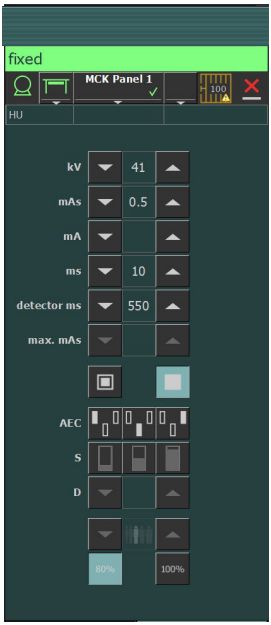
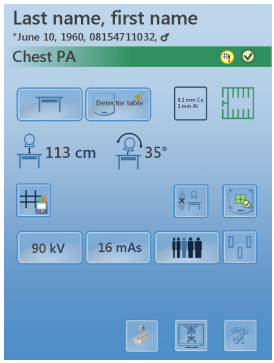
DR Software Console, DR Tube Head Display

User Manual





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Introduction to this Manual

Topics:

Scope of this Manual

This manual contains the information for safe and effective use of the DR software console and the DR Tube Head Display.

The software is part of a General Radiography X-ray imaging system.

About the safety notices in this document

The following samples show how warnings, cautions, instructions and notes appear in this document. The text explains their intended use.

DANGER:
A danger safety notice indicates a hazardous situation of direct, immediate danger for a potential serious injury to a user, engineer, patient or any other person.

WARNING:
A warning safety notice indicates a hazardous situation which can lead to a potential serious injury to a user, engineer, patient or any other person.

CAUTION:
A caution safety notice indicates a hazardous situation which can lead to a potential minor injury to a user, engineer, patient or any other person.

An instruction is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

A prohibition is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

Note: *Notes provide advice and highlight unusual points. A note is not intended as an instruction.*

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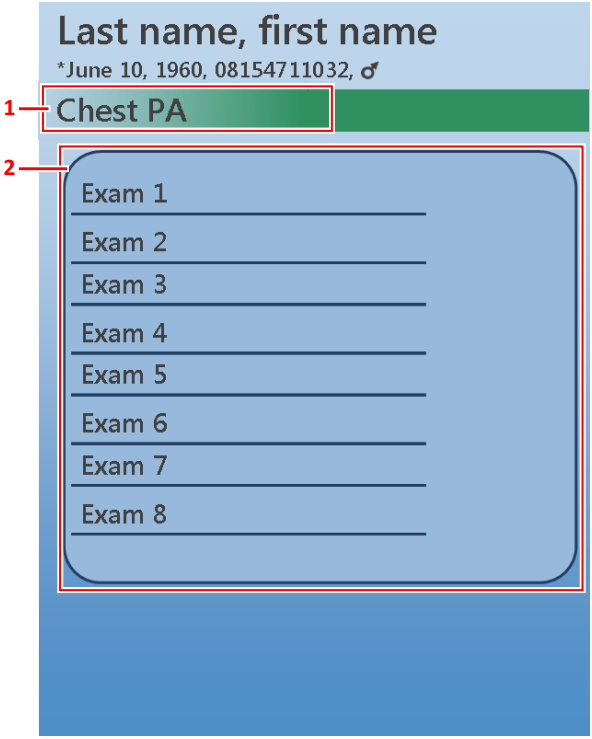
Note: *In the United States, Federal law restricts this device to sale by or on the order of a physician.*

Introduction to the DR Software Console and DR Tube Head Display

Topics:

Examination Overview

To view the examination overview window on the tube head display, push the left side of the device status frame.



1. Left side of the device status frame
2. Overview of exposures

Figure 1: Examination overview window

Related Links

Examination Overview on page 24

Generator Operation Controls

To view the generator window on the software console, select the **Generator** tab.

To switch to the generator window on the tube head display, push the **Home** button.

1. Title frame
2. Device status frame
3. Heat units and DAP value
4. Radiographic parameters
5. Focal spot indicator
6. AEC buttons
7. X-ray tube load
8. Positioning controls
9. Patient information

10. Positioner button
11. Toggle image preview button
12. Tools button

Figure 2: Operation controls

The graphical user interface consists of several panes and toolbars.

Note: *The contents of the graphical user interface depends on the configuration of the X-ray system. The screenshots in this chapter are examples.*

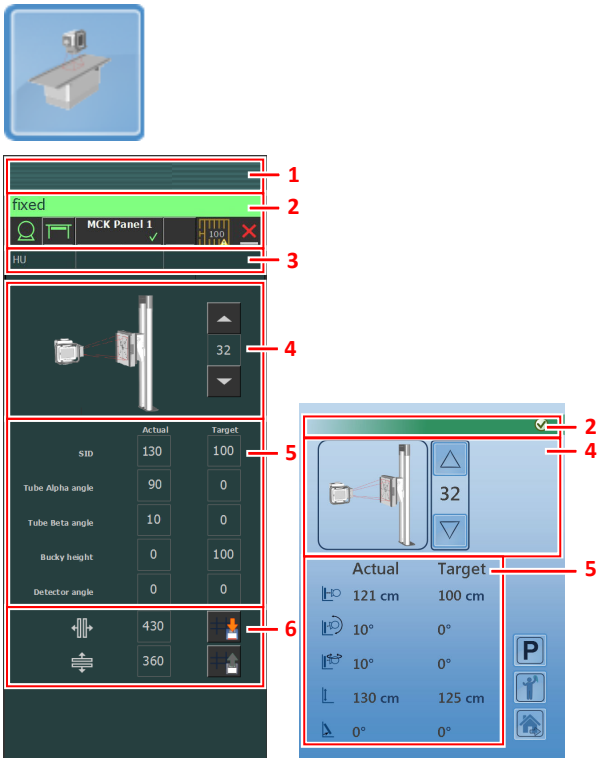
Related Links

Operation on page 23

Positioner Operation Controls

To view the positioner window on the software console, select the **Positioner** tab.

