# OMNERA® 400A

Auto-Positioning Digital Radiographic System

# Operator´s Manual


Technical Publication: 0073-095-418-EN Rev. 5.1

Canon

CANON MEDICAL SYSTEMS USA, INC.

## Disclaimer

The standard warranty is void if the product has been intentionally modified, or damaged by accident, abuse or misuse. Additionally, this warranty is void if untrained personnel service the OMNERA® 400A equipment.

Lost profits, downtime, goodwill, damage to or replacement of property, and any costs of repairing the OMNERA® 400A resulting from a breach of warranty are not the responsibility of Canon Medical Systems

Specifications are subject to change without notice. Not responsible for typographical errors.

## Notices



**Note:** Photos and drawings used in this guide may be slightly different from the actual product.

Dispose of electronic equipment in accordance with local, state, and federal regulations.



## Trademarks

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# 1 Introduction

## 1.1 Document Information

It is important to keep this document for the life of the equipment, and pass the document on to any subsequent holder or user of the equipment.

Training is provided by Canon Medical Systems. Training material is the Operation Manual and the Installation and Service Manual.

### 1.1.1 System Documentation

The following documentation is available for the System:

- OMNERA™ 400A Planning Guide
- OMNERA™ 400A Installation and Service Manual
- OMNERA™ 400A Operator's Manual

### 1.1.2 Stylistic Conventions

All warning label texts are shown in red italic *style* in this Manual. All references are shown in *italic* style in this Manual.

### 1.1.3 Document Producer

This document has been produced by:
Arcoma AB
Annavägen 1
S–352 46 VÄXJÖ,
Sweden

### 1.1.4 Text Emphasis

***WARNING!***

***All texts labelled with "WARNING" call attention to potential risk to health or life.***

*CAUTION!*

***All texts labelled with "CAUTION" contain information about dangerous situations and measures to avoid risk.***

*Note!*

*All texts labelled with "NOTE" contain additional information regarding the work step, and is provided for a better understanding or as a warning about unnecessary and avoidable difficulties.*

## 1.2 Identification Labels

The figure shows the location of the identification labels on the equipment.

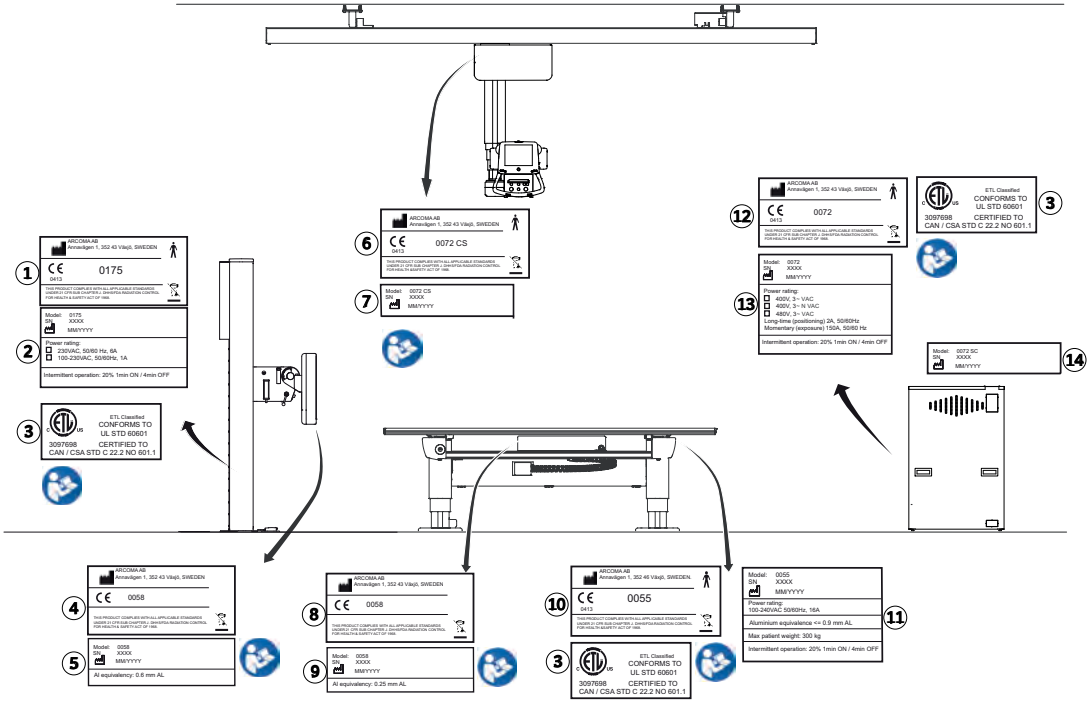
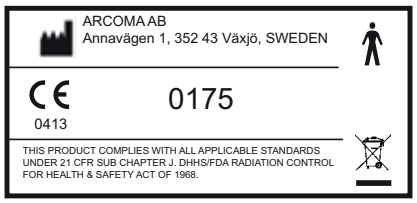



*Fig. 1-1 Identification label locations*

The labelling for accompanying components are shown in their documentation.

1

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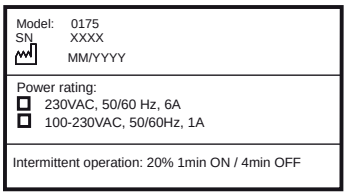


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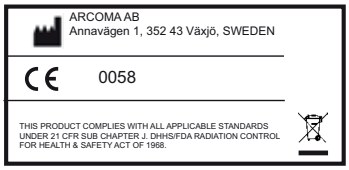


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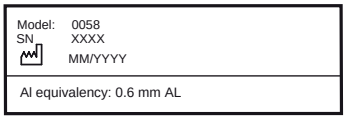


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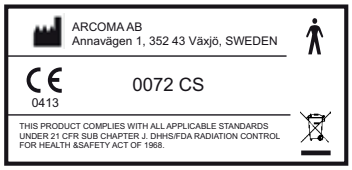


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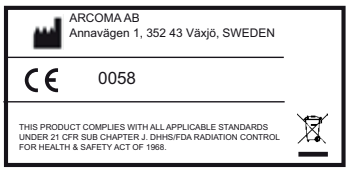


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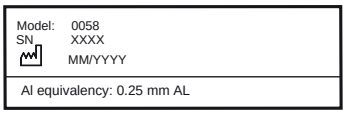


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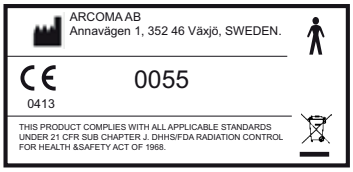


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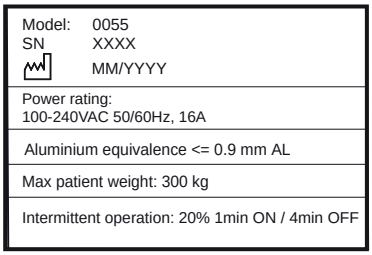


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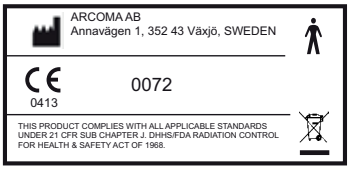


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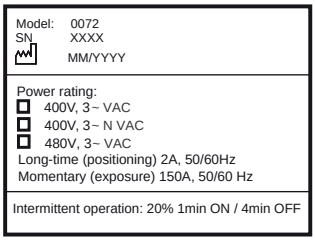


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## 1.3 System Description

### 1.3.1 General

OMNERA™ includes a system cabinet with a high voltage generator, generator user interface, a ceiling suspended unit (with an x-ray tube and a collimator), a Table and a Wallstand.

### 1.3.2 Intended Use (Rx Only)

It is a stationary X-ray system intended for obtaining radiographic images of various portions of the human body in a clinical environment.

The System is not intended for mammography.

### 1.3.3 Configuration

Two System configurations are supported. System Cabinet (including generator), Imaging System and Ceiling suspended unit are always included;

• Table and Wall stand system

• Wall stand system

### 1.3.4 System Overview

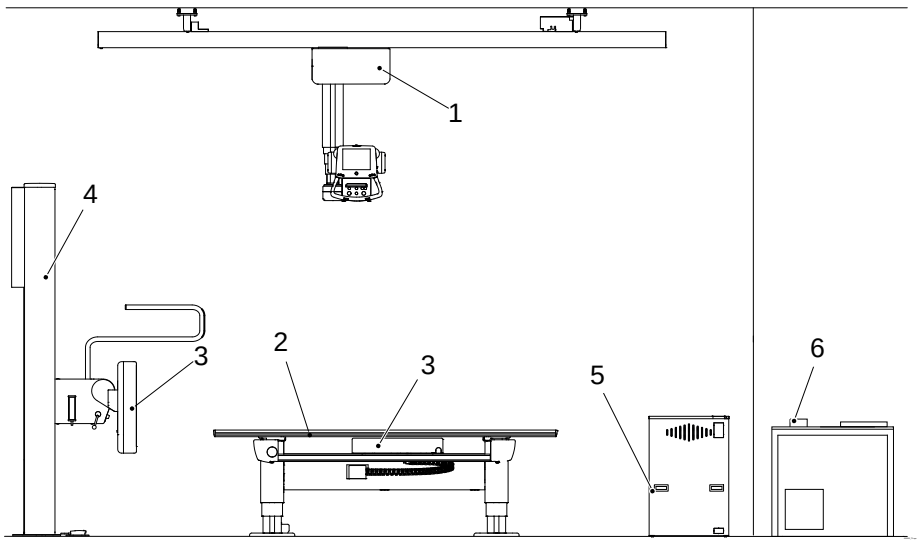



*Fig. 1-2 System components*

1. Overhead Tube Crane (OTC)
2. Table
3. Detector holder
4. Wallstand
5. System Cabinet
6. External emergency stop/sync.

### 1.3.4.1 OTC, Overview

The figure shows the main parts of the OTC.

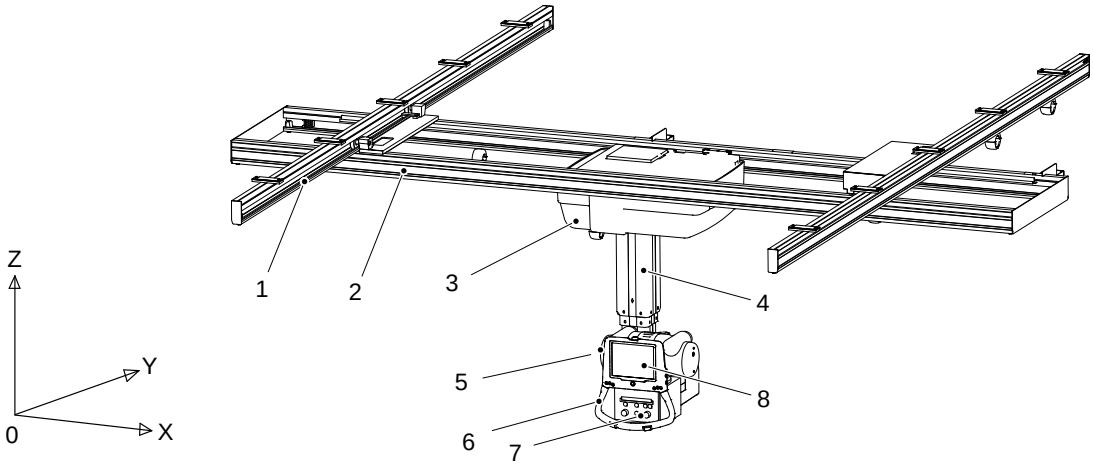



*Fig. 1-3 OTC*

1. Traverse rail (X)
2. Ceiling rail (Y)
3. Ceiling wagon
4. Column (Z)
5. X-ray tube
6. Maneuver handle
7. Collimator

### 1.3.4.2 Wall Stand Overview

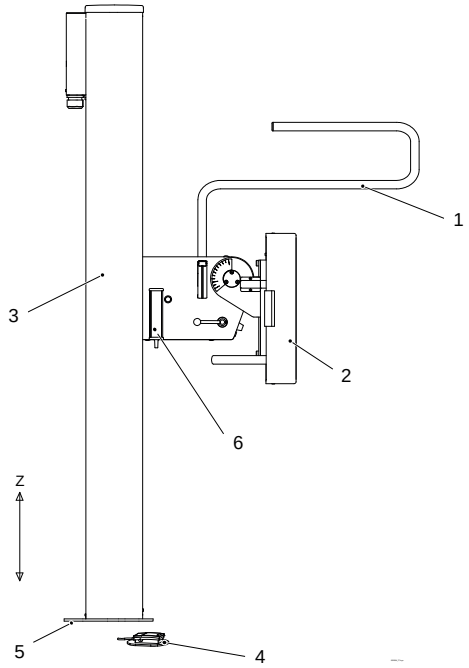



*Fig. 1-4 Wall stand overview.*

1. Lateral armrest
2. Detector holder
3. Column
4. Foot control (brake release)
5. Foot plate
6. Hand control (collimator adjustments, and up/down movement)

### 1.3.4.3 Table overview

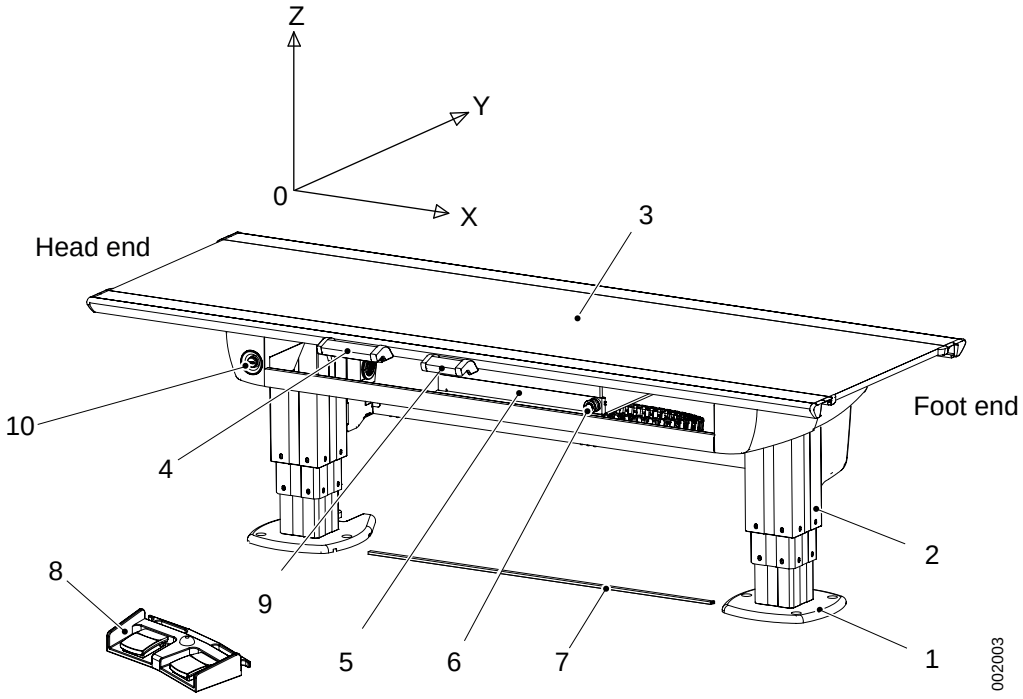



*Fig. 1-5 Table overview*

1. Foot plate
2. Column
3. Table top
4. Table hand control (X/Y/Z, Ceiling tube pendulum movement)
5. Detector holder
6. Brake release for detector holder
7. XY foot control strip type (Option)
8. Foot control table top (X/Y/Z) (Option)
9. Collimator hand control (option)
10. Emergency stop

# 2 Safety

## 2.1 Compliance

External equipment intended for connection to signal input, signal output or other connectors shall comply with the relevant product standard e.g. IEC 60950–1 for IT equipment and the IEC 60601–series for medical electrical equipment.

In addition, all such combinations – systems – shall comply with the safety requirements stated in the collateral standard IEC 60601–1–1 or the general standard IEC 60601–1, edition 3.1, clause 16. Any equipment not complying with the leakage current requirements in IEC 60601–1 shall be kept outside the patient environment i.e. at least 1.5 m from the patient support.

Any person who connects external equipment to signal input, signal output or other connectors has formed a system and is therefore responsible for the system to comply with the requirements.

If in doubt, contact qualified medical technician or your local representative.

If external equipment is connected, an isolation device is needed to isolate the equipment located outside the patient environment from the equipment located inside the patient environment. In particular such a separation device is required when a network connection is made. The requirements on the separation device is defined in IEC 60601–1–1 and in IEC 60601–1, edition 3.1, clause 16.

This product conforms to DHHS radiation Standards of 21 CFR subpart J as of the date of manufacture.

## 2.2 Qualifications of Personnel

*CAUTION!*

***Federal law restricts this device to sale by, or on the order of a physician.***

*CAUTION!*

***This equipment is intended for use in radiographic examinations under the guidance of trained health care professionals.***

### 2.2.1 Operating Personnel

Before using the product it is required that the operating personnel is thoroughly familiar with the product and its operating instructions, in particular:

- Safety
- Function and Safety Checks

### 2.2.2 Service Personnel

***WARNING!***

***Before working with service and maintenance, always turn off the power and make sure to lock it, so it cannot be mistakenly turned on.***

The equipment shall be serviced only by qualified personnel who:

- is completely familiar with the System
- has read and understood *Operation Manual* and *Installation and Service Manual*.
- knows how to remove power to the unit in case of an emergency
- is trained in the use of equipment and procedures of this type.

Failure to follow the instructions given in this Manual could result in serious injury to the service person, patient and operator.

*Note!*

*It is the responsibility of the owner to ensure that the technicians have the right training and knowledge to perform service and maintenance.*

*Note!*

*It is the responsibility of the owner to ensure that the product is operated only by trained radiologist, service technicians or product specialists.*

## 2.3 Service and Maintenance

***WARNING!***

***When service or maintenance is to be performed the service technician shall lock the equipment from all energy sources.***

***Be aware of that there are live parts even some time after having switched off the mains.***

***Due to remaining energy, always wait at least 15 seconds before working on the System.***

***WARNING!***

***There will still be live parts even when the System is switched off.***

***WARNING!***

***The equipment must not be serviced or maintained while in use with the patient.***

- ***Risk for personal injury.***

***Service and maintenance shall only be performed when no patient is present.***

***WARNING!***

***No modification of this equipment is allowed.***

The equipment must be checked according to the 7 *Function and Safety Checks* to maintain reliability and serviceability, and to ensure the safety of the patients, the operator and third parties.

If national rules or regulations specify more frequent checks and/or maintenance, such regulations must be observed.

### 2.3.1 Operation, Installation and Repair

***WARNING!***

***To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.***

***WARNING!***

***Only medical-approved products shall be in the X-ray room***

***Risk of electric shock to patient or user***

- ***No non-medical electrical devices shall be used in the x-ray room.***
- ***Note that the monitor and the PC for the Image system, are none-medical approved products.***

***WARNING!***

***The Manufacturer can not assume responsibility for the safety features or for the reliability and performance of the equipment, if:***

- ***installation of equipment expansions or modification are not approved by the Manufacturer.***
- ***installation of equipment expansions or modification are not carried out by persons authorized by the Manufacturer.***
- ***components are not replaced by original spare parts in case of a malfunction.***
- ***the electrical installation of the room concerned does not meet the requirements or the corresponding national regulations.***
- ***the product is not used in accordance with the operating instructions.***

*CAUTION!*

***Only service engineers are allowed to open the covers.***

*CAUTION!*

***When installing this equipment in a different location, contact us or our designated dealer.***

*CAUTION!*

***Do not modify the equipment.***

*CAUTION!*

***Do not remove, disassemble, change, modify, repair, or add any part.***

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

## 2.4 Safety and Warning Symbols

The following symbols are used for the product.

| | |
|---|---|
|  | Attention consult accompanying documents. |
|  | To signify a general warning. This symbol is used in various places throughout the Manual where special precaution shall be observed. |
|  | Type B applied part. |
|  | Protective earth terminal. |
|  | Earth terminal. |
| N | Connection point for the neutral conductor on permanently installed equipment. |
|  | Squeezing hazard. |
|  | This symbol indicates compliance of the equipment with Directive 93/42/EEC. |
|  | Separate collection for electrical and electronic equipment. |
|  | Manufacturer |
|  | Manufacture date producer |
|  | To indicate the emission or the imminent emission of X-radiation. |
|   | Marking on the emergency stop button. Activation of the actuator interrupts all mechanical movements and prohibits exposures. |

## 2.5 Safety and Warning Labels on the Equipment

The figure shows the location of the safety and warning labels.

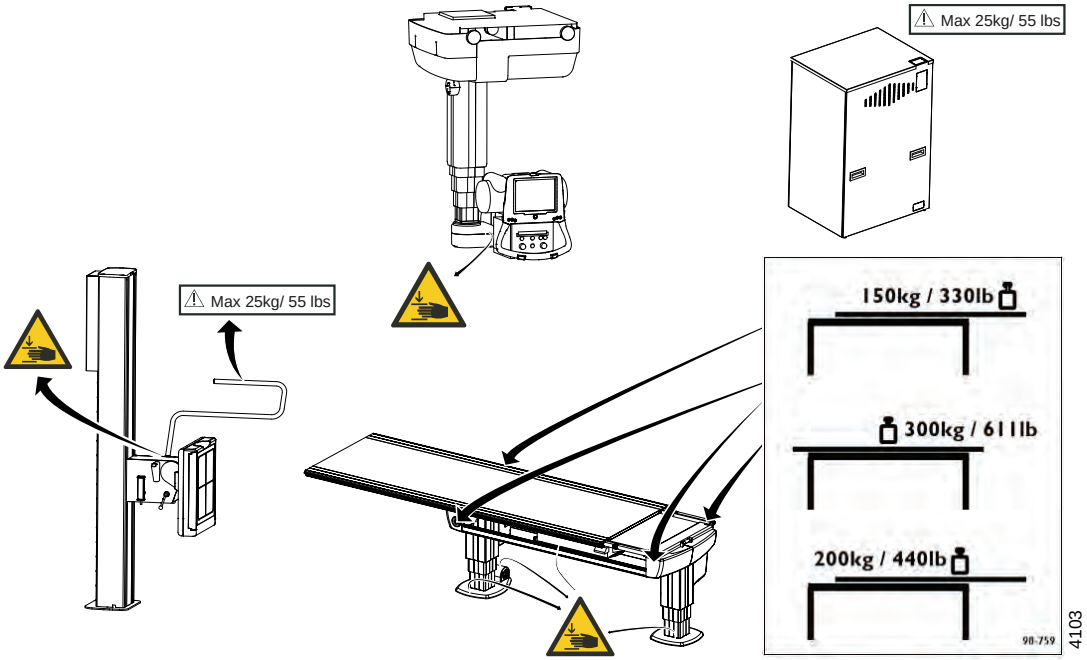



*Fig. 2-1 Safety and Warning Labels*

## 2.6 Emergency Stop

The System has six emergency stops, one on the ceiling suspended X-ray tube support, two on each side of the Table (at the head end), two on the Wallstand and one external.

Pressing one of the emergency stop buttons, immediately cuts the power to all motorized movements.

The emergency stop is also connected to the generator. The emergency stop will prevent a new exposure but not terminate an ongoing exposure.

To leave the emergency stop position, turn the button clockwise and the button will be released and the System can be used again.

There are additional external emergency stops as option.

*Note!*

*It is recommended to train the operator regularly in the use of the emergency stop function so the operator feels confident in using it.*

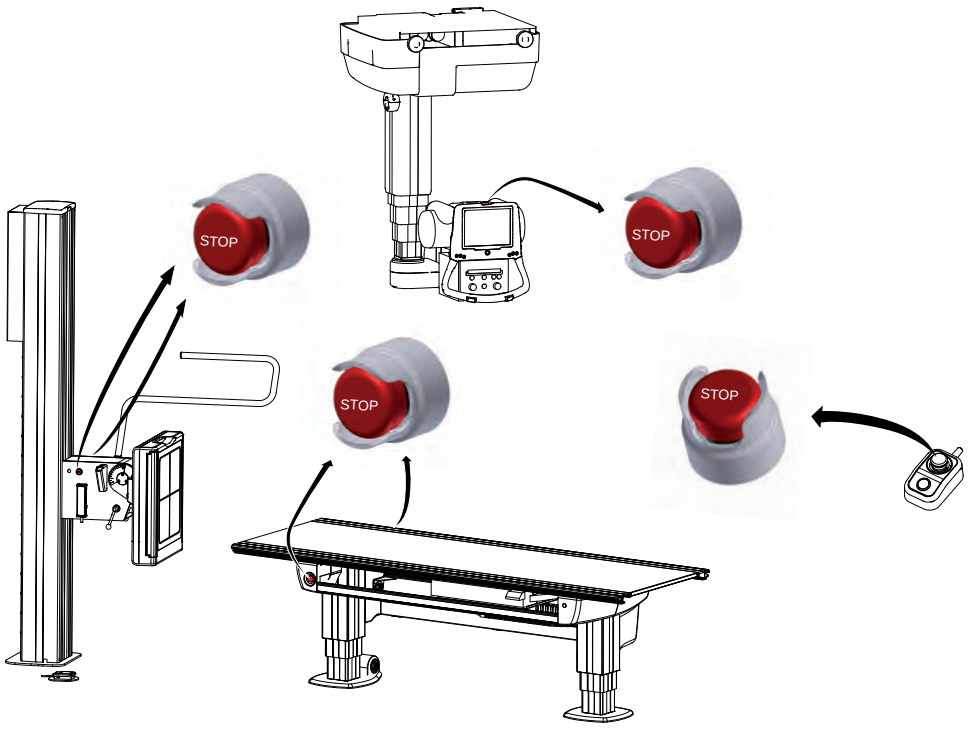



*Fig. 2-2*

## 2.7 Radiation and X-ray Tube

***WARNING!***

***Make sure that the patients, the operators and third parties are protected against unnecessary X-ray radiation in accordance with the local regulations.***

***WARNING!***

***The surfaces on the Collimator and the X-ray tube can be warm. The collimator temperature will not reach 60 degrees Celsius, but the X-ray tube may be up to 85 degrees Celsius.***

***WARNING!***

***The collimator filter must be verified so that correct filter is used during exposure.***

***WARNING!***

***Make sure that the SID shown in the display corresponds to that shown on the collimator.***

*CAUTION!*

***Audio and visual communication must be possible between the operator and the patient when performing an exposure.***

*CAUTION!*

***No exposure outside the active area of the imaging unit is allowed. Make sure that the x-ray beam is not outside the active area of the imaging unit in order to prevent unnecessary dose to the patient.***

*CAUTION!*

***To minimize the x-ray dose:***

***- keep the distance between the focal spot and patient as large as possible.***

***- and the beam size as small as possible.***

## 2.8 Mechanical Safety

***WARNING!***

***Tracking is only allowed under supervision of trained personnel.***

***WARNING!***

***Squeezing hazard can occur between column segments and beta rotation assembly interface.***

*Note!*

*Surrounding equipment is not subject of the collision warning.*

### 2.8.1 General

It is the operator's duty to ensure that any danger to the patient and/or third person is prevented, before movements are released.

