PHILIPS

Instructions for Use

English

4523 001 03571

Philips Azurion

Release 3.0

Contents

1 Introduction

Welcome to the Azurion Instructions for Use. Before using the system, read these Instructions for Use, especially the information contained in the Safety section.

1.1 About These Instructions for Use

These Instructions for Use are intended to assist you in the safe and effective operation of the system.

Important safety information is provided in the following ways:

WARNING
A warning alerts you to a potential serious outcome, adverse event, or safety hazard. Failure to observe a warning may result in death or serious injury to the operator or patient.

CAUTION
A caution alerts you when special care is necessary for the safe and effective use of the system. Failure to observe a caution may result in moderate personal injury or damage to the equipment, and presents a remote risk of more serious injury or environmental pollution.

NOTE
Notes highlight unusual points as an aid to the operator.

An electronic version of these instructions for use is available to view within the system. A set of printed Emergency Instruction Cards is also provided.

These Instructions for Use may describe some products or features that are not available in all countries. Please contact your local sales representative for the availability of products and features in your region.

1.2 Electronic Instructions for Use

These Instructions for Use are available to view on the screen while you are using the system.

- To open the Electronic Instructions for Use, do one of the following:
  - On the **Help** menu in the review window, click **Help**.
  - In the control room, select the review window and then press F1 on the keyboard.

- To move the window containing the electronic Instructions for Use, drag the header bar to the desired location on the screen.
- To browse topic headings, use the table of contents in the left pane of the viewing window.
- To expand and close topic headings, click the arrow next to the heading. If a heading does not have an arrow next to it, it cannot be expanded further.
- To go directly to a topic, click the corresponding heading in the table of contents. The topic is displayed in the right pane of the viewing window.
- To move backward or forward through your browsing history, click **Back** or **Forward**.
- To close the electronic Instructions for Use, click **Close**.

Searching the Electronic Instructions for Use
You can search the electronic Instructions for Use using keywords to help you find topics of interest.

1 Click inside the search box and enter the keywords for your search query.

2 Click **Search** or press Enter to display the search results in the search window.

3 To view a topic, click it in the search results.

1.3 Intended Use of the System

CAUTION
In the United States, Federal law restricts this device to sale, distribution, and use by, or on the order of, a physician.

Product Description
The Azurion series consists of a number of monoplane and biplane systems with different detector sizes (12", 15" and 20").

Indications for Use / Medical Purpose
The Azurion series (within the limits of the used operating room table) is intended for use to perform:
- Image guidance in diagnostic, interventional, and minimally invasive surgery procedures for the following clinical application areas: vascular, non-vascular, cardiovascular, and neuro procedures.
- Cardiac imaging applications including diagnostics, interventional and minimally invasive surgery procedures.

Additionally:
- The Azurion series can be used in a hybrid operating room.
- The Azurion series contains a number of features to support a flexible and patient-centric procedural workflow.

The Azurion series is intended for all human patients of all ages. Patient weight is limited to the specification of the patient table.

Intended Operator Profile
The Azurion series is intended to be used and operated by adequately trained, qualified, and authorized healthcare professionals who have an understanding of the safety information and emergency procedures as defined by local laws and regulations for radiation workers and staff.

Clinical Environment
The Azurion series is a fixed and stationary system that can be used in a clinical environment fulfilling the local laws and regulations for radiological X-ray systems in sterile and non-sterile environments.

General Safety and Effectiveness
To facilitate safe and efficacious operation of the system by a trained healthcare professional, instructions for use are provided as part of the device labeling and training is provided during system handover.

Contraindications
Avoid using the system with patients who are pregnant or who may possibly be pregnant. However, the risk may be outweighed by the benefit of diagnosing or treating a serious condition. It is the responsibility of the personnel operating the system to make the decision. Avoid using the system in case of existing radiation injury (operator or patient).

Operating Principle
The system uses X-ray generation, detection and image processing for medical imaging, and additionally displays images from other sources (for example ultrasound). The control mechanisms are input devices and controls for, for example, geometry and table movements. The system provides feedback by audible and visual means.

1.4 Compatibility

Third-party components or systems can be connected to the Azurion system if they meet one of the following conditions:
- They are connected to the public interfaces of the Azurion system. For more information, see Interfaces for Third-Party Equipment (page 234).
- They make use of the public DICOM interface of the Azurion system.
- They are declared as compatible with the Azurion system by Philips Medical Systems.

WARNING
Do not connect third-party components or systems to the Azurion system unless they meet one of the conditions stated above.

For information about declarations of compatibility, see the following website:

www.philips.com/doc_library

More information is available from Philips. See Contacting Philips (page 427).

1.5 Training

Do not attempt to operate this product without adequate training. As a minimum level of training, you should read and understand these Instructions for Use.

Application training is also available. For more information about the availability of application training, including information on the duration and frequency of training, contact Philips. See Contacting Philips (page 427).

1.6 Help and Guidance

Help and guidance are available in the user interface while you are using the system.

Help Button
The **Help** button is available in the task panel. When you click the button, a help box is displayed containing information for using associated functions.

If multiple help boxes are available, only one help box can be displayed at a time. If you open a second help box, the first box is automatically closed.

To close a help box, click **Close**.

Electronic Instructions for Use
To open the Electronic Instructions for Use, do one of the following:

- On the **Help** menu in the review window, click **Help**.
- In the control room, select the review window and then press F1 on the keyboard.

You can also download the Instructions for Use from the following website:

www.philips.com/doc_library

Task Guidance
Guidance for performing tasks may sometimes be displayed as instructions on the screen.

Tooltips
Pause the pointer over a button to display a tooltip that provides information about the function.

2 Safety

Philips Medical Systems products are designed to meet stringent safety standards. All medical electrical equipment requires proper installation, operation, and maintenance to ensure personal safety and correct operation.

WARNING
Do not use the system if you suspect that any part of the equipment is defective. Operation of the system in a defective state could lead to fatal or serious injury. It could also lead to clinical misdiagnosis or clinical mistreatment.

For information about verifying the functionality of the system, see User Verification Test (page 299). If you suspect that any part of the equipment is defective, contact technical support.

WARNING
Never attempt to remove, modify, override or frustrate any safety device on the system. Interfering with safety devices could lead to fatal or other serious personal injury.

Only qualified and authorized personnel may operate, repair, or maintain this equipment. "Qualified" means those legally permitted to operate this type of medical electrical equipment in the jurisdictions in which the equipment is being used, and "authorized" means those authorized by the owner of the equipment.

Personnel operating the equipment and personnel in the examination room must observe all laws and regulations that apply to the operation of this equipment. If in doubt, do not use it.

Wireless Foot Switch (Option)

CAUTION
The wired foot switch must always remain connected to your X-ray system and be available for clinical use when using the wireless foot switch. If image acquisition cannot be started using the wireless foot switch, you can continue the procedure with the wired foot switch.

Product Symbols
For information about the symbols that are used with this product, refer to the Technical Information section or to the following website:

www.symbols.philips.com

2.1 Emergency Procedures

You should read and understand the emergency procedures in this section before using the system.

NOTE
In a hospital environment, an emergency power-off switch may be installed to interrupt the mains power supply to the system. For more information, contact technical support.

2.1.1 Clinical Emergency

In the event of a clinical emergency, use this procedure to reset the system to its default position and provide all-round access to the patient.

►0◄ **1** Press and hold the **Reset Geo** button on the control module in the examination room.

2 Move the stand or tabletop to provide access to the patient.

2.1.2 Cardiopulmonary Resuscitation

In the event of a clinical emergency involving a patient requiring cardiopulmonary resuscitation (CPR), directly start the CPR procedure.

CPR is possible in any tabletop position. However, to make CPR easier to perform, follow this procedure.

NOTE
If a TruSystem OR table is in use, refer to the Emergency Instructions Card supplied with the system for details of how to position the TruSystem table for CPR.

1 Move the detector away from the patient.

2 Ensure that there is all-round access to the patient.

If applicable, pivot the table to improve access. For more information, see Pivoting the Table (Option) (page 89).

3 Move the patient above the table base to reduce the effect of flexing of the tabletop.

4 Adjust the tabletop height to an appropriate height.

5 Perform CPR.

2.1.3 Emergency Stop

To stop all system movements during an emergency in the examination room, press the emergency **STOP** button.

The emergency **STOP** button is located on the control module.

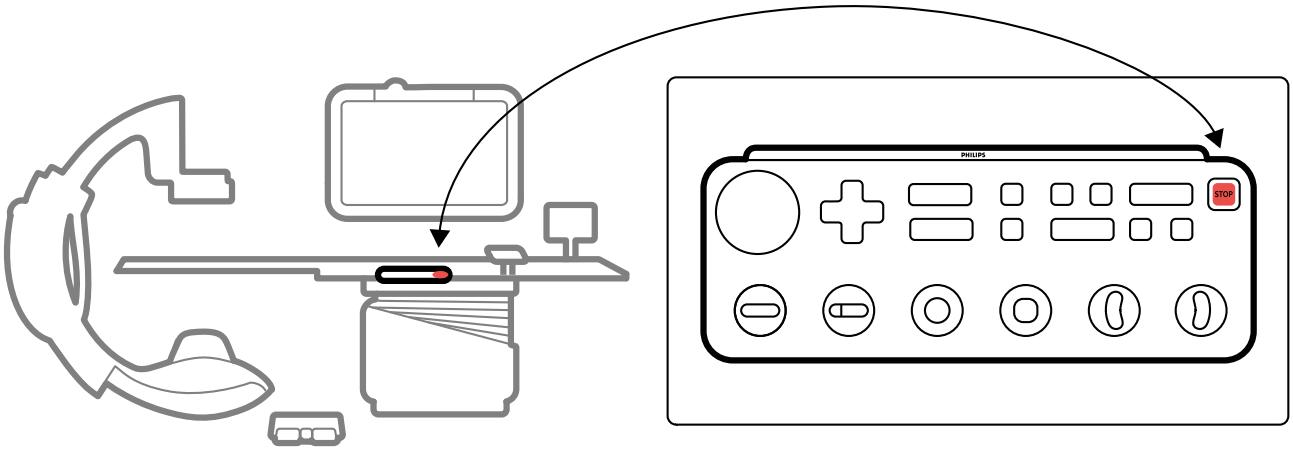


Figure 1 Emergency Stop button

1 Press **STOP** on the control module.

All motorized movements are stopped. You can manually rotate the stand and push the monitor ceiling suspension.

Floating the tabletop after an emergency stop action depends on the following conditions:
- If the tilt option is not installed, you can float the tabletop transversely and longitudinally.
- If the VA brake option is installed, it is not possible to float the tabletop.
- If the tilt option is installed, and the VA brake option is not installed, you can float the table transversely but not longitudinally.

2 To reset the system and restart it, press and hold the **Power On** button for approximately two seconds.

For more information, see Restarting the System (page 57).

2.2 Reporting a Serious Incident

If a serious incident occurs in relation to the device, it should be reported to Philips and the competent authority of the country where you are located.

A serious incident means any incident that directly or indirectly led to, might have led to, or in case of recurrence, could lead to, any of the following:

- The death of a patient, user, or other person.
- The serious deterioration of the state of health (temporary or permanent) of a patient, user, fetus, or other person.
- A serious public health threat.

For contact details, see Contacting Philips (page 427).

2.3 Electrical Safety

Follow the electrical safety guidelines in this section. Failure to do so could cause serious or fatal injury to the patient, and could damage the equipment.

The room where the system is used must comply with all applicable laws and regulations, or regulations concerning electrical safety for this type of equipment. The combination of the system and the connected equipment must comply with the requirements for medical electrical systems as specified in the IEC 60601-1 standard.

Voltages
Dangerous electrical voltages are present within the system. Covers or cables should only be removed by qualified and authorized service personnel.

WARNING
Connector contact pins may carry low voltages that are safe to touch, but that may be harmful to the patient. Do not touch the connector contact pins while simultaneously touching the patient. Connector contact pins are located on the following equipment:
- ***Patient table***
- ***Monitor ceiling suspension***
- ***Wall connection boxes***

For more information about this equipment, see Patient Table (page 34) and Wall Connection Box (Option) (page 236).

Electrical Grounding (Earth)
You can only connect medical equipment to the system if that equipment is compatible (see Compatibility (page 18)) and is galvanically isolated from the system. For medical equipment interfacing using Ethernet, video, or USB, galvanic isolation is ensured by using a wall connection box. For more information, contact technical support.

Protection Against Patient Leakage Current
An equipotential ground connection point is provided at the base of the patient table. If an operating table is installed, the ground connection point is located on the surgery wall connection box. For more information, contact technical support.

Wall Connection Boxes

CAUTION
Each wall connection box is limited to a single device. Check the accompanying documentation of a device before connecting it to a wall connection box.

For more information about this equipment, see Wall Connection Box (Option) (page 236).

Cables
Do not use multiple socket outlets or extension cables for installing or connecting any part of the system. Such cables can compromise the electrical safety of the system, especially for equipment in the examination room near the patient.

Cleaning
Do not use cleaning agents or damp cloths on connector contact pins. For more information, see Cleaning and Disinfecting (page 289).

2.4 Mechanical Safety

This section provides information about how to avoid collisions when using the system.

Stand and Table

WARNING
During manual and motorized movements of the stand or the table, the operator is responsible for the safety of patient, staff, and equipment. Avoid collisions to prevent serious injury to patient and staff, or damage to the equipment.

Collisions may occur in the following situations:
- With the stand in any position, the tabletop may hit the stand during the longitudinal, transverse, and height movements of the tabletop. Collisions may also occur during tilt movements, if applicable.
- With the stand at the head end of the tabletop, the stand may hit the tabletop during angulation or rotation movements.

The system is installed with safety devices to help you avoid collisions during motorized movements:
- Mechanical devices, such as slip clutches and motor current thresholds, are installed to limit harm or damage during a collision.
- Movement controls need to be continuously activated by the operator to start and continue a motorized movement. Releasing the control stops the movement. (The exception to this is if the alternating **Float Tabletop** mode is configured on your system. In this case, pressing and releasing the pan handle alternately releases and activates the tabletop brake.)
- The BodyGuard function senses distances between the stand and other objects and slows the movement speed when an object is detected within a certain distance of a sensor. The BodyGuard function does not prevent all collisions, but if a collision occurs, the collision force will be lower because of the reduced movement speed.
- Intelligent Collision Prevention (iCP) prevents collisions between the tabletop, the X-ray tube, and the stand. In a biplane system, iCP also prevents collisions between the frontal stand and the lateral stand.
- Collision switches on the lateral stand can detect a collision and stop motorized movements.

Monitor Ceiling Suspension
Use caution when moving the monitor ceiling suspension. Take care not to trap the patient between the monitor ceiling suspension and the table.

2.5 Explosion Safety

Using the system in an environment for which it was not designed can cause fire or explosion.

Do not use the system in the presence of explosive gases or vapors, such as certain anaesthetic gases.

Do not use flammable or potentially explosive disinfectant sprays. For more information, see Cleaning and Disinfecting (page 289).

2.6 Fire Safety

Fire regulations for the type of medical environment being used should be fully observed, applied, and enforced. Using the system in an environment for which it was not designed can cause fire or explosion.

Fire extinguishers should be available for both electrical and non-electrical fires. Only use fire extinguishers on electrical or chemical fires that are specifically labeled for those purposes. Using water or other liquids on an electrical fire can cause fatal or serious personal injury.

If it is safe to do so, switch off the system before attempting to fight a fire. This reduces the risk of electric shocks.

2.7 Electromagnetic Compatibility

Medical electrical products require special precautions regarding electromagnetic compatibility, and should be installed and put into service according to information provided in the accompanying documents.

The Azurion medical electrical system, further referred to as the system in this section, is intended for use in a professional healthcare environment. Operation in any other environment may compromise electromagnetic compatibility. The system should not be directly connected to the public low-voltage power supply network.

WARNING
The use of accessories, transducers, and cables other than those specified for this equipment may result in increased electromagnetic emissions or decreased electromagnetic immunity and result in improper operation.

WARNING
The equipment should not be used adjacent to, or stacked with, other equipment. If adjacent or stacked use is necessary, the responsible organization must verify that all equipment operates normally in the configuration in which it will be used.

WARNING
Do not acquire X-ray images while actively using electrosurgical devices (for example, electrosurgical knives), or cardiac defibrillators. The electromagnetic interference generated by these devices may reduce image quality, resulting in additional exposure series being required.

WARNING
Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 in) to any part of the equipment and cables of the system. Otherwise, degradation of the performance of the equipment could result.

The system complies with relevant international and national laws and standards on electromagnetic compatibility for this type of product when it is installed and used as intended. These laws and standards define both the permissible electromagnetic emission levels from the system and its required immunity to electromagnetic interference from external sources.

Other electronic products that exceed the limits defined in these standards could, in unusual circumstances, affect the operation of the system. Note the following:

- Radio services operating in frequency bands and disturbance characteristics that are not covered by CISPR11 may be disturbed. If safety critical radio services are used in or near the facility where the system is used, the responsible organization should evaluate the risks associated with radio disturbance.
- Mobile devices can affect medical electrical equipment. Use caution when using such devices within the specified range of medical electrical devices.

If intermittent degradation or failure of functions, including wireless functions, is experienced, consult your local technical staff who can interpret the detailed information provided in the section Electromagnetic Compatibility (technical information) (page 398). If interference is determined, contact technical support.

2.8 Radiation Safety

Patient Safety

WARNING
The system is intended for procedures in which air kerma levels can be high enough during normal use to constitute a risk of deterministic effects. To manage these risks, follow the radiation guidelines in this section.

These Instructions for Use provide information about measures to reduce the risk of deterministic effects, for the intended use of the system. In general, you should work in accordance with the ALARA (As Low As Reasonably Achievable) radiation safety principles:

- Minimize radiation time.
- Maintain distance from the source.
- Provide shielding.

More specifically, take the measures described in the following sections to minimize the deterministic effects of X-ray radiation on the patient.

- Never radiate unless absolutely necessary and only radiate for as short a time as possible.
- Select an appropriate X-ray protocol for the current procedure:
  - For exposure, select an X-ray protocol with the lowest possible framespeed.
  - For exposure, select an X-ray protocol with the lowest possible dose level.
  - For fluoroscopy, select the fluoroscopy flavor with the lowest dose level.
  - For vascular procedures, make appropriate use of the multiphase speeds and do not use higher frame rates than are necessary.
  - For user-selected X-ray protocols, allow optimized operation for indicated clinical protocols.
- Immobilize the patient to prevent the need to reacquire images due to patient movement.
- Select the appropriate patient type.
- Select the appropriate field size for the current procedure (per X-ray plane).
- Use the radiation disable switch at all times to prevent accidental exposure to radiation (except when the radiation procedure is in progress).
- Shield sensitive organs when they are exposed to the beam or are in proximity to it.
- Use caution if the patient has acute skin burns or acute hair loss.
- Minimize the duration of radiation in fluoroscopy and exposure acquisition. Modifying settings like collimation, can also be performed while the last image hold image is displayed.
- Collimate as much as possible and position the detector as close as possible to the object.
- Keep the patient as far as possible from the X-ray source, using the table height setting.
- Keep the focal spot to skin distance as large as possible.
- Use different X-ray beam projections, to spread radiation over the skin.
- Avoid oblique projections, in order to reduce the depth of tissue irradiated.
- Consider using fluoroscopy instead of exposure acquisition.
- Clear the primary beam of unnecessary objects. They may cause adverse effects such as unnecessary patient dose and misinterpretation of images.
- Release and depress the hand switch or foot switch again when the requested X-ray does not start or stop automatically.
- Position the patient and the system as accurately as possible without using radiation.
- Continuous X-ray exposure for patients with implanted medical devices such as pacemakers or defibrillators could cause a malfunction. Avoid placing the device directly in the beam and minimize X-ray exposure time.
- Check the patient for pregnancy before X-ray exposure.

Staff Safety

- Make full use of the system's radiation protection features, devices, accessories, and procedures that are available to you as the operator. For more information, see Using Radiation Shields (page 97).
- Always wear a lead apron and use badges to monitor the radiation received.
- Wear thyroid and eye protection devices.
- Stay as far away from the radiated object as possible.
- Use caution if any member of staff has a chronic radiation injury.
- Remove all unnecessary obscuring objects from the primary beam (including the operator's hands).
- Keep the X-ray source under the table.
- Do not attempt to remove, modify, override, or frustrate any safety device on the equipment.

NOTE

When door contacts should give a warning for radiation using the room warning light, the configuration of the door contacts should be implemented by the user.

More Information

The following table summarizes the effects of the most significant measures on skin dose rate, air kerma rate, dose area product, and staff dose.

Measure	Effect on skin dose rate	Effect on Ref.AK-rate	Effect on DAP-rate	Effect on staff dose
Selecting the appropriate X-ray protocol dose level	+	+	+	+
Reducing framespeed (by X-ray protocol/ multiphase)	+	+	+	+
Selecting the largest field size	+	+	-	-
Limiting the duration of fluoroscopy/ exposure	+	+	+	+
Applying proper collimation and wedges	0	0	+	+
Increasing the distance from the patient to the X-ray source (at a constant SID)	+	0	0	0
Minimizing the SID at a constant table height	+	+	0	0
Using different X-ray beam projections	+	0	0	0
Avoiding oblique projections	+	+	+	+
+ = positive effect (less dose), **-** = negative effect (more dose), **0** = no significant effect				

Patient thickness also influences the deterministic effects of X-ray radiation.

For more information about improving radiation safety during procedures, see the following sections:
- System Settings Influencing the Radiation Dose (page 334)
- Protection Against Stray Radiation (page 388)
- Additional Filtering (page 393)

You are strongly urged to read the current recommendations of the International Commission on Radiological Protection, and in the United States, with those of the US National Council for Radiological Protection.
- ICRP, Pergamon Press, Oxford, New York, Beijing, Frankfurt, São Paulo, Sydney, Tokyo, Toronto.
- NCRP, Suite 800, 7910 Woodmont Avenue, Bethesda, Maryland 20814, USA.

2.8.1 Pediatric Radiation Guidelines

When performing pediatric radiation, you should follow these guidelines:
- Follow the guidelines provided in Radiation Safety (page 24).
- Do not radiate when it is not necessary. Use a non-ionizing radiation modality whenever possible (for example, ultrasound).
- Remove any objects in the beam that are not radiolucent or that are not necessary to perform the procedure (for example, mattresses, pillows, tubes).
- Select the correct patient type and the correct examination protocol for the anatomy.
- Select the lowest fluoroscopy flavor with the lowest dose.
- Position the detector as close as possible to the patient.
- Use electronic zoom instead of detector zoom.
- Use collimation as much as possible to protect areas outside the region of interest. Exclude eyes, thyroid, breast, and gonads when possible. When possible, perform collimation on the Last Image Hold image. Use semi-permeable wedges.
- Consider using **Fluoro Store** as an alternative to acquisition.
- Radiate for the shortest time possible, use the Last Image Hold image to review the anatomy rather than live fluoroscopy.
- Consider using the diagnostic reference level (DRL) for pediatric radiology.
- Use a protective apron to protect the child's genitals during X-ray exposure.
- Use proper collimation for pediatric patients to avoid unnecessary X-ray exposure.
- The child's guardian should accompany the child to avoid unnecessary re-examination due to patient movement during the examination.

Before you use the equipment for pediatric cases, Philips recommends reviewing generally available resources on pediatric imaging, such as the following:

- The U.S. Food and Drug Administration

  www.fda.gov/radiation-emitting-products/medical-imaging/pediatric-x-ray-imaging
- The Alliance for Radiation Safety in Pediatric Imaging

  www.imagegently.org
- The Society for Pediatric Radiology

  www.pedrad.org

2.9 Hazardous Substances

Parts of the system may contain hazardous substances that must be disposed of in accordance with local, state, or federal laws.

Item	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)
Electronic modules	✕	O	O
Flat screens	✕	O	O
Detector	✕	O	O
Radiation shielding	✕	O	O
Collimator	✕	O	O
Grid	✕	O	O
X-ray tube assembly	✕	O	O
Electromechanical parts	✕	O	O

O : Indicates that this substance, as contained in all materials for this part, is below the limit required in GB/T 26572.

✕ : Indicates that this substance, as contained in at least one of the materials used for this part, is above the limit required in GB/T 26572.

Item	Hexavalent Chromium (Cr6+)	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Electronic modules	O	O	O
Flat screens	O	O	O
Detector	O	O	O
Radiation shielding	O	O	O
Collimator	O	O	O
Grid	O	O	O
X-ray tube assembly	O	O	O
Electromechanical parts	O	O	O

O : Indicates that this substance, as contained in all materials for this part, is below the limit required in GB/T 26572.

✕ : Indicates that this substance, as contained in at least one of the materials used for this part, is above the limit required in GB/T 26572.

WARNING

California's Proposition 65 requires Philips Medical Systems to provide reasonable safety warning Information when a released substance is above safe harbor levels. The internal components of this product may contain substances that, when exposed, are known to the State of California to cause cancer or reproductive harm. Based on the risk assessment performed by Philips, there is no risk or low risk to patient or hospital staff. Service personnel may be exposed to internal components while servicing the equipment. For information about risks to service personnel, refer to the service documentation.

For more information on California's Proposition 65, see the following websites:
- www.philips.com/about/sustainability
- www.p65warnings.ca.gov

REACH Declaration
REACH requires that Philips Medical Systems provides chemical content information for Substances of Very High Concern (SVHC) if they are present above 0.1% of the product weight. Components within electric and electronic equipment may contain phthalates above the threshold. The SVHC list is updated on a regular basis. For the most up-to-date list of products containing SVHC above the threshold, refer to the following Philips website:

www.philips.com/reach

Perchlorate Materials
In this product, perchlorate material is present in lithium coin cells and batteries. Special handling may apply for these materials. For more information, refer to the following website:

www.dtsc.ca.gov/hazardouswaste/perchlorate

3 About the System

The system is available in the following configurations.

Monoplane Systems
- Azurion M12: A ceiling or floor-mounted monoplane system with a 12-in detector.
- Azurion M15: A floor-mounted monoplane system with a 15-in detector.
- Azurion M20: A ceiling or floor-mounted monoplane system with a 20-in detector.
- Azurion M20 OR: A ceiling-mounted monoplane system with a 20-in detector and an interface for an OR table.

Biplane Systems
All biplane systems have a floor-mounted frontal stand and a ceiling-mounted lateral stand:
- Azurion B12/12: A biplane system with a 12-in detector on the frontal stand and a 12-in detector on the lateral stand.
- Azurion B20/12: A biplane system with a 20-in detector on the frontal stand and a 12-in detector on the lateral stand.
- Azurion B20/15: A biplane system with a 20-in detector on the frontal stand and a 15-in detector on the lateral stand.
- Azurion B12/12 OR: A biplane system with a 12-in detector on the frontal stand and a 12-in detector on the lateral stand, and an interface for an OR table.
- Azurion B20/12 OR: A biplane system with a 20-in detector on the frontal stand and a 12-in detector on the lateral stand, and an interface for an OR table.
- Azurion B20/15 OR: A biplane system with a 20-in detector on the frontal stand and a 15-in detector on the lateral stand, and an interface for an OR table.

Video Infrastructure
Azurion systems initially shipped as release 1.x or 2.x systems have a DVI-based video infrastructure. Azurion systems initially shipped as release 3.x systems have an IP-based video infrastructure. In these Instructions for Use, differences in functionality that are related to the type of video infrastructure are indicated accordingly.

3.1 Equipment in the Examination Room

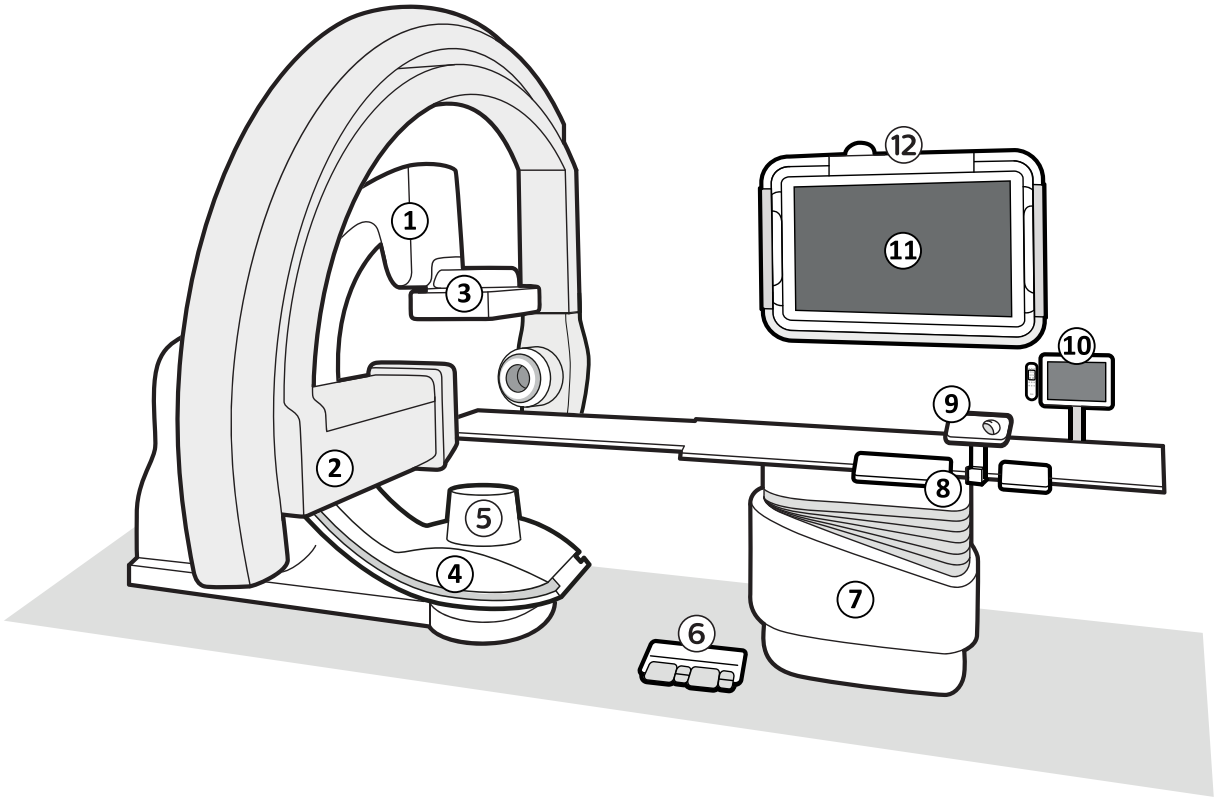


Figure 2 General system components in the examination room

Legend			
1	Frontal stand (for monoplane systems, the stand may be floor or ceiling-mounted)	7	Patient table
2	Lateral stand (biplane systems only)	8	Control module
3	Detector	9	Mouse and mouse table (option)
4	X-ray tube	10	Touch screen module and viewpad holder
5	Collimator	11	Monitors
6	Foot switch	12	Monitor ceiling suspension

The maximum temperature of the detector enclosure and the tube enclosure can be up to 43 degrees in the extreme condition that the room temperature exceeds 30 degrees. For safe use, ensure that the patient does not make contact with these parts for a prolonged time.

3.1.1 Stand

The stand allows you to position the detector and X-ray tube in relation to the patient table using the control module.

Monoplane Stand

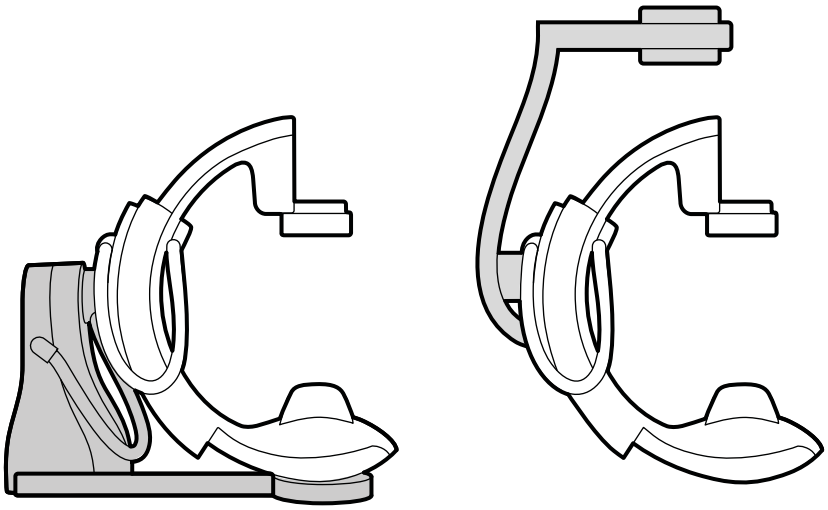


Figure 3 The monoplane stand may be floor-mounted (left) or ceiling-mounted (right)

Biplane Stands

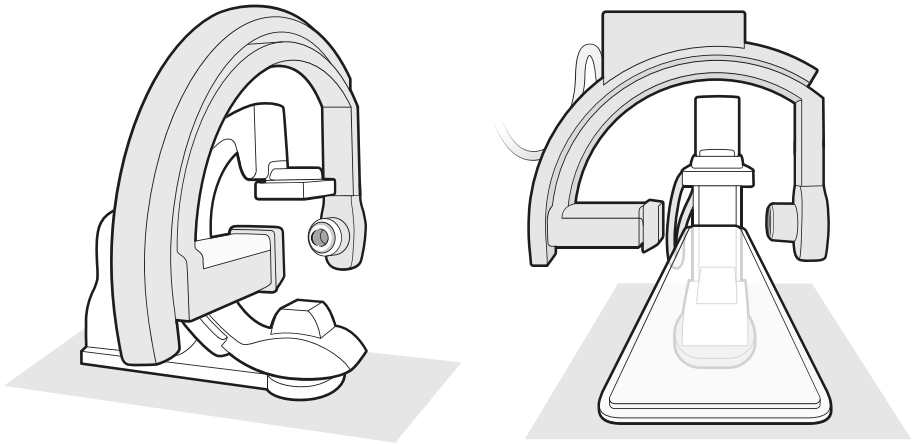


Figure 4 Two views of the frontal stand and lateral stand of a neuro biplane system

3.1.2 FlexArm Stand (Option)

The FlexArm stand is a ceiling-mounted monoplane stand with a 20-in detector.

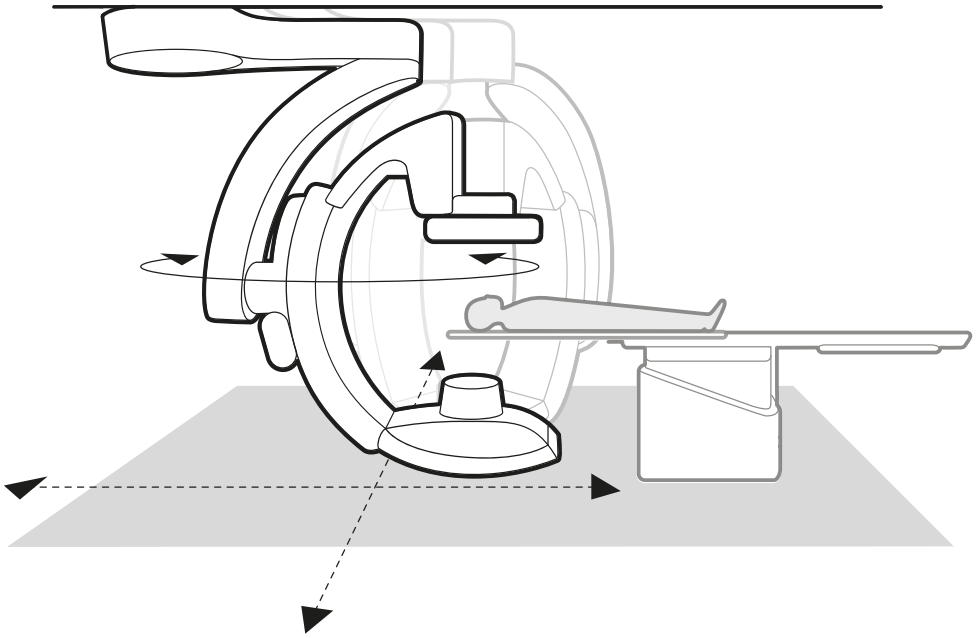


Figure 5 FlexArm stand (option)

The FlexArm stand allows you to perform the following actions:

- Move the stand longitudinally and transversely, enabling off-center imaging without moving the patient table (for radial access, for example).
- Park the stand in a standby position and move it into the working position when needed during the procedure without interfering with staff or third-party equipment, such as anesthesia equipment.

NOTE
The FlexArm stand provides full body coverage using stand movements. Therefore, the swivel option is not available for the patient table when using a FlexArm system.

For more information about positioning the FlexArm stand, see Positioning the FlexArm Stand (Option) (page 78).

If desired, stand movements to unwanted positions can be blocked by service configuration. For more information, contact technical support.

Off-Center Imaging
Transverse movements allow you to image a region of interest that is outside the table, for example, the patient's arm.

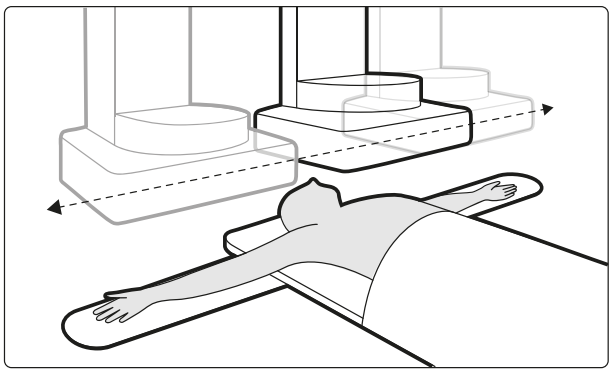


Figure 6 Off-center imaging

3.1.3 FlexMove (Option)

FlexMove allows you to park the stand in a stand-by position and then move it into position when needed during the procedure.

If the FlexMove option is installed, the stand moves longitudinally and transversely on ceiling-mounted rails. For more information, see Positioning the Stand with the FlexMove Option (page 81).

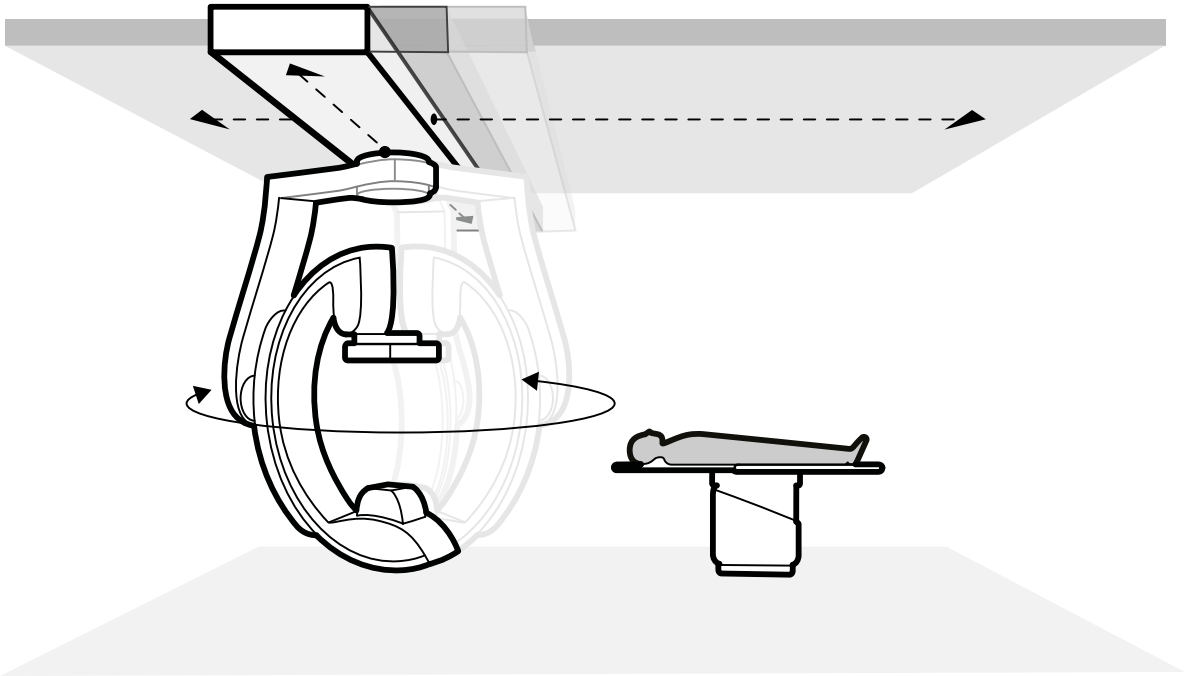


Figure 7 FlexMove option

3.1.4 Optical Imaging System (Option)

If installed, this option will not be enabled until the relevant application becomes available.

The Optical Imaging System will provide intra-operative image guidance and consists of video cameras positioned around the detector. The video stream of each camera will be used by specific Philips applications.

If the Optical Imaging System hardware is installed, ensure that the windows on the BodyGuard are clean and use a sterile cover with window inserts at the location of the camera.

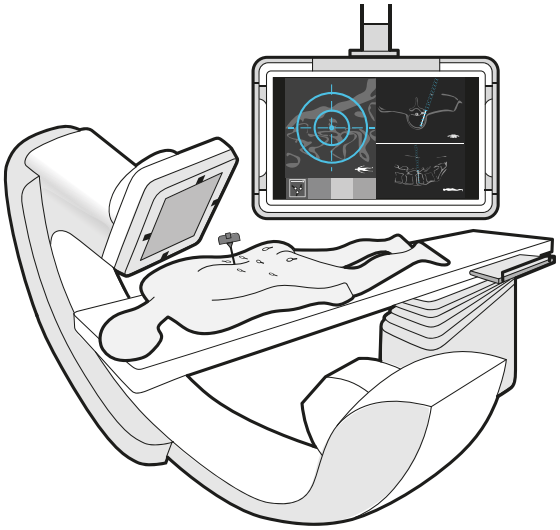


Figure 8 Optical Imaging System (option)

3.1.5 Patient Table

The patient table allows you to position the patient in several different ways to suit the procedure that you are performing.

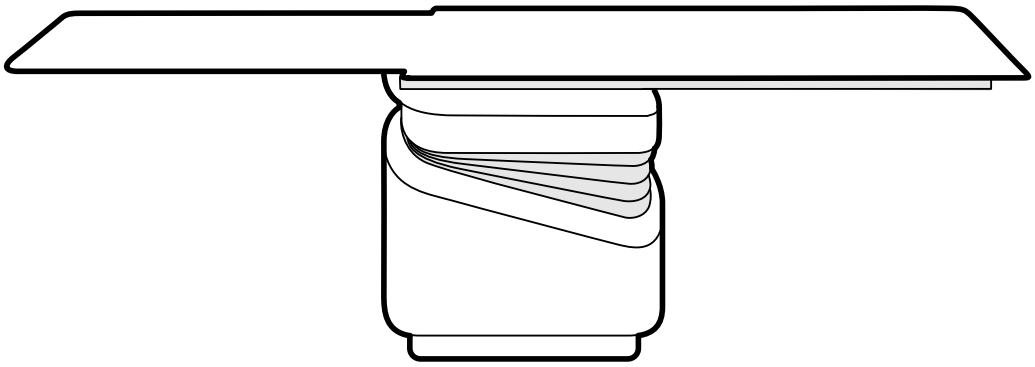


Figure 9 Patient table

Available movements depend on the type of table and the configured options:
- Manual or motorized tabletop float for longitudinal and transverse movements
- Height adjustment
- Tilt (when the table is tilted, longitudinal float movements are motorized, while transverse movements can still be performed manually)
- Cradle
- Pivot (option)
- Swivel (option)

Table movements are controlled using the control module. Some of these functions may not be available on your system. For more information, see Positioning the Table (page 88).

The patient table has an accessory rail that is used to mount additional equipment such as the control module, touch screen module, and radiation shields.

The maximum permissible weight on the tabletop is 275 kg (600 lbs). This includes the weight of all accessories that are attached to the tabletop.

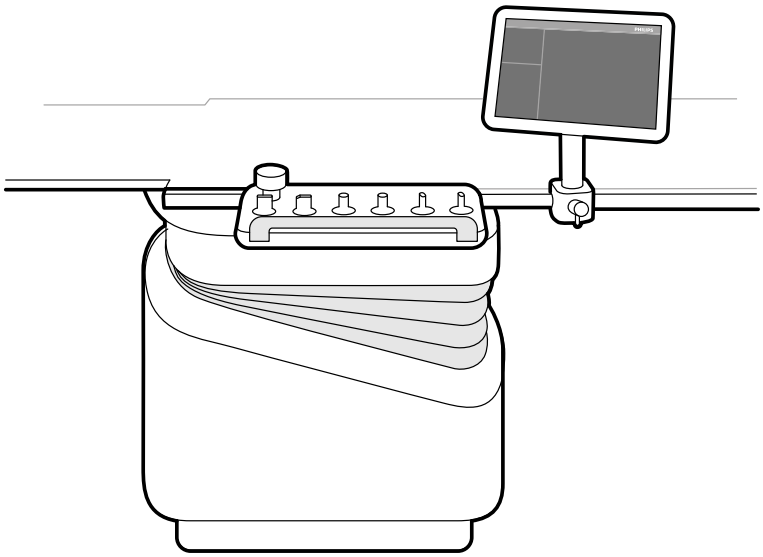


Figure 10 Control module and touch screen module on the accessory rail

Pan Handle (Option)

You can use the pan handle to release the tabletop brakes and float the tabletop.

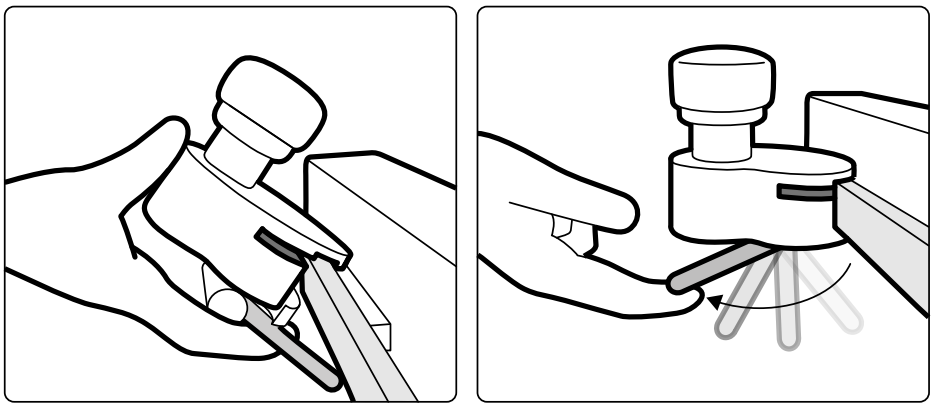


Figure 11 Pan handle

1 Clamp the pan handle to the accessory rail or to the tabletop.

2 Tighten the locking lever to secure the pan handle.

The function of the pan handle is configured by a service engineer and corresponds to the function configured for the **Float Tabletop** function on the control module:

- Alternating mode: When you press and release the pan handle, the tabletop brake is released and you can float the table. Press and release the pan handle again to activate the tabletop brake.
- Direct mode: When you press and hold the pan handle, the tabletop brake is released and you can float the table. Release the pan handle to activate the tabletop brake.

If your table has a tilt function, you can only float the tabletop longitudinally using the pan handle when the table is not tilted.

Table Interface Panel

The table interface panel is located at the rear of the table base and provides additional connectivity to the system.

The interfaces on the table interface panel provide a safe and standardized method for installing third party equipment and do not impose limitations on table movements. For more information, contact technical support.

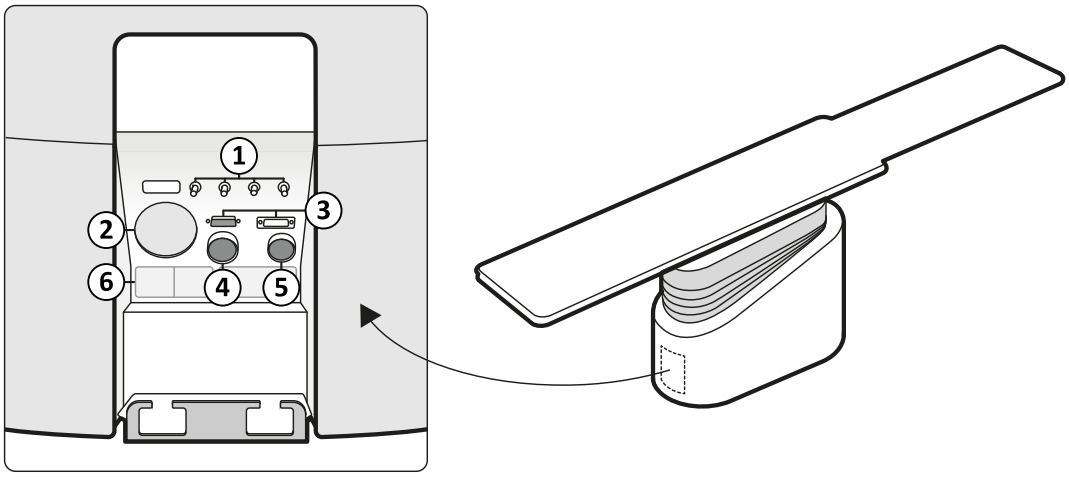


Figure 12 Table interface panel on the rear side of the table base

Connectors		
1	Potential equalization points	Functional ground connection points (x4)
2	Cable pass-through	An opening that allows third-party system cables to connect third-party devices, such as non-pedestal injectors
3	Foot switch connectors	Connectors for the foot switches
4	28-pin connector	Connector for pedestal injectors

Connectors		
5	23-pin connector	Connector for external ECG and Physio equipment
6	Secondary circuit outlet connector	230 V (50/60 Hz)

Table Base Accessory Rail
The table base accessory rail can carry equipment up to 10 kg. The maximum torque load (moment) is 30 Nm.

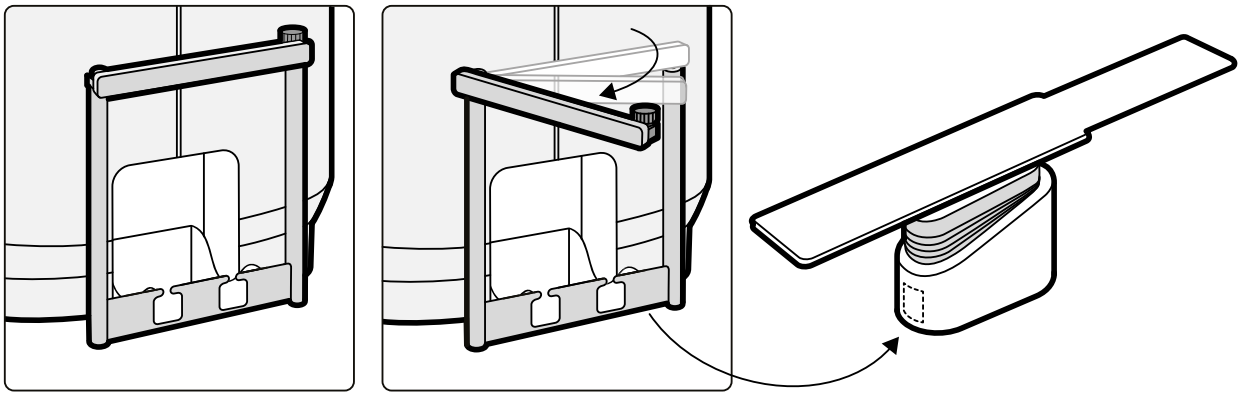


Figure 13 Table base accessory rail

3.1.6 Control Module

The control module provides the controls required to adjust the position of the table and stand, and to perform image functions during acquisition.

Multiple sets of control modules may be used with the system:
- The control module at the tableside in the examination room can be attached to the accessory rail in three positions: doctor side, nurse side, and foot end.
- An additional control module in the examination room can be mounted on a pedestal (option). The pedestal can be positioned anywhere in the examination room.
- An additional control module can be located in the control room (option).

NOTE
There are several versions of the control module, each one applicable to a specific configuration of the Azurion system. The functions that are available on the control module and the layout of controls depend on the configuration of the system and the options that are installed.

The following overview images are provided as examples only. For full information about the control modules that are available for each system configuration, see Control Modules (page 452).

Monoplane Control Module
Monoplane systems use a control module that combines geometry and imaging functions in one module. A dedicated imaging control module is additionally available as an option.

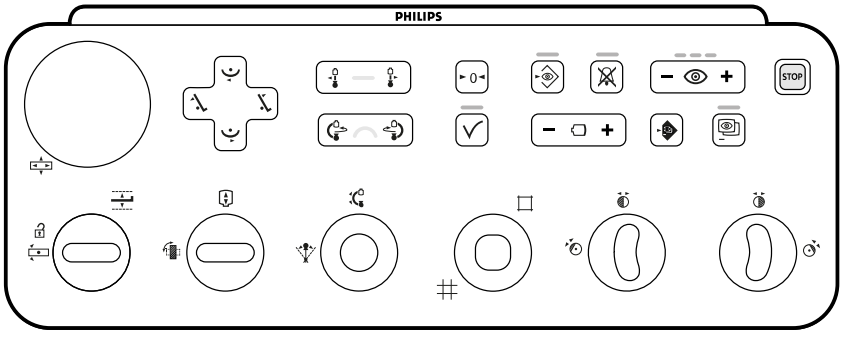


Figure 14 Monoplane control module

Biplane Control Modules
Biplane systems use a dedicated geometry control module beside a dedicated imaging control module.

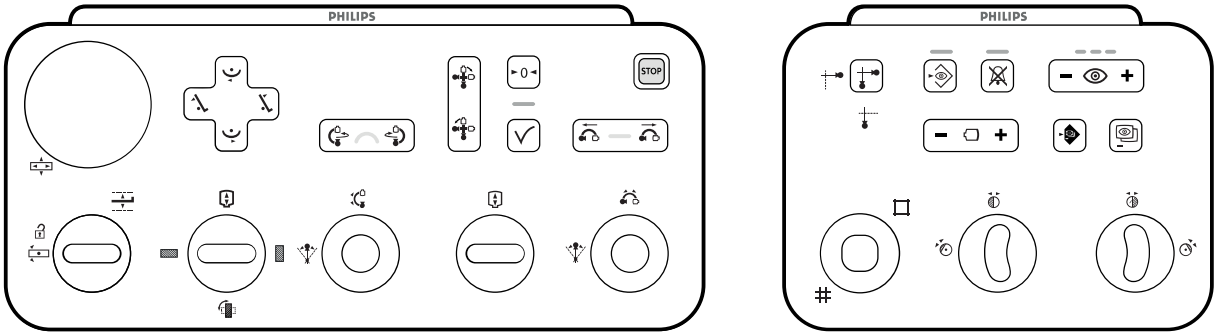


Figure 15 Biplane control modules: geometry control module (left) and imaging control module (right)

3.1.7 Touch Screen Module

The touch screen module in the examination room provides access to functions at the tableside.

The following functions are available:
- Control acquisition settings.
- Select images for review or post-processing.
- Select monitor layouts and presets.
- Access applications such as Interventional Tools, if available.

The touch screen module is mounted on a swing arm that can be positioned to provide access from the same side of the tabletop or from the opposite side.

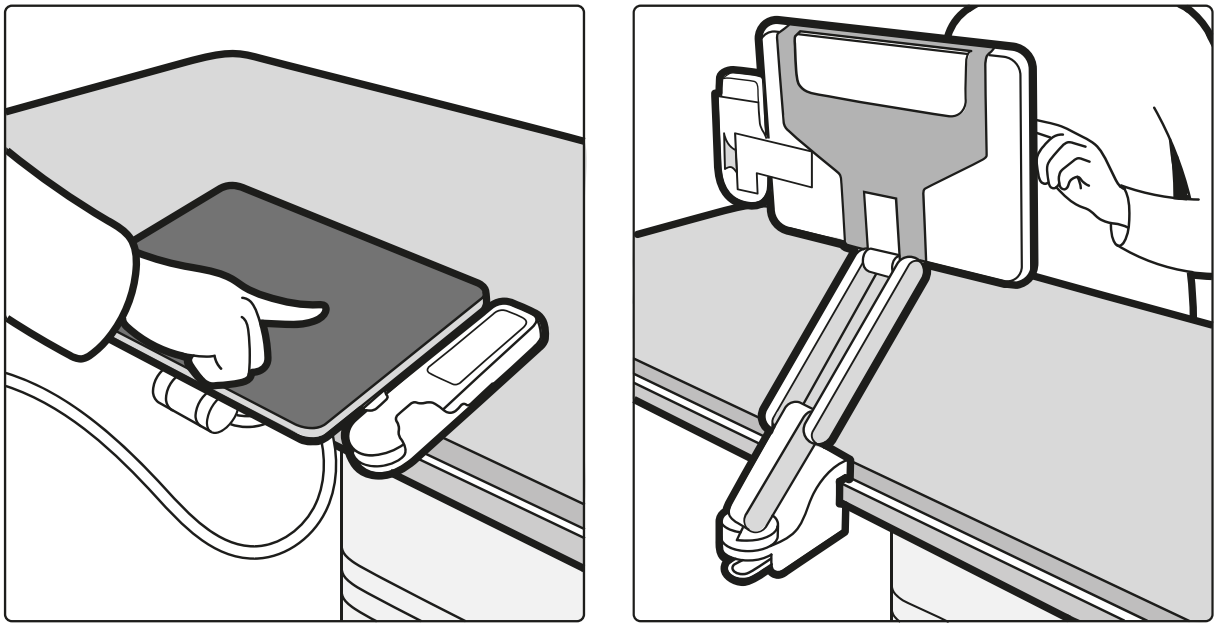


Figure 16 Touch screen module in the examination room

You can control functions for multiple applications concurrently using the touch screen module. Depending on the active procedure or the system configuration, some functions may not be available.

Up to three touch screen modules can be used with each system.
- The touch screen module at the tableside in the examination room can be attached to the accessory rail in any position: doctor side, nurse side, or foot end.
- A second touch screen module in the examination room can be mounted on a pedestal (optional). The pedestal can be positioned anywhere in the examination room.
- A third (optional) touch screen module can be located in the control room.

If you are using multiple touch screen modules, the following rules apply:

- You can use different applications on each touch screen module.
- If you use the same application on multiple touch screen modules, the modules are fully linked.

The touch screen module can be placed within the reach of the patient. The maximum temperature of the enclosure of the module can be up to 48 degrees. For safe use, ensure that the patient does not make contact with the module for more than 1 minute.

For more information about the touch screen module, see the following sections:
- Touch Screen Module (page 69)
- Touch Screen Module (page 436) (Quick Reference)

3.1.8 Monitor Configuration

For a monoplane system, there is always at least one monitor in the examination room that displays live and reference images. For a biplane system, there are always at least two monitors, and the live images for the frontal and lateral channels are always synchronized and displayed side by side. Additional monitors to display reference images can be configured at installation.

Monitors can be mounted in either of the following configurations:
- Monitor ceiling suspension. For more information, see Positioning the Monitor Ceiling Suspension (page 85).
- Monitor boom. For more information, see Positioning the Monitor Boom (page 86).

Monoplane View Layout

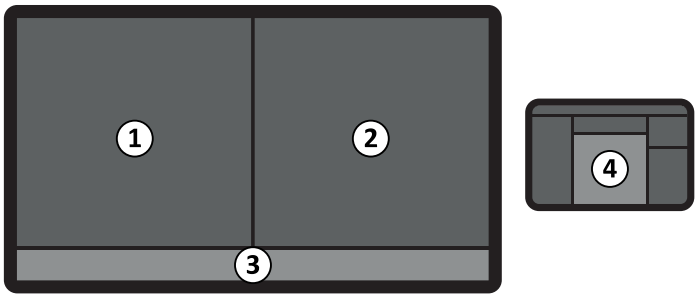


Figure 17 Layout of views for a monoplane system

Legend			
1	Live view	3	Status area
2	Reference 1 view	4	Touch screen module

Biplane View Layout

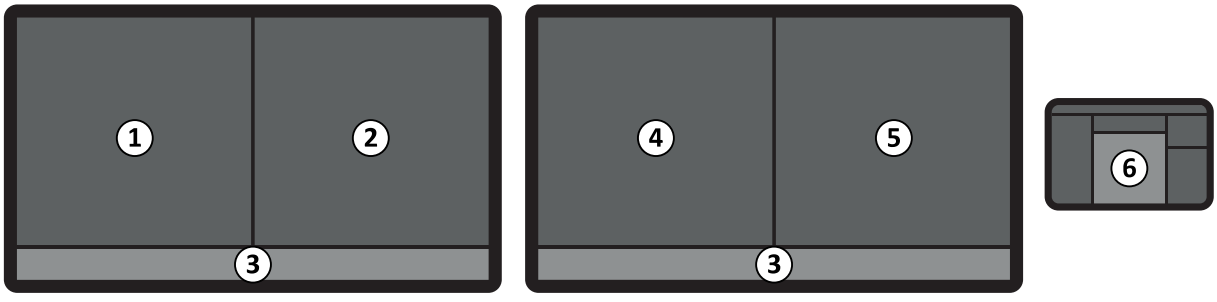


Figure 18 Layout of views for a biplane system

Legend			
1	Live view displaying frontal and lateral viewports	4	Reference 2 view
2	Reference 1 view	5	Reference 3 view displaying frontal and lateral viewports (option)
3	Status area	6	Touch screen module

3.1.9 Switchable Monitors (Option)

The switchable monitors option allows you to manage up to 16 displays in the examination room. You can display video and applications originating from the Azurion system and video sources from auxiliary systems, depending on the video infrastructure of the Azurion system:

- Azurion systems with IP-based video infrastructure can display any available application and up to 20 sources from auxiliary systems.
- Azurion systems with DVI-based video infrastructure can display any available application and up to 11 sources from auxiliary systems.

You can choose what is displayed on each monitor using the touch screen module. For more information, see Using Switchable Monitors (Option) (page 125).

3.1.10 MultiVision (Option)

The MultiVision option allows you to manage one additional monitor in the examination room. You can display video and applications originating from the Azurion system and video sources from auxiliary systems, depending on the video infrastructure of the Azurion system:

- Azurion systems with IP-based video infrastructure can display any available application and up to 20 sources from auxiliary systems.
- Azurion systems with DVI-based video infrastructure can display the Azurion review application or any one of up to 4 sources from auxiliary systems.

You can choose what is displayed on each monitor using the touch screen module. For more information, see Using MultiVision (Option) (page 126).

3.1.11 FlexVision (Option)

FlexVision is a single ultra-high-definition monitor situated in the examination room. It replaces individual monitors and allows you to display and control multiple applications on one monitor.

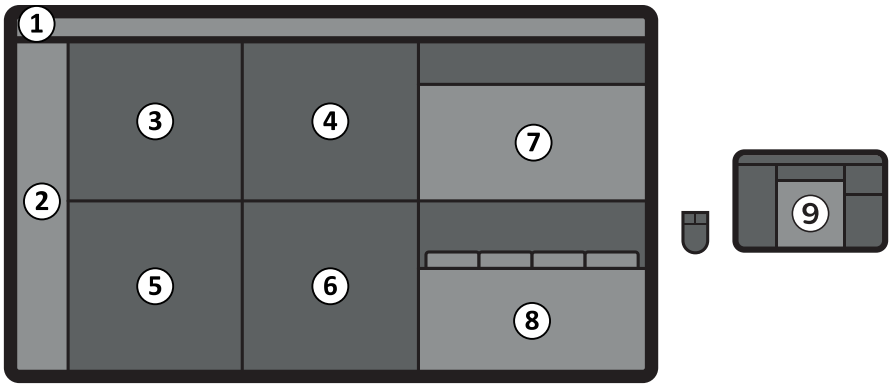


Figure 19 FlexVision (option) layout in the examination room

Legend			
1	Top bar	6	Application view
2	Status area	7	Application workstation
3	Reference 1 view	8	X-ray workstation
4	Reference 2 view	9	Touch screen module
5	Live view		

NOTE
The position of the status area may vary, depending on the selected preset.

The monitor can be mounted in either of the following configurations:

- Monitor ceiling suspension. For more information, see Positioning the Monitor Ceiling Suspension (page 85).
- Monitor boom. For more information, see Positioning the Monitor Boom (page 86).

The monitor displays available applications in windows. You can choose which application to display in each window and select different preset layouts according to your workflow. For more information, see the following sections:

- Selecting a Different Preset for FlexVision (page 123)
- Managing FlexVision Presets Using the Touch Screen Module (page 247)

NOTE
When a third-party video source has no patient identification, the hospital should have a procedure in place to assess the video feeds on the large screen without the risk of mixing up patient data.

NOTE
When third-party video sources are too bright (for example, ultrasound), you can reposition the third-party video feed on the large screen. Alternatively, the display settings (input LUT) for a third-party video source can be changed; for more information, contact technical support.

3.1.12 Foot Switch

You can control fluoroscopy and exposure using the foot switch.

NOTE
Under normal operating conditions, the maximum amount of time that irradiation can continue after the release of a foot switch pedal is 100 ms.

Monoplane Foot Switch

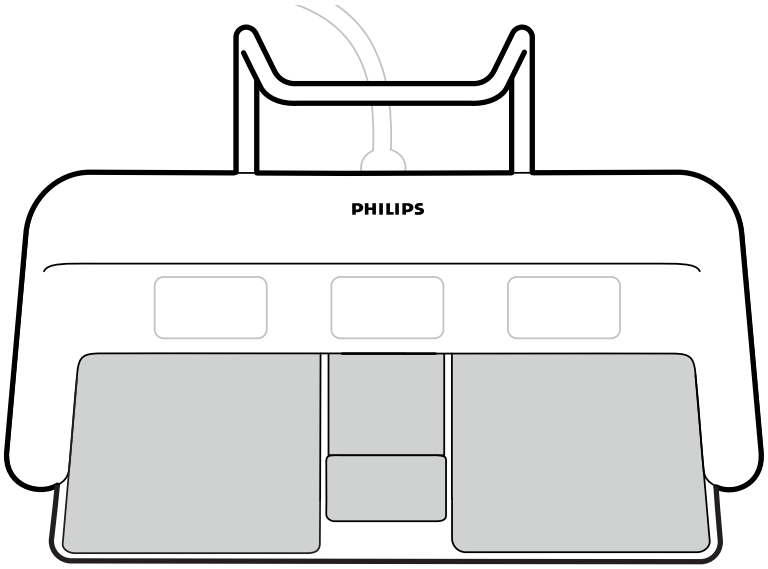


Figure 20 Monoplane foot switch

The functions that are assigned to each switch are configured when your system is installed. A label is placed next to each switch to indicate the assigned function.

The following functions are always assigned to a switch:

Mandatory Functions	
	Perform fluoroscopy
	Prepare and perform exposure

One of the following functions can be assigned to the remaining switch:

Optional Functions			
	Fluoro Store function		Switch the room light on and off
1×	Prepare and perform single-shot exposure		**Copy as photo image** function

Biplane Foot Switch

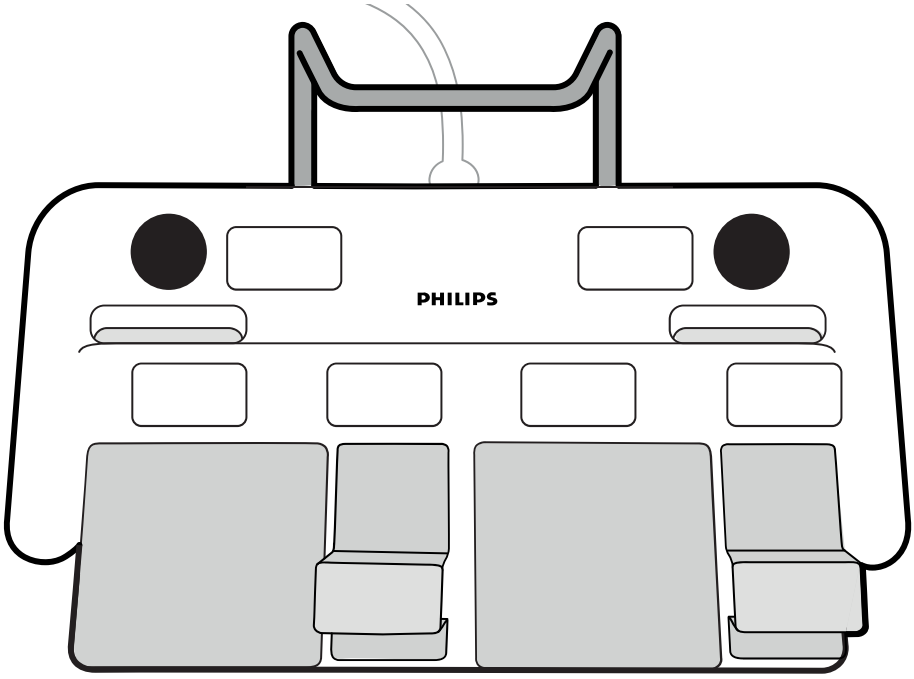


Figure 21 Biplane foot switch

The functions that are assigned to each switch are configured when your system is installed. A label is placed next to each switch to indicate the assigned function.

The following functions are always assigned to a switch:

Mandatory Functions			
	Select channel		Perform biplane fluoroscopy
	Perform fluoroscopy on the frontal channel		Prepare and perform exposure
	Perform fluoroscopy on the lateral channel		

One of the following functions can be assigned to the remaining switch:

Optional Functions			
	Fluoro Store function		Switch the room light on and off
1×	Prepare and perform single-shot exposure		**Copy as photo image** function

Additional Foot Switch

If an additional foot switch is available, it provides the same functions as the standard foot switch. X-ray can be started from either foot switch in the examination room.

Wireless Foot Switch (Option)
A wireless foot switch option is available. For more information, see Wireless Foot Switch (Option) (page 42).

3.1.13 Wireless Foot Switch (Option)

The wireless foot switch provides the same functions as the wired foot switch delivered with the X-ray system.

CAUTION
The wired foot switch must always remain connected to your X-ray system and be available for clinical use when using the wireless foot switch. If image acquisition cannot be started using the wireless foot switch, you can continue the procedure with the wired foot switch.

The wireless foot switch uses an RF transmitter and receiver and must be installed by a qualified service engineer with a Philips installation kit. Contact a Philips representative for details.

NOTE
The wireless foot switch generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. This can be determined by switching the equipment off and on. If interference is determined, contact technical support.

There is no guarantee that a particular location will be free from radio interference and the wireless foot switch may be susceptible to interference from other radio equipment. Such interference may cause sporadic interruptions to the function of the wireless foot switch. If interference is determined, contact technical support.

For technical information about the wireless foot switch as radio equipment, see Wireless Foot Switch (technical information) (page 318).

NOTE
Under normal operating conditions, the maximum amount of time that irradiation can continue after the release of a foot switch pedal is 100 ms.

When using the wireless foot switch, observe the following guidelines:
- Only use the wireless foot switch on a horizontal surface.
- Do not tilt or move the wireless foot switch during use as this may cause the wireless foot switch to switch off, causing the immediate cancellation of signals and loss of functionality.
- Ensure that the wireless foot switch is used at a maximum distance of 10 m from the receiver. The location of the receiver depends on your system configuration; it is located either inside the patient table base or in the surgery wall connection box.
- Do not use the charging cable to move, transport, or store the wireless foot switch.
- Avoid driving over the charging cable with other devices or equipment.
- Avoid pressing any of the wireless foot switch pedals or buttons while the X-ray system is starting as this may inhibit the start-up process.

Identification Labels
During installation, the wireless foot switch is paired with the X-ray system, so that the foot switch activates functions only on the matching X-ray system.

A sheet of self-adhesive identification labels is supplied with the wireless foot switch. We recommend that you use these labels to identify the foot switch and the X-ray system.

The sheet of labels provides 6 pairs of printed numbers. Attach one label to the recess in the upper-right corner of the foot switch, and then attach the matching label to a clearly visible location on the X-ray system. Blank labels are also provided, in case you want to use your own identification marks.

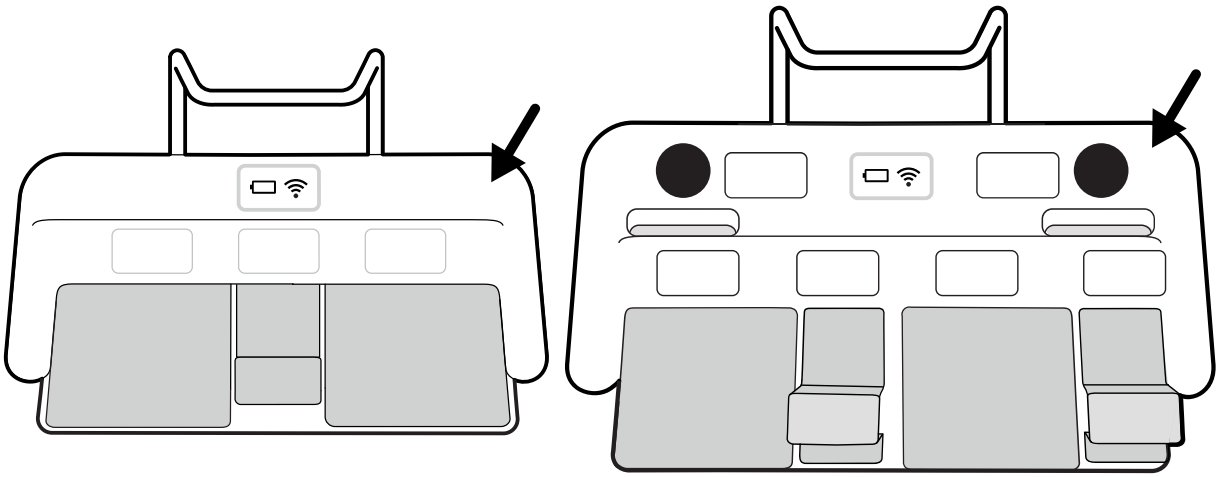


Figure 22 Location of the recess for identification labels (monoplane left, biplane right)

Monoplane Foot Switch Functions

The functions that are assigned to each switch are configured when your system is installed. A label is placed next to each switch to indicate the assigned function.

The following functions are always assigned to a switch:

Mandatory Functions	
	Perform fluoroscopy
	Prepare and perform exposure

One of the following functions can be assigned to the remaining switch. The functions that are available depend on the version of your system.

Optional Functions			
	Fluoro Store function		Switch the room light on and off
1×	Prepare and perform single-shot exposure		**Copy as photo image** function

Biplane Foot Switch Functions

The functions that are assigned to each switch are configured when your system is installed. A label is placed next to each switch to indicate the assigned function.

The following functions are always assigned to a switch:

Mandatory Functions			
	Select channel		Perform biplane fluoroscopy
	Perform fluoroscopy on the frontal channel		Prepare and perform exposure
	Perform fluoroscopy on the lateral channel		

One of the following functions can be assigned to the remaining switch. The functions that are available depend on the version of your system.

Optional Functions			
	Fluoro Store function		Switch the room light on and off
1×	Prepare and perform single-shot exposure		**Copy as photo image** function

Switching the Wireless Foot Switch On and Off

NOTE

Ensure that the wireless foot switch battery is sufficiently charged before using the foot switch. If the battery is depleted during a procedure, the foot switch will stop working. In this case, use the wired foot switch. Alternatively, connect the charger to the foot switch and continue to use it. Take care not to damage the cable of the charger when moving equipment around the examination room (for example, when moving carts or beds).

Information about battery charge level is provided in this section.

Before using the system, check that the wireless foot switch functions with the system and all the pedals are working correctly. If identification labels have been used, check that the labels attached to the system and to the foot switch match. For more information, see Identification Labels (page 42).

The wireless foot switch may be put in a sterile plastic cover.

1 Switch the wireless foot switch on using the power switch on the back of the foot switch.

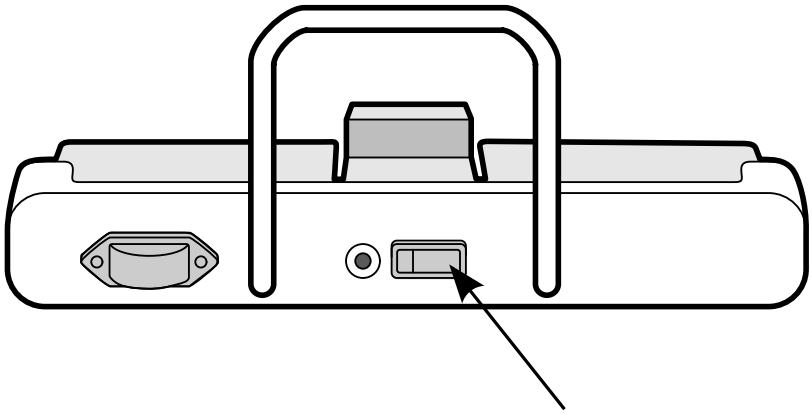


Figure 23 Wireless foot switch power switch (monoplane foot switch shown as an example, also applicable for the biplane foot switch)

2 Check the status of the indicator lights on the wireless foot switch to ensure that it has sufficient charge and that the wireless connection is active.

The battery indicator descriptions in the following table are based on typical usage.

If the wireless foot switch is not in use, it enters sleep mode and all indicators are switched off. To wake the wireless foot switch, move it or press any pedal.

Battery indicator	Status	Action
Green	Battery charge level should provide more than 40 hours of use.	No action required. The foot switch is ready to use.
Red	Battery charge level should provide 20 to 40 hours of use.	The foot switch can be used, but it is recommended to charge the battery. See Charging the Wireless Foot Switch Battery (page 46).
Red, flashing every 0.5s	Battery charge level will provide less than 20 hours of use.	Charge the battery. See Charging the Wireless Foot Switch Battery (page 46).
Red, flashing rapidly	Battery charge level is less than 1.5%. Charge the wireless foot switch battery before use.	Charge the battery. See Charging the Wireless Foot Switch Battery (page 46).
Green, flashing	Battery is charging.	See Charging the Wireless Foot Switch Battery (page 46).
Red and green (at startup)	A critical error has occurred.	Disconnect the charger if it is connected. Switch the wireless foot switch off and then on again, or perform a cold restart of the X-ray system. If this does not resolve the issue, use the wired foot switch for the procedure and contact technical support.

Wireless indicator	Status	Action
Off	Wireless connection is operational.	No action required. The foot switch is ready to use.
Red	There is an error in the wireless connection. Do not use the foot switch.	Move the wireless foot switch closer to the receiver. The location of the receiver depends on your system configuration; it is located either inside the patient table base or in the surgery wall connection box. Wait for the wireless indicator to go out before using the wireless foot switch. If this does not resolve the issue, continue the procedure using the wired foot switch. To resolve the issue after completing the procedure, switch the wireless foot switch off and then on again or perform a cold restart of the X-ray system. If this does not resolve the issue, continue using the wired foot switch and contact technical support.
Red, flashing rapidly	A critical error has occurred.	Switch the wireless foot switch off and then on again or disconnect the charger if it is connected. Wait for the wireless indicator to go out before using the wireless foot switch. If this does not resolve the issue, continue the procedure using the wired foot switch. To resolve the issue after completing the procedure, perform a cold restart of the X-ray system. If this does not resolve the issue, continue using the wired foot switch and contact technical support.

NOTE
If the battery indicator is red and flashing rapidly, the red wireless indicator light is also switched on. This is because there is insufficient charge in the battery to maintain the wireless connection and the wireless foot switch has stopped working. Connect the charger or use the wired foot switch.

3 To switch the wireless foot switch off, use the power switch on the back of the foot switch.

Charging the Wireless Foot Switch Battery

A charger is supplied to recharge the battery of the wireless foot switch.

NOTE
Use only the charger supplied with the wireless foot switch. Using any other charger may cause damage to the foot switch.

1 Remove the cap from the charging port on the back of the wireless foot switch.

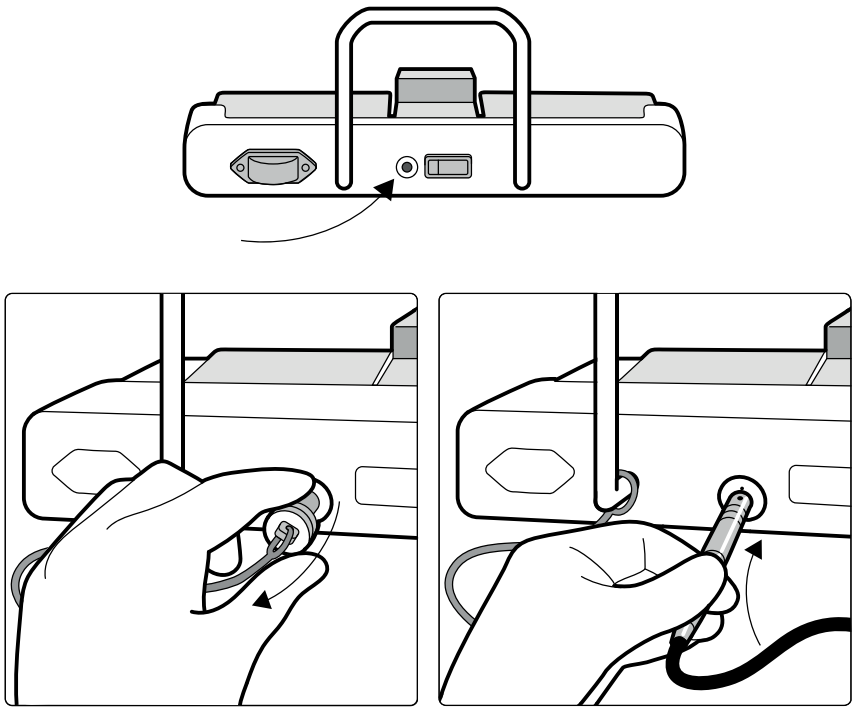


Figure 24 Wireless foot switch charging port (monoplane foot switch shown as an example, also applicable for the biplane foot switch)

2 Connect the charger to the charging port. Ensure that you align the red dot on the charger connector with the marker on the charging port.

The battery indicator on the wireless foot switch flashes green while the foot switch is charging.

NOTE
If you use the wireless foot switch with the charger connected, ensure that the wireless foot switch is positioned to allow the charger to be easily disconnected from the foot switch if necessary. You may need to disconnect the charger to restart the wireless foot switch. If care is not taken when disconnecting the charger, damage may be caused to the charger or the wireless foot switch.

3 To stop charging the wireless foot switch, disconnect the charger from the charging port by doing the following:

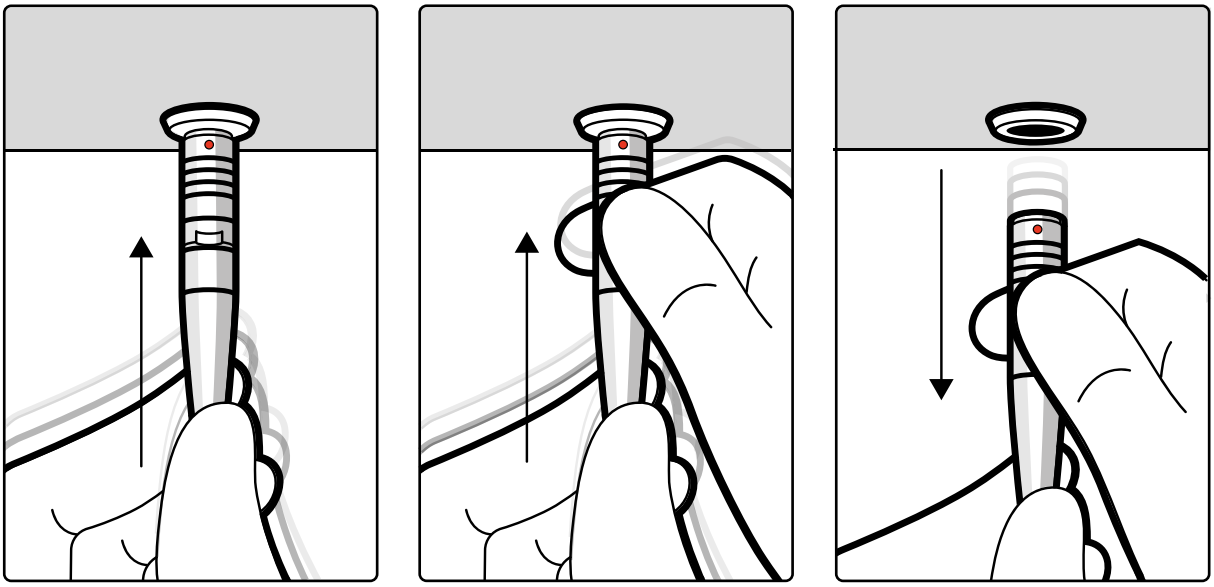


Figure 25 Disconnecting the charger cable

a Hold the connector firmly and push it gently toward the wireless foot switch, and hold the connector in that position.

b Using your other hand, grip the collar and pull the connector out of the charging port.

c Put the cap back on the charging port on the back of the wireless foot switch.

NOTE
If you disconnect the charger while X-ray is being performed (while a pedal is being pressed), image acquisition stops and should be restarted, if needed, by releasing and pressing the pedal again.

A complete charge cycle takes more than 12 hours. A charge of between 6 to 8 hours provides up to 8 hours of continuous use. Ensure that the wireless foot switch battery is charged at least every week. We recommend that you charge the battery at the end of every day, or when the battery indicator turns red. The battery has built-in safety devices to protect it from overcharging.

NOTE
If the battery of the wireless foot switch is depleted within 2 days after a complete charge, contact technical support for a replacement battery. The battery may only be removed and replaced by a qualified service engineer.

Storing the wireless foot switch for longer than 12 months without recharging the battery may damage the battery.

Storing the wireless foot switch for longer than 24 months without recharging the battery will cause battery failure.

3.1.14 Swivel Hand Switch (Option)

If the swivel option is installed, you use the swivel hand switch to swivel the table towards the head end or towards the foot end.

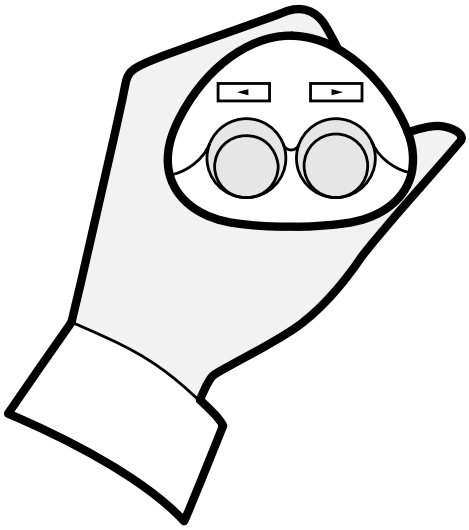


Figure 26 Swivel hand switch

3.1.15 Viewpad

The viewpad is a handheld remote control that you can use to control viewing and processing functions from anywhere in the examination room.

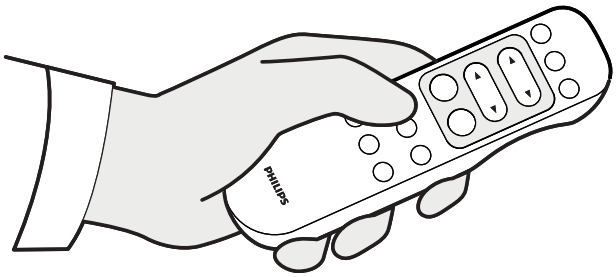


Figure 27 Viewpad

When you activate a function on the viewpad, the function is applied to the viewport that currently has focus. A viewpad icon is displayed in the middle of the viewport for a moment, and is then displayed in the top bar of the viewport.

The viewpad is an infrared remote control. The infrared transmitter is located on the front of the viewpad. If the transmitter is obstructed, signals are not transmitted. The receiver is located in the monitor ceiling suspension, above the monitors. A light on the receiver indicates that the selected command has been received. The viewpad should be used inside a transparent sterile cover (not supplied by Philips Medical Systems).

A laser pointer is located on the front of the viewpad. You activate the laser pointer using the button on the underside of the viewpad. The quality of the laser pointer is affected when using a sterile cover.

WARNING
Do not stare into the beam or point the beam at other people's eyes.

NOTE
Do not open the cover of the viewpad (not including the battery compartment cover). For maintenance, contact technical support. If the cover is damaged, do not use the viewpad and call technical support for a replacement.

NOTE
Do not use the viewpad when more than one Azurion system is in use in the same room.

NOTE
Infrared signals from the viewpad may interfere with other infrared-controlled equipment in the same room. Before using the viewpad in a procedure, check that there is no interference with other equipment.

When not in use, store the viewpad in the holder provided on the side of the touch screen module.

For more information, see the following sections:
- Accessories and detachable parts: Viewpad (page 227).
- Batteries: Replacing Batteries (page 298)
- Quick reference: Viewpad (page 465).

Viewpad Laser Aperture
The laser aperture of the viewpad is indicated with an arrow in the following illustration.

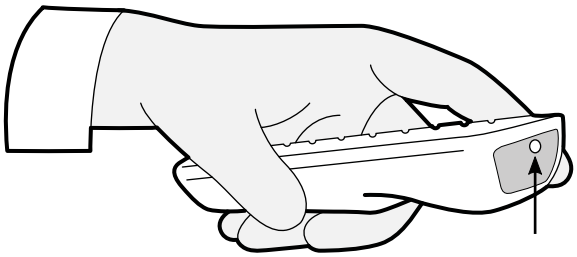


Figure 28 Viewpad laser aperture

3.1.16 Mouse and Mouse Table (Option)

A wireless mouse is available as an option in the examination room to assist with operating the system.

You use the mouse with a mouse table mounted on the table accessory rail. The mouse should be used inside a sterile cover (not supplied by Philips Medical Systems).

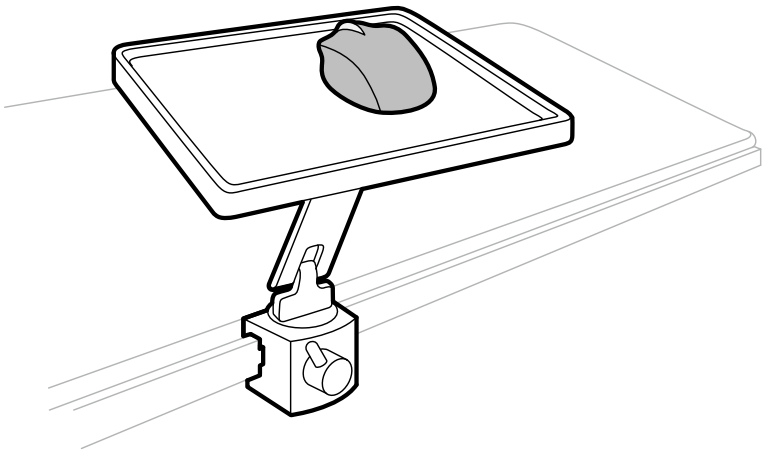


Figure 29 Mouse and mouse table (option)

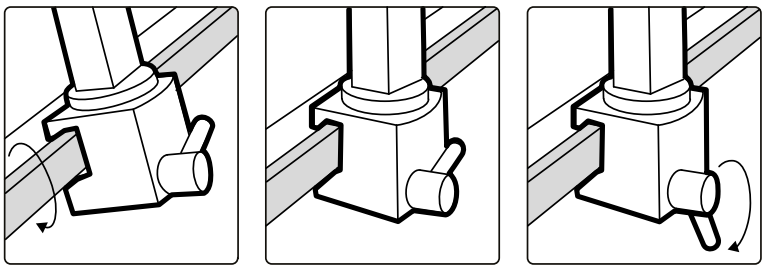


Figure 30 Attaching the mouse table to the accessory rail

3.1.17 Sterile Covers

We recommend that you use sterile covers to prevent contamination of the system and maintain a sterile environment. It is the responsibility of the hospital to supply and fit sterile covers when needed.

3.1.18 Collect and Display Dose Information (Option)

DoseAware is an X-ray dose monitoring system for hospital staff. It allows staff to visualize their X-ray dose in real-time, enabling them to use radiation protection more effectively.

DoseAware is available in the following configurations:

- DoseAware: Displays dose information from the Personal Dose Meters (PDMs) on a dedicated touch-screen Base Station.
- DoseAware Xtend: Uses a dedicated Dosimetry hub to collect dose and procedure information from the PDMs and the X-ray system, and displays the information on a monitor in the examination room.

For more information, refer to the Instructions for Use supplied with Philips DoseAware.

3.2 Equipment in the Control Room

The control room usually contains two monitors that display the acquisition window and the review window.

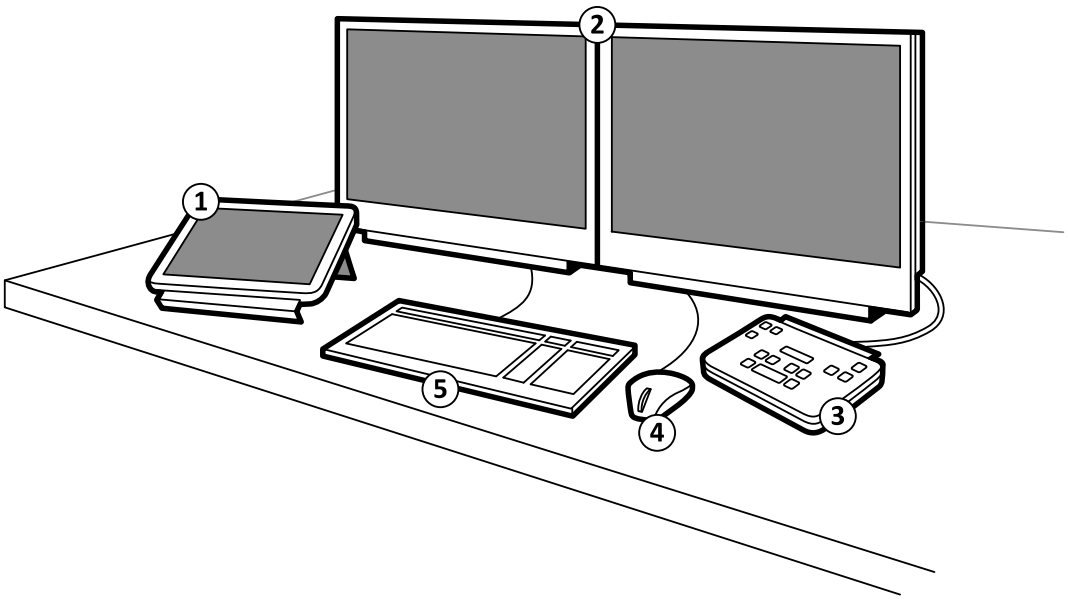


Figure 31 Typical equipment in the control room

Legend			
1	Touch screen module	4	Mouse
2	Monitors	5	Keyboard
3	Review module		

The acquisition window displays live X-ray images and is used to change procedure settings, and to schedule procedures. When acquisition is not being performed, you can use this monitor to perform other tasks such as reviewing images and post-processing.

The review window allows you to work with studies and series from any patient. While acquisition is being performed in the examination room, you can use the review window in the control room to work in parallel and perform tasks such as reviewing and post-processing, for any study, including studies and series that do not relate to the acquisition patient. For more information, see Instant Parallel Working (page 149).

The control room may contain additional equipment and workspots:

- Review module
- Touch screen module
- MultiSwitch (option)
- FlexSpot (option)
- Second FlexSpot (this option is only available for Azurion systems with IP-based video infrastructure)
- Additional FlexSpot (this option is only available for Azurion systems with DVI-based video infrastructure)
- Additional monitors (option):
  - Up to 10 additional monitors (depending on installed options) for Azurion systems with IP-based video infrastructure.
  - Up to 3 additional monitors for Azurion systems with DVI-based video infrastructure.

3.2.1 Review Module

The review module is located in the control room and provides controls for reviewing images in the acquisition window.

You can also perform some general functions using the review module, for example, switching the system on and off, disabling radiation, disabling geometry movements, and resetting the fluoroscopy buzzer.

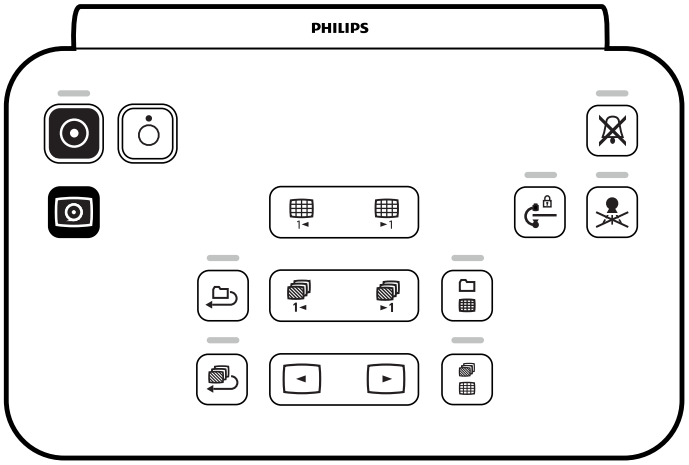


Figure 32 Review module

For more information, see Review Module (page 463).

3.2.2 Touch Screen Module

An optional touch screen module can be installed in the control room.

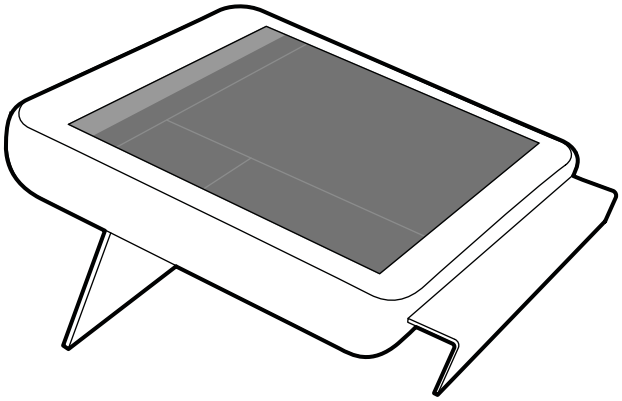


Figure 33 Touch screen module in the control room

You can control functions for multiple applications concurrently using the touch screen module. Depending on the active procedure or the system configuration, some functions may not be available.

Up to three touch screen modules can be used with each system.

- The touch screen module at the tableside in the examination room can be attached to the accessory rail in any position: doctor side, nurse side, or foot end.
- A second touch screen module in the examination room can be mounted on a pedestal (optional). The pedestal can be positioned anywhere in the examination room.
- A third (optional) touch screen module can be located in the control room.

If you are using multiple touch screen modules, the following rules apply:
- You can use different applications on each touch screen module.
- If you use the same application on multiple touch screen modules, the modules are fully linked.

For more information, see Touch Screen Module (page 436).

3.2.3 MultiSwitch (Option)

When installed, the functions available with the MultiSwitch option in the control room depend on the video infrastructure of the Azurion system.

MultiSwitch for Azurion System with IP-Based Video Infrastructure
The MultiSwitch option for IP-based video infrastructure allows you to view and control a selection of 8 video sources on the review monitor in the control room. The Azurion review application and up to 7 other video sources can be configured from all available Azurion and auxiliary video sources.

A second MultiSwitch can be installed as an additional option that allows you to view and control a selection of 8 video sources on an additional monitor in the control room. Up to 8 video sources can be configured from all available Azurion and auxiliary video sources.

Video selection is possible using a keyboard shortcut as indicated on the user guidance sticker on the monitor bezel. After pressing the keyboard shortcut and holding the Ctrl button, an on-screen overlay menu appears showing the selectable video sources. Pressing the keyboard shortcut again while the overlay menu is displayed selects the next application in the list.

NOTE
The default video selection keyboard shortcut is Ctrl+Scroll lock. It can changed by technical support.

MultiSwitch for Azurion System with DVI-Based Video Infrastructure
The MultiSwitch option for DVI-based video infrastructure allows you to connect up to three Philips PCs and switch between them using a single, shared WorkSpot (monitor, keyboard, and mouse). These Philips PCs are supplied with the system and can be used to run Philips applications such as Xcelera, Interventional Workspot, and IntelliSpace Portal.

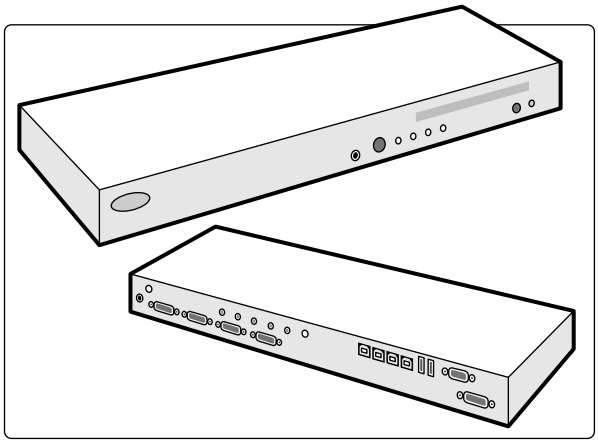


Figure 34 MultiSwitch unit

The MultiSwitch unit is located on the WorkSpot table. You switch the WorkSpot interface to one of the connected Philips PCs manually using the button on the front of the MultiSwitch unit. An indicator light on the MultiSwitch unit shows the selected input. Input selection is performed in sequential order.

The control room connection box houses the mains power connections for the following devices:

- MultiSwitch unit
- Ethernet switch
- Connected Philips PCs

Power for the WorkSpot, the connection box, and the associated devices (including the connected Philips PCs) is provided by the system.

3.2.4 FlexSpot (Option)

If the FlexSpot option is installed, the monitors in the control room are replaced by up to two larger wide-screen monitors (called the primary and secondary monitors) that are capable of displaying multiple applications.

For more information, see FlexSpot (Option) (page 433).

3.2.5 Second FlexSpot (Option)

NOTE
This option is only available for Azurion systems with IP-based video infrastructure.

Second FlexSpot is an extension to the FlexSpot option, consisting of up to two wide-screen monitors, mouse, and keyboard, located either in the control room or the examination room. The interface is identical to FlexSpot.

3.2.6 Additional FlexSpot (Option)

NOTE
This option is only available for Azurion systems with DVI-based video infrastructure.

Additional FlexSpot is an extension to the FlexSpot option, consisting of an additional wide-screen monitor, mouse, and keyboard, located either in the control room or the examination room.

The interface is identical to FlexSpot with the following exceptions:
- Only one application can be displayed at a time.
- In the menu bar, only the application selector and the keyboard lock icons are available.
- The status area can be hidden to make the main display area larger.

3.2.7 Control Room Workspace (Option)

NOTE
This option is only available for Azurion systems with IP-based video infrastructure.

The control room workspace option provides the following facilities in the control room:
- FlexSpot with two wide-screen monitors
- Second FlexSpot with two wide-screen monitors
- Two additional MultiSwitch monitors

3.2.8 Exposure Hand Switch

You can use the exposure hand switch to prepare or control the exposure function from the control room.

The hand switch has a single button that you press in two stages:
- Pressing the button to the first stage prepares the system for exposure.
- Pressing the button to the second stage activates exposure.

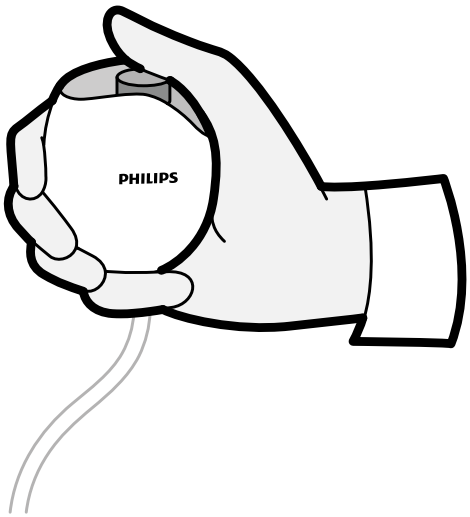


Figure 35 Exposure hand switch

3.2.9 Speed Controller (Option)

If the Bolus Chase Reconstruction option is installed, you use the speed controller to control the speed of longitudinal table movements when acquiring bolus chase images.

The speed controller is automatically enabled when you select an X-ray protocol for bolus chase. You control the table speed by pressing the trigger. The more you press the trigger, the faster the table moves.

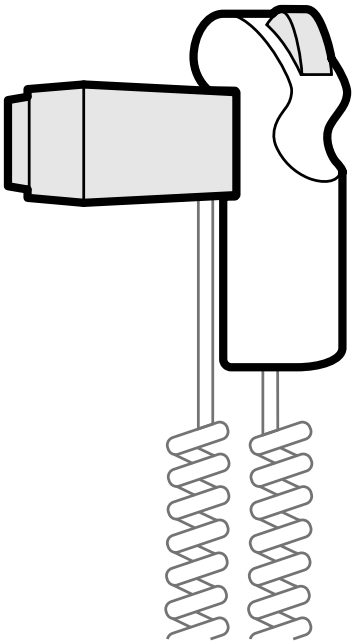


Figure 36 Speed controller

4 Starting and Stopping the System

This section provides information about starting and stopping the system during normal use. For information about stopping the system in an emergency, see Emergency Stop (page 21).

You start and stop the system using the review module.

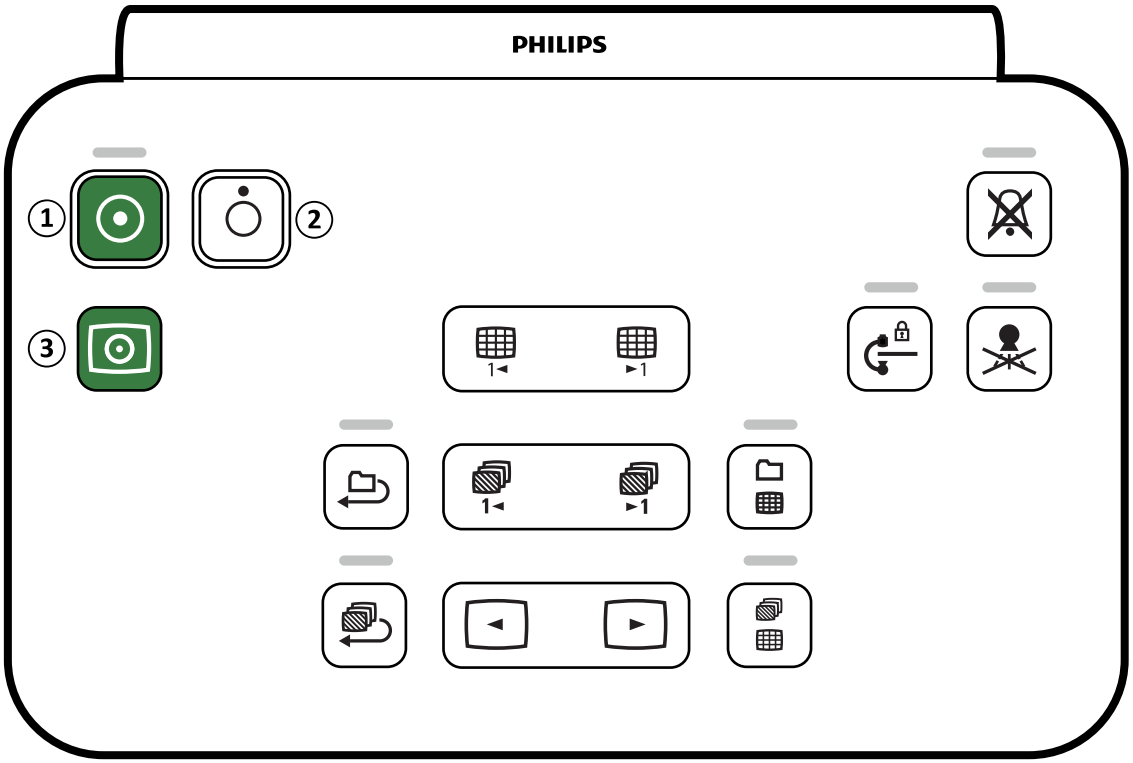


Figure 37 Review module

Legend	
1	**Power On**
2	**Power Off**
3	**Video Only**

4.1 Starting the System

1 On the review module, press and hold **Power On** for 2 seconds.

NOTE
Avoid operating any of the controls while the system is powering on, as this may inhibit the start-up process.

2 Release the button when the indicator begins to flash.

The indicator light stays on when the start-up process is complete.

Figure 38 System startup screen

The system takes 5 minutes from switching on until all functionality is available.

3 If your work schedule includes tasks performed on a separate workstation, switch the workstation on and log on to it to avoid a delay during the procedure.

4 When the logon screen appears, do the following:

a Click the arrow in the **User Name** box and select your user name.

b Enter your password in the **Password** box.

c Select **Log On** or press Enter.

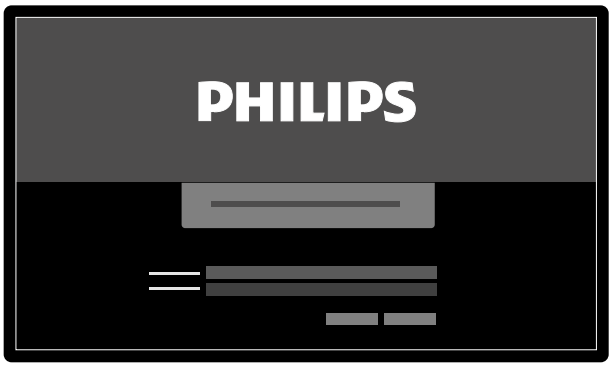


Figure 39 Logon screen

If your password has expired, a dialog box is displayed allowing you to change your password. You are asked to enter your existing password and to set your new password.

4.1.1 Accessing the System in an Emergency

Depending on the system configuration, you can access the system in an emergency without logging on.

1 If the system is not switched on, press and hold **Power On** on the review module until the indicator light stops flashing.

2 In the logon screen, click **Emergency**.

The system is available in emergency access mode. This mode allows you to perform an emergency procedure, but has reduced functionality.

For information about configuring the system to allow emergency access, see Managing Users and System Logon (page 260).

4.1.2 Using Video Only Mode (Option)

This option allows you to use the monitors without switching the X-ray system on, which saves energy. You can then view images of the Interventional Tools or perform a procedure that does not involve the system, such as ultrasound.

This option is available if your system has the FlexVision or FlexSpot option installed.

The following functions are unavailable when using video only mode:
- The **X-ray** application and the **Review** application
- Stand and table movements

NOTE
If an OR table with a dedicated movement control panel is used, table movements are possible during video only mode.

- Press **Video Only** on the review module for at least 2 seconds.

  The monitors are switched on and the mouse is available for configuring the screen layout.

4.2 Restarting the System

NOTE
If control of the system starts to deviate from its expected behavior, you should restart the system.

There are two methods for restarting the system.
- Warm restart: Use this method when you are trying to resolve a software-related issue with the system. This is the standard method for restarting the system.
- Cold restart: Use this method when you are trying to resolve a hardware-related issue with the system.

We recommend that you perform a cold restart of the system every day. During a cold restart important data is saved, which assists with remote servicing.

If you stop the system using the emergency **STOP** button, you must restart the system before you can use it again. For more information, see Emergency Stop (page 21).

- To perform a warm restart, press and hold **Power On** on the review module.

  A warm restart takes 90 seconds until the system is fully functional. Fluoroscopy is possible after 60 seconds.

  NOTE
  After a warm restart, X-ray is enabled.

- To perform a cold restart, do the following:

a On the review module, press and hold **Power Off**.

b Release the button when the indicator light begins to flash.

c When the indicator light stops flashing, wait 10 seconds.

d On the review module, press and hold **Power On**.

NOTE
Do not operate any of the controls while the system is powering on, as this may inhibit the start-up process.

A cold restart of the system takes 6 minutes from initiation of the cold restart until all system functionality is available.

NOTE
When restarting after an emergency power off situation, the system is fully functional after 105 seconds. For more information, see Restarting after Emergency Power Off (page 58).

4.3 Mains Power Failure

The system is powered by the hospital mains power supply. The stability of the mains power supply may vary over time and can sometimes be interrupted.

In the event of a mains power failure, the system behaves as follows:
- All stored patient and system data is preserved.
- All mechanical, non-balanced movements are blocked.

If a mains power failure occurs during a clinical procedure, you should do one of the following:
- Transport the patient to another system to continue the procedure.
- Wait until the hospital mains power supply is restored, and then restart the system to continue the procedure.

When the hospital's back-up power system is active, the system takes measures to conserve power. Functions that cause high power consumption are disabled. Low-load fluoroscopy is still possible, as well as patient and beam positioning functions. This ensures that you can always free the patient from the system.

NOTE
The last acquired series may be lost if the power failure occurs during the acquisition, or shortly after the series was acquired.

4.3.1 Uninterruptible Power Supply (Option)

An option is available to provide a limited amount of power to the system during mains power failure using an uninterruptible power supply (UPS).

The optional uninterruptible power supply allows the system to perform a controlled shutdown if the hospital mains power supply is interrupted. All data is backed up during the shutdown.

Other compatible uninterruptible power supplies can be connected to the system, which allow full functionality or reduced functionality for a limited time when mains power fails. However, such parts are not categorized as options for the system.

- For more information about the optional uninterruptible power supply, contact technical support.
- For more information about compatibility with third-party components, see Compatibility (page 18).

4.4 Restarting after Emergency Power Off

Following an emergency power off situation, the system will enter an emergency power off state.

This is indicated by a flashing indicator light above the **Power On** button on the review module.

To restart the system after an emergency power off situation, you must use the following procedure.

- When the indicator light above the **Power On** button stops flashing, press and hold **Power On** for more than 2 seconds.

When restarting after an emergency power off situation, the system is fully functional after 105 seconds.

4.5 Stopping the System

Switching the system off automatically logs you off. Alternatively, you can log off without switching the system off, and leave the system available for the next operator.

- To log off, select **System** from the menu bar of the review window, and then select **Log Off**.

- To switch the system off, press **Power Off** on the review module for 3 seconds.

For system security, it is recommended that you shut down the system after use.

5 Preparing a Patient Study

You can schedule and prepare a patient study in advance of a procedure. You select, edit, and start the study from the patient database.

5.1 Patient Database

When you open the patient database, the system automatically retrieves a list of scheduled studies from the system's database.

If configured to do so, the system can also retrieve a list of scheduled studies from the hospital worklist.

You open the patient database by clicking the patient selector in the upper left corner of the acquisition window or the review window.

Figure 40 Patient database

Legend	
1	List selector
2	Patient list
3	Study details

Use the list selector to filter the studies displayed in the patient list.

Icon	Label	Description
	**In Progress**	Displays the details of the study currently in progress
	**Scheduled**	Displays studies scheduled in the database
	**Suspended**	Displays studies that have been started but not completed
	**Completed**	Displays studies that have been completed
	**All Patients**	Displays all studies in the database

You can sort the patient list to make studies easier to find.

- Clicking on each column heading sorts the column in ascending order.
- Clicking on the column heading again, sorts the same column in descending order. An arrow in the column heading indicates that a column has been sorted and in which order (ascending or descending).

You can change the order columns are displayed in by dragging a column heading to a new location.

You can also show or hide columns by right-clicking on any column heading and selecting the columns to show or hide.

If you select **All Patients**, the status of each study is displayed using icons.

Icon	Status	Description
	**Scheduled**	The procedure is scheduled and has not been started.
	**In progress**	The procedure has been started and is the current acquisition study.
	**Suspended**	The procedure has been started but was not completed, and is not the current acquisition study. You can resume the procedure at an appropriate time.
	**Completing**	The procedure has been completed but some automatic processes, data transfers, or storing activities may still be underway in the background.
	**Completed with an error**	The procedure has been completed but some errors were encountered. To find out more information about the errors, use the job viewer.
	**Completed**	The procedure has been completed and all automatic processes, data transfers, or storing activities were successfully carried out.
	**Imported**	The study has been imported from the archive.
	**Importing**	The study is currently importing from the archive.
	**Imported with errors**	The study was imported from the archive but errors were encountered. To find out more information about the errors, use the job viewer.

NOTE
If an automatic transfer of data fails while a procedure is completing, the procedure's status may remain as Completing. To find out more information about why completion may have failed, use the job viewer.

For more information, see Viewing System Tasks in the Job Viewer (page 190).

Quick Search

A search box is available above the patient list, allowing you to search the patient database.

Search results appear automatically as you enter search text. The search is not case-sensitive.

When you enter search text, the icon changes to allow you to clear the search text if desired. You can clear the search text by clicking **Clear**.

5.2 ProcedureCards

A ProcedureCard is a digital card that contains predefined procedure settings such as acquisition protocols, patient orientation, and imported documents for procedure instructions. ProcedureCards allow you to acquire images with optimal image quality for specific patient types and detector field sizes

The system provides predefined ProcedureCards that are divided into procedure groups. You can also create your own ProcedureCards and save them in your own groups.

If your system has the FlexSpot or FlexVision option installed, ProcedureCards also contain predefined screen layouts.

If the Interventional Workspot is connected to the X-ray system, you can configure settings for supported Interventional Tools in a ProcedureCard on the X-ray system.

ProcedureCards provide the following information to the system:

- The default X-ray settings for use in the study.
- The X-ray setting selections that are available to you during the study.
- The desired patient orientation.
- The default preset for the FlexSpot option, if installed.
- The default preset for the second FlexSpot option, if installed.
- The default preset for the FlexVision option, if installed.
- Settings for supported Interventional Tools, if connected.
- Guidance notes for the study.

For more information, see Managing ProcedureCards (page 280).

5.3 Scheduling a Study from the Hospital Worklist

If the patient that you are scheduling a study for is not displayed in the worklist, you can search for the patient in the hospital worklist.

1 Click the patient selector in the upper-left corner of the review window or the acquisition window to display the patient database.

2 Do one of the following:

- Click **Scheduled** to see the list of scheduled procedures.

- Click **All Patients** to see all procedures in the local database.

3 Click **Add from Worklist**.

4 To find a patient in the worklist, do one of the following:

- Enter the patient's surname, patient ID, or accession number, and click **Search**.

- To display a list of all patients in the worklist scheduled for this system, leave the fields blank and click **Search**.

If the patient you are searching for was scheduled to be examined on another system, you may need to search again using different **Station AE-Title** and **Modality** values.

If you cannot find the patient in the worklist, you may need to add the patient manually. For more information, see Scheduling a Study Manually (page 62).

You can change the ProcedureCard selected for the study by editing the study. For more information, see Editing a Scheduled Study (page 64).

5 Select the patient in the patient list.

6 Click **Add to Schedule**.

When you schedule a study from the hospital worklist, the ProcedureCard is automatically selected based on the DICOM RIS code recorded for the study in the hospital worklist. For more information, see Mapping RIS Codes to ProcedureCards (page 263).

5.4 Scheduling a Study Manually

You can schedule a study for a patient who is not available in the worklist.

1 Click the patient selector in the upper-left corner of the review window or the acquisition window to display the patient database.

2 Do one of the following:

- Click **Scheduled** to see the list of scheduled procedures.

- Click **All Patients** to see all procedures in the local database.

3 Click **Add Patient** to display the **Add Patient** dialog box.

4 In the upper section of the **Add Patient** dialog box, enter the details of the patient.

5 In the middle section of the **Add Patient** dialog box, enter the details of the study.

If you select **Auto** in the **Patient Type** box, the system automatically selects an appropriate patient type based on the patient's height and weight.

6 In the lower section of the **Add Patient** dialog box, do the following to select the ProcedureCard:

a Click the **ProcedureCard Group** list and select the group that contains the ProcedureCard that you want to use.

b Select the ProcedureCard.

If you do not select a ProcedureCard, the default ProcedureCard is used. For more information, see Changing the Default ProcedureCard (page 280).

7 Do one of the following:

- To add the procedure to the schedule list without starting the procedure yet, click **Add to Schedule** in the review window or the acquisition window.
- To add the procedure to the schedule list and start the procedure immediately, click **Start Procedure** in the acquisition window.

5.5 Adding a Study

You can add a new study to a patient in the worklist if a patient is undergoing a repeat study.

1 Right-click the patient in the worklist and then click **Add Study** in the shortcut menu.

The **Add Patient** dialog box is displayed, with the patient's demographic information already inserted.

2 In the middle section of the **Add Patient** dialog box, enter the details of the study.

If you select **Auto** in the **Patient Type** box, the system automatically selects an appropriate patient type based on the patient's height and weight.

3 In the lower section of the **Add Patient** dialog box, do the following to select the ProcedureCard:

a Click the **ProcedureCard Group** list and select the group that contains the ProcedureCard that you want to use.

b Select the ProcedureCard.

If you do not select a ProcedureCard, the default ProcedureCard is used. For more information, see Changing the Default ProcedureCard (page 280).

4 Do one of the following:

- To add the procedure to the schedule list without starting the procedure yet, click **Add to Schedule** in the review window or the acquisition window.
- To add the procedure to the schedule list and start the procedure immediately, click **Start Procedure** in the acquisition window.

5.6 Editing a Scheduled Study

You can edit a scheduled study to change or add details, or to change the ProcedureCard.

1 Click the patient selector in the upper left corner of the acquisition window or the review window.

2 Select the patient in the patient list and click **Edit**.

3 To change or add details, use the **Study Details** tab.

If the study was imported from the hospital worklist, you can only change information about the patient type, size and weight. For more information about importing studies from the hospital worklist, see Scheduling a Study from the Hospital Worklist (page 62).

4 To change the ProcedureCard, use the **Procedures** tab.

If you change the ProcedureCard, the settings associated with the new ProcedureCard selected are applied to the system when you select the study for acquisition.

5 Click **Save** to save your changes.

Alternatively, click **Back to Schedule** to return to the patient database without saving your changes.

5.7 Checking the Available Disk Storage Space

Before starting a study and acquiring images, you should check that the system has sufficient storage capacity.

You can check the available storage capacity by looking in the notification area. The following icons indicate the status of the storage disk.

Icon	Status
	The storage disk has capacity. Position the pointer over the icon to see the percentage of the disk space available.
	Available disk space is low. Unprotected studies may be overwritten. You should delete studies or export important data to an appropriate location to create more space.
	Available disk space is critically low. You may not be able to store the study. You should delete studies or export important data to an appropriate location to create more space.

On biplane systems, storage capacity is indicated for each channel.

For more information about protecting or archiving important data, see the following sections:

- Protecting and Unprotecting Studies (page 153)
- Exporting Data (page 183)

5.8 Starting a Study

If a study has been scheduled, you can select it and start it.

You can only start a study from the acquisition window.

1 Click the patient selector in the upper-left corner of the acquisition window.

2 Click **Scheduled** to see the list of scheduled studies.

If the patient or study is not displayed in the list of scheduled studies, you may need to search the hospital worklist or add the patient manually.

For more information, see the following sections:
- Scheduling a Study from the Hospital Worklist (page 62)
- Scheduling a Study Manually (page 62)

3 Select the patient in the list and click **Start Procedure**.

5.9 Positioning the Patient on the Table

Positioning the patient correctly on the table before sterile preparation prevents the need to reposition the patient during the study.

NOTE
Disable geometry movements and X-ray while performing the following actions:
- ***Positioning the patient on the tabletop.***
- ***Removing the patient from the tabletop.***
- ***Preparing the patient for the procedure.***

The maximum permissible weight on the table is 275 kg / 600 lbs. This includes the weight of all accessories that are attached to the table.

NOTE
The maximum permissible load of an operating table differs from the standard table. For more information, refer to the Instructions for Use supplied with the operating table.

1 If the tilt or cradle options are installed, position the tabletop at 0 degrees tilt and 0 degrees cradle.

2 If the pivot option is installed, you can pivot the table to improve accessibility while transferring the patient. To pivot the tabletop do the following:

a Move the tabletop all the way towards the head end (fully extended from the table base) to make it easier to pivot.

b Turn and hold the **Pivot Lock** switch on the control module until the unlock indicator light changes color from white to blue.

The **Pivot Lock** switch delay prevents unintentional unlocking during patient transfer.

c Push the tabletop to one of the detent positions.

There are detent positions at +13 degrees and -13 degrees, and another detent position at +180 degrees or -180 degrees (the choice is selected during installation of the system). Using a detent position ensures maximum stability while transferring the patient.

The pivot lock engages automatically 10 seconds after the pivot movement. The unlock indicator light switches to white when the pivot lock is engaged.

d Ensure that the pivot lock is engaged by pushing or pulling the tabletop.

For more information, see Pivoting the Table (Option) (page 89).

3 Move the tabletop all the way towards the foot end (fully retracted toward the table base).

4 Raise or lower the tabletop to a convenient height for transferring the patient.

5 Remove control modules and the radiation shield if they are attached to the accessory rail between the trolley and the tabletop.

You can replace these items after the patient has been transferred.

6 Transfer the patient on to the tabletop and place the patient into the correct position.

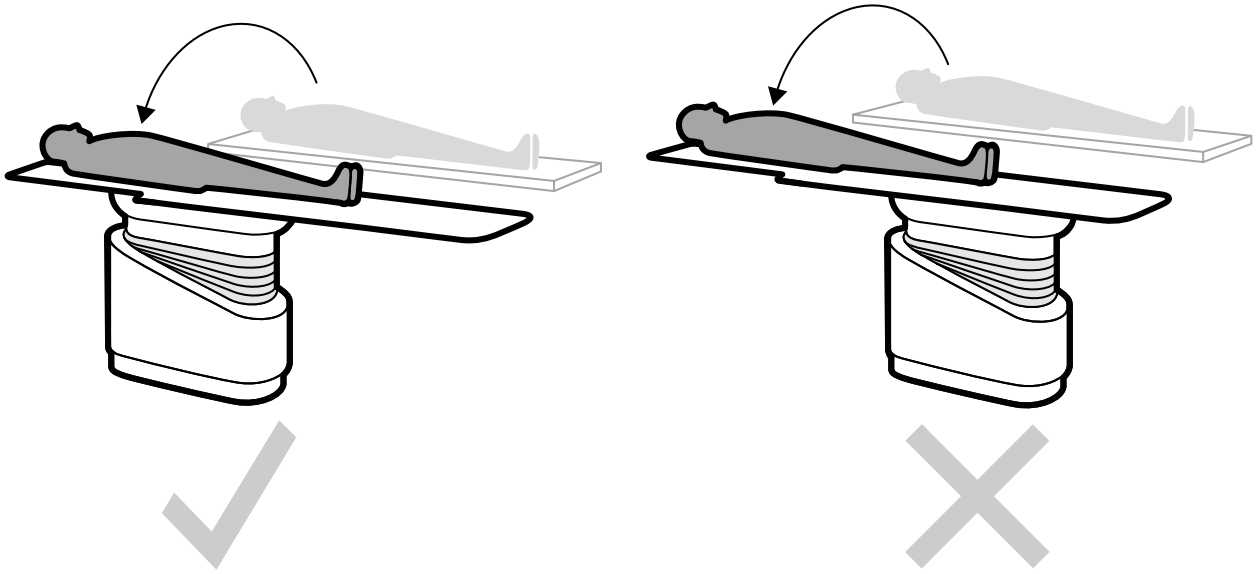


Figure 41 Transfer the patient with the table fully retracted toward the table base

The required patient orientation for the selected ProcedureCard is shown in the **X-ray Settings** task panel. If the patient orientation is different, change the patient orientation in the task panel. For more information, see Changing the Patient Orientation (page 68).

NOTE
Ensure that the patient, the control module, and the touch screen module are positioned in such a way that the patient cannot touch or come in contact with the modules.

7 If you pivoted the table to transfer the patient, do the following to return the table to the desired procedure position:

a Unlock the pivot lock and pivot the table.

b Ensure that the pivot lock is engaged before continuing with patient preparation.

5.9.1 Using Patient Straps

Use patient straps to ensure patient safety before starting tilt or cradle movements of the tabletop.

If you use sterile sheets to cover the patient, they might obscure the visibility of the straps. If the patient is covered by sterile sheets, check that the patient is secured with straps before starting tilt or cradle movements.

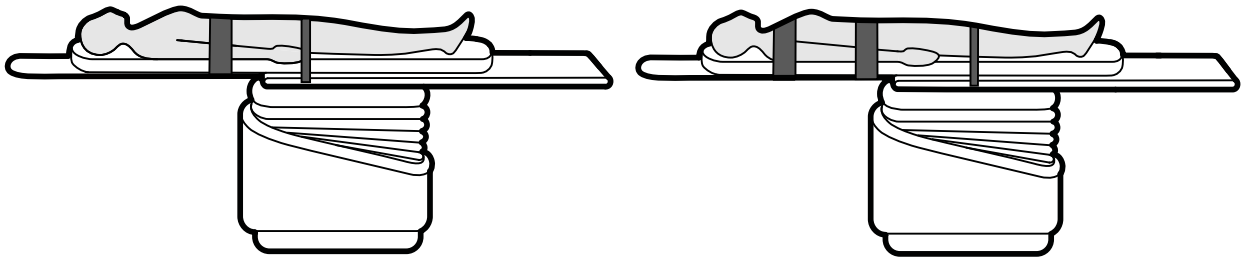


Figure 42 Using patient straps

Ensure that the straps are applied correctly around the accessory rail of the table.

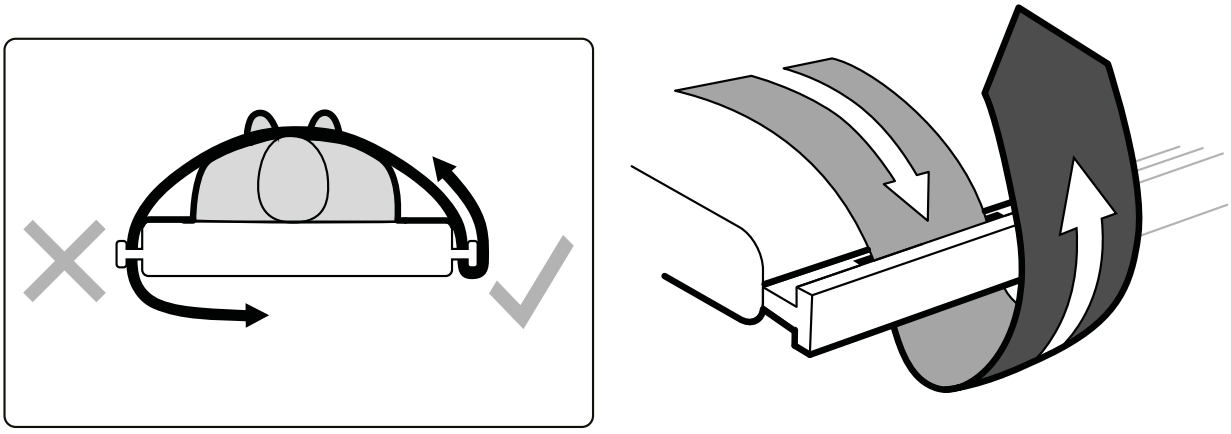


Figure 43 Applying patient straps around the accessory rail

A label showing the correct use of the straps is located on both sides of the table between the strap location holes.

Figure 44 Patient straps label

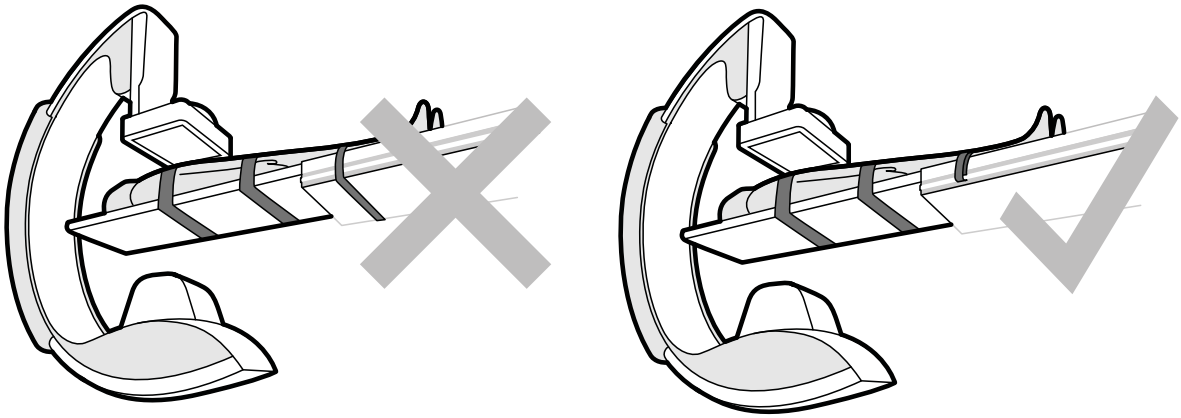


Figure 45 Patient straps: incorrect use and correct use

NOTE
For patients with disabilities that do not allow the recommended use of straps, it is your responsibility to decide how best to use the tilt or cradle functions while minimizing the risk of harm to the patient.

5.9.2 Changing the Patient Orientation

The default patient orientation for the procedure is determined by the ProcedureCard. You can change the patient orientation to suit the procedure that you are performing, and to match the patient's actual position on the table.

Orientation	Symbol
Patient facing up with their head at the head end of the table	
Patient facing up with their head at the foot end of the table	
Patient facing down with their head at the head end of the table	
Patient facing down with their head at the foot end of the table	

You can change the patient orientation using the acquisition window or the touch screen module.

1 To change the patient orientation using the acquisition window, do the following:

a Select the **X-ray Settings** task.

b In the task panel, click the **Patient Orientation** icon and select the patient orientation.

NOTE
Surgical view cannot be enabled in the X-ray Settings task.

2 To change the patient orientation using the touch screen module, do the following:

a Select the **X-ray Acquisition** application.

b Tap the **X-ray Settings** task.

c Tap the **Patient Orientation** icon in the upper-right corner and select the patient orientation.

d To enable surgical view, tap the **Patient Orientation** icon in the upper-right corner, and then switch **Surgical View** to **On**.

When surgical view is enabled, images are reversed left to right.

For more information, see Image Orientation (page 122).

6 Preparing the System

The procedures in this section describe the preferred stand and table positions in relation to the procedure types.

6.1 Safety Information

Patient Safety
Ensure that the patient's fingers do not become jammed between the table and stand during motorized movement of the stand in the transverse direction.

When moving the detector towards the patient, take care that the detector's front plate does not hit any small objects, such as the patient's nose.

When the patient's arm is positioned on the catheter arm support, ensure that the patient's arm or fingers do not become jammed between the arm support and the stand during table or stand movements.

Hospital Staff Safety
While floating the tabletop, ensure that other staff members do not become trapped between the tabletop and other equipment in the examination room.

It is possible to access the longitudinal guiding mechanism from underneath the tabletop. Serious injury may result if any part of the body becomes trapped in the mechanism.

Safety Devices
For information about safety devices for stand and table movements, see Collision Prevention (page 82).

Unintentional Activation

WARNING
Ensure that unintentional activation of the control module buttons does not occur by the patient, sterile covers, or other means. This can cause serious injury to the patient or any other person.

Foot Switch
Ensure that the foot switch is not unintentionally activated during geometry movement or swivel movement of the table base.

If the foot switch is fitted with a sterile cover, do not fit the cover too tightly. This is to ensure that when one pedal is pressed the cover does not activate other pedals.

Spillage of Liquids
Prevent spillage of liquids, which may bring live parts of the equipment into contact with conductive enclosures or direct contact with the operator, other personnel, or the patient.

6.2 Touch Screen Module

You can use the touch screen module to select monitor layouts and presets, control acquisition settings, select images for review or post-processing, and access applications such as Interventional Tools.