To switch to the positioner window on the tube head display, push the **Positioner** button. The symbol in the **Positioner** button indicates the selected modality position.



1. Title frame
2. Device status frame
3. Heat units and DAP value
4. Automatic position number
5. Automatic position values
6. Collimator light field values

Figure 3: Operation controls

The graphical user interface consists of several panes and toolbars.

Note: *The contents of the graphical user interface depends on the configuration of the X-ray system. The screenshots in this chapter are examples.*

Related Links

Operation on page 23

Image Preview Window

After an exposure, the acquired image is displayed on the tube head display.

To return to the controls, push the display anywhere.

To disable image preview, toggle the **Image preview** button.

Related Links

Generator Operation Controls on page 11

Tools Window

To switch to the tools window on the tube head display, push the Tools button.

The tools window contains a button that temporarily disables the tube head display to clean the screen during operation.

System Documentation

Refer to the User Manual of the DR System for general safety instructions, system information and instructions for performing a basic workflow.

Labels

NX has an About box, showing information on version and release of NX and other software on the NX workstation. To consult the About box, click **About NX...** in the Tools section of the Main Menu.

Figure 4: Example of the NX About box

System messages

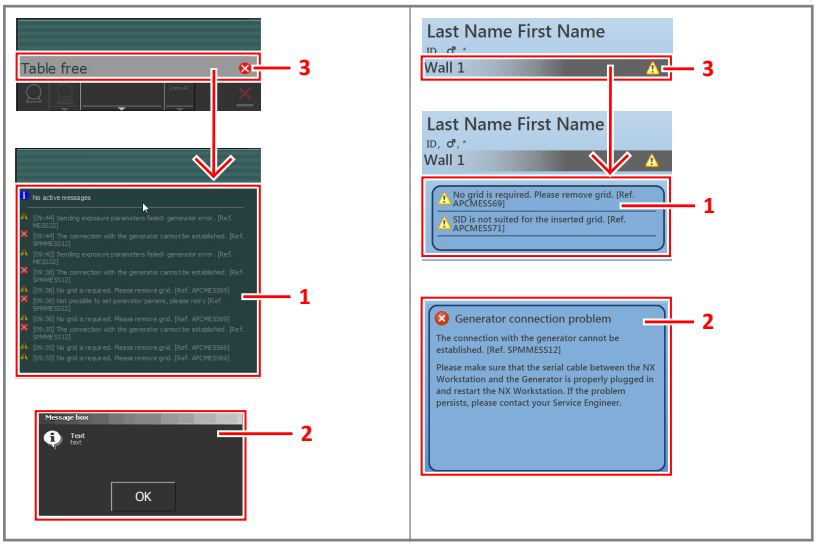
The system can display messages to the user on the screen. Messages are displayed on the Software Console and on the Tube head display.

- Device status frame

  A message icon is displayed in the device status frame. Click the right half of the device status frame to display the message frame. To hide the message frame, click anywhere in the display.

  The message frame on the Software Console displays active messages on top and a history list of messages below. The message frame on the Tube head display displays active messages only.
- Dialog box

  A dialog box is displayed in the middle of the screen. The dialog box can contain a title, a status description, an instruction for the user and a button.



1. Message frame
2. Dialog box
3. Device status frame

Figure 5: Messages

Related Links

Tube head display shows only Agfa logo on page 68

Message types

There are different types of messages. The icon in the device status frame shows the message type.

Type of message	Icon	User response
Information		Information messages help to understand the workflow status and do not affect safety or efficiency.
Warning		Warning messages indicate a difference between the actual status of the system and the status expected based on the configuration. Check the message frame for warnings and read the messages carefully. If there's a dialog box, click the button in the dialog box to continue operation.
Error		A dialog box is displayed. Read the message carefully. Click the button in the dialog box to continue operation.
Blocking error		A dialog box is displayed. Read the message carefully. It provides instructions to resolve the problem. Operation is blocked until the problem is resolved. The dialog box is closed automatically when the problem is resolved.

Messages that require no user response disappear automatically.

Warning or error messages may instruct to contact the Agfa service organization if the problem repeats, but by following the instructions in the message, the user can restore the operation of the system.

Getting started

Topics:

Starting the Software Console

The software console software is started automatically when the NX workstation is switched on.

Starting the Tube Head Display

The tube head display is started automatically when the DR modality is switched on and becomes operational when the NX workstation is switched on.

Stopping the Software Console

The software console is stopped automatically when the NX workstation is switched off.