### 2.8.2 Ceiling Suspended X-ray Tube Support

Possible squeezing hazard areas are indicated in the figure.

Squeezing hazard can occur between the:

- column (1) and the column bottom plate (3), when the column is moving upward (Z-direction).

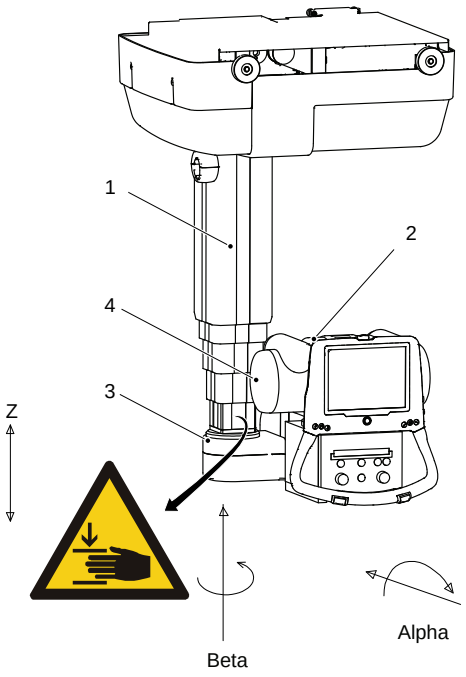



*Fig. 2-3*

1. Column (Z)
2. Cover
3. Column bottom plate
4. X-ray tube

### 2.8.3 Table

Possible squeeze hazard areas are indicated in the figure.

Squeezing hazard can occur between the:

- table top (1) and the top of the imaging unit (4); when the table top (1) is in the outer position (Y-direction) or moving in a longitudinal direction (X-direction).
- table top (1) and the imaging unit rail (6); when the table top (1) is in the outer position (Y-direction).
- imaging unit (4) and the cover (5); when the imaging unit is moving in a longitudinal direction (X-direction).
- column (7) and the footplate (8); when the column (7) is moving downwards (Z-direction).
- cover (2) and the column cover foot (3); when the column (7) is moving downwards (Z-direction).

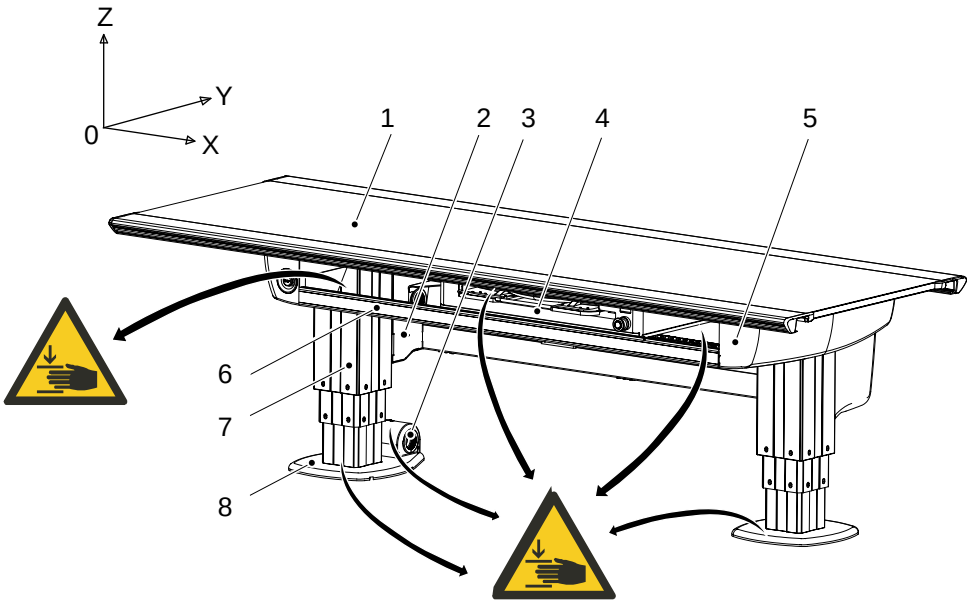



*Fig. 2-4*

1. Table top (X/Y/Z)
2. Cover
3. Column cover foot
4. Imaging unit (X)
5. Cover
6. Imaging unit rail
7. Column (Z)
8. Footplate

***WARNING!***

***Squeezing hazards may occur between the table top and the imaging unit or the imaging unit rail.***

### 2.8.3.1 Detector Unit, Table

The manoeuver control (2) controls the detector holder brake.

When the control is activated, the carriage is free to move, and when released, the brake is activated holding the carriage in position. The brake is normally activated, at power loss the brake is released.

The detector holder is designed to accommodate detectors and detector holders. The electrical design of the detector unit is made in the same manner, e.g. standard electronics are used for all detector/detector holder options and additional electronics are added to suit each individual option.

When using a fixed detector or a wireless detector with a charging cable in the table, a power box for the detector is mounted under the Table. For location, see Fig. 2-5 *Location of Power box*.

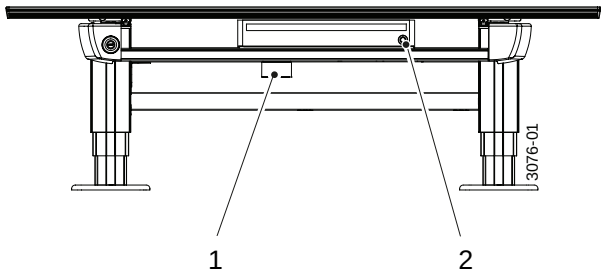



*Fig. 2-5 Location of Power box*

1. Power box
2. Manoeuver control

## 2.8.4 Wall stand

*Note!*

*The patient or operator is allowed to lean against the Wall stand, patient handle or armrest, but **not** to put any weight on it.*

### 2.8.4.1 Standard Version of the Wall stand

Possible squeezing hazard areas are indicated in Fig. 2-6 *Warning labels*. Getting stuck in the imaging unit slide opening (1), causes squeezing hazard, if the imaging unit is moving downward or upward (Z-direction).

*CAUTION!*

***If the motorized movement is operated in high speed level, it is not allowed to have patient sitting or standing in the surroundings of the Wall stand.***

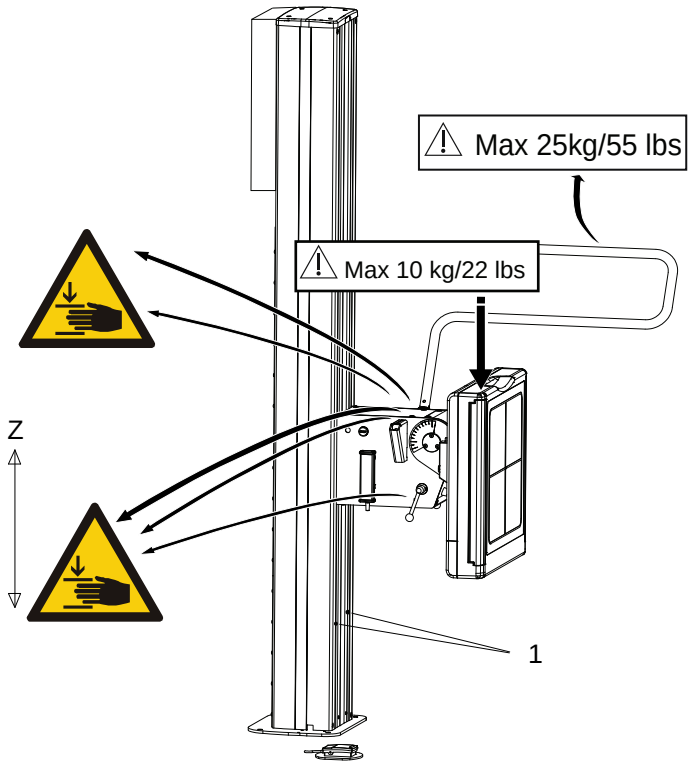



*Fig. 2-6 Warning labels*

1. Slide opening of the imaging unit

### 2.8.4.2 Weight Restrictions

- The maximum weight to put on the wall stand lateral armrest is restricted to 25 kg/ 55 lbs.
- For the wall stand detector holder the maximum weight is set to 10 kg/ 22 lbs.

### 2.8.4.3 Indication of Power to Wall stand

The device is powered when the indicator light on the electrical box is lit.

## 2.9 Safety issues when placing the patient

***WARNING!***

***Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.***

***WARNING!***

***The hospital bed shall be placed in direct contact with, and at the same height as, the table top to avoid any potential risk of injury during transfer of the patient between the bed and table.***

***WARNING!***

***Due to squeezing hazards, patients shall always have their extremities placed over the table top.***

*CAUTION!*

***When the table top switch is activated, the table top will be floating, therefore do not lean against the table top***

When transferring the patient from the hospital bed to the X-ray table, the table top has to be locked and centered over the table.

The table shall always be operated from the front, i.e. the same side as the image receptor holder is operated. To reduce the lateral forces on the table, the operator should be placed on the opposite longitudinal side of the patient and the hospital bed. The operator should then drag the mattress with the patient from the hospital bed to the X-ray Table.

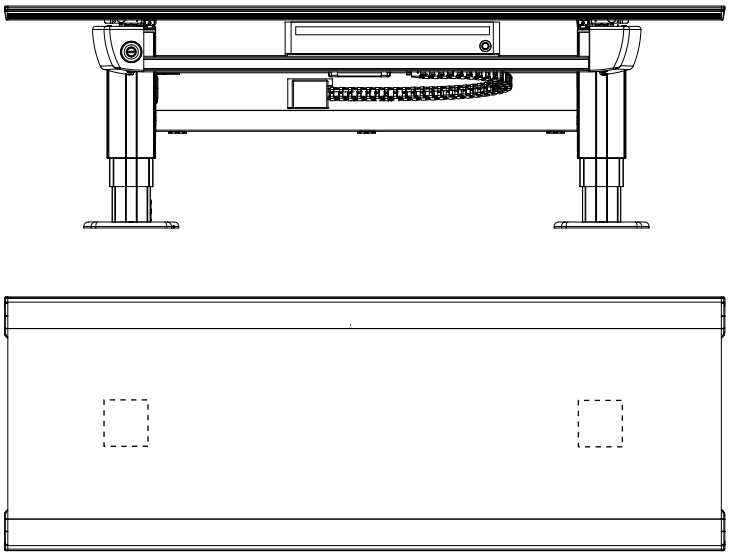


*Fig. 2-7 Placement of the table top when loading the patient.*

### 2.9.1 Working area

***WARNING!***

***Due to squeezing hazard, when operating any motorized movement — when not placed on the table — patients shall always be outside the working area.***

The working area is the size of the table top, including the length of stroke of the table top in the X- and Y-direction.

The measurements in Fig. 2-8 show the length of the stroke in the X- and Y-direction.

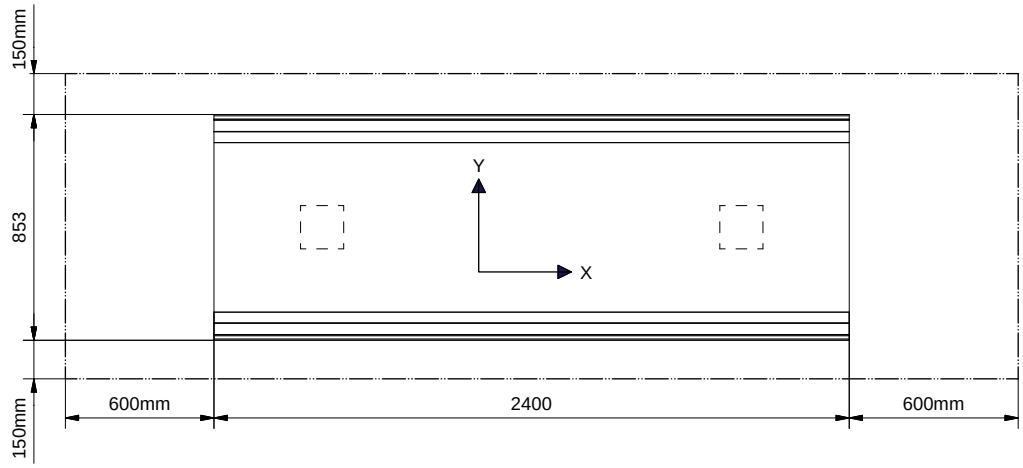



*Fig. 2-8*

The Fig. 2-9 shows the dimensions underneath the table

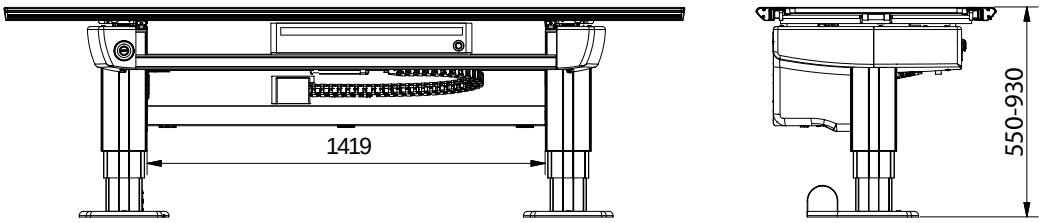



*Fig. 2-9*

### 2.9.2 Weight restrictions, table

The following figures show the maximum load at different positions of the table.

When the table top is centered over the table frame, the maximum load of a patient either lying or sitting is 300 kg / 611 lbs, see Fig. 2-10

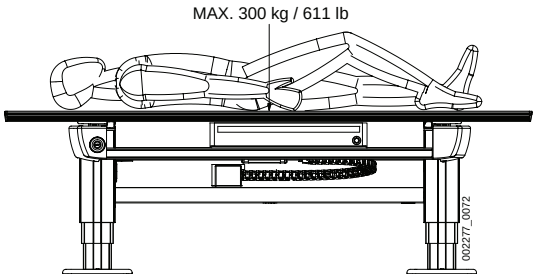



*Fig. 2-10*

When the table top is positioned outside the table frame, the maximum load of at patient lying on the table top is 200 kg/ 440 lbs and the maximum load of at patient sitting on the table top is 150 kg / 330 lbs.

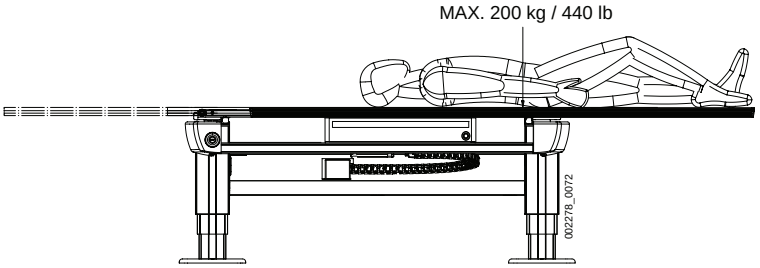



*Fig. 2-11*

The table frame is marked on the upper side with the maximum weight when positioning in outer positions, see Fig. 2-12 *Weight restriction labels on the table*

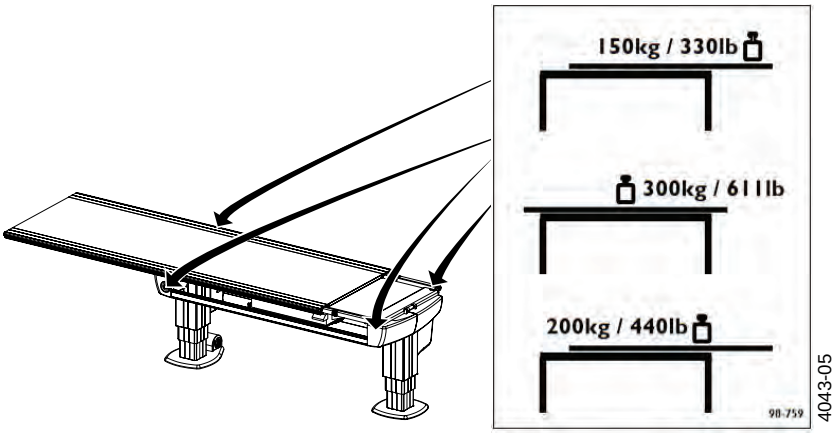



*Fig. 2-12 Weight restriction labels on the table*

## 2.10 Safety Functions

***WARNING!***

***The operator must always have supervision of the System.***

### 2.10.1 Table Safety Zone and OTC

There is a safety zone over and around the Table. The safety zone reaches from the table top surface and vertical up 500 mm and from the table top edge and horizontal out 120 mm.

Inside the zone the OTC moves vertically with reduced speed. Not until the OTC is outside the zone the vertical movements are performed with full speed.

***WARNING!***

***When the stand has passed the table top level, on its way downward, the speed will increase to normal speed again.***

Additionally, when the stand moves manually down into the zone, at a distance of 50 cm from the Table, the OTC stops the vertical movement and the movement has to be restarted by releasing and pressing the button again.

### 2.10.2 Wallstand Safety Zone

With consideration of detector tilting and the safety height of the tube, there is a collision validation when moving in Auto-position. The System validates if it is possible to move to the position, without any collision between tube and detector.

In *Wall Flexible mode*, when user activates the *Servo* button and Z reaches the transport interval zone, the System checks the Auto-position target with the detector tilting and the safety height of the tube to detect possible collision points. The System then moves, or stops moving and displays message.

### 2.10.3 Collision Detection

#### 2.10.3.1 Motorized Movements

Every motorized movement has a collision detection.

All movements are stopped when the collision detection activates and the display shows an error message. When a collision in Z-direction is detected, the OTC has to be moved in the opposite direction before it can be moved in the original direction again.

#### 2.10.3.2 Z Column

A guard plate installed on top of the column, registers vertical pressure on the column, for instance a vertical impact.

When the pressure exceeds the trig level vertically, all movements are stopped and a warning message is displayed. To be able to release the pressure, a movement in the opposite direction is allowed. When the pressure on the column has returned to normal, see Fig. 2-13 *Collision detection* the warning message is removed and motorized movements are allowed again.

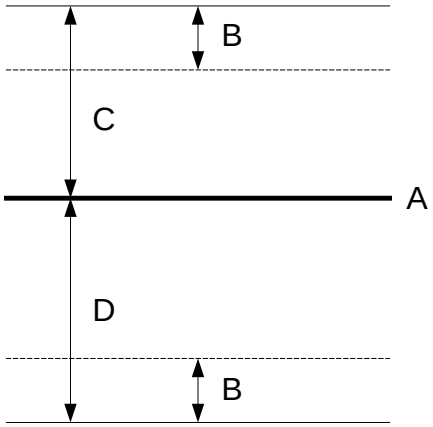



*Fig. 2-13 Collision detection*

A Zero force level
B Hysteresis
C Upper trig level
D Lower trig level

*Note!*

*In some situations it is possible to force a false detection of a collision. This can occur if the column is affected by a pressure at the time the movement starts. This could be for example the case if the collimator rests on the Table, when the operator moves the column upward, a collision is detected.*

*The reason for the collision detection is that, when the movement starts, the zero force level is calculated based on the actual pressure affecting the column at that moment. As soon as the movement starts and the collimator is no longer resting on the Table, the guard plate catch a change in pressure and a collision is detected.*

*To solve the problem the operator must affect pressure on the column, for example manually pull the column up or down. The System will take this as a sign that the operator has removed the obstacle and that no collision exists any more. If the problem is yet not solved, the System must be restarted.*

#### 2.10.3.3 Motor Nodes

Every motor node has collision detection on its own movement. A collision can be detected in different ways, for instance if the control error in the motor node's regulator is too large, if the final position is not reached in time, or if the position transducer has not moved although the drive unit had an output voltage for a given time.

A detected collision stops all movements in that part of the System (e.g. OTC, Table or Wall stand) where the collision is detected. An error message is displayed.

#### 2.10.3.4 Malfunctioning Node

If any node stops functioning, all movements are stopped and the power to the motors in the System is removed.

### 2.10.4 Quick Abortion of an Auto Positioning

When any of the buttons on the stand, is pressed while the stand is moving towards its position, it has the same effect as when the servo button is released, which means that all movements are stopped.

### 2.10.5 Opposite buttons pressed

If, at any time, two from each other opposite buttons are pressed, for example movements up and down, the movement is stopped. Both buttons must be released before any movement is allowed.

### 2.10.6 Dead Man’s Grip

All buttons for motorized movements require constant activation. If the operator releases one of the buttons/controls, the System will immediately stop or engage the brakes (manual movements). The exposure hand control has the same functionality.

## 2.11 Electromagnetic Compatibility (EMC)

The System complies with the requirements of IEC 60601-1-2:2007 regarding electromagnetic compatibility. Surrounding equipment shall follow the standard IEC 60601-1-2:2007.

*CAUTION!*

***Mobile telephones and other radiating equipment can interfere with the function of the System and can therefore cause safety hazards.***

| **Guidance and manufacturers declaration - electromagnetic emissions** | | |
|---|---|---|
| The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment. | | |
| **Emissions test** | **Compliance** | **Electromagnetic environment - guidance** |
| RF emissions CISPR 11 | Group 1 | The System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. |
| RF emissions CISPR 11 | Class B | The System is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purpose. For information purpose the System complies with IEC61000-3-11 and is suitable for connection to public mains network if the impedance is 0,32 Ohm or lower |
| Harmonic emissions IEC 61000-3-2 | Not applicable | |
| Voltage fluctuations/ Flicker emissions IEC 61000-3-3 | Not applicable | |

| **Guidance and manufacturers declaration - electromagnetic immunity** | | | |
|---|---|---|---|
| The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment. | | | |
| **Immunity test** | **IEC 60601 test level** | **Compliance level** | **Electromagnetic environment - guidance** |
| Electrostatic discharger (ESD) IEC 61000-4-2 | ± 6 kV contact<br>± 8 kV air | ± 6 kV contact<br>± 8 kV air | Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. |
| Electrical fast transient/burst IEC 61000-4-4 | ± 2 kV for power supply lines<br>+ 1 kV for input/ output lines | ± 2 kV for power supply lines<br>n/a. for input/output lines | Mains power quality should be that of a typical commercial or hospital environment. |
| Surge<br>IEC 61000-4-5 | ± 1 kV differential mode<br>± 2 kV common mode | ± 1 kV differential mode<br>± 2 kV common mode | Mains power quality should be that of a typical commercial or hospital environment. |

| Guidance and manufacturers declaration - electromagnetic immunity | | | |
|---|---|---|---|
| Voltage dips, short interruptions and voltage variations on power supply input lines.<br>IEC 61000-4-11 | <5 % $U_T$<br>(>95 % dip in $U_T$) for 0,5 cycle<br>40 % $U_T$<br>(60 % dip in $U_T$) for 5 cycles<br>70 % $U_T$<br>(30 % dip in $U_T$) for 25 cycles<br><5 % $U_T$<br>(>95 % dip in $U_T$) for 5 sec | <5 % $U_T$<br>(>95 % dip in $U_T$) for 0,5 cycle<br>40 % $U_T$<br>(60 % dip in $U_T$) for 5 cycles<br>70 % $U_T$<br>(30 % dip in $U_T$) for 25 cycles<br><5 % $U_T$<br>(>95 % dip in $U_T$) for 5 sec | Mains power quality should be that of a typical commercial or hospital environment. If the user of the System requires continued operation during power mains interruptions, it is recommended that the System be powered from an uninterrupted power supply or battery. |
| Power frequency (50/60 Hz) magnetic field<br>IEC 61000-4-8 | 3 A/m | 3 A/m | Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment. |

*Note!*

*$U_T$ is the AC mains voltage prior to application of the test level.*

| Guidance and manufacturers declaration - electromagnetic immunity | | | |
|---|---|---|---|
| The System is intended for use in the electromagnetic environment specified below. The customer or the user of the System should assure that it is used in such an environment. | | | |
| **Immunity test** | **IEC 60601 test level** | **Compliance level** | **Electromagnetic environment - guidance** |
| | | | Portable and mobile RF communications equipment should be used no closer to any part of the System, including cables, than the recommended separation distance, calculated from the equation applicable to the frequency of the transmitter.<br>Recommended separation distance |
| Conducted RF IEC 61000-4-6 | 3 Vrms<br>150 kHz to 80 MHz | 3 Vrms<br>150 kHz to 80 MHz | $d = 1,2 \sqrt{p}$ |

| **Guidance and manufacturers declaration - electromagnetic immunity** | | | |
|---|---|---|---|
| Radiated RF IEC 61000-4-3 | 3 V/m<br>80 MHz to 2,5 GHz | 3 V/m<br>80 MHz to 2,5 GHz | $d = 1,2\sqrt{p}$ 80 MHz to 800 MHz<br>$d = 2,3\sqrt{p}$ 800 MHz to 2,5 GHz<br>where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m).<br>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be range. [b]<br>Interference may occur in the vicinity of equipment marked with the following symbol:  |

