SIEMENS

POLYDOROS SX 65/80

AX

Adjustment

POLYDOROS SX

Adjustment and Configuration

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Product-specific Remarks

Safety Information

NOTE

When carrying out the work steps and checks, the product-specific safety information contained in the documents and the general safety information must be observed.

Protective Measures

- Prior to performing any activity in the generator, switch it off at the power OFF switch on the D160 board.

⚠WARNING

With the generator switched off, there is still line power present at the T1 transformer D160 switch-on circuit. After switching off the generator, there is still approx. 600 V DC voltage present for the inverter!

➪ **This is indicated by LEDs V35 and V36 on the D110 and LED V89 that is lit up on the D220. The voltage dissipates within approx. 1.5 minutes to 0 V; the LEDs go off at approx. 30 V.**

- To switch power off to all parts of the system (generator and connected components), set the system switch to the OFF position.
- To prevent unintentional triggering of high voltage or radiation, set the SS switch (S1) on the D100 to OFF (no control of the inverter).
- Install or remove components only with the generator switched off; when doing this, observe ESD guidelines.

⚠WARNING

Checks and adjustments that need to be performed under X-radiation are identified with the radiation warning symbol ☢ .

➪ **Take appropriate radiation protective measures while performing these work steps.**

Required Documents

- Wiring Diagram X2206
- RX63-055.840.01... POLYDOROS SX65/80 Troubleshooting Guide
- RX63-055.841.01... POLYDOROS SX65/80 Replacement of Parts
- RX63-055.842.01... POLYDOROS SX65/80 Adjustment and Configuration

Required Tools and Test Equipment

- Service tool kit
- Service PC
- PC connection cable (Part No. 99 00 440)
- Digital multimeter (e.g. Fluke 187)
- Oscilloscope (e.g. FLUKE Scopemeter 199)

Requirements

- Completed POLYDOROS SX 65/80 course, or completed system course.
- Prerequisites for the adjustment and configuration with the Service PC are:
  - Basic knowledge such as PC handling and Windows program operation.
  - The requirements for the Service PC can be tested in the SSW under **Help / Index / PC HW Check**.

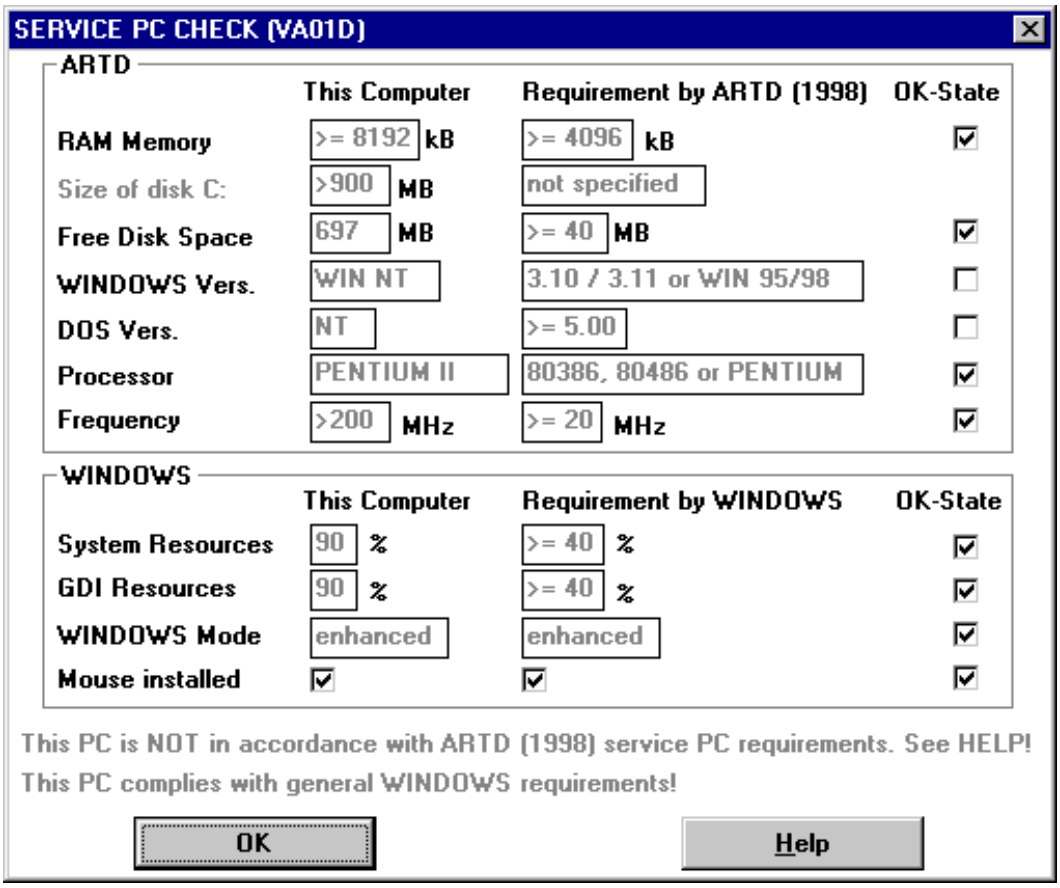


Fig. 1: SERVICE PC CHECK (VA01D)

- The Service PC “COM1 serial interface” is connected to the SX control unit or the XCU HD unit at “D320.X5” in the generator using the PC connection cable.
- To enable triggering of radiation from the PC, the S3 switch on the D100 must be set to the “Service” position.

Switching to a Different Line Voltage and Line Frequency

The line voltage and line frequency at which the generator was tested can be found in the Test Certificate.

400V / 440V / 480V Power Line Voltage

If the generator is to be connected to a different line voltage, the changes per Wiring Diagram X2206 *2 must be performed.

NOTE

A pre-transformer is also needed for 440V and 480V power systems.

50 Hz / 60 Hz Power Line Frequency Adaptation

If the generator is to be connected to a different line frequency, the changes per Wiring Diagram X2206 *2 must be performed.

- Frequency-related adaptations are made by programming the D160 board.

Line frequency	Jumper position on D160	
50 Hz	X20--X21	X23--X24
60 Hz	X21--X22	X24--X25

Checking the Phase Connection

NOTE

For units that use three-phase connections, the phase connections for the power line cables must be checked.

Use the field rotation meter to check the correct phase connections of the power line cables at M16.L1, L2 and L3:

- Connect the field rotation meter to terminals L1, L2 and L3 (on power connection side).
- Switch the system breaker to **ON**.
- Perform the measurement.
- If needed, correct the phase connection and repeat the measurement.
- Switch the system breaker **OFF**.
- Disconnect the field rotation meter.

Measuring the Internal Power Line Resistance

Measure the internal power line resistance with the internal line resistance meter connected to M16.L1, L2, L3 (one after the other, phase to phase):

- Connect the internal line resistance meter between each of the two phases of L1, L2 and L3.
- Switch the system breaker to **ON**.
- Perform the measurement.
- Switch the system breaker **OFF**.
- Disconnect the test meter and perform the measurement for the other phases.

Internal Power Line Resistance, Ri

According to VDE 0750, Section 21, IEC 601-2-7, the max. values in Ohm for UN should be - 10%

UN / P	65 kW	80 kW
400 V	0.17 Ohm	0.11 Ohm
440 V	0.20 Ohm	0.14 Ohm
480 V	0.24 Ohm	0.16 Ohm

Installing the XCS Service Software on the Service PC

NOTE

There is a SSW manager beginning with XCS SSW VE00D; with it, several versions of the XCS SSW can remain loaded on the Service PC and selected accordingly as the current working version.

Installing the SSW with Diskettes

- Install the XCS service SW version on the Service PC; to do this:
  - either delete the existing service SW on the PC,
  - or prior to installation, rename the existing SSW directory to e.g. SSWold or SSWVxxx using the File Manager.
- Insert SSW diskette **1+** into drive **A**.
- Select the File Manager in Windows.
- Install the SSW by selecting **Install.exe** and confirm with **Full Install**.

NOTE

"C:\ SSW" is pre-set. Do not change!

- Confirm the message window with **OK**.
  - A prompt will appear to insert the appropriate diskette.
- Confirm the window that follows with **OK**.
  - Then the software will create a **SERVICE** program group.

Installing the SSW using the CD

- Install the XCS service SW version on the Service PC; to do this:
  - either delete the existing service SW on the PC,
  - or prior to installation, rename the existing SSW directory to e.g. SSWold or SSWVxxx using the File Manager.
- Insert the SSW CD into the CD drive.
- Select the File Manager in Windows.
- Install the SSW by selecting **Install.exe** and confirm with **Full Install**.

NOTE

"C:\ SSW" is pre-set. Do not change!

- Confirm the window that follows with **OK**.
  - Then the software will create a **SERVICE** program group.

NOTE

"C:\ SSW" is pre-set. Do not change!

Selecting the XCS Service Program

- Select **XCS SERVICE**.

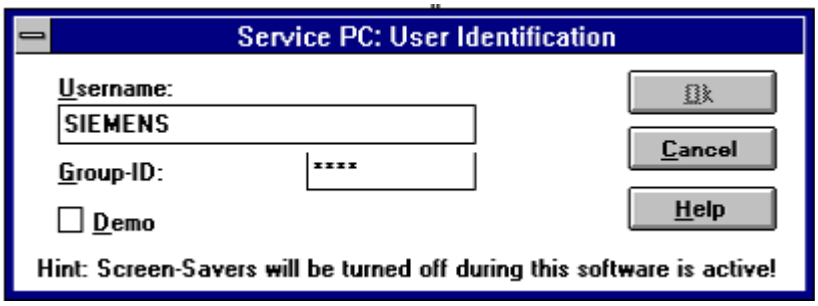


Fig. 2: Service PC:User Identification

- User name: enter **Name**.
- Group ID: "enter **_siemens"**.