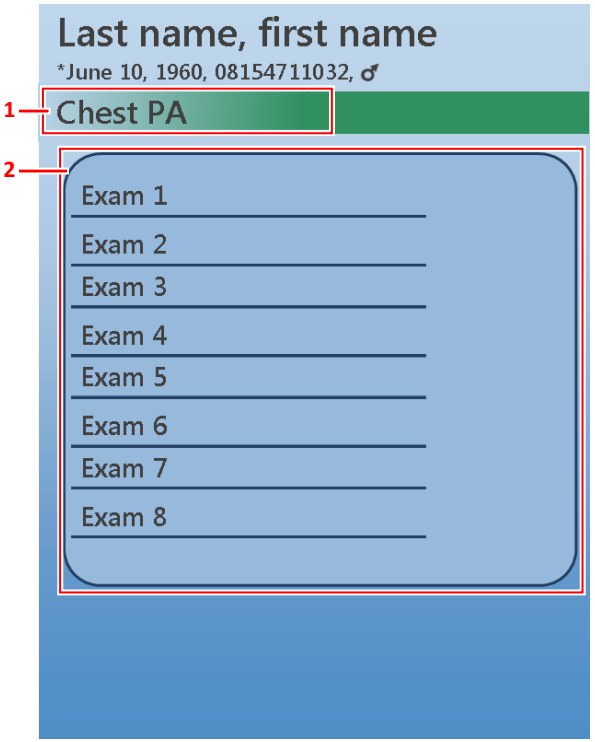
Stopping the Tube Head Display

The tube head display is stopped automatically when the DR modality is switched off.

Operation

Topics:

Examination Overview



1. Left side of the device status frame
2. Overview of exposures

Figure 6: Examination overview window

In the examination overview window, an overview is displayed of the exposures that still have to be taken for the examination.

Select an exposure to load the default X-ray exposure parameters and X-ray system position and to activate the selected DR Detector.

Use the Image Overview pane of the Examination Window at the NX workstation for following actions:

- To add or modify exposures.
- To start a CR Full Leg Full Spine examination.
- To switch between exposures when making multiple exposure on a single cassette (the examination overview displays the number of exposures that have been made and the total number of exposures planned for the cassette).

Device Status Frame

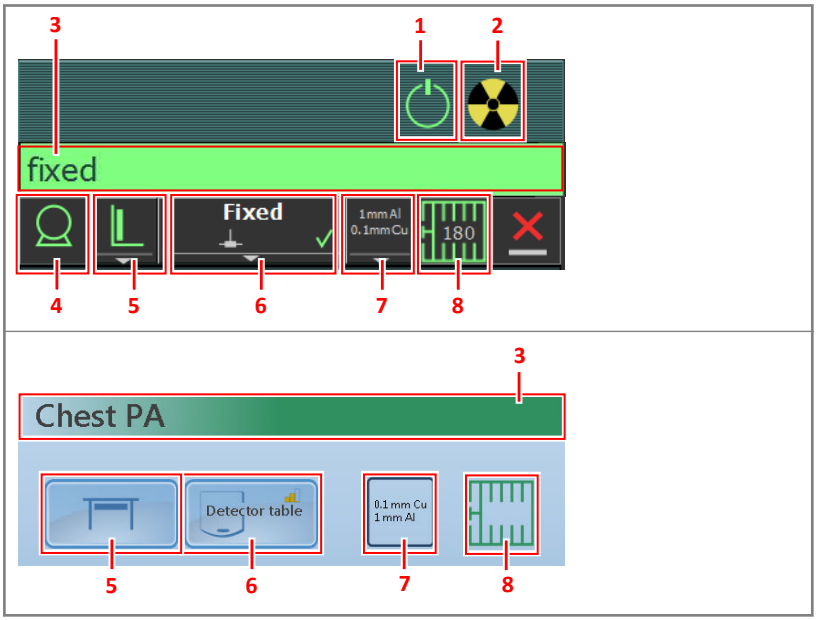


Figure 7: Device status frame

1. Preparation
2. X-Ray On
3. Ready for Exposure Status
4. X-Ray Tube
5. Modality Position
6. DR Detector Switch
7. Filter Status
8. Grid Status

Topics:

- *Preparation*
- *X-Ray On*
- *Ready For Exposure Status*
- *X-Ray Tube*
- *Modality Position*
- *DR Detector Switch*
- *Filter Status*

- *Grid Status*
- *Unknown status*

Preparation

Table 1: Preparation

Icon	Description
	The X-ray tube is prepared.
	The examination room door is open.

Press the handswitch halfway (“Prep” position) to prepare the X-ray tube for exposure. The indicator will light up when the X-ray tube is prepared and there are no interlock failures or system faults.

After pressing this push-button, the following functions are activated:

- Anode rotation.
- Filament current switches from stand-by to the selected mA.

X-Ray On

Figure 8: X-ray on

After pressing the handswitch completely, the X-ray exposure is made. The indicator on the console will light up.

Ready For Exposure Status

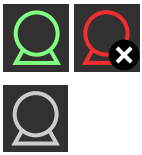
Table 2: Exposure ready

Color	Description
	Green Exposure ready. Indicates that the selected technique is properly set and there are no interlock failures or system faults.
	Red Exposure not ready. Check the message frame for more information. It is not possible to perform an exposure due to an error. The status will turn to green when problem is solved.
	Gray Exposure not ready. No examination defined.

X-Ray Tube

An icon indicates whether the X-ray system is ready for taking the exposure.

Table 3: Exposure ready

Icon	Description
	The color of the icon reflects the ready for exposure status.

If multiple tubes can be used, the number of the tube is displayed in the icon.

To select another tube, click the drop-down arrow and select the tube from the list.

Related Links

Ready For Exposure Status on page 29

Modality Position

The modality position is automatically selected, based on the selected exposure.