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the System is used exceeds the applicable RF compliance level above, the System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as relocating the System.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

**Recommended separation distances between portable and mobile RF communications equipment and System**

The System is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the System as recommended below, according to the maximum output power of the communications equipment.

| **Rated maximum output power of transmitter W** | **Separation distance according to frequency of transmitter** | | |
|---|---|---|---|
| | 150 kHz to 80 MHz<br>$d = 1,17\sqrt{p}$ | 80 MHz to 800 MHz<br>$d = 0,35\sqrt{p}$ | 800 MHz to 2,5 GHz<br>$d = 0,7\sqrt{p}$ |
| 0,01 | 0,12 | 0,04 | 0,07 |
| 0,1 | 0,37 | 0,11 | 0,22 |
| 1 | 1,17 | 0,35 | 0,7 |
| 10 | 3,69 | 1,11 | 2,21 |

| Recommended separation distances between portable and mobile RF communications equipment and System | | | |
|---|---|---|---|
| 100 | 11,67 | 3,5 | 7 |
| For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.<br>NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.<br>NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption as reflection from structures, objects and people. | | | |

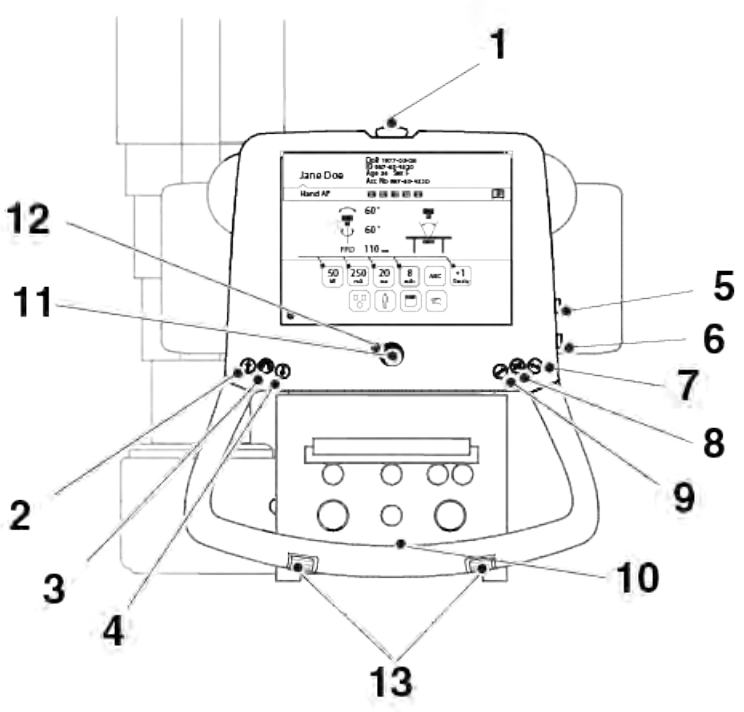
# 3 User Interface

## 3.1 Overhead Tube Crane

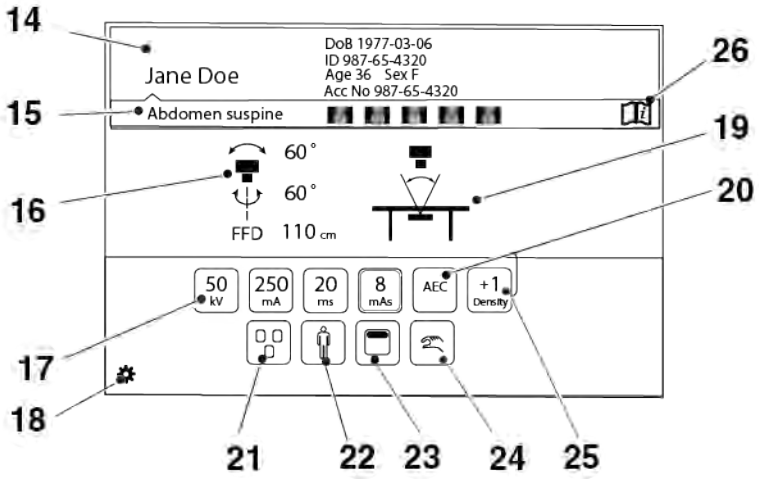
The overhead tube crane (OTC) can be moved to the correct position by autopositioning, motorized movements or manual movements.

The OTC has a display that shows patient information, information of the tube angulation and the selected workstation etc. The exposure parameters are shown and can easily be changed from the OTC.

### 3.1.1 System Display Overview




1. Emergency brake
2. Z movement up
3. Alpha Beta rotation
4. Z movement down
5. Z movement up
6. Z movement down
7. Unlock X brake
8. Unlock X and Y brake
9. Unlock Y brake
10. Handle frame (option): X/Y brake release button
11. Servo button
12. Servo Mode indication light
13. Z movement up/down




14. Patient information
15. Active protocol
16. Position information
17. Adjustment of generator parameters: kV, mA, ms, mAs
18. Select the settings menu
19. Active mode
20. Selection of Technique mode
21. Selection of active AEC field (AEC mode only)
22. Patient size
23. Collimator centering
24. Manual or Servo mode
25. Density
26. Hospital manual

See the following pages for detailed description of the functions.

### 3.1.2 Patient Information

In this field the *Patient Name*, *Patient ID*, *Date of Birth*, *Age, Sex* and *Accession number* can be shown.

The information shown is defined in the *Setting menu*. In the *Setting menu* it is also possible to decide if the *Patient information* shall be shown always (picture 1), or on demand (picture 2).

When the button is shown on demand, the *Patient information* can be obtained by pushing the “i” on the black bar.

The *Patient information* closes automatically, or when the bar is pushed once again.


Picture 1 Picture 2

*Fig. 3-1 Patient information display*

### 3.1.3 Position Information

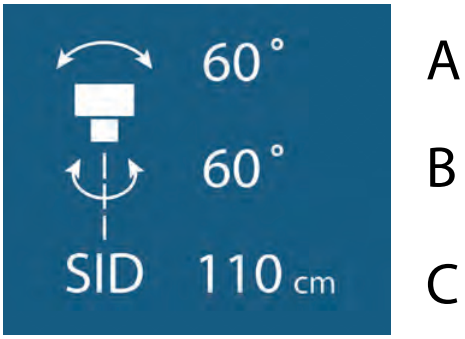



*Fig. 3-2 Position information*

A. Alpha angle (°)
B. Beta angle (°)
C. Source Image Distance (SID), or Height to floor (H) in Free or Auto Position Mode (cm/inch)

The height to floor (H) is shown in *Free mode* and *Auto position mode*. In all other modes the source image distance (SID) is shown. The unit for the distance can be either cm or inch, and is set in the *Setting menu* (Fig. 3-2 *Position information*).

### 3.1.4 Adjustment of Generator Parameters (kV, mA, ms, mAs, Density)

In order to change the exposure values, the button with the parameter that shall be changed, is pushed. Then the user may select to increase or decrease the value.

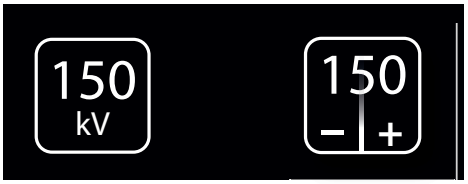



*Fig. 3-3 Adjustment of generator parameters*

*Note!*

*The Operator/User is always responsible for checking and validating the exposure parameters in the Image system before performing exposure.*

#### 3.1.4.1 Exposure Index

The exposure index, EXI, is a measure of the amount of exposure received by the detector and depends on mAs, the total detector area irridiated respective the beam attenuation. It is indicative of the image quality.

### 3.1.5 Selection of Technique Mode

There are three different technique modes available that are selected by pushing the *Technique mode selection* button. The selected mode is highlighted and the pop-up window closes automatically.

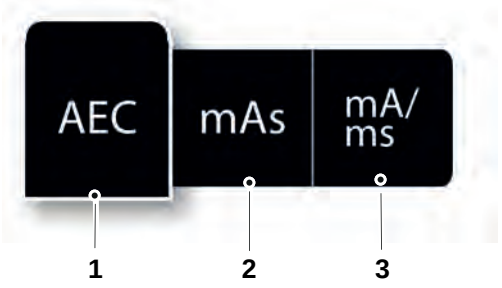



*Fig. 3-4 Technique mode selection*

1. AEC mode
2. mAs mode
3. mA/ms mode

Depending on what mode is active, different parameters will be available. Parameters not available for selection will be grayed out, see the *mAs selection* button in Fig. 3-5 *mAs selection button grayed out*, below.

In *AEC mode* the value that will be used as back-up value (ms, mAs or fixed), is indicated with the text *AEC Backup*.

*CAUTION!*

***For avoiding unnecessary radiation, make sure that the AEC back-up values are properly defined.***

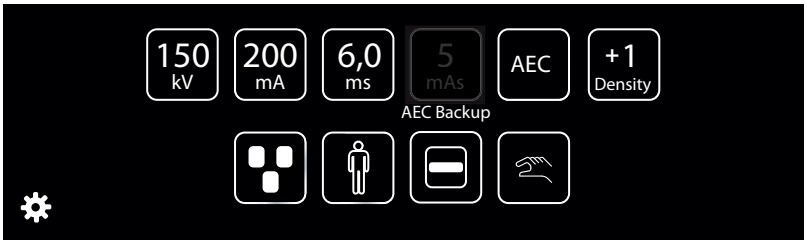



*Fig. 3-5 mAs selection button grayed out*

For more detailed information about the different technique modes, please see Operator's Manual for Canon single console CXDI NE.

### 3.1.5.1 Selection of Active AEC Field (AEC Mode Only)

The *AEC field selection* button is available in *AEC mode*.

When selecting the *AEC field* button, a pop-up-window with the different AEC fields according to Fig. 3-6 *AEC field selection*, will appear. The *AEC fields* are activated by a selection in the pop-up window to the right (2). All activated *AEC fields* will be shown in the left picture (1). *AEC fields* are deactivated by selecting them again in the pop-up window (2).

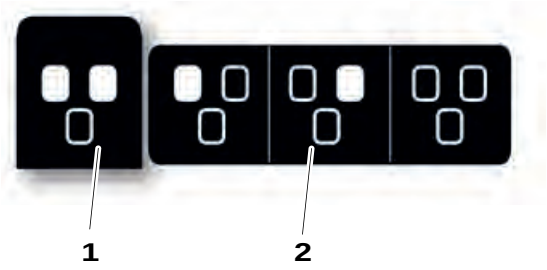



*Fig. 3-6 AEC field selection*

### 3.1.6 Patient Size

The *Patient size setting* is used for a quick setting of the generator parameters to suit the physique of the patient.

*Patient size* is adjusted by pressing the *Patient size selection* button. A pop-up window, according to Fig. 3-7 *Patient size selection*, will open and show available patient sizes.

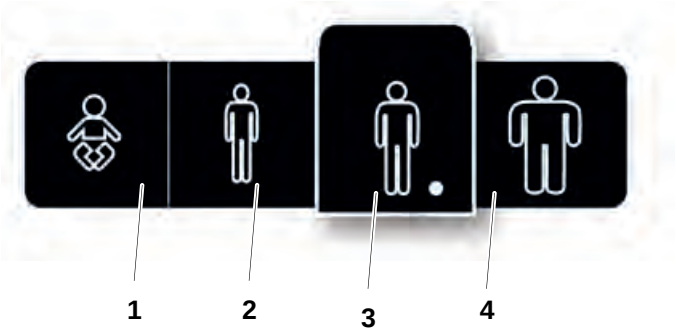



*Fig. 3-7 Patient size selection*

1. Paediatric
2. Small
3. Medium
4. Large

Select the desired *Patient size*. The pop-up window will automatically close shortly after the selection.

*Note!*

*The generator parameters and the collimator settings (field size and filter) will change to the defined values for the new Patient size.*

*If no generator parameters or collimator settings are defined for the new Patient size (defined in APR), the current values will be kept.*

*Note!*

*At the stitching procedure, a change of the Patient size for the first included image in the sequence, will not be kept for the following included images.*

### 3.1.7 Grid Status

#### 3.1.7.1 Grid Not Present

The user has defined in the *Anatomic Protocol*, that a grid shall be present for the selected examination, but no grid is attached.

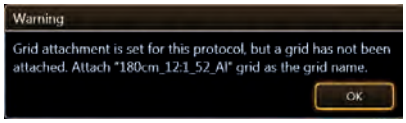



*Fig. 3-8 Grid not present.*

A warning will be displayed at the PC screen, see Fig. 3-8 *Grid not present.*

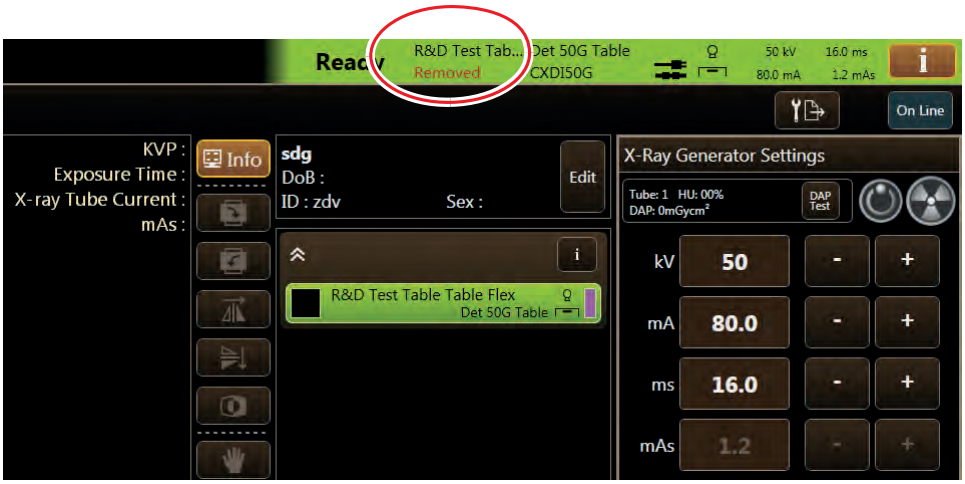



*Fig. 3-9 Grid removed.*

At the same time, a message is displayed at the *Information field*, saying *Removed*. This message is always shown when the grid shall be present, according to the settings at the *Anatomic Protocol*, but is absent. See Fig. 3-9 *Grid removed.*

#### 3.1.7.2 Grid Present

The user has defined, in the *Anatomic Protocol*, that a grid shall not be used for the selected examination, but a grid is attached.

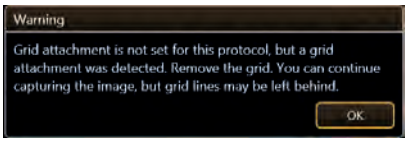



*Fig. 3-10 Grid present.*

A warning will be displayed at the PC screen, see Fig. 3-10 *Grid present.*


*Fig. 3-11 Grid data displayed.*

When a grid is attached, the grid data will be displayed at the *Information field*. See Fig. 3-11 *Grid data displayed.*

### 3.1.8 Collimator Centering

The collimator centering is adjusted by pressing the *Collimator centering* button.

A pop-up window according to Fig. 3-12 *Collimator centering selection*, will appear with the alternatives *Top centering*, and *Bottom centering*. Select the desired collimator centering.

The pop-up window will automatically close shortly after the selection, and the light field will adjust accordingly.

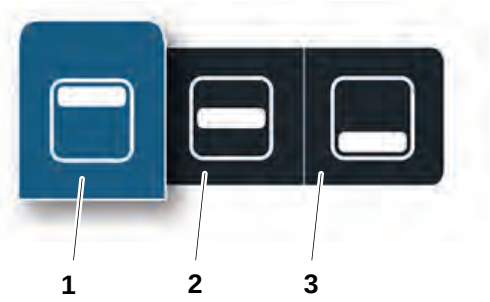
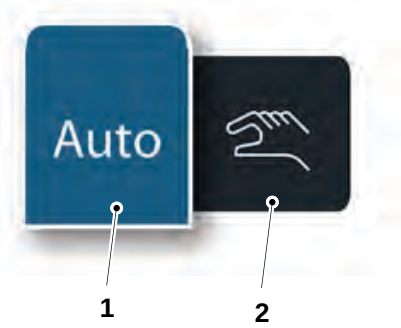



*Fig. 3-12 Collimator centering selection*

*Collimator centering selection 1) Top, 2) Center and 3) Bottom*

### 3.1.9 Servo State Mode




The Servo state can be either *Automatic mode* (1) or *Manual mode* (2).

A pop-up window according to Fig. 3-13 *Servo state mode*, will appear with two alternatives. When the System is in *Manual mode* all movements are allowed and exposure can be performed in any position, also outside the detector.

For further information about *Manual mode*, see corresponding section.

*Fig. 3-13 Servo state mode*

1. Automatic mode
2. Manual mode

### 3.1.10 Hospital manual

The hospital manual is reached by a activating the *Hospital manual* button for 1 second.

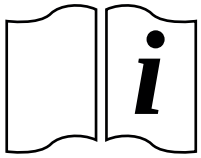


*Fig. 3-14 Hospital manual button*

## 3.1.11 Settings

The *Setting menu* is reached by a activating the *Setting* button for 1 second.

*Fig. 3-15 Setting button*

The *Setting menu* has the following tabs; *User Settings* and *Service*.

User settings has the following tabs: *Display*, *Settings* and *Themes*.

Service has the following tabs: *Log*, *Settings* and *Display*.

### 3.1.11.1 User settings

***User settings – Display***

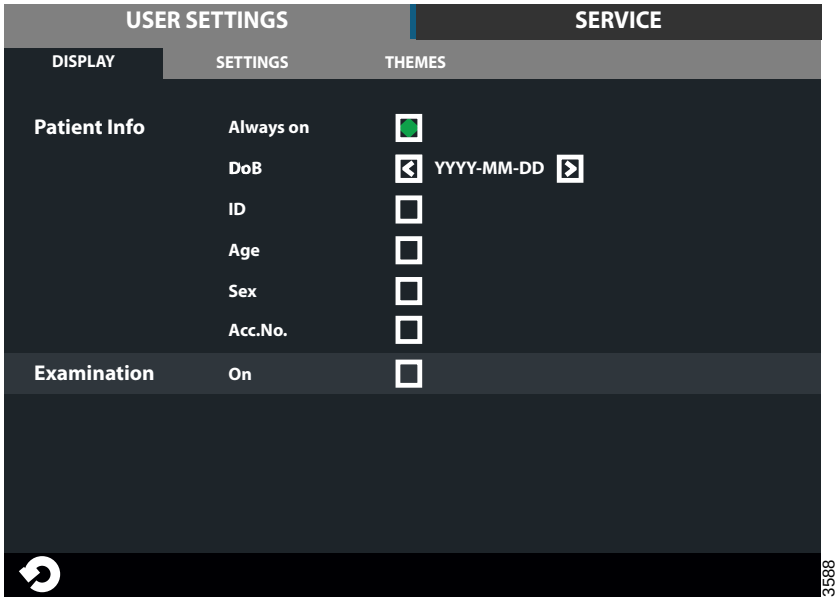



*Fig. 3-16 User settings – Display*

***Patient Info***

*CAUTION!*

***The user shall always assure that the Patient info and the type of examination is corresponding to the one in HIS and RIS.***


When the *Always on* is marked, the *Patient information* is shown as soon as the information is selected in the imaging display.

*Fig. 3-17 “Always On” selected*


When the *Always on* is **not** marked, the *Patient information* is shown when pushing the black field where the *‘i’* is.

*Fig. 3-18 “Always On” not selected.*

The *Patient information* closes automatically.

It is also possible to select what patient information to show on the display. The following parameters can be selected:

- *Date of Birth (DoB)*, different formats selectable
  - YYYY-MM-DD
  - DD-MM-YYYY
  - MM-DD-YYYY
- ID
- Age
- Sex
- Accession number
- Examination/Active Protocol

***Settings***

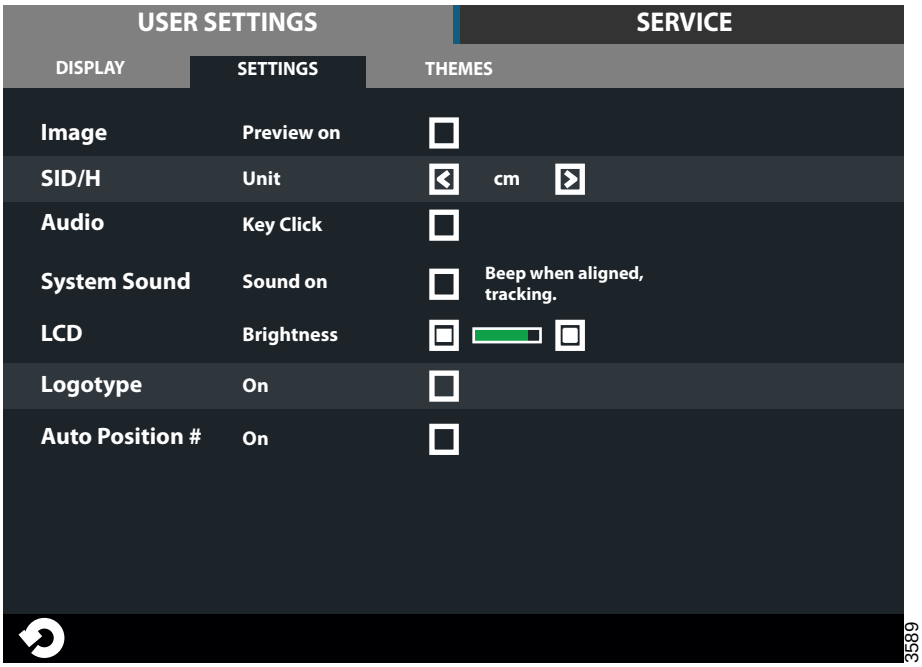



*Fig. 3-19 Settings*

In the *Settings* tab, it is possible to adjust the following:

- Preview Image (not applicable for CR systems)
- SID/H unit selection
- Audio key click, On/Off
- System sound, On/Off
- LCD brightness, Plus/Minus
- Arcoma logotype in display, On/Off

| | |
|---|---|
| – Image preview on | By selecting this, a small preview image will be shown next to the Active Protocol name (see figure on page35). |
| – SID/H Unit | Changes between cm and inch. (Changes unit on both display and collimator.) |
| – Audio Key Click | By selecting this, a key click will be heard when touching the System display. |
| – Sound on | By selecting this, a beep will be heard when OTC is aligned with the detector, at tracking. |

***LCD***

The display brightness can be adjusted. There is also a setting if the logo shall be shown or not.

***Preview Image (not applicable for CR systems)***

***WARNING!***

***The preview image must not be used for diagnostics or positioning***

It is possible to select if a *Preview image* shall be shown on the touchscreen display or not.

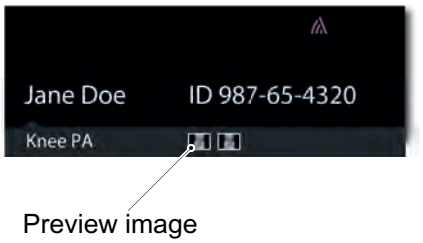



*Fig. 3-20 Preview image displayed*

If preview is selected, a small preview image, see Fig. 3-20 *Preview image displayed*, is shown on the touchscreen display when an exposure is performed.

Touch the small image on the display, and the image is shown as a large image.

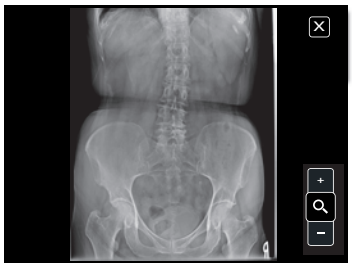


*Fig. 3-21 Preview image enlarged*

By touching the zoom button +/-, it is possible to zoom in and out, in the image.

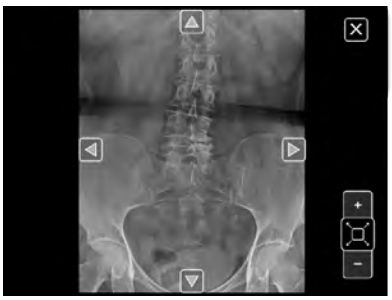


*Fig. 3-22 Zooming In/Out*

The arrows appearing in the image are used to pan in the image.

***Themes***

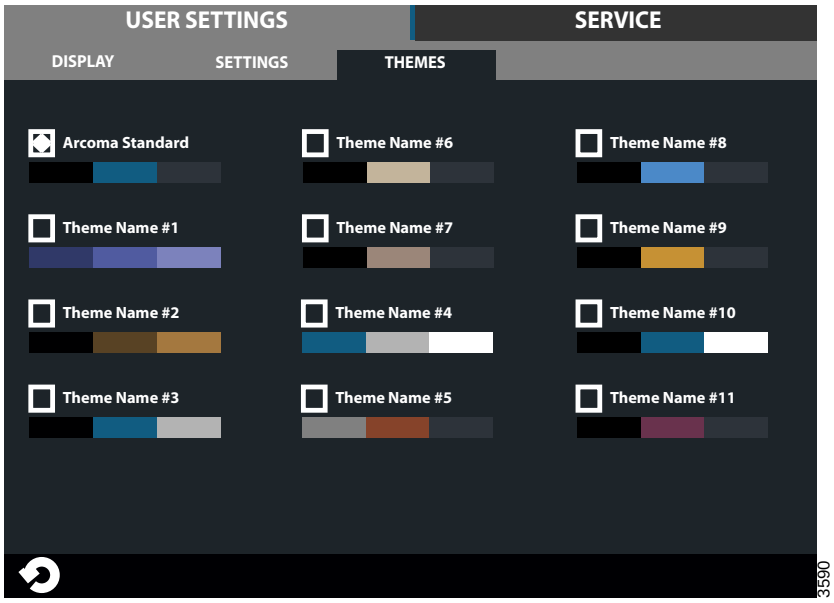



*Fig. 3-23 Themes*

Select a pre-set theme.