NOTE

If "Demo" is checked, the software can work without the XCU. Communication with the XCU is not possible under "Demo function".

- Exit the window with **OK**.

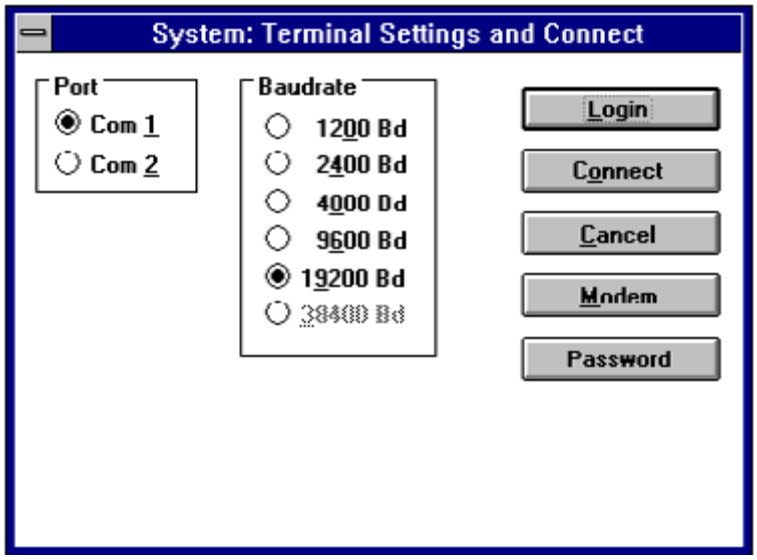


Fig. 3: System Terminal Settings and Connect

NOTE

When Connect is selected, “System” “Realtime Cl” (clock time for the XCU) and “ID Codes” are enabled in the main menu.

If Password is selected, a password is requested; see the chapter “Variable Password”

- Exit the window with **Login**.
- If **Login** is selected, a connection to the XCU is established.

ID Codes in the System Menu

NOTE

Setting the system ID code is necessary:

- prior to entering the variable password

- the first time there is a log-in with a newly installed XCS SSW

To set the ID codes in the system controller, it is permissible to have performed CONNECT but not LOGIN yet. The entries are used here to generate the variable password. While the System Host ID is only displayed and cannot be changed, the two other Serial Numbers and Product Types (maintenance unit numbers) must be entered specifically.

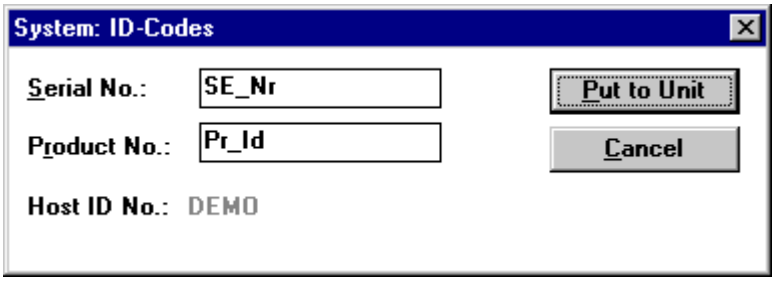


Fig. 4: System: ID-Codes

- Put to Unit — The data that were set are saved in the system controller.
- Cancel — The data are not changed in the system controller
- Serial Number — **= entry of the System Serial Number**
- Product No. — **Maintenance Unit No. of System (in combination with the variable password)**

Variable Password

What is referred to as a variable password must be generated for XCU-based systems. To generate a variable password, please contact the person responsible for this in your Regional Unit. If this person cannot be contacted, you can also have the password generated by HSC in exceptional cases.

The following data must be available to generate the password:

- Host ID
- System Serial No.

The Host ID can be read out from the XCU under <System><ID Codes> using the Service PC.

NOTE

Prior to entering the variable password, set the System Serial Number and the maintenance unit under <System> <ID Codes>.

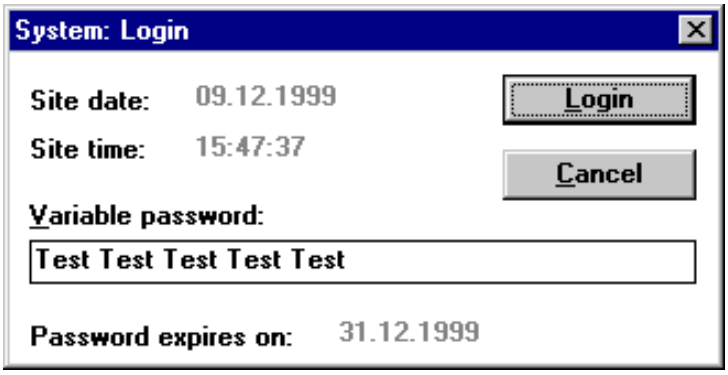


Fig. 5: System: Login

Exiting the Service Software

- In the window, select "XCS-Service Application - Main Program/System/Quit".

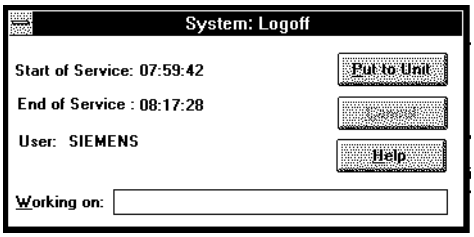


Fig. 6: System Logoff

- **Working on:**

  Enter text, e.g. “Restore performed”. (Texts can be read out in “Main Program / Info”).

- Select **Put to Unit**.

XCS Help

- Selection in the **main menu, "Help/Index**".

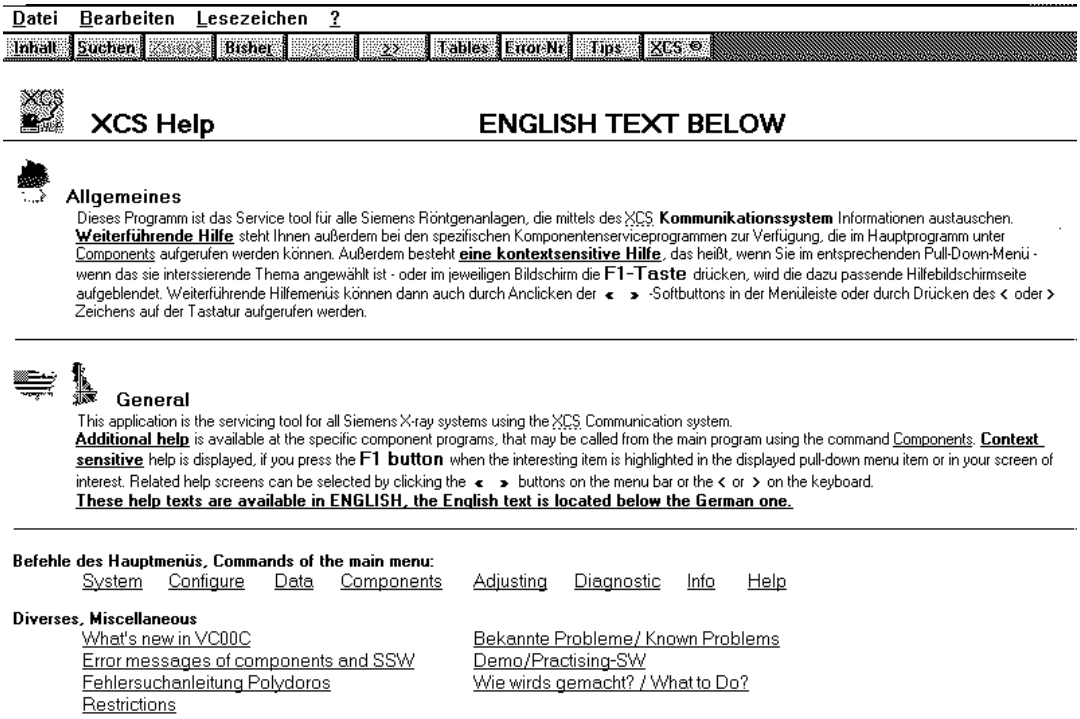


Fig. 7:

Reading Out the Config and Adjustment Data

NOTE

The configuration and adjustments have already been performed for equipment shipped as a system. The SSW diskette, "Site Data Disk", included in the shipment is a backup.

Printing Out the Site Structure Configuration:

- In **Configure / Site Structure**, press the **List** button in the Component Selection window.
- In **Configure / Site Structure** in the **Component Selection** window, press the **OK** button, in the **Edit System** window, press the **List** button.
- In **Configure / Site Structure** press the **OK** button in the **Component Selection** window, in the **Edit System** window, press the **OK** button, in the **Fluoro Details** window, press the **List** button.
- In **Configure / Site Structure**, press the **OK** Button in the **Component Selection** window, in the **Edit System** window, press the **OK** button, in the **Fluoro Details** window, press the **OK** button, in the**Edit Fluoro Programs** window, press the **List** button.
- In **Configure / Site Structure**, press the **OK** button in the **Component Selection** window, in the **Edit System** window, press the **OK** button, in the **Fluoro Details** window, press the **OK** button, in the **Edit Fluoro Programs** window, press the **OK** button, in the **Site Adjustment** window, press the **List** button.

Printing Out the Adjustment Results:

- Component / Polydoros SX / Diagnostics / Adjustment Results / Display all Parameters.

