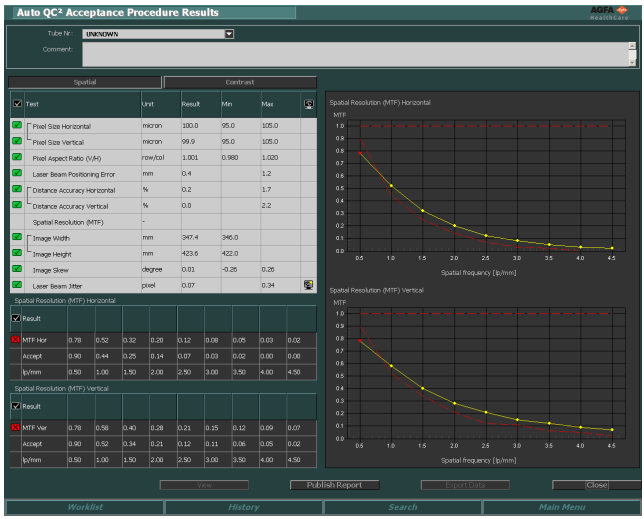
Auto QC²

User Manual



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Contents

Legal Notice

Agfa NV, Septestraat 27, B-2640 Mortsel - Belgium

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Introduction to this Manual

Topics:

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

Topics:

Intended Use

Auto QC² is used for acceptance procedures and quality control tests of medical CR systems, especially Agfa Digitizers and plates. Auto QC² will be used in:

- The production of CR systems.
- Acceptance procedures of new installations.
- Quality control procedures performed by the customers.

Table 1: Intended use of Auto QC².

Category	Description
Device Type	Quality Control Device.
Role of the Device	Quality Control.
Environment of use	• In X-ray rooms. • Outside X-ray rooms. • Private radiologist sites. • Clinics. • Imaging centers. • Emergency rooms. • Intensive care sites. • Mobile environments.
Medical area	• General Radiology (GenRad). • Pediatrics. • Uro/Tomo. • Dental. • Radiotherapy (only for acceptance procedures by Agfa Service personnel).

Intended User

Performing Auto QC² examinations mainly needs two competences in the hospital test area:

- Using all the Auto QC² hardware components (positioning template, phantom, filter module, Light Field Indicator target), setting up the test installations and performing the test exposures.
- Interpreting and analyzing the results using Auto QC² software and take corrective actions if necessary.

It is the responsibility of the hospital management to assign these competences to the most appropriate persons.

In general following users can be expected:

- In the medical environment: hospital physicists, imaging specialists, radiographers or service engineers performing acceptance tests and quality control tests.

Training

The user must have received adequate training on the safe and effective use of Auto QC² before attempting to work with it. Training requirements may vary from country to country. User must make sure that training is received in accordance with local laws or regulations that have the force of law. Your local Agfa representative can provide further information on training.

The user must note the following information in the preliminary section of this manual:

Related Links

Intended Use on page 9

Intended User on page 10

Safety Directions on page 22

Features

Auto QC² is developed as a tool to check quality aspects related to the radiology practice.

The concepts used for quality control with Auto QC² are defined using the AAPM Report of Task Group 10 (Acceptance Testing and Quality Control for photostimulable storage phosphor imaging systems) as a guideline.

In this perspective, Auto QC² has the following features:

- One phantom is used for spatial and contrast tests.
- Auto QC² Software offers an easy user interface, enabling the user to perform the steps and to interpret and analyze the results.
- Auto QC² generates test results with acceptance levels.
- Auto QC² generates a report of the test results.
- Auto QC² offers search and history functions.

Compatibility

- Compatibility with Agfa equipment:

Table 2: Compatibility with Agfa equipment.

Equipment	Type
Digitizers:	Auto QC² is compatible with the following Digitizers. • ADC COMPACT • ADC COMPACT PLUS V1.1 • ADC COMPACT PLUS • CR 25 • DX-S • CR 75 • CR 85 • CR 30 • CR 35 • CR 55 • CR 55 ASAP • DX-G • DX-G ASAP • CR 30 • DX-M • DX-M ASAP • CR30-X • CR30-Xm • CR10-X • CR12-X • CR15-X • CR15-X-CROP • Fast ID is not supported for the DICOM Digitizers (ADC Solo, ADC Compact, ADC Compact Plus, CR 25, CR 35-X, CR 75, CR 85-X, DX-G and DX-M) for scanning the cassettes with quality control exposures, as high resolution images are required for quality control procedures. • Fast ID for identifying the cassettes is supported for the DX-S and CR 30-X Digitizer, in the sense that for these digitizer types this is the only way to identify cassettes without ID Tablet.

Equipment	Type
	• DX-S does not support to be connected to a Windows 10 pc, but the images can be sent from the DX-S pc to Auto QC² running on a standalone Windows 10 pc.
Cassette sizes:	• 15x30 cm. • 18x 24 cm. • 8x10 inch. • 24x30 cm. • 10x12 inch. • 35x43 cm (PQC/ATP/LFI). • 35x35 cm.
Plate types:	• ADC MD 10. • CR MD 30. • CR MD 40. • CR MD 4.0. • CR MD 4.0R. • CR HD 5.0. • CR MD1.0 General • CR HD5.0S General

- Software compatibility:

Table 3: Compatibility with Agfa equipment.

Equipment	Type
Browser requirements:	• Internet Explorer version 5.0 or higher.
Operating Systems:	Auto QC² version 1.00: • Windows XP Home SP2. • Windows XP Professional SP2. • Windows Vista SP1 - 32 bit. • Windows 7 - 32 bit. Auto QC² version 2.00: • Windows 10 - 64 bit. • Older versions of Windows are not supported.
Microsoft Excel:	• Excel 2000 or higher.

- Hardware compatibility:

Table 4: Supported hardware.

Item	Type
Processors:	Only support for the following Windows XP 32-bit Intel processors: • Intel: Pentium 4 (or higher) • AMD: Athlon 64 (or higher)
Supported screen resolutions:	Auto QC² Software will support the following resolutions: • minimum 1280 x 768 pixels. The recommended Windows display DPI setting is 96. Auto QC² Software will not start when the screen resolution does not meet the specifications. The system will show an error message and stops the initialization of the Auto QC² Software.
Supported color quality:	The graphic board must support 32 bits colors.

- X-ray tube collimator compatibility

Check if external DAP with rail is present. Check if it can carry the weight of the filter module (+/- 2.5 kg)

Note:

Changes or additions to the equipment must only be carried out by persons authorized to do so by Agfa. Such changes must comply with best engineering practice and all applicable laws and regulations that have the force of law within the jurisdiction of the hospital.

Compliance

Auto QC² has been designed in accordance with the MEDDEV Guidelines relating to the application of Medical Devices and has been tested as part of the conformity assessment procedures required by 93/42/EEC MDD (European Council Directive 93/42/EEC on Medical Devices).

This Agfa product has been designed in accordance with the IEC 60601-1, Ed. 3: Medical electrical equipment - Part 1: General requirements for basic safety and essential performance.

Auto QC² is compliant with the IEC 61267 standard for Medical Diagnostic X-Ray Equipment and Radiation conditions for use in the determination of characteristics.

The concepts used for quality control with Auto QC² are defined using the AAPM Report of Task Group 10 (Acceptance Testing and Quality Control for photostimulable storage phosphor imaging systems) as a guideline.

Connectivity

The Auto QC² workstation requires a 100 Mbit ethernet network to exchange information with a number of other devices. Auto QC² is provided with a mechanism to prevent data loss on network failure.

Auto QC² communicates with other devices in the hospital network using the DICOM protocol with the following SOP Class:

- DICOM

Table 5: DICOM mapping table.

SOP Class	SCU/SCP
Digital X-Ray Image Storage – For Processing	SCU / SCP

Installation

Installing Auto QC² Software is done by Agfa Service.

The availability of the Auto QC² software depends on the license dongle to be connected to the PC. Agfa advizes not to remove the dongle, even if the Auto QC² software is not being used, because this will consume the “license grace period”. The grace period is a limited period of time during which you can continue working if the dongle is accidentaly removed or lost.

To remove the dongle without consuming this license grace period, open the License Manager tool (Start > Agfa > Service > License Manager) and click “Disable grace functionality”. This may be useful if Auto QC² is installed on a laptop, used for other purposes. To use Auto QC², the dongle must be plugged in. If the dongle gets broken or lost, the licenses will be immediately blocked and you must open the License Manager tool and click “Enable grace functionality” to continue working for a limited period of time, during which the dongle can be replaced.

Product Complaints

Any health care professional (for example a customer or a user) who has any complaints or has experienced any dissatisfaction with the quality, durability, reliability, safety, effectiveness, or performance of this product must notify Agfa.

If the device malfunctions and may have caused or contributed to a serious injury, Agfa must be notified immediately by telephone, fax or written correspondence to the following address:

Agfa Service Support - local support addresses and phone numbers are listed on www.agfa.com

Agfa - Septestraat 27, 2640 Mortsel, Belgium

Agfa - Fax +32 3 444 7094

Messages

Under certain conditions Auto QC² Software will show a dialog box in the middle of the screen containing a message. This message will tell that either a problem has occurred or that a requested action cannot be performed.

The user must read these messages carefully. It will provide information on what to do from then on. This will be either performing an action to resolve the problem or to contact the Agfa service organization.

Related Documentation

- Auto QC² Key user manual (2376).
- Auto QC² Workflow Sheets (2374).
- Auto QC² Troubleshooting Guide (2375).

Safety Directions

WARNING:

The user must strictly observe all warnings, cautions, notes and safety markings within this document.

Safety is only guaranteed when trained Agfa personnel have installed Auto QC².

All Agfa medical products must be used by trained and qualified professionals.

The user must follow the hospital quality assurance procedures for covering the risks resulting from errors in the image processing.

CAUTION:

Do not position the Auto QC² workstation so that it is difficult to disconnect the mains power connection.

Only trained personnel may carry out changes, additions or maintenance to the equipment.

Do not use unapproved spare parts.

Note:

Every reasonable precaution has been taken during the manufacturing of Auto QC² to safeguard the health and safety of persons who will operate this system. Cautions, warnings and notes must be observed at all times.

Auto QC² Hardware Components

This section describes the components which are part of the Auto QC² package and which are required at sites where Auto QC² test procedures will be performed. All components are stored in the Auto QC² suitcase.

Topics:

Filter Module and Filters

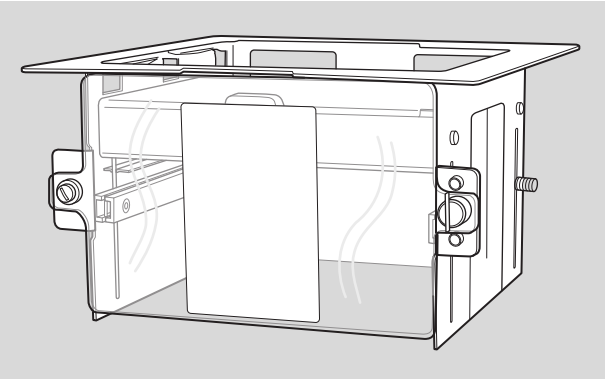
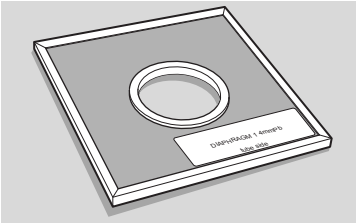


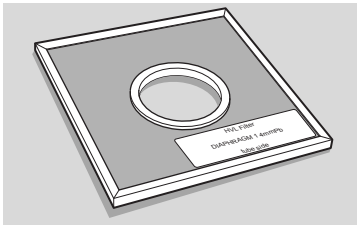
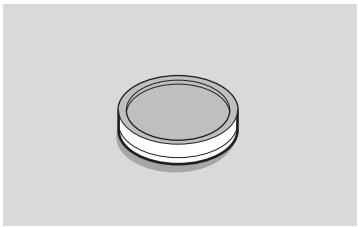
Figure 1: The Auto QC² filter module.

The filter module is the module in which the different filters can be inserted. The module itself is attached to the X-Ray tube.

The following elements can be inserted in the module. You will find them listed in the table below along with a technical and functional description.

Table 6: Description of the Auto QC² filter module components.

Component name	Technical specification	Functional specification
Diaphragm 1 & 2:  **Figure 2: Diaphragm 1.**	Lead with thickness of 4 mm and circular hole of 48 mm.	Focussing of the X-Ray beam

Component name	Technical specification	Functional specification
 **Figure 3: Diaphragm 2.**		
RQA5 filter:	21 mm aluminum filter. Fixed in the filter module, protected with thin film (to avoid scratches when mounting the HVL filter).	Used for the tube validation prescribed and specified by the IEC 61267 standard to maintain radiation quality.
HVL filter:  **Figure 4: HVL filter.**	Round, separately delivered filter	Used in the procedure to calculate the half value kV for HVL.