When multiple touch screen modules are used, each module provides identical functionality, but different applications can be opened on each module. You can start multiple applications on one touch screen module and switch between applications without closing running applications.

The touch screen module starts automatically when the system starts and displays the application that is currently in the upper-left position on the first page in the **Applications** window. (For more information,

see Customizing the Applications Window (page 75).) When the system is switched off, the touch screen module automatically shuts down.

Figure 46 Touch screen module

Legend			
1	Active application	5	**Fluoro Store** button (not available during fluoroscopy, stores the last fluoroscopy series when pressed after fluoroscopy)
2	**Applications** button (displays the **Applications** window)	6	**Stopwatch** button (starts or stops the stopwatch display on one of the monitors in the examination room)
3	Active application tab	7	**X-ray** button (enables or disables X-ray)
4	Application tabs for running applications		

You use touch gestures to activate and control applications on the touch screen module. For more information, see Touch Screen Gestures (page 437).

NOTE
If you press a function on the touch screen module for longer than seven seconds, the function will automatically deactivate. To continue, press the function again.

If the mouse option is installed, you can activate compatible applications on the touch screen module and then use the mouse to control them.

If FlexVision (option) is installed, the touch screen module also provides an on-screen mouse and keyboard.

6.2.1 Touch Screen Module Swing Arm

The swing arm allows you to use the touch screen module from either side of the table without needing to reposition it on the accessory rail.

1 To attach the swing arm to the accessory rail, do the following:

a Ensure the clamp on the swing arm is open.

b Place the swing on the accessory rail at the desired position.

c Close the clamp by pulling it toward you.

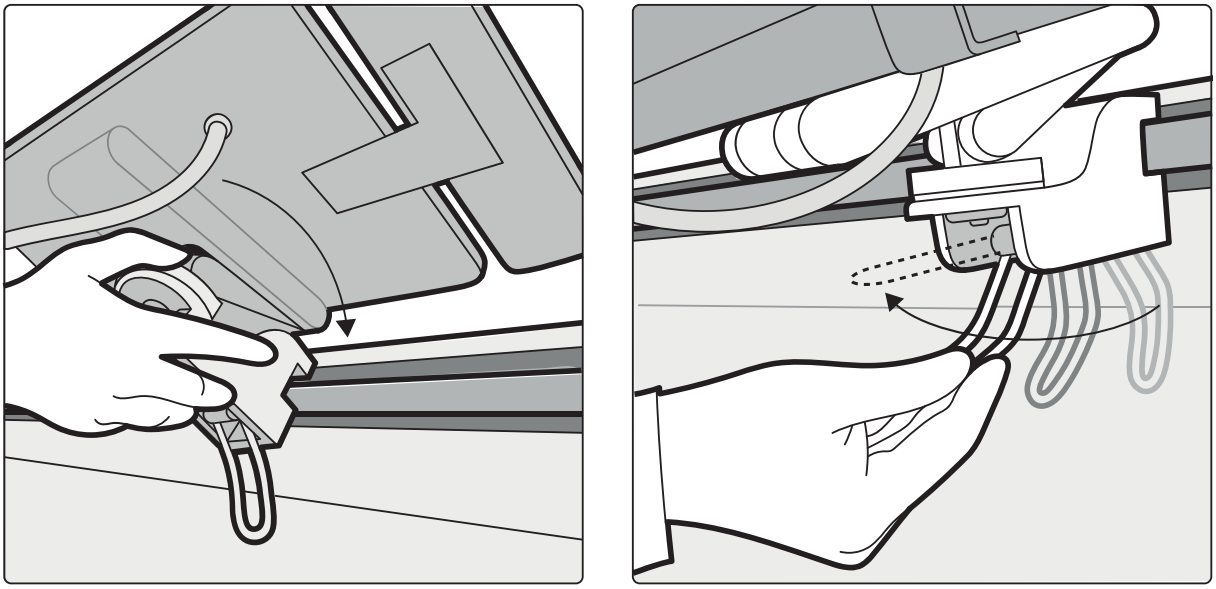


Figure 47 Attaching the swing arm to the accessory rail

2 Position the touch screen module as desired.
- Keep the swing arm folded to use the touch screen module at the same side of the table.
- Extend the swing arm and rotate the touch screen module to use it from the other side of the table.

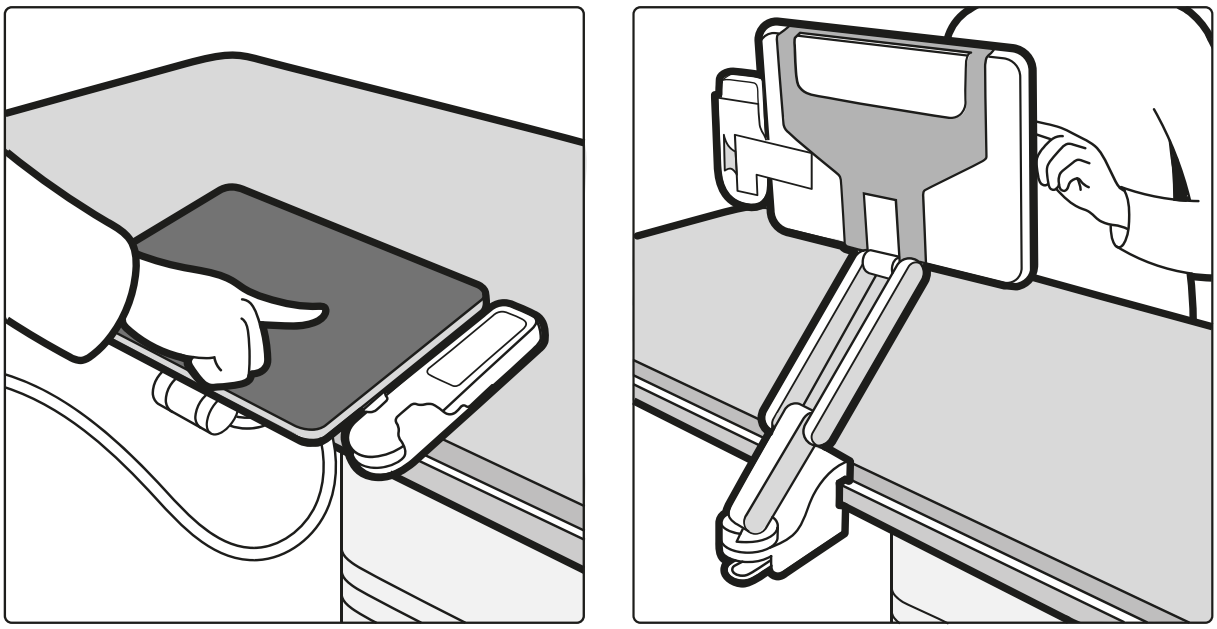


Figure 48 Positioning the touch screen module with the swing arm

3 To remove the swing arm from the accessory rail, release the clamp and lift the swing arm and the touch screen module off the rail.

6.2.2 Starting an Application

1 To start an application on the touch screen module, tap **Applications** in the lower-left corner of the module.

The **Applications** window is displayed providing an overview of available applications.

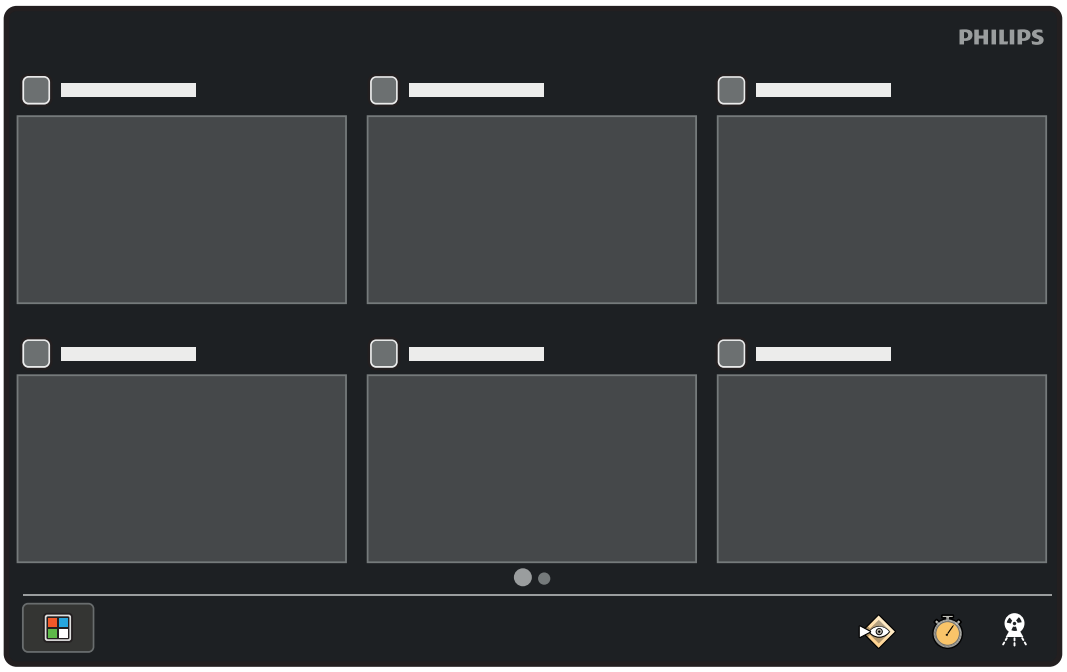


Figure 49 **Applications** window

If there are more applications available than can be shown on one page of thumbnails, additional pages are indicated below the thumbnails.

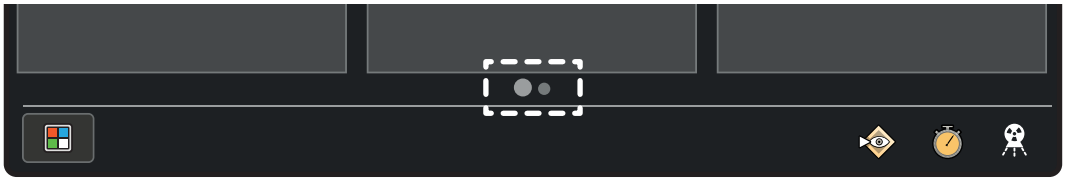


Figure 50 Indicator showing that multiple pages are available

2 To view additional pages of applications (if available), swipe left or right to view them.

3 Tap the application that you want to start.

The touch screen module starts the application and displays available functions.

NOTE
You can open several applications concurrently on the touch screen module.

If another application is already running when you start a new application, it is not closed. It is still available as a tab at the bottom of the window. If an event occurs in a running application that is not currently active, the tab blinks to inform you that there is a new event in the application.

4 To switch to another running application, tap the corresponding tab at the bottom of the module's display.

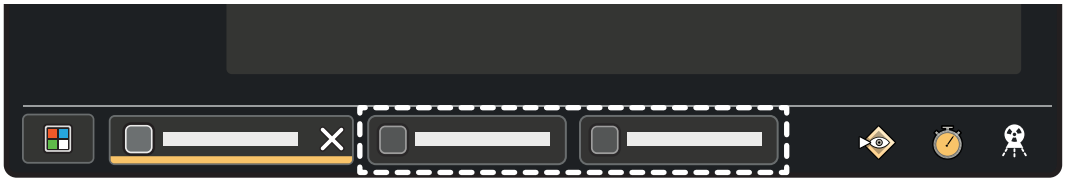


Figure 51 Application tabs

6.2.3 Using the Mouse (Option)

If the mouse option is installed, compatible applications are displayed in the **Applications** window with a mouse outline symbol in the upper-right corner above the thumbnail. The application where mouse control is active is displayed with a solid mouse symbol.

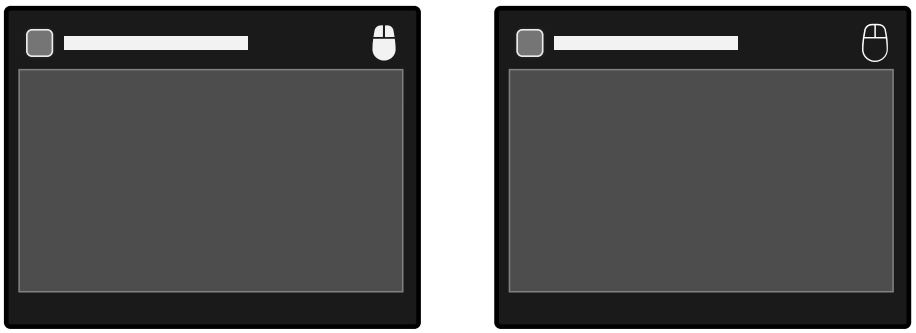


Figure 52 Left: Mouse control is active for this application. Right: Mouse control is available for this application

When you start an application that is compatible with the mouse option, mouse control is automatically transferred to the newly active application.

6.2.4 Managing Notifications

Special notifications require affirmative action to dismiss them. Special notifications are displayed on all modules regardless of the active application.

1 To dismiss a notification, do one of the following:

- Tap **Close** in the upper-right corner of the notification.
- Swipe the notification to the left or right.

2 To reset the buzzer when the **Reset Fluoroscopy Buzzer** notification is displayed, tap **Reset**.

Figure 53 **Reset Fluoroscopy Buzzer** notification

6.2.5 Closing an Application

- To close an application that is running on the touch screen module, tap **Close** on the application's tab at the bottom of the window.

Figure 54 Closing an application

NOTE
If the application that you want to close is not the active application and its Close button is not visible, tap the tab to make it visible.

When you close an application, the application in the first tab to the right becomes the active application. If there are no tabs to the right, the application tab to the left becomes the active application.

When you close the last available tab, the **Applications** window is displayed.

6.2.6 Removing an Unavailable Application

If the connection to an application is interrupted, the following animated symbol is displayed in the application window and on the application thumbnail.

Figure 55 Trying to reconnect to an unavailable application

If the connection to the application cannot be restored after a couple of minutes, the following symbol is displayed in the application window and on the application thumbnail.

Figure 56 The application is unavailable

You can remove unavailable applications using the **Applications** window.

1 Tap **Applications** in the lower-left corner of the touch screen module.

2 Press and hold for one second the thumbnail of the unavailable application that you want to remove.

A trash icon (**Delete**) is displayed in the upper-right corner above the thumbnail.

NOTE
The trash icon is displayed on all unavailable applications.

3 Tap **Delete** to remove the application.

NOTE
You can only remove applications that are unavailable.

4 If desired, tap **Delete** on other unavailable application thumbnails to remove them.

5 To exit this mode, tap an empty space in the **Applications** window, or tap an available application.

6.2.7 Customizing the Applications Window

1 Tap **Applications** in the lower-left corner of the touch screen module to display the **Applications** window.

2 To move an application thumbnail, do the following:

a Press and hold the thumbnail.

After a short pause, the thumbnail enlarges to indicate that you can move it.

b Drag the thumbnail to another position and release it.

The other thumbnails are automatically repositioned.

3 To move an application thumbnail to another page (if multiple pages are available), do the following:

a Press and hold the thumbnail and move it to the edge of the window.

After a short pause, the next or previous page is displayed.

Dragging the thumbnail to the left edge of the window displays the previous page and dragging it to the right edge displays the next page, when available.

b Position the thumbnail as desired on the page.

NOTE
It is not possible to create a new page by dragging a thumbnail.

4 To set the application that is displayed when the system starts, move the application thumbnail to the upper-left position on the first page.

6.2.8 Using Cleaning Mode

The touch screen module provides a dedicated cleaning mode, allowing you to clean the module without inadvertently activating a function.

1 Tap **Applications** in the lower-left corner of the touch screen module.

2 In the **Applications** window, tap the **Cleaning Mode** application thumbnail.

Figure 57 Cleaning Mode application thumbnail

While the **Cleaning Mode** application is active, all functions on the module are unavailable.

3 To close the **Cleaning Mode** application after cleaning the module, press and hold anywhere on the module's display for three seconds.

The module displays user guidance and a timer that counts down as you press the display.

6.3 Control Modules

The control module provides a combination of controls to adjust the position of the stand and table, and to perform imaging functions during acquisition.

You can position the control modules at convenient positions around the table by mounting the modules on the accessory rail.

Do not attach more than two modules to the accessory rail.

6.3.1 Repositioning the Control Module

You can reposition the control module to a more convenient position for the study being performed.

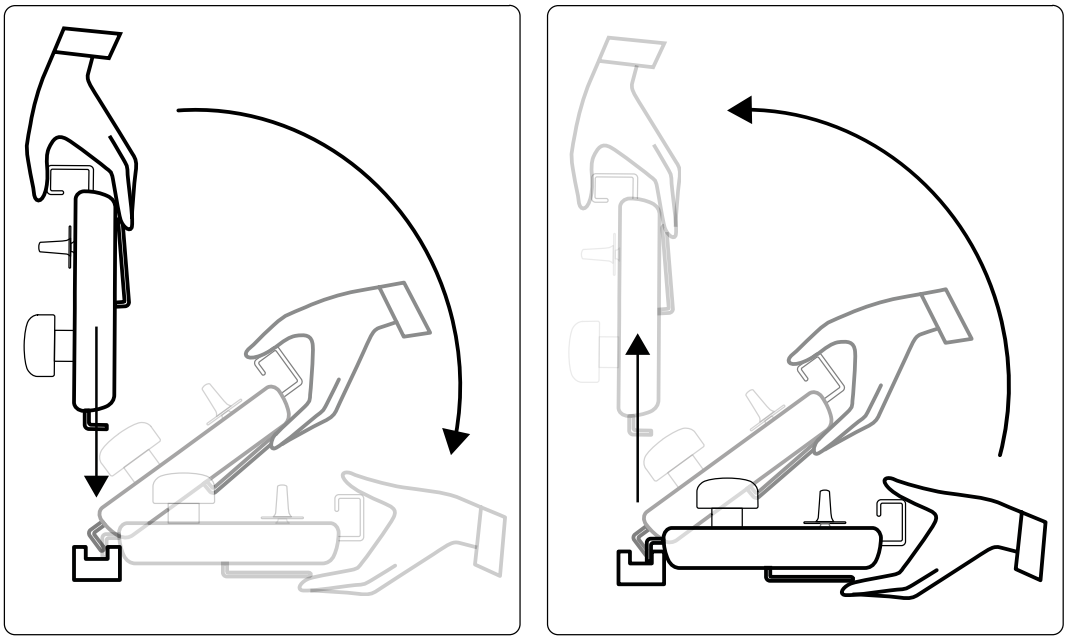


Figure 58 Attaching the control module (left) and removing the control module (right)

1. To remove the control module from the accessory rail, grip it from the front with one hand, with your thumb on top and your fingers on the lock release bar.
2. Press the lock release bar to release the module and lift the module upwards.

   The module can now be lifted off the accessory rail and moved to another position.
3. To attach the control module to the accessory rail, press the lock release bar to open the lock.
4. Place the lock over the accessory rail and push the module down until the back edge of the module housing is flush with the accessory rail, and then release the lock release bar.
5. Ensure that the control module cables are supported by the cable guides.
6. If you repositioned the control module to a different side of the table, you must select the correct tableside position using the **Orientation** switch. For more information, see Selecting the Tableside Position for the Control Module (page 76).

6.3.2 Selecting the Tableside Position for the Control Module

To ensure that stand movements remain logical for each position in which the control module can be mounted, the **Orientation** switch located on the under side of the module must be set to the appropriate position.

- When mounting the control module on the doctor side, the switch must point to the left.
- When mounting the control module on the nurse side, the switch must point to the right.
- When mounting the control module at the foot end, the switch must point towards the tabletop.

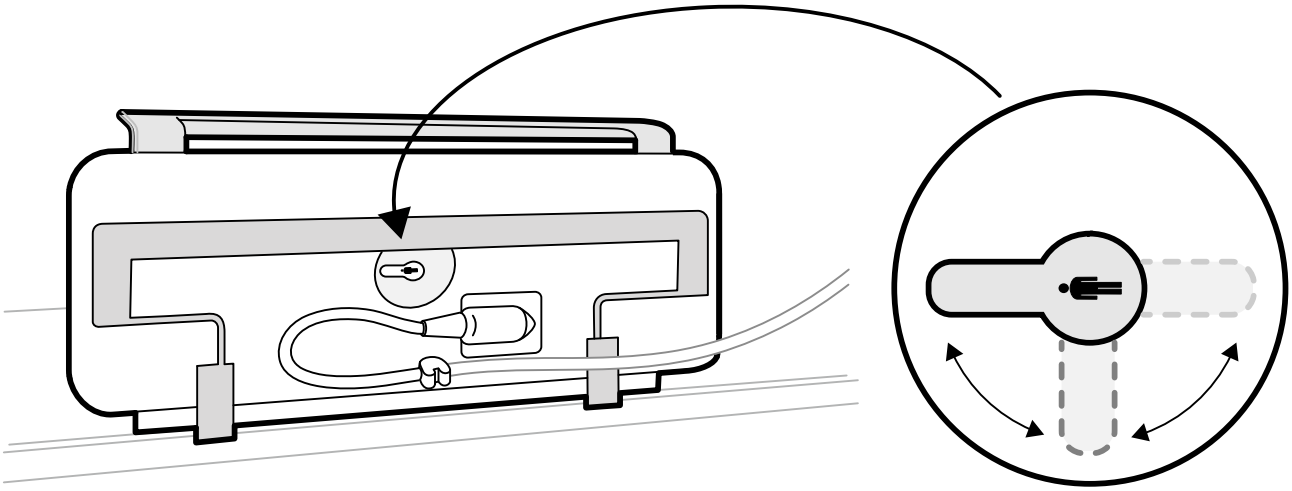


Figure 59 Control module (underside) and **Orientation** switch

For definitions of table positions, see Patient Table: Doctor Side and Nurse Side (page 469).

When the **Orientation** switch on the under side of the control module is in the correct position, the movement of the stand is logical compared to the direction in which the switches are operated.

6.4 Stand Movements

You position the stand in the working position using the control module.

The following working positions are available:
- Head side
- Doctor side
- Nurse side

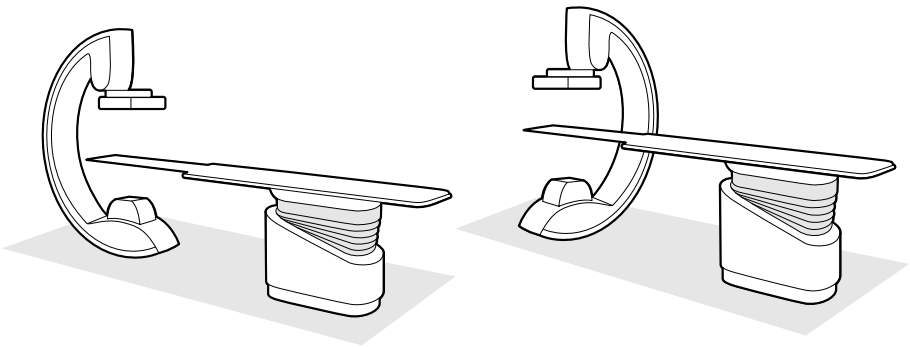


Figure 60 Positioning the stand at the head end (left) and nurse side (right)

For more information, see Patient Table: Doctor Side and Nurse Side (page 469).

Rotation and angulation movements are motorized with variable speed. The greater the deflection of the switch on the control module, the faster the stand moves. If the stand is not in its working area, the maximum speeds are reduced. For details of movement speeds, see Beam Carriers (page 310).

WARNING
All motorized movements should take place in the field of view of the operator.

The direction of movement is affected by the position of the **Orientation** switch on the underside of the control module. For more information, see Selecting the Tableside Position for the Control Module (page 76).

6.4.1 Positioning the Stand

This procedure provides information for preparing the stand.This procedure is applicable when the FlexArm option is not installed.

WARNING
All motorized movements should take place in the field of view of the operator.

NOTE
If you are using a biplane system, the source-to-image distance (SID) joystick for the lateral stand functions in one of two ways, depending on the configuration of your system:

- ***Fixed direction: Pushing the joystick up increases the distance and pushing the joystick down decreases the distance.***
- ***Intuitive direction: Pushing the joystick away from you moves the detector away from you and pulling the joystick toward you moves the detector toward you.***

For information about using the stand with the FlexArm option, see Positioning the FlexArm Stand (Option) (page 78).

1 Check the table lock status, and lock or unlock the table as appropriate during the procedure.

For more information, see Locking and Unlocking Stand and Table Movements (page 116).

2 If the table has the tilt option installed, ensure that the table is not tilted.

3 If the table has the pivot option installed, ensure that the table is not pivoted.

4 Set the detector source-to-image distance to the maximum.

5 Place the patient on the table in the desired position.

For more information, see Positioning the Patient on the Table (page 65).

6 Move the stand to the desired position.

For more information, see Patient Table: Doctor Side and Nurse Side (page 469).

7 Move the tabletop into the desired position.

8 Adjust the stand rotation and angulation for the required projections.

9 For additional positioning of the region of interest, use table movements.

For more information, see Isocentering (page 121).

10 If your system has a rotatable detector, rotate the detector to the desired position (portrait or landscape).

11 Move the detector as close as possible to the patient.

6.4.2 Positioning the FlexArm Stand (Option)

This section provides information for positioning the FlexArm stand (option) in preparation for a procedure.

WARNING
All motorized movements should take place in the field of view of the operator.

For information about using the stand without the FlexArm option, see Positioning the Stand (page 78).

The FlexArm stand provides longitudinal and transverse movements, and free detector rotation.

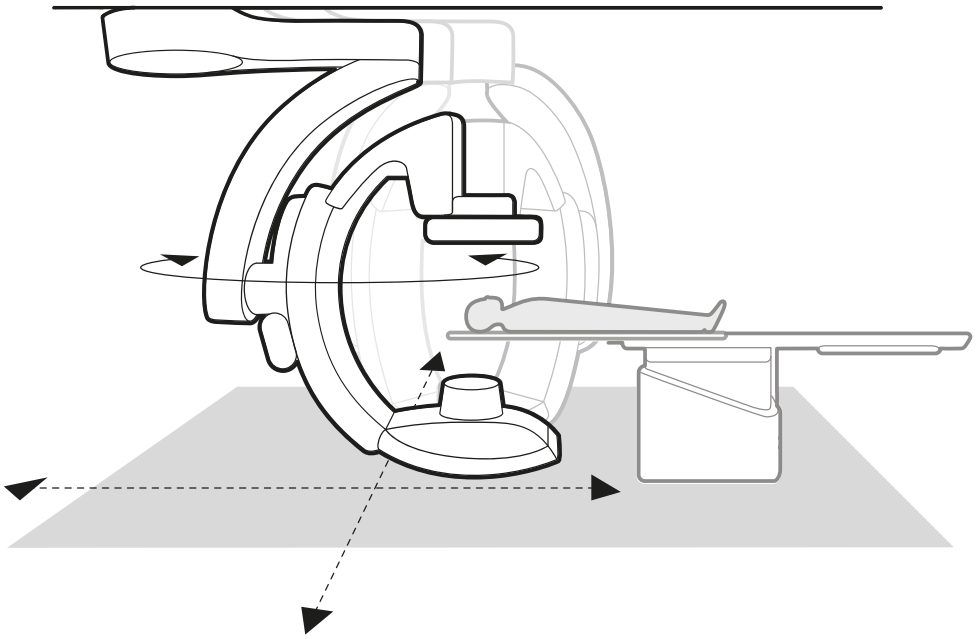


Figure 61 FlexArm stand (option)

The stand joystick on the control module provides intuitive control of the stand for consistent movements from any position:

- To move the stand longitudinally and transversely, push the joystick in the desired direction of movement. For example, to move the stand transversely, push the joystick in the corresponding direction from your point of view.
- To rotate the stand around the vertical axis, turn the joystick in the desired direction.

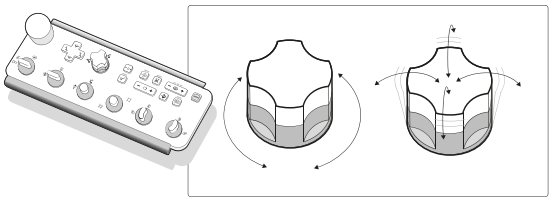


Figure 62 Stand joystick on the control module

When you make longitudinal and transverse movements with the FlexArm stand, it moves at a reduced speed for the first two seconds and then continues at the maximum speed. This allows you to make small, precise movements for accurate positioning of the region of interest, particularly when using a small field of view.

1 Check the table lock status, and lock or unlock the table as appropriate during the procedure.

For more information, see Locking and Unlocking Stand and Table Movements (page 116).

2 Set the detector source-to-image distance to the maximum.

3 Place the patient on the table in the desired position.

For more information, see Positioning the Patient on the Table (page 65).

4 Move the tabletop to the desired position.

5 Move the stand to the desired position using the stand joystick on the control module.

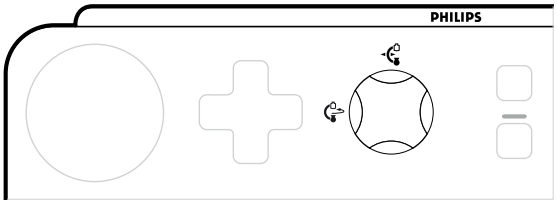


Figure 63 FlexArm stand joystick on the control module

a Turn the joystick to rotate the stand around the vertical axis.

This function allows you to position the stand at the head of the table or at either side, depending on your workflow. When you rotate the stand in the vertical axis, the selected projection is automatically maintained, allowing you to create space as needed during an intervention.

b Push the joystick in the direction that you want to move the stand to bring it to the region of interest.

It is possible to move the stand manually using the handles and brake controls on the side of the stand. There is a brake to control longitudinal movement and a brake to control movement around the vertical axis. If you move the stand out of its working area for motorized movements, a guidance message is displayed in the status area indicating the stand is out of range. Move the stand back to the working area manually to continue with motorized movement.

6 Adjust the stand rotation and angulation for the required projections.

7 To set the detector to a patient-aligned orientation (landscape or portrait), do one of the following:

- To set the detector to landscape orientation, push the detector switch to the left. The indicator light illuminates when the detector reaches the orientation.

- To set the detector to portrait orientation, push the detector switch to the right. The indicator light illuminates when the detector reaches the orientation.

NOTE
It is recommended to set the detector to a patient-aligned orientation. When the detector is patient-aligned and you turn the stand around the vertical axis (for example, to or from the side position), the alignment of the detector is automatically maintained with the region of interest in the isocenter.

8 To rotate the detector freely to align with a region of interest, turn the detector switch until the detector is in the desired position.

When you rotate the detector, the collimator rotates automatically to maintain the selected field size.

NOTE
Be aware that when the detector is in a free position and is not patient-aligned (landscape or portrait orientation), its orientation towards the patient is not maintained during stand movements around the vertical axis (the detector keeps its orientation relative to the stand).

NOTE
When you turn the stand or rotate the detector, the rotation direction of the detector and collimator is determined by the system to maintain an optimal range of freedom for successive movements. The detector and collimator may rotate in the direction contrary to your expectation, but the desired orientation is always attained. This is called "switching" and a guidance message is displayed in the status area when the system performs a switching movement.

9 Move the detector as close as possible to the patient.

For information about isocentering the region of interest, see Isocentering (page 121).

10 To move the stand to a new region of interest, move the stand longitudinally or transversely.

11 To park the stand, move it transversely to side of the examination room at the head end or the foot end of the room.

Parking the stand creates space around the patient table for cleaning or for procedures that do not require X-ray imaging. When you move the stand towards the wall to park it, it automatically rotates to provide maximum space. If the stand is parked during an intervention, and the patient table is not moved, you can move the stand back to the working position automatically to resume imaging.

You can also move the FlexArm stand using automatic position control. A dedicated **Pathway** function allows you to select a stored destination position and move the stand automatically along a predefined path. For example, the **Pathway** function can be configured to move the stand between the park position and the working position. For more information, see the following sections:

- Using Automatic Position Control (page 117)
- Customizing APC Pathways (page 278)

6.4.3 Positioning the Stand with the FlexMove Option

The FlexMove option provides longitudinal and transverse movements for a ceiling-mounted stand.

WARNING
All motorized movements should take place in the field of view of the operator.

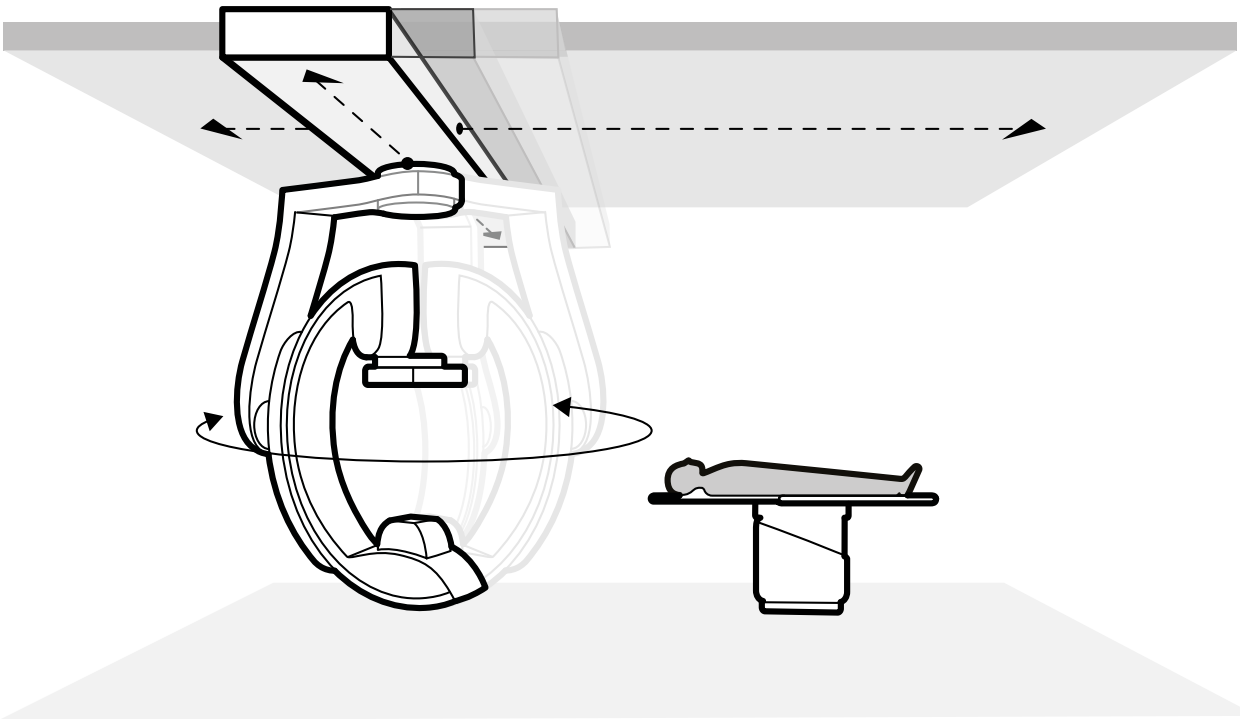


Figure 64 FlexMove geometry

- To perform manual movements, do the following:

  a Press and hold the **Longitudinal/Transverse** movement brake release key on the stand.

  b Use the handgrips to push or pull the stand to the desired position.

  c To stop the movement, release the key.

- To perform motorized movements, use the **Move Beam XY Motorized** switch on the control module.

6.4.4 Image Beam Rotation

Image beam rotation (IBR) allows you to acquire images with the detector oriented in the clinically preferred way, independent of the position of the stand and the position of anatomical objects.

WARNING
All motorized movements should take place in the field of view of the operator.

Image beam rotation is available with the following stands:
- The frontal stand of the Azurion B20/15 Neuro system
- The FlexArm stand

Image beam rotation allows the simultaneous rotation of both the detector and the collimator, so that different orientations for a projection are possible for any stand position. This aligns the beam with the region of interest and allows the operator to select a desired orientation of the region of interest (for example, alignment with the arm for radial access). Both of the following situations are possible and would produce the same image:
- Position the stand at 45 degrees on the nurse side and orient the detector in a landscape position.
- Position the stand parallel to the table and orient the detector at 45 degrees.

When the detector is patient-aligned (set to landscape or portrait orientation) and you turn the frontal stand, the alignment of the detector is automatically maintained with the region of interest in the isocenter. (The stand may perform additional compensating movements as you turn it using the stand joystick.) Therefore, the FlexArm stand position is not restricted to doctor, head, or nurse side. The region of interest is also maintained in the isocenter if you tilt or cradle the tabletop.

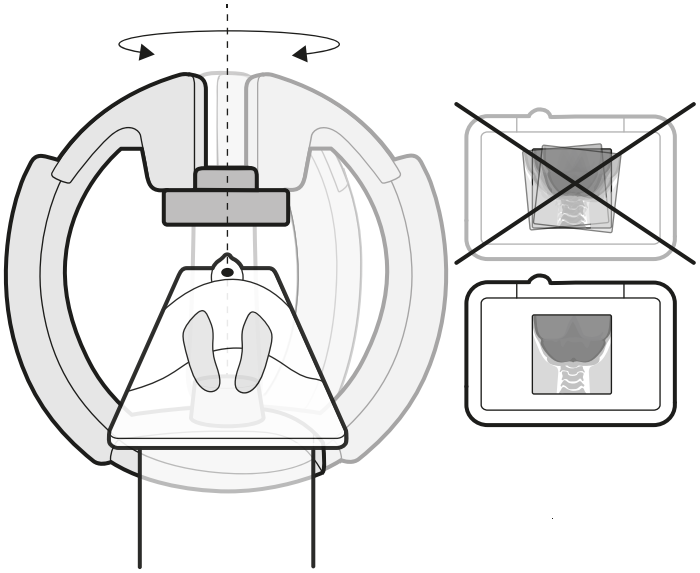


Figure 65 Image beam rotation

6.5 Collision Prevention

The Azurion system uses the BodyGuard function and the Intelligent Collision Prevention (iCP) function to protect the patient by slowing system movement speeds when an object is sensed within a certain safety distance.

WARNING
During manual and motorized movements of the stand or the table, the operator is responsible for the safety of patient, staff, and equipment. Avoid collisions to prevent serious injury to patient and staff, or damage to the equipment.

CAUTION
If a collision occurs involving any part of the system, contact technical support.

If a collision occurs that causes any equipment cover to break or become detached, you should do the following:

- Finish the case
- Switch off the power
- Contact technical support

6.5.1 BodyGuard

The frontal stand is fitted with BodyGuard sensors around the detector. Depending on the stand in use, sensors may also be located around the X-ray tube and collimator housing.

The BodyGuard sensor detects the proximity of a person and slows down or stops a movement in proximity of a detected person. In this way, the BodyGuard helps to prevent collisions with the patient during normal use of the system. The BodyGuard cannot prevent all collisions, but if a collision occurs, the collision force will be lower because of the reduced movement speed.

During rotational scans and bolus chase applications, the Bodyguard sensors are switched off to prevent interference with the clinical function.

To ensure that the path is clear during a rotational scan, a trial run is performed. To prevent a collision, the patient should remain stationary between the trial run and the acquisition run, which is performed at a higher speed.

Note the following concerning the BodyGuard function:
- Do not place an object that is not electrically conductive on the patient. Such objects cannot be detected by the BodyGuard sensor and a collision may occur.
- The BodyGuard sensor has a blind spot in its center. Small objects, such as the patient's nose or a very small child (for example, a baby of less than 1 kg) may not be detected when approached from directly above.
- To prevent the detector from hitting objects during APC movements, the detector can be configured to remain at the maximum SID when recalling a position. For more information about how to configure this function, contact technical support.
- BodyGuard sensors must be kept dry, otherwise the BodyGuard function degrades.
- If the system detects an issue with the BodyGuard sensor, stand movement speeds are reduced.

BodyGuard Off Below Table
The BodyGuard function can be customized such that certain BodyGuard sensors are switched off when they are below the table. When the sensors are switched off, BodyGuard does not prevent a collision with an object below the level of the tabletop. When the stand is positioned at the doctor or nurse side, the BodyGuard sensor on top of the stand remains switched on, to prevent a collision with the operator's legs.

6.5.2 Intelligent Collision Prevention

Intelligent Collision Prevention (iCP) helps to prevent collisions between the tabletop, the X-ray tube, and the stand. In a biplane system, iCP also helps to prevent collisions between the frontal stand and the lateral stand.

When a distance between objects becomes too small, a collision is prevented by reducing the movement speed or stopping the movement.

In most cases, it is possible to override the iCP and resume movement in a controlled way. This is done by releasing the movement control and reactivating it within 5 seconds.

It is the responsibility of the operator to ensure that collisions with the patient or equipment do not occur while the override function is active.

When you activate the override function, a message is displayed in the status area, and a repeating beep sound can be heard. The maximum movement speed during override is reduced compared to normal movements. The override function is deactivated and normal movements are available again if the requested movement is no longer being limited by the collision prevention system.

6.5.3 Collision Detection

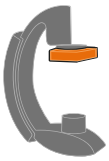
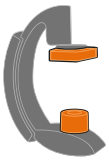
Although the Bodyguard sensors and the iCP function help in preventing collisions, it is still possible to cause a collision (for example, during override mode or with other equipment in the examination room).

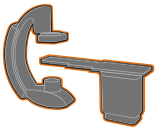
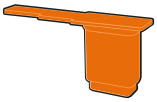
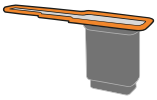
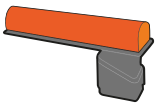
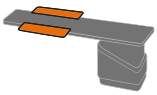
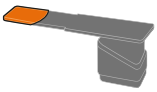
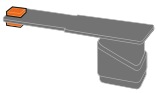
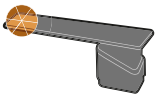
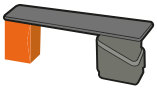
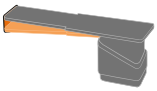
To limit the collision forces, all system movements are guarded by either current sensing, collision switches, or force sensors (depending on the movement and configuration type).

If a collision is detected, all movements are stopped and subsequent movements might be restricted until the collision condition is resolved.

6.5.4 Collision Indicators

When a collision is detected, a collision indicator is displayed in the following locations:
- In the status area of the live X-ray window in the examination room.
- In the status area of the acquisition window in the control room.

Indicator	Description
	• The frontal detector is nearing a collision or a detector collision has been detected by the force sensor. Movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The frontal stand is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The frontal tube is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	The X-ray beam is misaligned. The image size is reduced. Align the detector to portrait or landscape orientation.
	• The frontal stand is nearing a collision (not involving the detector or the tube) and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral detector is nearing a collision or a detector collision has been detected by the force sensor. Movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral stand is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral tube is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.

Indicator	Description
	• Motorized movement has stopped to prevent a collision between the frontal stand and the lateral stand. • This indicator is also displayed when override is active.
	• Motorized movement has stopped to prevent a collision between the stand and the table. • This indicator is also displayed when override is active.
	• Motorized movement has stopped to prevent a collision with the table. • This indicator is also displayed when override is active.
	Movement speeds have been reduced.
	• The stand is nearing a collision with the patient zone of the table. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the extended patient zone of the table. • This indicator is also displayed when override is active.
	The stand is nearing the finger-pinching zone of the table.
	• The stand is nearing a collision with the head support. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the head clamp. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the spinal frame. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the underside of the table. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with a person or object in a parking position and movement speeds have been reduced (FlexArm option). • This indicator is also displayed when override is active.

For more information, see the following sections:
- Status Area (page 438)
- Intelligent Collision Prevention (page 83)

6.6 Positioning the Monitor Ceiling Suspension

NOTE
Do not allow the patient to touch the lower handgrip of the monitor ceiling suspension. It is not an applied part and should not come into contact with the patient.

NOTE
Do not mount any equipment on the lower handgrip of the monitor ceiling suspension that is not regarded as an applied part.

For more information, see Applied Parts (page 420).

1 Press and hold the motorized movement buttons to adjust the height of the monitor ceiling suspension.

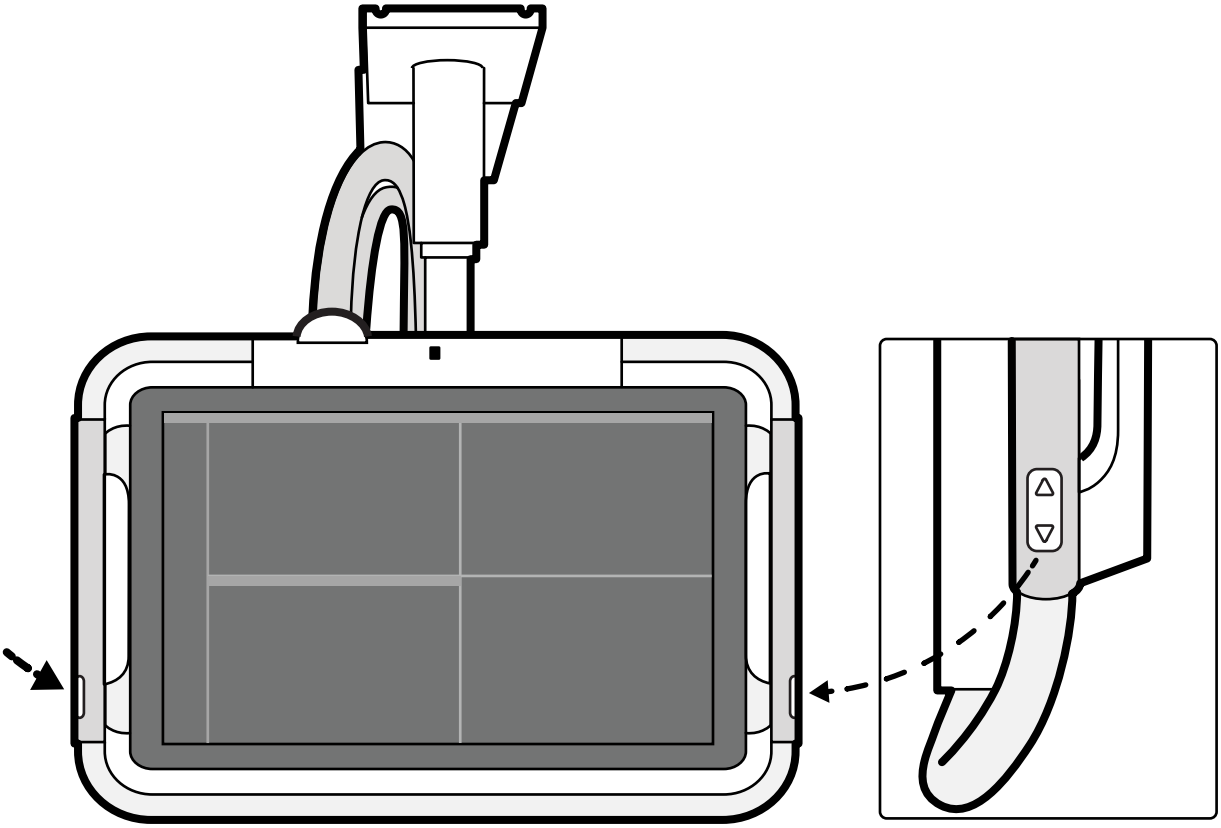


Figure 66 Monitor ceiling suspension height movement buttons

2 Push or pull the handgrip to make the following adjustments:
- Adjust the horizontal working position of the monitor ceiling suspension.
- Rotate the monitor ceiling suspension.

6.7 Positioning the Monitor Boom

The monitor boom can be moved by releasing color-coded brakes using buttons positioned on either side of the handgrip. You can also freely rotate the monitor frame or adjust its height without releasing a brake.

An X-ray indicator light is positioned on the upper corner of the handgrip on either side.

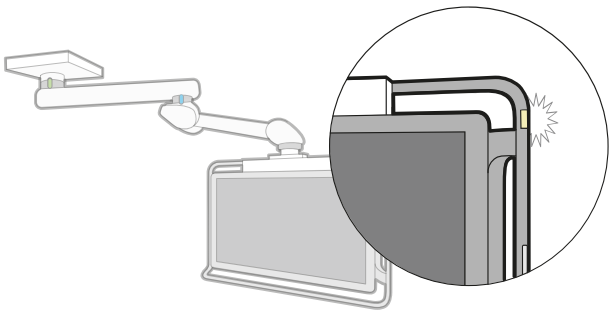


Figure 67 X-ray indicator light

1 To move the monitor boom from its parking position, do the following:

a Press the green brake release button on the side handgrip of the monitor boom and pull the handgrip to move the upper arm toward the patient table.

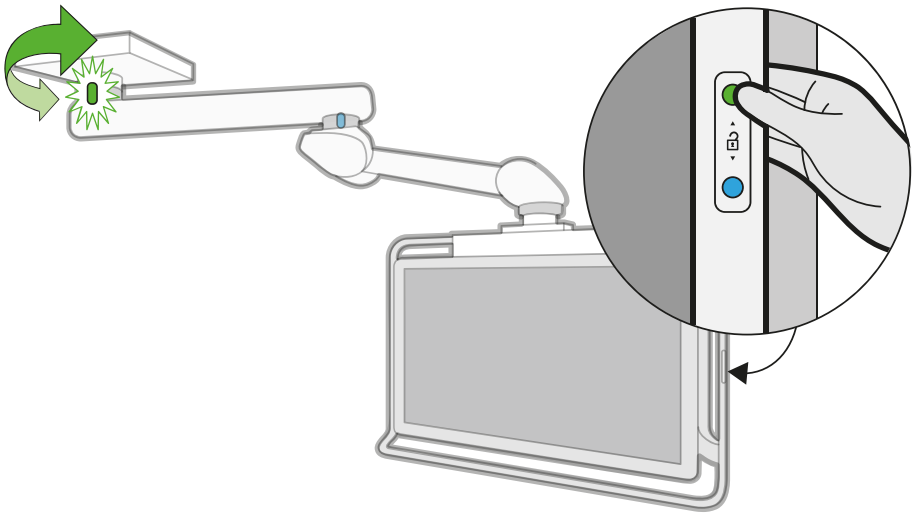


Figure 68 Brake release button for the upper arm

b Press the blue brake release button on the side handgrip of the monitor boom and pull or push the handgrip to adjust the position of the lower arm in the working position.

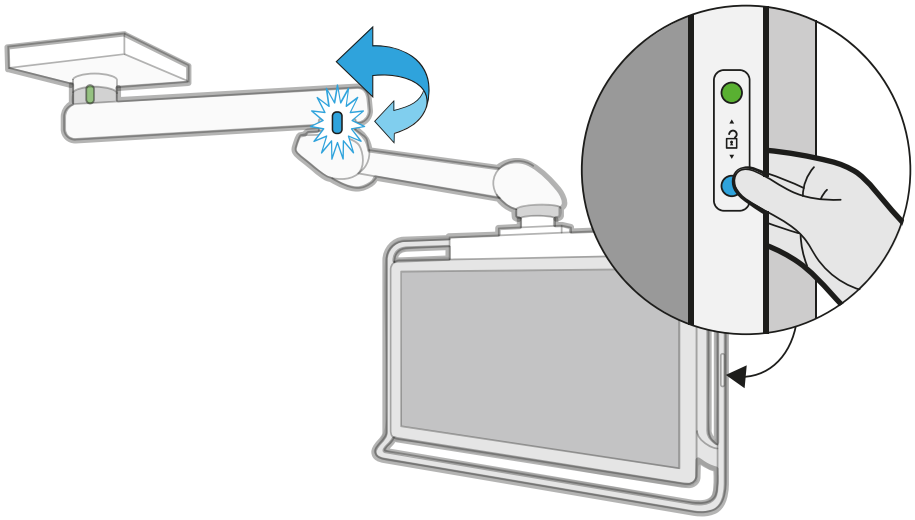


Figure 69 Brake release button for the lower arm

NOTE
You can release both brakes at the same time by pressing the button between the color-coded brake release buttons. However, it is recommended to release one brake at a time for better control of the movement of the monitor boom.

c Pull or push the handgrip to adjust the orientation or the height of the monitor boom.

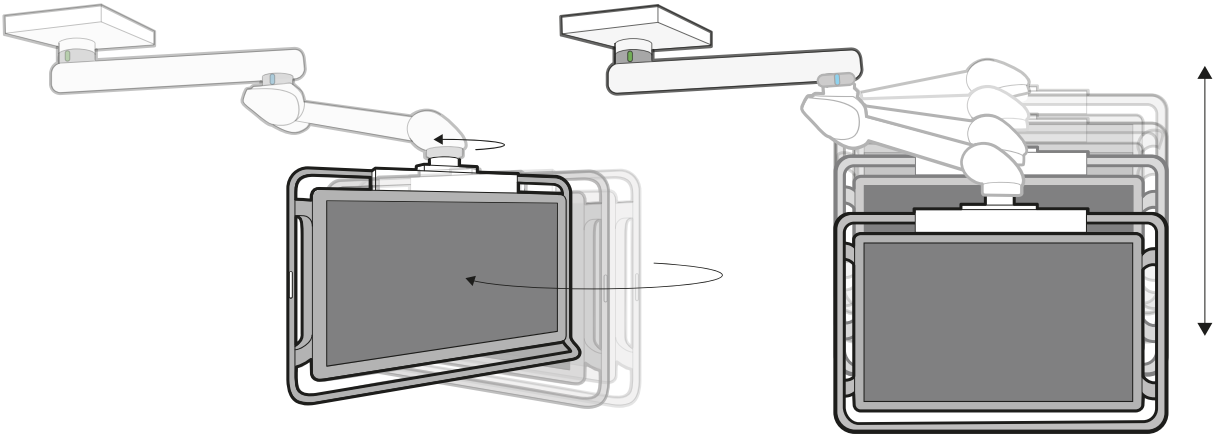


Figure 70 Moving the monitor boom manually

2 To move the monitor boom back to its parking position, release the brakes as appropriate and push the monitor boom away from the patient table to the desired position.

NOTE
When moving the lower arm, ensure that it is below the height of the upper arm to avoid a collision.

6.8 Positioning the Table

These sections provide guidance on using the table positioning functions.

6.8.1 Adjusting the Table Height

You can adjust the height of the table to ensure the region of interest is in the appropriate position.

For more information about positioning the region of interest in the isocenter, see Isocentering (page 121).

1 Clear all objects from the path of the table.

2 Using the control module, adjust the table height until the region of interest is in the middle of the field of view.

This can be aided with fluoroscopy.

6.8.2 Floating the Tabletop

You can float the tabletop transversely and longitudinally to assist in positioning the region of interest.

Depending on your system configuration, transverse and longitudinal movements may be manual or motorized.

1 Clear all objects from the path of the table.

2 Using the control module, float the table and center the region of interest in the middle of the field of view.

This can be aided with fluoroscopy.

6.8.3 Tilting the Table

The tilt function allows you to tilt the tabletop from -17 degrees to +17 degrees.

WARNING

Beware of finger entrapment. Do not place your fingers on the table bellows during tilting.

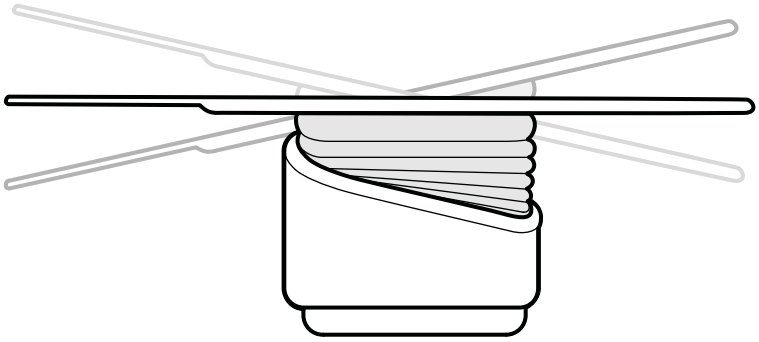


Figure 71 Tilting the table

1 Clear all objects from the path of the table.

2 Press and hold **Tilt** until the desired angle is reached.

If the synchro tilt option is available and the working position is set to doctor side or nurse side, the table height automatically adjusts during the tilt movement to ensure the region of interest stays in the isocenter.

3 To float the tabletop when it is tilted, press the **Float Tabletop** control on the control module, and then push the **Float Tabletop** control in the direction that you want to move the tabletop.

To assist with moving the tabletop with heavy patients, longitudinal movements are automatically motorized when you use **Float Tabletop** with a tilted tabletop. Transverse movements are not motorized, even when the tabletop is tilted.

6.8.4 Cradling the Table

The cradle function allows you to cradle the tabletop from -15 degrees to +15 degrees.

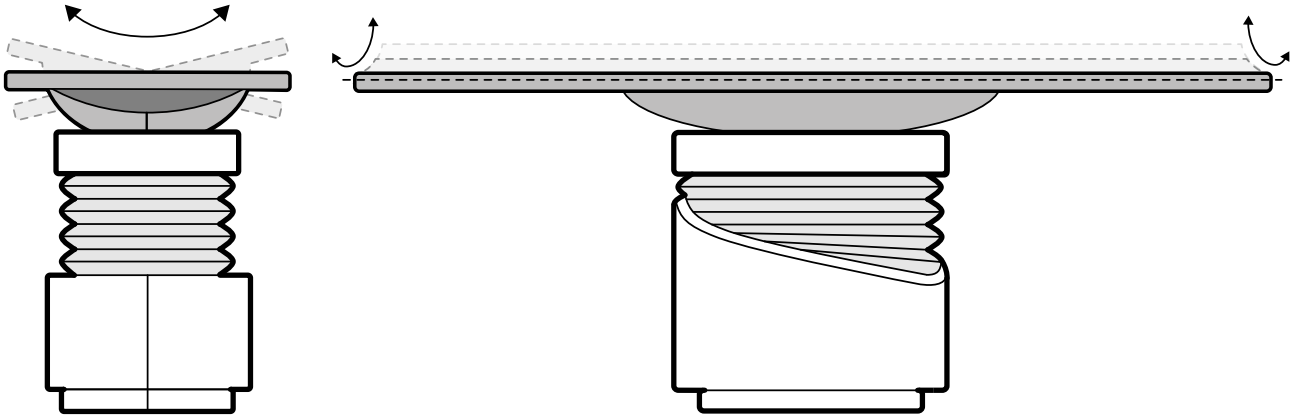


Figure 72 Cradling the table

1 Clear all objects from the path of the table.

2 Press and hold **Cradle** until the desired angle is reached.

6.8.5 Pivoting the Table (Option)

If installed, the pivot option allows you to pivot the tabletop for improved accessibility during patient transfer, or to position the tabletop for a procedure.

1 Clear all objects from the path of the table.

2 To pivot the table from the head end, extend the tabletop to the head end to make pivoting the table easier.

If the procedure or room arrangements require you to pivot the table from the foot end, do not extend the table, so that less force is necessary to perform the pivot movement.

3 Unlock the table pivot lock by turning and holding the **Pivot Lock** switch on the control module until the unlock indicator light changes color from white to blue.

4 Push the table to the desired angle.

There are detent positions at +13 degrees and -13 degrees, and another detent position at +180 degrees or -180 degrees (the choice is selected during installation of the system).

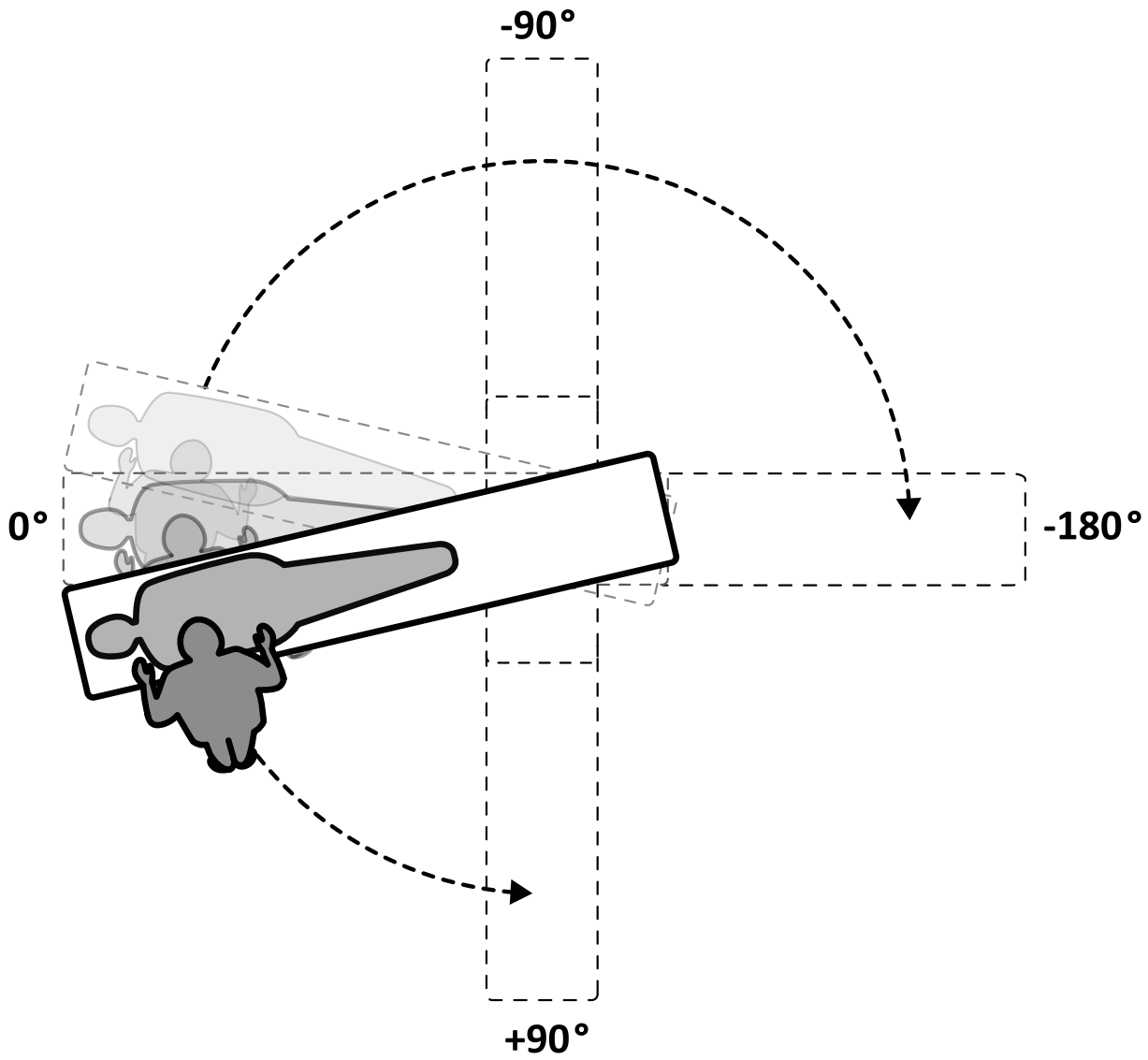


Figure 73 Range of pivot movement

NOTE
If the table is pivoted by more than 13 degrees, the BodyGuard cannot prevent collisions with the patient during rotation and angulation movements.

NOTE
The pivot lock engages automatically after 10 seconds if you do not pivot the table within that time.

The unlock indicator light on the control module switches to white when the pivot lock is engaged.

5 Before continuing with your task, ensure that the pivot lock is engaged by pushing or pulling the tabletop.

6.8.6 Swiveling the Table (Option)

If installed, the swivel option allows you to position the table for entire body imaging.

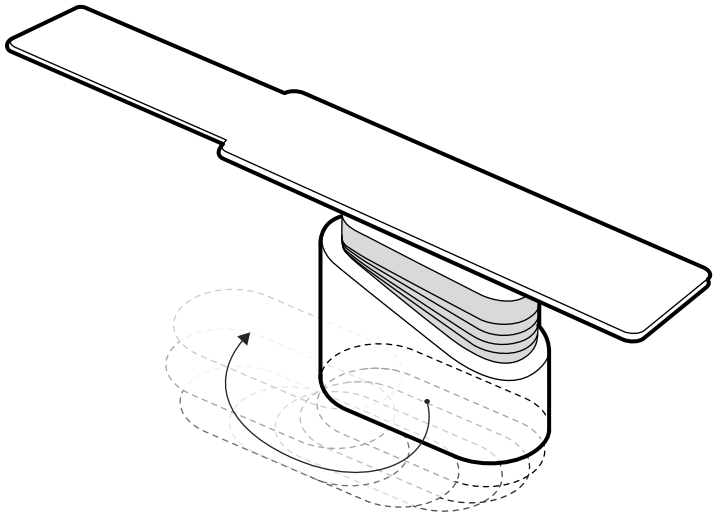


Figure 74 Swiveling the table

NOTE
The swivel option is not available for the patient table when using a ceiling-mounted frontal stand.

1 Clear all objects from the path of the table.

2 Press and hold the direction button on the swivel hand switch.

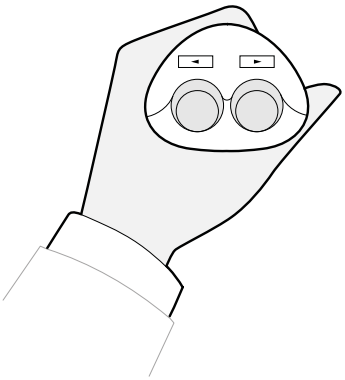


Figure 75 Swivel hand switch

6.9 Using an OR Table (Option)

You can use an OR table with the Azurion X-ray system. The level of integration depends on the OR table used, and available functions are described in this section.

The Azurion X-ray system is compatible with OR tables from the following manufacturers:
- Maquet Magnus table from Getinge, referred to as Maquet in these Instructions for Use.
- TruSystem table from Hillrom (Trumpf), referred to as TruSystem in these Instructions for Use.

For more information, see Compatibility (page 18).

Tableside Modules
Tableside modules can be mounted on the OR table. During patient transfer to or from the table, the tableside modules can be parked on a pedestal (option) in the examination room.

Geometry Set-Up and BodyGuard
When using an OR table, the following functions are not available:

- Automatic stop at work positions 1 or 2 during motorized longitudinal movement of the stand
- BodyGuard Off Below Table (optional function)

When using an OR table, the automatic BodyGuard override (ABO) function is available. When an object is sensed, this function allows stand movements and transverse or longitudinal movements of the table to continue at a safe speed.

When using an OR table with the FlexArm stand, the automatic BodyGuard override function is not available. In this case, table movement stops and only continues at a safe speed when you restart the movement action.

Collision Detection

WARNING
When moving the table, take care to avoid collisions with the stand.

The Intelligent Collision Prevention (iCP) function prevents collisions between the stand and the OR table.

When a collision is detected, the following actions are performed:
- All table movements are stopped.
- A user message is displayed, and an acoustic signal sounds.

Normal movement is restored when the collision is resolved.

NOTE
If the X-ray system is switched off, the collision detection system will not function when table movement is controlled with the OR table controls.

Accessories
The following accessories can be used with an OR table.
- Arm support board (not available with the TruSystem OR table)
- Shoulder support board
- Peripheral X-ray filters
- Cerebral filter (not available with the FlexArm option)
- Neuro wedge
- Ceiling-suspended radiation shield
- Accessory bracket for ceiling suspended radiation shield

NOTE
Additional accessories may be available from the manufacturer of the OR table. However, these accessories have not been tested for use with the Azurion X-ray system. Refer to the information provided by the manufacturer.

Parking the Stand
If the optional ceiling rail extension is installed, you can park the stand so that it is out of the way of the table. The optional ceiling rail extension is available at the head end or at the foot end.

6.9.1 Maquet Operating Table (Option)

The Maquet operating table consists of the operating table column and tabletop. The tabletop is available in the following configurations:
- Universal tabletop: Suitable for a range of surgery applications, using a base plate and additional jointed modules to allow patient positioning.
- Radiolucent tabletop: Suitable for interventional procedures and minimally invasive operations.

NOTE
Do not use straps from Philips to secure the patient during movements. Refer to the Maquet documentation for details of how to secure the patient.

Startup and Shutdown
Startup and shutdown of the Maquet operating table is managed by the X-ray system. It is not necessary to power it on or off.

Patient Transfer
During patient tabletop transfer, the X-ray system may be switched on or off. If the X-ray system is switched on, table movement functions on the control module of the X-ray system are locked.

Patient Orientation
The Maquet operating table features a blue dot on the table base. When the upper part of the patient's body is on the same side as the blue dot, the patient orientation for the Maquet operating table is Normal (patient's head at the head end of the table). Otherwise, the patient orientation is Reversed (patient's head at the foot end of the table).

Patient orientation functions on each system are linked; when the patient orientation is changed on the Maquet operating table, the patient orientation indication of the patient's head at the head end of the table or at the foot end of the table is updated on the X-ray system (the indication of the patient facing up or facing down is not updated). The displayed rotation angle and angulation angle are also updated.

Operation Modes
A subset of table functions is available using the control module of the X-ray system.

Function	Universal Tabletop	Radiolucent Tabletop
Basic table functions (longitudinal, transverse, height, and cradle movements)	Yes	Yes
Isocentric tilt	No	Yes
SyncraTilt	No	Yes
Automatic Position Control (APC)	No	Yes
Bolus chase (FDPA)	No	Yes
Table locking (whole system)	Yes	Yes
Emergency stop	Yes	Yes
Reset geometry (not available when the stand and table are locked)	No	Yes
Compatibility with Interventional Tools	Yes (with universal frame)	Yes

Alternatively, full control of the table is provided on a dedicated Maquet remote control module or joystick. For details of the Maquet user interface controls, refer to the documentation supplied with the Maquet operating table.

NOTE
To prevent unintentional movement of the Maquet table during procedures that require imaging, it is recommended that you do not use the Maquet controls, and instead use the two-step approach of the Philips controls: unlock the table and use the movement controls.

NOTE
The large size of the universal tabletop may make 3D acquisition difficult to perform.

NOTE
Any movement function can be started from either the control module or the Maquet user interface controls in the examination room. However, if a movement function is activated on each module at the same time, all movements are blocked until the movement function on both modules is deactivated.

NOTE
If movements are blocked on the control module after changing the tabletop, first activate the desired movement using the Maquet user interface controls. The control module will then be enabled again for further movements.

NOTE
If the geometry is locked by the control module and the X-ray system is switched off, the Maquet table is automatically unlocked. Table functions are still available using the Maquet remote control module.

6.9.2 TruSystem Operating Table (Option)

The TruSystem operating table consists of the operating table column and tabletop. The tabletop is available in the following configurations:

- Carbon FloatLine OR tabletop: Suitable for cardio and vascular interventional procedures.
- Carbon Spine OR tabletop: Suitable for spine surgery applications.
- SQ14 X-TRA OR tabletop: Suitable for universal surgery applications.
- Universal tabletop: Suitable for universal surgery applications.

You can change the tabletop using the TruSystem shuttle and table docking system.

NOTE
When docking the shuttle to change the tabletop, ensure that the stand is parked. This provides space for the shuttle and prevents interference from the X-ray system's collision prevention features while docking the tabletop.

NOTE
Do not use straps from Philips to secure the patient during movements. Refer to the TruSystem documentation for details of how to secure the patient.

Startup and Shutdown

When the X-ray system is switched off, it is still possible to use the TruSystem table.

WARNING
After the X-ray system is switched on, do not move the table until the X-ray system is fully operational.

Patient Transfer

During patient tabletop transfer, the X-ray system may be switched on or off. If the X-ray system is switched on, table movement functions on the control module of the X-ray system are locked.

Operation Modes

A subset of table functions is available using the control module of the X-ray system.

NOTE
Table functions are not available using the control module if the FlexMove option is installed. For more information, see Using a TruSystem Table with the FlexMove Option (page 95).

	Tabletop			
Function	**Carbon FloatLine**	**Carbon Spine**	**SQ14 X-TRA**	**Universal**
Basic table functions (longitudinal, transverse, height, and cradle movements)	Yes	Yes	Yes	Yes
Isocentric tilt	No	No	No	No
SyncraTilt	No	No	No	No
Automatic Position Control (APC)	Yes	Yes	Height only	No
Bolus chase (FDPA)	No	No	No	No
Table locking (whole system)	Yes	Yes	Yes	Yes
Emergency stop	Yes	Yes	Yes	Yes
Reset geometry (not available when the stand and table are locked)	Yes	Yes	Limited: only the middle segment (mounted directly on the column) is reset	Limited: only the segment mounted directly on the column is reset
Compatibility with Interventional Tools	Yes	Yes	Yes	Yes

Alternatively, you can control the TruSystem table using a dedicated remote control or a control panel on the table column. For details of the TruSystem user interface controls, refer to the documentation supplied with the TruSystem operating table.

WARNING
When moving the X-ray system or the table manually or under motor control, take care to avoid collisions with the patient or objects.

NOTE
To prevent unintentional movement of the TruSystem table during procedures that require imaging, it is recommended that you do not use the TruSystem controls, and instead use the two-step approach of the Philips controls: unlock the table and use the movement controls.

NOTE
The large size of the universal tabletop may make 3D acquisition difficult to perform.

NOTE
Any movement function can be started from either the control module or the TruSystem user interface controls in the examination room. If a movement function is activated on each module at the same time, the function activated on the TruSystem user interface has priority.

6.9.3 Using a TruSystem Table with the FlexMove Option

If you are using a TruSystem table with the FlexMove option, some limitations on the operation of the TruSystem table apply.

Table Control

NOTE
When the FlexMove option is installed, the control module cannot be used to control the TruSystem table.

The TruSystem table can be controlled using the remote control supplied with the table, or using the emergency control panel on the table base.

When moving the table towards the tube or towards the detector, the table stops at a distance of approximately 5 cm from the tube or detector cover.

A collision message appears on the X-ray system display. In this situation it is not possible to move the table in any direction.

NOTE
Be aware that the user message disappears after some time, but table movement is still inhibited. In this situation the table can be moved in table override mode. The restriction can be canceled by moving the stand away from the table.

When the table has been stopped by BodyGuard, the table can be moved in override mode. The override mode works when the table override joystick is moved downwards and a table movement button is pressed simultaneously. Alternatively, you can use the emergency control panel on the table base which will override movement restrictions.

If the movement has been stopped by BodyGuard, the table can also move again when BodyGuard is no longer active because the stand has been moved away. The table override joystick does not have to be used in this situation.

As long as the override mode is active, a beep sound is heard and a BodyGuard user message is shown.

CAUTION
It is possible for the table to collide with the X-ray system. The table will not stop by itself.

X-ray System Controls
If you are moving the X-ray system towards the TruSystem table and the X-ray system stops because it is too close (5 cm) to the table, you can move the X-ray system away from the table without overriding.

When BodyGuard is activated it is possible to move the X-ray system closer to the table at a lower speed.

During a warm restart procedure, you can move the table.

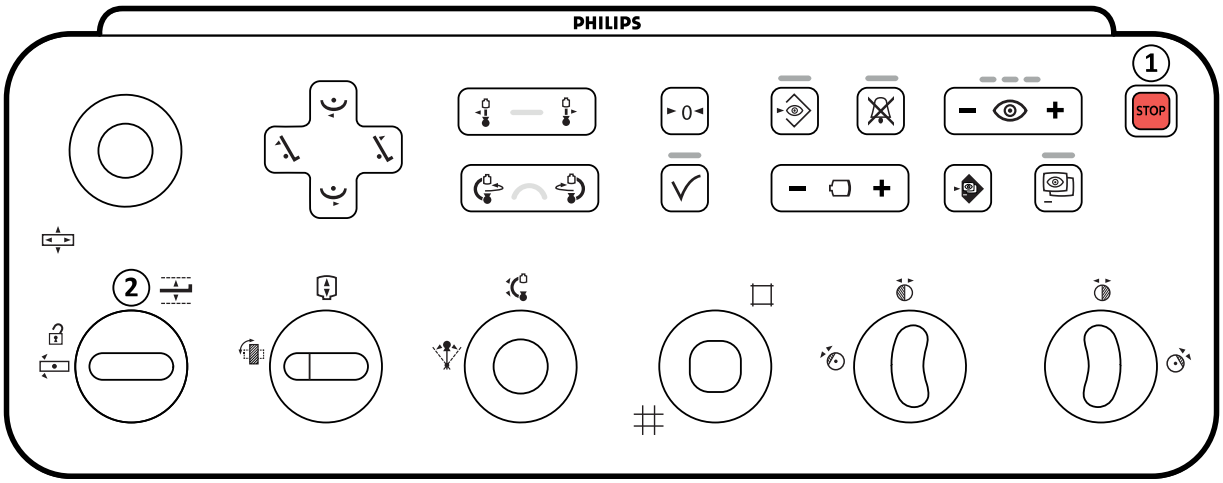


Figure 76 Control module

Legend	
1	Emergency stop
2	Table override

Emergency Stop

The emergency stop button stops any motorized movement by switching the geometry functions off. The geometry functions become operational again after a geometry restart.

To perform a geometry restart, press **Power On** on the review module.

Table Override

Move the joystick downward to activate the override mode.

WARNING

The system has limited collision prevention functionality when using a TruSystem table in combination with the FlexMove option. When moving the X-ray system or the table manually or under motor control, take care to avoid collisions with the patient or objects.

NOTE

The X-ray system patient orientation position information is inaccurate since it is based on the horizontal table position and is independent of the position of the TruSystem table.

Rotational Scan

After defining the end position for the rotational scan, TruSystem table movements are blocked.

The table is enabled again once the rotational scan has been performed.

If the rotational scan procedure is stopped before the scan is completed, the table is only enabled again once another procedure is selected.

6.9.4 Fitting Sterile and Disposable Covers in a (Hybrid) OR Environment

CAUTION

You should always use disposable sterile covers with the system when using it in a (hybrid) OR environment to avoid contact with the equipment. Preventing contamination in this way makes cleaning the equipment easier.

Sterile and non-sterile covers and sheets for the equipment can be purchased from Ecolab. For details, please refer to the Ecolab website:

www.ecolab.com

NOTE

Any covers that are positioned under the table, or that are moved under the table during the procedure, must be considered as not sterile.

NOTE
If there is any doubt regarding a cover's sterility, consider it not sterile.

NOTE
A new set of sterile covers must be used for each procedure.

The following covers are provided in the sterile covers package:
- Stand bottom cover
- Stand top cover
- Detector cover
- Cable harness cover

1 Park the stand in the standby parking position, with the detector above and the tube below.

NOTE
If you cannot easily reach the top part of the stand, turn the stand to the lateral position.

2 From the sterile cover set package, take the stand bottom cover, which is identified with a sticker displaying a tube image.

3 Place the stand bottom cover over the tube and the bottom inner part of the stand.

4 Open the glued stickers and attach the inner part of the stand bottom cover to the bottom inner part of the stand.

5 Take the cable harness cover, which is identified with a sticker displaying an arrow.

6 Open the glued stickers and begin to attach it along the length of the left side of the cover, and then along the length of the right side.

7 Take the stand top cover, which is the biggest piece of the cover set package, and which is identified with a sticker displaying a detector image.

8 Starting with the opening indicated with the identification sticker, place the stand top cover around the top part of the detector, ensuring that the elasticated end surrounds the flat round connection part of the detector.

9 Open the glued stickers and attach the stand top cover to the inner part of the stand from top to bottom.

10 Take the detector cover, which is the smallest piece of the sterile covers package.

11 Place the detector cover over the detector, ensuring that the elasticated end surrounds the flat round connection part of the detector.

A separate cover package can be purchased from Microtek for the touch screen module. The Instructions for Use supplied with the touch screen module cover package provide guidance on fitting the cover.

Standard covers can be used for the foot switch, which should be covered with a plastic cover or bag.

6.10 Using Radiation Shields

Radiation shields provide additional protection against stray radiation. You can use a table-mounted radiation shield and a ceiling-suspended radiation shield with the system.

The table-mounted and ceiling-suspended radiation shields are 0.5 mm lead (Pb) equivalent. For optimal protection, use the table-mounted and ceiling-suspended radiation shields together with lead aprons.

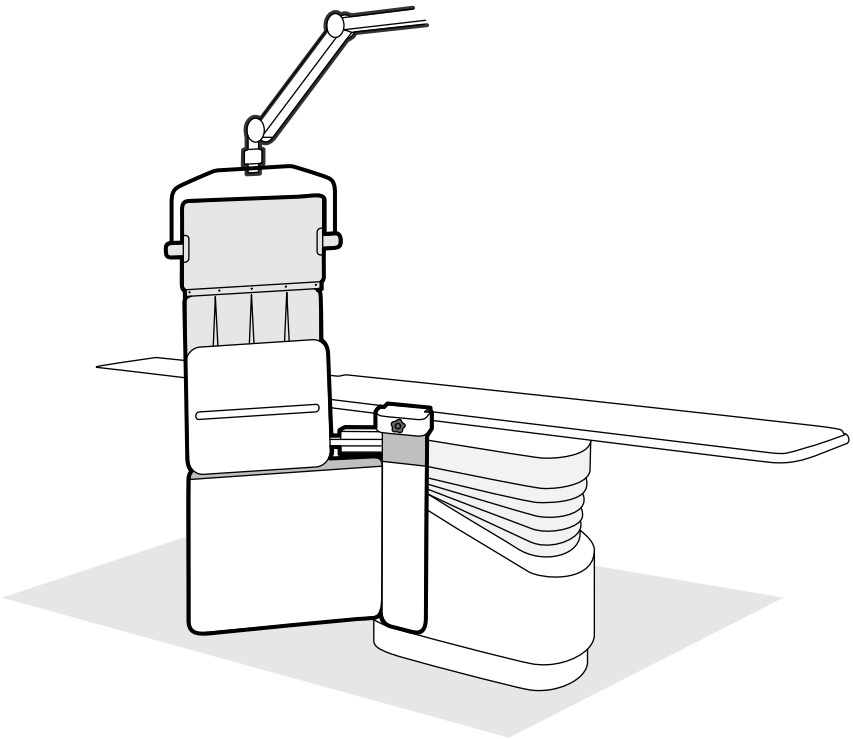


Figure 77 Combined use of the radiation shields

Before using the radiation shields, check that the shielding material is not damaged. The shields should be free from cracks or tears. It is strongly recommended to check the shields visually on a regular basis and whenever there is a possibility that the shield may have been damaged.

Remove the table-mounted radiation shield from the table accessory rail before tilting or cradling the tabletop, as it may come loose during the movement. When the tabletop is cradled, the protection provided by the table-mounted radiation shield is reduced.

Collisions may occur with the radiation shields when positioning the stand or the monitor ceiling suspension. Take care to avoid collisions as this may damage the equipment.

6.10.1 Attaching and Positioning the Table-Mounted Radiation Shield

NOTE
Do not fit the table-mounted radiation shield to the additional table accessory rail.

1. If desired, place a sterile bag over the radiation shield and apron.
2. Hold the radiation shield with your right hand on the clamping device and your left hand on the arm of the shield.
3. Slide the jaws of the clamping device on to the tabletop accessory rail.

4 Turn the knob of the clamping device clockwise to clamp the radiation shield to the accessory rail.

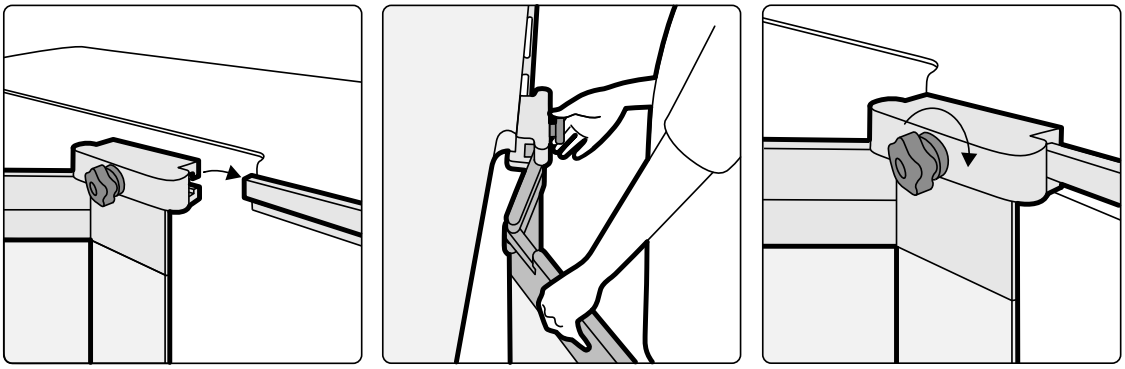


Figure 78 Attaching the radiation shield with the clamping device

5 The radiation shield can be placed in the following positions:
- Working position with both the lower and upper shield in use.
- Working position with the lower shield only in use (the upper shield is folded down).
- Parking position (shield stowed under the table).

6 To use the upper shield, lift the shield upward until the pins drop into the notches.

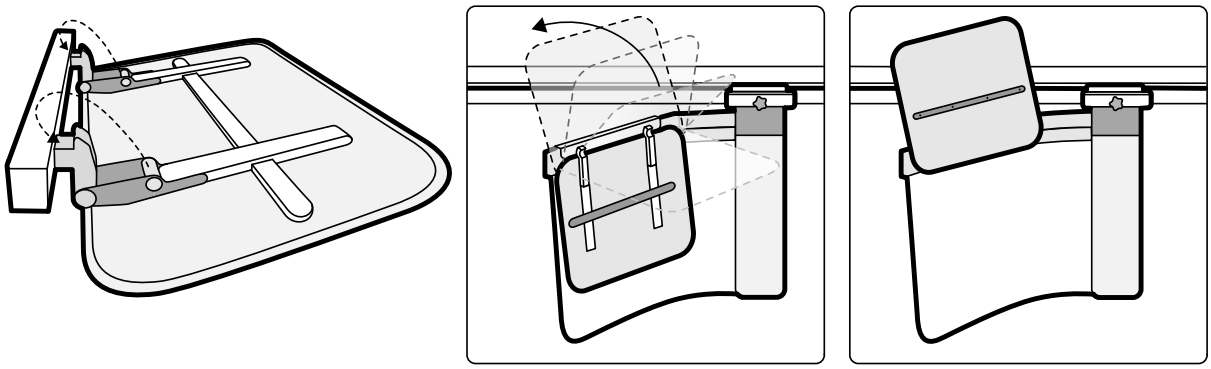


Figure 79 Using the upper shield

7 To park the radiation shield, fold down the upper shield if deployed and push the lower shield underneath the table.

6.10.2 Positioning the Ceiling-Suspended Radiation Shield

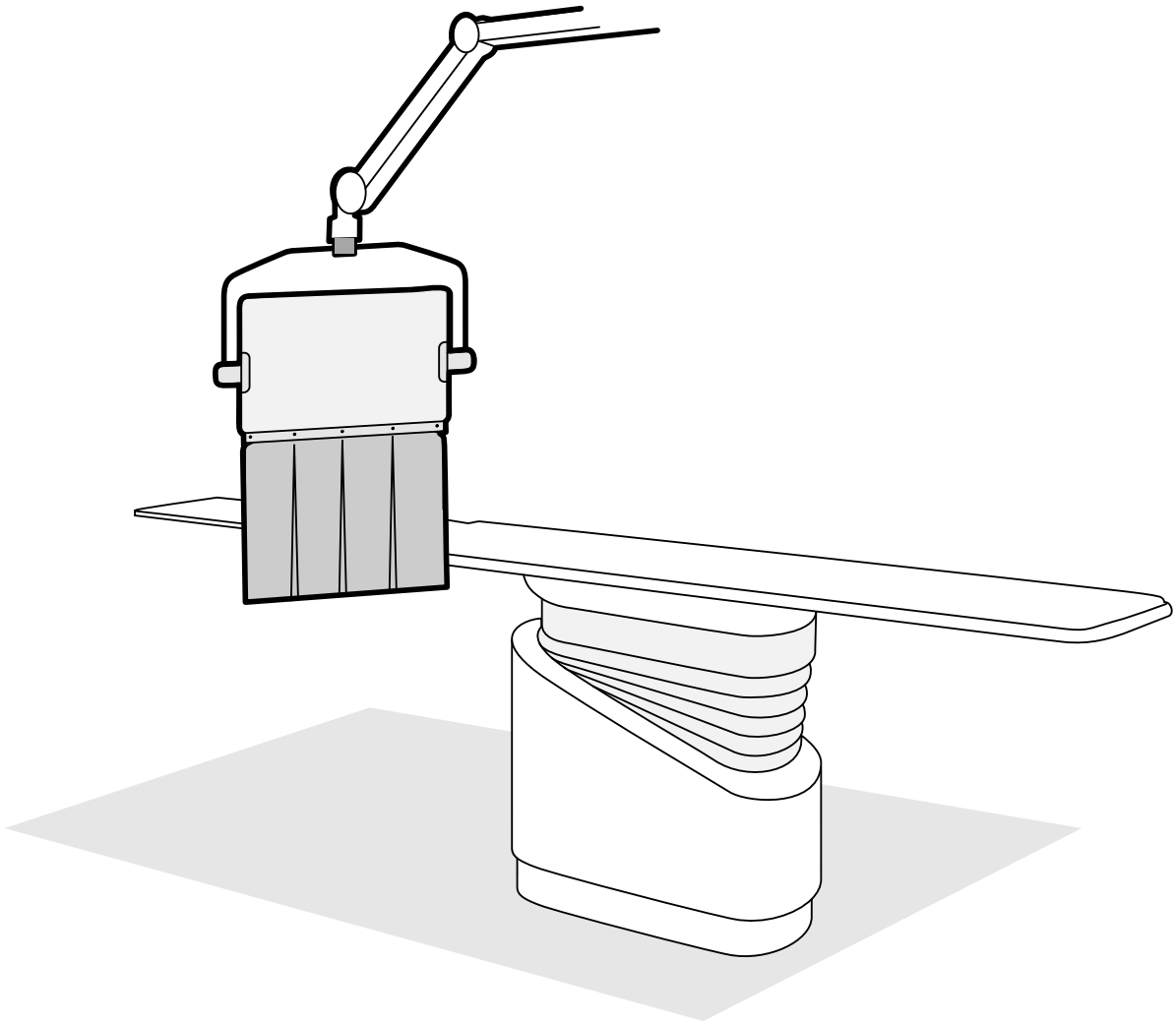


Figure 80 Ceiling-suspended radiation shield in the working position

1. If desired, place a sterile bag over the apron of the shield and part of the lead acrylic shield, securing the bag in the two notches.
2. Move the shield to the desired position using the suspension arm.
3. Tilt the shield to the desired position.

6.10.3 Using a Third-Party Radiation Shield

You can use your own radiation shield, provided it complies with the following requirements.

General requirements for all radiation shields:
- Shields shall have a minimum lead equivalent of 0.5 mm.
- Shields shall comply with IEC 61331-n:2014.

Patient Table Accessory Rail
If the radiation shield is to be mounted on the accessory rail of the patient table, the following requirements apply:
- The radiation shield shall respect the maximum weight and torque limits of the longitudinal accessory rail:
  - The combined weight of accessories mounted on the accessory rail shall not exceed 50 kg.
  - The combined torque shall not exceed 180 Nm.
- The shield shall be at least 500 mm wide.

- The shield shall have a part that overlaps the ceiling suspended radiation shield to provide optimal protection against stray radiation.
- When the table is at its maximum height, the distance between the ground and the lower edge of the shield shall not exceed 40 cm.

Monitor Ceiling Suspension
If the radiation shield is to be mounted on the monitor ceiling suspension, the following requirements apply:
- Check that the suspension arm of your radiation shield can be installed.
- The weight of the shield and suspension arm shall not exceed 30 kg. The maximum torque load that can be applied is 341 Nm.
- The shield shall be at least 500 mm wide.

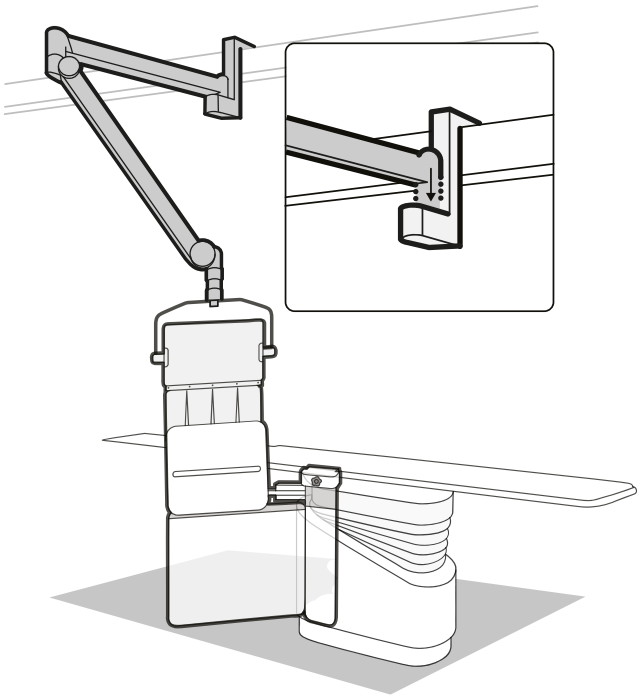


Figure 81 Mounting a third-party radiation shield on the monitor ceiling suspension

Dual Ceiling Mount
If the radiation shield is to be mounted on the dual ceiling mount, the following requirements apply:
- Check that the suspension arm of your radiation shield can be installed.
- The weight of the shield and suspension arm shall not exceed 77 kg. The maximum torque load that can be applied is 341 Nm.
- The shield shall be at least 500 mm wide.

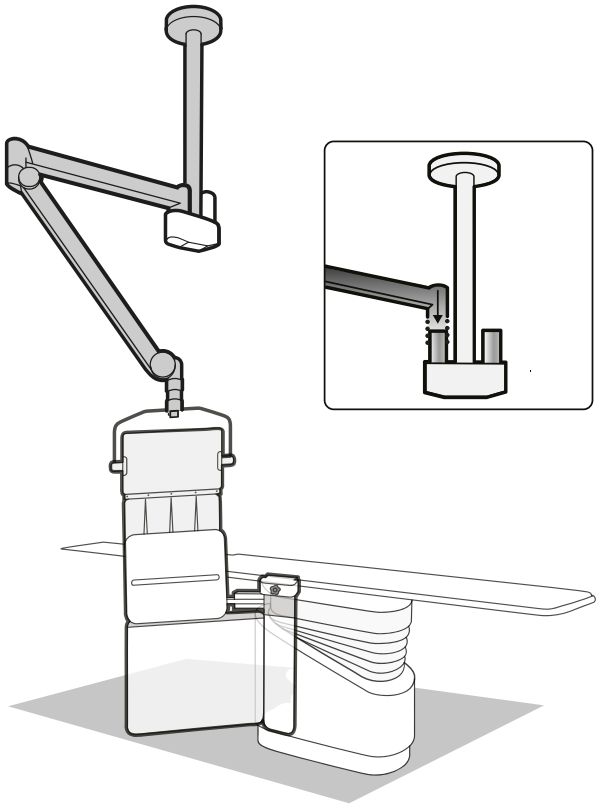


Figure 82 Mounting a third-party radiation shield on the dual ceiling mount

6.11 Using Sterile Covers

Detailed procedures for fitting sterile covers are the responsibility of the healthcare environment.

Place a thin sheet of sterilized plastic over the tabletop, control modules, and pan handle.

Separate covers should be used for each of the following items:
- Viewpad
- Touch screen module,
- Mouse and mouse table
- Laser tool
- Radiation shields
- Foot switch
- Detector
- X-ray tube

NOTE
When using a sterile cover on the touch screen module, ensure that the cover is fitted tightly to avoid problems when using the touch screen for actions such as dragging.

7 Performing Procedures

You can perform procedures and acquire images when a patient study has been scheduled or started. Before performing procedures with the equipment, read and follow the guidelines contained in Radiation Safety (page 24).

WARNING
If you misuse radiography (exposure) on purpose for real-time imaging, the image display delay may be longer than for radioscopy (fluoroscopy).

WARNING
Misinterpreting still images as live images could lead to serious patient injury. When images displayed are live, the following icon is displayed:

In a biplane system, the X-ray status icon is displayed for each channel.

WARNING
Do not acquire X-ray images while actively using electrosurgical devices (for example, electrosurgical knives), or cardiac defibrillators. The electromagnetic interference generated by these devices may reduce image quality, resulting in additional exposure series being required.

When you start a study, the ProcedureCard that you selected when preparing the study provides the X-ray protocols. While performing the procedure, you can change the ProcedureCard and the X-ray protocol settings. For more information, see the following sections:
- ProcedureCards (page 61)
- Starting a Study (page 64)

NOTE
Cumulative dose is automatically reset to zero at the start of a new procedure.

Many of the procedures described in these Instructions for Use are further supported by the extended functionality of Interventional Tools. For more information, see Interventional Tools (page 474).

Before acquiring new images, you should check that the system has sufficient storage capacity and protect or archive important data if necessary. For more information, see Checking the Available Disk Storage Space (page 64).

7.1 General Acquisition Workflow

These steps provide a general workflow for performing a study. Details of performing specific study types are available in dedicated procedures in this section.

1 Select a scheduled patient study from the patient database.

For more information, see Patient Database (page 60).

2 Select the desired X-ray protocol in the **X-ray Settings** task in **X-ray Acquisition** application on the touch screen module, or in the acquisition window.

The desired ProcedureCard is already selected within the scheduled study. For more information, see ProcedureCards (page 61).

3 Position the region of interest.

For more information, see the following sections:
- Positioning the Patient on the Table (page 65)
- Isocentering (page 121)

4 Start acquisition.

For more information, see Acquiring Images (page 105).

5 When the study is complete, close the study.

For more information, see Ending a Study (page 146).

7.2 Enabling X-ray

To use the system for imaging, you need to enable X-ray. You can do this using the review module or the touch screen module.

You can see on the touch screen module if X-ray is enabled or disabled. The following symbols are used:

Symbol	Status
	X-ray is disabled
	X-ray is enabled

1 To enable X-ray using the review module, press **Enable X-ray**.

When X-ray is disabled, the indicator light is on.

When X-ray is enabled, the indicator light is off.

2 To enable X-ray using the touch screen module, tap **X-ray Disabled**.

7.3 X-ray On Indicators

For safety reasons, the system is provided with several indicators to show that X-ray is active.

The following paragraphs describe the indicators and their locations.

Indication Box
An indication box is installed in the examination room. It provides indicator lights for when the system is ready for exposure (green) and when X-ray is on (yellow). When X-ray is on, the indication box also provides an audible signal.

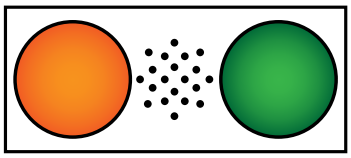


Figure 83 Indication box: X-ray On indicator light (left) and Ready for Exposure indicator light (right)

NOTE
Even if the Ready for Exposure indicator light is not lit, it is still possible to start fluoroscopy.

Outside Indicator
Third-party indicators can be connected to the system and positioned outside the examination room. The indicator is triggered when a foot or hand switch is pressed to initiate fluoroscopy or exposure. For more information, contact technical support.

Monitor Ceiling Suspension Indicator
An indicator light is mounted on each side of the monitor ceiling suspension in the examination room. The light is lit when a foot or hand switch is pressed to initiate fluoroscopy or exposure.

NOTE
The 2-fold and 3-fold monitor booms do not have an indicator light.

NOTE
When a third-party frame is used, the indicator light is on the monitor ceiling suspension auxiliary kit.

Live Image Indicator

When fluoroscopy or exposure is active, an X-ray on indicator icon is displayed in the live image window.

In a biplane system, the X-ray status icon is displayed for each channel.

Status Area

When fluoroscopy or exposure is active, an X-ray on indicator icon is displayed in the status area. For more information, see Status Area (page 438).

7.3.1 Audible Signals

The system is equipped with audible signals which can be used to signal when fluoroscopy or exposure are active, to prevent unintended radiation.

The three audible signals, which can be configured by technical support, are:
- Fluoroscopy buzzer
- High level fluoroscopy buzzer
- Exposure buzzer

Fluoroscopy Buzzer

With the fluoroscopy buzzer configured and the high level fluoroscopy buzzer not configured, if fluoroscopy is activated at the low/normal or high flavors the buzzer sound is a continuously audible signal.

With the fluoroscopy buzzer and high level fluoroscopy buzzer configured, if fluoroscopy is activated at the low/normal fluoroscopy flavors, the buzzer sound is a continuously audible signal. When using the high fluoroscopy flavor, the buzzer sound is a repeating 2 pulses audible signal every 2 seconds.

High Level Fluoroscopy Buzzer

With the high level fluoroscopy buzzer configured and the fluoroscopy buzzer not configured, if fluoroscopy is activated at the high fluoroscopy flavor the buzzer sound will be a repeating 2 pulses (audible) signal every 2 seconds. The buzzer does not sound if fluoroscopy is activated at the low/normal fluoroscopy flavors.

Exposure Buzzer

When the exposure buzzer is configured, if exposure is activated the buzzer sound will be a continuously audible signal. When the exposure buzzer is not configured, the buzzer does not sound if exposure is activated.

7.4 Acquiring Images

You can acquire fluoroscopy images or exposure images. Exposure images are automatically stored, but you can also manually store fluoroscopy images.

When acquiring images, the X-ray protocol settings in use are displayed in the status area in the control room and the examination room.

You cannot perform fluoroscopy and exposure at the same time. However, when using a biplane system, you can perform either fluoroscopy or exposure on both channels simultaneously.

You can only acquire images when the system is ready to do so. For more information, see System Readiness (page 105).

7.4.1 System Readiness

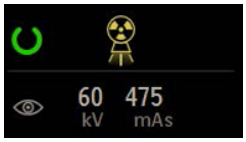
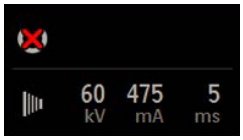
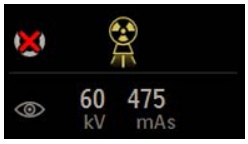
The readiness of the system to perform procedures is indicated in the status area.

The status area indicates the system status using the following symbols:

Symbol	Status
	The system is ready for acquisition. Exposure and fluoroscopy are possible.
	The system is not ready for exposure acquisition. Fluoroscopy is possible.
	X-ray is disabled.
	X-ray is on.
	Exposure is selected.
	Fluoroscopy is selected.

A combination of these symbols is used to advise you of the readiness of the system. The following table shows examples of these combinations and their meanings.

If the system is not ready, you should observe the guidance given in the messages displayed in the status area.

Indication	Meaning
	The system is ready and exposure is active
	The system is ready and fluoroscopy is active
	The system is not ready for exposure
	The system is not ready for exposure but fluoroscopy is active

7.4.2 Acquiring Fluoroscopy Images

Fluoroscopy is the generation of X-ray images at low air kerma rates.

During fluoroscopy, the following indications are displayed in the status area in the control room and the examination room:

- X-ray on indicator
- Fluoroscopy parameters
- Fluoroscopy flavor

NOTE
If you are using a biplane system and the lateral stand is parked, dose indication for the lateral stand is not displayed unless the air kerma for the lateral stand is above zero.

Setting the Fluoro Flavor

You can choose which level of fluoroscopy to use. These fluoroscopy levels are known as flavors.

There are three fluoroscopy flavors.

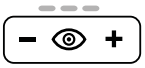
Standard System	System with ClarityIQ (Option)
Low	Low
Normal	Medium
High	Normal

You can change the default fluoroscopy flavor before initiating fluoroscopy. The default flavor is defined when the system is installed.

Each flavor provides a different dose level, and can also differ for each group of X-ray protocols.

The indicator lights on the control module indicate which flavor is active.

You can set the fluoroscopy flavor in the following locations:
- Control module
- Touch screen module
- Acquisition window in the control room
- Live X-ray window in the examination room



1 To set the fluoroscopy flavor using the control module, press **+** or **-**.

Control Module Indicator Lights	Standard System	System with ClarityIQ (Option)
One	Low	Low
Two	Normal	Medium
Three	High	Normal

2 To set the fluoroscopy flavor using the touch screen module, do the following:

a Tap the **X-ray Settings** task.

b In the fluoroscopy panel, select the desired flavor from the list.

3 To set the fluoroscopy flavor in the acquisition window, do the following:

a Click the **X-ray Settings** task.

b Expand the **Fluoroscopy** task panel.

c Select the desired flavor from the list.

Performing Fluoroscopy

Fluoroscopy is the generation of X-ray images at low air kerma rates.

WARNING
Misinterpreting still images as live images could lead to serious patient injury. When images displayed are live, the following icon is displayed:

In a biplane system, the X-ray status icon is displayed for each channel.

Ensure that you have selected and started the required study in the patient database. For more information, see Starting a Study (page 64).

1 Position the patient.

For more information, see Positioning the Patient on the Table (page 65).

2 To start fluoroscopy, press the corresponding pedal on the foot switch.

During fluoroscopy, the X-ray on indicator light is on. For more information, see X-ray On Indicators (page 104).

3 *(Optional step)* While fluoroscopy is in progress, a staff member can select the X-ray protocol for the next acquisition in the **X-ray Settings** task of the **X-ray Acquisition** application on the touch screen module.

The X-ray protocol is queued and activated when the current acquisition ends.

4 To stop fluoroscopy, release the foot switch.

The following symbol is displayed in the top right-hand corner of the image, indicating that this is a Last Image Hold image:

You can see the unsaved fluoroscopy series in the **Series** task control panel. When a fluoroscopy series is unsaved, the pictorial displayed in the pictorial index has a diagonal line pattern applied so that you can immediately recognize that the series is not saved.

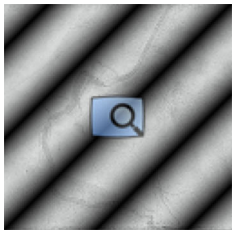


Figure 84 Unsaved fluoroscopy series pictorial

Storing Fluoroscopy Series and Images

You can store acquired fluoroscopy series and images in the patient's file.

You can retrieve them in the **Series** task.

You can store individual images while you are performing fluoroscopy, and store a fluoroscopy series after acquiring it.

1 Start fluoroscopy.

For more information, see Acquiring Fluoroscopy Images (page 106).

2 To store (or grab) individual images while you are performing fluoroscopy, do one of the following:

- On the control module, press and hold **Fluoro Store**.

- If configured on the foot switch, press and hold **Fluoro Store**.

Each image acquired while you hold the **Fluoro Store** button is stored. When you review the images, the following symbol is displayed in the top right-hand corner of the image, indicating that it is a stored image:

NOTE
If you change the fluoroscopy flavor or the detector size during fluoroscopy, the Fluoro Store function is stopped and all images stored up to that point are cleared.

3 To store the series, do the following:

a Stop fluoroscopy.

The last image in the acquired series is displayed as a Last Image Hold image.

b Do one of the following:

- On the control module, press **Fluoro Store**.

- On the lower bar of the touch screen module, tap **Fluoro Store**.

- In the **Fluoroscopy** task panel in the acquisition window, click **Fluoro Store**.

- On the toolbar of the acquisition window, click **Fluoro Store**.

- If configured on the foot switch, press **Fluoro Store**.

The fluoroscopy series is stored. When you review the series, the following symbol is displayed in the top right-hand corner of each image, indicating that it is a stored series:

Resetting the Fluoroscopy Buzzer

When the cumulative fluoroscopy time reaches 5 minutes, you are given an audible signal.

The indicator lights flash at the **Reset Fluoroscopy Buzzer** buttons on the review module and the control module, and a notification is displayed on the touch screen module.

NOTE
Fluoroscopy is switched off automatically after 10 minutes of uninterrupted fluoroscopy.

1 To switch off the audible signal, do one of the following:

- On the control module or on the review module, press **Reset Fluoroscopy Buzzer**.

- On the touch screen module, tap **Reset**.

2 Continue with fluoroscopy if appropriate.

Using Dual Fluoroscopy (Option)

If the X-ray protocol you are using is configured to do so, you can use dual fluoroscopy to view two live fluoroscopy images. Live fluoroscopy is displayed in the live window, with a second live image displayed in a reference window.

You can switch dual fluoroscopy on or off in the acquisition window or using the touch screen module.

Dual fluoroscopy is activated automatically if the X-ray protocol is configured to do so, or when you zoom a last image hold fluoroscopy image. For example, when Roadmap is switched on. In the examination room, the Roadmap or SmartMask image is displayed in the acquisition window, and the fluoroscopy image is displayed in the reference window. For more information, see the following sections:

- Using Roadmap Pro (page 132)
- Using SmartMask (Option) (page 133)

1 Select the **X-ray Settings** task.

2 To switch dual fluoroscopy on, select **Dual Fluoro**.

NOTE
The Dual Fluoro function is also available in Roadmap task.

Dual fluoroscopy is switched on and a second live image is displayed in an available reference window. You can manipulate the image in the live window, for example by applying zoom or subtraction, to assist with performing the procedure.

7.4.3 Using Shutters and Wedges

Shutters and wedges reduce the amount of stray radiation, which improves image quality.

Using shutters and wedges is also an important step to restrict the exposed patient area to the region of interest and minimize the X-ray dose.

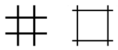
You can adjust shutters and wedges using the control module and the touch screen module.

Shutters
Shutters are collimators used to limit the width and height of the irradiated area, and to improve the quality of the image. The rectangular shutters operate in pairs. The vertical shutters move together and the horizontal shutters move together. Shutter position is displayed as a graphic overlay with white dashed lines when making adjustments in the Last Image Hold image without the use of fluoroscopy.

Wedges
Wedges are filters used to reduce the X-ray intensity of the irradiated area and improve the quality of the image. There are two wedges that are controlled independently, each with their own switch. Wedge position is displayed as a graphic overlay when making adjustments in the Last Image Hold image without the use of fluoroscopy. A blue dashed line represents the left wedge and a green dashed line represents the right wedge.

Adjusting Shutters on the Control Module

You adjust the shutters using the shutter switch.



For more information, see Control Modules (page 452).

1 When using a biplane system, select the desired channel.

   The symbol for the selected channel illuminates. Pressing the button repeatedly cycles through the following options:

Illuminated Symbol	Selected Channel
	Frontal channel
	Lateral channel

2 Push the switch, left and right to adjust the vertical shutters.

3 Push the switch, up and down to adjust the horizontal shutters.

4 Press down on the switch to reset the shutters to automatic collimation.

   The shutters move to the edge of the image area.

Adjusting Shutters on the Touch Screen Module

You can adjust the vertical and horizontal shutter positions using the touch screen module.

The shutters can only be adjusted on the touch screen module after acquiring an image. On biplane systems, a biplane acquisition is needed to adjust the shutters on both channels.

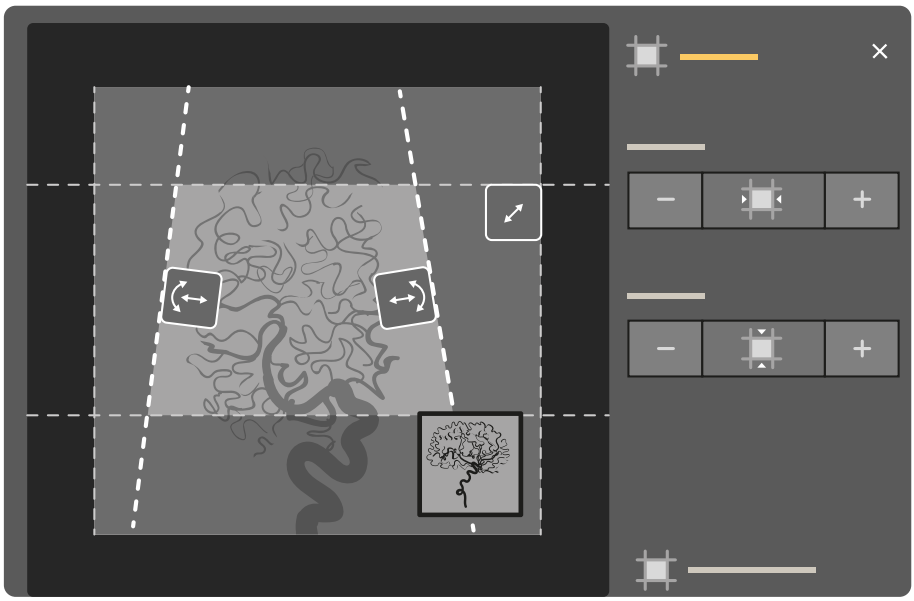


Figure 85 Shutter controls on the touch screen module (biplane system shown)

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **Collimation** task.

3 When using a biplane system, adjustments are applied to the channel represented by the main image. To change the channel, tap the mini viewport.

4 To move the horizontal shutters or the vertical shutters independently, do the following:

a Tap **Shutters**.

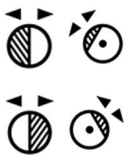
b Tap **+** and **-** to increase and decrease the horizontal shuttered area.

c Tap **+** and **-** to increase and decrease the vertical shuttered area.

5 To reset the shutters to the default positions, tap **Reset Shutters**.

Adjusting Wedges on the Control Module

You adjust wedges on the control module using the left and right wedge switches.



For more information, see Control Modules (page 452).

1 When using a biplane system, select the desired channel.

The symbol for the selected channel illuminates. Pressing the button repeatedly cycles through the following options:

Illuminated Symbol	Selected Channel
	Frontal channel
	Lateral channel

2 Rotate the appropriate switch to rotate the wedge filter.

3 Push the switches left and right to adjust the relevant wedge position.

4 Press down on the switch to reset the relevant wedge to just outside the imaging area.

Adjusting Wedges on the Touch Screen Module

You can adjust the positions of the wedge filters using the touch screen module.

The wedges can only be adjusted on the touch screen module after acquiring an image. On biplane systems, a biplane acquisition is needed to adjust the wedges on both channels.

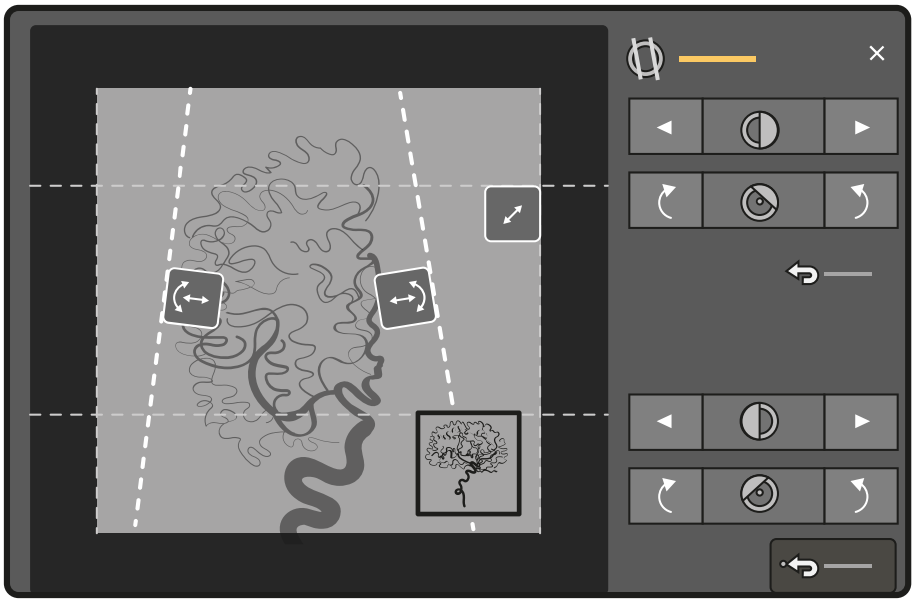


Figure 86 Adjusting wedges on the touch screen module (biplane system shown)

The left wedge is displayed in blue. The right wedge is displayed in green.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **Collimation** task.

3 When using a biplane system, adjustments are applied to the channel represented by the main image. To change the channel, tap the mini viewport.

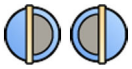
4 To adjust the position of each wedge by dragging, drag the handle for the desired wedge to a new position.

Dragging the wedge allows you to move the wedge laterally and to rotate the wedge simultaneously. Dragging the wedge up and down while dragging left and right, rotates the wedge.

5 To adjust the position of the left or right wedges using the control buttons, do the following:

a Tap **Wedges**.

b Tap the left or right arrow buttons to move each wedge left or right until the desired position is reached.



c Tap the rotation buttons to rotate each wedge clockwise or counterclockwise until the desired position is reached.

6 Tap **Reset** to reset the desired wedge filter to the default position.

Using Automatic Wedge Following

The system can automatically position the wedges according to the stand rotation and angulation angles.

For example, in 2D cardiac applications the system automatically positions wedges over the lung area to prevent over exposure. During geometry movement the wedges move in parallel, remaining positioned over the lung area. For cardiac procedures the system default is set to on.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **Collimation** task.

3 Tap **Auto Wedge Follow** to set the function on or off as desired.

7.4.4 Acquiring Exposure Images

Exposure is the acquisition of X-ray images, resulting in a series of individual images.

Ensure that you have selected and started the required study in the patient database. For more information, see Starting a Study (page 64).

The X-ray settings are configured by the X-ray protocol selected in the ProcedureCard being used. For more information, see ProcedureCards (page 61).

Before and during exposure, the following indications are displayed in the status area of the acquisition window in both the control room and the examination room:
- System readiness
- X-ray on indicator
- Exposure parameters (for each channel in biplane systems), kV, mA, mAs, and ms

NOTE
If you are using a biplane system and the lateral stand is parked, dose indication for the lateral stand is not displayed unless the air kerma for the lateral stand is above zero.

NOTE
Some of the steps in this procedure describe how to adjust the frame speed and the dose level to change the number of images captured per second and to adjust the image quality. For some X-ray protocols, these settings cannot be adjusted.

1 Position the patient.

You can use fluoroscopy to position the patient. For more information, see the following sections:
- Positioning the Patient on the Table (page 65)
- Acquiring Fluoroscopy Images (page 106)

2 Check that the system is ready to acquire exposure images.

For more information, see System Readiness (page 105).

3 To change the number of images acquired per second, do the following:

a Select the **X-ray Settings** task.

b If you are using the acquisition window, click the **Exposure** expander to open the menu.

c Select a new **Frame Speed**.

4 To adjust the image quality by changing the dose level used, do the following:

a Select the **X-ray Settings** task.

b If you are using the acquisition window, click the **Exposure** expander to open the menu.

c Select a new **Dose Level**.

5 To start acquiring exposure images, press the exposure hand switch or the exposure foot switch.

Pressing the exposure hand switch button to the first stage prepares the system for exposure. Pressing the button to the second stage activates exposure.

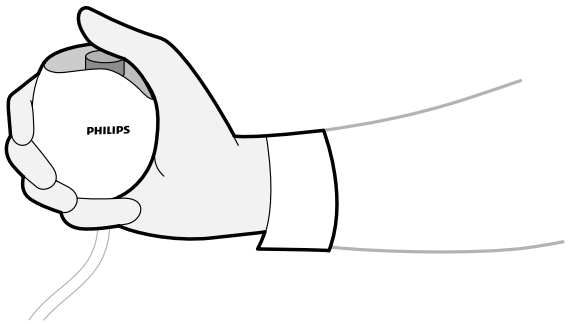


Figure 87 Exposure hand switch

During acquisition, the X-ray on indicator light is on.

6 To stop acquiring images, release the exposure hand switch or foot switch.

If the X-ray protocol in use is configured to automatically replay the series, then this starts automatically when you stop acquiring images. If this is not configured for the X-ray protocol you are using, the last image in the acquired series is displayed.

The following symbol is displayed in the top right-hand corner of all images in the acquired series, indicating that these are Last Image Hold images:

7.4.5 Zero-Dose Positioning (Option)

When you have acquired an image, you can reposition the center of the image without using X-ray to determine the new center position.

This function is available in the Last Image Hold (LIH) image. It is also available on the touch screen module in the **Series** and **Processing** tasks.

NOTE
Depending on the configuration of the patient table, this function may not be available.

1 Move the table to a new position using the float tabletop control on the control module.

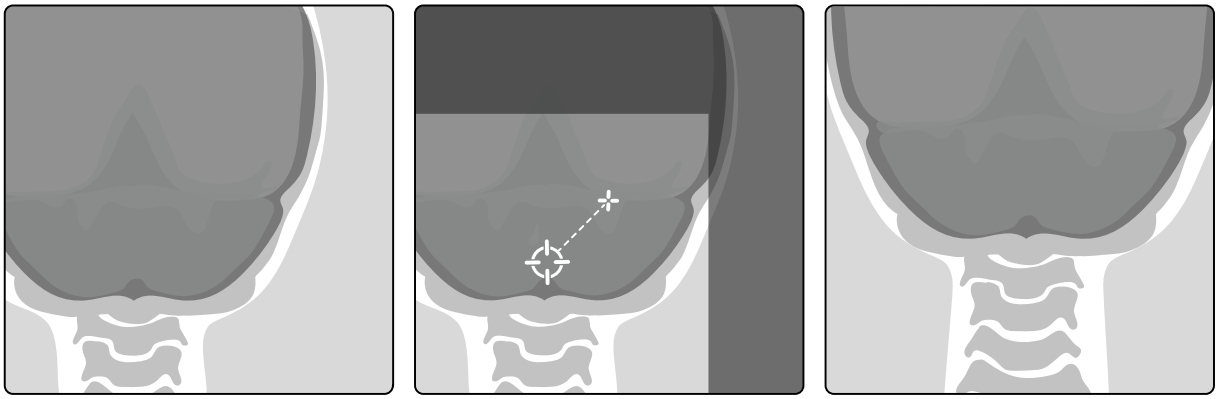


Figure 88 Repositioning the image center

A graphical representation of the boundaries of the X-ray field and the center of the X-ray beam are displayed as an overlay on the X-ray image.

2 When the new center position has been achieved, you can acquire a new image.

NOTE
If desired, this function can be turned off in the procedure settings.

NOTE
In the following circumstances, the target overlay is not displayed:
- ***Fluoroscopy or exposure is active.***
- ***The live image viewports are in series overview mode (as opposed to image overview mode).***
- ***There is a projection mismatch between the geometry of the displayed image and the current geometry (including table pivot and swivel position, if applicable).***
- ***If a rotatable detector is in use and it is not set to 0 degrees or 90 degrees.***
- ***The table pivot is not in the working area, if applicable.***
- ***The table swivel is not in an end position, if applicable.***

7.5 Acquiring Images in an Emergency

In an emergency, you can start a study without logging on and without having previously scheduled the patient, by using the emergency access mode. While you are using the system in emergency access mode, you can acquire images but other system functions are not available.

When you operate the system in emergency access mode, you cannot review other studies. You can only acquire new images and series. You can review the images and series that you acquire while in emergency access mode but if you end the procedure, you cannot open it again until you have logged onto the system.

For more information about configuring the system to allow emergency access without logging on, see Managing Users and System Logon (page 260).

You can start an emergency study without entering any patient details. You can still find the study in the patient database by looking for the time and date of the study contained in the **Patient ID**.

1 If the system is not switched on, press and hold **Power On** on the review module until the indicator light stops flashing.

2 In the logon screen, click **Emergency**.

The system is available in emergency access mode. This mode allows you to perform an emergency procedure, but has reduced functionality.

A study is started immediately using the default ProcedureCard and a menu is displayed allowing you to select the ProcedureCard for the study.

3 To change the ProcedureCard, do the following:

a Select the patient in the patient list and click **Edit**.

b Select the appropriate **ProcedureCard Group** from the drop-down list.

c Select an alternative ProcedureCard.

4 If you are able to, enter any available patient information in the **Study Details** tab.

NOTE
You cannot add or change patient details once images have been acquired. If you have not entered the patient's details before acquiring images, you can add the patient to the system later when you are logged on and use the Resolve Patient Mix wizard to associate the acquired series with the patient. For more information, see Resolving a Patient Mix (page 159).

5 To start the study, click **Back to Procedure**.

6 Perform the necessary procedure.

7 To end the study, do the following:

a Click **End Procedure**.

A dialog box is displayed with a warning, reminding you that you are in emergency access mode and that the acquired data will not be accessible if you end the procedure.

b To close the dialog box and continue the study, click **Cancel**.

c To end the study, click **OK**.

The study ends and the **Add Patient** window is displayed, allowing you start another study if necessary.

8 To start a new study in emergency access mode, click **Start Procedure** and repeat steps 2 to 6.

9 If all studies are complete and emergency access is no longer needed, click **System** and select **Log Off** to exit emergency access mode and return to the logon screen.

7.6 Intelligent System Recovery

The system is equipped with intelligence to monitor the performance of system processes, so that actions can be initiated to recover from unexpected loss of functionality. This can include stopping and restarting software functions, or restarting hardware components, including a warm restart of the whole system.

Note the following information:
- User guidance may be displayed to inform you about the recovery situation.
- System design separates processes that are essential for performing fluoroscopy from other, lower priority processes. This enables the system to safeguard the fluoroscopy function so that, if a serious problem is detected, you can finish the examination safely, including removing a catheter when necessary.
- In extreme situations, a cold restart might be necessary to recover from unexpected situations.

7.7 Locking and Unlocking Stand and Table Movements

The stand and table locks prevent unintended movements of the stand and the table.

The procedure below uses the touch screen module but you can also lock and unlock all geometry movements using the review module in the control room.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Tap the **X-ray Settings** task.

3 Tap the **Lock** icon in the upper-right corner and select the lock that you want to apply or release.

The following options are available:

Lock	Locked	Unlocked
All Fully locks the stand movements and the table movements.		
Table Prevents the table from moving in any direction.		
Table Lateral Prevents the table from moving in the transverse direction (for example, in bolus chase procedures).		

When a lock is applied, the **Lock** icon displays the corresponding icon with the lock symbol highlighted.

When no locks are applied, the **Lock** icon displays the **Table** icon with the lock symbol dimmed.

7.8 Using Automatic Position Control

You can use automatic position control (APC) to move the stand and table to positions based on live or reference images, to previously stored positions, or to predefined projections.

NOTE
When using automatic position control in combination with SmartMask, observe the recalled position and ensure that it is as expected before proceeding.

The following movements are available with automatic position control:
- **Image**: moves the stand and table to match an available reference image.
- **Stored**: moves the stand and table to a previously stored position.
- **Pre-defined**: moves the stand to a predefined rotation and angulation. Default projections and user-defined projections are available.
- **Table**: moves the table to a previously stored position (only motorized movements are included).
- **Pathway** (FlexArm option only): moves the stand along a pathway to a stored position through predefined intermediate positions.

NOTE
Depending on the configuration of your system, some movement options may not be available.

Before the system moves to the selected position, the source-to-image distance (SID) is maximized to avoid collisions. It returns to its configured setting when the movements finish unless otherwise configured in the procedure card.

NOTE
This does not apply for Pre-defined movements.

The positions of the following items are also restored when the system reaches the selected position:
- Detector rotation
- Field of view
- Shutters and wedges

If the system does not move when you activate a position using APC, ensure that the stand is in the working position.

For table movements, the following guidance applies:
- If the table is fully locked, only stand movements are activated.
- If the pivot option is installed, ensure that the table is in the working position (pivot ±13 degrees).

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Tap the **Live** view tab.

3 Tap the **C-arm and Table** task.

4 Tap the **Full System APC** tab.

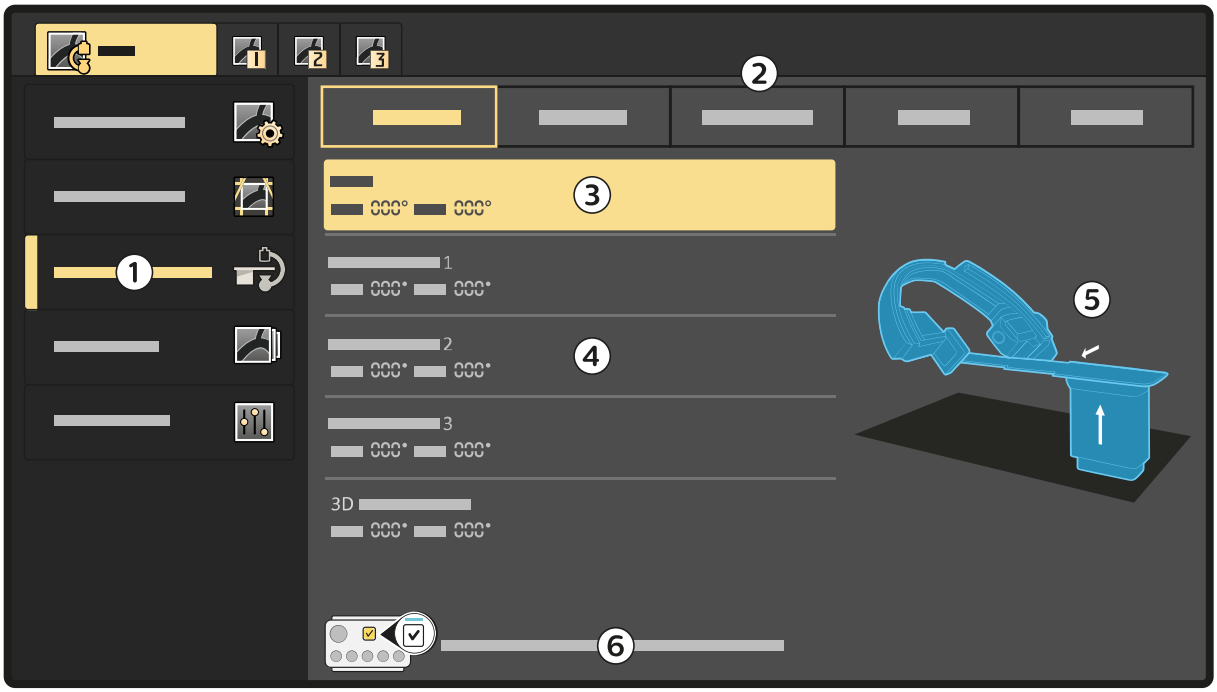


Figure 89 **Full System APC** tab of the **C-arm and Table** task

Legend			
1	**C-arm and Table** task	4	Available positions
2	APC functions	5	Movement preview
3	Selected position	6	User guidance

5 Select the APC function that you want to use to move the system.
- Matching a Reference Image (page 119) (see the following task)
- Moving to a Stored Position (page 119)
- Moving to a Predefined Position (page 119)
- Moving Only the Table (page 120)
- Moving the Stand along a Pathway (FlexArm Option Only) (page 120)

7.8.1 Matching a Reference Image

The **Image** function allows you to move the stand and table to the position displayed in the live view or one of the reference views.

1 Tap the **Image** tab.

2 Select one of the available positions.

- **Live**: the position displayed in the **Live** view.
- **Reference**: the position displayed in one of the reference views.
- **3D Image**: the target position supplied by the 3D application on the Interventional Workspot with the minimum source-to-image distance.

NOTE
If X-ray is active, the position in the Live view cannot be recalled.

If the series in the selected view is replaying, the stand and table move to the position of the initial image in the series.

The stand and table image provides an indication of the resulting stand orientation and the direction of table movements (if applicable) if the selected position is recalled. Parts that move if the selected position is recalled are highlighted.

3 Press and hold **Accept** on the control module until the stand and table reach the selected position.

7.8.2 Moving to a Stored Position

The **Stored** function allows you to move the stand and table to a previously stored position.

1 Tap the **Stored** tab.

2 Select a stored position.

The stand and table image provides an indication of the resulting stand orientation and the direction of table movements (if applicable) if the selected position is recalled. Parts that move if the selected position is recalled are highlighted.

3 Press and hold **Accept** on the control module until the stand and table reach the selected position.

4 To store the current stand and table position, tap **Store Current Stand and Table Position**.

The newly stored position is added to the top of the list.

5 To delete a stored stand and table position, select it and then tap **Delete** next to the selected position.

7.8.3 Moving to a Predefined Position

The **Pre-defined** function allows you to move the stand to a predefined projection.

Pre-defined positions do not include table positions and the source-to-image distance is not recalled.

1 Tap the **Pre-defined** tab.

2 Select a predefined projection.

3 Press and hold **Accept** on the control module until the stand and table reach the selected projection.

The next predefined projection is automatically selected so that you can continue movements by pressing **Accept** again when appropriate.

7.8.4 Moving Only the Table

The **Table** function allows you to store and recall the current position of the table for future recall.

You can also turn the table locks on and off in the **Table** tab:

- **Table**: Prevents the table from moving in any direction.

- **Table Lateral**: Prevents the table from moving in the transverse direction.

1 Tap the **Table** tab.

2 Tap **Store Current Table Position** to store the table position.

If a table position has been previously stored, it is overwritten with the new position.

3 After moving the table, do one of the following to move it back to the stored position:

- To move the table to the stored height, longitudinal position, and transverse position, tap **Table All**.

  The table image displays the direction of the resulting table movements when the position is recalled.

- To move the table to the stored height only, tap **Table Height**.

  The table image displays the resulting height movement when the position is recalled.

- Press and hold **Accept** on the control module until the table reaches the selected position.

NOTE
If a table position is not yet stored, the default table position is used.

7.8.5 Moving the Stand along a Pathway (FlexArm Option Only)

The **Pathway** function allows you to move the FlexArm stand along a predefined pathway to a stored end position.

1 Tap the **Pathway** tab.

2 Select a pathway.

The symbol next to a pathway indicates what kind of pathway it is.

Symbol	Symbol
	A pathway with multiple positions
	A pathway with only one position

If the stand is in a position where it cannot be recalled for the selected pathway, the system displays a message that the stand is out of range.

3 Press and hold **Accept** on the control module until the stand and table (if applicable) reach the final position.

Depending on how the pathway has been configured, a table movement at the beginning or end of the pathway may or may not occur.

If the movement of the stand is interrupted while it is moving along the pathway, press and hold **Accept** again until the stand reaches the final position.

Pathways can be created or customized using the **System Customization** function. For more information, see Customizing APC Pathways (page 278).

7.9 Isocentering

For some types of procedure it is important that the anatomical region of interest is in the isocenter.

The isocenter of the stand is the point around which the detector and the tube rotate.

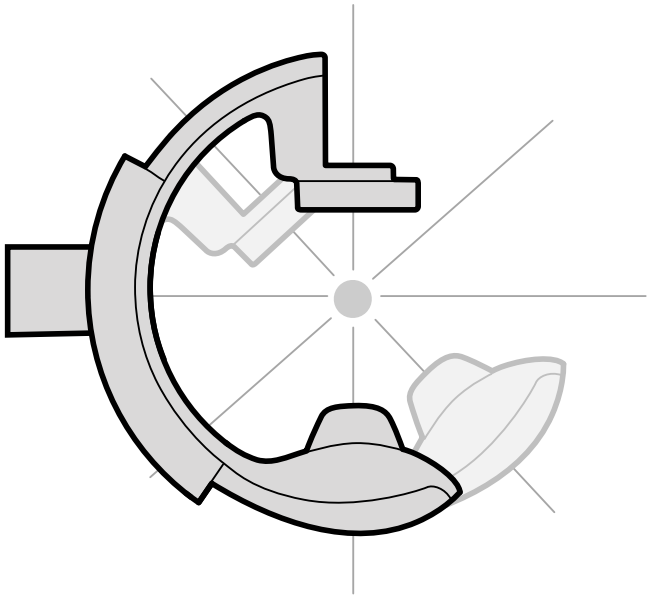


Figure 90 Isocenter of the stand

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Tap the **C-arm and Table** task.

3 If the stand is not already in the anterior-posterior position, do one of the following:

- Tap the **Pre-defined** tab, select **AP**, then press **Accept** on the control module to move the stand.
- Position the stand at 0 degrees of rotation.

4 Using the control module, float the table and center the region of interest in the middle of the field of view.

This can be aided with fluoroscopy.