NOTE

Tip: If you always enter the same name for the file name in all print dialogs for Site Structure Configure, all Print to Files will be written to the same file, one after the other.

Configuration

NOTE

Programming the options is permitted only if the corresponding license is available!

- Select the system under **Configure / Site Structure / Site Selection** and confirm with **ok**.

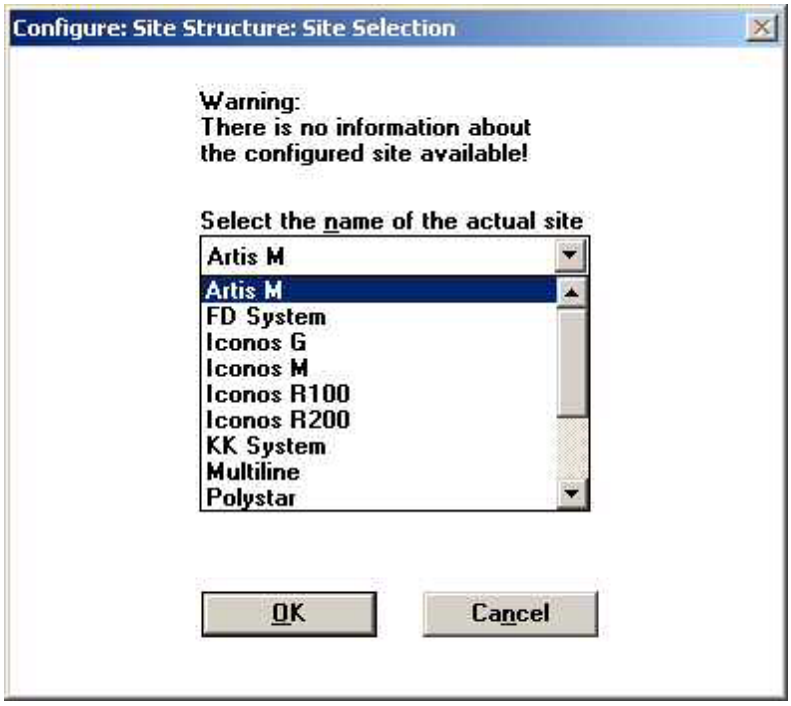


Fig. 8: Configure - Site Structure, Site Selection

NOTE

If Configure / Site Structure / Site Adjustments has been saved once, the Configure / Site Structure / Component Selection window is selected immediately when Configure / Site Structure is selected. Changing Configure / Site Structure / Site Selection is possible only if Data / Erase Configuration was performed first. All configuration and adjustment data are lost when Data / Erase Configuraion is selected.

- Select the configured components under **Configure / Site Structure / Component Selection** and configure them with Edit and/or Option.

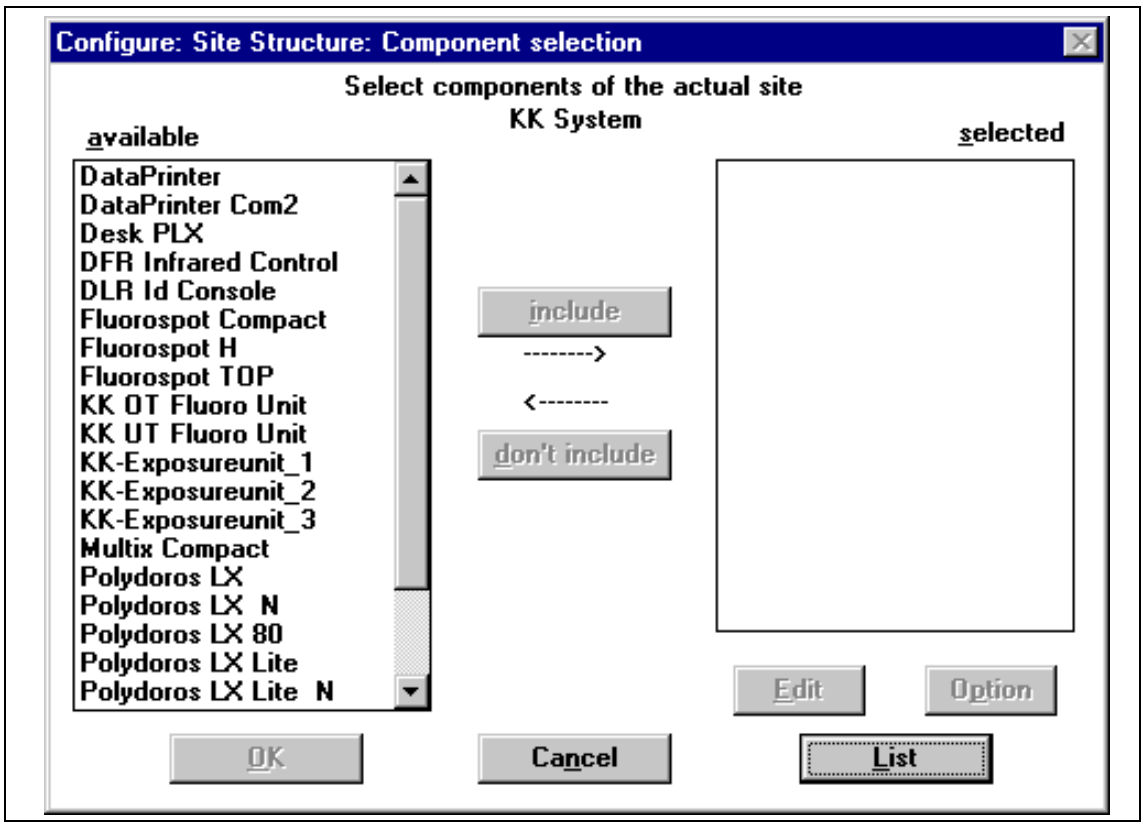


Fig. 9: Configure:Site Structure:Component selection

- **Configure / Site Structure / Edit System**

⚠WARNING

If the tube unit is replaced with a different tube unit mode, particularly when a tube unit with a 0.3 mm filament is replaced with a tube unit that has a 0.22 filament:

➪ **the programming for the tube unit model must be performed with the X44 connector (D160) unplugged.**

NOTE

Window: Configure / Site Structure / Edit System:

If tube unit type is clicked on, even if it is not changed, the tube unit data are immediately set back to the default data. This means that test shots of the tube unit must be performed every time this is clicked.