WARNING:

The filter module must be attached by pushing the edges of the filter in the accessory rails of the collimator. If the module is attached in another way it may fall and hurt the user or damage other equipment due to its weight.

Note:

The filter module is designed in such way that the size (176mm x 168.5 mm x 96 mm) fits with 80% of all collimators available in the market.

To attach the filter module to the collimator:

Push the filter module with the fixed RQA5 filter in the accessory rails of the collimator.

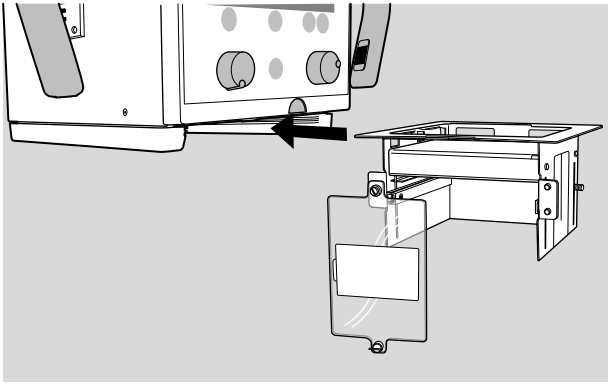


Figure 5: Pushing the filter module in the accessory rails of the collimator.

Note:

The filter module can be inserted in the rails with the front of the module in all possible directions.

Positioning Template

1. Red dot.
2. Positioning template orientation label.
3. Dosimeter position reference.
4. Arrows and lines.
5. Holes for the metal pins.
6. Phantom holders
7. Dots for light field indicator target

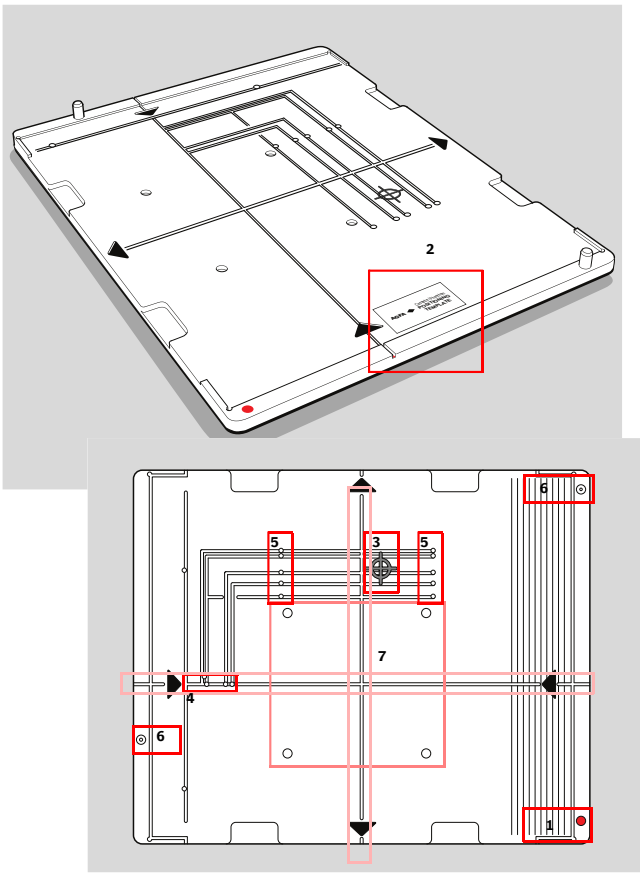
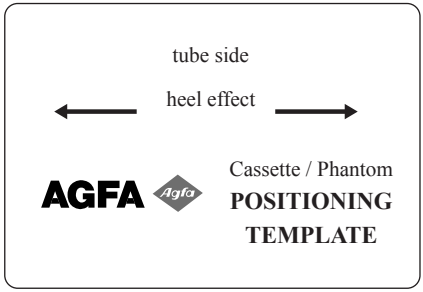


Figure 6: The Auto QC² positioning template.

The positioning template is used to position cassettes on the modality table.

Table 7: Functional description of the positioning template.

Elements	Functional description
Red dot (1).	Used for positioning the positioning template. The red dot must be situated under the anode side. When the anode is on the left side, the red dot must be at the lower left hand side. When the anode is on the right side, the red dot must be at the upper right hand side.
Positioning template orientation label (2)	This label shows the orientation towards the Heel effect.  **Figure 7: Detail of the label.**
Dosimeter position reference (3)	This is the point where the dosimeter is placed for the determination of the exposure settings. So the dosimeter position reference is used for measuring X-Ray doses.
Arrows and lines (4)	These are used to align the positioning template together with the collimator light lines in the longitudinal and transverse side.
Holes to position the metal pins (5)	These are used to position different cassette sizes. Enter metal pins and push the cassette so that the left and bottom side touch the metal pins.
2 phantom holders (6)	Used to position the phantom firmly on the positioning template in combination with the phantom cuttings.
4 central round cuttings (7)	Is the holder for the light field indicator target when you store the phantom with the light field indicator in the flight case.

1. Position the positioning template.
   a) Switch on the collimator light.
   b) Position the template on the table according to the following specifications:

- The red dot must be situated under the anode side. When the anode is on the left side, the red dot must be at the lower left hand side. When the anode is on the right side, the red dot must be at the upper right hand side. In most situations the anode will be at the left hand side, the cathode right.
- Make sure the light lines match the according lines and arrows on the positioning template.

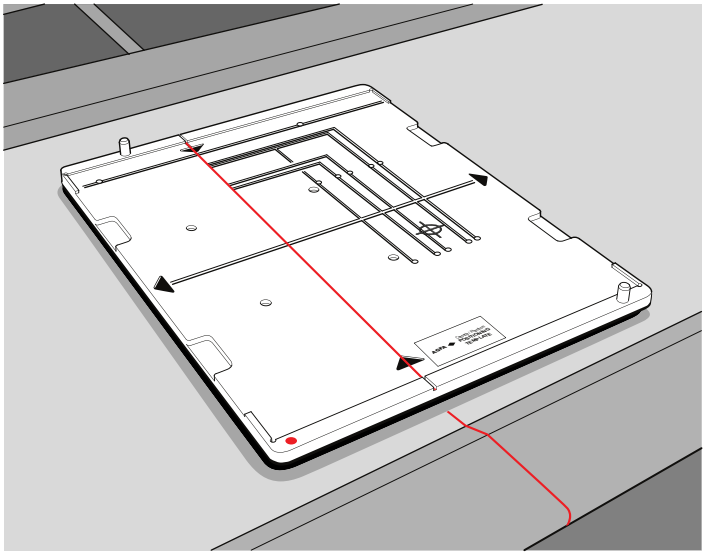


Figure 8: Position the positioning template.

c) As the positioning lines are asymmetrical, align your light field so that on the cathode side the light touches the end of the arrow and the complete positioning template is covered. On the anode side the light field will exceed the positioning template.

d) Make sure that the Heel effect is perpendicular with the longest side of the positioning template.

2. Position the cassette on the positioning template.

a) Put the cassette on the template as shown below:

1. The scribor or the label of the detector / cassette must be at the bottom left.
2. For other types of cassettes (MD10, MD 4.0,...), the label of the cassette must be at the bottom left.
3. If you use small cassettes: the cassette must be pushed against the metal pins in the positioning template.

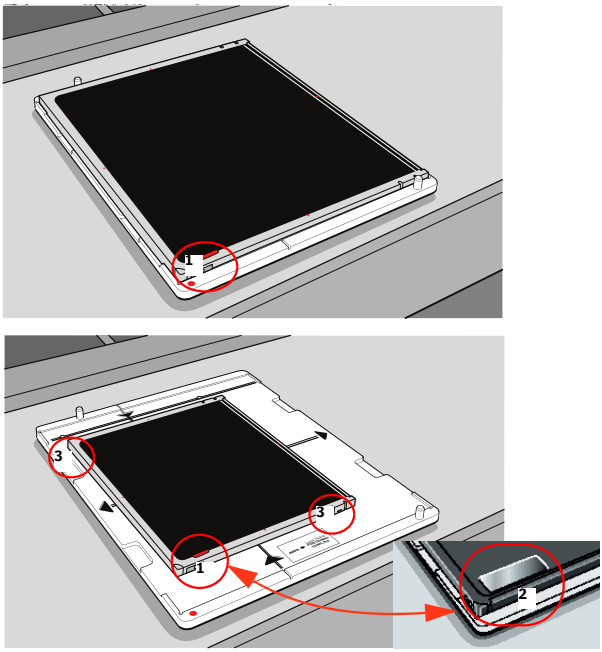


Figure 9: Putting the Cassette on the positioning template.

Test Phantom

1. Positioning template orientation label.
2. Red dot.

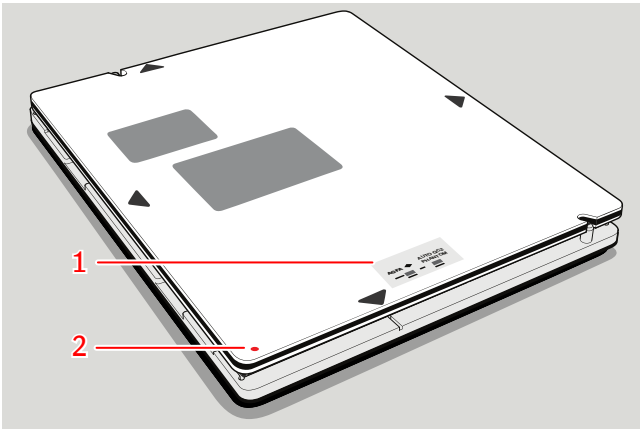


Figure 10: The Auto QC² test phantom.

The phantom is used for the test exposures PHAP and PHQC. Materials and elements in the phantom influence exposure result on the cassette. These results are used to perform calculations on quality and continuity of the X-Ray equipment and the Digitizer.

Find below a functional and technical description of the phantom:

1. Step wedge.
2. Copper plate.
3. MTF Edge targets.
4. Horizontal ruler.
5. Vertical ruler.
6. ID Data.
7. Jitter Slits.
8. Pixel Size Square.

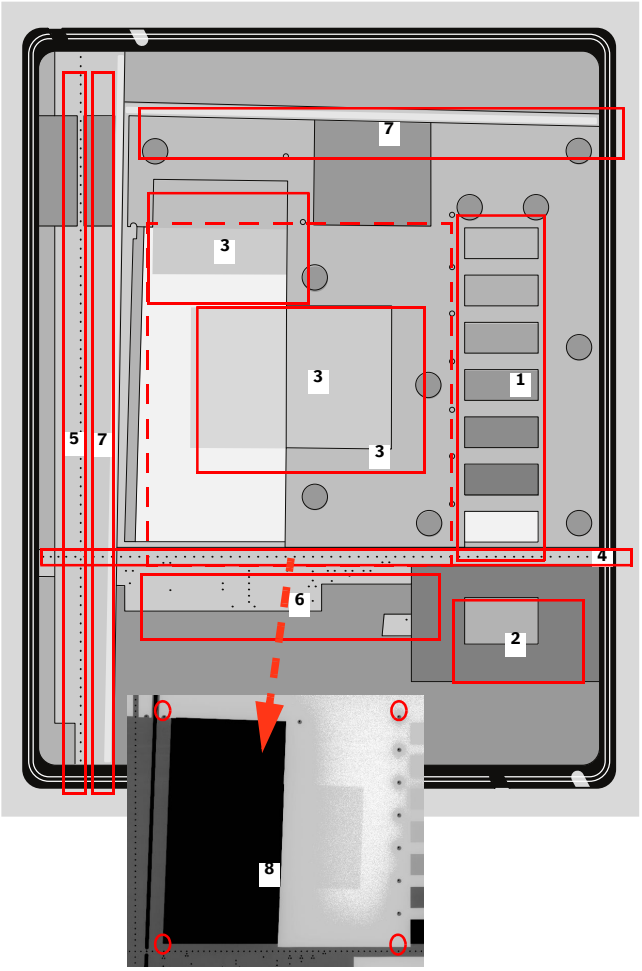


Figure 11: The inside of the phantom.

Table 8: Description of the Auto QC² phantom.

Part of the phantom	Material	Function
Step wedge (1)	Hafnium	Used for contrast behavior calculations. If the positioning of the positioning template and the phantom is correct, the step

Part of the phantom	Material	Function
		wedge will be situated under the cathode side.
Copper plate (2)	Copper	Used for the Radiation Quality test.
MTF Edge targets (3)	Tungsten	Used for the Spatial Resolution test.
Horizontal ruler with holes and squares (4)	Ruler with synthetic parts CNC precision holes in thin lead layer Squares	Used for spatial check.
Vertical ruler with holes and squares (5)	Ruler with synthetic parts CNC precision holes in thin lead layer Squares	Used for spatial check.
ID Data (6)		The pattern of holes uniquely identifies the phantom.
Jitter Slits (7)		Used for the tests Laser Beam Jitter, Overshoots/Ringing and Scan-Line Dropouts which are part of the Periodic Quality Control.
Pixel Size Square (8)		Used for determining the horizontal and vertical pixel size and the image skew.