5 Reposition the stand by doing one of the following:

- Select **LAT** on the touch screen module, then press **Accept** on the control module to move the stand.
- Rotate the stand to 90 degrees

6 Using the control module, adjust the table height until the region of interest is in the middle of the field of view.

This can be aided with fluoroscopy.

7 In the **C-arm and Table** task on the touch screen module, do the following:

a Tap the **Table** tab.

b Tap **Store Current Table Position**.

The region of interest is in the isocenter and this table position is stored. A message is displayed in the status area of the acquisition window when this table position, the isocenter, is recalled.

7.9.1 Recalling the Isocenter Position

After saving the isocenter position, you can recall it if you have moved the table to another position.

You recall the isocenter position using the touch screen module.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Tap the **C-arm and Table** task.

3 Tap the **Table** tab.

4 Ensure that all table movement locks are off.

For more information, see Locking and Unlocking Stand and Table Movements (page 116).

5 To recall the stored table height only, tap **Table Height**.

6 To recall the stored table position, tap **Table All**.

7 Press and hold **Accept** on the control module until the table stops moving.

When the table has reached the stored isocenter position, the following icon is displayed in the status area.

NOTE
If you release Accept before the table has stopped, press and hold the button again. The table will continue to move to the isocenter position.

7.10 Image Orientation

The image orientation is determined by the patient orientation which is set by the ProcedureCard.

You can change the patient orientation in the X-ray protocol settings to match the actual patient orientation. For more information, see Changing the Patient Orientation (page 68).

WARNING
Image orientation is determined by the patient orientation, which is set by the ProcedureCard in use. Different image orientations are possible depending upon the settings in use. You should ensure that the image orientation is appropriate for the procedure you are performing.

For more information, see ProcedureCards (page 61).

Diagnostic View
For most procedures, images are displayed for a patient orientation where the patient is in the supine position with their head at the head end of the table. The image is displayed with the patient's head at the top of the image, and their face towards you as the viewer. This is known as the diagnostic view.

Surgical View
For some procedures it may be necessary to position the patient differently, for example face-down on the table. When the image is displayed with the patient's head at the top but facing away from you as the viewer, this is known as the surgical view. When surgical view is enabled, images are reversed left to right. The following symbol is displayed with images acquired in surgical view:

7.11 Selecting a Different Preset for FlexVision

Presets are predefined window and content layouts. You can edit presets to provide a layout that suits your workflow, and that displays the applications you want to use.

The preset layout for FlexVision is predefined in the selected ProcedureCard in use but you can select a different layout to use for the study.

1 On the touch screen module, tap the application selector.

2 Tap **FlexVision** to display available presets.

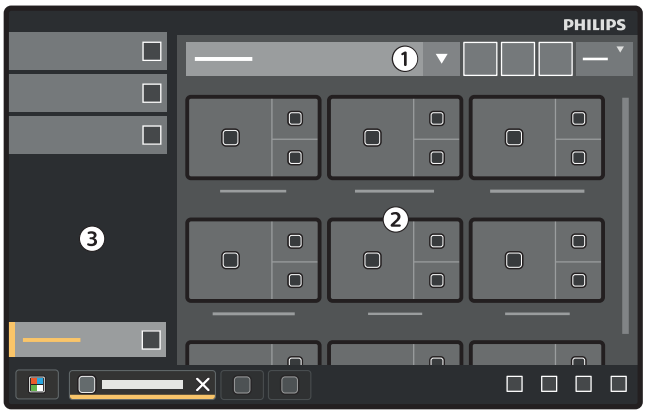


Figure 91 FlexVision preset menu

Legend	
1	Preset groups list
2	Available presets
3	Task panel

Each preset is depicted with a thumbnail image showing the predefined screen layout and applications.

3 Tap the desired preset to select it and apply it to the the FlexVision monitor.

4 To change the applications displayed during a study, do the following:

a Tap **Change Content**.

An image of the layout is displayed showing each application as an icon in each window.

b Drag the applications you want to use to the desired window positions on the layout image.

Your changes are applied immediately on the FlexVision monitor.

5 To reset the preset to its original settings, do the following:

a Tap **Select Preset**.

b Tap **Reset**.

For more information, see Managing FlexVision Presets Using the Touch Screen Module (page 247).

7.11.1 Saving a Modified Preset for FlexVision

If you have modified the window content during a study, you can save it as a preset for future use.

1 On the touch screen module, tap the application selector.

2 Tap **FlexVision**.

3 Tap **Change Content**.

4 Tap **Save As**.

5 Select a preset group from the list.

6 Enter a name for the new preset using the on-screen keyboard.

7 To close the dialog box without saving the preset, tap **Cancel**.

8 To save the preset, tap **Save**.

7.11.2 Displaying Patient Comfort Movies on FlexVision

When not acquiring X-ray images, you can display a patient comfort movie on the FlexVision monitor.

NOTE
The movie cannot be started while X-ray acquisition is in progress.

1 On the touch screen module, tap the application selector.

2 Tap **FlexVision**.

3 Tap **ComfortThemes**.

Available patient comfort movies are displayed.

4 To start playing a movie, do one of the following:
- Double-tap a movie.
- Tap a movie to select it and then tap **Play**.

The movie starts playing on the FlexVision monitor. The top bar and the status area remain visible while the movie is playing. Notifications are displayed on top of the movie.

NOTE
You cannot create screenshots while the movie is active.

5 To dismiss the patient comfort movie, tap **Stop** on the selected movie.

The movie is dismissed automatically if you start X-ray acquisition or interact with the top bar or status area using a mouse.

7.12 Using Switchable Monitors (Option)

If the switchable monitors option is installed, you can choose which applications or video sources to display on each monitor in the examination room and save that configuration for future use.

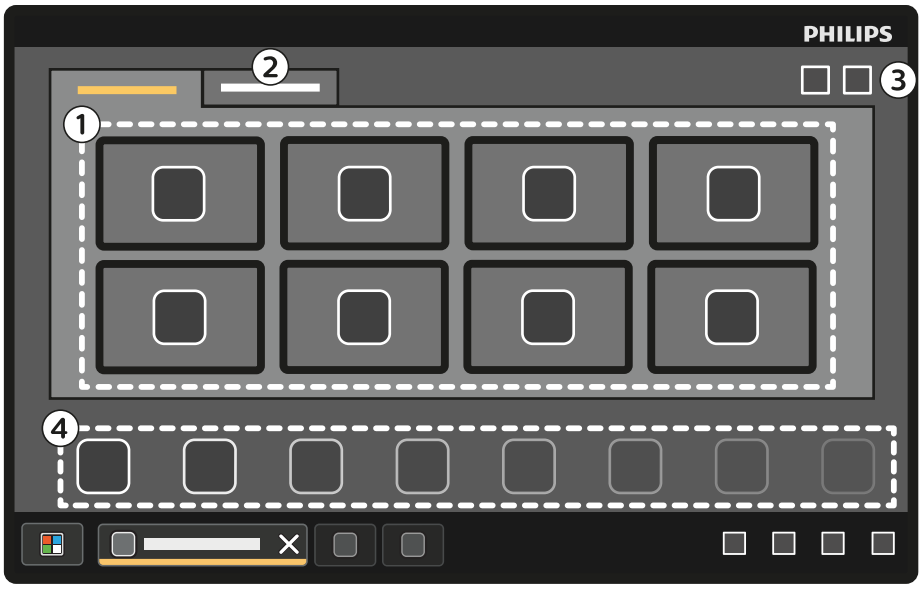


Figure 92 Switching monitors using the touch screen module

Legend			
1	Monitors	3	Toolbar
2	Additional monitors	4	Applications or video sources

1 On the touch screen module, tap the application selector.

2 Tap **Switchable Monitors**.

3 Identify the monitor and the application or video source you want to display on it.

The system can manage a maximum of 16 monitors. If more than 8 monitors are installed, tabs are used on the touch screen module, each displaying a maximum of 8 monitors.

For Azurion systems with DVI-based video infrastructure and the FlexVision option, the maximum number of switchable monitors is 8.

4 Drag the application or video source on to the monitor.

Each monitor is identified by a sticker on the upper left corner. This number corresponds to the monitor number on the touch screen module.

Figure 93 Monitor identification sticker

You can display the same application or video source on more than one monitor.

5 To reset the monitors and undo your changes, tap **Reset**.

6 To save your changes, tap **Save**.

This saved configuration is saved as the default configuration, and is used the next time that the systems starts.

7.13 Using MultiVision (Option)

If the MultiVision option is installed, you can select an application or video source to display on an additional monitor in the examination room.

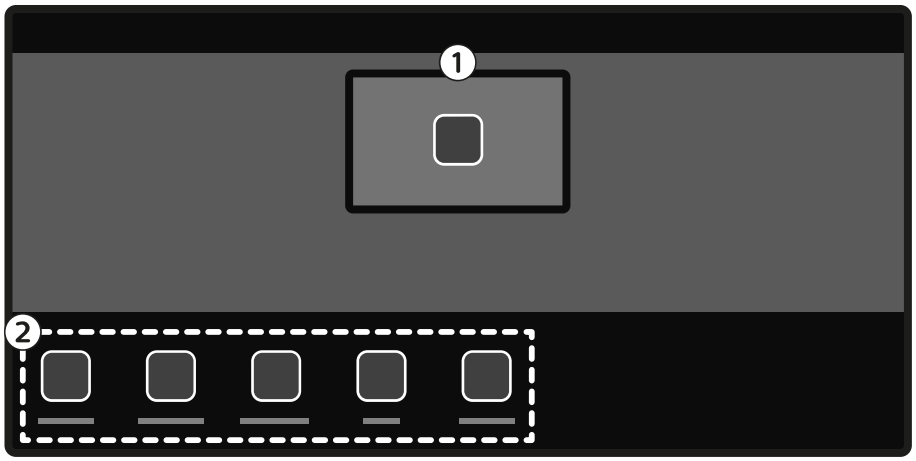


Figure 94 Using MultiVision on the touch screen module

Legend	
1	Additional monitor
2	Application and video sources

1 On the touch screen module, tap the application selector.

2 Tap **MultiVision Switch**.

Depending on the video infrastructure used on your Azurion system, the following application and video sources are available:

- Azurion systems with IP-based video infrastructure can display any available application and up to 20 sources from auxiliary systems.
- Azurion systems with DVI-based video infrastructure can display the Azurion review application or any one of up to 4 sources from auxiliary systems.

3 Identify the application or video source you want to display and drag it to the additional monitor.

7.14 Injector Coupling (Option)

Timing of contrast injection and X-ray imaging can be coupled in order to synchronize the acquisition of images to the flow of contrast medium.

WARNING
Only use an injector system that has a compatibility statement for the X-ray system in use. Using any other injector system may result in the injection of an excessive amount of contrast medium. The operator is responsible for the amount of contrast medium administered to the patient.

Injection timing and exposure is calculated depending on the selected settings. You can manually adjust the X-ray delay time determined by the protocol settings. The value range is from 0 to 40 seconds, in steps of 0.5 seconds.

Two modes of injector coupling operation are available:

- Coupled: In coupled mode, you can have one or two-switch operation modes.
- Uncoupled: In uncoupled mode, the hand and foot switches control X-ray only, and injection is controlled by the injector hand switch.

For more information, see the following:

- Connecting an Injector (page 235)
- Injector Control Methods (page 474)

.

7.14.1 Uncoupled Operation

You can acquire images with injector coupling uncoupled.

When injector coupling is uncoupled, you must trigger the injector manually at the appropriate time using the injector hand switch.

You can select uncoupled operation using the touch screen module or the acquisition window.

1 Select the **X-ray Settings** task.

2 Select the X-ray protocol.

3 Select **Injector** to display the injector settings.

NOTE
If you are performing a multiphase acquisition, the injector settings are located in the Multiphase Acq. settings group.

4 If injector coupling is on, tap **Coupling** to switch injector coupling off.

5 Start and stop injection by pressing and releasing the injector hand switch.

6 Start and stop acquisition by pressing and releasing the hand switch or the foot switch.

7.14.2 Coupled Operation

You can control injection of contrast medium automatically using injector coupling.

You can specify a delay between injection of contrast and acquisition of images to ensure that the contrast is visible at the region of interest. This is known as the X-ray delay.

NOTE
Coupled operation is not available for every X-ray protocol.

You can configure the system to uncouple after every exposure series to prevent unintentional injection of contrast medium. The system can be customized by technical support, so that the injector is not uncoupled after each exposure series and procedure change, but is only uncoupled following selection of a new patient.

1 Select the **X-ray Settings** task.

2 Select the X-ray protocol.

3 Select **Injector** to display the injector settings.

NOTE
If you are performing a multiphase acquisition, the injector settings are located in the Multiphase Acq. settings group.

4 If injector coupling is off, tap **Coupling** to switch injector coupling on.

5 Adjust the X-ray delay time using **+** or **-**.

6 Prepare the injector.

Contrast is not injected until exposure starts.

7 Press the exposure hand or foot switch to start acquisition and if you are using a two-switch method, press the injector switch to start contrast medium injection.

A timer bar representing the X-ray delay count-down in seconds is displayed in the middle of the acquisition window. When the count-down is completed, X-ray acquisition starts automatically.

For more information about using one or two-switch methods, see Injector Control Methods (page 474).

8 Release the hand or foot switch to stop acquisition and contrast medium injection.

7.15 Multiphase Acquisition

Multiphase acquisition is used for vascular applications only.

During multiphase acquisition, you have direct control over the acquisition speed and duration. The acquisition is separated into a maximum of three phases and is used when a constant frame rate is not needed throughout the duration of the exposure.

You can adjust the duration of each phase in seconds and the image speed in frames per second. You may also switch between the second and third phases, if you want to slow the frame rate down or speed it up during long acquisition series.

Multiphase acquisition is usually enabled automatically for the appropriate X-ray protocols. This is configured when the system is installed.

NOTE
The image speed (frame rate) is limited by the image speed chosen in the Multiphase Acq. settings in the X-ray Settings task.

1 Select the **X-ray Settings** task in the acquisition window or in the **X-ray Acquisition** application on the touch screen module.

2 Select the desired procedure.

3 Start acquisition.

When X-ray is active, the controls to adjust the image speed and phase duration are not displayed. These are replaced by a phase button, displaying the selected image speed for each phase.

4 To move between phases and change the image speed, tap the desired phase button.

Images are acquired at the new image speed shown for the selected phase.

You can only switch to a phase if the relevant phase button is enabled.

7.15.1 Changing Multiphase Acquisition Settings

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **X-ray Settings** task.

3 Tap **Multiphase Acq.** to display the multiphase acquisition settings screen.

4 Set the image speed (frame rate) in frames per second, for each phase:

- Tap **+** to increase the image speed.
- Tap **-** to decrease the image speed.

5 Set the duration of each phase.

- Tap **+** to increase the duration.
- Tap **-** to decrease the duration.

The phase duration is displayed in seconds.

6 If desired, tap **Coupling** to switch injector coupling on.

7 Set the X-ray delay time in seconds.

For more information about acquiring images using multiple phases, including changing the image speed during acquisition, see Multiphase Acquisition (page 128).

7.16 Bolus Chase (Option)

You use the bolus chase procedure to acquire images of the vessels in the lower extremities. You control the speed of the table as you chase the contrast bolus down the legs.

You acquire a bolus chase series with contrast using the **Bolus Chase** procedure. If desired, you can acquire a mask series without contrast after the bolus chase series. After acquisition, the Bolus Chase Reconstruction application automatically reconstructs the images for review. For more information, see Bolus Chase Reconstruction (Option) (page 155).

The following guidance is recommended for acquiring a bolus chase series:

- Use peripheral X-ray filters for optimal image quality. For more information, see Peripheral X-ray Filters (page 223).
- To improve the accuracy of the reconstruction, place a bolus chase reconstruction ruler in the view, parallel to the table, during acquisition.
- At least five contrast images are required to create a reconstruction.

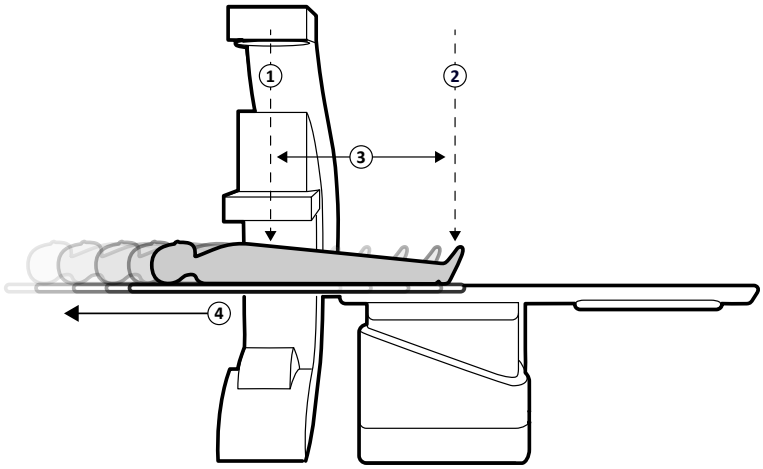


Figure 95 Bolus chase table positions and movement

Legend			
1	Start position	3	Table travel distance (maximum 100 cm / 39.4 in)
2	End position	4	Table movement

7.16.1 Acquiring a Contrast Series

To acquire a contrast series for Bolus Chase Reconstruction, you chase the contrast bolus along the patient's legs.

Before starting the procedure, ensure that the stand is positioned at either the nurse or doctor side and that all objects have been cleared from the table path.

1 Park the lateral stand in the parking position.

2 Position the patient on the table.

For more information, see Positioning the Patient on the Table (page 65).

3 Position the peripheral X-ray filters.

For more information, see Peripheral X-ray Filters (page 223).

4 Immobilize the patient's legs.

5 To select the bolus chase X-ray protocol, do the following.

a On the touch screen module, select the **X-ray Acquisition** application.

b Select the **X-ray Settings** task.

The X-ray protocols displayed are the ones associated with the currently selected ProcedureCard.

c Tap **Bolus Chase**.

If **Bolus Chase** is not visible in the list of X-ray protocols, tap **Other**, select **Peripherals**, and then select **Bolus Chase** from the full list of available X-ray protocols.

6 If your system has a rotatable detector, position the detector in landscape or portrait position.

7 To allow you to raise the table to its highest position, raise the detector to the highest possible position.

8 Raise the table to the maximum height.

9 Set the field of view to the maximum size.

10 Center the region of interest at the start position.

11 Reduce the distance between the patient and the detector to the minimum possible.

12 Lock transverse movements of the table by doing the following:

a On the touch screen module, tap the **Table** task.

b Tap **Lateral** to switch the transverse table lock on.

13 Use fluoroscopy to confirm that the patient is in the correct position, by moving the table from the start position to the end position.

14 If necessary, adjust the patient's lateral position by moving the patient on the tabletop.

NOTE
Do not unlock table transverse movements.

15 Reposition the table longitudinally at the start position.

16 Switch **Injector Coupling** on.

For more information, see Injector Coupling (Option) (page 126).

17 Prepare the injector.

18 Start acquisition by pressing and holding the hand switch.

NOTE
BodyGuard is disabled during image acquisition.

19 When the contrast bolus reaches the bottom of the image on the monitor, start moving the tabletop using the speed controller.

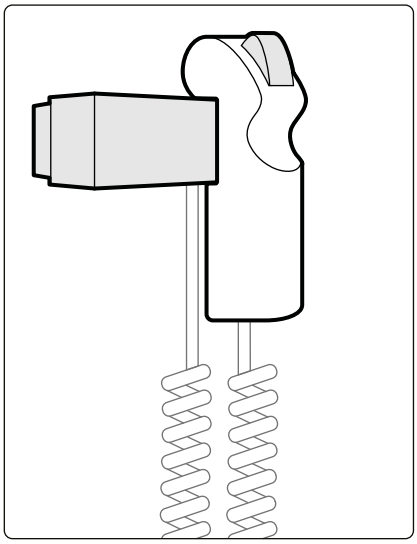


Figure 96 Speed controller

20 Use the speed controller to control the speed of the table so that the contrast bolus remains close to the bottom of the image.

The speed controller is proportional; the harder you press the switch, the faster the tabletop moves.

21 Release the speed controller when the contrast reaches the patient's feet.

22 Stop the acquisition by releasing the hand switch when the contrast bolus arrives.

After acquiring a contrast series, Bolus Chase Reconstruction is started in the review window and the acquired images are reconstructed. For more information, see Bolus Chase Reconstruction (Option) (page 155).

7.16.2 Acquiring a Mask Series (Optional)

Acquiring a mask series allows you to view subtracted images in Bolus Chase Reconstruction.

1 For optimal subtraction results, ensure that the patient remains immobilized as much as possible during the whole procedure.

2 After acquiring the contrast series, wait 30-60 seconds before acquiring the mask series to reduce the possibility of imaging venous filling.

3 Press and hold the speed control hand switch until the table has returned to the start position.

4 Start acquisition by pressing and holding the hand switch.

The tabletop automatically repeats the movement from the contrast series.

5 Release the hand switch when the exposure stops.

Exposure stops automatically when the same number of images have been acquired as during the contrast series.

Bolus Chase Reconstruction automatically uses the mask series to display subtracted images.

6 While reviewing the series, you can use **Subtraction On / Off** to view subtracted images or contrast images.

You can acquire additional mask series, if desired.

7.17 Roadmap Pro (Option)

Roadmap Pro allows you to superimpose a mask image of the vessel tree to improve visibility of catheters, devices, and materials.

Roadmap Pro is 2D subtracted fluoroscopy and is acquired in two phases:
- The first phase is the vessel mask. This is used to create the mask onto which the live fluoroscopy is superimposed.
- The second phase is the device phase. This phase is to view the device, for example a catheter, wire, or coil, under fluoroscopy over the vessel mask.

To ensure that the subtracted fluoroscopy image is not disturbed by unintentional movement of the tabletop or stand during a critical procedure, you should lock the table and geometry movements during Roadmap Pro. For more information, see Locking and Unlocking Stand and Table Movements (page 116).

WARNING
Misinterpreting still images as live images could lead to serious patient injury. When images displayed are live, the following icon is displayed:

In a biplane system, the X-ray status icon is displayed for each channel.

WARNING
When using overlay images in a procedure, you should ensure that the overlay image and the main image are properly aligned. Misaligned images may cause clinical misdiagnosis or clinical mistreatment.

7.17.1 Using Roadmap Pro

Using Roadmap Pro, you can produce a vessel map to use with live fluoroscopy.

You can do this using the touch screen module or the acquisition window.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **X-ray Settings** task.

3 If you are using the touch screen module, tap **Roadmap** to open the **Roadmap** menu.

4 To switch Roadmap on, do one of the following:
- On the touch screen module, tap **Roadmap**.
- In the acquisition window, click the **Roadmap** expander in the task panel and click **On**.

- Press **Roadmap** on the control module.

5 To select the clinical mode, do one of the following:
- On the touch screen module, tap the desired **Mode** name.
- In the acquisition window, select the mode from the **Mode** list in the task panel.

6 Start fluoroscopy.

For more information, see Performing Fluoroscopy (page 107).

7 When the subtracted image is created, inject the contrast.

For more information, see Injector Coupling (Option) (page 126).

8 Stop fluoroscopy when the vessel tree is fully visible (maximum opacification).

9 To adjust the transparency of the image, tap **+** or **-** on the touch screen module for the following masks:

- **Vessel**
- **Device**

NOTE
You can only adjust transparency when fluoroscopy is not active.

10 Start fluoroscopy for the clinical procedure.

11 Insert the device when the subtracted vessel map is visible.

7.17.2 Using SmartMask (Option)

SmartMask allows you to use a previously acquired image as a vessel mask.

You can choose the image that you want to use for SmartMask. SmartMask images must have the same projection and source-to-image distance settings as the current acquisition settings, but they can be from a different series for the same patient.

NOTE
SmartMask is not available for snapshots or bolus chase (FDPA) series.

1 Identify the series containing the desired image and open the series for review.

For more information, see the following sections:
- Reviewing a Series using the Review Window (page 149)
- Reviewing a Series using the Touch Screen Module (page 150)

2 Select the image for the vessel mask in the acquisition window using the touch screen module or the viewpad.

3 When the desired image is displayed in the live window, enable SmartMask by doing one of the following:

- On the control module, press **SmartMask**.

- In the **X-ray Settings** task of the **X-ray Acquisition** application on the touch screen module, select **Roadmap** and then select **SmartMask**.

4 Start fluoroscopy.

For more information, see Performing Fluoroscopy (page 107).

After subtraction, the current image is set as the SmartMask image.

5 Insert the device.

7.18 ECG Triggering (Option)

ECG triggering allows you to acquire images in the same phase of the heart cycle. The ECG signal is used to generate the ECG trigger pulses with an adjustable delay.

To be able to start ECG triggered exposure or fluoroscopy, establish a proper ECG signal. The system is ready to start, but waits a limited period of time for an ECG signal. The system does not generate X-ray before the ECG signal is recognized. ECG triggering is only applicable for fluoroscopy and a limited set of exposure procedures.

NOTE
For Single Shot triggering, only one image is generated this way.

By default, ECG triggering is not activated. Once activated, the settings remain valid until switched off or a new patient is selected. Selecting a procedure that is not supported by ECG triggering, for example, rotational scan, automatically deactivates ECG triggering and the controls in the ECG triggering task panel are unavailable.

When ECG triggering is activated, the system monitors the trigger pulses (also during standby). If for any reason the trigger pulses are not present for 2 seconds or more, the system message **ECG signal absent** is displayed. The system message is removed when the trigger pulses are present again, or when ECG triggering is deactivated.

NOTE
A system message is also displayed 2 seconds after every trigger pulse, when the heart rate is less than 30 bpm.

NOTE
If the ECG signal is absent during acquisition, a blank image is stored at the selected frame rate. This may appear as a flickering image when the series is replayed. To avoid this, the slowest recommended frame rate when using ECG triggering is 3.75 fr/s.

1 Select the **X-ray Settings** task.

2 If you are using the acquisition window, do the following:

a Click the expander in the control panel relating to the type of procedure you are performing (**Fluoroscopy** or **Exposure**).

If the X-ray protocol you are using supports ECG triggering, the **ECG-Triggering** expander is displayed.

b Expand the **ECG-Triggering** expander.

c To switch ECG triggering on, click **On**.

3 If you are using the touch screen module, do the following:

a Tap **More** and select **ECG Triggering**.

The **ECG-Triggering** task panel is displayed.

b Tap either **Fluoro ECG** or **Exposure ECG**, to switch the desired function on.

The system replaces the fluoroscopy flavor indication or the exposure series speed indication in the live window with the ECG indication.

NOTE
For 'Single Shot' procedures, the indication in the live window remains as 'Single Shot'.

If injector coupling is on, it is automatically switched off.

4 Increase or decrease the **Trigger Delay** time as appropriate.

The accuracy of the delay time is limited. The selected delay should relate to the current heart rate of the patient and desired heart rate phase, for example, end diastole or end systole.

5 Initiate fluoroscopy or exposure as appropriate for the selected ECG triggering.

The controls on the touch screen module are unavailable during fluoroscopy and exposure.

Images are acquired according to the current heart rate of the patient. After every R-top of the ECG signal plus the selected trigger delay, one image is acquired. If another trigger pulse is received during the delay period, (for example, when the ECG signal is too high) then that trigger pulse is ignored.

6 On completion of the selection or adjustment, tap X to close the task panel.

7.19 Rotational Scans (Option)

Rotational scans are used to acquire a 3D perception of an anatomy.

When performing a rotational scan, the following requirements apply:
- If the pivot option is installed, the table must not be pivoted.
- The isocenter must be centered. User guidance is provided when the isocenter is out of position.

NOTE
BodyGuard sensors are switched off during a rotational scan.

7.19.1 Fixed and Free Rotational Scans (Option)

A fixed rotational scan is predefined and you cannot alter the start and end positions. A free rotational scan allows you to define the start and end position of the scan.

You can perform a rotational scan from the head side, doctor side, or nurse side of the patient table.

If the FlexArm option is installed, you can perform a rotational scan with a stand position between +135 degrees and -135 degrees.

Rotational scans can be subtracted by acquiring two series. Best practice is to acquire a mask series followed by a contrast series.

1 Position the stand in the desired work position.

2 On the touch screen module, select the **X-ray Acquisition** application.

3 Select the **X-ray Settings** task.

4 Select the rotational scan procedure that you want to use.

Step 1 **Settings** is displayed.

Settings that applicable for the selected procedure are displayed.

5 Configure the settings as desired.

6 If you are using an injector, do the following:

a Select **Injector Coupling** to switch injector coupling on.

b Set the X-ray delay time.

7 To change these settings in a later step, do the following:

a Select **Edit**.

b Change the settings.

c Select **Continue**.

8 Press **Accept** on the control module or **Next** on the touch screen module.

Step 2 **Isocenter** is displayed.

9 Follow the on-screen guidance to position the region of interest in the isocenter.

For more information, see Isocentering (page 121).

To return to the **Isocenter** step in a later step and reposition the region of interest, select **Unlock Table**.

10 Tap **Next**.

Step 3 **Check Path is Clear** is displayed.

11 Clear all objects from the rotational arc of the stand.

12 Follow the on-screen guidance to move the stand to the end position and then the start position.

- When performing a free rotational scan, select **Next** after the start position has been reached to display step 4, **Acquisition**.
- When performing a fixed rotational scan, step 4 **Acquisition** is displayed automatically after the start position has been reached.

13 If injector coupling is turned on, prepare the injector.

The system is now ready to acquire images.

14 Instruct the patient not to move during the acquisition.

15 Follow the on-screen guidance in step 4 **Acquisition** to perform the acquisition.

NOTE
BodyGuard is disabled during acquisition.

7.19.2 CBCT (Option)

The CBCT procedure consists of a rotational scan. The acquired images are automatically sent to the Interventional Workspot.

This procedure is only available on systems fitted with the 20-in detector.

For biplane systems, this procedure is only available on the frontal channel.

For information about CBCT calibration, see CBCT Calibration (page 304).

To be able to use CBCT, the table should be positioned within the following ranges:

- Table Pivot Angle:
  - -5 to 5 degrees
  - 175 to 185 degrees
  - -175 to -185 degrees
- Table Swivel Angle:
  - -1 to 1 degrees
  - 179 to 181 degrees
  - -179 to -181 degrees

NOTE
Depending on your version of the Interventional Workspot, it may be possible to acquire the rotational scan with a tilted and cradled table.

NOTE
You must be logged on to the Interventional Workspot before starting the acquisition. We recommend that you switch the workstation on and log on at the start of your work schedule to avoid a delay.

NOTE
BodyGuard is disabled during image acquisition.

1 Position the stand in the desired work position.

2 On the touch screen module, select the **X-ray Acquisition** application.

3 Select the **X-ray Settings** task.

4 Select the CBCT procedure that you want to use.

For more information, see CBCT Procedure Selection (page 137).

Step 1 **Settings** is displayed.

Settings that applicable for the selected procedure are displayed.

5 Configure the settings as desired.

6 If you are using an injector, do the following:

a Select **Injector Coupling** to switch injector coupling on.

b Set the X-ray delay time.

7 To change these settings in a later step, do the following:

a Select **Edit**.

b Change the settings.

c Select **Continue**.

8 Press **Accept** on the control module or **Next** on the touch screen module.

Step 2 **Isocenter** is displayed.

9 Follow the on-screen guidance to position the region of interest in the isocenter.

For more information, see Isocentering (page 121).

To return to the **Isocenter** step in a later step and reposition the region of interest, select **Unlock Table**.

10 Tap **Next**.

Functions for step 3 **Check Path is Clear** are displayed.

11 Clear all objects from the rotational arc of the stand.

12 Follow the on-screen guidance to move the stand to the end position and then the start position.

After the start position has been reached, step 4 **Acquisition** is displayed automatically.

13 If injector coupling is switched on, prepare the injector.

The system is now ready to acquire images.

14 Instruct the patient not to move during the acquisition.

15 Follow the on-screen guidance in step 4 **Acquisition** to perform the acquisition.

NOTE
BodyGuard is disabled during acquisition.

CBCT Procedure Selection

Protocol	Speed [fps]	Duration [s] (approximate)	Position
Cone Beam CT HQ 30fps - 21s	30	21	Head
Cone Beam CT LD 30fps - 10s	30	10	Head
Cone Beam CT HQ 60fps - 10s	60	10	Head
Cone Beam CT LD 60fps - 5s	60	5	Head
CBCT Prop (open) HQ - 5s	60	5	Head
CBCT Dual Prop (open) HQ - 5s	60	5	Head
CBCT Prop (open) LD - 5s	60	5	Head
CBCT Dual Prop (open) LD - 5s	60	5	Head
CBCT Prop open - 4s	60	4	Head
CBCT Roll - 5s	60	5	Side
CBCT Dual Roll - 8s	60	8	Side
CBCT Circular 10s Low	60	10	Head
CBCT Circular 10s Medium	60	10	Head
CBCT Circular 10s Normal	60	10	Head
CBCT Helical 10s Low	60	10	Head
CBCT Helical 10s Medium	60	10	Head
CBCT Helical 10s Normal	60	10	Head
CBCT Helical 8s Low	60	8	Head
CBCT Helical 8s Medium	60	8	Head
CBCT Helical 8s Normal	60	8	Head
CBCT Angio I.A. Circular	60	8	Head
CBCT Angio I.A. Helical	60	8	Head
CBCT Angio I.A. Dual Phase	60	8	Head
CBCT Angio I.V. Circular	60	8	Head
CBCT Angio I.V. Helical	60	8	Head
CBCT Angio I.V. Dual Phase	60	8	Head
VasoCT I.A. 22 cm / 8.5"	30	21	Head
VasoCT I.A. 27 cm / 10.5"	30	21	Head
VasoCT I.V. 22 cm / 8.5"	30	21	Head
VasoCT I.V. 27 cm / 10.5"	30	21	Head

NOTE
Some of these application protocols may not be available, depending on the X-ray equipment in use and the purchased options.

7.19.3 CBCT Dual (Option)

The CBCT Dual procedure is a dual phase scan that consists of a forward phase and a backward phase. The acquired images are automatically sent to the Interventional Workspot.

Contrast is used during the forward phase of the scan to visualize the arteries. After a brief pause, known as the scan interval, the backward phase is acquired. While the contrast medium has washed out of the arteries, the lesion holds the contrast medium for slightly longer, allowing the lesion to be visualized in the backward phase.

This procedure is only available on systems fitted with the 20-in detector.

For biplane systems, this procedure is only available on the frontal channel.

For information about CBCT calibration, see CBCT Calibration (page 304).

NOTE
You must be logged on to the Interventional Workspot before starting the acquisition. We recommend that you switch the workstation on and log on at the start of your work schedule to avoid a delay.

NOTE
If the exposure switch is released after the forward scan, the backward scan is canceled.

NOTE
BodyGuard is disabled during image acquisition.

1 Position the stand in the desired work position.

2 On the touch screen module, select the **X-ray Acquisition** application.

3 Select the **X-ray Settings** task.

4 Select the CBCT Dual procedure that you want to use.

For more information, see CBCT Procedure Selection (page 137).

Step 1 **Settings** is displayed.

Settings that applicable for the selected procedure are displayed.

5 Configure the settings as desired.

a Select **Injector Coupling** to switch injector coupling on.

b Set the X-ray delay time.

c Adjust the interval time between the forward phase and the backward phase, if desired.

6 To change these settings in a later step, do the following:

a Select **Edit**.

b Change the settings.

c Select **Continue**.

7 Press **Accept** on the control module or **Next** on the touch screen module.

Step 2 **Isocenter** is displayed.

8 Follow the on-screen guidance to position the region of interest in the isocenter.

For more information, see Isocentering (page 121).

To return to the **Isocenter** step in a later step and reposition the region of interest, select **Unlock Table**.

9 Tap **Next**.

Functions for step 3 **Check Path is Clear** are displayed.

10 Clear all objects from the rotational arc of the stand.

11 Follow the on-screen guidance to move the stand to the end position and then the start position.

After the start position has been reached, step 4 **Acquisition** is displayed automatically.

12 Prepare the injector.

The system is now ready to acquire images.

13 Instruct the patient about the breathing procedure.

14 Follow the on-screen guidance in step 4 **Acquisition** to perform the acquisition.

a Continue to hold the exposure switch at the end of the forward phase.

b Using the counter displayed in the live X-ray window or the acquisition window as a guide, instruct the patient to breathe during the interval time, and to hold their breath at the beginning of the backward phase.

c At the end of the backward phase release the exposure hand or foot switch.

NOTE
BodyGuard is disabled during acquisition.

7.19.4 CBCT I.V. (Option)

CBCT I.V. provides an intravenous injection technique to visualize the arterial phase. The acquired images are automatically sent to the Interventional Workspot.

CBCT I.V. can use a circular, helical, or dual phase trajectory. The helical trajectory is a dual-axis CBCT rotational scan that improves image quality by reducing bone-hardening artifacts and cone-beam artifacts. When using a helical trajectory, it is recommended to allow more space around the head end of the table compared to a single-axis rotational scan.

CBCT I.V. uses an intravenous injection technique that is known as Bolus Watch.
- After the injection of contrast medium, the operator observes the progress of contrast medium in the patient using the roadmap functionality. (Roadmap mode is started automatically on the Interventional Workspot.)
- When the contrast medium arrives at the region of interest, the operator starts the CBCT I.V. rotational scan.

This procedure is only available on systems fitted with the 20-in detector.

For biplane systems, this procedure is only available on the frontal channel.

For information about CBCT calibration, see CBCT Calibration (page 304).

NOTE
You must be logged on to the Interventional Workspot before starting the acquisition. We recommend that you switch the workstation on and log on at the start of your work schedule to avoid a delay.

NOTE
BodyGuard is disabled during image acquisition.

1 Position the stand in the desired work position.

2 On the touch screen module, select the **X-ray Acquisition** application.

3 Select the **X-ray Settings** task.

4 Select the CBCT procedure that you want to use.

For more information, see CBCT Procedure Selection (page 137).

Step 1 **Settings** is displayed.

Settings that applicable for the selected procedure are displayed.

5 Configure the settings as desired.

6 To change these settings in a later step, do the following:

a Select **Edit**.

b Change the settings.

c Select **Continue**.

7 Press **Accept** on the control module or **Next** on the touch screen module.

Step 2 **Isocenter** is displayed.

8 Follow the on-screen guidance to position the region of interest in the isocenter.

For more information, see Isocentering (page 121).

To return to the **Isocenter** step in a later step and reposition the region of interest, select **Unlock Table**.

9 Tap **Next**.

Functions for step 3 **Check Path is Clear** are displayed.

10 Clear all objects from the path of the stand.

11 Follow the on-screen guidance to move the stand to the end position and then the start position.

After the start position has been reached, step 4-5 **Injection and Acquisition** is displayed automatically.

12 Follow the on-screen guidance to prepare the injector.

13 Instruct the patient about the breathing procedure.

14 Follow the on-screen guidance in step 4-5 **Injection and Acquisition** to start the contrast injection and perform the acquisition.

a Start fluoroscopy.

NOTE
Fluoroscopy is automatically set to the appropriate flavor for this procedure and roadmap mode is enabled. Do not change the fluoroscopy flavor.

The subtracted Bolus Watch roadmap image is displayed.

b Start the contrast injection before you start acquisition.

c Observe the progress of the contrast medium in the roadmap image.

d When contrast is visible in the region of interest, stop fluoroscopy and start the exposure acquisition.

e Follow the counter displayed on the on-screen guidance.

f At the end of the of the exposure acquisition, release the hand switch or foot switch.

The acquired images are sent to the Interventional Workspot.

7.19.5 CardiacSwing (Option)

CardiacSwing provides a dual-axis rotation for either the left or right coronary artery. The acquisition series combines both rotation and angulation movement of the stand, which covers most of the routine coronary projections in a single sweep.

Dedicated X-ray protocols for the left and right coronaries are included in the system. CardiacSwing is used with the stand positioned for a cardiac study.

Contrast medium can be injected either manually or via an injector, care should be taken that contrast is present throughout the coronary tree for the duration of the swing.

1 Position the stand in the desired work position.

2 On the touch screen module, select the **X-ray Acquisition** application.

3 Select the **X-ray Settings** task.

4 Select the CardiacSwing procedure that you want to use.

For more information, see CardiacSwing Procedure Selection (page 141).

If procedure that you want to use is not visible in the list of X-ray protocols associated with the currently selected ProcedureCard, select the **Cardiac** settings. and then select **CardiacSwing**.

Step 1 **Settings** is displayed.

Settings that applicable for the selected procedure are displayed.

5 Configure the settings as desired.

6 If you are using an injector, do the following:

a Tap **Injector Coupling** to switch injector coupling on.

b Set the X-ray delay time.

7 To change these settings in a later step, do the following:

a Select **Edit**.

b Change the settings.

c Select **Continue**.

8 Press **Accept** on the control module or **Next** on the touch screen module.

Step 2 **Isocenter** is displayed.

9 Follow the on-screen guidance to position the region of interest in the isocenter.

a Center the region of interest in the lateral position.

b Center AP: position the catheter tip in left upper quadrant of the detector.

For more information, see Isocentering (page 121).

You may find it helpful to set this position as the isocenter so you can recall it later.

To return to the **Isocenter** step in a later step and reposition the region of interest, select **Unlock Table**.

10 Tap **Next**.

Functions for step 3 **Check Path is Clear** are displayed.

11 Clear all objects from the rotational arc of the stand.

12 Follow the on-screen guidance to move the stand to the end position and then the start position.

After the start position has been reached, step 4 **Acquisition** is displayed automatically.

13 If injector coupling is switched on, prepare the injector.

The system is now ready to acquire images.

14 Instruct the patient not to move during the acquisition.

15 Follow the on-screen guidance in step 4 **Acquisition** to perform the acquisition.

NOTE
BodyGuard is disabled during acquisition.

CardiacSwing Procedure Selection

For CardiacSwing procedures, the recommended field of view is 30 cm (11.6 in) when using a 12-in detector, and 27 cm (10.5 in) or greater when using a 15-in or 20-in detector.

To optimize imaging, the artery should be filled from first to last image of the swing procedure. It is recommended to begin the injection 0.5 seconds prior to acquisition of the first image. If you are using a power injector set an X-ray delay time on the system for 0.5 seconds.

All procedures are performed with the following settings:

- Stand position: head end
- Frame rate: 15 fps or 25 fps

Procedure	Exposure Time [seconds]	Injection Duration [seconds]	Clinical Area
LCA CRA 30 5s	5.3	5.8	Left coronary
LCA CRA 35 6s (Best practice)	5.8	6.3	Left coronary
LCA CRA 40 6s *Floor-mounted stand with 12-in detector only*	5.8	6.3	Left coronary
RCA LAO 4s	3.7	4.2	Right coronary
RCA AP 4s (Best practice)	4.1	4.5	Right coronary
LCA/RCA RAO-CAU -> LAO-CRA 4s	4.1	4.6	Left coronary Right coronary Grafts
LCA/RCA LAO-CAU -> RAO-CRA 4s	4.1	4.6	Left coronary Right coronary Grafts

LCA Trajectories

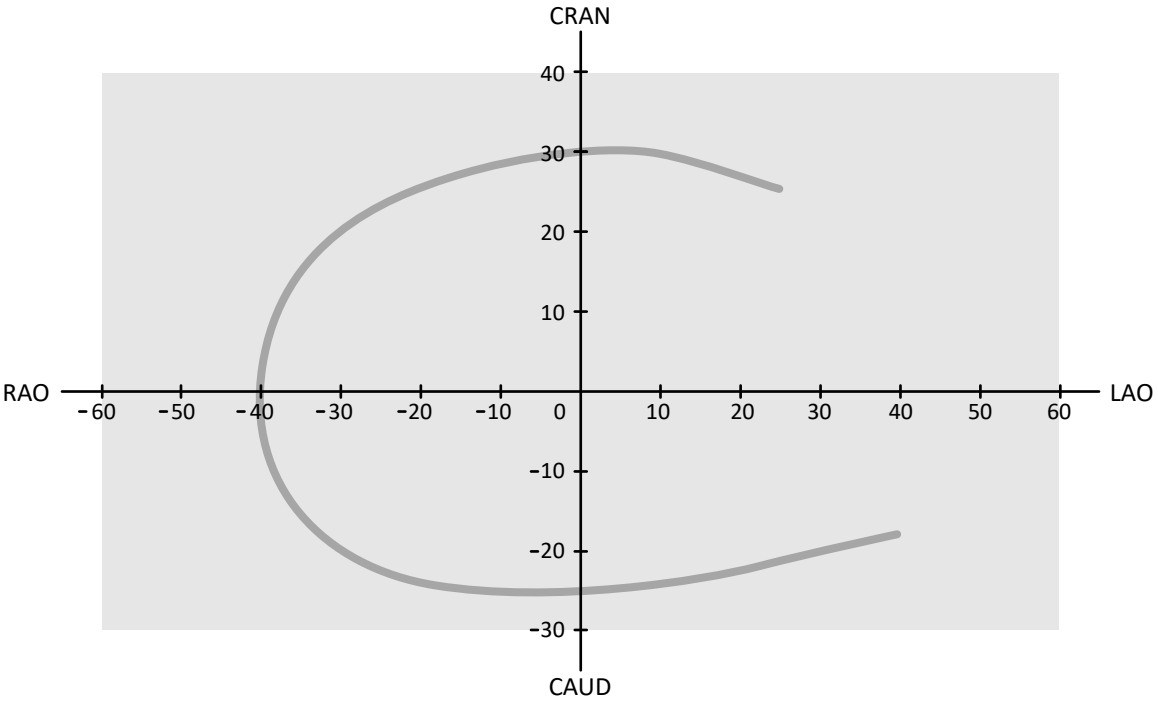


Figure 97 Small curve for all patients: **LCA CRA 30 5s**

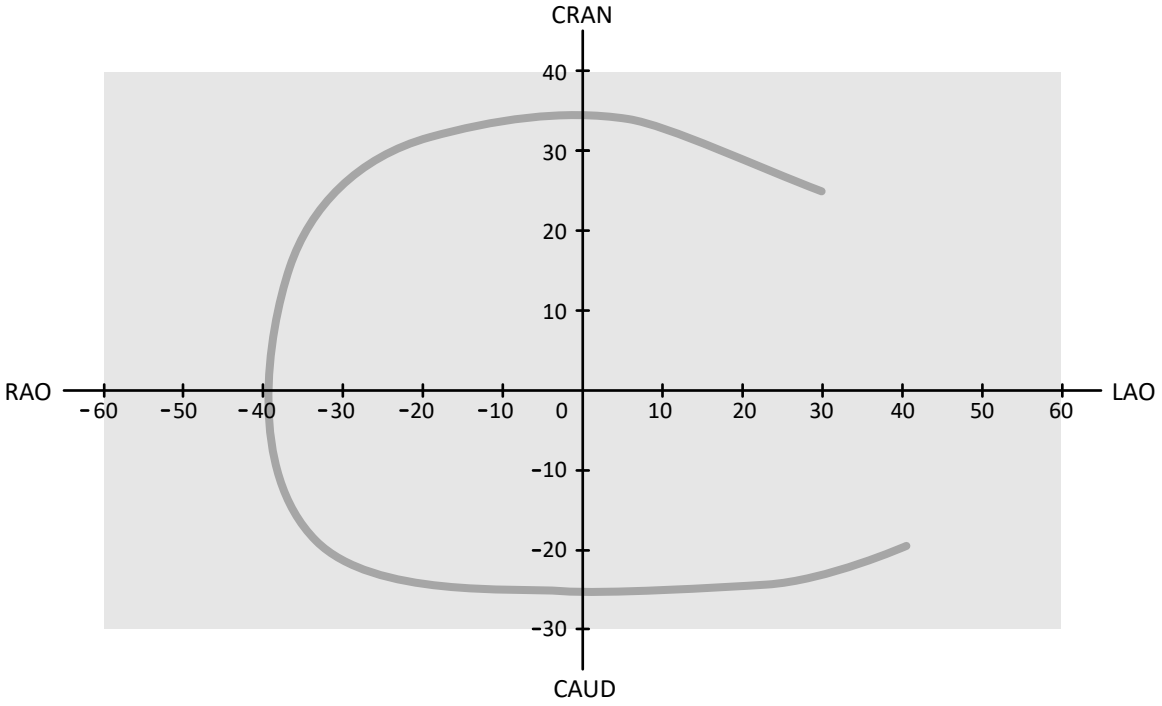


Figure 98 Medium curve for all patients: **LCA CRA 35 6s** (best practice for LCA)

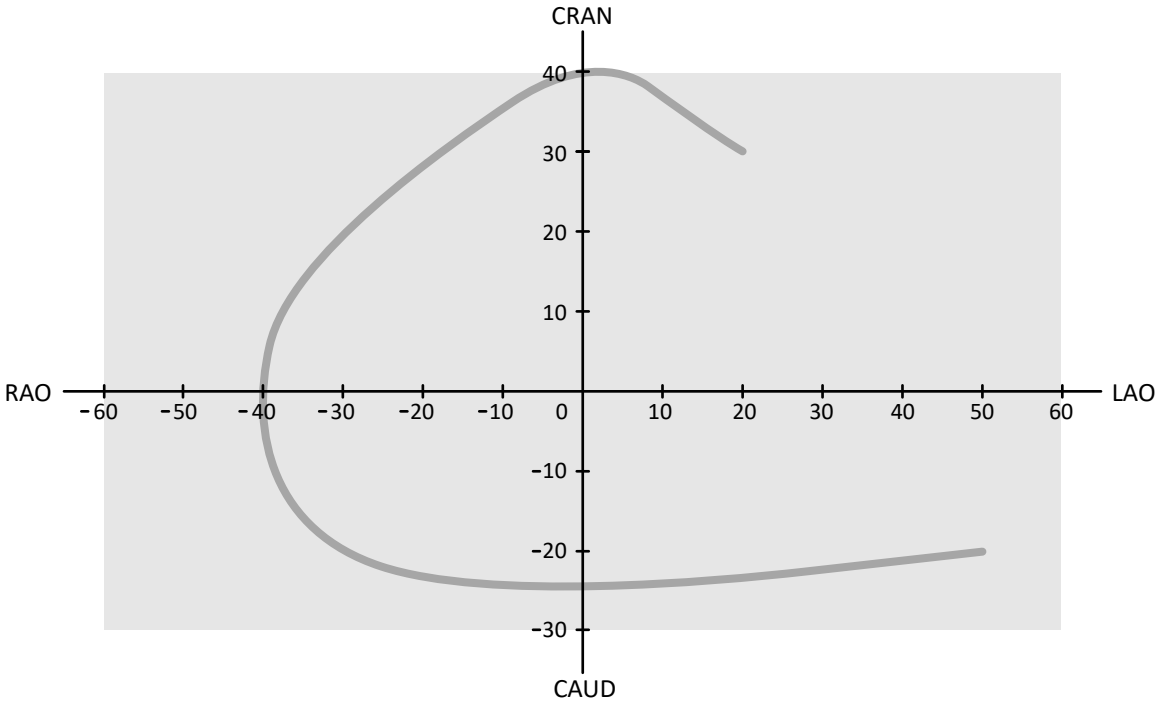


Figure 99 Large curve for normal or thin patients: **LCA CRA 40 6s**

RCA Trajectories

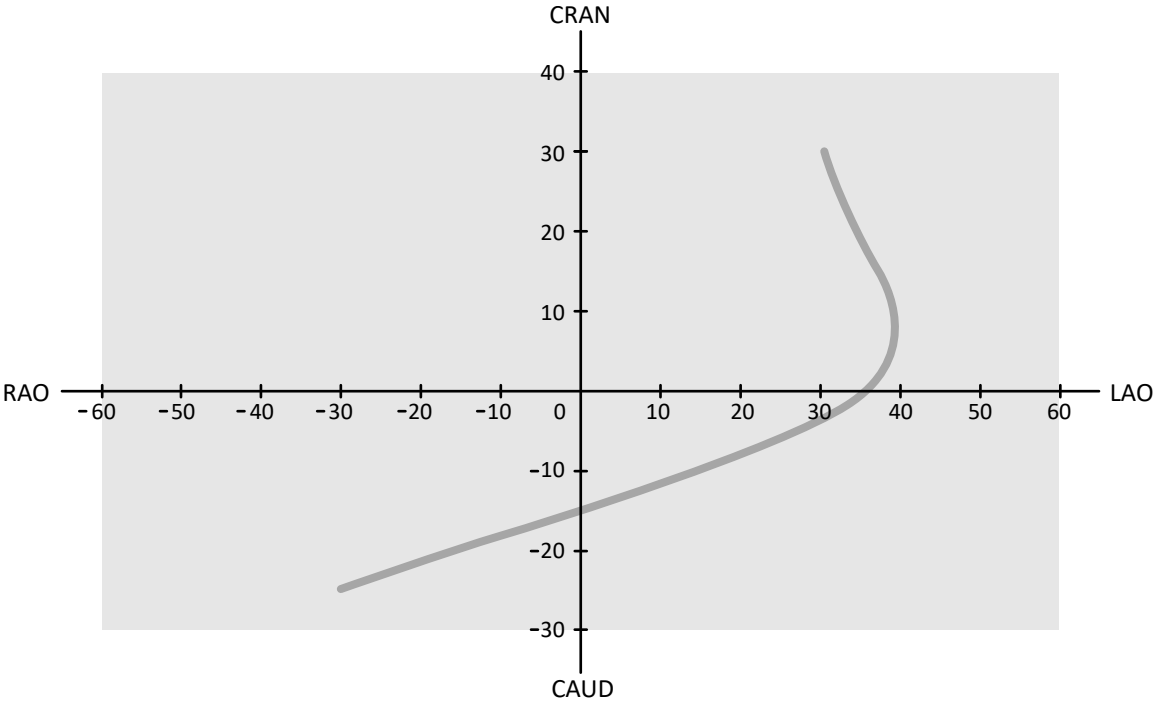


Figure 100 Standard curve for all patients: **RCA LAO 4s**

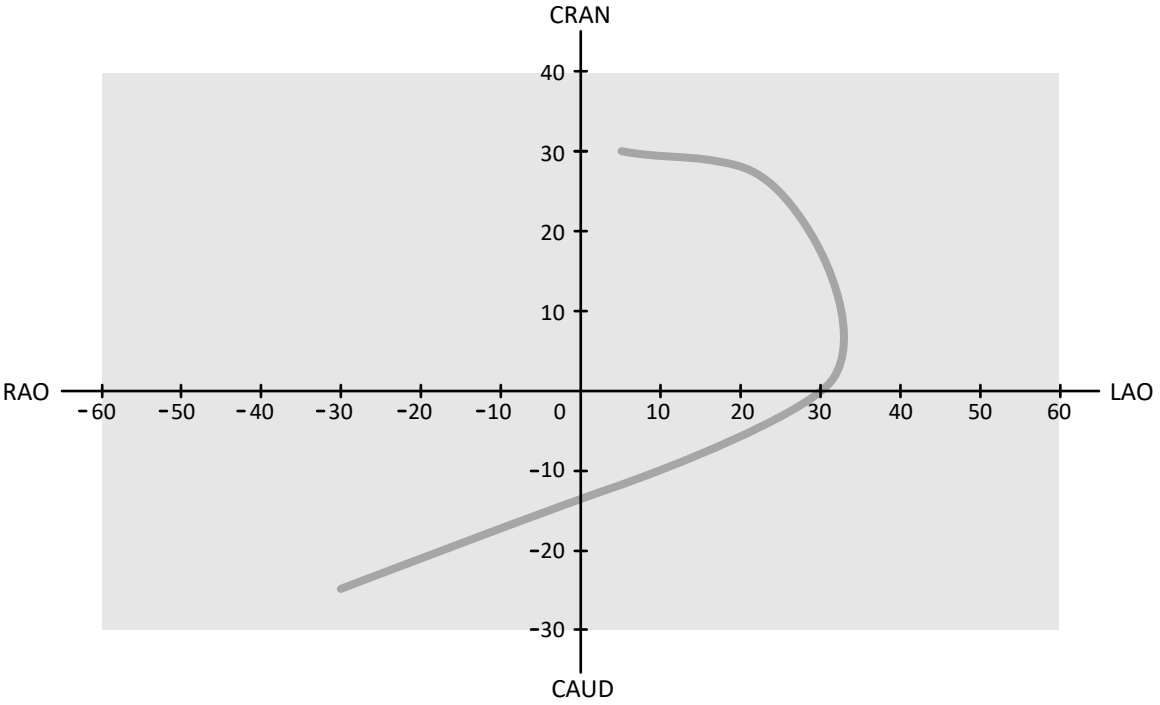


Figure 101 Standard curve for all patients: **RCA AP 4s**

LCA, RCA, and Graft Trajectories

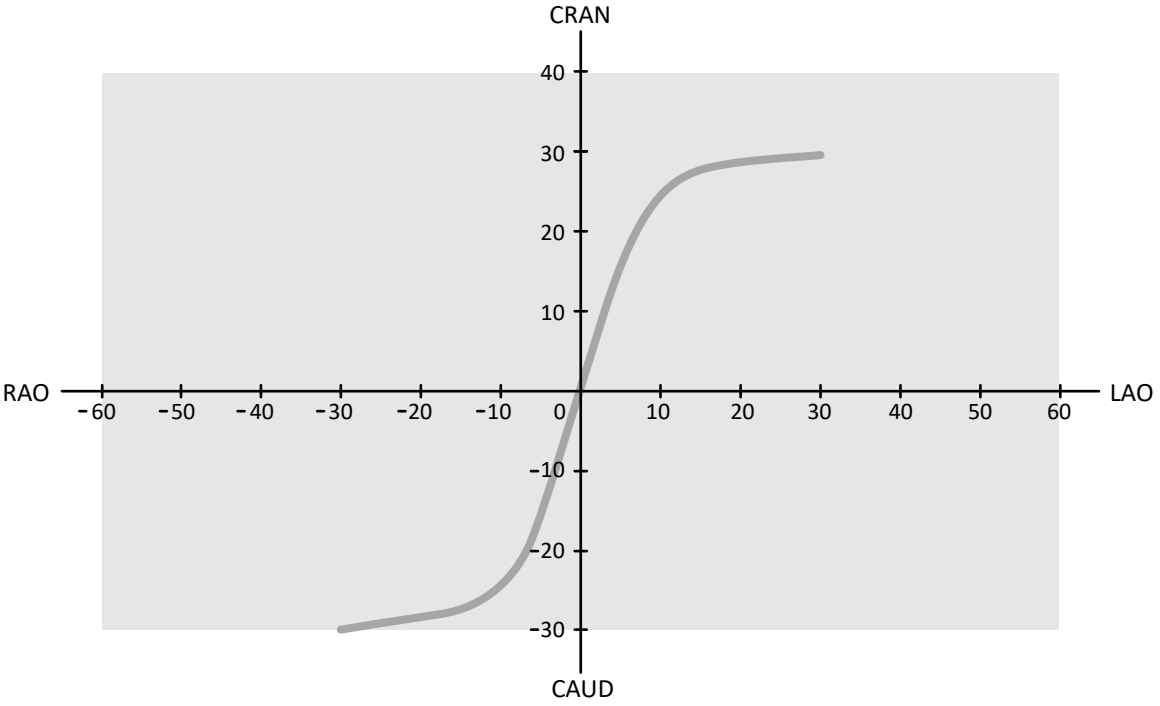


Figure 102 Swing for coronary and grafts: **LCA/RCA RAO-CAU -> LAO-CRA 4s**

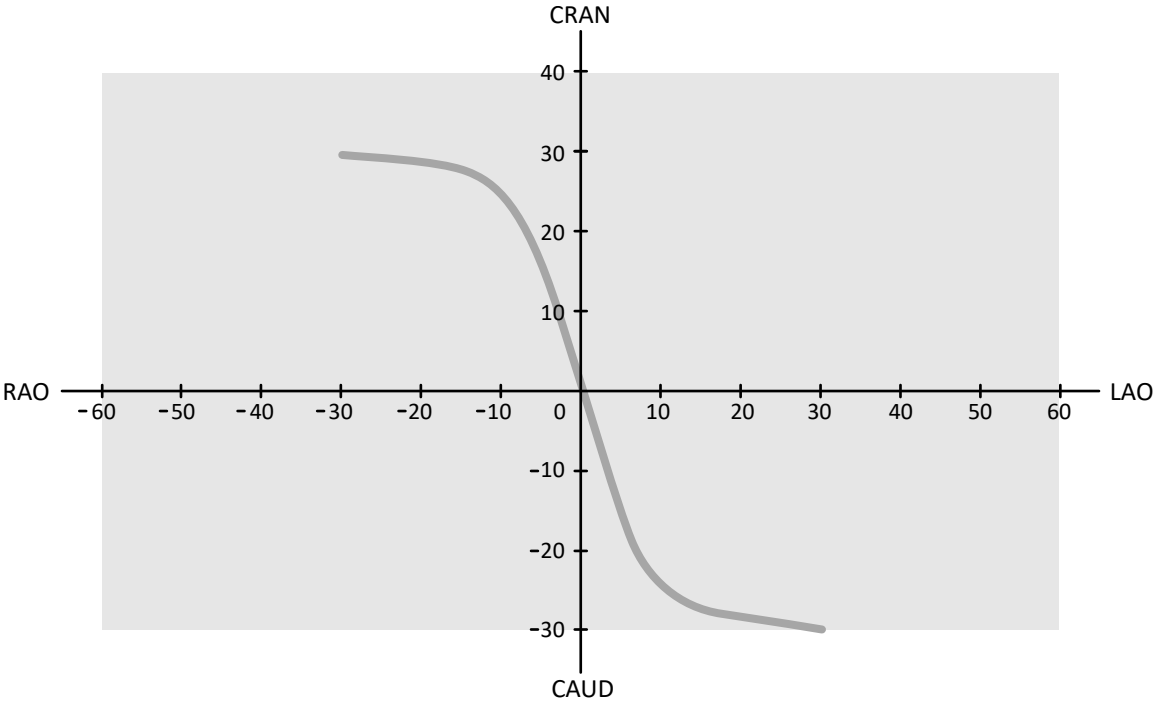


Figure 103 Swing for coronary and grafts: **LCA/RCA LAO-CAU -> RAO-CRA 4s**

7.20 Electrophysiology Procedures

CAUTION

Do not use X-ray images acquired using X-ray protocols in the EP Mapping procedure for diagnostic purposes since electromagnetic interference generated by the mapping equipment may reduce image quality. These images are for non-diagnostic viewing only.

Third-party Electrosphysiology systems may interfere with the BodyGuard sensor on the X-ray tube cover. When such systems are activated, the sensor on the X-ray tube cover is not reliable, and the stand may collide with the Electrophysiology equipment under the tabletop.

7.21 Previewing Series and Images for Automatic Archiving

If your system is configured to do so, series and images are automatically archived when you end a study.

You can preview the series and images that will be automatically archived at any time. For more information, see Configuring Automatic Data Transfer (page 271).

1 Click **Archive Preview** in the global tools panel.

A dialog box is displayed showing the series and images to be archived.

If there is more than one archive destination, the dialog box displays a section for each specific archive destination and the series and images to be archived to that destination.

The following icons indicate whether the whole series or only some images in the series are to be archived.

Icon	Description
	The series will be archived
	Only some images in the series will be archived

2 To exclude a series from archiving, select the series and click **Exclude**.

You can select multiple series for exclusion. When a series is excluded, a message is displayed on the pictorial and the pictorial image is dimmed.

NOTE
Excluded series can be exported manually.

3 To undo any changes that you have made and start again, if desired, click **Undo Changes**.

4 Click **Done** to save your changes and close the dialog box.

7.22 Ending a Study

When you end a study, you can choose which status to apply to each of the procedure steps performed within the study.

When you end a study, the system may be configured to automatically archive series and images associated with the study. You can check which series and images will be archived before you end the study.

You can only end a study from the acquisition window.

1 To end the study, do one of the following:
- Click **End Procedure** in the acquisition window.
- Click **End Procedure** in the patient database, if the patient database is open.

A dialog box is displayed and you are prompted to select how to end the study.

The dialog box displays the steps performed in the study.

2 For each procedure step performed, select a status.

If no X-ray images have been acquired in the study, the following options are available:
- **Complete**
- **Keep Scheduled**

If X-ray images have been acquired, the following options are available:
- **Complete** (displayed only when MPPS is not configured)
- **Discontinue** (displayed only when MPPS is configured)
- **Suspend**

3 If you selected **Discontinue** for one or more procedure step, select the appropriate reason for discontinuing each discontinued step.

4 To preview the series and images that will be archived when you end the study, click **Archive Preview**.

A dialog box is displayed showing the series and images that will be archived. For more information, see Previewing Series and Images for Automatic Archiving (page 146).

5 To end the study, click **OK**.

7.23 Dose Reports

Dose reports can be created automatically when a study is completed. A dose report contains dose information for each series and for the whole study.

DICOM Radiation Structured Dose Report
A DICOM radiation structured dose report is created automatically when a study is completed. This report cannot be viewed on the system, but it is automatically exported to a network destination (for example, a workstation that can display structured reports). For more information, see Configuring Automatic Data Transfer (page 271).

Secondary Capture Dose Report
A secondary capture dose report is a photo image of a dose report. This type of dose report is created automatically if your system is configured to do so. For more information, see Changing General Workflow Settings (page 262).

A secondary capture dose report is stored with the study and is identified by a report pictorial in the task panel. It can be viewed on the system and printed. You can also export the dose report to a network destination or storage device. For more information, see Exporting Data (page 183). Additionally, secondary capture dose reports are automatically exported to a network destination. For more information, see Configuring Automatic Data Transfer (page 271).

7.23.1 Viewing a Secondary Capture Dose Report

You can view a secondary capture dose report in the viewing application in the review window.

To view a dose report, you must complete the associated study.

Dose reports are saved when a study is completed. They are saved as photo images and are available to view in the **Series** task control panel.

1 Load the desired patient study.

2 Select the **Series** tab in the control panel.

3 Select **All Images** or **Photo Images** in the image selector drop-down list.

4 Click the dose report pictorial in the image list.

The dose report is displayed in the viewer.

7.23.2 Printing a Secondary Capture Dose Report

Secondary capture dose reports are created as images and can be printed.

The dose report for a procedure is available as a pictorial in the task panel.

1 To add the dose report to the print preview, do one of the following:

- Select the dose report pictorial in the control panel and click **Add to Print Preview** in the global tools panel.

- Right click on the dose report pictorial in the control panel and select **Add Series to Print Preview**.

2 To launch the print application, click **More Tools** and then select **Print Preview**.

The print application is launched and a preview of the report is displayed, including the dose report.

3 Compile any other desired elements of the report.

4 Click **Print** to print the report.

8 Reviewing

You can review a series or an image in the examination room using the viewpad or the optional mouse, or in the control room using the mouse or the review module.

You select a series or image for review using the pictorial index in the **Series** task in the acquisition window, the review window, or in the **X-ray Acquisition** application on the touch screen module.

Series are listed in a pictorial index. A yellow border around a pictorial indicates that this is the displayed image or series in the main display area. Biplane series are always displayed with the frontal series and lateral series side by side in the **Series** task. When you select a biplane series, the corresponding series on the other channel is also selected.

If the pictorial display area is not sufficient to display all the pictorials, a slide bar appears to the side of the display which you use to scroll through the pictorials. You can also apply a filter In the **Series** task navigation panel to find the series you are looking for.

If the X-ray protocol is configured to do so, after acquiring a series the series is displayed in the main display area, automatically replaying the images in the series.

For fluoroscopy, if the X-ray protocol is not configured to automatically replay the series, the last image acquired in the series is displayed. This is the last image hold function.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

For more information, see the following sections:
- Windows, Panels, Views, and Viewports (page 468)
- Acquisition Monitor (page 429)
- Review Monitor (page 431)
- Review Module (page 463)
- Viewpad (page 465)

8.1 Instant Parallel Working

While acquisition is being performed in the examination room, you can use the review window in the control room to work in parallel and perform tasks such as reviewing and post-processing, for any study, including studies and series that do not relate to the acquisition patient.

You select a study or series for review using the patient list in the review window. For more information, see Reviewing a Series using the Review Window (page 149).

When you review a study or series that is not related to the acquisition patient, a warning is displayed in the review window reminding you that you are not reviewing the acquisition patient. You can dim this warning, but while you are reviewing a series or study that is not from the acquisition patient, it is always displayed.

8.2 Reviewing a Series using the Review Window

You can review a series for any patient in the review window using the mouse or review module in the control room, or the viewpad or optional mouse in the examination room.

The following procedure describes a single method but you can also perform many of the actions using either the mouse, the review module, or the viewpad depending upon the situation. For more information, see Review Module (page 463) and Viewpad (page 465).

1 Click the **Series** task in the review window to select a series for review.

2 To change the way series are listed in the control panel, do one of the following:

- Click **Show pictorials** to display the series as pictorials.

- Click **Show details** to display the series as a list.

3 Do one of the following:
- Click a series to open it in the main display area.
- Double-click a series to open it in the main display area and automatically replay the images in the series.

NOTE
Biplane series are always displayed with the frontal series and lateral series side by side in the Series task. When you select a biplane series, the corresponding series on the other channel is also selected.

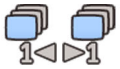
4 To control the replay of the images in a series, do the following:

a To replay the series, click **Play**.

b To pause the series, click **Pause**

c To review the previous or next image in the series, click **Previous image** or **Next image**.

d To review the previous or next series, click **Previous series** or **Next series**.



e To change the frame rate used when replaying the images, click **Frame Rate** and adjust the slider to the desired number of images per second.

NOTE
When reviewing biplane images, only one movie toolbar is displayed. Movie playback and displayed images are synchronized for the frontal and lateral images.

5 To replay all images and series in the study, click **Cycle All**.

6 To display an overview of all images in the selected series, click **Image Overview**.

7 To display one image from each of the available series for the patient, click **Series Overview**.

8 To review a particular type of image, select one of the following filters from the list:
- **Acquired Images**
- **Photo Images**
- **Flagged Images**

8.3 Reviewing a Series using the Touch Screen Module

You can review a series for the acquisition patient using the touch screen module.

The following procedure describes a single method but you can also perform many of the actions using either the mouse, the review module, or the viewpad depending upon the situation. For more information, see Review Module (page 463) and Viewpad (page 465).

When you review a biplane series on the touch screen module, instead of the frontal image and lateral image displayed side by side as in the review window, the frontal image is displayed in the main viewport, and the lateral image is displayed in a mini viewport within the main viewport.

Figure 104 Mini viewport in the main viewport

To swap the image in the main viewport with the image in the mini viewport, tap the mini viewport.

To reposition the mini viewport, touch the mini viewport and drag it to a new location.

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **Series** task.

3 Tap a series in the task panel to open it in the main display area.

NOTE
Biplane series are always displayed with the frontal series and lateral series side by side in the Series task. When you select a biplane series, the corresponding series on the other channel is also selected.

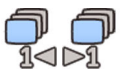
4 To replay the images in a series, do the following:

a To replay the series, tap **Play**.

b To pause the series, tap **Pause**

c To review the previous or next image in the series, tap **Previous image** or **Next image**.

d To review the previous or next series, tap **Previous series** or **Next series**.



5 To replay all images and series in the study, tap **Cycle All**.

6 To display an overview of all images in the selected series, tap **Image Overview**.

7 To display one image from each of the available series for the patient, tap **Series Overview**.

8 To review a particular type of image, select one of the following filters from the list:
- **Acquired Images**
- **Photo Images**
- **Flagged Images**

8.4 Using the Interventional Room Pointer

You can display the interventional room pointer on an image in a viewport to indicate a region of interest temporarily. The pointer is visible in any window (in the examination room and the control room) and on any touch screen module that also displays the image.

You can access the **Interventional Room Pointer** function from the examination room or the control room, using either the workstation or the touch screen module.

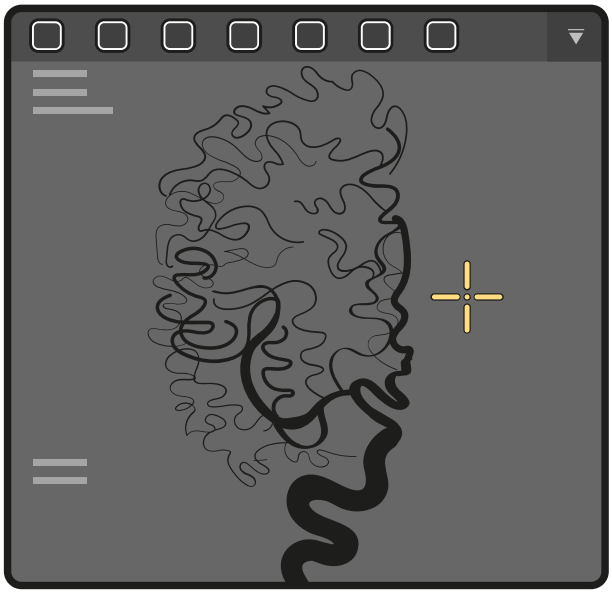


Figure 105 Interventional room pointer

1 To display the pointer using the workstation, click **Interventional Room Pointer** on the toolbar of the viewport.

NOTE
The Interventional Room Pointer function is grouped with the Markers function on the toolbar. You may need to click the arrow next to the Markers button to access the Interventional Room Pointer function.

a Move the mouse to move the pointer on the image.

b To remove the pointer from the image, click **Interventional Room Pointer** on the toolbar again.

2 To display the pointer using the touch screen module, tap and hold on the image in the viewport.

a Drag your finger to move the pointer on the image.

b To remove the pointer from the image, lift your finger off the touch screen module.

8.5 Protecting and Unprotecting Studies

If the system's storage is full, the system automatically deletes data that is not protected to make space for newly acquired images. You can protect individual studies to prevent deletion.

1 Click the patient selector in the upper-left corner of the acquisition window or the review window.

2 Select a study in the list.

3 To protect the study, right-click the study and click **Protect Study**.

4 To unprotect a study which is already protected, right-click the study and click **Unprotect Study**.

You can configure the system to protect every study upon completion. For more information, see Changing General Workflow Settings (page 262).

8.6 Reviewing Historical Data for a Scheduled Patient

You can review historical studies and series for a scheduled patient.

When you have selected a patient in the patient list, you can view all the studies that are available for that patient. This includes studies and series available on the local database and archived studies and series available on the network.

1 Click the patient selector in the upper-left corner of the review window to display the patient database.

2 Select a scheduled patient in the patient list.

3 Click the **History** tab.

All available studies and series for the selected patient are displayed, including archived studies and series that are available on the network. If a series is available in the local patient database, a pictorial is displayed. If a series is an archived series, a pictorial image is not displayed.

Studies are displayed in acquisition date order by default, with the most recent first.

4 To view a study in the local patient database, do the following:

a Find the study in the list.

b Select the series that you want to view within the study.

c Click **View**.

5 To view an archived study, do the following:

a Find the study in the list.

b Select the series that you want to review within the study.

To import more than one archived series at a time, select the check box in the top left corner of each series that you want to import.

c Click **Import**.

The selected series are imported from the network archive to the local database.

d Select the imported series that you want to view.

e Click **View**.

8.7 Importing Studies or Series for Review

You can import studies or series from a network location, a CD or DVD, or a USB device for review on the system.

8.7.1 Importing Studies or Series from a Network Location

1 Open the patient database.

2 Click the network location that you want to import from.

A search panel is displayed, allowing you to find the patient and study you are looking for.

3 Enter some appropriate search terms and click **Search**.

A patient list is displayed showing studies matching your search criteria.

4 Select the desired patient study in the list.

The study details are displayed below the patient list.

5 To import the whole study, click **Import**.

6 To import a series from the study, click the **Series** tab.

The available series are displayed. No previews are shown in the pictorials as the series are not in the local patient database.

7 Select the series you want to import.

8 Click **Import**.

When the import process is complete, a preview image is displayed in the pictorial.

9 If you want to cancel the import process, click **Stop**.

8.7.2 Importing Studies and Series from USB Device, CD, or DVD

NOTE
USB devices may contain malicious software that could steal personal information or cause the system to malfunction. You should always scan a USB device for malicious software before connecting it to the system.

1 If you are importing from a USB device, insert the device into one of the USB ports on the monitor in the control room.

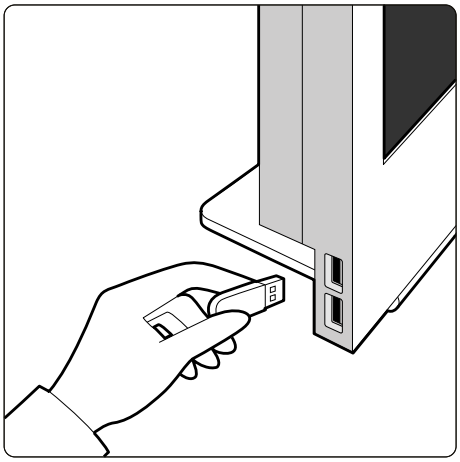


Figure 106 Inserting a USB flash memory drive

2 If you are importing from a CD or DVD, insert the disc into the CD/DVD drive.

3 Open the patient database.

4 Click the device that you want to import from.

If the device is password-protected or encrypted, enter the password in the dialog box displayed and click **Unlock**.

NOTE
The system supports BitLocker encryption. Other encryption tools are not supported.

A patient list is displayed showing the available studies from the selected device.

5 Select the desired patient study in the list.

The study details are displayed below the patient list.

6 To import the whole study, click **Import**.

A dialog box is displayed requesting you to confirm your action.

7 Confirm your import by doing the following:
- Click **Link** to import the data and merge patient details. Use this option if the data that you are importing belongs to a patient who already has studies on the system.
- Click **Import** to import the data without merging patient details.
- Click **Cancel** to cancel the import.

If you click **Link**, a further dialog box is displayed. Check that the patient details are correct and then click **Link Data** to import the data and merge the patient details. Alternatively, click **Cancel** to close the dialog box without importing the data.

8 To import a series from the study, click the **Series** tab.

The available series are displayed. No previews are shown in the pictorials as the series are not stored in the local patient database.

9 Select the series that you want to import and click **Import**.

NOTE
Do not remove the USB device, the CD, or the DVD until the import process is complete (the progress of the import process is displayed).

When the import process is complete, a preview image is displayed in the pictorial.

10 If you want to cancel the import process, click **Stop**.

8.8 Bolus Chase Reconstruction (Option)

Bolus Chase Reconstruction is a software tool that is available as an option on the system. It creates an overview image of the arteries in the patient's legs by automatically stitching together successive images acquired with the **Bolus Chase** procedure or the FDPA procedure.

The overview image is intended to assist you in viewing the original images. The overview image is not intended to be used for diagnosis. Actual diagnosis (for example, analysis of occlusions) should be based on information contained in the original X-ray images.

For information about acquiring X-ray images, see Bolus Chase (Option) (page 129).

NOTE
Imported images cannot be used to create an overview image in Bolus Chase Reconstruction.

The Bolus Chase Reconstruction screen provides the following views and task panels.

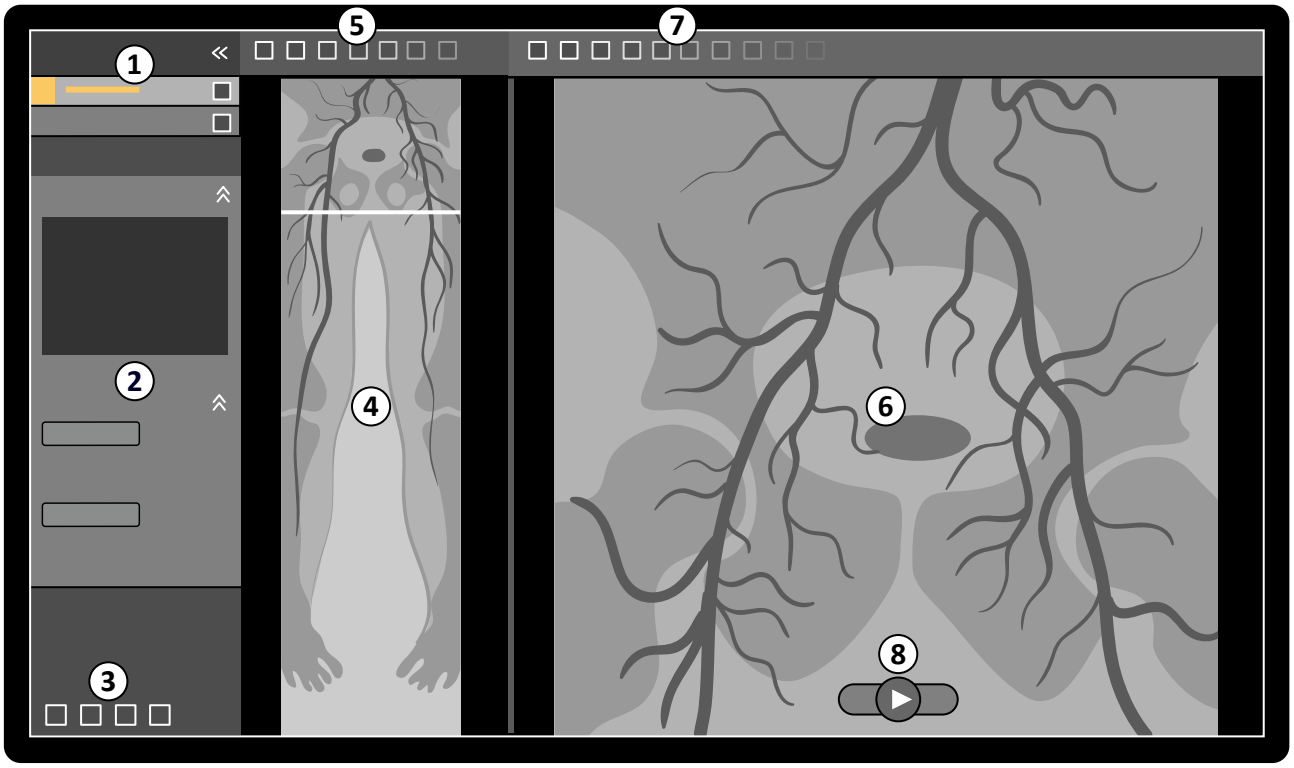


Figure 107 Bolus Chase Reconstruction

Legend			
1	Task selection panel	5	Overview image toolbar
2	Task panel	6	Main view (displaying original or subtracted images)
3	Global tools	7	Main view toolbar
4	Overview image	8	Navigation toolbar

8.8.1 Tasks

Bolus Chase Reconstruction provides the following tasks:

Reconstruction: This task allows you to view the reconstructed overview image. You use the overview image to assist you with navigation and analysis of the original images.

Processing: This task provides tools for adding annotations and creating measurements in the images.

You use the task selection panel to move to the next task when the current task is complete. You can also move back to a previous task and repeat it, if desired. The task panel provides functions associated with the current task.

8.8.2 Reconstruction

After you acquire a bolus chase series, Bolus Chase Reconstruction starts automatically and reconstructs an overview image.

If a patient other than the acquisition patient is being reviewed in the review window, that patient is automatically closed and the bolus chase series for the acquisition patient is opened.

When a bolus chase mask series is also available for the acquisition patient, you can create a subtracted view of the reconstruction image.

NOTE
You can start Bolus Chase Reconstruction manually in the control room for a patient other than the acquisition patient by opening a previously acquired bolus chase series in the patient database. To start the application, click More Tools and then click Bolus Chase Reconstruction.

NOTE
Reconstructions are saved automatically.

Reviewing the Reconstruction

After automatic reconstruction of the bolus chase series, an overview image is displayed alongside the original acquisition images.

NOTE
The reconstructed image is only for overview and navigation. It is not intended for diagnostic purposes. Clinical conclusions should be based on and verified using the original images.

The **Reconstruction** task is opened, providing a control panel containing tools for managing reconstructions.

1 Review the overview image and the original images to verify whether the complete peripheral artery is visible, or if any occlusions are present.

Use the overview image as a reference when navigating through the original images.

2 To view the original image corresponding to a particular point in the overview image, click the point in the overview image.

A line is displayed in the overview image as a marker, and the corresponding original image is displayed in the main view. You can drag the marker line to adjust its position.

3 To view the original images in the series or to review the series as a movie, use the navigation toolbar at the bottom of the main view.

The navigation toolbar provides the following controls:

Control	Function	
	**Play**	Plays the original images as a movie
	**Stop**	Stops movie playback
	**Next image**	Displays original images sequentially forward through the series
	**Previous image**	Displays original images sequentially backward through the series

You can also control image navigation using the following actions:
- Double-click in the main view to start and stop movie playback.
- With movie playback stopped, rotate the wheel button down to view the next image, or rotate the wheel button up to view the previous image.

The following functions are not available when reviewing the series as a movie:
- Annotations
- Measurements
- Snapshots
- Printing

4 To view original images in the main view with the anatomy fixed in place, do the following:

- Display the desired location in the overview image.
- Select **Fixed Anatomy** in the **Reconstruction** control panel.

When the anatomy is fixed and you click **Next image** or **Previous image** in the navigation toolbar, sequential images are displayed higher or lower in the main view so that the anatomy in each image is displayed in the same position in the view. Fixing the anatomy assists you with reviewing a region of interest in a series of the original images.

NOTE
When Fixed Anatomy is enabled, the movie review function cannot be used.

5 To zoom the original images in the main view, click **Zoom** on the main view toolbar and do the following:

- To zoom in, drag upward.
- To zoom out, drag downward.

You can also zoom the view directly by pressing Ctrl and rotating the wheel button, even when the Zoom tool is not selected.

NOTE
The overview image cannot be zoomed.

6 To pan the original images in the main view, click **Pan** on the main view toolbar and drag the image to pan the view.

You can also pan the view directly by dragging with the right mouse button, even when the pan tool is not selected. The overview image cannot be panned.

7 To adjust the brightness and contrast of the overview image or the original images, click **Brightness / Contrast** on the corresponding toolbar and do the following:

- Drag the pointer upward to decrease the brightness level.
- Drag the pointer downward to increase the brightness level.
- Drag the pointer to the right to decrease the contrast level.
- Drag the pointer to the left to increase the contrast level.

You can also adjust the brightness and contrast directly by pressing Ctrl and dragging with the middle mouse button, even when the brightness/contrast tool is not selected.

8 To invert the gray values of the overview image or the original images, click **Invert** on the corresponding toolbar.

9 To create a snapshot of the overview image or of the original image displayed in the main view, click **Snapshot** on the corresponding toolbar.

Before creating a snapshot, ensure that the appropriate level of patient information is displayed in the image using the **Image overlays** tool in the global tools panel.

The snapshot is saved in the patient database under the current study.

10 To send the overview image or the currently displayed original image to a reference view in the examination room, click **Copy to Reference** on the corresponding toolbar.

Depending on the configuration of your X-ray system, you can choose to send the image to reference view 1, reference view 2, or reference view 3.

11 To reset the overview image or the original images to their default presentation state, click **Reset** in the corresponding toolbar.

12 To hide the overview image and display only the original images, select **Hide Reconstruction** in the **Reconstruction** control panel.

13 If another bolus chase reconstruction is available for the patient, you can select the reconstruction in the **Existing Reconstructions** panel of the **Reconstruction** control panel.

The bolus chase reconstruction that is currently selected for investigation is indicated with an icon in the **Existing Reconstructions** panel.

14 If the currently displayed bolus chase series is not suitable, you can acquire another bolus chase series for the patient. To view the newly acquired series, click **Select Series** in the **Reconstruction** control panel.

If you acquired a new contrast series and a new mask series, you can select both series in the **Select Series** dialog box.

15 To delete a reconstruction, right-click the reconstruction in the **Existing Reconstructions** panel and click **Delete** in the shortcut menu.

Using a Mask

If a mask acquisition series (without contrast) is available, you can apply the mask and create a subtracted image.

1 Acquire a mask series.

The mask series is automatically processed and applied to the current contrast series and a subtracted overview image is displayed. The subtracted original images are displayed in the main view.

The subtracted reconstruction is also selected in the **Existing Reconstructions** panel in the task panel.

2 Review the subtracted series.

3 To manually combine part of the subtracted background with the subtracted overview image or the subtracted original images, click **Landmarking** on the corresponding toolbar and do the following:

- Drag the pointer upward to decrease the visibility of landmarks (increase transparency).
- Drag the pointer downward to increase the visibility of landmarks (decrease transparency).

Landmarking is useful for orientation purposes.

4 To turn subtraction off in the main view and view the original unsubtracted images, click **Subtraction On / Off** on the toolbar.

5 To turn subtraction back on, click **Subtraction On / Off** again.

6 If desired, you can acquire a new mask series.

The new mask series is automatically processed and applied to the current contrast series and a subtracted overview image is displayed. The subtracted original images are displayed in the main view.

7 To use a different mask series that you have already acquired, click **Remask** in the **Reconstruction** task panel.

The **Remask** dialog box is displayed, showing available mask series.

8 Select a mask series in **Remask** dialog box and click **OK**.

Subtraction is automatically applied using the new mask series.

8.8.3 Processing

You can add annotations and measurements to the original images and to the overview image.

For more information, see the following sections:
- Adding Annotations (page 165)
- Creating Measurements (page 177)

8.9 Resolving a Patient Mix

If you believe images have been stored for the wrong patient, you can move them to the correct patient using the **Resolve Patient Mix** wizard.

NOTE
If the patient to whom you want to move the series (the destination patient) is not in the patient list, you must add the patient before using the wizard. For more information, see Scheduling a Study Manually (page 62).

1 To start the wizard, do the following:

a Click the patient selector in the upper-left corner of the acquisition window.

b Select the patient whose folder contains the series you want to move.

c Right-click on the patient and click **Resolve Patient Mix** in the shortcut menu.

2 Verify that the source patient is correct, and click **Next**.

3 Select the series to move to the destination patient.

You can select more than one series at a time if you believe more than one series needs to be moved. To select more than one series, select the check box in the top left corner of each series to be moved.

4 Click **Next**.

5 Select the destination study by doing the following:

a Select the destination patient in the list.

A list of available destination studies for the selected patient is displayed.

b Select the destination study in the list.

6 Click **Next**.

7 Verify that the series to be moved and the destination patient are correct.

8 If they are correct, click **Finish**.

NOTE
After you move the series, dose information is applied as follows:
- ***The dose information for the whole source study is added to the destination patient. As a result, the displayed dose information for the destination patient may be higher than the actual dose that the patient has received.***
- ***The dose information is not removed from the source patient.***

9 Click **Close** to close the wizard.

9 Processing

After acquiring images or opening a series, you can perform image processing functions.

In the **Processing** task, you can perform the following image processing functions:

- Zoom and pan images
- Adjust contrast, brightness and edge enhancements
- Add text and graphical annotations
- Add freehand markers
- Crop images (electronic shutters)
- Apply vascular tools
- Create view trace images
- Perform measurements
- Start quantitative analysis

When performing processing actions, you select the appropriate task in the task selection panel and the images are displayed in the main display area. For more information, see the following sections:

- Windows, Panels, Views, and Viewports (page 468)
- Acquisition Monitor (page 429)
- Review Monitor (page 431)
- Toolbars (page 450)

Processing Biplane Images

When processing biplane images, you can set the scope of your modifications to just the frontal or lateral image, independently to either image, or automatically to both images.

To set the processing scope, click **Link Image Processing** on the toolbar.

- **Biplane Unlinked**: Changes can be applied independently to both the frontal and lateral images
- **Biplane Linked**: Changes applied to one image are automatically applied to both the frontal and lateral images

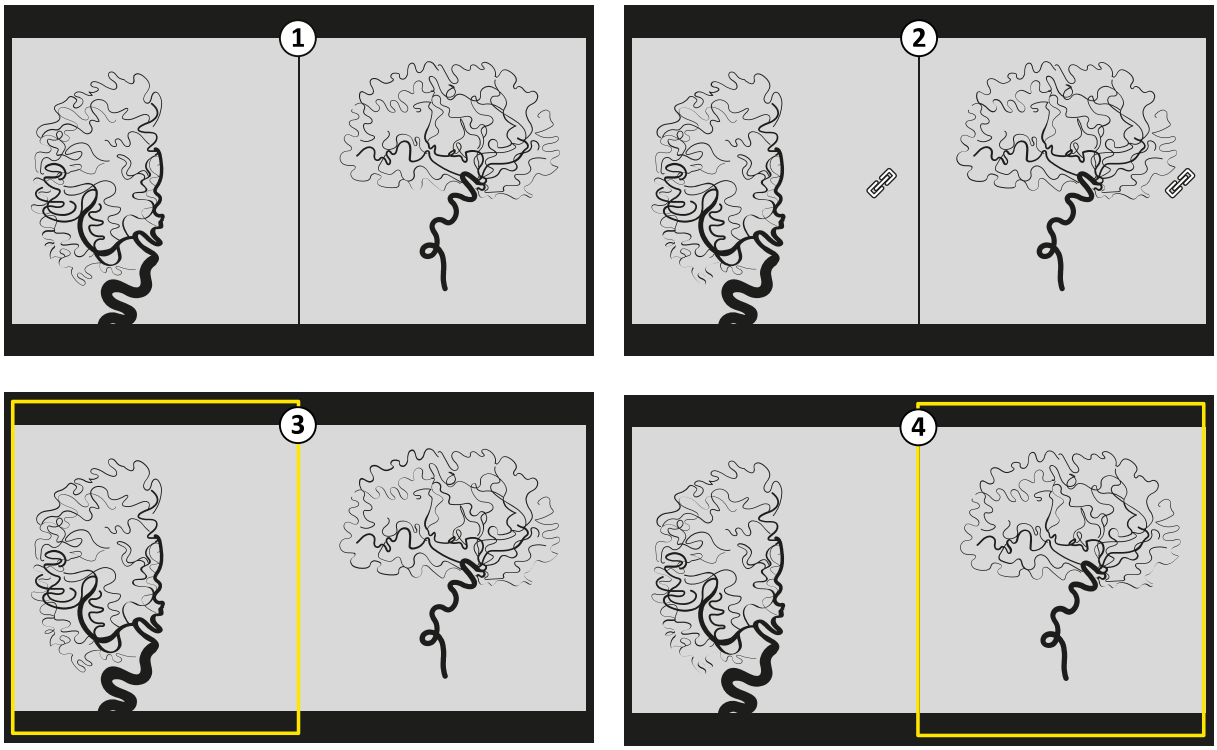


Figure 108 Link Image Processing options

Legend			
1	**Biplane Unlinked** image processing	3	**Biplane Unlinked** with focus on the frontal image
2	**Biplane Linked** image processing	4	**Biplane Unlinked** with focus on the lateral image

Resetting Processing Changes

You can reset processing changes by tapping **Reset All Settings** in the task panel of the **Processing** task in the **X-ray Acquisition** application on the touch screen module.

This function resets the image or series to the presentation state at acquisition, with the following exceptions:

- The zoom center is always set to the image center.
- The zoom factor is always set to 1.
- Annotations, markers, and measurements are not removed.

NOTE
This function is only available on the touch screen module.

9.1 Zooming

You can zoom images using the mouse or the touch screen module. When using the mouse, you can zoom images in the acquisition window and the review window. When using the touch screen module, you can zoom images in the acquisition window.

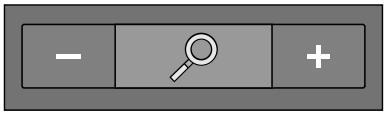
1 Select the **Processing** task, and then click or tap **Zoom and Pan**.

NOTE
Zoom is also available on the toolbar in the acquisition window or review window.

2 To zoom using the mouse, do the following:
- To zoom in, drag upward.
- To zoom out, drag downward.

a To zoom the current image only, select **Adjust current image only** in the control panel.

3 To zoom using the touch screen module, use the **Zoom** controls.



NOTE
You can also zoom with touch gestures on the touch screen module. For more information, see Touch Screen Gestures (page 437).

a To select whether your changes apply to the current image only or to all images, tap **Scope** and select an option.
- Apply changes to the current image only.
- Apply changes to all images in the series.

4 To display the complete image in the center of the view again, click or tap **Reset** in the control panel.

9.2 Panning

You can pan images using the mouse or the touch screen module. When using the mouse, you can pan images in the acquisition window and the review window. When using the touch screen module, you can pan images in the acquisition window. Panning allows you to view different areas of a zoomed image.

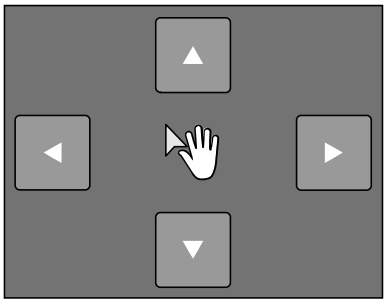
1 Select the **Processing** task, and then click or tap **Zoom and Pan**.

NOTE
Pan is also available on the toolbar in the acquisition window or review window.

2 To pan using the mouse, drag the image in the desired direction.

a To pan the current image only, select **Adjust current image only** in the control panel.

3 To pan using the touch screen module, use the **Pan** controls.



NOTE
You can also pan by dragging directly on the touch screen module. For more information, see Touch Screen Gestures (page 437).

a To select whether your changes apply to the current image only or to all images, tap **Scope** and select an option.

- Apply changes to the current image only.
- Apply changes to all images in the series.

4 To display the complete image in the center of the view again, click **Reset** in the control panel.

9.3 Adjusting Contrast and Brightness

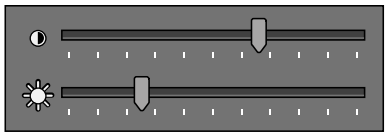
To assist you when reviewing images, you can adjust the contrast and brightness levels independently.

1 To adjust contrast and brightness using the mouse directly on the image, click **Contrast and brightness** on the toolbar in the acquisition window or review window, and do the following:
- Drag upward to decrease the brightness level.
- Drag downward to increase the brightness level.
- Drag to the right to decrease the contrast level.
- Drag to the left to increase the contrast level.

2 To adjust contrast and brightness in the task panel, do the following:

a Select the **Processing** task and click **Contrast, Brightness, Edge**.

b Adjust the **Contrast and brightness** sliders.



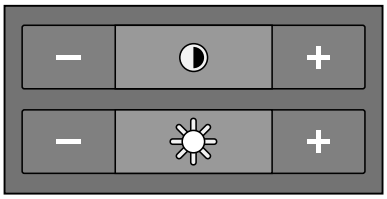
c To apply the changes to the current image only, select **Adjust current image only**.

3 To adjust contrast and brightness on the touch screen module, do the following:

a Select the **X-ray Acquisition** application.

b Select the **Processing** task and tap **CBE**.

c Use the **Contrast and brightness** controls.



d To select whether your changes apply to the current image only or to all images, tap **Scope** and select an option.

- Apply changes to the current image only.
- Apply changes to all images in the series.

4 To reset your changes, click or tap **Reset** in the task panel.

You can also reset your changes by clicking **Reset Image Processing** on the toolbar in the acquisition window or review window.

9.4 Enhancing Edges in Images

To assist you when reviewing images, you can use the edge enhancement function to sharpen edges and make them clearer.

1 To enhance edges using the mouse directly on the image, click **Edge enhancements** on the toolbar in the acquisition window or review window, and do the following:

- Drag upward to make edges sharper.
- Drag downward to make edges softer.

2 To adjust edge enhancement in the task panel, do the following:

a Select the **Processing** task and click **Contrast, Brightness, Edge**.

b Adjust the **Edge enhancements** slider.

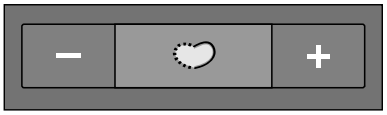
c To apply the changes to the current image only, select **Adjust current image only**.

3 To adjust edge enhancement on the touch screen module, do the following:

a Select the **X-ray Acquisition** application.

b Select the **Processing** task and tap **CBE**.

c Use the **Edge enhancements** controls.



d To select whether your changes apply to the current image only or to all images, tap **Scope** and select an option.

- Apply changes to the current image only.
- Apply changes to all images in the series.

4 To reset your changes, click or tap **Reset** in the task panel.

You can also reset your changes by clicking **Reset Image Processing** on the toolbar in the acquisition window or review window.

9.5 Inverting Images

You can invert images when reviewing and processing.

1 Select the **Processing** task, and then click or tap **Contrast, Brightness, Edge** (**CBE**).

2 Click or tap **Invert**.

3 To switch the invert function off, click or tap **Invert** again.

9.6 Adding Annotations

You can add annotations to images using the **Processing** task.

The following types of annotations are available:
- Text, using predefined labels or your own text
- Arrow with text
- Ellipse
- Rectangle
- Solid rectangle
- Polyline
- Smooth polyline

NOTE
You can copy and paste annotations using the standard PC keyboard shortcuts: Ctrl+C and Ctrl+V.

Annotations are saved with the images, and they are available if you open the images in another application on your system.

9.6.1 Adding a Text Annotation

You can add a text annotation using your own text or predefined text.

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 To apply an annotation to all images in the series, instead of just the selected image, select **Annotate All Images** in the task panel before creating the annotation.

3 Click **Free Format Text** in the task panel, and then click in the image at the location where you want to add the annotation.

The **Free Format Text** function is also available on the toolbar and in the shortcut menu when you right-click a location in the image.

4 Do one of the following:
- Type your own text in the annotation, and then press Enter or click outside the annotation.
- Click the arrow at the end of the annotation and select a predefined annotation. For more information, see Customizing Predefined Annotations (page 257).

NOTE
To edit an annotation after creating it, click the annotation, and then edit the text.

5 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

6 To move an annotation, drag it to a new location.

7 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.2 Adding an Arrow

You can add an arrow annotation with a text label.

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 To apply an annotation to all images in the series, instead of just the selected image, select **Annotate All Images** in the task panel before creating the annotation.

3 Click **Arrow + Text** in the task panel.

4 Click in the image at the location where you want to place the point of the arrow, and then click again at the end of the arrow.

5 Do one of the following:
- Type your own text in the label, and then press Enter or click outside the label.
- Click the arrow at the end of the label and select a predefined annotation.
- To create the annotation without a text label, press Enter or click outside the label without entering any text.

NOTE
To edit a text label after creating an annotation, click the label, and then edit the text.

6 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

7 To move an arrow or its text label, drag it to a new location.

8 To edit an arrow, drag an end point to a new location.

9 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.3 Adding an Ellipse

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 Click **Ellipse** in the task panel, and then do the following (creating an ellipse requires three mouse clicks):

- In the image, click to start drawing the ellipse.
- Move the pointer and click to set the length (long axis) of the ellipse.
- Click again to set the width (short axis) of the ellipse.

3 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

4 To move an ellipse, drag it to a new location.

NOTE
Before dragging an ellipse, move the pointer over the border of the ellipse.

5 To edit an ellipse, move the pointer over the ellipse, and then drag a control point to change the shape of the ellipse.

6 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.4 Adding a Rectangle

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 Click **Rectangle** in the task panel.

3 In the image, drag diagonally across the location where you want to place the rectangle.

4 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

5 To move a rectangle, drag it to a new location.

NOTE
Before dragging a rectangle, move the pointer over the border of the rectangle.

6 To edit a rectangle, move the pointer over the rectangle, and then drag a control point to change the shape of the rectangle.

7 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.5 Adding a Solid Rectangle

You can use a solid rectangle annotation to cover sensitive personal data in photo images that you want to export.

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 Click **Solid Rectangle** in the task panel.

3 In the image, drag diagonally across the location where you want to place the rectangle.

4 To move a rectangle, drag it to a new location.

5 To edit a rectangle, move the pointer over the rectangle, and then drag a control point to change its shape.

6 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.6 Adding a Polyline

This function creates a polyline without smooth intermediate points. To create a smooth polyline, see Adding a Smooth Polyline (page 168).

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 Click **Polyline** in the task panel.

3 In the image, click at the start point of the line.

4 Click at intermediate points in the line.

You can set as many intermediate points as you want.

5 Double-click at the end point of the line.

6 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

7 To move a polyline, drag it to a new location.

8 To edit a polyline, do any of the following:
- Drag an end point or an intermediate point to a new location.
- To create a new point, click on the line between points and then drag the new point to a new location.
- To delete a point, right-click the point and then click **Delete Point**.

9 To apply an annotation to all images in the series, instead of just the selected image, select **Annotate All Images** in the task panel before creating the annotation.

10 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.6.7 Adding a Smooth Polyline

This function create a polyline with smooth intermediate points. To create a polyline without smooth points, see Adding a Polyline (page 168).

1 Click the **Processing** task, and then click **Annotations** to display the available options.

2 Click **Smooth Polyline** in the task panel.

3 In the image, click at the start point of the line.

4 Click at intermediate points in the line.

You can set as many intermediate points as you want.

5 Double-click at the end point of the line.

6 To change the appearance of an annotation, right-click it and select an option from the shortcut menu.

You can change the following characteristics, when available:
- **Color**
- **Font Size**
- **Line Thickness**

7 To move a polyline, drag it to a new location.

8 To edit a polyline, do any of the following:
- Drag an end point or an intermediate point to a new location.
- To create a new point, click on the line between points and then drag the new point to a new location.
- To delete a point, right-click the point and then click **Delete Point**.

9 To apply an annotation to all images in the series, instead of just the selected image, select **Annotate All Images** in the task panel before creating the annotation.

10 To delete an annotation, select the annotation, and then click **Delete** in the task panel.

You can also delete an annotation (or just an annotation's text label, if applicable) from the shortcut menu after right-clicking the annotation.

9.7 Drawing Markers

You can draw freehand markers on an overlay in a viewport to add guidance or information about the displayed image, or to indicate a region of interest. Markers are visible in any window (in the examination room and the control room) and on any touch screen module that also displays the image.

You can access the **Markers** function from the examination room or the control, using either the workstation or the touch screen module.

1 Display the image that you want to overlay a marker on.

You can overlay markers on any acquired X-ray image, including fluoroscopy images that are not stored.

2 To display the **Markers** task panel using the workstation, do the following:

a Select the **Processing** task in the task selection panel.

b Click **Markers** on the toolbar of the viewport.

NOTE
The Markers function is grouped with the Interventional Room Pointer function on the tool bar. You may need to click the arrow next to the Interventional Room Pointer button to access the Markers function.

The **Markers** task panel is displayed and the **Free Draw** function is already selected.

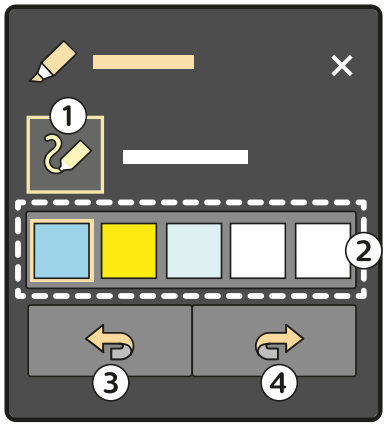
3 To display the **Markers** task panel using the touch screen module, do the following:

a Select the **X-ray Acquisition** application.

b Select the **Processing** task in the task selection panel.

c Tap **More** in the panel on the right side of the touch screen module and then tap **Markers**.

The **Markers** task panel is displayed.



Legend			
1	**Free Draw**	3	**Undo**
2	Available colors	4	**Redo**

d Tap **Free Draw** in the **Markers** task panel.

NOTE

You can also tap and hold on the image viewport on the touch screen module to start drawing a marker. This action also displays the Markers task panel. You can perform this action in either the Series task or the Processing task.

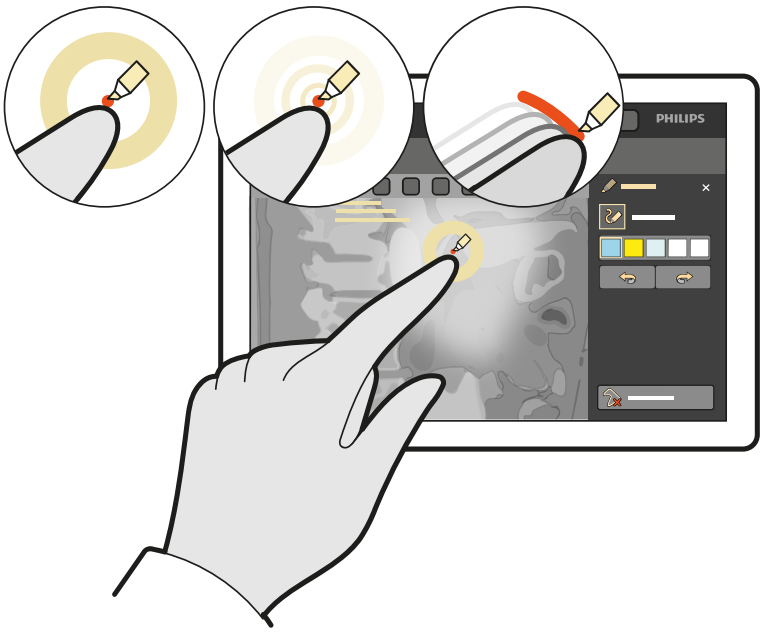


Figure 109 Tap and hold to create a marker on the touch screen module

4 Select a color for the marker in the **Markers** task panel.

You cannot change the color of a marker after creating it.

5 Use the mouse or your finger to draw a marker.

You can draw as many markers as desired.

NOTE
When using the touch screen module, you can perform the following interactions:
- ***To draw a straight line, touch the screen with two fingers.***
- ***To draw a round shape, touch the screen with three fingers.***

While using these gestures, a preview is displayed on the touch screen module. You can adjust the marker while your fingers are still touching the module. The marker is drawn on the image when you release your fingers.

Markers are displayed on all images in the series, and on all images acquired after creating markers. However, markers are removed if there is significant movement of the geometry.

Markers are displayed during X-ray acquisition and when viewing the series as a movie. In dual fluoroscopy mode, markers are displayed on both viewports and are zoomed according to the zoom factor of the displayed image.

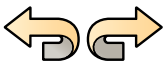
On biplane systems, you can overlay markers on either channel but they are only displayed on images in the same channel.

6 To pan or zoom while drawing markers, do the following:

a Tap **Free Draw** to deactivate the **Markers** function.

b Drag with your finger to pan or pinch in or out to zoom.

c Tap **Free Draw** again to continue drawing markers.



7 To undo or redo your actions, click or tap **Undo** or **Redo** in the **Markers** task panel.

8 To remove markers from the overlay, click or tap **Remove All**.

All markers are removed automatically when you select a new study for acquisition.

9 When you have finished drawing markers, click or tap **Close** in the upper-right corner of the **Markers** task panel.

NOTE
Markers are not stored or exported with the series. However, if you copy a series to a reference view, markers are also copied and they are converted to standard annotations.

9.8 Cropping Images

Cropping an image allows you to hide parts of the viewed image that are not of interest. This does not affect the stored image. Crop lines are also known as electronic shutters.

1 Click the **Processing** task in the acquisition or review windows.

2 Click **Image Cropping** in the control panel.

Shutter lines are displayed at the edges of the image.

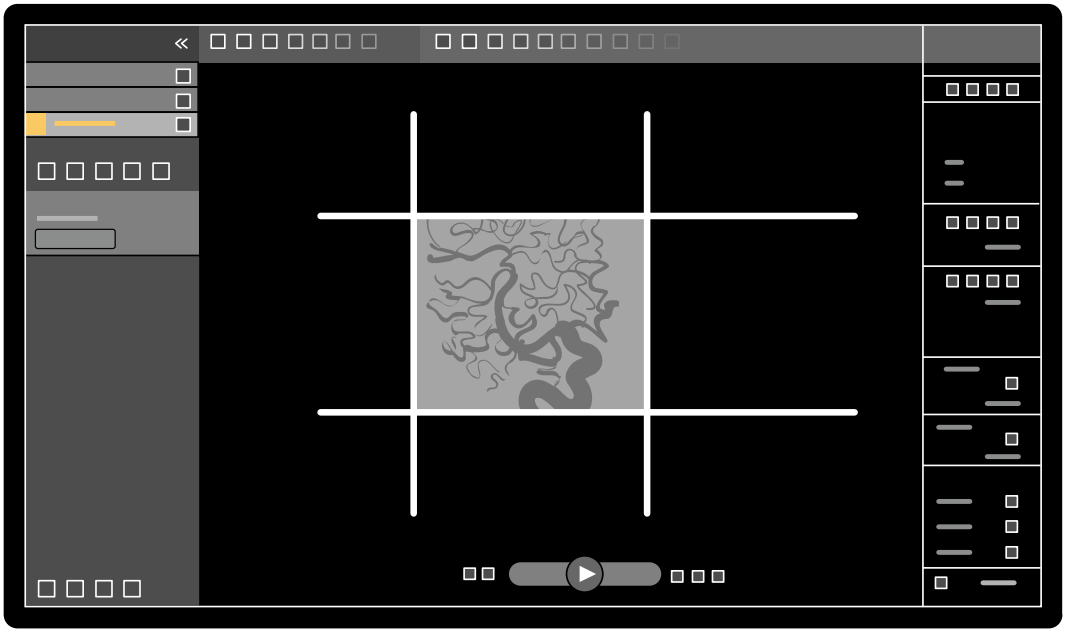


Figure 110 Shutter lines when cropping an image

3 To move the left and right, and top and bottom lines together, select the **Use symmetric lines** check box.

For example, moving the left shutter line to the right when using symmetric lines, will also cause the right shutter line to move to the left.

4 To set each line to move independently, clear the **Use symmetric lines** check box.

5 To move a line, drag it to the desired position.

NOTE
The shutter lines disappear in the acquisition window when acquisition starts or when a new task is selected in the control panel. To move the shutter lines after they have disappeared, you must first reselect Image Cropping in the control panel.

6 To reset all image processing changes, click **Reset** in the control panel, or click **Reset Image Processing** on the toolbar.

9.9 Using Subtraction

Subtraction can assist with orientation in the anatomy when reviewing series, and can help you visualize blood vessels in soft tissue by removing details that do not relate to the contrast-filled vessels.

Subtraction uses a mask image. You can select the mask from the same series, or subtract one series from another series.

1 Open the series that you want to perform postprocessing on.

2 Select the **Processing** task.

3 Select **Vascular Tools**.

4 To start subtraction, do one of the following:

a To use a single mask image, select **Image Subtraction**.

This function subtracts all images in a series from one single mask image.

NOTE
You can also select Image Subtraction using the toolbar.

b To subtract one series from another series, select **Series Subtraction**

This function subtracts all images in a series from the corresponding images (images with the same image number) in another series from the same study.

9.9.1 Changing the Subtraction Mask

You can change the mask used for subtraction by selecting another image from the current series or by selecting another series within the same study. This is also known as remasking.

Ensure that subtraction is switched on. For more information, see Using Subtraction (page 172).

1 Select the **Processing** task.

2 Select **Vascular Tools**.

3 If you are using the touch screen module, tap **Remask**.

4 If you are using **Image Subtraction**, use one of the following functions to select a new mask image:

-  Sets the current image as the new mask image. Before using this function, navigate to the desired mask image. This function is also available on the toolbar.
-  Sets the last image in the current series as the new mask image.
-  Sets the image before the current mask image as the new mask image.
-  Sets the image after the current mask image as the new mask image.

5 If you are using **Series Subtraction**, do one of the following to select a new mask series:

-  Sets the series before the current mask series as the new mask series.
-  Sets the series after the current mask series as the new mask series.

6 To reset the mask to the default mask used during acquisition, select **Reset**.

9.9.2 Adjusting the Mask Position

If the mask image and the live image are not aligned, for example, due to patient movement, you can adjust the position of the mask image.

Ensure that subtraction is switched on. For more information, see Using Subtraction (page 172).

1 Select the **Processing** task, and then select **Vascular Tools**.

2 Select **Pixel Shift**.

NOTE
You can also select Pixel Shift using the toolbar.

3 Select the **Scope** to determine what images to apply the repositioning to.

- Apply changes to all images in the series.
- Apply changes to the current image only.
- Apply changes to the current image and preceding images.
- Apply changes to the current image and all following images.

4 To adjust the position of the mask image using the mouse, drag the mask image to the new position.

5 To adjust the position of the mask image using the touch screen module, tap the arrow corresponding to the desired direction.

6 To reset the mask image position, click or tap **Reset**.

9.10 Using Landmarking

Landmarking allows you to fade in background anatomy when reviewing images.

You can only apply **Landmarking** if subtraction is switched on.

1 To adjust landmarking using the mouse directly on the image, right-click the image, click **Landmarking**, and then do one of the following:
- To increase transparency, drag upward.
- To decrease transparency, drag downward.

2 To adjust landmarking in the control panel, do the following:

a Select the **Processing** task and click **Vascular Tools**.

b click **On** in the **Landmarking** control panel

c Adjust the **Landmarking** slider.

d To apply the changes to the current image only, select **Adjust current image only**.

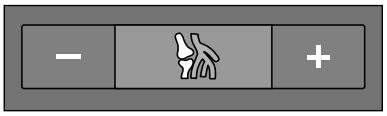
NOTE
You can also select Landmarking using the toolbar.

3 To adjust landmarking on the touch screen module, do the following:

a Select the **X-ray Acquisition** application.

b Select the **Processing** task, tap **Vascular Tools**, and then tap **Landmarking**.

c Use the **Landmarking** controls.



d To select whether your changes apply to the current image only or to all images, tap **Scope** and select an option.

- Apply changes to the current image only.
- Apply changes to all images in the series.

4 To turn landmarking on or off, click **Landmarking** on the toolbar.

5 To reset your changes, click or tap **Reset** in the task panel.

You can also reset your changes by clicking **Reset Image Processing** on the toolbar in the acquisition window or review window.

9.11 Creating a View Trace Image

View Trace creates a single image showing the whole vessel tree filled with contrast. The system creates this image by adding together images that you select from the series.

To use **View Trace**, the series that you are reviewing must contain images with contrast medium.

NOTE
While creating a view trace image, other processing tools are unavailable.

1 Navigate to the image that you want to use as the starting point.

2 Click the **Processing** task in the acquisition or review window.

3 Click **View Trace**.

The **View Trace** control panel opens and the view trace image is displayed.

4 Select the contrast medium in use.
- **Iodine**
- **CO2**

5 To add the current image to the view trace image, click **Add**.

The image is added to the view trace image and the next image is displayed. The following symbol is displayed:

6 To move to the next image without adding the current image to the view trace image, click **Skip**.

7 To remove the last image added from view trace image, click **Undo Last**.

8 To save the view trace image, click **Save**.

9 To cancel the creation of the view trace image, click **Exit**.

The **View Trace** control panel closes.

NOTE
An unsaved view trace image is not saved automatically.

9.12 Copying Images and Series to Reference Windows

You can copy an image or series to a reference window. Depending on your system configuration, either two or three reference windows are available.

In the control room, reference windows that are in use are displayed as tabs in the header area. In the examination room, separate reference windows or viewports are used.

1 To copy an image, navigate to the desired image, do one of the following:

- Click **Copy image to Reference 1**. On a biplane system, the image with focus is copied. If neither image has focus, the frontal image is copied.

- Click **Copy image to Reference 2**. On a biplane system, the image with focus is copied. If neither image has focus, the lateral image is copied.

- Click **Copy image to Reference 3**. On a biplane system, the image with focus is copied. If neither image has focus, both images are copied.

2 To copy the series, right-click on the current image, select **Copy to Reference** in the shortcut menu, and do one of the following:

- Click **Copy series to Reference 1**. On a biplane system, the series from the frontal channel is copied.

- Click **Copy series to Reference 2**. On a biplane system, the series from the lateral channel is copied.

- Click **Copy series to Reference 3**. On a biplane system, the series with focus is copied. If neither series has focus, both series are copied.

3 To view an image or series copied to a reference window, click on the corresponding reference tab in the header area of the review monitor, or refer to the appropriate window or viewport in the examination room.

9.13 Creating a Snapshot

You can create a snapshot of an image, including any annotations on the image. Snapshots are stored in the relevant patient study as photo images.

1 Navigate to the desired image.

2 Do one of the following:

- On the toolbar, click **Copy as photo image**.

- Right-click on the image and select **Copy as photo image**.

The snapshot is stored as a photo image within the patient study.

9.14 Flagging Images

You can flag one or more images to create a selection for exporting or printing.

1 To flag a particular image, use the navigation toolbar to display the image, and then click **Flag** on the toolbar.

You can display and flag other images in the series using this method.

2 To flag all images in the current series, click the arrow next to the **Flag** tool on the toolbar and select **Flag Series**.

Images that have been flagged display a flag symbol in the upper-right corner: 

9.15 Creating Measurements

You can create measurements on images using the **Measurements** task panel in the **Processing** task.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

The following types of measurements are available:
- Distance
- Polyline
- Ratio
- Angle
- Open Angle

Measurements are saved with the images, and they are available if you open the images in another application on your system.

Calibration
Calibration is required to obtain absolute values with distance measurements. If the current series has already been calibrated, the calibration factor is displayed with an option to re-calibrate, if desired. If the series not yet been calibrated and automatic calibration is available, you can accept the calibration factor and continue with measurement.

To accept the automatic calibration factor, click **Accept** in the **Calibration** task panel.

When you accept the calibration factor, the information is added to the image information overlay on the image.

CAUTION
If you use automatic calibration for measurements or quantitative analysis, the region of interest must be positioned as close to the isocenter as possible during acquisition. If the region of interest is not in the isocenter, the calibration factor will not be correct and measurements will not be accurate.

If automatic calibration is not available, you should calibrate the series manually. For more information, see Manual Calibration (page 181).

NOTE
If you accept the calibration factor, measurement values are displayed in millimeters. If you do not accept the calibration factor, measurement values are displayed in pixels.

Accuracy
Accuracy of length measurements, when calibrated automatically, is ±5% when the measured object is in the isocenter and where the length of the object is at least 50 pixels on the monitor.

Accuracy of angle measurements is ±2 degrees.

9.15.1 Creating a Distance Measurement

NOTE
You can also perform this task using the touch screen module. See Creating a Distance Measurement on the Touch Screen Module (page 178).

1 Select the **Processing** task and click **Measurements** to display the **Measurements** task panel.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

2 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

3 Click **Distance**.

4 Click on the image at the start point of the measurement, then click again at the end point.

The measurement and its value are displayed on the image.

5 To move a measurement, drag it to a new location.

6 To edit a measurement, drag an end point to a new location.

7 To delete a measurement, select the measurement and click **Delete** in the task panel.

You can also delete the selected measurement using Delete on the keyboard, or from the shortcut menu after right-clicking a measurement.

9.15.2 Creating a Distance Measurement on the Touch Screen Module

1 On the touch screen module, select the **X-ray Acquisition** application.

2 Select the **Processing** task.

3 Select **Measurements** in the task panel on the right.

4 In the **Measurements** task panel, select **Distance**.

If the image is not calibrated, a user message is displayed over the image indicating that automatic calibration will be applied. Tap **OK** to accept the message.

5 To create a measurement, do one of the following:
- Tap at the start of the measurement and then tap again at the end of the measurement.
- Tap and hold at the start of the measurement and then drag to the end of the measurement.

The measurement and its value are displayed on the image.

6 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

7 To edit a measurement, tap the start point or the end point to select it, and then drag it to a new position.

When you select a point, a ring is briefly displayed around the point to indicate that it is selected. The end point is automatically selected when you create a measurement.

8 To remove all measurements from the image, tap **Remove All**.

All measurements are removed from the current channel. For linked images, measurements are removed from both channels.

9.15.3 Creating a Polyline Measurement

1 Select the **Processing** task and click **Measurements** to display the **Measurements** task panel.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

2 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

3 Click **Polyline**.

4 In the image, click at the start point of the line.

5 Click at intermediate points in the line.

You can set as many intermediate points as you want.

6 Double-click at the end point of the line.

7 To move a measurement, drag it to a new location.

8 To edit a measurement, do any of the following:

- Drag any of the points on the line to a new location.
- To delete a point, right-click the point and then click **Delete Point**.

9 To delete a measurement, select the measurement and click **Delete** in the task panel.

You can also delete the selected measurement using Delete on the keyboard, or from the shortcut menu after right-clicking a measurement.

9.15.4 Creating a Ratio Measurement

A ratio measurement displays the difference between two distances as a percentage.

1 Select the **Processing** task and click **Measurements** to display the **Measurements** task panel.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

2 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

3 Click **Ratio**.

4 Click in the image at the start point of the first distance line, then click again at the end point.

5 Click at the start point of the second distance line, then click again at the end point.

The two distance lines are displayed in the image, and the ratio of the second distance to the first distance is indicated.

6 To move a measurement, drag it to a new location.

7 To edit a measurement, drag an end point to a new location.

8 To delete a measurement, select the measurement and click **Delete** in the task panel.

You can also delete the selected measurement using Delete on the keyboard, or from the shortcut menu after right-clicking a measurement.

9.15.5 Creating an Angle Measurement

An angle measurement displays the angle between two angle legs that are joined at the apex.

1 Select the **Processing** task and click **Measurements** to display the **Measurements** task panel.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

2 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

3 Click **Angle**.

4 Click in the image at the end of the first angle leg.

5 Click at the apex of the angle.

6 Click at the end of the second leg.

The angle and its value are displayed in the image.

7 To move a measurement, drag it to a new location.

8 To edit a measurement, drag an end point or the apex to a new location.

9 To delete a measurement, select the measurement and click **Delete** in the task panel.

You can also delete the selected measurement using Delete on the keyboard, or from the shortcut menu after right-clicking a measurement.

9.15.6 Creating an Open Angle Measurement

An open angle measurement displays the angle between two lines that are not joined at an apex.

1 Select the **Processing** task and click **Measurements** to display the **Measurements** task panel.

NOTE
You can also display the Measurements task panel using the Measurements button in the top bar of a viewport in any task.

2 If the automatic calibration factor is available, click **Accept**.

If the automatic calibration factor is not available, you should perform manual calibration before creating a measurement. For more information, see Manual Calibration (page 181).

3 Click **Open Angle**.

4 Click in the image at the start point of the first line, then click again at the end point.

5 Click at the start point of the second line, then click again at the end point.

The two lines and the value of the angle between them are displayed in the image.

6 To move a measurement, drag it to a new location.

7 To edit a measurement, drag an end point to a new location.

8 To delete a measurement, select the measurement and click **Delete** in the task panel.

You can also delete the selected measurement using Delete on the keyboard, or from the shortcut menu after right-clicking a measurement.

9.15.7 Manual Calibration

To ensure accurate measurements, the measurement function must be calibrated.

You can perform manual calibration using one of the following methods:
- **Catheter**
- **Distance**
- **Sphere**

NOTE
When performing manual calibration on biplane images, you must perform calibration on frontal image and the lateral image separately.

Catheter Calibration

You perform catheter calibration by tracing the centerline of a catheter in the image.

You can perform catheter calibration on either a straight catheter segment or a curved segment, but you should always use a non-tapered segment. Using a tapered segment for calibration will result in incorrect measurement results.

1 In the **Calibration and Measurements** task panel, click **Manual Calibration** to display the **Calibration** dialog box.

2 In the **Cal. Method** list, select **Catheter**.

3 If you want to change the series on which to perform calibration, click **Change** and select an available series.

The currently selected series is used by default. The selected series number is displayed in the task panel.

4 Click **Draw** in the control panel and do the following:
- Click on the centerline of the catheter at the desired start point.
- Click again to place a point further along the centerline.
- Continue placing points along the centerline, and then double-click at the desired end point.

For additional information, click **Help** in the control panel.

5 To hide or show the contour of the catheter as you work, select or clear **Hide** in the control panel.

6 To edit a contour, click **Edit** in the control panel, and do one of the following:
- Click along the walls of the catheter in the image and then double-click on the last position to complete the contour.
- Drag along the walls of the catheter in the image to correct the position of the contour.

7 When the contours are complete, select the catheter size from the list in the control panel.

If the desired catheter size is not available, you can type it directly in the box.

8 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

9 To complete manual calibration, click **Accept and Close**.

Distance Calibration

You perform distance calibration by marking a known distance in the image.

1 In the **Calibration and Measurements** task panel, click **Manual Calibration** to display the **Calibration** dialog box.

2 In the **Cal. Method** list, select **Distance**.

3 If you want to change the series on which to perform calibration, click **Change** and select an available series.

The currently selected series is used by default. The selected series number is displayed in the task panel.

4 Click **Draw** in the control panel and do the following:

- Click in the image at the desired start point of the line.
- Click again at the desired end point.

5 To hide or show the line, select or clear **Hide** in the control panel.

6 To edit the line, click **Edit** in the control panel, and do the following:

a Move the pointer over the start point or the end point

b Drag the point to a new position.

7 After drawing the line, select the distance in the list in the control panel.

If the desired distance is not available, you can type it directly in the box.

8 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

9 To complete manual calibration, click **Accept and Close**.

Sphere Calibration

You perform sphere calibration by identifying a sphere of a known size in the image.

1 In the **Calibration and Measurements** task panel, click **Manual Calibration** to display the **Calibration** dialog box.

2 In the **Cal. Method** list, select **Sphere**.

3 If you want to change the series on which to perform calibration, click **Change** and select an available series.

The currently selected series is used by default. The selected series number is displayed in the task panel.

4 Click **Draw** in the control panel.

5 Click a sphere in the image to identify it.

6 To hide or show the sphere contour, select or clear **Hide** in the control panel.

7 To edit the sphere, click **Edit** in the control panel, and do any of the following:

- To move the sphere, drag the center of the sphere to a new position.
- To change the diameter of the sphere, drag the circumference of the sphere.

8 When the sphere is defined, select the diameter in the list in the control panel.

If the desired diameter is not available, you can type it directly in the box.

9 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

10 To complete manual calibration, click **Accept and Close**.

10 Exporting and Printing

The following sections provide information about how to export the images that you acquired during a patient study. Printing functions are also provided on the system if a printer is available.

10.1 Exporting Data

You can export locally stored data to network locations or to storage devices in either DICOM or PC formats.

You can export complete studies or selected series and images from a study to a network location, a DICOM archive, or to a storage device such as USB flash memory drives or CD/DVD.

When you export biplane images, the frontal and lateral images are always exported together.

You can export images in the following formats:

Destination	Supported Formats
USB memory device	DICOM, PNG, MPEG4
PACS, Xcelera, MultiModality Viewer	DICOM
DVD	DICOM, PNG, MPEG4

CAUTION
Do not use images in PNG or MPEG4 format for diagnostic purposes. Such images are for non-diagnostic viewing only.

You can also configure the system to export data automatically when you acquire images or when you close a study, by customizing the export protocols in use. For more information about customizing export protocols and automatic data transfer, see Configuring Export Protocols (page 269) and Configuring Automatic Data Transfer (page 271).

NOTE
Export protocols and automatic data transfer settings can only be customized by a system administrator.

10.1.1 Exporting Data to a USB Flash Memory Drive

You can export data from either the **Series** task or from the patients list to a USB flash memory drive in either DICOM or PC format, allowing you to view the study, series, or images on another system or computer.

Ensure you have the desired study open in the **Series** task in the review window, or that you have the patients list open and the study available.

You can select images or series to export and you can export more than one study, series, or image at a time.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

NOTE
USB devices may contain malicious software that could steal personal information or cause the system to malfunction. You should always scan a USB device for malicious software before connecting it to the system.

1 Ensure that the appropriate level of patient information is displayed in the images using the **Image overlays** tool in the global tools panel.

2 Insert a USB flash memory drive into one of the USB ports at the side of the left monitor.

Regardless of the position of the review and acquisition monitors (left or right) within the control room, the USB ports are always situated in the left monitor.

For Azurion systems with IP-based video infrastructure, the USB ports of the left monitor on the first workspot, FlexSpot, or MultiSwitch monitor as well as the left monitor of the second workspot, second FlexSpot, and second MultiSwitch monitor can be used.

For Azurion systems with DVI-based video infrastructure, only the USB ports of the left monitor of the first workspot or FlexSpot monitor can be used. The USB ports of the additional FlexSpot monitor are not functional.

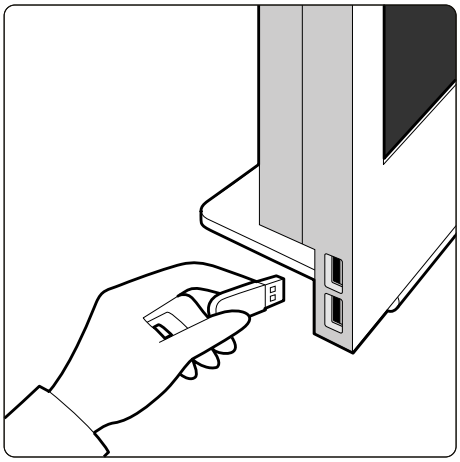


Figure 111 Inserting a USB flash memory drive

If the device is password-protected, enter the password in the dialog box displayed and click **Unlock**.

3 Select the studies, series or images you want to export.

To select more than one study, series, or image at a time, do one of the following:

- In the **Series** task, hold down the Ctrl key and click each of the images or series you want to export.
- In the **Series** task, click the first image or series you want to export and then click the check box in the top left corner of each additional pictorial you want to select.
- In the patients list, hold down the Ctrl key and click each of the studies you want to export.

NOTE
Biplane series are always displayed with the frontal series and lateral series side by side in the Series task. When you select a biplane series, the corresponding series on the other channel is also selected.

4 Do one of the following:
- In the **Series** task, right click one of the selected pictorials and select **Save To**.
- In the patients list, click **Save To**.

The **Save To** dialog panel is displayed.

5 Ensure **Selected images** is selected.

To change the images you want to export, you can choose one of the following options:
- **Selected images** [1]
- **Selected series**
- **All series** [2]
- **All acquired series**
- **Photo Images**
- **Reference images**
- **Flagged images**

[1] This option is only available if you have selected specific images to export.

[2] This option is not available if you have selected specific images to export.

The series or images being exported are listed below your selection.

6 To select a DICOM format for export, do the following:

a Select the **Format** to use for exporting, from the **DICOM Formats** section of the drop-down list.

For all DICOM formats, the list displays the export protocols available. For more information on changing export protocol settings, see Configuring Export Protocols (page 269).

b To include a standard DICOM viewer on the USB drive, select **Include DICOM Viewer**.

7 To select a PC format for export, do the following:

a Select the **Format** to use for exporting, from the **PC Formats** section of the drop-down list.

You can select a PC format which allows you to export a series as an MPEG4 movie, and images as PNG photos.

b Enter a filename for the exported data.

If you are exporting more than one series or image, each file will be exported using the name you enter with a consecutive number added.

8 Select **USB** in the **Destination** list.

The amount of free space on the USB drive is displayed with a colored bar:
- Green: more than 20% space is available
- Orange: between 10% and 20% space is available
- Red: less than 10% space is available

The default destination for a USB drive is the root folder of the drive.

9 To select a subfolder within the USB drive, do the following:

a Click **Browse**.

b Select the desired subfolder.

c Click **OK**.

10 To de-identify the images, do the following:

a Select **De-Identify**.

b For each of the patients listed, enter an alternative **De-Identified Name**.

NOTE
Personal data in photo images cannot be de-identified. You can use a solid rectangle annotation to cover sensitive personal data in photo images that you want to export. For more information, see Adding a Solid Rectangle (page 167).

11 Click **Save** to export the data.

12 Click **Cancel** to close the dialog panel without exporting data.

10.1.2 Exporting Data to CD/DVD

You can export data from either the **Series** task or from the patients list to a CD/DVD in either DICOM or PC format, allowing you to view the study, series, or images on another system or computer.