To modify the position on the modality where the exposure will be made, click the drop-down arrow and select the modality position from the list.

Table 4: Modality Position

Icon	Description
	The image is planned for the radiographic table.
	The image is planned for the radiographic wall stand.
	The image is planned as a free exposure.
	A manual X-ray exposure can be made. No image will be acquired on the NX workstation.

The type and configuration of the X-ray system defines which modality positions are available.

The available workstations depend on the modality type and configuration.

Status icon on Tube Head Display

Table 5: Icon on buttons and status indicators on the tube head display to show the status of the highlighted component

Icon	Description
	Error
	Warning

DR Detector Switch

The DR Detector Switch shows which DR Detector is active and shows its status. The DR Detector Switch can be used to activate another DR Detector. The DR Detector Switch can also be used to switch to CR for making an exposure on a cassette.

Topics:

DR Detector Status

Battery status icon				
Meaning	Full	Medium	Low	Empty

Connection status icon (wifi/ wired)				
Meaning	Good	Low	Bad	Wired DR Detector

DR detector status icon		 (blinking)			
Meaning	Ready	Initializing exposure	Error	Sleep	One DR detector must be selected

DR Detector Status on Tube Head Display

DR detector status icon				
Meaning	Ready	Initializing exposure	Error	One DR detector must be selected

DR Detector exposure synchronization

Automatic exposure detection icon		(empty)

Meaning	The active DR Detector is using automatic exposure detection	The active DR Detector is using X-ray generator synchronization

Note: Depending on the installed software version, the icon may not be displayed.

Filter Status

On systems with automatic filtering, the filter is automatically set, based on the selected exposure.

The filter setting can be modified on the software console or on the collimator.

- on the software console, click the filter status drop-down arrow and select the filter from the list.
- on the collimator, use the filter button

Table 6: Collimator with automatic filter

(no icon)	No filter is used.
	A filter is used. Material and thickness of the filter are specified.

Table 7: Collimator with manual filter

(no icon)	No filter is required.
	A filter is required. Insert the filter manually.

Grid Status

Table 8: Grid status - automatically detected

(no icon)	No grid is required.
	The correct grid type is inserted.
	The correct grid type is not inserted. A grid is inserted, but no grid is required. The SID does not correspond to the inserted grid.
	The grid is inserted wrongly.

The grid type is displayed inside the icon.

Table 9: Grid status - not automatically detected

(no icon)	No grid is required.
	A grid is required.

Unknown status

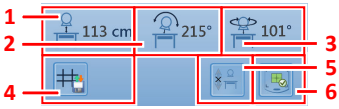
If a status is unknown, a question mark icon is displayed:

Figure 9: Unknown status

Depending on the component for which the unknown status is displayed, an action is required on the component or on the software to provide the system with the missing information.

E.g. to solve the unknown detector status, one DR detector must be selected.

Positioning Controls



1. Source image distance (SID)
2. Tube angle
3. Tube rotation
4. Collimator save and recall
5. Tracking
6. Automatic centering

Figure 10: Positioning controls

Topics:

- *Source image distance (SID)*
- *X-ray tube angle*
- *X-ray tube rotation*
- *Collimator Parameters*
- *Tracking the radiographic table*
- *Tracking the Radiographic Wall Stand*
- *Automatic Positioning*
- *Automatically centering the X-ray tube head unit*

Source image distance (SID)

The icon and reading of the SID depends on the position of the X-ray system.

Table 10: Source image distance (SID)

Icon	Value	X-ray system position
	reading of SID	using the bucky of the radiographic table
	reading of SID	using the bucky of the radiographic wall stand
(no icon)	(no value)	free exposure
 or 	--- cm	the X-ray tube is not pointing to the selected DR detector

Related Links

Tracking the radiographic table on page 42
Tracking the Radiographic Wall Stand on page 44

X-ray tube angle

The icon and reading of the X-ray tube angle depends on the position of the X-ray system.

Table 11: X-ray tube angle

Icon	Value	X-ray system position
	reading of tube angle	using the bucky of the radiographic table
	reading of tube angle	using the bucky of the radiographic wall stand
	reading of tube angle	free exposure

X-ray tube rotation

The icon and reading of the X-ray tube rotation depends on the position of the X-ray system.

Table 12: X-ray tube rotation

Icon	Value	X-ray system position
	reading of tube head rotation	using the bucky of the radiographic table
	reading of tube head rotation	using the bucky of the radiographic wall stand
	reading of tube head rotation	free exposure

Collimator Parameters

On systems with an automatic collimator, the collimation is automatically set, based on the selected exposure.

To use the same collimation setting on different exposures, push the store button on the first exposure and push the restore button on all later exposures that require the same collimation setting.

Table 13: Modality Position

Icon	Description
	Activate the collimator controls on the tube head display
	store the current collimation setting
	restore the last saved collimation setting
	no collimation setting is stored

Tracking the radiographic table

The **position tracking** button on the main screen of the tube head display indicates if tracking can be performed.

Table 14: Tracking status

	Tracking can be performed but is not activated.
	Tracking cannot be performed. Make sure that the X-ray tube is pointing to the detector and that the distance between the tube head unit and the tabletop is higher than 50 cm and that the tube head unit is not in a collision zone.