### 3.1.11.2 Service

The Service tag is meant to be used by the service technician.

***Log***

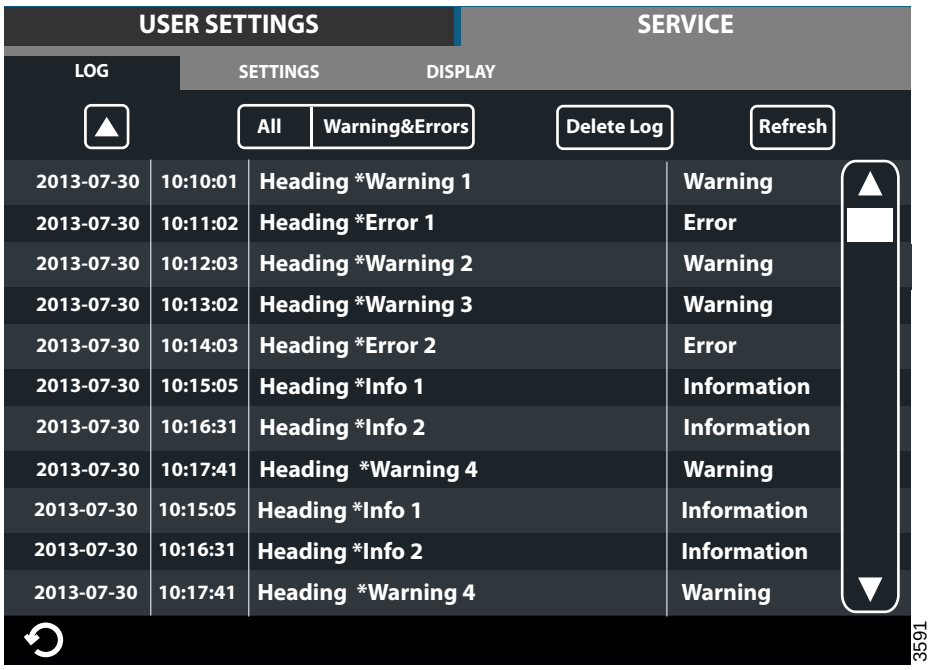



*Fig. 3-24 Log*

The log file shows warnings, errors and events that have occurred in the system. The log file can be filtered to show all information, or just warnings and errors. By selecting *Information*, *Warning* or *Error*, more information concerning the current issue will be shown.

The log file may be used for troubleshooting.

It is possible for service personnel to delete the log file which can be helpful when fault tracing. The refresh button retrieves the latest events.

***Delete log file***

*Note!*

*This procedure shall only be performed by service personnel.*

When selecting *Delete Log* a four digit access code is required before the log is deleted.

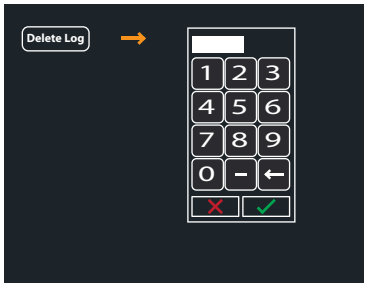



*Fig. 3-25 Delete log file*

***Settings***

The Service menu shows system set up and system software versions. A more detailed description can be found in the Service and installation manual.

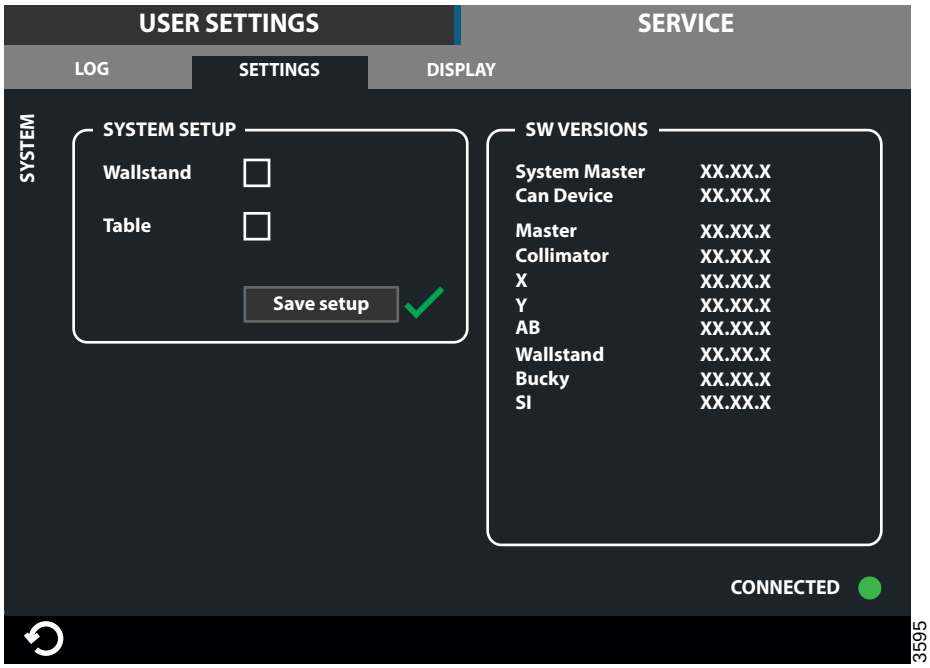



*Fig. 3-26*

***Display***

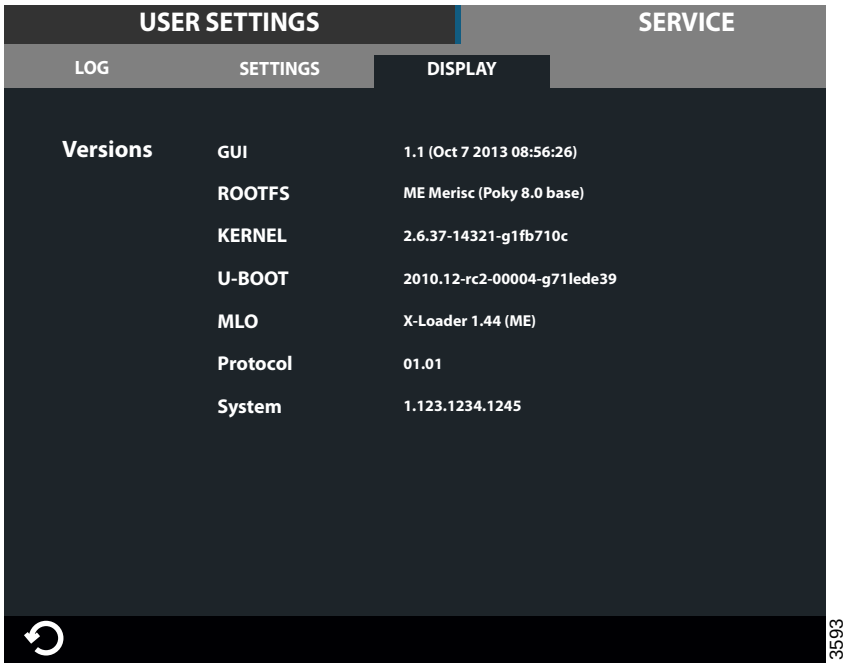



*Fig. 3-27 Display*

Information of the display software versions.

## 3.2 Exposure

*CAUTION!*

***The operator is responsible for validation of the exposure parameters before performing an exposure.***

Exposures are done by using the hand control.

### 3.2.1 Exposure Hand Control

A. Exposure control in normal position.
B. Exposure control in preparation position.
C. Exposure control in exposure position.

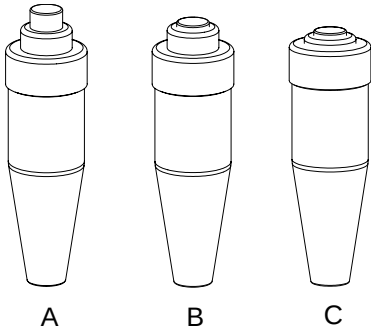



*Fig. 3-28 Exposure hand control*

### 3.2.2 Exposure Index

After exposure the Exposure Index (EXI) and Deviation Index (DI) will be shown in the image, in order to indicate the dose level. See further description of the indexes below.

The exposure index, is a measure of the amount of exposure received by the detector and depends on mAs, the total detector area irradiated respective the beam attenuation. It is indicative of the image quality.

### 3.2.3 Deviation Index

The deviation index, DI, gives an indication of the dose level used for capturing the image. The DI value compares the current standard EXI with the target EXI.

The target EXI is defined by the user. See Imaging system for further description.

## 3.3 Image System

For information about Image system functions, see the Image System Manual.

## 3.4 Ceiling Suspended x-ray Tube Support

### 3.4.1 Direction of Movement

The figure below, shows the movements of the OTC.

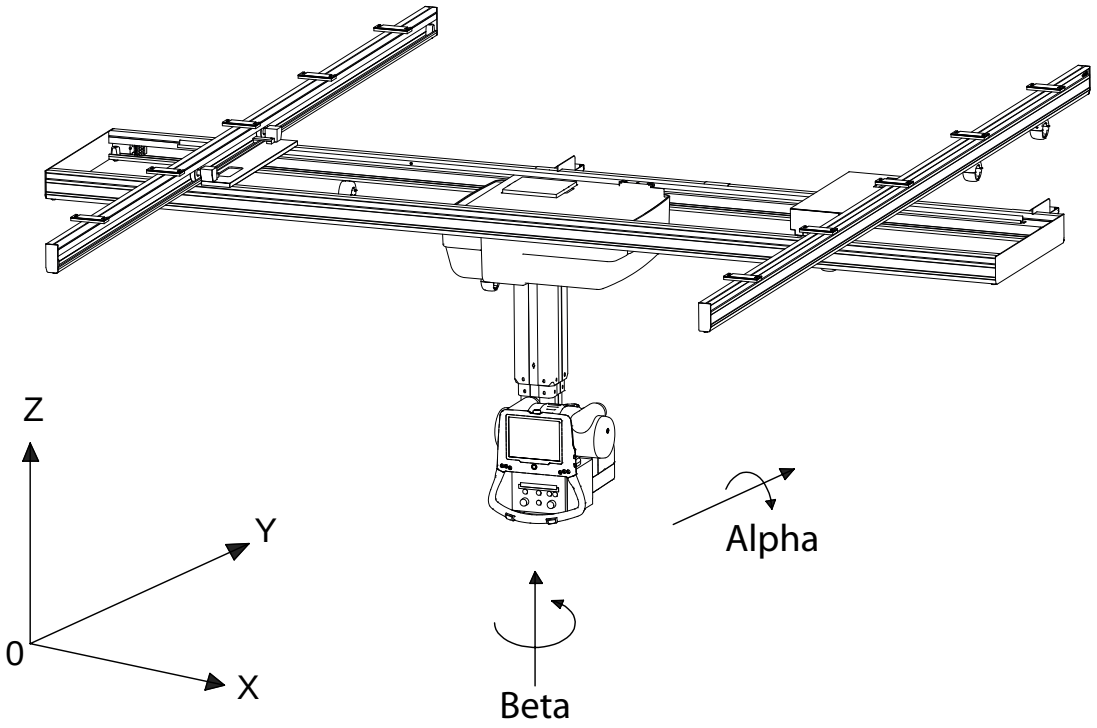



*Fig. 3-29 OTC direction of movement*

| | | |
|---|---|---|
| Z | Vertical movement | Motorized |
| Y | Lateral movement | Motorized and manual |
| X | Longitudinal movement | Motorized and manual |

### 3.4.2 Servo Button

When pressing the servo button, the System will enter an active mode status. The Indicator light, will show the status of the mode.

If the servo button is activated, the stand will start positioning automatically (excluding *Free mode*). If the servo button is released, the movement will stop and a manual movement of the stand is possible.

If a new position is chosen or if the OTC is manually moved from the position, the OTC will automatically start moving when the servo button is activated.

#### 3.4.2.1 External Servo Button

When pressing the external servo button, the System will enter an active mode status.

The indicator light, will show the mode status.

The stand will start positioning automatically (excluding Free mode).

If the external servo button is released, the movement will stop and manual movement of the stand is possible.

If a new position is chosen or if the OTC is manually moved from the position, the OTC will automatically start moving if the external servo button is activated.

The external servo button is also used for auto positioning the overhead tube crane. When the servo button is released the movement stops. The servo button includes an indication light, see description below. See Fig. 3-30 *External servo button*.

The external servo button is equipped with an emergency stop, that can be used to stop the motions in the system.

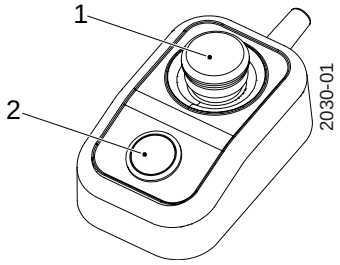



*Fig. 3-30 External servo button*

1. Emergency stop
2. External Servo button and Indicator light

#### 3.4.2.2 Indication Light

***WARNING!***

***Due to the squeezing hazard, motorized movements are only allowed if patient and System are observed by personnel.***

The Indicator light has 3 different modes:

- *Fixed light* - The System is in an active mode and in position, waiting to perform an action. Supervision of the patient and System is required.
- *Flashing light* - Attention. The System is performing an action, for instance manoeuvering to start position or waiting for action.
- *No light* - the chosen mode is not activated. No light will be shown in *Free mode* or *Autoposition*.

### 3.4.3 Sound Signal

- One sound signal, means that the OTC is in position and ready for exposure.
- Two sound signals, in rapid succession, indicates a fault and the display will show an error message, for example after a collision. The error message shows the corrective action.

## 3.5 Remote control (option)

***WARNING!***

***The System must always be supervised when activated.***

*Note!*

*The remote control shall only be used inside the examination room.*

*Note!*

*Always mark up the remote controls with, for example, the room number or the system number. Use the enclosed labels to distinguish different system remotes, from each other.*

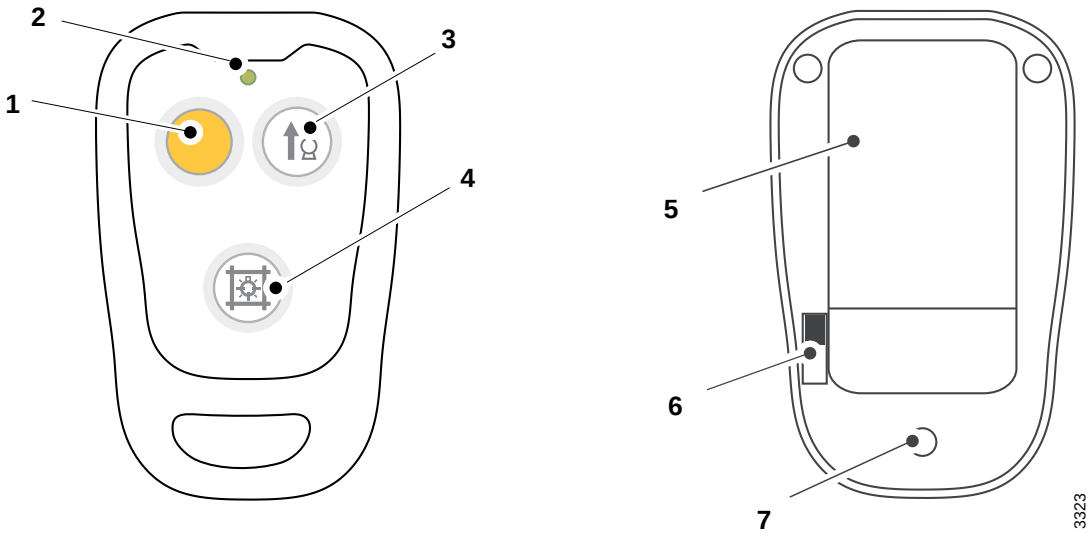



*Fig. 3-31 Remote control, front and back*

Front

1 Servo button – (yellow)

2 Indication diode (green)

3 Tube up

4 Switch On/Off Collimator light

Back

5 Fastening clip

6 On/Off switch

7 Battery changing slot

**Servo button**

The servo button is yellow with a little peg, making it easy to recognize the button.

When activating the yellow servo button, the OTC moves to auto-position.

**Indication diode**

The diode shows a green light, when the remote control button is activated. When the diode turns red, the batteries shall be exchanged.

**Tube up**

When the *Tube up* button is activated, the OTC will move upward. The movement will stop at button is release or when the highest possible position is reached.

**Switch On/Off collimator light**

The button turns the X-ray field illumination and linear light localizer on/off.

Automatic switch-off via a time switch.

**On/Off switch**

There is an On/Off switch for the remote control, at the back of the remote control. When the control is switched off, all buttons are disabled.

**Battery changing slot**

When the indication diode lights red, changing of battery is needed.

The remote control uses 2 pcs of LR03, 1.5V, AAA batteries. To change batteries, loosen the 3 screws and open the slot at the back of the remote control.

*Note!*

*The batteries shall be recycled.*

# 3.6 Automatic Collimator Control

## 3.6.1 General

Collimator settings will be controlled from the selected examination program (fully APR controlled). That is, the light field size and the filter can be preset for each examination.

The main features of the automatic collimator control are:

- All examinations can be programmed with collimator settings including free techniques as e.g. *Auto position mode* and *Free mode*.
- A memory function remembers the light field size when a mode is changed from *Manual* to *Automatic* , and back. This function makes it easy to return to the same size after checking the alignment and centring of the System by using the light field.
- The light field size is dynamically updated from the SID value, i.e. the light field size is kept constant with increasing or decreasing SID.
- Function for fast adjustment of light field to max image size and back (toggling).
- Collimator filters; 0. 0.1, 0.2, 0.3 mm Cu.
- Function for cancellation of manual changes and return to preset settings for the examination.
- Automatic light on function when tracking to Wallstand is active and when the table top is moved.
- Collimator control handles available for remote control of light field, light on/off and mode.
- Function for top and bottom alignment Wallstand.

  This function makes it easy to find the best position and reduce the dose in e.g. an upper thorax examination, when the patient is sitting in a wheelchair and the image unit cannot be lowered, or for a standing knee examination were the tube is required to go low.
- Overall, the automatic collimator function is designed to ease the examination procedure, support the operator, decrease the patient dose and increase the patient through-put of the System.

## 3.6.2 Basic Flow of Operation

Select an examination program from the Image system.

- The collimator changes to *Automatic mode*.
- At the start of a new examination, the *Automatic mode* is indicated on the collimator (ACSS).
- The collimator changes filter to the programmed filter for the chosen examination program.
- The collimator changes field size (width, height) to the programmed field size.

## 3.6.3 Exposure

Exposure is not allowed while the collimator adjusts settings.

## 3.6.4 DAP (option)

If a DAP meter is included the System, the Dose Area Product will be presented in the Imaging system.

Checks and settings can be done by the service software, see *'Installation and Service Manual'*, Chapter *4, Installation.*

## 3.6.5 Display and Control Elements

### 3.6.5.1 Laser

The System includes a laser, that can be easily turned off.

### 3.6.5.2 Display Automatic Collimator

The following figure shows the functions of the automatic collimator.

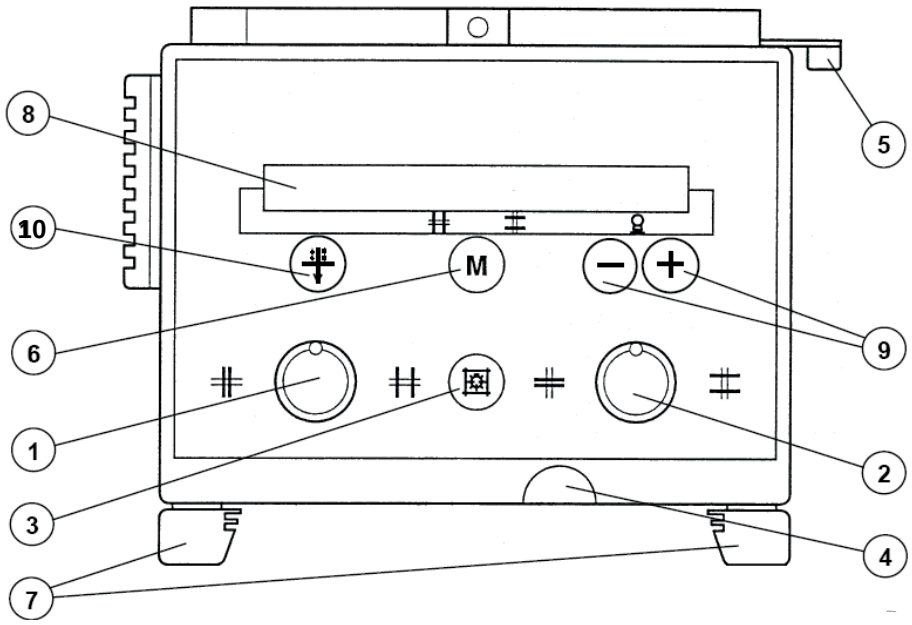



*Fig. 3-32 Display, automatic collimator*

1. Adjusting knob for format height collimation.
2. Adjusting knob for format width collimation.
3. Button turns the X-ray field illumination and linear light localizer on/off. Automatic switch off via a time switch.
4. Measuring tape grip for SID measurement - Take reading at bottom edge of multi-leaf collimator. - The measuring tape has both a cm and an inch graduation.
5. Detent lever for +/-45° rotation of the collimator around the central beam axis. - The collimator only stops in the 0° position.
6. Button for changing between *Automatic* and *Manual* mode. A 2–seconds activation of the M-button will restore the collimator settings to the last settings that were sent to the collimator.

   *Manual mode* is active until the M-button is pushed once more or until a new patient is selected.

   In *Automatic mode* the maximum light field size is restricted to the maximum active area of the imaging unit.

   *Note!*

   *If there is no new examination and the System is in a Manual mode, the collimator ignores the instructions of sent collimator filtration from the Imaging system. This can be useful if the collimator area is intended to be kept for the next examination.*

7. Accessory rail.
8. Function display will indicate *Manual mode* or *Automatic mode*(ACSS) of the collimator.
9. *'+'* and '-' buttons.

In *Free mode* and *Auto positioning mode*, the buttons are used for manually defining the SID value to be used by the collimator.

In other modes, only the *'+'* button is active and then used for switching between max collimator size and the previous set value.

10. Button for selecting collimator filtration.

    Collimator filters; 0. 0.1, 0.2, 0.3 mm Cu

### 3.6.5.3 Collimator Control Handle, Table (option)

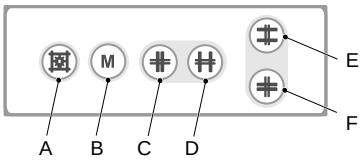



*Fig. 3-33 Table collimator control handle*

A. Button for switching the light and the laser line on/off. The light and laser line is automatically switched off via a time switch.
B. Button for changing between *Automatic mode* and *Manual mode*. A long activation of the *M button* set the light field to max image size, based on the pre-programmed SID value and the selected receptor.
C. Button for closing the format height collimation.
D. Button for opening the format height collimation.
E. Button for opening the format width collimation.
F. Button for closing the format width collimation.

### 3.6.5.4 Collimator Control Handle, Wallstand

The figure shows the function of the collimator control handle.

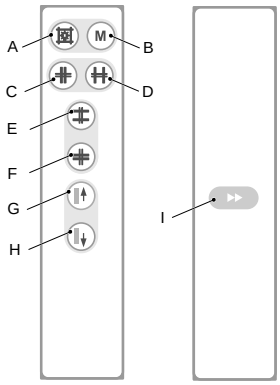



*Fig. 3-34 Wallstand collimator control handle functions.*

A. Button for switching the light and the laser line on/off.
   The light and laser lines are automatically switched off via a time switch.
B. Button for changing between *Automatic mode* and *Manual mode*. A long activation of the *M button* sets the light field to max image size, based on the pre-programmed SID value and the selected receptor.
C. Button for closing the format width collimation.
D. Button for opening the format width collimation.
E. Button for opening the format height collimation.
F. Button for closing the format height collimation.
G. Detector movement up.
H. Detector movement down.
I. Detector movement high speed. (together with G or H)

### 3.6.6 Operating Automatic Collimator

#### 3.6.6.1 Startup Mode

At start-up of the System the collimator is defined to *Automatic mode* ACSS, light field to max, SID to 110 cm and filter to the first defined.

#### 3.6.6.2 Top and Bottom Centring

The collimator light field size can be top or bottom centered against the maximum image area.

This means that the upper border of the collimator light field is aligned with the top of the maximum image area, or that the lower of the collimator light field is aligned with the bottom of the maximum image area. The stand will automatically move to keep the alignment of the top or bottom of the maximum image area when the collimator light field is increased or decreased.

The functionality of top and bottom centring is only available in *Wall mode* or *Wall Flexible mode*

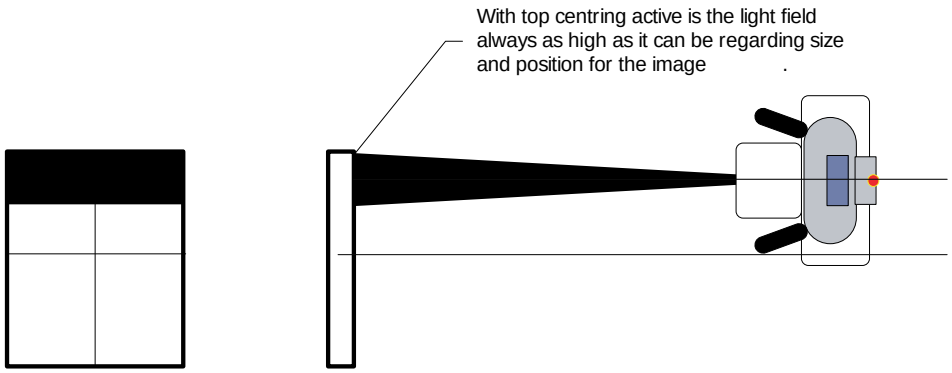



*Fig. 3-35 Top and bottom centering of the collimator light field*

#### 3.6.6.3 Change Working Mode

The collimator can be operated in either *Automatic* or *Manual mode*.

