

DISC QA Mamchex Tool Use Instructions with CARESTREAM DIRECTVIEW CR Mammography Systems

Purpose

This document describes and provides instructions for use of the QA Mamchex Tool in calibrating a mammography x-ray system's Automatic Exposure Control (AEC) for use with the CARESTREAM DIRECTVIEW CR Mammography System.

AEC Calibration frequency

The mammography x-ray system's Automatic Exposure Control (AEC) must be properly calibrated upon initial install and before clinical use of the CARESTREAM DIRECTVIEW CR Mammography System.

Subsequent AEC Calibration should be performed at the interval specified by the manufacturer of mammography x-ray system.

AEC Calibration Performance / Constancy Test

Carestream specifies as part of a quality control program an 'AEC System Performance/Constancy Test' be performed by a Medical Physicist after AEC calibration is made and before clinical use of the CARESTREAM DIRECTVIEW CR Mammography System.

Subsequent AEC Performance/Constancy Test should be performed annually or whenever AEC operation issues are suspected, AEC re-calibration has been performed, or a major system component has been repaired or replaced.

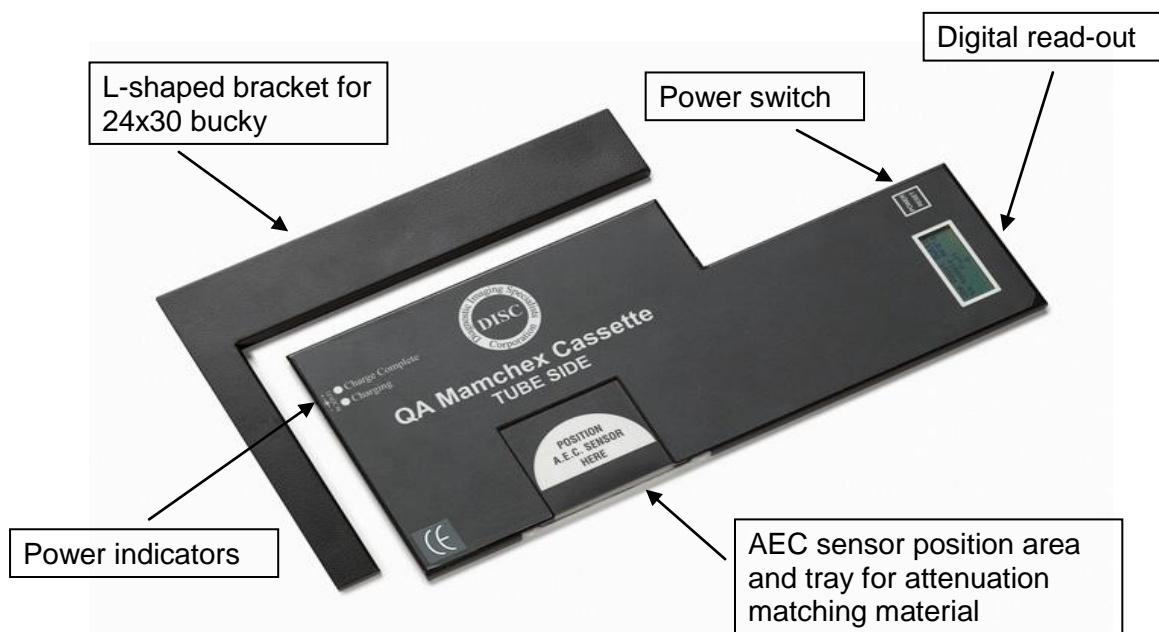
QA Mamchex Tool Description

The QA Mamchex Tool provides a means to accomplish calibration of a traditional mammography x-ray system's Automatic Exposure Control (AEC) device for use with CARESTREAM DIRECTVIEW CR Mammography Cassettes with EHR screens, used in the CARESTREAM DIRECTVIEW CR Mammography Systems.