Tracking synchronizes the movement of two components:

- Adjusting the table height drives the X-ray tube height. The SID is kept constant.
- Adjusting the position of the table bucky drives the X-ray tube longitudinal position.
- Adjusting the longitudinal position of the X-ray tube drives the position of the table bucky.
- Adjusting the alpha rotation of the tube head unit drives the position of the table bucky.

To enable tracking:

1. On the tube head display, press the **position tracking** button.

   Table 15: Tracking status

	Tracking is activated.

2. Adjust the table height, the position of the table bucky, the longitudinal position of the X-ray tube or the alpha rotation of the tube head unit. The corresponding component (X-ray tube or table bucky) is moving accordingly.

Note: The movement of the X-ray tube stand has a small delay compared to the movement of the table. The movement of the X-ray tube is automatically stopped if the distance between the X-ray tube head and the table would become too small (SID lower than 45 cm).

Related Links

Emergency stop button on page 70

Tracking the Radiographic Wall Stand

The **position tracking** button on the main screen of the tube head display indicates if tracking can be performed.

Table 16: Tracking status

	Tracking can be performed but is not activated.
	Tracking cannot be performed. Make sure that the distance between the tube head unit and the tabletop is higher than 15 cm and that the tube head unit is not in a collision zone.

Tracking synchronizes the movement of two components, without changing the SID:

On a configuration with radiographic wall stand with motorization:

- Adjusting the wall stand bucky height drives the X-ray tube height.
- Adjusting the height of the X-ray tube drives the height of the wall stand bucky.
- Adjusting the alpha rotation of the X-ray tube head drives the wall stand bucky height.

On a configuration with radiographic wall stand without motorization:

- Adjusting the wall stand bucky height drives the X-ray tube height.

To enable tracking:

1. On the tube head display, press the **position tracking** button.

WARNING:
Do not use position tracking on the wall stand while the patient is lying on the table.

Table 17: Tracking status

	Tracking is activated.

2. Adjust the wall stand bucky height, the height of the X-ray tube or the alpha rotation of the X-ray tube head.
   The corresponding component (X-ray tube or wall stand bucky) is moving accordingly.

Note: The movement of the X-ray tube is automatically stopped if the distance between the X-ray tube head and the table top would become too small (less than 10 cm).

Related Links

Emergency stop button on page 70

Automatic Positioning

WARNING:
Collision with objects within the movement area of the system. Do not activate automatic movement if extraneous objects are in the allowed movement area of the system.

Each exposure has a default automatic position configured in the workstation.

The default X-Ray system position for the selected exposure is sent to the modality and displayed on the software console and on the tube head display, for automatic positioning of the X-Ray system.

The symbol in the **Positioner** button indicates the selected modality position. To view the detailed position values, click the **Positioner** button.

Table 18: Example symbols indicating the selected modality position

Symbol	Modality position
	Table
	Wall stand
	Free exposure
	Parking position
	Cleaning position
	No position selected

Up to 30 auto-positions per modality type (table, wall stand, free) can be configured.

Related Links

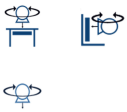
Positioner Operation Controls on page 13

Topics:

- *Moving the system to cleaning position*

Automatic Position Parameters

Table 19: Automatic Position Parameters

Icon on tube head display	Label on software console	Description
	SID	Source Image Distance Distance to the detector in the bucky of the radiographic table or the radiographic wall stand
	Tube Alpha angle	X-ray tube angle (alpha) Windmill movement
	Tube Beta angle	X-ray tube rotation (beta) Carousel movement
	Bucky position	Horizontal position of the bucky at the radiographic table
	Bucky height	Vertical position of the bucky at the radiographic wall stand
	Detector angle	Tilting angle of the bucky at the radiographic wall stand

Moving to an Automatic Position

The default X-Ray system position for the selected exposure is sent to the modality and displayed on the software console and on the tube head display, for automatic positioning of the X-Ray system.

To move to the predefined position:

Press and hold the **automatic positioning** button.

The status of the automatic positioning is displayed on the Software Console and in the position screen of the tube head display:

Table 20: Positioning status

	Movement is active. The icon is displayed as long as user presses and holds the **automatic positioning** button.
	The target position is reached successfully.
	The target position is not reached due to failure or when the user releases the **automatic positioning** button early.

A short double beep indicates that position is reached.

Selecting an automatic position

The automatic positions are configured by the service engineer and cannot be changed by the user.

The user can modify the X-Ray system position for the selected exposure by selecting another predefined automatic position for the current active modality.

To select another predefined automatic position:

1. Set the correct modality position.
2. Display the position screen.
   - On the Software Console, select the **Positioning** tab.
   - On the main screen of the tube head display, click the **Positioner** button.
3. Click the up or down arrow next to the illustration of selected position until the correct position is displayed.

Figure 11: Software Console

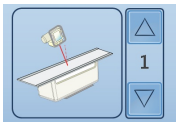


Figure 12: Tube head display

The system can be moved to the selected automatic position.

Moving the system to parking position

The parking position is defined during installation and cannot be changed by the user.

The parking position is intended as a position where the system can remain for longer time, e.g. over night, when it is switched off. Typically the tube head unit is moved towards a corner or over the radiographic table and the wall stand bucky is moved to vertical position so they are out of the way for other activities.

The parking position can be selected on tube head display only and applied without involvement of the NX workstation.

To move system to parking position:

1. Display the position screen.
   On the main screen of the tube head display, click the **Positioner** button.
2. Press parking button.
   .
   

   The parking position settings are loaded.
3. Press and hold the **automatic positioning** button.