These modes can easily be changed on the collimator (button 6) or the collimator control handle (button B), see Fig. 3-32 *Display, automatic collimator*. When the mode is changed from *Manual mode* to *Automatic mode*, the settings are restored to the settings at the latest change from *Automatic mode* to *Manual mode*.

*Manual mode* will be active until the *M*-button is pushed once more, or until *New patient* is selected.

*Manual mode*

The purpose with *Manual mode* is to be able to adjust the collimator light field outside the imaging unit.

– There are no restrictions for exposure outside active image area.

*Automatic mode*

– Exposure is not allowed when the light field is outside the active image area.
– The maximum light field size is restricted to the maximum active area of the imaging unit.

#### 3.6.6.4 Restore Last Settings

The collimator settings can be restored to the last settings that were sent to the collimator. Press and hold the mode change control (button 6 on the collimator, or button B on the collimator control handle, see Fig. 3-32 *Display, automatic collimator*) for about 2 seconds.

#### 3.6.6.5 Maximum Image Size

In *Free mode/Auto position mode* the *M*-button is used to adjust the collimator light field to the maximum size of the imaging unit.

In other modes, the *'+'* button is used.

#### 3.6.6.6 Change SID

When the OTC moves in a direction that changes the SID, the collimator starts to compensate the field size. The collimator light field size on the imaging unit is held constant with changing SID.

#### 3.6.6.7 Automatic Collimator Light

When the OTC is tracking against the Wallstand or when the table top is released, the collimator light automatically will be turned on. This will make it easier to directly find the correct stand and patient position.

#### 3.6.6.8 Free Technique

In *Free mode/Auto position mode* the position of the detector is unknown for the System. The indicated size of the light field is correct at the shown SID. To change the SID value, use the *'+'* and *'-'* buttons on the collimator.

#### 3.6.6.9 Collimator Filters

The collimator filter options are 0 mm Cu, 0.1 mm Cu, 0.2 mm Cu and 0.3 mm Cu.

## 3.7 Table Control Elements

### 3.7.1 Directions of Movement

The figure below shows the directions of the table movement.

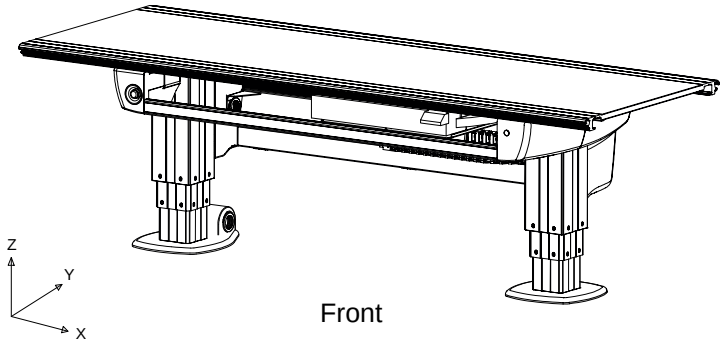



*Fig. 3-36 Directions of movement, Table*

Z Vertical movement

Y Lateral movement

X Longitudinal movement

### 3.7.2 Power Indication

At the back of the electric box, a green indication light is located. The green light indicates that the System is active.

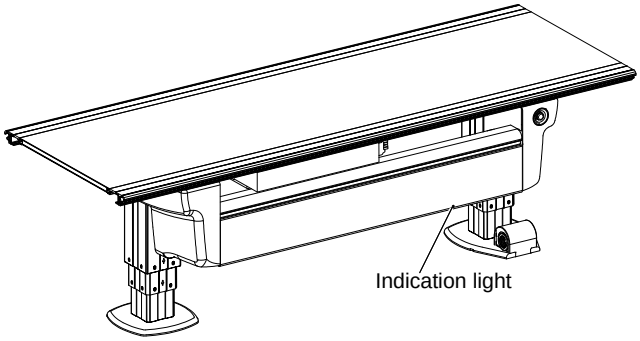



*Fig. 3-37 Power indication light*

### 3.7.3 Foot Control, Table X/Y/Z (option)

The Table with motorized vertical movement is manoeuvred from the foot control.

The foot control X/Y/Z is a standard control unit for Table with motorized vertical movement.

Consider the working area when the table top is manoeuvred.

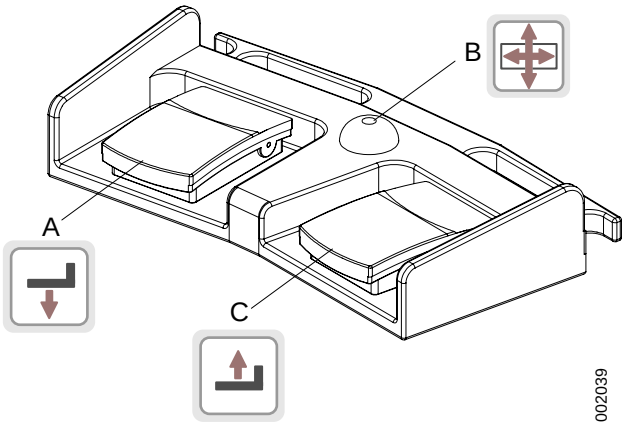



*Fig. 3-38 Foot control*

A. Z movement down
B. Unlock table top brakes (X/Y)
C. Z movement up

#### 3.7.3.1 How to Manoeuver

A. Press button to move the table top downwards.
B. Press the button to release the brakes on the table top, Y and X. On activation, the table top can be moved manually.
   When the release button is activated, the collimator light will be lit.
C. Press button to move the table top upwards.

## 3.7.4 XY Foot Control, Strip Type (Option)

Press and hold the foot control strip type (1) to release the brakes (X, Y) on the table top (2). When activated, the table top can be moved manually (floating table top).

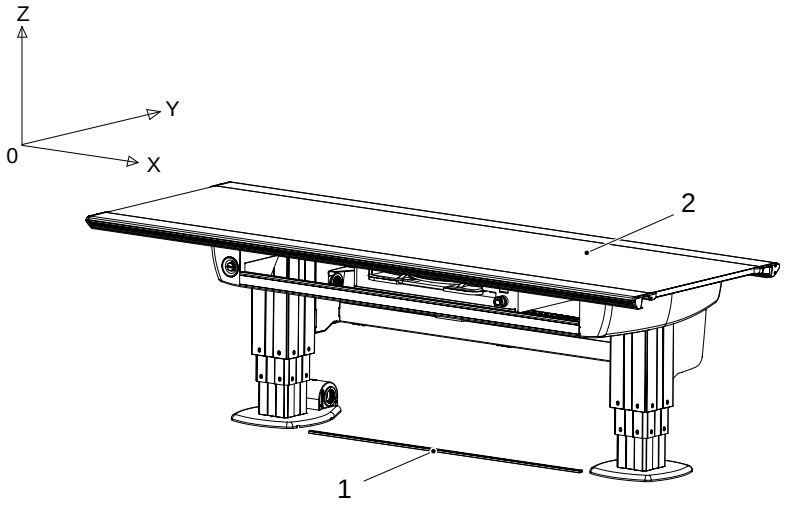



*Fig. 3-39 Foot control strip type*

1. XY foot control strip type (option)
2. Table top (X/Y)

### 3.7.5 Table Hand Control

Beside the functions for moving the table top, the hand control also has functions for; moving the imaging unit and performing a pendulum movement..

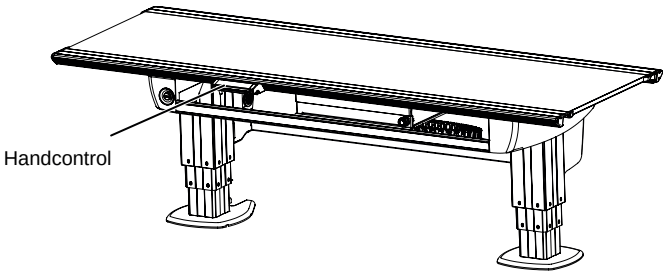



*Fig. 3-40 Table hand control location*

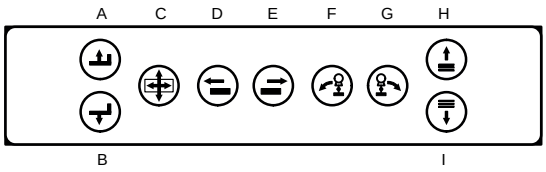



*Fig. 3-41 Table hand control*

#### 3.7.5.1 How to Manoeuver

A. Press button to move the table top upwards.
B. Press button to move the table top downwards.
C. Press the button to release the brakes on the table top, Y and X. When activated, the table top can be moved manually.
D. Drive motorized image receptor holder to left.
E. Drive motorized image receptor holder to right.
F. Move the OTC to the left in *Pendulum mode*.
G. Move the OTC to the right in *Pendulum mode*.
H. Not used.
I. Not used.

## 3.7.6 Moving Table Top

To manually move the table top, release the brakes and use the hand grip rails located at the long sides of the table top.

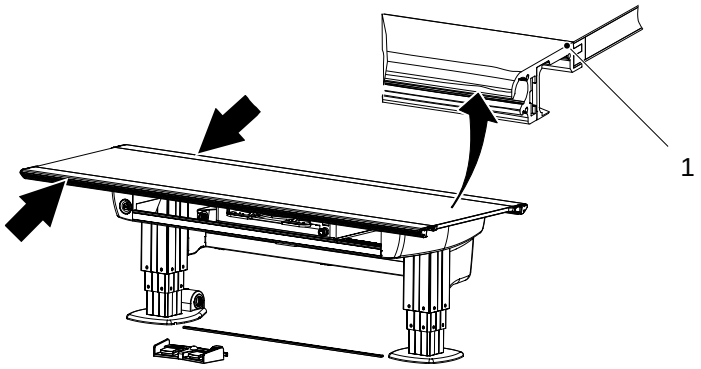



*Fig. 3-42 Table hand grip rail*

1. Hand grip rail

### 3.7.6.1 Directions of Movement

The figure below shows the directions of the table movement.

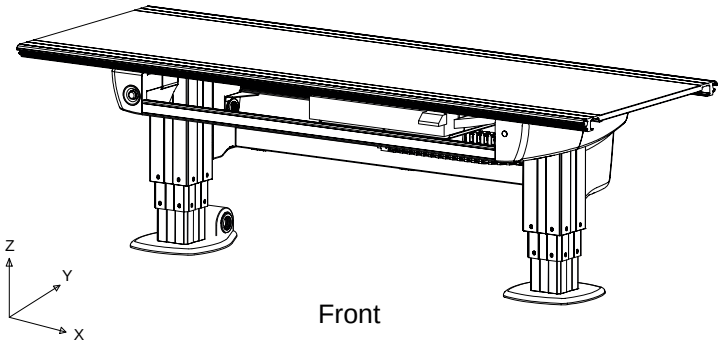



*Fig. 3-43 Directions of movement, Table*

Z Vertical movement

Y Lateral movement

X Longitudinal movement

## 3.7.7 Vertical Travel Safety (option)

The Table may, as an option, be equipped with a vertical travel safety system that protects the table top.

It activates if a collision is detected and the force exceeds 20 kg, all movements will be stopped.

### 3.7.8 Attach/Remove Accessories

Accessories are attached and removed as shown in the figures below. This instruction is valid for all accessories attached to the table top.

Attach

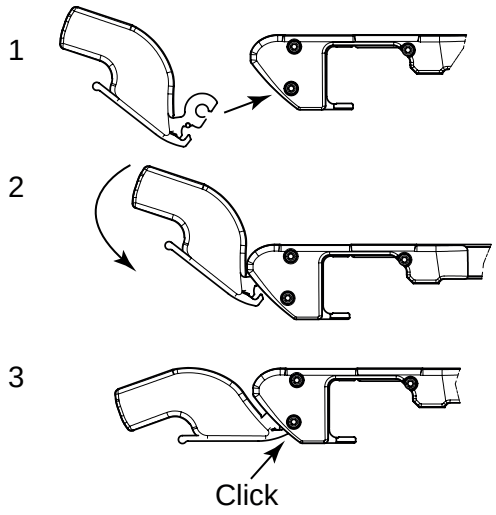



*Fig. 3-44 Attaching accessories*

Remove

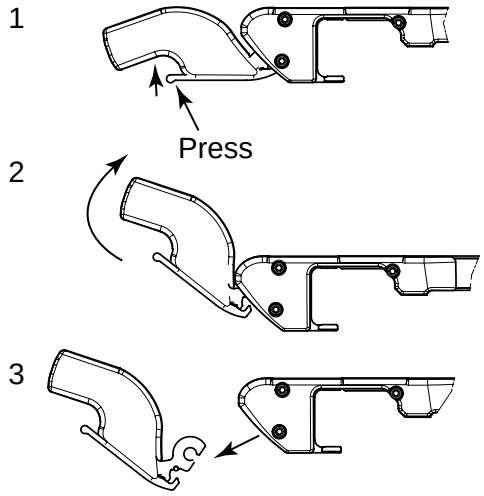



*Fig. 3-45 Removing accessories*

## 3.7.9 Motorized Imaging Unit Movement

The imaging unit can be moved in X direction motorized. The motorized movement is manoeuvred from the table hand control, see Fig. 1-5 *Table overview*.The function can synchronize the imaging unit and follow the movement of the ceiling unit.

### 3.7.9.1 Synchronization Function

In Auto position mode and in Table flexible mode, the detector holder may be moved in X-direction using the motor (via the table handle or manually by activating the green button at the detector holder). There is no synchronization between the tube and the table detector.

In Film tracking and Pendulum mode the detector holder may be moved manually in X-direction. If this is done, the servo button will be deactivated and exposure is no longer possible. To return to an activated servo button, the detector holder shall be moved to the correct position. The correct position will be indicated by the lightning of the green detector holder button.

*Note!*

*It is the user's responsibility to verify that the detector is in position at exposure.*

# 3.8 Wall stand Control Elements

## 3.8.1 Direction of Movement

The figure shows the directions of movement of the Wallstand.

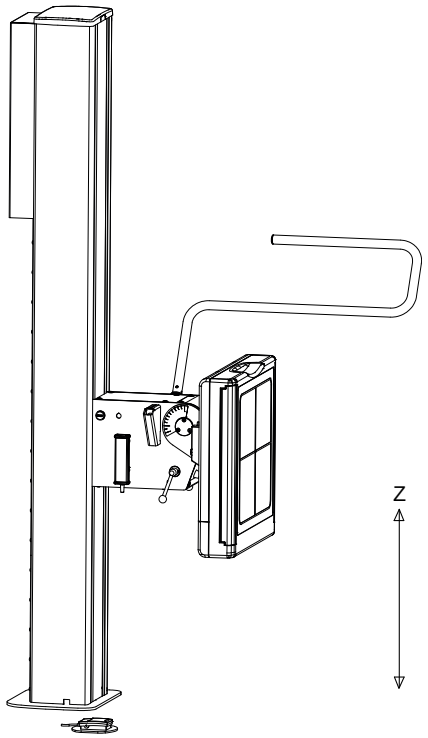



*Fig. 3-46 Wallstand, direction of movement*

Z Vertical movement

#### 3.8.1.1 Tiltable Detector

Remove the lateral armrest (1), see picture A.

Turn the lock handle (2) up to release the detector holder and push the holder in position according to picture B.

Then turn the lock handle down to secure the detector holder in position, see picture C in figure.

A tilting function enables the detector holder to be set in any angle within a range of –20 to 90 degrees.

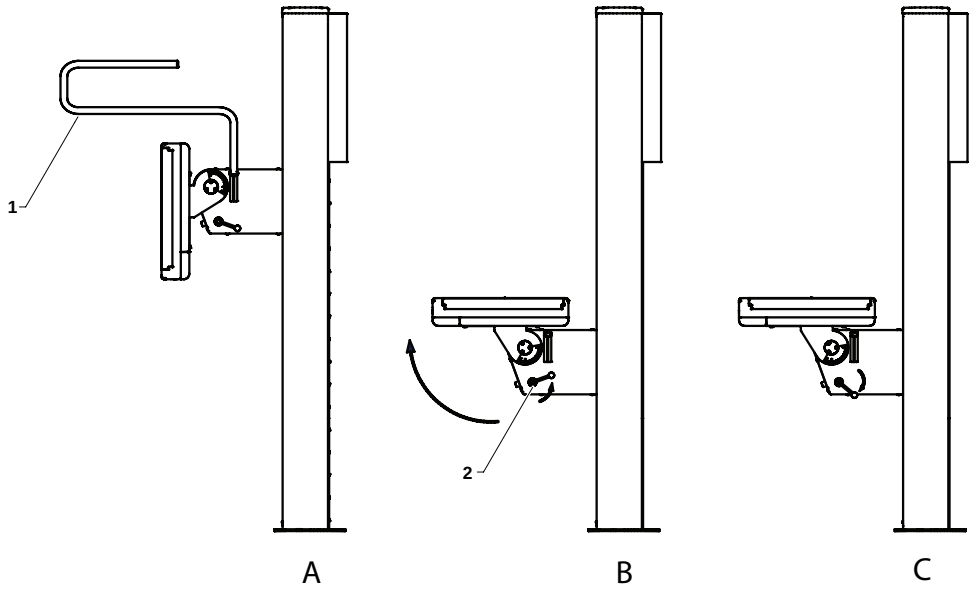



*Fig. 3-47 Tilting the Imaging unit holder*

### 3.8.2 Wallstand Controls

The controls concerning the Wallstand are placed on the image unit holder bracket and at the foot of the column.

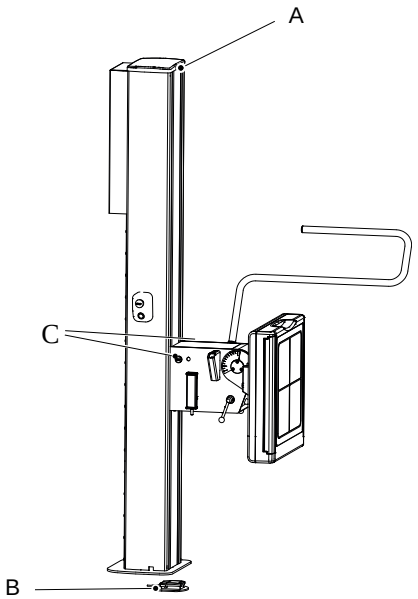



*Fig. 3-48 Wallstand controls*

A Light indication (lit when the Wallstand is selected as a work station)

B Release/Engage image unit brake (Z-direction, up/down)

C Emergency stops

Press and hold the image unit brake (B) to release the brake for manual movement (Z-direction).

#### 3.8.2.1 Light Indication (A)

The selected Workstation is indicated in the imaging system and with a green light on the Wallstand.

### 3.8.2.2 Wallstand Foot Control for Vertical Movement (option)

The Wallstand with motorized vertical movement is maneuvered from the foot control. The foot control is an optional control unit for Wallstand with motorized vertical movement.

Consider the working area when the Wallstand detector is maneuvered.

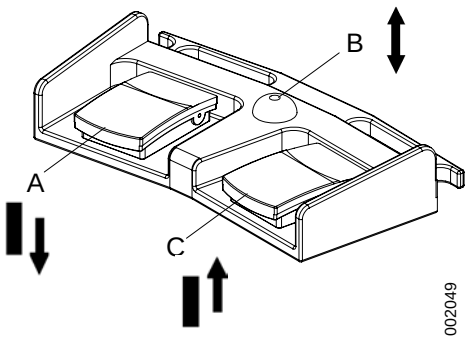



*Fig. 3-49 Wallstand foot control maneuvering*

A Z movement down.

B Brake release manual movement

C Z movement up

***How to Maneuver***

A. Press the pedal to move the detector downwards.

B. Press the pedal to release the brakes. When activated, the detector can be moved manually.

C. Press the pedal to move the detector upwards.

### 3.8.3 Foot control, wireless (option)

The foot control is applicable for table and wall stand.

*CAUTION!*

***Make sure that the correct control is activated, as there is one foot control for the table and one for the wall stand.***

The table and the wall stand with motorized vertical movement, can be manoeuvred from the foot control.

The wireless foot control is an optional control unit for table and wall stand.

Consider the working area when manoeuvred.

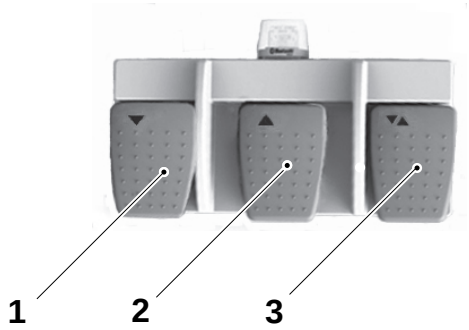
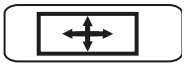



*Fig. 3-50 Wireless foot control*

1. Z movement down 
2. Z movement up 
3. Release pedal:

 Unlocks wall stand detector brake. Manual movement is possible.

 Unlocks table top. Manual movement is possible, table top is floating.

#### 3.8.3.1 How to manoeuver

1. Press pedal to move downward.
2. Press pedal to move upward.
3. Press the pedal to release the brakes. On activation, the table top or the wall stand detector holder, can be moved manually.

   When the release pedal is activated, the collimator light will be lit.

*Note!*

*The foot control must not be used outside the examination room.*

The device has no applied parts and should not be accessible to patients.

#### 3.8.3.2 Battery

The yellow battery indication LED will begin to flash once every two seconds, when the remaining battery capacity is approximately 1 week of constant use, or 168 hours. It will then

change to 2 flashes per second when the capacity has been reduced to approximately 2 days, or 48 hours.

# 4 Operating the System

## 4.1 General

***WARNING!***

***Always be aware of that there may still be power in the System and live parts accessible even though the system is turned off.***

*CAUTION!*

***The Detector should be powered up at least half an hour before intended use. If it is used sooner than half an hour after being powered up, image quality may be affected***

### 4.1.1 Applied Parts

Applied parts are intended for patient touching.

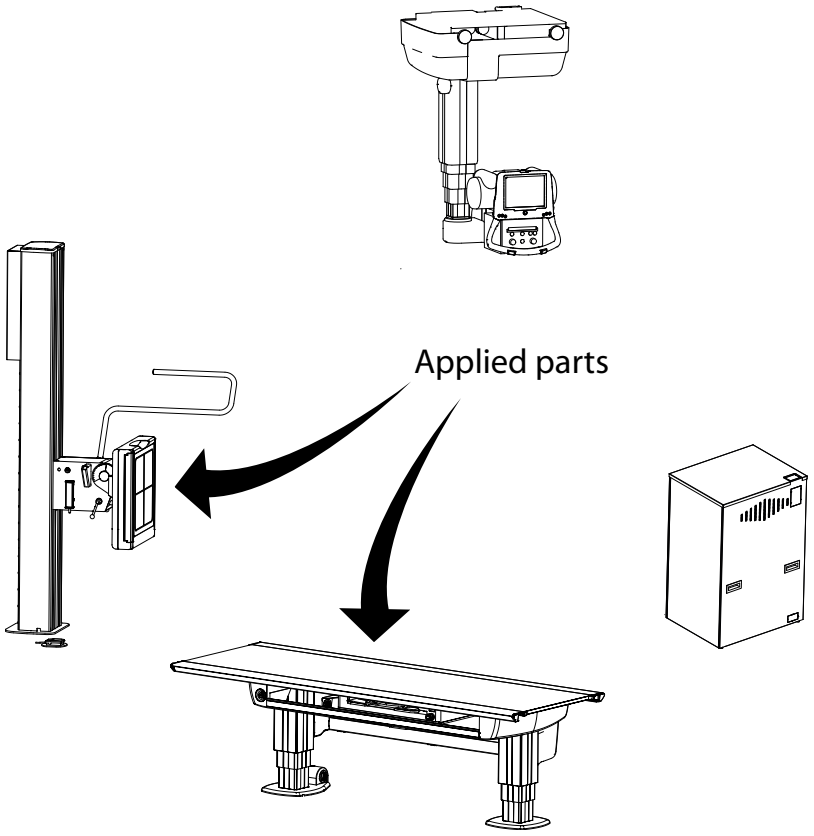



*Fig. 4-1 Applied parts, System*

## 4.2 Movement

***WARNING!***

***The operator must have supervision of the System, when operating the System with a patient inside the room.***

At installation a transport interval zone and a movement short-cut zone is set up.

Outside the movement short-cut zones, the OTC will first move in Z direction, up to the transport interval zone, before moving to position.

## 4.3 Movement Short-cut Zones

A short-cut movement is defined as, when the OTC moves directly to the intended position, without first moving up into the transport interval zone.

Movement short-cut zones are defined both for the Table and the Wallstand, as rectangular cubes.

To perform a short-cut movement, the following conditions must be fulfilled;

- The System shall be positioned above the Table, or at the specified short-cut zone in front of the Wallstand.
- At least one of the OTC corners must be inside the short-cut zone at the start of the movement.

  Outside these short-cut zones, the OTC will first move in Z direction, to the transport interval zone, before moving to position.

### 4.3.1 Wallstand Short-cut Zone

The Wallstand short-cut zone is defined in front of the Wallstand.