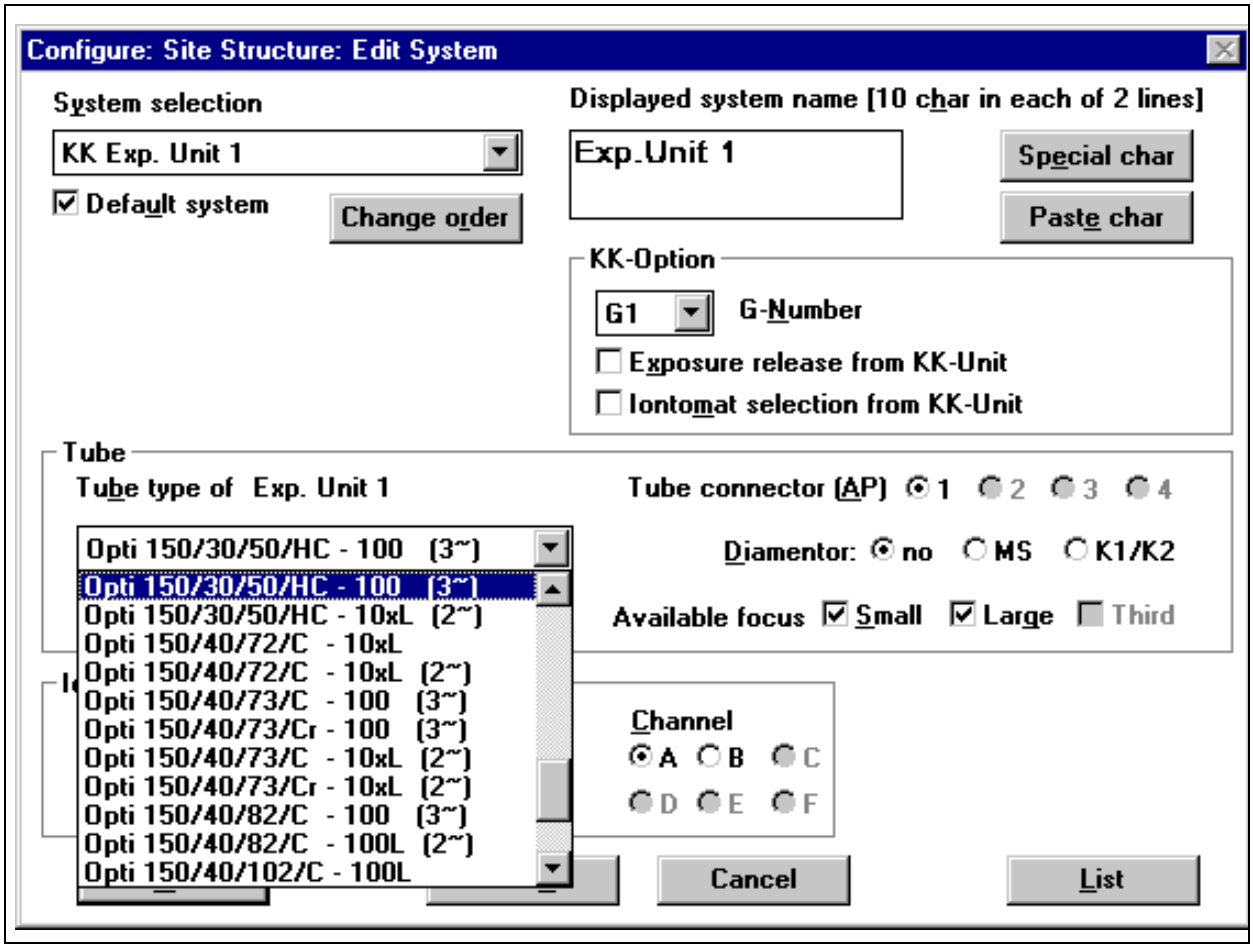


Fig. 10: Configure:Site Structure:Edit System

- **Configure / Site Structure / Site Adjustments**

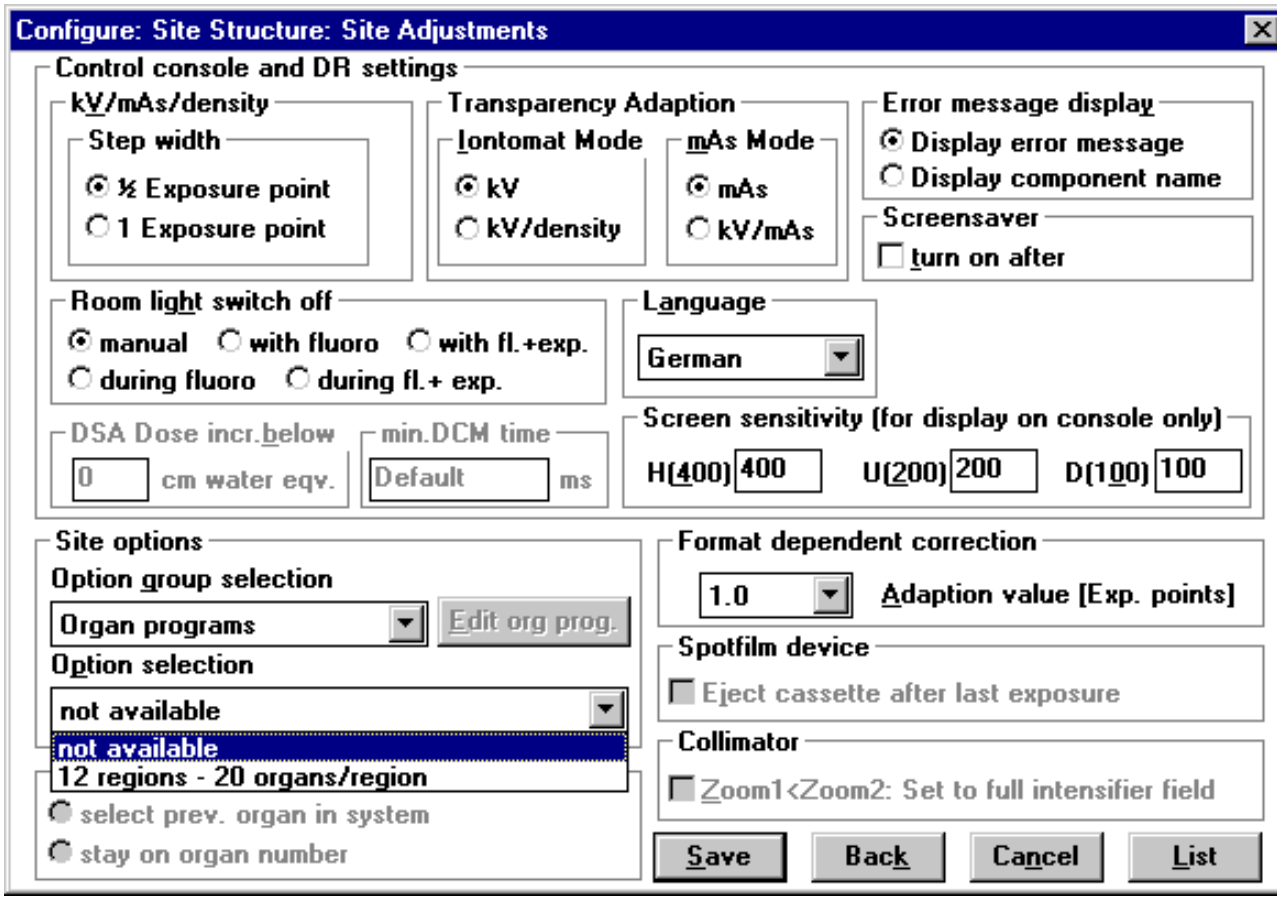


Fig. 11: Configure:Site Structure:Site Adjustments

NOTE

In systems with the FLUOROSPOT T.O.P., no "Default organ programs" may be loaded from the program Configure / Site Structure / Site Adjustments.

If "Default organ programs" are loaded, they cannot be used in combination with the FLUOROSPOT T.O.P.

Window: Configure / Site Structure / Site Adjustments:

If a license is available, the "Organ Program" option can be enabled in the Site Options menu - "Default organ programs" will then be available.

- Exit the **Configure / Site Structure / Site Adjustments** window with **"Save"**.

NOTE

The configuration is saved in the XCU with Save and a backup is generated on the "Site Data Disk".

- Exit the message window that follows with **OK**.
- **Language Download for Displayed Texts on the Touchscreen Console**

NOTE	Perform only if the D230, Part No. 48 19 640 X2076, is configured.

- Select **Component / PLSX Desk**.

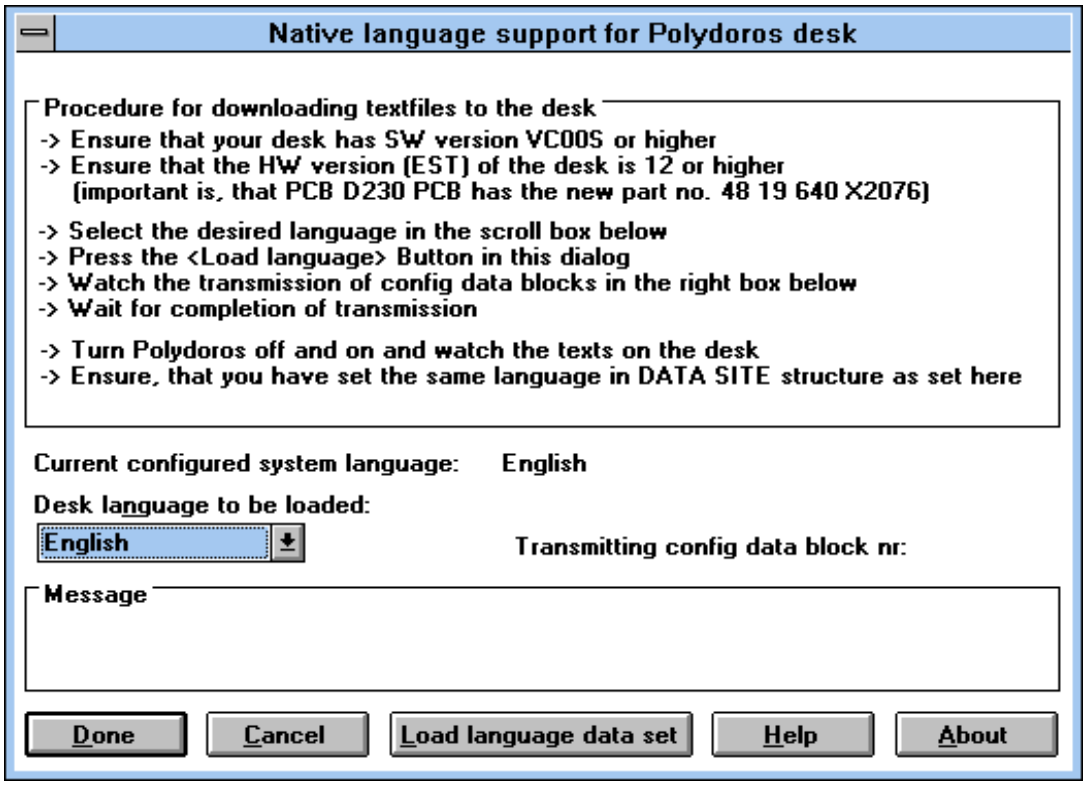


Fig. 12: Native language support for Polydoros desk

- Select **Desk language to be loaded** and the appropriate language.
- Select **Load language data set**.
- Exit the service window with **Done**.

Generator Parameters

- Select the **Generator Parameters** in XCS SSW / Components / Polydoros / Diagnostic /.
- In the "Generator Parameters" window, select the high voltage cable lengths for the particular tube unit (Tube 1, 2).
- Exit the window with **OK**.

Warm-up

- Select **Warm Up** in the XCS SSW / Components / Polydoros / Adjustment /.

⚠CAUTION **Radiation is triggered in the next work step**

➪ **Close the collimator, cover the I.I. with a lead-rubber apron.**

- In the "Warm Up" window: click on "Fluoroscopy **ON**": fluoroscopy will be switched off automatically **after 10 min.**.
- Exit the window with **OK**.
- The adjustment points: " Pre-Heating, Filament Correction, Filament Push current" will be performed by the software. While this is happening, switch on fluoroscopy or exposure in the window until the "**OK button**" goes on.

NOTE **First the small focus, then the large focus is completely calibrated (test shots).**

- Exit the window with **OK**.
- Repeat the adjustment of the fluoroscopy option.

Checking Exposure Heating

- At the console, select the kV value and the tube current values (mAs/ms) in each instance.