NOTE
CD-RW is an unreliable medium and is not recommended for archiving purposes.

Ensure you have the desired study open in the **Series** task in the review window, or that you have the patients list open and the study available.

You can select images or series to export and you can export more than one study, series, or image at a time.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

1 Select the studies, series or images you want to export.

To select more than one study, series or image at a time, do one of the following:

- In the **Series** task, hold down the Ctrl key and click each of the images or series you want to export.
- In the **Series** task, click the first image or series you want to export and then click the check box in the top left corner of each additional pictorial you want to select.
- In the patients list, hold down the Ctrl key and click each of the studies you want to export.

NOTE
Biplane series are always displayed with the frontal series and lateral series side by side in the Series task. When you select a biplane series, the corresponding series on the other channel is also selected.

2 Do one of the following:
- In the **Series** task, right click one of the selected pictorials and select **Save To**.
- In the patients list, click **Save To**.

The **Save To** dialog panel is displayed.

3 Ensure **Selected images** is selected.

To change the images you want to export, you can choose one of the following options:
- **Selected images** [1]
- **Selected series**
- **All series** [2]
- **All acquired series**
- **Photo Images**
- **Reference images**
- **Flagged images**

[1] This option is only available if you have selected specific images to export.

[2] This option is not available if you have selected specific images to export.

The series or images being exported are listed below your selection.

4 To select a DICOM format for export, do the following:

a Select the **Format** to use for exporting, from the **DICOM Formats** section of the drop-down list.

For all DICOM formats, the list displays the export protocols available. For more information on changing export protocol settings, see Configuring Export Protocols (page 269).

b To include a standard DICOM viewer on the CD/DVD, select **Include DICOM Viewer**.

5 To select a PC format for export, do the following:

a Select the **Format** to use for exporting, from the **PC Formats** section of the drop-down list.

You can select a PC format which allows you to export a series as an MPEG4 movie, and images as PNG photos.

b Enter a filename for the exported data.

If you are exporting more than one series or image, each file will be exported using the name you enter with a consecutive number added.

6 Select **DVD** in the **Destination** list.

7 To de-identify the images, do the following:

a Select **De-Identify**.

b For each of the patients listed, enter an alternative **De-Identified Name**.

NOTE
Personal data in photo images cannot be de-identified. You can use a solid rectangle annotation to cover sensitive personal data in photo images that you want to export. For more information, see Adding a Solid Rectangle (page 167).

8 Click **Save** to export the data.

9 Click **Cancel** to close the dialog panel without exporting data.

If the exporting process is interrupted for any reason while the disc is being written, for example by restarting the system while the export is still in progress, it is possible that the external CD/DVD drive fails to open. If the external CD/DVD drive fails to open or cannot be opened as normal following a failed export process, switch the external CD/DVD drive off or disconnect its power cable. When you switch the external CD/DVD drive on again, the disc tray should open normally.

10.1.3 Exporting Data to a PACS

If the system is connected to a Picture Archiving and Communication System (PACS) network location, you can export DICOM format data to the selected PACS.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

This procedure can be performed from either the **Series** task or from the patients list.

Ensure you have the desired study open in the **Series** task in the review window, or that you have the patients list open and the study available.

1 Select the studies, series or images you want to export.

To select more than one study, series or image at a time, do one of the following:

- In the **Series** task, hold down the Ctrl key and click each of the images or series you want to export.
- In the **Series** task, click the first image or series you want to export and then click the check box in the top left corner of each additional pictorial you want to select.
- In the patients list, hold down the Ctrl key and click each of the studies you want to export.

NOTE
Biplane series are always displayed with the frontal series and lateral series side by side in the Series task. When you select a biplane series, the corresponding series on the other channel is also selected.

2 Do one of the following:
- In the **Series** task, right click one of the selected pictorials and select **Save To**.
- In the patients list, click **Save To**.

The **Save To** dialog panel is displayed.

3 Ensure **Selected images** is selected.

To change the images you want to export, you can choose one of the following options:
- **Selected images** [1]
- **Selected series**
- **All series** [2]
- **All acquired series**
- **Photo Images**
- **Reference images**
- **Flagged images**

[1] This option is only available if you have selected specific images to export.

[2] This option is not available if you have selected specific images to export.

The series or images being exported are listed below your selection.

4 Select the **Format** to use for exporting, from the **DICOM Formats** section of the drop-down list.

For all DICOM formats, the list displays the export protocols available. For more information on changing export protocol settings, see Configuring Export Protocols (page 269).

Data exported in PC formats cannot be exported to PACS locations.

5 Select the desired PACS network location in the **Destination** list.

6 To de-identify the images, do the following:

a Select **De-Identify**.

b For each of the patients listed, enter an alternative **De-Identified Name**.

NOTE
Personal data in photo images cannot be de-identified. You can use a solid rectangle annotation to cover sensitive personal data in photo images that you want to export. For more information, see Adding a Solid Rectangle (page 167).

7 Click **Save** to export the data.

NOTE
Before using exported images for diagnostic purposes, the system on which these images are displayed should be validated using a representative set of exported images.

10.1.4 Exporting Data Using Drag and Drop

You can export studies or series quickly by dragging and dropping the desired data directly from the patient list.

Ensure that the desired patient study is available in the patients list. If the device that you want to copy to is password-protected, ensure that you know the password.

Ensure that the default export protocol is set as desired; this protocol is used when you export using drag and drop. For more information on setting the default export protocol, see Configuring Export Protocols (page 269).

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

1 Open the patient database by clicking the patient selector in the upper left corner of the the review window.

2 To export a study using drag and drop, do the following:

a Select the desired study in the patient list.

b Drag and drop the study from the patients list onto the desired device or network location to the left.

If the data cannot be exported to the desired location for any reason, the pointer changes to indicate this.

3 To export a series from a study, do the following:

a Select the desired study in the patient list.

b Select the **Series** tab.

c Drag and drop the desired series from the series list onto the desired device or network location to the left.

If the data cannot be exported to the desired location for any reason, the pointer changes to indicate this.

10.1.5 Export Status

The status of export jobs is displayed in the transfer progress column of the patient list.

Status		Comments
	In progress	This status is displayed if at least one job for the selected study is in progress. Move the pointer over the status icon to display a tooltip that indicates the progress of the job as a percentage. If an export job to a media device (USB/CD/DVD) is running at the same time as a DICOM export job, the displayed status indicates the status of the media device export job. You can cancel the job by right-clicking the status icon and selecting **Cancel**.
	Pending	This status is displayed if at least one job for the selected study has been submitted and there are no executing jobs. Move the pointer over the status icon to display a tooltip that indicates the number of pending jobs. You can cancel the job by right-clicking the status icon and selecting **Cancel**.
	Error	This status is displayed if the last submitted job failed. To view details of the error, open the job viewer.

10.2 Printing

You use the print preview function to select images and dose reports and compose a print job for the active study. You can then print the job on transparent film or on paper, using any printer that is connected to the system.

Printing is performed in the background, so that there is no interference with the clinical workflow.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

1 Use the navigation toolbar to display the image that you want to print in the main window.

2 Click **Add to Print Preview** in the global tools panel.

NOTE
If you add a biplane image to Print Preview, both the frontal and lateral images are added. If Optimize for biplane image printing is selected in the Print application settings, they are printed side by side unless you change the page layout to 1x1 or a single column. For more information, see Changing Print Settings (page 257).

3 To launch the print application, click **More Tools** and select **Print Preview**.

4 To add more images to the print preview, do the following:

a Click the viewer application tab.

b Select the **Series** task.

c Click the image to add in the task control panel.

d Click **Add to Print Preview** in the global tools panel.

e To return to the print application, click the print tab.

5 Select the following settings using the drop-down lists in the control panel.

- Printer
- Media size
- Media type (only applicable for DICOM printers)
- Orientation
- Page layout
- Image information
- Number of copies

6 To de-identify the images, do the following:

a Select **De-Identify**.

NOTE
Dose reports cannot be de-identified.

b For each of the patients listed, enter an alternative **De-Identified Name**.

7 Select the pages or page range you want to print.

Selecting **All** prints all of the pages in the print job.

If you want to print specific pages only, select the page range radio button and enter the pages or range of pages you want to print.

To print a single page, enter the page number.

To print a page range, enter the page range using a dash. For example, to print pages 1 to 5, enter 1-5.

To print single pages and page ranges together, separate the page numbers with a comma. For example, to print pages 1 to 5 and page 8 only, enter 1-5, 8.

8 To delete all images from the print job and start over, click **Clear Preview** in the control panel.

9 To delete selected images from the print job, do the following:

a Select the image to be deleted in the print preview.

Images can be selected in the print preview by selecting the check box in the top left corner of the image.

b Click **Delete Selected Images**.

10 Select how you want the pages collated.

- **Collated**
- **Uncollated**

If you print more than one copy of the print job, or more than one copy of a page range, you can choose to collate the pages. If you select collated pages, each copy of the print job is printed individually in page order. If you select uncollated pages, all copies of each page are printed together.

11 Click **Print** to print the print job or the selected pages.

10.3 Viewing System Tasks in the Job Viewer

Using the job viewer, you can see import, export, and print tasks being carried out by the system.

The job viewer displays tasks that are waiting or that resulted in errors and allows you to see what errors were encountered.

You can also delete, abort, or repeat jobs.

1 On the **System** menu, click **Job Viewer**.

The job viewer is displayed.

The job viewer contains tabs for each type of task:

- **All Jobs**
- **Export**
- **Import**
- **Print**
- **MPPS**

NOTE
The MPPS tab is only shown if a Modality Performed Procedure Step Manager is enabled. For more information, see Configuring Worklist Management and the Modality Performed Procedure Step (MPPS) Manager (page 266).

If an error is encountered, the relevant tab displays a warning symbol.

2 Click on the relevant tab to find the job you are looking for.

Each tab displays the following information for each task:
- **Name**
- **Type**
- **Location**
- **Status**
- **Submitted Time**
- **Progress**

3 Select the job in the list.

4 To see more information about a task, click **More Info**.

More details about the task are displayed including any error messages and any available recommendations for action.

Close the job details by clicking **Close**.

5 To delete a task, click **Delete**.

6 To cancel a task which is running or waiting, click **Cancel**.

7 To restart or repeat a task, click **Redo**.

8 To close the job viewer, click **Close**.

11 2D Quantitative Analysis (Option)

2D Quantitative Analysis is a dedicated suite of analysis applications that allow you to analyze angiographic X-ray images using computational models to obtain quantitative information about vessels and vessel obstructions, ventricular volumes, and ventricular wall motion. 2D-QA provides semi-automatic contour detection of vessels, catheters, and the left ventricle.

11.1 Acquiring X-ray Images

Accurate results in 2D-QA can only be obtained with good quality images of the correct type and after performing an accurate calibration. The following sections provide guidance for acquiring images for use in 2D-QA.

CAUTION
You should take steps to prevent foreshortening in images to be used for analysis or calibration in 2D-QA.

CAUTION
If you intend to use automatic calibration during analysis, the object under investigation should be placed as close to the isocenter as possible during image acquisition (within at most 5 cm).

CAUTION
Analysis results may not be accurate if a non-standard regression formula is used.

CAUTION
Analysis results may not be accurate in the following circumstances:
- ***The acquisition angles of the series used for analysis are out of range for the selected LVA / RVA volume model or regression formula.***
- ***The geometry positions of the calibration image and the analysis image are significantly different.***
- ***Catheter calibration is performed with a catheter that is less than 6 French.***

CAUTION
RVA cannot be used with monoplane pediatric RV series.

General Guidance
- 2D-QA only supports exposure images.
-
- Avoid using images with insufficient image quality, such as low contrast, high noise, or overlapping structures.
- Position the calibration object close to the position of the object under investigation.
- Objects under investigation should be evenly filled with contrast agent. If the contrast between an object and its background is insufficient, the semi-automatic contour detection process cannot detect contours properly.

NOTE
CO_2 should not be used as contrast agent when acquiring series for QVA.

Guidance for QCA and QVA
- Prevent foreshortening of objects by using projections where the object under analysis is in a plane parallel to the image detector.
- Avoid imaging with strong noise, background structures, or overlapping vessels.
- Avoid imaging at 50/60 fps as the decreased resolution in these images affects the accuracy of the results.

Guidance for LVA and RVA
- Use an acquisition speed of at least 15 fps to allow selection of images from non-ectopic beats and in a proper end-diastolic and end-systolic phase.
- Acquire images from angles as prescribed for the various volume and wall motion methods.
- Instruct the patient in the use of breath-holding techniques for acquisition of images for wall motion analysis.

11.2 Starting 2D Quantitative Analysis

1 Click the **Processing** task to display the image processing tools.

2 Click **Measurements** to display the **Measurements** task panel.

3 In the **Open Analysis Tool** section, click the desired analysis tool button to start the analysis.

- **Quantitative Coronary Analysis**

- **Quantitative Vascular Analysis**

- **Left Ventricular Analysis**

- **Biplane Left Ventricular Analysis**

- **Right Ventricular Analysis**

- **Biplane Right Ventricular Analysis**

NOTE
To open only the frontal image or the lateral image of a biplane series in an analysis application, right-click the image, point to Open With, and then click a monoplane application.

11.3 Calibration Guidelines

A projection of an anatomical object on an X-ray detector is geometrically magnified. If you want to perform a realistic measurement in the corresponding X-ray image, you have to compensate for that magnification. This is done through performing a calibration on the X-ray image, and determining a calibration factor (CF) in units of millimeter/pixel.

There are two main types of calibration:

- Auto calibration can be used when the anatomy is in isocenter. For objects at this location, 2D-QA knows all relevant distances that are needed for automatic computation of the geometrical magnification and the calibration factor. No further user input is required.
- Manual calibration is applicable for any location in the X-ray beam. The calibration factor for the anatomy under investigation is computed with help of a calibration object of known size positioned nearby. The user marks the calibration object and indicates its actual size.

Note that errors in the calibration factor directly translate into proportional errors in QCA/QVA distance measurements. In the computation of volumes in LVA/RVA, these errors even multiply by a factor of 2 to 3. Therefore it is important to adhere to the following guidelines for accurate calibration.

Avoid foreshortened views on the calibration object and the anatomy.

- This is important in distance calibration and for all measurements in anatomical regions of interest.

Position the calibration object and the object under investigation accurately.

- If you intend to use auto calibration, the object under investigation must be placed as close to the isocenter as possible during image acquisition (within at most 5 cm).
- If you intend to use manual calibration (catheter, sphere, or distance), the calibration object must be placed as close as possible to the anatomy under investigation.
- Differences in height between the anatomy and the isocenter (in auto calibration), or between the anatomy and the calibration object (in manual calibration) cause differences in geometrical magnification. This leads to additional errors in the calibration factor of 1-1.5% for each centimeter of difference in height.

Auto calibration, or intermediate sized objects for manual Calibration, is preferred.

- Preferably use auto calibration when the anatomy under investigation is sufficiently close to the isocenter (within at most 5 cm). Most images are usually acceptable for auto calibration.
- In case auto calibration is not applicable, catheter calibration is usually considered as the most convenient option. However, when used in combination with modern small-diameter (4-6 French) catheters, it is also the least accurate option (see the following table). If possible, use distance calibration on a sizing catheter or sphere calibration instead.
- In general, the accuracy of manual calibration increases with the object size or distance used. Do not use small calibration objects for manual calibration. If possible, choose a calibration object of intermediate size (a few centimeters) for optimal accuracy.

Overview of Calibration Factor Accuracy

Calibration method (specification condition)	CF accuracy for properly positioned objects	Additional errors in CF from inaccurate positioning or views
Auto calibration	Accurate [1]	1-1.5% for each centimeter of difference in height between isocenter and anatomy
Distance calibration (over distance of a few cm)	Accurate [1]	1-1.5% for each centimeter of difference in height between object and anatomy. This method is sensitive to foreshortening in the image
Sphere calibration (with metal ball of a few cm diameter)	Accurate [1]	1-1.5% for each centimeter of difference in height between sphere and anatomy
Catheter calibration [2] (catheter of 6 French diameter filled with contrast agent [3])	Less accurate: approximately 7% error introduced [4]	1-1.5% for each centimeter of difference in height between catheter and anatomy

Note 1: Accurate means that the small deviation from this source does not adversely affect overall measurement accuracy.

Note 2: As verified for commonly used catheters. Due to the small diameter of modern catheters and diversity in their walls, obtainable accuracies may vary with catheter brand and size.

Note 3: CO_2 should not be used as contrast agent when acquiring series for QVA.

Note 4: Errors from using unfilled catheters or catheters below 6 French can be 20% or more.

Errors in the calibration factor propagate proportionally into QCA/QVA distance measurement. Relative errors multiply with a factor of approximately 2 to 3 in the LVA/RVA computations of absolute ventricle volumes. Ejection fraction, however, is not affected by these calibration inaccuracies.

Guidance for Manual Catheter Calibration

- Use a radiopaque catheter.
- Use a filled catheter to improve detection and accuracy.
- Philips Medical Systems does not recommend catheter calibration on empty catheters or catheters below 6 French, as this may lead to an inaccurate calibration factor. The error can be 20% or more. 2D-QA does not support catheters below 4 French.
- To improve accuracy, avoid low dose and high frame rates.

Guidance for Manual Sphere Calibration

It is possible to use two different series for imaging the sphere and the anatomy under investigation. However, ensure that the sphere and the anatomy have the same geometrical magnification in the X-ray image. This means that the images are acquired with the following characteristics:

- The same X-ray focus-object distance and same object-detector distance.
- The same angulation and rotation angles.
- The same table height.

Checking calibration accuracy for your preferred catheter

1 Position a catheter and a ruler close together, acquire images, and then perform catheter calibration.

2 In the X-ray image perform a QCA length measurement along the catheter between two marks on the ruler and compare your result with the actual distance from the ruler.

11.4 QCA / QVA

The QCA and QVA applications have similar tasks, and they are described together in the following sections.

Quantitative Coronary Analysis (QCA)
You use QCA to mark the contours of a coronary artery in the heart, analyze a stenosis, and create, store and print reports of the analysis.

Quantitative Vascular Analysis (QVA)
You use QVA to mark the contours of aortic and peripheral arteries, analyse a stenosis, and create, store and print reports of the analysis.

NOTE
CO_2 should not be used as contrast agent when acquiring series for QVA.

11.4.1 QCA / QVA Tasks

A set of predefined tasks is used to ensure coronary or vascular analysis is performed in a logical way.

The QCA and QVA applications provide the following tasks in order:
- **Select Series**
- **Calibration**
- **Analysis**
- **Result**

When a series is selected, the system progresses automatically to the **Calibration** task.

When the calibration factor is accepted, the system progresses automatically to the **Analysis** task.

NOTE
Auto calibration is available if the appropriate image attributes in the selected series (source image distance, source object distance, and image plane pixel spacing) did not change during acquisition. If you choose auto calibration in this case, ensure that the region of interest is in the isocenter.

11.4.2 Select Series Task

You use the **Select Series** task to select an image series for analysis.

NOTE
Only XA exposure images can be used for analysis.

NOTE
Series with image pixel sizes greater than 0.225 mm for QCA and greater than 0.4 mm for QVA are suboptimal for analysis.

NOTE
You can decrease the detector field size or decrease the frame speed to obtain smaller pixel sizes.

1 Click **Select Series** in the task panel.

2 Select the desired image series in the **Select Series** dialog box and click **Select** to open the series.

11.4.3 Calibration Task

To allow accurate measurement during analysis and to ensure that measurements are displayed in relevant units, the image must be calibrated.

NOTE
You can configure default settings for calibration using the Customization screen. For details, see Changing Default Calibration Settings (page 216).

You can perform calibration automatically or manually using the **Calibration** task.

Conditions
For accurate manual calibration, follow these guidelines:
- Position the calibration object close to the position of the anatomy under investigation.
- Choose a calibration object of intermediate size (a few centimeters) for optimal accuracy.

For manual catheter calibration, follow these guidelines:
- Use a radiopaque catheter.
- Use a filled catheter to improve detection.
- Use catheters for calibration that are at least 6 French. Catheters below 4 French are not supported.
- Ensure that the external catheter size as provided by the manufacturer is accurate.

Ensure that the image quality is good and that the contrast between the calibrating object and the background is good.

Automatic Calibration

2D-QA can calculate the calibration factor automatically if the required information is available in the image series.

1 Click the **Calibration** task.

The **Auto** calibration method is automatically selected if the required information is available in the image series.

2 To accept the calibration factor, click **Accept and Continue**.

Manual Calibration

You can perform manual calibration using one of the following methods:
- **Catheter**
- **Distance**
- **Sphere**

Catheter Calibration

You perform catheter calibration by tracing the centerline of a catheter in the image.

You can perform catheter calibration on either a straight catheter segment or a curved segment, but you should always use a non-tapered segment. Using a tapered segment for calibration will result in incorrect measurement results.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Catheter** in the **Select calibration method** list.

4 Click **Draw** in the control panel and do the following:

- Click on the centerline of the catheter at the desired start point.
- Click again to place a point further along the centerline.
- Continue placing points along the centerline, and then double-click at the desired end point.

For additional information, click **Help** in the control panel.

5 To hide or show the contour of the catheter as you work, select or clear **Hide** in the control panel.

6 To edit a contour, click **Edit** in the control panel, and do one of the following:
- Click along the walls of the catheter in the image and then double-click on the last position to complete the contour.
- Drag along the walls of the catheter in the image to correct the position of the contour.

7 When the contours are complete, select the catheter size from the list in the control panel.

If the desired catheter size is not available, you can type it directly in the box.

8 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

9 To accept the calibration factor, click **Accept and Continue** in the control panel.

Distance Calibration

You perform distance calibration by marking a known distance in the image.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Distance** in the **Select calibration method** list.

4 Click **Draw** in the control panel and do the following:

- Click in the image at the desired start point of the line.
- Click again at the desired end point.

5 To hide or show the line, select or clear **Hide** in the control panel.

6 To edit the line, click **Edit** in the control panel, and do the following:

a Move the pointer over the start point or the end point

b Drag the point to a new position.

7 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

8 After drawing the line, select the distance in the list in the control panel.

If the desired distance is not available, you can type it directly in the box.

9 To accept the calibration factor, click **Accept and Continue** in the control panel.

Sphere Calibration

You perform sphere calibration by identifying a sphere of a known size in the image.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Sphere** in the **Select calibration method** list.

4 Click a sphere in the image to identify it.

5 To hide or show the sphere contour, select or clear **Hide** in the control panel.

6 To edit the sphere, click **Edit** in the control panel, and do any of the following:
- To move the sphere, drag the center of the sphere to a new position.
- To change the diameter of the sphere, drag the circumference of the sphere.

7 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

8 When the sphere is defined, select the diameter in the list in the control panel.

If the desired diameter is not available, you can type it directly in the box.

9 To accept the calibration factor, click **Accept and Continue** in the control panel.

11.4.4 Analysis Task

You use the **Analysis** task to identify and mark the contours of the coronary or vascular artery.

You can analyze subtracted and unsubtracted images in QVA, but you can analyze only unsubtracted images in QCA.

Defining the Region of Interest

You can define the contours of a region of interest automatically (“one-click” method), or by manually placing points along the centerline of the vessel.

At any time, you can delete the contours and start over by selecting **Delete** in the control panel.

Defining the Region of Interest Automatically

This is also known as the “one-click” method. Measurements and graphs are displayed when the region of interest is defined.

1 Click the **Analysis** task.

2 Click **Identify Vessel Segment** in the control panel.

3 Double-click on the stenosis in the center of the vessel to detect the contour of the vessel.

4 To adjust the contour, see Editing the Contour (page 199).

Detected contours may not be correctly aligned with the vessel wall if there is insufficient contrast in the image, or if a bifurcation or overlapping vessels are present.

Defining the Region of Interest Manually

This method allows you to define the region of interest by placing points along the centerline of the vessel. Measurements and graphs are displayed when the region of interest is defined.

1 Click the **Analysis** task.

2 Click **Identify Vessel Segment** in the control panel and do the following:

- Click the centerline of the vessel at the proximal part to place the start point of the region of interest.
- Continue placing points along the centerline and double-click to place the end point and to detect the contour of the vessel.

Editing the Contour

If the contour for the vessel segment is not satisfactory, you can edit the contour manually.

When editing a contour, you must start and finish the edit on the existing contour. The pointer changes to indicate that you are close enough to the contour.

For additional information, click **Help** in the control panel.

1 In the analysis task, click **Edit**.

2 To edit the contour by clicking, do the following:

- Click the contour at the start point of the section to be edited.
- Continue placing points along the vessel wall and then double-click on the contour at the end point of the edit.

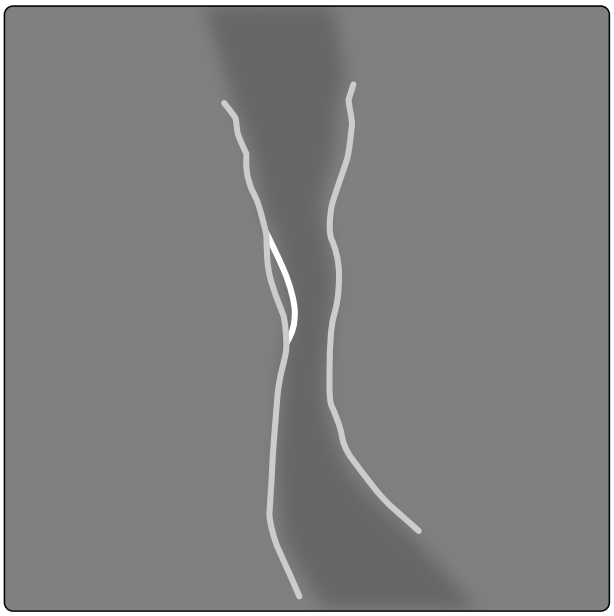


Figure 112 Editing the contour

3 To edit the contour by dragging, drag a point on the contour to the correct position on the vessel wall.

4 To undo your last edit, click **Undo Last Edit** in the control panel.

Adjusting Measurements

You can adjust the analysis measurements by moving reference lines in the image or in the graph.

When you move a reference line, diameters, lengths, and percentages are automatically updated in the **Analysis Results** panel.

When you move the minimum lesion diameter reference line, the reference lines in the image and in the graph are displayed at the new position, but the system-defined reference line is maintained.

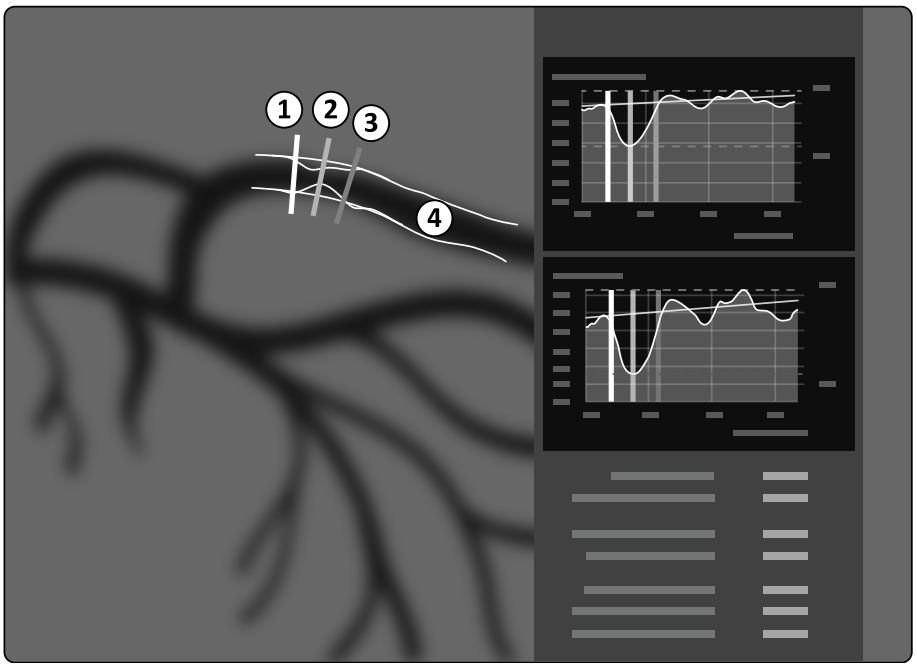


Figure 113 Stenosis measurement reference lines

Legend			
1	Proximal boundary	3	Distal boundary
2	Minimum lesion diameter (MLD)	4	Contour

1 To reposition the point of stenosis, drag the minimum lesion diameter to a new position.

2 To reposition the proximal boundary, drag the green reference line to a new position.

3 To reposition the distal boundary, drag the blue reference line to a new position.

4 To show or hide plaque within the segment, click **Show/Hide Plaque** in the control panel.

5 To show or hide the segment contour, click **Show/Hide Contour** in the control panel.

11.4.5 Result Task

You use the **Result** task to view analysis results from QCA and QVA.

The result page displays the analysis results, the analyzed image, and analysis graphs. Any warnings associated with the analysis results are also displayed.

Accuracy of QCA / QVA Results

QCA

QCA Analysis Results	Accuracy (Systematic Error)	Precision (Random Error)
Vessel diameter	< 0.2 mm (for diameters ≤ 1 mm) < 0.1 mm (for diameters > 1 mm)	< 0.2 mm
Vessel segment length	< 1.0 mm	< 2.0 mm

Vessel diameter accuracy is specified for measurements performed on a vessel placed in the isocenter, using automatic calibration.

Vessel segment length accuracy is specified for distances up to 50 mm between user-defined markers on an unforeshortened view of a vessel placed in the isocenter, using automatic calibration.

NOTE
Using an inaccurate calibration factor (due to, for example, foreshortening, inaccurate position of the calibration object, or calibration on a small diameter catheter) may lead to additional errors in measured lengths and diameters.

QVA

QVA Analysis Results	Accuracy (Systematic Error)	Precision (Random Error)
Vessel diameter	< 0.2 mm (for diameters ≤ 20 mm) < 1% (for diameters > 20 mm)	< 0.2 mm
Vessel segment length	< 1.0 mm	< 2.0 mm

Vessel diameter accuracy is specified for measurements performed on a vessel placed in the isocenter, using automatic calibration.

Vessel segment length accuracy is specified for distances up to 50 mm between user-defined markers on an unforeshortened view of a vessel placed in the isocenter, using automatic calibration.

NOTE
Using an inaccurate calibration factor (due to, for example, foreshortening, inaccurate position of the calibration object, or calibration on a small diameter catheter) may lead to additional errors in measured lengths and diameters.

References

Computations in 2D-QA are performed according to methods described in medical literature.

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11.5 LVA / RVA

The LVA and RVA applications have similar tasks, and they are described together in the following sections.

Additional steps that are required for Biplane LVA and Biplane RVA are indicated where appropriate.

Left Ventricle Analysis (LVA)
You use LVA to establish end diastolic (ED) and end systolic (ES) contours of the left ventricle, to determine ventricular volumes and wall motion. You can create, store and print reports of the analysis.

Right Ventricle Analysis (RVA)
You use RVA to establish end diastolic (ED) and end systolic (ES) contours of the right ventricle, to determine ventricular volumes and wall motion. You can create, store and print reports of the analysis.

11.5.1 LVA / RVA Tasks

A set of predefined tasks is used to ensure left or right ventricle analysis is performed in a logical way.

The LVA and RVA applications provide the following tasks in order:

- **Select Series**
- **Calibration**
- **End Diastole**
- **End Systole**
- **Result**

After you select a series, the **Calibration** task is automatically opened.

After you complete calibration, the **End Diastole** task is automatically opened.

NOTE
Auto calibration is available if the appropriate image attributes in the selected series (source image distance, source object distance, and image plane pixel spacing) did not change during acquisition. If you choose auto calibration in this case, ensure that the region of interest is in the isocenter.

11.5.2 Select Series Task

You use the **Select Series** Task to select a series for analysis.

NOTE
Only XA exposure images can be used for analysis.

NOTE
Series with characteristics outside the following ranges are suboptimal for analysis:
- ***Series with image pixel sizes greater than 1 mm.***
- ***Series with frame rate less than 15 fps.***
- ***Series captured with angulation and rotation angles that do match the angle requirements for the selected volume method/regression formula.***

1 Click **Select Series** in the tasks panel.

2 Select the desired image series in the **Select Series** dialog box and click **Select** to open the series.

11.5.3 Calibration Task

To allow accurate measurement during analysis and to ensure that measurements are displayed in relevant units, the image must be calibrated.

NOTE
You can configure default settings for calibration using the Customization screen. For details, see Changing Default Calibration Settings (page 216).

You can perform calibration automatically using Auto Calibration, or manually using the **Calibration** task.

If you are only interested in calculating the ejection fraction, you can skip calibration for monoplane LVA and monoplane RVA.

Conditions
For manual calibration, follow these guidelines:
- Position the calibration object close to the position of the anatomy under investigation.
- Choose a calibration object of intermediate size (a few centimeters) for optimal accuracy.

  For LVA/RVA, the use of catheter calibration is not recommended. Relative errors from calibration are multiplied by a factor of up to three when computing (ventricle) volumes.

For manual catheter calibration, follow these guidelines:
- Use a radiopaque catheter.
- Use a filled catheter to improve detection.
- Use catheters for calibration that are at least 6 French. Catheters below 4 French are not supported.
- Ensure that the external catheter size as provided by the manufacturer is accurate.

Ensure that the image quality is good and that the contrast between the calibrating object and the background is good.

Automatic Calibration

2D-QA can calculate the calibration factor automatically if the required information is available in the image series.

1 Click the **Calibration** task.

The **Auto** calibration method is automatically selected if the required information is available in the image series.

2 To accept the calibration factor, click **Accept and Continue**.

Manual Calibration

You can perform manual calibration using one of the following methods:

- **Catheter**
- **Distance**
- **Sphere**

Catheter Calibration

You perform catheter calibration by tracing the centerline of a catheter in the image.

You can perform catheter calibration on either a straight catheter segment or a curved segment, but you should always use a non-tapered segment. Using a tapered segment for calibration will result in incorrect measurement results.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Catheter** in the **Select calibration method** list.

4 Click **Draw** in the control panel and do the following:

- Click on the centerline of the catheter at the desired start point.
- Click again to place a point further along the centerline.
- Continue placing points along the centerline, and then double-click at the desired end point.

For additional information, click **Help** in the control panel.

5 To hide or show the contour of the catheter as you work, select or clear **Hide** in the control panel.

6 To edit a contour, click **Edit** in the control panel, and do one of the following:

- Click along the walls of the catheter in the image and then double-click on the last position to complete the contour.
- Drag along the walls of the catheter in the image to correct the position of the contour.

7 If you are using **Biplane LVA/RVA**: Trace the centerline of the catheter in both the frontal image and the lateral image.

8 When the contours are complete, select the catheter size from the list in the control panel.

If the desired catheter size is not available, you can type it directly in the box.

9 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

10 To accept the calibration factor, click **Accept and Continue** in the control panel.

Distance Calibration

You perform distance calibration by marking a known distance in the image.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Distance** in the **Select calibration method** list.

4 Click **Draw** in the control panel and do the following:

- Click in the image at the desired start point of the line.
- Click again at the desired end point.

5 To hide or show the line, select or clear **Hide** in the control panel.

6 To edit the line, click **Edit** in the control panel, and do the following:

a Move the pointer over the start point or the end point

b Drag the point to a new position.

7 If you are using **Biplane LVA/RVA**: Mark the line in both the frontal image and the lateral image.

8 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

9 After drawing the line, select the distance in the list in the control panel.

If the desired distance is not available, you can type it directly in the box.

10 To accept the calibration factor, click **Accept and Continue** in the control panel.

Sphere Calibration

You perform sphere calibration by identifying a sphere of a known size in the image.

1 Use the navigation toolbar to review the series and select an image to be used for calibration.

NOTE
You can change the calibration image at any time by clicking Change in the control panel and selecting a different image.

2 Click the **Calibration** task.

3 Click **Sphere** in the **Select calibration method** list.

4 Click a sphere in the image to identify it.

5 To hide or show the sphere contour, select or clear **Hide** in the control panel.

6 To edit the sphere, click **Edit** in the control panel, and do any of the following:
- To move the sphere, drag the center of the sphere to a new position.
- To change the diameter of the sphere, drag the circumference of the sphere.

7 If you are using **Biplane LVA/RVA**: Mark the sphere in both the frontal image and the lateral image.

8 You can delete the calibration at any time and start over by clicking **Delete** in the task panel.

9 When the sphere is defined, select the diameter in the list in the control panel.

If the desired diameter is not available, you can type it directly in the box.

10 To accept the calibration factor, click **Accept and Continue** in the control panel.

11.5.4 End Diastole (ED) Task

You use the **End Diastole** task to select the ED image from the series and to define a contour on the image.

When defining a contour in LVA, you can use either a semi-automatic method or a manual method.

When defining a contour in RVA, you can only use the manual method.

Selecting the ED Image

Before you define the ED contour, you must select a suitable image that shows the ED position.

If the ECG is available, it is displayed with the series to assist you with identifying the ED position.

1 Click **End Diastole** in the tasks panel.

2 Use the navigation toolbar to review the series and select an image that shows the ED position.

Defining the ED Contour Semi-Automatically in LVA

To define a contour semi-automatically in LVA, you place three key points on the selected image.

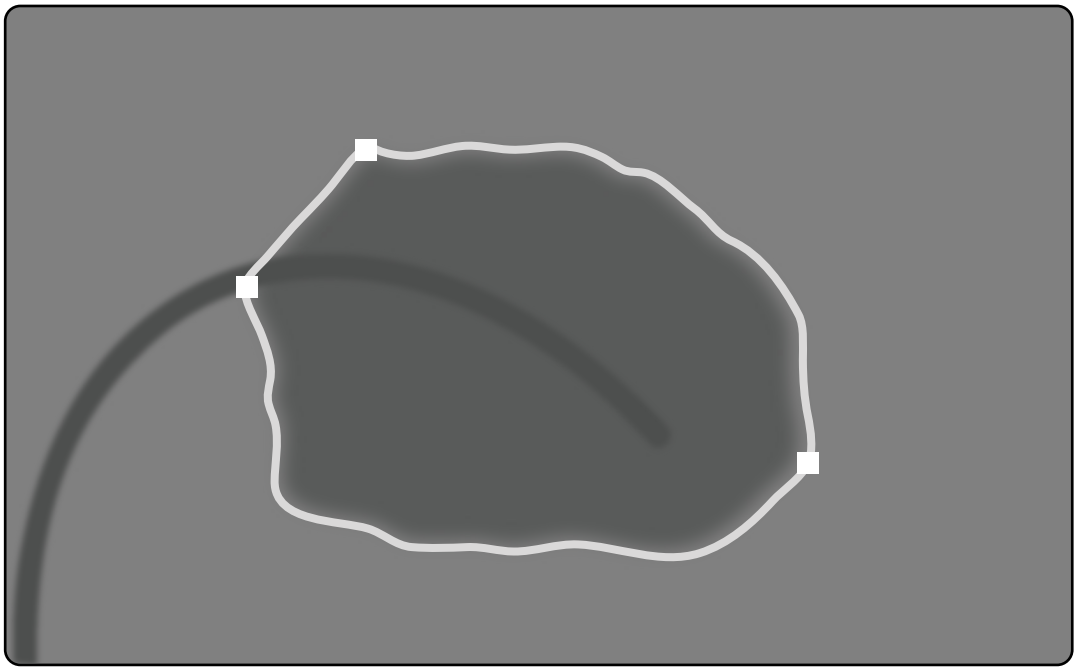

Figure 114 LVA semi-automatic ED contour detection

After placing the points, the contour is displayed and the ED volume (EDV) is displayed in a panel in the lower-right corner.

1 Click **Semi-Automatic** in the control panel.

2 Click on the superior border of the aortic root.

3 Click on the inferior border of the aortic root.

4 Click on the apex.

5 If you are using **Biplane LVA**: Perform this process on both the frontal image and the lateral image so that the contour is detected in each image.

6 If you want to delete the contour and start over, click **Delete** in the control panel.

If the contrast level in the image is insufficient, the contour may not be correctly defined. You can manually edit the contour to correct it: see Editing the Contour (page 210).

Defining the ED Contour Manually

To define a contour manually, you place points along the ventricle wall.

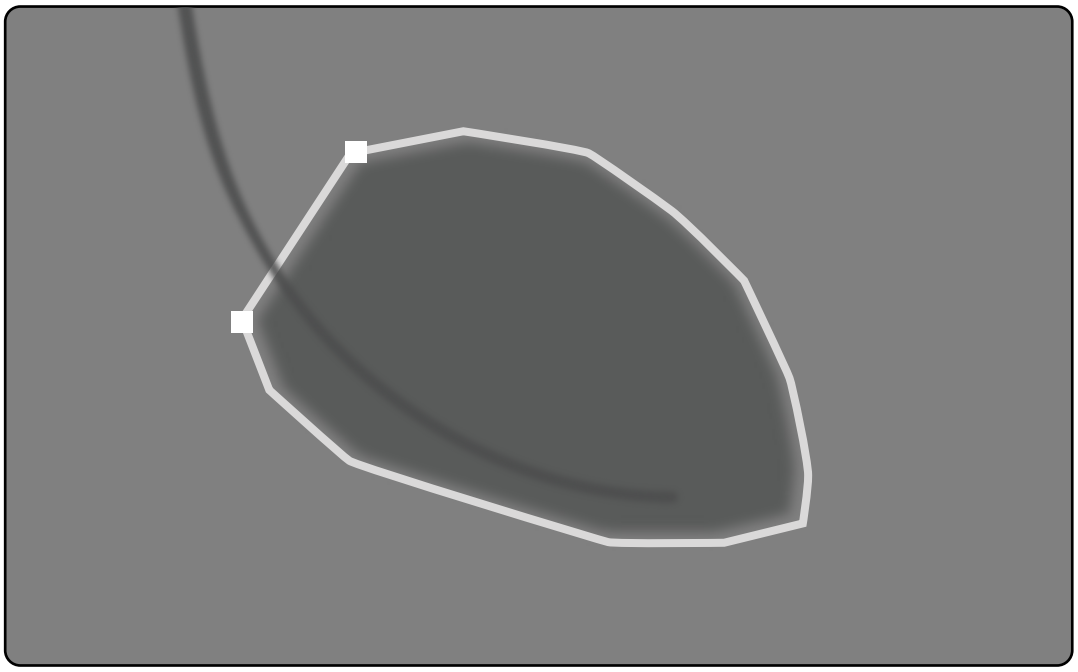

Figure 115 ED manual contour definition

1 Click **Manual** in the control panel.

2 Click on the superior border of the aortic root (LVA) or the pulmonary root (RVA) to start the contour.

3 Click further along the ventricle wall to place the next point of the contour.

4 Continue placing points along the ventricle wall through the cardiac apex until you reach the inferior border of the aortic root (LVA) or the pulmonary root (RVA).

5 Double-click on the inferior border of the aortic root (LVA) or the pulmonary root (RVA) to complete the contour.

6 If you are using **Biplane LVA/RVA**: Perform this process on both the frontal image and the lateral image so that the contour is detected in each image.

7 If you want to delete the contour and start over, click **Delete** in the control panel.

11.5.5 End Systole (ES) Task

You use the **End Systole** task to select the ES image from the series and to define a contour on the image.

When defining a contour in LVA, you can use either a semi-automatic method or a manual method.

When defining a contour in RVA, you can only use the manual method.

Selecting the ES Image

Before you define the ES contour, you must select a suitable image that shows the ES position.

The ECG is displayed with the series to assist you with identifying the ES cardiac phase.

NOTE
Ensure that the ES image that you select is in the same cardiac cycle as the ED image that you selected in the End Diastole task.

1 Click the **End Systole** task.

2 Use the navigation toolbar to review the series and select an image that shows the ES cardiac phase.

Defining the ES Contour Semi-Automatically in LVA

To define a contour semi-automatically in LVA, you place three key points on the selected image.

After defining the ES contour, both the ED and ES contours are displayed in each image in the series. The contours are highlighted when you view the image used to define the contour.

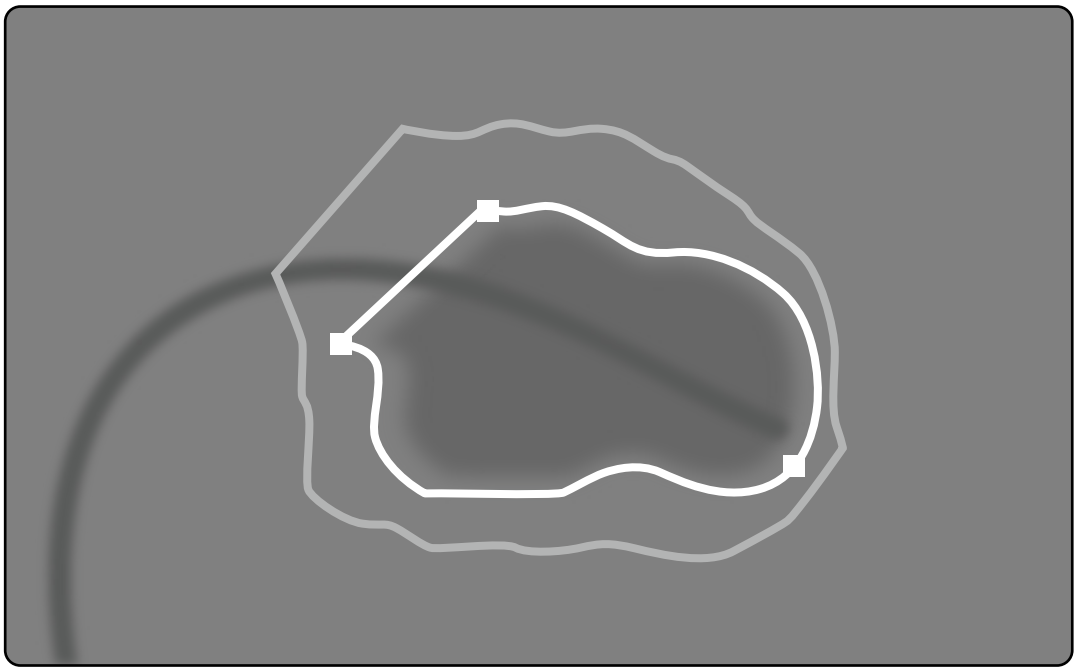

Figure 116 LVA semi-automatic ES contour detection

The main analysis results are displayed in a panel in the lower right corner.

1 Click **Semi-Automatic** in the control panel.

2 Click on the superior border of the aortic root.

3 Click on the inferior border of the aortic root.

4 Click on the apex.

5 If you are using **Biplane LVA**: Perform this process on both the frontal image and the lateral image so that the contour is detected in each image.

6 If you want to delete the contour and start over, click **Delete** in the control panel.

7 Use the navigation toolbar to check the accuracy of the ED and ES contours in each image of the series.

If the contrast level in the image is insufficient, the contour may not be correctly defined. You can manually edit the contour to correct it: see Editing the Contour (page 210).

Defining the ES Contour Manually

To define a contour manually, you place points along the ventricle wall.

After defining the ES contour, both the ED and ES contours are displayed in each image in the series. The contours are highlighted when you view the image used to define the contour. The main analysis results are also displayed in a panel in the lower right corner.

Figure 117 ES manual contour definition

1 Click **Manual** in the control panel.

2 Click on the superior border of the aortic root (LVA) or the pulmonary root (RVA) to start the contour.

3 Click further along the ventricle wall to place the next point of the contour.

4 Continue placing points along the ventricle wall through the cardiac apex until you reach the inferior border of the aortic root (LVA) or the pulmonary root (RVA).

5 Double-click on the inferior border of the aortic root (LVA) or the pulmonary root (RVA) to complete the contour.

6 If you are using **Biplane LVA/RVA**: Perform this process on both the frontal image and the lateral image so that the contour is detected in each image.

7 If you want to delete the contour and start over, click **Delete** in the control panel.

8 Use the navigation toolbar to check the accuracy of the ED and ES contours in each image of the series.

11.5.6 Editing the Contour

If the contour is not accurately defined, you can edit it manually.

When editing a contour, you must start and finish the edit on the existing contour. The pointer changes to indicate that you are close enough to the contour.

For additional information, click **Help** in the control panel.

1 Click **Edit** in the control panel.

2 Click the contour at the start point of the section to be edited.

3 Continue placing points along the vessel wall and then double-click on the contour at the end point of the edit.

4 If you are using **Biplane LVA/RVA**: You can edit the contour in either the frontal image or the lateral image as desired, or you can edit the contour in both images.

5 To undo your last edit, click **Undo Last Edit** in the control panel.

11.5.7 Result Task

Ventricle analysis results are displayed in the **Result** task.

This task displays the analysis results and the selected ED image with the ED and ES contours indicated. Any warnings associated with the analysis results are also displayed.

Analysis Results

The ED or ES Volume calculation is based on the contour and the calibration factor, using the calculation model selected in the customization settings.

A first iteration for the volume is calculated with the selected volume method. The volume displayed in the report is corrected with a regression formula.

Indexed values can be calculated when the patient's demographic information is available.

2D-QA has been thoroughly checked and tested. The software is designed to produce a mathematical model as described in the medical literature or medical research. Philips Medical Systems cannot be held responsible in any way for any inaccuracies of any nature resulting from the use of this software. If the calibration guidelines are not followed, the absolute measurements may be inaccurate or unreliable.

Analysis Results	Description	Formula (if applicable)
Ejection Fraction (EF)	The Ejection Fraction is calculated based on the ED Volume and the ES Volume.	EF (%) = (EDV-ESV) ÷ EDV × 100%
Cardiac Output	This item indicates the amount of blood that the heart pumps through the circulatory system in a minute. The Cardiac Output is calculated as the Stroke Volume times the heart rate in Beats Per Minute.	Cardiac Output (l/min) = Stroke Volume ÷ 1000 × BPM
Cardiac Index	The Cardiac Index is the Cardiac Output indexed with Body Surface Area	Cardiac Index (l/min/m^2) = Cardiac Output ÷ BSA
Heart Rate (BPM)	The Heart Rate is indicated in Beats Per Minute.	
Body Surface Area (BSA)	Body Surface Area is calculated from the patient's height and weight. BSA can be used to generate indexed results.	
Index Method	The index method used to calculate indexed results.	
Volume Method	The selected volume method.	
ED Volume Regression	The formula used with the volume method to calculate the ED volume.	

Analysis Results	Description	Formula (if applicable)
ES Volume Regression	The formula used with the volume method to calculate the ES volume.	
Contour Correction	Indicates whether contours were manually corrected during analysis.	
Calibration Object	The calibration method used and the size of the calibration object.	
Calibration Factor	The calibration factor calculated by the system using the inputs in the Calibration task.	
Series	The series number of the series used for analysis.	
ED Image	The image number of the image used as the selected ED image.	
ES Image	The image number of the image used as the selected ES image.	
Projection (Frontal/Lateral for biplane systems)	The projection used during acquistion (RAO/LAO).	
ED Volume (EDV)	The ED volume is calculated from using the volume method and the ED regression method. The Indexed ED Volume is displayed if the patient's demographics are available.	
ES Volume (ESV)	The ES volume is calculated from using the volume method and the ES regression method. The Indexed ES Volume is displayed if the patient's demographics are available.	
Stroke Volume (SV)	The Stroke Volume is calculated as the difference of the ED Volume and the ES Volume. The Indexed StrokeVolume is displayed if the patient's demographics are available.	SV (ml) = EDV - ESV Indexed SV (ml/m^2) = SV ÷ BSA

Setting the Patient Demographics

Some analysis results depend on correctly defined patient demographics, such as the patient's height, weight, and heart rate.

The patient's height and weight allows the Body Surface Area (BSA) to be calculated, which in turn allows indexed analysis results to be calculated. When available, the patient's height and weight are automatically retrieved from the patient database, otherwise you can enter them manually.

The patient's heart rate allows the Cardiac Output and the Cardiac Index to be calculated. The patient's heart rate is automatically entered if this information is available in the patient database, or you can enter the information manually.

You can edit the acquisition patient's demographics using the following procedure.

1 In the control panel, click **Edit Patient Demographics**.

2 If the patient's height and weight information is not displayed, or if it is incorrect, enter the correct information.

3 Enter the patient's heart rate.

4 Click **OK** to close the dialog box and return to the **Result** task.

Volume Methods

Volume Methods: Area Length method

The Area Length method is based on a model of a three-dimensional ellipsoid that is symmetric around its long axis. The resulting volume is corrected with an appropriate regression formula.

Volume Methods: Simpson method

The Simpson method, or slice summation method, is based on a set of circular slices of equal thickness perpendicular to the long axis. The resulting volume is corrected with an appropriate regression formula.

Regression Formulas

The volume calculated from a two-dimensional image has to be corrected to be used as a representation of the three dimensional left ventricle volume. A standard regression formula is used during analysis. This can be changed in the customization settings.

CAUTION
Analysis results may not be accurate if a non-standard regression formula is used.

NOTE
The results of the analysis are heavily influenced by the used regression formula, therefore care should be taken when selecting these factors.

NOTE
For standardization, it is recommended to use the same predefined method and regression formulas throughout the department.

Predefined Regression Formula

Different volume correction formulas are defined to correct the ED and ES Volumes. The correction formulas are defined in the customization screens and depend on the volume calculation method selected (for both monoplane and biplane).

User Defined Regression Formula

The calculation of corrected volumes is as follows (for both monoplane and biplane):

- EDV_{corr} = [user defined factor] * EDV_{calc} + [user defined constant]
- ESV_{corr} = [user defined factor] * ESV_{calc} + [user defined constant]

You are free to define optimal formulas to correct the ED and ES volumes. User-defined factors can be different for the Area Length method or the Simpson method.

If you are only interested in the percentage EF, this can be obtained by skipping the calibration procedure.

The formula that is used for the results in the report is indicated in the report.

Wall Motion Results

Wall Motion results are not displayed by default. To include Wall Motion results in the results page, select the Wall Motion options in the control panel:

- Slager Wall Motion
- Centerline Wall Motion

Slager Wall Motion Results (LVA only)

Slager Wall Motion results are calculated for LVA only. The result page includes an image showing a representation of the Slager wall motion model, and graphs showing color-coded information concerning the contribution to overall EF from each area of the heart wall.

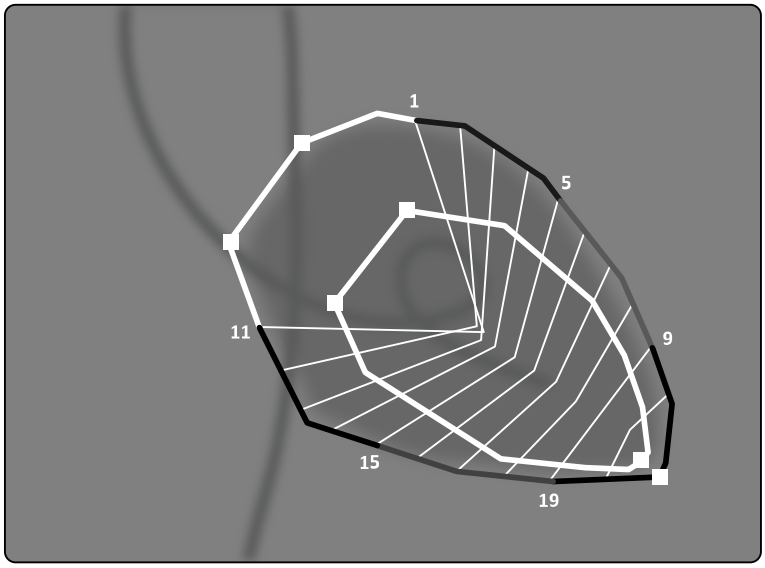

Figure 118 Slager Wall Motion

The Slager Wall Motion method is based on a contraction model and is described in medical literature:

- Slager, C.J., Hooghoudt, T.E.H., et al., "Quantitative assessment of regional left ventricular motion using endocardial landmarks"
- Slager, D.J., Hooghoudt, T.E.H., et al., "Left ventricular contour segmentation from anatomical landmark trajectories and its application to wall motion analysis"

The method is used to describe the displacement between the end diastole and end systole of particular points on the left ventricular wall. The calculations are based on images in standard RAO 30-degree projection, which is also required for the volume calculation utilized.

The left side of the results page shows a composite graph of CREF (Regional Contribution to global Ejection Fraction) values for the 20 segments. CREF values are derived from systolic wall displacement data and left ventricular long-axis shortening. The individual anterior and posterior CREF values of the patient are superimposed and connected by straight lines.

To compare the quantitative results with those provided by the usual visual interpretation, the left ventricular boundary is divided into 5 anatomical regions, denoted Anterobasal, Anterolateral, Apical, Diaphragmatic, and Posterobasal. The segments are assigned to these regions and the CREF values for the regions are plotted as well.

In LVA results, the gray band represents the wall motion parameters for a normal patient population, collected by the Thorax Center, Erasmus University and the University Hospital Dijkzigt, Rotterdam, The Netherlands. The gray band shows the average normal value ±2 standard deviations.

The left side of the results page shows the ED image chosen for left ventricular (EF) analysis with the contours accepted during the analysis. Left ventricular segmental wall motion is computed along 20 straight lines, calculated from a mathematical expression derived from anatomical landmark trajectories in normal patients.

The 20 lines result from 20 well-defined ED contour points or segments, 10 anterior and 10 posterior. The point or segment numbers are plotted along the contour. A center of contraction is defined for each pair of 2 opposite ED contour points.

Centerline Wall Motion Results (LVA / RVA)

Centerline Wall Motion results can be displayed for both LVA and RVA. The result page includes an image showing a representation of the detected wall motion, a table showing kinetic parts, and graphs showing normalized motion and standard deviation.

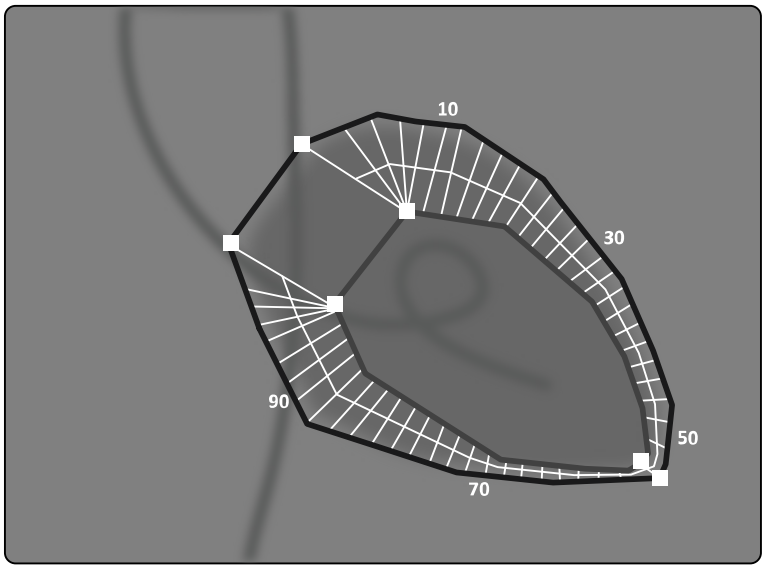

Figure 119 Centerline Wall Motion

The Centerline Wall Motion method is described in medical literature: Sheehan, F.H. "Advantages and applications of the centerline method for characterizing regional ventricular function".

The Centerline Wall Motion method describes the displacement between the ED and ES of particular points on the ventricular wall. The calculations are based on images in standard RAO 30-degree projection, which is also required for the used volume calculation.

Between the ED and ES contours a centerline is defined. 100 Equidistant chords perpendicular to this centerline are defined. Only 50 chords are shown in the graphic display. The chords are defined in such a way that they do not cross each other.

Besides the image with the contours and chords, a table indicates the hyperkinetic parts (more than two standard deviations of normal movement) and the hypokinetic parts (less than minus two standard deviations of normal movement).

Graphs are also displayed, indicating normalized motion and standard deviation based on the lengths of the chords. The vertical axis represents the length, the horizontal axis the location of the measurement points over the ventricular wall.

In LVA results, the gray band represents the wall motion parameters for a normal population. The gray band represents the wall motion parameters for a normal patient population, as described in the above-mentioned article by Sheehan. The gray band shows the average normal value ±2 standard deviations. This is not available in RVA results.

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Computations in 2D Quantitative Analysis are performed according to methods described in medical literature.

LVA

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RVA

Author	Article
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11.6 Managing Results

You can review, save, or delete results pages in the **Result** task.

If results pages of the currently selected analysis application have already been saved for the current study, they are displayed in the **Existing result pages** list in the control panel.

11.6.1 Saving a Result Page

When you save a result page, it is stored in the patient database with the current study.

1 When the analysis is complete, click the **Result** task.

2 Click **Save Result**.

11.6.2 Reviewing a Saved Result Page

You can review a saved result page in the **Result** task.

Only results pages for the currently selected analysis application can be reviewed.

In the **Existing result pages** pane, scroll through the saved result pages and select the desired page.

11.6.3 Deleting a Result Page

You can delete a previously saved result page in the **Result** task.

In the **Existing result pages** list, scroll through the saved result pages, right-click the desired page and click **Delete**.

11.7 2D-QA Settings

The following sections provide information about customizing the 2D-QA according to your preferred workflow.

11.7.1 Changing Default Calibration Settings

NOTE
Changes that any user makes to the customization settings are applied for all users.

1 On the **System** menu, click **Customization**.

2 On the left side of the screen, in the **Measurements and Analysis** section, click **Calibration and Vessel Analysis**.

3 Change the following settings, as desired:

Item	Settings	Notes
Default Manual Calibration	**Catheter**	This setting determines which manual calibration method is selected by default if automatic calibration is not available.
	Distance	
	Sphere	
Predefined catheter size values (French)	To change a predefined size, select the item and enter a new value.	You cannot enter a catheter size less than 4 French.
	To add an additional size, enter the value in the box.	
	To remove an item, select the value and press BACKSPACE.	
Predefined distance values (mm)	To change a predefined distance, select the item and enter a new value.	
	To add an additional distance, enter the value in the box.	
	To remove an item, select the value and press BACKSPACE.	
Predefined sphere size values (mm)	To change a predefined size, select the item and enter a new value.	
	To add an additional size, enter the value in the box.	
	To remove an item, select the value and press BACKSPACE.	

NOTE
In the Calibration and Vessel Analysis panel, you can also change the default curve settings. For details, see Changing QCA / QVA Default Curve Display Settings (page 217).

4 To undo any changes that you have made in the **Calibration and Vessel Analysis** panel, click **Undo Changes**.

5 Alternatively, to restore the system settings to default values, click **Reset Default**.

Item	Default Settings	Input Range
Default Manual Calibration	Catheter	Not applicable
Predefined catheter size values (French)	4, 4.5, 5, 5.5, 6, 6.5, 7	4 French to 12 French
Predefined distance values (mm)	10, 15, 35, 50	10 mm to 100 mm
Predefined sphere size values (mm)	45, 50, 55	10 mm to 100 mm

6 Click **Save** to save your changes.

11.7.2 Changing QCA / QVA Default Curve Display Settings

1 On the **System** menu, click **Customization**.

2 On the left side of the screen, in the **Measurements and Analysis** section, click **Calibration and Vessel Analysis**.

3 Change the following setting, as desired:

Item	Settings
Default Curve Display	**Diameter**
	Diameter & Area

4 Click **Save** to save your changes.

11.7.3 Changing LVA Default Settings

1 On the **System** menu, click **Customization**.

2 On the left side of the screen, in the **Measurements and Analysis** section, click **Left Ventricle Analysis**.

3 Change the following settings, as desired:

Item	Settings	Notes
Default Index method	**BSA**	The cardiac output is always indexed to BSA, irrespective of the selected index method.
	BSA^1.219	
	Weight	
Monoplane Volume Method List	**Area Length**	
	Simpson	
Monoplane Regression Formulas	**Area Length**	
	RAO30, EDV, ESV = 0.783, Vcalc = –3.759, Adults/Children	
	RAO30, EDV, ESV = 0.810, Vcalc = 1.9, Adults/Children	
	RAO30, EDV, ESV = 0.822, Vcalc = 0, Adults/Children	
	Simpson	
	RAO30, EDV, ESV = 0.737, Vcalc = –4.649, Adults/Children	
	You can select a predefined regression formula, or you can enter a user-defined formula in the boxes provided.	
Biplane Volume Method List	**Area Length**	
Biplane Regression Formulas	RAO30/LAO60, EDV, ESV = 0.989, Vcalc = –8.1, Adults/Children	
	You can select a predefined regression formula, or you can enter a user-defined formula in the boxes provided.	
Rotation Range	Enter a range in the boxes in which warnings are suppressed.	
Angulation Range	Enter a range in the boxes in which warnings are suppressed.	

4 To undo any changes that you have made in the **Left Ventricle Analysis** panel, click **Undo Changes**.

5 Alternatively, to restore the system settings to default values, click **Reset Default**.

Item	Default Settings	Input Range
Default index method	BSA	Not applicable
LVA Monoplane Volume Methods List	Area Length	Not applicable
LVA Monoplane Regression formula	EDV, ESV = 0.783, Vcalc = –3.759	Not applicable
LVA Biplane Volume Methods List	Area Length	Not applicable
LVA Biplane Regression formula	EDV, ESV = 0.989, Vcalc = –8.1	Not applicable
LVA Rotation/Angulation Range	–10 degrees to +10 degrees	–20 degrees to +20 degrees

6 Click **Save** to save your changes.

11.7.4 Changing RVA Default Settings

1 On the **System** menu, click **Customization**.

2 On the left side of the screen, in the **Measurements and Analysis** section, click **Right Ventricle Analysis**.

3 Change the following settings, as desired:

Item	Settings
Default Index method	**BSA**
	BSA^1.219
	Weight
Age Threshold	Enter a value in the box to specify the child/adult age threshold.
Monoplane Volume Method List	**Pyramid**
Monoplane Regression Formulas	RAO30, EDV, ESV = 0.898, Vcalc = 3.862, Adults You can select a predefined regression formula, or you can enter a user-defined formula in the boxes provided.
Biplane Volume Method List	**Area Length**
	Simpson
Biplane Regression Formulas	**Area Length** AP/Lateral, EDV, ESV = 0.779, Vcalc = –1.807, Adults RAO30/LAO60, EDV, ESV = 0.79, Vcalc = 0.238, Adults RAO45/LAO45, EDV, ESV = 0.737, Vcalc = –1.435, Adults RAO60/LAO30, EDV, ESV = 0.749, Vcalc = 0.836, Adults Any projection, EDV, ESV = 0.76, Vcalc = –0.2, Adults AP/Lateral, EDV, ESV = 0.898, Vcalc = 2.8, Children AP/Lateral, EDV, ESV = 0.68, Vcalc = 0, Children **Simpson** AP/Lateral, EDV, ESV = 0.649, Vcalc = 0, Children You can select a predefined regression formula, or you can enter a user-defined formula in the boxes provided.
Rotation Range	Enter a range in the boxes in which warnings are suppressed.
Angulation Range	Enter a range in the boxes in which warnings are suppressed.

4 To undo any changes that you have made in the **Right Ventricle Analysis** panel, click **Undo Changes**.

5 Alternatively, to restore the system settings to default values, click **Reset Default**.

Item	Default Settings	Input Range
Default index method	BSA	Not applicable
RVA Age Threshold	16 years	1 year to 120 years
RVA Monoplane Volume Methods List	Pyramid only - not customizable	Not applicable
RVA Monoplane Regression formula	EDV, ESV = 0.898, Vcalc = 3.862	Not applicable
RVA Biplane Volume Methods List	Area Length	Not applicable
RVA Biplane Regression formula	EDV, ESV = 0.779, Vcalc = –1.807	Not applicable
RVA Rotation/Angulation Range	–10 degrees to +10 degrees	–20 degrees to +20 degrees

6 Click **Save** to save your changes.

12 Using Other Equipment

The system is designed for use with compatible options, systems, and equipment. These Instructions for Use provide basic information on how the system interfaces with other compatible equipment. For information on how to use compatible equipment, you should refer to the Instructions for Use supplied with that equipment.

When other compatible equipment requires cabling, contact Philips for assistance to ensure that the cables do not trail on the floor. For more information, see Contacting Philips (page 427).

12.1 Accessories

This section provides information about accessories that are available with the system.

12.1.1 Using the Arm Support Board

The arm support board can be used to support the patient's arm during brachio-cephalic catheterization procedures.

1 Position the patient on the table before using the arm support board.

2 Attach the foam pad to the arm support board ensuring that the arm support board is passed through the loop of the pad.

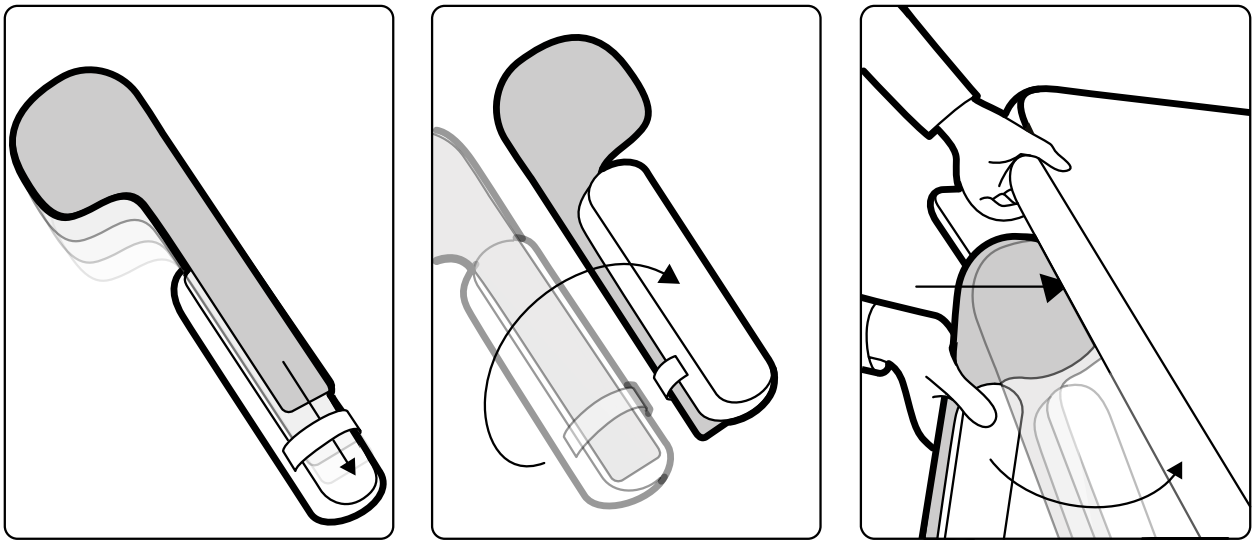


Figure 120 Attaching the foam pad to the arm support board

3 With the foam pad facing upward, slide the arm support board under the patient's shoulder between the tabletop and the mattress.

4 Position the patient's arm on the arm support board.

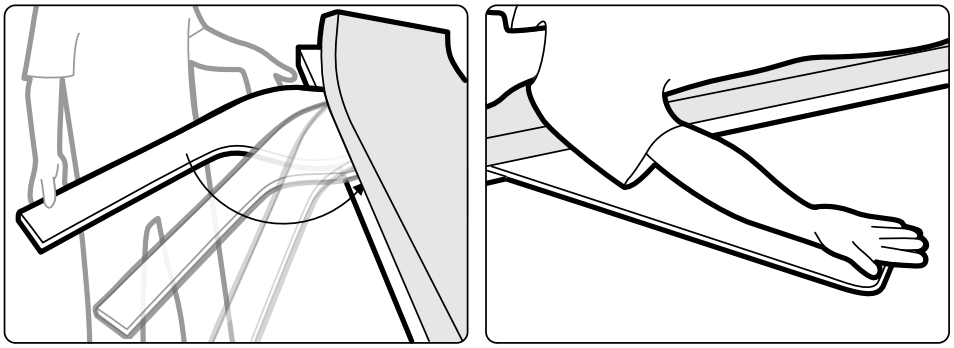


Figure 121 Positioning the patient's arm

12.1.2 Using the Shoulder Support Board

The shoulder support board can be used to support both arms during brachio-cephalic catheterization procedures.

1 Slide the shoulder support board between the mattress and the tabletop, and under the patients' shoulder.

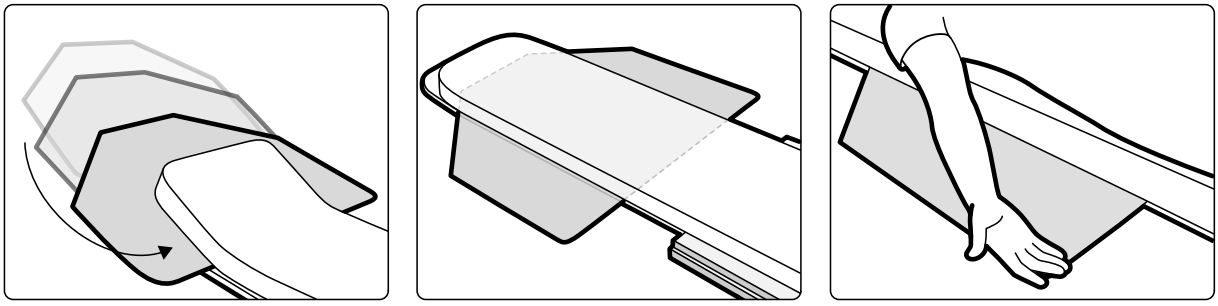


Figure 122 Using the shoulder support board

2 Position the patient's arm on the support board.

12.1.3 Using the Height-Adjustable Arm Support

The height-adjustable arm support can be used to manage blood flow during venous digitial subtraction angiography (DSA).

NOTE
The height-adjustable arm support cannot be used for X-ray procedures on the arm. In such cases, use the arm support board. For more information, see Using the Arm Support Board (page 220).

1 Position the patient on the table.

For more information, see Positioning the Patient on the Table (page 65).

2 Fit the tabletop accessory clamp to the tabletop at the desired position, and tighten the locking lever.

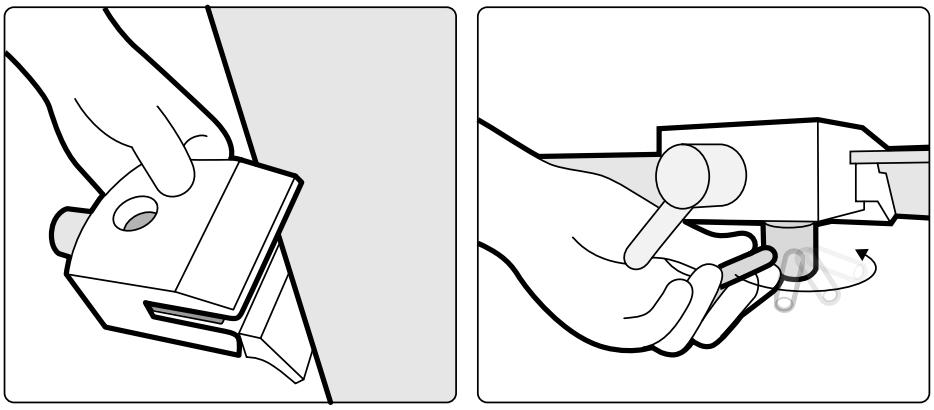


Figure 123 Fitting the tabletop accessory clamp to the tabletop

3 Do one of the following:

- Attach the arm support extension to the arm support, and adjust the length of the extension as necessary.

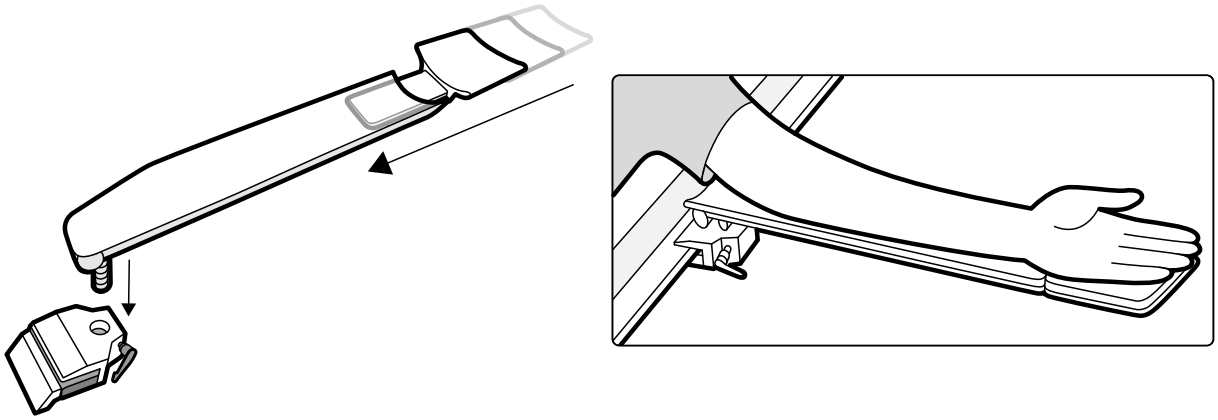


Figure 124 Using the arm support extension

- Attach the arm support handgrip to the arm support, and adjust the position of the handgrip as necessary.

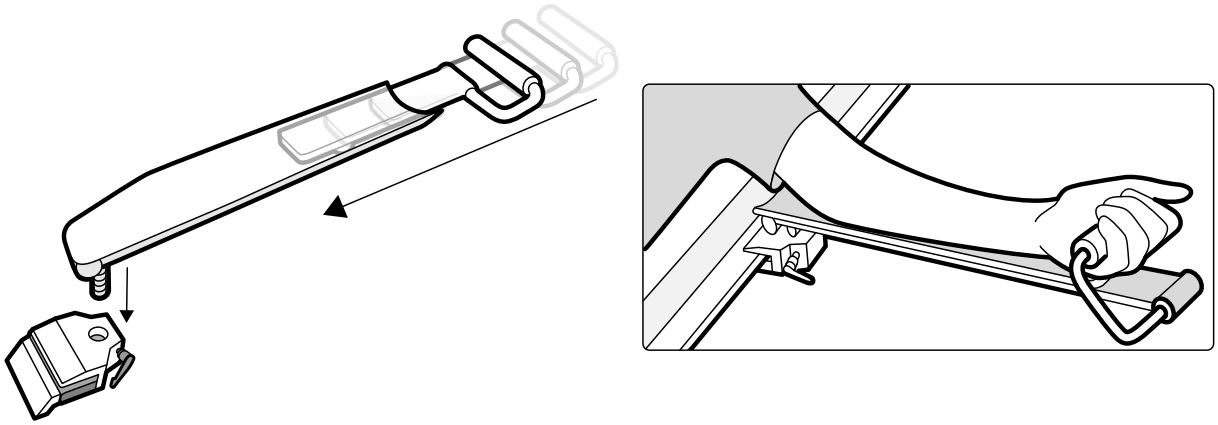


Figure 125 Using the arm support handgrip

4 Fit the arm support into the accessory clamp, and tighten the locking lever.

5 Cover the arm support with a biocompatible material, such as tissue paper or a sheet, to avoid direct contact with the patient.

6 Set the angle of the arm support and position the patient's arm on the support.

12.1.4 Cerebral Filter

If your system is supplied with a cerebral filter, use the following procedure to fit or remove the filter.

1 To fit the cerebral filter, push the cerebral filter into the rim of the X-ray tube housing.

2 To remove the cerebral filter, insert your finger into the filter hole and lift the filter out of the rim of the X-ray tube housing.

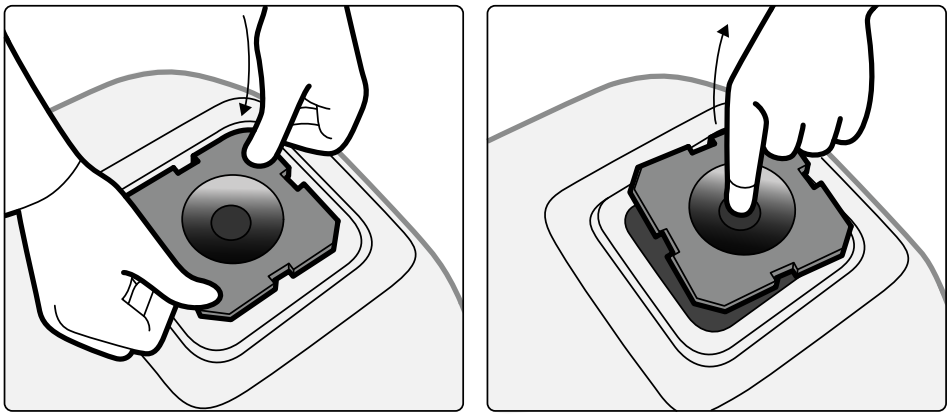


Figure 126 Fitting and removing the cerebral filter

12.1.5 Peripheral X-ray Filters

Peripheral X-ray filters minimize patient movements during lower peripheral angiography procedures.

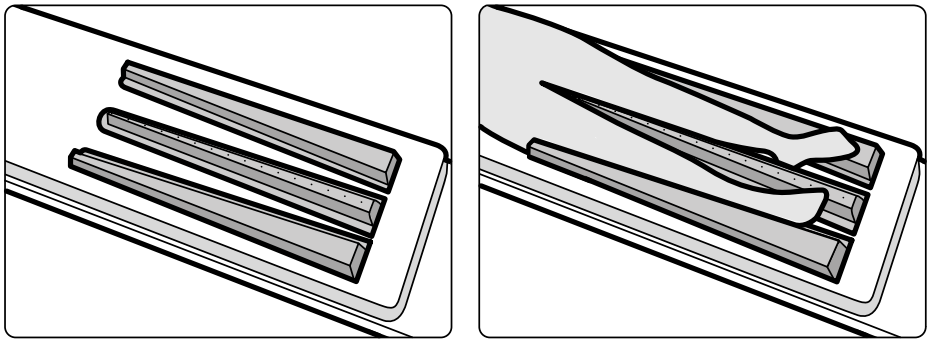


Figure 127 Peripheral X-ray filters

The center filter is marked to facilitate measurements in acquired images. The marks are spaced approximately 5 cm (2 in) apart.

1 Position the central peripheral filter carefully between the patient's legs, with the wide end at the patient's feet and the narrow end as high up as possible.

WARNING
The peripheral X-ray filters contain copper. You must use a sheet or cover to avoid direct contact with the patient's skin.

2 Immobilize the patient's legs at knee and ankle using straps.

For patients with genu varum (O), the patient's knees should be slightly lifted and supported underneath, and then strapped closely together.

For patients with genu valgum (X), the patient's knees should be slightly lifted and supported underneath, and then the patient's ankles should be strapped closely together.

3 Position the side filters as close as possible to the sides of the patient's legs, with the wide end at the patient's feet.

4 Fit the filters to the shape of the patient's legs to avoid gaps between the filters and the legs.

12.1.6 Head Support

The head support improves patient comfort and minimizes head movements during a procedure.

1 Place the base of the head support at the head end of the table with the rectangular side towards the mattress, but not on the mattress.

2 Place the shaped head support on the head support base and align the markers.

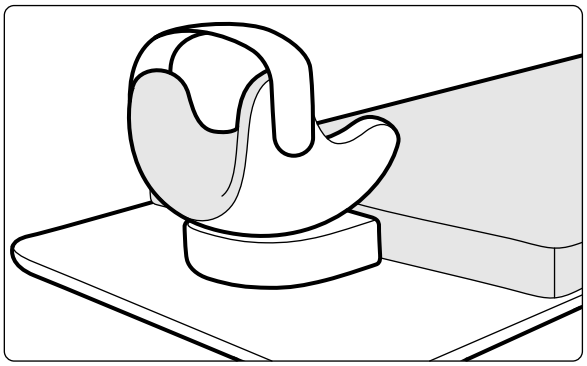


Figure 128 Positioning the head support

3 Position the patient so that the patient's head lies comfortably in the head support.

4 For extra support, attach the head band.

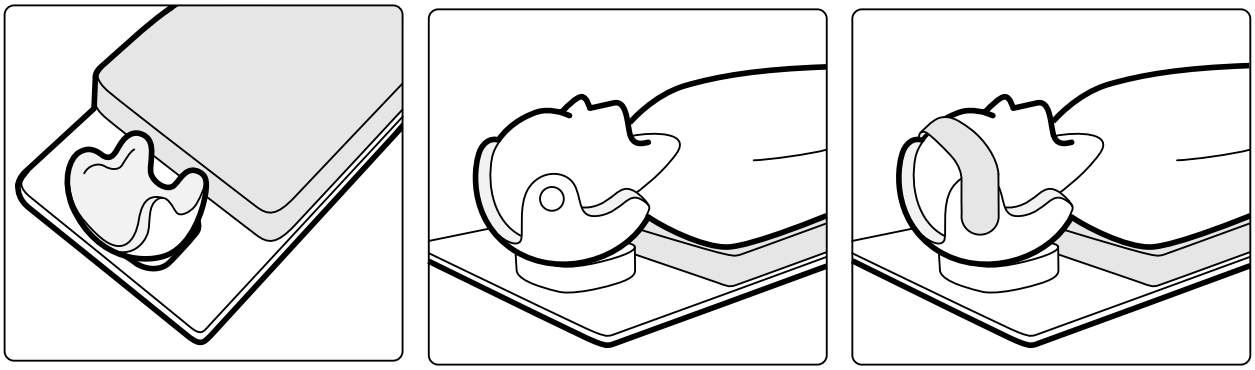


Figure 129 Positioning the patient in the head support

You can use the neuro wedge with the head support. For more information about the neuro wedge, see Neuro Wedge (page 225).

12.1.7 Mattress

The mattress provides comfort for the patient and spreads the weight of the patient evenly.

There are three types of mattress available:
- Standard
- Cardio
- Neuro

NOTE
The mattress does not contain latex (natural rubber).

Before positioning the patient on the mattress, open the air plug to allow the mattress to expand and contract properly with the weight of the patient.

Close the air plug while cleaning the mattress. When the mattress is not in use, the air plug can be pushed all the way in to the mattress.

12.1.8 Neuro Wedge

You can use the neuro wedge to position the patient's head in the isocenter position during neuro-radiology procedures. The neuro wedge should be used with the head support. For more information about the head support, see Head Support (page 224).

NOTE
The neuro wedge should not be used during neuro CBCT procedures.

1. Slide the tapered end of the neuro wedge under the mattress at the head end of the table so that only the rectangular portion of the wedge is visible.
2. Position the head support on top the rectangular part of the neuro wedge.
3. Position the patient so that the patient's head lies comfortably in the head support.

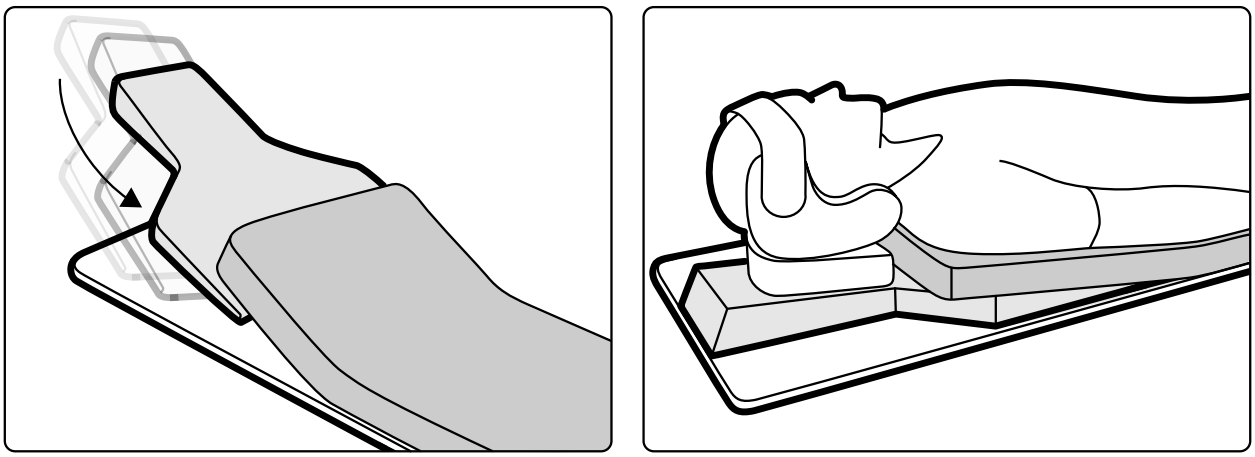


Figure 130 Positioning the neuro wedge

12.1.9 Patient Straps

Use patient straps to ensure patient safety before starting tilt or cradle movements of the tabletop.

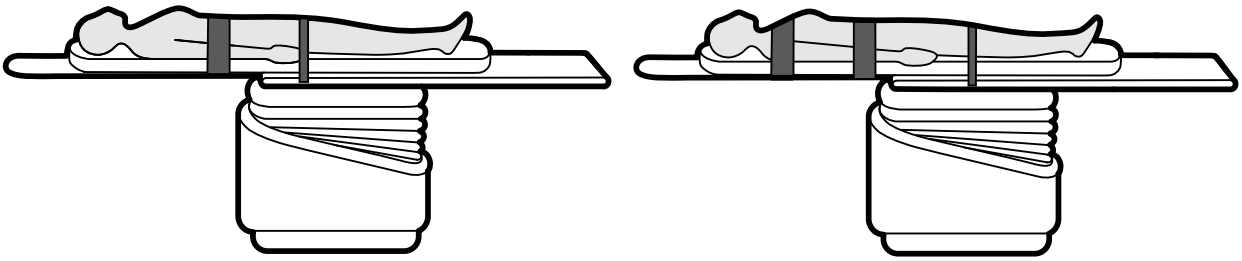


Figure 131 Using patient straps

Ensure that the straps are applied correctly around the accessory rail of the table.

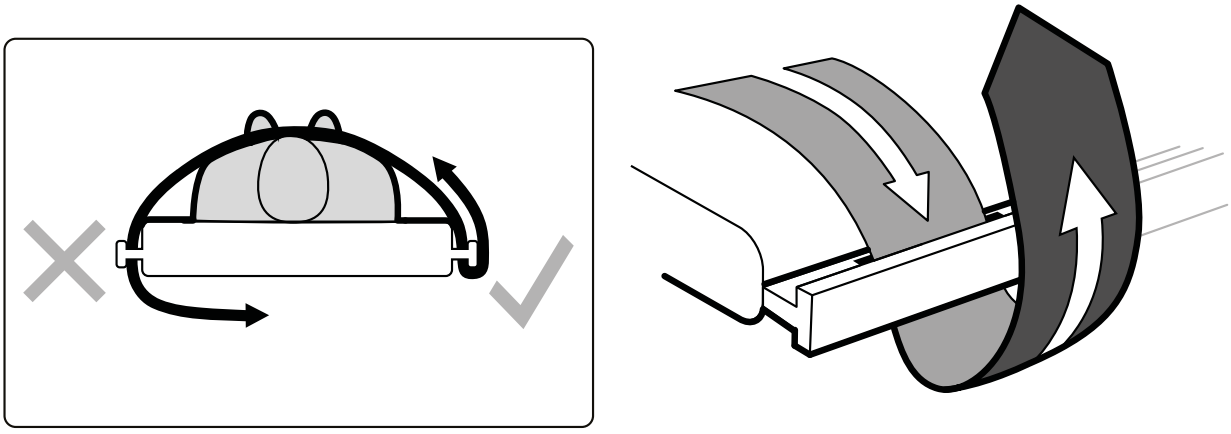


Figure 132 Applying patient straps around the accessory rail

For more information, see Using Patient Straps (page 66).

12.1.10 Ratchet Compressor

The ratchet compressor applies moderate compression to the patient and minimizes patient movement. This improves visualization of internal organs.

1. Position the unit on the edge of the table and tighten the attachments underneath the unit.
2. Push the release lever down to release the compression band.
3. Pass the compression band over the patient and back under the table, and then put the end of the band over the compression band roller.

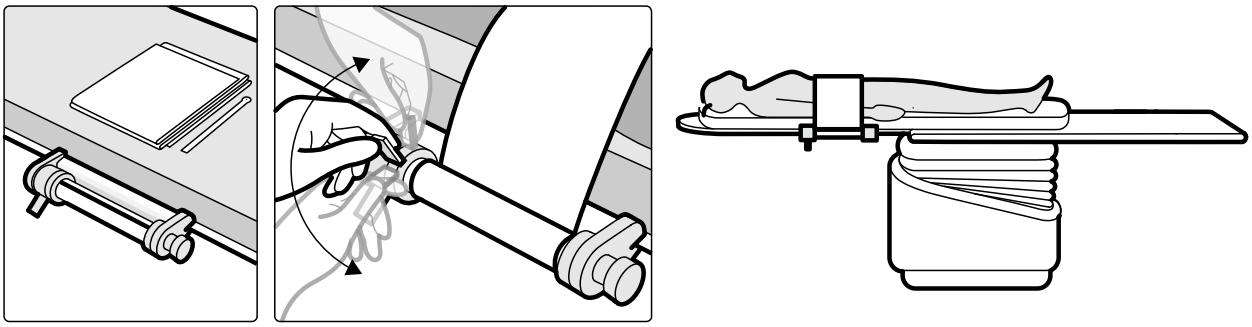


Figure 133 Fitting the compression band

4. Turn the ratchet winder to increase the compression.

   Take care to control the amount of compression.
5. To decrease the compression, push the release lever down.
6. To release the compression band when the procedure is finished, do the following:
   a. Push the release lever down.
   b. Release the band from the compression band roller.
   c. Remove the unit from the edge of the table.

12.1.11 Viewpad

The viewpad is a handheld remote control that you can use to control viewing and processing functions from anywhere in the examination room.

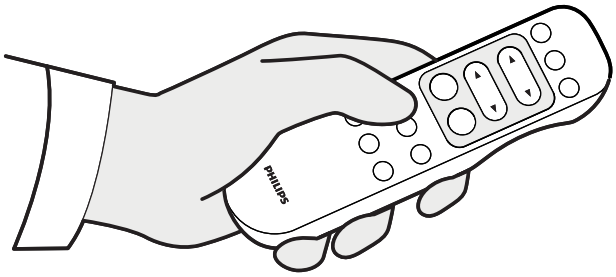


Figure 134 Viewpad

When you activate a function on the viewpad, the function is applied to the viewport that currently has focus. A viewpad icon is displayed in the middle of the viewport for a moment, and is then displayed in the top bar of the viewport.

The viewpad is an infrared remote control. The infrared transmitter is located on the front of the viewpad. If the transmitter is obstructed, signals are not transmitted. The receiver is located in the monitor ceiling suspension, above the monitors. A light on the receiver indicates that the selected command has been received. The viewpad should be used inside a transparent sterile cover (not supplied by Philips Medical Systems).

A laser pointer is located on the front of the viewpad. You activate the laser pointer using the button on the underside of the viewpad. The quality of the laser pointer is affected when using a sterile cover.

WARNING
Do not stare into the beam or point the beam at other people's eyes.

NOTE
Do not open the cover of the viewpad (not including the battery compartment cover). For maintenance, contact technical support. If the cover is damaged, do not use the viewpad and call technical support for a replacement.

NOTE
Do not use the viewpad when more than one Azurion system is in use in the same room.

NOTE
Infrared signals from the viewpad may interfere with other infrared-controlled equipment in the same room. Before using the viewpad in a procedure, check that there is no interference with other equipment.

When not in use, store the viewpad in the holder provided on the side of the touch screen module.

For more information, see the following sections:
- Equipment in the examination room: Viewpad (page 48)
- Batteries: Replacing Batteries (page 298)
- Quick reference: Viewpad (page 465)

Viewpad Laser Aperture
The laser aperture of the viewpad is indicated with an arrow in the following illustration.

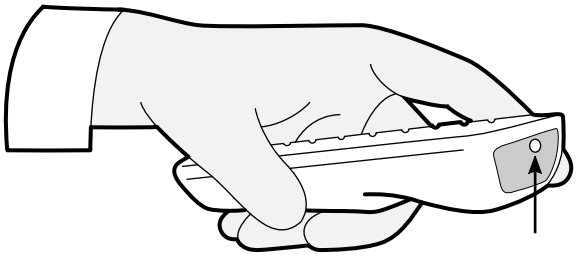


Figure 135 Viewpad laser aperture

12.1.12 XperGuide Laser Tool (Option)

The XperGuide laser tool is a positioning aid. It is attached to the patient table for use during percutaneous interventional procedures.

The XperGuide laser tool contains a laser with the IEC classification of class 1 laser product.

WARNING
Do not stare into the beam or point the beam at other people's eyes.

NOTE
Do not use the laser tool for investigation. The laser tool is for alignment only.

The laser tool marks the needle entry point on the skin, and assists the user holding the needle in the correct position and orientation.

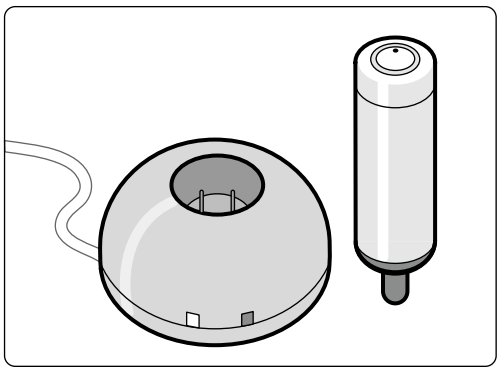


Figure 136 Laser tool and charger

The laser tool is used in the laser tool holder, which is attached to the table using a tabletop accessory clamp.

The laser aperture of the laser tool is indicated with an arrow in the following illustration.

Figure 137 Laser tool laser aperture

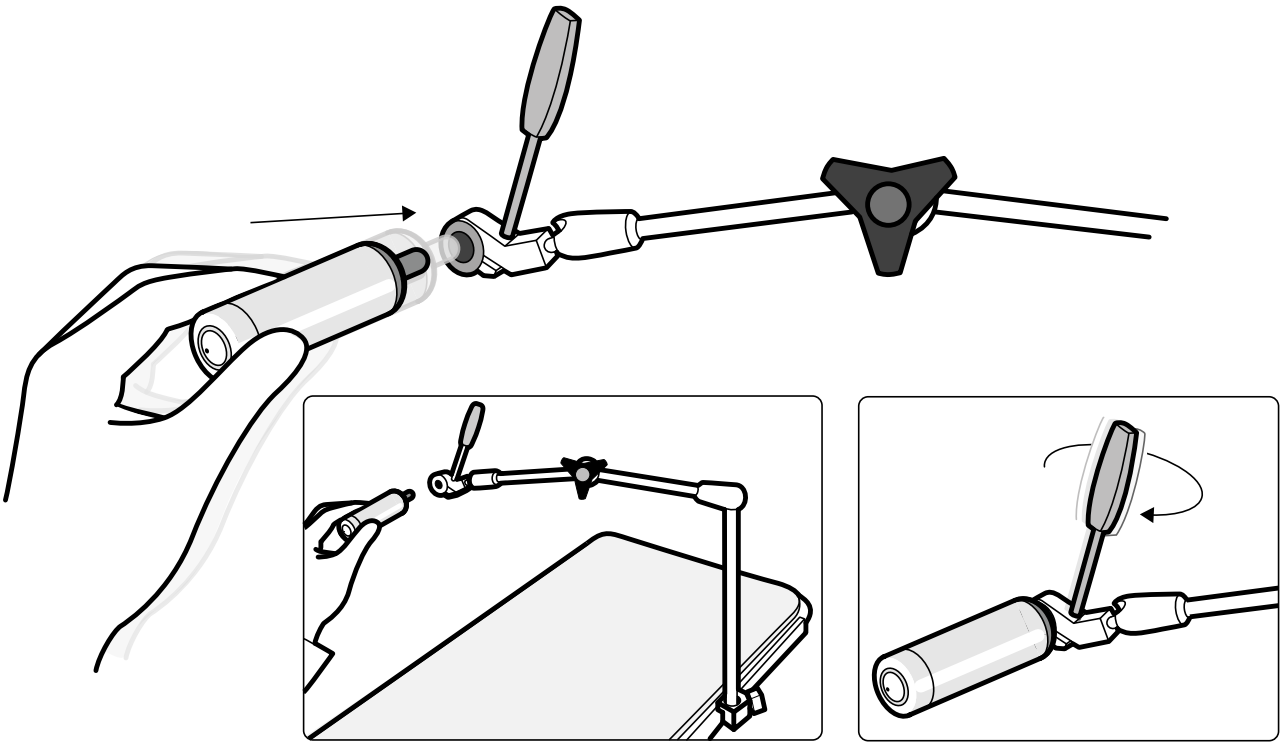


Figure 138 Laser tool holder

Sterile disposable covers are not supplied with the laser tool and must be obtained locally.

Switching the XperGuide Laser Tool On and Off

1 To switch the laser tool on, press the power button on the top of the tool.
When the laser tool is switched on, the indicator light on the button is illuminated.

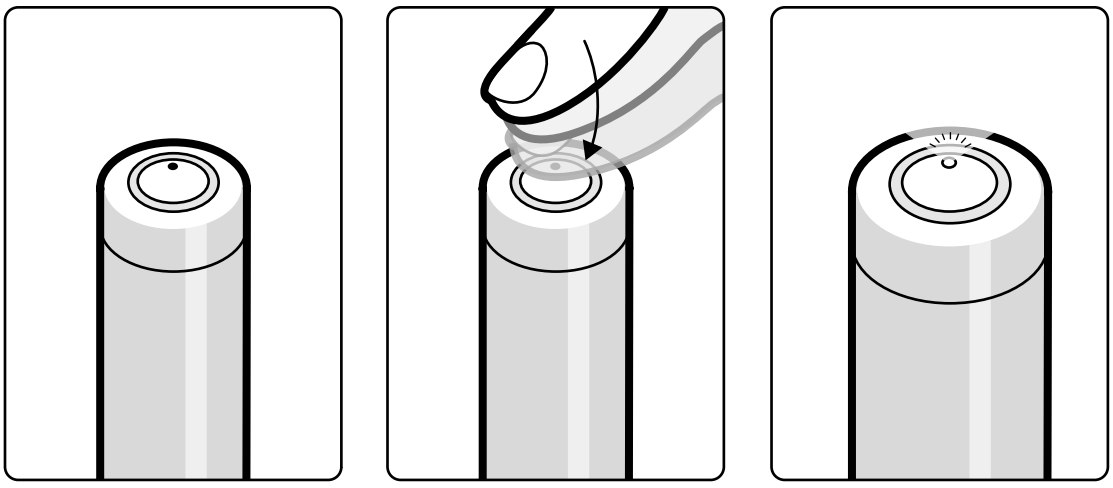


Figure 139 XperGuide laser tool power button

2 To switch the laser tool off, press the power button again.

Charging the XperGuide Laser Tool

Keep the laser tool charger in the control room (out of the patient environment).

1 Connect the laser tool charger to the mains.

When the red indicator light on the laser tool charger is illuminated, the charger is connected to the mains.

2 Insert the laser tool to the charger.

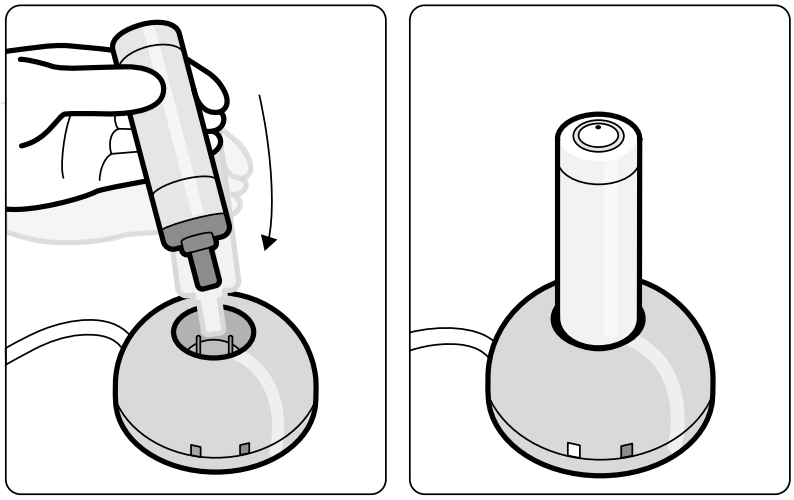


Figure 140 XperGuide Laser Tool Charger

When the green indicator light is illuminated, the laser tool is charging.

When the green indicator light switches off the laser tool is fully charged.

3 Disconnect the laser tool charger from the mains.

4 Recharge the laser tool after each use to ensure the availability of the laser for the next procedure.

12.2 Detachable Parts

This section provides information about detachable parts that are available with the system.

12.2.1 Drip Stand

You can attach the drip stand to the table accessory rail to hang bags of fluid. The maximum load for the drip stand is 2 kg on each hook.

1 Attach a rail accessory clamp to the accessory rail and fit the drip stand into the rail accessory clamp.

2 Tighten the clamp to secure the drip stand.

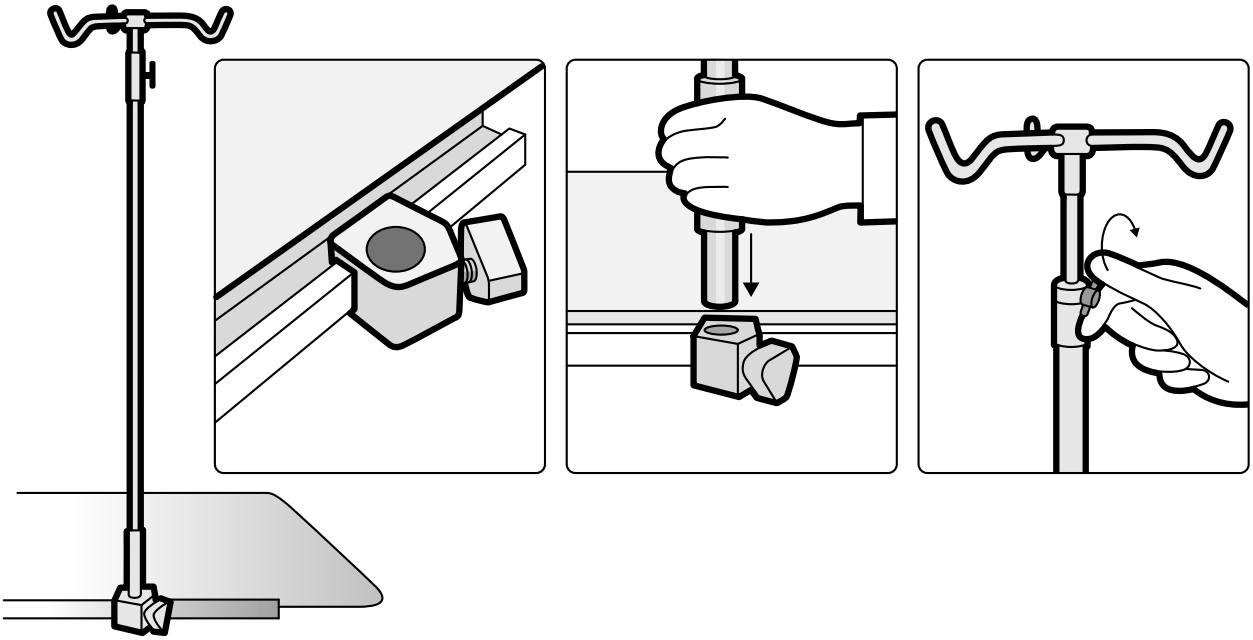


Figure 141 Fitting the drip stand

3 To adjust the height of the drip stand, loosen the height adjustment clamp, adjust the height of the drip stand, and then tighten the clamp.

12.2.2 Handgrip and Clamp Set

The handgrip and clamp set provides safety and comfort for the patient during tilt or cradle movements.

1 Attach a tabletop accessory clamp on each side of the table at the appropriate position.

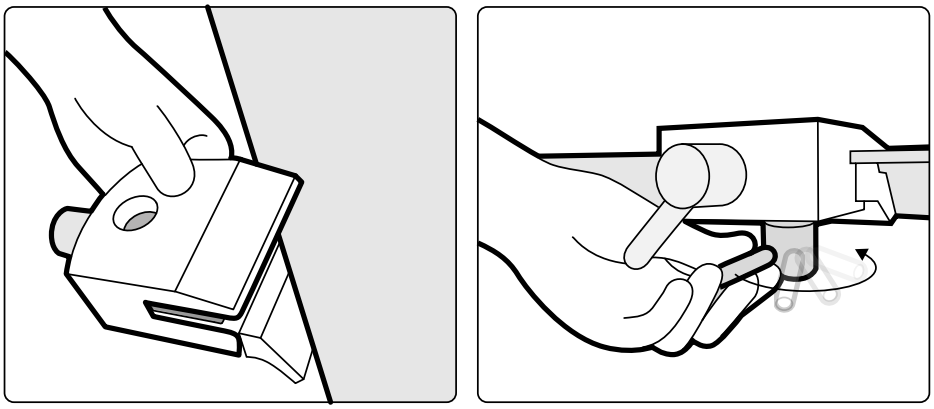


Figure 142 Fitting the tabletop accessory clamp

2 Fit the handgrips in the clamps and tighten the locking levers.

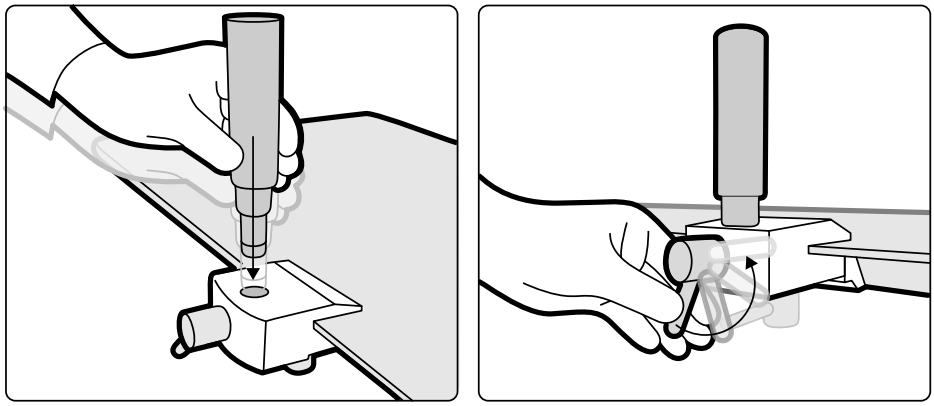


Figure 143 Positioning the handgrips

12.2.3 Using the Elbow Support

Elbow supports can be used for patient comfort and to prevent the patient's arms from hanging over the side of the table.

1 Position the patient on the table before using the elbow support.

2 Slide the elbow support under the patient between the tabletop and the mattress.

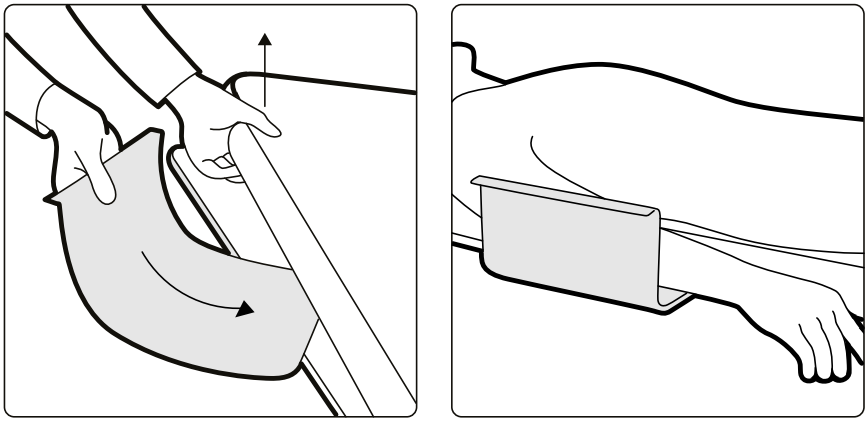


Figure 144 Positioning the elbow support

3 Position the patient's arm on the elbow support.

12.2.4 Tabletop Accessory Clamps

Tabletop accessory clamps allow you to attach compatible accessories to the tabletop.

1 Slide the clamp on to the edge of the tabletop.

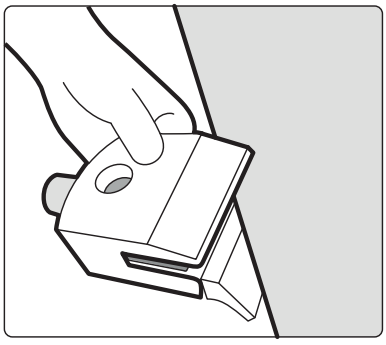


Figure 145 Sliding the clamp on to the edge of the tabletop

2 Secure the clamp by tightening the lever [1] on the underside of the clamp.

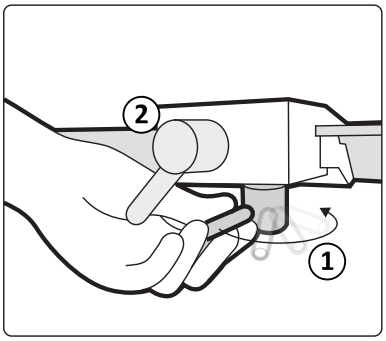


Figure 146 Securing the clamp to the tabletop

3 Fit an accessory in the clamp and tighten the lever [2] on the side of the clamp.

When a clamp does not have an accessory fitted, it should be removed from the tabletop.

12.2.5 Additional Table Accessory Rail

You can use the additional table accessory rail to position modules and accessories closer to the head of the tabletop.

The maximum load on the additional table accessory rail must not exceed 100 N downwards (limited by the table), and a maximum torque of 40 Nm downwards and 20 Nm upwards (limited by the table).

The additional table accessory rail is available as EU and US versions (the US version has a black anodized finish). The modules that are designed for the EU version do not fit correctly on the US version; the modules may become detached from the rail.

1 Open the clamps on the additional table accessory rail, position the rail on the edge of the tabletop, and then close the clamps to secure the rail.

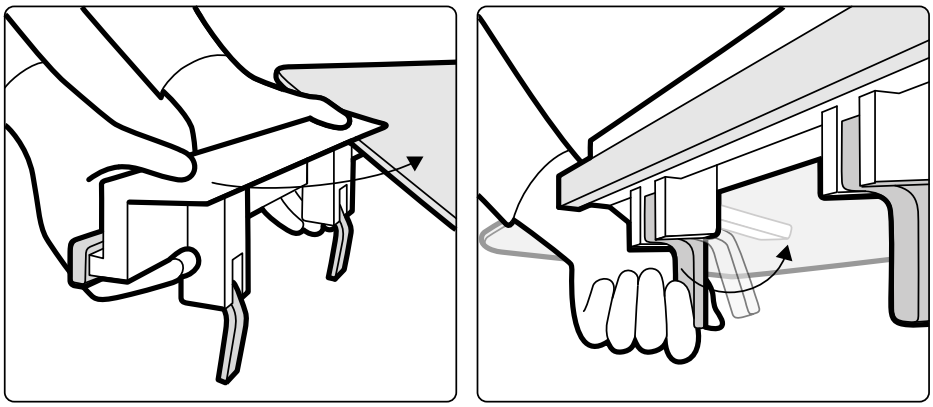


Figure 147 Additional table accessory rail

2 Attach modules to the additional table accessory rail.

The additional table accessory rail can be used for 2 modules, or 1 module and surgical accessories. The maximum weight may not exceed 10 kg. If you attach a surgical accessory on the additional table accessory rail, which will be placed over the table width, the maximum weight may not exceed 4 kg over the middle of the table.

3 If cable supports (option) are available, fit all cables to the cable supports.

4 To remove the additional table accessory rail, do the following:

a Remove the modules and attach them to the standard table accessory rail.

b Remove the additional table accessory rail from the tabletop.

12.2.6 Accessory Rail Clamps

Accessory rail clamps allow you to attach compatible accessories to the table accessory rail.

1 Slide the clamp on to the accessory rail.

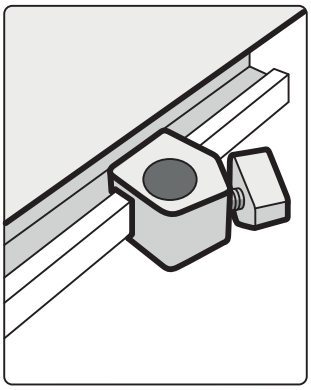


Figure 148 Positioning the clamp on the accessory rail

2 Fit an accessory in the clamp.

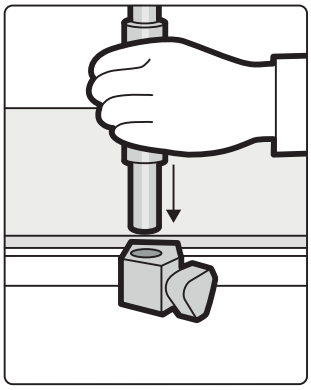


Figure 149 Fitting an accessory in the clamp

3 Turn the knob on the clamp so that the clamp and accessory are firmly attached to the accessory rail.

When a clamp does not have an accessory fitted, it should be removed from the rails.

12.3 Interfaces for Third-Party Equipment

This section provides information about connecting compatible third-party equipment to the system.

12.3.1 Declarations of Compatibility

Philips Medical Systems has defined declarations of compatibility for a variety of third-party components and systems. A declaration of compatibility implies that a third-party component or system and the Azurion system are verified for mutual compatibility when operated in accordance with the manufacturers' instructions.

The declaration of compatibility means that the third-party component or system and the Azurion system, when used together, do not adversely affect the following:

- The intended use and essential performance of either system.
- The safety and effectiveness of either system.

12.3.2 Connecting an Injector

To connect an injector to the system, you use a specific connector on the interface panel on the rear side of the table base.

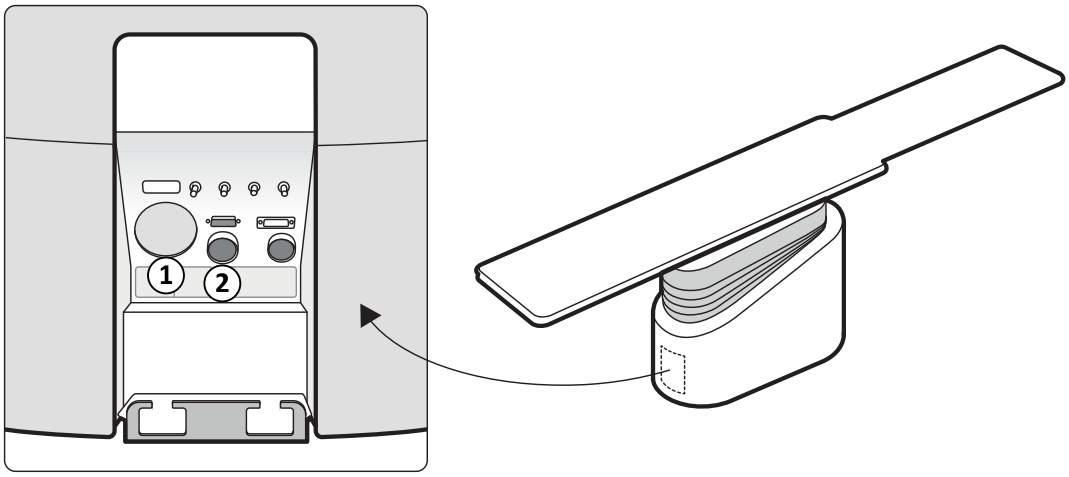


Figure 150 Injector connectors on the rear interface panel

Legend	
1	Connector for injectors in non-pedestal configuration
2	Connector for injectors in pedestal configuration

Ask your Philips representative for a compatibility statement for the injector device that you want to connect to your system.

Non-Pedestal Configuration
In the non-pedestal configuration, only the injector head and injector display unit are located in the examination room. The injector base unit is located in the technical room. An additional injector display unit can also be located in the control room. Injector connection [1] is used in this configuration.

Pedestal Configuration
In the pedestal configuration, the entire injector is located in the examination room except for an optional injector display unit in the control room. The injector is placed on a movable pedestal and can be easily connected and disconnected from the X-ray system using a Burndy connector. The Burndy connector is located at the rear interface panel at the table base (item [2] in the illustration).

If you are using an OR table, the rear interface panel at the table base cannot be used. Instead, a surgery wall connection box is provided in the examination room, but at a greater distance from the table.

12.3.3 Connecting Video Sources

There are several possibilities for connecting compatible third-party devices to the Philips interventional X-ray system to display auxiliary video sources.

The wall connection box is used to connect third-party devices. For more information, see Wall Connection Box (Option) (page 236).

Video sources from third-party devices can be shown on the following:
- A dedicated Philips monitor in the control room or the examination room.
- FlexVision (option).
- A third-party monitor, powered by the third-party system (including a third-party monitor mounted in the monitor ceiling suspension).
- MultiSwitch in the control room (option).
- MultiVision in the examination room (option).
- Switchable monitors in the examination room (option).
- FlexSpot in the control room (option).

Video sources from the Philips interventional X-ray system can be displayed on third-party monitors.

Third-party 4K video sources with 4K resolution can be connected to the system and displayed on third-party 4K monitors.

NOTE
Philips cannot guarantee the image quality or coordination of the following:
- ***Philips video sources displayed on third-party monitors.***
- ***Third-party video sources displayed on Philips monitors.***

Philips can only ensure that the image quality of a third-party device is guaranteed by performing a compatibility study and obtaining a positive result.

To reconfigure the display of video sources on monitors or extend the system with additional wall connection boxes, contact a Philips representative.

12.3.4 Using a Third-Party Boom for Tableside Modules (Option)

This option allows you to position tableside modules and other operating modules on a ceiling-mounted boom in the examination room. The boom provides accessory rails and shelves to support a set of tableside modules in a layout that is similar to the layout used at the tableside. The cabling for the modules is contained within the boom, which reduces trailing cables on the floor of the examination room.

You can move the boom to any position in the examination room that the boom can reach. You can adjust the height of the boom to provide a clear view of the patient and the X-ray system.

The boom also provides alternative configuration options
- The boom can be used as storage only for the tableside modules, allowing you to move them out of the working area when they are not needed.
- The boom can be used to carry only the cables for tableside modules that are attached to a pedestal.

Wireless modules, such as a wireless foot switch, can be stored on the boom, but cannot be charged using the boom.

12.4 Other Devices

This section provides infomation about additional equipment that can be used with the system.

12.4.1 Wall Connection Box (Option)

The wall connection box provides connection points to the system for ethernet, video, and USB.

You can connect additional compatible equipment to the system using a wall connection box.

NOTE
While a wall connection box provides connection points for additional equipment, it does not provide power to connected equipment.

Wall connection boxes can be installed in the control room, the examination room, and the technical room.

For more information about the technical specification of the wall connection box, see the following sections:
- Wall Connection Box (page 332)
- Installation and Equipment Connections (page 422)

12.4.2 Intercom (Option)

An optional intercom is available to assist communication between the control room and the examination room.

Two intercom units are installed: one in the control room and one in the examination room.

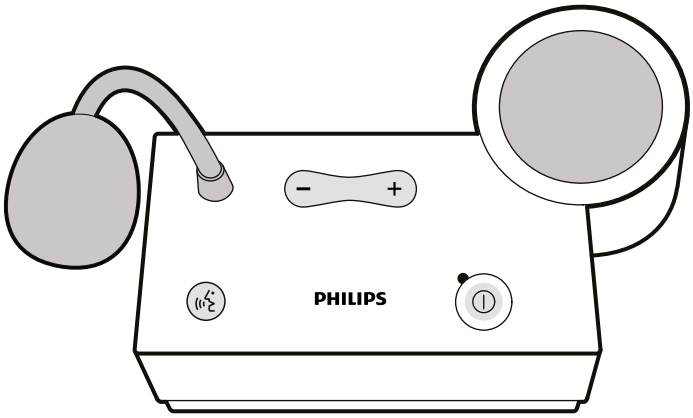


Figure 151 Intercom unit

The following controls are used to operate the intercom.

Control	Description
	Switch the intercom on and off. The indicator light is on when the intercom is switched on.
	Press and hold to speak.
	Volume control.

12.4.3 Equipment Rack (Option)

The ceiling-suspended equipment rack is a space-saving unit which helps you keep the examination room tidy by consolidating the separate equipment carriers associated with EP procedures, for example, and by streamlining cabling.

Additional power and network connection points are integrated with the equipment rack.

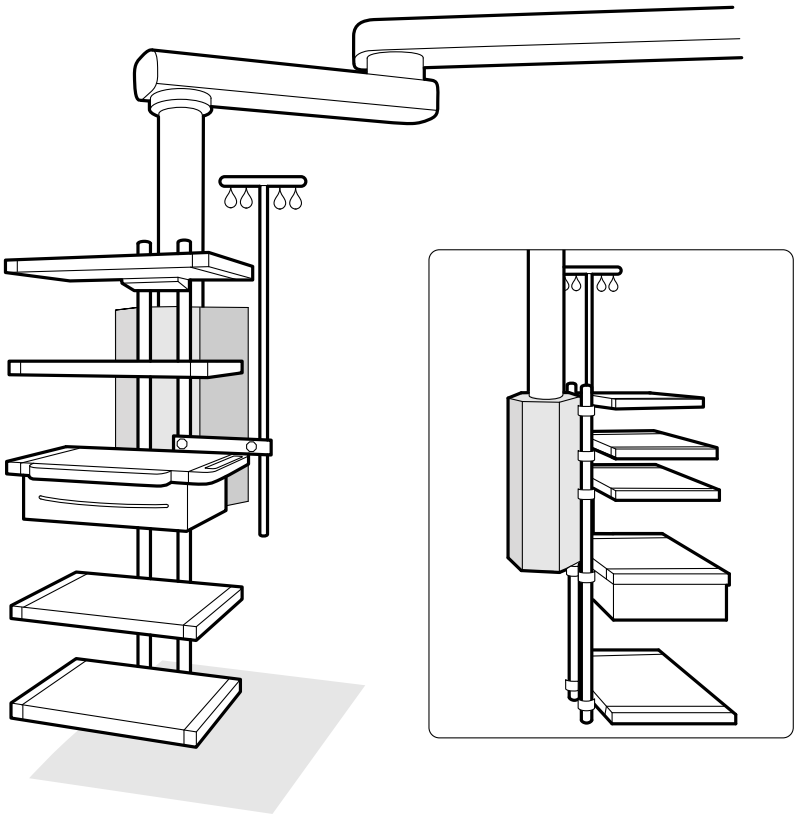


Figure 152 Equipment rack

For information on using and maintaining the equipment rack, refer to the Instructions for Use supplied with the equipment rack.

12.4.4 Pedestal (Option)

You can use the pedestal as a primary or secondary point of control for the system.

You can position the control module and the touch screen module on the pedestal. You can then position the pedestal in a more convenient position in the examination room, if desired.

WARNING
Do not push or lean against the pedestal.

WARNING
Do not attach any modules other than the control module or the touch screen module to the pedestal.

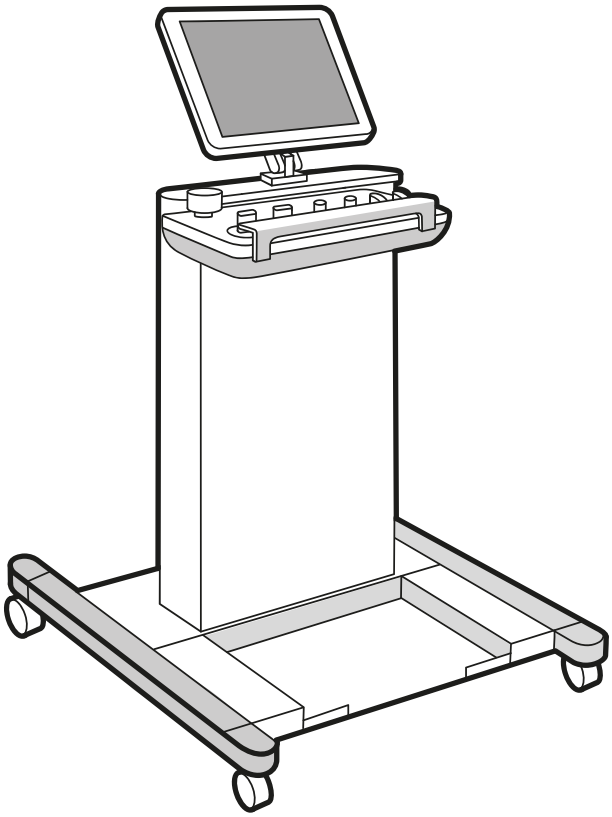


Figure 153 Pedestal

To support certain system configurations, you can use a compatible, ceiling-suspended equipment rack as an alternative to the pedestal.

12.4.5 8-Meter Cable Assembly Kit (Option)

You can use an 8-meter cable assembly kit to connect other compatible equipment to the system and to hospital power. The cable provides power, DVI, USB, and Ethernet connectivity.

NOTE
If the 8 meter cable assembly kit is disconnected from the equipment, it is possible that the cable could be left on the floor with live voltage still present in the connection plug. This presents a risk of electric shock if fluids make contact with the connectors. To prevent this risk, the connection plug must be covered with the rubber cap attached to the connector after disconnecting the equipment cable, and the cable must be stored on the wall bracket next to the wall connection box.

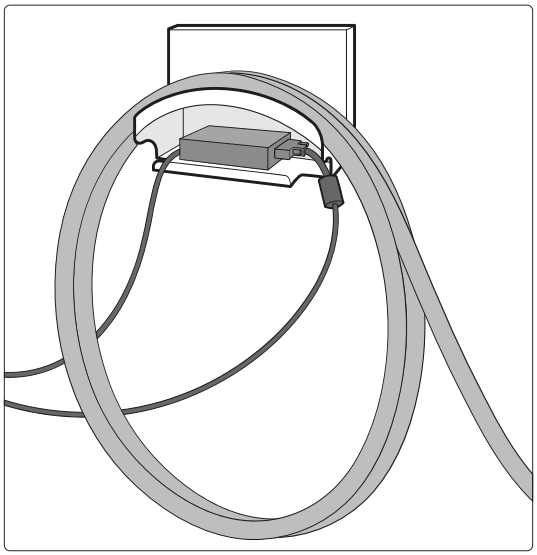


Figure 154 8-meter cable assembly kit

13 User Customization

You can customize the system's functionality and configuration to suit the way you want to use it. You can view or configure these settings without a system administrator account.

NOTE
Before you make changes to system customization settings, you should consider exporting the existing settings so you can import them later if you need to. Settings can only be imported or exported by a system administrator.

13.1 Changing Your Password

It is important to ensure your password remains private at all times and it is good practice to change your password regularly.

You can change your password at any time when logged into the system. If you forget your password, your system administrator can reset it for you. For more information about resetting a password, see Resetting a User's Password (page 261).

To change your own password, ensure you are logged into the system and do the following:

1 In the review window, click **System** and select **Change Password**.

A dialog box is displayed requesting you to enter your old password and to set your new password.

2 Check the **User Name** displayed is correct.

If the **User Name** displayed is not yours, you must log out of the system and log in using your own user name and password.

3 Enter your **Old Password**.

4 Enter your **New Password**.

You must follow these rules when setting a password:
- The password field cannot be empty.
- Passwords cannot contain user names.
- Passwords must conform to the password policy settings.
- If password complexity is enabled, passwords must contain characters from three of the following categories:
  - Uppercase letters
  - Lower case letters
  - Numbers (0 through 9)
  - Non-alphabetic characters (for example: ! $ # %)

For more information about password policy settings, see Managing Users and System Logon (page 260).

5 Enter your new password again in **Confirm Password**.

6 Do one of the following:

a To close the dialog box without changing your new password, click **Cancel**.

b To close the dialog box and change your password, click **Apply**.

13.2 Viewing System and License Information

You can view basic information about the system and the licenses installed on the system.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **System and License Information**.

System and license information is displayed in the right pane:
- Hospital and department names
- Local system ID
- Computer and host names
- IP and MAC addresses
- Installed hardware and software licenses

3 To close the **System Customization** window, click **Close**.

13.3 Setting the Date and Time

You can choose whether the date and time should be set manually or automatically.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Date and Time Settings**.

3 To set the date and time automatically using a time server, enable the **Time Server** by selecting **Enabled**.

If the time server is enabled, the date and time is automatically synchronized after startup when a connection with the time server is established. A manually entered date and time is overwritten when the date and time are automatically synchronized. The time and date is synchronized hourly when the system is connected to the time server. The system date and time cannot be changed manually if the time server is enabled.

If the time server is **Enabled**, ensure that the correct host name or IP address for the time server is entered in the field below the radio buttons.

4 To set the date and time manually, do the following:

a Select **Disabled** for the time server.

b Select the correct date from the **System Date** drop-down calendar.

c Enter the correct time in the **System Time** field.

5 Select the correct **Time Zone** from the list.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

8 To close the **System Customization** window, click **Close**.

13.4 Changing the Date and Time Formats

The system displays both short and long versions of the date and time. You can change the way that they are displayed to suit your local preferences.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Date and Time Settings**.

3 Select the formats to be used for **Short Date** and **Long Date** from the available lists.

4 Select the formats to be used for **Short Time** and **Long Time** from the drop-down lists.

5 Select which day should be regarded as the **First Day of the Week** from the drop-down list.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

8 To close the **System Customization** window, click **Close**.

13.5 Changing the Physician List

You can add, remove, or change the names of physicians used on the system. Instead of removing a physician from the system, you can choose whether physicians are visible on the system.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Physician List**.

3 To change a physician's details do the following:

a Select the physician in the **Physician List**.

Physician Details are displayed beside the **Physician List**.

b Change the **Physician Details**.

NOTE
If you change the name of the physician, settings that were associated with the previous name are removed. This includes, for example, predefined APC sequences. You should reconfigure or reselect these settings for the physician's new name.

4 To add a new physician do the following:

a Click **New**.

A new physician is added to the **Physician List** with the name **New Physician**.

b Select the new physician in the **Physician List**.

c Change the **Physician Details** to display the correct name.

d If desired, you can hide the physician on the system by clearing the check box beside the physician's name in the **Physician List**.

NOTE
When a physician is added, they are visible on the system by default.

5 To delete a physician, click **Delete** and confirm that you want to delete the physician.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

8 To close the **System Customization** window, click **Close**.

13.6 Managing Presets from the Control Room

If the FlexSpot, second FlexSpot, or FlexVision option is installed on your system, you can edit, create, and delete preset screen layouts for these options. Using these presets, you can define your preferred screen layout to assist you during a study.

For information about managing presets in the examination room, see Managing FlexVision Presets Using the Touch Screen Module (page 247).