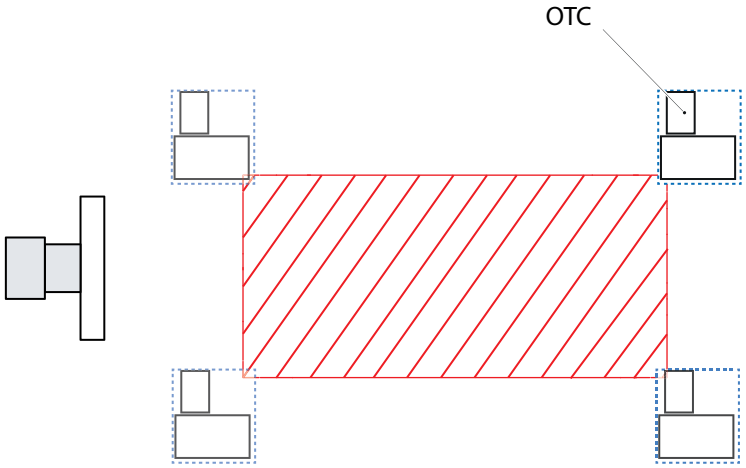



*Fig. 4-2 Wallstand short-cut zone*

### 4.3.2 Table Short-cut Zone

The Table short-cut zone is defined above the table top.

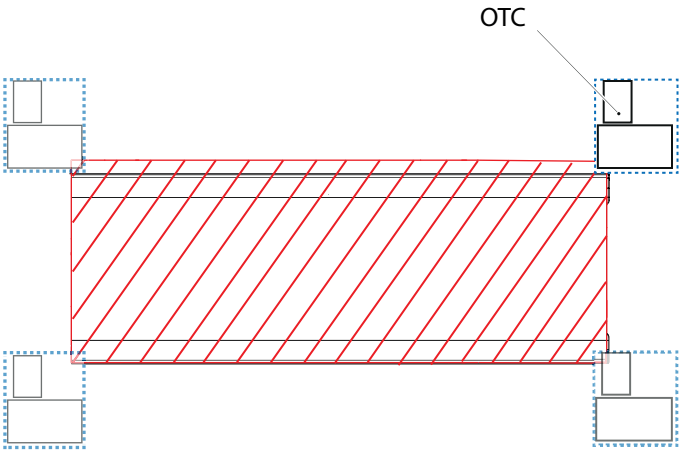



*Fig. 4-3 Table short-cut zone*

## 4.4 Transport Interval Zone

Outside the short-cut zones, movements between auto-positions are performed in a defined transport interval zone. The upper and lower limits are defined at System installation.

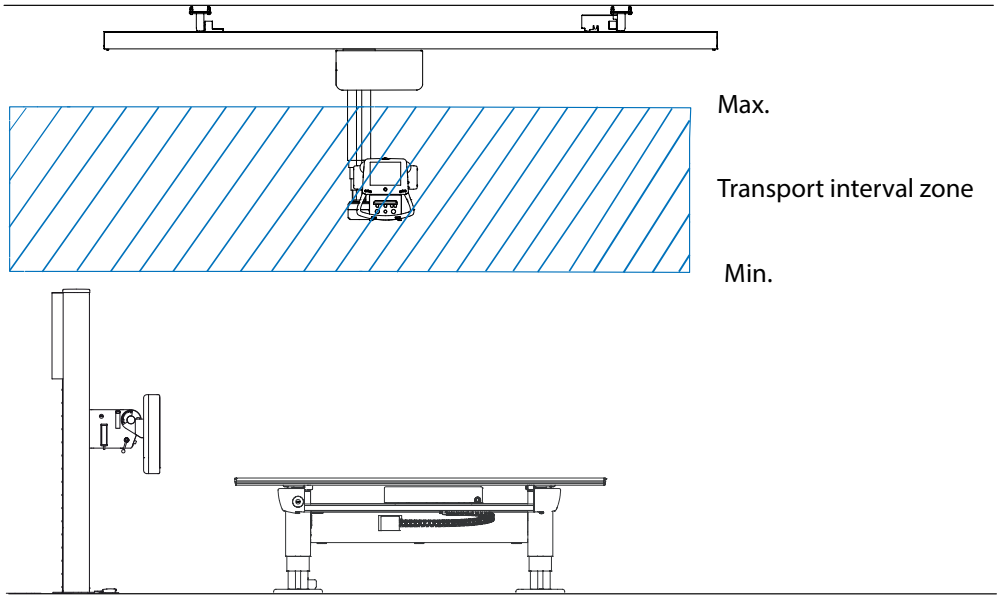



*Fig. 4-4*

When moving between positions outside the short-cut zones, the OTC will first move to the transport interval zone.

Inside the transport interval zone the OTC will move horizontally until it reaches the intended X, Y-position.

Then the OTC will move vertically, to the intended Z-position.

## 4.5 Manual Mode

*CAUTION!*

***Be aware that there is no tracking between the x-ray tube and the detector when the System is in Manual mode. Therefore, take extra care that the x-ray beam is within the active area of the detector before performing an exposure.***

The System can be set to a *Manual mode* from the display. In the *Manual mode* it is possible to move the System manually in the room and perform exposure. In *Manual mode* no tracking will be performed. The *Manual mode* can be selected when the System is in one of the following modes:

- *WallFlexible*
- *TableFlexible*
- *FilmTracking*
- *Pendulum table*

### 4.5.1 Activation of Manual Mode

The servo state can be either *Automatic mode* or *Manual mode*. A pop-up window according to Fig. 4-5 *Servo state selection pop-up window*, will appear with the two alternatives. When the System is in *Manual mode* all movements are allowed and exposure can be performed in any position.


*Fig. 4-5 Servo state selection pop-up window*

The *Manual mode* is activated by pressing the *Servo state* , see Fig. 4-5 *Servo state selection pop-up window*. If the System is in *TableFlexible*, *FilmTracking* or *Pendulum mode* the table and the OTC will be shown without connection when *Manual mode* is selected. In the same way, the Wallstand will be shown without connection to the OTC in *Manual mode*, see Fig. 4-6 *Wallstand and Table shown without connection to the OTC in Manual mode*

*Fig. 4-6 Wallstand and Table shown without connection to the OTC in Manual mode*

#### 4.5.1.1 Deactivation of Manual Mode

The *Manual mode* is deactivated by selecting a new APR with a different auto-position. Deactivation is also done by changing to *Automatic mode* .

If the same patient is examined and an APR with the same auto-position is selected, the *Manual mode* will be kept.

#### 4.5.1.2 Restrictions in Manual Mode

In *Manual mode* the shown SID value is based on the assumption that the detector is positioned in the same way as it should have been in an active servo mode. Note that the SID value will not be able to be calculated is some positions. No SID value will be shown if the System is not in an active servo mode when *Manual mode* is activated.

Tracking or other mode movements are not possible when *Manual mode* is active.

# 4.6 Free Examination Procedures

## 4.6.1 Free Mode

### 4.6.1.1 General

The *Free mode* is designed for emergency examinations. The servo button cannot be activated in *Free mode*, consequently no automatic movement is available.

### 4.6.1.2 Flow of Operation

Select a *Free mode* examination.

The System display will display the following, see Fig. 4-7 *Free mode display*.

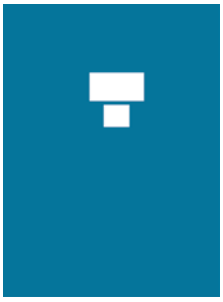


*Fig. 4-7 Free mode display*

- The stand will display H, distance to the floor.
- All movements are available.

### 4.6.1.3 Exposure

Exposure is possible when the OTC is not moving.

*Note!*

*The OTC will automatically enter the “Free mode” at start-up.*

## 4.6.2 Auto Position Mode

### 4.6.2.1 General

The *Auto position mode* is designed for emergency examinations or examination with a mobile detector.

#### 4.6.2.2 Flow of Operation

Select an *Auto position mode* examination.

The System display will display the following.

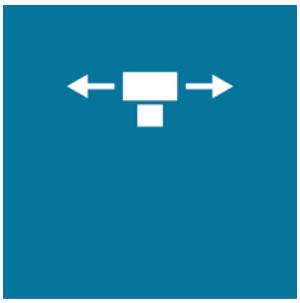


*Fig. 4-8 Auto position mode display*

- The OTC will display *"H"*, distance to the floor.

Activate the mode by pressing the servo button.

- When auto—positioning to a wall stand, the wall stand detector unit will move into a basic position.
- The OTC will automatically move to its programmed position.
- The servo mode button light indication will be switched off.

All movements are available.

#### 4.6.2.3 Exposure

Exposure is possible when the OTC is not moving.

# 4.7 X-ray Table Examination Procedures

## 4.7.1 Table Flexible Mode

### 4.7.1.1 General

The *Table Flexible mode* is designed for examinations with the detector placed on the table top.

The OTC can be moved freely in all directions. When the height of the table top is adjusted, the OTC will track the height of the table top in order to keep the SID constant.

### 4.7.1.2 Flow of Operation

Select a *Table Flexible mode* examination.

The System display will show the following.

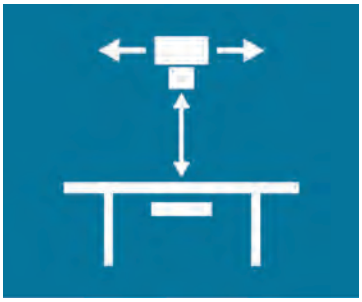


*Fig. 4-9 Table Flexible mode display*

- The SID will be displayed.

Activate the mode by pressing the servo button.

- The OTC will automatically move to its programmed position.
- The OTC will move to the programmed SID.
- Servo mode indication light fixed.

Adjust the table height.

- The OTC will follow the Table to maintain the programmed SID.

Adjust the tube position.

- The mode will stay activated (detector holder will not follow).
- Move the imaging unit manually, if needed, to assure that the x-ray field is inside the boundaries of the detector.

### 4.7.1.3 Exposure

Exposure is possible when the OTC is not moving, and the servo mode indication light is fixed.

*CAUTION!*

***Materials located in the X-ray beam may cause adverse image effects.***

*Note!*

*In “Table Flexible mode” examinations exposure is possible outside the imaging unit.*

*The imaging unit does not follow the OTC.*

## 4.7.2 Film Tracking Mode

### 4.7.2.1 General

The *Film Tracking mode* is designed for examinations of patients lying on the Table.

### 4.7.2.2 Flow of Operation

Select a *Film Tracking mode* examination.

The System display will display the following, see Fig. 4-10 *Film tracking mode display*.

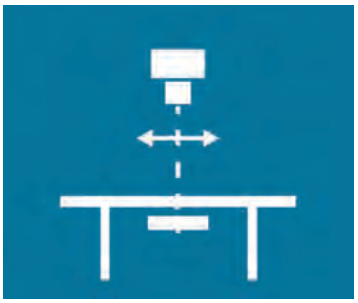


*Fig. 4-10 Film tracking mode display*

- The SID will be displayed.

Activate the mode by pressing the servo button.

- The OTC will automatically move to its programmed position.
- The OTC will move to the programmed SID.
- Servo mode indication light fixed.

Adjust the table height.

- The OTC will follow the Table to maintain the programmed SID.

Press the brake release button.

Move the OTC lengthwise the Table.

- The imaging unit will follow the movement to stay aligned with the tube.

Press the button to deactivate the alpha brake.

Turn the tube in alpha direction.

- The imaging unit will follow the movement to stay aligned with the tube.
- The SID value can be adjusted by moving the OTC, then all moving will be performed with the new SID.

### 4.7.2.3 Exposure

Exposure is possible when the OTC is not moving, and the servo mode indication light is fixed, and the x-ray beam covers the image unit

## 4.7.3 Pendulum Mode

### 4.7.3.1 General

The *Pendulum mode* is designed for non-vertical examinations of patients lying on the Table.

### 4.7.3.2 Flow of Operation

Select a *Pendulum mode* examination.

The System display will display the following, see Fig. 4-11 *Pendulum mode display*.

*Fig. 4-11 Pendulum mode display*

- The SID will be displayed.

Activate the mode by pressing the servo button.

- The OTC will automatically move to its programmed position.
- The OTC will move to the programmed SID.

Adjust the height of the Table stand.

- The OTC will follow the Table stand to maintain the programmed SID.

Press the arrow left or corresponding buttons on the table handle.

- Press the buttons for moving the OTC to the right or left, see item F and G at Fig. 3-41 *Table hand control*. The tube move in the desired direction and the imaging unit move to stay aligned with the tube.

### 4.7.3.3 Exposure

Exposure is possible when the OTC is not moving, and the servo button is activated.

### 4.7.4 Stitching Table Mode (Option)

*Note!*

*Stitching Table Mode is not available according to the described procedure with CR systems.*

Select a *Stitching Table mode* examination.

The system display will display the following, see Fig. 4-12 *a) Left position and b) Right position.*

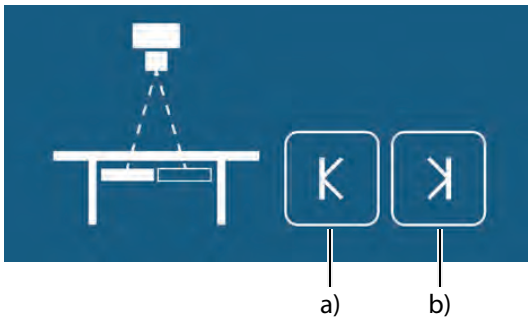



*Fig. 4-12 a) Left position and b) Right position.*

Activate the mode by pressing the servo button.

- The servo mode indication light will flash until the left and right positions are specified.
- The OTC will automatically move to its programmed position.
- The system will beep when position is reached.

Invite the patient and position the patient on the table.

Move the focus point to the middle of the planned composite image. This could be done either by moving the tabletop or by moving the column in X (or Y) direction.

Rotate the x-ray tube in order for the right edge of the collimator light field to indicate the right limit for the composite image.

Press the button (F1) to set the right limit, see Fig. 4-13 .

- The button turns green to indicate that the limit is set.

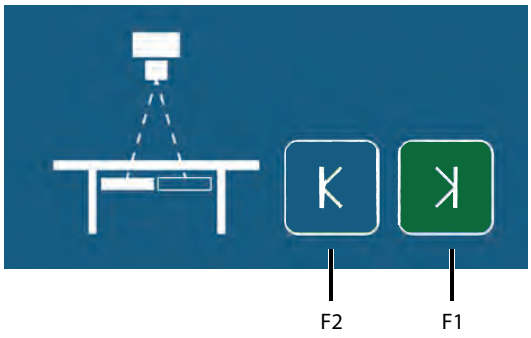



*Fig. 4-13*

Rotate the x-ray tube in order for the left edge of the collimator light field to indicate the left limit for the composite image.

Press the button (F2) to set the left limit, see Fig. 4-13 .

- The button turns green to indicate that the limit is set.
- Data is present on the right side of the display.
- When both limits have been defined, the total length of the composite image (c), see Fig. 4-14 *Left and Right Limits Set.*and the number of exposures (d) will be shown.

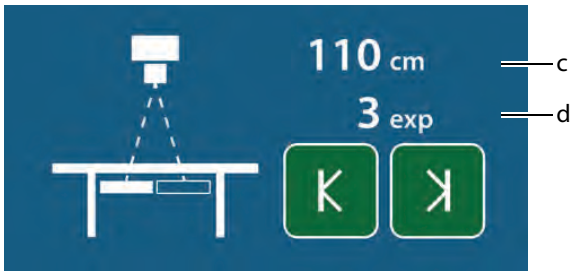



*Fig. 4-14 Left and Right Limits Set.*

- The servo mode indication light will be fixed.

Modify the exposure settings if necessary.

Activate the exposure button, and keep it activated during the procedure.

- The starting position is always at the left edge of the composite image. Activate the exposure button and keep it activated until the exposure procedure is completed. The system will move to the correct starting position.
- When the system is in the correct position for the first image, the first image is captured.
- After exposure, the system will move to the next correct position and the second image will be captured.

This is repeated until all images for the composite image has been captured.

- The system will beep when the sequence is finished.

# 4.8 Wallstand Examination Procedures

## 4.8.1 Wall Flexible Modes

### 4.8.1.1 General

The *Wall Flexible modes* are designed for examinations of patients standing up against a vertical moving imaging unit.

The movement up/down of the OTC, will only change the tube position, the Wallstand will not follow.

### 4.8.1.2 Wall Flexible Movements

There is 3 different Wall Flexible Modes, all accessible from the Arcoma Service program, *Adjust WallFlexible parameters*. The *Wall Flexible Movements* shall be set at the installation, and will thereafter be valid for all Auto positions using the *Wall Flexible mode*.

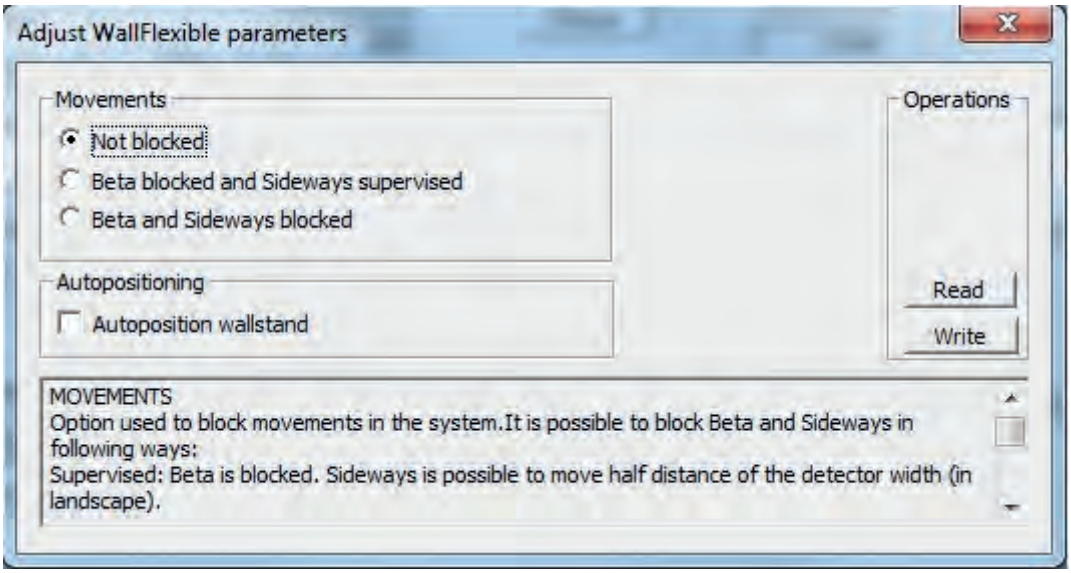



*Fig. 4-15 Adjust WallFlexible parameters.*

- *Not Blocked* — All OTC movements are allowed.
- *Beta blocked and Sideways supervised* — Blocked beta movement, movement will turn the servo off. It is possible to move a distance of half the detector length (landscape), before turning off the servo.
- *Beta and Sideways blocked* — It is only possible to move the OTC upwards and downwards. Blocked beta movement, movement will turn servo off. Blocked non-FFD directional (X/Y) movement, movement will turn servo off and block exposure.

#### 4.8.1.3 Basic Flow

Select a *Wall Flexible mode* examination.

The System display will display the following.

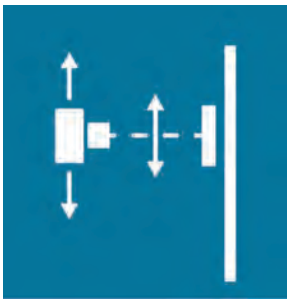


*Fig. 4-16 Wall Flexible mode display*

- The SID will be displayed.

Activate the mode by pressing the servo button.

- All movements are available.
- The OTC will automatically move to its programmed position.
- The OTC will either go direct to an aligned position to the detector or wait in the transportation height until detector is moved (wait or no wait selected).
- The mode will stay activated. The OTC beeps once and the servo mode indication light will flash.

Adjust the height of the Wallstand.

Move the detector holder at the Wallstand.

- The OTC will move down and align with the Wallstand.
- The OTC will follow the Wallstand to stay aligned.
- The OTC turns on the collimator light when the correct height is reached.

Adjust the position.

- The mode will stay activated.
- The *SID* value is changed to the new distance (if selected distance towards the Wallstand is changed).

### 4.8.2 NoWait Configuration

***WARNING!***

***The Wallstand will immediately start tracking the height of the detector.***

At the installation of the System, it is possible to select that the System shall not wait for the user to move the Wallstand.

The flow will then be as follow;

Select a *Wall Flexible mode* examination.

- The SID will be displayed.

Activate the mode by pressing the servo button.

- All movements are available.
- The OTC will automatically move to its programmed position.
- The OTC will move down and align with the Wallstand detector.
- The OTC will follow the Wallstand detector to stay aligned.
- The OTC reaches the correct height and stops.
- The *SID* value is changed to the new distance (if selected distance towards the Wallstand is changed).

#### 4.8.2.1 Exposure

Exposure is possible when the OTC stands still, and the servo mode indication light is fixed.

### 4.8.3 Stitching Wallstand Mode

*Note!*

*Stitching Wallstand Mode is not available according to the described procedure with CR systems.*

***WARNING!***

***The Wallstand detector holder will move during stitching. This may cause danger for the patient.***

Select a *Stitching Wallstand mode* examination.

The System display will display the following.

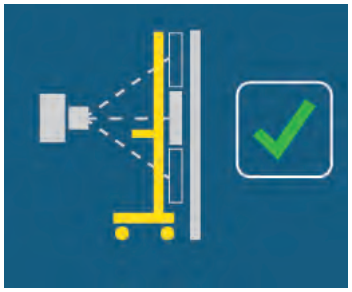


*Fig. 4-17 Patient protection*

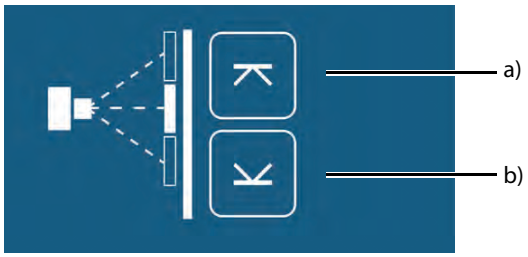



*Fig. 4-18 Stitching Wallstand mode examination*

The following buttons and information are located in the display, see Fig. 4-18 *Stitching Wallstand mode examination*

a *High position* , b *Low position*

1. Activate the mode by pressing the *servo* button.
   - The servo mode indication light will flash until both limits are defined.
   - The OTC will automatically move to its programmed position.
   - The System will beep when position is reached.
2. Install a patient protection in front of the Wallstand.
3. Invite the patient and position the patient in front of the Wallstand.
4. Verify that the patient protection is placed in front of the Wallstand by pressing the*green check* button on the display.
5. Move the focus point to the middle of the planned composite image. This could be done by moving the tube in Z direction.
6. Rotate the x-ray tube in order for the lower edge of the collimator light field to indicate the lower limit for the composite image.

7. Press the button to indicate the lower limit. The button turns green.

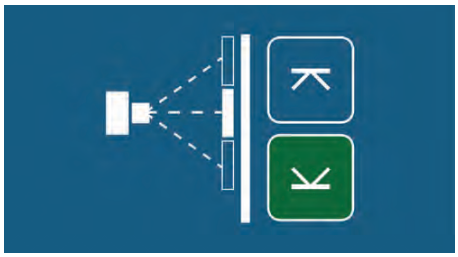


*Fig. 4-19 Lower limit indication*

8. Rotate the x-ray tube in order for the upper edge of the collimator light field to indicate the upper limit for the composite image.
9. Press the button to indicate the upper limit.
   - The button turns green to indicate that the limit is set.

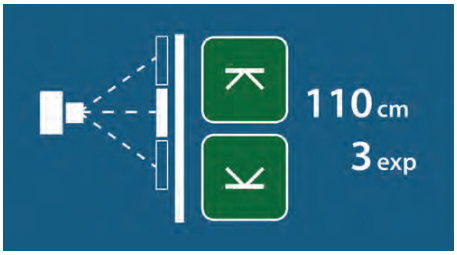



*Fig. 4-20 Stitching mode — upper and lower limit set*

   - When both limits have been defined the total length of the composite image and the number of exposures will be shown.
   - The servo mode indication light will be fixed.
10. Modify the exposure settings if necessary.

*Note!*

*For a stitching procedure, a change of the patient size or change of exposure parameters for the first image included in the sequence, is not kept for the following included images.*

11. Activate the *Exposure* button and keep it activated during the procedure.

- The starting position is always at the top edge of the composite image. Activate the *Exposure* button and keep it activated until the exposure procedure is completed.
- The System will move to the correct starting position.
- When the System is in the correct position for the first image, the first image is captured.
- After exposure, the System moves to the next, correct position and the second image will be captured.
- This is repeated until all images for the composite image has been captured.
- The System will beep when the sequence is finished. Release the button.

### 4.8.4 AEC Technique Setup

For information about the AEC Technique setup, see the *Generator Manual*.

## 4.9 Detector, Wallstand

***WARNING!***

- ***Before setting or adjusting the detector and other equipment, complete the setting of the counterweights.***
- ***Whenever any item is removed from the Wallstand, e.g. the lateral armrest, the detector holder will become highly unbalanced.***
- ***Whenever the brake is released, it will move upwards and may cause injury.***
- ***Make sure that the operation will be done by personnel who are trained in the use of the equipment.***
- ***Shutdown the power when changing a permanent detector.***
- ***Confirm that it is not possible to elevate. If the detector holder elevates accidentally while work is being carried out, it may fall against the worker and result in serious injury.***

*CAUTION!*

***Do not put any load on the detector tray. It might be damaged.***

*CAUTION!*

***Always supervise movements of the detector to avoid collision with peripherals.***

*Note!*

*This instruction applies only to the portable image receptor.*

*Note!*

- Depending on left or right operated Wallstand, the location of the detector tray and position of button and latches is different.