NOTE **With the Artis U, select the following settings in the XCS SSW / Components / Polydoros / Diagnostic / Manual Exposure.**

- 3-point technique
- 81 kV
- 40 mAs
- ■
- 100 ms or the next possible value

- Trigger an exposure for each tube unit configured (S27: approx. 2s prep, then HK **ON**) and check the curve for the exposure voltage and tube current on the oscilloscope.

  The exposure voltage must be flat during exposure. The tube current should rise to ±10% of the reference value within 50 ms and be flat during exposure.

  If the measured values differ from the specifications, test shots must be performed again for the tube unit (calibrated).

Checking the Heat-up

- Make an exposure using the values listed above each time ("trigger" S27) and check the curves for exposure voltage and tube current on the oscilloscope: The exposure voltage must be even during exposure.

  The tube current should stabilize within 50 ms to ±10% of the reference value and should be even during exposure. If the measurement values differ from the specifications, test shots must be made again for the tube (calibrated).

mAs Relay Adjustment

- Select **mAs Relay Adjust** in XCS SSW / Components / Polydoros / Diagnostic /.
- Connect the mAs meter to D220.X16 (mAs socket).
- Exit the message window with **OK**.

NOTE

Perform the mAs relay adjustment:

1. During startup (not done when system is shipped)

2. Following replacement of the D100

3. If there are differences from mAs values in the 2-point technique.

- Select
- **"Exposure ON**".
- Enter the measured value in "**Measured value: ...**".
- Exit the window with **OK**.
- Remove the mAs meter and reinstall the mAs jumper.

NOTE

Following "Erase Configuration" or during the first adjustment of this module, the following message appears: "You are about to generate Init Block # 103! Do you really want to do this?"

Answer this question with "Yes".

Checking the mAs Values

- Switch the generator **OFF**.
- Remove the jumper from the mAs socket on the D220 board (on the H1).
- Connect the mAs meter to the mAs measuring sockets.
- Connect the oscilloscope to the following points, D100/X61.kVist
- Trigger SWR D100/X64
- Switch the generator **ON**.

- Select the following values at the console for the tube unit with the highest power:
  ■, 77 kV, 80 mAs, 100% kW
- Trigger exposure and check the mAs value on the mAs meter.
  For the tolerance, see the Test Certificate.

FC Attachment Adjustment

Adjustment of the Fluoroscopy Option

NOTE

Perform the adjustment of the "FC Attachment":

1. During startup

2. Following replacement of the D100

3. Following replacement of inverter components (fluoro option)

See the Speed Info in the Knowledge Database “POLYDOROS SX65/80: Adjusting the Fluoroscopy Attachment” on the MED CS INTRANET.

MS Diamentor

NOTE

There are separate installation and adjustment instructions for the Diamentor K1/K2 and for the KermaX dose area product measuring system.

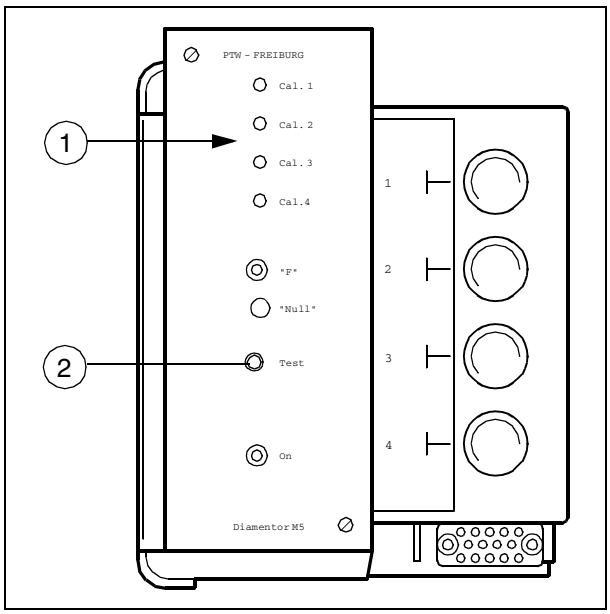


Fig. 13:

Procedure

- Select the **Diamentor** in XCS SSW / Components / Polydoros / Diagnostic /.
- Enter the following values in the "Diamentor Calibration" window in the "Diamentor Factors" box: read the **KG value/s** from the measurement chamber/s and the **QT value** from the DIAMENTOR MS in the assembly, or obtain them from the DIAMENTOR MS Function Description.

NOTE

Multiply the KG value by the factor 0.86, only with the SIRESKOP SX.

- Select "Diamentor Calibration **Start Autocycles**" in the window and start the adjustment with the "Test" button on the DIAMENTOR.
- **0** must be displayed in the "Diamentor Calibration" window, in the "**Actual-Expected Value**" box. If this is not the case, use the particular CAL1... CAL4 potentiometer to perform the zero adjustment. After adjusting the potentiometer, press the "Test" button. Repeat the procedure until 0 is displayed in the **"Actual-Expected Value"** box.
- Exit the window with **OK**.

Iontomat Sensitivity

General Information

Three different exposure steps (BSt) corresponding to three different film-screen combinations (H, U, D) can be programmed at the generator.

- The screen and the film intended for it must be recorded in the IQ Test Certificate for each exposure step with the data:
  - Sensitivity, S
  - Theoretical dose requirement, K_S
  - Minimum resolution, R_{Gr}
  - Color sensitivity of the films and screens

NOTE

Make sure that only films for the light color for which the screen is sensitize determined are used (green sensitive film for green screen, blue for blue screen).

- The sensitivity, S (speed), specified by the manufacturer must be recorded for each film-screen combination.
  - The sensitivity of a film-screen combination is defined according to ISO 9236 as the quotient of 1000 µGy and the air kerma (dose) $_S$ required to achieve an optical density (blackening) of 1 above base fog.

$$S = \frac{1000\mu Gy}{K_S}$$

- With a known sensitivity S, see also the “Appendix, Sensitivity of Film-Screen Systems”, the theoretical dose requirement, K_S must be calculated and documented:

$$K_S = \frac{1000\mu Gy}{K}$$

  - A minimum resolution R_{Gr} in LP/mm is assigned to each required dose K_S, i.e. the higher the required dose is for a film-screen combination, the higher the resolution that must be reached in order to justify the increased dose.

    The particular minimum resolution, R_{Gr}, must be taken from the illustration for each film-screen combination used.

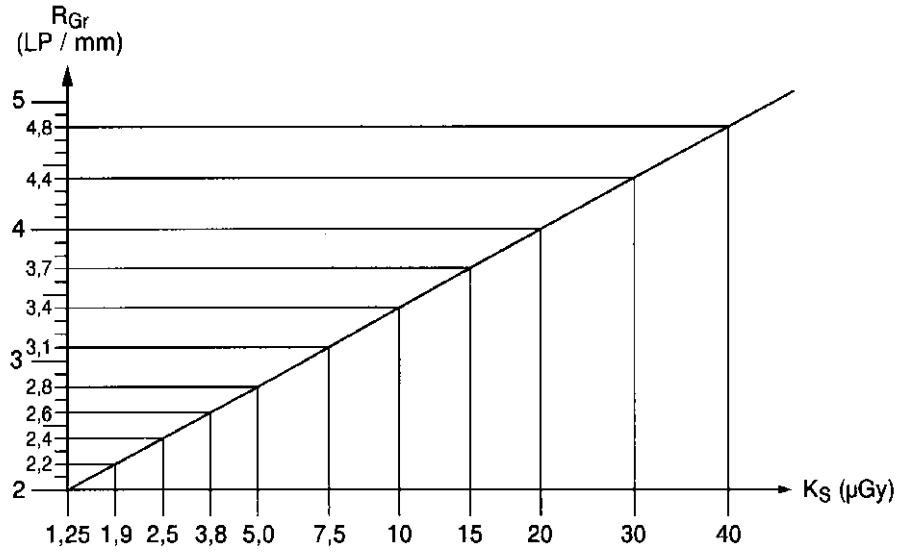


Fig. 14:

K_B	= Dose requirement of the film-screen combination per DIN 6867
R_{Gr}	= Minimum resolution of the film-screen combination per DIN 6868
S (Speed)	= Sensitivity of the film-screen combination (ISO 9236)

NOTE

There are no international, uniform regulations regarding use of the film-screen combinations; national regulations (e.g §16 RöV) must be observed in the particular country.

Checking the Chamber and Measuring Field Selection

Perform the following checks for all connected IONTOMAT detectors and their measuring fields (dominants):

Detector Selection

- Select the particular IONTOMAT work station (unit) at the generator deck.

- Open the collimator at the unit so that the measuring fields for the IONTOMAT chambers are fully exposed.
- SS **ON**.

- Trigger an exposure (at the 73 kV default value).
  - ➪ Required: An immediate switch-off must take place; if there is incorrect chamber selection or if there is a cable break, ERROR 550 appears (dose monitoring).

Measuring Field Selection

- At the generator or at the unit, select a measuring field for the IONTOMAT chamber.
- Cover the measuring fields that are not selected on the IONTOMAT chamber (e.g. with a lead apron).

- Trigger an exposure:
  - ➪ Required: An immediate switch-off must take place.

- Select one of the covered measuring fields and trigger an exposure:
  - ➪ Required: The exposure must take a log time or ERROR 550 must be displayed.

NOTE

If measuring field selection takes place at the unit (Configurate: Site Structure: Edit System"), all measuring fields will be dark (touchscreen console) when the generator is switched ON at the generator console - only with KK systems!!!

Determining the Optical Density

NOTE

Tables can be found in the chapter, "Sensitivity of the Film-Screen Systems" from which the values can be determined.