Refer to the Workflow Sheets for more information.

To position the phantom:

1. Check if the positioning template is well positioned.
2. Put the cassette on the positioning template.

3. Check the orientation of the phantom: the Heel effect side (indicated by the label on the cover of the phantom) must be on top of the label on the positioning template. The red dot of the phantom must be situated under the anode.
4. Place the phantom carefully on top of the cassette. The positioning holes in the phantom must fit with the white holders of the positioning template.

CAUTION:

Handle the phantom extremely careful. If it drops, the risk of damage exists.

Light Field Indicator Target

1. Round dots.
2. Arrows.

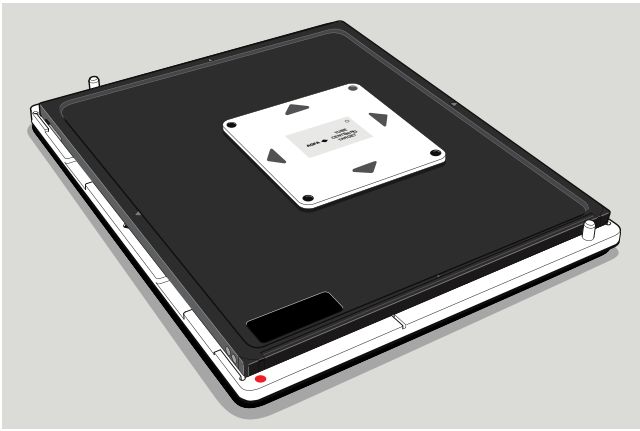
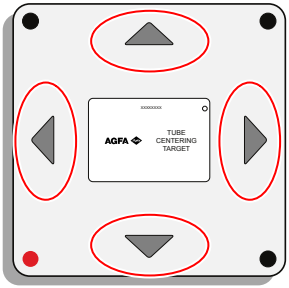
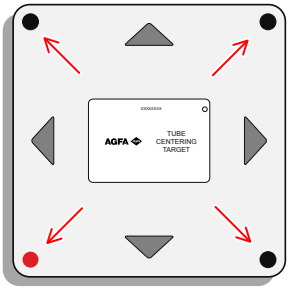


Figure 12: The Auto QC² Light Field Indicator target.

The Light Field Indicator target is used to perform the Light Field Indicator. You can check the centering of the tube of your X-Ray equipment by collimating on the center of the four markers and the arrows. In the exposure result on the cassette, the collimated field should be visible and aligned with the four markers. If this is not the case, the light field indication is not correct.

Table 9: Description of the Light Field Indicator target.

Element	Function
Arrows.	Are used to position the Light Field Indicator target in the longitudinal and transverse side.

Element	Function
 **Figure 13: Arrows on Light Field Indicator target.**	
3 black markers - 1 red disk.  **Figure 14: Markers and Disk on Light Field Indicator target.**	The black markers containing 3 small, X-Ray absorbing objects. The metal disk covered by a red dot. All four are placed at the corners of a 15 cm square. Light fields must be positioned on these (lead) round dots.

To position the Light Field Indicator target:

1. Position the positioning template.
2. Put the cassette on the positioning template.
3. Put the Light Field Indicator target on the cassette.
4. Make sure the red dot of the Light Field Indicator target is situated on the lower left hand side.
5. Collimate the light field in the center of the four dots.

Metal Pins

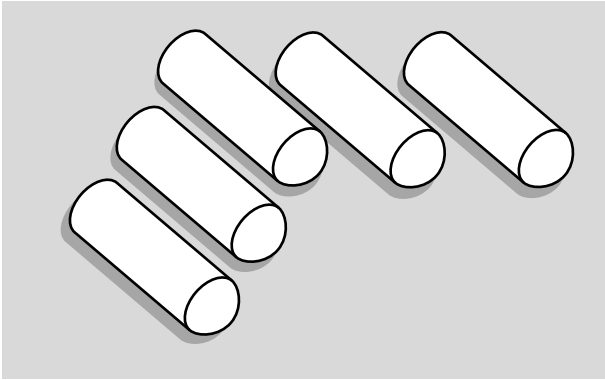


Figure 15: Metal pins for cassette positioning.

Five metal pins are included in the Auto QC² package. These are used to position the smaller cassettes on the positioning template.

Dosimeter

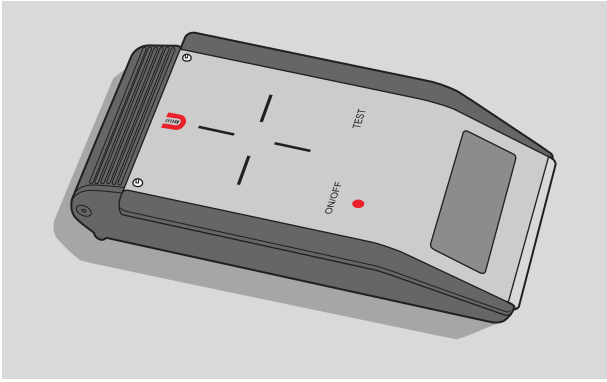


Figure 16: Dosimeter.

In general all types of dosimeter can be used to perform the Auto QC² tests, solid state detector dosimeters as well as dosimeter with ionization chamber.

They need to fulfill certain minimum technical requirements to be usable.

For more information, refer to the technical specifications of the dosimeter in the Auto QC² workflow sheets.

Additionally correction factors may need to be applied for the use of the RQA5 (21 mm Aluminum) filter.

Please refer to the datasheet of your dosimeter.

An appropriate device is the Unfors Instrument Unfors Dosimeter 557L.

This instrument can be ordered from: Unfors Instruments AB, Uggledalsvägen 29, SE-427 40 Billdal, Sweden. Phone : +46 31 939 970. Fax : +46 31 910 950.

Operating Auto QC² Software

Topics:

Starting Auto QC² Software

To start the Auto QC² Software:

1. Log on the Auto QC² Software station.
2. Start the Auto QC² Software by clicking the Auto QC² icon on the desktop.

   The Auto QC² Software splash screen will be displayed:

Figure 17: Auto QC² Software splash screen.

The system will check if the screen resolution is supported. If not an error will be displayed.

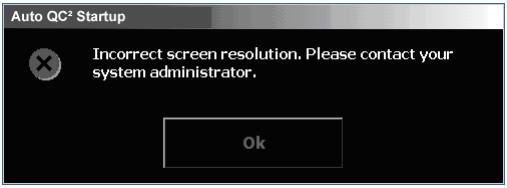


Figure 18: Screen resolution error message.

If the initialization is completed and the user interface is built up you can start working in Auto QC² Software.

Stopping Auto QC² Software

To exit the Auto QC² Software:

1. Navigate to the Main Menu.
2. Click the Exit Auto QC² action button.

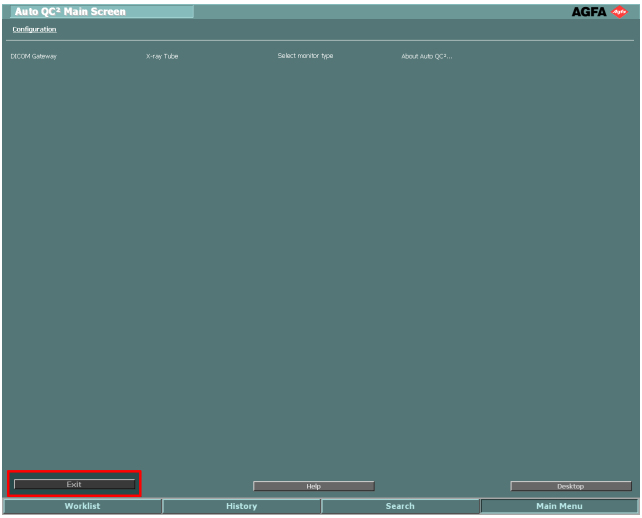


Figure 19: Exit Auto QC² action button.

3. Log off the Auto QC² Software station.

Switching to Windows without Stopping Auto QC² Software

To switch to Windows without stopping Auto QC² Software:

1. Navigate to the Main Menu.
2. Click the Desktop action button.

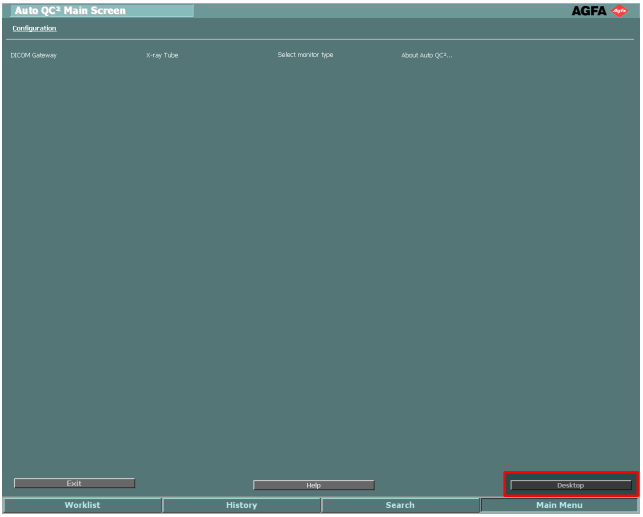


Figure 20: Desktop action button.

Auto QC² Software Windows

This section describes the four windows of Auto QC² Software as well as their main elements and action buttons. You can switch between the windows by using the buttons at the bottom of the screen.

Topics:

Worklist Window

A user working in the Worklist window is able to:

- Look for the exposures waiting for the selected Test Group and Digitizer.
- Visually check the image(s).
- Remove image(s) from the worklist.
- Edit image information.
- Generate results and publish the report.

1. Title bar.
2. Test Group Selection buttons.
3. Digitizer Selection drop down list.
4. Exposure pane.
5. Bar with buttons for Worklist related actions: remove, edit, view, generate results.
6. Navigation bar.

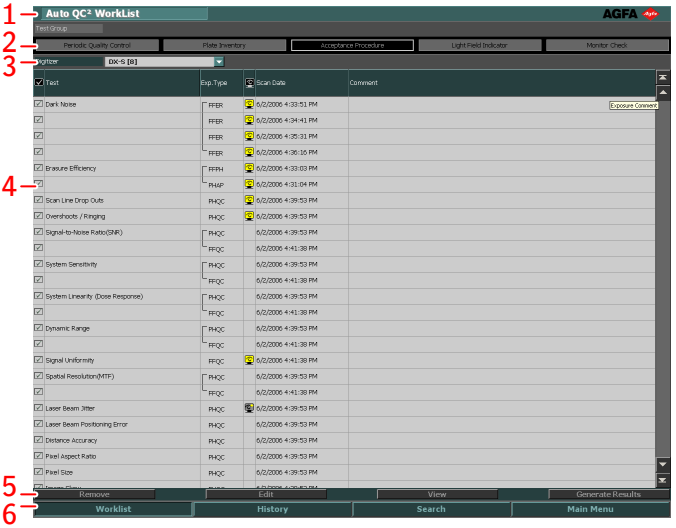


Figure 21: Worklist window.

1. Status column.
2. Test name.
3. Exposure name.
4. Visual Check status.
5. Date.
6. Comment.

Figure 22: Detail of the Worklist window.

History Window

The History window is used for managing history overview reports.

1. Title bar.
2. Search criteria selection pane.
3. Test selection buttons.
4. Report pane.
5. Bar with buttons for History related actions: report, export data.
6. Navigation bar.

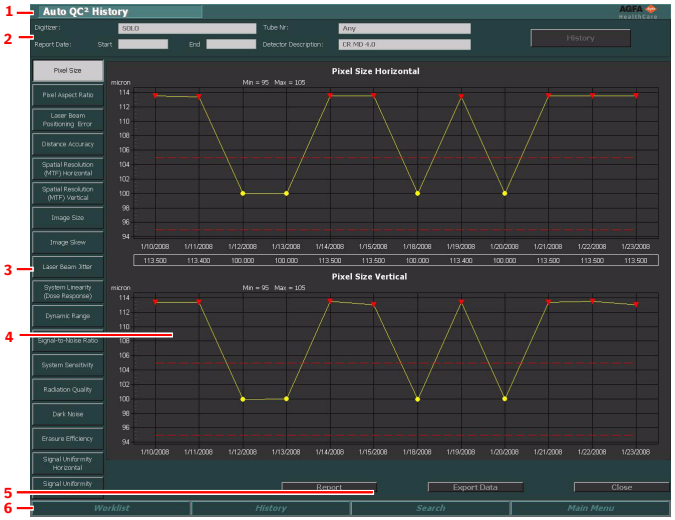


Figure 23: The History window.

Search Window

The Search window is used for managing published and saved Auto QC² reports. In this window the user will be able to retrieve published reports from the Auto QC² repository.