A short double beep indicates that position is reached.

Moving the system to cleaning position

The cleaning position is defined during installation and cannot be changed by the user.

The cleaning position is intended as a position the system allows best access to all components for cleaning purposes. Typically the tube head unit is moved in middle of the room so user can access them easily from all sides for cleaning. The radiographic table and the wall stand are typically moved to a mid position.

The cleaning position can be selected on tube head display only and applied without involvement of the NX workstation.

To move system to cleaning position:

1. Display the position screen.
   On the main screen of the tube head display, click the **Positioner** button.
2. Press cleaning button.

The cleaning position settings are loaded.

3. Press and hold the **automatic positioning** button.

A short double beep indicates that position is reached.

Automatically centering the X-ray tube head unit

The **automatic centering** button on the main screen of the tube head display indicates if automatic centering can be performed.

Table 21: Automatic centering status

	Automatic centering can be performed, but is not activated.
	Automatic centering cannot be performed. Make sure that the X-ray tube is pointing to the detector and that it is within a range of 50 cm from its center position.

1. Press the **automatic centering** button on the main screen of the tube head display.
2. Press and hold the **automatic positioning** button.

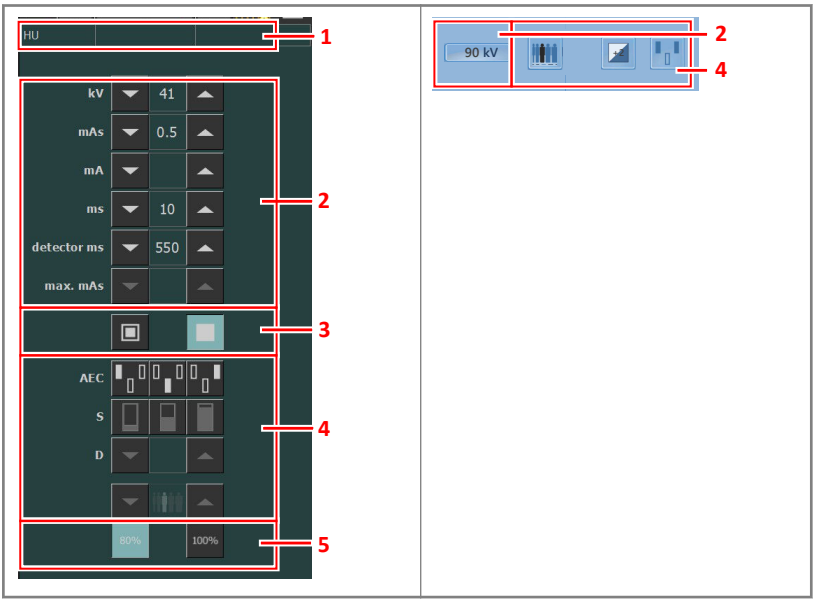
   The status of the automatic centering is displayed on the main screen of the tube head display:

Table 22: Automatic centering status

	Automatic centering is active. Center position is not reached. The **automatic positioning** button can be pressed.
	Center position is reached.

A short double beep indicates that position is reached.

Generator Controls



1. Heat units and DAP value
2. Radiographic parameters
3. Focal spot indicator
4. AEC buttons
5. X-ray tube load

Figure 13: Operation controls

To change a value, use the UP and DOWN arrows. On the tube head display, touch the button to display the arrows. The values increase or decrease step by step each time the corresponding button is touched, and change faster when either of them is touched continuously. On the tube head display, touch elsewhere to hide the arrows.

Figure 14: UP and DOWN arrows on tube head display

Topics:

- *Radiographic Parameters*
- *Focal Spot Indicator*

- *X-Ray Tube Load*
- *Automatic Exposure Control (AEC)*
- *DAP Value*
- *Heat Units*

Radiographic Parameters

You can set up following radiographic parameters:

- **kV**: shows the radiographic kV value (X-ray tube voltage) selected for the exposure.
- **mAs** can show:
  - The radiographic mAs value selected for the exposure.
  - When an exposure is made, it shows the actual mAs at the end of the exposure.
- **mA**: shows the radiographic mA value (current) selected for the exposure.
- **ms** can show:
  - The time value (in milliseconds) selected for the exposure.
  - When an exposure is made, it shows the actual time at the end of the exposure.
- **Detector ms** shows the integration time of the DR detector. When operating the DR detector, the calculated exposure time (ms) or manual overrides can never exceed the integration time (detector ms) of the DR detector.
- **Max mAs** shows the maximum allowed mAs value for exposures using AEC. The highest allowed setting for max mAs depends on the mA setting and the detector ms setting. Not available in Free Exposure mode using DR or Free Exposure mode using CR.

When using AEC, the exposure is terminated by the detector ms or max mAs settings, even if the target dose is not reached.

Related Links

Radiographic Parameter Limits on page 67
One Point Mode (1P) on page 63
Two Point Mode (2P) on page 64
Three Point Mode (3P) on page 65

Focal Spot Indicator

A focal spot indicator shows the selected focal spot of the X-ray tube: “Small” or “Large”.

Table 23: Focal Spot Indicator

	Small
	Large

You can change the focal spot by touching this indicator. It keeps kV and constant mAs, whenever it is possible. The mA value available is set according to maximum power, instantaneous power, space charge, etc.