- For all screens used and work stations, make test exposures at 81 kV, small focus, 80% using **20 ± 0,5 cm** and **5 ± 1 cm** water (≥ 18 x 24 cm film format) and check the film density of each:

  The films must have the optical density that the customer desires. If there is no specific customer requirement, adjust to a net optical density, DN = 1 (density of 1.0 + 0.2 above base fog).
- If necessary, correct the programmed sensitivity values (connector position) under XCS SSW / Components / Polydoros / Adjustment / **Iontomat Sensitivity**.

  For exposures with the side measuring fields, the difference may not exceed ±0.2 of the optical density in the range of the measuring fields.

Iontomat Adjustment

- Select **Iontomat Sensitivity** in XCS SSW / Components / Polydoros / Adjustment /.
- Select the detector to be adjusted.
- Determine and program the basic sensitivity required for the film-screen combinations being used.

- Determine and program the delay per the system-specific object path.

Recommended Values for the Basic Setting

Empfindlichkeit/Sensitivity
400 / 11
200 / 14
80 / 17

NOTE

The data in the XCU can be updated with "Transfer Value" and control exposures can be made without having to exit the SSW.

- Exit the window with **OK**.

Plani Iontomat

Checking PLANI IONTOMAT Selection

- Switch the generator ON.
- Select IONTOMAT at the deck and a tomo time at the tomo unit.
- The displays for the "IONTOMAT" and "Tomo unit" operating modes must light up on the control console and the tomo time selected at the unit must be displayed in the ms display.

PLANI IONTOMAT Density Correction

Prerequisite: The basic adjustment of the Iontomat (Iontomat Sensitivity) must already have been performed.

- Select direct mode at the tomo unit and insert a cassette.
- Position the **20 ± 0,5 cm** water phantom on the tabletop.
- Collimate accordingly.
- Select 8°/0.6 sec at the tomo device.
- Select 81 kV, screen H and the middle Iontomat measuring field.
- Select **Plani Iontomat** in XCS SSW / Components / Polydoros / Adjustment /.
- Select **<Tomo System>** and **<Tomo Programs 1>**.

- Trigger a tomo exposure.
- Develop the film and measure the optical density. If the desired density is not reached, change **<Blackening Correction / Iris Correction>**, **<Put to Unit>**

NOTE

In this case, the iris setting is not changed with "Iris Correction", but the dose!

- Trigger a tomo exposure, develop the film and measure the optical density. Change the <Blackening Correction / Iris Correction> until the desire optical density is reached.

- Select **<Tomo Programs 2>** and select 20°/0.8 sec at the tomo unit and proceed as for 8°/0.6 sec

- Select **<Tomo Programs 3>** and select 40°/1.2 sec at the tomo unit and proceed as for 8°/0.6 sec.
- <OK>
- <System>
- <Quit Ctrl X>
- Click on the top left of the screen and then click on <Close>.
- Enter any letter in the "Working on" line and click on <**Put to Unit**>.
- Switch off the system.

Iris Adjustment for Digital Tomo

NOTE	**Perform only in systems with the FL-Compact!**

- Select DFR, select Zoom 0 (full format)
- Position the **20 ± 0.5 cm** water phantom on the tabletop.
- Collimate accordingly.
- Select a focus-I.I. distance (SID) of 115 cm
- Select 20°/0.8 sec at the tomo device
- Set the SS to ON
- Click on <Set> at the FLC and then select <IQ ON> or <BQ ON>.
- Click on<Service> and enter "test" as the password to call up the service mode.
- Click on <Acq> and select Service Program 1. If "Service Program 1" cannot be selected, first make a tomo exposure.
- Click on <Set> <Organ> and check whether 70 kV is set in Program 1 for the exposure kV; if not, set 70 kV and save the change with <Store>.
- Select **Plani Iontomat** in XCS SSW / Components / Polydoros / Adjustment /.
- Select **<Tomo DFR System>** and **<Tomo Programs 2>**. Make sure that "Iris Correction" is set to 0.0, **<Put to Unit>**, **<OK>**, **<System>**, **<Quit Ctrl X>**

- Click on <Acq> and trigger a tomo exposure.
- Click on <ROI 20> and measure the gray value in the center of the image. Required value: **400 ± 15 %**
- If there are differences, start XCS SSW / Adjustment / **TV-Parameter** and select **<Exposure Tomo>**, change the **<Iris Correction>**, **<Put to Unit>**, <Start>, trigger exposure, <Stop>, measure the gray value (again with <ROI20>) and, if needed, continue changing the **<Iris Correction>** until the desired reference value is reached. <Close>
- Select 8°/0.6 sec at the tomo device.

- Select XCS SSW / Component / Polydoros SX / Adjustment / **Plani-Iontomat**, select**<Tomo DFR System>** and **<Tomo Programs 1>**, **<Put to Unit>**, <Start>, trigger a tomo exposure.
- Click on <Stop>, <ROI 20> and measure the gray value in the center of the image. If the required gray value of **400 ± 15 %** is not reached, change the **<Iris Correction>**.

- **<Put to Unit>**, <Start>, trigger a tomo exposure and, if needed, continue changing the <Iris Correction> until the desired reference value is reached.
- Select 40°/1.2 sec at the tomo unit.

- Select **<Tomo Programs 3>** and proceed in the same way as described for 8°/0.6 sec and <Tomo Programs 1>.
- <OK>, <System>, <Quit Ctrl X>

Checking the kV Reduction Value

NOTE

Perform the following points:

- Checking the kV Reduction Value

- Checking Control when Exposure is Triggered

- Checking Drift and Hum

- Checking Dose Rate Control

only if problems occurred during adjustment of the density correction or during iris adjustment with digital tomography!

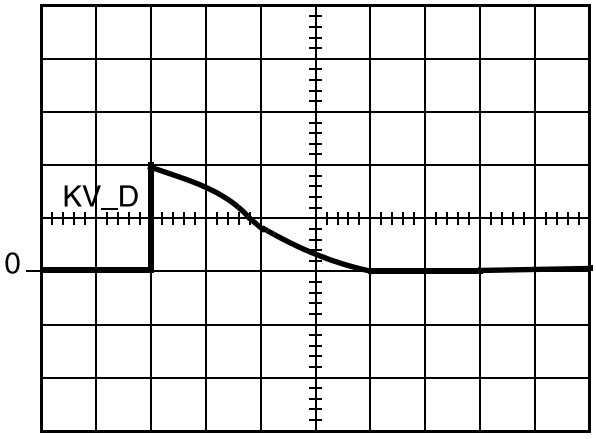
Otherwise, continue with the section "Cutoff Dose".

- Switch the SS **OFF** and the generator **ON**.
- Connect the oscilloscope:
  - Channel 1: D100.X61 KV_Δ and D100.X61 A_GND (1V = 20 kV).
  - Trigger: D100.X64 SWR (leading edge)
- PLANI-IONTOMAT (IONTOMAT and Tomography) selected.
- Select 81 kV at the console.
- Trigger exposure using the trigger button

  Calculation:

  Starting value kV_{ANF} for kV controller = 40 kV = 2.0V

  kV_ Δ = kVSOLL - kV_{ANF} = 81 kV - 40 kV = 41 kV = 2.05V



Channel 1: 1V/div.

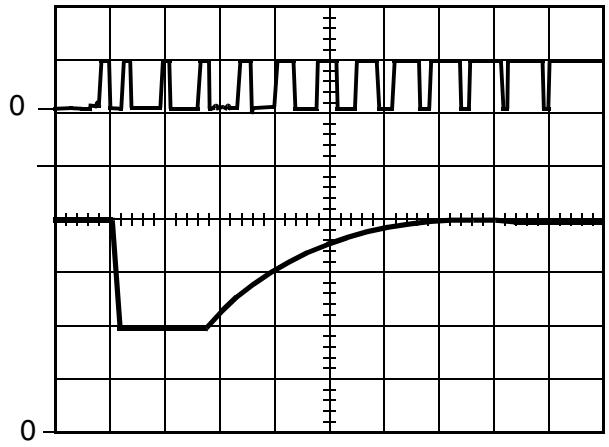
Offset: 10 ms/div.

Fig. 15: D100.X61 kV_Δ

Checking Control when Exposure is Triggered

- Connect the oscilloscope:
  - Channel 1 to D100.X64 SWR
  - Channel 2 to D100.X61 kV_{SOLL} (1 V = 20 kV)
  - Ground to D100.X61 A_GND

- PLANI-IONTOMAT (IONTOMAT and Tomography) selected.
- Select 81 kV at the console.
- SS **OFF**
- Trigger exposure and check the signal curve of SWR (pulse-pauses control) and kV NOM (kV reduction).



Channel 1: 10V/div.

Channel 2: 1 V/div.

Offset: 10 ms/div.

Fig. 16:

Checking Drift and Hum

- Select **Iontomat Sensitivity** in XCS SSW / Components \ Polydoros \ Adjustment \ .
- Work station (CH: A...F) program sensitivity 10 (Sensitivity = 10) (make a note of the original sensitivity).
- Connect the oscilloscope:

  - Channel 1: D190.X26 UDL and D190 A_GND (0V)

  - Triggering: D100.X64 SWR
- Select the particular tomo time at the tomo device; perform the checks, once after the other, for all selectable tomo times.