The QA Mamchex Tool is intended to be used by:

- A service representative for the x-ray mammography system.
- The customer site's designated QC personnel to check the AEC is performing consistent with the initial AEC calibration.

IMPORTANT: The Automatic Exposure Control (AEC) device must be calibrated by a qualified, trained x-ray equipment service representative.



QA Mamchex Tool components and features

Principle of Operation

The QA Mamchex Tool consists of the QA Mamchex Cassette which is designed to be inserted into the mammography x-ray system's cassette holder (small or large). The QA Mamchex Cassette simulates the attenuation response from a CARESTREAM Min-R 2000 screen-film system under the beam conditions typically used for AEC calibration and produces an OD (Optical Density) digital read out to replace the need for screen film while performing the calibration. Before AEC calibration is performed, the Mamchex Cassette is attenuation matched to the CARESTREAM DIRECTVIEW CR Mammography Cassette with EHR screen. This ensures that the optical density reported by the QA Mamchex Cassette is the same as if the CR Cassette was used to calibrate the AEC. The AEC driven exposures for the QA Mamchex Cassette will therefore respond in the same manor as the CR Cassette would..

Mammography x-ray system AEC calibration procedures for screen film systems are based on reading and performing adjustments to obtain a constant Optical Density read out with varying thicknesses and x-ray energies (kVp). The QA Mamchex Cassette's Liquid Crystal Display (LCD) provides an optical density (OD) read out so existing AEC calibration procedures as defined by the x-ray equipment manufacturer can be used.

The QA Mamchex Cassette displays the following outputs.

1. O.D.: The QA Mamchex Cassette is attenuation matched with a CR Mammography Cassette with EHR screen and calculates the resultant film O.D. for a reference CARESTREAM MR 2000 screen-film system when exposed to radiation.

IMPORTANT: Only the O.D. read out value is used to achieve AEC calibration for use with the CARESTREAM DIRECTVIEW CR Mammography System.

2. MamLU: The QA Mamchex meter calculates the resultant MamLU (Mammo light units) produced by the radiation. This value is directly proportional to the light produced by the imaging plate.

3. Radiation Time: The QA Mamchex meter calculates the total radiation time for each exposure.

Operating Instructions

Turning the QA Mamchex Cassette ON

To turn the QA Mamchex Cassette “ON”, momentarily press the Power/Reset button. The QA Mamchex Cassette will turn ON and do internal diagnostic test. The display will then indicate “Waiting for Reset”.

Note: The QA Mamchex Cassette will show the charge level of the internal battery. If the battery charge is “Low”, you should charge the batteries for at least ½ hour before using the QA Mamchex Cassette.

Resetting the QA Mamchex Cassette

Just before you are ready to take an exposure, momentarily press the Power/Reset button. The display will change from “Waiting for Reset” to “Reset Detected” and then to “Ready for Exposure”. You can now take a test exposure. The QA Mamchex Cassette measures the exposure, calculates and displays the three read out values.

Canceling Reset

If you have reset the QA Mamchex Cassette and change your mind about taking a test exposure, you can cancel the reset by momentarily pressing the Power/Reset button. Display will change from “Ready for Exposure” to “Exposure Aborted” and then back to “Waiting for Reset”.

Turning the QA Mamchex Cassette OFF

To turn the meter “OFF”, press and hold the Power/Reset button down until the display reads “Power Down” and then release the button.

Note: If the QA Mamchex Cassette is ON and not used for ~10 minutes, the QA Mamchex Cassette will automatically power itself down.