1. Title bar.
2. Search criteria selection pane.
3. Report pane.
4. Bar with buttons for Search related actions: remove, view, report, export data.
5. Navigation bar.

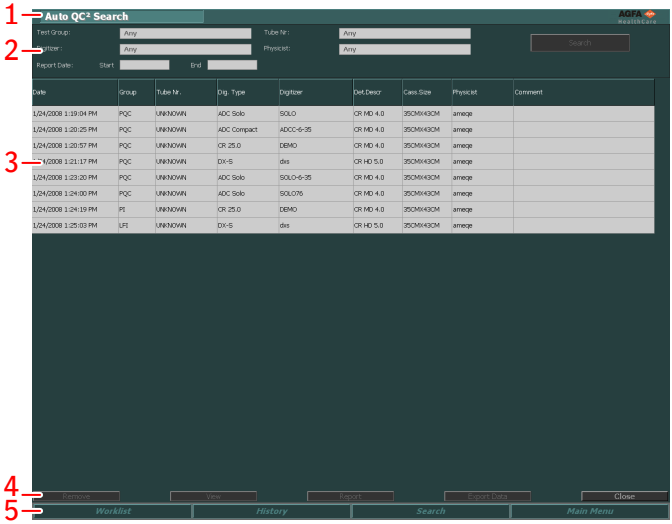


Figure 24: The Search window.

Main Menu Window

The Main Menu window is used for configuring Auto QC², retrieving online help information, minimizing all active applications and to quit Auto QC² Software.

A user working in the Main Menu window is able to:

- Configure Auto QC².
- Configure the DICOM gateway.
- Configure the X-Ray Tube.
- Configure the monitor.
- Import images in DICOM format.
- Check the Auto QC² Software version.
- Start the online-help.
- Minimize all active programs.
- Quit Auto QC² Software.

1. Title bar.
2. Configuration panel with action buttons.
3. Main Menu workspace.
4. Bar with buttons for Main Menu related actions: Exit Auto QC², Help, Desktop).
5. Navigation bar.

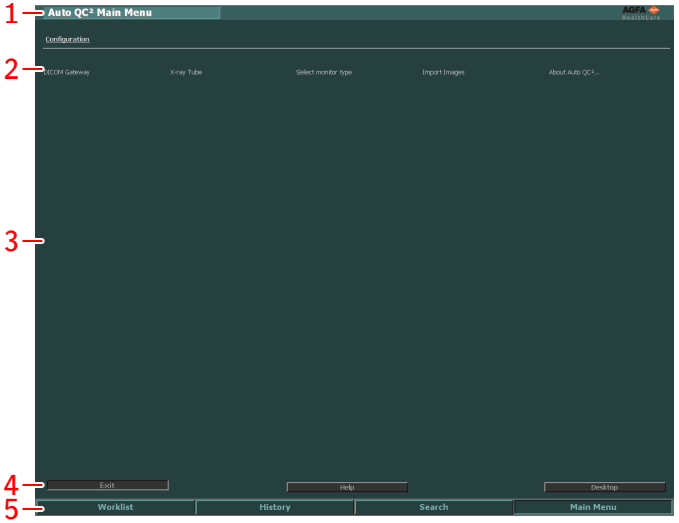


Figure 25: The Main Menu window.

General Workflow

This section describes the general workflow for planning and performing Auto QC² tests.

This workflow consists of the following steps:

1. Identify the Test Group.
2. Prepare the modality and acquire an exposure.
3. Identify and scan the cassette and send the exposure to the Auto QC² Software using NX.
4. Manage the worklist.
    - Select Digitizer and Test Group.
    - Check the status of the icons.
    - Remove exposures.
    - Edit image information.
    - Perform the visual check.
    - Generate the result, publish the report and export the result data.

Topics:

Test Group Selection

To choose a Test Group:

1. For information on the test groups, browse to Auto QC² Software documentation CD or use the Online Help.
2. Select a Test Group.
3. Print the Test Group procedure for the selected Test Group.

   Refer to the separate Auto QC² Workflow Sheets (2374 A).

Preparing the Modality and Acquiring an Exposure

To prepare the modality:

1. Inspect the plate visually for scratches and artifacts.
2. Erase the cassette.

   Refer to the documentation of the Digitizer.
3. Prepare the console and the tube with the predefined settings.

   Refer to the Workflow Sheets for more information.
4. Center and collimate the positioning template to the tube.
5. If needed, attach the filter in the collimator.
6. Put the cassette on the positioning template.
7. If this is necessary, put the test phantom or Light Field Indicator target on the cassette.
8. For the Plate Inventory, put the dosimeter next to the positioning template and register the used dose for each cassette (use the cassette ID number as present on RF-tag).

   Refer to the NX User Manual on how to read the cassette ID number, section “Read and Initialize Cassettes”.

   Note: The dosimeter must be positioned next to the positioning template in the lightfield, on the same side as the red dot. If the anode side is the left hand side and the positioning template is positioned correctly, this must be the left side.

   Note: We recommend to use a reference plate for the ATP/PQC.
9. Press the Expose button on the console.

   The modality exposes the cassette.
10. If a phantom is used, remove it from the cassette.
11. Remove the cassette from the modality table.

    Note:

    See the individual tests for more detailed information.

Related Links

Positioning Template on page 27
Filter Module and Filters on page 24

Test Phantom on page 31
Light Field Indicator Target on page 35

Identifying the Cassette and Sending the Examinations to the Auto QC² Software Station using NX

For a procedure on how to identify cassettes, refer to the User Manual of NX.

After the exposures are done and the images are sent to NX, the exposures must be sent to the Auto QC² workstation. Refer to the User Manual of NX on how to send images to the destination.

At the moment the images have been sent successfully to the Auto QC² Software Station, the following conditions will be checked:

- The Auto QC² Software checks if the image received is a quality control image.
- The Auto QC² Software checks the exposure type.
- The Auto QC² Software checks the rescale type of the exposure.
- The Auto QC² Software checks if an exposure with the same exposure SOP Instance UID already exists.

Note:

Always check if Auto QC² Software is running before you send images to the Auto QC² station.

Make sure to identify the cassette with the Auto QC² exposure type.

It is recommended to put the images in one study and name it Auto QC².

Fast ID is not supported for the DICOM Digitizers (ADC Solo, ADC Compact, ADC Compact Plus, CR 25, CR 35-X, CR 75, CR 85-X, DX-G and DX-M) for scanning the cassettes with quality control exposures, as high resolution images are required for quality control procedures.

Fast ID for identifying the cassettes is supported for the DX-S and CR 30-X Digitizer, in the sense that for these digitizer types this is the only way to identify cassettes without ID Tablet.

Managing the Worklist

When the Worklist window of Auto QC² Software is opened, Auto QC² Software performs a number of preparatory actions:

- Auto QC² Software retrieves the Digitizers which have exposures waiting to be processed for the selected Test Group. For each Digitizer, the system will show the number of exposures waiting to be processed.
- Auto QC² Software retrieves all predefined exposures.
- Auto QC² Software sets the default Test Group to PQC.

Figure 26: Worklist window.

Note:

When images are sent to the Auto QC² station after a selection of a Test Group and Digitizer are made, there will be no automatic upload of these images. You will need to refresh the worklist by selecting a Test Group or a Digitizer again.

When the system has performed these actions, the user has to perform a number of steps.

To manage the worklist of images:

1. Select a Digitizer.
2. Select a Test Group (the default Test Group is PQC).
3. Check if all conditions for performing the test are fulfilled

- In the Status column, all fields must have the Approved status. By inspecting the icons, check if there are any duplicate images, missing images or images missing any data.

Table 10: Status icons in the Worklist window.

Icon	Meaning
 **Figure 27: Approved icon.**	Means the image is OK.
 **Figure 28: Duplicate Image icon.**	This means the image has been sent twice to the Auto QC² Station. One of the two images needs to be removed.
 **Figure 29: Data Missing icon.**	This means that test data are missing for this image. Image details need to be edited.
 **Figure 30: Not Sent icon.**	The image has not yet been sent to the Auto QC² Station. Check if all planned actions have been performed correctly.
 **Figure 31: Not OK icon.**	The image sent to the Auto QC² Station does not meet the required specifications for a QC image.

- Also perform all visual checks that must be executed.

Table 11: Visual Check icons in the Worklist window.

Icon	Meaning
 **Figure 32: Visual Check Approved icon.**	The image is OK.

Icon	Meaning
 **Figure 33: Obliged Visual Check icon.**	Visual check is needed.
 **Figure 34: Optional Visual Check icon.**	A visual check is optional.
 **Figure 35: Rejected Image icon.**	After the visual check has been performed, the image is rejected.

4. If this is needed, you can remove images, edit image information or view the images (for visual check) using the action buttons at the bottom of the screen.

CAUTION:
Pressing the Remove action button removes an image physically from the Auto QC² station. Use this button only to remove duplicate images.

5. Generate the results by clicking the Generate Result action button.

Topics:

- *Removing images*
- *Editing Image Information*
- *Performing the Visual Check*
- *Generating the Result, Publishing the Report and Exporting the Result Data*

Removing images

To remove images, e.g. double exposures, wrongly identified exposures:

1. In the Worklist pane of the Worklist window, select an image.
2. Click the Remove action button.

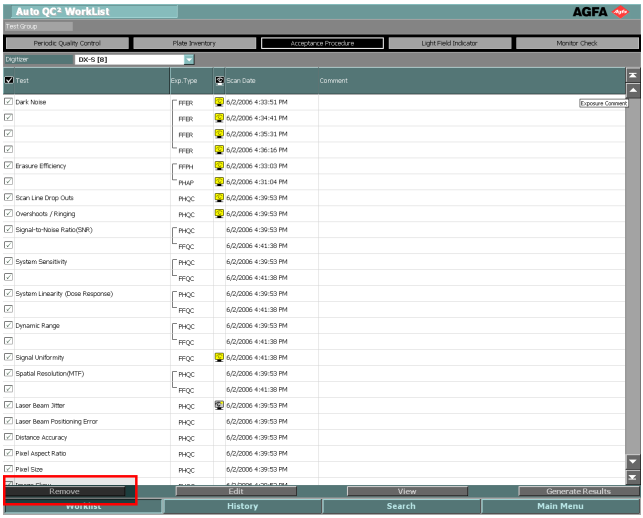


Figure 36: Remove action button.

The system will ask you if you are sure to remove the image.

3. Click OK to confirm.

Editing Image Information

It is possible to edit or enter data of an image you have selected in the Worklist overview.

CAUTION:

Corrections in the Edit Exposure window may have an impact on test results.

To change and edit extra information about image details, cassette and Digitizer:

1. In the Worklist pane of the Worklist window, select an image.
2. Click the Edit action button.

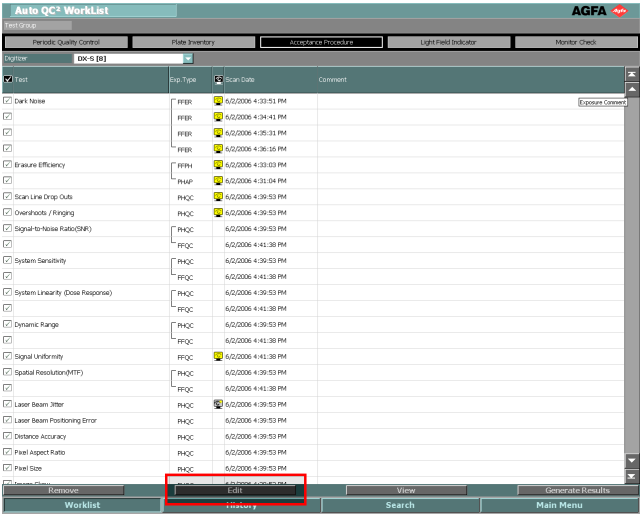


Figure 37: Edit action button.

The Exposure Detail window appears:

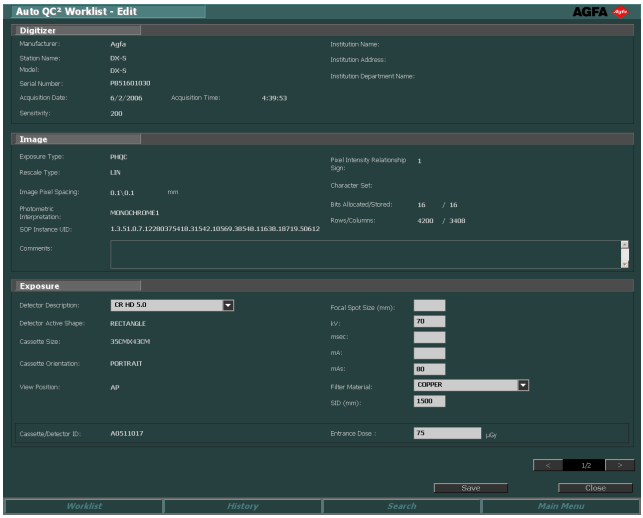


Figure 38: Edit Exposure window.