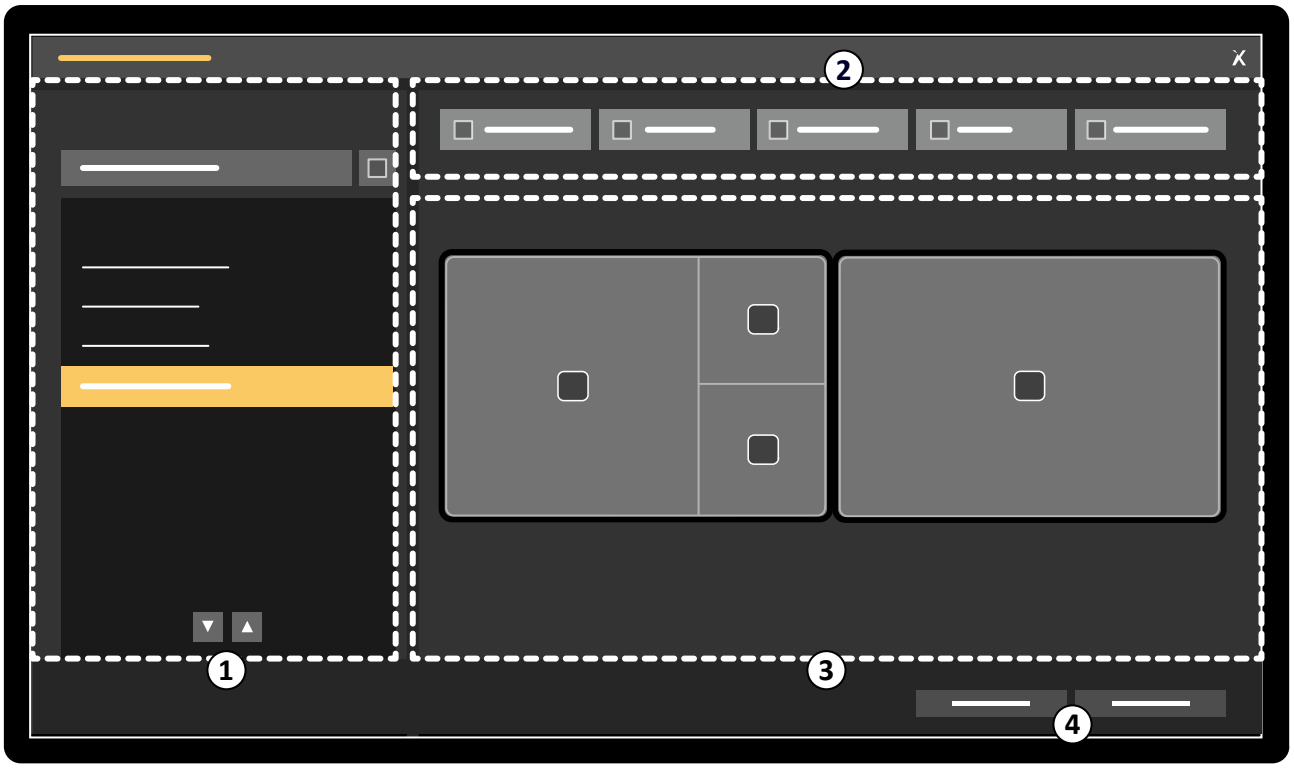


Figure 155 Dialog box for managing presets

Legend			
1	**Presets Group** list	3	Current preset
2	Toolbar	4	Function buttons

1 To manage FlexSpot presets, click **FlexSpot** on the FlexSpot primary monitor and select **Manage FlexSpot Presets**.

The **FlexSpot Presets Manager** is displayed.

You can perform this step on the FlexSpot and second FlexSpot, if available.

2 To manage FlexVision presets, do the following:
- On the review monitor, click **System** and select **Manage FlexVision Presets**.
- If the FlexSpot option is installed, click **FlexSpot** on the FlexSpot primary monitor and select **Manage FlexVision Presets**.

The **FlexVision Presets Manager** is displayed.

3 Perform one of the following procedures:
- Creating a New Preset (page 244)
- Editing a Preset (page 245)
- Copying or Moving a Preset (page 245)
- Deleting a Preset (page 245)
- Managing Preset Groups (page 245)

4 To use the selected preset on the system now, click **Activate**.

The selected preset is displayed on the system monitors.

5 Click **Close** to close the dialog box.

13.6.1 Creating a New Preset

You can create new presets to suit your workflow.

1 Select the desired preset group in the **Presets Group** list.

2 Click **New**.

The **New Preset** dialog box is displayed.

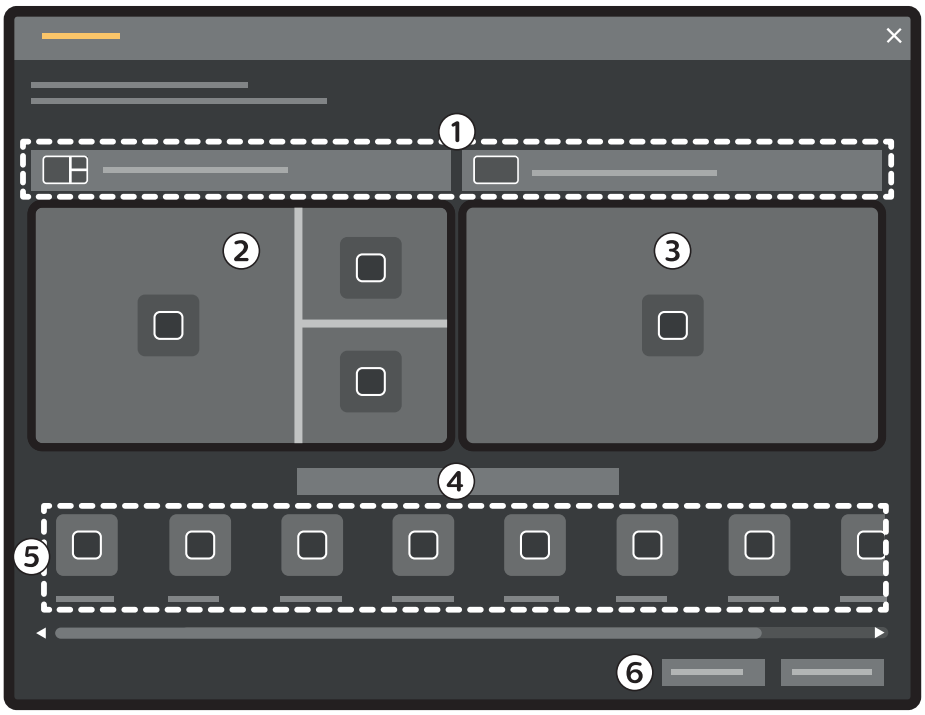


Figure 156 New Preset dialog box

Legend			
1	Layout selection lists	4	Preset name
2	Preset thumbnail for the acquisition window	5	Available applications
3	Preset thumbnail for the review window	6	**Save** button

Your monitor configuration is depicted in the dialog box as thumbnail images. For FlexVision, only one monitor is shown.

3 For each monitor depicted, select the desired layout using the lists above each monitor thumbnail image.

Available screen layouts show how windows are arranged. You can assign applications to specific windows in a later step. The layouts also indicate the location of the status area. For standard layouts, the default position of the status area is on the left side. For layouts that contain two high-definition (HD) viewports, the status area can be positioned at the top or bottom. You can change this in a later step.

4 Enter a name for your preset in the box below the preset thumbnails.

5 Drag the applications you want to be displayed in your preset, from the application list to the desired positions on the monitors.

6 To save your preset, click **Save**.

Your preset is saved within the selected preset group.

7 To close the dialog box without saving your preset, click **Cancel**.

13.6.2 Editing a Preset

You can edit existing presets to better suit your workflow.

1 Select the preset group containing the preset that you want to edit.

2 In the list, select the preset that you want to edit.

3 Click **Edit**.

A dialog box is displayed.

4 Edit the preset as desired.

5 To save your changes, click **Save**.

6 To close the dialog box without saving your changes, click **Cancel**.

13.6.3 Copying or Moving a Preset

You can create a copy of a preset and save the copy to a different preset group, or you can move a preset to a different preset group, removing it from the original group.

1 Select the preset group containing the preset that you want to copy or move.

2 In the list, select the preset that you want to copy or move.

3 Do one of the following:
- To copy the preset, click **Copy To**.
- To move the preset, click **Move To**. The preset will be removed from the original preset group.

4 In the dialog box, select the preset group that you want to copy or move the preset to.

5 Click **OK**.

13.6.4 Deleting a Preset

You can delete presets if they are no longer needed.

1 Select the preset group containing the preset that you want to delete.

2 In the list, select the preset that you want to delete.

3 Click **Delete**.

13.6.5 Managing Preset Groups

You can create, rename, reorder, and delete preset groups from the control room.

Presets are organized into groups, allowing you to choose which group to add a preset to.

For information about managing preset groups in the examination room, see Managing FlexVision Preset Groups Using the Touch Screen Module (page 250).

Figure 157 Dialog box for managing preset groups

Legend	
1	Function buttons
2	Preset groups list

1 Click **Manage Preset Groups**.

The **Manage Preset Groups** dialog box is displayed.

2 To create a new presets group, do the following:

a Click **New**.

A dialog box is displayed.

b Enter a name for the new group.

c To save the new group, click **OK**.

d To close the dialog box without saving the new group, click **Cancel**.

3 To rename a preset group, do the following:

a Select the desired group in the list.

b Click **Rename**.

A dialog box is displayed.

c Enter a new name for the group.

d To save the new group name, click **OK**.

e To close the dialog box without saving the new group name, click **Cancel**.

4 To delete a preset group, do the following:

a Select the desired group in the list.

b Click **Delete**.

A confirmation message is displayed.

c To delete the group, click **OK**.

d To close the confirmation message without deleting the group, click **Cancel**.

5 To reorder the preset groups in the list, do the following:

a Select the preset you want to move.

b Click the arrows to move the preset up and down within the list.

6 To restore the factory default preset groups, click **Restore factory default presets**.

7 Click **Close** to close the dialog box.

13.7 Managing FlexVision Presets Using the Touch Screen Module

Presets are predefined screen layouts for the FlexVision option. Default presets are provided, or you can define your own presets to suit your workflow.

The following procedures provide guidance for managing presets using the touch screen module. For information about managing presets from the control room, see Managing Presets from the Control Room (page 243).

NOTE
These functions are not available if the FlexVision option is not installed.

1 To display the **Manage Presets** window, do the following:

a On the touch screen module, tap the application selector.

b Tap **FlexVision**.

c Tap **Manage Presets**.

The **Manage Presets** window provides functions for creating, editing, deleting, and organizing presets and preset groups.

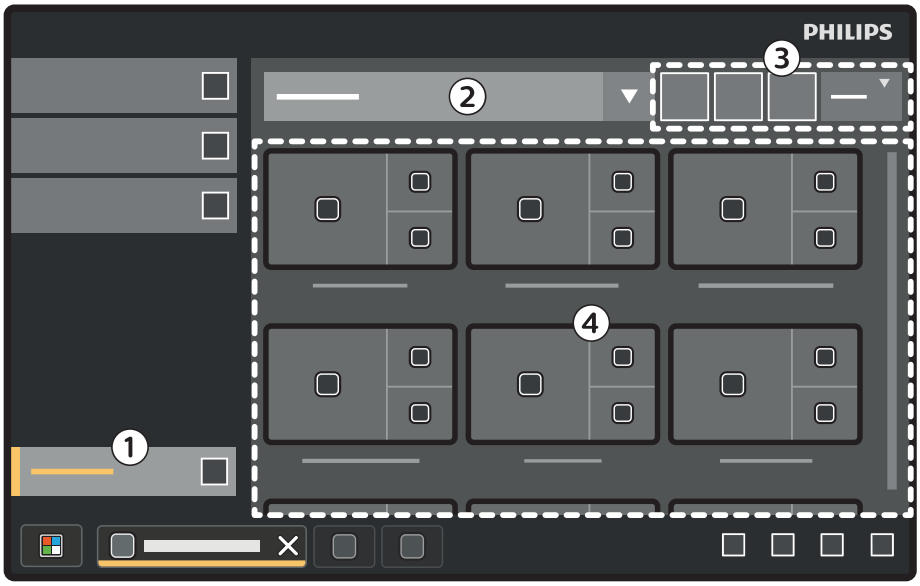


Figure 158 Manage Presets window

Legend			
1	**Manage Presets** button	3	Function buttons
2	Preset groups list	4	Available presets

Each preset is depicted with a thumbnail image showing its screen layout and assigned applications.

2 Perform one of the following tasks:
- Create a new preset.
- Edit or delete a preset.
- Copy or move a preset.
- Change the display order of presets.
- Manage preset groups.

These tasks are described in the following sections.

13.7.1 Creating a New Preset (Using the Touch Screen Module)

You can create new presets to suit your workflow.

NOTE
When you create a new preset, the system automatically includes applications that are mandatory for the current situation in the examination room. You cannot remove mandatory applications from the preset, but to prevent applications from being defined as mandatory, arrange the situation in the examination room accordingly. For example, to create a preset that does not include the live lateral application as a mandatory, park the lateral stand or disable X-ray before creating the preset.

1 Tap **New** in the **Manage Presets** window.

The **New Preset** dialog box is displayed. On-screen guidance is provided for creating a new preset.

2 **Step 1/4**: Select a screen layout and tap **Next**.

Available screen layouts show how windows are arranged. You can assign applications to specific windows in a later step. The layouts also indicate the location of the status area. For standard layouts, the default position of the status area is on the left side. For layouts that contain two high-definition (HD) viewports, the status area can be positioned at the top or bottom. You can change this in a later step.

3 **Step 2/4**: Select the applications that you want to include in the preset and tap **Next**.

As you select applications, the system indicates how many empty windows remain.

4 **Step 3/4**: Do the following to configure the preset:

a If desired, rearrange the applications in the layout.

Initially, the system arranges the applications automatically. You can rearrange applications by dragging them.

b If desired, reposition the status area by tapping one of the four indicators on the right side of the window.

c Tap **Next** when the preset is configured as desired.

5 **Step 4/4**: To save the new preset, do the following:

a Select a preset group from the list.

b Enter a name for the preset.

c Tap **Complete**.

13.7.2 Editing a Preset (Using the Touch Screen Module)

You can edit existing presets to better suit your workflow.

1 In the preset group list in the **Manage Presets** window, select the group that contains the preset that you want to edit.

2 Select the preset that you want to edit.

3 Tap **Edit**.

The **Edit Preset** dialog box is displayed. On-screen guidance is provided steps for editing the preset.

NOTE
The Edit Preset dialog box provides the same steps as the New Preset dialog box. The settings that are already saved for the preset are displayed in each page of the dialog box, allowing you to make changes, if desired.

4 **Step 1/4**: If desired, select a different screen layout and tap **Next**.

5 **Step 2/4**: Select the applications that you want to include in the preset and tap **Next**.

6 **Step 3/4**: Configure the preset as desired and tap **Next**.

You can rearrange the applications or reposition the status area.

7 **Step 4/4**: If desired, select a different presets group or enter a new name for the preset, and then tap **Complete**.

13.7.3 Copying or Moving a Preset (Using the Touch Screen Module)

You can create a copy of a preset and save the copy to a different preset group, or you can move a preset to a different preset group, removing it from the original group.

1 In the preset group list in the **Manage Presets** window, select the group that contains the preset that you want to copy or move.

2 Select the preset that you want to copy or move.

3 Tap **More** and do one of the following:

- To copy the preset, tap **Copy To**.

- To move the preset, tap **Move To**. The preset will be removed from the original preset group.

4 In the dialog box, select the preset group that you want to copy or move the preset to.

5 Tap **OK**.

13.7.4 Changing the Order of Presets (Using the Touch Screen Module)

You can change the display order of presets, for example, to make commonly used presets easier to select.

1 In the **Manage Presets** window, tap **More**.

2 Tap **Change Order**.

3 Select the preset that you want to move.

4 Tap **Left** or **Right** to move the preset to the desired position in the list.

5 Tap **Save**.

13.7.5 Deleting a Preset (Using the Touch Screen Module)

You can delete presets if they are no longer needed.

1 In the preset group list in the **Manage Presets** window, select the group that contains the preset that you want to delete.

2 Select the preset that you want to delete.

3 Tap **Delete**.

13.7.6 Managing FlexVision Preset Groups Using the Touch Screen Module

You can create, rename and delete preset groups for FlexVision using the touch screen module.

Preset groups allow you to group presets to make them easier to find or to group related presets together.

For information about managing preset groups from the control room, see Managing Preset Groups (page 245).

1 On the touch screen module, tap the application selector.

2 Tap **FlexVision**.

3 Tap **Manage Presets**.

4 Tap **More** and select **Manage Groups**.

5 To create a new preset group, do the following:

a Tap **New**.

A new preset group is added to the list of available preset groups with the name **My Preset Group**.

b Select the new preset group in the list and perform step 6 to rename the preset group.

6 To rename a preset group, do the following:

a Select desired preset group in the list.

b Tap **More** and select **Rename**.

The keyboard on the touch screen module is enabled.

c Edit the preset group name using the keyboard on the touch screen module.

d To exit without renaming the preset group, tap **Cancel**.

e To rename the preset group, tap **Save**.

7 To delete a preset group, do the following:

NOTE
Deleting a preset group will delete all presets contained in the preset group.

a Select desired preset group in the list.

b Tap **More** and select **Delete**.

A confirmation dialogue box is displayed.

c To close the dialog box without deleting the preset group, tap **Cancel**.

d To delete the preset group, tap **Delete**.

The preset group is deleted, including all presets contained within it.

8 To restore the factory default preset groups, do the following:

NOTE
Restoring the factory default preset groups will overwrite all existing presets and preset groups, including customized presets and preset groups.

a Tap **More** and select **Restore Defaults**.

A confirmation dialogue box is displayed.

b To close the dialog box without restoring the factory default preset groups, tap **Cancel**.

c To restore the factory default preset groups, tap **Delete**.

The factory default preset groups and presets are restored. Customized presets and preset groups are deleted.

13.8 Customizing APC Projections

You can change, rename, copy, delete, and add new projections for use with the automatic position control function.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **APC Predefined**.

The **APC Predefined** dialog box contains the following tabs:
- **Projections** tab: allows you to customize APC projections (described in this procedure).
- **X-ray Protocols** tab: allows you to customize APC settings for each X-ray protocol. For more information, see Customizing APC Sequences for X-ray Protocols (page 253).

3 Select the **Projections** tab.

If you are using a biplane system, the **Projections** tab allows you to select between **Monoplane** or **Biplane** projections. You can use **Monoplane** projections on a biplane system, in which case, only the projection information for the frontal channel is stored.

4 To rename an existing APC projection, do the following:

a Select the APC projection in the **Projection Name** list.

The **Projection Details** are displayed.

b Enter a new name in the **Projection Name** field.

For a biplane projection, there are two **Projection Name** fields; one for the frontal channel and one for the lateral channel.

The **Projection Name** list is automatically updated.

5 To change the settings of a monoplane projection, do the following:

a Select the monoplane APC projection in the **Projection Name** list.

The **Projection Details** are displayed.

b Set the **Rotation** angle for the frontal stand using the slider or by entering a number in the box.

NOTE
The labels used to indicate Rotation and Angulation depend on the setting that is configured for Rotation/Angulation Display Flavor.

c Set the **Angulation** angle using the slider or by entering a number in the box.

d Set the **SID** using the slider or by entering a number in the box.

e Select the **Detector Orientation** from the drop-down list.

6 To change the settings of a biplane projection, do the following:

a Select the biplane APC projection in the **Projection Name** list.

The **Projection Details** are displayed.

b In the **Frontal** section, configure the following settings:

- Set the **Rotation** angle using the slider or by entering a number in the box.

  NOTE
  The labels used to indicate Rotation and Angulation depend on the setting that is configured for Rotation/Angulation Display Flavor. This also applies to the angles in the Lateral section.

- Set the **Angulation** angle using the slider or by entering a number in the box.

- Set the **SID** using the slider or by entering a number in the box.
- Select the **Detector Orientation** from the drop-down list.

c In the **Lateral** section, configure the following settings:

- Set the **Rotation** angle using the slider or by entering a number in the box.
- Set the **Angulation** angle using the slider or by entering a number in the box.
- Set the **SID** using the slider or by entering a number in the box.

7 To add a new projection, do the following:

a Click **New** below the **Projection Name** list.

A new projection is added to the list with the name *New projection*.

b Select the new projection in the **Projection Name** list.

c Enter a new **Projection Name**.

d Configure the projection settings as described above.

8 To copy a projection, do the following:

a Select the desired projection in the **Projection Name** list.

b Click **Copy** below the **Projection Name** list.

A new projection is added to the list and is identified as a copy.

NOTE
On a FlexArm system, the default projections cannot be copied.

c Select the copied projection in the **Projection Name** list.

d Enter a new **Projection Name**.

e Configure the projection settings as described above.

9 To delete a projection, do the following:

a Select the desired projection in the **Projection Name** list.

b Click **Delete** below the **Projection Name** list.

NOTE
On a FlexArm system, the default projections cannot be deleted.

c Confirm that you want to delete the projection.

10 To undo any changes you have made, click **Undo Changes**.

11 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

12 To close the **System Customization** window, click **Close**.

13.9 Customizing APC Sequences for X-ray Protocols

You can change, rename, copy, delete, and add new automatic position control sequences associated with each X-ray protocol.

Each X-ray protocol is associated with a customized APC sequence. A sequence defines available APC projections and their order, and the physicians who can access the sequence.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **APC Predefined**.

The **APC Predefined** dialog box contains the following tabs:
- **Projections** tab: allows you to manage APC projections. For more information, see Customizing APC Projections (page 252).
- **X-ray Protocols** tab: allows you to manage the APC sequence associated with each X-ray protocol (described in this procedure).

3 Select the **X-ray Protocols** tab.

4 Select the desired X-ray protocol in the list on the left side.

The list displays X-ray applications, with appropriate X-ray protocols listed within each X-ray application. You can expand each X-ray application to view and select an X-ray protocol.

5 Select the **Sequence** that you want to customize in the drop-down list on the right side.

6 To change the name of the sequence, enter a new name in the **Name** box in the **Sequence Details** area.

The **Default** sequence cannot be renamed.

7 In the **Assigned Physicians** box, select the physicians for whom you want to make the sequence available.

The following rules apply when assigning physicians to a sequence:
- At least one physician must be assigned to a sequence.
- A physician can only be assigned to one sequence.
- When you assign a physician to a sequence, the physician is automatically removed from the sequence that they were previously assigned to, if applicable.
- If automatic removal of a physician from a sequence causes that sequence to no longer have any physicians assigned to it, the sequence is automatically deleted.

User messages provide on-screen guidance when potential error situations are encountered.

8 In the **Projections** box, select the projections to be included in the sequence.

You can select up to 20 projections.

NOTE
Before you can assign an APC projection to the APC sequence, it must exist in the list of available projections.

9 In the **Projections Order** box, do the following to define the order in which the projections appear:

a Select the projection that you want to reorder.

b Use the up or down arrows below the **Projections Order** box to move the projection up or down in the list.

10 To add a new sequence, do the following:

a Select **New** next to the **Sequence** drop-down list.

A new sequence is added to the list with the name *New sequence*.

b Enter a new **Name**.

c Customize the sequence as described above.

11 To copy a sequence, do the following:

a Select the desired sequence in the **Sequence** drop-down list.

b Select **Copy** next to the **Sequence** drop-down list.

A new sequence is created.

c Customize the sequence as described above.

12 To delete a sequence, do the following:

a Select the desired sequence in the **Sequence** drop-down list.

b Select **Copy** next to the **Sequence** drop-down list.

c Confirm that you want to delete the sequence.

13 To undo any changes you have made, click **Undo Changes**.

14 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

15 To close the **System Customization** window, click **Close**.

13.10 Changing Viewing Preferences

You can change some viewing settings to suit the way you use the system.

The viewing settings you can change are:
- The X-ray image displayed when you open a series.
- The way that navigation and replay is managed between series.
- Maximum series and study replay times.
- The way that angles are displayed on the system.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **Viewing and Processing**.

3 To change the default image displayed when you open a series, select an option in the **Default Active X-ray Image** list.

The following options are available:
- **First image**: displays the first image in the series.
- **Middle image**: displays the middle image in the series.

The default selection is **Middle image**.

4 To change the way that navigation works when you reach the beginning or end of a study, select an option in the **Image Navigation Model** list.

The following options are available:
- **Navigate images in all series**: image navigation does not stop at the end of the current series, but continues to the next available series for in the selected study.
- **Stop at the beginning and at the end of the series**: image navigation stops at the beginning or end of the current series.
- **Step through the images in a loop**: image navigation of the current series continues until stopped.

5 To specify a maximum length of time for series image replay, enter a value in seconds for **Replay Time Out**.

6 To specify a maximum length of time for study image replay, enter a value in seconds for **Study Cycle Replay Time Out**.

7 To change the way that angles are displayed on the system, select the angle flavor in the **Rotation/ Angulation Display Flavor** list.

The following options are available:
- **Cardio (LAO/RAO, CRAN/CAUD)**
- **Vascular (Rot, Ang)**

8 To specify which reference window the dual fluoroscopy image is sent to when **Dual Fluoro** is turned on, select a window in the **Dual Fluoro Output** list.

9 To set the default filter that is used when reviewing series, select an option in the **Default Review Series Filter** list.

The following options are available:
- **Acquired Images**
- **Photo Images**
- **All Images**
- **Flagged Images**

10 To specify which items are displayed by default in the image information overlay, select or clear check boxes in the **Default Image Information** settings.

11 To undo any changes you have made, click **Undo Changes**.

12 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

13 To close the **System Customization** window, click **Close**.

13.11 Changing Display Preferences

To ensure the correct mouse movements between screens, you can select the control monitor configuration you are using.

You can also specify a waiting time for screen saver activation.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **Viewing and Processing**.

3 To ensure the correct mouse movements between the acquisition and review windows, select the configuration you are using in the **Displays and Mouse Control** settings.

4 To change the waiting time before the screen saver is activated, select a suitable time in the **Screen Saver Wait Time** list.

5 To immediately activate the screen saver, click **Activate Screen Saver**.

Moving the mouse or pressing any key on the keyboard will deactivate the screen saver.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

8 To close the **System Customization** window, click **Close**.

13.12 Customizing Predefined Annotations

Some annotations are predefined but you can customize them.

When customizing predefined annotations, you can change the text, the color and the size for each annotation.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **Annotations**.

A list of predefined annotations is displayed, with details for the selected annotation shown in the **Annotation Details**.

3 To create a new annotation, do the following:

a Click **New**.

A new annotation is added to the list with the text **New annotation**.

b Select the new annotation in the list and edit the annotation (step 6).

4 To copy an existing annotation, do the following:

a Click **Copy**.

A new annotation is added to the list and is marked as a copy of the original annotation.

b Select the copied annotation in the list and edit the annotation (step 6).

5 To edit an existing annotation, do the following:

You can see a preview of the annotation in the **Annotation Details**.

a Select the desired annotation in the **Annotations** list.

b To change the text of the annotation, enter new text in the **Annotation Details**.

c To change the size of the annotation, select a size.

d To change the default color of the annotation, click on a color to select it.

6 To delete an annotation, do the following:

a Select the desired annotation in the **Annotations** list.

b Click **Delete**.

A confirmation dialog box is displayed.

c To cancel without deleting the annotation, click **Cancel**.

d To delete the annotation, click **OK**.

7 To undo any changes you have made, click **Undo Changes**.

8 To save your changes, click **Save**.

9 To close the **System Customization** window, click **Close**.

13.13 Changing Print Settings

You can change the default printer settings and the information shown on printed pages.

When printing an image, you can show or hide additional information on the page.

- Patient details
- Study description

- Physician
- Hospital name

You can also specify which default printer and media types to use.

NOTE
When handling personal data, do so in accordance with the privacy policies that apply in your healthcare environment and privacy laws that apply in your region.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **Print Application** settings group, click **Print**.

3 Select the desired information in the **Page Header and Footer Information** by selecting or clearing the desired check boxes.

4 Set each of the **Print Preferences** as desired.

NOTE
If you select Optimize for biplane image printing, frontal and lateral images are printed side by side unless you change the page layout to 1x1 or a single column.

5 To undo any changes you have made, click **Undo Changes**.

6 To save your changes, click **Save**.

7 To close the **System Customization** window, click **Close**.

14 System Administration

With a system administrator account, you can customize many aspects of the system's functionality to suit the way the system is used in your hospital. To change these settings you must have a system administrator user account.

NOTE
Before you make changes to system customization settings, you should consider exporting the existing settings so you can import them later if you need to. For more information, see Exporting Settings (page 285).

14.1 Changing Regional Settings

You can change the language used in the system, and the way measurements, numbers, and timings are displayed, to suit your local preferences.

The system user interface supports several languages and you can change the language in use. The Instructions for Use within the system can also be viewed in different languages.

NOTE
You can view the Instructions for Use in a different language than that used for the user interface since the Instructions for Use are available in a larger number of languages than the user interface supports.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Regional Settings** .

3 To change the system user interface language, select the desired **Language**.

4 To change the language you use to provide inputs and the associated keyboard layout, select the desired **Input Language and Keyboard**.

5 To change the Instructions for Use language, select the desired **Instructions for Use Language**.

6 Select the desired **Decimal Symbol** to use from the drop-down list.

7 Select the **Digit Grouping Symbol** to use from the drop-down list.

8 Select the **Measurement System** to use from the drop-down list.

9 Select the format used to display fluoroscopy timings from the **Fluoro Time Display Format** drop-down list.

10 Select the unit used to display detector size from the **Detector Size Display Unit** drop-down list.

11 Select the unit used to display dose area product (DAP) from the **Dose Area Product (DAP) Unit** drop-down list.

The selected unit is used to display all DAP values, including cumulative DAP and total DAP values.

12 To undo any changes you have made, click **Undo Changes**.

13 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup. If you changed the Language setting, the system must be shut down and restarted twice for the change to take effect.

14 To close the **System Customization** window, click **Close**.

14.2 Configuring Audit Trail Settings

You can configure the settings used in the system to produce audit logs.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Audit Trail**.

3 To enable the **Local Audit Trail**, select **Enabled**.

4 To enable the **Remote Audit Trail**, select **Enabled** and configure the following repository settings.

   a Enter the **Host Name or IP Address** of the central audit repository.

   b Click the **Network Protocol** box and select a protocol for communication with the central audit repository.

   c Enter the **Port Number** for communication with the central audit repository.

   d To enable secure communication, select **Use Authentication**.

   e To enable the use of encryption, select **Use Encryption**.

   This option is only available if **Use Authentication** is selected.

   f If **Use Authentication** is selected, click the **Certificate** box and select a local certificate to use for authentication.

5 Click **Test Connection**.

The result of the test is indicated by an icon.

	Test successful
	Test failed

If the test fails, more information is provided.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

NOTE
The changes take effect after the next system shutdown and startup.

8 To close the **System Customization** window, click **Close**.

14.3 Managing Users and System Logon

You can manage user accounts and allow emergency access, or configure the system to log on automatically when started.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **System Logon**.

3 To enable automatic logon when the system starts, select the **System automatic logon** check box and select the **Automatic logon User Name** to be used from the drop-down list.

4 To enable emergency system access, select the **Allow emergency system access** check box.

5 To change password policy, do one or all of the following:
- Enter the **Maximum password age** (days).
- Enter the **Minimum password length** (characters).
- Enable or disable **Password complexity**.

6 To change a user account's details, select the user account in the **User Accounts** list and change the user account's details in the **Details** area.

7 To undo any changes you have made, click **Undo Changes**.

8 To save your changes, click **Save**.

9 To close the **System Customization** window, click **Close**.

14.3.1 Adding and Deleting Users

A system administrator can create, change, or delete user accounts.

You add and delete users in the **System Logon** dialog box.

1 In the **System Logon** dialog panel, click **New**.

A new user is displayed in the list with the name **New User**.

2 Select the new user in the **User Accounts** list.

3 Enter a **User Name** in the **Details** section.

NOTE
You cannot change the user name after saving the new user's details.

4 Enter the user's **Full Name** and a **Description** if desired.

5 Select the appropriate **User Group**.

The **User Group** selected sets the level of access that the user has within the system. Users are normally grouped as clinical users or system administrators.

6 Click **Save** to save the new user's details.

7 To delete a user, select the user in the list, click **Delete** and then confirm that you want to delete the user account.

14.3.2 Resetting a User's Password

As a system administrator, you can reset a user's password.

You can reset a user's password in the **System Logon** dialog panel. For information about changing your own password, see Changing Your Password (page 240).

1 Select the user in the **User Accounts** list.

The user's details are displayed in the **Details** section.

2 Click **Reset Password**.

A dialog box is displayed.

3 Enter a **New Password**.

You must follow these rules when setting a password:
- The password field cannot be empty.
- Passwords cannot contain user names.
- Passwords must conform to the password policy settings.
- If password complexity is enabled, passwords must contain characters from three of the following categories:

- Uppercase letters
- Lower case letters
- Numbers (0 through 9)
- Non-alphabetic characters (for example: ! $ # %)

For more information about password policy settings, see Managing Users and System Logon (page 260).

4 Enter the same password in **Confirm Password**.

NOTE
The password entered in Confirm Password must match the password entered in New Password.

5 Do one of the following:

a To close the dialog box without resetting the user's password, click **Cancel**.

b To close the dialog box and reset the user's password, click **Apply**.

14.4 Changing General Workflow Settings

You can customize general workflow settings, including patient type settings.

NOTE
For the shutters to be visible in the clinical image, the system requires special configuration. For more information, contact technical support. If the system is configured appropriately, all shutters are visible in the PA position (0 degrees rotation, 0 degrees angulation) for the frontal channel and at 70 degrees rotation, 0 degrees angulation for the lateral channel. For other orientations, shutter visibility may vary due to sagging of the stand.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Workflow**.

3 To protect every study upon completion, select **Prevent Automatic Study Deletion**.

You can allow an individual study to be deleted by manually removing the protection for that study. Unprotected studies are automatically deleted to make space for new images if the local storage is full. For more information, see Protecting and Unprotecting Studies (page 153).

4 To enable support for Chinese, Japanese, and Korean characters in DICOM patient names, select **Show Chinese, Japanese and Korean (CJK) ideographic characters**.

5 To make the system compliant with requirements from the United States Department of Veterans Affairs (VA), select **US Veterans Affairs compliant system**.

6 To configure the system to automatically start procedures that have been provided from Xper Information Management, select **Allow for procedure start from Xper IM**.

7 To automatically mark procedures as completed when closed, select **Simplified DICOM Workflow**.

8 To enable creation of a dose report when a procedure is closed, do the following:

a Select the **Automatic Dose Report (SC)** check box.

b Click the arrow in the **Type of Report** box and select the type of report that you want to produce.

9 To group photo images when they are exported to PACS, select **Group photo images into a single series**.

a If you are using a biplane system, click the arrow in the **Grouping Option** box and select the grouping method.

For a biplane system, you can group all photo images in one series or use separate series for frontal images and lateral images. Snapshots, reference images, and the dose report are grouped with the frontal photo images.

10 Click the arrow in the **DICOM Modality Type for all Secondary Captured (SC) Images** box and select a DICOM modality type for secondary captures.

11 To configure patient type settings, do the following:

a Select the **Default** patient type.

b For pediatric patient types, set the age limit in the **Age/Circumference limit** box that defines these patient types on the system.

The relevant unit is indicated to the right of the **Age/Circumference limit** box.

c For adult patient types, set the circumference size limit in the **Age/Circumference limit** box that defines these patient types on the system.

The relevant unit is indicated to the right of the **Age/Circumference limit** box.

12 To undo any changes you have made, click **Undo Changes**.

13 To save your changes, click **Save**.

14 To close the **System Customization** window, click **Close**.

14.5 Enabling and Disabling Storage Device Export and Import

Export of data to storage devices (USB flash memory drive or CD/DVD) is enabled by default. You can disable this function if needed.

You can also change the default setting for anonymizing patient data for export to a USB flash memory drive or to CD/DVD.

You can also include a DICOM viewing application on the storage device with the patient data.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Workflow**.

3 To disable **Storage Device Export and Import**, select **Disabled**.

4 To automatically include a DICOM viewing application with exported patient data, select **Include DICOM Viewer**.

5 To anonymize patient data exported to a USB flash memory drive, select **Default De-Identify Upon USB Export**.

6 To anonymize patient data exported to CD/DVD, select **Default De-Identify Upon CD/DVD Export**.

7 To undo any changes you have made, click **Undo Changes**.

8 To save your changes, click **Save**.

9 To close the **System Customization** window, click **Close**.

14.6 Mapping RIS Codes to ProcedureCards

You can map the codes used in the hospital's Radiology Information System (RIS) to ProcedureCards on the system.

When you import a patient's details from a radiology information system, mapping allows you to apply the correct ProcedureCard in the Azurion system for the intended clinical procedure.

The system collects a list of all RIS codes used in scheduled procedures, or you can enter new codes manually.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **RIS Code Mapping**.

A list of RIS codes is displayed, showing the ProcedureCard that each one is mapped to. The DICOM attribute that is used for the RIS code mapping is displayed above the list.

If a RIS code is not mapped to a ProcedureCard, a warning symbol is displayed.

You can sort each column in ascending or descending order by clicking the RIS Code or Mapped ProcedureCard column heading.

3 To use an alternative DICOM attribute for the RIS code mapping, click the arrow in the **DICOM Mapping Attribute** box and select an attribute.

4 To add a new RIS code, do the following:

a Click **New**.

A new RIS code called **New RIS Code** is added to the list.

b Select the new RIS code and enter the correct RIS code in the **RIS Code Details** box.

c Click **Save** to save the new RIS code.

5 Select the RIS code to be mapped.

The RIS code details are displayed.

6 Select the ProcedureCard group from the **Cards Group** drop-down list.

The ProcedureCards relating to the selected group are displayed.

7 Select the ProcedureCard you want to map to the RIS code.

8 To undo any changes you have made, click **Undo Changes**.

9 To save your changes, click **Save**.

10 To close the **System Customization** window, click **Close**.

14.7 DICOM Settings

You can customize the system's DICOM settings.

DICOM Settings are available in **General** settings group for the following items:
- Local system
- Worklist and MPPS
- Remote systems
- DICOM Printers

14.7.1 Configuring Local Settings

You can configure DICOM settings for the local system and enable the use of secure communication.

You can configure these local DICOM settings using the **DICOM Settings** menu.

The following items are read-only and cannot be changed:
- IP address
- Default gateway IP address

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **DICOM Settings**.

The **Local System** tab is displayed by default.

3 To change the Application Entity Title, enter a new title in the **AE Title** field.

4 To change the port number in use, enter a new port number in the **Port Number** field.

5 To configure secure communication, click **Advanced Settings** and continue with the task in Configuring Secure Communication on the Local System (page 265).

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

8 To close the **System Customization** window, click **Close**.

Configuring Secure Communication on the Local System

You can configure secure communication and manage certificates from trusted certification authorities.

You can import and delete certificates, and choose which local system certificate to use for secure communications.

1 If the **Local System** tab is not already displayed, do the following:

a On the **System** menu, click **Customization** to display the **System Customization** window.

b In the **General** settings group, click **DICOM Settings**.

2 Click **Advanced Settings**.

The **Advanced DICOM Settings** dialog box is displayed.

3 To enable secure communication, select **Use Authentication**.

4 To enable the use of encryption, select **Use Encryption**.

This option is only available if **Use Authentication** is selected.

NOTE
For correct implementation of secure communication between the local system and remote systems, ensure that the secure communication settings are configured in the same way on the local system and the remote systems. If the settings do not match, import and export jobs between the local system and a remote system may fail.

5 To change the certificate used for secure communications:

a Select the certificate to be used, in the **Local System Certificates** list.

If a certificate has expired, a warning is displayed for the certificate in the list. You cannot use an expired certificate.

b Click **Use in Secure Communication**.

6 To import a certificate:

a Click **Import** in the **Local System Certificates** list or in the **Trusted Certification Authorities Certificates** list.

The Import Certificate dialog panel is displayed.

b Select the certificate file to be imported.

c Click **Cancel** to close the dialog panel without importing a certificate.

d Click **Import** to import the selected certificate.

7 To delete a certificate:

a Select the certificate to be deleted.

b Click **Delete**.

c Confirm that you want to delete the certificate.

8 To undo any changes you have made, click **Undo Changes**.

9 To save your changes, click **Save**.

10 To close the **Advanced DICOM Settings** dialog box, click **Close**.

11 To close the **System Customization** window, click **Close**.

14.7.2 Configuring Worklist Management and the Modality Performed Procedure Step (MPPS) Manager

You can enable or disable worklist management and the MPPS manager.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **DICOM Settings**.

The **Local System** tab is displayed by default.

3 Select the **WLM/MPPS** tab.

4 To enable worklist management, select **Enabled** in the **Worklist Management** section.

5 To enable the MPPS manager, select **Enabled** in the **Modality Performed Procedure Step Manager** section.

6 Enter the following mandatory information for worklist management and for the MPPS manager:

- **AE Title**
- **Host Name or IP Address**
- **Port Number**

7 Select the time period to be used for automatic querying of scheduled procedures.

8 To enable secure communication, select **Use Authentication**.

9 To enable the use of encryption, select **Use Encryption**.

This option is only available if **Use Authentication** is selected.

10 Click **Test Connection**.

The result of the test is indicated by an icon.

	Test successful
	Test failed

If the test fails, more information is provided.

11 To disable worklist management, select **Disabled** in the **Worklist Management** section.

12 To disable the MPPS manager, select **Disabled** in the **Modality Performed Procedure Step Manager** section.

13 To undo any changes you have made, click **Undo Changes**.

14 To save your changes, click **Save**.

15 To close the **System Customization** window, click **Close**.

14.7.3 Configuring Remote Systems

You can configure the settings for other DICOM-compatible systems connected to the same hospital network as the Azurion system.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **DICOM Settings**.

3 Click the **Remote Systems** tab.

A list of remote systems is displayed (DICOM nodes).

4 To view the settings that are configured for an existing remote system, select a system in the list.

The **Remote System Settings** and **Services** settings are displayed, providing information about the selected remote system and the services it supports.

5 To add a new remote system, click **Add** below the list of remote systems.

A new remote system is added to the list. You can now configure the settings of the new system.

6 To configure a system's settings in the **Remote System Settings** section, select the system in the list and do the following:

a Enter the **Name** of the remote system.

b Click the **Template Type** box and select a template.

The template defines the services that available on the remote system. Available services are indicated with a selected check box in the **Services** section.

c To enable secure communication, select **Use Authentication**.

d To enable the use of encryption, select **Use Encryption**.

This option is only available if **Use Authentication** is selected.

NOTE
For correct implementation of secure communication between the local system and remote systems, ensure that the secure communication settings are configured in the same way on the local system and the remote systems. If the settings do not match, import and export jobs between the local system and a remote system may fail.

7 To configure the services of the selected remote system in the **Services** section, do the following:

a Select a service in the **Service** list.

b Configure the service's settings as desired

- **AE Title**
- **Host Name or IP Address**
- **Port Number**
- **DICOM Presentation State Support**
- **JPEG Compression**
- **Monitor Type**

8 To test the configuration of a remote system, click **Test Connection**.

The connection to the system is tested and the result is displayed in the remote systems list next to the system name.

a If a test fails, click **Status Details** to display more information about the test result.

9 To test all remote system connections, click **Test All** below the list of remote systems.

10 To remove a remote system, click **Remove** and confirm that you want to remove the system.

11 To undo any changes you have made, click **Undo Changes**.

12 To save your changes, click **Save**.

13 To close the **System Customization** window, click **Close**.

14.7.4 Configuring DICOM Printers

You can add, reconfigure, test, calibrate, and remove DICOM printers that are connected to the system's network.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **DICOM Settings**.

The **Local System** tab is displayed by default.

3 Select the **DICOM Printers** tab.

A list of DICOM printers is displayed.

The printer list can be sorted by clicking on the column headings to sort each column in ascending or descending order.

4 To reconfigure an existing printer, perform the following procedure:

a Select the desired printer in the list.

The settings for the selected printer are displayed in the **Printer Settings** section.

b Change the desired printer setting in the **Printer Settings** section.

5 To add a new printer, perform the following procedure:

a Click **Add**.

A new printer is added to the list.

b Select the new printer.

c Enter the **Printer Settings** for the new printer.

d To enable secure communication, select **Use Authentication**.

e To enable the use of encryption, select **Use Encryption**.

This option is only available if **Use Authentication** is selected.

f Click **Save** to save your changes.

6 To test an individual printer's connection, click **Test Connection**.

The connection to the printer is tested and the result is displayed in the printer list next to the printer name.

The result of the test is indicated by an icon.

	Test successful
	Test failed

7 To test all printer connections, click **Test All**.

8 To calibrate a printer, click **Printer Calibration**.

9 To remove a printer, click **Remove** and confirm that you want to remove the printer.

10 To undo any changes you have made, click **Undo Changes**.

11 To save your changes, click **Save**.

12 To close the **System Customization** window, click **Close**.

14.8 Configuring Export Protocols

You can configure how and when the system exports images by configuring the export protocols.

An export protocol specifies whether an export occurs automatically or manually, what format the images will be, and where they will be exported to.

You can edit, copy, or delete an existing export protocol, or create a new one.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Export Protocols**.

Currently configured export protocols are displayed in a list.

3 To change the default protocol:

a Select the desired protocol in the list.

b Click **Set as Default** below the export protocol list.

4 To add a new protocol, do one of the following:

- Click **New**.

- Select a protocol in the list and click **Copy**.

a Select the new protocol in the list.

b Edit the **Export Protocol Details**.

When editing or creating a protocol, you can configure the following options:

- Manual or automatic export
- Protocol name
- Default destination
- Image format and size

- When automatic exports occur
- What images are automatically exported

The following settings are recommended.

Settings	Options	Notes
Processing Format	**Processed** (recommended)	Default option. Image processing is applied to the image before export. If subtraction is used during the acquisition, you can optionally select either or both of the following: • Add the unsubtracted middle image to the series. • Add the mask image to the subtracted series.
	Unprocessed	The image is not processed. Processing parameters are described in private DICOM attributes (only IntelliSpace Portal can handle this correctly). Select **Unprocessed** only for export to IntelliSpace Portal or to a workstation where measurements are performed on image data (for example, quantitative analysis). If subtraction is used during the acquisition, you can optionally select to add the unsubtracted middle image to the series
Image Size	**Do Not Downscale** (recommended for vascular images)	Default option
	1024x1024	The resolution is limited to $1k^2$. This has no impact on cardio images.
	512x512	The resolution is limited to 512^2. The file size is reduced.
Image Quality	**Normal** 8 bits/pixel	The file size is reduced.
	High 12 bits/pixel (recommended)	The file size is twice as large as **Normal** image quality.

c Click **Save** to save the new protocol details.

5 To edit an existing protocol:

a Select the desired protocol in the list.

b Edit the **Export Protocol Details**.

NOTE
If the export protocol has no default destination specified, a warning symbol is displayed in the list.

c Click **Save** to save the new protocol details.

6 To delete a protocol:

a Select the desired protocol in the list.

b Click **Delete the selected export protocol**.

c Confirm that you want to delete the protocol.

7 To undo any changes you have made, click **Undo Changes**.

8 To save your changes, click **Save**.

9 To close the **System Customization** window, click **Close**.

14.9 Configuring Automatic Data Transfer

You can configure what types of images and data are exported automatically, and what format is used.

For each X-ray protocol, you can specify how you want the system to manage the automatic transfer of image data, by selecting the export protocols to use.

For non-X-ray image data (snapshots, analysis reports, and dose reports), you can select the destination for data based on the data type or the X-ray protocol used to acquire it.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Automatic Data Transfer**.

The **X-ray Image Data** tab is displayed by default.

3 Select the desired X-ray protocol.

4 Select the export protocol to use for each image type.

5 Set the non X-ray image preferences using the following procedure:

a Select the **Non X-ray Image Data** tab.

b Select the export protocol to use for each data type.

If configured in the **Workflow** settings, photo images are grouped for automatic data transfer.

6 To undo any changes you have made, click **Undo Changes**.

7 To save your changes, click **Save**.

8 To close the **System Customization** window, click **Close**.

14.10 Network Configuration

You can configure standard network settings on the system.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Network Configuration**.

In the **Network Configuration** panel, the current network status of the system is displayed in the **Network Adapter** section. You can **Disable** or **Enable** the network adapter as desired.

3 To set the IP address settings of the system, click the **IPv4 Settings** tab or the **IPv6 Settings** tab, depending on the networking protocol in use, and configure the IP address settings according to the requirements of your network.

NOTE
If you configure the system to use only IPv6, the functionality of the system may be limited.

If you are unsure of how to configure these settings, contact your network administrator.

4 Configure the **DNS Settings** according to the requirements of your network.

If you are unsure of how to configure these settings, contact your network administrator.

The network configuration of the system is displayed in the **Network Details** panel. If you have made changes to the network configuration, click **Refresh** to display the latest settings.

5 To undo any changes you have made, click **Undo Changes**.

6 To save your changes, click **Save**.

7 To close the **System Customization** window, click **Close**.

14.11 Enabling or Disabling Remote Support

You can enable remote support to allow technical support to monitor the system, or you can disable this service to prevent remote monitoring.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **General** settings group, click **Remote Support**.

3 To enable remote support, select **Enabled** in the **Remote Support** panel.

When remote support is enabled, technical support can remotely track the system.

a Select any of the following support options:

- **Allow the system to send diagnostic data**: This option sends diagnostic data and alerts to technical support.
- **Allow Remote Assistance**: This option allows technical support to provide remote assistance by screen sharing. You retain the ability to stop screen sharing if desired.
- **Allow the system to receive and install software updates**: This option allows the system to download updates automatically for installation by technical support or by a hospital administrator.

4 To disable remote support, select **Disabled**.

5 To undo any changes you have made, click **Undo Changes**.

6 To save your changes, click **Save**.

7 To close the **System Customization** window, click **Close**.

14.12 Enabling Remote Assistance

You can enable remote assistance for immediate access by a remote user or schedule a remote assistance session to allow access during a specified time period.

You can also enable remote viewing as an alternative to remote assistance. Remote viewing allows a remote user to view the active window, but not control the system.

1 Select **System** in the review window, and then select **Enable/Disable Remote Assistance**.

The **Remote Assistance** dialog box is displayed.

2 To enable remote assistance for immediate access, do the following:

a Select **Enable Remote Access**.

Remote assistance is enabled. An icon in the notification area indicates the status of the remote assistance function.

	Remote assistance is enabled but not in use.
	Remote assistance is enabled and in use.

b To switch to remote viewing while remote access is enabled, select **Switch to Remote View**.

c To switch remote assistance off, select **Disable Remote Access**.

3 To enable remote viewing instead of remote assistance, do the following:

a Select **Enable Remote View**.

b To switch to remote access while remote viewing is enabled, select **Switch to Remote Access**.

c To switch remote viewing off, select **Disable Remote View**.

4 To schedule a remote assistance session, do the following:

a Select **Schedule Session Later**.

b Enter a date and time in the **Start Date** and **Start Time** boxes.

c Enter a date and time in the **End Date** and **End Time** boxes.

These entries define the schedule when the system will be accessible by a remote user.

d *(Optional step)* To allow a remote user to access the system during the defined schedule without requiring confirmation by the hospital user, select **Automatically accept incoming connections**.

e Select **Enable Remote Access**.

Remote assistance remains switched off until the defined schedule begins.

f If you want to cancel the scheduled remote assistance session before it begins, select **Cancel Schedule**.

14.13 Updating the System Software

You can download and install system software updates when they become available.

The task of downloading and installing system software updates varies slightly, depending on whether ServiceHub is available. Select the task that corresponds to your situation.

- Updating the System Software without ServiceHub (page 273)
- Updating the System Software with ServiceHub (page 276)

14.13.1 Updating the System Software without ServiceHub

Use this task to download and install system software updates if ServiceHub is not available.

If updates are available, an icon is displayed in the notification area at the bottom of the review window.

Software updates are provided as individual packages which you can download and install separately. You do this using the **Software Updates** dialog box.

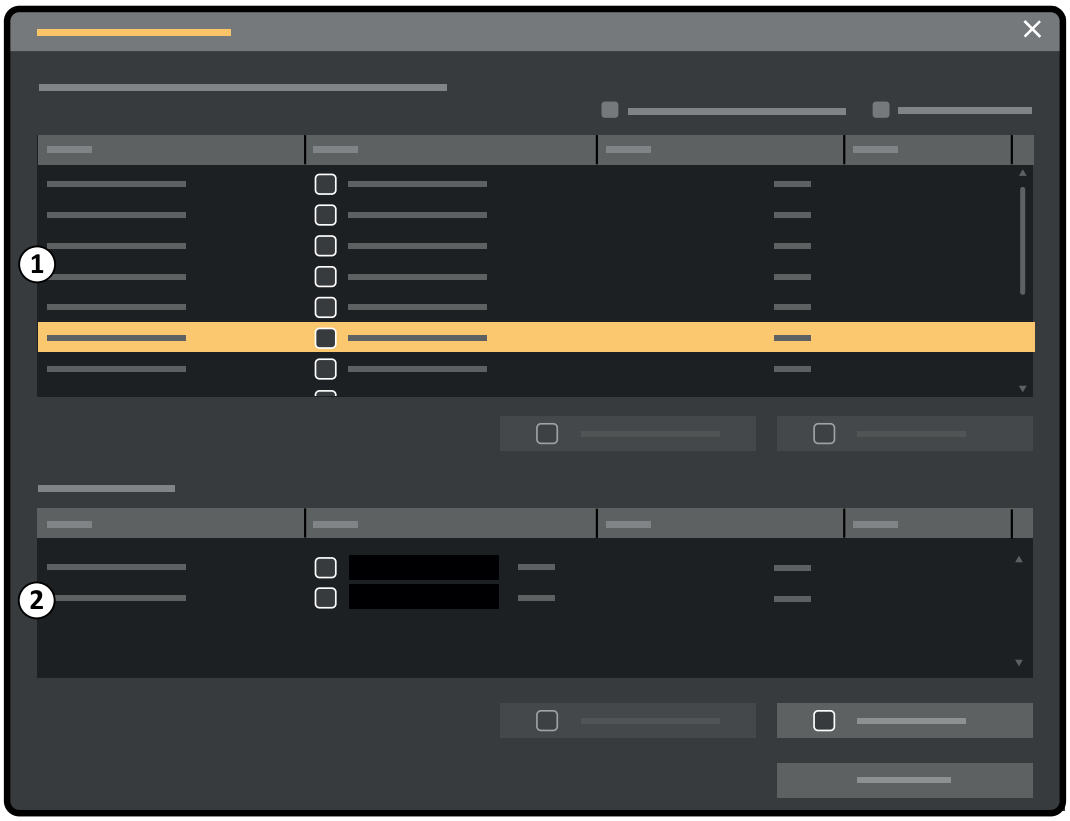


Figure 159 Software Updates dialog box

Legend	
1	Software update package list
2	Download queue

1 If software updates are available, do one of the following:

- Click **System** and select **Software Updates**.

- Click the software update icon in the notification area.

The **Software Updates** dialog box is displayed. Software update packages are shown in a list.

2 Filter the list using the filter check boxes.

- Select **Show installed successfully** to include all successfully installed software update packages.
- Select **Show install failed** to include all software update packages that failed to install.

Each software update package has an icon displaying its status.

	Ready for download / Retry download
	Download queued
	Downloading
	Download paused
	Download invalid / installation failed
	Ready to install
	Installing
	Installed

3 To download a software update package that is ready for download, select it in the list and click **Download** or **Add to Download Queue**.

You can select more than one software update package at a time, by holding down the Ctrl key on the keyboard and clicking each of the packages you want to download.

The software update package is shown in the download queue and the progress of the download is displayed.

Once downloading is complete, the status of the package changes.

4 To abort a download, do the following:

a Select the download you want to abort in the download queue.

You can select more than one download at a time, by holding down the Ctrl key on the keyboard and clicking each of the downloads you want to abort.

b Click **Abort Download** to stop the selected download and remove it from the download queue.

5 To pause a download, select the download and click **Pause**.

6 To resume all paused downloads, click **Resume All**

7 To install a downloaded package, do the following:

a Select the package in the software update package list and click **Install**.

A confirmation dialog box is displayed, showing the estimated time required to install the selected package.

b Click **Install** to install the package, or click **Cancel** to close the dialog box without installing the package.

If you choose to install the package, its status changes in the software update package list.

Installation is performed automatically. If the installation is successful, this is shown in the software update package list.

If an installation fails, an error message is displayed.

NOTE
If a software update package installation fails, the system is not ready for clinical use. If this occurs, contact technical support for assistance.

8 To close the dialog box, click **Close**.

Downloading of software update packages continues.

14.13.2 Updating the System Software with ServiceHub

Use this task to download and install system software updates when ServiceHub is available.

NOTE
The system cannot be used for clinical purposes while installing software updates.

If software updates are available for your system, an icon is displayed in the notification area at the bottom of the review window.

Software updates are provided as individual packages which you can download and install separately. You do this using the **Software Updates** dialog box.

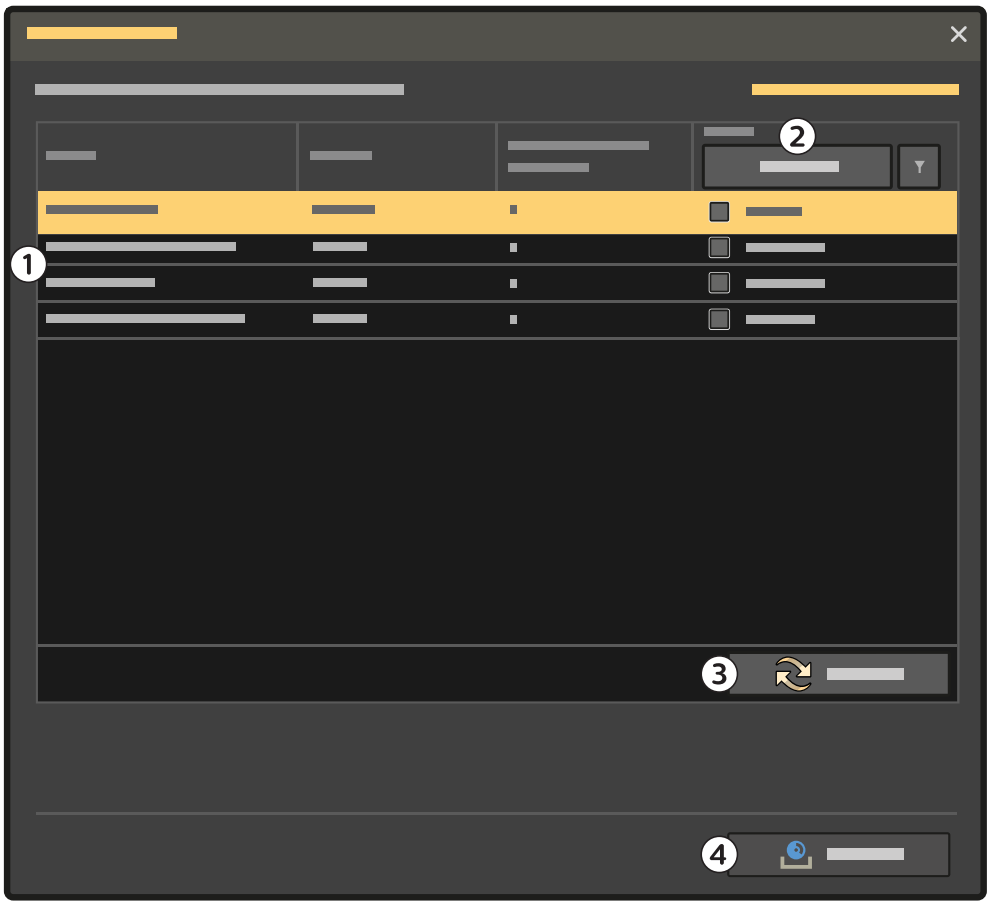


Figure 160 Software Updates dialog box

Legend			
1	Software update package list	3	**Refresh**
2	**Filter**	4	**Install**

1 If software updates are available, do one of the following:

- Click **System** and select **Software Updates**.

- Click the software update icon in the notification area.

The **Software Updates** dialog box is displayed. Software update packages are shown in a list.

2 To filter the list, select **Set Filter**, select the filters that you want to apply, and then select **Filter**.

Each software update package has an icon displaying its status.

	**Pending**
	**Installing**
	**Revoked**
	**Rejected**
	**Failed**
	**Success**

3 To install a software update package, select it in the list and then select **Install**.

A confirmation dialog box is displayed, showing the estimated time required to install the selected package.

4 Select **Install** to install the package, or select **Cancel** to close the dialog box without installing the package.

If you choose to install the package, its status changes in the software update package list.

Installation is performed automatically. If the installation is successful, a confirmation message is displayed and the status is updated in the software update package list.

If an installation fails, an error message is displayed.

NOTE
If a software update package installation fails, the system is not ready for clinical use. If this occurs, contact technical support for assistance.

14.14 Customizing APC Pathways

APC pathways allow you to define a pathway for the system to follow when moving to a predefined position using automatic position control. APC pathways are only available when using the FlexArm stand (option).

Using the **System Customization** function, you can create new APC pathways and modify or delete existing pathways. An APC pathway consists of one or more stored positions. When multiple positions are stored, the stand moves along the APC pathway through the positions in the order that they are stored. For example, you can configure a pathway to move the stand from the park position to the working position. The APC pathways that you configure here are displayed in the **Pathway** tab of the **C-arm and Table** task on the touch screen module.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 In the **X-ray Application** settings group, click **APC Pathway**.

Guidance for creating a pathway is available in the **APC Pathway** panel.

3 Click **New** below the **Pathway** list.

4 Enter a descriptive name for the pathway in the **Name** box.

5 Move the stand to the first position along the desired pathway.

NOTE
This position is not the starting position of the pathway. It is the first position that the stand moves to from whatever position the stand is in when the pathway is recalled using the touch screen module.

6 Click **Store** below the **Positions** list.

7 To include the current table position in the pathway settings, set the **Table Included** toggle button to **On**.

The table position can only be included with the first position or the last position in the pathway.

When the pathway is recalled using the touch screen module, positions are recalled in the order that they appear in the **Positions** list.

8 Continue to store positions along the desired pathway.

9 To delete a position, select the position in the **Positions** list and click **Delete**.

a To delete multiple positions at once, select the positions while holding down the Ctrl key, and then click **Delete**.

10 To rearrange the order of the pathways in the **Pathway** list, select a pathway, and then click the up arrow or down arrow below the list.

The symbol next to a pathway in the **Pathway** list indicates what kind of pathway it is.

Symbol	Type of Pathway
	A pathway with multiple positions
	A pathway with only one position

11 To delete a pathway, select the pathway in the **Pathway** list and click **Delete**.

12 To undo any changes you have made, click **Undo Changes**.

13 To save your changes, click **Save**.

The changes are immediately available on the touch screen module.

14 To close the **System Customization** window, click **Close**.

14.15 Managing ProcedureCards

You can create, edit, copy, move, and delete ProcedureCards to suit the studies you are performing.

A ProcedureCard is a predefined collection of settings that you can associate with a study. When you schedule a study, you can choose which ProcedureCard is used and this will provide the system settings used for the study.

You can manage ProcedureCards within the system, allowing you to create, edit and organize the ProcedureCards to suit how you use the system.

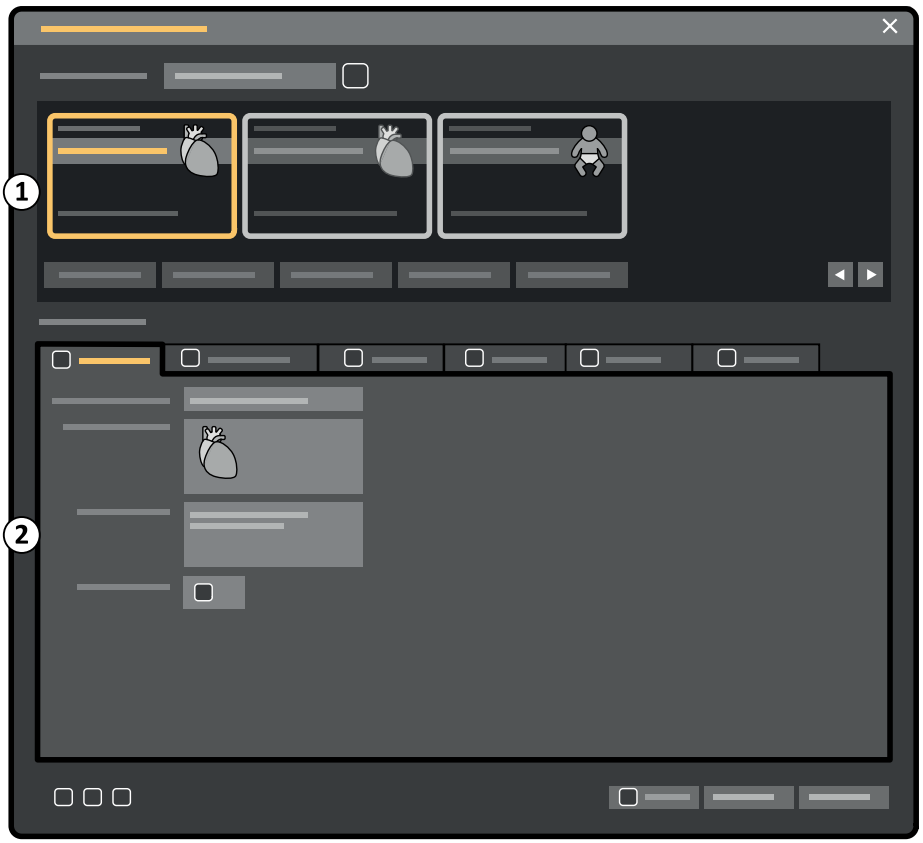


Figure 161 ProcedureCards Manager

Legend	
1	ProcedureCard selection area
2	ProcedureCard details

14.15.1 Changing the Default ProcedureCard

You can change the default ProcedureCard used for studies.

For more information on ProcedureCards, see ProcedureCards (page 61).

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** containing the desired ProcedureCard.

3 Select the desired ProcedureCard.

4 Click **Set as Default**.

The selected ProcedureCard is now the default ProcedureCard.

5 Click **OK** to close the **ProcedureCards Manager**.

14.15.2 Creating a New ProcedureCard

You can create new ProcedureCards for use with studies.

You can also create a new ProcedureCard by copying an existing ProcedureCard and changing the settings.

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** that you want to place the new ProcedureCard in.

3 Create a new ProcedureCard by doing one of the following:

- Click **New**.

- Copy an existing ProcedureCard.

For more information about copying a ProcedureCard, see Copying a ProcedureCard (page 282).

A new ProcedureCard with the default title **My ProcedureCard** is created and is visible in the list. You can edit this new ProcedureCard to apply the desired settings. For more information about editing ProcedureCards, see Editing a ProcedureCard (page 281).

14.15.3 Editing a ProcedureCard

You can edit the settings of a ProcedureCard.

The changes that you make affect all scheduled studies that have this ProcedureCard selected.

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** containing the desired ProcedureCard.

3 Select the desired ProcedureCard.

4 To edit general ProcedureCard information, do the following:

a Select the **General** tab.

b Edit the general ProcedureCard information as desired.

5 To edit the available X-ray settings, do the following:

a Select the **X-ray Acquisition** tab.

b Select the X-ray protocols available for use with the ProcedureCard.

c Set the default X-ray protocol for the ProcedureCard.

d Reorder the X-ray protocols as desired.

△ ▽

6 To change the preset screen layout used for the FlexSpot option or second FlexSpot option, if installed, do the following:

a Select the **FlexSpot** tab.

b Change the preset group by selecting a new group from the list.

c Select the new preset to use.

7 To change the preset screen layout used for the FlexVision option, if installed, do the following:

a Select the **FlexVision** tab.

b Change the preset group by selecting a new group from the list.

c Select the new preset to use.

8 To edit the instructions included with the ProcedureCard, do the following:

a Select the **Instructions** tab.

b To rename an existing document, click **Rename the selected bookmark**, enter a new name and click **OK**.

c To preview an existing document, select the document and click **View the selected bookmark**.

The document is displayed in a viewer.

d To delete a document from the ProcedureCard, select the document and click **Delete**.

9 To include new external documents for the ProcedureCard, do the following:

a Select the **Instructions** tab.

b Click **Add External**.

The **XPS documents library** list is displayed, showing previously uploaded documents and a preview window.

c To preview a document, select it in the **XPS documents library**.

d To add a document which has been previously uploaded, select the document and click **Add**.

e To upload a new document from a USB flash memory drive, click **Import from USB** and select the document you want to import, then click **Add**.

f To delete a document, select it and click **Delete**.

g To close the dialog box without adding a document, click **Cancel**.

10 To configure settings for an application on the Interventional Workspot, if connected, do the following:

a Select the **Interventional Tools** tab.

b Configure the settings for the application.

11 To check all settings in the ProcedureCard, do the following:

a Select the **Summary** tab.

b Check the settings displayed for each section.

12 To save your changes, click **Save**.

13 To close the **ProcedureCards Manager** without saving your changes, click **Cancel**.

14.15.4 Copying a ProcedureCard

You can copy a ProcedureCard to use as the basis for a new ProcedureCard.

ProcedureCards are copied within the same ProcedureCard Group. You can move a copied ProcedureCard to another ProcedureCard group. For more information about moving ProcedureCards, see Moving a ProcedureCard (page 283).

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** containing the desired ProcedureCard.

3 Select the desired ProcedureCard.

4 Click **Copy**.

The ProcedureCard is copied within the same ProcedureCard group and is saved with the same name and marked as a copy.

14.15.5 Moving a ProcedureCard

You can move a ProcedureCard to another ProcedureCard group.

For example, you can copy a ProcedureCard and then move the copy to another group. For more information about copying ProcedureCards, see Copying a ProcedureCard (page 282).

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** containing the desired ProcedureCard.

3 Select the desired ProcedureCard.

4 Click **Move To**.

A dialog box is displayed where you can choose which group you want to move the ProcedureCard to.

5 Select the desired group from the list.

6 Click **OK**.

The ProcedureCard is moved to the selected group.

14.15.6 Deleting a ProcedureCard

You can delete a ProcedureCard so that it is no longer displayed in the list of available cards.

If you delete a ProcedureCard which is selected for use in a scheduled study, the study will use the default ProcedureCard.

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Select the **ProcedureCard Group** containing the desired ProcedureCard.

3 Select the desired ProcedureCard.

4 Click **Delete**.

A confirmation message is displayed asking you to confirm that you want to delete the ProcedureCard.

5 To delete the ProcedureCard, click **Delete**.

6 To close the confirmation message without deleting the ProcedureCard, click **Cancel**.

14.15.7 Managing ProcedureCard Groups

You can create, rename, reorder, and delete ProcedureCard groups.

ProcedureCards are organized into groups allowing you to choose which group to add a ProcedureCard to.

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 Click **Edit ProcedureCard groups**.

The **Edit ProcedureCard Groups** dialog box is displayed.

3 To create a new ProcedureCards group, do the following:

a Click **New**.

A dialog box is displayed.

b Enter a name for the new group.

c To save the new group, click **OK**.

d To close the dialog box without saving the new group, click **Cancel**.

4 To rename a ProcedureCards group, do the following:

a Select the desired group in the list.

b Click **Rename**.

A dialog box is displayed.

c Enter a new name for the group.

d To save the new group name, click **OK**.

e To close the dialog box without saving the new group name, click **Cancel**.

5 To delete a ProcedureCard group, do the following:

a Select the desired group in the list.

b Click **Delete**.

A confirmation message is displayed.

c To delete the group, click **OK**.

d To close the confirmation message without deleting the group, click **Cancel**.

6 To reorder the groups in the list, do the following:

a Select the ProcedureCard you want to move.

b Click the arrows to move the ProcedureCard up and down within the list.

7 Click **OK** to close the dialog box.

14.15.8 Importing, Exporting and Restoring ProcedureCards

You can import and export ProcedureCards from storage devices like a USB flash memory drive, or from a network location.

You can also restore the factory default ProcedureCard set.

NOTE
When you import or restore ProcedureCards, all currently available ProcedureCards are deleted and replaced by the imported or restored set of ProcedureCards. Before you import or restore ProcedureCards, you should consider exporting the existing set of ProcedureCards so you can import them later if you need to.

1 In the review window, click **System** and select **Manage ProcedureCards**.

The **ProcedureCards Manager** is displayed.

2 To export ProcedureCards from the system, do the following:

a Click **Export ProcedureCards**.

A dialog box is displayed allowing you to select the folder you want to export ProcedureCards to.

b Click **Browse**, select the folder you want to use and click **OK**.

c Enter a name for the set of ProcedureCards you are exporting.

d To close the dialog box without exporting the ProcedureCards, click **Cancel**.

e To export the ProcedureCards to the selected folder, click **Export**.

3 To import ProcedureCards to the system, do the following:

a Click **Import ProcedureCards**.

A dialog box is displayed allowing you to select the folder you want to import ProcedureCards from.

b Click **Browse**, select the folder containing the ProcedureCards and click **OK**.

c To close the dialog box without importing the ProcedureCards, click **Cancel**.

d To import the ProcedureCards from the selected folder, click **Import**.

NOTE
All currently available ProcedureCards are deleted and replaced by the imported ProcedureCards.

4 To restore the factory default ProcedureCard set, do the following:

a Click **Restore the factory default ProcedureCards**.

A dialog box is displayed asking you to confirm that you want to restore the factory default ProcedureCard set.

NOTE
All currently available ProcedureCards are deleted and replaced by the factory default ProcedureCards.

b To close the dialog box without restoring the factory default ProcedureCards, click **Cancel**.

c To restore the factory default ProcedureCard set, click **Restore Defaults**.

14.16 Exporting Settings

You can export system customization settings to allow you to import them later. Only settings that are available in the **Customization** window can be exported.

NOTE
Before you make changes to system customization settings, you should consider exporting the existing settings so you can import them later if you need to.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 Click **Export Settings**.

3 Click **Browse** and select the directory for the settings to be saved to.

4 Enter a name for the export file.

5 To export the settings, click **OK**.

6 To close the **System Customization** window, click **Close**.

For more information about this function, contact Philips.

14.17 Importing Settings

You can import system customization settings, including EPX data, that have been previously exported and stored.

You can choose which settings to import from an import file to ensure you only import the settings you need.

NOTE
You can only import settings from the same version or older versions of the system software.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 Click **Import Settings**.

A dialog box is displayed allowing you to select the file you want to import settings from, and which settings you want to import.

3 Do one of the following:
- Select the directory that you want to **Import Settings From**.
- Click **Browse**, select the directory that you want to use and click **OK**.

4 Select the check boxes for each of the settings you want to import.

NOTE
The settings you select are imported from the file you have chosen, and will replace the current settings. This might cause some functionality to be unavailable after importing. To resolve any inconsistencies, update the detailed settings of the DICOM settings, export settings, and automatic data transfer settings.

NOTE
Importing APC positions from a different system configuration may result in some unreachable positions.

5 To import the selected settings, click **Import**.

6 To close the **System Customization** window, click **Close**.

For more information about this function, contact Philips.

14.18 Restoring Factory Default Settings

You can restore the system's settings to the factory default settings, if needed.

You can select which settings to restore, allowing you to retain some customized settings. Some settings cannot be restored to factory default settings and cannot be selected.

NOTE
Before you restore the factory default settings, you should consider exporting the existing settings so you can import them later if you need to.

1 On the **System** menu, click **Customization** to display the **System Customization** window.

2 Click **Restore Factory Default Settings**.

The **Restore Factory Default Settings** dialog panel is displayed allowing you to select the settings that you want to restore to factory default settings.

3 Select the check box for each of the settings that you want to restore.

NOTE
The settings that you select will be restored to the factory default settings, replacing the current settings. This might cause some functionality to be unavailable.

4 To close the dialog box without restoring the settings to the factory defaults, click **Cancel**.

5 To restore the selected settings to the factory default settings, click **Restore Defaults**.

6 To close the **System Customization** window, click **Close**.

For more information about this function, contact Philips.

15 Maintenance

This product requires proper operation, planned maintenance, and checks that the user must perform routinely. These tasks are essential to keep the product operating safely, effectively, and reliably.

WARNING
Maintenance of the system by persons without appropriate training, or using unapproved spare parts, accessories, or detachable parts, may void the manufacturer's warranty. Such maintenance carries serious risk of personal injury and damage to the system.

Clinical application is not allowed during maintenance and service.

15.1 Planned Maintenance Program

To ensure that maintenance is performed at the required intervals, the responsible organization (the owner of the equipment) should issue a request to the maintenance organization for maintenance to be carried out in accordance with the planned maintenance program described in this section. Planned maintenance may only be carried out by qualified and authorized personnel.

Philips Medical Systems provides a full planned maintenance and repair service on both a call basis and a contract basis. Full details are available from your Philips representative.

Task	Frequency	Required Personnel
Check the labels	Every 6 months	User
Check the emergency stop circuit	Every 6 months	Technician
Visually inspect the system	Every 6 months	Technician
Adjust the generators	Every 6 months	Technician
Perform the level 1 IQ tests	Every 6 months	Technician
Perform the air kerma rate verification	Every 6 months	Technician
Check the fixation of the ceiling mounted equipment	1 year after installation	Technician
Check the coolant levels	Every year	Technician
Adjust the detectors	Every year	Technician
Check the ceiling rails	Every year	Technician
Clean the ceiling rails	Every year	User/technician
Perform mechanical maintenance of the frontal stand	Every year	Technician
Adjust the frontal stand	Every year	Technician
Perform mechanical maintenance of the lateral stand	Every year	Technician
Adjust the lateral stand	Every year	Technician
Check the mechanical fixation of the monitor ceiling suspension	Every year	Technician
Perform mechanical maintenance of the FlexArm option, if installed	Every year	Technician
Perform mechanical maintenance of the FlexMove option, if installed	Every year	Technician
Check the X-ray protection devices	Every year	Technician
Check the ECG and injector relays	Every year	Technician
Perform mechanical maintenance of the patient table	Every year	Technician
Perform mechanical maintenance in the technical room	Every year	Technician
Replace the batteries of the operator controls	Every year	User/technician
Check the counter-balanced support arms and installed equipment	Every year	User/technician
Check the electrical safety	Every 2 years	Technician
Check the X-ray safety	Every 2 years	Technician
Clean the top side of the FlexMove carriage, if installed	Every 2 years	Technician
Clean the FlexMove cable chain plate, if installed	Every 2 years	Technician

Task	Frequency	Required Personnel
Replace the battery pack of the 1 phase UPS option, if installed	Every 3 years	Technician
Perform extended mechanical maintenance of the patient table	Every 4 years	Technician
Lubricate the FlexMove bearings, if installed	Every 6 years	Technician
Replace the cooling hoses	Every 15 years	Technician

You should ensure that the planned maintenance program is fully up to date before using the product with a patient.

Philips Medical Systems will make the required information available that assists technical support personnel to repair those parts of the equipment that are designated by Philips Medical Systems as repairable by qualified and authorized technical support personnel.

For a complete list of consumables, contact technical support.

15.2 Cleaning and Disinfecting

Insufficient cleaning of residues that remain on the equipment after procedures may lead to patient infection from polluted parts. Follow these guidelines to ensure that the system is properly cleaned and disinfected.

When cleaning and disinfecting the system, follow these general guidelines:
- Do not allow liquids to enter the system. This may cause corrosion or electrical damage.
- Do not apply cleaning liquid or spray directly onto the system. Always use a cloth dampened with the cleaning product.
- Do not use corrosive or abrasive agents or pads.
- When cleaning scratched or worn painted surfaces, it is to be expected that some additional paint is removed.

NOTE
You should always comply with local instructions, regulations, and guidelines concerning hygiene.

These cleaning and disinfecting instructions only apply to the X-ray system and do not apply to other equipment in the room. Cleaning instructions for other equipment are described in the accompanying documents of the equipment. If cleaning or disinfecting is needed at the interface of third-party equipment with the X-ray system, dismount the equipment before cleaning or disinfecting. You should also dismount third-party equipment if you need to clean or disinfect it with agents that are not compatible with the X-ray system.

NOTE
Always follow the manufacturer's instructions for the cleaning agents or disinfectants that you use.

Mattress
When cleaning the mattress, the following information is additional to the cleaning and disinfecting process described in this section.

NOTE
Before cleaning the mattress, close the air plug to prevent liquids from entering. After cleaning the mattress, open the air plug to allow the mattress to expand and contract properly when the patient is positioned on it.

Patient Straps and Ratchet Compressor Band
The patient straps and the ratchet compressor band should be laundered instead of subjected to surface disinfection. For these items, follow the guidance in the following section: Cleaning the Patient Straps and Ratchet Compressor Band (page 296).

15.2.1 Cleaning Workflow

The cleaning and disinfecting workflow consists of the following tasks:

- Preparation
- Manual cleaning
  - Cleaning
  - Rinsing
  - Drying
- Manual disinfecting
  - Disinfecting
  - Rinsing
  - Drying

Initial treatment of the equipment is not required for effective cleaning and disinfecting.

NOTE
The manual cleaning step is recommended for effective disinfection. However, it can be skipped if there are no visible residues, such as dust, dirt, or organic material.

NOTE
It is recommended to complete the cleaning and disinfecting workflow for one part before moving to the next part. This avoids over-exposing parts to cleaning and disinfection agents.

Cleaning and Disinfecting Frequency

The following figure and table indicate the frequency with which different parts of the equipment should be cleaned and disinfected.

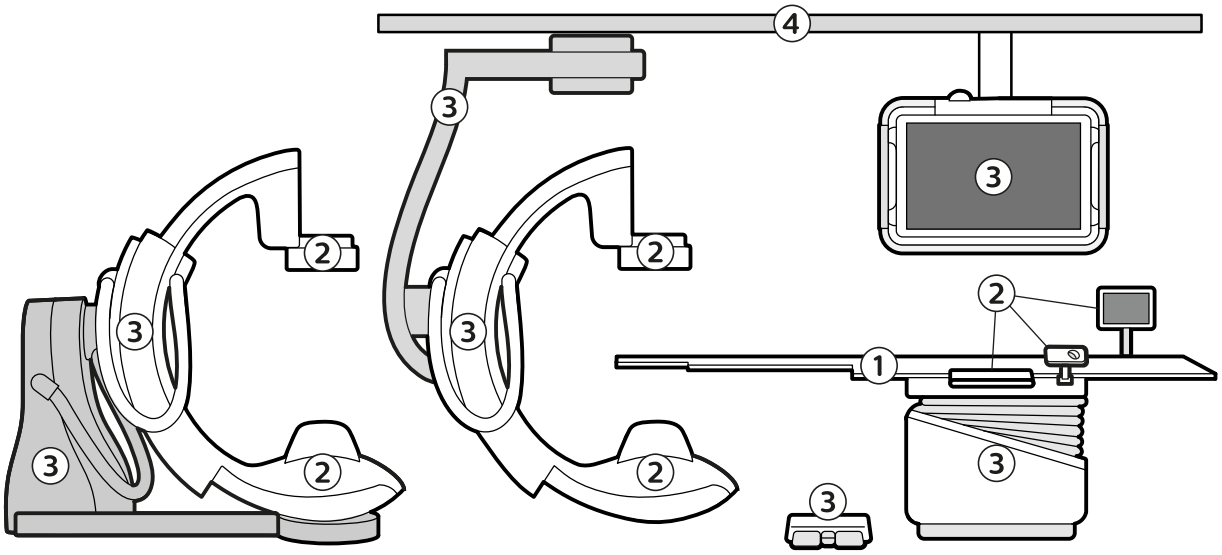


Figure 162 Part types, indicated by numbers

Part Type	Cleaning Required?	Recommended Cleaning Frequency	Disinfection Required after Cleaning?	Recommended Disinfection Frequency
1: Tabletop and parts that come in direct contact with the patient, such as the mattress and head support	Yes	After each patient.	Yes	After each patient
2: Detector housing, X-ray tube housing, and parts that may come in contact with the patient	Yes	Daily[1]	Yes	Daily[1]
3: Stand, C-arc, table support, foot switch, and monitor ceiling suspension (including monitors)	Yes	Weekly	When contaminated	When contaminated
4: Ceiling rails and all parts outside the operating room	Yes	Weekly	When contaminated	When contaminated

Note 1: Depending on the level of contamination, cleaning and disinfection may be required after each patient (for example, if there are visible residues).

NOTE
Fabric accessories (for example, the ratchet compression band) should be washed after each patient.

15.2.2 Preparation Task

You should prepare the equipment for cleaning and disinfecting before starting these tasks.

Note the following guidance:
- Disassembly of the medical device is not required.
- Testing the equipment to determine whether cleaning is necessary is not required.
- Pre-cleaning the equipment to remove debris is not required.

The following tools are required:
- Goggles, gloves, and protective equipment are required for cleaning staff, according to the hospital regulations.
- Ready-to-use wipes
- If ready-to-use wipes are not available, then dry, lint-free wipes that do not leave residues should be used.

NOTE
Ready-to-use wipes are recommended as they are already prepared with the correct amount of a suitable agent. This eliminates errors, reduces the time required for the task, and ensures effective cleaning and disinfection.

The following tools are recommended:
- A soft toothbrush or equivalent is recommended but not necessary to remove residues from corners and openings, such as the accessory rail.

1 Remove any sterile covers from the tube, detector, and table modules after each patient.

2 Remove accessories attached to the accessory rail if there are visible residues under or around the clamps and moving parts.

For information about removing accessories from the accessory rail, see Using Other Equipment (page 220).

3 **Frontal stand:** Position the C-arc so that you can reach all surfaces and the detector housing and X-ray tube housing are easily accessible.

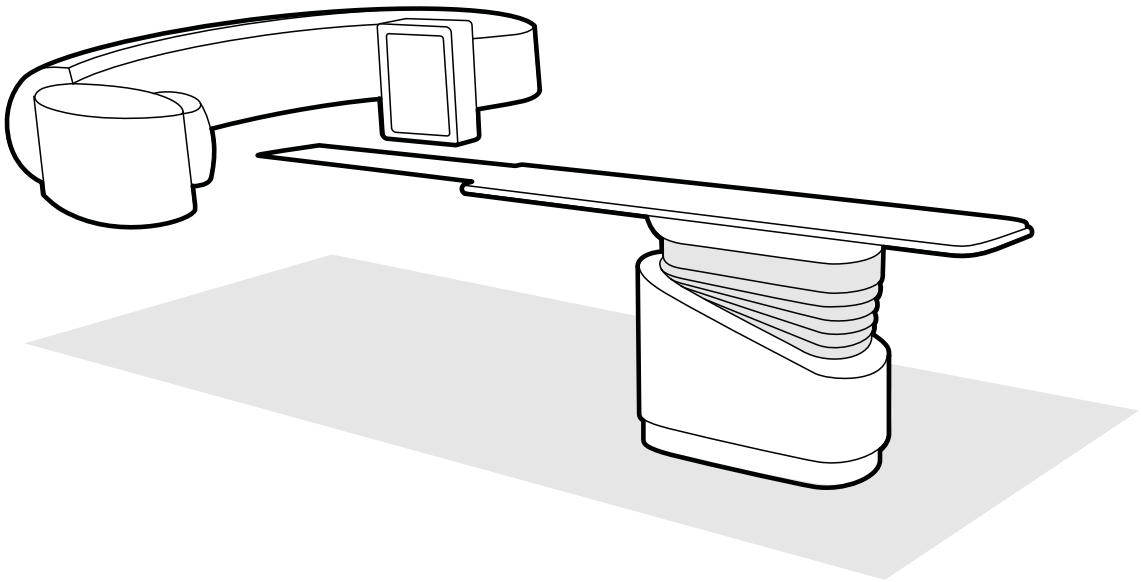


Figure 163 Positioning the C-arc for cleaning and disinfection

4 **Lateral stand:** The lateral stand can be cleaned while it is in the parking position.

5 Position detector as close to the X-ray tube as possible, so that the surface of the carriage mechanism is accessible

6 Remove the anti-scatter grid (it should be cleaned and disinfected separately).

For more information, see Removing and Replacing the Anti-Scatter Grid (page 297).

7 If you are performing daily or weekly cleaning and disinfection, switch the system off.

It is not necessary to switch the system off when cleaning and disinfecting the system between patients.

15.2.3 Manual Cleaning

This section provides details of a validated manual procedure for cleaning, rinsing, and drying the equipment. Automatic cleaning of the equipment is not possible.

The recommended order for cleaning is as follows:

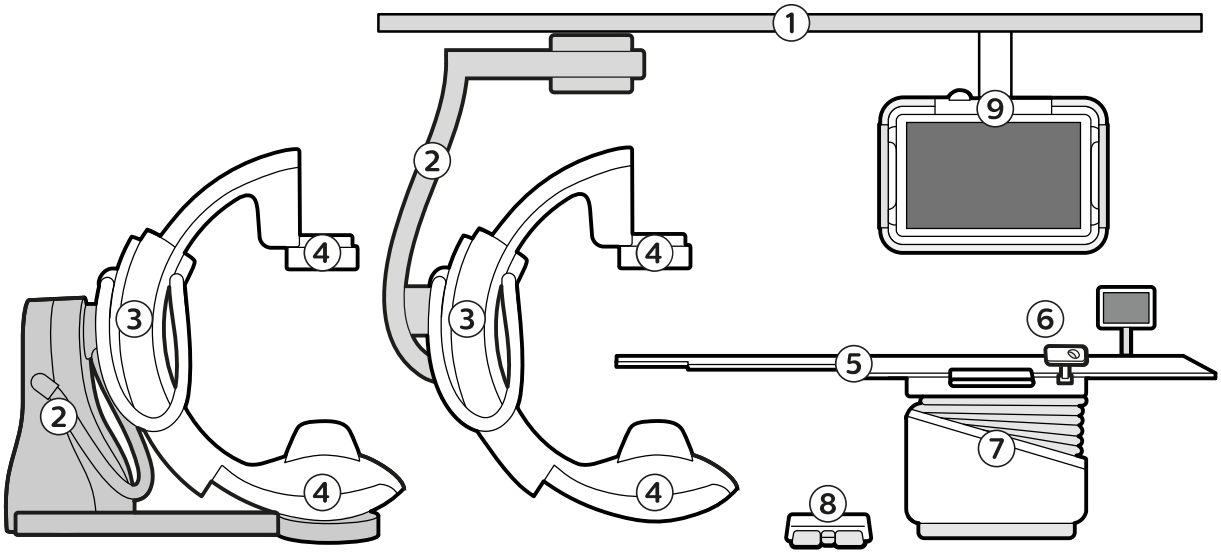


Figure 164 Recommended cleaning order

Recommended Cleaning Order	
1	Ceiling suspension and ceiling rails
2	Floor stand / ceiling stand (both types of stand are shown in the figure above)
3	C-arc
4	Detector and tube
5	Mattress, tabletop, and accessory rail (clean from the head end to the foot end)
6	Accessories and user interface modules attached to the accessory rail
7	Table base
8	Foot switch
9	Monitor ceiling suspension (clean from top to bottom)

1 Use any of the following cleaning agents:
- Regular cleaning agent that is available to hospital staff.
- Mild detergent.
- Ready-to-use wipes.

NOTE
For ease of use, ready-to-use wipes are recommended.

2 If ready-to-use wipes are not available, apply the cleaning agent to dry, lint-free wipes.

Never apply the cleaning agent directly to the equipment. Doing so may lead to ingress of liquid. Spraying can cause a fire risk or rust as aerosol cleaning agent may get inside the equipment.

3 Clean the parts of the system with a linear motion.

The contact time of the cleaning agent with the equipment is not relevant.

4 While cleaning, change wipes as necessary and at least between cleaning each part of the equipment.

5 Continue cleaning until all visible residues are removed.

6 After cleaning all parts of the equipment, rinse the equipment with damp, lint-free wipes using a linear motion.

Wipes can be dampened with tap water or demineralized water. The temperature of the water should be between 15°C and 35°C.

7 After rinsing all parts of the equipment, dry the equipment with a dry, lint-free wipe using a linear motion.

You should always dry the equipment after rinsing it. Continue drying the equipment until it is visibly dry. Drying agent is not required.

15.2.4 Manual Disinfecting

This section provides details of a validated manual procedure for disinfecting, rinsing, and drying the equipment. Automatic disinfection of the equipment is not possible.

When preparing your own disinfection solution, use any of the agents in the following table. Alternatively, contact Philips for a list of approved brands that have been tested and approved. For details, see Contacting Philips (page 427).

NOTE
If you use a brand of disinfectant other than one recommended by Philips, you should check its safety data sheet (available from the manufacturer of the brand) to verify that the active ingredients and their concentrations are within the limits indicated in the following table. Be aware that there may be additional ingredients in other branded disinfectants that are not suitable.

Sprays and vapor-based disinfectants should not be used as the vapor may enter the system and cause corrosion or electrical damage.

Active Ingredient	Concentration
Ethyl alcohol	45% - 70%
Isopropyl alcohol	70% – 95%
Ethyl alcohol and isopropyl alcohol mixtures	50% - 60%
Hydrogen peroxide	6% – 7%
Chlorhexidine (0.5%) in ethanol or isopropyl alcohol	70% – 95%
Sodium Hypochlorite	0.5% – 0.6% (limit the usage)

NOTE
For ease of use, ready-to-use wipes are recommended.

The recommended order for disinfecting is as follows:

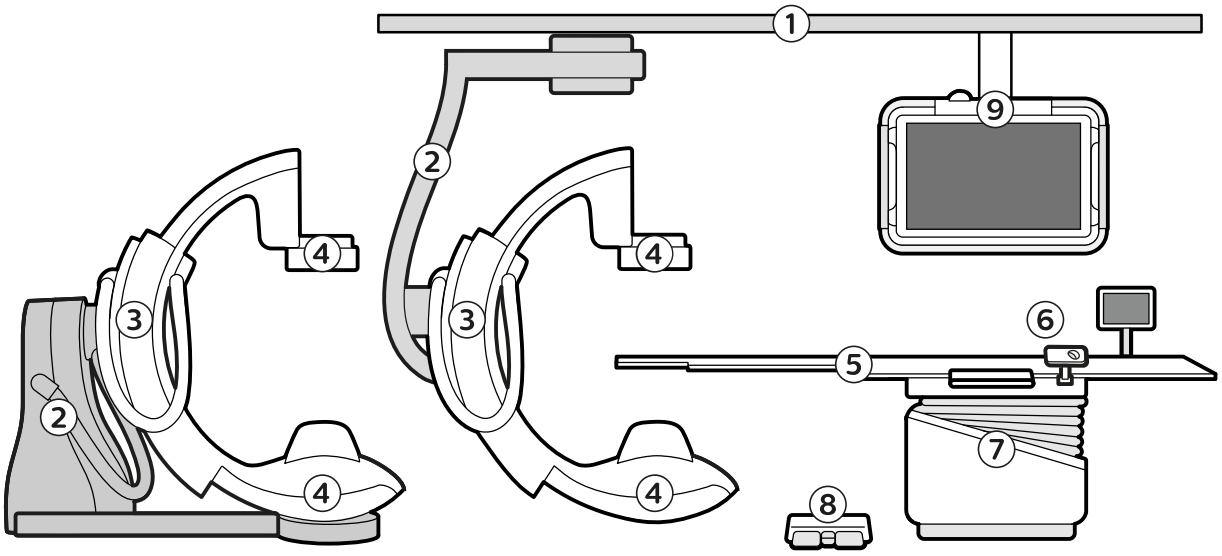


Figure 165 Recommended disinfecting order

Recommended Disinfection Order	
1	Ceiling suspension and ceiling rails
2	Floor stand / ceiling stand (both types of stand are shown in the figure above)
3	C-arc
4	Detector and tube
5	Mattress, tabletop, and accessory rail (disinfect from the head end to the foot end)
6	Accessories and user interface modules attached to the accessory rail
7	Table base
8	Foot switch
9	Monitor ceiling suspension (disinfect from top to bottom)

1 If ready-to-use wipes are not available, apply the disinfection agent to dry, lint-free wipes.

Never apply the disinfection agent directly to the equipment. Doing so may lead to ingress of liquid. Spraying can cause a fire risk or rust as aerosol disinfection agent may get inside the equipment.

2 Disinfect the first part of the system by linear motion with wipes, from the top to the bottom of each item of equipment.

For effective disinfection, the disinfectant should remain in contact with the part for five minutes. Wipe the item for a minimum of 30 seconds and then wait for the remaining duration before continuing.

NOTE
If you use a branded disinfectant, refer to the information supplied with the disinfectant for details of the recommended contact time.

NOTE
For quaternary disinfectants (Quat type), it is recommended to apply the disinfectant twice.

3 While disinfecting, change wipes as necessary and at least between disinfecting each part of the equipment.

4 Rinse the part with damp, lint-free wipes using a linear motion.

Wipes can be dampened with tap water or demineralized water. The temperature of the water should be between 15°C and 35°C.

NOTE
If you use a branded disinfectant, rinsing may not be required. Check the instructions supplied with the disinfectant.

5 Dry the part with a dry, lint-free wipe using a linear motion.

You should always dry a part after rinsing it. Drying agent is not required.

NOTE
If you use a branded disinfectant, drying may not be required. Check the instructions supplied with the disinfectant.

6 Repeat this procedure for all parts of the equipment.

7 If you removed any accessories or user interfaces from the accessory rail, replace them on the rail.

For information about attaching accessories to the accessory rail, see Using Other Equipment (page 220).

15.2.5 Incompatible Cleaning and Disinfection Agents

Part	Not Compatible With	Effects
Cover below the tabletop	Alcohol-based disinfectants or chloroxylenol 5%	Coloring and gloss change
Arm support	Alcohol-based disinfectants or chloroxylenol 5%	Coloring and gloss change
Arm board of the adjustable arm support	Alcohol-based disinfectants or chloroxylenol 5%	Coloring and gloss change
Speed controller hand switch	Heamo sol Regular, 1% solution, or Microbac Forte	Gloss change
Azurion tags	Chloroxylenol 5%	Deformation
Neuro wedge (Out of scope of disinfection)	Chloroxylenol 5%	Deformation
Mattress	Long-term exposure to chloroxylenol 5%	Deformation
Cover of the table tilt movement	Alcohol-based disinfectants, chloroxylenol 5%, or Bacillol	Deformation
Monitor ceiling suspension	Isopropyl alcohol	Deformation
Ceiling-mounted radiation shield	Ethyl alcohol, ethyl and isopropyl alcohol mixture, or chlorhexidine (0.5%) in ethanol or isopropyl alcohol	Gloss change

15.2.6 Supplementary Information about Cleaning

Degradation or Limitations of the Process
Cleaning and disinfecting the equipment in accordance with these instructions is not known to lead to degradation that might limit the service life of the equipment.

The service life of the equipment is not known to be limited by the number of cleaning cycles performed.

Inspect the equipment parts before using the system after cleaning and disinfection. Table accessories such as mattresses, head supports or arm supports may deteriorate over time. For example, a hole in the foil of a mattress can be a source of contamination and indicates that the mattress should be replaced.

Inspection and Maintenance
Calibration after cleaning and disinfection is not needed.

Lubrication after cleaning and disinfection is not needed because only the outer surfaces of the equipment covers are cleaned.

15.2.7 Cleaning the Ceiling Rails

The ceiling rails should be cleaned according to the planned maintenance program (see Planned Maintenance Program (page 288)) to prevent dust and debris from being released from the rails and

polluting the air flow around the table. Polluted air and contaminated parts of the X-ray system may infect the patient.

1 Clean the ceiling rail track to remove dirt.

Insufficient cleaning may result in clots of dirt that degrade the performance of longitudinal movements.

2 When present, check the fixation of the longitudinal brake strip and clean the strip with alcohol.

15.2.8 Cleaning the Patient Straps and Ratchet Compressor Band

The patient straps and the ratchet compressor band should be laundered instead of subjected to surface disinfection.

Cleaning and Disinfection
After each use, it is recommended to remove the patient straps and compressor bands from the patient table, place them in a clearly identified bag for laundry, and send them to the laundry reprocessing area.

Manual Cleaning and Disinfection:
Hand-wash cycles should be performed in the following conditions:
- In a tap water bath of at least 40°C up to about 60°C.
- Using a combination of a compatible alkaline detergent and a peracetic acid-based disinfecting agent.
- Using a liquor ratio not lower than 1:4.
- Strictly following the instructions provided by the manufacturer of the chemicals used.

Automated Cleaning and Disinfection:
Machine-wash cycles should be performed in the following conditions:
- For normally contaminated parts: using a validated washing machine cycle with a prewash of at least 35°C and a main wash of at least 40°C.
- For highly contaminated parts: using a chemo-thermal cycle up to 60°C.
- Using a combination of a compatible alkaline detergent and a peracetic acid-based disinfecting agent.
- Using a liquor ratio not lower than 1:4.
- Strictly following the instructions provided by the manufacturer of the chemicals used.
- Strictly following the operating instructions provided by the manufacturer of the laundry washing machine.

Drying
The patient straps and compressor bands should be immediately air dried after laundering to prevent bad smells, discoloration, or bacterial growth. The patient straps can be reprocessed up to 2,000 times.

15.2.9 Cleaning the Wireless Foot Switch (Option)

Before cleaning the wireless foot switch, ensure that the wireless foot switch and the X-ray system are switched off.

Clean the wireless foot switch after each clinical session to avoid impaired functionality due to bacterial contamination or soiling.

Always comply with local instructions, regulations, and guidelines concerning hygiene.

Always follow the manufacturer's instructions for the cleaning agents or disinfectants that you use.

When cleaning the wireless foot switch, always use a cloth dampened with water and a mild cleanser. Do not use cleaning agents that may damage the metal surfaces, such as detergents, abrasive cleansers or solvent-based cleaners (such as benzine, stain remover). You should only clean the wireless foot switch by hand.

15.3 Removing and Replacing the Anti-Scatter Grid

This procedure provides guidance for removing and replacing the anti-scatter grid.

To prevent damage to the grid, observe the following guidance:
- Do not drop the grid.
- Do not apply excessive force to the grid.
- Do not use the grid to carry objects.
- Do not expose the grid to temperatures above 40°C (104°F).
- Do not store the grid in direct sunlight or near heat sources such as heaters or cooling fan outlets.
- Do not store the grid in cabinets with heat dissipating components.
- Do not sterilize the grid, or immerse it in water.
- Do not expose the grid to steam cleaners.

NOTE
If you are using a ClarityIQ system, do not remove the grid before acquisition, as the image quality will not be optimal. The grid should only be removed for cleaning.

15.3.1 Removing the Anti-Scatter Grid

Take care to avoid damaging either the detector or the anti-scatter grid during the following procedure.

1 Rotate the stand to the lateral position shown in the figure below.

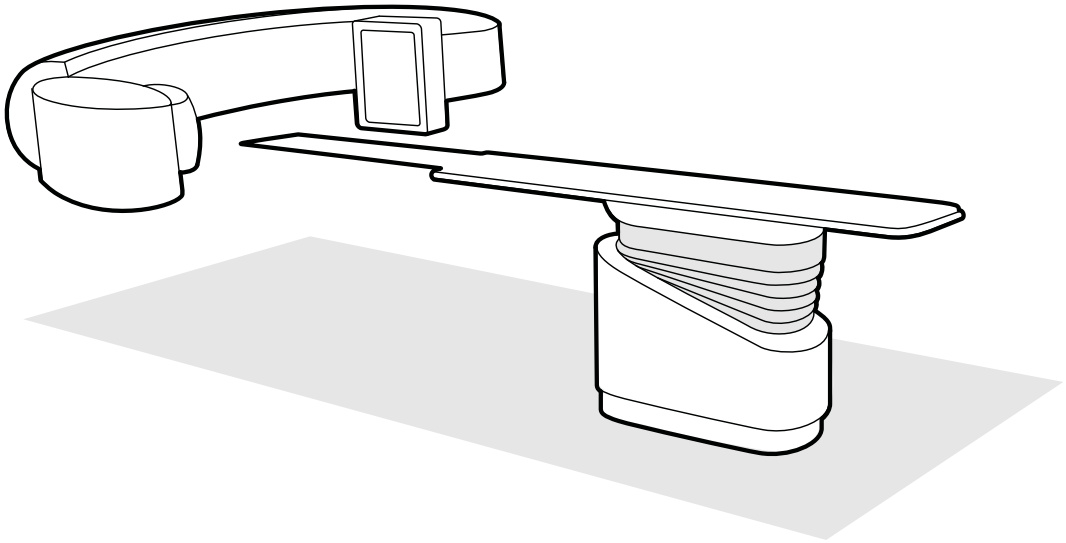


Figure 166 Positioning the detector for removal of the anti-scatter grid

2 Move the tabletop just below the detector.

3 Move the spring-loaded locking sliders toward the center of the anti-scatter grid.

4 Carefully remove the grid from the detector.

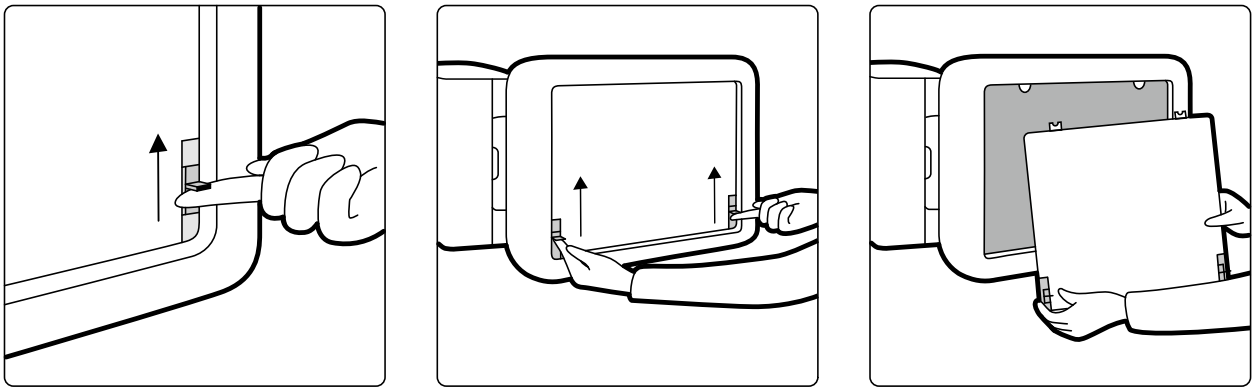


Figure 167 Removing the anti-scatter grid

15.3.2 Replacing the Anti-Scatter Grid

Take care to avoid damaging either the detector or the anti-scatter grid during the following procedure.

NOTE
Before replacing the anti-scatter grid, ensure that it is clean and free from debris.

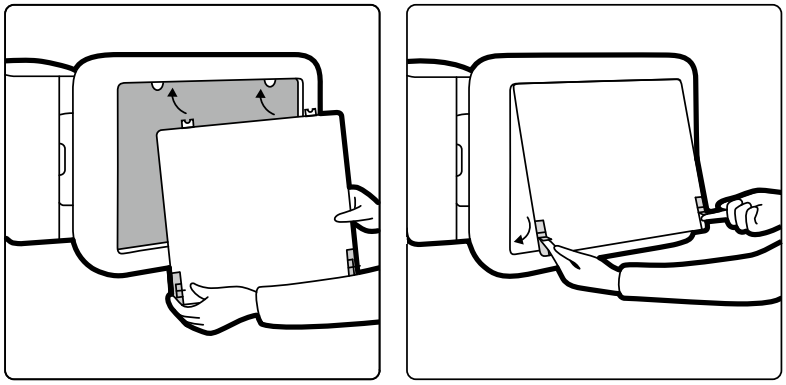


Figure 168 Replacing the anti-scatter grid

1. Insert the locating tabs on the anti-scatter grid in the corresponding slots of the detector casing.
2. Pull back the locking sliders and push the grid towards the detector until it is flush with the detector casing and release the locking sliders.
3. Ensure that the locating tabs are correctly positioned in the detector casing and the grid locking sliders are correctly engaged.

15.4 Replacing Batteries

For safe operation, you should replace the batteries in battery-operated equipment at regular intervals.

The batteries of the following items should be replaced regularly:
- Viewpad
- Wireless mouse

CAUTION
Always remove the batteries if the equipment will not be used for some time.

1. To replace the batteries, open the battery compartment cover on the rear or underside of the equipment.
2. Remove the old batteries.

NOTE
Batteries harm the environment. Dispose of batteries responsibly.

3. Insert new batteries of the correct type in the position indicated in the battery compartment.

   The viewpad and the wireless mouse use AA batteries.
4. Replace the battery compartment cover.

15.4.1 Wireless Foot Switch Battery (Option)

When the wireless foot switch is not in use, or during transport or storage, keep it in a cool, dry place.

Replacing the Wireless Foot Switch Battery
If the battery of the wireless foot switch is depleted within two days after a complete charge, contact technical support for a replacement battery. The battery may only be removed and replaced by a qualified service engineer.

Disposing of the Wireless Foot Switch Battery
The wireless foot switch contains a built-in rechargeable battery covered by the European Directive 2006/66/EC, which cannot be disposed of with normal household waste. To safeguard the functionality and safety of your product, always bring your product to an official collection point or service center where a professional can remove or replace the battery. Inform yourself about the local regulations on separate collection of batteries. Correct disposal of batteries helps prevent negative consequences for the environment and human health.

15.5 User Quality Control Mode

To enable X-ray dose-related acceptance and constancy testing, the equipment provides a User Quality Control Mode (UQCM) to perform X-ray dose-related tests.
UQCM is intended for trained hospital radiation physicists or service engineers and comprises special user quality control procedures that are accessible by using a service dongle. This dongle is only made available by Philips Medical Systems once the user has followed the appropriate training. For more information, see Contacting Philips (page 427).

For details of the recommended frequency of these tests, see Planned Maintenance Program (page 288).

In case of failure of the measurements performed under UQCM, contact technical support.

15.6 User Verification Test

Perform this procedure to verify system functionality.

1 Perform a cold restart of the system:

a On the review module, press and hold **Power Off**.

b Release the button when the indicator light begins to flash.

c When the indicator light stops flashing, wait 10 seconds.

d On the review module, press and hold **Power On**.

NOTE
Do not operate any of the controls while the system is powering on, as this may inhibit the start-up process.

A cold restart of the system takes 6 minutes from initiation of the cold restart until all system functionality is available.

2 Test the collimator functions using fluoroscopy and confirm that the X-ray on indicators are on while X-ray is active.

For more information about X-ray on indicators, see X-ray On Indicators (page 104).

3 Test the table and the stand movements without using X-ray.

4 Perform the following test using a user-defined phantom for constancy evaluation.

a Position the stand in a vertical position.

b Place the phantom on the table and in the X-ray beam.

c For constancy evaluation, use a fixed source-to-image distance and a consistent choice for field of view.

d Perform fluoroscopy and check whether the X-ray indications are as expected, and that the kV and mA values are within the expected ranges for the constancy evaluation.

e Perform a digital cardiac or vascular exposure series and check whether the X-ray indications are as expected, and the kV and mA values are within the expected ranges for the constancy evaluation.

15.6.1 Automatic Exposure Control Test

1 Select a pulsed fluoroscopy X-ray protocol.

2 Close the shutters to apply full collimation.

3 Perform pulsed fluoroscopy twice and note the exposure parameters.

The kV value must reach the maximum programmed value (for example 110 kV) with no error message occurring. This test also includes a test of the grid switch at the highest kV value.

15.6.2 Beam Limitation Check

You can perform the beam limitation check as needed If it is suspected that the beam limiting device (shutters) are malfunctioning.

1 Reset the shutters.

2 Position the tabletop horizontally and adjust it to maximum height.

3 Position the stand with the X-ray beam perpendicular to the tabletop.

4 Position two lead rulers crosswise on the tabletop and use tape to attach the rulers.

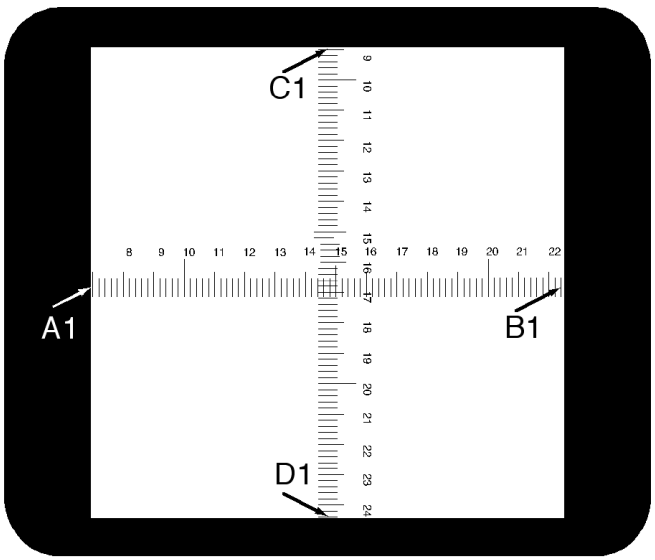
5 Move the detector as close as possible to the rulers.

6 Select a field size such that the rulers span the height and width of the entire screen (see figure below).

7 Acquire a fluoroscopy image.

8 Float the tabletop to position the center of the intersection of the two lead rulers in the center of the image.

9 Acquire a fluoroscopy image and write down the ruler values (A1 to D1), corresponding to the edges of the image.

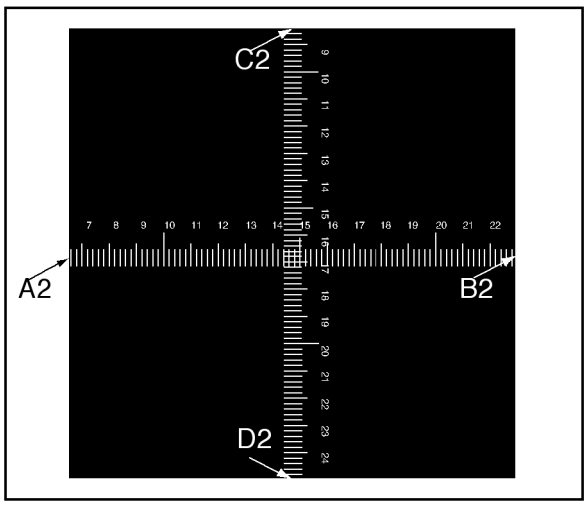


10 Position an adequately sized film cassette or digital film cassette on top of the rulers.

11 Expose the film (or digital film) by acquiring fluoroscopy.

The maximum density of the developed film should be 0.9 ± 0.1.

12 Write down the ruler values (A2 to D2).



13 Determine the distance [X] in cm between the focal spot and the tabletop.

NOTE
The position of the focal spot is indicated at the outside cover of the tube housing.

14 For each edge (A to D) calculate the following:

(Value 2 - Value 1) ≤ X/50.

EXAMPLE

A1 = 7; A2 = 6.8 and X = 85. Therefore the formula gives:

(6.8 - 7) ≤ 85/50 = 0.2 ≤ 1.7, which is acceptable.

If any calculated value is larger than X/50, the beam limiting device is malfunctioning and you should contact technical support.

15.7 Viewing and Testing Network Connections

You can view and test the system's network connections to assist in troubleshooting.

1 To view the system's network connections, do one of the following in the review window:
- Click **System** and select **System Connectivity Overview**.
- Click the connection status icon in the notification area.

The following icons are used in the notification area to indicate the connection status:

	No connectivity problems have been detected.
	Connectivity problems have been detected.

The **Network Connections** dialog box is displayed showing a list of the system's network connections with information about each connection and its status.

2 To view the information for a network connection, select the connection in the list.

The following icons are used in the **Network Connections** dialog box to indicate the connection status:

	The connection is operational.
	The connection has an error.

Information about the selected network connection is displayed below the list and includes the name and status of the connection, when the last successful connection was made and some recommendations for appropriate action you can take.

If you are a system administrator, you are shown more detailed information about each connection.

3 To test an individual connection, do the following:

a Select the desired connection in the **Network Connections** dialog box.

b Click **Test Connection**.

The status of the connection and its associated information is refreshed.

15.8 Activating the Screen Saver

For occasions when you want to blank the monitors, you can activate the screen saver.

1 Ensure all geometry movements are stopped and that X-ray is not active.

2 Click **System** in the review window and select **Activate Screen Saver**.

A dialog box is displayed requesting you to confirm that you wish to activate the screen saver.

3 Do one of the following:
- To close the dialog box without activating the screen saver, click **Cancel**.
- To activate the screen saver, click **Activate**.

The screen saver is displayed.

4 To deactivate the screen saver, move the mouse or press any key or mouse button.

15.9 Viewing Audit Logs

If you are logged on as a system administrator, you can view an audit trail of actions carried out on the system.

1 Click **System** and select **View Audit Logs**.

The **Audit Trail Viewer** is displayed showing the list of actions carried out on the system.

2 To find for a specific action in the audit log, enter text in the search field and click **Search**.

Matching search results are displayed.

3 To close the **Audit Trail Viewer**, click **Close**.

For more information about audit trail settings, see Configuring Audit Trail Settings (page 260).

15.10 Saving Information for Technical Support

You can save information on the system for use by technical support.

The system allows you to save the following information:
- Images
- Log files

15.10.1 Saving a Series for Technical Support

If you encounter a problem with a series, you can save it to help with technical support.

When you save a series for technical support, the system saves the series that is displayed in the review window.

1 Ensure that the series you want to save is displayed in the review window.

2 In the review window, click **System** and select **Save Series for Technical Support**.

The series is saved and is available to assist in technical support activities.

15.10.2 Saving a Log File for Technical Support

If you encounter an error or a problem in the system, you can save a log file that Technical Support can use to assist in resolving the problem.

1 In the review window, click **System** and select **Save Log File for Technical Support**.

A dialog box is displayed asking you to confirm that you want to save the log file.

2 To close the dialog box without saving the log file, click **Cancel**.

3 To save the log file, click **Save**.

The following icons are displayed in the notification area, indicating the status of the saving operation:

	The log file is being saved.
	The log file is saved (displayed for 5 seconds when saving is complete).

15.11 Showing the Monitor Test Image

To assist with maintenance, you can make the system display the Society of Motion Pictures and Television Engineers (SMPTE) test image.

When the test image is displayed, you cannot use the system.

1 Ensure that the service application is not in use and that a remote assistance session is not being performed.

2 Click **System** in the review window and select **Show Monitor Test Image**.

A dialog box is displayed, requesting you to confirm that you want to display the test image.

3 Do one of the following:
- To close the dialog box without displaying the test image, click **No**.
- To display the test image, click **Yes**.

4 To stop displaying the image and restore the system to normal use, press any key or mouse button.

15.12 CBCT Calibration

You can perform CBCT calibration without assistance from technical support. For example, if you notice artifacts in CBCT acquisitions, you should perform CBCT calibration. Calibration should not be performed from inside the examination room.

NOTE
The following procedure is automated. Follow the instructions provided on-screen, and interact with the system when instructed to do so.

1 On the **System** menu, click **CBCT Calibration**.

2 In the **CBCT Calibration** dialog box, select a **Scan Type**:
- **Propeller**
- **Roll**

3 Follow the instructions provided in the **CBCT Calibration** dialog box to position the stand and table for the calibration procedure.

4 (FlexMove option or FlexArm option only) On the control module, use the **Move Beam XY Motorized** joystick to position the stand in the transverse zero position.

You can also do this by selecting a procedure in which the stand moves automatically to the transverse zero position.

5 Click **Start Calibration** and press and hold the acquisition hand switch or foot switch.

The system performs the calibration procedure.

6 Release the acquisition hand switch or foot switch when the system indicates that the calibration procedure is finished.

NOTE
If you release the hand switch or foot switch before the calibration procedure is complete, press the switch again to continue the procedure.

7 To stop the calibration procedure while it is in progress, click **Abort**.

15.13 Environmental Impact of the System

Good operational habits can significantly reduce the energy consumption of the system. Switching the X-ray system off when it is not in use has a positive impact on the environment.

As an alternative to switching the system on, you can use Video Only Mode (option) to use the monitors when X-ray is not needed. For more information, see Using Video Only Mode (Option) (page 57).

However, bear in mind that switching the system off has an impact on the clinical availability of the system. After switching the system on, it takes several minutes before full functionality is available.

NOTE
Switching the system on and off multiple times a day is not harmful.

For information, visit the following website and select one of the available guides:

www.cocir.org/initiatives/ecodesign-initiative/saving-energy

15.14 Disposing of the System

Final disposal is when the equipment or system is disposed of in such a way that it can no longer be used for its intended purpose. Philips Medical Systems is concerned about protecting the natural environment and ensuring continued safe and effective use of the system through proper support, maintenance and training.

Hospital staff should not de-install the system prior to disposal. Contact Philips to arrange for the system to be de-installed in a safe manner. For contact details, see Contacting Philips (page 427).

This symbol indicates that the equipment contains materials that are harmful to the environment if disposed of incorrectly.

Philips Medical Systems equipment is compliant with WEEE regulations. It is designed and manufactured to comply with relevant guidelines for environmental protection. As long as the system is properly operated and maintained it presents no risk to the environment. However, the equipment may contain materials which could be harmful to the environment if disposed of incorrectly. Use of such materials is essential for the implementation of certain functions and for meeting certain statutory and other requirements.

The system, or any part of it, should not be disposed of with industrial or domestic waste. The system may contain materials such as lead, tungsten or oil, or other hazardous substances that can cause serious environmental pollution.

Contact Philips for information about disposing of the system. For contact details, see Contacting Philips (page 427).

NOTE
Computer disks and media from the system could contain personal data. Contact Philips for information about disposing of these items.

Recycling
Philips Medical Systems supports responsible organizations with recovery of reusable parts, recycling useful materials, and the safe and effective disposal of equipment.

The WEEE Recycling passport of this product can be requested through the following website:

www.medical.philips.com/main/about/sustainability/recycling/index.wpd

Disposing of Batteries
Your product contains batteries covered by the European Directive 2006/66/EC, which cannot be disposed of with normal household waste. Inform yourself about the local regulations on separate collection of batteries. Correct disposal of batteries helps prevent negative consequences for the environmental and human health.

The following items have disposable batteries:
- Viewpad
- Wireless mouse

In Brazil, to contribute to environmental quality and your health, Philips will receive batteries and batteries sold or supplied with its products after their end of life, which will be sent to the environmentally correct destination. Philips has collection points for technical assistance.

Disposing of the Wireless Foot Switch Battery
The wireless foot switch contains a built-in rechargeable battery covered by the European Directive 2006/66/EC, which cannot be disposed of with normal household waste. To safeguard the functionality and safety of your product, always bring your product to an official collection point or service center where a professional can remove or replace the battery. Inform yourself about the local regulations on separate collection of batteries. Correct disposal of batteries helps prevent negative consequences for the environment and human health.

Passing the System on to Another User

If the system is passed to another organization, it must be in its complete state, including all product support documentation.

You should make the new user aware of the support services that Philips Medical Systems provides. Before passing on the system or taking it out of service, all patient data must be deleted and unrecoverable on the system. It should be backed up elsewhere, if necessary.

Passing medical electrical products on to a new responsible organization may create serious technical, medical, and legal risks. Such risks can arise even if the system is given away. A responsible organization is strongly advised to seek advice from a Philips representative before committing to passing on any product.

Once the system has been passed on to a new user, the previous user may still receive important safety-related information. In many jurisdictions there is a clear duty on the previous user to communicate such safety-related information to new users. Previous users who are unable or unprepared to do this should inform Philips Medical Systems about the new user.

16 Security

The system is compliant with the Security Technical Implementation Guide (STIG) standard.

16.1 Customer Role in the Product Security Partnership

Philips recognizes that the security of its products is an important part of your facility's in-depth security strategy. However, these benefits can only be realized if you implement a comprehensive, multi-layered strategy (including policies, processes, and technologies) to protect information and systems from external and internal threats.

Following industry-standard practice, your strategy should address physical security, operational security, procedural security, risk management, security policies, and contingency planning. The practical implementation of technical security elements varies by site and may employ a number of technologies, including firewalls, virus-scanning software, and authentication technologies.

As with any computer-based system, protection must be provided such that firewalls or other security devices are in place between the medical system and any externally accessible systems. The USA Veterans Administration has developed a widely used Medical Device Isolation Architecture for this purpose. Such perimeter and network defenses are essential elements in a comprehensive medical device security strategy.

The latest information on security and privacy, including recommended customer actions, can be found on the following website:

www.philips.com/productsecurity

NOTE
You should check the system's published cyber security status regularly on this website.

16.1.1 Risks Related to Security

To ensure the confidentiality, integrity, and availability of the device and related data, you should assess the risks to security based on the following recommendations.

- Implement network and physical access controls to limit the likelihood of compromise. For more information, see Customer Role in the Product Security Partnership (page 307).
- Monitor the product security recommendations issued by Philips on a regular basis. For more information, see Malware Protection (page 308).

The assessment should be repeated whenever changes are made to the network. Such changes include:
- Changes in the network configuration
- Connection of additional items to the network
- Disconnection of items from the network
- Updates or upgrades to items that are connected to the network

16.1.2 Detecting Security Failures

Azurion is designed to handle errors, including security failures, and restricts user access to the application level only. The system provides logging capabilities for local and remote services that support diagnostics and forensics.

Security failures arising from user actions display error messages for the user and create audit events according to the IHE ATNA integration profile.

Network communication failures are audited. An error message is displayed for the user when user interaction is required.

System failures are handled depending on the nature and severity of the failure and may result in changes to the workflow, error messages, logging, or audit events. For example, software that is not on the whitelist is not executed and the failure is logged.

A number of security features have been implemented in this product. It is recommended to contact technical support to activate these features, in cooperation with the IT specialist of the hospital. These features are described below.

Encryption of Personal Data
When personal data is stored on the system, this feature ensures that the media cannot be misused when removed from the system or site.

Secure DICOM Transfer
When medical images or data are transmitted over a network, this feature ensures that the data is not modified by intruders during transmission, as well as ensuring that the data cannot be read if it is intercepted and displayed.

This feature can be switched on or off for each network node, if required.

Audit Trail
Any user action involving personal data is logged to allow analysis as to whether any hostile action has been performed on the personal data.

Network Time Synchronization
This function ensures that every device on the network uses the same clock so that all relevant user actions and data transmissions, including audit trail actions, can be checked in chronological order.

This function can be configured by the service engineer during installation.

16.2 Malware Protection

Philips systematically analyzes sources of information related to cyber security vulnerabilities to assess the equipment's cyber security risk. To ensure the proper functioning of the medical device, Philips may recommend specific customer or service actions, or issue service recommendations to update, alter, or even replace the equipment's protection mechanisms.

The latest information, including the Product Security Policy Statement and recommended customer actions, can be found on the following website:

www.philips.com/productsecurity

NOTE
You should regularly check the published equipment's cyber security status on the website mentioned above.

Despite preventive measures already implemented, a remote possibility remains that the equipment may become infected with malware. When malware is detected, or when you notice that unfamiliar behavior or degraded performance occurs repeatedly, including after switched off and on again, you should contact technical support for an inspection. When the inspection confirms the infection, be sure to take measures to contain and remove the source of infection. Technical support will reinstall the equipment's software to bring the equipment back into specification. Technical support can also assist in accessing the equipment's event log, which may provide information useful for the investigation.

16.2.1 Security Updates

This equipment incorporates protection mechanisms against the intrusion of malware such as viruses. Without proper cyber security maintenance, the effectiveness of these provisions may degrade over time, since malware is continuously altered to target newly discovered vulnerabilities.

The systematic analysis on cyber security vulnerabilities includes an assessment on the applicability and need for applying security updates taking into account mitigating circumstances in the intended use and design of this equipment.

Security updates alter the equipment's design and thus require proper validation and approval by Philips. Security updates are deployed by the Philips Service organization and are only to be installed by authorized service engineers according to Philips maintenance procedures for medical devices.

The latest information, including recommended customer actions, can be found on the following website:

www.philips.com/productsecurity

16.2.2 Whitelist Protection

Whitelist protection software is installed on this equipment. The whitelist identifies all trusted software, which is allowed to execute on the equipment.

The protection software prohibits the execution of untrusted software, thus effectively blocking malware before damage is done. Instead of relying on frequent updates, as for antivirus software, it offers proactive protection against a wide spectrum of malware and malware alterations.

Since only known trusted software is allowed to run, no regular updates are required.

16.3 Personal Data

To prevent loss of personal data, you are advised follow these guidelines.

- Do not use the system for long-term storage of clinical data.
- Create backups of personal data in a secure way on a daily basis (at a minimum).
- Store the backups at a safe location, taking into account the environmental requirements for backup media.
- Frequently refresh the storage media to prevent loss of personal data due to obsolescence.

16.4 Automatic Logoff and Automatic Lockout

The Azurionsystem does not have an automatic logoff function or automatic lockout function.

You should use access control to restrict access to the system to authorized users.

17 Technical Information

The following sections provide information and data tables about the specification of the system.

17.1 Geometry

17.1.1 Beam Carriers

Floor-Mounted Stand with 12-in Detector
The X-ray beam field is always aligned with the image receptor area and the reference axis is always perpendicular to the image receptor plane.

Item	Specification
Isocenter to floor	106.5 cm (41.9 in)
C-arm rotation	120 degrees LAO 120 degrees RAO
C-arm rotation speed	25 degrees/s
C-arm rotation for a rotational scan	Maximum rotation speed: 55 degrees/s Rotation angle: -120 to +120 degrees
C-arm angulation	45 degrees cranial 45 degrees caudal
C-arm angulation speed	25 degrees/s
L-arm rotation	-105 to +105 degrees
L-arm rotation speed	12 degrees/s
Detector movement	34.5 cm (13.6 in)
Detector movement speed	Toward the patient: 10 cm/s (3.9 in/s) Away from the patient: 20 cm/s (7.9 in/s)
Focal spot to isocenter	76.5 cm (30.1 in)
Source-to-image distance (SID)	89 to 123.5 cm (35.0 to 48.6 in)
C-arm depth	105 cm (41.3 in)

Ceiling-Mounted Stand with 12-in Detector
The X-ray beam field is always aligned with the image receptor area and the reference axis is always perpendicular to the image receptor plane.

Item	Specification
Isocenter to floor	106.5 cm (41.9 in)
Longitudinal movement	260 cm (102.4 in) 410 cm (161.4 in) with optional extended rail
Longitudinal movement speed	15 cm/s (5.9 in/s)
L-arm rotation	-90 to +90 degrees
L-arm rotation speed	12 degrees/s
C-arm rotation	120 degrees LAO 120 degrees RAO
C-arm rotation speed	25 degrees/s
C-arm rotation for a rotational scan	Maximum rotation speed: 55 degrees/s Rotation angle: -120 to +120 degrees
C-arm angulation	45 degrees cranial 45 degrees caudal
C-arm angulation speed	25 degrees/s

Item	Specification
Detector movement	34.5 cm (13.6 in)
Detector movement speed	Toward the patient: 10 cm/s (3.9 in/s) Away from the patient: 20 cm/s (7.9 in/s)
Focal spot to isocenter	76.5 cm (30.1 in)
Source-to-image distance (SID)	89 to 123.5 cm (35.0 to 48.6 in)
C-arm depth	105 cm (41.3 in)
Ceiling height	270 cm (106 in) with short L-arm 290 cm (114 in), with long L-arm

Floor-Mounted Stand with 15-in or 20-in Detector

The X-ray beam field is always aligned with the image receptor area and the reference axis is always perpendicular to the image receptor plane.

Item	Specification
Isocenter to floor	114.5 cm (45.1 in)
C-arm rotation	Head position: 120 degrees LAO, 185 degrees RAO Side position: 90 degrees LAO, 90 degrees RAO
C-arm rotation speed	25 degrees/s
C-arm angulation	Head position: 90 degrees cranial, 90 degrees caudal Side position: 185 degrees cranial, 120 degrees caudal
C-arm angulation speed	25 degrees/s
Focal spot to isocenter	81 cm (31.9 in)
Source-to-image distance (SID)	89.5 to 119.5 cm (35.2 to 47.0 in)
C-arm depth	90 cm (35.4 in)
Detector movement	30 cm (11.8 in)
Detector movement speed	Toward the patient: 10 cm/s (3.9 in/s) Away from the patient: 15 cm/s (5.9 in/s)
Detector rotation (rotation around the center of the functional detector surface)	Floor stand: 0 to +90 degrees Floor stand with L-arc-N 15: • Azurion release 1.x and release 2.x systems: 0 to +90 degrees • Azurion release 3.x system: -180 to +90 degrees Floor stand with L-arc-C 12, L-arc-C 15, or L-arc-N 12: 0 to +90 degrees
Detector rotation speed	Re-positioning of the detector between portrait and landscape: within 4 seconds
Z-rotation	Floor stand: -90 to +90 degrees Floor stand with L-arc-N 15: • Azurion release 1.x and release 2.x systems: -90 to +90 degrees • Azurion release 3.x system: -135 to +90 degrees Floor stand with L-arc-C 12, L-arc-C 15, or L-arc-N 12: -90 to +90 degrees
Z-rotation speed	12 degrees/s
C-arm rotation for a rotational scan	-185 to +120 degrees Maximum rotation speed in head position: 55 degrees/s
Ceiling height	Floor stand: 230 cm (90.6 in) Floor stand with L-arc: 298 cm (117.3 in)

Ceiling-Mounted Stand with 20-in Detector

The X-ray beam field is always aligned with the image receptor area and the reference axis is always perpendicular to the image receptor plane.

Item	Specification
Isocenter to floor	106.5 cm (41.9 in)
C-arm rotation	Head position: 120 degrees LAO, 185 degrees RAO Side position: 90 degrees LAO, 90 degrees RAO
C-arm rotation speed	25 degrees/s
C-arm angulation	Head-end position: 90 degrees cranial, 90 degrees caudal Side position: 185 degrees cranial, 120 degrees caudal
C-arm angulation speed	25 degrees/s
Longitudinal movement	Ceiling stand: • 260 cm (102.4 in) • 410 cm (161.4 in) with an extended rail of 150 cm (59.1 in) FlexArm: • 285 cm (112.2 in) • 460 cm (181.1 in) with extended rail type 1 • 635 cm (250.0 in) with extended rail type 2 FlexMove: • 440 cm (173.2 in) • 540 cm (212.6 in) with extended rail option
Lateral movement	FlexArm: 150 cm (59.1 in) FlexMove: -130 cm to +130 cm (-51.2 to +51.2 in), relative to the centerline of the patient table
Longitudinal/Lateral movement speed	15 cm/s (5.9 in/s)
Focal spot to isocenter	81 cm (31.9 in)
Source-to-image distance (SID)	89.5 to 119.5 cm (35.2 to 47.0 in)
C-arm depth	90 cm (35.4 in)
Detector movement	30 cm (11.8 in)
Detector movement speed	Toward the patient: 10 cm/s (3.9 in/s) Away from the patient: 15 cm/s (5.9 in/s)
Detector rotation (rotation around the center of the functional detector surface)	Ceiling stand and FlexMove: 0 degrees to +90 degrees FlexArm: -180 degrees to +90 degrees
Detector rotation speed	Re-positioning of the detector between portrait to landscape: within 4 seconds
Z-rotation	Ceiling stand: -90 degrees to +90 degrees FlexArm: -135 degrees to +135 degrees FlexMove: -90 degrees to +90 degrees
Z-rotation speed	12 degrees/s
C-arm rotation for a rotational scan	-185 degrees to +120 degrees, maximum rotation speed in head position 55 degrees/s
Ceiling height	270 cm (106 in), with short L-arm, 290 cm (114 in), with long L-arm 7C20 with FlexMove: 290 cm (114 in), with short L-arm 7C20 with FlexMove: 310 cm (122 in), with long L-arm

Lateral Stand for Biplane Systems

The X-ray beam field is always aligned with the image receptor area and the reference axis is always perpendicular to the image receptor plane.