Attenuation Matching Procedure

IMPORTANT: Attenuation matching must be performed prior to performing the x-ray unit's AEC calibration procedures

1. Technique to use for attenuation matching: Use Large Focus, 25kVp, Mo/Mo Anode filter combination, 4 cm breast equivalent phantom, AEC "ON", and density selector to "0".
2. Use a sheet at least 10cm x 10cm of breast equivalent material (BR12 or PMMA). Center the sheet on the top of the cassette holder from left to right and overhang the sheet by 1cm over the chest wall edge. Make sure that the sheet covers the AEC sensor position area of the QA Mamchex Cassette (AEC sensor position area is 8.5cm x 7.5cm).
3. AEC Detector Positioning: Position the x-ray unit's AEC detector ~2cm away from the chest wall, this ensures that the AEC detector is positioned in the center of the QA Mamchex Cassette's sensor position area.
4. Place the CARESTREAM DIRECTVIEW CR Mammography Cassette with EHR screen in the cassette holder and take an AEC driven test exposure. Document the exposure kVp and mAs values displayed on the x-ray machine.
5. Install one (0.2mm AL filter) and one (0.1 mm Al filter) in the plastic drawer located just below sensor position area of QA Mamchex Cassette.
6. Remove the CARESTREAM DIRECTVIEW CR Mammography Cassette with EHR screen from the cassette holder and place the QA Mamchex Cassette in the cassette holder and turn it ON. If using a 24cm x 30cm cassette holder, use the L-bracket in conjunction with the QA Mamchex Cassette to position the QA Mamchex Cassette in the cassette holder (pictures below show sequence of steps).



- 1) If an AEC calibration is required for 24x30cm cassette holder
Insert L bracket



2) Insert QA Mamchex Cassette into cassette holder with the AEC sensor position area forward



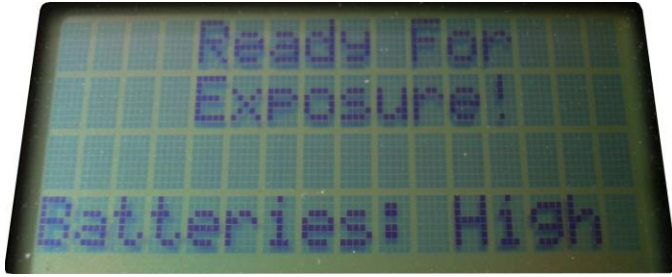
3) Insert until QA Mamchex Cassette locks in place



4) Press Power/Reset to turn QA Mamchex Cassette ON



5) Display shows Waiting for Reset and Battery condition



- 6) Momentarily press Power/Reset again. Display will show: Ready for Exposure
7. Take same AEC driven exposures as in step 4. Document the exposure kVp and mAs values displayed on the x-ray machine. Compare the mAs value obtained to the mAs value in step 4. (Confirm the kVp values are the same).

IMPORTANT: If the mAs value from step 7 differs from mAs value in step 4 by more than 2%, remove QA Mamchex Cassette from the cassette holder and add or remove attenuating filters. (% shown is approximate attenuation the filter provides).

Piece of laminated Paper: ~2%
Al Filter(0.1mm): ~18%
Al Filter(0.2mm): ~35%

8. Repeat Step 7 until mAs value from Step 7 matches mAs value from step 4 to within +/- 2%. Record the final mAs value achieved and type/number of filters used for subsequent AEC operation checks using the QA Mamchex Cassette.

AEC Calibration Procedure

Once the QA Mamchex Cassette has been attenuation matched to the CARESTREAM DIRECTVIEW CR Mammography Cassette with EHR screen, you can use the QA Mamchex Cassette to calibrate the x-ray unit's AEC system.

IMPORTANT: The Automatic Exposure Control (AEC) device must be calibrated by a qualified, trained x-ray equipment service representative.

1. Place the QA Mamchex Cassette in the cassette holder.
2. A qualified, trained x-ray equipment service representative is to perform the manufacturer's AEC calibration procedures as specified for the AEC modes, using various kVp's, Anode filter combinations and phantom thicknesses to produce a customer preferred constant O.D. value output (typically in the range of 1.5 to 1.9) on the QA Mamchex Cassette.

QA Mamchex Tool Availability

To obtain the QA Mamchex Tool contact:

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Inquire / ask for QA Mamchex Tool - Model QMX-Carestream.