The Edit Exposure window has three panels:

- Digitizer
- Image
- Exposure

3. Change the image information.
4. Save the settings or click Close to leave without saving.

After you have changed the settings, the system will store these settings in the Auto QC² Software Station.

Note:

The more you maintain and fill out the Edit exposure fields, the more accurate the calculation and the results will be.

Performing the Visual Check

For a number of Auto QC² tests a visual check of the exposure is optional or required.

Refer to the Workflow Sheets for more information.

To perform the visual check:

1. In the Worklist pane of the Worklist window, select an image.
2. Click the View action button or perform a double click to the appropriate line in the Worklist.

    1. The Text area: this area holds information on the test, the exposure type, the cassette and the Digitizer. It also allows you to add comments.
    2. The Image area.
    3. The Zoom area.

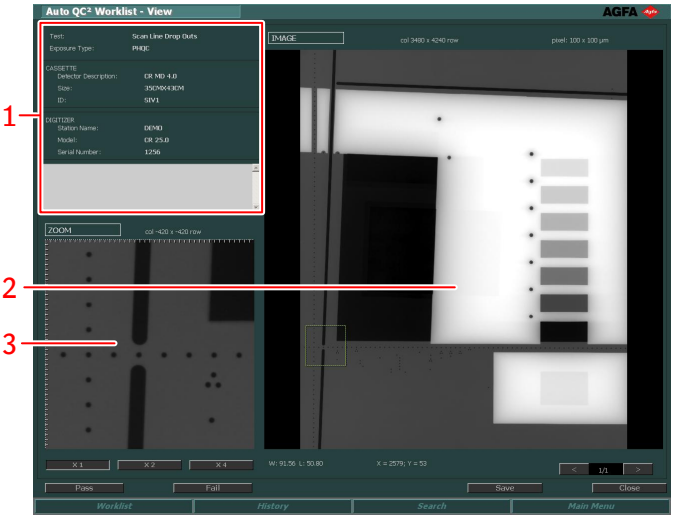


Figure 39: View window.

WARNING:

Test results are incomplete if only part of the image is checked.

On low resolution monitors, the visual check window contains a vertical scroll bar. Use the scroll bar to view the complete image.

In this window the following actions are possible. Refer to the appropriate section for more information.

Topics:

Browsing through the Images of a Test

In the View window, use the Browse buttons to go to the next or the previous exposure of a test.

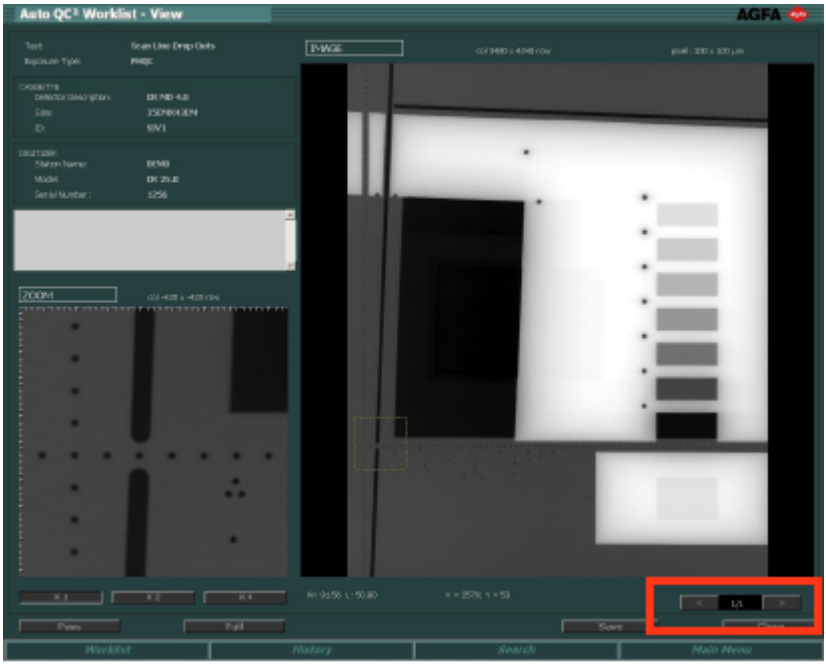


Figure 40: View window with browse buttons highlighted.

For example, for the Signal-to-Noise Ratio test (part of the Periodic Quality Control Test Group), you will be able to browse between the two exposures (PHQC and FFQC).

Roaming

When you are inspecting an exposure, you can roam on the image.

To roam over an exposure:

1. Click once on the image in the Image area.

   In the Image area, a square marker appears around the clicked point.

   The Zoom area is filled with the part of the image having a square marker.

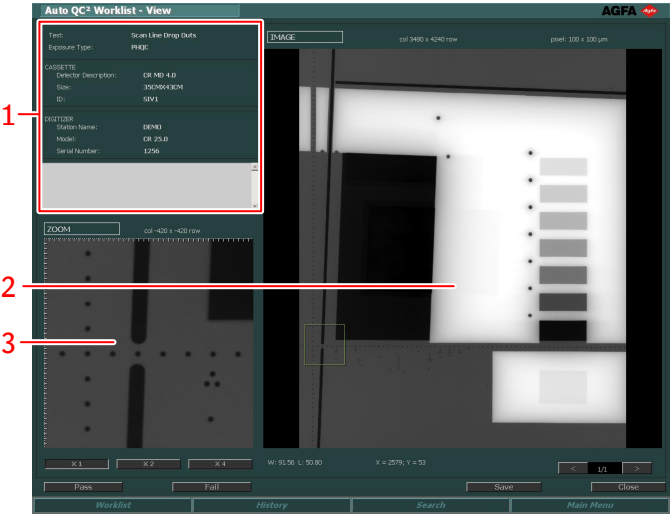


Figure 41: View window with square marker in the Image area.

2. Roam over the image by dragging the square marker around in the Image area or by clicking a new area in the Image area.

Setting Comments

When you are inspecting an exposure in the View window, you can add comments to the image in the Comments field of the Text area.

To set comments on an image:

1. Click the Comments field.

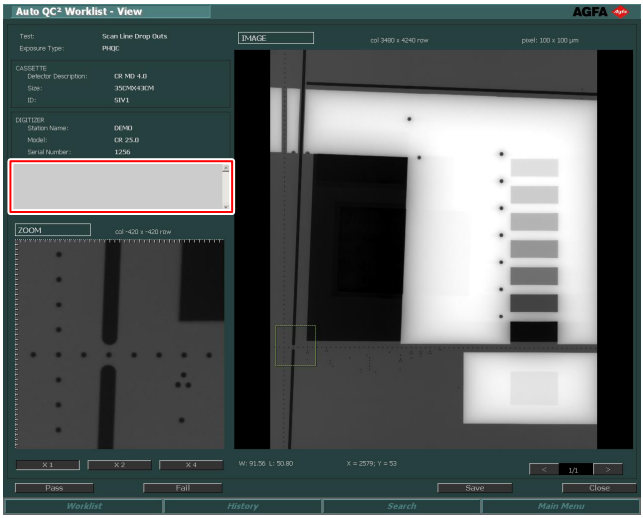


Figure 42: View window with Comments field highlighted.

2. Enter your comments.

   Comments you enter in the View window will also be visible in the other Auto QC² windows for the same image.

Zooming

To zoom in on parts of the image:

1. Click on the image in the Image area.

   In the Image area, a square marker appears around the clicked point.

2. You can zoom into the image shown in the Zoom area by using the Zoom action buttons.

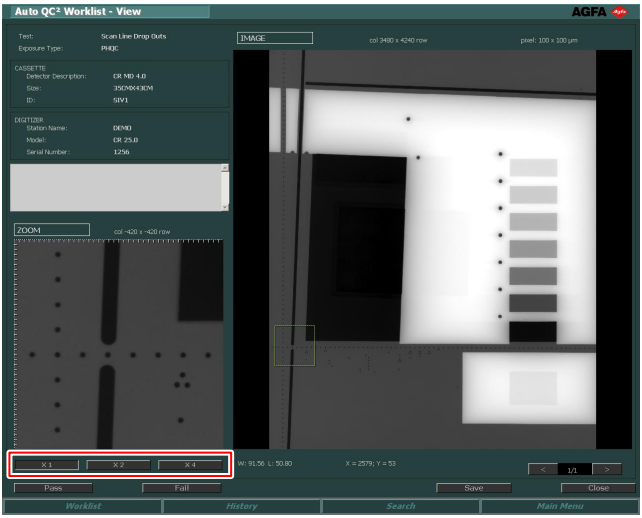


Figure 43: View window with Zoom action buttons highlighted.

You have the choice between 3 zoom factors (factor 1, 2 and 4). In the zoom area, the part of the image will be shown in “enhanced viewing” mode.

When you change the Zoom factor:

- The image will be shown with the specified zoom factor.
- The scale indicator on the image is recalculated.
- The square marker around the selected location in the image will be resized.

Accepting or Rejecting Images

These action buttons must be used when a visual check is necessary. If this check is needed to perform a test correctly, the buttons will be available. If this check is not necessary, they will be disabled.

The criteria to pass an image or reject an image depend on the test performed. Refer to the separate Auto QC² Workflow Sheets (2374 A).

To pass an image:

Click the Pass action button.

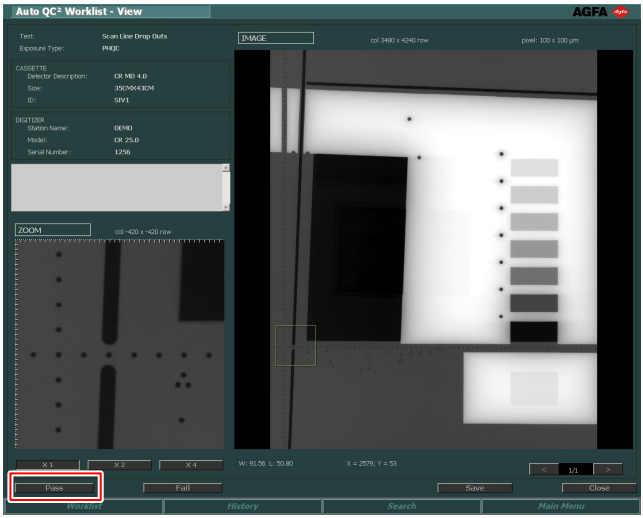


Figure 44: View window with Pass button highlighted.

The Visual Check Status icon in the Worklist overview will be set to OK.

Figure 45: Status of Visual Exposure icon changes to OK.

Rejecting a Failed Image

To reject a failed image:

Click the Fail action button.

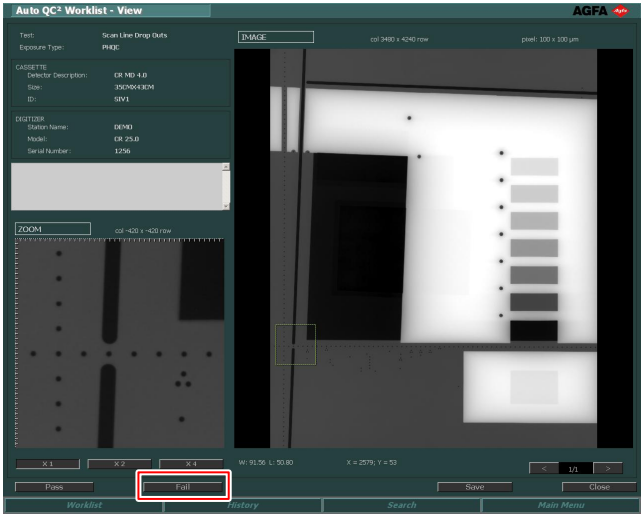


Figure 46: View window with Fail action button highlighted.

Note:

The criteria to pass an image or reject an image depend on the test performed.

The Visual Check Status icon in the Worklist overview will be set to Rejected.

Figure 47: Status of Visual Exposure icon changes to Failed.

Generating the Result, Publishing the Report and Exporting the Result Data

The last main step is to generate the result and publish the report.

To generate the test result:

1. Click on Generate Results in the Worklist.

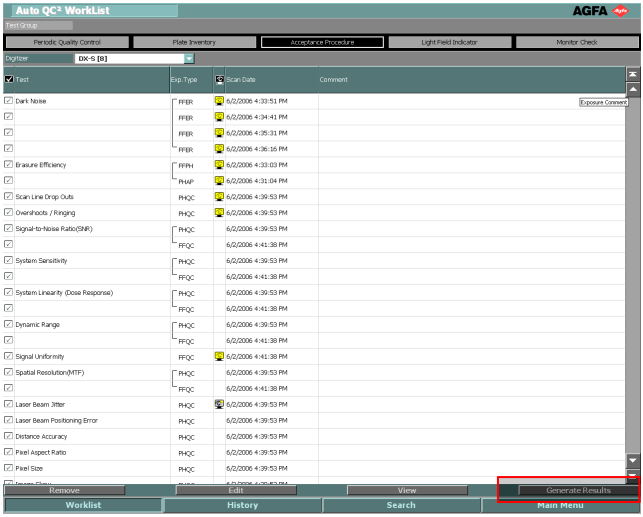


Figure 48: Worklist window with Generate action button highlighted.