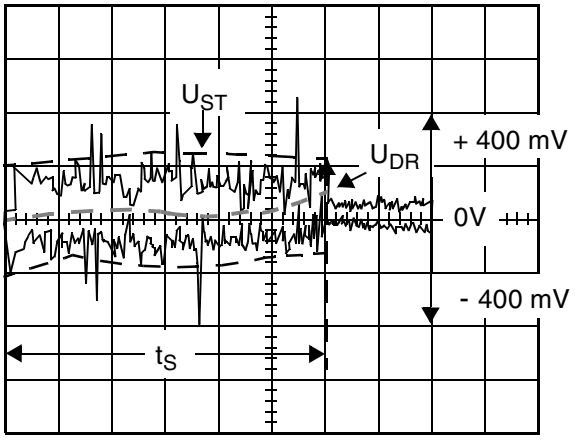
- Trigger exposure (SS **OFF**) and check the drift and hum:

  - Drift:

  The drift (U_{DR}) may be a maximum of ±400 mV/tomo time (ts). In the following oscillogram, the max. drift is +100 mV.

  - Hum:

  The hum (U_{ST}) may be a maximum of 1 V_{pp}. In the following oscillogram, the max. hum is 500 mV_{pp}.



Drift and hum at
D190.X26 UDL
Channel 1: 200mV/div.
Offset:
200 ms/div.

Fig. 17:

- Select **Iontomat Sensitivity** in XCS SSW / Components \ Polydoros \ Adjustment \ and for the PLANI-IONTOMAT work station (CH: A...F), again program the sensitivity originally determined (Sensitivity).

Checking Dose Rate Control

- Connect the oscilloscope:

  - Channel 1: D190.X26 UDL

  - Channel 2: D100.X61 KV Act

  - Ground: D100.X61 A_GND

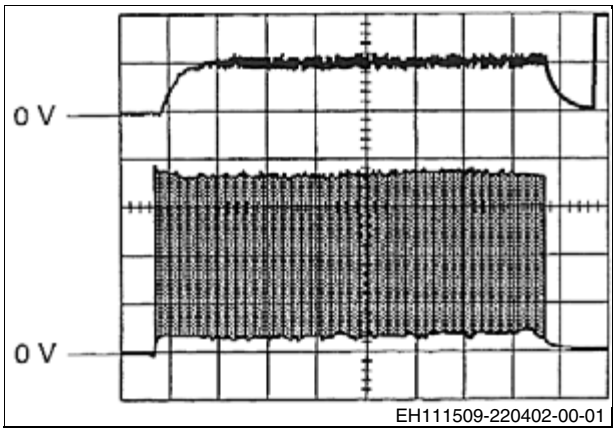
  - Trigger: D100.X64 SWR (leading edge)
- SS **ON**
- Select the IONTOMAT (middle measuring field) and 81 kV at the console.
- Use a 20 cm water phantom ±1 cm for the following test exposures; collimate to the phantom.
- Select the particular tomo time at the tomo device. Perform the check for all tomo times, one after the other.

- Trigger an exposure for each tomo time and check using the following oscillogram:

  After max. 1/4 of the tomo time, ts, the dose rate actual value, UDL, must have reached the corresponding required value. The required values are between 4 V and 8 V.

  Oscillogram, Fig. 7:

  - Tomo time 0.8 s, 81 kV, 20 cm water phantom ±1 cm
  - Offset: 100 ms/div.



UDL (5 V/div.)

kV_{act} (+1V = 20kV)
1 V/div.

Fig. 18: Planiiontomat kV_{ist} measurement

Sample Exposure

"Lung exposure" = tomo exposure of a 10 cm water phantom ±1 cm with PLANI-ION-TOMAT.

Adjustment Values:

- At the tomo device: Tomo time 1.25 s
- At the console: 125 kV, 12.5 mAs, [•]+ ms

Test Points:

Oscilloscope:

Channel 1:	D190.X26 UDL
Channel 2:	D100.X61 KV Act
Ground:	D100.X61 A_GND
Trigger:	D100.X64. SWR (leading edge)
Offset:	200 ms/div.

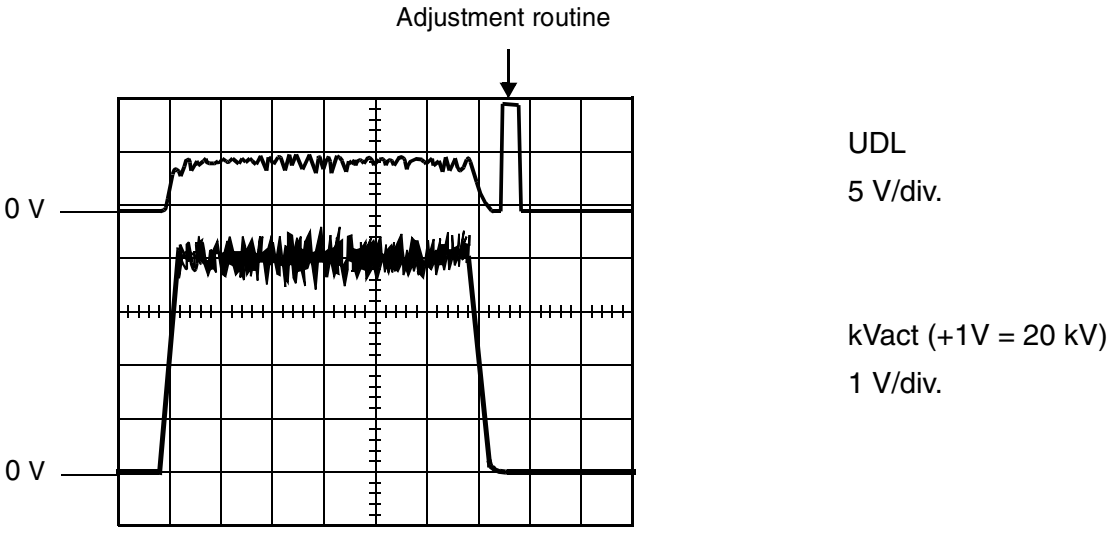


Fig. 19:

Cutoff Dose

The cutoff dose must be measured at each application unit for IONTOMAT P and for PLANI-IONTOMAT for all exposure steps (screen) used.

Test Conditions:

- Exposure parameters: 81 kV, small focus, 80% power; middle measuring field
- Move the scatter radiation grid into the beam path.
- SID to be set: OT units: 115 cm; UT units: max. distance (no Distator); record the SID set.
- Make the exposures.

  If exposures using a different kV value (e.g. 125 kV at the BWS) are made exclusively at one work station, record the kV value.

Procedure:

- Insert the 2.1 mm precision copper filter into the beam path:

  OT units at the collimator; UT units on the tabletop, if the collimator is not accessible.

NOTE

The dosimeter must be switched on for 15 minutes prior to beginning measurement and then must be calibrated. No additional filtering may be selected at the collimator.

Set the density correction to 0 ±exposure points.

- Insert the dose measurement chamber into the cassette holder and collimate slightly larger than the chamber size.
- Trigger an exposure.
- Measure the cutoff dose, K_B and record it.

- Take the dose measurement chamber out of the cassette holder and in its place, insert a 18x24 cm (8"x10") or 24x30 cm (10"x12") cassette without film.

- Repeat the exposure and record the mAs value displayed at the generator.
- If the measuring location K_B in the image receptor plate for the dose measurement chamber is not accessible, measure the transmission dose K_T and covert it to the image receptor dose K_B using the following formula.

$$K_B = \frac{K_T \times 0{,}94}{m}$$

Fig. 20:

Record both dose values, (K_T and K_B).

- The dose, K_T is measured on the tabletop for OT units; with UT units, on the back wall of the spotfilm device.
- The factor **0.94** takes the radiation attenuation of the dose measuring chamber into consideration.
- The correction factor, m, takes all attenuation layers (grid, IONTOMAT chamber, etc.) between the patient and ht image receptor plane into consideration.
- The correction factor, m (equipment attenuation factor), can be found in the Unit Test Certificate for the particular application unit.

- Compare the measured cutoff dose values, K_B with the film-screen combination being used with the required dose K_S that was recorded.
- Admissible difference:

$$K_B \leq 2{,}5 \times K_S; \quad \left(K_S = \frac{1000\,\mu Gy}{S} \right)$$

Fig. 21:

Maintenance and Service

- During maintenance work or in a service situation, the function of the automatic exposure control can be easily and quickly checked using what is called the "Indirect Dose Control".
- Insert the 2.1 mm precision radiation filter into the beam path.
- Insert a cassette without film into the cassette holder and collimate to the cassette size.
- Set all exposure parameters and test conditions listed in the Test Certificate.

- Trigger exposure and compare the mAs value displayed at the generator or measured using the mAs meter with the value recorded in the Test Certificate.
- If the recorded value is reached to an accuracy of ±10%, nothing in the automatic exposure control has changed. If K_B is > 2.5 K_S, check film processing and the film material being used. It can also be assumed that the screens are a source of error or can be mechanically worn.

Resolution Power

The resolution power must be determined for each film-screen combination.

Test Conditions:

- Small focus, 80% power; middle measuring field; 81kV.
- SID: OT units = 115 cm; UT units, max. distance (no Distator)
- 1.2 mm Cu pre-filter, OT units at the collimator; UT units on the tabletop, if the collimator is not accessible.
- Place the lead strip test outside the IONTOMAT measuring field:

  OT units on the tabletop, UT units on the back wall of the spotfilm device.

Procedure:

- Trigger an exposure with every film-screen combination recorded in the IQ Test Certificate.
- Determine the effective optical resolution using a magnifier (at least 6x magnification) on a light box and record the result.
- The minimum resolution R_G for each film-screen combination must reach the minimum resolution recorded in the IQ Test Certificate.
- If the minimum resolution is not reached, check the screen for damage and for soiling and the cassette for correct flattening of the screen.