Item	Specification
Isocenter to floor	B12/12: 106.5 cm (41.9 in) B20/12: 114 cm (44.9 in) B20/15: 114 cm (44.9 in)
L-arc rotation	L-arc-C with FD12: 0 degrees LAO to 90 degrees LAO L-arc-C with FD15: 0 degrees LAO to 90 degrees LAO L-arc-N with FD12: 27 degrees RAO to 115 degrees RAO L-arc-N with FD15: • Azurion release 1.x and release 2.x systems: 27 degrees RAO to 115 degrees RAO • Azurion release 3.x systems: 27 degrees RAO to 117 degrees RAO
L-arc rotation speed	L-arc-C with FD12: 8 degrees/s L-arc-C with FD15: 8 degrees/s L-arc-N with FD12: 8 degrees/s L-arc-N with FD15 • Azurion release 1.x and release 2.x systems: 8 degrees/s • Azurion release 3.x systems: 16 degrees/s
L-arc angulation	45 degrees cranial to 45 degrees caudal, possible at any rotation angle
L-arc angulation speed	L-arc-C with FD12: 8 degrees/s L-arc-C with FD15: 8 degrees/s L-arc-N with FD12: 8 degrees/s L-arc-N with FD15: • Azurion release 1.x and release 2.x systems: 8 degrees/s • Azurion release 3.x systems: 16 degrees/s
Source-to-image distance (SID)	L-arc-C with FD12: 87.8 cm (34.6 in) - 130.6 cm (51.4 in) L-arc-C with FD15: 87.4 cm (34.4 in) - 130.2 cm (51.3 in) L-arc-N with FD12: 87.8 cm (34.6 in) - 130.6 cm (51.4 in) L-arc-N with FD15: • Azurion release 1.x and release 2.x systems: 87.4 cm (34.4 in) - 130.2 cm (51.3 in) • Azurion release 3.x systems: 87.5 cm (34.4 in) - 130.1 cm (51.2 in)
Longitudinal movement	L-arc-C with FD12: 315 cm (124 in), optionally additional 150 cm (59.1 in) L-arc-C with FD15: 315 cm (124 in), optionally additional 150 cm (59.1 in) L-arc-N with FD12: 315 cm (124 in), optionally additional 150 cm (59.1 in) L-arc-N with FD15: • Azurion release 1.x and release 2.x systems: 315 cm (124 in), optionally additional 150 cm (59.1 in) • Azurion release 3.x systems: 312 cm (122.8 in), optionally additional 146 cm (57.5 in)
Longitudinal movement speed	L-arc-C with FD12: 6 cm/s (2.4 in/s) inside the working area, 12 cm/s (4.7 in/s) outside the working area L-arc-C with FD15: 6 cm/s (2.4 in/s) inside the working area, 12 cm/s (4.7 in/s) outside the working area L-arc-N with FD12: 8 cm/s (3.1 in/s) inside the working area, 12 cm/s (4.7 in/s) outside the working area L-arc-N with FD15: • Azurion release 1.x and release 2.x systems: 8 cm/s (3.1 in/s) inside the working area, 12 cm/s (4.7 in/s) outside the working area • Azurion release 3.x systems: 15 cm/s (5.9 in/s), safe speed 4 cm/s (1.6 in/s) outside the working area

17.1.2 Patient Table

Item	Specification
Table height (min, max)	Patient table without the tilt or cradle option: 74 to 102 cm (29.1 in to 40.4 in) Patient table with the tilt or cradle option: 79 to 104 cm (31.1 in to 40.9 in)
Tabletop length (including table accessory rail)	319 cm (125.6 in)
Tabletop width	50 cm (19.7 in)
Longitudinal float range	120 cm (47.2 in)
Lateral float range	36 cm (14.2 in)
Maximum table load	275 kg (606 lb) 500 N additional force permitted for cardio-pulmonary resuscitation (CPR) with tabletop at maximum extension
Maximum patient weight	250 kg (551 lb)
Table up/down speed	30 mm/s (1.2 in/s)
Pivot	-90 to +180 degrees or -180 to +90 degrees
Swivel (including pivot)	Extended longitudinal range: 78.2 cm (30.8 in) Table height increase: +8 cm (3.2 in) Pivot range: -90 to +180 degrees only
Tilt and cradle	Tilting range: ±16.5 degrees isocentric Cradle tilting range: ±15 degrees Table height increase: • Minimum height +5 cm (+1.97 in) • Maximum height +2 cm (0.78 in)
Tilt	Tilting range: ±16.5 degrees isocentric Table height increase: • Minimum height +5 cm (+1.97 in) • Maximum height +2 cm (0.78 in)

17.1.3 Monitor Ceiling Suspension

Movement Range for Rail Systems

Item	Specification
Rotation range	360 degrees
Transversal movement range	293 cm (115.4 in)
Longitudinal movement range	330 cm (129.9 in)
Height movement (motorized)	1-fold, 3-fold, and 4-fold rail system: 32 cm (12.6 in) 2-fold rail system: 52 cm (20.5 in)

Movement Range for Boom Systems

Item	Specification
Rotation range	1-fold and 4-fold boom systems: 350 degrees 2-fold and 3-fold light boom systems: 315 degrees
Reach (maximum range in horizontal plane)	1-fold and 4-fold boom systems: 241 cm (94.9 in) 2-fold and 3-fold light boom systems: 201 cm (79.1 in)
Height movement (can be adjusted to reduced range)	1-fold and 4-fold boom systems: 82 cm (32.3 in) 2-fold and 3-fold light boom systems: 106 cm (41.7 in)

Dimensions

Item	Width × Height × Depth
2 Fold MCS on Philips boom frame + monitor	1500 × 600 × 313 mm (59.1 × 23.6 × 12.3 in)
3 Fold MCS on Philips boom frame + monitor	1027 × 925 × 318 mm (40.4 × 36.4 × 12.5 in)
4 Fold MCS on Philips boom frame + monitor	1500 × 1020 × 330 mm (59.1 × 40.2 × 13.0 in)
6 Fold MCS on Philips boom frame + monitor	1500 × 1020 × 460 mm (59.1 × 40.2 × 16.9 in)
1 Fold FlexVision XL on Philips boom frame + monitor	1600 × 1020 × 335 mm (63.0 × 40.2 × 13.2 in)
3 Fold FlexVision XL on Philips boom frame + monitor	1600 × 1020 × 435 mm (63.0 × 40.2 × 17.1 in)

Actuator

Item	Specification
Mains voltage	230 V
Mains frequency	50/60 Hz
Maximum power consumption	500 W
Maximum speed	12 to 24 mm/s (0.47 to 0.95 in/s) depending on the load and direction of movement

17.1.4 Monitor Boom

Configuration

The monitor boom is available in the following configurations.

Configuration	Weight
1-fold monitor boom with one FlexVision monitor (58-in, option)	159.9 kg
3-fold monitor boom with one FlexVision monitor (58-in, option) and two 27-in rear-view monitors	185.9 kg
4-fold monitor boom with three or four[1] 27-in monitors	128.9 kg
6-fold monitor boom with three or four[1] 27-in monitors and two 27-in rear-view monitors	154.9 kg
Note 1: The fourth monitor may be a third-party monitor for non-X-ray images. Contact Philips for more information.	

Movement Range

Item	Range
Upper arm (horizontal)	1400 mm
Lower arm (horizontal)	1015 mm
Total (horizontal)	2415 mm

17.1.5 Springarm Monitor Ceiling Suspension

NOTE
The springarm monitor ceiling suspension is only available for Azurion 3 series systems.

The springarm monitor ceiling suspension is available in the following configurations:
- 2-fold springarm monitor ceiling suspension for two 27-in (9 kg) monitors.
- 3-fold springarm monitor ceiling suspension for one 27-in (9 kg) monitor and two 19-in (5 kg) monitors.

A dummy monitor can be used to substitute one of the monitors in either configuration. Additional components cannot be mounted in the springarm monitor ceiling suspension.

17.1.6 Alternative Monitor Support Systems

If preferred, a compatible third-party monitor support system can be used to position additional monitors in the examination room.

For more information, refer to the Instructions for Use supplied with the monitor support system.

17.1.7 Accessories

This section provides details of accessories that can be used with the system.

Item	Identification [1]
Height-adjustable arm support	4598 007 5211X
Shoulder support board	4598 008 2855X
Arm support board	4598 007 5903X
Cerebral filter (not applicable for the FlexArm option)	9896 001 3362X
Peripheral X-ray filter	9896 000 3241X
Head support	4598 007 4807X
Standard mattress for Azurion series 3	4598 011 1024X
Standard mattress for Azurion series 5	4598 016 0935X
Standard mattress for Azurion series 7	4598 011 1020X
Cardio mattress for Azurion series 3	4598 011 1025X
Cardio mattress for Azurion series 5	4598 016 0936X
Cardio mattress for Azurion series 7	4598 011 1021X
Neuro mattress for Azurion series 3	4598 011 1028X
Neuro mattress for Azurion series 5	4598 016 0937X
Neuro mattress for Azurion series 7	4598 011 1023X
Neuro wedge	4598 007 9790X
Ratchet compressor	4598 007 2220X
Patient straps (table tilt and cradle accessory)	9896 002 0453X
Cardio viewpad	4598 006 7815X
Vascular viewpad	4598 006 7818X
XperGuide laser tool	4522 129 2372X

[1] X may be any number between 1 and 9.

XperGuide Laser Tool

XperGuide Laser Tool Specification

Item	Specification
Type	Laser with affixed optics to convert it into a crosshair laser
IEC classification	Class 1 Laser Product
Wavelength	635 nm
Power output assembly	<0.39 mW
Weight (including laser, holder, and battery)	0.3 kg

The following statement on compliance applies to the XperGuide laser tool:

Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

Guidance for Using the XperGuide Laser Tool

- Avoid exposing eyes to the laser at any time.
- Do not use the laser tool for investigation. The laser tool is for alignment only.
- The laser tool contains a laser with the IEC classification Class 1 Laser Product.

XperGuide Laser Tool Charger

The charger of the XperGuide laser tool is classified as Class II.

17.1.8 Detachable Parts

This section provides details of detachable parts that can be used with the system.

Item	Identification [1]
Additional table accessory rail	4598 012 9567X
Additional table accessory rail (US version)	4598 012 9568X
Anti-scatter grid (FD12)	9896 010 6943X
Anti-scatter grid (FD15)	9896 010 6905X
Anti-scatter grid (FD20)	9896 010 6904X
Anti-scatter grid (FD20, Neuro grid)	9896 010 7372X
Arm support board pad for Azurion series 3	4598 011 1026X
Arm support board pad for Azurion series 5	4598 016 0938X
Arm support board pad for Azurion series 7	4598 011 1022X
Cable supports	4598 006 5949X
Drip stand	9896 002 0633X
Elbow supports	4598 007 0274X
Handgrip and clamp set (table tilt and cradle accessory)	4598 007 4462X
Mouse table	4598 007 4805X
Table accessory rail clamps	9896 002 0461X
Table-mounted radiation shield	9896 000 7720X
Wireless foot switch (biplane)	4598 012 3825X
Wireless foot switch (monoplane)	4598 012 3823X
Wireless mouse	4598 004 7453X

[1] X may be any number between 1 and 9.

17.1.9 Ceiling-Suspended Radiation Shield

Item	Specification
Suspension arm	Two-section suspension arm: • 75 cm (29.5 in) horizontal beam • 91 cm (35.8 in) angulated part
Radiation shield	50 × 40 cm (19.7 × 15.7 in) with rounded corners A flexible apron 50 x 30 cm (19.7 × 11.8 in) is attached to the shield
Radiation shield material	Transparent leaded acrylic plate X-ray protection equivalent to 0.5 mm (0.02 in) Pb (also applicable for the apron)

Accessory Bracket

Item	Specification
Pivot pin length	32 mm (1.26 in)
Maximum torque	The total torque generated by the multiplication of the weights by distance from the center of gravity of the two components to the pivot pin may never exceed 225 Nm in all positions

17.1.10 Examination Light

For information about the safe use of this device and related technical information, refer to the manufacturer's instructions for use that is supplied with the examination light.

17.2 User Interface

17.2.1 Viewpad

Viewpad Laser Pointer

Item	Specification
Wavelength	Between 630 and 640 nm
Maximum output power	<1 mW

Viewpad Functions

Function	Cardio Viewpad	Vascular Viewpad
Copy the current image to the Reference 1 window (on biplane systems, the frontal image is copied)	Yes	Yes
Copy the current image to the Reference 2 window (on biplane systems, the lateral image is copied)	Yes	Yes
Copy the current image to the Reference 3 window (on biplane systems, images from both channels are copied, and are displayed side by side and synchronized)	Yes	Yes
Display the previous series	Yes	Yes
Display the next series	Yes	Yes
Display the previous image	Yes	Yes
Display the next image	Yes	Yes
Display all series in the study overview	Yes	Yes
Play the current series in looped movie mode	Yes	Yes
Play all series of the study in looped movie mode	Yes	Yes
Move the focus of the viewpad between the live X-ray window and each of the reference windows	Yes	Yes
Create a snapshot of the current image and stores it with the study	Yes	Yes
Enable or disables subtraction	No	Yes
Set the current image as the mask image for subtraction	No	Yes
Enable or disable landmarking	No	Yes

17.2.2 Wireless Foot Switch (Option)

Item	Specification
Frequency range	2402 MHz to 2480 MHz
Channel spacing	2 MHz

Item	Specification
Modulation	Gaussian Frequency Shift Keying (GFSK) Adaptive frequency-hopping on 40 channels
Range	10 m in open field
Conformity	Europe: EN 301 489-1 v2.1.1, EN 301 489-17 v3.2.0, EN 300 328 v2.1.1, EN 60950-1 USA: FCC, Part 15C, single modular, FCC Identifier: XK5-SW24LE Canada: RSS-247 Issue 1, 5158A-SW24LE Japan: MIC 204-650001, ARIB STD-66

17.3 X-ray Generation

17.3.1 X-ray Generator

This section contains information about the specification of the X-ray generator only. Information about usage of the X-ray generator that is specific to the Azurionsystem is described in the next section.

Methods of Measurement

Item	Measurement Unit	Method
X-ray tube voltage	Kilovolts (kV)	Tube voltage is measured with the aid of balanced high-voltage bleeders in the high voltage circuit
X-ray tube current	Milliamperes (mA)	Tube current is measured on the cathode side in the rectified high-voltage circuit of the X-ray generator
Load time	Seconds (s) or milliseconds (ms)	Load time is measured between 75% ±7.5% peak voltage of the high-voltage rise edge and 75% ±7.5% peak voltage of the high-voltage fall edge
Current-time product	Milliampereseconds (mAs)	Current-time product is measured on the cathode side in the rectified high voltage circuit of the HV generator between 75% ±7.5% peak voltage of the high-voltage rise edge and 75% ±7.5% peak voltage of the high-voltage fall edge

Loading Factors

Output Parameter	Mode	Loading Factor
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	Radiographic (Intermittent)	125 kV, 720 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	Radiographic (Intermittent)	1000 mA, 100 kV
Combination of X-ray tube current and X-ray tube voltage resulting in highest output power	Radiographic (Intermittent)	1000 mA, 100 kV
Highest constant output power at 100 kV, 0.1s	Radiographic (Intermittent)	100 kW, 1000 mA
The lowest current time product or the combination of loading factors resulting in the lowest current time product	Radiographic (Intermittent)	0.1 mAs
Nominal shortest irradiation time (AEC exposures)	AEC	Not applicable: no photo time technique
Ranges of tube load factors controlled by AEC	AEC	Ranges of tube load factors determined by X-ray protocol. The maximum range is: 40 – 125 kV; 10 – 1000 mA

Electrical Data

Item		Specification
Power supply	For current catalog numbers: 722220, 722229, 722230, 722231, 722232, 722233, 722234, 722235, and 722236	380 V – 480 V ±10%, 50 Hz / 60 Hz, 3 – phase, switched and fused (50 A slow blow) by system PDU
	For previous catalog numbers: 722221, 722222, 722223, 722224, 722225, 722226, 722227, and 722228	380 V – 480 V ±10%, 50 Hz / 60 Hz, 3 – phase, switched and fused (50 A slow blow) by system PDU
	For previous catalog numbers: 722063, 722064, 722067, 722068, 722078, and 722079	400 V – 480 V ±10%, 50 Hz / 60 Hz, 3 – phase, switched and fused (50 A slow blow) by system PDU
Radiography	Maximum voltage power	125 kV
	X-ray tube current	1000 mA
	Nominal electrical power	100 kW (100 kV, 1000 mA, 0.1 s)
	Maximum electrical power	• 100 kW • 1000 mA at 100 kV
Continuous output		1.5 kW (for example, 9 fpm at 100 kW, 0.1 s)
High-voltage generation		Converter
Ripple		DC voltage
Duty cycle		The generator can be used continuously as long as average power limitations described in X-ray Tube Usage (page 322) are satisfied.

Radiography with Automatic Exposure Control

Item	Specification
mAs	0.01 mAs…10 mAs
Switching times	3.0 ms…10 ms

Radiography without Automatic Exposure Control

Item	Specification
Tube voltage	40 kV…125 kV adjustable in steps of 1 kV or according to a sequence the steps of which roughly correspond to an exposure increment. In the case of tubes with lower maximum voltage this is limited accordingly.
Tube current	For kV-mA-s and kV-mAs techniques this can be adjusted in steps [1]
	10 m A...1000 mA
mAs range	0.1 mAs…2000 mAs
	Adjustable in steps [1]
Exposure times	1 ms…16 s
	Adjustable in steps [1]
Note 1: Steps selectable on system level	

Pulsed fluoroscopy with Grid Control

Item	Specification
Tube voltage	40 kV - 125 kV
Tube current	10 mA - 200 mA (depending on the tube configuration)

Accuracy

Item	Generator Performance	Requested by Standard
Tube voltage	± (5%)	± 8%
Tube current-time product	± (3% + 0.2 mAs)	± (10% + 0.2 mAs)

Item	Generator Performance	Requested by Standard
Tube current	± (5% + 1.0 mA) (Tp ≥ 35 ms) ± (8% + 1.0 mA) (1 < Tp < 35 ms)	± 20%
Exposure time	± (10% + 1 ms)	± (10% + 1 ms)
mAs post-exposure display	± (3% + 0.2 mAs)	
Post-exposure time display	± (2% + 0.1 ms)	

Automatic Exposure Control

The system adapts the exposure settings by varying one or more loading factors, based on the source-to-image distance and objects in the beam using automatic exposure control. The following graphs show an example of the range and inter-relationship of loading factors for a single X-ray protocol.

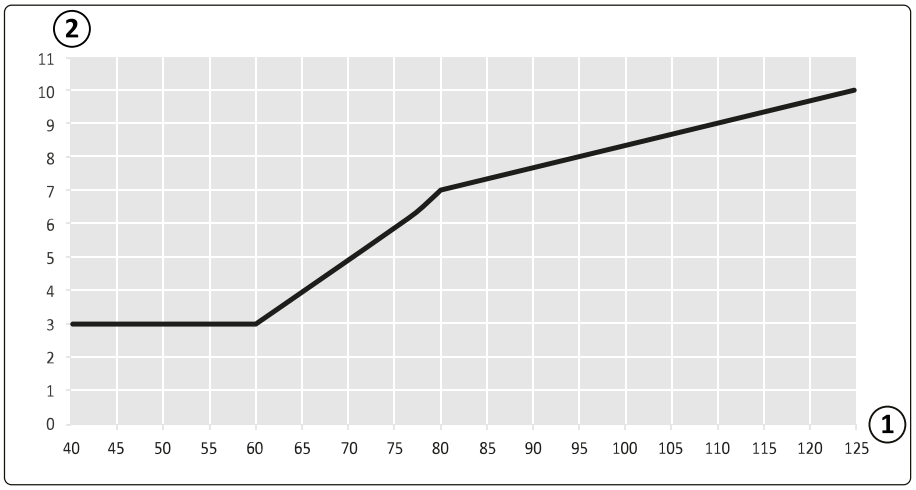


Figure 169 Loading factors (Left Coronary, 15 fps) - pulse width and tube voltage

Legend	
1	Tube voltage (kV)
2	Pulse width (ms)

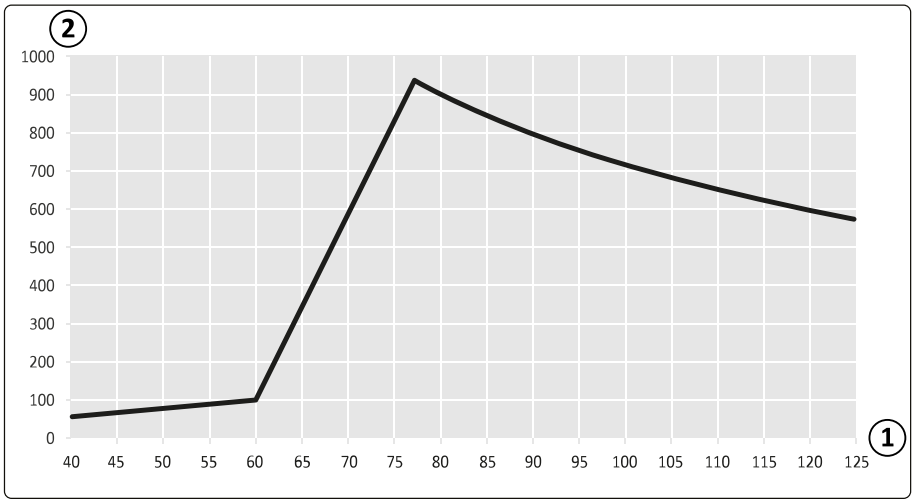


Figure 170 Loading factors (Left Coronary, 15 fps) - tube current and voltage

Legend	
1	Tube voltage (kV)
2	Tube current (mA)

Compatibility
The Certeray iX High Voltage generator is compatible with the following tubes made by Philips:
- MRC 200+ GS 0508
- MRC 200+ GS 0407
- MRC 200 GS 0508
- MRC 200 GS 0407

Labels
For information about labels, see Equipment Labels (page 405).

17.3.2 X-ray Tube Usage

The performance of the system is primarily determined by the X-ray tube (except for field sizes, which are determined by the detector).

Monoplane Systems	Current Catalog Number	Previous Catalog Number	X-ray Tube Assembly
Azurion 3 M12	722229	722221, 722063	MRC 200+ 0508 ROT-GS 1003
Azurion 3 M15	722230	722222, 722064	MRC 200+ 0407 ROT-GS 1004
Azurion 5 M12	722231	722227	MRC 200+ 0508 ROT-GS 1003
Azurion 5 M20	722232	722228	MRC 200+ 0407 ROT-GS 1004
Azurion 7 M12	722233	722223,722078	MRC 200+ 0508 ROT-GS 1003
Azurion 7 M20	722234	722224, 722079	MRC 200+ 0407 ROT-GS 1004

Biplane Systems	Current Catalog No.	Previous Catalog No.	Frontal X-ray Tube Assembly	Lateral X-ray Tube Assembly
Azurion 7 B12	722235	722225, 722067	MRC 200+ 0508 ROT-GS 1003	MRC 200+ 0508 ROT-GS 1003
Azurion 7 B20	722236	722226, 722068	MRC 200+ 0407 ROT-GS 1004	MRC 200+ 0508 ROT-GS 1003

FlexArm Option	Current Catalog Number	Previous Catalog Number	X-ray Tube Assembly
Azurion 7 M20	722234	722224, 722079	MRC 200+ 0407 ROT-GS 1008
Azurion FlexArm	722220	Not applicable	MRC 200+ 0407 ROT-GS 1008

Assembly of X-ray tube and collimator (X-ray source assembly)

Item	Specification
Loading factors corresponding to the maximum specified energy input to anode in one hour when applied at the nominal X-ray tube voltage	125 kV, 28 mA (3500 W)
Maximum symmetrical radiation field	MRC 200+ 0508 ROT-GS 1003: 28 x 28 cm at 1 m distance MRC 200+ 0407 ROT-GS 1004: 35 x 35 cm at 1 m distance MRC 200+ 0407 ROT-GS 1008: 35 x 35 cm at 1 m distance MRC 200 0508 ROT-GS 1003: 28 x 28 cm at 1 m distance MRC 200 0407 ROT-GS 1004: 35 x 35 cm at 1 m distance

17.3.3 X-ray Tube: MRC 200+ GS 0508

Item	MRC 200+ GS 0508
Focal spot size and loadability	0.5 mm nominal focal spot with maximal 45 kW loadability 0.8 mm nominal focal spot with maximal 85 kW loadability Based on 250 W anode reference power
Grid-switched pulsed fluoroscopy	Yes
Fluoroscopy power for 10 minutes	4500 W
Fluoroscopy power for 20 minutes	4000 W
Maximum X-ray field with SID = 100	28 x 28 cm (11.0 × 11.0 in)
Maximum X-ray field with SID = 120	33.6 x 33.6 cm (13.2 × 13.2 in)
Maximum X-ray field with SID = 70	19.6 x 19.6 cm (7.7 × 7.7 in)
Maximum anode cooling rate	1750 kHU/min
Maximum anode heat storage	6.4 MHUeff
Maximum assembly heat storage	9.4 MHUeff
Anode heat dissipation	21000 W
Continuous anode heat dissipation	3500 W
Maximum assembly continuous heat dissipation	4000 W
Anode target angle	9 degrees

Tube Output Power

Exposure	MRC 200+ GS 0508
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	85 kW (125 kV, 680 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	85 kW (850 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV, 680 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	1063 mA, 80 kV The maximum tube current cannot be reached with the current system configuration.
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.1 mAs (10 mA, 10 ms)

Fluoroscopy with Grid Switch	MRC 200+ GS 0508
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	25 kW (125 kV, 200 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	20 kW (200 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV[1], 200 mA
Minimum X-ray tube voltage and lowest X-ray tube current at that voltage	40 kV, 10 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	200 mA, 125 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.007 mAs (2 mA, 3.5 ms)
Note 1: Normal usage is 120 kV. For low load fluoroscopy, 125 kV is possible. *General note: Fluoroscopy is available in pulsed fluoroscopy mode only.*	

17.3.4 X-ray Tube: MRC 200+ GS 0407

Item	MRC 200+ GS 0407
Focal spot size and loadability	0.4 mm nominal focal spot with maximal 30 kW loadability 0.7 mm nominal focal spot with maximal 65 kW loadability Based on 250 W anode reference power
Grid-switched pulsed fluoroscopy	Yes
Fluoroscopy power for 10 minutes	4500 W
Fluoroscopy power for 20 minutes	4000 W
Maximum X-ray field with SID = 100	35 × 35 cm (13.8 × 13.8 in)
Maximum X-ray field with SID = 120	42 × 42 cm (16.5 × 16.5 in)
Maximum X-ray field with SID = 70	24.5 × 24.5 cm (9.6 × 9.6 in)
Maximum anode cooling rate	1750 kHU/min
Maximum anode heat storage	6.4 MHUeff
Maximum assembly heat storage	9.4 MHUeff
Anode heat dissipation	21000 W
Continuous anode heat dissipation	3500 W
Maximum assembly continuous heat dissipation	4000 W
Anode target angle	11 degrees

Tube Output Power

Exposure	MRC 200+ GS 0407
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	65 kW (125 kV, 520 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	65 kW (650 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV, 520 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	813 mA, 80 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.1 mAs (10 mA, 10 ms)

Fluoroscopy with Grid Switch	MRC 200+ GS 0407
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	20 kW (125 kV, 160 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	16 kW (160 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV[1], 160 mA
Minimum X-ray tube voltage and lowest X-ray tube current at that voltage	40 kV, 10 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	160 mA, 125 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.007 mAs (2 mA, 3.5 ms)
Note 1: Normal usage is 120 kV. For low load fluoroscopy, 125 kV is possible. *General note: Fluoroscopy is available in pulsed fluoroscopy mode only.*	

17.3.5 X-ray Tube: MRC 200 GS 0508

Item	MRC 200 GS 0508
Focal spot size and loadability	0.5 mm nominal focal spot with maximal 45 kW loadability 0.8 mm nominal focal spot with maximal 85 kW loadability Based on 250 W anode reference power
Grid-switched pulsed fluoroscopy	Yes
Fluoroscopy power for 10 minutes	-
Fluoroscopy power for 20 minutes	-
Maximum X-ray field with SID = 100	28 x 28 cm (11.0 × 11.0 in)
Maximum X-ray field with SID = 120	33.6 x 33.6 cm (13.2 × 13.2 in)
Maximum X-ray field with SID = 70	19.6 x 19.6 cm (7.7 × 7.7 in)
Maximum anode cooling rate	910 kHU/min
Maximum anode heat storage	2.4 MHU
Maximum assembly heat storage	5.4 MHU
Anode heat dissipation	11000 W
Continuous anode heat dissipation	3200 W
Maximum assembly continuous heat dissipation	3500 W
Anode target angle	9 degrees

Tube Output Power

Exposure	MRC 200 GS 0508
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	85 kW (125 kV, 680 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	85 kW (850 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV, 680 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	1063 mA, 80 kV The maximum tube current cannot be reached with the current system configuration.
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.1 mAs (10 mA, 10 ms)

Fluoroscopy with Grid Switch	MRC 200 GS 0508
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	25 kW (125 kV, 200 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	20 kW (200 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV[1], 200 mA
Minimum X-ray tube voltage and lowest X-ray tube current at that voltage	40 kV, 10 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	200 mA, 125 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.007 mAs (2 mA, 3.5 ms)
Note 1: Normal usage is 120 kV. For low load fluoroscopy, 125 kV is possible. *General note: Fluoroscopy is available in pulsed fluoroscopy mode only.*	

17.3.6 X-ray Tube: MRC 200 GS 0407

Item	MRC 200 GS 0407
Focal spot size and loadability	0.4 mm nominal focal spot with maximal 30 kW loadability 0.7 mm nominal focal spot with maximal 65 kW loadability Based on 250 W anode reference power
Grid-switched pulsed fluoroscopy	Yes
Fluoroscopy power for 10 minutes	4500 W
Fluoroscopy power for 20 minutes	3500 W
Maximum X-ray field with SID = 100	35 × 35 cm (13.8 × 13.8 in)
Maximum X-ray field with SID = 120	42 × 42 cm (16.5 × 16.5 in)
Maximum X-ray field with SID = 70	24.5 × 24.5 cm (9.6 × 9.6 in)
Maximum anode cooling rate	910 kHU/min
Maximum anode heat storage	2.4 MHU
Maximum assembly heat storage	5.4 MHU
Anode heat dissipation	11000 W
Continuous anode heat dissipation	3200 W
Maximum assembly continuous heat dissipation	3500 W
Anode target angle	11 degrees

Tube Output Power

Exposure	MRC 200 GS 0407
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	65 kW (125 kV, 520 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	65 kW (650 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV, 520 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	813 mA, 80 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.1 mAs (10 mA, 10 ms)

Fluoroscopy with Grid Switch	MRC 200 GS 0407
Highest electric power (X-ray tube current and X-ray tube voltage resulting in highest electric power)	20 kW (125 kV, 160 mA)
Highest electric output power at 100kV, 0.1s (X-ray tube current)	16 kW (160 mA)
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	125 kV[1], 160 mA
Minimum X-ray tube voltage and lowest X-ray tube current at that voltage	40 kV, 10 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	160 mA, 125 kV
Minimum X-ray tube current and lowest X-ray tube voltage at that current	10 mA, 40 kV
The lowest current time product (loading factors at the lowest current time product)	0.007 mAs (2 mA, 3.5 ms)
Note 1: Normal usage is 120 kV. For low load fluoroscopy, 125 kV is possible. *General note: Fluoroscopy is available in pulsed fluoroscopy mode only.*	

17.3.7 Accuracy of Dosimetric Indications and Automatic Control System

Dosimetric Indication	Accuracy
Accuracy of the reference air kerma	±35% (above 100 mGy)
Accuracy of reference air kerma rate	±35% (above 6 mGy/min)
Accuracy of cumulative dose area product	±35% (above 2.5 Gy·cm^2)
Coefficient of variation of the automatic control system	<0.05

The dosimetric indications for reference air kerma (rate) and cumulative dose area product are calculated using the acquisition parameters and a calibration procedure with a reference dose meter in the equipment. When the optional dose area product meter is used, the dose area product value comes from this instrument.

All given reference air kerma (rate) values have an accuracy of ±35%.

The unit of display for dose area product is configurable.

17.3.8 Collimator

Nicol V3 Collimator

Item	Specification
Minimum field size	<2x2 mm at 1 m source-to-image distance
Inherent filtration (without spectral filter)	≤0.1 mm Al equivalent at 75 kV
Maximum shutter operational speed at 1 m source-to-image distance	20 cm/s
Maximum wedge operational speed at 1 m source-to-image distance	10 cm/s
Maximum wedge operational rotational speed	90 degrees/s

Nicol V4 Collimator

Item	Specification
Minimum field size	<2x2 mm at 1 m source-to-image distance
Inherent filtration (without spectral filter)	≤0.1 mm Al equivalent at 75 kV
Maximum shutter operational speed at 1 m source-to-image distance	20 cm/s
Maximum wedge operational speed at 1 m source-to-image distance	10 cm/s
Maximum wedge operational rotational speed	90 degrees/s
Maximum collimator rotational speed (for systems with image beam rotation)	45 degrees/s

17.3.9 Anti-Scatter Grid

Detector Type	Line Rate	Grid Ratio	Focal Spot Distance
FD12	74 lines/cm	14	105 cm
FD15	70 lines/cm	13	100 cm
FD20	44 lines/cm	12	105 cm

17.4 Imaging

17.4.1 Detectors

12-in Detector

Item	Specification
Size of detector housing	47 cm (18 in) diagonal including BodyGuard
Detector dimensions	28.8 x 28.3 cm (11.3 x 11.1 in)
Maximum field of view	30 cm (12 in) diagonal
X-ray sensitive area	1344 x 1344 pixels (207 mm x 207 mm)
Detector zoom fields	30, 27, 22, 19, 15 cm (12, 11, 8, 7, 6 in) diagonal square formats
Pixel pitch	154 µm x 154 µm
Detector bit depth	16 bits
Nyquist frequency	3.2 lp/mm
DQE (0)	77% at 0 lp/mm
MTF at 1 lp/mm	59% (typical)

15-in Detector

Item	Specification
Size of detector housing	58 cm (22.8 in) diagonal
Detector dimensions	33.8 x 39.2 cm (13.3 x 15.4 in)
Maximum field of view	39 cm (15.2 in) diagonal
X-ray sensitive area	1420 x 1560 pixels, 261 mm x 287 mm
Detector zoom fields	39, 37, 31, 27, 22, 19, 15 cm (15, 14, 13, 10, 8, 7, 6 in) diagonal square formats
Pixel pitch	184 µm x 184 µm
Detector bit depth	16 bits
Nyquist frequency	2.7 lp/mm
DQE (0)	70% at 0 lp/mm
MTF at 1 lp/mm	59% (typical)

20-in Detector

Item	Specification
Size of detector housing	67 cm (26 in) diagonal, including BodyGuard
Detector dimensions	47.2 x 36.0 cm (18.6 x 14.2 in)
Maximum field of view	48 cm (19 in) diagonal
X-ray sensitive area	1904 x 2586 pixels, 293.2 mm x 398.2 mm
Detector zoom fields	48, 42, 37, 31, 27, 22, 19, 15 cm (19, 17, 14.4, 13, 10.5, 8, 7, 6 in) diagonal formats
Pixel pitch	154 µm x 154 µm
Detector bit depth	16 bits
Nyquist frequency	3.2 lp/mm
DQE (0)	77% at 0 lp/mm
MTF at 1 lp/mm	59% (typical)

17.4.2 Fluoroscopy

Item	Specification
Extra pre-filtration	SpectraBeam filters: 0.1, 0.4, 0.9 mm Cu and 1 mm Al backing.
Fluoroscopy image processing	Smart Recursive filtering, localized contrastadaptive contour enhancement and Clarity-IQ algorithm
Pulse rates	30, 25, 20, 15, 12.5, 10, 7.5, 6.25, 5, 3.75, 3.125, 2.5, 1.875, 1.25, 1.0, 0.625, 0.5 images/s
Frame grabbing of static fluoroscopy images	Yes
Fluoroscopy storage	Default storage of the up to 2000 images, based on PulsedFluoFrameSpeed (EPX defined) x FluoStoreLength (EPX defined)) of fluoroscopy for reference or archiving
Grid-switched pulsed fluoroscopy	Yes

17.4.3 Digital Acquisition

Item	Specification
Standard configuration	• Vascular mode: 0.5 to 12 images/s • Cardio and cine mode: 3.75 to 60 images/s
Image storage	50000 images (based on 1k2)
Storage extension (optional)	100000 images (based on 1k2)

17.5 System-Level Information

17.5.1 Environmental Requirements

Operation

Environmental Condition	Range (Minimum to Maximum)
Ambient temperature	+10°C to +30°C (+50°F to +86°F)
Relative humidity	20% to 80%
Pressure	70 kPa to 106 kPa (0 to 3000 m altitude) (700 hPa to 1060 hPa)

NOTE
To allow unrestricted air flow around the cabinets of the system, do not place any items on top of the cabinets.

NOTE
The equipment can be put in operation immediately after the environmental operating conditions have been reached.

Transport and Storage

Environmental Condition	Range (Minimum to Maximum)
Temperature	-25°C to +70°C (-13°F to +158°F)
Relative humidity	5% to 95%
Pressure	70 kPa to 110 kPa (0 to 3000 m altitude) (700 hPa to 1100 hPa)

Equipment IP Ratings

Equipment		IP Rating	Protection
System		IPX0	Not protected
Wireless mouse		IPX0	Not protected
Patient support table base		IPX1	Protected against vertically falling water drops
X-ray tube cover	For Azurion release 3.0 Neuro 20/15 biplane system (frontal and lateral stand)	IPX2	Protected against vertically falling water drops when enclosure tilted up to 15 degrees
	For the FlexArm option	IPX2	Protected against vertically falling water drops when enclosure tilted up to 15 degrees
	For all other systems	IPX0	Not protected
Patient support tabletop		IPX2	Protected against vertically falling water drops when enclosure tilted up to 15 degrees
Viewpad		IPX2	Protected against vertically falling water drops when enclosure tilted up to 15 degrees
Review module		IPX2	Protected against vertically falling water drops when enclosure tilted up to 15 degrees
Pan handle		IP03	Protected against spraying water
Control module		IPX4	Protected against splashing water
Touch screen module		IP44	Protected against splashing water
X-ray hand switch		IP54	Protected against splashing water and dust
Foot switch (wired and wireless)		IPX8	Protected against the effects of continuous immersion in water

The shaded area (1) in the following figure indicates the parts of the X-ray tube cover that are rated as IPX2.

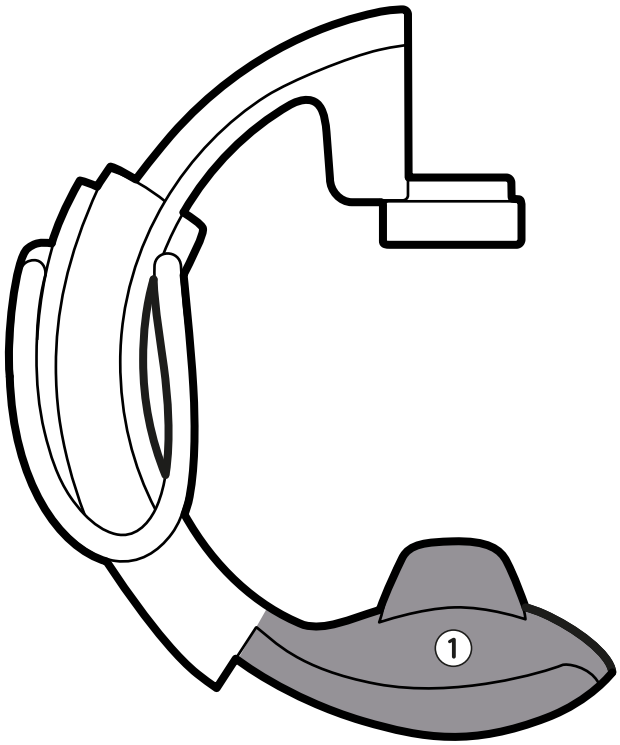


Figure 171 X-ray tube cover parts with IPX2 rating

Legend	
1	X-ray tube assembly and associated gantry elements

Heat Emission

The following table provides information about average heat emission during clinical use.

Equipment	Heat Emission
Basic monoplane system: • 3-fold springarm monitor ceiling suspension in the examination room • Two monitors and one workstation in the control room • Power injector	• Control room: 570 W • Examination room: 1600 W • Technical room: 3700 W
Basic biplane system: • One large monitor in the examination room • Two monitors and one workstation in the control room • Power injector	• Control room: 570 W • Examination room: 1800 W • Technical room: 6500 W
Additional large monitor	Additional 350 W
Additional small monitor	Additional 80 W
Additional workstation	Additional 300 W

17.5.2 Mains Power

The system is classified as class I equipment for continuous operation.

System

Configuration	Settings
Recording mode of operation	Continuous
Supply configurations	3 phase Y, 4 wires (L1, L2, L3, PE)
Mains voltage (±10%), long time current, peak current, frequency	3~380 V, 80 A, 338 Apk, 50/60 Hz 3~400 V, 76 A, 330 Apk, 50/60 Hz 3~415 V, 73 A, 325 Apk, 50/60 Hz 3~440 V, 69 A, 315 Apk, 50/60 Hz 3~480 V, 63 A, 300 Apk, 50/60 Hz
Momentary power	100 kVA MAX
Maximum resistance at the mains input terminal of the system For current catalog numbers: 722229, 722230, 722231, 722232, 722233, 722234, 722235, 722236, and 722220 For previous catalog numbers: 722221, 722222, 722223, 722224, 722225, 722226, 722227, and 722228	380 V: 74 mOhm (only applicable for Azurion release 2.1 and higher) 400 V: 140 mOhm 415 V: 215 mOhm 440 V: 325 mOhm 480 V: 465 mOhm
Maximum resistance at the mains input terminal of the system For previous catalog numbers: 722063, 722064, 722067, 722068, 722078, and 722079	400 V: 140 mOhm 415 V: 215 mOhm 440 V: 325 mOhm 480 V: 465 mOhm

NOTE
All connected phase wires shall have an upstream disconnect switch (80 A to 125 A) and a mains fuse or overcurrent breaker with a rating of 80 A to 125 A with gG characteristics (slow blow).

NOTE
All installations and wiring up to the incoming mains power shall be installed and verified to comply with applicable local regulations.

NOTE
Input wiring shall be at least 6AWG (13.3 mm^2).

Additional Equipment

Equipment	Mains Voltage	Mains Frequency	Maximum Power Consumption
Wireless foot switch charger	100 - 240 V AC	50 / 60 Hz	26 W
XperGuide laser tool charger	100 - 240 V AC	50 / 60 Hz	6 W (approximately)

Equipment	Mains Voltage	Mains Frequency	Maximum Power Consumption
Wall connection box (DVI-based systems)	100 - 240 V AC	50 / 60 Hz	40 W
Wall connection box (IP-based systems)	100 - 240 V AC	50 / 60 Hz	60 W
Equipment rack	100 - 240 V AC	50 / 60 Hz	3680 W

NOTE
If used, the following parts should be positioned so that they are easily accessible and can be disconnected from the power socket by a staff member in case of an emergency:
- ***The power cable of the wall connection box***
- ***The charger of the wireless foot switch***
- ***The charger of the XperGuide laser tool***

17.5.3 Wall Connection Box

The wall connection box provides galvanic isolated connections between the system and external equipment. Galvanic isolation ensures that the power source and grounding of the system and external equipment remain separated.

WARNING
Do not touch the electrical connectors on a wall connection box while simultaneously touching the patient. Connector contact pins may carry low voltages that are safe to touch, but that may be harmful to the patient.

CAUTION
Each wall connection box is limited to a single device. Check the accompanying documentation of a device before connecting it to a wall connection box.

NOTE
Cables to connect external equipment are supplied with the wall connection box.

The wall connection box provides the following interfaces.

Video Connection for DVI-Based Systems

Item	Specification
Standard	DVI 1.0
Connector type	DVI-I
Cable length (external equipment side)	3 m DVI-I to DVI-I cable 3 m VGA to DVI-I cable
Supported resolutions	Up to 1920 x 1200 x 60 Hz (WUXGA)
Supported clock frequencies	25-165 MHz
DVI lanes supported	1 lane
Supported features	EDID / DDC2, Hot Plug Detect optional

Video Connection for IP-Based Systems

Item	Specification
Standard	DVI 1.0 / DisplayPort 1.2
Connector type	DVI-I / DisplayPort (only one connection is allowed at a time)
Cable length (external equipment side)	3 m DVI-I to DVI-I cable 3 m DP to DP cable
Supported resolutions	Up to 1920 x 1200 x 60 Hz (WUXGA)
Supported clock frequencies	25-165 MHz
DVI lanes supported	1 lane
DP lanes supported	4 lanes, SST
Supported features	EDID / DDC2, Hot Plug Detect optional

Video Connection for IP-Based Systems with 4K Resolution

Item	Specification
Standard	DisplayPort 1.2
Connector type	DisplayPort
Cable length (external equipment side)	3 m DP to DP cable
Supported resolutions	Up to 3840 x 2160 x 60 Hz (UHD)
Supported clock frequencies	25-600 MHz
DP lanes supported	4 lanes, SST
Supported features	EDID / DDC2, Hot Plug Detect optional

Video Output Connection for IP-Based Systems

Item	Specification
Standard	DisplayPort 1.2
Connector type	DisplayPort (connections are limited to a single device)
Cable length (external equipment side)	3 m DP to DP cable
Supported resolutions	2 x 1920 x 1200 x 60 Hz (FHD) or 1 x 3840 x 2160 x 60 Hz (UHD)
Supported clock frequencies	25-600 MHz
DP lanes supported	DP 1.2 SST 2 lanes DP++ 1.2 SST 4 lanes (4K)
Supported features	DP++ connector supports SL-DVI output

USB Connection

Specification	
Standard	DVI-based systems: USB 1.1 IP-based systems: USB 2.0
Supported speeds	DVI-based systems: normal speed and full speed (maximum 12 Mbps) IP-based systems: normal speed, full speed, and high speed (maximum 480 Mbps)
Cable length (external equipment side)	3 m

Ethernet Connection

Specification	
Standard	IEEE Std. 802.3u/x (1000 Mbps)
Connector type	RJ45 shielded, CAT7 compliant
Cable length (external equipment side)	3 m

AC Power Input

Specification	
Cable length (molded cable for EU and US)	3 m
Un (nominal voltage rating)	100 – 240 V
Fn (nominal frequency rating)	50 / 60 Hz
Sn (nominal apparent power rating)	DVI-based systems: 40 VA IP-based systems: 60 VA
Fuse	1 A slow blow
Pollution degree	2

DC Power Output

Specification	
Voltage	5 V
Amperage	1 A

Wall Connection Box in the Examination Room
The wall connection box in the examination room should be mounted with the external interface connectors facing downwards.

17.5.4 Network Data

NOTE
Transfer speeds depend on the local situation (network load, network devices, and the external station).

DICOM Image Interface

Item	Specification
Maximum Ethernet transfer speed	1 Gbit/s
Transfer speed for images	2.5 Mbit/s

RIS/CIS DICOM Interface

Item	Specification
Maximum Ethernet transfer speed	1 Gbit/s

17.5.5 System Settings Influencing the Radiation Dose

The following sections provide additional information about system settings that influence the radiation dose.

You should also refer to the radiation guidelines given in Radiation Safety (page 24) for measures to reduce patient and staff dose, and to shield stray radiation.

X-ray Protocol Selection

X-ray protocols contain recommended predefined parameters. The parameters as preset by X-ray protocol selection are related to each other, and they have been tuned for an optimal image quality for a specific procedure.

Examples of these parameters are:
- Dose control mode (such as cine, test shot-lockin, CBCT).
- Timing mode (series, single-shot for cardiac, vascular).
- Dose control curve (for kV, mA, ms, detector-dose).
- Requested detector dose rate – for fluoroscopy only.
- Requested detector dose per image – for exposure only.
- Fluoroscopy frame speed (per fluoroscopy flavor).
- Exposure frame speed (for example, for cardiac procedures 7.5, 15, or 30 fps).
- Multiphase settings (for example, for vascular procedure: the duration and frame speed per phase).
- Spectral filter (mm Al + mm Cu).

The following examples give the reference air kerma values for typical cardiac, neuro, and vascular X-ray protocols.

System	X-ray Protocol			Reference Air Kerma (mGy/image)
12-in detector	Pediatric	Pediatrics	15 fps Normal	0.195
	Cardiac	Left Coronary	15 fps Normal	0.196

System	X-ray Protocol			Reference Air Kerma (mGy/image)
	Head	Cerebral	2 fps Normal	5.051
	Head	Cerebral	4 fps Normal	5.049
	Thorax	Lungs	3 fps	2.522
12-in detector with ClarityIQ (option)	Cardio Pediatric	<40 kg Cine	15 fps Low	0.019
	Cardio Pediatric	>40 kg Cine	15 fps Low	0.037
	Cardiac	Left Coronary	15 fps Low	0.036
	Cerebral	Cerebral	2 fps Low	0.978
	Cerebral	Cerebral	4 fps Low	0.978
	Thorax	Lungs	3 fps	1.208

Measurement conditions: patient type: default, field size: 30 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).

System	X-ray Protocol			Reference Air Kerma (mGy/image)
15-in detector	Pediatric	Pediatrics	15 fps Normal	0.126
	Cardiac	Left Coronary	15 fps Normal	0.125
	Head	Cerebral	2 fps Normal	2.785
	Head	Cerebral	4 fps Normal	2.784
	Thorax	Lungs	3 fps	4.312
15-in detector with ClarityIQ (option)	Cardio Pediatric	<40 kg Cine	15 fps Low	0.012
	Cardio Pediatric	>40 kg Cine	15 fps Low	0.023
	Cardiac	Left Coronary	15 fps Low	0.023
	Cerebral	Cerebral	2 fps Low	0.573
	Cerebral	Cerebral	4 fps Low	0.572
	Thorax	Lungs	3 fps	0.700

Measurement conditions: patient type: default, field size: 39 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).

System	X-ray Protocol			Reference Air Kerma (mGy/image)
20-in detector	Pediatric	Pediatrics	15 fps Normal	0.105
	Cardiac	Left Coronary	15 fps Normal	0.102
	Head	Cerebral	2 fps Normal	2.279
	Head	Cerebral	4 fps Normal	2.280
	Thorax	Lungs	3 fps	1.140
20-in detector with ClarityIQ (option)	Cardio Pediatric	<40 kg Cine	15 fps Low	0.010
	Cardio Pediatric	>40 kg Cine	15 fps Low	0.019
	Cardiac	Left Coronary	15 fps Low	0.018
	Head	Cerebral	2 fps Low	0.463
	Head	Cerebral	4 fps Low	0.463
	Thorax	Subclavian	3 fps	0.795

Measurement conditions: patient type: default, field size: 48 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).

The following examples give the reference air kerma rate for the three fluoroscopy flavors for a typical cardiac X-ray protocol.

System	X-ray Protocol	Flavor	Reference Air Kerma Rate (mGy/s)
12-in detector	Pediatric	Low	0.183
	Pediatric	Normal	0.434
	Pediatric	High	0.684
	Cardiac	Low	0.238

System	X-ray Protocol	Flavor	Reference Air Kerma Rate (mGy/s)
	Cardiac	Normal	0.517
	Cardiac	High	0.719
12-in detector with ClarityIQ (option)	Cardio Pediatric	Low	0.061
	Cardio Pediatric	Medium	0.092
	Cardio Pediatric	Normal	0.144
	Cardiac	Low	0.145
	Cardiac	Medium	0.214
	Cardiac	Normal	0.501
Measurement conditions: patient type: default, field size: 30 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).			

System	X-ray Protocol	Flavor	Reference Air Kerma Rate (mGy/s)
15-in detector	Pediatric	Low	0.112
	Pediatric	Normal	0.246
	Pediatric	High	0.412
	Cardiac	Low	0.121
	Cardiac	Normal	0.353
	Cardiac	High	0.421
15-in detector with ClarityIQ (option)	Cardio Pediatric	Low	0.038
	Cardio Pediatric	Medium	0.057
	Cardio Pediatric	Normal	0.087
	Cardiac	Low	0.090
	Cardiac	Medium	0.132
	Cardiac	Normal	0.322
Measurement conditions: patient type: default, field size: 39 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).			

System	X-ray Protocol	Flavor	Reference Air Kerma Rate (mGy/s)
20-in detector	Pediatric	Low	0.096
	Pediatric	Normal	0.217
	Pediatric	High	0.384
	Cardiac	Low	0.101
	Cardiac	Normal	0.296
	Cardiac	High	0.366
20-in detector with ClarityIQ (option)	Cardio Pediatric	Low	0.032
	Cardio Pediatric	Medium	0.048
	Cardio Pediatric	Normal	0.074
	Cardiac	Low	0.076
	Cardiac	Medium	0.113
	Cardiac	Normal	0.271
Measurement conditions: patient type: default, field size: 48 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).			

For an overview of a number of frequently used exposure procedures and fluoroscopy flavors, under defined measurement conditions, see Typical Reference Air Kerma (Rate) Values (page 344).

Patient Type

Although the system has an automatic dose control mechanism that compensates for the various depths of irradiated tissue, in some cases the image quality needs to be improved for very obese or very thin patients. This is achieved by the system by removing or adding spectral filtering.

The patient type selection may have an effect on the resulting reference air kerma. For optimal image quality, you should select a patient type that matches the actual patient thickness. You can change the

patient type by editing the scheduled study. For more information about editing study details, see Editing a Scheduled Study (page 64).

You can select one of the following patient types:

Patient Type	Weight
Neonate	<5 kg
Infant	5 - 15 kg
Child	15 - 40 kg
Small Adult	40 - 55 kg
Normal Adult	55 - 70 kg
Large Adult	70 - 90 kg
Very Large Adult	>90 kg

The table above provides guidance for manual patient type selection. You can also select the **Automatic** patient type. In this case the system automatically selects an appropriate patient type for each study based on the patient's age, height, and weight, which can be entered while scheduling the patient.

For some applications and procedures, the dose settings are equal for all patient types. In these cases the automatic dose control mechanism manages all depths of irradiated tissue without loss of image quality, and the patient type selection has no effect on the reference air kerma (rate). Examples are: fluoroscopy, roadmap, and vascular peripheral. The settings for the default patient type are used if no specific X-ray protocols are defined for the selected patient type.

For other applications and procedures, the patient type selection will influence the reference air kerma. See the following example for cardiac procedures:

System	Patient Type	Reference Air Kerma (mGy/image)
12-in detector • Cardiac procedure • Left Coronary • 15 fps Normal	Neonate	0.041
	Infant	0.074
	Child, Small Adult	0.117
	Default	0.196
	Large Adult, Very Large Adult	0.197
12-in detector • Pediatrics procedure • Pediatric • 15 fps Normal	Neonate	0.043
	Infant	0.074
	Child, Small Adult	0.115
	Default	0.195
Measurement conditions: field size: 30 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).		

System	Patient Type	Reference Air Kerma (mGy/image)
15-in detector • Cardiac procedure • Left Coronary • 15 fps Normal	Neonate	0.024
	Infant	0.046
	Child, Small Adult	0.072
	Default	0.125
	Large Adult, Very Large Adult	0.110
15-in detector • Pediatrics procedure • Pediatric • 15 fps Normal	Neonate	0.024
	Infant	0.039
	Child, Small Adult	0.072
	Default	0.126
Measurement conditions: field size: 39 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).		

System	Patient Type	Reference Air Kerma (mGy/image)
20-in detector	Neonate	0.020
	Infant	0.039

System	Patient Type	Reference Air Kerma (mGy/image)
• Cardiac procedure • Left Coronary • 15 fps Normal	Child, Small Adult	0.059
	Default	0.102
	Large Adult, Very Large Adult	0.089
20-in detector • Pediatrics procedure • Pediatric • 15 fps Normal	Neonate	0.021
	Infant	0.034
	Child, Small Adult	0.061
	Default	0.105
Measurement conditions: field size: 48 cm. All other settings in accordance with Reference Air Kerma Measurement Setup (page 386).		

For more information about the influence of patient thickness on the air kerma, see Influence of Oblique Projections (page 339).

Field Size

In general, the requested detector dose needs to be larger for smaller field sizes to compensate for increasing perceived noise at smaller field sizes. Therefore, the air kerma and air kerma rate is larger for smaller field sizes.

NOTE
Consider zooming fluoroscopy images with appropriate collimation, instead of using a small field size. Digital zooming does not influence the air kerma.

NOTE
Unlike air kerma, dose area product decreases at smaller field sizes, so using a small field size decreases the risk of stochastic effects. For example, for pediatric procedures, a small field size may be more appropriate.

For every fluoroscopy flavor and every exposure X-ray protocol, a programmable dose ratio for each field size and for each X-ray plane is available. The dose ratio indicates for each available field size the percentage detector dose increase, compared to the detector dose at the largest field size.

In the examples below, reference air kerma increases approximately proportionally with the dose ratio numbers. The same applies to reference air kerma rate for fluoroscopy. The measurement conditions used are in accordance with Reference Air Kerma Measurement Setup (page 386). The following values are for non-ClarityIQ systems.

12-in Detector			Dose ratio (%)	100	110	130	155	185
			Field Size (cm)	30	27	22	19	15
X-ray Protocol			Patient Type	Reference Air Kerma (mGy/image)				
Head	Cerebral	2 fps Low	Default	2.447	2.719	3.273	3.981	4.874

15-in Detector			Dose ratio (%)	100	110	130	150	180	215	260
			Field Size (cm)	39	37	31	27	22	19	15
X-ray Protocol			Patient Type	Reference Air Kerma (mGy/image)						
Head	Cerebral	2 fps Low	Default	1.392	1.535	1.838	2.158	2.630	3.227	4.002

20-in Detector			Dose ratio (%)	100	130	145	170	200	240	280	330
			Field Size (cm)	48	42	37	31	27	22	19	15
X-ray Protocol			Patient Type	Reference Air Kerma (mGy/image)							
Head	Cerebral	2 fps Low	Default	1.148	1.503	1.682	1.986	2.359	2.865	3.391	4.059

NOTE
The dose ratio numbers may differ for each procedure and for each fluoroscopy flavor.

Multiphase Settings

The vascular exposure procedure contains the default duration and frame speed per phase.

For these procedures it is possible to manually change the frame speed and duration per phase. For more information about changing frame speed and duration, see Changing Multiphase Acquisition Settings (page 128).

The reference air kerma is defined per image and will not change at different frame speeds. However, the cumulative skin dose is directly related to the frame speed and so, if the frame speed in one phase is reduced by 50%, the cumulative skin dose in that phase is also reduced by 50%.

Conclusion: Consider lowering the frame speed, if possible.

Shutters and Wedges

When you apply proper collimation, direct irradiation of body parts not needed for the procedure is prevented.

This reduces the dose area product and the staff dose, although the reference air kerma and the (peak) skin dose are not influenced.

In general, for example, 25% collimation of the irradiated area will reduce the dose area product by 25%.

Using the wedges reduces the radiation intensity in a user-defined area and improves the image quality. The wedges also reduce the dose area product and the staff dose.

The amount of radiation that is reduced by the wedges depends, for example, on the amount of the image coverage by the wedges.

Source-to-Image Distance

When the source-to-image distance is increased by a factor *x*, the system increases the skin dose by a factor x^2 to maintain the requested detector dose.

Hence, the source-to-image distance should be kept to a minimum (for a given source skin distance), so that the requested detector dose is reached with as low as possible skin dose. It is also important to keep the distance between the patient and the detector as small as possible. This improves image sharpness and, when combined with collimation, causes less staff dose (decreased scatter).

Table Height

The table height at a constant source-to-image distance does not influence the reference air kerma (rate), and the indicated air kerma (rate) value, as these are only applicable at the patient entrance reference point.

To minimize the skin dose (rate), the X-ray source must be as far from the skin as possible.

Influence of Oblique Projections

Due to the absorption of radiation in human tissue, the X-ray field strength is reduced by a factor 2, approximately every 3 cm.

For example, if the patient thickness is 27 cm, the X-ray beam loses intensity within the body by a factor of 512 ($2^{(27/3)}$). This shows that a thicker patient requires a larger entrance dose than a thin patient, to obtain the same detector dose.

The same applies to oblique projections of the X-ray beam since an oblique view generally increases the perceived patient thickness. This can be seen in the figure below where distance *2* (oblique) is considerably larger than distance *1*.

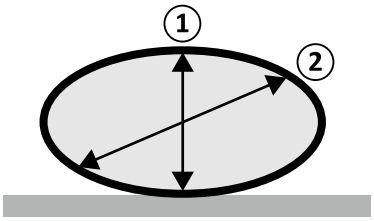


Figure 172 Patient thickness

The following examples show that the resulting air kerma is larger for a 30 cm PMMA than for a 20 cm PMMA patient thickness, when measured at the same system settings for three typical exposure procedures.

12-in Detector

System	X-ray Protocol		Patient Thickness	20 cm PMMA Reference Air Kerma (mGy/image)	30 cm PMMA Air Kerma (mGy/image)
12-in detector	Cardiac	Left Coronary	15 fps Normal	0.196	0.912
	Head	Cerebral	2 fps Normal	5.051	14.068
	Thorax	Lungs	3 fps	2.522	7.491
12-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.036	0.200
	Head	Cerebral	2 fps Low	0.978	6.749
	Thorax	Lungs	3 fps	1.208	6.460

Measurement conditions: patient type: default, field size: 30 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386), except for the different phantom thicknesses.

15-in Detector

System	X-ray Protocol		Patient Thickness	20 cm PMMA Reference Air Kerma (mGy/image)	30 cm PMMA Air Kerma (mGy/image)
15-in detector	Cardiac	Left Coronary	15 fps Normal	0.125	0.600
	Head	Cerebral	2 fps Normal	2.785	12.919
	Thorax	Lungs	3 fps	4.312	5.208
15-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.023	0.123
	Head	Cerebral	2 fps Low	0.573	4.018
	Thorax	Lungs	3 fps	0.700	4.119

Measurement conditions: patient type: default, field size: 39 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386), except for the different phantom thicknesses.

20-in Detector

System	X-ray Protocol		Patient Thickness	20 cm PMMA Reference Air Kerma (mGy/image)	30 cm PMMA Air Kerma (mGy/image)
20-in detector	Cardiac	Left Coronary	15 fps Normal	0.102	0.558
	Head	Cerebral	2 fps Normal	2.279	12.305
	Thorax	Lungs	3 fps	1.140	4.956
20-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.018	0.110
	Head	Cerebral	2 fps Low	0.463	3.765
	Thorax	Lungs	3 fps	0.569	3.861

Measurement conditions: patient type: default, field size: 48 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386), except for the different phantom thicknesses.

Exposure and Fluoroscopy Time to Reach the 2 Gy Limit

To reduce the risk of skin injuries, it is important to know after approximately how much exposure or fluoroscopy time the 2 Gy air kerma value will be reached.

The time remaining until the 2 Gy limit is reached for each study is displayed in the status area. For more information, see Status Area (page 438).

The number of exposure frames to reach 2 Gy (assuming no fluoroscopy) can be calculated by dividing 2000 mGy by the reference air kerma value per frame (as given in Typical Reference Air Kerma (Rate) Values (page 344), in mGy/image, for some of the most frequently used procedures).

The duration to reach 2 Gy in minutes is determined by dividing the number of exposure frames by the frame rate (fps) of the procedure, and dividing this by 60.

For fluoroscopy, the duration to reach 2 Gy in minutes (assuming no exposures) is determined by dividing 2000 mGy by the reference air kerma rate given in Typical Reference Air Kerma (Rate) Values (page 344) and dividing this by 60.

Exposure

The following example shows the number of exposures and time required to reach the 2 Gy limit, for a few typical exposure settings, and for a normal and an obese patient:

12-in Detector

System	X-ray Protocol	Patient Thickness		20 cm PMMA			30 cm PMMA		
				Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps	Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps
12-in detector	Cardiac	Left Coronary	15 fps Normal	0.196	10185	11 min	0.912	2194	2.4 min
	Head	Cerebral	2 fps Normal	5.051	396	3.3 min	14.068	142	1.2 min
	Head	Cerebral	4 fps Normal	5.049	396	1.7 min	15.413	130	0.5 min
	Thorax	Lungs	3 fps	2.522	793	4.4 min	7.491	267	1.5 min
12-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.036	55221	61.4 min	0.200	10022	11.1 min
	Head	Cerebral	2 fps Low	0.978	2045	17 min	6.749	296	2.5 min
	Head	Cerebral	4 fps Low	0.978	2044	8.5 min	6.749	296	1.2 min
	Thorax	Lungs	3 fps	1.208	1656	9.2 min	6.460	310	1.7 min

15-in Detector

System	X-ray Protocol	Patient Thickness		20 cm PMMA			30 cm PMMA		
				Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps	Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps
15-in detector	Cardiac	Left Coronary	15 fps Normal	0.125	16044	17.8 min	0.600	3335	3.7 min
	Head	Cerebral	2 fps Normal	2.785	718	6 min	9.478	211	1.8 min
	Head	Cerebral	4 fps Normal	2.784	718	5 min	9.843	203	0.8 min

System	X-ray Protocol	Patient Thickness		20 cm PMMA			30 cm PMMA		
				Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps	Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps
	Thorax	Lungs	3 fps	4.312	464	2.6 min	5.208	384	2.1 min
15-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.023	88265	98.1 min	0.123	16281	18.1 min
	Head	Cerebral	2 fps Low	0.573	3490	29.1 min	4.018	498	4,1 min
	Head	Cerebral	4 fps Low	0.572	3494	14.6 min	3.504	571	2.4 min
	Thorax	Lungs	3 fps	0.700	2856	15.9 min	4.119	486	2.7 min

20-in Detector

System	X-ray Protocol	Patient Thickness		20 cm PMMA			30 cm PMMA		
				Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps	Reference Air Kerma (mGy/image)	# Exp. Needed	Time at constant fps
20-in detector	Cardiac	Left Coronary	15 fps Normal	0.102	19515	21.7 min	0.558	3585	4.0 min
	Head	Cerebral	2 fps Normal	2.279	877	7.3 min	12.305	163	1.4 min
	Head	Cerebral	4 fps Normal	2.280	877	3.7 min	10.064	199	0,8 min
	Thorax	Lungs	3 fps	1.140	1754	9.7 min	4.956	404	2.2 min
20-in detector with ClarityIQ (option)	Cardiac	Left Coronary	15 fps Low	0.018	108243	120.3 min	0.110	18141	20.2 min
	Head	Cerebral	2 fps Low	0.463	4321	36 min	3.765	531	4.4 min
	Head	Cerebral	4 fps Low	0.463	4323	18 min	3.283	609	2.5 min
	Thorax	Lungs	3 fps	0.569	3512	19.5 min	3.861	518	2.9 min

Fluoroscopy

The following examples show the time required to reach the 2 Gy limit, for a few typical fluoroscopy flavor settings, and for a normal and an obese patient:

12-in Detector

System	X-ray Protocol	Patient Thickness	20 cm PMMA		30 cm PMMA	
		Flavor	Reference Air Kerma Rate (mGy/s)	Time required	Reference Air Kerma Rate (mGy/s)	Time required
12-in detector	Cardiac	Low	0.238	140 min	1.358	25 min
	Cardiac	Normal	0.517	64 min	2.251	15 min
	Head	Low	0.189	177 min	0.878	38 min
12-in detector with ClarityIQ (option)	Cardiac	Low	0.145	231 min	0.644	52 min
	Cardiac	Normal	0.501	67 min	2.269	15 min
	Head	Low	0.185	181 min	0.431	77 min

Measurement conditions: patient type: default, field size: 30 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386).

15-in Detector

System	X-ray Protocol	Patient Thickness Flavor	20 cm PMMA Reference Air Kerma Rate (mGy/s)	20 cm PMMA Time required	30 cm PMMA Reference Air Kerma Rate (mGy/s)	30 cm PMMA Time required
15-in detector	Cardiac	Low	0.121	275 min	0.725	46 min
	Cardiac	Normal	0.353	94 min	1.446	23 min
	Head	Low	0.169	197 min	0.722	46 min
15-in detector with ClarityIQ (option)	Cardiac	Low	0.090	370 min	0.421	79 min
	Cardiac	Normal	0.322	104 min	1.525	22 min
	Head	Low	0.121	275 min	0.362	92 min

Measurement conditions: patient type: default, field size: 39 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386).

20-in Detector

System	X-ray Protocol	Patient Thickness Flavor	20 cm PMMA Reference Air Kerma Rate (mGy/s)	20 cm PMMA Time required	30 cm PMMA Reference Air Kerma Rate (mGy/s)	30 cm PMMA Time required
20-in detector	Cardiac	Low	0.101	330 min	0.656	51 min
	Cardiac	Normal	0.296	113 min	1.328	25 min
	Head	Low	0.366	91 min	0.601	55 min
20-in detector with ClarityIQ (option)	Cardiac	Low	0.076	437 min	0.387	86 min
	Cardiac	Normal	0.113	295 min	1.415	24 min
	Head	Low	0.271	123 min	0.363	92 min

Measurement conditions: patient type: default, field size: 48 cm. All other settings are in accordance with Reference Air Kerma Measurement Setup (page 386).

Conclusion: The time to reach the 2 Gy limit is longer when the patient thickness decreases.

NOTE
As the total dose is a combination of exposure and fluoroscopy, the total time to reach 2 Gy for each will be less than calculated above.

Source-to-Skin Distance Spacer

The system can be equipped with a spacer on the X-ray tube housing, around the X-ray beam, which will maintain, a minimum source-to-skin distance of 38 cm. The use of the spacer is recommended, and is mandatory in the USA.

For specific surgical applications, which require a source-to-skin distance of less than 38 cm, the spacer can be removed. The spacer must be re-installed when the surgical application has been completed.

WARNING
Removing the source-to-skin distance spacer may increase the skin dose by 60%, when the X-ray source is placed against the patient's skin.

The source-to-skin distance without the spacer is 30 cm.

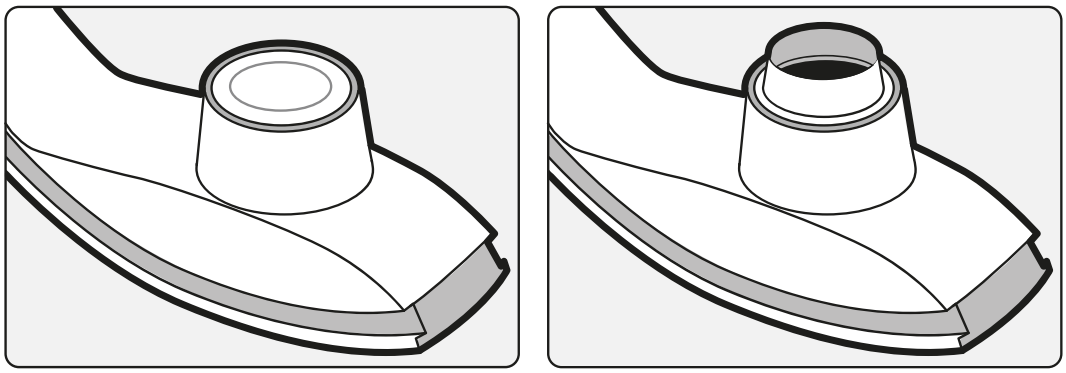


Figure 173 Stand without the spacer (left) and with the spacer (right)

Depending on the system in use, the spacer may look slightly different.

17.5.6 Typical Reference Air Kerma (Rate) Values

These Instructions for Use specify the Reference Air Kerma (Rate) values for a number of frequently used X-ray protocols and the levels of protection provided by the system against stray radiation. All dose values are automatically determined by the system, based on the X-ray protocol selected.

This section gives the actual reference air kerma (rate) values for a number of frequently used X-ray protocols and fluoroscopy flavors.

The measuring conditions are as defined in Reference Air Kerma Measurement Setup (page 386). The values are only applicable for the factory default X-ray protocol settings, without overrides.

All given reference air kerma (rate) values have an accuracy of ±50%.

M12 Systems

Radioscopy (Fluoroscopy) - M12 Systems

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
Cardio	Low	Default	0.233	0.254	0.296	0.349	0.420
	Norm	Default	0.512	0.664	0.850	0.861	0.876
	High	Default	0.709	0.770	0.884	1.026	1.183
Pediatrics	Low	Default	0.183	0.199	0.233	0.276	0.328
	Norm	Default	0.433	0.470	0.539	0.611	0.698
	High	Default	0.684	0.731	0.792	0.864	0.951
EP	Low	Default	0.087	0.095	0.112	0.132	0.157
	Norm	Default	0.206	0.224	0.261	0.308	0.365
	High	Default	0.247	0.269	0.313	0.368	0.436
EP Mapping	Low	Default	0.043	0.048	0.056	0.068	0.082
	Norm	Default	0.103	0.112	0.131	0.154	0.184
	High	Default	0.123	0.135	0.157	0.184	0.218
Head	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Spine	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Thorax	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
	High	Default	0.753	0.815	0.937	1.094	1.278
Abdomen	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Peripheral	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278

Radiography (Exposure) - M12 Systems

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Left Coronary 15 fps Low	Default	0.104	0.113	0.130	0.152	0.178
		Infant	0.074	0.079	0.088	0.099	0.114
		Large Adult, Very Large Adult	0.104	0.113	0.130	0.152	0.178
		Neonate	0.040	0.044	0.051	0.062	0.074
	Rotational Scan Prop Ang0 4s	Default	0.195	0.212	0.244	0.282	0.329
		Infant	0.063	0.068	0.078	0.090	0.106
		Neonate	0.040	0.044	0.051	0.062	0.074
Pediatrics	15 fps Contrast Normal	Default	0.195	0.212	0.244	0.282	0.329
		Child, Small Adult	0.115	0.125	0.145	0.169	0.198
		Infant	0.074	0.079	0.088	0.099	0.114
		Neonate	0.043	0.047	0.054	0.064	0.076
	Prop Free Position	Default	0.201	0.218	0.252	0.293	0.342
		Neonate, Infant	0.043	0.047	0.054	0.064	0.076
EP	15 fps	Default	0.115	0.125	0.145	0.169	0.198
	Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, nfant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
EP Mapping	7.5 fps low	Default	0.017	0.018	0.021	0.026	0.031
	3D EP Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
Head	Cerebral 2 fps normal	Default	4.895	5.436	6.540	7.701	8.502
		Child	3.153	3.378	3.820	4.379	5.072
		Neonate, Infant	3.153	3.378	3.820	4.379	5.072
	Aortic Arch 3 fps	Default	7.304	8.113	9.713	11.788	12.894
Spine	4 fps	Default	2.050	2.279	2.739	3.335	4.088
	2 fps	Default	2.566	2.851	3.428	4.172	5.113
Thorax	Lungs 2 fps	Default	2.446	2.719	3.269	3.950	4.361
	Subclavian 3 fps	Default	9.046	10.673	10.810	10.972	11.183
Abdomen	Abdomen	Default	3.824	4.242	5.101	6.198	7.578
	3 fps	Large Adult, Very Large Adult	3.317	3.681	4.434	5.398	6.620
	Iliac / Pelvis 3 fps	Default	7.297	8.108	9.730	11.842	14.472

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Peripheral	Upper Legs 3 fps	Default	6.608	7.334	8.209	8.933	9.781
	Lower Legs 1 fps	Default	8.229	8.644	9.320	10.125	11.043

Roadmap - M12 Systems

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
Pediatrics	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
EP	Navigate	Default	0.383	0.486	0.490	0.496	0.503
EP Mapping	Navigate	Default	0.383	0.486	0.490	0.496	0.503
Head	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Carotid	Default	0.381	0.461	0.465	0.470	0.476
	Coil	Default	1.818	2.020	2.428	2.951	3.611
Spine	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Stent	Default	0.381	0.461	0.465	0.470	0.476
Thorax	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Intervention	Default	0.381	0.461	0.465	0.470	0.476
Abdomen	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Stent	Default	0.381	0.461	0.465	0.470	0.476
Peripheral	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503

M12 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - M12 Systems with ClarityIQ

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
Cardio Clarity	Low	Default	0.147	0.159	0.184	0.214	0.250
	Medium	Default	0.217	0.236	0.274	0.322	0.380
	Normal	Default	0.512	0.553	0.635	0.737	0.858
Cardio Pediatrics Clarity <40 kg	Low	Default	0.061	0.066	0.078	0.091	0.109
	Medium	Default	0.092	0.100	0.116	0.135	0.158
	Normal	Default	0.144	0.157	0.181	0.211	0.248
Cardio Pediatrics Clarity >40 kg	Low	Default	0.061	0.066	0.078	0.091	0.109
	Medium	Default	0.092	0.100	0.116	0.135	0.158
	Normal	Default	0.144	0.157	0.181	0.211	0.248
EP Clarity	Low	Default	0.044	0.047	0.055	0.064	0.073
	Medium	Default	0.086	0.094	0.109	0.127	0.147

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/s)				
	Normal	Default	0.106	0.116	0.135	0.159	0.189
EP Mapping Clarity	Low	Default	0.044	0.047	0.055	0.064	0.073
	Medium	Default	0.086	0.094	0.109	0.127	0.147
	Normal	Default	0.106	0.116	0.135	0.159	0.189
Head Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Spine Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Thorax Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Abdomen Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Peripheral Clarity	Low	Default	0.147	0.159	0.184	0.214	0.250
	Medium	Default	0.217	0.236	0.274	0.322	0.380
	Normal	Default	0.512	0.553	0.635	0.737	0.858

Radiography (Exposure) - M12 Systems with ClarityIQ

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/image)				
Cardio Clarity	Left Coronary 15 fps Low	Default	0.037	0.040	0.047	0.055	0.065
	Rotational Scan Prop Ang0 4s	Default	0.195	0.212	0.244	0.282	0.329
		Infant	0.063	0.068	0.078	0.090	0.106
		Neonate	0.040	0.044	0.051	0.062	0.074
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.019	0.020	0.023	0.028	0.032
	15 fps Contrast normal	Default	0.030	0.033	0.039	0.046	0.055
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.037	0.040	0.047	0.055	0.065
		Neonate, Infant, Child	0.019	0.020	0.023	0.028	0.032
	15 fps Contrast normal	Default	0.077	0.084	0.097	0.113	0.133
		Neonate, Infant, Child	0.030	0.033	0.039	0.046	0.055
EP Clarity	15 fps	Default	0.037	0.040	0.047	0.055	0.065
	Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
EP Mapping Clarity	7.5 fps	Default	0.037	0.040	0.047	0.055	0.065
	3D EP Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Head Clarity	Cerebral 2 fps low	Default	0.990	1.099	1.318	1.602	1.953
	Aortic Arch 3 fps	Default	1.423	1.580	1.895	2.305	2.810
Spine Clarity	4 fps	Default	1.133	1.260	1.519	1.852	2.273
	2 fps	Default	1.134	1.260	1.518	1.853	2.273
Thorax Clarity	Lungs 2 fps	Default	1.221	1.357	1.630	1.986	2.432
	Subclavian 3 fps	Default	1.722	1.912	2.289	2.774	3.378
Abdomen Clarity	3 fps low	Default	0.797	0.884	1.060	1.285	1.569
	Iliac / Pelvis 3 fps	Default	3.890	4.322	5.202	6.340	7.138
Peripheral Clarity	Upper Legs 3 fps	Default	1.128	1.254	1.502	1.688	1.903
	Lower Legs 1 fps	Default	2.064	2.285	2.732	3.302	4.006

Roadmap - M12 Systems with ClarityIQ

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
EP Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
EP Mapping Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Head Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	Coil	Default	0.335	0.372	0.447	0.542	0.661
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Spine Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	Coil	Default	0.236	0.262	0.314	0.382	0.467
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Thorax Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279
Abdomen Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279
Peripheral Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279

M15 Systems

Radioscopy (Fluoroscopy) - M15 Systems

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)						
Cardio	Low	Default	0.121	0.132	0.155	0.179	0.214	0.251	0.313
	Norm	Default	0.353	0.380	0.432	0.484	0.557	0.634	0.754
	High	Default	0.421	0.454	0.519	0.586	0.680	0.780	0.936
Pediatrics	Low	Default	0.112	0.121	0.140	0.161	0.190	0.227	0.274
	Norm	Default	0.246	0.266	0.307	0.349	0.403	0.466	0.546
	High	Default	0.412	0.440	0.494	0.549	0.626	0.712	0.786
EP	Low	Default	0.051	0.055	0.065	0.075	0.090	0.108	0.130
	Norm	Default	0.121	0.132	0.154	0.176	0.207	0.248	0.300
	High	Default	0.144	0.157	0.184	0.212	0.253	0.305	0.372
EP Mapping	Low	Default	0.025	0.028	0.032	0.037	0.045	0.054	0.066
	Norm	Default	0.060	0.066	0.077	0.088	0.104	0.124	0.150
	High	Default	0.072	0.078	0.092	0.106	0.127	0.152	0.186
Head	Low	Default	0.169	0.183	0.214	0.246	0.293	0.355	0.435
	Norm	Default	0.287	0.309	0.356	0.403	0.473	0.550	0.640
	High	Default	0.388	0.417	0.477	0.537	0.624	0.728	0.859
Spine	Low	Default	0.132	0.143	0.166	0.191	0.227	0.273	0.334
	Norm	Default	0.285	0.307	0.354	0.401	0.470	0.547	0.636
	High	Default	0.473	0.508	0.583	0.657	0.763	0.892	1.054
Thorax	Low	Default	0.123	0.133	0.155	0.178	0.211	0.254	0.310
	Norm	Default	0.287	0.309	0.356	0.403	0.473	0.550	0.640
	High	Default	0.476	0.512	0.587	0.661	0.768	0.897	1.060
Abdomen	Low	Default	0.132	0.143	0.166	0.191	0.227	0.273	0.334
	Norm	Default	0.285	0.307	0.354	0.401	0.470	0.547	0.636
	High	Default	0.473	0.508	0.583	0.657	0.763	0.892	1.054
Peripheral	Low	Default	0.132	0.143	0.166	0.191	0.227	0.273	0.334
	Norm	Default	0.285	0.307	0.354	0.401	0.470	0.547	0.636
	High	Default	0.473	0.508	0.583	0.657	0.763	0.892	1.054

Radiography (Exposure) - M15 Systems

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)						
Cardio	Left Coronary	Default	0.064	0.069	0.080	0.091	0.106	0.125	0.148
	15 fps Low	Infant	0.046	0.049	0.055	0.060	0.068	0.078	0.090
		Large Adult, Very Large Adult	0.063	0.068	0.079	0.090	0.105	0.123	0.146
		Neonate	0.024	0.026	0.030	0.034	0.041	0.050	0.061
	Rotational Scan	Default	0.123	0.132	0.153	0.173	0.201	0.235	0.278
	Prop Ang0 4s	Infant	0.039	0.042	0.047	0.053	0.061	0.071	0.085
		Neonate	0.024	0.026	0.030	0.034	0.041	0.050	0.061
Pediatrics	15 fps Contrast Normal	Default	0.126	0.136	0.157	0.177	0.206	0.241	0.282
		Child, Small Adult	0.072	0.078	0.091	0.103	0.120	0.141	0.167

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)						
		Infant	0.039	0.042	0.047	0.053	0.062	0.072	0.086
		Neonate	0.024	0.026	0.030	0.035	0.041	0.050	0.062
	Prop Free Position	Default	0.122	0.131	0.151	0.172	0.201	0.235	0.276
		Neonate, Infant	0.027	0.029	0.033	0.037	0.043	0.050	0.060
EP	15 fps	Default	0.072	0.078	0.091	0.103	0.120	0.141	0.167
	15 fps	Default	0.072	0.078	0.091	0.103	0.120	0.141	0.167
EP Mapping	7.5 fps low	Default	0.010	0.011	0.013	0.015	0.017	0.021	0.025
	15 fps normal	Default	0.072	0.078	0.091	0.103	0.120	0.141	0.167
Head	Cerebral 2 fps normal	Default	2.785	3.068	3.675	4.316	5.260	6.448	7.902
		Child	1.770	1.883	2.124	2.373	2.730	3.198	3.838
		Neonate, Infant	1.770	1.883	2.124	2.373	2.730	3.198	3.838
	Aortic Arch 3 fps	Default	4.312	4.750	5.671	6.635	6.729	6.880	7.020
Spine	4 fps	Default	1.172	1.291	1.548	1.815	2.214	2.714	3.365
	2 fps	Default	1.466	1.615	1.934	2.271	2.767	3.394	4.209
Thorax	Lungs 2 fps	Default	1.399	1.543	1.848	2.168	2.624	2.896	3.234
	Subclavian 3 fps	Default	5.338	5.881	7.014	8.201	9.940	11.254	11.316
Abdomen	Abdomen	Default	2.616	2.883	3.446	4.047	4.925	6.030	6.554
	3 fps	Large Adult, Very Large Adult	2.264	2.500	2.991	3.520	4.290	5.262	6.538
	Iliac / Pelvis 3 fps	Default	4.250	4.687	5.605	6.578	7.999	9.805	12.139
Peripheral	Upper Legs 3 fps	Default	3.784	4.169	4.974	5.551	6.044	6.621	7.326
	Lower Legs 1 fps	Default	4.732	5.209	5.774	6.193	6.737	7.343	8.098

Roadmap - M15 Systems

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)						
Cardio	Navigate	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
	UnSubtract	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
Pediatrics	Navigate	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
	UnSubtract	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
EP	Navigate	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
EP Mapping	Navigate	Default	0.198	0.244	0.269	0.296	0.351	0.411	0.443
Head	Navigate	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Carotid	Default	0.212	0.225	0.252	0.279	0.318	0.342	0.347
	Coil	Default	1.064	1.171	1.401	1.645	2.001	2.450	3.037
Spine	UnSubtract	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Navigate	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Stent	Default	0.212	0.225	0.252	0.279	0.318	0.342	0.347
Thorax	UnSubtract	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Navigate	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Intervention	Default	0.212	0.225	0.252	0.279	0.318	0.342	0.347
Abdomen	UnSubtract	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Navigate	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Stent	Default	0.212	0.225	0.252	0.279	0.318	0.342	0.347

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)						
Peripheral	UnSubtract	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443
	Navigate	Default	0.246	0.266	0.307	0.330	0.401	0.437	0.443

M15 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - M15 Systems with ClarityIQ

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)						
Cardio Clarity	Low	Default	0.090	0.098	0.112	0.127	0.149	0.175	0.206
	Medium	Default	0.132	0.142	0.165	0.187	0.220	0.259	0.310
	Normal	Default	0.322	0.346	0.397	0.447	0.517	0.604	0.710
Cardio Pediatrics Clarity <40 kg	Low	Default	0.038	0.041	0.047	0.054	0.063	0.075	0.090
	Medium	Default	0.057	0.061	0.071	0.081	0.096	0.114	0.136
	Normal	Default	0.087	0.094	0.109	0.125	0.146	0.172	0.204
Cardio Pediatrics Clarity >40 kg	Low	Default	0.038	0.041	0.047	0.054	0.063	0.075	0.090
	Medium	Default	0.057	0.061	0.071	0.081	0.096	0.114	0.136
	Normal	Default	0.087	0.094	0.109	0.125	0.146	0.172	0.204
EP Clarity	Low	Default	0.027	0.029	0.033	0.038	0.044	0.052	0.061
	Medium	Default	0.053	0.057	0.066	0.075	0.087	0.103	0.121
	Normal	Default	0.063	0.069	0.080	0.091	0.108	0.128	0.153
EP Mapping Clarity	Low	Default	0.027	0.029	0.033	0.038	0.044	0.052	0.061
	Medium	Default	0.053	0.057	0.066	0.075	0.087	0.103	0.121
	Normal	Default	0.063	0.069	0.080	0.091	0.108	0.128	0.153
Head Clarity	Low	Default	0.121	0.131	0.147	0.163	0.187	0.217	0.255
	Medium	Default	0.186	0.202	0.234	0.267	0.316	0.367	0.427
	Normal	Default	0.343	0.370	0.426	0.482	0.563	0.661	0.784
Spine Clarity	Low	Default	0.121	0.131	0.147	0.163	0.187	0.217	0.255
	Medium	Default	0.186	0.202	0.234	0.267	0.316	0.367	0.427
	Normal	Default	0.343	0.370	0.426	0.482	0.563	0.661	0.784
Thorax Clarity	Low	Default	0.121	0.131	0.147	0.163	0.187	0.217	0.255
	Medium	Default	0.186	0.202	0.234	0.267	0.316	0.367	0.427
	Normal	Default	0.343	0.370	0.426	0.482	0.563	0.661	0.784
Abdomen Clarity	Low	Default	0.121	0.131	0.147	0.163	0.187	0.217	0.255
	Medium	Default	0.186	0.202	0.234	0.267	0.316	0.367	0.427
	Normal	Default	0.343	0.370	0.426	0.482	0.563	0.661	0.784
Peripheral Clarity	Low	Default	0.090	0.098	0.112	0.127	0.149	0.175	0.206
	Medium	Default	0.132	0.142	0.165	0.187	0.220	0.259	0.310
	Normal	Default	0.322	0.346	0.397	0.447	0.517	0.604	0.710

Radiography (Exposure) - M15 Systems with ClarityIQ

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)						
Cardio Clarity	Left Coronary 15 fps Low	Default	0.023	0.025	0.029	0.033	0.038	0.045	0.054
	Rotational Scan Prop Ang0 4s	Default	0.125	0.135	0.155	0.175	0.204	0.238	0.280
		Infant	0.039	0.042	0.047	0.053	0.061	0.071	0.085
		Neonate	0.024	0.026	0.030	0.034	0.041	0.050	0.061
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.012	0.013	0.015	0.017	0.020	0.023	0.028
	15 fps Contrast normal	Default	0.018	0.020	0.023	0.027	0.032	0.038	0.046
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.023	0.025	0.029	0.033	0.038	0.045	0.054
		Neonate, Infant, Child	0.012	0.013	0.015	0.017	0.020	0.023	0.028
	15 fps Contrast normal	Default	0.048	0.052	0.060	0.069	0.081	0.094	0.112
		Neonate, Infant, Child	0.018	0.020	0.023	0.027	0.032	0.038	0.046
EP Clarity	15 Fps	Default	0.023	0.025	0.029	0.033	0.038	0.045	0.054
EP Mapping Clarity	7.5 fps	Default	0.023	0.025	0.029	0.033	0.038	0.045	0.054
Head Clarity	Cerebral 2 fps low	Default	0.573	0.631	0.754	0.885	1.076	1.315	1.625
	Aortic Arch 3 fps	Default	0.817	0.900	1.076	1.261	1.534	1.876	2.319
Spine Clarity	4 fps	Default	0.492	0.542	0.651	0.766	0.933	1.150	1.429
	2 fps	Default	0.492	0.543	0.650	0.765	0.934	1.149	1.428
Thorax Clarity	Lungs 2 fps	Default	0.700	0.772	0.924	1.085	1.321	1.620	2.010
	Subclavian 3 fps	Default	0.988	1.090	1.301	1.523	1.848	2.253	2.773
Abdomen Clarity	3 fps low	Default	0.460	0.507	0.605	0.709	0.861	1.051	1.299
	Iliac / Pelvis 3 fps	Default	2.264	2.500	2.991	3.520	4.290	5.262	6.538
Peripheral Clarity	Upper Legs 3 fps	Default	0.641	0.706	0.827	0.923	1.059	1.216	1.390
	Lower Legs 1 fps	Default	1.184	1.303	1.553	1.812	2.132	2.402	2.730

Roadmap - M15 Systems with ClarityIQ

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)						
Cardio Clarity	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
EP Clarity	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
EP Mapping Clarity	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
Head Clarity	Navigate	Default	0.096	0.103	0.117	0.130	0.150	0.174	0.203
	Coil	Default	0.192	0.211	0.253	0.296	0.360	0.441	0.544

Procedure	Mode	Patient Type	Field of View	0	1	2	3	4	5	6
			Field Size (cm)	39	37	31	27	22	19	15
				Reference Air Kerma (mGy/image)						
	UnSubtract	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
Spine Clarity	Navigate	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
	Coil	Default		0.145	0.160	0.192	0.225	0.273	0.334	0.413
	UnSubtract	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
Thorax Clarity	UnSubtract	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
	Navigate	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
Abdomen Clarity	UnSubtract	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
	Navigate	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
Peripheral Clarity	Navigate	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203
	UnSubtract	Default		0.096	0.103	0.117	0.130	0.150	0.174	0.203

M20 Systems

Radioscopy (Fluoroscopy) - M20 Systems

Procedure	Flavor	Patient Type	Field of View	0	1	2	3	4	5	6	7
			Field Size (cm)	48	42	37	31	27	22	19	15
				Reference Air Kerma (mGy/s)							
Cardio	Low	Default		0.102	0.129	0.143	0.166	0.193	0.230	0.268	0.328
	Norm	Default		0.302	0.367	0.399	0.451	0.510	0.588	0.664	0.784
	High	Default		0.372	0.458	0.501	0.569	0.649	0.754	0.857	1.017
Pediatrics	Low	Default		0.096	0.119	0.131	0.150	0.173	0.205	0.237	0.273
	Norm	Default		0.217	0.269	0.294	0.336	0.386	0.450	0.503	0.584
	High	Default		0.384	0.463	0.499	0.558	0.625	0.688	0.743	0.826
EP	Low	Default		0.047	0.060	0.066	0.074	0.085	0.098	0.115	0.128
	Norm	Default		0.104	0.132	0.146	0.167	0.200	0.226	0.277	0.317
	High	Default		0.123	0.157	0.173	0.201	0.234	0.279	0.324	0.397
EP Mapping	Low	Default		0.024	0.030	0.033	0.037	0.043	0.049	0.058	0.065
	Norm	Default		0.052	0.066	0.073	0.083	0.100	0.113	0.138	0.159
	High	Default		0.062	0.078	0.086	0.100	0.117	0.139	0.162	0.198
Head	Low	Default		0.113	0.141	0.155	0.178	0.206	0.236	0.267	0.299
	Norm	Default		0.244	0.301	0.329	0.376	0.448	0.532	0.594	0.662
	High	Default		0.406	0.495	0.541	0.615	0.701	0.814	0.927	1.105
Spine	Low	Default		0.113	0.141	0.155	0.178	0.206	0.236	0.267	0.299
	Norm	Default		0.244	0.301	0.329	0.376	0.448	0.532	0.594	0.662
	High	Default		0.406	0.495	0.541	0.615	0.701	0.814	0.927	1.105
Thorax	Low	Default		0.113	0.141	0.155	0.178	0.206	0.236	0.267	0.299
	Norm	Default		0.244	0.301	0.329	0.376	0.448	0.532	0.594	0.662
	High	Default		0.406	0.495	0.541	0.615	0.701	0.814	0.927	1.105
Abdomen	Low	Default		0.113	0.141	0.155	0.178	0.206	0.236	0.267	0.299
	Norm	Default		0.244	0.301	0.329	0.376	0.448	0.532	0.594	0.662
	High	Default		0.406	0.495	0.541	0.615	0.701	0.814	0.927	1.105
Peripheral	Low	Default		0.113	0.141	0.155	0.178	0.206	0.236	0.267	0.299
	Norm	Default		0.244	0.301	0.329	0.376	0.448	0.532	0.594	0.662
	High	Default		0.406	0.495	0.541	0.615	0.701	0.814	0.927	1.105

Radiography (Exposure) - M20 Systems

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Cardio	Left Coronary	Default	0.053	0.066	0.073	0.083	0.096	0.112	0.128	0.153
	15 fps Low	Infant	0.039	0.048	0.052	0.057	0.064	0.072	0.080	0.093
		Large Adult, Very Large Adult	0.052	0.065	0.072	0.082	0.095	0.111	0.126	0.151
		Neonate	0.021	0.025	0.028	0.032	0.037	0.044	0.052	0.064
	Rotational Scan	Default	0.103	0.128	0.140	0.160	0.184	0.214	0.244	0.291
	Prop Ang0 4s	Infant	0.034	0.041	0.044	0.050	0.056	0.065	0.074	0.089
		Neonate	0.021	0.025	0.028	0.032	0.037	0.044	0.052	0.064
Pediatrics	15 fps Contrast Normal	Default	0.105	0.130	0.142	0.163	0.186	0.217	0.247	0.293
		Child, Small Adult	0.060	0.075	0.083	0.095	0.109	0.127	0.145	0.173
		Infant	0.034	0.041	0.044	0.050	0.056	0.065	0.074	0.089
		Neonate	0.021	0.025	0.028	0.032	0.037	0.044	0.052	0.064
	Prop Free Position	Default	0.101	0.127	0.139	0.159	0.182	0.213	0.243	0.289
		Neonate, Infant	0.023	0.028	0.030	0.034	0.039	0.046	0.052	0.063
EP	15 fps	Default	0.060	0.075	0.083	0.095	0.109	0.127	0.145	0.173
	Prop 4s	Default	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
		Neonate, Infant	0.073	0.095	0.120	0.121	0.123	0.125	0.127	0.129
		Large Adult, Very Large Adult	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
EP Mapping	7.5 fps low	Default	0.009	0.011	0.013	0.014	0.016	0.018	0.022	0.024
	3D EP Prop 4s	Default	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
		Neonate, Infant	0.073	0.095	0.120	0.121	0.123	0.125	0.127	0.129
		Large Adult, Very Large Adult	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
Head	Cerebral 2 fps normal	Default	2.295	3.004	3.359	3.973	4.718	5.731	6.779	8.103
		Child	1.525	1.899	2.044	2.282	2.565	2.945	3.354	3.884
		Neonate, Infant	1.603	1.899	2.044	2.282	2.565	2.945	3.354	3.884
	Aortic Arch 3 fps	Default	3.505	4.585	5.127	6.061	7.047	7.121	7.210	7.299
Spine	4 fps	Default	0.963	1.259	1.408	1.664	1.976	2.403	2.842	3.554
	2 fps	Default	1.203	1.572	1.759	2.082	2.470	3.003	3.555	4.445
Thorax	Lungs 2 fps	Default	1.148	1.502	1.682	1.987	2.357	2.727	2.962	3.245
	Subclavian 3 fps	Default	4.318	5.645	6.318	7.456	8.830	10.706	11.747	12.554
Abdomen	Abdomen	Default	2.140	2.799	3.131	3.699	4.389	5.335	6.304	6.395
	3 fps	Large Adult, Very Large Adult	1.856	2.431	2.719	3.214	3.817	4.643	5.496	6.877
	Iliac / Pelvis 3 fps	Default	3.476	4.546	5.089	6.010	7.138	8.669	10.255	12.255

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
Peripheral	Upper Legs 3 fps	Default	3.069	4.004	4.483	5.297	5.845	6.370	6.869	7.481
	Lower Legs 1 fps	Default	3.810	4.981	5.557	6.109	6.568	7.144	7.688	8.335

Roadmap - M20 Systems

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
Cardio	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
Pediatrics	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
EP	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
EP Mapping	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
Head	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Carotid	Default	0.184	0.219	0.236	0.263	0.294	0.334	0.355	0.358
	Coil	Default	0.869	1.137	1.273	1.504	1.784	2.167	2.559	3.203
Spine	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Stent	Default	0.184	0.219	0.236	0.263	0.294	0.334	0.355	0.358
Thorax	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Interventio n	Default	0.184	0.219	0.236	0.263	0.294	0.334	0.355	0.358
Abdomen	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Stent	Default	0.184	0.219	0.236	0.263	0.294	0.334	0.355	0.358
Peripheral	UnSubtract	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460
	Navigate	Default	0.207	0.257	0.280	0.320	0.366	0.423	0.456	0.460

M20 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - M20 Systems with ClarityIQ

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/s)							
Cardio Clarity	Low	Default	0.077	0.096	0.105	0.119	0.137	0.160	0.182	0.216
	Medium	Default	0.115	0.142	0.156	0.179	0.205	0.241	0.276	0.333
	Normal	Default	0.277	0.340	0.370	0.420	0.478	0.555	0.630	0.748
Cardio Pediatrics Clarity <40 kg	Low	Default	0.032	0.040	0.044	0.051	0.058	0.068	0.079	0.095
	Medium	Default	0.048	0.060	0.066	0.076	0.087	0.103	0.119	0.143
	Normal	Default	0.074	0.093	0.101	0.117	0.134	0.157	0.180	0.214

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/s)							
Cardio Pediatrics Clarity >40 kg	Low	Default	0.032	0.040	0.044	0.051	0.058	0.068	0.079	0.095
	Medium	Default	0.048	0.060	0.066	0.076	0.087	0.103	0.119	0.143
	Normal	Default	0.074	0.093	0.101	0.117	0.134	0.157	0.180	0.214
EP Clarity	Low	Default	0.030	0.030	0.030	0.034	0.039	0.046	0.052	0.062
	Medium	Default	0.059	0.059	0.059	0.068	0.078	0.091	0.104	0.123
	Normal	Default	0.076	0.076	0.076	0.087	0.101	0.119	0.137	0.166
EP Mapping Clarity	Low	Default	0.030	0.030	0.030	0.034	0.039	0.046	0.052	0.062
	Medium	Default	0.059	0.059	0.059	0.068	0.078	0.091	0.104	0.123
	Normal	Default	0.076	0.076	0.076	0.087	0.101	0.119	0.137	0.166
Head Clarity	Low	Default	0.103	0.128	0.139	0.155	0.179	0.209	0.234	0.264
	Medium	Default	0.157	0.196	0.215	0.248	0.297	0.355	0.395	0.441
	Normal	Default	0.288	0.356	0.389	0.446	0.511	0.595	0.681	0.814
Spine Clarity	Low	Default	0.103	0.128	0.139	0.155	0.179	0.209	0.234	0.264
	Medium	Default	0.157	0.196	0.215	0.248	0.297	0.355	0.395	0.441
	Normal	Default	0.288	0.356	0.389	0.446	0.511	0.595	0.681	0.814
Thorax Clarity	Low	Default	0.103	0.128	0.139	0.155	0.179	0.209	0.234	0.264
	Medium	Default	0.157	0.196	0.215	0.248	0.297	0.355	0.395	0.441
	Normal	Default	0.288	0.356	0.389	0.446	0.511	0.595	0.681	0.814
Abdomen Clarity	Low	Default	0.103	0.128	0.139	0.155	0.179	0.209	0.234	0.264
	Medium	Default	0.157	0.196	0.215	0.248	0.297	0.355	0.395	0.441
	Normal	Default	0.288	0.356	0.389	0.446	0.511	0.595	0.681	0.814
Peripheral Clarity	Low	Default	0.077	0.096	0.105	0.119	0.137	0.160	0.182	0.216
	Medium	Default	0.115	0.142	0.156	0.179	0.205	0.241	0.276	0.333
	Normal	Default	0.277	0.340	0.370	0.420	0.478	0.555	0.630	0.748

Radiography (Exposure) - M20 Systems with ClarityIQ

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
Cardio Clarity	Left Coronary 15 fps Low	Default	0.019	0.023	0.026	0.030	0.034	0.040	0.047	0.056
	Rotational Scan Prop Ang0 4s	Default	0.105	0.130	0.142	0.163	0.187	0.217	0.247	0.293
		Infant	0.034	0.041	0.044	0.050	0.056	0.065	0.074	0.089
		Neonate	0.021	0.025	0.028	0.032	0.037	0.044	0.052	0.064
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.010	0.012	0.013	0.015	0.018	0.021	0.024	0.028
	15 fps Contrast normal	Default	0.015	0.019	0.021	0.024	0.028	0.034	0.039	0.048
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.019	0.023	0.026	0.030	0.034	0.040	0.047	0.056
		Neonate, Infant, Child	0.010	0.012	0.013	0.015	0.018	0.021	0.024	0.028
	15 fps Contrast normal	Default	0.041	0.051	0.056	0.064	0.074	0.087	0.099	0.118
		Neonate, Infant, Child	0.015	0.019	0.021	0.024	0.028	0.034	0.039	0.048
EP Clarity	15 fps	Default	0.019	0.023	0.026	0.030	0.034	0.040	0.047	0.056
	Prop 4s	Default	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
		Neonate, Infant	0.073	0.095	0.120	0.121	0.123	0.125	0.127	0.129
		Large Adult, Very Large Adult	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
EP Mapping Clarity	7.5 fps	Default	0.019	0.023	0.026	0.030	0.034	0.040	0.047	0.056
	3D EP Prop 4s	Default	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
		Neonate, Infant	0.073	0.095	0.120	0.121	0.123	0.125	0.127	0.129
		Large Adult, Very Large Adult	0.115	0.147	0.184	0.186	0.188	0.190	0.193	0.196
Head Clarity	Cerebral 2 fps low	Default	0.466	0.609	0.682	0.805	0.957	1.159	1.370	1.639
	Aortic Arch 3 fps	Default	0.666	0.870	0.975	1.151	1.365	1.656	1.959	2.339
Spine Clarity	4 fps	Default	0.534	0.698	0.781	0.923	1.098	1.336	1.585	1.899
	2 fps	Default	0.534	0.699	0.781	0.923	1.098	1.336	1.583	1.898
Thorax Clarity	Lungs 2 fps	Default	0.574	0.751	0.841	0.993	1.179	1.433	1.695	2.030
	Subclavian 3 fps	Default	0.801	1.047	1.172	1.384	1.641	1.988	2.345	2.793
Abdomen Clarity	3 fps low	Default	0.602	0.787	0.880	1.040	1.236	1.501	1.778	2.126
	Iliac / Pelvis 3 fps	Default	0.574	0.751	0.840	0.993	1.180	1.432	1.695	2.029
Peripheral Clarity	Upper Legs 3 fps	Default	0.521	0.681	0.761	0.866	0.976	1.121	1.250	1.397
	Lower Legs 1 fps	Default	0.953	1.245	1.393	1.642	1.944	2.227	2.458	2.740

Roadmap - M20 Systems with ClarityIQ

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Cardio Clarity	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
EP Clarity	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
EP Mapping Clarity	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Head Clarity	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	Coil	Default	0.156	0.205	0.229	0.271	0.321	0.389	0.460	0.575
	Unsubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Spine Clarity	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	Coil	Default	0.156	0.205	0.229	0.271	0.321	0.389	0.460	0.575

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
	Unsubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Thorax Clarity	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Abdomen Clarity	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
Peripheral Clarity	UnSubtract	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211
	Navigate	Default	0.083	0.101	0.109	0.122	0.138	0.159	0.179	0.211

B12/12 Systems

Radioscopy (Fluoroscopy) - B12/12 Systems, Frontal Stand

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/s)				
Cardio	Low	Default	0.233	0.254	0.296	0.349	0.420
	Norm	Default	0.512	0.664	0.850	0.861	0.876
	High	Default	0.709	0.756	0.884	1.026	1.183
Pediatrics	Low	Default	0.183	0.199	0.233	0.276	0.328
	Norm	Default	0.433	0.470	0.539	0.611	0.698
	High	Default	0.684	0.731	0.792	0.864	0.951
EP	Low	Default	0.087	0.095	0.112	0.132	0.157
	Norm	Default	0.206	0.224	0.261	0.308	0.365
	High	Default	0.247	0.269	0.313	0.368	0.436
EP Mapping	Low	Default	0.043	0.048	0.056	0.068	0.082
	Norm	Default	0.103	0.112	0.131	0.154	0.184
	High	Default	0.123	0.135	0.157	0.184	0.218
Head	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Spine	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Thorax	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Abdomen	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278
Peripheral	Low	Default	0.184	0.252	0.291	0.299	0.310
	Norm	Default	0.472	0.503	0.565	0.641	0.734
	High	Default	0.753	0.815	0.937	1.094	1.278

Radioscopy (Fluoroscopy) - B12/12 Systems, Lateral Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
Cardio	Low	Default	0.263	0.287	0.334	0.395	0.479
	Norm	Default	0.576	0.749	0.957	0.970	0.987
	High	Default	0.802	0.850	0.997	1.155	1.349
Pediatrics	Low	Default	0.206	0.225	0.264	0.311	0.371
	Norm	Default	0.500	0.540	0.630	0.722	0.825
	High	Default	0.774	0.830	0.937	1.043	1.145
EP	Low	Default	0.099	0.108	0.128	0.153	0.182
	Norm	Default	0.232	0.252	0.294	0.348	0.415
	High	Default	0.279	0.303	0.353	0.416	0.493
EP Mapping	Low	Default	0.049	0.054	0.064	0.077	0.093
	Norm	Default	0.116	0.126	0.147	0.174	0.208
	High	Default	0.139	0.152	0.176	0.208	0.247
Head	Low	Default	0.209	0.287	0.332	0.342	0.355
	Norm	Default	0.543	0.581	0.657	0.750	0.857
	High	Default	0.848	0.919	1.058	1.233	1.444
Spine	Low	Default	0.209	0.287	0.332	0.342	0.355
	Norm	Default	0.543	0.581	0.657	0.750	0.857
	High	Default	0.848	0.919	1.058	1.233	1.444
Thorax	Low	Default	0.209	0.287	0.332	0.342	0.355
	Norm	Default	0.543	0.581	0.657	0.750	0.857
	High	Default	0.848	0.919	1.058	1.233	1.444
Abdomen	Low	Default	0.209	0.287	0.332	0.342	0.355
	Norm	Default	0.543	0.581	0.657	0.750	0.857
	High	Default	0.848	0.919	1.058	1.233	1.444
Peripheral	Low	Default	0.209	0.287	0.332	0.342	0.355
	Norm	Default	0.543	0.581	0.657	0.750	0.857
	High	Default	0.848	0.919	1.058	1.233	1.444

Radiography (Exposure) - B12/12 Systems, Frontal Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Left Coronary 15 fps Low	Default	0.104	0.113	0.130	0.152	0.178
		Infant	0.074	0.079	0.088	0.099	0.114
		Large Adult, Very Large Adult	0.104	0.113	0.130	0.152	0.178
		Neonate	0.040	0.044	0.051	0.062	0.074
	Rotational Scan Prop Ang0 4s	Default	0.195	0.212	0.244	0.282	0.329
		Infant	0.063	0.068	0.078	0.090	0.106
		Neonate	0.040	0.044	0.051	0.062	0.074
Pediatrics	15 fps Contrast Normal	Default	0.195	0.212	0.244	0.282	0.329
		Child, Small Adult	0.115	0.125	0.145	0.169	0.198
		Infant	0.074	0.079	0.088	0.099	0.114
		Neonate	0.043	0.047	0.054	0.064	0.076
	Prop Free Position	Default	0.201	0.218	0.252	0.293	0.342

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
		Neonate, Infant	0.043	0.047	0.054	0.064	0.076
EP	15 fps	Default	0.115	0.125	0.145	0.169	0.198
	Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, nfant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
EP Mapping	7.5 fps low	Default	0.017	0.018	0.021	0.026	0.031
	3D EP Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
Head	Cerebral 2 fps normal	Default	4.895	5.436	6.540	7.701	8.502
		Child	3.153	3.378	3.820	4.379	5.072
		Neonate, Infant	3.153	3.378	3.820	4.379	5.072
	Aortic Arch 3 fps	Default	7.304	8.113	9.713	11.788	12.894
Spine	4 fps	Default	2.050	2.279	2.739	3.335	4.088
	2 fps	Default	2.566	2.851	3.428	4.172	5.113
Thorax	Lungs 2 fps	Default	2.446	2.719	3.269	3.950	4.361
	Subclavian 3 fps	Default	9.046	10.673	10.810	10.972	11.183
Abdomen	Abdomen	Default	3.824	4.242	5.101	6.198	7.578
	3 fps	Large Adult, Very Large Adult	3.317	3.681	4.434	5.398	6.620
	Iliac / Pelvis 3 fps	Default	7.297	8.108	9.730	11.842	14.472
Peripheral	Upper Legs 3 fps	Default	6.608	7.334	8.209	8.933	9.781
	Lower Legs 1 fps	Default	8.229	8.644	9.320	10.125	11.043

Radiography (Exposure) - B12/12 Systems, Lateral Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Left Coronary	Default	0.117	0.128	0.147	0.172	0.201
	15 fps Low	Infant	0.081	0.087	0.097	0.110	0.126
		Large Adult, Very Large Adult	0.117	0.128	0.147	0.172	0.201
		Neonate	0.048	0.052	0.061	0.072	0.086
	Rotational Scan	Default	-	-	-	-	-
	Prop Ang0 4s	Infant	-	-	-	-	-
		Neonate	-	-	-	-	-
Pediatrics	15 fps Contrast Normal	Default	0.222	0.240	0.276	0.320	0.372
		Child, Small Adult	0.131	0.142	0.164	0.191	0.224
		Infant	0.081	0.087	0.097	0.110	0.126
		Neonate	0.048	0.052	0.061	0.072	0.086
	Prop Free Position	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
EP	15 fps	Default	0.131	0.142	0.164	0.191	0.224
	Prop 4s	Default	-	-	-	-	-
		Neonate, nfant	-	-	-	-	-

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
		Large Adult, Very Large Adult	-	-	-	-	-
EP Mapping	7.5 fps low	Default	0.019	0.021	0.024	0.029	0.035
	3D EP Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
Head	Cerebral 2 fps normal	Default	5.654	6.278	7.554	8.391	9.281
		Child	3.491	3.739	4.233	4.860	5.655
		Neonate, Infant	3.491	3.739	4.233	4.860	5.655
	Aortic Arch 3 fps	Default	8.478	9.399	11.276	13.029	13.856
Spine	4 fps	Default	1.806	2.011	2.428	2.967	3.648
	2 fps	Default	2.258	2.517	3.035	3.711	4.557
Thorax	Lungs 2 fps	Default	2.827	3.142	3.779	4.305	4.760
	Subclavian 3 fps	Default	10.511	12.386	12.544	12.732	12.977
Abdomen	Abdomen	Default	4.429	4.923	5.908	7.179	8.778
	3 fps	Large Adult, Very Large Adult	3.842	4.264	5.131	6.253	7.653
	Iliac / Pelvis 3 fps	Default	8.449	9.387	11.287	13.710	16.755
Peripheral	Upper Legs 3 fps	Default	6.048	6.336	6.894	7.585	8.413
	Lower Legs 1 fps	Default	6.790	7.107	7.707	8.437	9.318

Roadmap - B12/12 Systems, Frontal Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
Pediatrics	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
EP	Navigate	Default	0.383	0.486	0.490	0.496	0.503
EP Mapping	Navigate	Default	0.383	0.486	0.490	0.496	0.503
Head	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Carotid	Default	0.381	0.461	0.465	0.470	0.476
	Coil	Default	1.818	2.020	2.428	2.951	3.611
Spine	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Stent	Default	0.381	0.461	0.465	0.470	0.476
Thorax	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Intervention	Default	0.381	0.461	0.465	0.470	0.476
Abdomen	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503
	Stent	Default	0.381	0.461	0.465	0.470	0.476
Peripheral	UnSubtract	Default	0.383	0.486	0.490	0.496	0.503
	Navigate	Default	0.383	0.486	0.490	0.496	0.503

Roadmap - B12/12 Systems, Lateral Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
Pediatrics	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
EP	Navigate	Default	0.434	0.549	0.554	0.560	0.569
EP Mapping	Navigate	Default	0.434	0.549	0.554	0.560	0.569
Head	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	Carotid	Default	0.423	0.514	0.517	0.524	0.531
	Coil	Default	2.110	2.344	2.812	3.418	4.181
Spine	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	Stent	Default	0.423	0.514	0.517	0.524	0.531
Thorax	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	Intervention	Default	0.423	0.514	0.517	0.524	0.531
Abdomen	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
	Navigate	Default	0.434	0.549	0.554	0.560	0.569
	Stent	Default	0.423	0.514	0.517	0.524	0.531
Peripheral	UnSubtract	Default	0.434	0.549	0.554	0.560	0.569
	Navigate	Default	0.434	0.549	0.554	0.560	0.569

B12/12 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - B12/12 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
Cardio Clarity	Low	Default	0.147	0.159	0.184	0.214	0.250
	Medium	Default	0.217	0.236	0.274	0.322	0.380
	Normal	Default	0.512	0.553	0.635	0.737	0.858
Cardio Pediatrics Clarity <40 kg	Low	Default	0.061	0.066	0.078	0.091	0.109
	Medium	Default	0.092	0.100	0.116	0.135	0.158
	Normal	Default	0.144	0.157	0.181	0.211	0.248
Cardio Pediatrics Clarity >40 kg	Low	Default	0.061	0.066	0.078	0.091	0.109
	Medium	Default	0.092	0.100	0.116	0.135	0.158
	Normal	Default	0.144	0.157	0.181	0.211	0.248
EP Clarity	Low	Default	0.044	0.047	0.055	0.064	0.073
	Medium	Default	0.086	0.094	0.109	0.127	0.147
	Normal	Default	0.106	0.116	0.135	0.159	0.189
EP Mapping Clarity	Low	Default	0.044	0.047	0.055	0.064	0.073
	Medium	Default	0.086	0.094	0.109	0.127	0.147
	Normal	Default	0.106	0.116	0.135	0.159	0.189
Head Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/s)				
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Spine Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Thorax Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Abdomen Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951
Peripheral Clarity	Low	Default	0.189	0.202	0.229	0.263	0.307
	Medium	Default	0.306	0.334	0.389	0.447	0.514
	Normal	Default	0.557	0.604	0.697	0.813	0.951

Radioscopy (Fluoroscopy) - B12/12 Systems with ClarityIQ, Lateral Stand

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/s)				
Cardio Clarity	Low	Default	0.165	0.180	0.208	0.243	0.286
	Medium	Default	0.245	0.267	0.309	0.363	0.429
	Normal	Default	0.575	0.623	0.715	0.829	0.968
Cardio Pediatrics Clarity <40 kg	Low	Default	0.069	0.075	0.087	0.103	0.123
	Medium	Default	0.104	0.114	0.132	0.155	0.181
	Normal	Default	0.163	0.177	0.205	0.241	0.285
Cardio Pediatrics Clarity >40 kg	Low	Default	0.069	0.075	0.087	0.103	0.123
	Medium	Default	0.104	0.114	0.132	0.155	0.181
	Normal	Default	0.163	0.177	0.205	0.241	0.285
EP Clarity	Low	Default	0.050	0.054	0.063	0.073	0.086
	Medium	Default	0.101	0.110	0.127	0.149	0.174
	Normal	Default	0.120	0.131	0.153	0.180	0.214
EP Mapping Clarity	Low	Default	0.050	0.054	0.063	0.073	0.086
	Medium	Default	0.101	0.110	0.127	0.149	0.174
	Normal	Default	0.120	0.131	0.153	0.180	0.214
Head Clarity	Low	Default	0.213	0.230	0.264	0.308	0.360
	Medium	Default	0.346	0.377	0.436	0.503	0.585
	Normal	Default	0.628	0.682	0.787	0.918	1.076
Spine Clarity	Low	Default	0.213	0.230	0.264	0.308	0.360
	Medium	Default	0.346	0.377	0.436	0.503	0.585
	Normal	Default	0.628	0.682	0.787	0.918	1.076
Thorax Clarity	Low	Default	0.213	0.230	0.264	0.308	0.360
	Medium	Default	0.346	0.377	0.436	0.503	0.585
	Normal	Default	0.628	0.682	0.787	0.918	1.076
Abdomen Clarity	Low	Default	0.213	0.230	0.264	0.308	0.360
	Medium	Default	0.346	0.377	0.436	0.503	0.585
	Normal	Default	0.628	0.682	0.787	0.918	1.076

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/s)				
Peripheral Clarity	Low	Default	0.213	0.230	0.264	0.308	0.360
	Medium	Default	0.346	0.377	0.436	0.503	0.585
	Normal	Default	0.628	0.682	0.787	0.918	1.076

Radiography (Exposure) - B12/12 Systems with ClarityIQ, Frontal Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/image)				
Cardio Clarity	Left Coronary 15 fps Low	Default	0.037	0.040	0.047	0.055	0.065
	Rotational Scan Prop Ang0 4s	Default	0.195	0.212	0.244	0.282	0.329
		Infant	0.063	0.068	0.078	0.090	0.106
		Neonate	0.040	0.044	0.051	0.062	0.074
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.019	0.020	0.023	0.028	0.032
	15 fps Contrast normal	Default	0.030	0.033	0.039	0.046	0.055
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.037	0.040	0.047	0.055	0.065
		Neonate, Infant, Child	0.019	0.020	0.023	0.028	0.032
	15 fps Contrast normal	Default	0.077	0.084	0.097	0.113	0.133
		Neonate, Infant, Child	0.030	0.033	0.039	0.046	0.055
EP Clarity	15 fps	Default	0.037	0.040	0.047	0.055	0.065
	Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
EP Mapping Clarity	7.5 fps	Default	0.037	0.040	0.047	0.055	0.065
	3D EP Prop 4s	Default	0.228	0.231	0.235	0.240	0.246
		Neonate, Infant	0.148	0.150	0.152	0.156	0.161
		Large Adult, Very Large Adult	0.228	0.231	0.235	0.240	0.246
Head Clarity	Cerebral 2 fps low	Default	0.990	1.099	1.318	1.602	1.953
	Aortic Arch 3 fps	Default	1.423	1.580	1.895	2.305	2.810
Spine Clarity	4 fps	Default	1.133	1.260	1.519	1.852	2.273
	2 fps	Default	1.134	1.260	1.518	1.853	2.273
Thorax Clarity	Lungs 2 fps	Default	1.221	1.357	1.630	1.986	2.432
	Subclavian 3 fps	Default	1.722	1.912	2.289	2.774	3.378
Abdomen Clarity	3 fps low	Default	0.797	0.884	1.060	1.285	1.569
	Iliac / Pelvis 3 fps	Default	3.890	4.322	5.202	6.340	7.138
Peripheral Clarity	Upper Legs 3 fps	Default	1.128	1.254	1.502	1.688	1.903
	Lower Legs 1 fps	Default	2.064	2.285	2.732	3.302	4.006

Radiography (Exposure) - B12/12 Systems with ClarityIQ, Lateral Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)				
Cardio Clarity	Left Coronary 15 fps Low	Default	0.042	0.045	0.053	0.062	0.073
	Rotational Scan Prop Ang0 4s	Default	-	-	-	-	-
		Infant	-	-	-	-	-
		Neonate	-	-	-	-	-
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.021	0.023	0.026	0.031	0.036
	15 fps Contrast normal	Default	0.034	0.037	0.044	0.052	0.061
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.042	0.045	0.053	0.062	0.073
		Neonate, Infant, Child	0.021	0.023	0.026	0.031	0.036
	15 fps Contrast normal	Default	0.087	0.095	0.110	0.128	0.150
		Neonate, Infant, Child	0.034	0.037	0.044	0.052	0.061
EP Clarity	15 fps	Default	0.042	0.045	0.053	0.062	0.073
	Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
EP Mapping Clarity	7.5 fps	Default	0.042	0.045	0.053	0.062	0.073
	3D EP Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
Head Clarity	Cerebral 2 fps low	Default	1.143	1.269	1.524	1.849	2.258
	Aortic Arch 3 fps	Default	1.646	1.827	2.192	2.660	3.250
Spine Clarity	4 fps	Default	1.250	1.387	1.673	2.039	2.502
	2 fps	Default	1.248	1.388	1.672	2.040	2.500
Thorax Clarity	Lungs 2 fps	Default	1.410	1.567	1.882	2.292	2.804
	Subclavian 3 fps	Default	1.993	2.210	2.647	3.203	3.901
Abdomen Clarity	3 fps low	Default	0.921	1.022	1.225	1.486	1.813
	Iliac / Pelvis 3 fps	Default	3.984	4.435	5.339	6.520	7.354
Peripheral Clarity	Upper Legs 3 fps	Default	1.304	1.445	1.662	1.862	2.102
	Lower Legs 1 fps	Default	2.391	2.645	3.161	3.816	4.503

Roadmap - B12/12 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
EP Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/image)				
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
EP Mapping Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
Head Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	Coil	Default	0.335	0.372	0.447	0.542	0.661
	Unsubtract	Default	0.175	0.188	0.213	0.243	0.279
Spine Clarity	Navigate	Default	0.175	0.188	0.213	0.243	0.279
	Coil	Default	0.236	0.262	0.314	0.382	0.467
	Unsubtract	Default	0.175	0.188	0.213	0.243	0.279
Thorax Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279
Abdomen Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279
Peripheral Clarity	UnSubtract	Default	0.175	0.188	0.213	0.243	0.279
	Navigate	Default	0.175	0.188	0.213	0.243	0.279

Roadmap - B12/12 Systems with ClarityIQ, Lateral Stand

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/image)				
Cardio Clarity	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
EP Clarity	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
EP Mapping Clarity	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
Head Clarity	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	Coil	Default	0.387	0.429	0.516	0.626	0.764
	Unsubtract	Default	0.196	0.210	0.238	0.272	0.313
Spine Clarity	Navigate	Default	0.196	0.210	0.238	0.272	0.313
	Coil	Default	0.387	0.429	0.516	0.626	0.764
	Unsubtract	Default	0.196	0.210	0.238	0.272	0.313
Thorax Clarity	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
	Navigate	Default	0.196	0.210	0.238	0.272	0.313
Abdomen Clarity	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
	Navigate	Default	0.196	0.210	0.238	0.272	0.313
Peripheral Clarity	UnSubtract	Default	0.196	0.210	0.238	0.272	0.313
	Navigate	Default	0.196	0.210	0.238	0.272	0.313

B20/12 Systems

Radioscopy (Fluoroscopy) - B20/12 Systems, Frontal Stand

	Field of View		0	1	2	3	4	5	6	7
	Field Size (cm)		48	42	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)							
Cardio	Low	Default	0.125	0.158	0.174	0.201	0.232	0.274	0.314	0.379
	Norm	Default	0.338	0.412	0.447	0.503	0.567	0.651	0.731	0.847
	High	Default	0.423	0.521	0.568	0.643	0.730	0.842	0.951	1.112
Pediatrics	Low	Default	0.115	0.144	0.158	0.181	0.208	0.243	0.278	0.315
	Norm	Default	0.253	0.313	0.343	0.390	0.443	0.501	0.557	0.645
	High	Default	0.428	0.514	0.553	0.615	0.663	0.724	0.782	0.871
EP	Low	Default	0.059	0.075	0.082	0.093	0.104	0.118	0.136	0.149
	Norm	Default	0.130	0.162	0.178	0.203	0.243	0.273	0.331	0.375
	High	Default	0.151	0.191	0.211	0.244	0.282	0.332	0.381	0.460
EP Mapping	Low	Default	0.030	0.037	0.041	0.046	0.053	0.060	0.070	0.077
	Norm	Default	0.065	0.081	0.089	0.102	0.121	0.136	0.166	0.187
	High	Default	0.076	0.096	0.105	0.122	0.141	0.166	0.191	0.230
Head	Low	Default	0.140	0.175	0.192	0.221	0.254	0.288	0.321	0.354
	Norm	Default	0.285	0.353	0.386	0.439	0.518	0.602	0.667	0.737
	High	Default	0.462	0.567	0.618	0.700	0.796	0.921	1.040	1.203
Spine	Low	Default	0.140	0.175	0.192	0.221	0.254	0.288	0.321	0.354
	Norm	Default	0.285	0.353	0.386	0.439	0.518	0.602	0.667	0.737
	High	Default	0.462	0.567	0.618	0.700	0.796	0.921	1.040	1.203
Thorax	Low	Default	0.140	0.175	0.192	0.221	0.254	0.288	0.321	0.354
	Norm	Default	0.285	0.353	0.386	0.439	0.518	0.602	0.667	0.737
	High	Default	0.462	0.567	0.618	0.700	0.796	0.921	1.040	1.203
Abdomen	Low	Default	0.140	0.175	0.192	0.221	0.254	0.288	0.321	0.354
	Norm	Default	0.285	0.353	0.386	0.439	0.518	0.602	0.667	0.737
	High	Default	0.462	0.567	0.618	0.700	0.796	0.921	1.040	1.203
Peripheral	Low	Default	0.140	0.175	0.192	0.221	0.254	0.288	0.321	0.354
	Norm	Default	0.285	0.353	0.386	0.439	0.518	0.602	0.667	0.737
	High	Default	0.462	0.567	0.618	0.700	0.796	0.921	1.040	1.203

Radioscopy (Fluoroscopy) - B20/12 Systems, Lateral Stand

	Field of View		0	1	2	3	4
	Field Size (cm)		30	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)				
Cardio	Low	Default	0.337	0.366	0.428	0.504	0.594
	Norm	Default	0.672	0.878	1.118	1.118	1.118
	High	Default	0.936	0.983	1.152	1.323	1.525
Pediatrics	Low	Default	0.264	0.287	0.331	0.385	0.449
	Norm	Default	0.608	0.642	0.732	0.827	0.937
	High	Default	0.882	0.933	1.013	1.108	1.213
EP	Low	Default	0.132	0.144	0.166	0.193	0.224
	Norm	Default	0.302	0.328	0.379	0.441	0.516
	High	Default	0.353	0.382	0.440	0.512	0.602
EP Mapping	Low	Default	0.066	0.072	0.084	0.099	0.116

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 30	1 27	2 22	3 19	4 15
			Reference Air Kerma (mGy/s)				
	Norm	Default	0.151	0.164	0.189	0.221	0.258
	High	Default	0.176	0.191	0.220	0.256	0.301
Head	Low	Default	0.293	0.402	0.456	0.456	0.456
	Norm	Default	0.633	0.678	0.761	0.861	0.976
	High	Default	1.000	1.080	1.236	1.424	1.643
Spine	Low	Default	0.293	0.402	0.456	0.456	0.456
	Norm	Default	0.633	0.678	0.761	0.861	0.976
	High	Default	1.000	1.080	1.236	1.424	1.643
Thorax	Low	Default	0.293	0.402	0.456	0.456	0.456
	Norm	Default	0.633	0.678	0.761	0.861	0.976
	High	Default	1.000	1.080	1.236	1.424	1.643
Abdomen	Low	Default	0.293	0.402	0.456	0.456	0.456
	Norm	Default	0.633	0.678	0.761	0.861	0.976
	High	Default	1.000	1.080	1.236	1.424	1.643
Peripheral	Low	Default	0.293	0.402	0.456	0.456	0.456
	Norm	Default	0.633	0.678	0.761	0.861	0.976
	High	Default	1.000	1.080	1.236	1.424	1.643

Radiography (Exposure) - B20/12 Systems, Frontal Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Cardio	Left Coronary	Default	0.061	0.076	0.083	0.095	0.108	0.125	0.142	0.168
	15 fps Low	Infant	0.046	0.054	0.058	0.064	0.071	0.081	0.090	0.104
		Large Adult, Very Large Adult	0.060	0.075	0.082	0.093	0.107	0.124	0.141	0.166
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
	Rotational Scan	Default	0.116	0.143	0.157	0.179	0.204	0.236	0.267	0.314
	Prop Ang0 4s	Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
Pediatrics	15 fps Contrast Normal	Default	0.118	0.146	0.160	0.181	0.206	0.238	0.269	0.317
		Child, Small Adult	0.069	0.086	0.094	0.107	0.123	0.142	0.161	0.188
		Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
	Prop Free Position	Default	0.114	0.142	0.155	0.177	0.202	0.234	0.265	0.314
		Neonate, Infant	0.027	0.033	0.036	0.041	0.047	0.054	0.062	0.074
EP	15 fps	Default	0.069	0.086	0.094	0.107	0.123	0.142	0.161	0.188
	Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
EP Mapping	7.5 fps low	Default	0.011	0.014	0.015	0.017	0.019	0.022	0.025	0.028
	3D EP Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
Head	Cerebral 2 fps normal	Default	2.856	3.713	4.139	4.848	5.711	6.852	7.867	8.549
		Child	1.839	2.207	2.384	2.677	3.022	3.482	3.945	4.534
		Neonate, Infant	1.839	2.207	2.384	2.677	3.022	3.482	3.945	4.534
	Aortic Arch 3 fps	Default	4.232	5.502	6.139	7.198	8.155	8.155	8.155	8.155
Spine	4 fps	Default	1.197	1.555	1.734	2.034	2.390	2.870	3.350	4.127
	2 fps	Default	1.495	1.944	2.168	2.540	2.993	3.591	4.184	5.163
Thorax	Lungs 2 fps	Default	1.427	1.857	2.068	2.426	2.677	2.938	3.189	3.492
	Subclavian 3 fps	Default	5.136	6.669	7.447	8.718	10.268	11.183	11.737	12.575
Abdomen	Abdomen	Default	2.619	3.406	3.801	4.455	5.243	6.296	7.334	7.334
	3 fps	Large Adult, Very Large Adult	2.306	2.995	3.342	3.922	4.613	5.530	6.457	7.953
	Iliac / Pelvis 3 fps	Default	4.262	5.538	6.173	7.243	8.517	10.218	11.918	14.041
Peripheral	Upper Legs 3 fps	Default	3.690	4.793	5.292	5.691	6.142	6.705	7.241	7.869
	Lower Legs 1 fps	Default	4.509	5.620	5.922	6.361	6.850	7.454	8.029	8.708

Radiography (Exposure) - B20/12 Systems, Lateral Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 30	1 / 27	2 / 22	3 / 19	4 / 15
			Reference Air Kerma (mGy/image)				
Cardio	Left Coronary	Default	0.137	0.148	0.170	0.197	0.227
	15 fps Low	Infant	0.095	0.101	0.113	0.128	0.145
		Large Adult, Very Large Adult	0.138	0.148	0.170	0.196	0.227
		Neonate	0.063	0.068	0.078	0.091	0.107
	Rotational Scan	Default	-	-	-	-	-
	Prop Ang0 4s	Infant	-	-	-	-	-
		Neonate	-	-	-	-	-
Pediatrics	15 fps Contrast Normal	Default	0.252	0.271	0.310	0.356	0.408
		Child, Small Adult	0.153	0.166	0.189	0.219	0.253
		Infant	0.095	0.101	0.113	0.128	0.145
		Neonate	0.063	0.068	0.078	0.091	0.107
	Prop Free Position	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
EP	15 fps	Default	0.153	0.166	0.189	0.219	0.253
	Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 30	1 27	2 22	3 19	4 15
			Reference Air Kerma (mGy/image)				
		Large Adult, Very Large Adult	-	-	-	-	-
EP Mapping	7.5 fps low	Default	0.024	0.027	0.031	0.036	0.042
	3D EP Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
Head	Cerebral 2 fps normal	Default	7.227	7.589	8.276	9.092	10.049
		Child	4.242	4.550	5.153	5.904	6.819
		Neonate, Infant	4.242	4.550	5.153	5.904	6.819
	Aortic Arch 3 fps	Default	10.577	11.581	12.244	13.006	13.861
Spine	4 fps	Default	2.441	2.684	3.173	3.783	4.519
	2 fps	Default	3.050	3.352	3.962	4.729	5.646
Thorax	Lungs 2 fps	Default	3.692	3.915	4.264	4.683	5.161
	Subclavian 3 fps	Default	12.819	14.979	14.979	14.979	14.979
Abdomen	Abdomen	Default	5.656	6.215	7.351	8.767	10.456
	3 fps	Large Adult, Very Large Adult	4.985	5.485	6.475	7.726	9.217
	Iliac / Pelvis 3 fps	Default	10.803	11.882	14.028	16.732	19.956
Peripheral	Upper Legs 3 fps	Default	6.762	7.096	7.749	8.528	9.433
	Lower Legs 1 fps	Default	7.254	7.608	8.292	9.091	10.024