The Procedure Results window appears showing the results of the calculations.

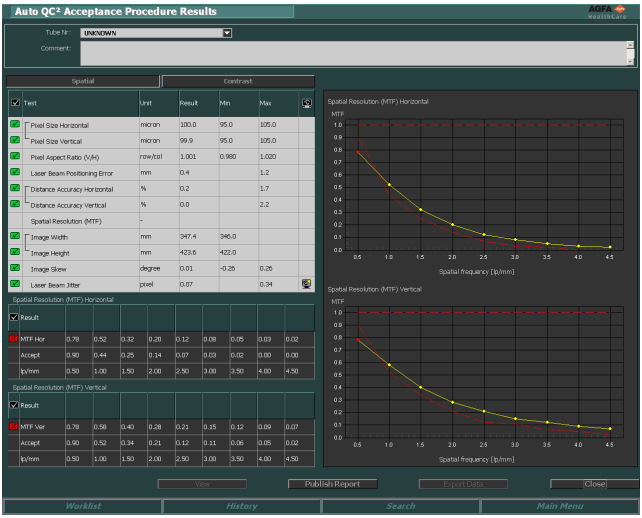


Figure 49: The Procedure Results window.

In the above window a result is generated for the Periodic Quality Control. In the Test overview all tests are summarized belonging to this Test Group of the Periodic Quality Control.

Refer to the Workflow Sheets for more information.

Note:

If one or more of the images cannot be used for the calculation, the execution of the algorithm will fail and an error message will be shown. Check the images, delete them and retake them if necessary. As long as something is wrong, the same error message will appear when you press the Generate Results action button.

2. Use the action buttons to switch between the different tests.
3. Analyze and interpret the results.

   Refer to the separate Auto QC² Workflow Sheets (2374 A).
4. The symbol in front of the test shows if the test result is failed or passed for the different tests. It can also give an indication that the results could not be calculated. If this occurs, exposures need to be redone.

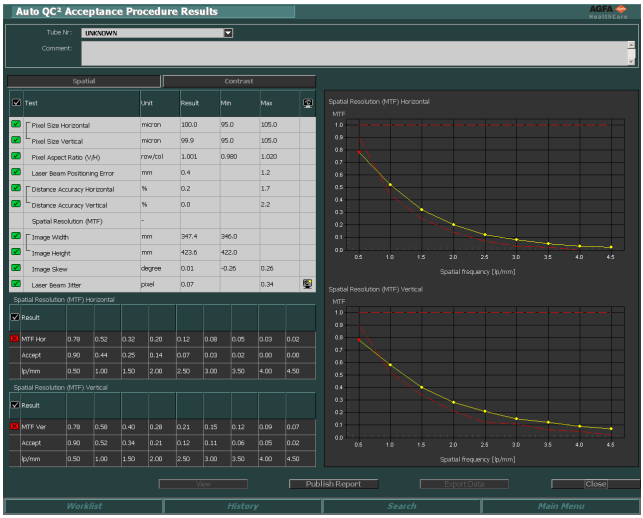


Figure 50: Pass or Fail icons.

Table 12: Test Results icons.

Icon	Meaning
 **Figure 51: Approved icon.**	The test has been processed correctly for this image and the result is OK.
 **Figure 52: Not OK icon.**	The test has been processed correctly, but the result does not meet the requirements.
 **Figure 53: Calculation Failed icon.**	Performing the calculations has failed. If this icon is displayed in a PQC/ATP procedure, exposing must be redone for both exposures. As long as there are failed calculations, you will not be able to generate results.

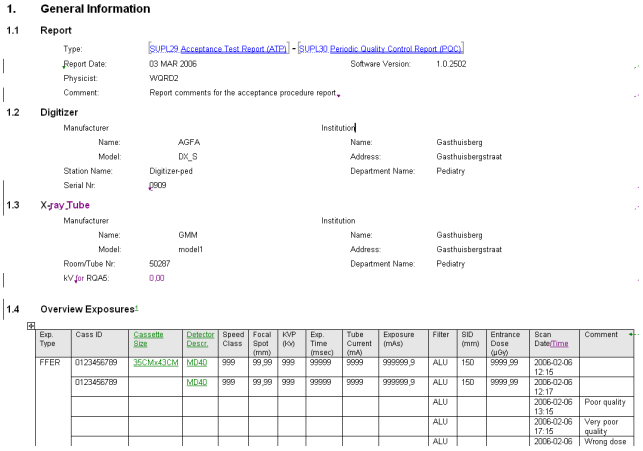
5. Publish the report as described in the following procedure. Only then the calculations are saved.
6. Additionally click **Export Data** to export the data to a csv- or txt-file.
7. If you want to view the related image(s) for a test again, click the **View** button or perform a double click in the appropriate line of the result table to switch to the view environment.
8. If you choose not to publish the report, click **Close**.

   As a consequence:

- The calculations will be cancelled.
- The images will remain in the worklist.
- The data will not be written to the Auto QC² database.

9. Click the **Publish Report** action button in the Test Group Result window.

   As a result the report will be shown as HTML in a new window and the data will be saved in the database for further consulting.



1. General Information

1.1 Report

Type: [SUPL29 Acceptance Test Report (ATP)] - [SUPL30 Periodic Quality Control Report (PQC)]
Report Date: 03 MAR 2006 Software Version: 1.0.2502
Physicist: WQRD2
Comment: Report comments for the acceptance procedure report.

1.2 Digitizer

Manufacturer: Institution:
Name: AGFA Name: Gasthuisberg
Model: DX_S Address: Gasthuisbergstraat
Station Name: Digitizer-ped Department Name: Pediatry
Serial Nr: 2809

1.3 X-ray Tube

Manufacturer Institution
Name: GMM Name: Gasthuisberg
Model: model1 Address: Gasthuisbergstraat
Room/Tube Nr: 50287 Department Name: Pediatry
kV for RQA5: 0.00

1.4 Overview Exposures

Exp. Type	Cass ID	Cassette Size	Detector Descr.	Speed Class	Focal Spot (mm)	KVP (kV)	Exp. Time (msec)	Tube Current (mA)	Exposure (mAs)	Filter	SID (mm)	Entrance Dose (µGy)	Scan Date/Time	Comment
FFER	0123456789	35CMx43CM	MD40	999	99,99	999	99999	9999	999999,9	ALU	150	9999,99	2006-02-06 12:15	
	0123456789		MD40	999	99,99	999	99999	9999	999999,9	ALU	150	9999,99	2006-02-06 12:17	
										ALU			2006-02-06 13:15	Poor quality
										ALU			2006-02-06 17:15	Very poor quality
										ALU			2006-02-06	Wrong dose

Figure 54: Auto QC² report.

10. Using the browser, you can save the report on a location you choose. You can also print it with the browser functionality.
11. If you switch back to the Auto QC² Software window and click Close, you will return to the Worklist window.

Note:

All data will be removed from the worklist as soon as you click the Publish Report action button. From then on the report is only to be consulted with the Search function.

Auto QC² Software has no inbuilt backup function. If you remove a report within the Search Environment of the Auto QC2 Software it is irreversibly removed from the system. Therefore it is recommended to save the published report manually on your computer.

For the best result, print the report in landscape.

Related Links

Exporting the Data of a Report on page 76

Managing Reports with the Search Window

With the Search function you can search for reports from the past using a number of search criteria.

To perform a search action:

1. With the Search action button in the navigation pane, go to the Search window.

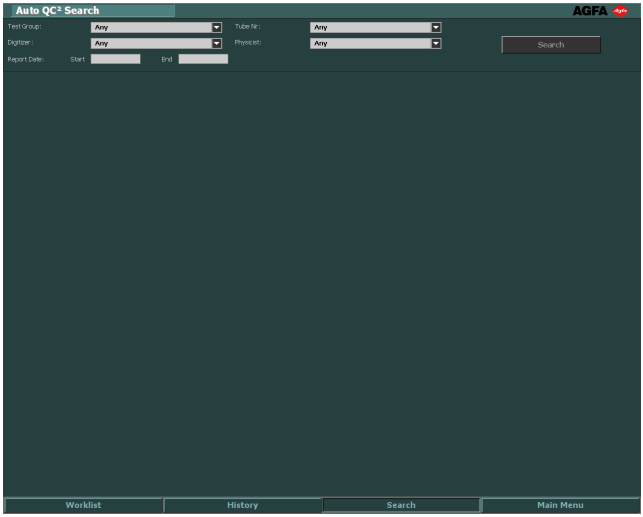


Figure 55: The Search window.

2. In the Selection pane, define the Search criteria.
3. Click the Search action button.

   A list with reports will appear in the Report overview pane. Following attributes are displayed per report: Date, Group, Tube number, Station name and Physicist. The “Station name” is referring to the Digitizer name.

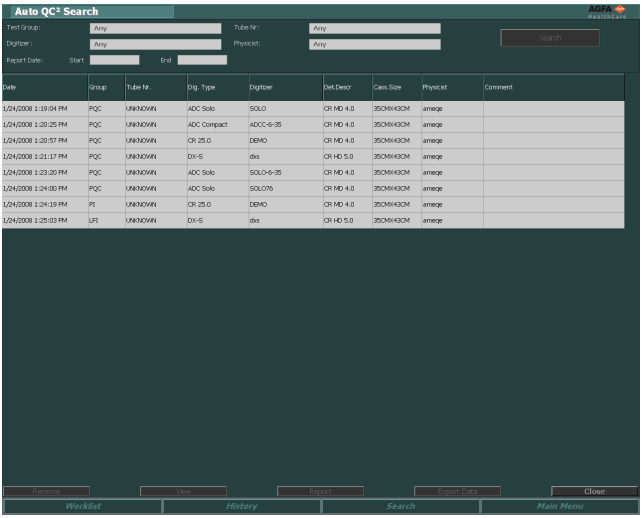


Figure 56: Search results.

If no reports are found, the following message is displayed.

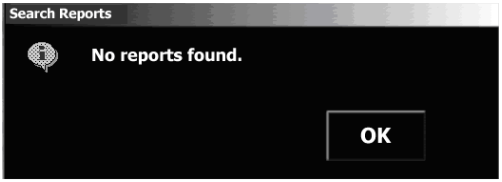


Figure 57: No search reports message.

4. Select a report from the list.

Note: The more fields you specify, the more accurate the results of your query will be.

Topics:

- *Removing Reports*
- *Viewing Exposures Connected to the Report*
- *Creating a Report*
- *Exporting the Data of a Report*
- *Closing the List of Search Results*

Removing Reports

To remove a report:

1. Select a report from your search results.
2. Click the Remove action button.
3. Click Yes to remove the report.

   The selected report will be removed from the Auto QC² repository.

Note:

Auto QC² Software has no inbuilt backup function. If you remove a report within the Search Environment of the Auto QC2 Software it is irreversibly removed from the system. Therefore it is recommended to save the published report manually on your computer.

Viewing Exposures Connected to the Report

To consult exposures connected to a report

1. In the Search window, select a report from your search results.
2. Click the View action button or perform a double click to the appropriate line in the Worklist.

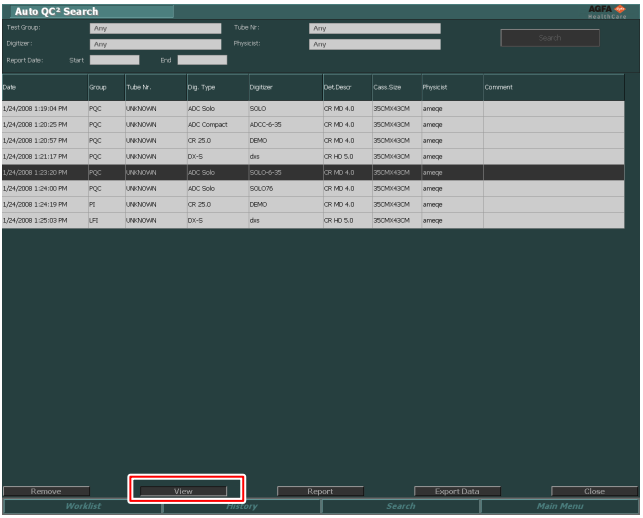


Figure 58: View action button.

This will open the Exposure window.

3. With the browse buttons you can navigate quickly through each of the exposures of the report. If there is only one exposure, the browse buttons will be disabled.
4. Click the Close action button to return to the Search overview.

