoustic beeper message is generated.

Beep cycle	Description
2x 	General warning
3x 	Accumulator nearly discharged
6x 	Accumulator discharged

Parking brakes for castors



Foot pedal for release of mechanical table top brakes

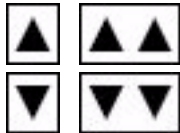
- ◆ Press the foot pedal to release the mechanical table top brakes.
Now, you can move the floating table top manually.

Table top Up and Down movement



You can adjust the table top to the preferred height.

However, move the FD detector carefully about 4 cm under the table top.



To move the table top up or down, press the corresponding pushbuttons in combination with the motion-release push button.

Column synchronization

Synchronize the controller, if

- ☐ the table is used for the first time or
- ☐ the table is used after a long time without operation or
- ☐ heights differences between the columns are visible.

Otherwise, the two columns can have different heights. As a consequence, if the table top brakes are released, the table top can move automatically to the lower side.



Never synchronize the controller with a patient on the table!

To synchronize the controller, use the hand-held control:

- ◆ Press push button „S“ (4) thrice.
- ◆ Then press push button (5) in combination with the motion-release push button (6) to move the table down until both columns stop.
 - The columns elevation controllers are now synchronized.

Adjustment and storage of preferred table heights

It is possible to store and memorize three different intermediate table heights to pushbuttons 1, 2 and 3 on the hand-held control.

- ◆ Move table height to desired position.
- ◆ Press push button "S" (4) thrice.
- ◆ Then press the memory pushbuttons 1, 2, or 3.
 - The current height is now memorized to the selected push button.
 - A beep confirms the Storage.

We recommend to memorize the table heights sequentially as for example

- for push button 1 the lower height
- for push button 2 the medium height and
- for push button 3 the highest table position.
- ◆ To select a memorized position, press memory pushbuttons 1, 2 or 3 in combination with the motion-release push button (6) until the table top stops.

Energy-saving mode¹

To reduce discharging of accumulator in standby, the Prognost XPE-Akku switches into energy-saving mode 20 seconds after last table top height adjustment.

- The indicator lamp switches from bright green to low green.

The Prognost XPE-Akku switches from energy-saving mode back to normal operating mode by pressing the motion-release push button again.

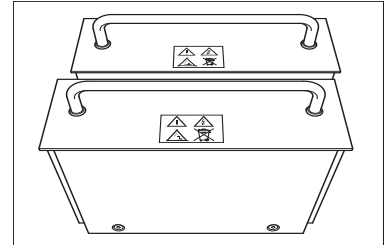
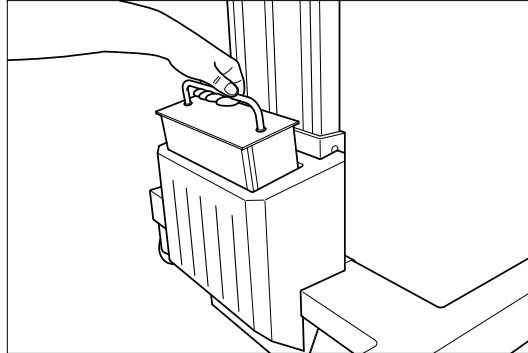
- The indicator lamp switches back to bright green or to the status before energy-saving mode.

If the Prognost XPE-Akku is not in operation over a longer period (for example on weekends), we recommend switching it OFF via emergency stop button.

¹ For XPE-Akku only

Accumulator box¹

Two accumulator boxes are delivered with the XPE-Akku.



For the operation of the Prognost XPE-Akku, insert a charged accumulator box into the power supply box of the table.



Before replacement of accumulator box, switch OFF Prognost XPE-Akku with emergency stop button.

After insertion of new charged accumulator box, switch ON again.

Charger



Do not place the charger in the patient area!

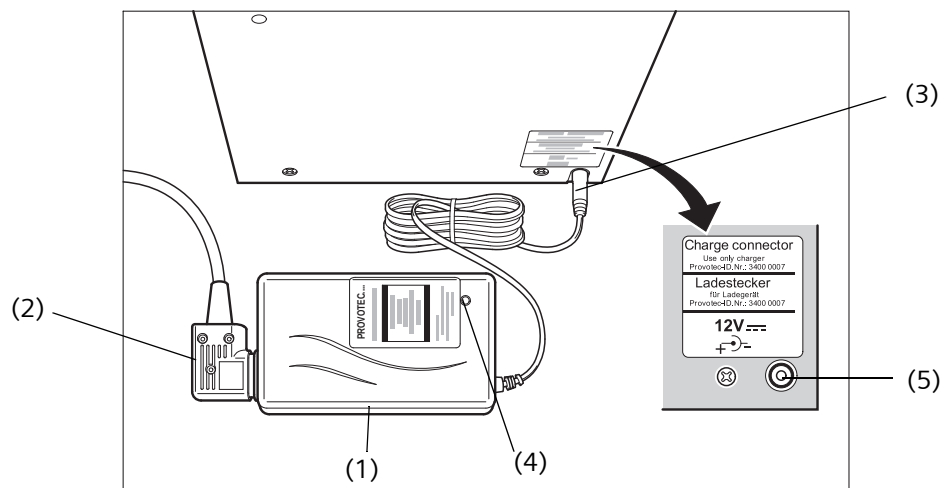


When you charge lead-acid storage batteries, explosive gases may develop.

- ◆ Ensure sufficient ventilation and avoid open fire or the formation of sparks.

The charger is for indoor use only.

- ◆ In order to avoid the risk of fire and/or electric shock, protect the charger against high humidity and water.
- ◆ To clean the charger, disconnect it from the mains supply.
- ◆ Use only a dry cloth.
- ◆ Do *not* plug in the charger if there are signs of damage to the housing or power cable.
- ◆ Call the service in such cases.
- ◆ Always disconnect charger from mains supply before you connect or remove the accumulator box.



- (1) Charger
- (2) Power cord with connector
- (3) Charge connector
- (4) Charging status LED
- (5) Socket for charge connector at the accumulator box

Charging the accumulator



Charging of accumulator boxes is only allowed with chargers that are released by Provotec.



At the bottom, the accumulator box has 2 contacts for connection to the 12-Vdc voltage of the inside mounted accumulator.

Never short-circuit these contacts!

To prevent the accumulator from short-circuiting, never place an accumulator box on metal plates, metal parts or conductive parts!

- ◆ Place accumulator box on a *non conductive* stable underground.
- ◆ Make sure that charger is disconnected from mains supply, before you connect the charger with the accumulator box.
- ◆ Insert the charge connector into the corresponding socket at the accumulator box.

Refer to "Charger" → p. 87

- ◆ Connect the charger with the mains supply.
- ◆ When the accumulator is charged, first of all, disconnect charger from mains supply.
- ◆ Wait until control LED is off.
- ◆ Then disconnect charge connector from the corresponding socket at the accumulator box.

Charging state at the charger



Even if you ignore the acoustic and visual discharge limit tone, the XPE controller allows up and down movement of the table.

You can continue table movements until the discharge safety limit of the accumulator box is reached.

If the discharge safety limit is reached, all movements are disabled to prevent the accumulator from complete discharging.

- ◆ Insert a new charged accumulator into the power supply box, to set the Prognost XPE Akku into correct operation again.

When the Prognost XPE-Akku is not used over a longer period, the accumulator box can discharge. To prevent discharging, we recommend switching the table OFF with the emergency stop button.



As known as characteristic of accumulators, the maximum charging capacity is reached after several cycles of discharging and charging.

The accumulator boxes are charged when delivered with the table.

In any case we recommend charging the accumulator boxes with the charger before the first use of Prognost XPE-Akku.

LED orange

Mode **boost charging**:

- Maximum and constant charging current until the load voltage is reached.
- The status LED changes from orange to yellow. The charge timer is switched on.

LED yellow

Mode **charge timer**:

- The charger is for 2 hours in time-controlled mode.
- Charge voltage is constant and charge current decreases. At this time, battery capacity is between 80-95% of maximum.
- The charger remains in this mode until the time interval is completed.

LED green

Mode **trickle charge** (standby):

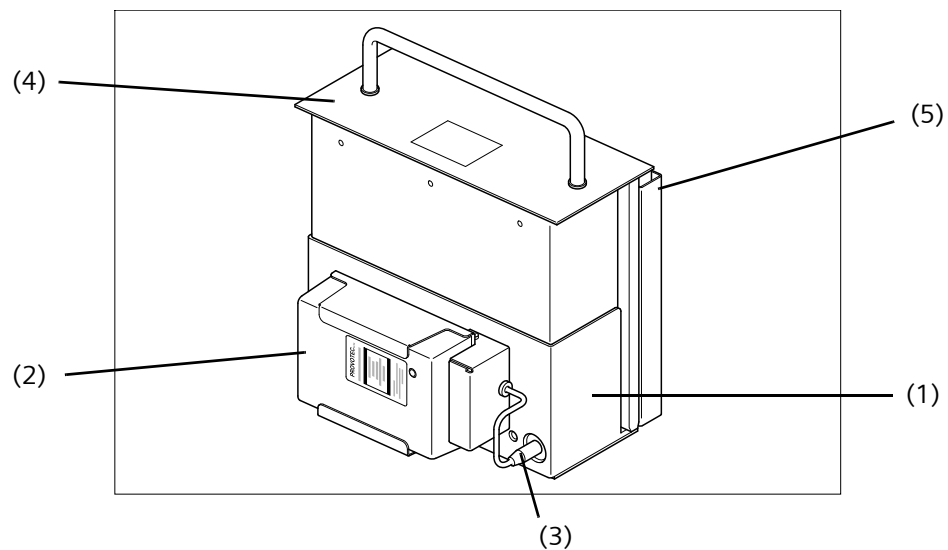
- The battery is fully charged.