When a focal spot is selected, it sets the highest mA value available for the selected focal spot and the respective exposure time in order to keep constant mAs, whenever the mA value does not exceed the maximum tube power and the exposure time value does not exceed the maximum integration time of the DR detector or the maximum exposure time of the generator.

X-Ray Tube Load

80%	As a way to increase the tube life cycle, the power percentage of the tube is reduced to a 80% by default.
100%	If a specific technique requires 100% of the X-ray tube power, touch the 100% button.

Depending on the status of the heat units, the system may limit the X-ray tube load, even when the X-ray tube load is set to 100%.

Automatic Exposure Control (AEC)

Automatic Exposure Control (AEC) produces consistent detector dose regardless of the radiographic technique selected and of the patient size. The AEC module comprises the controls for the selection of the exposure detector fields (ion chamber), S-value and density compensation.

To activate AEC mode, touch any of the three AEC field buttons.

To deactivate AEC mode, touch all the selected AEC field buttons until none of them is selected.

Related Links

One Point Mode (1P) on page 63

Topics:

Field Selection

Each button indicates its related physical location of the selected field in the AEC exposure detector, and you may select or deselect it by touching it.

Any combination of fields can be selected and the color of the buttons changes (highlighted) when active. The exposure is ended if any of the selected fields measures the AEC cut-off dose.

Table 24: Automatic filter

	Left field
	Middle field
	Right field

S-value

Each of these buttons allows adjustment of the AEC cut-off dose (low dose, middle dose and high dose: depending on configuration at installation time). Each time a button is selected (highlighted), the others are automatically deselected.

Table 25: Automatic filter

S	
	low dose
	middle dose
	high dose

Density

These buttons are used to adjust the AEC cut-off dose (and patient entrance dose accordingly).

Density can be increased and decreased in a range of -4 to +4. Each step is a change of one exposure step. An exposure step is a change of approximately -20% or +25% in dose. When disabled, the density range number appears in black.

Table 26: Dose variation compared to reference dose

 (D)	Dose
-4	0.41
-3	0.51
-2	0.64
-1	0.80
0	1 (reference dose)
+1	1.25
+2	1.56
+3	1.95
+4	2.44

Patient Size

The size of the patient is classified in five categories: Extra Small, Small, Medium, Large and Extra Large.

Touch the UP or DOWN arrows to select the desired patient size.

Table 27: kV variation over patient size

	Patient size	kV
	Extra Small	normal kV * 0.9
	Small	normal kV * 0.95
	Medium	normal kV
	Large	normal kV * 1.05
	Extra Large	normal kV * 1.1

AEC dose failure

The AEC dose failure safety device terminates the X-ray exposure when no radiation is detected in the ion chamber or when the selected parameters (short backup time/mAs) are not appropriate for an exposure with AEC.

DAP Value

The DAP value shows the radiation value of the last exposure. The radiation measure is read as DAP value (Dose Area Product) in cGy*cm^2 (for example: DAP 12.22).

A new exposure resets the DAP value.

Heat Units

The status of the heat units is displayed below the X-ray icon.

During exposures, the heat units are calculated and totalled. The heat units display shows the percentage of the thermal capacity of the X-ray tube that is used. For example, a display of “HU 0” would indicate that all the heat units capacity of the X-ray tube remains. A display of "HU 100" would indicate that maximum heat capacity of the X-ray tube is reached and no exposures can be made until the tube has cooled down.

Radiographic Working Modes

You can select following radiographic working modes according to the parameters to be controlled and the degree of automation:

- One Point Mode (1P), by selecting kV. The exposure is controlled by AEC.
- Two Point Mode (2P), by selecting kV and mAs. AEC is disabled.
- Three Point Mode (3P), by selecting kV, mA and exposure time independently. AEC is disabled.

Topics:

One Point Mode (1P)

By selecting one of the AEC field buttons, the one point mode is activated.

The value of kV, mA, max ms, max mAs, the setting of focal spot, density, S-value, patient size and the selected AEC fields can be adjusted.

The value for mAs and ms is not available.

For accurate AEC operation it may be needed to lower the mA value in order to obtain longer exposure times. The smallest exposure step is 1 ms.

Disabling all AEC fields will switch to two point mode.

After exposure all values reflect the settings actually used by the generator.

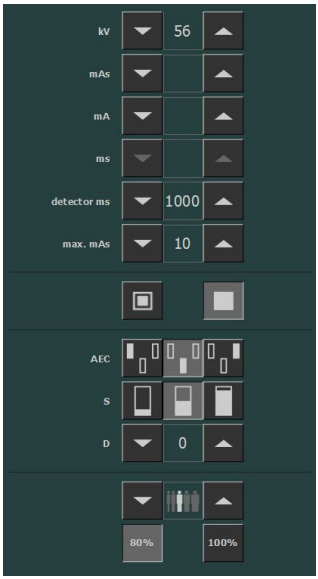


Figure 15: 1P working mode

Related Links

Automatic Exposure Control (AEC) on page 57

One Point Mode on Tube Head Display

Figure 16: 1P working mode

Two Point Mode (2P)

The value of kV, mAs, max ms, the setting of focal spot and X-ray tube load can be adjusted.

The value of mA and ms are adjusted automatically to keep the mAs value constant, within the boundaries of generator or X-ray tube limitations.

The setting of density, S-value and patient size is not available.

By selecting one of the AEC field buttons, the one point mode is activated.

By adjusting the value of mA or ms, the three point mode is activated.

After exposure all values reflect the settings actually used by the generator.