Related Links

Performing the Visual Check on page 60

Creating a Report

To create a report:

1. In the Search window, select a report from your search results.
2. Click the Report action button.

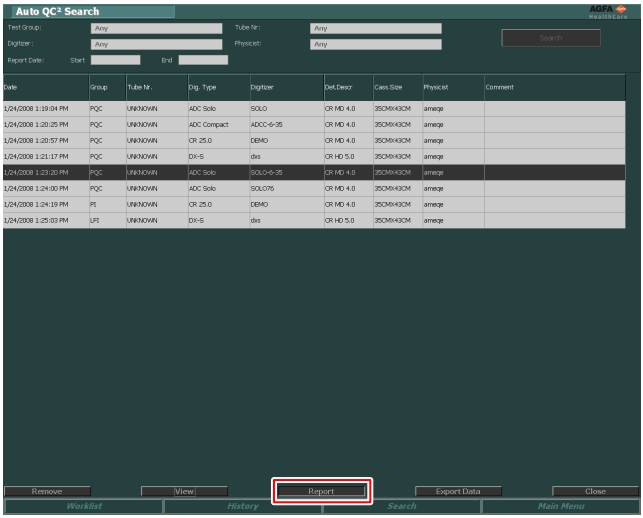


Figure 59: Report action button.

This will open the archived report as HTML in Internet Explorer.

Exporting the Data of a Report

To export the data of a report

1. Select a report from your search results.
2. Click the Export Data action button.

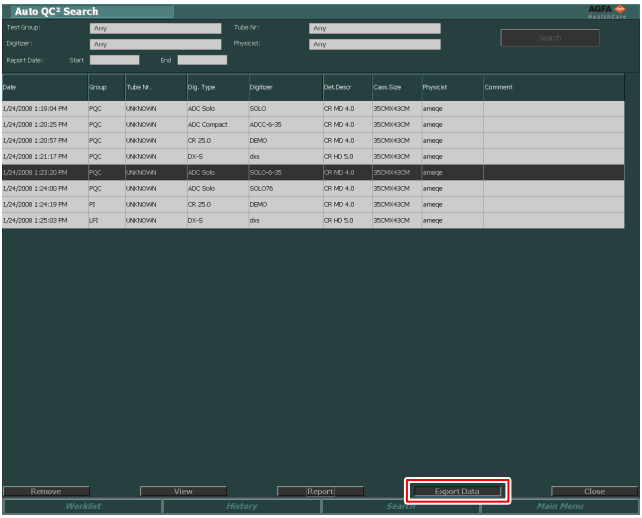


Figure 60: Export Data action button.

The data can be saved in a csv- or txt file which you can open with an appropriate program.

3. Use the Save As or Cancel functions from these respective programs to save the report or to go back to the Search window.

Closing the List of Search Results

When you click the Close action button, the system will remove all results displayed and return to the Search Criterion Selection pane.

Using the History Function

The History window is used for managing history overview reports.

A user working in the History window is able to:

- Consult history results for Auto QC² tests performed for a specific Digitizer, room, plate type and date interval.
- Generate a history report for the Auto QC² tests listed below:
- Export the history data.

The user can consult the history for the following tests:

- Pixel size.
- Pixel aspect ratio.
- Laser beam positioning error.
- Distance accuracy.
- Spatial resolution (MTF) Horizontal.
- Spatial resolution (MTF) Vertical.
- Image Skew.
- Laser Beam Jitter.
- System Linearity.
- Dynamic Range.
- Signal-to-Noise Ratio.
- System Sensitivity.
- Dark Noise.
- Erasure Efficiency.
- Radiation Quality.
- Horizontal Signal Uniformity.
- Vertical Signal Uniformity.
- Image Size.

To use the History window:

1. In the History Criterion Selection pane, define the Search criteria.
2. Click the History action button.

   The system will start generating a history overview for all reports meeting the history criteria.

   At this moment, the Search fields and the History action button will be disabled.

   When no results are found Auto QC² Software will display the following message. Click OK to go back to the History criteria panel.

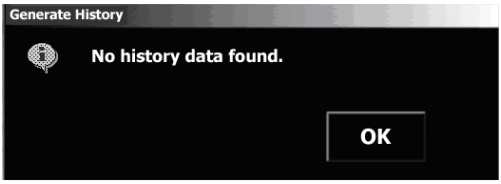


Figure 61: No history results found.

If there are positive results for the History criteria a test overview will appear on the left side of the window and the Report overview pane itself is filled with the graphical interface of results:

Figure 62: History window after Search action.

When the History window is opened:

- The system will perform an auto scaling algorithm for displaying the graphs and results properly.
- The scan date with corresponding data will be displayed for each history overview.
- A red triangle means that the test did not meet the acceptance levels.
- A yellow dot means that the result is within the acceptance levels.
- The dotted lines show the acceptance levels.

When test results are not in range with the acceptance levels the system will indicate this in the graphical presentation.

3. Select a test from the graphical test overview.

Note: The more fields you specify, the more accurate the results of your query will be.

Topics:

Creating a History Report

To consult a History report

1. Select a test from the Test Overview bar.
2. Click the Report action button.

   This will open the history report as HTML using Internet Explorer.

Related Links

Creating a Report on page 75

Exporting the Data of a Report

To export the data of a report

1. Select a report from your search results.
2. Click the Export Data action button.

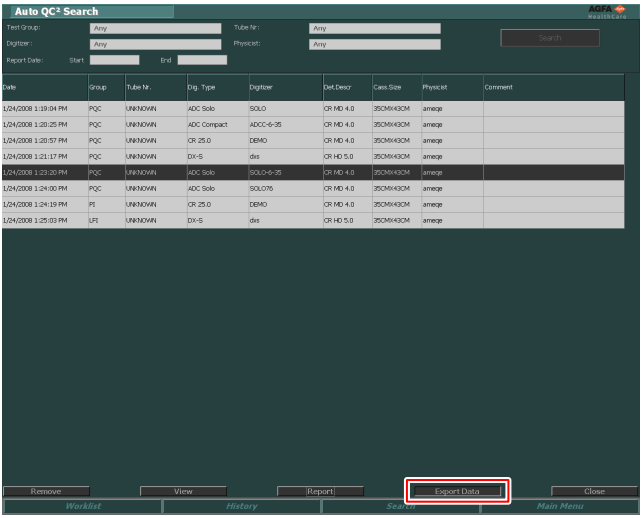


Figure 63: Export Data action button.

The data can be saved in a csv- or txt file which you can open with an appropriate program.

3. Use the Save As or Cancel functions from these respective programs to save the report or to go back to the Search window.

Main Menu

In the Main Menu window the user can manage certain aspects of the Auto QC² workflow.

Related Links

Main Menu Window on page 48

Topics:

Opening the Online Help

The online help is a compilation of the User manual, the Troubleshooting and the Workflow Sheets as a HTML help system.

To go to the online help of Auto QC² Software:

1. Navigate to the Main Menu.
2. Click the Help action button.

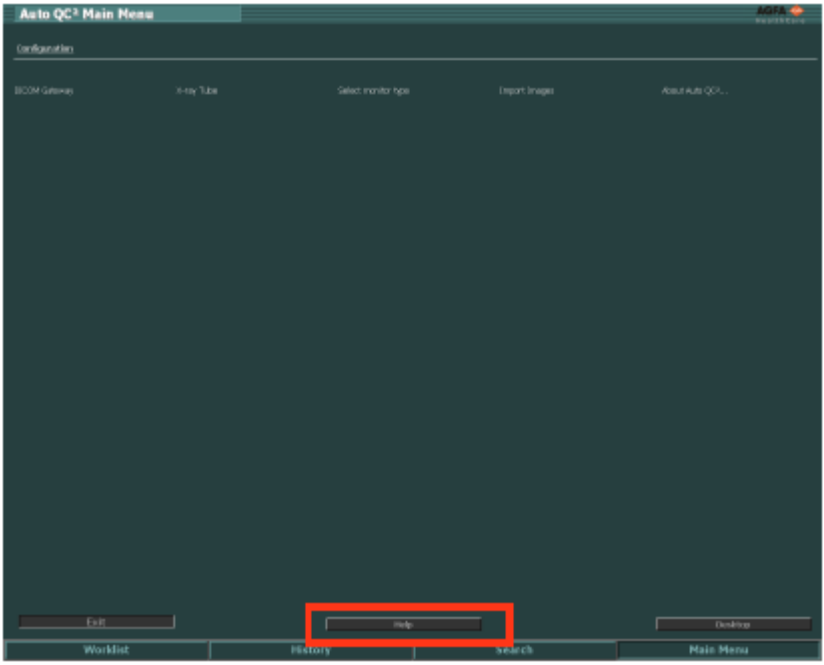


Figure 64: Online Help action button.

The online help file is opened.

Checking the Auto QC² Software Version

To check the version of Auto QC² Software:

1. Navigate to the Main Menu window.
2. In the Configuration panel in the top section of the Main Menu window, click the About Auto QC² label.

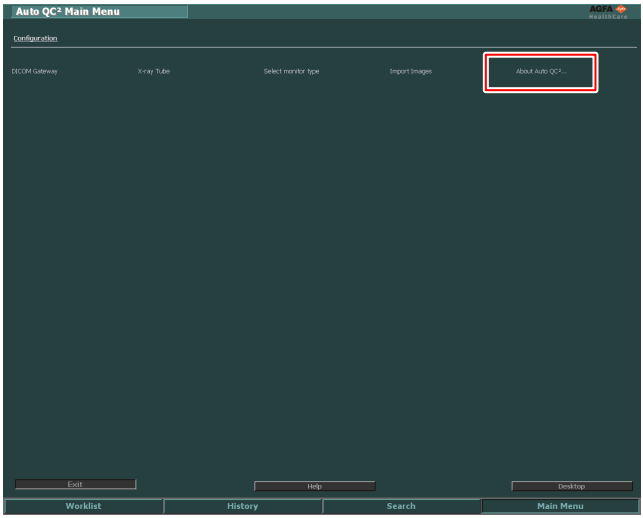


Figure 65: About action button.

The Splash screen of Auto QC² Software is displayed:

Figure 66: The Auto QC² Software splash screen.

Configuring the DICOM Gateway

In the Main Menu window of Auto QC² Software the user or service engineer can configure the DICOM gateway.

To configure the DICOM gateway:

1. In the Configuration panel in the top section of the Main Menu window, select the DICOM Gateway label.

   The workspace of the Main Menu window is filled with the configuration fields for the DICOM Gateway:

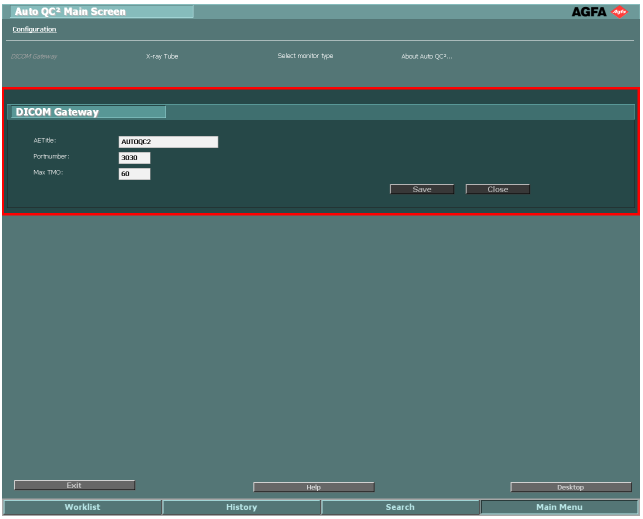


Figure 67: Main Menu window with configuration fields for DICOM gateway.

2. Set or modify the following parameters:

   - DICOM AE-Title.
   - Port Number.
   - Maximum time-out for the DICOM association in seconds.

3. Click Save to save the new parameters, otherwise click Close.

Editing X-Ray Tube information

In the Main Menu window of Auto QC² Software the user or service engineer can configure X-Ray Tubes.

To configure X-Ray Tubes:

In the Configuration panel in the top section of the Main Menu window, select X-Ray Tube.

The workspace of the Main Menu window is filled with the X-Ray Tube list and an extra bar with a number of action buttons.

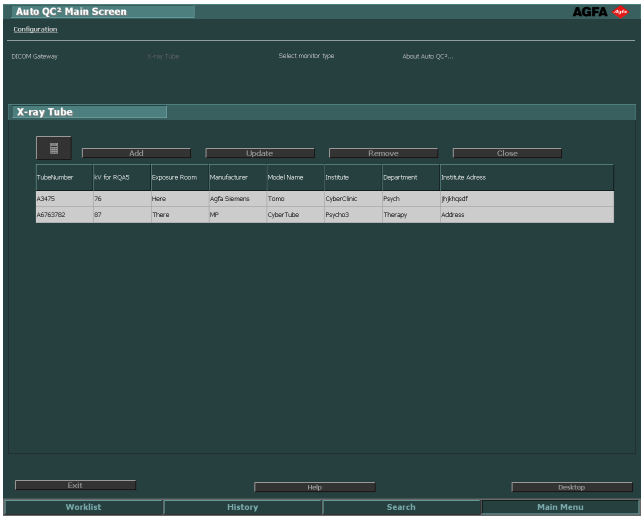


Figure 68: Main Menu window with X-Ray Tube list and action buttons.