If the accumulator box is not removed after fully charged, the charger switches over to trickle charge.



Remove the charge connector from accumulator box, after charger is disconnected from mains supply, to prevent discharging of accumulator to low energy level.

Accumulator box charging station



- (1) Charging station
- (2) Charger
- (3) Charge connector
- (4) Accumulator box
- (5) Wall holder

The charging station is used for positioning of a discharged accumulator box.
You can mount the charging station at the wall using the wall holder.



Do not place the charger in the patient area!

- ◆ Place the accumulator box inside the charging station.
- ◆ At first, connect the charge connector.
- ◆ Then connect charger to mains supply.

For further steps refer to "Charging the accumulator" → p. 88.

- ◆ Disconnect charger from mains supply.
- ◆ Then remove the charge connector from the corresponding socket at the accumulator box.
- ◆ Then remove the accumulator box.

Exposures with Prognost XPE/XPE-Akku

- ◆ Insert the power plug into the corresponding wall socket¹.
- ◆ Lay the power cord in such a way that you cannot damage it by the wheels running over it during table movement.¹
- ◆ Insert a charged accumulator box into the power supply box.²
- ◆ Switch power supply ON with emergency stop button.²
 - A short acoustic signal sounds from the controller box.
 - The green (Ready for use) indicator lamp must light up.



If the green (Ready for use) indicator lamp is not lit:

- ◆ Check the correct insertion of accumulator box into the power supply box.
- ◆ Make sure that the emergency stop button is switched on.
- ◆ Make sure that the accumulator box is charged.
- ◆ If it is not possible to solve the problem, call service.

If the green (Ready for use) indicator lamp flashes only for approximately 5 seconds after the power supply is switched ON with emergency stop button:

- ◆ Switch OFF the power supply with the emergency stop button.
- ◆ Remove the accumulator box from the power supply box
- ◆ Call service to check function of electronic inside controller .box



Before you remove a discharged accumulator box, switch OFF power supply with emergency stop button.

- ☐ A short acoustic signal sounds from the controller box.
- ☐ The green (Ready for use) indicator lamp does not light up.

¹ For XPE only

² For XPE-Akku only

To avoid collision with the system or the image receptor, the following sequence is necessary.

- ◆ Move the X-ray system to the necessary position.
- ◆ Adjust the height of the image receptor according to table top height or adjust height of mobile table according to height of image receptor.



Attention: The table elevating system is designed for short time rating, only.

- ◆ Move table carefully to desired exposure position.
- ◆ Check that there is no collision between table top, table, and image receptor.
- ◆ Move table to the best position for the patient to get ON the table top.
- ◆ Lock the parking brakes of the front castors and check that brakes are fixed.
- ◆ Assist patient to get ON the table top.
- ◆ Unlock the parking brakes.
- ◆ Move table to previous desired exposure position.
- ◆ Lock the parking brakes.
- ◆ Switch ON the collimator light.
- ◆ Move floating table top with patient to final exposure position.
- ◆ Collimate the organ and take an exposure.
- ◆ Unlock parking brakes.
- ◆ Move table to the best position for the patient to get OFF the table top easily.
- ◆ Lock parking brakes and check that brakes are fixed.
- ◆ Assist patient to get OFF the table top.



Attention: The Prognost XPE is not suitable for patient transport. Only use it as a support for the patient during examination.

Let patients get ON or OFF the table top only

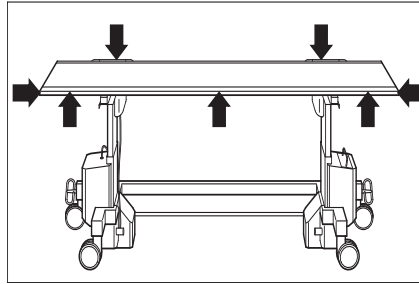
- ☐ if the brakes are fixed;
- ☐ under supervision and assistance from the examining personnel.

Otherwise, the whole table may tilt.

Danger points

The positions marked in the following illustration indicate danger zones in which patients or operating personnel could suffer injury by crushing or colliding.

Be sure that during movement of the table and the table top patients or personnel are *not* within the uncontrolled movement area.



- ◆ Take care that nobody is within the movement areas of the table and the X-ray system.
- ◆ Remove objects, as for example, chairs, out of the collision area, before using the table.

Be aware that careless movements of the Prognost XPE table and table top may injure patients, users, or other persons.

It may also cause damages to the X-ray tube assembly or the X-ray image receptor.

Cleaning



- ◆ Do *not* use water for cleaning.
 - Water causes short circuits in the electrical system, and corrosion in the mechanical components.
- ◆ Do *not* use corrosives, solvents, or abrasive cleaning materials.
- ◆ Clean painted and plastic surfaces *only* with a cloth and common household cleaners.
- ◆ Wipe surfaces with a clean, dry, lint-free cloth.
- ◆ Wipe chrome-plated parts with a clean, dry, lint-free cloth.

Disinfection

Disinfect all components, including accessories and connecting cables only by wiping with a disinfectant solution.

Cover the equipment with plastic sheets during room disinfection.

For safety reasons, do *not* spray.

For further information, refer to Register 2: *System Safety, "Cleaning and disinfection"* → p. 65.

Daily checks

- ◆ Check that the front castors are locked, when the parking brakes are turned into locking position.
- ◆ Check fixing and easy movement of table top by using the brake foot pedal.
- ◆ Check if there are visible height differences of elevation columns for table top. If yes, perform synchronization according to "*Column synchronization*" → p. 84
- ◆ Check that the power cord shows no damages.
 - If there are visible damages, do not insert the power plug into the wall socket and inform the service.

Checking the motion-release push button

- ◆ Press the motion-release push button without pressing any other motion push button or the other way round.
 - Height adjustment must not start.

If table height adjustment starts during this check, put the table out of operation and call service.

Disposal remarks

The Prognost XPE does not contain any toxic materials.

Dispose of all mechanical, electrical, and plastic components according to local or national regulations.

Technical data

The table top consists of carbon fiber with low attenuation (typical 0.7 mm Al)

Dimensions and weights

Table top thickness	2.5 cm
Length	200 cm - 226 cm
Width	65.5 cm - 75.5 cm
Height	59.5 cm - 86.5 cm
Usable width between the columns	112 cm
Table weight	120 kg (without patient)
Max. permissible patient weight	150 kg - 230 kg

Table top movement

longitudinal	± 33 cm to ± 46 cm
transverse	± 10 cm

Electrical characteristics

Line voltage ¹	230 V / 50 Hz or 115 V / 60 Hz
Power supply ²	12-Vdc accumulator box
Classification	Class I, type B (according to IEC 60601-1) ¹ Internally powered equipment, type B (according to IEC 60601-1) ²

¹ For XPE only

² For XPE-Akku only

Accessories and Auxiliary Devices

Description

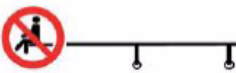
**Environmental
conditions (operation)**

Temperature range	+10° C to +35° C
Relative humidity	30 % to 70%, non-condensing
Air pressure	700 hPa to 1060 hPa

**Environmental
conditions (transport
and storage)**

Temperature Range	-10°C to +70°C
Relative Humidity	10% to 95%, non-condensing
Air Pressure	500 hPa to 1060 hPa

Symbols

	Parking brake unlocked
	Parking brake locked
	Attention, read accompanying documents!
	Attention, High Voltage!
	CE-marking
	Earth conductor ¹
	Classification according to IEC 60601-1, Type B
	EMC interference
	Danger of violent pressure to hands and fingers etc.
	Do <i>not</i> exceed maximum weight, risk of breakage
	Do not exceed maximum weight, danger of tilting
	Examination position
	Longitudinal positioning
	Transverse positioning
	Special disposal, separate collection ²
	No smoking ²
	Warning against battery risk ²
	Do <i>not</i> touch electric contacts! ²

¹ For XPE only

² For XPE-Akku only

Labeling

Prognost XPE

Nameplate



UL Label



FDA Label

Date of Manufacture: _____
Place of Manufacture: Espelkamp, Germany
This product complies with CDRH 21CFR, Subchapter J, as of the date of manufacture.
PROVOTEC GMBH & Co. KG

near power inlet (background yellow)

grounding reliability can only be achieved when the EQUIPMENT is connected to an equivalent receptacle marked **"Hospital Only"** or **"Hospital Grade"**