Figure 17: 2P working mode

Related Links

Radiographic Parameters on page 54

Two Point Mode and Three Point Mode on Tube Head Display

Figure 18: 2P and 3P working mode

Three Point Mode (3P)

The value of kV, mA and ms can be adjusted. The other values are adjusted automatically to keep the mAs value constant.

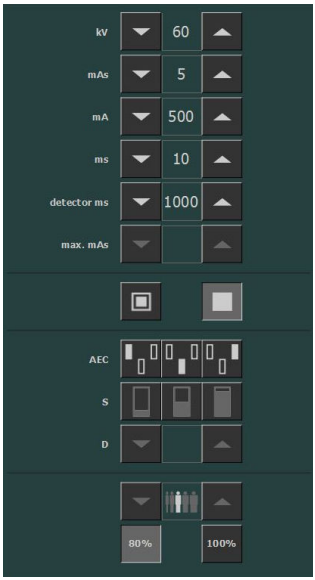


Figure 19: 3P working mode

Two Point Mode and Three Point Mode on Tube Head Display

Figure 20: 2P and 3P working mode

Problem solving

Topics:

Radiographic Parameter Limits

Switching between small focus and large focus may have a delay of a few seconds to enable the filament to warm up before switching.

The settings of kV and mAs or of mA and ms are defined by an algorithm. The highest mA setting is used for which the kV can be reached by the system and the exposure time is not lower than 1 ms or the mAs value is not lower than 0.5 mAs. When the kV setting is changed, the value of mA and ms are adjusted automatically to keep the mAs value constant, within the boundaries of generator or X-ray tube limitations.

If the radiographic parameters limits are reached, a value of a radiographic parameter cannot be increased or decreased, or another value can be automatically adjusted:

- **Radiographic Parameters Limit**. A maximum or minimum radiographic parameter limit is reached. The value cannot be increased or decreased.
- **Generator Power Limit**. The generator power limit (kV x mA) is reached. The value of the selected parameter cannot be increased. When increasing the value of the other parameter, the value of the first parameter will automatically be decreased to keep the mAs value constant.
- **Space Charge**. The space charge limit in the selected X-ray tube is reached by changing the kV or mA values. An information message is displayed.
- **Instantaneous Power**. The instantaneous power limit of the X-ray tube (ratings limit or the X-ray tube is momentarily overheated) is reached by selecting some technique. An information message is displayed.

Tube head display shows only Agfa logo

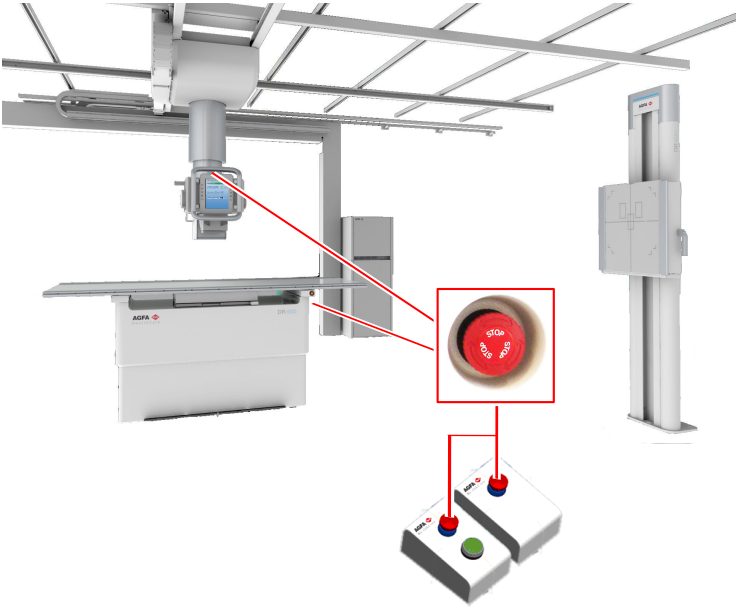
Details	The tube head display shows only the Agfa logo. 
Cause	The tube head display has no connection to the NX workstation.
Brief Solution	Restart the NX workstation.

Tube head display shows screen to check network connection

Details	The tube head display shows only the following screen. 
Cause	The tube head display does not detect a network connection.
Brief Solution	Check on the NX workstation if all network cables are plugged in.

Emergency stop button

If a system malfunction causes an emergency situation involving the patient, operating personnel or any system component, activate the emergency stop button.



- On the front side of the radiographic table
- On the top side of the X-ray tube cover
- Close to the radiographic wall stand
- In the operator room

Figure 21: Multiple emergency stop buttons are available on the system

All motor driven movements will be stopped. Motor driven movements:

- Radiographic table
- Radiographic wall stand
- Ceiling suspension

To allow motorized movements again, turn the cap of the emergency switch in clockwise direction (default position) and restart the system using the X-ray generator mini console.

CAUTION:
The emergency stop button does not switch off the voltage in the X-ray system.

Emergency shutdown power switch

Use the emergency shutdown power switch, if a dangerous situation cannot be eliminated by pressing the emergency stop button.

WARNING:
Use the emergency shutdown power switch in case of danger to patients, operators, third parties, or one of the units. The entire system will be shut down and the power supply will be disconnected.

The emergency shutdown power switch for the room is typically located on the wall and easy to access, often close to the power off switch of the X-ray system. It is installed and labeled by customer.

WARNING:
It must be ensured that the emergency switches are always freely accessible.