*Note!*

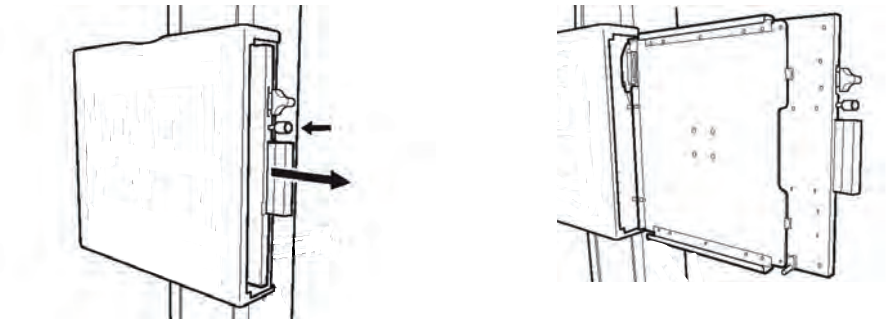
*If the System includes more than one detector, assure that the active detector is used.*

### 4.9.1 14x17 Detector, Wallstand

#### 4.9.1.1 Method to Load the 14x17 Detector, Wallstand

The method of setting the detector to the detector holder is as follows:

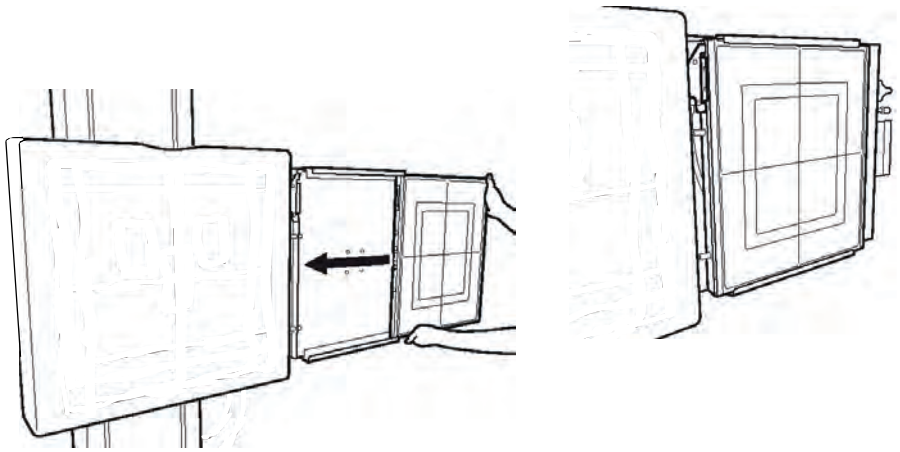
1. Pull the detector tray toward you until it locks.



*Note!*

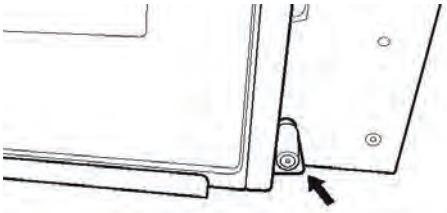
- Install the detector with the detector tray pulled into the locked position. When pulling the detector tray, the button on the side of the tray will first recede before snapping back into its original position when it locks.

2. Insert the detector into the detector holder, as shown below and set it by pushing it in, until it clicks.

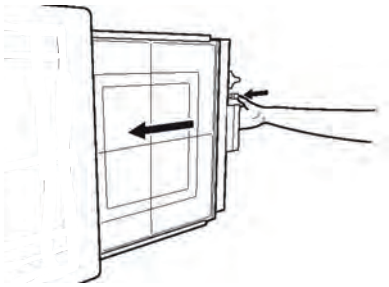


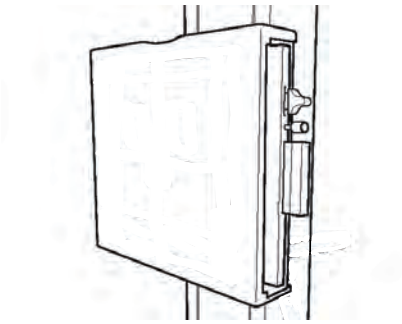
*CAUTION!*

- ***Confirm that the latch is going up firmly, as shown below.***



3. While pressing and holding the button of the detector tray, return it back to the inside of the detector holder.

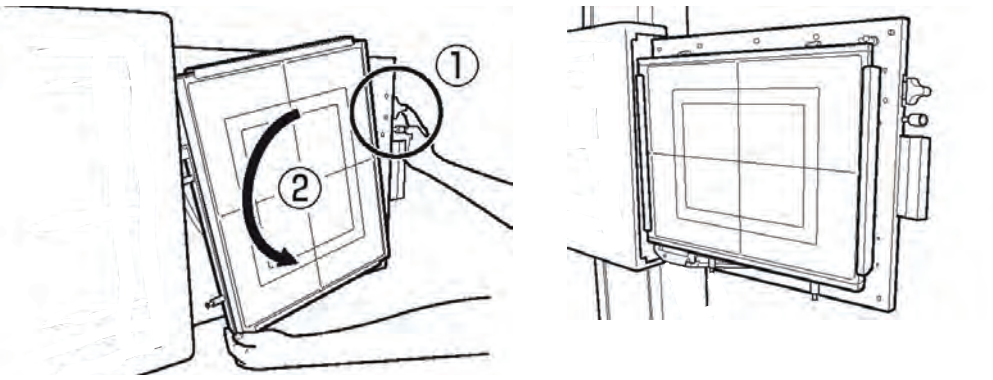




### 4.9.1.2 Change between Portrait and Landscape

The method of rotating the detector in the detector holder, is as follows:

1. To rotate the detector by 90°, , in the step 2 of “Method to set the detector”, hold the lower side of the detector and turn it from the below, clockwise or anti-clockwise (2) while pulling the latch upward or downward of the detector tray (1) in the direction of the arrow.




*Note!*

- To set the detector, pull the latch:
  - upward at upper position of the tray.
  - downward at the center of the tray.
- Depending on left— or right—operated Wallstand, the location of the detector tray and position of button and latches is different.

***Centered or Top Rotation of the Detector***

In the landscape position, there is a choice between having the detector rotated through the detector center or through the detector top.

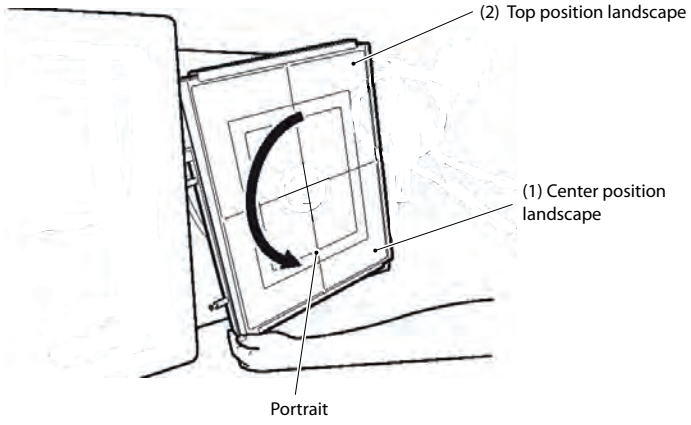



*Fig. 4-21 Rotating the detector*

#### 4.9.1.3 Method to Remove the 14x17 Detector, Wallstand

The method of removing the detector from the detector tray is as follows.

1. To remove the detector, in the step 2 of “Method to set the detector”, unlock the connector by pulling the latch of the detector tray in the direction of the arrow.

*Note!*

- Depending on left or right operated Wallstand, the location of the detector tray and position of button and latches is different.

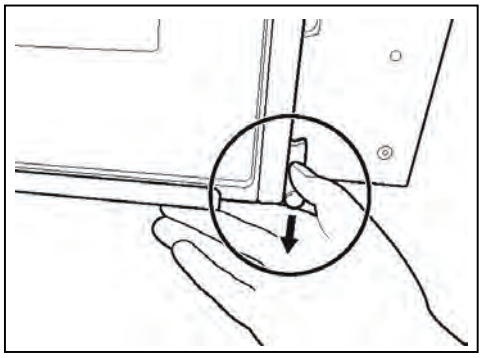


*Fig. 4-22 Unlocking the detector latch*

## 4.9.2 17x17 Detector, Wallstand

### 4.9.2.1 Method to load the 17x17 detector

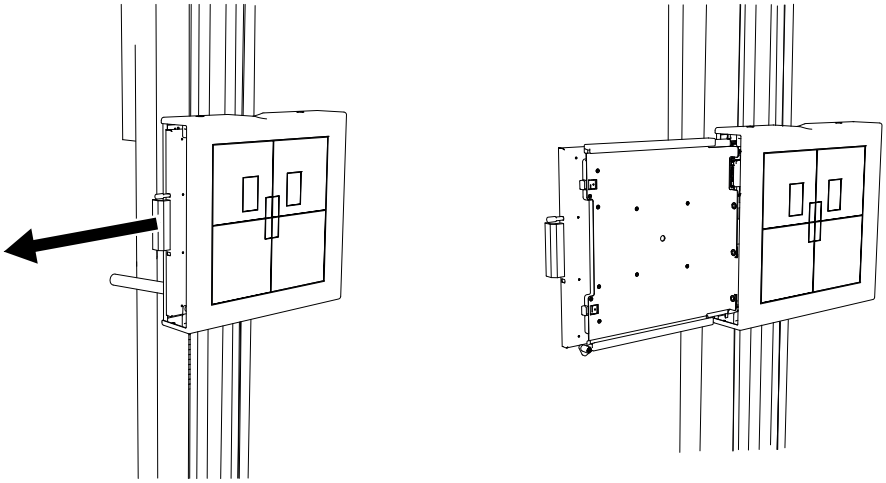
*Note!*

- Depending on left- or right-operated wallstand, the location of the detector tray and position of button and latches is different.

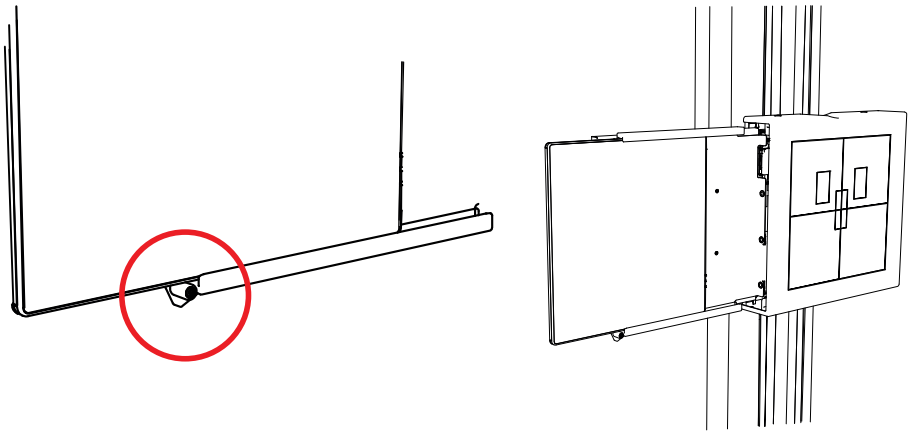
The method of setting the detector to the detector holder is as follows;

The following instruction describes the detector operated from the left side.

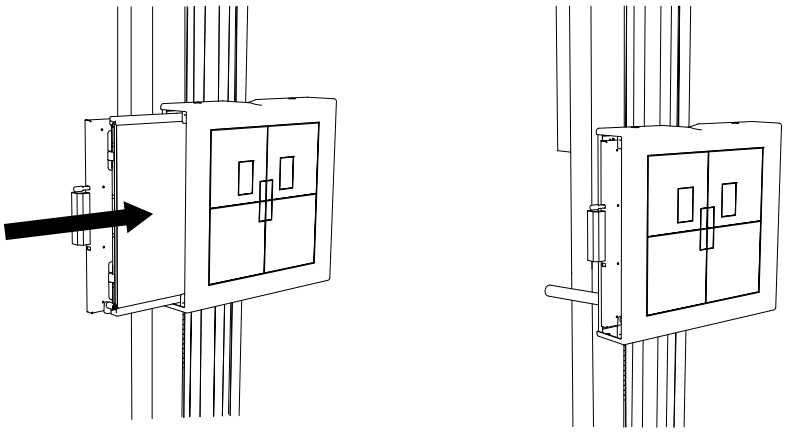
1. Pull the detector tray toward you. Make sure the detector tray is completely brought out.



2. Insert the detector into the detector tray as shown below and set it by pushing the detector, holding down the latch.



3. While pressing and holding the button of the detector tray, return it back to the inside of the detector holder.



4. Push the detector until the hold-backs are set. Then the detector is in the correct position. Chargeable detectors will start charging when set in this position.

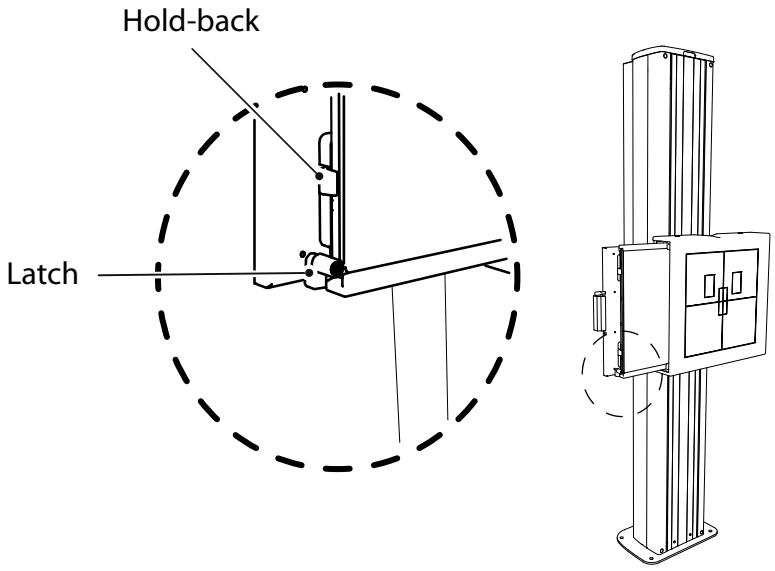



*Fig. 4-23*

*CAUTION!*

***It is important that the hold-backs lock outside the detector end. Failure to position the detector in the proper position, will lead to incorrect images.***

*Note!*

*If the detector or the detector holder is not properly inserted, a warning symbol will be shown at the display.*

## 4.10 Portable detector, table

*Note!*

*This instruction applies only to a portable detector.*

*CAUTION!*

***Do not put any load on the detector tray. It might be damaged.***

*CAUTION!*

***Always supervise movements of the detector to avoid collision with peripherals.***

*Note!*

*If the System includes more than one detector, assure that the active detector is used.*

### 4.10.1 Set the detector

1. Pull out the detector tray.

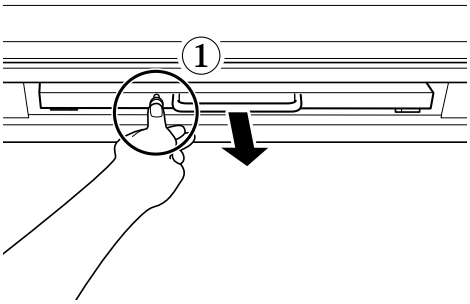



*Fig. 4-24 Releasing the detector tray*

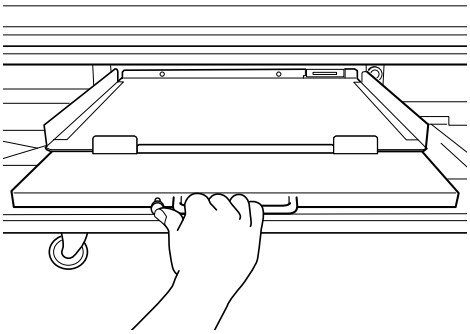


*Fig. 4-25 Pulling out the detector tray*

2. Insert the detector into the tray as shown below.

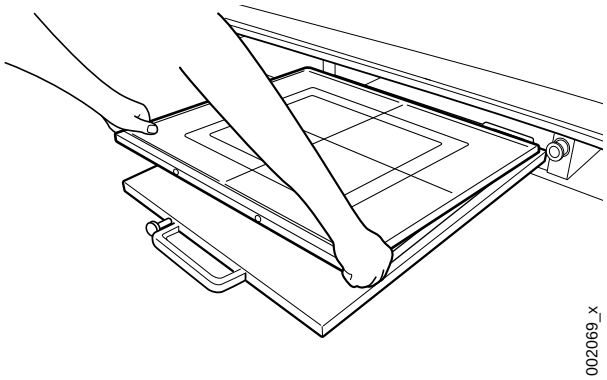



*Fig. 4-26 Inserting the detector into the detector tray*

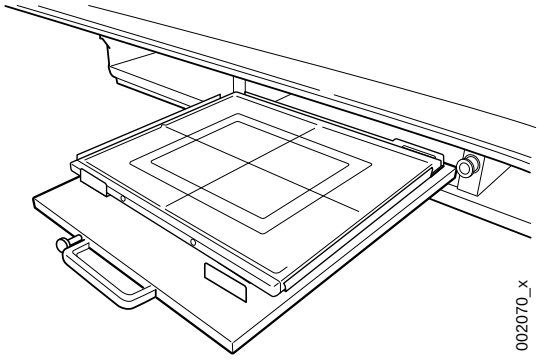



*Fig. 4-27*

3. In this position exposure is possible in *Free mode*, *Table Flexible mode* and *Auto position mode*.
4. Press and hold the button of the tray and push it in.

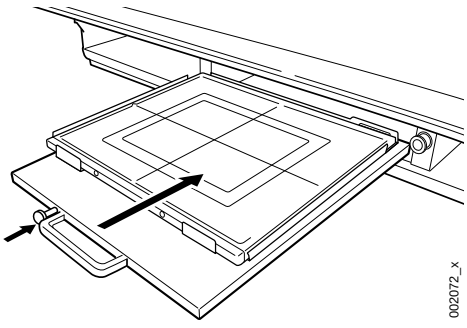



*Fig. 4-28 Reinserting the detector tray*

To check if the detector is in the right position, see the *“STATE” ;Detector position/ present/undefined* at the display.

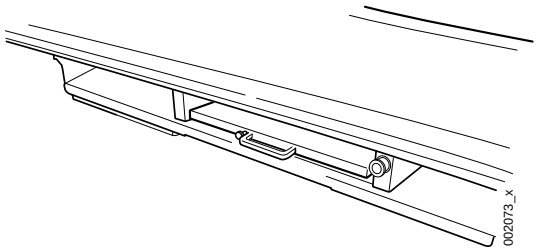



*Fig. 4-29*

### 4.10.2 Change between portrait and landscape

1. Rotate the detector 90°.
2. Hold as shown below and turn the detector, clockwise or anti-clockwise.

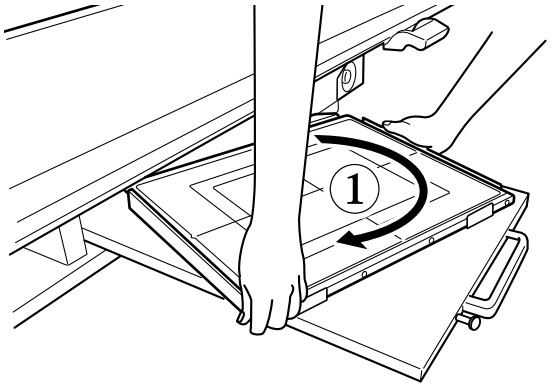



*Fig. 4-30 Detector change between portrait and landscape*

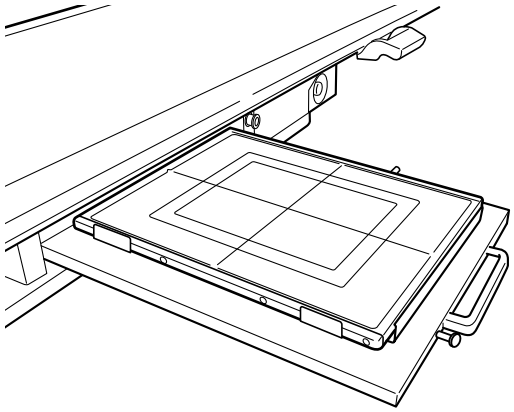


*Fig. 4-31*

### 4.10.3 Remove detector

1. Hold and remove detector towards you as shown below.

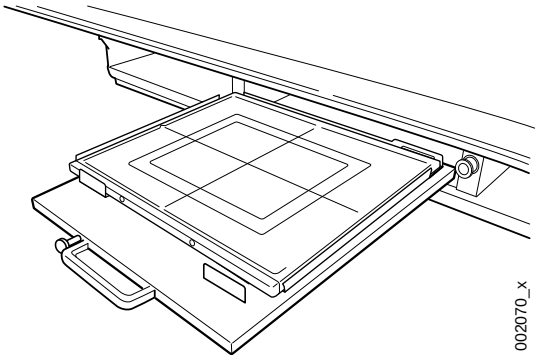



*Fig. 4-32*

2. In this position, exposure is possible in *Free mode*, *Table flexible mode* and *Auto position mode*.

   Other modes requires that the detector is in the tray.

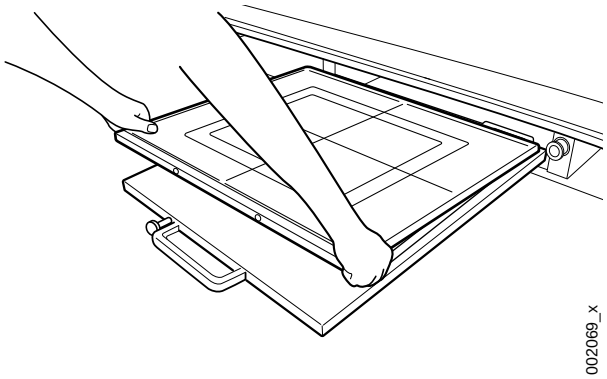



*Fig. 4-33 Detector removal*

### 4.10.4 Exchange grid

***WARNING!***

***Failure to insert the grid in the correct orientation, with the tube side facing towards the X-ray source, can result in unsuccessful patient imaging.***

***Additional corrective patient imaging and additional ionising radiation exposure for the patient may be needed.***

***Ensure the grid is inserted in the correct way.***

1. Pull out the grid.

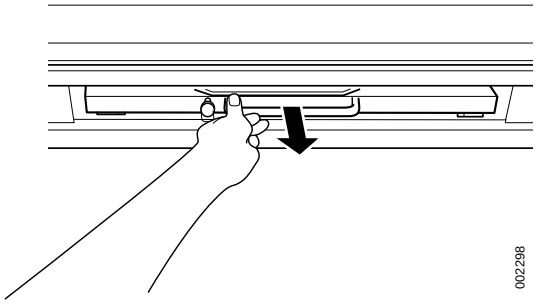



*Fig. 4-34 Pull out the grid*

2. Exchange the grid.
   Insert the grid with the tube side facing upwards, towards the X-ray source. The tube side of the grid has the specification label and the grid centre line identification.
3. Push in the grid, until it clicks.

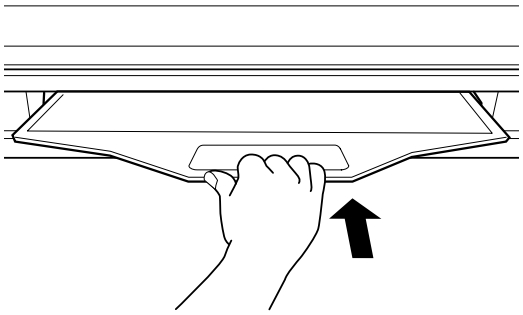


*Fig. 4-35 Push in the grid*

# 5 Error Handling

## 5.1 Fault Handling

There are three types of NOTIFICATIONS - Shows the present occurence. For example; collision. They are listed below in ranking order.

1. ERROR — The error information appears as a red bar in the lower part of the display. Sound; two beeps.
2. WARNING - Appears as a grey bar in the lower part of the display. Sound; one beep.
3. INFO - Not shown to the user. Only registered in the setting menu.

### 5.1.1 Notifications

#### 5.1.1.1 - 1) Error

When an error occurs, an Error pop-up window will appear in the display.

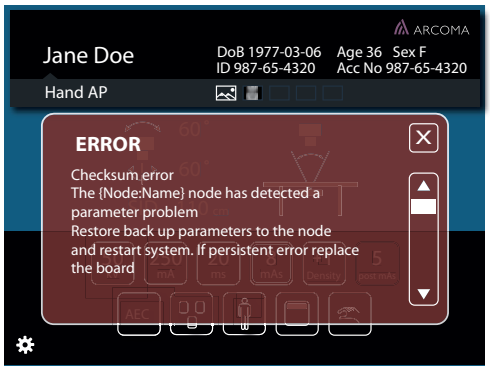



*Fig. 5-1 Error pop-up window*

The Error pop-up window will disappear when the user pushes the close button.

*Fig. 5-2 Close button*

When closing the Error pop-up window (Fig. 5-1 *Error pop-up window*), a red information bar will appear (see Fig. 5-3 *Error information bar, Table* and Fig. 5-4 *Error information bar, Wall stand*).

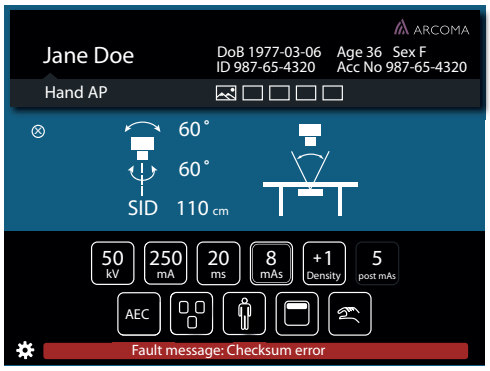



*Fig. 5-3 Error information bar, Table*

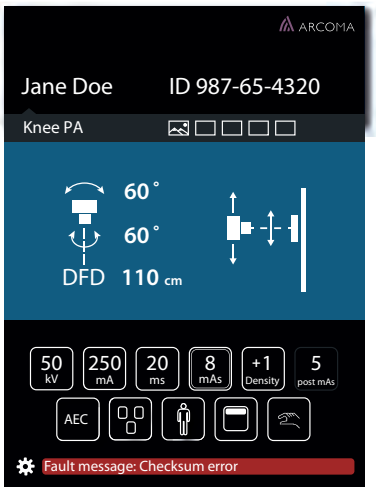



*Fig. 5-4 Error information bar, Wall stand*

When the user pushes the red information bar, the Error pop-up window will appear again.