Labels brake release/activate



Warning label at controller box (background yellow)



Near line fuse

FUSE	2x T 1.6A L, 250V, 230V / 50Hz line
	2x T 3.15A L, 250V, 115V / 60Hz line
Sicherung	2x T 1.6A L, 250V, 230V / 50Hz Netz
	2x T 3.15A L, 250V, 115V / 60Hz Netz

On table top



Prognost XPE 150kg version



Prognost XPE 230kg version

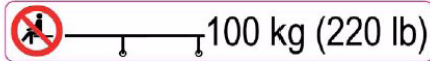


At lower front frame of table (background yellow)

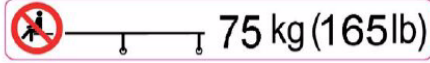


Labels on head and foot end of table top:

200cm table top length



226cm table top length



EMERGENCY-STOP



Prognost XPE-Akku

8.2 Labels

Nameplate table



UL Label



FDA Label

Date of Manufacture: _____
Place of Manufacture: Espelkamp, Germany
This product complies with CDRH 21CFR,
Supchapter J, as of the date of manufacture.
PROVOTEC GMBH & Co. KG

Labels brake
release/activate



Labels inside power supply
box and near contacts of
accumulator-box



Plus pole c
12dc

Labels inside power
supply box

Use UL listed types only
Autofuse rated 32dc
FUSE Sicherung 20A

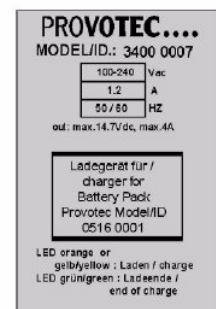


Minus pole o
12dc

Labels Akku-Box nameplate



Label on charger



Warning (background yellow)



Accessories and Auxiliary Devices

Description

At lower front frame of
table (background yellow)



EMERGENCY-STOP



On table top

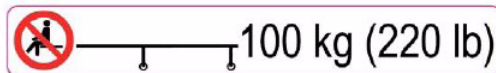


Prognost XPE-Akku 150kg version

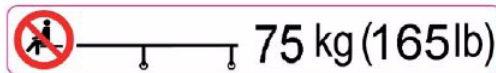


Prognost XPE-Akku 230kg version

Labels on head and foot end of table top:



200cm table top length



226cm table top length

Detector tray for Prognost tables

Safety information

The user and the personnel have to follow the warnings and safety information placed on the device, disregarding may lead to injury.

In the event of malfunction, do no longer use the unit and Siemens Customer Service.

Intended use

This detector tray for portable flat panel detectors is an option for the Prognost tables XP, XPE, and XPE Akku. It can be used for examinations with X-ray units for general radiography in diagnostic human medicine use. It has to be used in medical rooms only.

Features

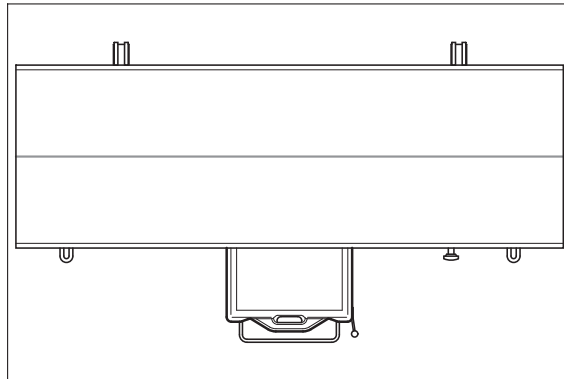
- ☐ Easy insertion and removal of the detector tray as well as longitudinal movement
- ☐ Easy insertion and removal of the flat panel detector
- ☐ Usable for flat panel detectors without grid
- ☐ Rotatable for portrait or landscape exposures
- ☐ Longitudinal detector movement in rails

Detector tray positions

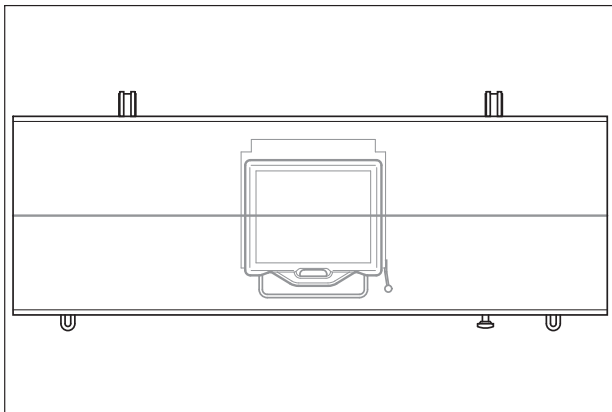
Detector tray in load position

In this position the detector can be inserted and removed from the tray. It can also be rotated by 90° for landscape or portrait exposures.

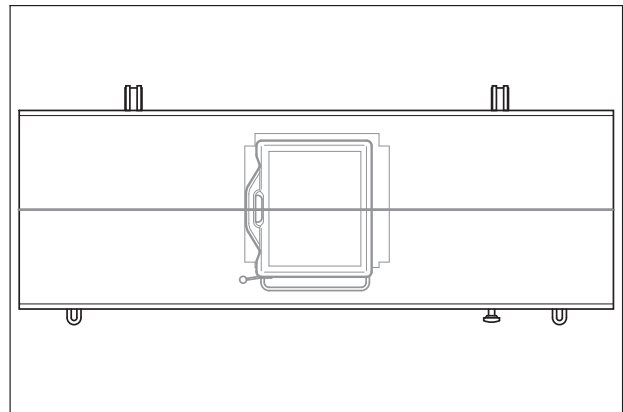
Detector tray in load position:



Detector tray in exposure positions



Position for landscape exposures



Position for portrait exposures

Operation

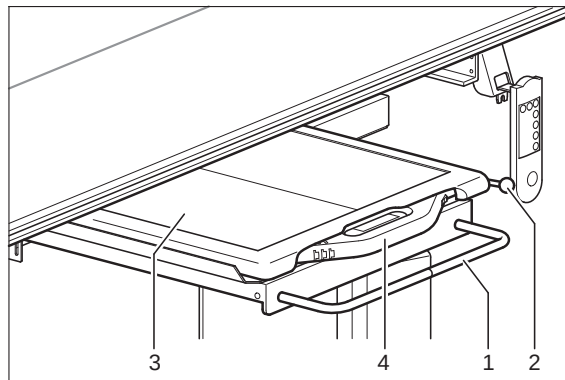
Overview



For further information regarding the detector operation, refer to Register 4:
System Components, Chapter **Wireless detectors (MAX wi-D or MAX mini)**.



Never exceed the indicated maximum weight of 10 kg indicated on the detector
tray.



Detector tray with inserted detector

- (1) Hand grip for detector tray in and out and longitudinal movement
- (2) Detector hand grip for rotation
- (3) Flat panel detector
- (4) Detector handle.

Inserting the detector into the detector tray



The detector tray must be in load position before inserting the detector.

- ◆ Move the table top to its rear position.
- ◆ Move the detector tray into load position using the hand grip.
- ◆ Insert the detector, and make sure the positioner is inside the handle.
- ◆ If required, rotate the detector tray from landscape to portrait position using the hand grip for rotation.
- ◆ Use the hand grip to move the detector tray into exposure position until a slight resistance can be sensed.
 - The detector tray automatically moves to the exposure position.

Removing the detector from the detector tray



The detector tray must be in load position before removing the detector.

- ◆ Move the table top to its rear position.
- ◆ Move the detector tray into load position using the hand grip.
- ◆ If the detector is in portrait position, rotate the detector tray to landscape position using the hand grip for rotation.
- ◆ Slightly lift the detector with its handle until it can be pulled over the positioner.
- ◆ Remove the detector.

Flat panel detector rotation and longitudinal movement

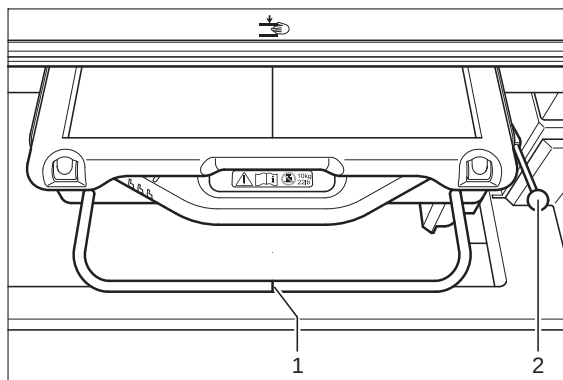


Take care for pinch points of hands and fingers during flat panel detector rotation and longitudinal movement.

Only rotate the flat panel detector if the detector tray is in the load position.

Rotate the flat panel detector from landscape to portrait position and vice versa.

Click stops are provided for both positions.