Roadmap - B20/12 Systems, Frontal Stand

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Cardio	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
Pediatrics	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
EP	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
EP Mapping	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
Head	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Carotid	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
	Coil	Default	1.065	1.383	1.544	1.810	2.129	2.553	2.984	3.670
Spine	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Stent	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Thorax	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Interventio n	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Abdomen	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Stent	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Peripheral	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496

Roadmap - B20/12 Systems, Lateral Stand

		Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)				
Cardio	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
Pediatrics	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
EP	Navigate	Default	0.493	0.623	0.623	0.623	0.623
EP Mapping	Navigate	Default	0.493	0.623	0.623	0.623	0.623
Head	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	Carotid	Default	0.464	0.567	0.567	0.567	0.567
	Coil	Default	2.691	2.963	3.501	4.172	4.983
Spine	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	Stent	Default	0.464	0.567	0.567	0.567	0.567
Thorax	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	Intervention	Default	0.464	0.567	0.567	0.567	0.567
Abdomen	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
	Navigate	Default	0.493	0.623	0.623	0.623	0.623
	Stent	Default	0.464	0.567	0.567	0.567	0.567
Peripheral	UnSubtract	Default	0.493	0.623	0.623	0.623	0.623
	Navigate	Default	0.493	0.623	0.623	0.623	0.623

B20/12 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - B20/12 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)							
Cardio Clarity	Low	Default	0.089	0.111	0.121	0.138	0.157	0.181	0.205	0.241
	Medium	Default	0.134	0.166	0.182	0.208	0.238	0.278	0.316	0.377
	Normal	Default	0.313	0.385	0.419	0.474	0.537	0.620	0.701	0.827
Cardio Pediatrics Clarity <40 kg	Low	Default	0.039	0.048	0.053	0.060	0.069	0.080	0.091	0.109
	Medium	Default	0.057	0.071	0.078	0.089	0.103	0.120	0.137	0.159
	Normal	Default	0.087	0.108	0.118	0.135	0.155	0.179	0.203	0.240
Cardio Pediatrics Clarity >40 kg	Low	Default	0.039	0.048	0.053	0.060	0.069	0.080	0.091	0.109
	Medium	Default	0.057	0.071	0.078	0.089	0.103	0.120	0.137	0.159
	Normal	Default	0.087	0.108	0.118	0.135	0.155	0.179	0.203	0.240
EP Clarity	Low	Default	0.035	0.035	0.035	0.040	0.046	0.053	0.059	0.068
	Medium	Default	0.070	0.070	0.070	0.079	0.090	0.105	0.117	0.136
	Normal	Default	0.090	0.090	0.090	0.102	0.118	0.138	0.158	0.189
EP Mapping Clarity	Low	Default	0.035	0.035	0.035	0.040	0.046	0.053	0.059	0.068
	Medium	Default	0.070	0.070	0.070	0.079	0.090	0.105	0.117	0.136
	Normal	Default	0.090	0.090	0.090	0.102	0.118	0.138	0.158	0.189
Head Clarity	Low	Default	0.123	0.148	0.160	0.178	0.208	0.244	0.273	0.305
	Medium	Default	0.187	0.234	0.256	0.294	0.346	0.402	0.445	0.493

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 48 Reference Air Kerma (mGy/s)	1 42	2 37	3 31	4 27	5 22	6 19	7 15
	Normal	Default	0.330	0.409	0.447	0.509	0.580	0.672	0.762	0.905
Spine Clarity	Low	Default	0.123	0.148	0.160	0.178	0.208	0.244	0.273	0.305
	Medium	Default	0.187	0.234	0.256	0.294	0.346	0.402	0.445	0.493
	Normal	Default	0.330	0.409	0.447	0.509	0.580	0.672	0.762	0.905
Thorax Clarity	Low	Default	0.123	0.148	0.160	0.178	0.208	0.244	0.273	0.305
	Medium	Default	0.187	0.234	0.256	0.294	0.346	0.402	0.445	0.493
	Normal	Default	0.330	0.409	0.447	0.509	0.580	0.672	0.762	0.905
Abdomen Clarity	Low	Default	0.123	0.148	0.160	0.178	0.208	0.244	0.273	0.305
	Medium	Default	0.187	0.234	0.256	0.294	0.346	0.402	0.445	0.493
	Normal	Default	0.330	0.409	0.447	0.509	0.580	0.672	0.762	0.905
Peripheral Clarity	Low	Default	0.123	0.148	0.160	0.178	0.208	0.244	0.273	0.305
	Medium	Default	0.187	0.234	0.256	0.294	0.346	0.402	0.445	0.493
	Normal	Default	0.330	0.409	0.447	0.509	0.580	0.672	0.762	0.905

Radioscopy (Fluoroscopy) - B20/12 Systems with ClarityIQ, Lateral Stand

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 30 Reference Air Kerma (mGy/s)	1 27	2 22	3 19	4 15
Cardio Clarity	Low	Default	0.200	0.217	0.249	0.288	0.333
	Medium	Default	0.300	0.325	0.374	0.434	0.505
	Normal	Default	0.673	0.726	0.827	0.952	1.095
Cardio Pediatrics Clarity <40 kg	Low	Default	0.087	0.095	0.109	0.127	0.148
	Medium	Default	0.130	0.141	0.160	0.183	0.211
	Normal	Default	0.198	0.215	0.247	0.287	0.333
Cardio Pediatrics Clarity >40 kg	Low	Default	0.087	0.095	0.109	0.127	0.148
	Medium	Default	0.130	0.141	0.160	0.183	0.211
	Normal	Default	0.198	0.215	0.247	0.287	0.333
EP Clarity	Low	Default	0.061	0.066	0.076	0.086	0.097
	Medium	Default	0.124	0.134	0.154	0.174	0.198
	Normal	Default	0.148	0.161	0.186	0.217	0.253
EP Mapping Clarity	Low	Default	0.061	0.066	0.076	0.086	0.097
	Medium	Default	0.124	0.134	0.154	0.174	0.198
	Normal	Default	0.148	0.161	0.186	0.217	0.253
Head Clarity	Low	Default	0.267	0.287	0.327	0.375	0.432
	Medium	Default	0.429	0.461	0.522	0.599	0.687
	Normal	Default	0.744	0.804	0.921	1.062	1.230
Spine Clarity	Low	Default	0.267	0.287	0.327	0.375	0.432
	Medium	Default	0.429	0.461	0.522	0.599	0.687
	Normal	Default	0.744	0.804	0.921	1.062	1.230
Thorax Clarity	Low	Default	0.267	0.287	0.327	0.375	0.432
	Medium	Default	0.429	0.461	0.522	0.599	0.687
	Normal	Default	0.744	0.804	0.921	1.062	1.230
Abdomen Clarity	Low	Default	0.267	0.287	0.327	0.375	0.432
	Medium	Default	0.429	0.461	0.522	0.599	0.687
	Normal	Default	0.744	0.804	0.921	1.062	1.230

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 30	1 27	2 22	3 19	4 15
			Reference Air Kerma (mGy/s)				
Peripheral Clarity	Low	Default	0.267	0.287	0.327	0.375	0.432
	Medium	Default	0.429	0.461	0.522	0.599	0.687
	Normal	Default	0.744	0.804	0.921	1.062	1.230

Radiography (Exposure) - B20/12 Systems with ClarityIQ, Frontal Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Cardio Clarity	Left Coronary 15 fps Low	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	Rotational Scan Prop Ang0 4s	Default	0.118	0.146	0.159	0.181	0.206	0.239	0.269	0.317
		Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.012	0.015	0.016	0.018	0.021	0.024	0.027	0.032
	15 fps Contrast normal	Default	0.018	0.023	0.025	0.029	0.034	0.040	0.045	0.052
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
		Neonate, Infant, Child	0.012	0.015	0.016	0.018	0.021	0.024	0.027	0.032
	15 fps Contrast normal	Default	0.047	0.058	0.064	0.073	0.083	0.097	0.110	0.130
		Neonate, Infant, Child	0.018	0.023	0.025	0.029	0.034	0.040	0.045	0.052
EP Clarity	15 fps	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
EP Mapping Clarity	7.5 fps	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	3D EP Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
Head Clarity	Cerebral 2 fps low	Default	0.570	0.741	0.827	0.969	1.141	1.367	1.595	1.882
	Aortic Arch 3 fps	Default	0.815	1.059	1.181	1.385	1.629	1.956	2.280	2.689
Spine Clarity	4 fps	Default	0.672	0.875	0.975	1.142	1.345	1.614	1.883	2.221
	2 fps	Default	0.673	0.875	0.974	1.142	1.344	1.612	1.882	2.221
Thorax Clarity	Lungs 2 fps	Default	0.713	0.928	1.036	1.213	1.429	1.713	1.999	2.355
	Subclavian 3 fps	Default	0.965	1.254	1.398	1.639	1.928	2.313	2.699	3.180
Abdomen Clarity	3 fps low	Default	0.748	0.972	1.084	1.272	1.497	1.793	2.095	2.465
	Iliac / Pelvis 3 fps	Default	0.714	0.927	1.034	1.214	1.428	1.714	1.998	2.356

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 48	1 42	2 37	3 31	4 27	5 22	6 19	7 15
			Reference Air Kerma (mGy/image)							
Peripheral Clarity	Upper Legs 3 fps	Default	0.631	0.802	0.868	0.973	1.097	1.236	1.366	1.523
	Lower Legs 1 fps	Default	1.127	1.465	1.633	1.915	2.123	2.384	2.625	2.911

Radiography (Exposure) - B20/12 Systems with ClarityIQ, Lateral Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 30	1 27	2 22	3 19	4 15
			Reference Air Kerma (mGy/image)				
Cardio Clarity	Left Coronary 15 fps Low	Default	0.050	0.055	0.063	0.073	0.085
	Rotational Scan Prop Ang0 4s	Default	-	-	-	-	-
		Infant	-	-	-	-	-
		Neonate	-	-	-	-	-
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.027	0.029	0.033	0.038	0.044
	15 fps Contrast normal	Default	0.043	0.047	0.054	0.061	0.070
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.050	0.055	0.063	0.073	0.085
		Neonate, Infant, Child	0.027	0.029	0.033	0.038	0.044
	15 fps Contrast normal	Default	0.102	0.110	0.126	0.146	0.169
		Neonate, Infant, Child	0.043	0.047	0.054	0.061	0.070
EP Clarity	15 fps	Default	0.050	0.055	0.063	0.073	0.085
	Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
EP Mapping Clarity	7.5 fps	Default	0.050	0.055	0.063	0.073	0.085
	3D EP Prop 4s	Default	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-
Head Clarity	Cerebral 2 fps low	Default	1.456	1.602	1.894	2.258	2.696
	Aortic Arch 3 fps	Default	2.097	2.305	2.725	3.247	3.878
Spine Clarity	4 fps	Default	1.659	1.821	2.154	2.569	3.064
	2 fps	Default	1.658	1.824	2.156	2.570	3.064
Thorax Clarity	Lungs 2 fps	Default	1.841	2.022	2.393	2.849	3.407
	Subclavian 3 fps	Default	2.477	2.724	3.222	3.839	4.585
Abdomen Clarity	3 fps low	Default	1.927	2.119	2.505	2.988	3.564
	Iliac / Pelvis 3 fps	Default	1.840	2.024	2.392	2.850	3.407
Peripheral Clarity	Upper Legs 3 fps	Default	1.589	1.685	1.869	2.093	2.348
	Lower Legs 1 fps	Default	2.897	3.181	3.760	4.258	4.743

Roadmap - B20/12 Systems with ClarityIQ, Frontal Stand

Procedure	Mode	Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
		Patient Type	Reference Air Kerma (mGy/image)							
Cardio Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
EP Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
EP Mapping Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Head Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Coil	Default	0.192	0.249	0.278	0.325	0.383	0.459	0.536	0.660
	Unsubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Spine Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Coil	Default	0.192	0.249	0.278	0.325	0.383	0.459	0.536	0.660
	Unsubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Thorax Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Abdomen Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Peripheral Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232

Roadmap - B20/12 Systems with ClarityIQ, Lateral Stand

Procedure	Mode	Field of View	0	1	2	3	4
		Field Size (cm)	30	27	22	19	15
		Patient Type	Reference Air Kerma (mGy/image)				
Cardio Clarity	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
EP Clarity	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
EP Mapping Clarity	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
Head Clarity	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	Coil	Default	0.493	0.542	0.641	0.764	0.890
	Unsubtract	Default	0.222	0.238	0.268	0.305	0.346
Spine Clarity	Navigate	Default	0.222	0.238	0.268	0.305	0.346
	Coil	Default	0.493	0.542	0.641	0.764	0.890
	Unsubtract	Default	0.222	0.238	0.268	0.305	0.346

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 30 Reference Air Kerma (mGy/image)	1 27	2 22	3 19	4 15
Thorax Clarity	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
	Navigate	Default	0.222	0.238	0.268	0.305	0.346
Abdomen Clarity	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
	Navigate	Default	0.222	0.238	0.268	0.305	0.346
Peripheral Clarity	UnSubtract	Default	0.222	0.238	0.268	0.305	0.346
	Navigate	Default	0.222	0.238	0.268	0.305	0.346

B20/15 Systems

Radioscopy (Fluoroscopy) - B20/15 Systems, Frontal Stand

Procedure	Flavor	Field of View / Field Size (cm) / Patient Type	0 48 Reference Air Kerma (mGy/s)	1 42	2 37	3 31	4 27	5 22	6 19	7 15
Cardio	Low	Default	0.122	0.155	0.171	0.197	0.228	0.269	0.309	0.372
	Norm	Default	0.323	0.393	0.426	0.480	0.543	0.623	0.696	0.786
	High	Default	0.423	0.521	0.568	0.643	0.730	0.842	0.951	1.112
Pediatrics	Low	Default	0.112	0.140	0.154	0.176	0.203	0.237	0.271	0.309
	Norm	Default	0.253	0.313	0.343	0.390	0.443	0.501	0.557	0.645
	High	Default	0.428	0.514	0.553	0.615	0.663	0.724	0.782	0.871
EP	Low	Default	0.058	0.073	0.081	0.091	0.103	0.118	0.136	0.149
	Norm	Default	0.127	0.158	0.173	0.198	0.237	0.266	0.325	0.368
	High	Default	0.148	0.188	0.207	0.239	0.277	0.326	0.375	0.452
EP Mapping	Low	Default	0.030	0.037	0.041	0.046	0.053	0.060	0.070	0.077
	Norm	Default	0.065	0.081	0.089	0.102	0.121	0.136	0.166	0.187
	High	Default	0.076	0.096	0.105	0.122	0.141	0.166	0.191	0.230
Head	Low	Default	0.136	0.171	0.188	0.216	0.249	0.282	0.315	0.348
	Norm	Default	0.275	0.341	0.373	0.426	0.503	0.589	0.657	0.731
	High	Default	0.444	0.545	0.594	0.674	0.767	0.887	0.987	1.122
Spine	Low	Default	0.136	0.171	0.188	0.216	0.249	0.282	0.315	0.348
	Norm	Default	0.275	0.341	0.373	0.426	0.503	0.589	0.657	0.731
	High	Default	0.444	0.545	0.594	0.674	0.767	0.887	0.987	1.122
Thorax	Low	Default	0.136	0.171	0.188	0.216	0.249	0.282	0.315	0.348
	Norm	Default	0.275	0.341	0.373	0.426	0.503	0.589	0.657	0.731
	High	Default	0.444	0.545	0.594	0.674	0.767	0.887	0.987	1.122
Abdomen	Low	Default	0.136	0.171	0.188	0.216	0.249	0.282	0.315	0.348
	Norm	Default	0.275	0.341	0.373	0.426	0.503	0.589	0.657	0.731
	High	Default	0.444	0.545	0.594	0.674	0.767	0.887	0.987	1.122
Peripheral	Low	Default	0.136	0.171	0.188	0.216	0.249	0.282	0.315	0.348
	Norm	Default	0.275	0.341	0.373	0.426	0.503	0.589	0.657	0.731
	High	Default	0.444	0.545	0.594	0.674	0.767	0.887	0.987	1.122

Radioscopy (Fluoroscopy) - B20/15 Systems, Lateral Stand

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)						
Cardio	Low	Default	0.262	0.285	0.330	0.376	0.443	0.519	0.616
	Norm	Default	0.524	0.564	0.641	0.714	0.823	0.941	1.054
	High	Default	0.696	0.751	0.858	0.961	1.112	1.282	1.493
Pediatrics	Low	Default	0.188	0.204	0.236	0.267	0.313	0.366	0.418
	Norm	Default	0.451	0.489	0.561	0.628	0.715	0.810	0.930
	High	Default	0.680	0.728	0.818	0.905	0.993	1.087	1.202
EP	Low	Default	0.095	0.104	0.121	0.137	0.162	0.190	0.224
	Norm	Default	0.220	0.239	0.276	0.313	0.367	0.431	0.512
	High	Default	0.271	0.293	0.338	0.383	0.448	0.523	0.617
EP Mapping	Low	Default	0.048	0.053	0.061	0.070	0.082	0.097	0.115
	Norm	Default	0.113	0.123	0.141	0.160	0.188	0.219	0.260
	High	Default	0.134	0.145	0.169	0.191	0.226	0.264	0.314
Head	Low	Default	0.212	0.231	0.271	0.311	0.370	0.438	0.517
	Norm	Default	0.497	0.531	0.600	0.668	0.767	0.878	1.019
	High	Default	0.774	0.835	0.957	1.075	1.248	1.444	1.668
Spine	Low	Default	0.212	0.231	0.271	0.311	0.370	0.438	0.517
	Norm	Default	0.497	0.531	0.600	0.668	0.767	0.878	1.019
	High	Default	0.774	0.835	0.957	1.075	1.248	1.444	1.668
Thorax	Low	Default	0.212	0.231	0.271	0.311	0.370	0.438	0.517
	Norm	Default	0.497	0.531	0.600	0.668	0.767	0.878	1.019
	High	Default	0.774	0.835	0.957	1.075	1.248	1.444	1.668
Abdomen	Low	Default	0.212	0.231	0.271	0.311	0.370	0.438	0.517
	Norm	Default	0.497	0.531	0.600	0.668	0.767	0.878	1.019
	High	Default	0.774	0.835	0.957	1.075	1.248	1.444	1.668
Peripheral	Low	Default	0.212	0.231	0.271	0.311	0.370	0.438	0.517
	Norm	Default	0.497	0.531	0.600	0.668	0.767	0.878	1.019
	High	Default	0.774	0.835	0.957	1.075	1.248	1.444	1.668

Radiography (Exposure) - B20/15 Systems, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)							
Cardio	Left Coronary	Default	0.061	0.076	0.083	0.095	0.108	0.125	0.142	0.168
	15 fps Low	Infant	0.046	0.054	0.058	0.064	0.071	0.081	0.090	0.104
		Large Adult, Very Large Adult	0.060	0.075	0.082	0.093	0.107	0.124	0.141	0.166
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
	Rotational Scan	Default	0.116	0.143	0.157	0.179	0.204	0.236	0.267	0.314
	Prop Ang0 4s	Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
Pediatrics	15 fps Contrast Normal	Default	0.118	0.146	0.160	0.181	0.206	0.238	0.269	0.317

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
		Child, Small Adult	0.069	0.086	0.094	0.107	0.123	0.142	0.161	0.188
		Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
	Prop Free Position	Default	0.114	0.142	0.155	0.177	0.202	0.234	0.265	0.314
		Neonate, Infant	0.027	0.033	0.036	0.041	0.047	0.054	0.062	0.074
EP	15 fps	Default	0.069	0.086	0.094	0.107	0.123	0.142	0.161	0.188
	Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
EP Mapping	7.5 fps low	Default	0.011	0.014	0.015	0.017	0.019	0.022	0.025	0.028
	3D EP Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
Head	Cerebral 2 fps normal	Default	2.856	3.713	4.139	4.848	5.711	6.852	7.867	8.549
		Child	1.839	2.207	2.384	2.677	3.022	3.482	3.945	4.534
		Neonate, Infant	1.839	2.207	2.384	2.677	3.022	3.482	3.945	4.534
	Aortic Arch 3 fps	Default	4.232	5.502	6.139	7.198	8.155	8.155	8.155	8.155
Spine	4 fps	Default	1.195	1.556	1.734	2.034	2.393	2.869	3.352	4.126
	2 fps	Default	1.495	1.944	2.168	2.540	2.993	3.591	4.184	5.163
Thorax	Lungs 2 fps	Default	1.427	1.856	2.071	2.428	2.657	2.919	3.169	3.474
	Subclavian 3 fps	Default	5.136	6.669	7.447	8.718	10.268	11.183	11.737	12.575
Abdomen	Abdomen	Default	2.619	3.406	3.801	4.455	5.243	6.296	7.334	7.334
	3 fps	Large Adult, Very Large Adult	2.306	2.995	3.342	3.922	4.613	5.530	6.457	7.953
	Iliac / Pelvis 3 fps	Default	4.262	5.538	6.173	7.243	8.517	10.218	11.918	14.041
Peripheral	Upper Legs 3 fps	Default	3.690	4.793	5.292	5.691	6.142	6.705	7.241	7.869
	Lower Legs 1 fps	Default	4.509	5.620	5.922	6.361	6.850	7.454	8.029	8.708

Radiography (Exposure) - B20/15 Systems, Lateral Stand

Procedure	X-ray Protocol	Field of View / Field Size (cm) / Patient Type	0 / 39	1 / 37	2 / 31	3 / 27	4 / 22	5 / 19	6 / 15
			Reference Air Kerma (mGy/image)						
Cardio	Left Coronary	Default	0.100	0.108	0.124	0.139	0.162	0.188	0.219
	15 fps Low	Infant	0.070	0.074	0.083	0.092	0.105	0.119	0.138
		Large Adult, Very Large Adult	0.100	0.108	0.124	0.139	0.162	0.188	0.219

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)						
		Neonate	0.046	0.049	0.057	0.064	0.076	0.089	0.093
	Rotational Scan	Default	-	-	-	-	-	-	-
	Prop Ang0 4s	Infant	-	-	-	-	-	-	-
		Neonate	-	-	-	-	-	-	-
Pediatrics	15 fps Contrast Normal	Default	0.187	0.202	0.231	0.258	0.299	0.344	0.399
		Child, Small Adult	0.113	0.122	0.141	0.158	0.184	0.212	0.248
		Infant	0.067	0.072	0.081	0.091	0.105	0.121	0.142
		Neonate	0.045	0.049	0.057	0.065	0.077	0.090	0.108
	Prop Free Position	Default	-	-	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-	-	-
EP	15 fps	Default	0.113	0.122	0.141	0.158	0.184	0.212	0.248
	Prop 4s	Default	-	-	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-	-	-
EP Mapping	7.5 fps low	Default	0.018	0.019	0.023	0.026	0.030	0.036	0.042
	3D EP Prop 4s	Default	-	-	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-	-	-
Head	Cerebral 2 fps normal	Default	5.093	5.597	6.615	7.258	7.985	8.807	9.820
		Child	3.253	3.482	3.925	4.368	5.019	5.788	6.784
		Neonate, Infant	3.253	3.482	3.925	4.368	5.019	5.788	6.784
	Aortic Arch 3 fps	Default	7.351	8.097	9.561	11.031	11.031	11.031	11.031
Spine	4 fps	Default	1.705	1.877	2.216	2.559	3.068	3.662	4.436
	2 fps	Default	2.135	2.346	2.770	3.197	3.837	4.587	5.550
Thorax	Lungs 2 fps	Default	2.561	2.815	3.328	3.784	4.159	4.581	5.098
	Subclavian 3 fps	Default	8.863	9.750	11.532	13.286	14.407	15.756	15.756
Abdomen	Abdomen	Default	4.597	5.056	5.972	6.896	8.273	9.885	10.475
	3 fps	Large Adult, Very Large Adult	4.063	4.474	5.289	6.105	7.326	8.734	10.568
	Iliac / Pelvis 3 fps	Default	7.471	8.209	9.708	11.214	13.446	16.044	19.432
Peripheral	Upper Legs 3 fps	Default	5.559	5.823	6.331	6.821	7.514	8.299	9.268
	Lower Legs 1 fps	Default	5.969	6.247	6.778	7.286	8.013	8.810	9.809

Roadmap - B20/15 Systems, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)							
Cardio	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
Pediatrics	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)							
EP	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
EP Mapping	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
Head	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Carotid	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
	Coil	Default	1.065	1.383	1.544	1.810	2.129	2.553	2.984	3.670
Spine	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Stent	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Thorax	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Interventio n	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Abdomen	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Stent	Default	0.201	0.240	0.258	0.287	0.320	0.363	0.383	0.383
Peripheral	UnSubtract	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496
	Navigate	Default	0.233	0.287	0.313	0.356	0.405	0.466	0.496	0.496

Roadmap - B20/15 Systems, Lateral Stand

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)						
Cardio	Navigate	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
	UnSubtract	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
Pediatrics	Navigate	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
	UnSubtract	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
EP	Navigate	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
EP Mapping	Navigate	Default	0.367	0.396	0.452	0.474	0.578	0.671	0.778
Head	Navigate	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Carotid	Default	0.362	0.385	0.431	0.473	0.534	0.568	0.568
	Coil	Default	1.865	2.052	2.429	2.799	3.361	4.019	4.852
Spine	UnSubtract	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Navigate	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Stent	Default	0.362	0.385	0.431	0.473	0.534	0.568	0.568
Thorax	UnSubtract	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Navigate	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Intervention	Default	0.362	0.385	0.431	0.473	0.534	0.568	0.568
Abdomen	UnSubtract	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Navigate	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Stent	Default	0.362	0.385	0.431	0.473	0.534	0.568	0.568
Peripheral	UnSubtract	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623
	Navigate	Default	0.365	0.394	0.450	0.472	0.577	0.623	0.623

B20/15 Systems with ClarityIQ Option

Radioscopy (Fluoroscopy) - B20/15 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)							
Cardio Clarity	Low	Default	0.086	0.107	0.117	0.133	0.152	0.177	0.201	0.240
	Medium	Default	0.130	0.161	0.177	0.202	0.231	0.270	0.307	0.368
	Normal	Default	0.301	0.369	0.403	0.456	0.517	0.596	0.674	0.796
Cardio Pediatrics Clarity <40 kg	Low	Default	0.037	0.046	0.051	0.058	0.067	0.078	0.089	0.106
	Medium	Default	0.055	0.069	0.076	0.087	0.100	0.116	0.133	0.158
	Normal	Default	0.084	0.105	0.115	0.132	0.151	0.176	0.201	0.240
Cardio Pediatrics Clarity >40 kg	Low	Default	0.037	0.046	0.051	0.058	0.067	0.078	0.089	0.106
	Medium	Default	0.055	0.069	0.076	0.087	0.100	0.116	0.133	0.158
	Normal	Default	0.084	0.105	0.115	0.132	0.151	0.176	0.201	0.240
EP Clarity	Low	Default	0.030	0.030	0.030	0.034	0.039	0.045	0.051	0.060
	Medium	Default	0.061	0.061	0.061	0.069	0.079	0.092	0.104	0.121
	Normal	Default	0.075	0.075	0.075	0.086	0.099	0.117	0.133	0.159
EP Mapping Clarity	Low	Default	0.035	0.035	0.035	0.040	0.046	0.053	0.059	0.068
	Medium	Default	0.070	0.070	0.070	0.079	0.090	0.105	0.117	0.136
	Normal	Default	0.090	0.090	0.090	0.102	0.118	0.138	0.158	0.189
Head Clarity	Low	Default	0.123	0.148	0.160	0.179	0.208	0.244	0.273	0.305
	Medium	Default	0.185	0.232	0.255	0.293	0.346	0.402	0.445	0.493
	Normal	Default	0.320	0.395	0.432	0.491	0.561	0.651	0.738	0.875
Spine Clarity	Low	Default	0.123	0.148	0.160	0.179	0.208	0.244	0.273	0.305
	Medium	Default	0.185	0.232	0.255	0.293	0.346	0.402	0.445	0.493
	Normal	Default	0.320	0.395	0.432	0.491	0.561	0.651	0.738	0.875
Thorax Clarity	Low	Default	0.123	0.148	0.160	0.179	0.208	0.244	0.273	0.305
	Medium	Default	0.185	0.232	0.255	0.293	0.346	0.402	0.445	0.493
	Normal	Default	0.320	0.395	0.432	0.491	0.561	0.651	0.738	0.875
Abdomen Clarity	Low	Default	0.123	0.148	0.160	0.179	0.208	0.244	0.273	0.305
	Medium	Default	0.185	0.232	0.255	0.293	0.346	0.402	0.445	0.493
	Normal	Default	0.320	0.395	0.432	0.491	0.561	0.651	0.738	0.875
Peripheral Clarity	Low	Default	0.123	0.148	0.160	0.179	0.208	0.244	0.273	0.305
	Medium	Default	0.185	0.232	0.255	0.293	0.346	0.402	0.445	0.493
	Normal	Default	0.320	0.395	0.432	0.491	0.561	0.651	0.738	0.875

Radioscopy (Fluoroscopy) - B20/15 Systems with ClarityIQ, Lateral Stand

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)						
Cardio Clarity	Low	Default	0.146	0.158	0.182	0.205	0.239	0.278	0.327
	Medium	Default	0.217	0.235	0.271	0.306	0.358	0.418	0.492
	Normal	Default	0.495	0.534	0.609	0.683	0.791	0.911	1.063
Cardio Pediatrics Clarity <40 kg	Low	Default	0.062	0.068	0.078	0.088	0.104	0.121	0.143
	Medium	Default	0.093	0.101	0.117	0.132	0.153	0.178	0.207
	Normal	Default	0.141	0.153	0.177	0.199	0.233	0.271	0.318

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	Flavor	Patient Type	Reference Air Kerma (mGy/s)						
Cardio Pediatrics Clarity >40 kg	Low	Default	0.062	0.068	0.078	0.088	0.104	0.121	0.143
	Medium	Default	0.093	0.101	0.117	0.132	0.153	0.178	0.207
	Normal	Default	0.141	0.153	0.177	0.199	0.233	0.271	0.318
EP Clarity	Low	Default	0.039	0.043	0.049	0.055	0.064	0.074	0.086
	Medium	Default	0.079	0.085	0.098	0.110	0.128	0.148	0.171
	Normal	Default	0.090	0.098	0.113	0.128	0.150	0.175	0.206
EP Mapping Clarity	Low	Default	0.046	0.050	0.057	0.064	0.075	0.085	0.098
	Medium	Default	0.091	0.099	0.113	0.127	0.148	0.169	0.194
	Normal	Default	0.108	0.117	0.135	0.153	0.179	0.209	0.246
Head Clarity	Low	Default	0.204	0.220	0.250	0.280	0.323	0.371	0.433
	Medium	Default	0.320	0.347	0.399	0.444	0.511	0.587	0.683
	Normal	Default	0.532	0.575	0.659	0.741	0.861	0.997	1.156
Spine Clarity	Low	Default	0.204	0.220	0.250	0.280	0.323	0.371	0.433
	Medium	Default	0.320	0.347	0.399	0.444	0.511	0.587	0.683
	Normal	Default	0.532	0.575	0.659	0.741	0.861	0.997	1.156
Thorax Clarity	Low	Default	0.204	0.220	0.250	0.280	0.323	0.371	0.433
	Medium	Default	0.320	0.347	0.399	0.444	0.511	0.587	0.683
	Normal	Default	0.532	0.575	0.659	0.741	0.861	0.997	1.156
Abdomen Clarity	Low	Default	0.204	0.220	0.250	0.280	0.323	0.371	0.433
	Medium	Default	0.320	0.347	0.399	0.444	0.511	0.587	0.683
	Normal	Default	0.532	0.575	0.659	0.741	0.861	0.997	1.156
Peripheral Clarity	Low	Default	0.204	0.220	0.250	0.280	0.323	0.371	0.433
	Medium	Default	0.320	0.347	0.399	0.444	0.511	0.587	0.683
	Normal	Default	0.532	0.575	0.659	0.741	0.861	0.997	1.156

Radiography (Exposure) - B20/15 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)							
Cardio Clarity	Left Coronary 15 fps Low	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	Rotational Scan Prop Ang0 4s	Default	0.118	0.146	0.159	0.181	0.206	0.239	0.269	0.317
		Infant	0.039	0.048	0.052	0.058	0.066	0.076	0.086	0.101
		Neonate	0.025	0.032	0.035	0.040	0.046	0.054	0.063	0.076
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.012	0.015	0.016	0.018	0.021	0.024	0.027	0.032
	15 fps Contrast normal	Default	0.018	0.023	0.025	0.029	0.034	0.040	0.045	0.052
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
		Neonate, Infant, Child	0.012	0.015	0.016	0.018	0.021	0.024	0.027	0.032
	15 fps Contrast normal	Default	0.047	0.058	0.064	0.073	0.083	0.097	0.110	0.130
		Neonate, Infant, Child	0.018	0.023	0.025	0.029	0.034	0.040	0.045	0.052
EP Clarity	15 fps	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225

Procedure	X-ray Protocol	Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
		Patient Type	Reference Air Kerma (mGy/image)							
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
EP Mapping Clarity	7.5 fps	Default	0.022	0.027	0.030	0.034	0.039	0.046	0.053	0.063
	3D EP Prop 4s	Default	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
		Neonate, Infant	0.094	0.121	0.153	0.153	0.153	0.153	0.153	0.153
		Large Adult, Very Large Adult	0.141	0.180	0.225	0.225	0.225	0.225	0.225	0.225
Head Clarity	Cerebral 2 fps low	Default	0.570	0.741	0.827	0.969	1.141	1.367	1.595	1.882
	Aortic Arch 3 fps	Default	0.815	1.059	1.181	1.385	1.629	1.956	2.280	2.689
Spine Clarity	4 fps	Default	0.672	0.875	0.975	1.142	1.345	1.614	1.883	2.221
	2 fps	Default	0.673	0.875	0.974	1.142	1.344	1.612	1.882	2.221
Thorax Clarity	Lungs 2 fps	Default	0.713	0.928	1.036	1.213	1.429	1.713	1.999	2.355
	Subclavian 3 fps	Default	0.965	1.254	1.398	1.639	1.928	2.313	2.699	3.180
Abdomen Clarity	3 fps low	Default	0.454	0.590	0.659	0.772	0.907	1.091	1.272	1.497
	Iliac / Pelvis 3 fps	Default	0.714	0.927	1.034	1.214	1.428	1.714	1.998	2.356
Peripheral Clarity	Upper Legs 3 fps	Default	0.631	0.802	0.868	0.973	1.097	1.236	1.366	1.523
	Lower Legs 1 fps	Default	1.127	1.465	1.633	1.915	2.123	2.384	2.625	2.911

Radiography (Exposure) - B20/15 Systems with ClarityIQ, Lateral Stand

Procedure	X-ray Protocol	Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
		Patient Type	Reference Air Kerma (mGy/image)						
Cardio Clarity	Left Coronary 15 fps Low	Default	0.037	0.040	0.047	0.053	0.062	0.072	0.085
	Rotational Scan Prop Ang0 4s	Default	-	-	-	-	-	-	-
		Infant	-	-	-	-	-	-	-
		Neonate	-	-	-	-	-	-	-
Cardio Pediatrics Clarity <40 kg	15 fps Contrast low	Default	0.020	0.022	0.025	0.028	0.033	0.038	0.044
	15 fps Contrast normal	Default	0.032	0.035	0.040	0.046	0.053	0.061	0.070
Cardio Pediatrics Clarity >40 kg	15 fps Contrast low	Default	0.037	0.040	0.047	0.053	0.062	0.072	0.085
		Neonate, Infant, Child	0.020	0.022	0.025	0.028	0.033	0.038	0.044
	15 fps Contrast normal	Default	0.075	0.081	0.094	0.105	0.122	0.142	0.166
		Neonate, Infant, Child	0.032	0.035	0.040	0.046	0.053	0.061	0.070
EP Clarity	15 fps	Default	0.037	0.040	0.047	0.053	0.062	0.072	0.085
	Prop 4s	Default	-	-	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-	-	-

		Field of View	0	1	2	3	4	5	6
		Field Size (cm)	39	37	31	27	22	19	15
Procedure	X-ray Protocol	Patient Type	Reference Air Kerma (mGy/image)						
		Large Adult, Very Large Adult	-	-	-	-	-	-	-
EP Mapping Clarity	7.5 fps	Default	0.037	0.040	0.047	0.053	0.062	0.072	0.085
	3D EP Prop 4s	Default	-	-	-	-	-	-	-
		Neonate, Infant	-	-	-	-	-	-	-
		Large Adult, Very Large Adult	-	-	-	-	-	-	-
Head Clarity	Cerebral 2 fps low	Default	1.017	1.119	1.321	1.524	1.830	2.184	2.643
	Aortic Arch 3 fps	Default	1.451	1.597	1.886	2.175	2.611	3.120	3.771
Spine Clarity	4 fps	Default	1.157	1.272	1.504	1.737	2.084	2.490	3.007
	2 fps	Default	1.157	1.272	1.503	1.736	2.083	2.488	3.011
Thorax Clarity	Lungs 2 fps	Default	1.281	1.406	1.664	1.918	2.303	2.753	3.327
	Subclavian 3 fps	Default	1.706	1.875	2.217	2.557	3.066	3.666	4.434
Abdomen Clarity	3 fps low	Default	0.806	0.887	1.049	1.210	1.452	1.732	2.097
	Iliac / Pelvis 3 fps	Default	1.281	1.406	1.664	1.919	2.303	2.750	3.324
Peripheral Clarity	Upper Legs 3 fps	Default	1.131	1.245	1.470	1.624	1.822	2.043	2.317
	Lower Legs 1 fps	Default	1.979	2.178	2.577	2.971	3.565	4.133	4.639

Roadmap - B20/15 Systems with ClarityIQ, Frontal Stand

		Field of View	0	1	2	3	4	5	6	7
		Field Size (cm)	48	42	37	31	27	22	19	15
Procedure	Mode	Patient Type	Reference Air Kerma (mGy/image)							
Cardio Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
EP Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
EP Mapping Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Head Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Coil	Default	0.192	0.249	0.278	0.325	0.383	0.459	0.536	0.660
	Unsubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Spine Clarity	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Coil	Default	0.192	0.249	0.278	0.325	0.383	0.459	0.536	0.660
	Unsubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Thorax Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
Abdomen Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 48	1 / 42	2 / 37	3 / 31	4 / 27	5 / 22	6 / 19	7 / 15
			Reference Air Kerma (mGy/image)							
Peripheral Clarity	UnSubtract	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232
	Navigate	Default	0.093	0.113	0.122	0.137	0.154	0.177	0.199	0.232

Roadmap - B20/15 Systems with ClarityIQ, Lateral Stand

Procedure	Mode	Field of View / Field Size (cm) / Patient Type	0 / 39	1 / 37	2 / 31	3 / 27	4 / 22	5 / 19	6 / 15
			Reference Air Kerma (mGy/image)						
Cardio Clarity	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Cardio Pediatrics Clarity <40 kg	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Cardio Pediatrics Clarity >40 kg	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
EP Clarity	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
EP Mapping Clarity	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Head Clarity	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	Coil	Default	0.341	0.374	0.443	0.511	0.614	0.733	0.872
	Unsubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Spine Clarity	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	Coil	Default	0.341	0.374	0.443	0.511	0.614	0.733	0.872
	Unsubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Thorax Clarity	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Abdomen Clarity	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
Peripheral Clarity	UnSubtract	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340
	Navigate	Default	0.170	0.182	0.205	0.227	0.260	0.296	0.340

Examples of Settings with a Relatively High Air Kerma (Rate)

The following table shows examples of exposure procedures that produce a relatively high reference air kerma value, compared to other procedures, for the different Azurion systems:

System	X-ray Protocol			Field size	Patient type
12-in detector	Thorax	Subclavian	3 fps	15 cm	Default
15-in detector	Thorax	Subclavian	3 fps	15 cm	Default
20-in detector	Thorax	Subclavian	3 fps	15 cm	Default
12-in detector with ClarityIQ (option)	Head	Cerebral	2 fps Normal	15 cm	Default
15-in detector with ClarityIQ (option)	Head	Cerebral	2 fps Normal	15 cm	Default
20-in detector with ClarityIQ (option)	Head	Cerebral	2 fps Normal	15 cm	Default

The following table shows examples of fluoroscopy flavors that produce a relatively high Reference Air Kerma value, compared to other procedures, for the different Azurion systems:

System	X-ray Protocol	Flavor	Field size	Patient type
12-in detector	Head	High	15 cm	Default
15-in detector	Head	High	15 cm	Default
20-in detector	Head	High	15 cm	Default
12-in detector with ClarityIQ (option)	Head	Normal	15 cm	Default
15-in detector with ClarityIQ (option)	Head	Normal	15 cm	Default
20-in detector with ClarityIQ (option)	Head	Normal	15 cm	Default

Measurement conditions: according to Reference Air Kerma Measurement Setup (page 386).

Reference Air Kerma Measurement Setup

12-in Detector

Description	Setup
Anti-scatter grid	In position
Distance from focal spot to entrance surface of the phantom	• Frontal: 985 mm (38.78 in) • Lateral: 1060 mm (41.73 in)
Distance from focal spot to Image receptor	• Frontal: 1210 mm (47.64 in) • Lateral: 1300 mm (51.18 in)
Distance from focal spot to patient entrance reference point	Frontal and lateral: 615 mm (24.21 in)
Distance from focal spot to isocenter	Frontal and lateral: 765 mm (30.12 in)
Measuring device	Unfors Xi meter or RaySafe X2 meter with sensor placed in the X-ray beam between the focal spot and the phantom, outside the system measurement field (see the figure below)
Measurement result	To determine the measured air kerma, the ratio between the distance from focal spot to patient entrance reference point and the distance from focal spot to the measurement device shall be taken into account
Patient support	Out of the primary X-ray beam
Phantom	Rectangular blocks of PMMA, total thickness 200 mm (7.87 in), sides equal to or greater than 250 mm (9.84 in)
Single-shot exposure	After radioscopy (stabilized kV/mA)
Wedge filter	Deselected
X-ray beam orientation	• Rotation: 90 degrees LAO • Angulation: 0 degrees CAUD

15-in Detector

Description	Setup
Anti-scatter grid	In position
Distance from focal spot to entrance surface of the phantom	• Frontal: 960 mm (37.80 in) • Lateral: 1075 mm (42.32 in)
Distance from focal spot to Image receptor	• Frontal: 1195 mm (47.05 in) • Lateral: 1300 mm (51.18 in)
Distance from focal spot to patient entrance reference point	• Frontal: 660 mm (25.98 in) • Lateral: 615 mm (24.21 in)
Distance from focal spot to isocenter	• Frontal: 810 mm (31.89 in) • Lateral: 765 mm (30.12 in)
Measuring device	Unfors Xi meter or RaySafe X2 meter with sensor placed in the X-ray beam between the focal spot and the phantom, outside the system measurement field (see the figure below)

Description	Setup
Measurement result	To determine the measured air kerma, the ratio between the distance from focal spot to patient entrance reference point and the distance from focal spot to the measurement device shall be taken into account
Patient support	Out of the primary X-ray beam
Phantom	Rectangular blocks of PMMA, total thickness 200 mm (7.87 in), sides equal to or greater than 300 x 400 mm (11.81 x 15.75 in)
Single-shot exposure	After radioscopy (stabilized kV/mA)
Wedge filter	Deselected
X-ray beam orientation	• Rotation: 90 degrees LAO • Angulation: 0 degrees CAUD

20-in Detector

Description	Setup
Anti-scatter grid	In position
Distance from focal spot to entrance surface of the phantom	945 mm (37.20 in)
Distance from focal spot to Image receptor	1195 mm (47.05 in)
Distance from focal spot to patient entrance reference point	660 mm (25.98 in)
Distance from focal spot to isocenter	810 mm (31.89 in)
Measuring device	Unfors Xi meter or RaySafe X2 meter with sensor placed in the X-ray beam between the focal spot and the phantom, outside the system measurement field (see the figure below)
Measurement result	To determine the measured air kerma, the ratio between the distance from focal spot to patient entrance reference point and the distance from focal spot to the measurement device shall be taken into account
Patient support	Out of the primary X-ray beam
Phantom	Rectangular blocks of PMMA, total thickness 200 mm (7.87 in), sides equal to or greater than 300 x 400 mm (11.81 x 15.75 in)
Single-shot exposure	After radioscopy (stabilized kV/mA)
Wedge filter	Deselected
X-ray beam orientation	• Rotation: 90 degrees LAO • Angulation: 0 degrees CAUD

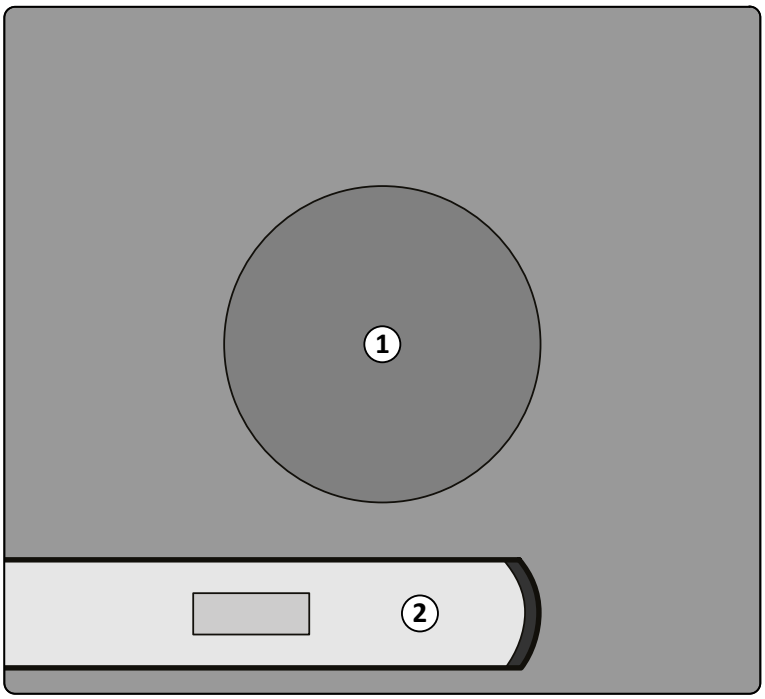


Figure 174 Location of the measuring device

Legend	
1	System measurement field
2	Measuring device

17.5.7 Protection Against Stray Radiation

This section describes the levels of protection provided by the system against stray radiation.

Zone of Occupancy

The indicated significant zone of occupancy is designated to be used for radiologic procedures according to the intended use of the equipment.

For details, see Intended Use of the System (page 18).

Technique factors can be obtained using the Manual X-ray Generator Test in Field Service mode. The following technique factors are used:

- 125 kV, 10 mA
- No additional filter

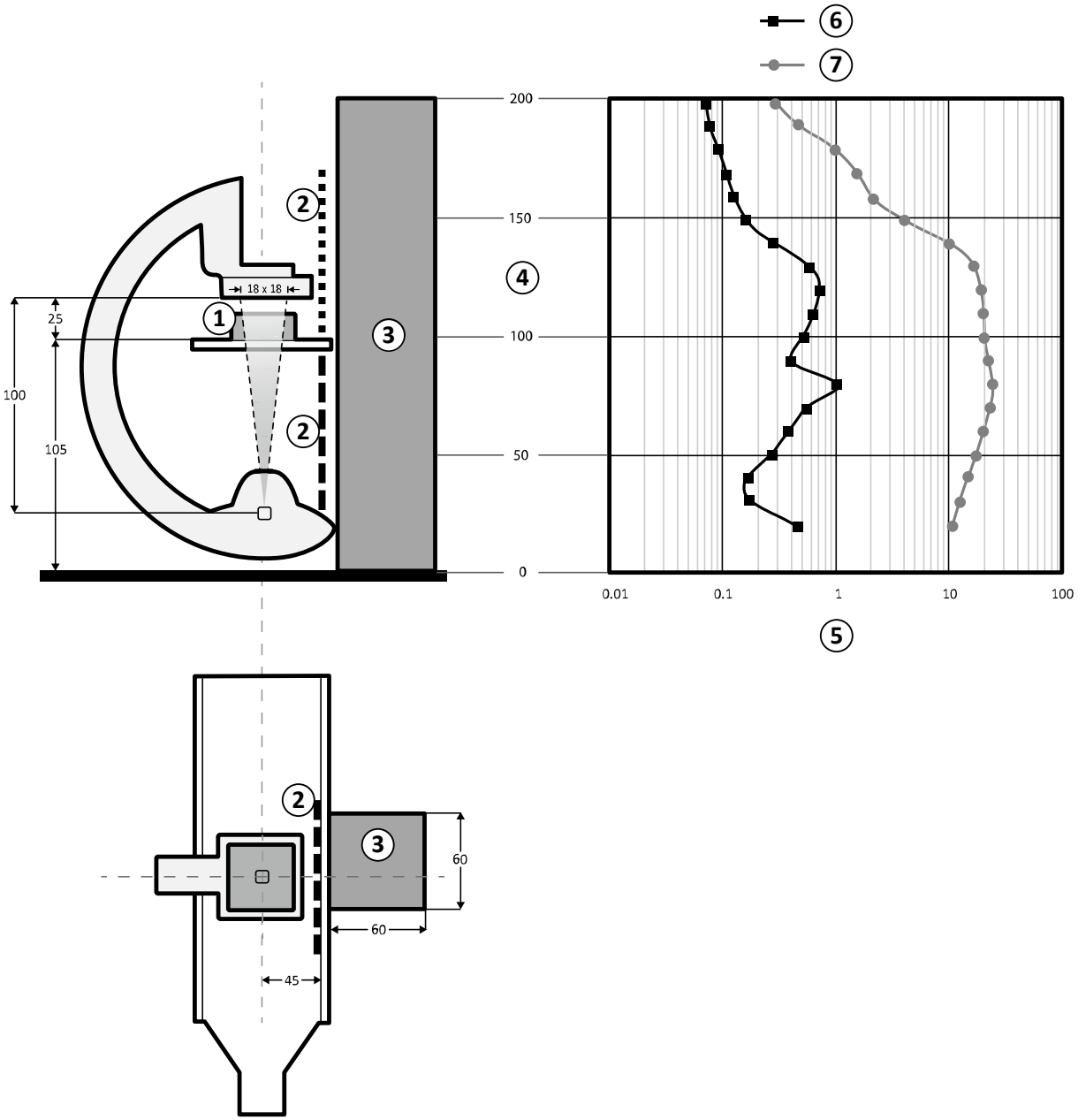


Figure 175 Technique factors graph (all dimensions are in cm)

Legend			
1	Scatter object: 25 x 25 x 15 cm PMMA	5	Dose (mGy/hour)
2	Radiation shields	6	Dose (mGy/hour) with shield (0.5 mm Pb equivalent)
3	Significant zone of occupation (LxWxH): 60 x 60 x 200 cm (located 10 cm from the radiation shield)	7	Dose (mGy/hour) without shield
4	Height (cm)		

NOTE
Radiation shields lower the AK by at least one order of magnitude.

Isokerma Maps for M12 System

The following illustrations show normalized isokerma maps at 100 cm (39.37 in) and 150 cm (59.10 in) above the floor with swivel out.

The following technique factors are used:
- Fluoroscopy 120 kV
- Source-to-image distance 100 cm

- Field size 10 x 10 cm
- No additional filter

Frontal X-ray Direction

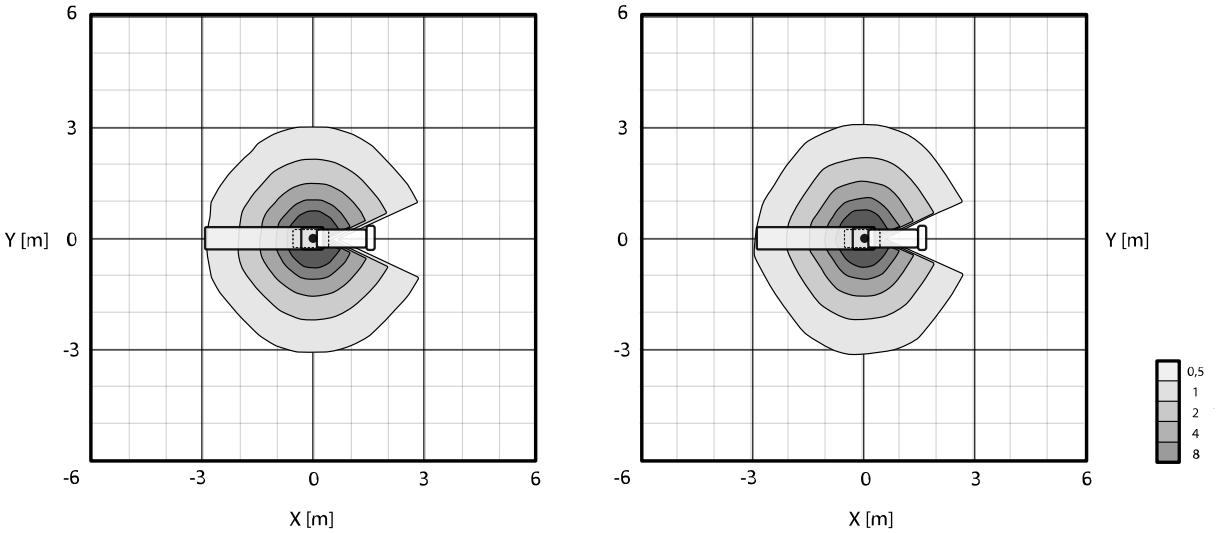


Figure 176 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Lateral X-ray Direction

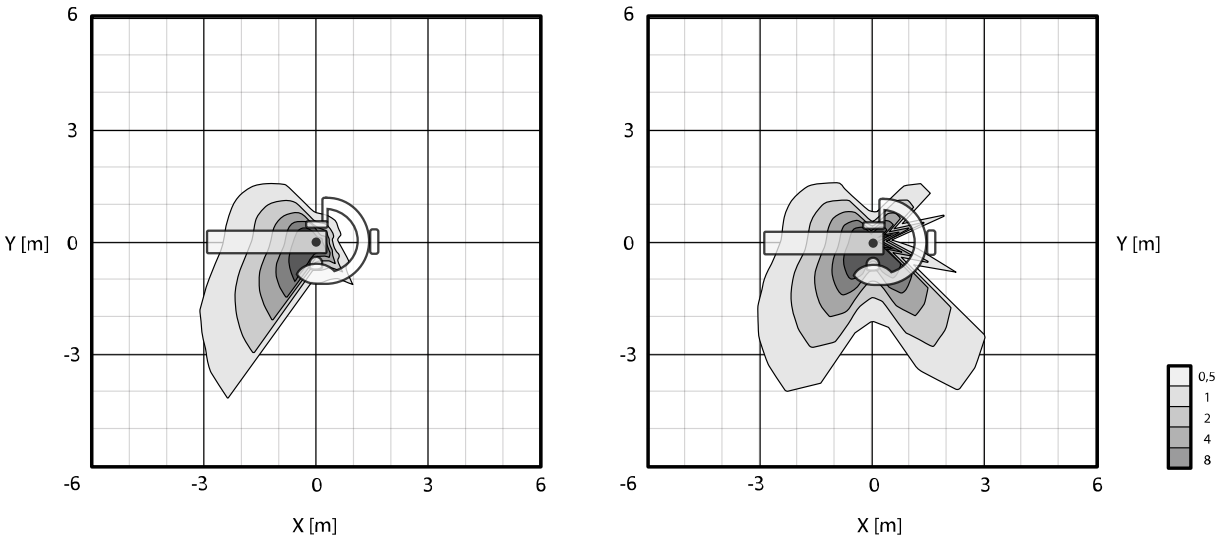


Figure 177 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Isokerma Maps for M15 System and M20 System

The following illustrations show normalized isokerma maps at 100 cm (39.37 in) and 150 cm (59.10 in) above the floor with swivel out.

The following technique factors are used:
- Fluoroscopy 120 kV
- Source-to-image distance 100 cm
- Field size 10 x 10 cm
- No additional filter

Frontal X-ray Direction

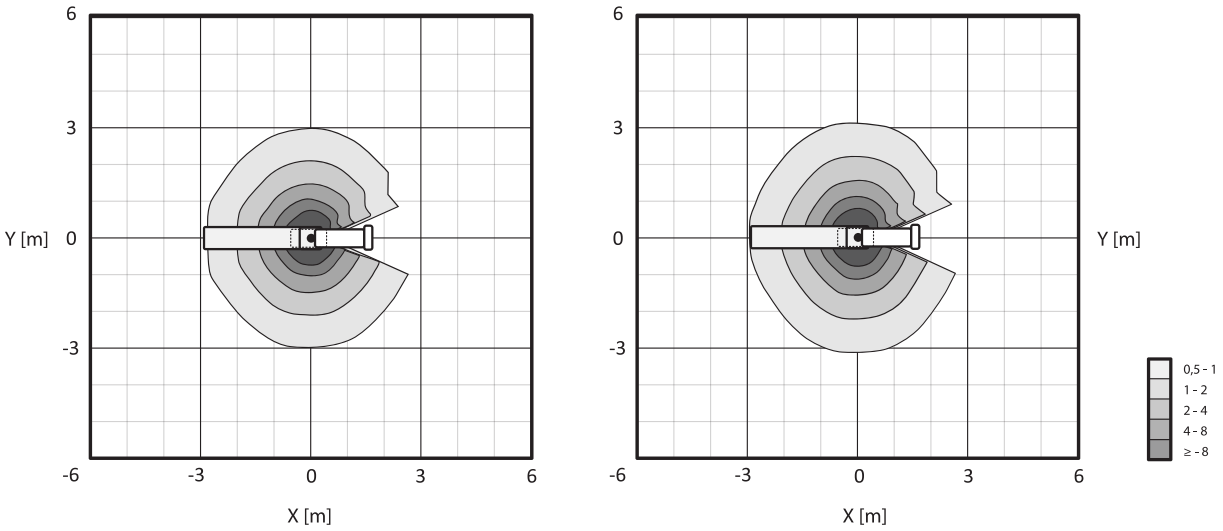


Figure 178 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Lateral X-ray Direction

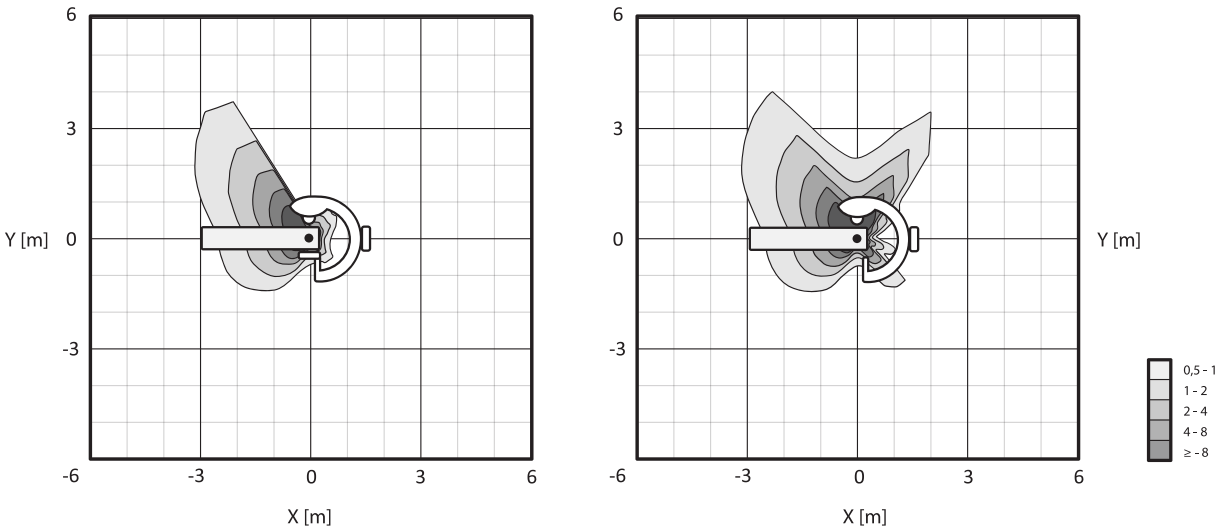


Figure 179 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Isokerma Maps for B20 System

The following illustrations show normalized isokerma maps at 100 cm (39.37 in) and 150 cm (59.10 in) above the floor with swivel out.

The following technique factors are used:
- Fluoroscopy 120 kV
- Source-to-image distance 100 cm
- Field size 10 x 10 cm
- No additional filter

Frontal X-ray Direction

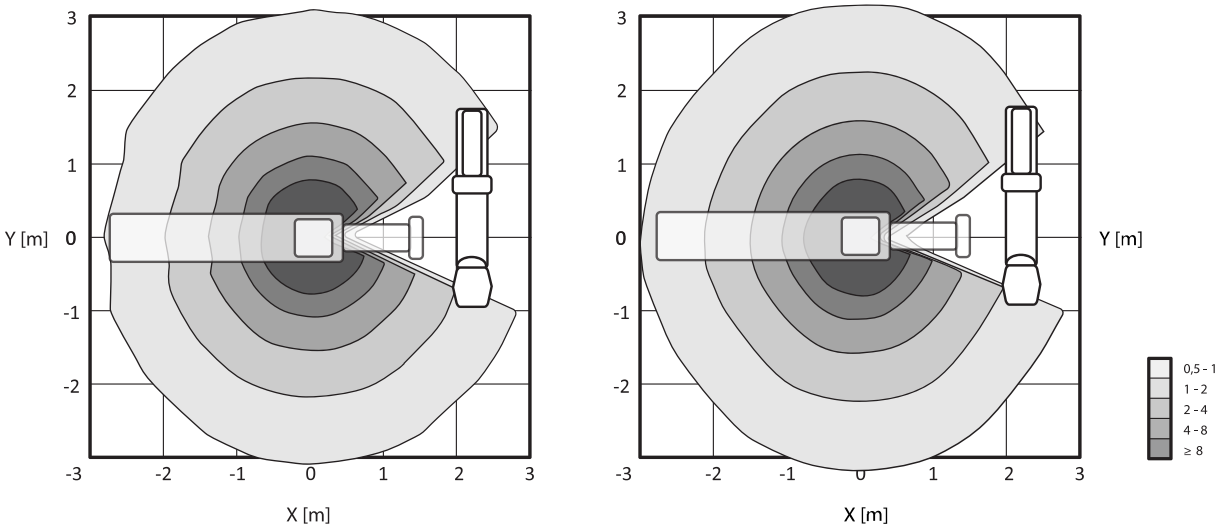


Figure 180 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Lateral X-ray Direction

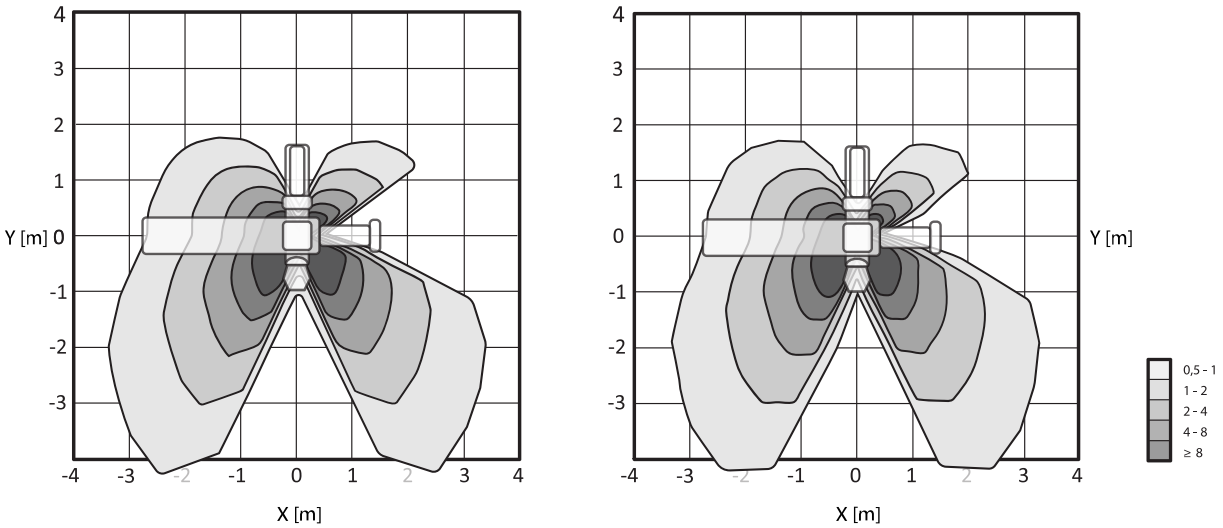


Figure 181 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Isokerma Maps for the FlexArm Stand (Option)

The following illustrations show normalized isokerma maps at 100 cm (39.37 in) and 150 cm (59.10 in) above the floor.

The following technique factors are used:
- Fluoroscopy 120 kV
- Source-to-image distance 100 cm
- Field size 10 x 10 cm
- No additional filter

Frontal X-ray Direction

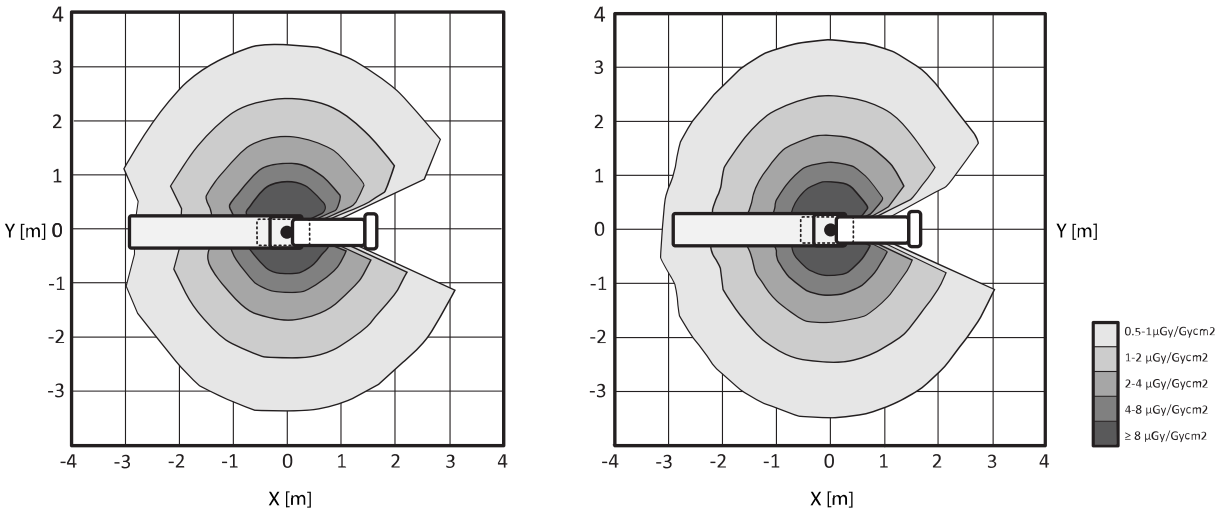


Figure 182 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Lateral X-ray Direction

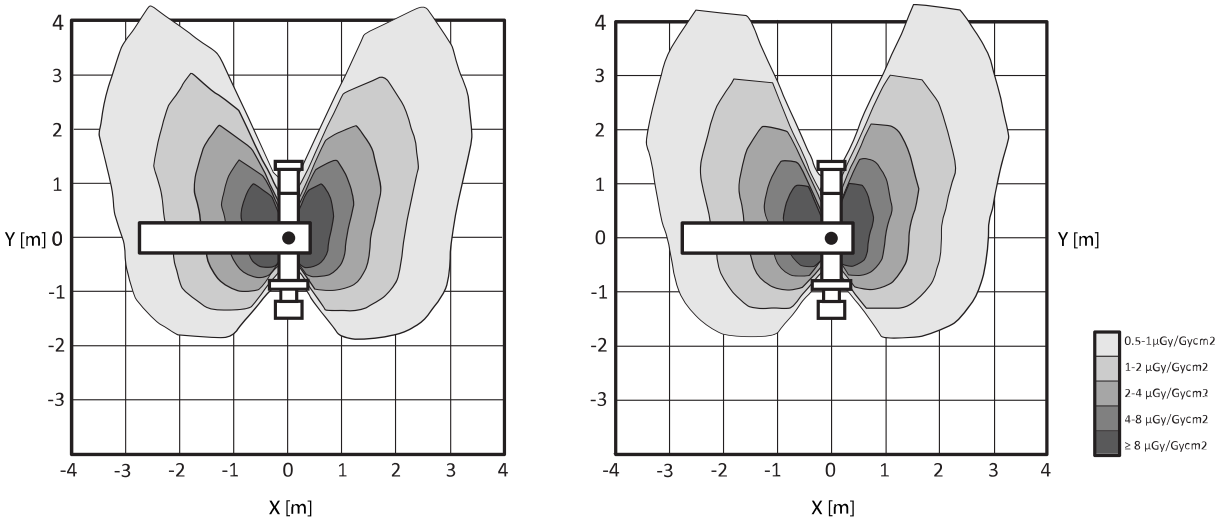


Figure 183 Isokerma map at 100 cm (left) and 150 cm (right) above the floor, µGy/(Gy x cm²)

Additional Filtering

This section provides information about the effect of filtration on air kerma values.

The maximum attenuation equivalent of the tabletop is 1.25 mm Al (at 100 kV / HVL 3.6 mm Al).

The minimum permanent filtration of the X-ray tube assembly is 2.5 mm Al / 75 kV IEC 60522/1999.

The quality equivalent filtration of other materials in the X-ray beam is as follows:
- X-ray tube assembly cover: <0.35 mm Al / 75 kV IEC 60522-1:2020
- DAP-meter (optional): <0.5 mm Al / 75 kV IEC 60522-1:2020
- Wedge filter: 1 mm brass (CuZn37 R-019; 22 mm Al / 75 kV IEC 60522-1:2020)

Depending on the selected procedure, an additional filter (spectral filter) may be applied by the system. For example, for a pediatric procedure, additional filter 1, 2, or 3 is applied, according to which filter provides optimal image quality. The following table indicates the filtration values for each filter.

Additional Filter Number	Filter
0	No filter
1	0.1 mm Cu + 1.0 mm Al

Additional Filter Number	Filter
2	0.4 mm Cu + 1.0 mm Al
3	0.9 mm Cu + 1.0 mm Al

3D Image Quality

This section provides information about cone-beam CT (CBCT) image acquisition. This information is only applicable for the combination of the Azurion release 3.0 system with 3D-RA up to release 6.6, SmartCT up to release 1.1, or XperCT Dual up to release 3.5. For later releases of these software packages, refer to the Instructions for Use provided with the software.

Low-Contrast Resolution

Non-stationarity of low-contrast resolution (image noise), was evaluated through 3D reconstructions of a Catphan 500 phantom (slice CTP515). Visual inspection of this image and similar images shows that non-stationarity of contrast resolution is negligible: at 10 and 5 Hounsfield Units (HU), discs representing features of 7 and 15 mm respectively are clearly visible.

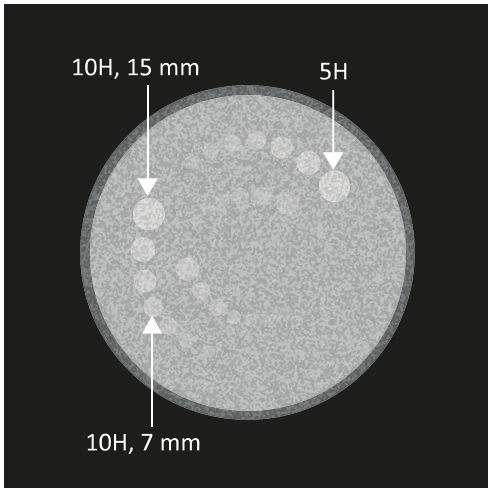


Figure 184 CBCT reconstruction of the Catphan 500 phantom, weighted CT dose ($CTDI_w$) 50 mGy, reconstruction slice thickness 5.2 mm, WW: 50 H, WL: 26 H, ST: 5.2 mm

For more information about the phantoms used, refer to the following website:

www.phantomlab.com

Uniformity

Uniformity within an axial single slice (near the plane of rotation) is dependent on the type of object scanned. Philips Medical Systems has measured uniformity using water phantoms (19 cm in diameter) where uniformity is better than 2%. This level of uniformity is also observed with CBCT Head. Uniformity with CBCT Abdomen is approximately 10%, mainly limited by scatter and truncation. Within axial slices (near plane of rotation) the uniformity is better than across axial slices. The across axial slice uniformity is influenced by the combination of object type and the incompleteness of semi-circular orbit of approximately 200 degrees, resulting in cone-beam artifacts which are clearly recognizable by the user (streaks).

Modulation Transfer Function

CBCT uses a linear reconstruction algorithm with a single reconstruction kernel. The graph below shows the measured modulation transfer function (MTF) for a typical CBCT reconstruction.

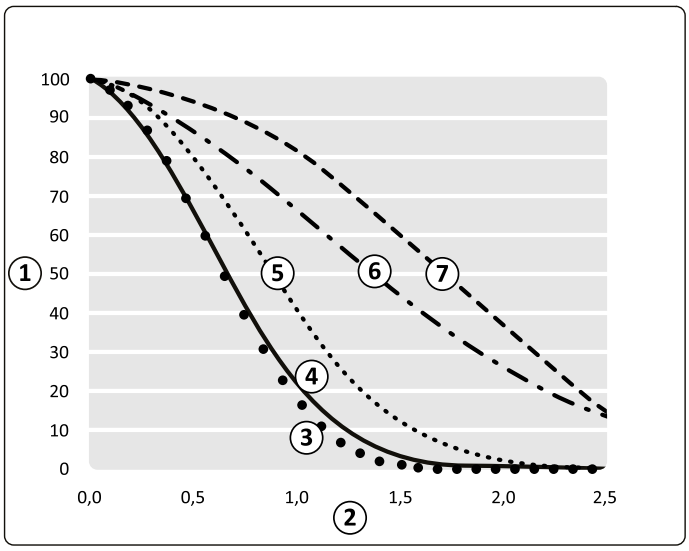


Figure 185 CBCT modulation transfer function simulation and measurement

Legend			
1	Modulation transfer function (%)	5	3D-RX processing
2	Spatial frequency in the isocenter (lp/mm)	6	Detector
3	Measured modulation transfer function	7	Focal spot blur
4	Total simulation		

Spatial Resolution and Distance Measurement

As a practical approach for measuring the MTF, the spatial resolution can be determined using a Catphan 500 phantom. Here, slice CTP528 is used to determine the spatial resolution for cone-beam CT and 3D-RA reconstructions.

Using high-quality head or body procedures, a spatial resolution better than 5 line pairs per cm (representing features of 1 mm) can be achieved.

A measurement accuracy better than 5% is achieved for line pairs consisting of more than 3 line-gap transitions, which still comply to the above mentioned spatial resolution.

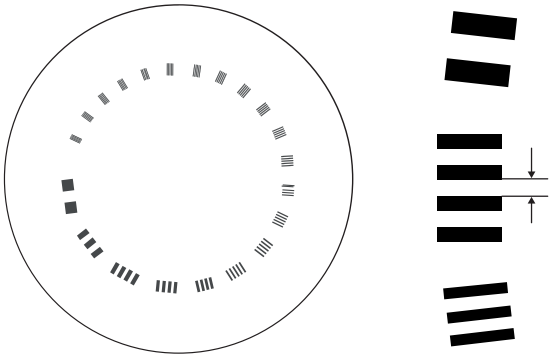


Figure 186 Schematic drawing and description of slice CTP528 of the Catphan 500 phantom (gap indicated on the right side)

Line Pair/cm	Gap Size	Line Pair/cm	Gap Size
1	0.500 cm	11	0.045 cm
2	0.250 cm	12	0.042 cm
3	0.167 cm	13	0.038 cm
4	0.125 cm	14	0.036 cm
5	0.100 cm	15	0.033 cm
6	0.083 cm	16	0.031 cm
7	0.071 cm	17	0.029 cm

Line Pair/cm	Gap Size	Line Pair/cm	Gap Size
8	0.063 cm	18	0.028 cm
9	0.056 cm	19	0.026 cm
10	0.050 cm	20	0.025 cm
		21	0.024 cm

Dose Phantoms
CT dosimetry (CTDI) phantoms are used to determine the dose delivered during a cone-beam CT acquisition. The phantoms consist of circular cylinders of polymethyl methacrylate (PMMA) and are 15 cm long. Their density is 1.19 ± 0.01 g/cc. The phantom for testing CT imaging of the body has a diameter of 32.0 cm, and the phantom for the head has a diameter of 16.0 cm. The phantoms provide the means for placement of the dosimeters along their axis of rotation and along a line parallel to the axis of rotation, 1.0 cm from the outer surface and within the phantom.

Dose Measurements
Actual dose values were measured with a 10 cm long, pencil-shaped ionization chamber.

CTDI Definition
The weighted CTDI dose is calculated with the formula:

CTDIW = 2/3 * (P1 + P2 + P3 + P4) / 4 + 1/3 P5 [Gy]

where P_i is the dose measured with the measurement device in position *i*.

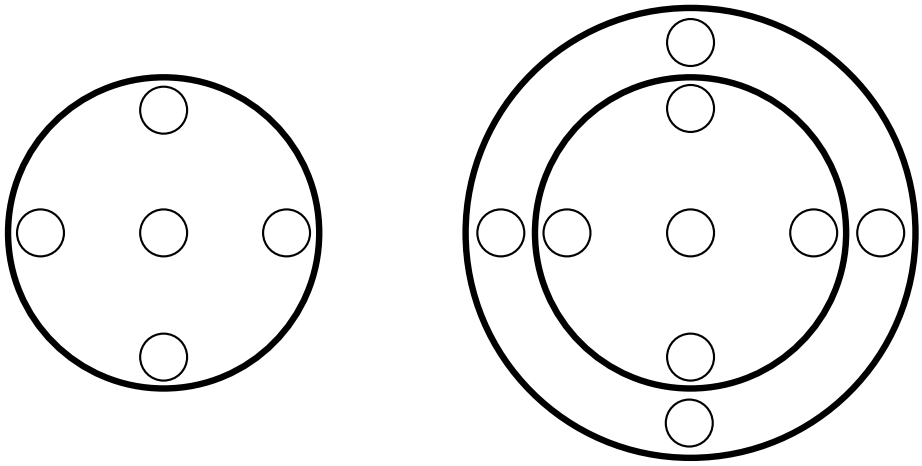


Figure 187 Dose measurement positions for head (left) and body (right) application areas

CTDI Dose Measurements
The following table indicates CTDI dose measurements for 3D-RA using the largest detector field size.

Phantom	Procedure Group	Procedure	CTDI [mGy] FD20	FD15	FD12	Tolerance[1]
Head	**3D-RA**	**Prop 4s**	3	3	6	±50%
Abdomen	**3D-RA**	**Prop 4s**	23	19	-	±50%
	3D-RA	**Roll 8s**	22	21	-	±50%

Note 1: Due to uncertainties in the dosimeter, X-ray statistics and system variations, the CT dose index (CTDI) has a margin of ±50%.

The following table indicates CTDI dose measurements for CBCT using the largest detector field size, unless otherwise indicated in the procedure name.

Phantom	Procedure Group	Procedure	CTDI [mGy]	Tolerance[1]
Head	**Cone Beam CT**	**HQ 60fps -10s**	29	±50%
	CBCT	**Circular 10s Medium**	45	±50%
	CBCT	**Helical 10s Medium**	45	±50%
	CBCT Angio I.A.	**Circular**[4]	30	±50%
	CBCT Angio I.A.	**Helical**	30	±50%
	CBCT Angio I.V.	**Circular**[4]	30	±50%
	CBCT Angio I.V.	**Helical**	30	±50%
	Vaso CT I.A.	**27cm / 10.5" I.A.**	45	±50%
	Vaso CT I.A.	**22cm / 8.5" I.A.**	37	±50%
	Vaso CT I.V.	**27cm / 10.5" I.V.**	45	±50%
	Vaso CT I.V.	**22cm / 8.5" I.V.**	37	±50%
Abdomen	**CBCT Closed**	**Prop HQ -5s**[2]	24	±50%
	CBCT Closed	**Prop LD -5s**	14	±50%
	CBCT Closed	**Roll -5s**[3]	27	±50%

Note 1: Due to uncertainties in the dosimeter, X-ray statistics and system variations, the CT dose index (CTDI) has a margin of ±50%.

*Note 2: The same acquisition protocol is applied for **CBCT Open** and twice for **CBCT Dual Phase Prop**.*

*Note 3: The same acquisition protocol is applied twice for **CBCT Dual Phase Roll**.*

*Note 4: The same acquisition protocol is applied twice for **CBCT Angio I.A. Dual Phase** and **CBCT Angio I.V. Dual Phase**.*

High-Contrast Resolution

3D-RA (3D rotational angiography) reconstructions provide high-speed and high-resolution 3D visualization of vessels and bones anatomy.

A high-contrast phantom is used in the evaluation of 3D-RA head and body procedures. Philips Medical Systems uses a CsI C-delta (Cesium-Iodine Contrast-difference) phantom. The CsI C-delta phantom consists of 2 cm thick, 10 cm in diameter circular cylinders of water equivalent plastic containing CsI rods representing 8 different contrast groups. The contrast groups represent: >2700, 1160, 562, 274, 116, 53, 27 and 14 HU. For each slice two different contrast groups are present each containing rods of 8 different diameters: 11.3; 8.0; 5.6; 4.0; 2.8; 2.0; 1.4; 1.0 mm. The discs are inserted in elliptical (or circular) containers of water equivalent plastic depending on procedure used (head or body).

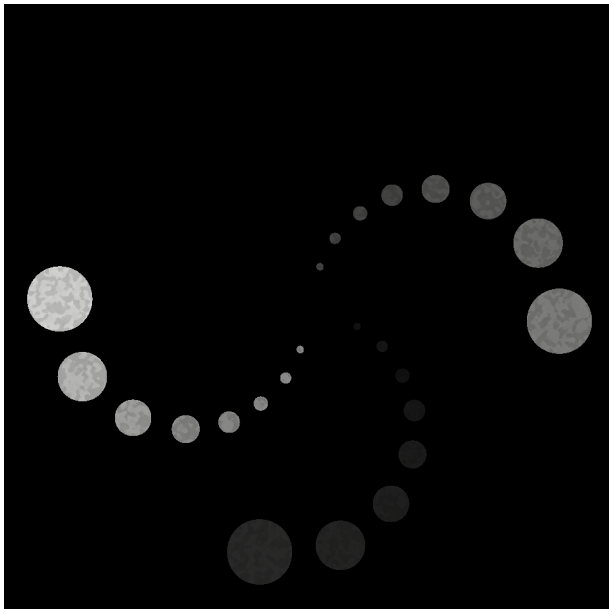


Figure 188 Projection of the CsI C-Delta phantom displaying two different contrast groups

The readout of the smallest discernable rod diameter gives the contrast resolution. The table shows representative values for typical head and body 3D-RA reconstructions. Although the same procedures

are used as for CTDI dose measurements, the CTDI dose for the high-contrast resolution measurements is lower due to the smaller diameter of the CsI C-delta phantom.

Acquisition Protocol	Contrast Resolution Group [HU]	Readout for FD Format	
		42 cm	22 cm
Head 3D-RA Prop scan 4 s	>2700	1	1
	1160	1	1
	562	1	1
	274	1	1
	116	1-1.4	2
	53	4	C/N limit
	27	C/N limit	None
	14	None	None
Abdomen 3D-RA Prop scan 4 s	>2700	1	1
	1160	1	1
	562	1	1
	274	1	1
	116	1.4	2
	53	5.7	C/N limit
	27	C/N limit	None
	14	None	None
Abdomen 3D-RA Roll scan 8 s	>2700	1	1
	1160	1	1
	562	1	1
	274	1	1
	116	1.4	2
	53	5.7	C/N limit
	27	C/N limit	None
	14	None	None

17.5.8 Electromagnetic Compatibility

The system should only be used in an electromagnetic environment similar to the environment described in this section.

The Azurion medical electrical system, further referred to as the system in this section, has been tested and complies with IEC 60601-1-2:2007 (edition 3: collateral standard - electromagnetic compatibility) and IEC60601-1-2:2014+AMD1:2020 (edition 4.1: collateral standard - electromagnetic disturbances) for medical electrical equipment.

Exceptions
DoseAware Family R2 is designed as an independent option that cannot adversely affect the medical electrical systems essential performance or basic safety as a result of electromagnetic interference or disturbances. DoseAware Family R2 is classified as multimedia equipment connected to the medical electrical system and complies with the Class-A CISPR 32 emission limits.

PC hardware for Philips clinical applications, when installed in the control room, is compliant with the ESD levels for IT and multimedia equipment. Higher discharge voltage levels specified (≥6 kV contact and ≥8 kV air) may in exceptional cases result in abnormal behavior requiring a PC restart. High levels of ESD can be prevented by keeping the relative humidity in the control room between 40% and 60% and preventing the presence of materials that facilitate tribo-electric charging like polyester, polystyrene, and other synthetic materials.

Emissions Declaration
Within the limits specified in the collateral EMC standards, the medical electrical system does not emit electromagnetic disturbances that could affect radio services, other equipment, or the essential performance of other medical electrical equipment or medical electrical systems.

Immunity Declaration
Within the limits specified in the collateral EMC standards, the medical electrical system has adequate immunity to be able to provide its basic safety and essential performance in the presence of electromagnetic disturbances.

However, be careful when operating the system in a low-humidity environment. Extreme electrostatic discharge of more than 8 kV on an application workstation in the control room (for example, Interventional Workspot) may cause unrecoverable damage to the workstation hardware.

Furthermore, some performance degradation may be observed during presence of electromagnetic disturbances:

- During severe mains power dips (>40%), the control room monitors, powered directly from hospital mains sockets, may restart. Performance recovers automatically within a few seconds after the disturbance has ended.
- During severe mains power dips, application workstations (for example, Interventional Workspot), powered directly from hospital mains sockets, may restart. Performance recovers automatically within a few minutes after the disturbance has ended.
- Severe electrical fast transients on supply mains or coupled into cables may lead to distortions or blanking on workspot monitors in the control room. Performance recovers after the disturbance has ended.
- Electrostatic discharge on the control modules may cause the module to reset with flashing LED indicators. Performance recovers within a few seconds after the discharge.
- Electromagnetic phenomena (such as electrostatic discharge, conductive and radiating disturbances) on the keyboard or mouse in the control room may lead to the keyboard and mouse stopping working. A cold system restart is required to restore functionality. For more information, see Restarting the System (page 57).
- The physical position of the DVD recorder and DVD connecting cabling, when installed in the control room, may, in exceptional cases, result in abnormal behavior requiring a DVD recorder restart, caused by crosstalk coming from external cabling in close proximity of the medical system cabling.
- Severe electromagnetic disturbance levels or transients coupled onto cables to the control room may cause the data export USB port to become unresponsive. Normal USB port data export is restored after a cold restart (see Intelligent System Recovery (page 116)).

Intended Use Environment
The system has been designed for the professional healthcare environment and does not require additional shielding against electromagnetic disturbances. In addition, equipment intended to be used on or near the patient table has been designed and tested to provide its basic safety and essential performance in the presence of reasonably foreseeable disturbances caused by the use of surgical equipment.

Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.

Supply mains quality should be that of a typical hospital environment, not exceeding overvoltage category III for the three-phase supply mains to the system and not exceeding overvoltage category II for single-phase hospital powered devices.

If the responsible organization requires continued operation during power mains interruptions, it is recommended that the system is powered from a compatible uninterruptable power supply. Contact a Philips representative for details.

Portable and mobile RF communications equipment should be used no closer to any part of the system enclosures, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.

The recommended separation distance for frequencies between 150 kHz and 800 MHz can be calculated as: $d=1.2\sqrt{P}$ 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 meters (m). For frequencies

above 800 MHz, the recommended separation distance can be calculated as: d=2.4√P. For the specified ISM frequencies in the 150 kHz to 80 MHz frequency range, the recommended separation distance can be calculated as: d=0.6√P.

The table below provides some concrete examples of portable and mobile RF communications equipment and the recommended separation distance.

Equipment examples	Rated effective radiated power (ERP)	Recommended separation distance
HAM radio 1.8 – 4 MHz	1,500 W	50 m
HAM radio 5.3-5.4 MHz	50 W	10 m
GSM phone 890-915 MHz	2 W	1 m
GSM base station 890-915 MHz	320 W	11 m
DCS1800 phone 1.7-1.8 GHz	4 W	5 m
DCS1800 base station 1.7-1.8 GHz	200 W	34 m
DECT phone 1.9-2 GHz	0.25 W	1.5 m
RFID 866-868 MHz	2 W	1 m
RFID 5.7-5.9 GHz (US only)	4 W	5 m
FM broadcast 88-108 MHz	100,000 W	190 m

Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. 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, the system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orientating or relocating part of the system components.

Interference may occur in the vicinity of equipment marked with the following symbol:

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

The responsible organization should ensure that the environment in which the system is used complies with the intended use environment. For further details on electromagnetic environments and environment classification refer to IEC TR 61000-2-5.

Essential Performance
The essential performance of the system (based on IEC60601-1) is: "Maintain fluoroscopy during the critical part of interventional procedures". It has been determined by EMC risk management and tests that in rare circumstances with high levels of continuous disturbances at specific frequencies, line or bar artifacts may be visible in X-ray images with a low signal-to-noise ratio.

Performance
In addition to the required immunity for basic safety and essential performance, the system has been tested against the performance levels of IEC TR 60601-4-2:2016 (Electromagnetic immunity: performance).

Electromagnetic Emissions
Electromagnetic emissions tests have been done in standby, movement, and X-ray operating modes of the system. EMC tests are performed on Azurion subsystems, subsystem test results are combined to show system level compliance with applicable standards.

The system uses RF energy only for its internal function. These RF emissions are not likely to cause any interference in nearby electronic equipment.

Overview of standards and EMC emission tests:

Description of emission test	Test standard	60601-1-2:2007 Edition 3	60601-1-2:2014 + AMD1:2020 Edition 4.1	60601-4-2:2016 Performance
Conducted disturbance at mains port 150 kHz – 30 MHz	CISPR 11	Group I Class A limits	Group I Class A limits	Not applicable
Radiated disturbances 30 MHz – 1000 MHz	CISPR 11	Group I Class A limits	Group I Class A limits	Not applicable
Radiated disturbances 1 GHz – 6 GHz	CISPR 32	Applicable for the following enclosures: • Wireless foot switch (including base station) • Wireless mouse (including receiver dongle) • DoseAware (Xtend) PDM and Hub		
Harmonic distortion	IEC 61000-3-2	Not applicable for the three-phase supply mains because the current rating is >16 A per phase. Applicable to single-phase supply mains interfaces. Single-phase supply mains interfaces are classified as class A, including information technology equipment classified as medical equipment.		
Voltage fluctuations and flicker	IEC 61000-3-3	Not applicable for the three-phase supply mains because the current rating is >16 A per phase. Applicable to single-phase supply mains interfaces. The equipment is classified for continuous use. It has been tested according to A.11 and complies with d_{max} limits of clause 5.		

NOTE

The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required), this equipment might not offer adequate protection to radio-frequency communication services. Mitigation measures might be required, such as relocating or re-orienting the equipment.

Electromagnetic Immunity

Electromagnetic immunity tests have been done in standby, movement, and X-ray operating modes of the system. EMC tests are performed on Azurion subsystems, operated in a representative end-use scenario using auxiliary equipment.

Overview of standards and EMC immunity tests:

Description of immunity test	Test standard	60601-1-2:2007 Edition 3	60601-1-2:2014 + AMD1:2020 Edition 4.1	60601-4-2:2016 Performance
Electrostatic discharge (ESD)	IEC 61000-4-2	±2, 4, 6 kV contact ±2, 4, 8 kV air	±8 kV contact ±2, 4, 8, 15 kV air	±4 kV contact ±2, 4, 8 kV air
Radiated RF electromagnetic fields	IEC 61000-4-3	80-2500 MHz 80% AM 1 kHz 3 V/m	80-2700 MHz 80% AM 1 kHz 3 V/m	80-2700 MHz 80% AM 1 kHz 3 V/m
Proximity fields	IEC 61000-4-3	Not applicable	Frequencies and levels determined by EMC risk management. Refer to the table below.	
Electrical fast transients and bursts	IEC 61000-4-4	±1 kV 5 & 100 kHz (SIP/SOP) ±2 kV 5 & 100 kHz (AC/DC power)	±1 kV 100 kHz (SIP/SOP) ±2 kV 100 kHz (AC/DC power)	±0.5 kV (DC power, SIP/SOP) 5 & 100 kHz ±1 kV (AC power) 5 & 100 kHz

Description of immunity test	Test standard	60601-1-2:2007 Edition 3	60601-1-2:2014 + AMD1:2020 Edition 4.1	60601-4-2:2016 Performance
Surges	IEC 61000-4-5	1 kV (line-line) 2 kV (line/neutral-PE)	±0.5, 1 kV (line-line) ±0.5, 1, 2 kV (line/PE) ±4 kV (3-phase AC supply mains)	±0.5, 1 kV (line-line) ±0.5, 1, 2 kV (line/PE)
Conducted disturbances, induced by RF fields	IEC 61000-4-6	0.15 – 80 MHz 80% AM 1kHz 3 V_{rms}	0.15 – 80 MHz 80% AM 1 kHz 3 V_{rms} 6 V_{rms} ISM freq. (refer to the table below)	0.15 – 80 MHz 80% AM 1 kHz 3 V_{rms} on system on external interface EI only
Voltage dips, short interruptions, and voltage variations on power supply input lines (Three-phase supply mains port and single-phase supply mains ports not powered from the system)	IEC 61000-4-11	**Single-phase**: >95% dip 0.5 cycle, 60% dip 5 cycles, 30% dip 25 cycles, >95% dip 5 seconds **Three-phase >16 A**: 100% dip 5 sec.	**Single-phase**: 100% dip 0.5 cycles angles 0, 45, 90, 135, 180, 225, 270 and 315, 100% dip 1 cycle angle 0, 30% dip 25/30 cycles angle 0 100% dip 5 sec. **Three-phase >16 A**: 100% dip 5 sec.	Voltage dips: 0% U_T 0º, 180º - 10 ms 70% U_T 0º - 500 ms 0% U_T 0º - 5,000 ms
Power frequency magnetic fields	IEC 61000-4-8	50 and 60 Hz 3 A/m	50 and 60 Hz 30 A/m	50 and 60 Hz 3 A/m
Proximity magnetic fields	IEC 61000-4-39	Not applicable	**Examination room environment:** 0.25A/m 134.2kHz 50%PM 2.1kHz. 0.02A/m 13.56MHz 50%PM 50kHz **Control room environment:** 65 A/m 134.2 kHz 50% PM 2.1 kHz 7.5 A/m 13.56 MHz 50% PM 50 kHz	Not applicable

NOTE

Voltage dips, short interruptions, and voltage variations: the system has been tested and found to comply with the requirements of YY 9706.102-2021 and IEC 60601-1-2:2007 standards. The 3-phase supply mains interface is exempted from these test requirements for the following reasons:

- ***The system is not classified as life supporting equipment.***
- ***The supply mains input current rating for the 3-phase supply mains exceeds 16 A.***

The short interruptions test has been applied to the 3-phase supply mains interface and passed.

NOTE

U_T is the AC mains voltage prior to application of the voltage dip or short interruption test.

NOTE

Magnetic sensitive components have been identified for the frequency band 9 kHz to 26 MHz by the manufacturer's EMC risk management, in addition to the proximity magnetic fields frequencies listed in the standard.

The following table of reasonable foreseeable ISM frequencies for conducted disturbance testing has been determined by EMC risk management.

ISM frequency table 0.15 MHz-80 MHz conducted disturbances induced by RF fields testing:

Frequency band	Test frequencies	Modulation	60601-1-2:2014 + AMD1:2020 Edition 4.1	60601-4-2:2016 Performance
0.15-29 MHz	0.15-29 MHz, 1% steps	80% AM, 1 kHz	6 V	3 V
6.765-6.795 MHz	6.765 MHz, 6.795 MHz	80% AM, 1 kHz	6 V	3 V
12.5-20 MHz (medical implants EN 301 330)	16 MHz	80% AM, 1 kHz	6 V	3 V
13.553-13.567 MHz	13.56 MHz	80% AM, 1 kHz	6 V	3 V
26.957-27.283 MHz	26.957 MHz, 27.03 MHz, 27.283 MHz	80% AM, 1 kHz	6 V	3 V
29-80 MHz (porto base stations, erp 130 W, d=2 m)	29-80 MHz, 1% steps	80% AM, 1 kHz	10 V	3 V
40.66-40.70 MHz	40.66 MHz, 40.70 MHz	80% AM, 1 kHz	6 V	3 V

NOTE

Frequency bands 0.15-29 MHz, 12.5-20 MHz and 29-80 MHz have been identified by the manufacturer's EMC risk management in addition to the ISM frequencies listed in the standard.

The following table of reasonable foreseeable ISM frequencies for proximity field testing has been determined by EMC risk management.

Proximity field frequency table 80-7125 MHz:

Frequency band	Test frequencies	Modulation	60601-1-2:2014 + AMD1:2020 Edition 4.1	60601-4-2:2016 Performance
80-990 MHz (porto base stations, erp 130 W, d=2 m)	80-990 MHz, 1% steps	80% AM, 1 kHz	10 V/m	3 V/m
380-390 MHz	385 MHz	Pulse, 18 Hz	27 V/m	6 V/m
401-406 MHz (medical implants EN 301 839)	405 MHz	Pulse, 18 Hz	27 V/m	-
430-470 MHz	434 MHz, 450 MHz	Pulse, 18 Hz	28 V/m	9 V/m
704-787 MHz	710 MHz, 745 MHz, 780 MHz	Pulse, 217 Hz	9 V/m	3 V/m
800-960 MHz	810 MHz, 870 MHz, 930 MHz	Pulse, 18 Hz	33 V/m	9 V/m
1700-1990 MHz	1720 MHz, 1845 MHz, 1970 MHz	Pulse, 217 Hz	28 V/m	9 V/m
1900-2000 MHz	1920 MHz, 1940 MHz, 1960 MHz, 1980 MHz	Pulse, 18 Hz	10 V/m	-
2400-2570 MHz	2410 MHz, 2430 MHz, ..., 2570 MHz	Pulse, 217 Hz	28 V/m	9 V/m
3300-3800 MHz	3310 MHz, 3370 MHz, …, 3790 MHz	Pulse, 16 kHz	10 V/m	-
4400-5000 MHz	4420 MHz, 4480 MHz, …, 4960 MHz	Pulse, 16 kHz	10 V/m	-
5100-5800 MHz	5240 MHz, 5500 MHz, 5785 MHz	Pulse, 217 Hz	9 V/m	6 V/m
5925-7125 MHz	5970 MHz, 6080 MHz, …, 7070 MHz	Pulse, 16 kHz	10 V/m	-

NOTE

Frequency band 430-470 MHz is designated for industrial, scientific, and medical (ISM) applications (433.05-434.79 MHz, 433.92 MHZ center frequency) for the following countries: Germany, Austria, Bosnia and Herzegovina, Croatia, North Macedonia, Liechtenstein, Montenegro, Portugal, Serbia, Slovenia, and Switzerland.

Radio Equipment

The following radio equipment can optionally be integrated with the medical electrical system. Compliance with the immunity requirements for medical electrical equipment and compliance with emission limits from 150 kHz to 1000 MHz has been shown through inclusion of the radio equipment in the EMC subsystem tests. Compliance with the emission limits from 1000 MHz to 6000 MHz has been shown by tests on the individual radio equipment.

Radio equipment technical data:

Radio equipment	Frequency	Power (EIRP)	Modulation	Conformity
Wireless mouse	2400.0-2483.5 MHz	<10 mW	Spectrum use: non-specific short range device	EN 301 489-1 V 2.1.1 EN 301 489-3 V2.1.1 EN 300 440 V 2.1.1
Wireless foot switch and base station	2400.0-2483.5 MHz	<10 mW	Spectrum use: FHSS Protocol type: Bluetooth Low Energy Type of modulation: GFSK Channel spacing: 2 MHz Adaptive frequency-hopping on 40 channels	EN 300 328 V2.2.2
DoseAware Family R2 Base Station (Hub) and Personal Dose Meter (PDM)	EU: 868.3 MHz US: 918.3 MHz Japan: 927.9 MHz India: 866.0 MHz	<5 mW	Spectrum use: non-specific short range device Type of modulation: GFSK Duty cycle: <1% Channel spacing: 100 kHz Occupied BW: 250 kHz	EN 301 489-1 V 2.1.1 EN 301 489-3 V2.1.1 EN 300 220-1 V 3.1.1 EN 300 220-2 V 3.1.1

WARNING

The system may be subject to interference from other equipment using the same frequencies shown above, even if the other equipment complies with emission requirements for medical devices.

There is no guarantee that a particular location will be free from radio interference and Azurion wireless device options may be susceptible to interference from other radio equipment. Such interference may cause sporadic interruptions to the function. If interference is determined, contact technical support.

Declaration of Conformity for Radio Equipment

Hereby, Philips Medical Systems Nederland B.V. declares that the radio equipment integrated in the Azurion product models is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available on request from Philips (see Contacting Philips (page 427)).

For the United States and Canada, the radio conformity is based on radio module license grants:

- Wireless foot switch (3P and 4P+2), wireless base station
  - USA: FCC Part 15C, single modular, FCC license grant number: XK5-SW100AMBINT or XK5 -SW24LE
  - Canada: RSS247 Issue 1, IC license grant number: 5158A-SW100AMBINT or 5158A-SW24LE
- Logitech M235 wireless mouse, receiver dongle C-U0010 / C-U0007 / C-U0008
  - FCC license grant number: JNZMR0038, JNZCU0010 / JNZCU0007 / -
  - IC license grant number: 4418A-MR0028, 4418-CU0010 / 4418-CU0007 / 4418-CU0008
- DoseAware Xtend Hub
  - FCC license grant number: XWK-8650202
  - IC license grant number: 9038A-8650202
- DoseAware Xtend PDM
  - FCC license grant number: XWK-8601015
  - IC license grant number: 9038A-8601015

Cabling Guidance
Philips provides high quality cabling with the system and has evaluated the system to be compliant with the emission and immunity requirements of the listed standards when installed in accordance with the accompanying documentation. Cables supplied with the system should be used and replaced by authorized spare parts.

Cable bundles of the system should be routed separately from foreign cables. For additional guidance on cable bundling and routing, refer to IEC TR 61000-5-2.

User-supplied cables may be installed to published system external interfaces provided they comply with the interface requirements in the accompanying documentation for the external interface. Cables should comply with the local regulations and public standards applicable for the interface type (shielded CAT5e or better for network RJ45 connections, USB cables should be shielded and no longer than 1 meter, DVI cables should be shielded and no longer than 1 meter). Ground loops through cable shields should be prevented by using isolating wall connection boxes. Contact your Philips representative for details.

17.5.9 Equipment Labels

This section provides information about the labels that are used on the system equipment. For an explanation of the symbols used on the labels, see Symbols Used on the Equipment (page 416).

NOTE
The following images are indicative of the actual labels used on the equipment.

System Label
The system label is located on the stand. On a biplane system, it is located on the frontal stand.

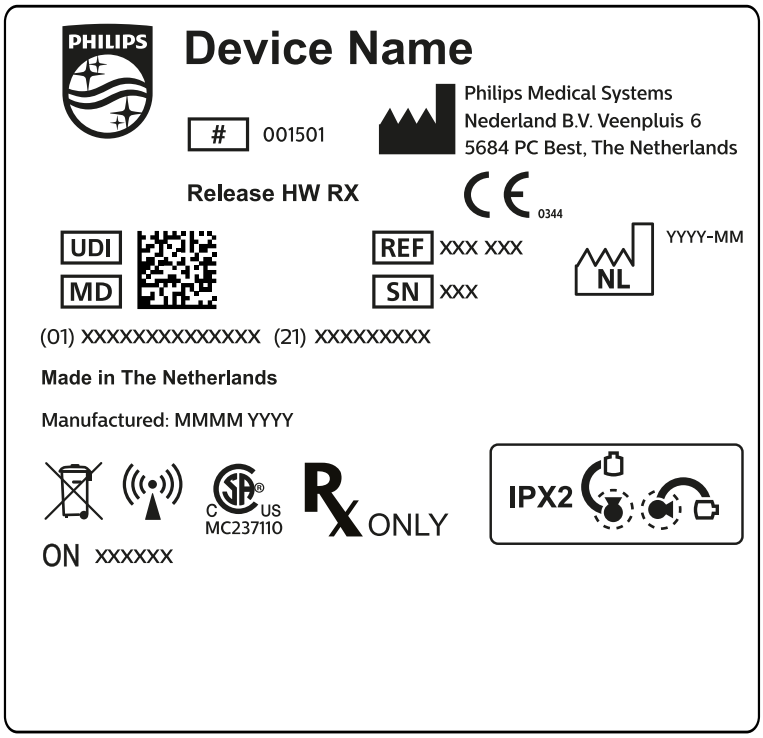


Figure 189 System label

Stand Label
Labels for the following items can be found on the back of the stand:
- X-ray tube assembly
- Beam limiting device (collimator)
- Image receptor (detector)

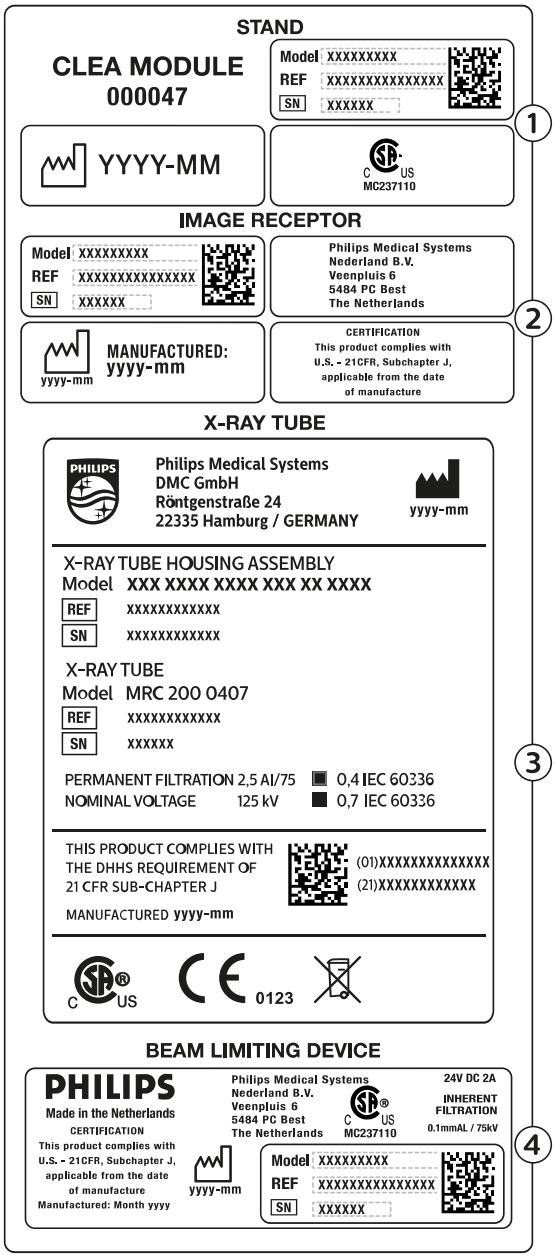


Figure 190 Stand label

Legend			
1	Stand type, including: • Part number (12NC) • Order number (ON) • Serial number (SN) • Date of manufacture	3	X-ray tube assembly: varies according to system configuration
2	Image receptor, including: • Manufacturer • Certification label	4	Beam limiting device, including: • Part number (12NC) • Order number (ON) • Serial number (SN) • Date of manufacture • Manufacturer • Certification label

Anti-Scatter Grid Label

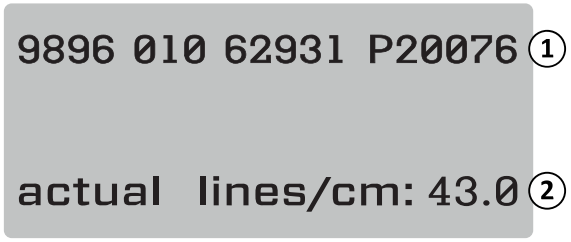


Figure 191 Anti-scatter grid label

Legend	
1	Part number (12NC) and serial number
2	Grid information: actual lines / cm: 43.0

Patient Table

The following label can be found on the connection plate at the base of the table.

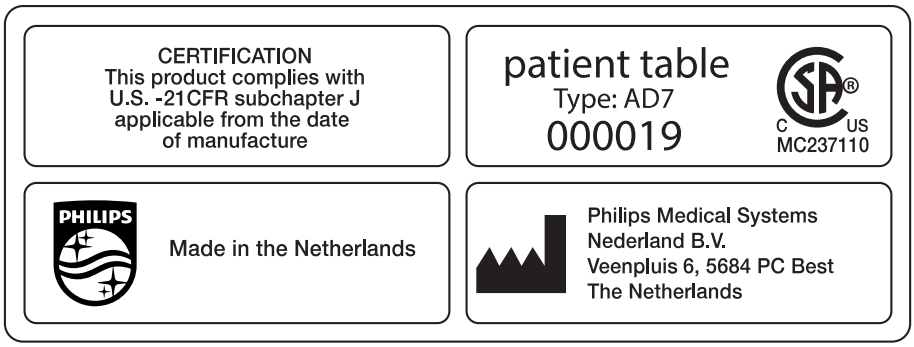


Figure 192 Patient table label

The tabletop is a type B applied part, and it carries the following label:

Figure 193 Symbol indicating type B applied part

A label on tabletop indicates the maximum permissible weight on the table including accessories and modules.

Figure 194 Patient table maximum weight label

Label text: Max. 275 kg

Table Secondary Circuit Outlet

A label for the secondary circuit outlet power socket can be found at the rear of the table base.

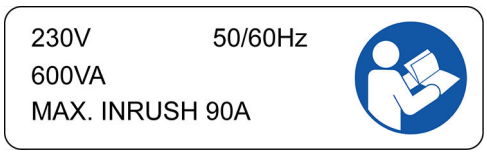


Figure 195 Secondary circuit outlet label

The label text states that the socket provides up to 600 VA at 230 V (50/60 Hz) with a maximum inrush (surge) current of 90 A.

NOTE
Exceeding these ratings risks damage to the system.

The following label near the secondary circuit outlet label indicates the location of a protective conductor (equipment grounding conductor).

The following label near the POAG-type potential equalization pins indicates the location of potential equalization for Physio/ECG equipment or injectors. For more information, see Installation and Equipment Connections (page 422).

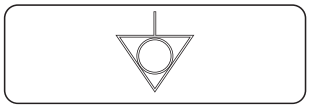


Figure 196 Potential equalization label

Table Accessory Rail
The label on the table accessory rail provides information about correct use of patient straps. For more information, see Using Patient Straps (page 66).

Figure 197 Patient straps label on the table accessory rail

Mattress Label
The label for the mattress provides basic information about the model number, part number, serial number, and legal manufacturer.

Figure 198 Mattress label

Table-Mounted Radiation Shield Label
The label for the table-mounted radiation shield provides basic information about the model number, part number, serial number, and manufacturer.

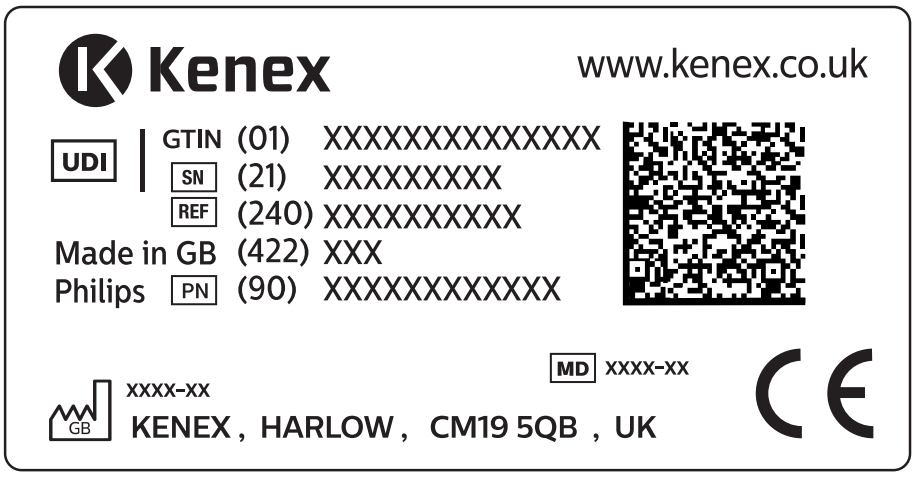


Figure 199 Table-mounted radiation shield label

Ceiling-Suspended Radiation Shield
The following label on the ceiling-suspended radiation shield warns the user about collisions with other equipment.

Figure 200 Collision warning label

A collision may cause damage to the suspension arm, and may result in injury to the patient or the operator. If a collision occurs, the suspension arm should be inspected by a qualified service technician.

Viewpad Labels
The viewpad has a laser pointing device. The intended use of the laser pointing device is to point at the images on the display monitors. Do not use this device to point at persons.

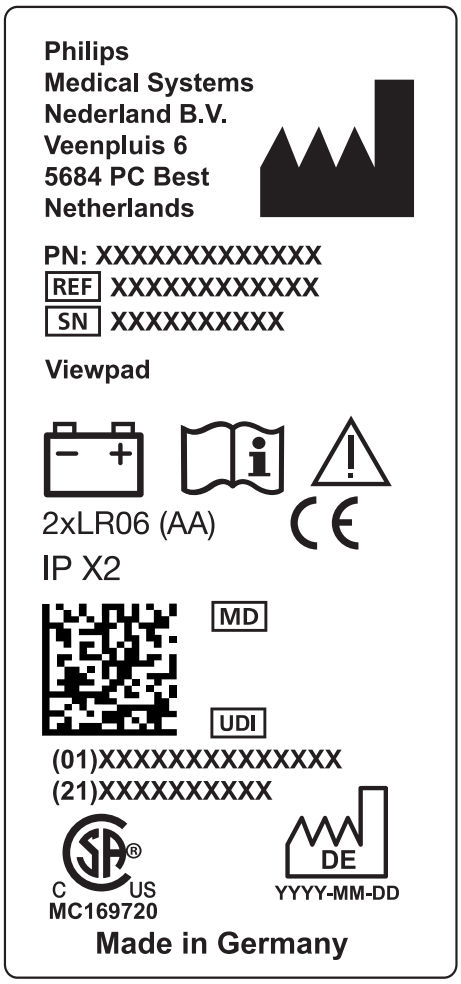


Figure 201 Viewpad product label

The following statement on compliance applies to the viewpad:

Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

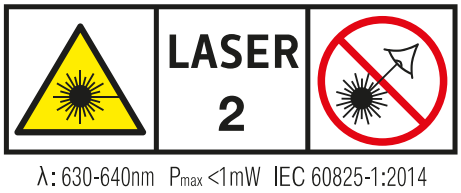


Figure 202 Viewpad laser warning label

Laser Warning Label Text
Laser 2
Wavelength: 630-640 nm
Maximum output: <1mW
IEC 60825-1:2014

The viewpad laser pointing device is a class 2 laser product.

WARNING
Do not stare into the beam or point the beam at other people's eyes.

Monoplane Wireless Foot Switch Labels
The following labels appear on the monoplane wireless foot switch.

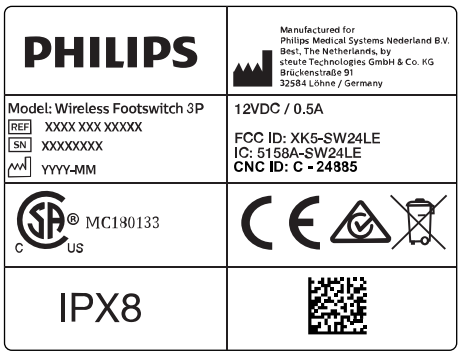


Figure 203 Product label

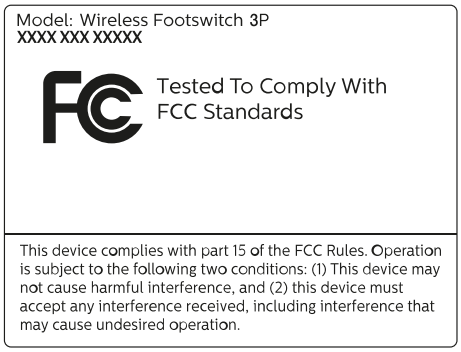


Figure 204 FCC standards label

Biplane Wireless Foot Switch

The following labels appear on the biplane wireless foot switch.

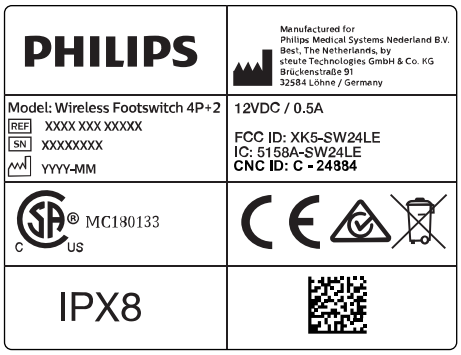


Figure 205 Product label

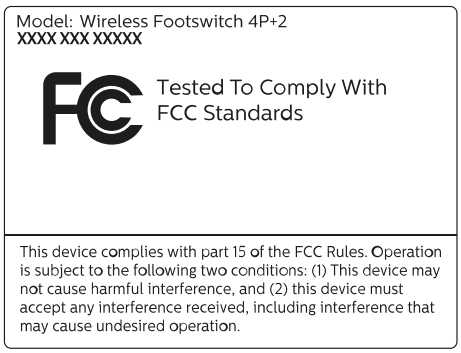


Figure 206 FCC standards label

Wireless Foot Switch Charging Unit

The following labels appear on the wireless foot switch charging unit.

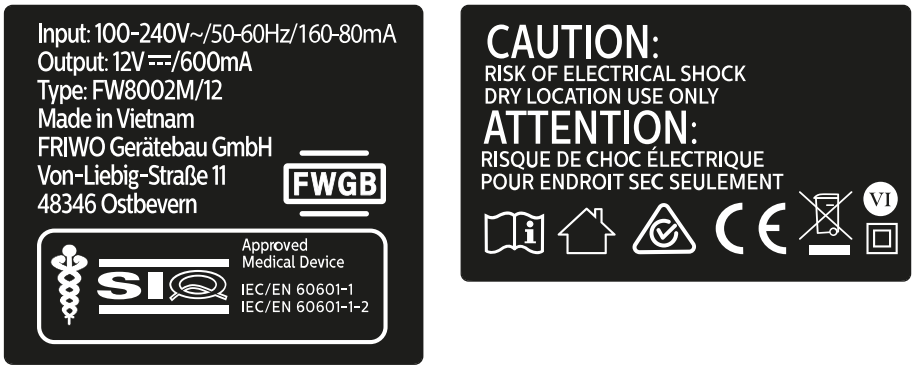


Figure 207 Product labels

Wall Connection Box: WCB 2.x Tx Variant
Labels for the WCB 2.x Tx variant of the wall connection box can be found on the front and side of the box.

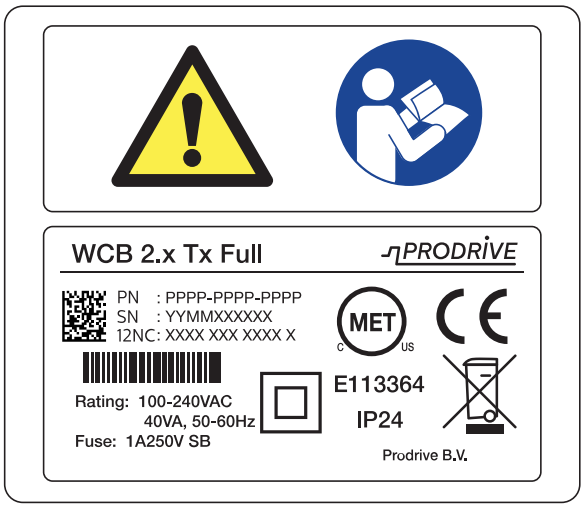


Figure 208 Wall connection box labels, 2.x Tx variant

The identification label contains the following information:

Label item	Content
Type/Model	WCB 2.x Tx Full
PN	Part number
SN	Serial number
12NC	12 digit numeric code
Barcode	Scan identification code
—	Voltage values, current rating, operating frequency and fuse rating

For more information, see the following sections:
- Wall Connection Box (page 332)
- Installation and Equipment Connections (page 422)

Wall Connection Box: WCB AUXEA-DP-DVI Variant
Labels for the WCB AUXEA-DP-DVI variant of the wall connection box can be found on the front of the box.

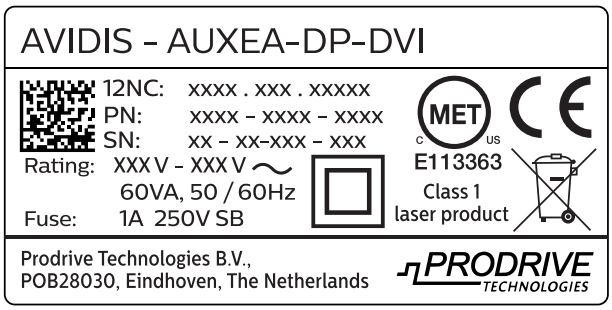


Figure 209 Product label for WCB AUXEA-DP-DVI variant

Wall Connection Box: WCB AUXEA-DP-4K Variant
Labels for the WCB AUXEA-DP-4K variant of the wall connection box can be found on the front of the box.

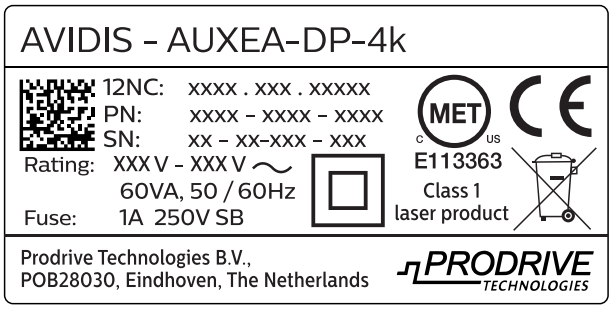


Figure 210 Product label for WCB AUXEA-DP-4K variant

Wall Connection Box: WCB AVO-2DP-4K Variant
Labels for the WCB AVO-2DP-4K variant of the wall connection box can be found on the front of the box.

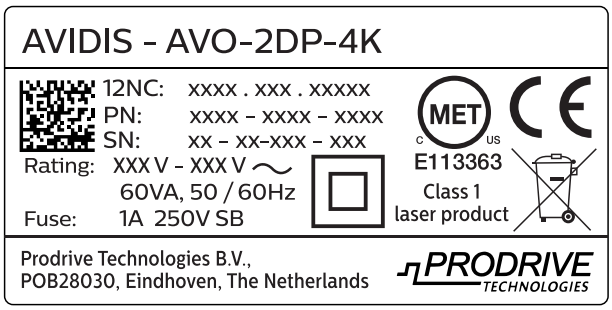


Figure 211 Product label for WCB AVO-2DP-4K variant

Cabinets
The labels for the X-ray control can be found on the top of the M-cabinet.

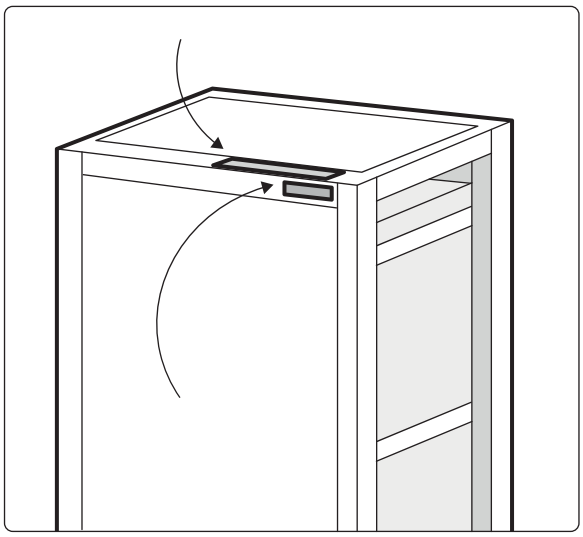


Figure 212 Position of labels on the X-ray control unit

The labels for the X-ray generator can be found on the top of the Generator cabinet.

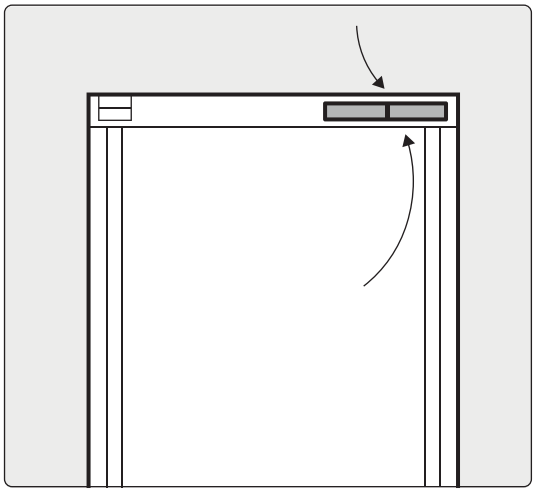


Figure 213 Position of labels on the X-ray generator

XperGuide Laser Tool Label
The label for the XperGuide laser tool provides basic information about the model number, part number, serial number and manufacturer.

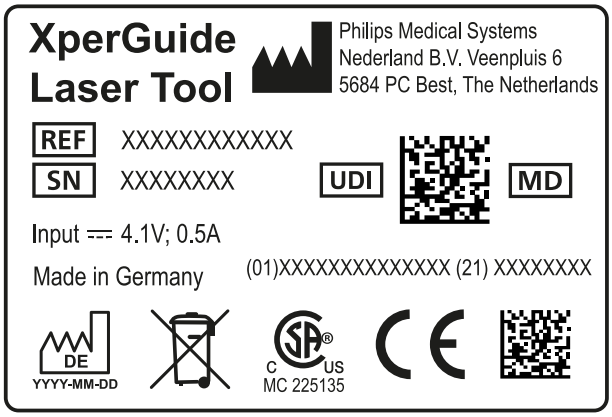


Figure 214 XperGuide laser tool label

Figure 215 Laser product label

Label text: CLASS 1 LASER PRODUCT

The following statement on compliance applies to the XperGuide laser tool:

Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

Monitor Boom
For more information about the following labels, refer to the Instructions for Use supplied with the monitor boom.

Figure 216 Monitor boom warning label

Label Text
Please don't hang anything on the handle. It may detune the spring arm.

The following label on the spring arm is applicable only for service engineers when adjusting the locking screws. It warns the service engineer that the spring arm may jump up suddenly.

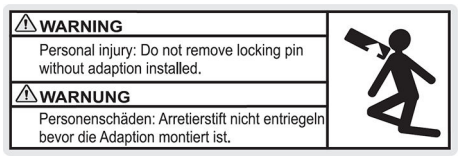


Figure 217 Locking pin warning label

Label Text
Personal injury: Do not remove locking pin without adaption installed.

Equipment Rack
The following label indicates the maximum payload for the equipment rack. The actual weight indicated on the label depends on the options installed in the equipment rack. For more information, refer to the Instructions for Use supplied with the equipment rack.

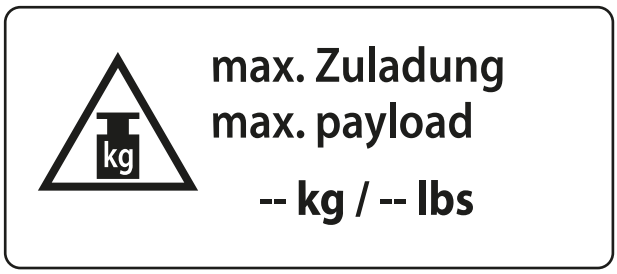


Figure 218 Equipment rack maximum payload label

17.5.10 Symbols Used on the Equipment

CE Label
This symbol indicates that the equipment complies with applicable European directives and regulations. The number of the notified body is indicated, if applicable.

Canadian Standards Association
This symbol indicates that the equipment has been tested and certified by the Canadian Standards Association to comply with the applicable U.S. and Canadian Standards.

MET Laboratories
This symbol indicates that the equipment has been tested and certified by the MET Laboratories to comply with the applicable U.S. and Canadian Standards.

Regulatory Compliance Mark for Australia and New Zealand
This symbol indicates that the equipment complies with regulations in Australia and New Zealand.

Product Disposal
This symbol indicates that the equipment contains materials that are harmful to the environment if disposed of incorrectly.

IP Code
IP stands for Ingress Protection. The IP code indicates the degree of protection of an enclosure and is regulated by IEC 60529. The first digit indicates the degree of protection for dust or solid objects, and the second digit indicates the protection against ingress of water.

For example:
- IP00 indicates that the enclosure is not protected.
- IP24 indicates that the enclosure is protected against objects larger than 12 mm (fingers), and is protected against splashing water from any direction.

IP Code - X-ray Tube Cover
This symbol indicates that the ingress protection code for the X-ray tube cover is IPX2 (protected against vertically falling water drops when enclosure tilted up to 15 degrees).

Class II Equipment
This symbol indicates that the equipment meets the safety requirements specified for Class II equipment (without the use of protective earth connection).

Prescription Device
In the United States, Federal law restricts this device to sale, distribution, and use by, or on the order of, a physician.

Manufacturer
This symbol identifies the manufacturer of the medical device or accessory. It is displayed on the system label beside the name and address of the manufacturer. The date of manufacture may also be displayed with this symbol, displayed as four digits for the year and, where appropriate, two digits for the month and two digits for the day.

Date of Manufacture
This symbol indicates the date when the medical device was manufactured. The date of manufacture is displayed as four digits for the year and, where appropriate, two digits for the month and two digits for the day. It is displayed on the system label.

Country of Manufacturer
This symbol indicates the country where the manufacturer is located. The letters inside the symbol indicate the country of origin.

Medical Device
This symbol indicates that the item is a medical device.

Catalog Number
This symbol indicates the manufacturer's catalog number so that the medical device, accessory, or component can be identified.

Serial Number
This symbol indicates the manufacturer's serial number so that a specific medical device, accessory, or component can be identified.

Unique Device Identifier
This symbol indicates the unique device identifier of the medical device or accessory. It is displayed on the system label or the accessory label.

Order Number
This symbol indicates the order number.

Model Number
This symbol indicates the model number or type number of the product.

Authorized Representative
This symbol indicates the authorized representative in the region indicated by XX.

Caution
This symbol indicates that the user should consult the Instructions for Use for details of specific warnings or precautions that are associated with the medical device.

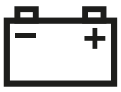
Consult the Instructions for Use
This symbol instructs the user to consult the Instructions for Use.

eIFU
This symbol instructs the user how to access the electronic version of the Instructions for Use. In the control room, select the review window and then press F1 on the keyboard.

Read the Instructions for Use
This symbol indicates that you should read the Instructions for Use as operator awareness or operator action is required to avoid undesirable consequences.

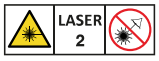
Applied Part
This symbol indicates a type B applied part.

Maximum Weight
This symbol indicates the maximum weight that can be applied to the patient table.

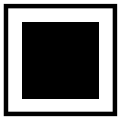


Battery
This symbol indicates the number and type of batteries used for the device.

Dangerous Voltage Warning
This symbol indicates that dangerous voltages are present in the associated component. Only trained personnel may remove the system cover, or otherwise obtain access to system components. There are no user serviceable parts and you should never attempt to repair this unit.



Laser Radiation
This symbol indicates that lasers are used with the system. Classification of lasers is indicated in Equipment Labels (page 405).



Intermediate Focal Spot
The value next to this symbol indicates the size of the intermediate focal spot of the X-ray tube.

Large Focal Spot
The value next to this symbol indicates the size of the large focal spot of the X-ray tube.

Radio Frequency Transmitters
This symbol indicates the presence of radio frequency transmitters.

X-Radiation
This symbol indicates that hazardous X-rays are emitted when the equipment is in operation.

Environment Friendly Use Period (EFUP)
This symbol indicates the number of years that the system can be used in an environmentally friendly way. This symbol is only applicable to products used in the People's Republic of China.

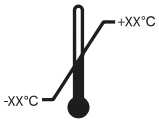
Environment Friendly Use Period (EFUP)
This symbol indicates that the system contains less than the maximum concentration value of all six hazardous substances. For more information, see Hazardous Substances (page 27). This symbol is only applicable to products used in the People's Republic of China.

Do Not Push
This symbol indicates that you should not push or lean against the equipment because it may overbalance and fall over.

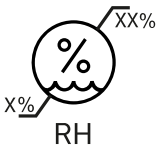
Finger Safety
This symbol indicates that there is a risk of fingers becoming pinched in the location of the symbol.

Fragile
This symbol indicates that parts of the system are fragile and should be handled with care.

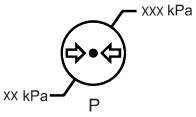
Keep Dry
This symbol indicates that parts of the system should be kept in dry conditions and not be exposed to water.



Temperature Limits
This symbol indicates the upper and lower temperature limits within which the system or its components should be kept during storage and transport.



Humidity Limits
This symbol indicates the upper and lower humidity limits within which the system or its components should be kept during storage and transport.



Atmospheric Pressure Limits
This symbol indicates the upper and lower atmospheric pressure limits within which the system or its components should be kept during storage and transport.

Eurasian Economic Union Conformity
This symbol indicates that the equipment complies with applicable regulations in the Eurasian Economic Union (EAEU).

Ukrainian Conformity
This symbol indicates that the equipment complies with applicable regulations in Ukraine.

UK Conformity Assessed
This symbol indicates that the equipment complies with applicable regulations in the United Kingdom.

18 Regulatory Information

The system complies with relevant international and national standards and laws.

18.1 Frequently Used Functions

The system provides the following frequently used functions:
- Collimator movements, i.e. shutter movements with hardware button
- Field of view adjustment
- Performing fluoroscopy, for example:
  - Selecting the fluoroscopy flavor
  - Activating fluoroscopy with the foot switch
  - Reviewing in last image hold
  - Storing fluoroscopy series and images
- Performing exposure, for example:
  - X-ray protocols
  - Activating exposure with the foot switch
  - Reviewing (image/series stepping and series cycle)
- Stand movements
- Tabletop horizontal and height movements
- Changing the source-to-image distance

18.2 Applied Parts

An applied part is a part of the equipment that in normal use satisfies one of the following conditions:
- The part must come into physical contact with the patient for the equipment to perform its function.
- The part can be brought into contact with the patient.
- The part needs to be touched by the patient.