Topics:

- *Adding an X-Ray Tube*
- *Updating Settings of an Existing X-Ray Tube*
- *Removing X-Ray Tubes*
- *Closing the List of X-Ray Tubes*

Adding an X-Ray Tube

In the Main Menu window of Auto QC² Software the user can add X-Ray Tubes.

To add an X-Ray Tube:

1. Press the Add action button of the X-Ray Tube pane.

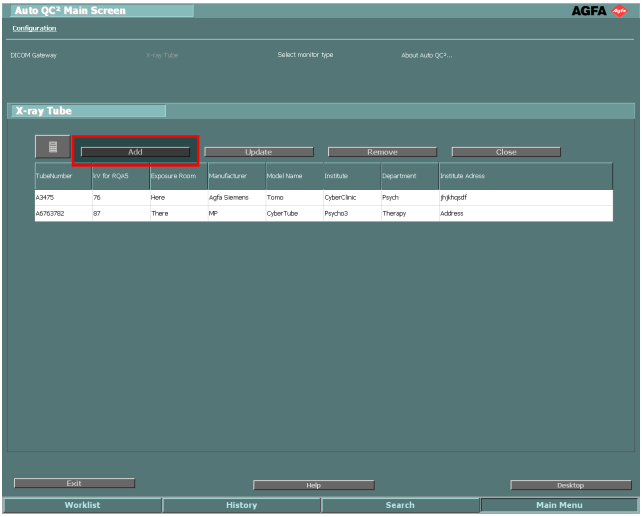


Figure 69: Main Menu window with Add action button highlighted.

The workspace of the Main Menu window is filled with the Add X-Ray Tube settings and a Save and Close action button.

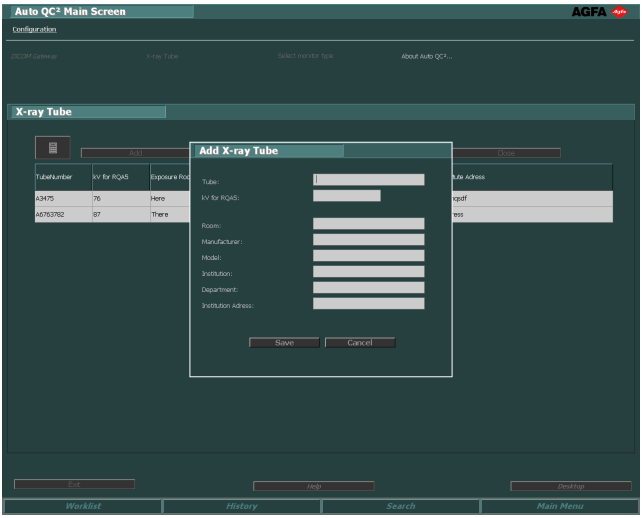


Figure 70: Add X-Ray Tube pane in Main Menu window.

2. Enter the following fields:
    - Tube.
    - KV for RQA5. Must be filled in here manually after calculations are done.
    - Room.
    - Manufacturer.
    - Model.
    - Institution.
    - Institution address.
    - Department.
3. Click Save or Close.

Updating Settings of an Existing X-Ray Tube

In the Main Menu window of Auto QC² Software the user can update the settings of an X-Ray Tube.

To adapt or update settings of an existing X-Ray Tube

1. Select an X-Ray Tube from the list in the X-Ray Tube pane.
2. Press the Update action button of the X-Ray Tube pane.

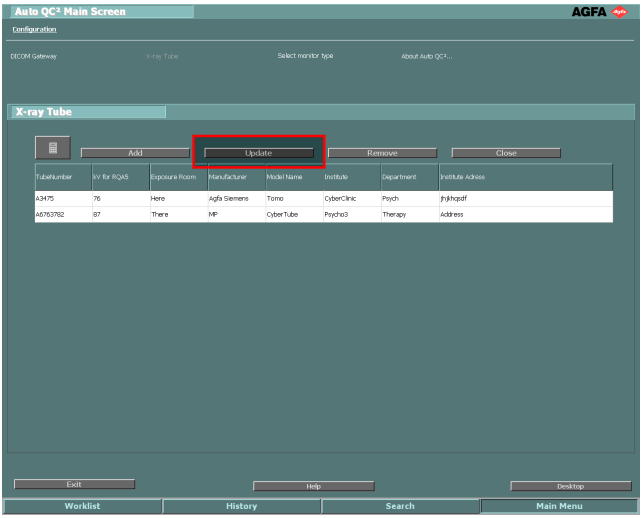


Figure 71: Main Menu window with Update action button highlighted.

The workspace of the Main Menu window is filled with the Update X-Ray Tube settings and a Save and Close action button.

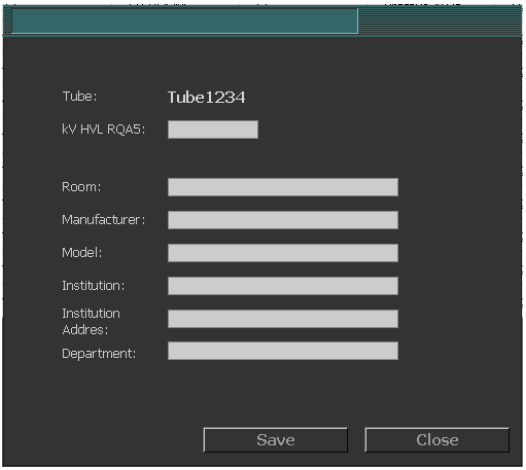


Figure 72: Update X-Ray Tube settings in Main Menu window.

3. Enter or change the following data:
    - kV for RQA5. Must be filled in here manually after calculations are done. No automatic save of results in Excel-file to the system.
    - Room.
    - Manufacturer.
    - Model.
    - Institution.
    - Institution address.
    - Department.
4. Click Save or Close.

Removing X-Ray Tubes

In the Main Menu window of Auto QC² Software the user can remove an X-Ray Tube.

To remove an X-Ray Tube from the list:

1. Select an X-Ray Tube from the list in the X-Ray Tube pane.
2. Press the Remove action button of the X-Ray Tube pane.

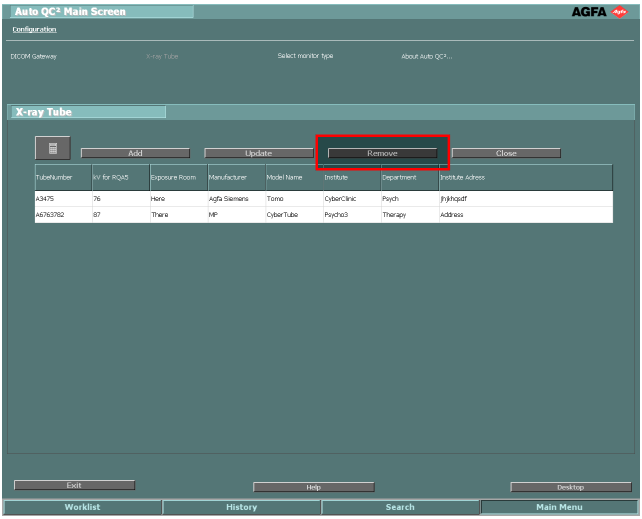


Figure 73: Main Menu window with Remove action button highlighted.

The system will display a message asking you if you are sure to remove the X-Ray Tube:

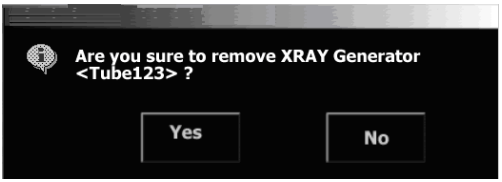


Figure 74: Confirm message for removing X-Ray Tube.

3. Click Yes or No.

Closing the List of X-Ray Tubes

The list of X-Ray Tubes can be closed with the Close action button.

Configuring the Monitor

Only change the monitor output in 8 Bit PVAL if:

1. Auto QC² is running together with NX.
2. NX is connected with P-value (Barco) monitor.
3. NX is configured to display P-values on the monitor.

Workflow:

1. Make your choice in the drop down menu.

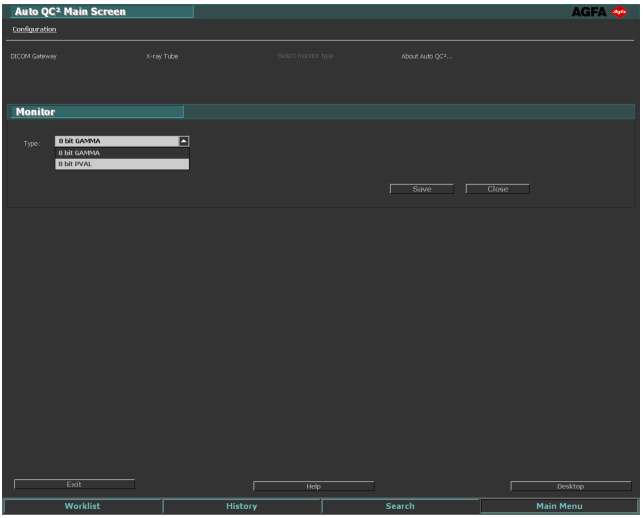


Figure 75: Configure the Monitor.

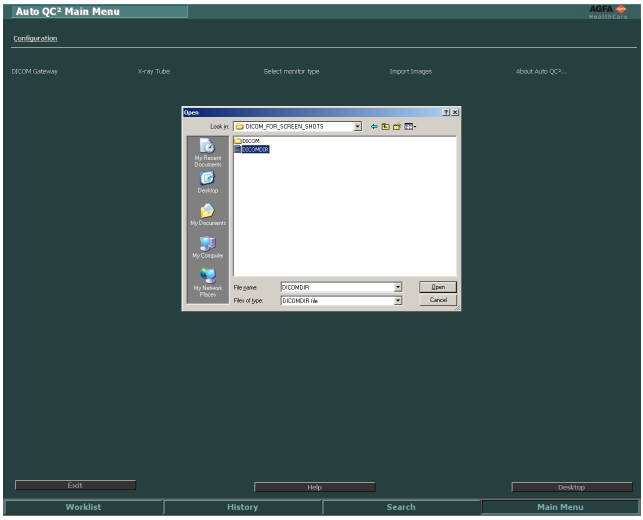
2. Click Save or Close to return to the Main menu.

Importing Images

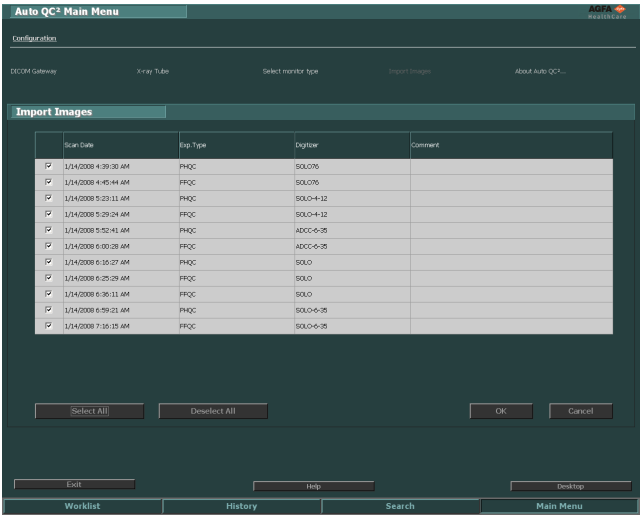
If the images can not be send over the network from the NX Workstation to the Auto QC² Software, this functionality can be used to import them. Pre-requisite is that the images were exported in DICOM-format at the NX Workstation (NX2.0 or higher). For details refer to the Auto QC² Key User Manual.

Workflow:

1. Click on Import Images in the Main Menu.
2. Browse for the folder the DICOMDIR file is located:



3. All exposures from the DICOMDIR are shown.
4. Select the images to import and click on OK. If you want to import all images click on Select All.


Auto QC² Main Menu
Configuration
DICOM Gateway
X-ray Tube
Select monitor type
Import Images
About Auto QC²...
Import Images
Scan Date
Exp.Type
Digitizer
Comment
1/14/2008 4:39:30 AM FHQC SOLO76
1/14/2008 4:45:44 AM FFQC SOLO76
1/14/2008 5:23:11 AM FHQC SOLO-4-12
1/14/2008 5:29:24 AM FFQC SOLO-4-12
1/14/2008 5:52:41 AM FHQC ADCC-6-35
1/14/2008 6:00:28 AM FFQC ADCC-6-35
1/14/2008 6:16:27 AM FHQC SOLO
1/14/2008 6:25:29 AM FFQC SOLO
1/14/2008 6:36:11 AM FFQC SOLO
1/14/2008 6:59:21 AM FHQC SOLO-6-35
1/14/2008 7:16:15 AM FFQC SOLO-6-35
Select All
Deselect All
OK
Cancel
Exit
Help
Desktop
Worklist
History
Search
Main Menu