- (1) Center mark
- (2) Hand grip for detector rotation

Exposures

- ☐ Insert the detector.
- ☐ Rotate the detector as required.
- ☐ Release the table top brake, and move the table top in transverse direction to the center the stop position. Either a mechanical center stop is provided already or is available as an option.
- ☐ Center the detector tray to the X-ray beam using the center mark on the hand grip of the detector tray for longitudinal direction as well as the labels on head and foot end of table top. The line and arrow on these labels indicate the transverse center of the table top. Transverse centering should be done in conjunction with the collimators' light beam.
- ☐ Release the exposure.

Cleaning



Prior to cleaning or disinfecting, remove the power cord and actuate the emergency OFF switch or safety switch (if existing). Make sure that no liquids can penetrate into the equipment.



- ◆ Do not use water for cleaning.
 - Water causes short circuits in the electrical portion of the system, and corrosion in the mechanical components.
- ◆ Do not use corrosives, solvents or abrasive cleaning materials.
- ◆ Clean painted and plastic surfaces only with a cloth and common household cleaners and wipe surfaces with a clean, dry, lint-free cloth.
- ◆ Clean chrome plated parts by wiping with a clean, dry, lint-free cloth.

Disinfection

All components, including accessories and connecting cables, may be disinfected only by wiping with a disinfectant solution.

The equipment must be well covered with plastic sheets during room disinfection.



For safety reasons, no spray disinfectant may be used.

Recommendations and instructions regarding the use of disinfectants and methods of disinfection may be derived from the most recent rules and guidelines concerning disinfection and explosion safety.

Regular checks

Quality control	X-ray equipment should be quality-controlled at regular intervals or as required by applicable regulations to determine that the image quality remains in accordance to national regulations, e.g. by a monthly consistency testing.
------------------------	--

Technical data

Dimensions

Longitudinal movement (LM)	56 cm for table models Prognost XP, XPE, and XPE-Akku
Table top to detector entrance distance (D)	45 mm for a standard table.
Transverse movement	Transverse movement from park to load position 459 mm.
Total weight	19 kg including longitudinal rails (less detector).

Environmental data

Operation

Temperature range	+10°C to +40°C
Relative humidity range	30 % to 70 %, not condensing
Atmospheric pressure range	700 hPa to 1060 hPa

Transport and stock environment

Temperature range	-10°C to +70°C
Relative humidity range	10 % to 95 %, not condensing
Atmospheric pressure range	500 hPa to 1060 hPa

Labels



Symbols



Mobile detector holder CR

Refer to the original Operator Manual of the manufacturer.



Caution

Lifting the table when the mobile detector holder is positioned above the table top.

Risk of crushing

- ◆ Be careful lifting the table top when the mobile detector holder is positioned near the table.



Caution

Removing the detector from the mobile detector holder

- Due to the spring loading, the holder will move upwards when the detector is removed or the brake is released.

Risk of injury

- ◆ Be careful when removing the detector from the detector holder.
- ◆ Turn the knob to lock the vertical position before removing the detector.
- ◆ Hold the horizontal arm while slowly removing the detector to make sure that the holder remains at that position.



Caution

The detector holder is not securely fastened

Injury of persons or damage to the detector or holder.

- ◆ Make sure the detector holder is securely fastened.
-

Wireless Remote Control¹

Important information

The functions of the Wireless Remote Control are activated via an RF transmitter.



The Wireless Remote Control may be interfered by other equipment, including portable and fixed RF communication equipment, even if such equipment meets the applicable emission requirements.

The operator must assure that other wireless devices in the 2.4-GHz ISM band are not operated in the vicinity of appr. 5 m around the wi-D system. System movements can interrupt sporadically.

Please observe and verify normal operation of the Wireless Remote Control prior to using it.

- ◆ Operate the Wireless Remote Control only in close vicinity to the patient table and with full visibility to the patient on the table.
- ◆ Take care that the batteries are always sufficiently charged.



Warning

The Wireless Remote Control generates an electromagnetic field so high that it disturbs a life-supporting device.

Interference with a life-supporting device resulting in possible malfunction

- ◆ Make sure to keep a safety separation distance of larger than 90 cm between the wireless remote control and the life-supporting device.
- ◆ In case of interference with other equipment increase the distance between the interfering devices.



Caution

Collision with operator or patient

Mechanical or personal damage

- ◆ Take care that the used remote control and the system have the same colored label.
- ◆ Use remote control only when there is visual and acoustic contact with the patient.
- ◆ In case of unintended movement press the nearest emergency STOP button.

¹ For option **Aim FAST** only

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The Wireless Remote Control may be interfered with by other equipment, including portable and mobile RF communication equipment, even if this equipment meets the applicable emissions requirements.

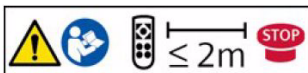
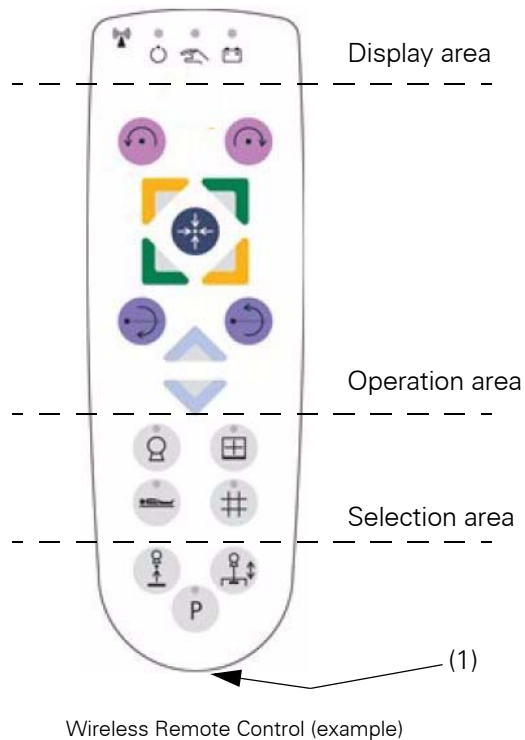
In order to perform its intended function, the Wireless Remote Control must emit electromagnetic energy. Maybe, nearby electronic equipment is affected.

Operation



Use the remote control only inside the examination room.

The remote control is active in a range of appr. 5 m around the table/stand, where the receiver is mounted. If the remote control is in a wider range of the table, it may lose contact with the receiver. It then turns into an inactive mode.



(1) Warning label

Display area

There are 3 LEDs showing the status of the remote control.



- ☐ Green LED on: Remote control is on and is in active mode.
- ☐ Green LED off: Remote control is inactive.
 - It is too far away from the table
 - The wi-D is switched off
 - The batteries are discharged
 - The remote control is in “sleep mode”. Press a button swiftly to activate it again.



Orange LED on: An operation button is being pressed.



- ☐ LED off: battery sufficiently charged, remote control not connected to the Charging Station
- ☐ LED flashing red: battery needs charging, remaining capacity < 4 h
- ☐ LED on red: remote control connected to Charging Station and batteries are being charged
- ☐ LED on green: remote control connected to Charging Station and batteries are fully charged



This symbol marks an RF transmitting component.

Selection area

In the selection area, you can select which part of the system you want to operate.

The green LED on the selected button is on.



Selection of tube unit



Selection of detector



Selection of patient table



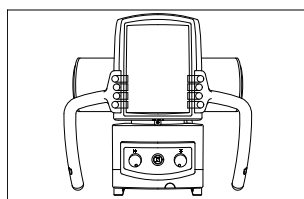
Selection of collimator

Operation area



On the backside of the remote control, there is a dead-man switch. To execute an operation with a button of the operation area you have to press the dead man's switch simultaneously.

As soon as you release the dead-man switch, the current operation is stopped.



All following operating directions only apply if you are standing in front of the tube unit.

Angular movement of tube unit and detector



Angular movement of tube unit and detector clockwise about the horizontal axis



Angular movement of tube unit and detector counter-clockwise about the horizontal axis



Angular movement of tube unit and detector clockwise about the vertical axis



Angular movement of tube unit and detector counter-clockwise about the vertical axis

Opening/closing the collimator; moving tube unit and detector in x and y direction (orange and green)



Opening the collimator in transverse direction
Moving tube unit and detector in y direction (orange)



Closing the collimator in transverse direction
Moving tube unit and detector in y direction (orange)



Opening the collimator in longitudinal direction
Moving tube unit and detector in x direction (green)



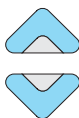
Closing the collimator in longitudinal direction
Moving tube unit and detector in x direction (green)

OGP position of patient table or parking position



Moving the patient table to OGP position;
Moving the system in parking position

Moving detector, tube unit, and patient table



Moving up and down detector, tube unit, and patient table.