Normal use is defined as "operation, including routine inspection and adjustments by any OPERATOR, and stand-by, according to the instructions for use".

The following parts are regarded as applied parts:
- Tabletop: The applied part of the tabletop is defined as 220 cm from the edge of the head end toward the foot end. Equipment attached to the foot end is not regarded as an applied part.
- Mattress
- Arm supports
- Head-fixing aids
- Patient straps
- Ratchet compressor (band only)
- Handgrips and clamps

The following parts are applied parts supplied by a third-party manufacturer:
- Injectors (a compatibility statement is provided with each injector)
- Operating tables (a compatibility statement is provided with each table)
- Neuro head holder

The following parts are considered accessible by the patient, and are therefore treated as applied parts:
- Table accessory rail
- Additional table accessory rail
- Table-mounted radiation shield
- Rails accessory clamp
- Tabletop accessory clamp
- Table rail cable guides
- Dripstand
- Peripheral X-ray filter
- Detector cover, including the detector suspension and detector bodyguard
- Detector front plate
- Antiscatter grid and grid suspension

- X-ray tube assembly cover
- Cerebral filter
- Control module (in the examination room)
- Touch screen module (in the examination room)
- Pan handle
- Mouse table

The following parts are supplied by a third-party manufacturer and are treated as applied parts:
- Biosense Carto frame

All applied parts that are described in this section are Type B applied parts (including parts that are treated as applied parts).

Figure 219 Symbol indicating a Type B applied part

18.3 System Version

You can find system version details in the product information screen.

1 On the **Help** menu, click **About**.

The product information screen is displayed.

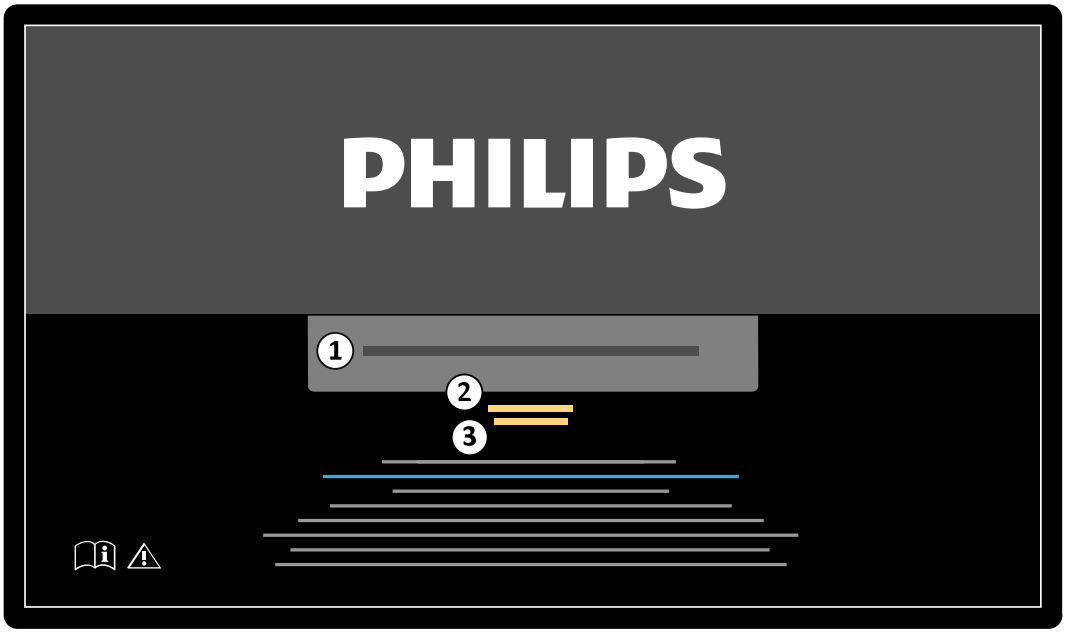


Figure 220 Product information screen

Legend	
1	Product name
2	Product release number
3	Product release date

2 To close the screen, click **Close** in the upper-right corner.

18.4 Third-Party Software

This product uses other software, including open-source software. Details of this software can be found in the following location on the installation medium:

3rd_party_sw\ReadMeLeaflet.txt

18.5 Installation and Equipment Connections

The system equipment must be installed and configured entirely by a trained service engineer as part of delivery and hand-over.

NOTE
All hospital network connections that are connected to the system must have double insulation towards the mains voltage, according to the international standard for IT equipment.

During use of the system or due to changes in the place of installation, modifications to the equipment or configuration may be necessary. This must be carried out by a trained service engineer, or by third parties expressly authorized by Philips Medical Systems to do so.

The information contained in this chapter is mandatory under the terms of IEC / CSA / ANSI/AAMI ES 60601-1 and provides a guide for correct connection of the equipment.

The system equipment satisfies the terms of IEC / CSA / ANSI/AAMI ES 60601-1 and provides inside and outside the patient environment, the level of safety stipulated in IEC / CSA / ANSI/AAMI ES 60601-1 provided that the equipment has been installed with the electrical safety measures described.

Network Workstation and Network Printer

Item	Specification
Compliance with standards	IEC standard
Location of the equipment	Outside the patient environment
Electrical safety measures	The network workstation or printer shall be connected via Ethernet isolator TN-X2.

Output to TV or Monitor with CVBS Input

NOTE
This equipment connection only applies to Azurion system with DVI-based video infrastructure.

Item	Specification
Compliance with standards	IEC standard
Location of the equipment	Outside the patient environment
Electrical safety measures	The equipment shall be connected to WVZ out. The TV or monitor shall be a modern certified TV or monitor with CVBS input that complies with the Audio/ Video, Information and Communication Technology Equipment international standard.

Wall Connection Box

Item	Specification
Compliance with standards	IEC / CSA / ANSI/AAMI ES 60601-1
Location of the equipment	Inside or outside the patient environment
Electrical safety measures	Additional equipment and the system are powered from the same branch circuit of hospital mains. Their PE domains are separated. Additional equipment connected using a wall connection box shall (can) be connected to WVB-X(ETH), WVB-X(USB), WVB-X(VIDEO). It is not permitted to connect IEC60950 / IEC62368-1 equipment located in the patient environment to a wall connection box. IEC / CSA / ANSI/AAMI ES 60601-1 devices can only be connected to a wall connection box if their accompanying documentation or compatibility allows for this. The following restrictions apply: • For DVI-based systems: the ambient temperature shall be below 40°C / 104°F. • For IP-based systems: the ambient temperature shall be below 35°C / 95°F. • The maximum load on 5 V output (x4) shall be less than 1 A. • The wall connection box shall be mounted such that its location is compliant with Pollution degree 2 (connectors at lower side).

WARNING
Do not touch the electrical connectors on a wall connection box while simultaneously touching the patient. Connector contact pins may carry low voltages that are safe to touch, but that may be harmful to the patient.

CAUTION
Each wall connection box is limited to a single device. Check the accompanying documentation of a device before connecting it to a wall connection box.

Surgery Wall Connection Box

Item	Specification
Compliance with standards	IEC / CSA / ANSI/AAMI ES 60601-1
Location of the equipment	Outside the patient environment
Electrical safety measures	The surgery wall connection box (SWCB) is used with systems that include an OR patient table. The connector for the pedestal injector (Metalok Bantam (Burndy) 28-pin connector) supplies power to the injector, up to a current of 5 A. The connector for ECG or physiology equipment (Metalok Bantam (Burndy) 23-pin connector) supplies power to the ECG or physiology equipment, up to a current of 3.5 A. For both Burndy connectors, power is only applied to the contacts of the connector when the equipment is connected. When specified in the accompanying documentation of the Physio, ECG, or injector equipment, the functional ground plug may be connected to one of the POAG-type functional ground pins on the SWCB.

Equipment Rack

Item	Specification
Compliance with standards	IEC / CSA / ANSI/AAMI ES 60601-1
Location of the equipment	Inside or outside the patient environment
Electrical safety measures	The equipment rack offers a number of additional power slots that are powered from the hospital mains directly. To assure IEC / CSA / ANSI/AAMI ES 60601-1 compliance within the patient environment it is required that: • Only IEC / CSA / ANSI/AAMI ES 60601-1 compliant devices are connected to these power slots. • None of these additional devices has any connection to equipment from the Azurion configuration. Disregarding these requirements violates the IEC / CSA / ANSI/AAMI ES 60601-1 compliance from the Azurion system.

Interventional Workspot

Item	Specification
Compliance with standards	IEC / CSA / UL 60950-1 or 62368-1
Location of the equipment	Outside the patient environment
Electrical safety measures	The following safety measures are applicable when the Interventional Workspot is located in the control room. Video output 2 of the workstation shall be connected using a wall connection box to the video input of a monitor in the examination room. Video output 1 of the workstation shall be connected to the video input of an additional monitor in the control room either directly or using an optional MultiSwitch. In case of direct connection to an additional monitor, the mains cable of Interventional Workspot shall be connected to a hospital mains input.

Patient Table with Rear Panel Interfaces

Item	Specification
Compliance with standards	IEC / CSA / ANSI/AAMI ES 60601-1
Location of the equipment	Inside the patient environment
Electrical safety measures	ECG connector: The analog output of compatible Physio or ECG monitoring equipment may be connected to the rear interface panel at the table base (Burndy 23-pin connector). When specified in the accompanying documentation of the Physio or ECG equipment, the functional ground plug may be connected to one of the POAG-type functional ground pins on the rear interface panel. Injector connector: Compatible contrast injector equipment may be connected to the rear interface panel at the table base (Burndy 28-pin connector). When specified in the accompanying documentation of the Physio or ECG equipment, the functional ground plug may be connected to one of the POAG-type functional ground pins on the rear interface panel. Secondary Circuit Outlet: Supply mains connection for external certified medical equipment with a supply voltage rating of 230 Vac not exceeding an input power rating of 600 VA. Connection of external equipment to this interface is only allowed if the equipment does not have other galvanic connections to supply mains grounds or building steel (such as unintended ground loops, for example, using shielded cables shall not be allowed).

18.5.1 Detailed Interface Information

Injector Interface

Interface Information	Injector Interface
Purpose	To power the injector and to enable the clinical user to control the start of injection of contrast fluid.
Type of interface	The electronic interface between X-ray system and injector is a proprietary interface agreed by Philips and the manufacturers of the compatible injectors.
Interface specification/standard	Not applicable, proprietary interface.
Summary of testing	The interface to the compatible injector device has been tested by performing the applicable image acquisition test cases (including safety related tests). Only after successful execution of these tests, the compatibility statements have been created.
Time synchronization	Not applicable.
Fault tolerance behavior, boundary condition testing, or fail safe	Not applicable.
Limitations, contraindications	Only to be used for injectors which have a compatibility statement with the Azurion system and release version.
Recommended connections	The X-ray system is intended to be connected with compatible injectors. A reference is added to Compatibility statements for more information about compatible injectors.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	In the pedestal configuration, the injector can be connected and disconnected from the X-ray system using a Burndy 28-pin connector, located at the rear interface panel at the table base or at the SWCB (surgical wall connection box). In the non-pedestal configuration, the connection between the injector and the X-ray system is made in the technical room by the service engineer.

ECG Interface

Interface Information	ECG Interface
Purpose	Exchange ECG signals with X-ray system. ECG Trigger Signal: Signal that is used by X-ray system to carry out ECG triggered fluoroscopy and exposure. ECG monitoring signal: ECG signal that is recorded in Live X-ray image. When reviewing live X-ray images, the ECG is displayed.
Type of interface	The electronic interface between X-ray system and ECG and Physio equipment is a proprietary interface agreed by Philips and the manufacturers of the compatible ECG and Physio equipment.
Interface specification/standard	Not applicable, proprietary interface.
Summary of testing	The interface to the compatible ECG and Physio equipment has been tested by performing the applicable image acquisition test cases (including safety related tests). Only after successful execution of these tests, the compatibility statements have been created.
Time synchronization	Not applicable.
Fault tolerance behavior, boundary condition testing, or fail safe	Not applicable.
Limitations, contraindications	Only to be used for ECG and Physio equipment which have a compatibility statement with the Azurion system and release version.
Recommended connections	The X-ray system is intended to be connected to exchange ECG signals. A reference is added to compatibility statements for more information about compatible ECG and Physio equipment.
Recommended settings or configurations	Not applicable.

Interface Information	ECG Interface
Connection to IT network	Not applicable.
Instructions for connecting	The ECG signals can be connected and disconnected from the X-ray system using a Burndy 23-pin connector, located at at the the rear interface panel at the table base. For OR systems, the ECG signals can be connected and disconnected from the X-ray system using a Burndy 23-pin connector, located at the SWCB (surgical wall connection box).

Video Interface (Wall Connection Box)

Interface Information	Video Interface (Wall Connection Box)
Purpose	Display video feeds from 3rd party devices, on X-ray system displays.
Type of interface	Standard digital video display interface.
Interface specification/standard	DVI 1.0 / DP 1.2 / VGA (with adapter).
Summary of testing	Refer to the standard.
Time synchronization	Refer to the standard.
Fault tolerance behavior, boundary condition testing, or fail safe	Refer to the standard.
Limitations, contraindications	None.
Recommended connections	None.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	The video interface can be connected and disconnected from the X-ray system at the wall connection box.

Ethernet Interface (Wall Connection Box)

Interface Information	Ethernet Interface (Wall Connection Box)
Purpose	Exchange of data with the X-ray system.
Type of interface	Standard network communication.
Interface specification/standard	IEEE Std. 802.3u/x (1000 Mbps).
Summary of testing	Refer to the standard.
Time synchronization	Refer to the standard.
Fault tolerance behavior, boundary condition testing, or fail safe	Refer to the standard.
Limitations, contraindications	None.
Recommended connections	None.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	Ethernet can be connected and disconnected from the X-ray system at the wall connection box.

For more information, ask your Philips representative for the MDS2 documents and white papers about this topic.

USB Interface (Wall Connection Box)

Interface Information	USB Interface (Wall Connection Box)
Purpose	Control of the connected device, by a mouse or keyboard of X-ray system.
Type of interface	Standard communication.
Interface specification/standard	DVI-based systems: USB 1.1 IP-based systems: USB 2.0
Summary of testing	Refer to the standard.

Interface Information	USB Interface (Wall Connection Box)
Time synchronization	Refer to the standard.
Fault tolerance behavior, boundary condition testing, or fail safe	Refer to the standard.
Limitations, contraindications	None.
Recommended connections	None.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	The USB device can be connected and disconnected from the X-ray system at the wall connection box.

USB Interface (Monitor)

Interface information	USB Interface (Monitor)
Purpose	Import and export studies or series from a USB device for review on the X-ray system.
Type of interface	Standard communication.
Interface specification/standard	USB 3.0 (effective speed depends on the connected infrastructure)
Summary of testing	Refer to the standard.
Time synchronization	Refer to the standard.
Fault tolerance behavior, boundary condition testing, or fail safe	Refer to the standard.
Limitations, contraindications	None.
Recommended connections	None.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	The USB device can be connected and disconnected from the X-ray system at the left monitor in the control room.

USB Interface (Workstations)

Interface information	USB Interface (Workstations)
Purpose	Import and export data from a USB device for review on a software medical device running on the workstation.
Type of interface	Standard communication.
Interface specification/standard	USB 2.0 / USB 3.0.
Summary of testing	Refer to the standard.
Time synchronization	Refer to the standard.
Fault tolerance behavior, boundary condition testing, or fail safe	Refer to the standard.
Limitations, contraindications	None.
Recommended connections	None.
Recommended settings or configurations	Not applicable.
Connection to IT network	Not applicable.
Instructions for connecting	The USB device can be connected and disconnected from the USB ports on the front of the workstation, as enabled by the software medical device. The ports on the back of the workstation are not for clinical use.

18.6 Contacting Philips

You can contact Philips by post or using the Philips website.

Contact details	
Postal address	Philips Medical Systems Nederland B.V. Veenpluis 6 5684 PC Best The Netherlands
Website address	www.philips.com/healthcare

19 Quick Reference

This section provides an overview of functions on the system that you can use as a quick reference when you are familiar with the associated procedures.

19.1 WorkSpot

A WorkSpot consists of two monitors: the acquisition monitor and the review monitor.

The layout of the acquisition monitor and the review monitor is fixed.

In the control room, you use one keyboard and one mouse to interact with both monitors. This allows you to perform independent tasks in each screen. You can review the acquisition patient on the review monitor without interrupting the procedure on the acquisition monitor. This is called Instant Parallel Working. For more information, see Instant Parallel Working (page 149).

19.1.1 Acquisition Monitor

In the WorkSpot configuration, the acquisition monitor displays the acquisition window.

The acquisition window is divided into the following areas:

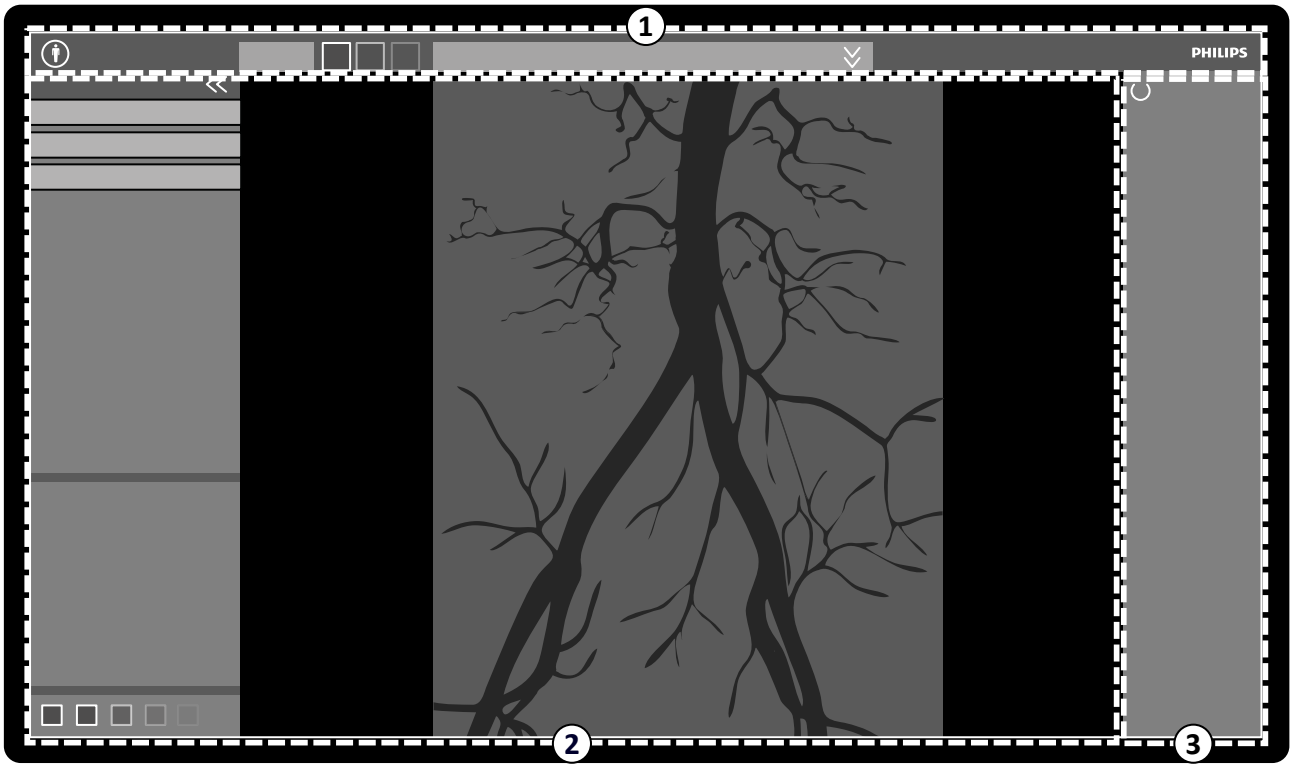


Figure 221 Acquisition window

Legend	
1	Main navigation area
2	Application area
3	Status area On biplane systems, the status area is displayed along the bottom edge of the window

Main Navigation Area
The main navigation area displays the following items:

- Patient selector: Click this button to open the patient database for patient and study administration.

- Patient information panel: This panel displays information about the acquisition patient. The expander button opens an overview panel containing details of the study, including the ProcedureCard. Warning messages related to the patient are also displayed here, for example, if the patient has allergies.
- **End Procedure** button: Click this button to open the **End Procedure** window and select how to end the procedure of the acquisition patient.

Application Area
The application area is divided into three main areas:

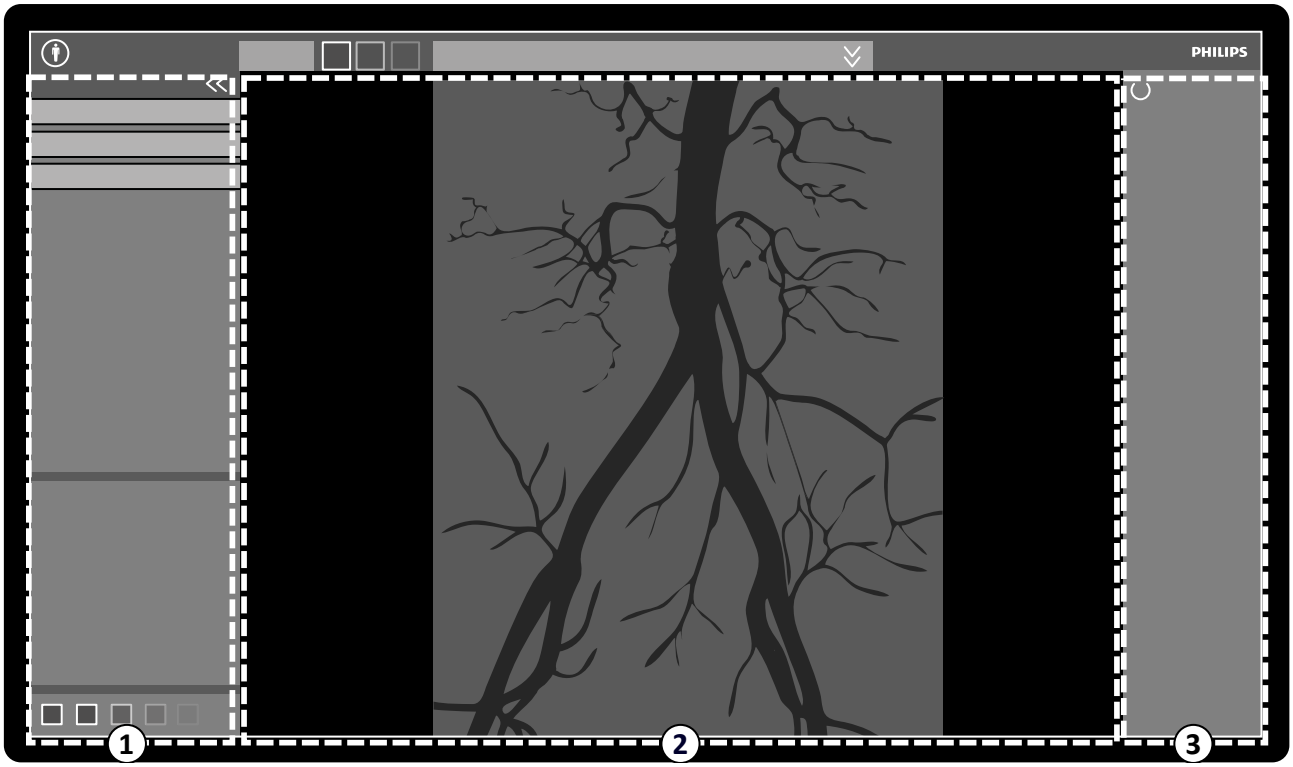


Figure 222 Application area in the acquisition window

Legend	
1	Control panel
2	Main display area On biplane systems, images from the frontal channel and the lateral channel are displayed side by side, and are synchronized.
3	Status area

- Control panel:
  - This panel provides controls and functions associated with the task that you are performing.
  - Moving to another task changes the controls and functions available in the control panel.
  - The global tools are always available regardless of the task to access activities such as archiving, printing, and image information.
- Main display area:
  - This area displays the images related to the selected X-ray live and reference views. The **Live** view is always available and displays the last acquired series or the selected series from the acquisition patient. On biplane systems, images from the frontal channel and the lateral channel are displayed side by side, and are synchronized. **Reference** views are available when images from the acquisition patient are saved as reference images. A maximum of three views can be created. Depending on the active view, the options on the task navigation panel and the main display area change accordingly.
  - The main display area contains a toolbar for manipulating the images and a control panel to change display of images and movie tools.
  - The toolbar and control panel are not always in view. They are automatically hidden if not being used to create a larger viewing area. Move the pointer over the area to display them again.

Status Area
The status area displays the following items:
- Status icons
- Exposure/Fluoroscopy data
- Stand and detector Information
- Table information
- Dose data
- User guidance
- System information

For more information about the icons used in the status area, see Status Area (page 438).

19.1.2 Review Monitor

In the WorkSpot configuration, the review monitor displays the review window.

You can use the review window for parallel working with series from the acquisition patient or studies and series from another patient. For more information on parallel working, see Instant Parallel Working (page 149).

The screen layout of the review window is divided into the following areas:

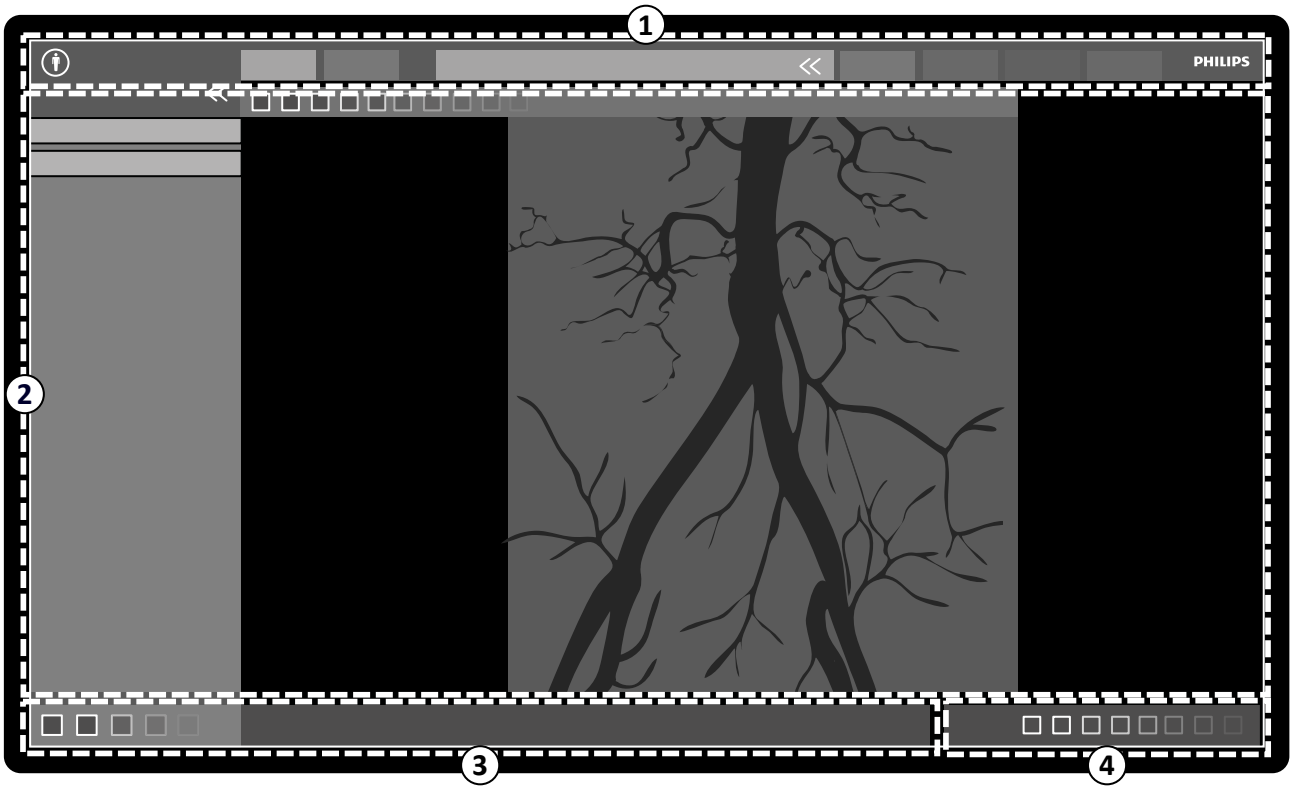


Figure 223 Review window

Legend			
1	Main navigation area	3	Application message area
2	Application area On biplane systems, images from the frontal channel and the lateral channel are displayed side by side, and are synchronized.	4	Notification area

Main Navigation Area

The main navigation area displays the following items:

Patient selector: Click this button to open the patient database for patient and study administration.

Acquisition tabs:

- **Viewer** tab: Click this tab to view the series currently being reviewed.
- **More Tools** tab: Click this tab to display a list of available tools. When a tool is selected a tab for the selected tool is added.

Patient information panel:

- This panel displays information about the acquisition patient. The expander button opens an overview panel containing details of the study, including the ProcedureCard.
- Warning messages related to the patient are also displayed here, for example, if the patient has allergies.

Close Study: Click this button to close the study.

System menu: This menu contains options for system configuration.

Help menu: This menu provides access to the following:

- Electronic Instructions for Use
- Information about the system

Application Area

The application area is divided into the following areas:

Task navigation panel: This panel allows you to move between available tasks.

NOTE
There is no X-ray Settings task in the review window.

Control panel:
- This panel provides controls and functions associated with the task that you are performing.
- Moving to another task changes the controls and functions available in the control panel.
- The global tools are always available regardless of the task to access activities such as archiving, printing, and image information.

Main display area:
- This area displays the images related to the selected acquisition tab.
- The main display area contains a toolbar for manipulating the images and a control panel to change display of images and movie tools.

On biplane systems, images from the frontal channel and the lateral channel are displayed side by side, and are synchronized.

NOTE
If the patient that you are reviewing is different to the acquisition patient then a warning message is displayed.

Application Message Area
Each application displays its own messages in this area.

Notification Area
This area provides the following additional information about the system:
- Availability of disk storage space.
- Availability of system software updates. This notification is only displayed when updates are available, or are being downloaded and installed. Click this notification to display the **Software Updates** window.
- System connection status. Click this notification to display the **System Connectivity Overview** window.
- Job viewer status. Click this notification to display the **Job Viewer** window.
- Remote assistance status. This notification is only displayed when remote assistance is enable and active. You can disable remote assistance from a shortcut menu when you right-click this notification.
- Log file status (a technical support function).
- User name of the currently logged-in user account.
- Date and time.

19.2 FlexSpot (Option)

If the FlexSpot option is installed, the monitors in the control room are replaced by up to two larger wide-screen monitors (called the primary and secondary monitors) that are capable of displaying multiple applications in multiple windows.

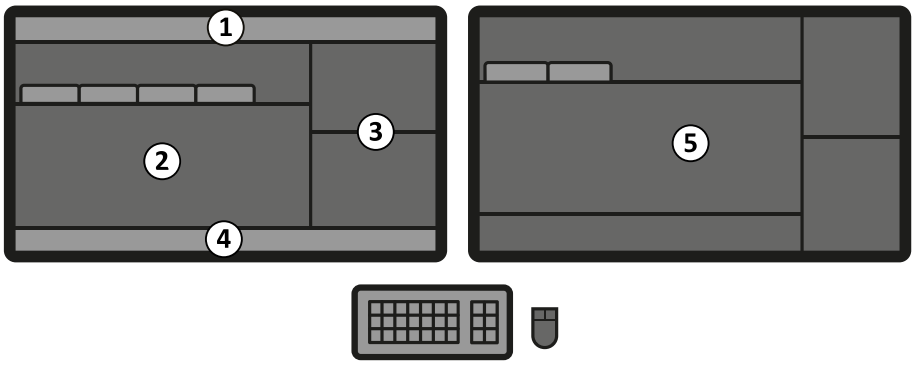


Figure 224 FlexSport primary monitor (left) and secondary monitor (right)

Legend			
1	Top bar	4	Status area
2	Live and reference images (tabs)	5	Secondary monitor
3	Application area		

The screen layout of both monitors is customizable and both monitors share a keyboard and a mouse. You can use the pointer on either monitor allowing you to perform independent tasks in each monitor.

For example, a procedure can continue in the acquisition window while you view the acquired series in the review window, or while you are reviewing another patient using the review window. This is called Instant Parallel Working. For more information, see Instant Parallel Working (page 149).

NOTE
The acquisition window is always displayed, but you can choose on which monitor to display it.

19.2.1 FlexSpot Primary Monitor

The status area is always displayed on the FlexSpot primary monitor regardless of where the acquisition window is displayed.

The primary monitor has three areas that are always displayed:
- Top bar
- Application area
- Status area

Top Bar

Applications: You can drag and drop available applications on to the screen from the top bar.

Presets: Predefined screen layouts are displayed here and you can select screen layouts for both the primary monitor and secondary monitor.

Examination Room: You can manage the applications and presets used in the examination room, from the control room.

You can select a workstation to connect to the control room USB ports.

Keyboard lock status icons: only displayed if the additional FlexSpot option with a second keyboard is installed.

FlexSpot menu: You can access FlexSpot and FlexVision preset management and system information.

Application Area
The application area is similar to the application area of the acquisition monitor of systems without the FlexSpot option. For more information, see Acquisition Monitor (page 429).

Status Area
The status area contains the following items:
- Status icons
- Exposure/fluoroscopy data
- Stand and detector information
- Table information
- Dose data
- User guidance
- System information

19.2.2 FlexSpot Secondary Monitor

The FlexSpot secondary monitor does not display the system menus in the header area. To access items in the **System** menu (for example, **Customization** or **Manage ProcedureCards**), make sure that the review window is displayed somewhere on one of the two monitors.

19.2.3 Second FlexSpot (Option)

NOTE
This option is only available for Azurion systems with IP-based video infrastructure.

Second FlexSpot is an extension to the FlexSpot option, consisting of up to two wide-screen monitors, mouse, and keyboard, located either in the control room or the examination room. The interface is identical to FlexSpot.

19.2.4 Additional FlexSpot (Option)

The Additional FlexSpot is situated in the control room or examination room. It is a single-monitor WorkSpot that can be added to a FlexSpot configuration.

NOTE
This option is only available for Azurion systems with DVI-based video infrastructure.

It provides one window displaying one application at a time. Depending on the configuration, you can change the application that is displayed in the window.

A keyboard and mouse are also provided for this monitor.

19.3 FlexVision (Option)

FlexVision is a single ultra-high-definition monitor situated in the examination room.

The FlexVision monitor has three areas that are always displayed:
- Top bar
- Status area
- Live X-ray window

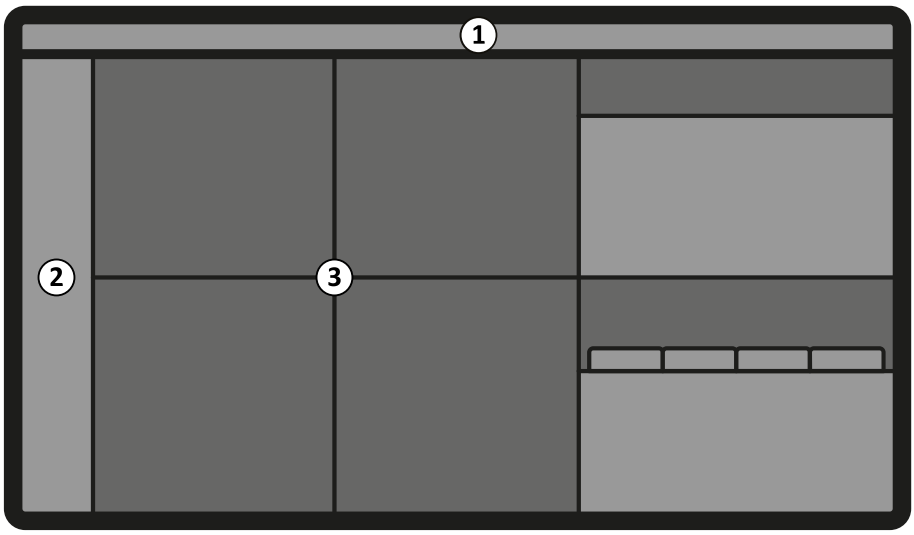


Figure 225 FlexVision monitor screen layout

Legend	
1	Top bar
2	Status area (the location of the status area depends on the selected preset)
3	Live, reference, and application windows (the screen layout depends on the selected preset)

Top Bar
Applications: You can drag and drop available applications on to the screen from the top bar.

Presets: Predefined screen layouts are displayed here and you can select screen layouts.

Status Area
The location of the status area depends on the selected preset. The status area contains the following items:

- Status icons
- Exposure/fluoroscopy data
- Stand and detector information
- Table information
- Dose data
- User guidance
- System information

On biplane systems, the status area displays separate status items for the frontal channel and the lateral channel. For more information, see Status Area On FlexVision (Biplane System) (page 446).

Live X-ray Window
The live X-ray window is always displayed and provides details of the acquisition patient.

On-Screen Mouse and Keyboard
When FlexVision is installed, an on-screen keyboard and mouse application may be available on the touch screen module, depending on the licenses installed on the system. Using the on-screen keyboard, you can control applications without using the optional mouse at the tableside. The mouse pointer is controlled using a touchpad on the touch screen module with two buttons for left-click and right-click actions.

The on-screen keyboard layout is determined by the language selected in the system's regional settings. For more information, see Changing Regional Settings (page 259).

You can activate the on-screen keyboard and mouse application using the application selector.

19.4 Touch Screen Module

The touch screen module in the examination room provides access to functions at the tableside.

The buttons that are available on the module depend on the active procedure or system configuration.

Figure 226 Touch screen module

Legend			
1	Active application	5	**Fluoro Store** button (not available during fluoroscopy, stores the last fluoroscopy series when pressed after fluoroscopy)
2	**Applications** button (displays the **Applications** window)	6	**Stopwatch** button (starts or stops the stopwatch display on one of the monitors in the examination room)
3	Active application tab	7	**X-ray** button (enables or disables X-ray)
4	Application tabs for running applications		

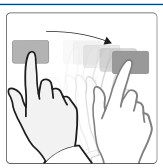
Applications
When you tap the **Applications** button, the **Applications** window is displayed. You can start an application by tapping it.

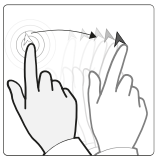
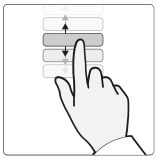
Figure 227 Applications window

If there are more applications available than can be shown on one page of thumbnails, additional pages are indicated below the thumbnails. Swipe to view the additional pages.

19.4.1 Touch Screen Gestures

You can use touch gestures on the touch screen module.

Gesture	Action		Effect
Tap		Tap the screen on a function	Activates the function
Drag		Touch an item or region in the window and move across the screen	Drags an item on the screen, or pans the image

Gesture	Action		Effect
Press		Press and hold	Displays the pointer. You can then drag the pointer to an item or region of interest. The pointer is hidden when you remove your finger from the screen
Slide		Touch a list item and move up or down	Scrolls the list
Stretch		Place two fingers close together on the screen and move them apart	Zoom in at this position
Pinch		Place two fingers a distance apart on the screen and move them towards each other	Zoom out from this position
Double tap		Tap the screen twice	• If the image is not already zoomed, a double tap zooms the image to twice the default magnification • If the image is already zoomed, a double tap resets the zoom and pan settings
		Tap the mini viewport twice (biplane systems)	Swaps the contents of the mini viewport and the main viewport

Using Gestures with the Markers Function
When using the touch screen module with the **Markers** function, you can perform the following interactions:
- To draw a straight line, touch the screen with two fingers.
- To draw a round shape, touch the screen with three fingers.

19.5 Status Area

The status area displays information about the status of the X-ray system, including settings in use and messages.

19.5.1 Status Area - Monoplane System

On a monoplane system, the status area is visible on the acquisition window in the control room and in the live X-ray window in the examination room.

Status Area in the Control Room (Monoplane System)

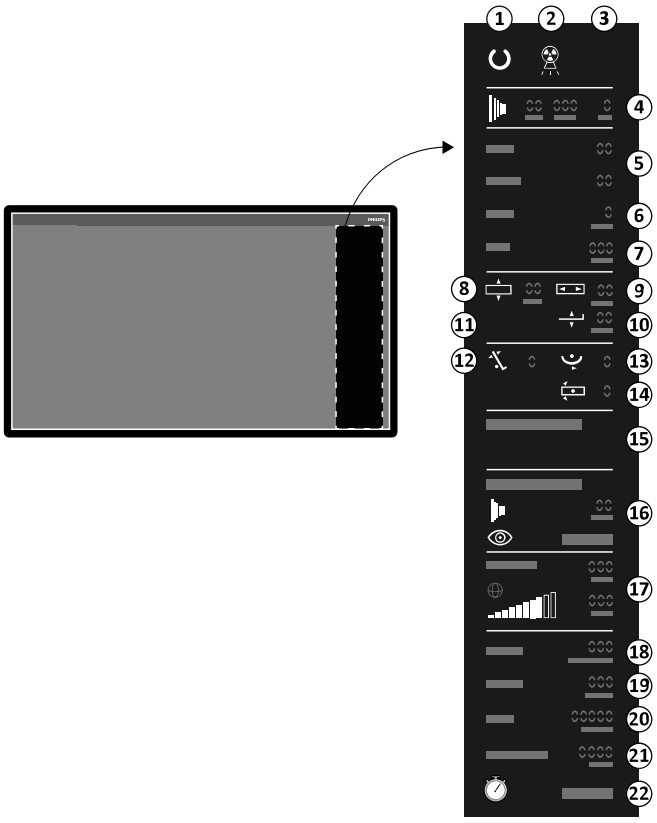


Figure 228 Status area in the control room acquisition window

Legend			Description
1		System status	The system is ready for exposure.
		System status	The system is not ready for exposure.
2		X-ray status	X-ray is on.
		X-ray status	X-ray is disabled.
3		Tube load	The tube is overheated.
4		Fluoroscopy	Fluoroscopy settings are displayed.
		Exposure	Exposure settings are displayed.
	-	kV	X-ray generator settings
	-	mA	
	-	ms	
5	-	LAO	Stand rotation angle.
	-	CRAN	Stand angulation angle.
6	-	SID	The actual or target source-to-image distance.

Legend			Description
7	-	FD	The selected detector size.
8		Table transverse isocenter offset [1]	The transverse offset of the table from the isocenter position.
9		Table longitudinal isocenter offset [1]	The longitudinal offset of the table from the isocenter position.
10		Table height isocenter offset [1]	The height offset of the table from the isocenter position.
11		Isocenter [1]	The table is in the isocenter position.
12		Table tilt [1]	The table tilt angle.
13		Table cradle [1]	The table cradle angle.
14		Table pivot [1]	The table pivot angle.
15	-	System information	System information, warnings, and error messages.
16	-	X-ray protocol	The selected procedure settings.
17	-	Dose model [2]	For more information, see Dose Model (page 472).
18	-	Air kerma rate	Displays the air kerma rate (mGy/min).
19	-	Cumulative air kerma	Displays the cumulative air kerma (mGy).
20	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable).
21	-	Total fluoroscopy time	Displays the total fluoroscopy time.
22		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed.

[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

Status Area in the Examination Room (Monoplane System)

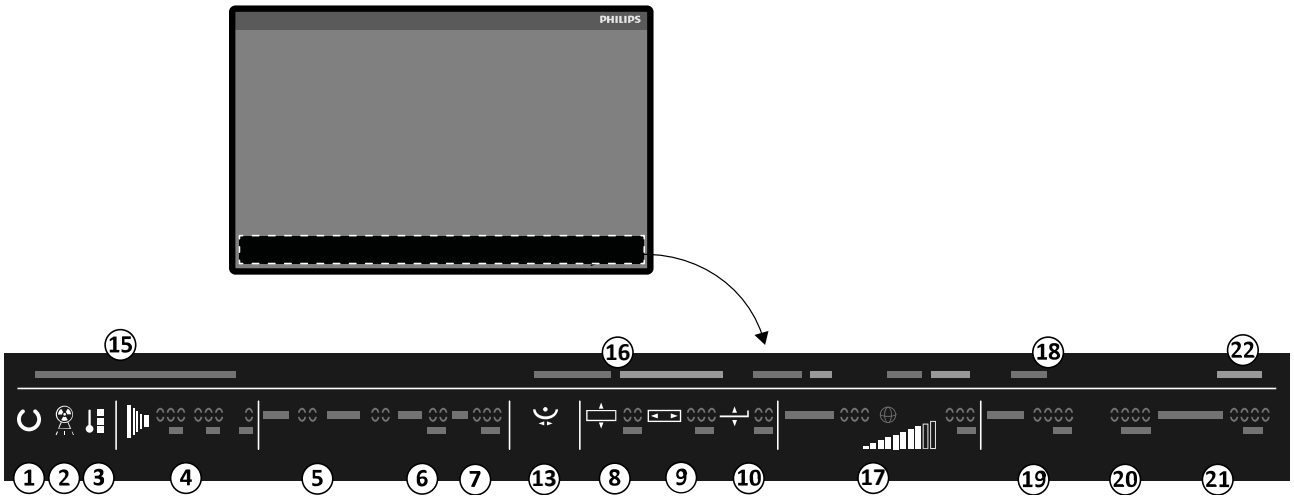


Figure 229 Status area in the examination room live X-ray window

Legend			Description
1		System status	The system is ready for exposure.
		System status	The system is not ready for exposure.
2		X-ray status	X-ray is on.
		X-ray status	X-ray is disabled.
3		Tube load	The tube is overheated.
4		Fluoroscopy	Fluoroscopy settings are displayed.
		Exposure	Exposure settings are displayed.
	-	kV	X-ray generator settings
	-	mA	
	-	ms	
5	-	LAO	Stand rotation angle.
	-	CRAN	Stand angulation angle.
6	-	SID	The actual or target source-to-image distance.
7	-	FD	The selected detector size.
8		Table transverse isocenter offset [1]	The transverse offset of the table from the isocenter position.
9		Table longitudinal isocenter offset [1]	The longitudinal offset of the table from the isocenter position.
10		Table height isocenter offset [1]	The height offset of the table from the isocenter position.
11		Isocenter [1]	The table is in the isocenter position.
12		Table tilt [1]	The table tilt angle.
13		Table cradle [1]	The table cradle angle.
14		Table pivot [1]	The table pivot angle.
15	-	System information	System information, warnings, and error messages.
16	-	X-ray protocol	The selected procedure settings.
17	-	Dose model [2]	For more information, see Dose Model (page 472).
18	-	Air kerma rate	Displays the air kerma rate (mGy/min).
19	-	Cumulative air kerma	Displays the cumulative air kerma (mGy).
20	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable).
21	-	Total fluoroscopy time	Displays the total fluoroscopy time.
22		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed.

[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

19.5.2 Status Area - Biplane System

On a biplane system, the status area is visible on the acquisition window in the control room. In the examination room, the status area is split across the live X-ray window and reference window.

NOTE
If you are using a biplane system and the lateral stand is parked, dose indication for the lateral stand is not displayed unless the air kerma for the lateral stand is above zero.

Status Area in the Control Room (Biplane System)

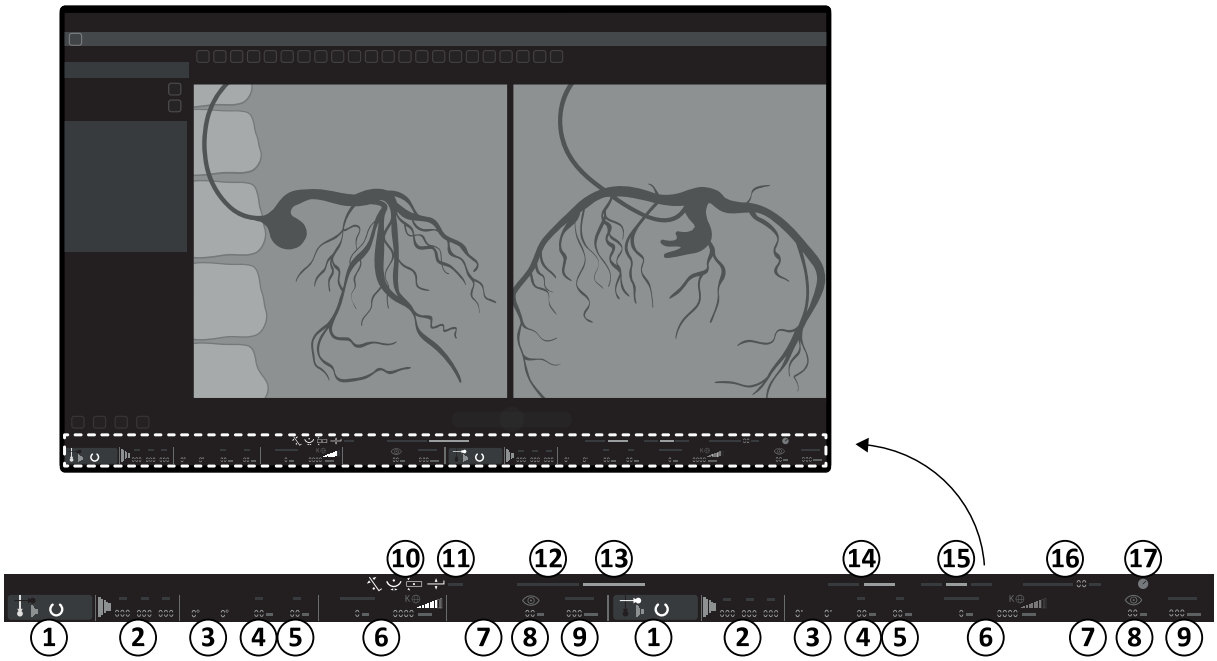


Figure 230 Status area in the control room acquisition window

Legend			Description
1		Channel indicator	Frontal channel
		Channel indicator	Lateral channel
		System status	The channel is ready for exposure (when a channel is selected for exposure, this section of the status area is highlighted)
		System status	The channel is not ready for exposure
		X-ray status	X-ray is on
		X-ray status	X-ray is disabled
		Tube load	The tube is overheated
2		Fluoroscopy	Fluoroscopy settings are displayed
		Exposure	Exposure settings are displayed
	-	kV	X-ray generator settings
	-	mA	

Legend			Description
	-	ms	
3	-	LAO	Stand rotation angle
	-	CRAN	Stand angulation angle
4	-	SID	The actual or target source-to-image distance
5	-	FD	The selected detector size
6	-	Dose model [2]	For more information, see Dose Model (page 472)
7	-	mGy/min	Air kerma rate
8	-	min	Fluoro time (for the channel)
9	-	mGy	Cumulative air kerma
10		Table tilt [1]	The table tilt angle
		Table cradle [1]	The table cradle angle
		Table pivot [1]	The table pivot angle
11		Table transverse isocenter offset [1]	The transverse offset of the table from the isocenter position
		Table longitudinal isocenter offset [1]	The longitudinal offset of the table from the isocenter position
		Table height isocenter offset [1]	The height offset of the table from the isocenter position
		Isocenter [1]	The table is in the isocenter position
12	-	X-ray protocol	The selected procedure settings
13	-	fps	Exposure speed (selected/actual)
14	-	Fluoroscopy flavor	The currently selected fluoroscopy flavor
15	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable)
16	-	Total fluoroscopy time	Displays the total fluoroscopy time
17		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed

[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

Status Area in the Examination Room (Biplane System)

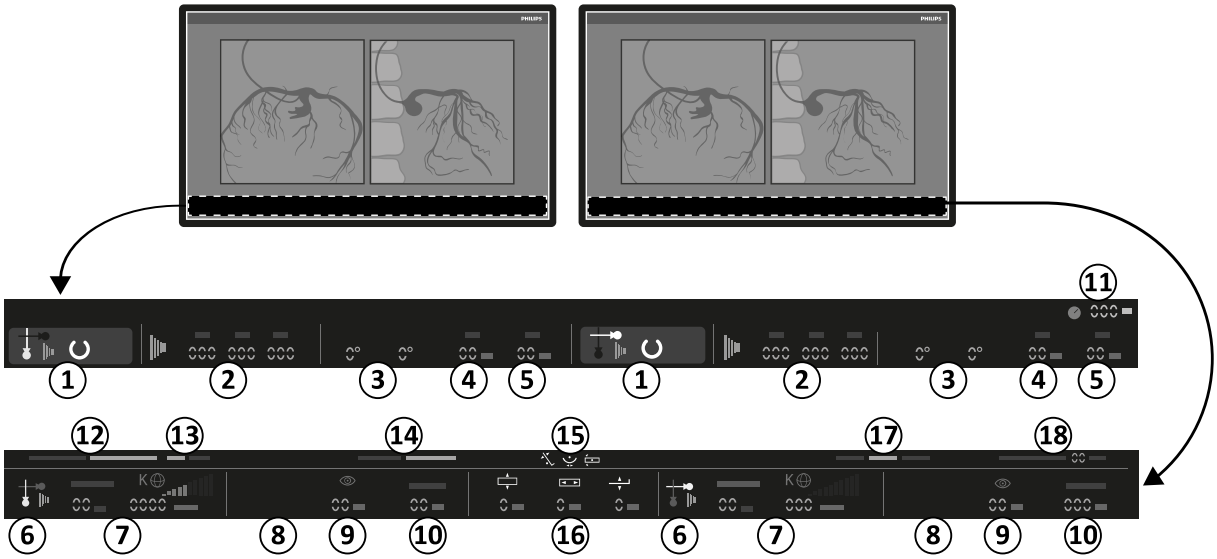


Figure 231 Status area in the examination room live X-ray window and reference window

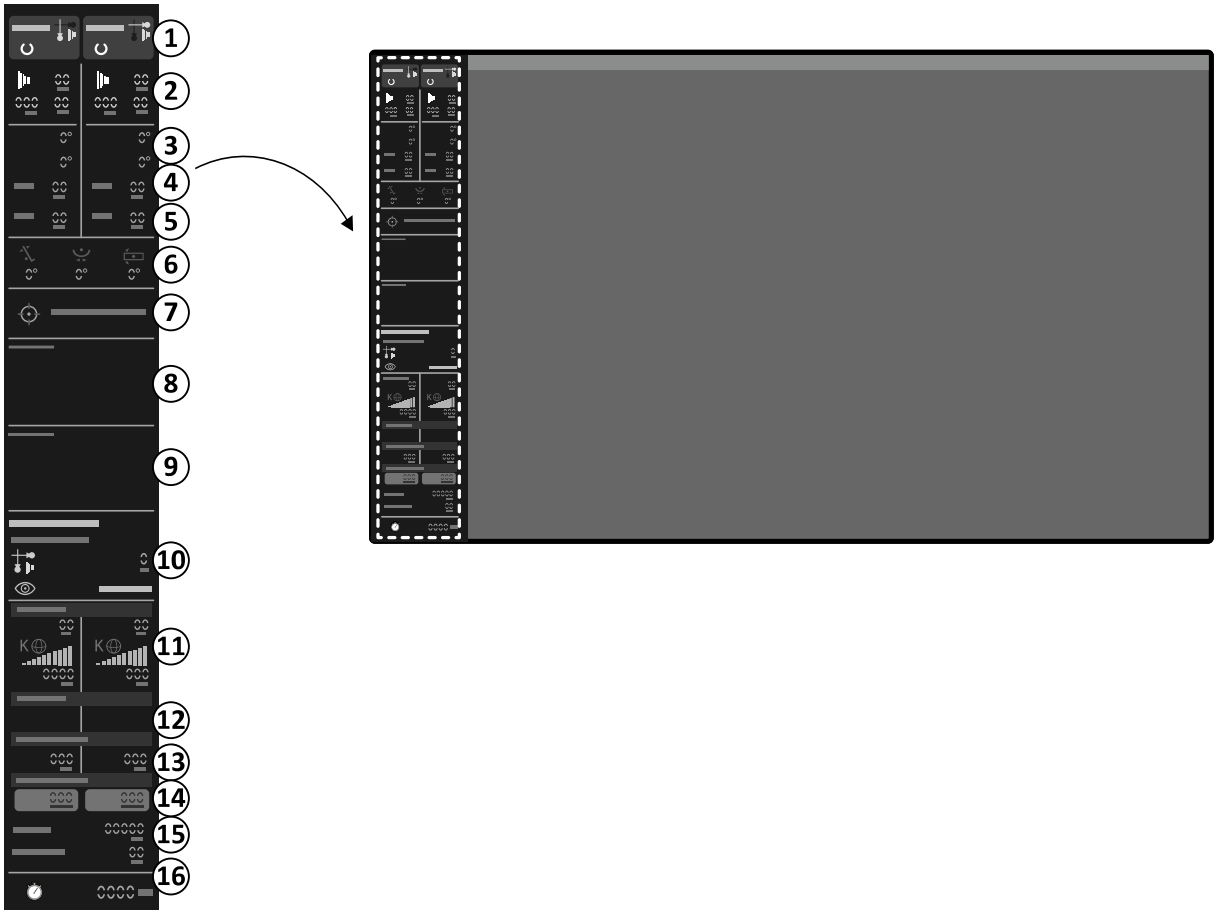
Legend			Description
1		Channel indicator	Frontal channel
		Channel indicator	Lateral channel
		System status	The system is ready for exposure (when a channel is selected for exposure, this section of the status area is highlighted)
		System status	The system is not ready for exposure
		X-ray status	X-ray is on
		X-ray status	X-ray is disabled
		Tube load	The tube is overheated
2		Fluoroscopy	Fluoroscopy settings are displayed
		Exposure	Exposure settings are displayed
	-	kV	X-ray generator settings
	-	mA	
	-	ms	
3	-	LAO	Stand rotation angle
	-	CRAN	Stand angulation angle
4	-	SID	The actual or target source-to-image distance
5	-	FD	The selected detector size
6		Channel indicator	Frontal channel
		Channel indicator	Lateral channel

Legend			Description
7	-	Dose model [2]	For more information, see Dose Model (page 472)
8	-	mGy/min	Air kerma rate
9	-	min	Fluoro time (for the channel)
10	-	mGy	Cumulative air kerma
11		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed
12	-	X-ray protocol	The selected procedure settings
13	-	fps	Exposure speed (selected/actual)
14	-	Fluoroscopy flavor	The currently selected fluoroscopy flavor
15		Table tilt [1]	The table tilt angle
		Table cradle [1]	The table cradle angle
		Table pivot [1]	The table pivot angle
16		Table transverse isocenter offset [1]	The transverse offset of the table from the isocenter position
		Table longitudinal isocenter offset [1]	The longitudinal offset of the table from the isocenter position
		Table height isocenter offset [1]	The height offset of the table from the isocenter position
		Isocenter [1]	The table is in the isocenter position
17	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable)
18	-	Total fluoroscopy time	Displays the total fluoroscopy time

[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

Status Area On FlexVision (Biplane System)



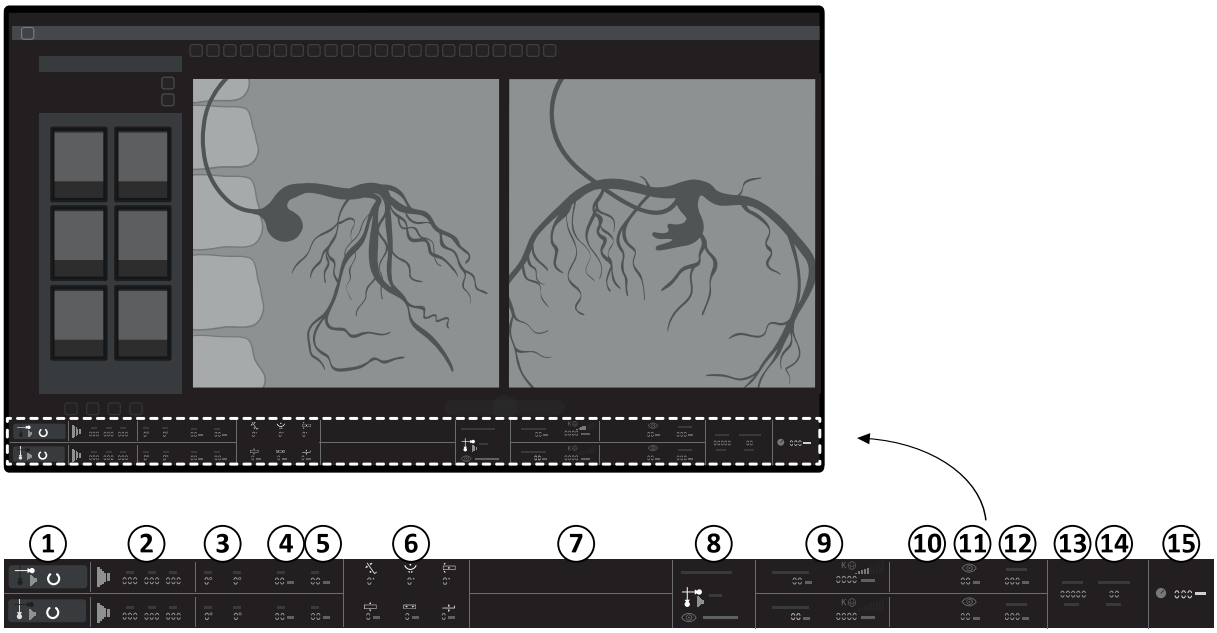
Legend			Description
1		Channel indicator	Frontal channel
		Channel indicator	Lateral channel
		System status	The system is ready for exposure (when a channel is selected for exposure, this section of the status area is highlighted)
		System status	The system is not ready for exposure
		X-ray status	X-ray is on
		X-ray status	X-ray is disabled
		Tube load	The tube is overheated
2		Fluoroscopy	Fluoroscopy settings are displayed
		Exposure	Exposure settings are displayed
	-	kV	X-ray generator settings
	-	mA	
	-	ms	
3	-	LAO	Stand rotation angle

Legend			Description
	-	CRAN	Stand angulation angle
4	-	SID	The actual or target source-to-image distance
5	-	FD	The selected detector size
6		Table tilt [1]	The table tilt angle
		Table cradle [1]	The table cradle angle
		Table pivot [1]	The table pivot angle
7		Isocenter [1]	The table is in the isocenter position
8	-	Frontal channel system messages	System information, warnings, and error messages for the frontal channel
9	-	Lateral channel system messages	System information, warnings, and error messages for the lateral channel
10	-	X-ray protocol	The selected procedure settings
	-	fps	Exposure speed (selected/actual)
	-	Fluoroscopy flavor	The currently selected fluoroscopy flavor
11	-	Dose model [2]	For more information, see Dose Model (page 472)
12	-	mGy/min	Air kerma rate
13	-	min	Fluoro time (for the channel)
14	-	mGy	Cumulative air kerma
15	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable)
	-	Total fluoroscopy time	Displays the total fluoroscopy time
16		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed

[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

Status Area On FlexSpot (Biplane System)



Legend			Description
1		Channel indicator	Frontal channel
		Channel indicator	Lateral channel
		System status	The system is ready for exposure (when a channel is selected for exposure, this section of the status area is highlighted)
		System status	The system is not ready for exposure
		X-ray status	X-ray is on
		X-ray status	X-ray is disabled
		Tube load	The tube is overheated
2		Fluoroscopy	Fluoroscopy settings are displayed
		Exposure	Exposure settings are displayed
	-	kV	X-ray generator settings
	-	mA	
	-	ms	
3	-	LAO	Stand rotation angle
	-	CRAN	Stand angulation angle
4	-	SID	The actual or target source-to-image distance
5	-	FD	The selected detector size
6		Table tilt [1]	The table tilt angle
		Table cradle [1]	The table cradle angle
		Table pivot [1]	The table pivot angle
		Table transverse isocenter offset [1]	The transverse offset of the table from the isocenter position
		Table longitudinal isocenter offset [1]	The longitudinal offset of the table from the isocenter position
		Table height isocenter offset [1]	The height offset of the table from the isocenter position
		Isocenter [1]	The table is in the isocenter position
7	-	System messages	System information, warnings, and error messages (for each channel)
8	-	X-ray protocol	The selected procedure settings
	-	fps	Exposure speed (selected/actual)
	-	Fluoroscopy flavor	The currently selected fluoroscopy flavor
9	-	Dose model [2]	For more information, see Dose Model (page 472)
10	-	mGy/min	Air kerma rate
11	-	min	Fluoro time (for the channel)
12	-	mGy	Cumulative air kerma
13	-	Dose area product	Displays the cumulative dose area product (the displayed unit is configurable)

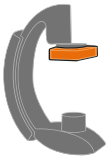
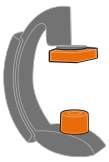
Legend			Description
14	-	Total fluoroscopy time	Displays the total fluoroscopy time
15		System time / stopwatch	Displays the system time. If the stopwatch is active, the stopwatch time is displayed

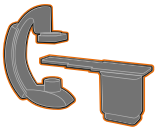
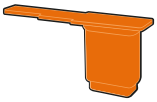
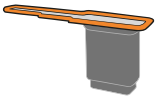
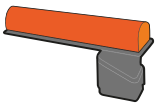
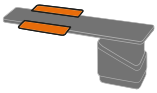
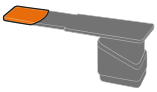
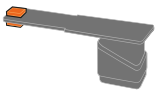
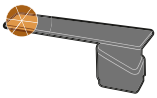
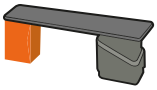
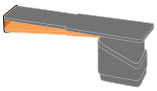
[1] If a collision is detected, this section in the status area displays collision detection warnings and icons.

[2] Only displayed if the thorax region is selected.

19.5.3 Collision Indicators

When a collision is detected, a collision indicator is displayed in the status area.

Indicator	Description
	• The frontal detector is nearing a collision or a detector collision has been detected by the force sensor. Movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The frontal stand is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The frontal tube is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	The X-ray beam is misaligned. The image size is reduced. Align the detector to portrait or landscape orientation.
	• The frontal stand is nearing a collision (not involving the detector or the tube) and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral detector is nearing a collision or a detector collision has been detected by the force sensor. Movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral stand is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.
	• The lateral tube is nearing a collision and movement speeds have been reduced. • This indicator is also displayed when override is active.

Indicator	Description
	• Motorized movement has stopped to prevent a collision between the frontal stand and the lateral stand. • This indicator is also displayed when override is active.
	• Motorized movement has stopped to prevent a collision between the stand and the table. • This indicator is also displayed when override is active.
	• Motorized movement has stopped to prevent a collision with the table. • This indicator is also displayed when override is active.
	Movement speeds have been reduced.
	• The stand is nearing a collision with the patient zone of the table. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the extended patient zone of the table. • This indicator is also displayed when override is active.
	The stand is nearing the finger-pinching zone of the table.
	• The stand is nearing a collision with the head support. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the head clamp. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the spinal frame. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with the underside of the table. • This indicator is also displayed when override is active.
	• The stand is nearing a collision with a person or object in a parking position and movement speeds have been reduced (FlexArm option). • This indicator is also displayed when override is active.

19.6 Toolbars

Acquisition and Review Windows

Tool	Function	Description
	Default	Default selection
	Zoom	Zoom the image
	Pan	Pan the image

Tool	Function	Description
	Contrast and Brightness	Adjust the contrast and brightness of the image
	Edge enhancement	Sharpen or soften edges in the image
	Interventional room pointer	Activate the image pointer
	Subtraction	Switch subtraction on or off
	Pixel shift	Reposition the mask image
	Landmarking	Apply landmarking
	Fluoro store	Store fluoroscopy images
	Copy to Reference 1	Copy the current image to the Reference 1 window On biplane systems, the frontal image is copied.
	Copy to Reference 2	Copy the current image to the Reference 2 window On biplane systems, the lateral image is copied.
	Copy to Reference 3	Copy the current image to the Reference 3 window On biplane systems, images from both channels are copied, and are displayed side by side and synchronized.
	Flag image	Flag the current image
	Flag series	Flag the current series
	Link image processing (biplane systems only)	Sets the scope when processing biplane images: • **Biplane Unlinked**: Changes can be applied independently to both the frontal and lateral images • **Biplane Linked**: Changes applied to one image are automatically applied to both the frontal and lateral images
	Snapshot	Copy the current image as a photo image
	Quantitative Coronary Analysis	Starts Quantitative Coronary Analysis
	Quantitative Vascular Analysis	Starts Quantitative Vascular Analysis
	Left Ventricular Analysis	Starts Left Ventricular Analysis
	Biplane Left Ventricular Analysis	Starts Biplane Left Ventricular Analysis
	Right Ventricular Analysis	Starts Right Ventricular Analysis
	Biplane Right Ventricular Analysis	Starts Biplane Right Ventricular Analysis
	Reset	Reset image processing

Series Review

Tool	Function	Description
	Play	Play the series review
	Pause	Pause the series review
	Next image	Display the next image in the series
	Previous image	Display the previous image in the series
	Next series	Display the next series in the study
	Previous series	Display the previous series in the study
	Frame rate	Adjust the frame rate
	Cycle all	Play all images and series in the study
	Image overview	Show an overview of all images in the series
	Series overview	Show an overview of all series in the study

19.7 Global Tools

The global tools are available in all tasks and provide tools for printing images, exporting images, and displaying patient information.

Tool		Function
	**Export**	Exports the image as seen in the main window. You can select the destination (connected device or location) and the format.
	**Archive Preview**	Displays a preview of the series and images to be automatically archived when the current study is ended. Series and images are automatically archived if automatic data transfer is configured. For more information about configuring the system to transfer data automatically, see Configuring Automatic Data Transfer (page 271).
	**Add to Print Preview**	Adds the image as seen in the main window to the print queue. The print queue can be managed using the Print application.
	**Image overlays**	Provides different levels of patient information that can be displayed on the image in the main window: • **Full image information** • **Limited image information** • **Minimum image information** (mandatory information) On biplane series, image overlays are displayed for each channel, except for the patient identification, which is displayed on the frontal image only.

19.8 Control Modules

The control module provides functions for moving the stand and acquiring images.

The following control modules are available:
- Monoplane Control Module (page 453)
- Biplane Control Modules (page 456)
- FlexArm Control Module (Option) (page 459)

- FlexMove Control Module (Option) (page 461)
- Control Module with OR Table (Option) (page 463)

19.8.1 Monoplane Control Module

Monoplane systems use a control module that combines geometry and imaging functions in one module. A dedicated imaging control module is additionally available as an option.

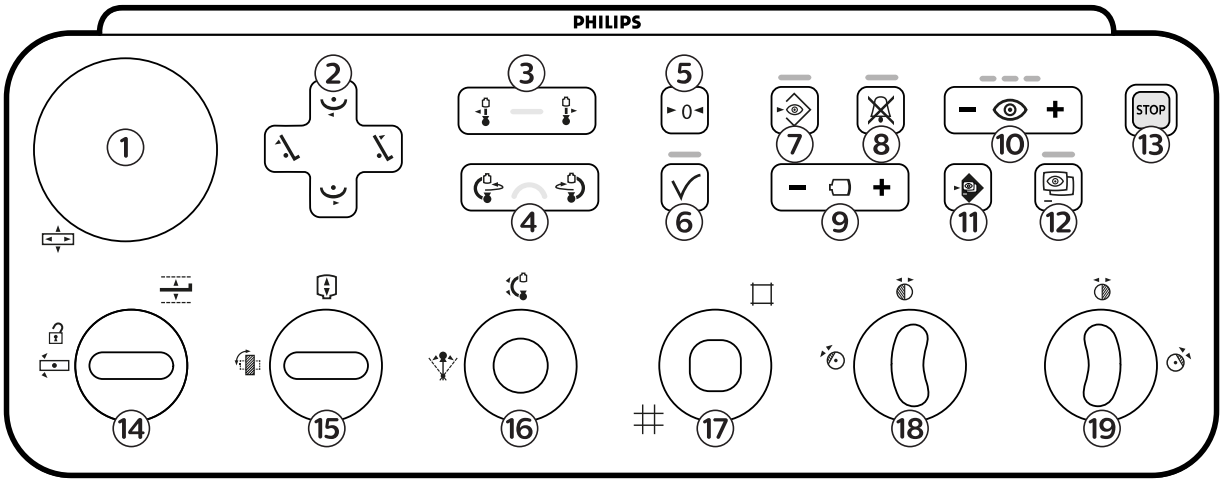
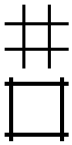


Figure 232 Monoplane control module (combined geometry and imaging functions)

Legend			Description
1		Float tabletop	Moves the tabletop in the longitudinal and transverse directions. This function operates only at the table side position. It is disabled in the control room and at the pedestal.
2		Tilt table	Tilts the table up.
		Tilt table	Tilts the table down.
		Cradle table	Cradles the table left.
		Cradle table	Cradles the table right.
3		Move stand (longitudinal)	Moves the stand longitudinally (ceiling-mounted only).
4		Rotate stand	Rotates (swings) the stand.
5	►0◄	Reset geometry	Resets the stand and table to a default position. This function is disabled in the control room.
6		Accept	When using automatic position control, this function recalls a selected stand or table position. The indicator light flashes when a new position is selected or when the stand is moved away from the selected position. The indicator light is on while the position is being recalled. The indicator light is off when the selected position is reached.

Legend			Description
7		Store fluoroscopy	Stores fluoroscopy images during and after fluoroscopy. If the indicator light is on during fluoroscopy, images are being stored. After fluoroscopy, the indicator light flashes once to indicate images have been stored.
8		Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
9		Field of view	Increases and decreases the detector field of view.
10		Fluoroscopy flavor	Selects the fluoroscopy level to be used. The three indicator lights show the selected level. When low load-fluoroscopy is selected the indicator lights are off. • One indicator light: Low (with ClarityIQ (option): Low) • Two indicator lights: Normal (with ClarityIQ (option): Medium) • Three indicator lights: High (with ClarityIQ (option): Normal)
11		SmartMask	Selects the current image as the SmartMask image. This function is disabled if the selected procedure settings do not support roadmap.
12		Roadmap	Switches the roadmap function on or off. This function is disabled if the selected procedure settings do not support roadmap.
13		Emergency stop	Stops all geometry movements. For information about restarting after an emergency stop, see Restarting the System (page 57).
14		Table height	Adjusts the height of the table.
		Table pivot unlock	Unlocks the table pivot lock.
15		Rotate detector	Moves the detector between portrait and landscape positions.
		Source-to-image distance	Changes the source-to-image distance.
16		Angulation	Controls the angulation position of the stand.
		Rotation	Controls the rotation position of the stand.
17		Shutters	Opens and closes the shutters.
18		Left wedge	Moves, rotates, and resets the left wedge.
19		Right wedge	Moves, rotates, and resets the right wedge.

NOTE

If the table tilt option is not installed on your system, the Tilt switch [2] is not present.

19.8.2 Imaging Control Module (Option for Monoplane Systems)

A dedicated imaging control module is available as an option for monoplane systems. The imaging control module provides imaging functions during acquisition.

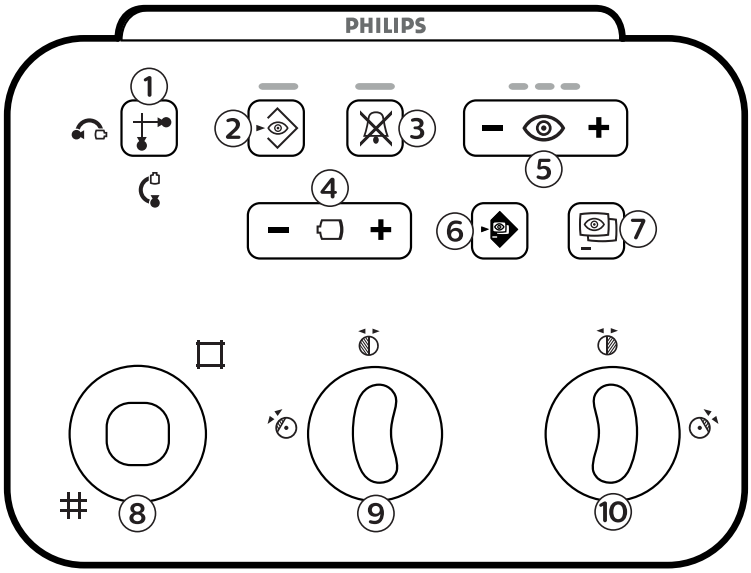


Figure 233 Imaging control module (option for monoplane systems)

Legend		Description
1	Select channel	On monoplane systems, this function is not applicable.
2	Store fluoroscopy	Stores fluoroscopy images during and after fluoroscopy. If the indicator light is on during fluoroscopy, images are being stored. After fluoroscopy, the indicator light flashes once to indicate images have been stored.
3	Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
4	Field of view	Increases and decreases the detector field of view.
5	Fluoroscopy flavor	Selects the fluoroscopy level to be used. The three indicator lights show the selected level. When low load-fluoroscopy is selected the indicator lights are off. • One indicator light: Low (with ClarityIQ (option): Low) • Two indicator lights: Normal (with ClarityIQ (option): Medium) • Three indicator lights: High (with ClarityIQ (option): Normal)
6	SmartMask	Selects the current image as the SmartMask image. This function is disabled if the selected procedure settings do not support roadmap.
7	Roadmap	Switches the roadmap function on or off. This function is disabled if the selected procedure settings do not support roadmap.
8	Shutters	Opens and closes the shutters.

Legend		Description
9	Left wedge	Moves, rotates, and resets the left wedge.
10	Right wedge	Moves, rotates, and resets the right wedge.

19.8.3 Biplane Control Modules

Biplane systems use a dedicated geometry control module beside a dedicated imaging control module.

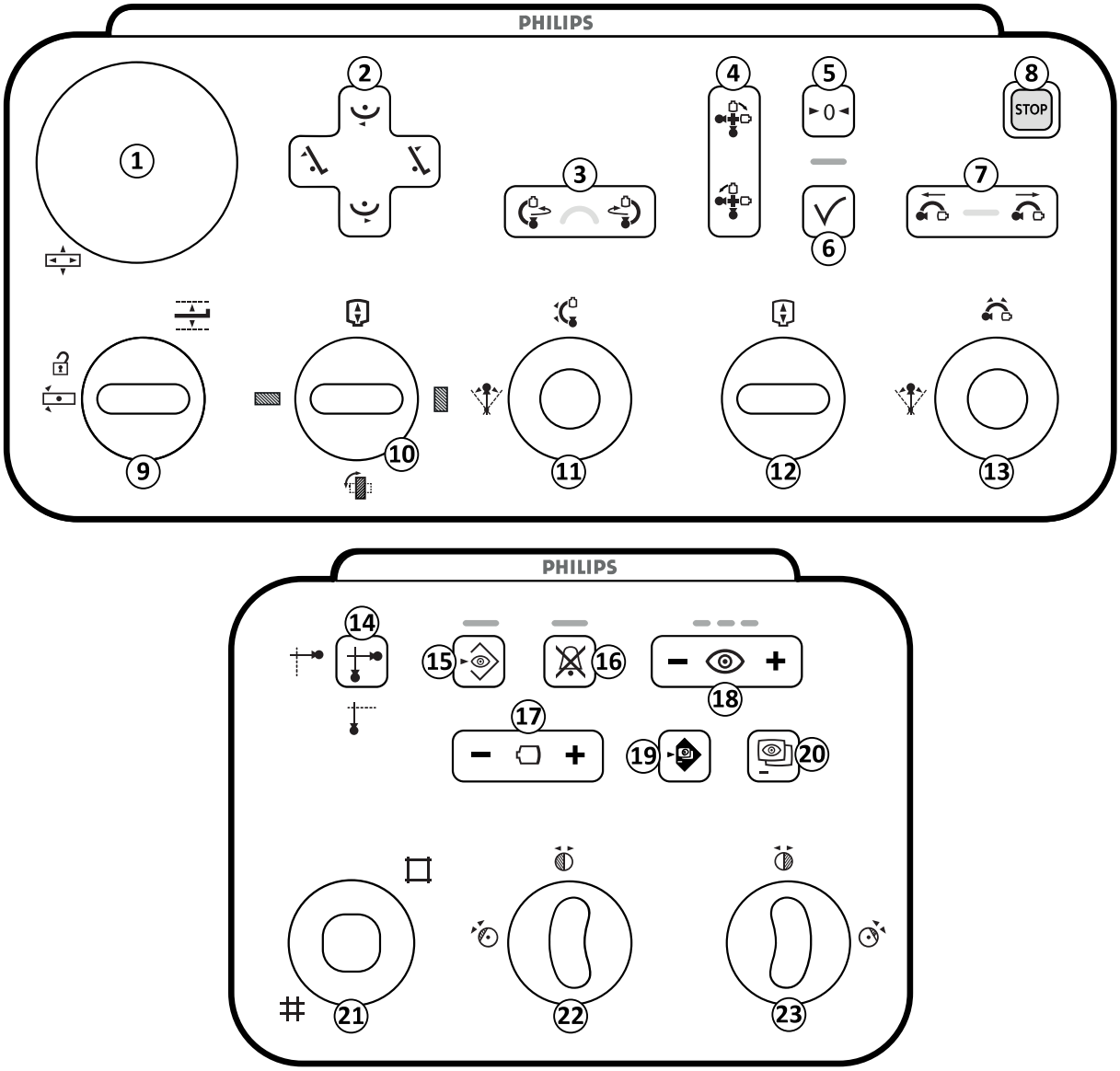
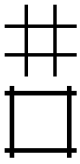


Figure 234 Biplane control modules (geometry control module and imaging control module)

Legend			Description
1		Float tabletop	Moves the tabletop in the longitudinal and transverse directions. This function operates only at the table side position. It is disabled in the control room and at the pedestal.
2		Tilt table	Tilts the table up.
		Tilt table	Tilts the table down.
		Cradle table	Cradles the table left.
		Cradle table	Cradles the table right.
3		Rotate frontal stand	Rotates (swings) the frontal stand.
4		Rotate biplane	Rotates (swings) the frontal stand and the lateral stand.
5		Reset geometry	Resets the stand and table to a default position. This function is disabled in the control room.
6		Accept	When using automatic position control, this function recalls a selected stand or table position. The indicator light flashes when a new position is selected or when the stand is moved away from the selected position. The indicator light is on while the position is being recalled. The indicator light is off when the selected position is reached.
7		Move lateral stand (longitudinal)	Moves the lateral stand longitudinally.
8		Emergency stop	Stops all geometry movements. For information about restarting after an emergency stop, see Restarting the System (page 57).
9		Table height	Adjusts the height of the table.
		Table pivot unlock	Unlocks the table pivot lock.
10		Rotate detector	Moves the detector between portrait and landscape positions.
		Source-to-image distance	Changes the source-to-image distance of the frontal stand.
		Reset landscape alignment This function may not be available on your system.	Moves the detector to the landscape position.

Legend			Description
		Reset portrait alignment This function may not be available on your system.	Moves the detector to the portrait position.
11		Angulation	Controls the angulation position of the frontal stand.
		Rotation	Controls the rotation position of the frontal stand.
12		Source-to-image distance	Changes the source-to-image distance of the lateral stand.
13		Angulation	Controls the angulation position of the lateral stand.
		Rotation	Controls the rotation position of the lateral stand.
14		Select channel	Alternates between the acquisition channels: frontal or lateral. The illuminated symbol indicates the current selection.
15		Store fluoroscopy	Stores fluoroscopy images during and after fluoroscopy. If the indicator light is on during fluoroscopy, images are being stored. After fluoroscopy, the indicator light flashes once to indicate images have been stored.
16		Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
17		Field of view	Increases and decreases the detector field of view on the selected acquisition channel: frontal or lateral.
18		Fluoroscopy flavor	Selects the fluoroscopy level to be used. The three indicator lights show the selected level. When low load-fluoroscopy is selected the indicator lights are off. • One indicator light: Low (with ClarityIQ (option): Low) • Two indicator lights: Normal (with ClarityIQ (option): Medium) • Three indicator lights: High (with ClarityIQ (option): Normal)
19		SmartMask	Selects the current image as the SmartMask image. This function is disabled if the selected procedure settings do not support roadmap.
20		Roadmap	Switches the roadmap function on or off. This function is disabled if the selected procedure settings do not support roadmap.
21		Shutters	Opens and closes the shutters on the frontal channel.
22		Left wedge	Moves, rotates, and resets the left wedge on the frontal channel.
23		Right wedge	Moves, rotates, and resets the right wedge on the frontal channel.

NOTE

If the table tilt option is not installed on your system, the Tilt switch [2] is not present.

NOTE
If the image beam rotation (IBR) option is not installed on your system, switch [10] is present but not enabled.

19.8.4 FlexArm Control Module (Option)

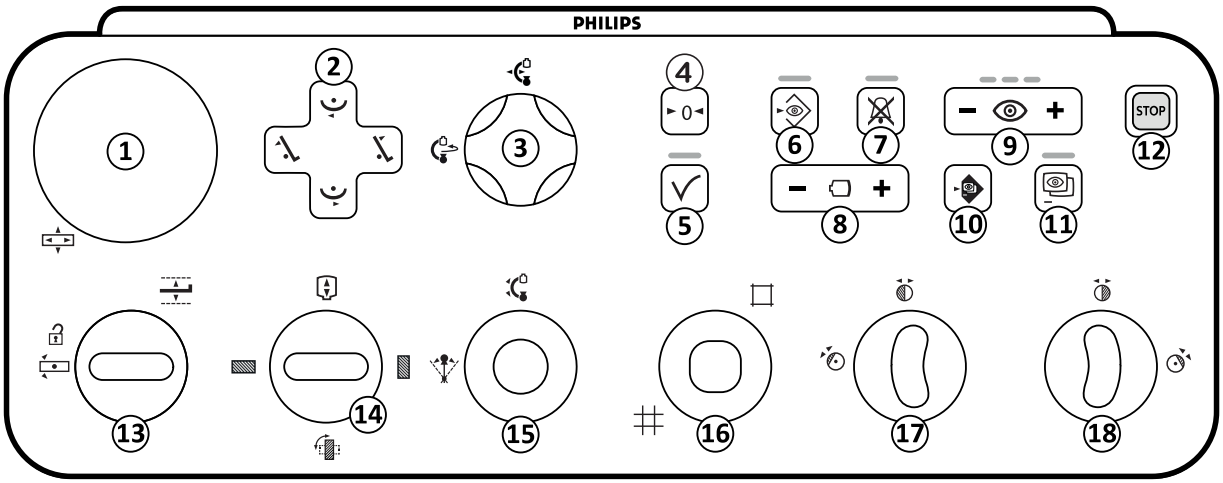
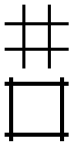


Figure 235 FlexArm control module (option)

Legend			Description
1		Float tabletop	Moves the tabletop in the longitudinal and transverse directions. This function operates only at the table side position. It is disabled in the control room and at the pedestal.
2		Tilt table	Tilts the table up.
		Tilt table	Tilts the table down.
		Cradle table	Cradles the table left.
		Cradle table	Cradles the table right.
3		Move stand (longitudinal)	Moves the stand longitudinally.
		Rotate stand	Rotates (swings) the stand.
4	►0◄	Reset geometry	Resets the stand and table to a default position. This function is disabled in the control room.
5		Accept	When using automatic position control, this function recalls a selected stand or table position, or a selected path. The indicator light flashes when a new position is selected or when the stand is moved away from the selected position. The indicator light is on while the position is being recalled. The indicator light is off when the selected position is reached.
6		Store fluoroscopy	Stores fluoroscopy images during and after fluoroscopy. If the indicator light is on during fluoroscopy, images are being stored. After fluoroscopy, the indicator light flashes once to indicate images have been stored.
7		Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
8		Field of view	Increases and decreases the detector field of view.

Legend			Description
9		Fluoroscopy flavor	Selects the fluoroscopy level to be used. The three indicator lights show the selected level. When low load-fluoroscopy is selected the indicator lights are off. • One indicator light: Low (with ClarityIQ (option): Low) • Two indicator lights: Normal (with ClarityIQ (option): Medium) • Three indicator lights: High (with ClarityIQ (option): Normal)
10		SmartMask	Selects the current image as the SmartMask image. This function is disabled if the selected procedure settings do not support roadmap.
11		Roadmap	Switches the roadmap function on or off. This function is disabled if the selected procedure settings do not support roadmap.
12		Emergency stop	Stops all geometry movements. For information about restarting after an emergency stop, see Restarting the System (page 57).
13		Table height	Adjusts the height of the table.
		Table pivot unlock	Unlocks the table pivot lock.
14		Rotate detector	Moves the detector between portrait and landscape positions.
		Source-to-image distance	Changes the source-to-image distance.
		Reset landscape alignment	Moves the detector to the landscape position.
		Reset portrait alignment	Moves the detector to the portrait position.
15		Angulation	Controls the angulation position of the stand.
		Rotation	Controls the rotation position of the stand.
16		Shutters	Opens and closes the shutters.
17		Left wedge	Moves, rotates, and resets the left wedge.
18		Right wedge	Moves, rotates, and resets the right wedge.

NOTE

If the table tilt option is not installed on your system, the Tilt switch [2] is not present.

19.8.5 FlexMove Control Module (Option)

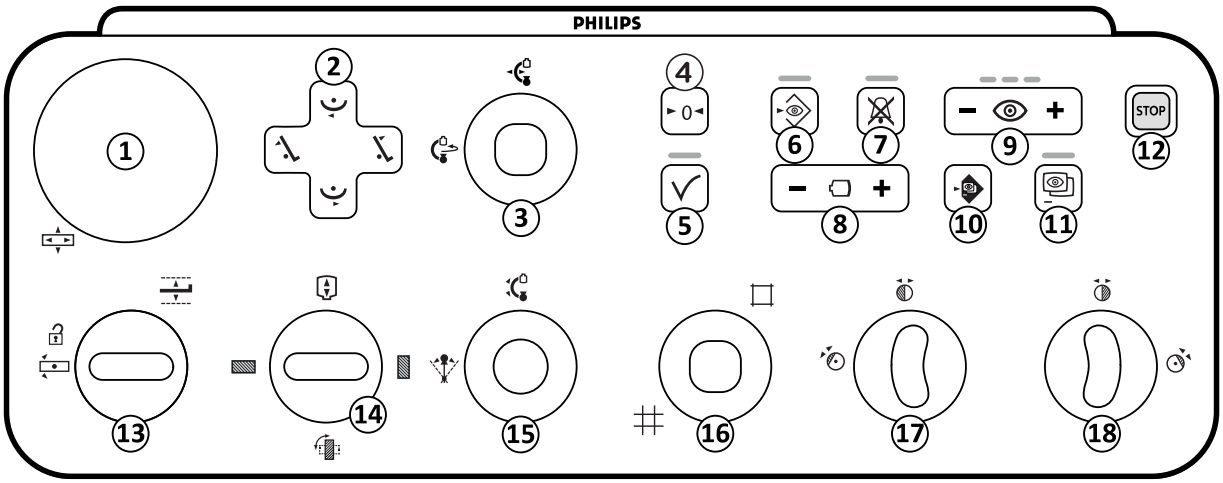
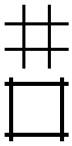


Figure 236 FlexMove control module (option)

Legend			Description
1		Float tabletop	Moves the tabletop in the longitudinal and transverse directions. This function operates only at the table side position. It is disabled in the control room and at the pedestal.
2		Tilt table	Tilts the table up.
		Tilt table	Tilts the table down.
		Cradle table	Cradles the table left.
		Cradle table	Cradles the table right.
3		Move stand (longitudinal)	Moves the stand longitudinally.
		Rotate stand	Rotates (swings) the stand.
4		Reset geometry	Resets the stand and table to a default position. This function is disabled in the control room.
5		Accept	When using automatic position control, this function recalls a selected stand or table position, or a selected path. The indicator light flashes when a new position is selected or when the stand is moved away from the selected position. The indicator light is on while the position is being recalled. The indicator light is off when the selected position is reached.
6		Store fluoroscopy	Stores fluoroscopy images during and after fluoroscopy. If the indicator light is on during fluoroscopy, images are being stored. After fluoroscopy, the indicator light flashes once to indicate images have been stored.
7		Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
8		Field of view	Increases and decreases the detector field of view.
9		Fluoroscopy flavor	Selects the fluoroscopy level to be used. The three indicator lights show the selected level. When low load-fluoroscopy is selected the indicator lights are off. • One indicator light: Low (with ClarityIQ (option): Low) • Two indicator lights: Normal (with ClarityIQ (option): Medium) • Three indicator lights: High (with ClarityIQ (option): Normal)

Legend			Description
10		SmartMask	Selects the current image as the SmartMask image. This function is disabled if the selected procedure settings do not support roadmap.
11		Roadmap	Switches the roadmap function on or off. This function is disabled if the selected procedure settings do not support roadmap.
12		Emergency stop	Stops all geometry movements. For information about restarting after an emergency stop, see Restarting the System (page 57).
13		Table height	Adjusts the height of the table.
		Table pivot unlock	Unlocks the table pivot lock.
14		Rotate detector	Moves the detector between portrait and landscape positions.
		Source-to-image distance	Changes the source-to-image distance of the frontal stand.
		Reset landscape alignment This function may not be available on your system.	Not available with the FlexMove option.
		Reset portrait alignment This function may not be available on your system.	Not available with the FlexMove option.
15		Angulation	Controls the angulation position of the stand.
		Rotation	Controls the rotation position of the stand.
16		Shutters	Opens and closes the shutters.
17		Left wedge	Moves, rotates, and resets the left wedge.
18		Right wedge	Moves, rotates, and resets the right wedge.

NOTE

If the table tilt option is not installed on your system, the Tilt switch [2] is not present.

19.8.6 Control Module with OR Table (Option)

If your system uses an OR Table, the control module has the same functions as a system that uses a Philips table, but the float tabletop control has a different appearance.

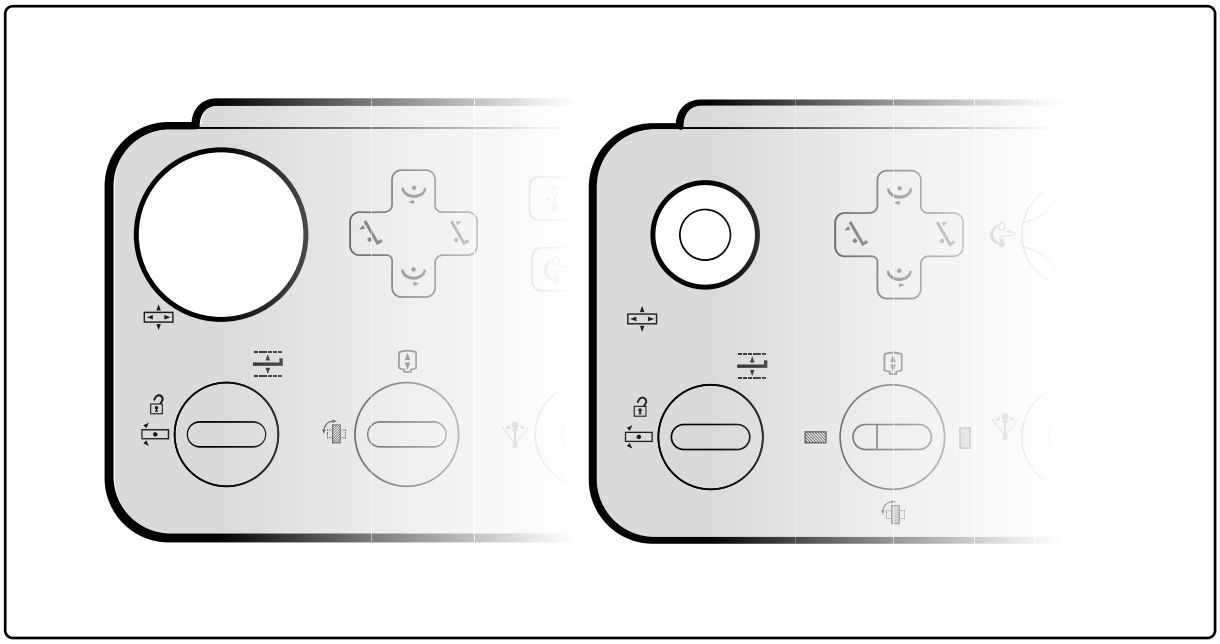


Figure 237 Control module with Philips table (left) and control module with OR table (right)

19.9 Review Module

The review functions on the review module operate on the active tab in the acquisition window.

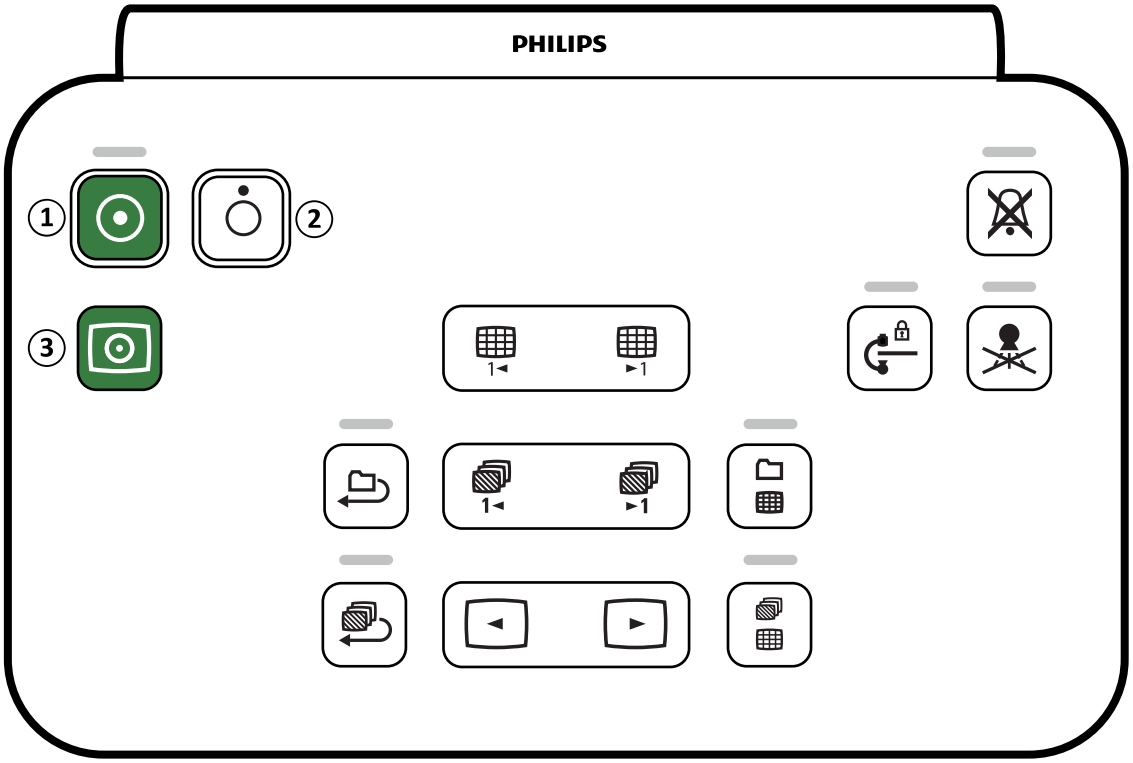


Figure 238 Review module

Legend			Description
1		Power on	Used to switch the system on or perform a warm restart. The indicator light is on when the system is on or starting. To operate, this button should be pressed for 2 seconds.
2		Power off	Used to switch the system off. To operate, this button should be pressed for 2 seconds.
3		Video on	This function is only available when the FlexVision option or the FlexSpot option is installed. Used to switch on the monitors only (video-only mode) in the examination and control rooms. The indicator light flashes during video-only start up and is on when the monitors are on in video-only mode. To operate, this button should be pressed for 2 seconds.
4		Reset fluoroscopy buzzer	Resets the fluoroscopy buzzer. The indicator light flashes when the buzzer is activated.
5		Disable geometry movements	Disables and enables stand and table movements. The indicator light is on when stand and table movements are disabled. To operate, this button should be pressed for 2 seconds.
6		Disable radiation	Disables and enables X-ray. The indicator light is on when X-ray is disabled.
7		Previous page	Displays the previous overview page in the series overview and study overview.
8		Next page	Displays the next overview page in the series overview and study overview.
9		Cycle all	Starts and stops replay of the images within the current series. The indicator light is on when replay is active.
10		Previous series	Displays the previous series.
11		Next series	Displays the next series.
12		Study overview	Switches between overview and single study viewing modes. The indicator light is on when overview mode is in use.
13		Series replay	Starts and stops replay of the series within the current study. The indicator light is on when replay is active.
14		Previous image	Displays the previous image in a series. This function is disabled in study overview mode.
15		Next image	Displays the next image in a series. This function is disabled in study overview mode.
16		Series overview	Switches between overview and single image viewing modes. The indicator light is on when overview mode is in use.

19.10 Using the Mouse

You can access several function shortcuts with the mouse.

The following functions are available:

Left button: Click to select a tool or item.

Mouse wheel: Rotate to navigate the images of a series or items in a list.

Mouse wheel button: Press and hold to adjust the WW/WL or brightness/contrast settings.

Right button: Click to open the shortcut menu.

Right button: Drag (click and hold) to pan the image.

Mouse wheel button + right button: Drag (click and hold) zoom the image.

19.11 Viewpad

The viewpad is a handheld remote control that you can use to control viewing and processing functions from anywhere in the examination room.

A laser pointer is located on the front of the viewpad. You activate the laser pointer using the button on the underside of the viewpad. The quality of the laser pointer is affected when using a sterile cover.

WARNING
Do not stare into the beam or point the beam at other people's eyes.

Two versions of the viewpad are available: cardio and vascular. The vascular viewpad has additional functions.

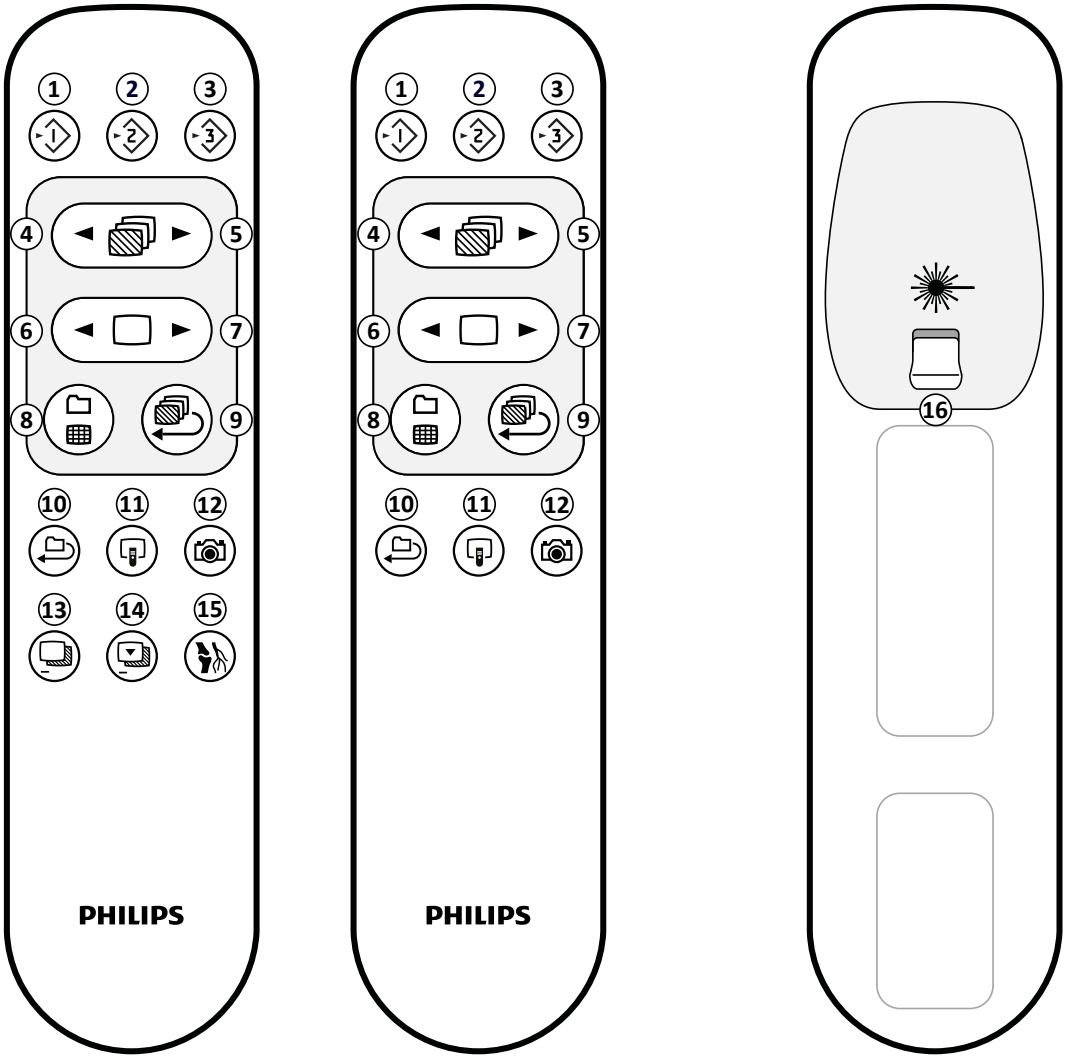


Figure 239 Viewpad: vascular version (left), cardio version (middle), and underside (right)

Legend			
1	Copies the current image to the Reference 1 window On biplane systems, the frontal image is copied.	9	Plays the current series in looped movie mode
2	Copies the current image to the Reference 2 window On biplane systems, the lateral image is copied.	10	Plays all series of the study in looped movie mode
3	Copies the current image to the Reference 3 window On biplane systems, images from both channels are copied, and are displayed side by side and synchronized.	11	Moves the focus of the viewpad between the live X-ray window and each of the reference windows
4	Displays the previous series	12	Creates a snapshot of the current image and stores it with the study
5	Displays the next series	13	Enables or disables subtraction (vascular viewpad only)
6	Displays the previous image	14	Sets the current image as the mask image for subtraction (vascular viewpad only)
7	Displays the next image	15	Enables or disables landmarking (vascular viewpad only)
8	Displays all series in the study overview	16	Turns the laser pointer on or off

19.12 Bolus Chase Reconstruction Main Window Toolbars

The main window displays the original images from the bolus chase acquisition.

The main window has a dedicated toolbar. It also has a navigation toolbar that you can use for reviewing images.

Main Window Toolbar

The toolbar in the main window provides tools for manipulating the original images.

Tool		Function
	**Select**	Selects an object (this is the default tool)
	**Zoom**	Zooms the image in or out
	**Pan**	Pans the image
	**Brightness / Contrast**	Adjusts the brightness or contrast of the image
	**Edge enhancements**	Sharpen or soften edges in the image
	**Subtraction On / Off**	Turns subtraction on or off (this tool is only available when a mask series is available)
	**Landmarking**	Adjusts the amount of subtracted background that is combined with the subtracted image
	**Copy to Reference**	Sends the image to a reference window in the examination room.
		
		
	**Annotations**	Allows you to add an annotation to the image (the type of annotation can be selected from a submenu)

Tool		Function
	**Snapshot**	Takes a snapshot of the image displayed and stores it with the current study in the patient database
	**Reset**	Resets the image to its original viewing settings

Navigation Toolbar

The navigation toolbar provides tools for reviewing the original images, either as a movie or by stepping through images one by one.

Tool		Function
	**Play**	Plays the original images as a movie
	**Stop**	Stops movie playback
	**Next image**	Displays original images sequentially forward through the series
	**Previous image**	Displays original images sequentially backward through the series

19.13 Bolus Chase Reconstruction Overview Image Window Toolbar

The overview image window in the Bolus Chase Reconstruction application displays the overview image that is reconstructed when the system receives a bolus chase series.

You can hide the overview image window to focus on the main window, if desired.

The overview image window has a dedicated toolbar, providing tools for manipulating the overview image.

Tool		Function
	**Select**	Selects an object in the window (this is the default tool)
	**Brightness / Contrast**	Adjusts the brightness or contrast of the image
	**Subtraction On / Off**	Turns subtraction on or off (this tool is only available when a mask series is available)
	**Landmarking**	Adjusts the amount of subtracted background that is combined with the subtracted image
	**Copy to Reference**	Sends the current image to a reference window in the examination room.
		
		
	**Annotations**	Allows you to add an annotation to the image (the type of annotation can be selected from a submenu)
	**Snapshot**	Takes a snapshot of the image displayed and stores it with the current study in the patient database
	**Reset**	Resets the image to its original viewing settings

20 Glossary

In this section you can find help with definitions of terms that are used in these Instructions for Use and explanations of abbreviations.

20.1 Definitions

Definitions of the terms used in the Instructions for Use are provided here.

20.1.1 Windows, Panels, Views, and Viewports

These terms are used to describe the viewing environment in which an application is displayed.

Window: A window is the overall container in which an application is viewed. It contains all the functions, images, and information that the application provides.

A window can be divided into several areas, depending on the current application:

- **Task selection panel**: A task selection panel contains the tasks that are applicable for the application. When you select a task, a dedicated task panel is displayed.
- **Task panel**: A task panel contains all the functions that you use to complete the selected task.
- **View**: A view contains information or images that are relevant to the application.
- **Viewport**: A viewport is a container inside a view that provides additional information that is relevant to the view. Viewports can contain, for example, orthogonal reference images or numerical information such as graphs and tables.

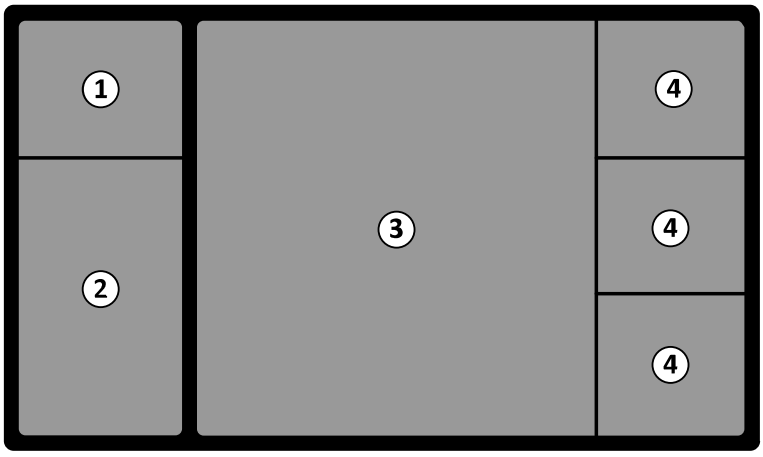


Figure 240 Parts of a window

Legend			
1	Task selection panel	3	View
2	Task panel	4	Viewport

The terms **monitor** or **screen** are not used to describe the software interface of the system. When these terms are used, they refer to the physical monitor or screen unit.

NOTE
The configuration of the monitors and screens used with the system is flexible. A window can appear on a dedicated monitor in the examination room or in the control room. If the FlexVision or FlexSpot options are installed, it may appear as part of a larger screen that can display multiple applications. When describing applications in these Instructions for Use, it is not always possible to indicate exactly on what monitor or screen that it appears.

Interacting with Windows
You can enlarge windows and display them full-screen, or you can minimize them to the last position. You can also manually resize a window by dragging its edge.

To activate the application in a window, click anywhere within the borders of the window. The borders of the window turn yellow to indicate that the window is selected. Only one window is active at a time.

When you move the pointer over the application window, the toolbar, task navigation panel, and review toolbar become visible. If there is no interaction in the application window after a few seconds, the toolbar and review toolbar are automatically hidden. Move the pointer over the area to display them again.

When you position the pointer within the borders of the window, the header becomes active and the following interactions are available:


- Click to maximize the window.


- Click to restore the window to the initial size.


- Click to hide the application in a window. When an application is hidden, its icon is shown in the middle of the window. Click the icon to display the application again.


- Click to create a photo image of the application in the window. The photo image is stored with the study of the current acquisition patient.

- Click to view the source at the actual pixel size.


- Click to view the source at the actual pixel size. This icon indicates that the source is critical and you should view the application in this window at the optimal resolution.

- Click to view the source at the actual pixel size and resize the viewport for an optimal fit.

NOTE
Only one viewport at a time can be set to actual pixel size.

Interacting with Panels
You can expand panels to make tools or tasks available, and then collapse them to create a less cluttered environment:


- Click to open the panel or window.


- Click to close the panel or window.


- Click to display more functions.


- Click to close the panel or window.

20.1.2 Patient Table: Doctor Side and Nurse Side

These definitions assume that the patient is supine on the table, with feet toward the table base.

With this patient orientation, the doctor side is the right side of the table (corresponding to the right side of the patient), and the nurse side is the left side of the table. The head end of the table is the end furthest away from the table base, and the foot end is the end nearest to the table base.

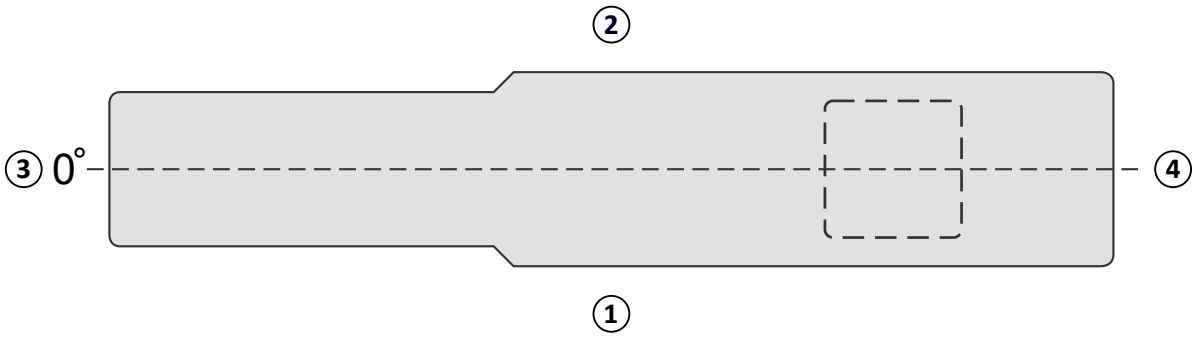


Figure 241 Top view of the patient table

Legend			
1	Doctor side	3	Head end
2	Nurse side	4	Foot end

20.1.3 Working Area

The working area is where the system performs its normal operation.

The working area is directly related to the position of the tabletop. It encloses the tabletop and its vicinity, from floor to ceiling, at all times.

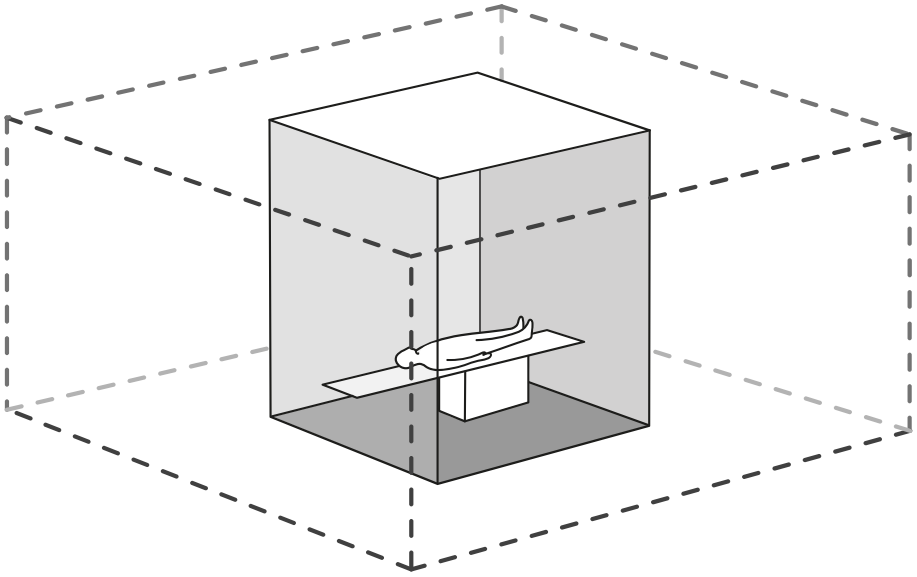


Figure 242 Working area

20.1.4 Dose Related Definitions

The following definitions are used in these Instructions for Use.

Patient Entrance Reference Point
The patient entrance reference point is an approximation for the location of the patient's skin.

NOTE
The distance from focal point to the isocenter can be different per type of geometry, resulting in different reference air kerma values under the same circumstances.

NOTE
The patient entry reference point may also be known as the interventional reference point.

It is located on the central axis of the X-ray beam, 15 cm from the isocenter, towards the focal spot. Depending on the patient's size, the table height and the direction of the X-ray beam, the patient entry reference point may be outside the patient (as in the figure on the left, below), it may coincide with the skin surface, or it may be inside the patient (as in the figure on the right, below).

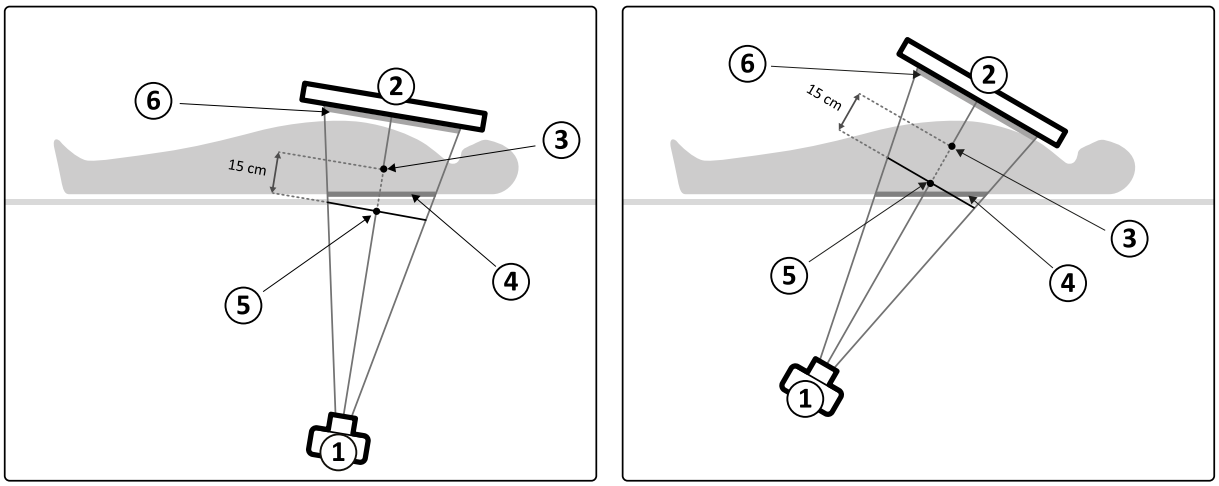


Figure 243 Patient entrance reference point

Legend			
1	X-ray tube	4	Entrance surface
2	Detector	5	Patient entrance reference point
3	Isocenter	6	Detector dose

Air Kerma (AK)
The amount of kinetic energy released in air by ionizing radiation. Or more precisely, the quotient of dEtr by dm, where dEtr is the sum of the initial kinetic energies of all the charged particles liberated by uncharged particles in a mass of dm of air. It is expressed in mGy, where 1 Gy = 1 Joule / kg.

Air Kerma Rate
The amount of air kerma per unit of time, expressed in mGy/min.

Reference Air Kerma
The air kerma free in air in the primary X-ray beam measured under specific conditions as specified in Reference Air Kerma Measurement Setup (page 386), and expressed in the patient entrance reference point.

NOTE
The reference air kerma value is independent of the actual position of the patient, for example, the table height, as it is measured at a specific point in space.

For exposure, the reference air kerma is expressed in mGy per image.

Reference Air Kerma Rate
The amount of reference air kerma per unit of time. For fluoroscopy the reference air kerma Rate is expressed in mGy/min.

Peak Air Kerma
The highest air kerma that any point of an irradiated surface is exposed to.

Skin Dose
The absorbed dose delivered by ionizing radiation to the patient's skin at the point of irradiation. Skin dose is expressed in Gy or mGy. Unlike the reference air kerma, this value indicates the actual energy absorption under the present conditions.

Skin Dose Rate
The skin dose per unit of time, expressed in Gy/s or mGy/s.

Peak Skin Dose
The highest skin dose that any portion of the patient’s skin is exposed to.

Staff Dose
Staff dose is the effective dose received by a healthcare professional during an examination, resulting primarily from scatter radiation emitted by the patient. The effective dose is expressed in unit mSv (milliSievert).

Dose Area Product
The product of the area of a cross-section of an X-ray beam and the averaged air kerma over that cross-section. The unit that is used to display dose area product on the system is configurable. For more information, see Changing Regional Settings (page 259).

Unlike skin dose and air kerma, the dose area product value is independent of the distance to the focal spot.

NOTE
Other vendors might use other units to express the dose area product. This should be taken into account when comparing dose values of different systems.

Detector Dose
The residual dose at the anti-scatter grid on the detector after the X-rays have passed the patient. The system uses the detector dose as an input to regulate the amount of X-ray radiation in order to obtain the proper image quality.

Deterministic Effects
Deterministic effects of ionizing radiation are related on a microbiological scale to cell destruction caused by high radiation levels. Deterministic effects or tissue reactions may occur when the radiation dose has exceeded a certain threshold level, which may depend on the irradiated tissue or organ and on the patient's sensitivity to radiation. When the threshold is exceeded, the severity of the tissue reactions increases with increased radiation dose.

The effects can be directly related to the radiation exposure. On a microbiological scale, these effects are related to cell destruction caused by high radiation levels. The threshold dose is typically 2 Gy for transient skin erythema (redness of the skin) and 3 Gy for temporary hair loss.

The air kerma is a measure to estimate the deterministic effects of ionizing radiation.

Stochastic Effects
Stochastic effects of ionizing radiation are related on a microbiologial scale to cell mutations due to DNA damage caused by low radiation levels. Such mutations may be controlled and eliminated by the human body or may develop into cancer on the long term (many years). It is difficult to show a direct relationship between radiation exposure and cancer for individual cases. The International Commission on Radiological Protection assumes that the stochastic risk or probability of developing cancer is linear with the total radiation dose received, and that there is no threshold as with the deterministic risk. Unlike the deterministic risk, the stochastic risk does not change if dose is spread over multiple parts of the body.

The dose area product is a measure to estimate the stochastic effects of ionizing radiation.

Patient Thickness
The depth of tissue irradiated, expressed in cm H_2O or cm PMMA.

20.1.5 Dose Model

To determine the applied dose on various parts of the patient’s body and to assist in reducing the deterministic effects of radiation, a dose model is used.

In this model the human body is divided into four zones.

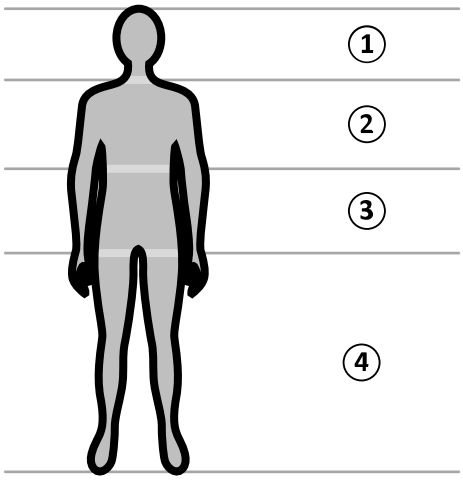


Figure 244 Body zones

Legend			
1	Head	3	Abdomen
2	Thorax	4	Peripheral

The dose model is further refined for the thorax body zone, as defined in the exposure procedure X-ray protocols.

For the thorax body zone, the skin is modeled as a sphere of 30 cm diameter, positioned around the isocenter. The surface of this sphere is divided into 10 areas corresponding to different projections of the X-ray beam: five at the cranial side and five at the caudal side.

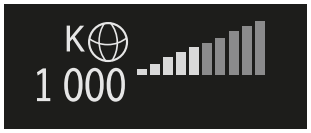


Figure 245 Dose model applied in the area corresponding to the current position (rotation and angulation) of the stand

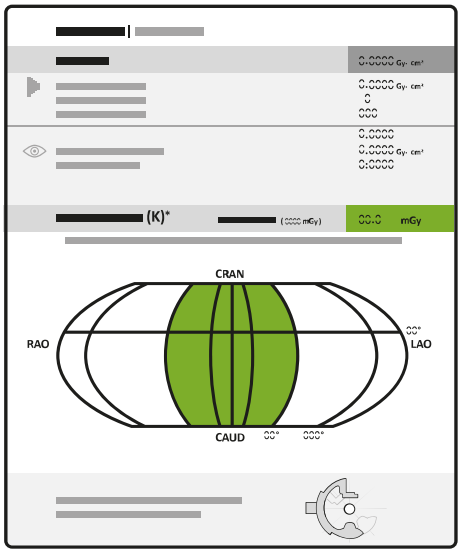


Figure 246 Dose model displayed in the dose report

Every body area is divided into a number of spots of approximately 0.5 x 0.5 cm, with one spot for every degree of beam rotation and angulation.

The radiated skin area corresponds with the part of the skin that is actually irradiated, which depends on the geometrical projection of the X-ray beam and the position of the collimator shutters.

The exposed body area (shaded) is the body area that is covered most by the radiated skin area.

The system keeps track of the peak air kerma that is applied to every irradiated body zone of the sphere via real-time dose calculation.

You can see the following X-ray dose information:
- The total actual cumulative air kerma for the whole body is shown as a number.
- During radiation, the actual cumulative peak air kerma and the peak air kerma rate of the hottest spot within the radiated body zone, is shown as a number and as a graphical representation.
- During radiation and standby, the predicted remaining fluoroscopy time until the threshold is reached is shown for the current X-ray beam projection.
- Visual feedback, for example, a change of color on the screen, when the cumulative peak air kerma in the radiated body zone becomes higher than a customizable threshold. The default setting is 2 Gy. You are warned that continuing radiating in the current projection might lead to increased risk of deterministic effects. To solve this, you should change the projection of the X-ray beam so that another body area is exposed, or modify the system settings as described in X-ray Protocol Selection (page 334).

The zone dose information is immediately adapted when you change the field size, the source-to-image distance, the fluoroscopy flavor, or the X-ray beam projection.

20.1.6 Interventional Tools

Interventional Tools extend the functionality of compatible X-ray equipment with 3D imaging during an interventional procedure.

The Interventional Tools are a suite of software products that help physicians diagnose and treat medical diseases. The applications are mainly used in the cathlab during an interventional procedure, and fulfill the following main goals:
- Understanding the situation
- Plan the intervention
- Support the intervention
- Verify the results of the intervention

The Interventional Workspot supports Interventional Tools by providing central data administration functions such as patient administration, printing and export. A basic viewing application is also provided. Each Interventional Tool is provided with dedicated Instructions for Use containing details of using the specific image processing tools associated with the Interventional Tool.

20.1.7 Injector Control Methods

Depending upon your system configuration, you may use either one or two switches when using contrast injection, in coupled or uncoupled modes.

For all control methods, you must prepare the injector manually at an appropriate time.

Always refer to the instructions for use for your injector for more information about using the injector.

Uncoupled Operation
Since uncoupled operation of a contrast injector does not involve communication between the X-ray system and the contrast injector, you will use more than one switch when operating in uncoupled mode. This involves using one switch to operate the injector and another switch (hand switch or foot switch) on the X-ray system to acquire images.

Coupled Operation One-Switch Method
When using a one-switch method to control contrast injection, you control image acquisition and contrast injection using the same switch. One-switch operation is a coupled operation mode. When you press the hand switch or foot switch to acquire images, the X-ray system also controls the injection of the contrast medium.

Coupled Operation Two-Switch Method
When using a two-switch method in coupled mode, you control image acquisition and contrast injection using separate switches. When you press the X-ray system hand switch or foot switch to start acquiring images, you must press the injector control switch simultaneously to inject contrast. The X-ray system synchronizes image acquisition with contrast arrival through the X-ray delay settings.

20.2 Abbreviations

A guide to the abbreviations that you may find in these Instructions for Use is provided here.

Abbreviation	Definition	Explanation
2D	2 Dimensional	Viewing mode
3D	3 Dimensional	Viewing mode
A	Amperes	Unit of measurement (electric current)
AC	Alternating Current	Electric current
ACQ	Acquisition	Procedure
AK	Air Kerma	Dose measurement
Al	Aluminum	Metallic element
ANG	Angulation	Geometry setting
AAMI	Association for the Advancement of Medical Instrumentation	National standards organization
ANSI	American National Standards Institute	National standards organization
AP	Anterior-Posterior	Stand projection
APC	Automatic Position Control	Geometry setting
B12/12	A biplane system with a 12-in detector on the frontal stand and a 12-in detector on the lateral stand	System description
B20/12	A biplane system with a 20-in detector on the frontal stand and a 12-in detector on the lateral stand	System description
B20/15	A biplane system with a 20-in detector on the frontal stand and a 15-in detector on the lateral stand	System description
BCR	Bolus Chase Reconstruction	Procedure
BPM	Beats per Minute	Anatomical measurement
BSA	Body Surface Area	Anatomical measurement
CAU	Caudal	Stand projection
CAUD	Caudal	Stand projection
CBCT	Cone-Beam Computed Tomography	Imaging technique
CD	Compact Disc	Removable storage media
CE	Conformité Européenne	Product certification mark
CIS	Cardiology Information System	Network interface
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)	International standards organization
cm	Centimeters	Unit of measurement (distance)
CPR	Cardiopulmonary Resuscitation	Procedure
CRA	Cranial	Stand projection
CRAN	Cranial	Stand projection
CSA	Canadian Standards Association	National standards organization
CT	Computed Tomography	Imaging technique
CTDI	Computed Tomography Dose Index	A radiation exposure index in X-ray computed tomography
Cu	Copper	Metallic element
DAP	Dose Area Product	Dose measurement
DC	Direct Current	Electric current
DHCP	Dynamic Host Configuration Protocol	Network protocol
DICOM	Digital Imaging and Communications in Medicine	Image file format (suitable for diagnostic purposes)

Abbreviation	Definition	Explanation
DNS	Domain Name Server	Network configuration setting
DVD	Digital Versatile Disc	Removable storage media
EAC	Eurasian Conformity	Product certification mark
ECG	Electrocardiogram	Anatomical measurement
ED	End Diastole	Anatomical state
EDV	End Diastole Volume	Anatomical measurement
EF	Ejection Fraction	Anatomical measurement
EMC	Electromagnetic Compatibility	Electrical environment
EMF	Electromagnetic Fields	Electrical environment
EP	Electrophysiology	Procedure
EPO	Emergency Power Off	Hardware function
ES	End Systole	Anatomical state
ESD	Electrostatic Discharge	Electrical environment
ESV	End Systole Volume	Anatomical measurement
F	French	Unit of measurement (catheters)
FDA	Food and Drug Administration	US government agency
FDPA	Flexible Dynamic Peripheral Angiography	Procedure
FPS	Frames Per Second	Acquisition speed
FOV	Field Of View	Viewing mode
HD	High Definition	Viewing mode
HD	High Dose	Procedure setting (protocol)
HIS	Hospital Information System	Network interface
hPA	Hectopascal	Unit of measurement (pressure)
HQ	High Quality	Procedure setting (protocol)
HU	Hounsfield Units (CT numbers)	Unit of measurement (radiodensity)
Hz	Hertz	Unit of measurement (frequency)
I.A.	Intra-Arterial	Contrast agent delivery method
IBR	Image Beam Rotation	Geometry setting
iCP	Intelligent Collision Prevention	System component
ID	Identification	Patient information
IEC	International Electrotechnical Commission	International standards organization
in	Inches	Unit of measurement (distance)
IP	International Protection marking	Rating indicating protection against ingress of particles and liquid (IEC 60529)
IP	Internet Protocol	Network protocol
I.V.	Intravenous	Contrast agent delivery method
kg	Kilograms	Unit of measurement (weight)
kHz	Kilohertz	Unit of measurement (frequency)
kPA	Kilopascal	Unit of measurement (pressure)
kV	Kilovolts	Unit of measurement (electrical potential)
kW	Kilowatts	Unit of measurement (power)
l	liters	Unit of measurement (volume)
LAO	Left Anterior Oblique	Anatomy
lbs	Pounds	Unit of measurement (weight)
LCA	Left Coronary Artery	Anatomy
LD	Low Dose	Procedure setting (protocol)
LED	Light Emitting Diode	Hardware
LUT	Lookup Table	Video configuration setting (requires technical support)
LVA	Left Ventricular Analysis	Postprocessing application

Abbreviation	Definition	Explanation
M12	A ceiling or floor-mounted monoplane system with a 12-in detector	System description
M15	A floor-mounted monoplane system with a 15-in detector	System description
M20	A ceiling or floor-mounted monoplane system with a 20-in detector	System description
M20 OR	A ceiling-mounted monoplane system with a 20-in detector and an interface for an OR (operating room) table	System description
m	Meters	Unit of measurement (distance)
mA	Milliamperes	Unit of measurement (electric current)
MAC	Media Access Control	Hardware function
MCS	Monitor Ceiling Suspension	System component
MDS2	Manufacturer Disclosure Statement for Medical Device Security	Voluntary standard for security and privacy in healthcare
min	Minutes	Unit of measurement (time)
MLD	Minimum Lesion Diameter	Anatomical measurement
mm	Millimeters	Unit of measurement (distance)
mOhm	Milliohm	Unit of measurement (electrical resistance)
MPEG	Motion Picture Experts Group	Video file format (not suitable for diagnostic purposes)
ms	Milliseconds	Unit of measurement (time)
N	Newtons	Unit of measurement (force)
OR	Operating Room	Working environment
PA	Posterior-Anterior	Stand projection
PACS	Picture Archiving and Communication System	Hardware
Pb	Lead	Material
PC	Personal Computer	Hardware
PE	Protective Earth	IEC definition
POAG	Potential Ausgleich (German term for Potential Equalization)	Equivalent to the IEC definition of Potential Equalization Connector
PMMA	Poly(methyl methacrylate)	Material (used in phantoms)
PNG	Portable Network Graphics	Image file format (not suitable for diagnostic purposes)
PPM	Parts Per Million	Unit of measurement (concentration)
PROP	Propeller	Geometry setting
QA	Quantitative Analysis	Postprocessing application
QCA	Quantitative Coronary Analysis	Postprocessing application
QVA	Quantitative Vascular Analysis	Postprocessing application
RA	Rotational Angiography	Postprocessing application
RAO	Right Anterior Oblique	Anatomy
RCA	Right Coronary Artery	Anatomy
RIS	Radiology Information System	Network interface
ROI	Region of Interest	Viewing mode
ROT	Rotation	Geometry setting
RVA	Right Ventricular Analysis	Postprocessing application
s	Seconds	Unit of measurement (time)
SID	Source-to-Image Distance	Geometry setting
SV	Stroke Volume	Anatomical measurement
TSM	Touch screen module	System component
UL	Underwriters Laboratories	National certification organization
UPS	Uninterruptible Power Supply	Hardware

Abbreviation	Definition	Explanation
USB	Universal Serial Bus	Removable storage media
V	Volts	Unit of measurement (electrical potential)
VA	Veterans Affairs	Government department (US)
VA	Volt-Amperes	Unit of measurement (electrical power)
W	Watts	Unit of measurement (power)
WCB	Wall connection box	System component
WLM	Worklist Manager	Network interface
XA	X-ray Angiography	Procedure
XL	Extra large	System component

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This medical device conforms with the applicable requirements set out by the European Union, as demonstrated in the Declaration of Conformity.

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