The Error information bar (lower part of the window) is present until the error is fixed or the System is restarted.

#### 5.1.1.2 2) Warning

A warning message will appear in a Warning information bar (lower part of the display), when the handling of the System justifies that.

The Warning information bar will be cleared if/when a new warning is displayed, or after time.

The latest sent warning is shown.

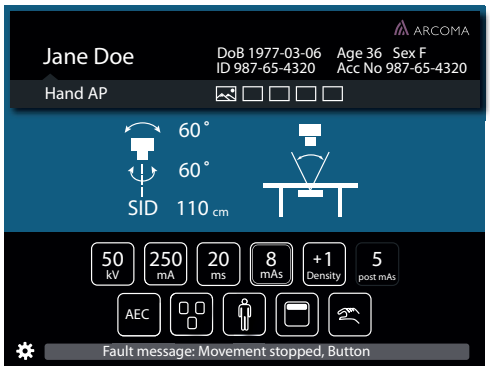



*Fig. 5-5 Warning information bar, Table*

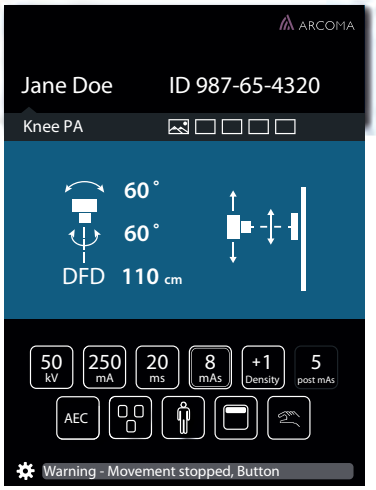



*Fig. 5-6 Warning information bar, Wall stand*

When pushing the Warning information bar, (see Fig. 5-5 *Warning information bar, Table* and Fig. 5-6 *Warning information bar, Wall stand*), a pop-up window will appear (see Fig. 5-7 *Pop-up window — Warning information bar* and Fig. 5-8 *Pop-up window — Information bar*).


*Fig. 5-7 Pop-up window — Warning information bar*

When the user closes the pop-up window, the Warning Information bar will appear again.

The Warning pop-up window will also appear again, when the user pushes the information bar.


*Fig. 5-8 Pop-up window — Information bar*

The *Warning pop-up window* disappears when the user pushes the close button.

*Fig. 5-9 Close button*

### 5.1.1.3 Log

The *Log file* is part of the *Setting menu* and reached by pressing the gear or the *Error/Warning messenger* bars.

# 6 Cleaning

## 6.1 General

*CAUTION!*

***Be sure to clean the device so it will not affect operation the next time it is being used.***

*Note!*

*Use a moderate amount of liquid, when cleaning the product!*

- Surfaces that are in contact with the patient shall be cleaned with a lint free cloth and a small amount of soap water or cleaning spirit.

## 6.2 Collimator

***WARNING!***

***Do not restart the System if inflammable liquids have leaked into the collimator.***

*CAUTION!*

***The collimator cover is not water resistant.***

How to clean the collimator:

- Disconnect the whole System.
- Use non-abrasive cleaning products. Care must be taken to prevent liquid from entering the collimator.

## 6.3 X-ray Tube

How to clean the X-ray tube:

- Surfaces that are in contact with the patient shall be cleaned with a lint free cloth and a small amount of soap water or cleaning spirit.

## 6.4 Ceiling Suspended X-ray Tube Support

How to clean the ceiling suspended X-ray tube support:

- Surfaces that are in contact with the patient shall be cleaned with a lint free cloth and a small amount of soap water or cleaning spirit.

## 6.5 Table

How to clean the Table:

- Surfaces that are in contact with the patient shall be cleaned with a lint free cloth and a small amount of soap water or cleaning spirit.

## 6.6 Wall stand

How to clean the Wall stand:

- Surfaces that are in contact with the patient shall be cleaned with a lint free cloth and a small amount of soap water or cleaning spirit.

# 7 Function and Safety Checks

## 7.1 Monthly Checks

### 7.1.1 General

If any malfunction is detected, the entire equipment must be taken out of use until the problem is eliminated by a service engineer from the supplier or by the local technical staff trained by the supplier.

*Note!*

*Before performing any maintenance please read the Safety chapter.*

Daily and monthly checks are normally performed by the user/operator.

Annual checks shall be performed either by local technical staff trained by the supplier or authorized service representatives.

Checks for all units.

OTC, table and Wallstand:

- ☐ 1. Check the cable hose for damage.
- ☐ 2. Check all outer cabling for damage.
- ☐ 3. Clean all outer surfaces, except for the lubricated column segments.
- ☐ 4. Make sure that the Instruction for use is available and up to date.
- ☐ 5. Check the emergency stop. By activating the emergency stop all motorized movements are inhibited. See *Safety Chapter* for information on how the Emergency stop should react on command.

### 7.1.2 OTC

- ☐ 6. Power up the OTC and check all functions.
- ☐ 7. Move the OTC around and observe any irregularities.

### 7.1.3 Table

- ☐ 8. Move the Table in X, Y and Z direction to make sure it runs smoothly and sounds OK.
- ☐ 9. Move the table top longitudinal and check that the mechanical end stops are not loose.

### 7.1.4 Wallstand

- ☐ 10. Move the Wallstand up and down in Z direction and make sure it runs smoothly and sounds OK.

# 8 Technical Specifications

## 8.1 0072 Version C System

### 8.1.1 Electrical Characteristics

| | |
|---|---|
| Mains voltage for the System | 400 V 3N, 50/60 Hz<br>400 V 3~<br>480 V 3~<br>150 A (Short term peak value),<br>(required fuse 63 A thermal breaker) |
| Heat dispation | 1713 BTU/hr |

For further information, see the tube’s Technical data sheet at the accompanying documents.

### 8.1.2 Environmental Requirements

| | |
|---|---|
| Ambient transport and storage temperature | -25°C - +70°C |
| Ambient operating temperature | +10°C- +40°C |
| Transport and storage humidity (relative) | 10-90%, non-condensing |
| Operating humidity (relative) | 30-75% RH, non-condensing |
| Maximum transport and storage altitude | 3000 m |
| Maximum operating altitude | 3000 m |
| Maximum air pressure | 700–1060 hPa |

## 8.2 Ceiling Suspended X-ray Tube Support

### 8.2.1 General

| | |
|---|---|
| Rotation range ceiling (beta) | >340° |
| Rotation range tube arm (alpha) | >±135° |
| Column (Z stroke) | 1750 mm |

### 8.2.2 Configuration

| | |
|---|---|
| OTC | The OTC is a mechanical part of an X-ray system. |

### 8.2.3 Weight

| | |
|---|---|
| OTC | Maximum 240 kg |
| Tube and collimator | 40 kg maximum allowed weight |
| Ceiling wagon | 95 kg |
| Column | 40 kg |
| Ceiling rail Y (4 m standard) | 28 kg |

### 8.2.4 Electrical Characteristics

| | |
|---|---|
| Mains voltage | 230 VAC, 50/60 Hz center tapped single phase 4 A |

### 8.2.5 Classification

Classification according to IEC 60601-1.

| | |
|---|---|
| Class | Class I equipment. All dead metal parts of the equipment are electrical connected to protective earth. |
| Applied part | Type B |
| Protection against ingress of water | IPXO |
| Mode of operation | Intermittent operation: 20%, maximum 1 min. ON / 4 min. OFF |
| Use of anaesthetic mixtures | The equipment is not suitable for use in the presence of flammable anaesthetic mixtures with air or with oxygen or with nitrous oxide. |

### 8.2.6 Speed

| | Low speed | Maximum speed |
|---|---|---|
| Z movement | 60 mm/s | |
| X movement | 250 mm/s | 500 mm/s |
| Y movement | 250 mm/s | 500 mm/s |
| α movement | 16°/s | |
| β movement | 16°/s | |
| Image receptor holder movement (with 50 kg mass) | 166 mm/s | 350 mm/s |

## 8.3 Table 0055

### 8.3.1 Column

| | |
|---|---|
| Lowest table top position (from the floor to the table top surface) | 550 mm |
| Column (Z stroke) | 380 mm |

### 8.3.2 Table Top

| | |
|---|---|
| Table top dimension | 2424 mm X 850 mm |
| Table top transparent area | 2400 mm X 613 mm |
| Table top thickness | 21.5 mm |
| Length of stroke, X direction | +/- 600 mm |
| Length of stroke, Y direction | +/- 150 mm |
| Movement range of the imaging unit | >650 mm |

### 8.3.3 Weight

| | |
|---|---|
| Table | Approximately 150 kg |
| Imaging unit | Approximately 21 kg |
| Table top | Approximately 47 kg |
| Maximum patient load | 300 kg |

### 8.3.4 Electrical Characteristics

| | |
|---|---|
| Maximum power without external electronics: | 500 W |

#### 8.3.4.1 External Electrical Characteristics

The external electronics must be approved according to IEC60601-1.

If any external electronics is installed the end product must be tested according to IEC60601-1.

| | |
|---|---|
| Power output to external | 110-240 VAC 50-60 Hz<br>Single phase 10 A |
| Power output external 24 VDC | 24 VDC 3 A |

### 8.3.5 Classification

Classification according to IEC 60601-1.

| | |
|---|---|
| Class | Class I equipment.<br>All dead metal parts of the equipment are electrical connected to protective earth. |
| Applied part | Type B |
| Protection against ingress of water | IPX2 |
| Mode of operation | Intermediate use: 20% 1 min ON / 4 min OFF |
| Use of anaesthetics mixtures | The equipment is not suitable for use in the presence of flammable anaesthetics mixtures with air or with oxygen or with nitrous oxide. |

### 8.3.6 Attenuation Equivalent

| | |
|---|---|
| Table top | ≤ 0.9 mm AL at 3.7 mm HVL |

## 8.4 Wallstand

| | |
|---|---|
| Column, Z stroke | 1470 +40/-10 mm (non-tilt)<br>1400 +40/-10 mm (tilt)<br>1550 +40/-10 mm (tilt) |

| | |
|---|---|
| Rotation range detector holder wagon (Only the tiltable detector holder wagon). | -20° - 90° |

### 8.4.1 Attenuation Equivalent

| | |
|---|---|
| detector holder | <=0.6 mm |

### 8.4.2 Configuration

| | |
|---|---|
| Wall stand | The Wall stand is the mechanical part of an X-ray system. |

### 8.4.3 Weight

| | |
|---|---|
| Wall stand | Maximum 180 kg (160 +20/ -20 kg) |
| detector | Maximum 40 kg |

### 8.4.4 Classification

Classification according to IEC/EN 60601-1.

| | |
|---|---|
| Class | Class I equipment.<br>All dead metal parts of the equipment are electrical connected to protective earth. |
| Applied part | Type B |
| Protection against ingress of water | IPX0 |
| Mode of operation | Intermittent operation: 20% 1 min ON / 4 min OFF |
| Use of anaesthetic mixtures | The equipment is not suitable for use in the presence of flammable anaesthetics mixtures with air or with oxygen or with nitrous oxide. |

Classification according to IEC/EN 60601-1–2

| | |
|---|---|
| Class | Class B |

# 8.5 Cabinet

## 8.5.1 Dimensions

| | |
|---|---|
| Dimensions (L x W x H) mm | 750 x 600 x 1125 mm |

## 8.5.2 Weight

| | |
|---|---|
| Cabinet | Max 134 kg |

# Technical Specifications
## Cabinet

# 9 Waste Disposal

The Manufacturing company is responsible for disposal of the product.

To avoid environment pollution and human injury, we therefore request that you contact the Manufacturer or your dealer if you wish to cease operation of your product with the intention of disposal.

For disposal of other components, refer to corresponding documentation.

# Waste Disposal

# 10 Accessories

## 10.1 General

***WARNING!***

***Due to squeezing hazards from motorized movements, only accessories approved by the Manufacturer are allowed for the 0072.***

| Part no. | Description |
|---|---|
| 0510–099–001 | Cable carriage (1 pc) |
| 0072–099–210 | External servo button incl. emergency stop |
| 0170–099–002 | Cable outlet CS |
| 0512–099–001 | Unistruts for rails 4x4m |
| 0512–099–002 | Unistruts for rails 4x5m |
| 0512–099–003 | Mounting kit, unistruts for rails 4x4m |
| 0512–099–004 | Mounting kit, unistruts for rails 4x5m |
| | |

### 10.1.1 Table

| Part no. | Description |
|---|---|
| 0072–095–170 | Patient kit incl.; |
| | - Compression belt cost effective |
| | - Patient handgrip (2 pcs) |
| | - Mattress |
| 0072-099-014 | Patient handgrip |
| 0055–099–007 | Mattress 2200 mm |
| 0055–099–009 | Hand control for automatic collimator (1 pc) |
| 0072-099-011 | Lateral cassette holder |
| 0072-099-004 | X, Y, Z Foot control |
| 0055-099-025 | X, Y Foot control strip type |
| 0072-099-028 | Compression belt cost effective |
| 0072-099-029 | Compression belt high-end |
| 0055-099-007 | Table top Mattress 2200x690x20 mm |

| Part no. | Description |
|---|---|
| 0080-099-051 | Form pad small- rectangle |
| 0080-099-050 | Form pad medium- wedge |
| 0080-099-052 | Form pad large- head |
| 0072–099–060 | Grid 52 lp/cm, 10:1 Ratio, FFD110 Alu type |
| 0180–099–050 | Grid 40lp/cm, 10_1 Ratio, F115, Al.type |

### 10.1.2 Wallstand

| Part.no. | Description |
|---|---|
| 0072–099–306 | Patient Lateral armrest |
| 0072-099-307 | Stitching; patient protection shield |
| | Stitching removable footstep |
| 0175-099-002 | Cable outlet WS |
| 0180-099-061 | Grid 52lp/cm, 10:1 Ratio, SID 180 Alu type |
| | Grid 52lp/cm, 10:1 Ratio, SID 140 Alu type |
| | Grid 40lp/cm, 10:1 Ratio, F115, Alu type |
| | Grid 40lp/cm, 10:1 Ratio, F150, Alu type |
| | Grid 40lp/cm, 10:1 Ratio, F180, Alu type |
| | Cable outlet WS |
| 0182–099–320 | Wall brackets WS |

### 10.1.3 Detector

| Part.no. | Description |
|---|---|
| CXDI-401C, wireless 43x43 | Canon |
| CXDI-401C, wireless 43x43 compact | Canon |
| CXDI-402C, wireless 43x43 | Canon |
| CXDI-410C, wireless 43x43 | Canon |
| CXDI-701C, wireless 35x43 | Canon |
| CXDI-702C, wireless 35x43 | Canon |
| CXDI-710C, wireless 35x43 | Canon |
| CXDI-801C, wireless ~28x35 | Canon |
| CXDI-810C, wireless ~28x35 | Canon |

# 11 Appendix A

## 11.1 Glossary

| | |
|---|---|
| **A** | |
| Accession Number | In DICOM, a term to uniquely identify a visit to a site by a patient. The meaning and use of accession numbers is not consistent in medical information. The Digital Radiography System uses the DICOM definition of the term |
| Accessories | Extra facilities which easily can be mounted by the user. |
| AEC | Automatic Exposure Control. |
| Alpha | Direction for a rotation movement. |
| Antiscatter grid | Device used to prevent the radiation scattered within the patient from reaching the Digital Radiography Detector and fogging it. |
| AP | Anterior/Posterior view position for X-ray exposure. |
| Artifact | Changes to an image due to outside influences such as defective pixels or Digital Radiography Detector scan lines. |
| Autoclave | The process of disinfecting articles by heating them with pressurized steam. |
| Automatic Exposure Control (AEC) | Ion chamber within the Bucky. Used to terminate X-ray when image density is achieved by measuring the amount of dosage occurring at the Digital Radiography Detector and providing feedback to the X-ray Generator to stop the exposure. |
| **B** | |
| Beta | Direction for a rotation movement. The tube turns round the Z-axis. |
| Btu/hr | British thermal unit /hour |
| BU | Backup |
| Bucky | Detector holder.<br>The component that houses the Digital Radiography Detector, AEC, moving grid, and related components. In the Digital Radiography System, the bucky contains the Digital Radiography Detector instead of the conventional film cassette. |

# Appendix A
## Glossary

| | |
|---|---|
| **C** | |
| CE | A CE-marked product verifies that the manufacture guarantees that the product fulfills EU:s fundamental health-, environment- and security requirements. |
| Centering | The field of image is centered over the imaging unit. |
| Collimator | The Collimator regulates the size and shape of the X-ray beam to accurately localize the area of interest on the patient, while reducing overall patient irradiation exposure. |
| Collision | Either a physical collision with an obstacle or the node cannot reach its end position. |
| CR | Image plates |
| **D** | |
| DAP | Dose Area Product.<br>DAP (Dose Area Product) is a quantity used in assessing the radiation risk from diagnostic X-ray examinations and is presented in dGycm².<br>Defined as the absorbed dose multiplied by the area irradiated. The DAP is independent of distance from source. |
| DAP meter | The DAP meter is placed next to the collimator and measures the amount of X-ray radiation that leaves the collimator. |
| Diagnostic X-ray System | An X-ray system designed for irradiation of any part of the human body for the purpose of diagnosis or visualization. |
| Diode | Electrical component that leads voltage and current in one direction. |
| Dealer | See supplier. |
| DI | Deviation Index. According to Standard IEC 62494-1: “Deviation Index (DI) is a number quantifying the deviation of the actual exposure index from a target exposure index.” |
| DICOM | Digital Imaging and Communications in Medicine (DICOM).<br>An industry standard specifications for interconnection of medical imaging equipment. Digital Radiography Operating Console. |

| | |
|---|---|
| Digital Radiography (DR) | The Digital Radiography Detector is a flat panel that receives the X-ray image and converts it to digital information. The Digital Radiography Detector replaces conventional X-ray film and cassettes. |
| Direct Radiography (DR) | A term used to distinguish the use of a photoconductor-based method as opposed to the X-ray capture and conversion method used in a scintillator or phosphor-based detector. |
| DR | *Digital Radiography/Direct Radiography* |
| | |
| **E** | |
| EMC | Electromagnetic Compatibility |
| End stop | See Mechanical end stop and Software end stop. |
| ESA | Exam Specific Algorithm. Algorithm used to optimize raw image data for a particular type of exam. |
| EXI value | Exposure Index. According to Standard IEC 62494-1: “Exposure index (EI) measures the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system.<br>The exposure index allows the operator to judge if an image was taken at a detector exposure level suitable for the intended level of image quality. It is important to note that the exposure index, as defined in IEC 62494-1, is derived from the image signal, which in turn is usually related to the energy absorbed in the detector, i.e. the detector dose, but not directly to the air kerma at the image receptor. The relation to image receptor air kerma (air kerma at the detector surface) is introduced only at one radiation quality through calibration. However, this definition is appropriate as the image quality in digital radiography is determined mainly by the signal-to-noise level, which in turn is determined by the absorbed energy” |
| Exposure | An image is taken against an imaging unit. |
| **F** | |
| Focal Distance | The distance from the source of the X-rays to the patient. |

# Appendix A
## Glossary

| | |
|---|---|
| **G** | |
| Generator | Device that supplies power to and controls the X-ray tube. |
| **H** | |
| HIS | Hospital Information System |
| Hospital Information System | In a hospital, the computer system that tracks patient demographic information, visit information, and other patient records. |
| **I** | |
| IEC | International Electrotechnical Commission. |
| Image Artifact | Non-desirable qualities on a printed image. |
| Imaging unit | Detector for X-ray. The reception and transfer of an image is digital. |
| Index | Mechanical position markings, for instance alpha 0°, +90° and -90°. |
| Intermittence | The number of repetitions / unit of time. Recurrent cycles |
| ISO | International Organization for Standardization. |
| **J** | |
| **K** | |
| Kvp | Peak kilo-volts. The highest energy of X-rays emitted by an X-ray tube (equal to the peak applied tube voltage). |
| **L** | |
| Lateral | Possible view position for X-ray exposure. |
| Look-Up Table (LUT) | A table of values used to convert raw image data to output data for a specific ESA setting. |
| LUT | Look-Up Table. |
| **M** | |
| mA | Milliamperes. |

| | |
|---|---|
| mAs | Milliampere-seconds. Combined with kVp, it indicates the dose of X-rays. |
| Mechanical end stop | A physical device that stops an automatic or manual movement if the software end stop is out of order. |
| motorized movement | A motor assisted movement. |
| **N** | |
| Node | A control and supervision unit, consists of printed circuit board and node specific software. |
| **O** | |
| Oblique | Possible view position for X-ray exposure. |
| O.D. | Optic Density. |
| Operating System (OS) | The basic software control system of the PC. |
| Options | Extra facilities that demand updating of the software and hardware before use.<br>Options demand installation of an authorized service technician. |
| OTC | Overhead Tube Crane. |
| **P** | |
| PA | Posterior/Anterior view position for X-ray exposure. |
| PC | Central Processing Unit of the Digital Radiography Operating Console. |
| Position | A location in the room (X, Y and Z). |
| Procedure | A predefined collection of images (views) for X-ray exposure. |
| **Q** | |
| **R** | |
| RIS | Radiology Information System. |
| **S** | |

# Appendix A
## Glossary

| | |
|---|---|
| SID | The distance between the focus-spot in the X-ray tube and the active image area. The distance is given in centimeter. |
| Software end stop | A non-physical device that stops an automatic or manual movement. The software end stop is placed before the mechanical end stop. |
| SSW | Service software. |
| Study | A specific instance of a procedure consisting of a set of X-ray images. |
| Supplier | The company that sells the 0072 Variant A to the user (hospital). |
| **T** | |
| Table frame | The metallic frame that carries the table top. The frame is attached to the bottom of the table top. |
| Technique factor | Any of the parameters describing the properties of an X-ray beam, including beam energy (kVp), beam intensity (mA), exposure (mAs), duration (seconds), and, at times, the Source to Image Distance (SID). |
| **U** | |
| **V** | |
| View | Prescription for the technique factors and geometric arrangement of the X-ray source, patient, and image sensor that yields and image of organs of interest seen on a specific orientation. |
| Visit | A set of studies identified in a locally unique manner and performed on a particular patient at a particular site for a particular reason. A visit is normally identified by an accession number or a Visit ID and is associated with a diagnosis |
| **W** | |
| Working area | The size of the table top including X and Y stroke. |
| **X** | |
| X-movement | The OTC moves in the X-direction. |

| | |
|---|---|
| **Y** | |
| Y-movement | The OTC moves in the Y-direction. |
| **Z** | |
| Z-node | The Z-node controls the Z-movement. |
| Z-movement | The OTC moves in the Z-direction |
| | |

# Appendix A
## Glossary

# 12 Appendix B

## 12.1 Monthly Checklist

Make a copy of this paper before filling in.

If there is any discrepancy please use the table to make a note.

Hospital:.....

Id no:..... Room:.....

Sign:..... Date:.....

### 12.1.1 OTC

- ☐ 1. Move the OTC manually to all positions in X, Y and Z direction and make sure it runs smoothly and sounds OK.
- ☐ 2. Check the emergency stop. By activating the emergency stop all motorized movements are inhibited.
- ☐ 3. Choose table position and make sure the tracking is activated.

  Measure between the X-ray tube focal spot and the active image receptor surface of the image receptor holder. The measured SID shall correspond with the displayed *SID*.

  Move the OTC in X or Y direction and measure between the X-ray tube focal spot and the active detector surface of the detector holder again. The SID is allowed to differ ±1%.
- ☐ 4. Check that the *SID*, shown on the display of both the Image system and the collimator, correspond with the measured SID.
- ☐ 5. Check the hoses for damage.
- ☐ 6. Check all outer cabling for damage.
- ☐ 7. Clean all outer surfaces, except for the lubricated column segments. See Chapter *“Cleaning”* at the *Instruction for use*

# Appendix B
## Monthly Checklist

#### 12.1.1.1 General

***Checks for All Units OTC, Table and Wallstand***

- ☐ 1. Make sure that the *Operation Manual* is available and up to date
- ☐ 2. Check the hoses for damage.
- ☐ 3. Check all outer cabling for damage.
- ☐ 4. Clean all outer surfaces, except for the lubricated column segments. See *Operation Manual, Chapter 6 “Cleaning”*, for cleaning instructions.
- ☐ 5. Check the emergency stop.

  By activating the emergency stop, all motorized movements are inhibited. See *Chapter 2, “Safety”*, for information of how the Emergency stop should react on command.

#### 12.1.1.2 OTC

- ☐ 6. Power up the Ceiling suspended unit and check all functions.
- ☐ 7. Move the Ceiling suspended unit around and observe any irregularities.

#### 12.1.1.3 Table

- ☐ 8. Move the Table in X, Y and Z direction an make sure it runs smoothly and without any dissonance.
- ☐ 9. Move the Table top in longitudinal direction and check that the mechanical end stops are not loose.

#### 12.1.1.4 Wallstand

- ☐ 10. Move the Wallstand up and down in Z direction and make sure it runs smoothly and sounds OK.

### 12.1.2 Remark

| No. | Remark | Action | Int Note |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

## 12.2 Annual Checks

Refer to Service and Installation Manual.

Canon

CANON MEDICAL SYSTEMS USA, INC.