'Center lock' tracking



Disable/enable '*center lock*' tracking

- Press the '*center lock*' tracking button just for a short time to activate or deactivate center-lock tracking at the current position.
- Symbol at the MAXtouch lights up green when tracking is active
- Symbol at the MAXtouch flashes red when tracking is not possible or being in progress

SID tracking



Disable/enable *S/D* tracking control

- Press: The tracking control is switched off(on).
- Symbol at the MAXtouch lights up green when tracking is active
- Symbol at the MAXtouch flashes red when tracking is not possible or being in progress

Parking position



Switching over the function of the OGP button to parking position

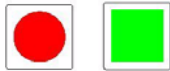
- Green LED is on.

After the parking position is reached, immediately switch off this function again.

- Green LED is off.

Marking signs

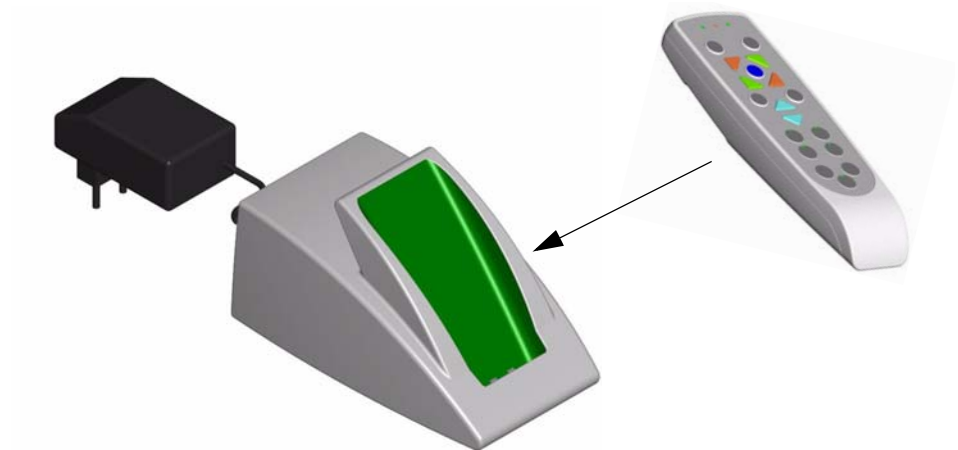
The Wireless Remote Control is marked with a colored sign of different shape. So you can avoid a mix up for installations with a multitude of Wireless Remote Controls. The same marks are attached to the respective table and room during installation.



These signs are two examples of colored signs of different shape to mark the remote control to a wi-D system.

Charging Station

The Wireless Remote Control is plugged in the Charging Station for charging the batteries. We recommend charging the batteries every day after deployment.



Charging Station

If the Wireless Remote Control needs charging during a patient procedure, simply plug it in the Charging Station.



Never use another charging device than the Charging Station delivered with the Wireless Remote Control.



For safety reasons, never touch the charging contacts and the patient simultaneously when the charging station is connected to a socket (charging contacts are permanently energized).

Installation

You can install the Charging Station either at the wall or on the table.

Exchange of batteries

Let authorized and trained staff exchange the batteries of the Wireless Remote Control once a year. Please call Siemens Service. Unauthorized exchange may cause severe damage.

Technical data

Active range	Approximately 5 m around the receiver mounted to the stand.
Charging time	Approx. 2 h
Operating time with full batteries	Approx. 12 h
Frequency range	2402 MHz - 2480 MHz
Modulation	GFSK
RF Power	0 dBm
RF emissions CISPR 11	Compliance: Group 2 The deployment of Wireless Remote Control in combination with Multitom Rax changes the classification of Multitom Rax from compliance group 1 to compliance group 2.

Register 8 Technical Description

Chapter: Location of Labels

Overview	4
Patient table.....	5
X-ray tube support	8
Multileaf collimator	10
Detector stand and system labels	12
Detector at the detector stand	14
MAX wi-D and MAX mini detectors	16
Fluoro control console (backside)	17
Generator cabinet	18

Chapter: Technical Data

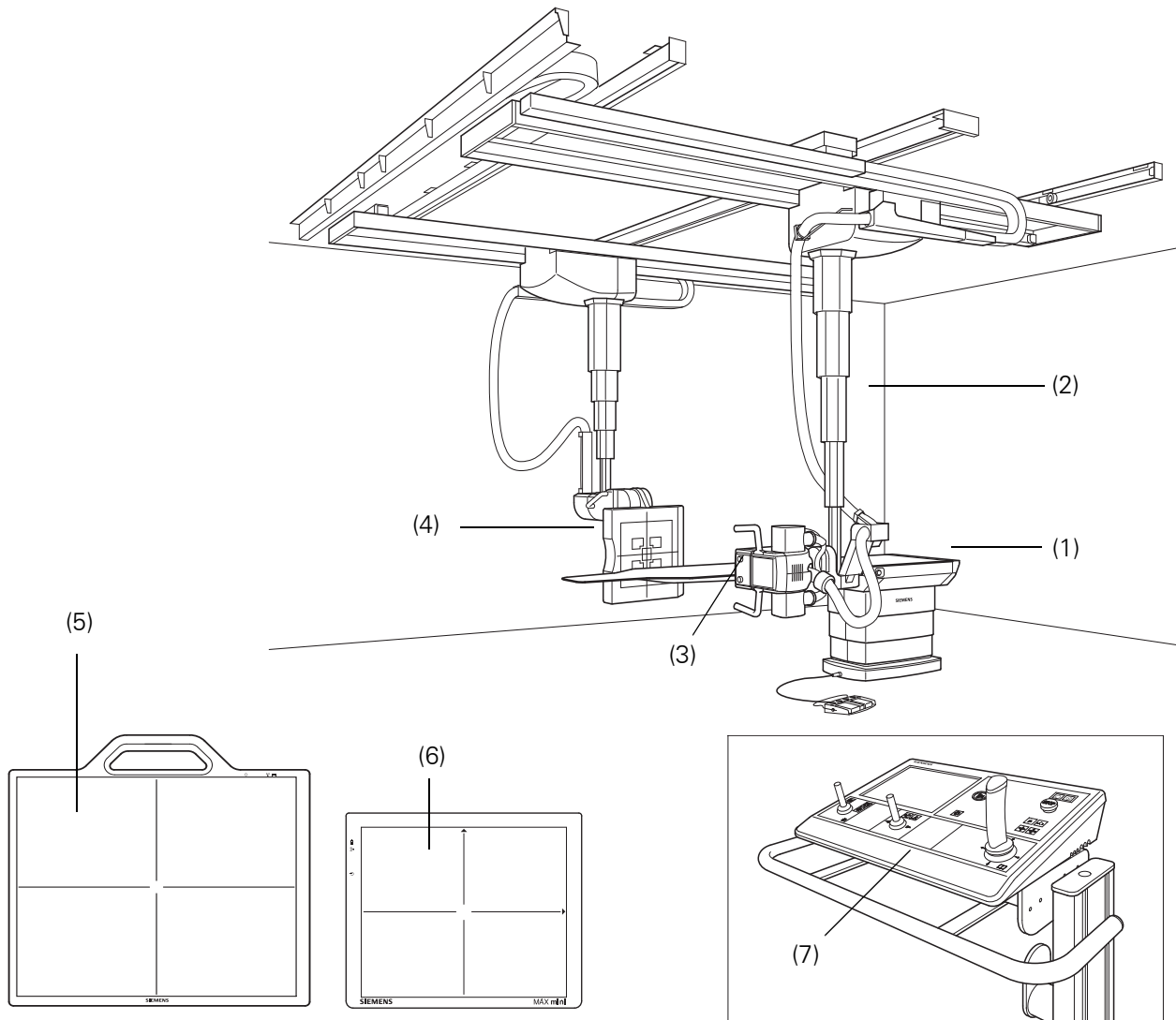
System	19
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Location of Labels



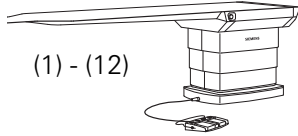
All labels displayed in the Operator Manuals are examples only and may differ from the labels attached to the system and components.

Overview

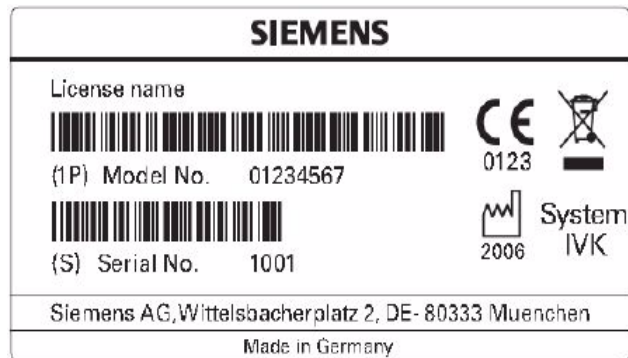


- (1) Patient table
- (2) X-ray tube support
- (3) Multileaf collimator
- (4) Detector stand
- (5) MAX wi-D detector
- (6) MAX mini detector
- (7) Fluoro control console
- (8) Generator cabinet (not shown)

Patient table



(1) System identification label



Model no. of RF table: 10092902

(2) Follow the instructions in the Operator Manual



(3) Attention!



(4) Crushing hazard: Hand



(5) Crushing hazard: Legs



(6) Maximum load



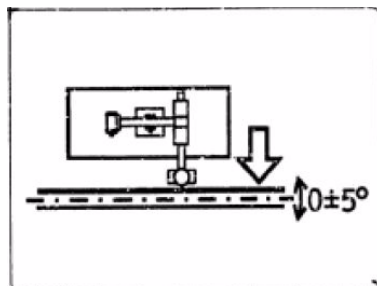
(7) Sitting prohibited



(8) Type B applied part



(9) Warning label: Detector holder



(10) Radiation absorption

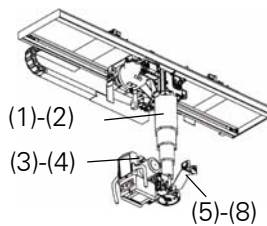
Radiation absorption
<x,xx mm AL 100 KV

(11) NRTL C US label TÜV Süd



(12) DHHS label

This product complies with DHHS regulations
21 CFR Subchapter J, applicable at date of
manufacture.
Manufactured:
Siemens Aktiengesellschaft
Wittelsbacherplatz 2, D-80333 München
Germany



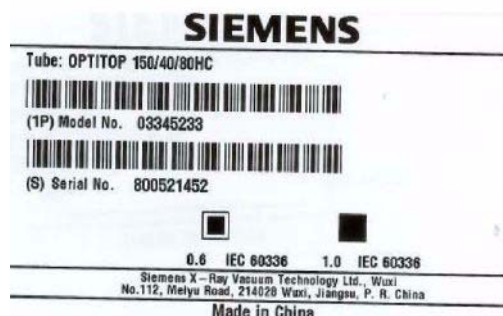
X-ray tube support

(1) Second set of labels: Tube housing assembly incl. identification label tube / radiator / DHHS label

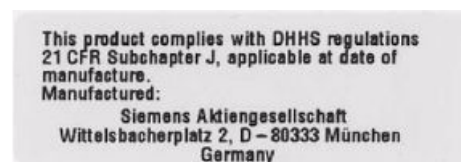
SECOND SET OF LABELS TUBE HOUSING ASSEMBLY



Identification label



Identification label



DHHS label

(2) Approval label Saudi Arabian Ministry of Health for deliveries to Saudi Arabian Ministry of Health



(3) Follow the instructions in the Operator Manual



(4) Attention: Hot surface



(5) Identification label



(6) UR-C-US label

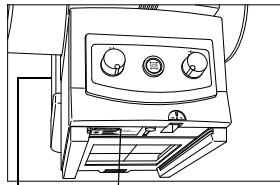


(7) Revision label

Rev.	00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36	37

(8) Disposal label





(1)-(6)
backside

Multileaf collimator

(1) Follow the instructions in the Operator Manual



(2) DHHS label

This product complies with DHHS regulations
21 CFR Subchapter J, applicable at date of
manufacture.
Manufactured:
Siemens Aktiengesellschaft
Wittelsbacherplatz 2, D-80333 München
Germany

(3) Label CSA



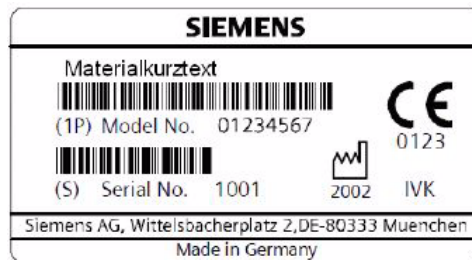
(4) Label UL



(5) Label Filtration 1.0 mm

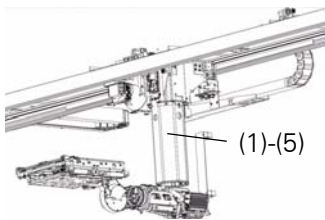


(6) Identification label



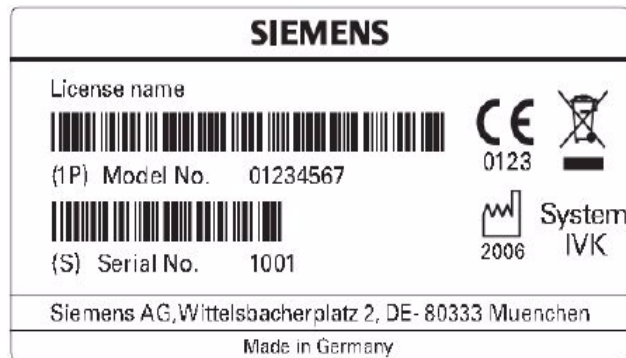
(7) Caution label laser beam





Detector stand and system labels

(1) System identification label



Model no. for this system: 10860700

(2) System approval label SGS (C US)



(3) Second set of labels: Detector incl. identification label detector / DHHS label



(4) Approval label INMETRO

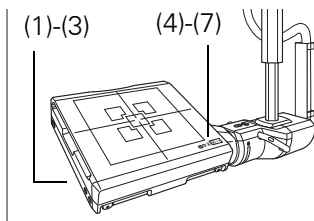
for deliveries to Brazil



(5) Approval label Saudi Arabian Ministry of Health

for deliveries to Saudi Arabian Ministry of Health





Detector at the detector stand

(1) Identification label



(2) UR-C-US label



(3) Disposal label



(4) Maximum load



(5) Sitting prohibited

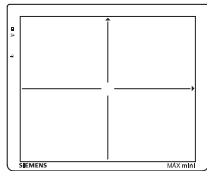
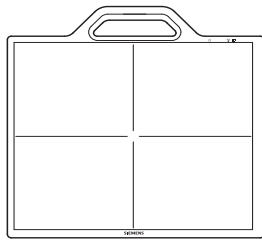


(6) Follow the instructions in the Operator Manual



(7) Type B applied part





(1) - (3)
Backside of detectors

MAX wi-D and MAX mini detectors

(1) Disposal label



(2) Siemens product label

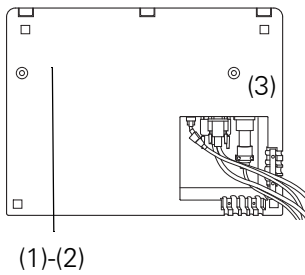


(3) Type B applied part



(3) Warning label "Not ionizing radiation"



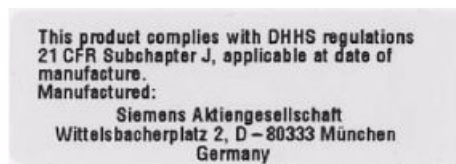


Fluoro control console (backside)

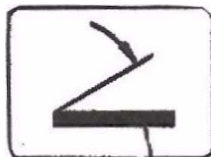
(1) Identification label



(2) DHHS label



(3) Foot switch label



Generator cabinet

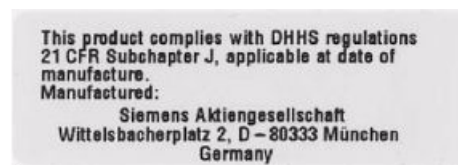
(1) Identification label



(2) UL label



(3) DHHS label



(4) Warning label "Not ionizing radiation"



(5) Warning label "dangerous voltage"



Technical Data

All technical data represent typical values unless specific tolerances are given.

Siemens reserves the right to change the design and specifications without notice.

System

Installation data	The entire system is connected via a single line voltage
Power connection	3-phase, 380 V, 400 V (440/480 V with additional transformer for the generator) $\pm 10\%$ at 50 or 60 Hz
Power input	Max. 126 kVA, 50 A fuse
Standby	≤ 0.7 kVA
Pre-fusing	63 A slow-blow

Internal line resistance		
U_{Line}	Max. R_{Line}	
	65 kW	80 kW
380 V	0.15 Ω	0.09 Ω
400 V	0.17 Ω	0.11 Ω
440 V	0.20 Ω	0.14 Ω
480 V	0.24 Ω	0.16 Ω

Ambient conditions (operation)

Examination room

Temperature range	+18°C to +28°C
Relative humidity	20% to 75%, non-condensing
Barometric pressure	700 hPa to 1060 hPa
Height	≤ 2000 m above sea level

Imaging system

Temperature range	+10°C to +35°C
Relative humidity	20% to 75%, non-condensing
Barometric pressure	700 hPa to 1060 hPa

Technical Description

Technical Data

Ambient conditions (Transport and storage)

Temperature range	-20°C to +70°C
Relative humidity	10% to 95%, non-condensing
Barometric pressure	500 hPa to 1060 hPa

Radio interference suppression/EMC

IEC 60601-1-2

Protection class



The system belongs to protection class I with a type B applied part according to IEC 60601-1

Attention:

To avoid the risk of electrical shock, a protective conductor must be implemented.

Protection against ingress of water:	☐ IPx8: Foot switches
	☐ IPx2: Control room module
	☐ IPx1: Fluoro control console
	☐ IPx0: Rest of system

Explosion protection (AP, APG according to IEC 60601-1:2005)

The system is not intended for operation in explosion-endangered areas (for example highly flammable mixtures of anaesthesia gases with air or oxygen or nitrous oxide).

Operating mode

Continuous

Weights

X-ray tube support	From 264 kg to 384 kg
Detector stand	From 264 kg to 384 kg
Imaging station	Approx. 50 kg
Generator cabinet	Approx. 428 kg
Patient table	Approx. 440 kg

Total inherent filtration

2.5 mm Al at 70 kv/2.5 mm Al HVL (DIN EN 61267, RQR5) (combined with collimator Al equivalent 1.0 mm Al and tube Al equivalent 1.5 mm Al) + DAP Al equivalent 0.5 mm Al

DAP chamber

Dose area product is measured by DAP meter at the collimator

Tolerance of DAP values $\pm 35\%$

AEC chambers

AEC chambers attenuation equivalent of 0.7 mm Al

Tolerance of AEC values $\pm 3\%$

Applied parts

- ☐ Table top
- ☐ Portable detectors

Components

Patient table

Tabletop width	75 cm
Tabletop length	219 cm
Table length	312 cm
Table height	50 cm $\pm$ 0.5 cm to 95.5 cm $\pm$ 0.5 cm; total lift 44.0 cm (tabletop)
X-ray absorption	$\leq$ 0.95 mm Al (at 100 kV / 3.6 mm Al HVL; EN/IEC 60601-2-54:2009)
Tabletop material	Carbon fibre
Patient weight	240 kg including patient and accessories (for example, patient 215 kg + accessories)
Max. patient coverage	Approx. 190 cm without patient repositioning
Auto tracking for table height adjustment	Yes, X-ray tube follows table height adjustment; source-image distance is maintained
Foot switch functions	Table up
	Table down
	Centering to detector
	Auto positioning
	X-ray acquisition
Removable tabletop	X-ray fluoroscopy

X-ray tube support

Horizontal travel range

Longitudinal	355 cm
Transverse	☐ With 400 cm trolley: 346 cm

Speeds

Vertical travel range	180 cm, manual or motorized
Speed in x- and y-axes	Up to max. 0.6 m/s
Speed in z-axis	Up to max. 0.3 m/s
Rotation range around the vertical axis	☐ -119° to +217° manual ☐ -115° to +215° motorized ☐ Software stops at -90°; 0°; +90°
Rotation speed around the vertical axis	Max. 25°/s
Rotation range around horizontal axis	☐ ±137° manual ☐ ±135° ±2° motorized ☐ Software stops at -90°; 0°; +90°
Rotation speed around the horizontal axis	Max. 40°/s

Minimum focus-ceiling distance

83 cm

Maximum focus-detector distance with horizontal beam

3 m

X-ray tube

	OPTITOP 150/40/80HC-100
Maximum exposure voltage	150 kV (IEC 60613)
Focal spot nominal value	0.6 (IEC 60336) 1.0 (IEC 60336)
Nominal output of anode	☐ 40 kW / 80 kW (IEC 60613) - thermal anode reference output 300 W ☐ 52 kW / 103 kW (IEC 60613) - thermal anode reference output 0 W
Optical anode angle	12° (IEC 60788)
Anode heat storage capacity	580,000 J (783,000 HU)

Technical Description

Technical Data

Maximum heat storage capacity of tube housing	1,800,000 J (2,430,000 HU)
Anode drive	150/180 Hz (8,500 to 10,800 rpm)
Leakage radiation	≤ 0.8 mGy/h (450 W) at 150 kV at 1 m distance (IEC 60601-1-3)
Total filtration	≥ 2.5 mm Al/80 kV (IEC 60601-1-3)
Weight	26 kg

Multileaf collimator

Inherent filtration	1mm Al at 75 kV
Full field light localizer	30 W high power LED technology, lifetime > 30,000 h, timer, laser slot light localizer (can be covered)
Copper prefilter	Without filter; 0.1 mm; 0.2 mm; 0.3 mm; motorized and can be positioned via organ programs
Rotation	Up to a maximum of ±45°
Collimator control	Manual and motorized, pre-set via organ programs

Laser localizer

	Class 2
Wave length	650 nm
Power	≤ 1 mW
Divergence	0.5 mrad

Ceiling-mounted detector stand

Al equivalent

≤ 0.45 mm Al (at 100 kV/3.6 mm Al HVL; EN/IEC 60601-2-54:2009)

Horizontal travel range

Longitudinal	355 cm
Transverse	□ With 400 cm trolley: 346 cm

Speeds

Vertical travel range	180 cm, manual or motorized
Speed in x- and y-axes	Up to max. 0.6 m/s
Speed in z-axis	Up to max. 0.3 m/s

Rotation range around the vertical axis	☐ -154° to +182° manual ☐ -150° to +180° motorized ☐ Software stops at -90°; 0°; +90°
Rotation speed around the vertical axis	Max. 25°/s
Rotation range around horizontal axis	☐ ±137° manual ☐ ±135° ±2° motorized ☐ Software stops at -90°; 0°; +90°
Rotation speed around the horizontal axis	Max. 40°/s

Minimum focus-ceiling distance

83 cm

Maximum focus-detector distance with horizontal beam

3 m

Detectors

X-ray absorption

≤ 0.5 mm Al (at 100 kV/3.6 mm Al; IEC 60601-2-54:2009)

MAX dynamic (ceiling-mounted)

Amorphous silicon flat detector with Cesium iodide scintillator

Input fields (active field)	Full format: 42 cm x 42.6 cm Zoom 1 [*] : 30 cm x 30 cm Zoom 2 [*] : 22 cm x 22 cm Zoom 3 [*] : 15 cm x 15 cm
Active detector matrix	up to 2840 x 2874 pixels
Pixel size	148 µm
Material	aSi with CsI scintillator
Scintillator	Cesium iodide (CsI)
Acquisition depth	16-bit
Spatial resolution (Nyquist frequency)	3.4 lp/mm

Technical Description

Technical Data

DQE in %; 1 µGy (RQA5)	65% at 0.05 lp/mm 51% at 1 lp/mm, (IEC 62220) 42% at 2 lp/mm, (IEC 62220) 28% at 3 lp/mm, (IEC 62220) 19% at 3.4 lp/mm (Nyquist), (IEC 62220)
DQE in %; 200 nGy (RQA5)	65% at 0.05 lp/mm 51% at 1 lp/mm, (IEC 62220) 41% at 2 lp/mm, (IEC 62220) 25% at 3 lp/mm, (IEC 62220) 16% at 3.4 lp/mm (Nyquist), (IEC 62220)
DQE in %; 20 nGy (RQA5)	59% at 0.05 lp/mm 41% at 1 lp/mm, (IEC 62220) 25% at 2 lp/mm, (IEC 62220) 11% at 3 lp/mm, (IEC 62220) 7% at 3.4 lp/mm (Nyquist), (IEC 62220)
MFT in % (RQA5)	66% at 1 lp/mm, (IEC 62220) 35% at 2 lp/mm, (IEC 62220) 19% at 3 lp/mm, (IEC 62220) 16% at 3.4 lp/mm (Nyquist), (IEC 62220)
Modulation depth at Nyquist frequency	Approx. 13%

* Fluoro option

MAX wi-D (wireless detector)

Detector technology	Cesium iodide scintillator coupled to TFT matrix with amorphous silicon technology
Dimensions (active area)	34.9 cm x 42.5 cm can be inserted in the detector tray in landscape and portrait format
Dimensions with detector housing	44 cm x 46.1 cm x 1.9 cm
Active detector matrix	2356 x 2872
Pixel size	148 µm
Semiconductor material	Amorphous silicon (a-Si)
Scintillator	Cesium iodide (CsI)
Acquisition depth	16-bit
Data transmission	WLAN < 2 s preview; < 5 s full image
DQE in %; 2µGy (RQA5)	66% at 0.05 lp/mm 50% at 1 lp/mm, (IEC 62220) 40% at 2 lp/mm, (IEC 62220) 24% at 3 lp/mm, (IEC 62220)

MFT in % (RQA5)	61% at 1 lp/mm, (IEC 62220) 31% at 2 lp/mm, (IEC 62220) 15% at 3 lp/mm, (IEC 62220) 12% at Nyquist
Thickness	19 mm
Weight	3 kg
Max. load capacity	☐ 150 kg with patient recumbent on it ☐ 100 kg with patient standing
Battery	Lithium-ion, rechargeable, exchangeable
Charging time	3 h in battery charger
Battery operation time	☐ Up to 525 images ☐ Up to 3.5 hours during regular utilization ☐ Up to 6 hours in standby mode
Charging location	Battery charger
Clip-on grid	☐ Pb 5/85, f0 = 115 cm ☐ Pb 15/80, f0 = 115 cm
WLAN Standard	IEEE 802.11n, 2 x 2 mimo

Technical Description

Technical Data

MAX mini (wireless detector)

Detector technology	Cesium iodide scintillator coupled to TFT matrix with amorphous silicon technology
Dimensions (active area)	28.4 cm x 22.8 cm
Dimensions with detector housing	26.9 cm x 32.9 cm x 1.6 cm
Active detector matrix	1538 x 1920
Pixel size	148 µm
Semiconductor material	Amorphous silicon (a-Si)
Scintillator	Cesium iodide (CsI)
Acquisition depth	16-bit
Data transmission	WLAN < 1.5 s preview; < 3.5 s full image
DQE in %; 2µGy (RQA5)	66% at 0.05 lp/mm 50% at 1 lp/mm, (IEC 62220) 40% at 2 lp/mm, (IEC 62220) 24% at 3 lp/mm, (IEC 62220) 17% at Nyquist
MFT in % (RQA5)	61% at 1 lp/mm, (IEC 62220) 31% at 2 lp/mm, (IEC 62220) 15% at 3 lp/mm, (IEC 62220) 12% at Nyquist
Thickness	16 mm
Weight	1.6 kg
Max. load capacity	☐ 150 kg with patient recumbent on it ☐ 100 kg with patient standing
Battery	Lithium-ion, rechargeable, exchangeable
Charging time	3 h in battery charger
Battery operation time	☐ Up to 525 images ☐ Up to 3.5 hours during regular utilization ☐ Up to 6 hours in standby mode
Charging location	Battery charger
Clip-on grid	☐ Pb 5/85, f0 = 115 cm
WLAN Standard	IEEE 802.11n, 2 x 2 mimo

Generator POLYDOROS F

Technical data

- ☐ X-ray generator POLYDOROS F 65 (150 kV/ 65 kW) or F 80 (150 kV/80 kW)
- ☐ All technical data prove typical values, if specific tolerances are not indicated.

Nominal voltage

380 V/ 400 V/ 440 V/ 480 V +/- 10%, 50/60 Hz 3-phases

Internal line resistance (max.)

POLYDOROS F 65

- ☐ 0,16 Ohm (380 V)
- ☐ 0,17 Ohm (400 V)
- ☐ 0,20 Ohm (440 V)
- ☐ 0,24 Ohm (480 V)

POLYDOROS F 80

- ☐ 0,10 Ohm (380 V)
- ☐ 0,11 Ohm (400 V)
- ☐ 0,14 Ohm (440 V)
- ☐ 0,16 Ohm (480 V)

Capacity

Generator

- ☐ Long-term 0,7 kVA (380 V, 400V, 440V, 480 V)
- ☐ Short-term 126 kVA (380 V, 400 V, 440V, 480 V)

External connection

- ☐ 380 V/ 400 V, 440 V, 480 V 25 A 3-phases
- ☐ 230V max 8 A 1-phase

Radio interference suppression/EMC

IEC 60601-1-2 limit-value-class B

Type of protection

Protective class I, in accordance with IEC 60601-1

Protection class

IPx0* according to IEC 60529

* IPx0 = no special protection

Application part

none

Degree of protection against inflammable gas mixtures

No use in combination with inflammable gas mixtures (not AP, APG examined)

Technical Description

Technical Data

Operation mode

Continuous operation

High-voltage waveform

Multipulse

Nominal shortest irradiation time

For Multitom Rax:

2 ms at 80 kV (with 5-field-chamber, central field of AEC chamber, filter of 0 mmCu, anti-scatter grid, large focus, dose level 2.50, 80% power)

Output

POLYDOROS F 65

- ☐ 40kV-150kV 1mA-800mA
- ☐ 800 mA at 79kV
- ☐ 650 mA at 100kV 100 ms rated output
- ☐ 65 kW (according IEC 60601-2-7)
- ☐ 430 mA at 150kV
- ☐ 0.5-800mAs (max. 56kWs in AEC mode)

POLYDOROS F 80

- ☐ 40kV - 150kV 1mA-1000mA
- ☐ 1000mA at 79kV 40ms
- ☐ 800mA at 100kV 100ms rated output
- ☐ 80kW (according to IEC 60601-2-7)
- ☐ 530 mA at 150 kV
- ☐ 0.5-800mAs (max. 56kWs in AEC mode)

Fluoroscopy

- ☐ 450W from 40kV/0.2mA up to 110kV/23mA, pulsed fluoroscopy
- ☐ 450W at 110kV/4.1mA, continuous fluoroscopy

Automatic System

- ☐ 0- and 1- point technique with continuously falling load
- ☐ 2- and 3- point technique with constant load

Switching time (Minimum)

- ☐ 1- point technique: 1ms at 100kV
- ☐ 2- point technique: 2ms at 100kV
- ☐ 3- point technique: 20 ms at 100kV

Tolerances

- ❑ Exposure time tolerance $\pm (10 \% + 1 \text{ ms})$
- ❑ kV tolerance $\pm 10 \%$
- ❑ mAs tolerance $\leq \pm (10 \% + 0.2 \text{ mAs})$
- ❑ mA tolerance $\leq \pm 20 \%$
- ❑ Variation coefficient of radiation output ≤ 0.05

Ambient conditions (Operation)

Temperature	+10°C to +55°C
Relative humidity	20% to 75%, non-condensing
Barometric pressure	700 hPa to 1060 hPa

Ambient conditions (Transport and storage)

Temperature	-20°C to +60°C
Relative humidity	10% to 95%, non-condensing
Barometric pressure	500 hPa to 1060 hPa

Fluorospot Compact imaging system

Computer system

Equipment	Intel-compatible dual-core microprocessor with PCI bus architecture, min. 3.4 GHz, 4 GB RAM, S-ATA drive, USB 3.0 and interface cards for the
Operating system	Windows 7 Ultimate 64 Bit
Noise level	≤ 50 dBA

Archiving and documentation

System storage capacity	10,000 images
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Background functions	Preprocessing and data transfer is done in the background.
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Archiving	DVD or CD-R read/write in DICOM 3.0 format (or packed format)
CD-R storage capacity	☐ DICOM 3.0 format: about 300 images ☐ Packed format: about 450 images ☐ DICOM send ☐ DICOM query/retrieve

Export	In TIFF or AVI format via CD-R
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Documentation	☐ DICOM Print ☐ Virtual Film Sheet
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DICOM Worklist, MPPS	Data exchange via HIS/RIS
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Paper printing	Printing of lists and images to a network paper printer
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Electrical data

Power supply	Powered by system power supply
Nominal frequency	50; 60 Hz
Power	< 900 VA (incl. 2 monitors)

Ambient conditions

Operation	Climate class S
Temperature range	+10 °C to +35°C
Relative humidity	20% to 75% not condensing
Air pressure	700 hPa to 1060 hPa
Height	≤ 2000 m

Displays

19" Color display

Screen size	19" (48 cm)
Display area (W x H)	37.5 cm x 30 cm
Pixel number	1280 x 1024
Typical brightness	300 cd/m ²
Typical contrast ratio	2000:1
Power consumption	< 43 W
Weight	7.2 kg
Horizontal viewing area	178° (H and V)
Dimensions (W x H x D)	40.5 cm x 40.7 cm to 50.7 cm x 20.5 cm

19" Color high contrast display*

19" TFT high-contrast color display for flicker-free, distortion-free live image and reference image display for X-ray diagnostics

Light weight, high luminance and contrast values

Screen size	19" (48 cm)
Display area (W x H)	37.5 cm x 30 cm
Pixel number	1280 x 1024
Typical brightness	800 cd/m ²
Surface	Anti-glare
Typical contrast ratio	1000:1
Power consumption	< 75 W
Weight	5.7 kg
Horizontal viewing area	176° (H and V)
Dimensions (W x H x D)	42.2 cm x 34.8 cm x 9.5 cm

* Option

WLAN access point SCALANCE W7x8

Data transfer

Ethernet transfer rate	BASE-T 10/100/10000Mbps
Wireless transmission rate	1 ... 450 Mbps
Wireless standards supported	☐ IEEE 802.11a ☐ IEEE 802.11b ☐ IEEE 802.11g ☐ IEEE 802.11h ☐ IEEE 802.11n
Power supply standards supported	IEEE 802.3at type 1 (802.3af) and 802.3at type 2 (Power over Ethernet)

Interfaces

Power	Power over Ethernet IEEE 802.3at min. 36 VDC, max. 57 VDC via RJ-45 jack The following applies to PoE: Current supply lines must be electrically isolated according to IEEE 802.3at, dielectric resistance > 2 Mohms.
Data W7x8-x RJ-45	RJ-45 jack for Ethernet 3 antenna sockets of type R-SMA female

Electrical data

Maximum power consumption	15.6 W
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Construction

Dimensions without antennae (H x W x D)	W7x8-x RJ-45 (IP30): 158 mm x 200 mm x 79 mm
Weight	W7x8-x RJ45 (IP 30): 1.7 kg

Permitted ambient conditions

Operating temperature	-20°C to +60°C
Transportation/storage temperature	-40°C to +70°C
Degree of protection	Tested to IP30