Checking Grid Blur

A check must be performed for every application unit with a movable grid, at which exposure time, tg, grid stripes can no longer be detected on the film.

Test Conditions:

- Small focus
- 80% power
- Middle measuring field
- Do not insert a filter into the beam path.
- SID = grid focusing distance or the next possible SID

Procedure:

- Cassette (if possible, with multiple subdivisions) without film into the cassette holder. Adjust to the subdivided format.

- Trigger an exposure at 40 kV and read the exposure time at the generator. Using several exposures at increasingly higher kV values, determine at which kV values exposure times of approx. 6, 8, 10, 12 ms, etc. result.

- Insert cassettes with fine-resolution screens in the cassette holder, if possible select multiple subdivisions, and trigger exposures one after the other using the determined kV values (switch times).
- Use a magnifier on the light box to determine at which switch time grid stripes can no longer be detected on the film. These switch times must be recorded with the data for the screen that is used, as well as the kV value.

Test Exposure

Measure the dose behind a defined radiation absorber.

- Set the following values:
  - **81 kV**
  - **32 mAs**
  - **Small focus, 80%**
- Center the detector for the dose meter in the beam.
- Remove all selectable filters.
- Measure the distance between the bottom edge (cross hair) of the collimator and the detector mount (tabletop) to exactly 70cm. If this distance cannot be reached, set to the next possible value and record the value reached.
- Collimate the radiation field close to the edge of the detector, but make sure that the entire detector is in the radiation field.
- Insert a radiation absorber between the tube unit and the detector, close to the tube unit.

  Preferably, insert the 2.1 mm Cu precision filter in the bottom filter rail of the collimator.

- Trigger an exposure and make a note of the dose reached.

  ➪ Starting value: ..... mGy/min

Voltage Response Correction

- Make test exposures at 60 kV and 125 kV using 20 cm water for each screen used and check the film density of each exposure.

  The film density at 60kV and 125kV must match the film density at 81kV (Section "Checking the Film Density).

  The difference in density can be

  between Dopt (81 kV) - Dopt (60 kV) ≤0.2

  Dopt (81 kV) - Dopt (125 kV) ≤0.2 of the optical density.

- Select the **Voltage Response Corr.** in XCS SSW / Components / Polydoros / Adjustment /.
- Select the corresponding detector type.
- Determine the correction values for the configured film-screen combination and enter this.

Value range **< 81 kV: 0...13**

≥ 81 kV: - 13.. 0

NOTE

The data in the XCU can be updated with "Transfer Value" and control exposures can be made without having to exit the SSW.

- Exit the window with **OK**.

NOTE

Correction curves 1...13 for the lower kV range (40...81 kV) and correction curves -1...-13 for the upper kV range (81...150 kV) are displayed in the following illustration and the corresponding value table. From this it is possible to read out what change in exposure points or in density results when there is a switch to a different correction curve.

A change of 1 exposure point results in a change in density of approx. Δ S = 0.25.

Determining the Voltage Correction for IONTOMAT Chambers

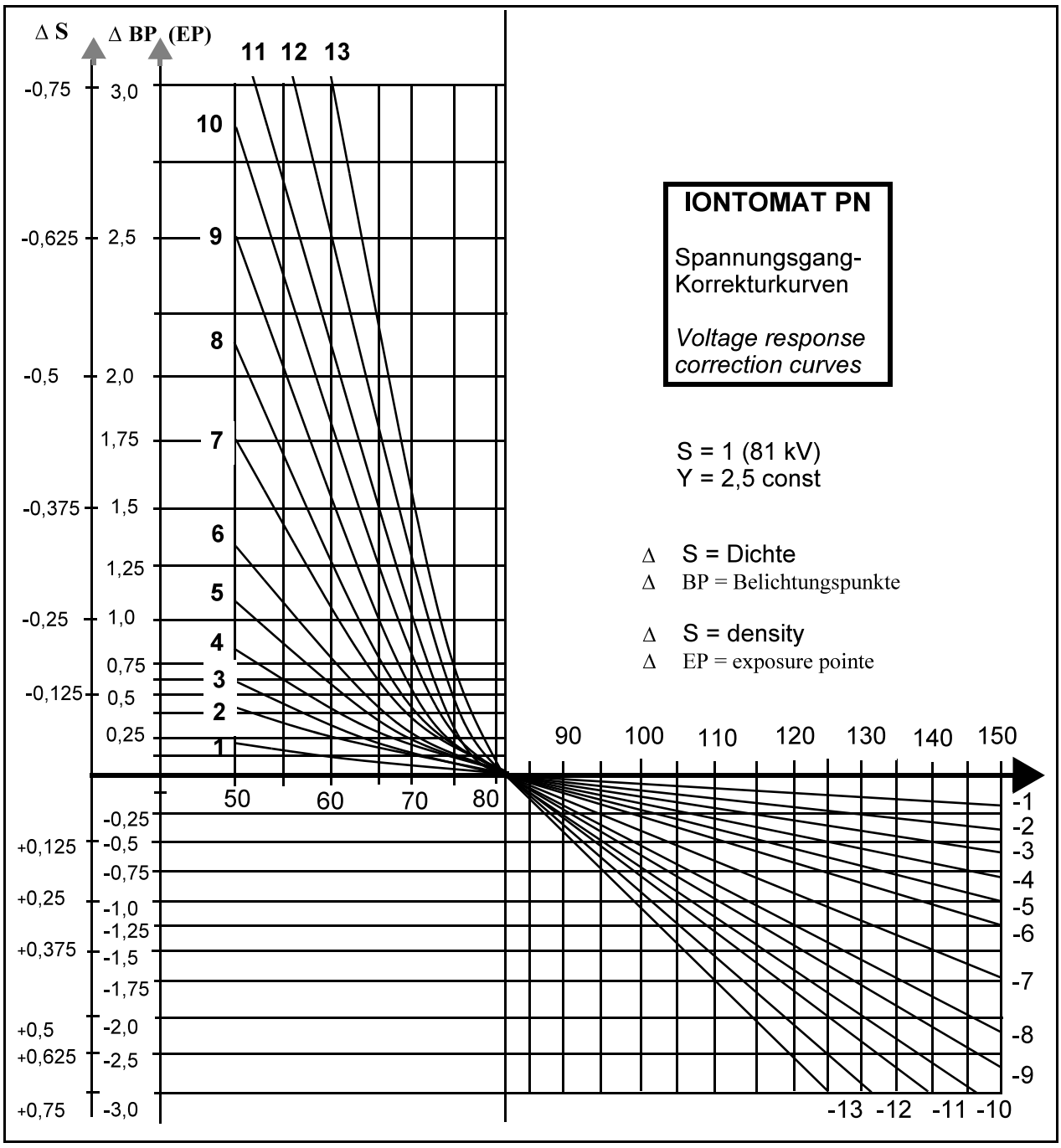


Fig. 22:

(≤81 kV)	Corrections for the lower kV range (≤81 kV)													
kV	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
40	48	42	35	32	28	24	20	16	13	11	8	6	3	
41	47	41	34	31	27	23	19	15	13	10	8	6	3	
42	46	40	33	30	26	23	19	15	12	10	8	5	3	
44	44	38	31	28	25	21	17	13	11	9	7	5	2	
46	41	35	30	26	23	20	16	12	10	8	7	4	2	
48	39	33	28	25	22	18	15	11	10	8	6	4	2	
50	37	31	26	23	20	17	14	10	9	7	5	4	2	
52	34	29	24	21	18	15	13	9	8	6	5	3	2	
55	30	26	21	18	16	13	11	8	7	6	4	3	1	
57	28	23	19	17	14	12	9	7	6	5	3	2	1	
60	24	20	16	14	12	10	8	6	5	4	3	2	1	
63	20	17	13	11	10	8	6	5	4	3	2	2	1	
66	16	13	10	9	8	6	5	4	3	2	2	1	1	
70	11	9	7	6	5	4	3	3	2	2	1	1	0	**DEPin $^1/_8$EP**
73	8	6	5	4	3	3	2	2	1	1	1	0	0	
77	3	3	2	2	2	1	1	1	1	0	0	0	0	
81	0	0	0	0	0	0	0	0	0	0	0	0	0	
85	-2	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	
90	-4	-3	-3	-2	-2	-2	-1	-1	-1	-1	-1	0	0	
96	-7	-6	-6	-4	-4	-3	-3	-2	-2	-1	-1	-1	0	
102	-10	-8	-8	-6	-5	-4	-4	-3	-2	-2	-1	-1	0	
109	-13	-11	-11	-9	-7	-6	-5	-4	-3	-2	-1	-1	-1	
117	-18	-15	-15	-11	-10	-8	-6	-5	-4	-3	-2	-2	-1	
125	-24	-20	-20	-14	-12	-10	-8	-6	-5	-4	-3	-2	-1	
133	-31	-25	-25	-17	-15	-12	-10	-7	-6	-5	-4	-2	-1	
141	-40	-32	-32	-21	-18	-15	-11	-8	-7	-6	-4	-3	-1	
150	-53	-40	-40	-26	-21	-17	-14	-10	-8	-7	-5	-3	-2	
kV	**-13**	**-12**	**-11**	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	
(>81KV)	**Corrections for the Upper kV Range (> 81 kV)**													

Dose Rate

Adjusting the Dose Rate with the PDA / SDM

- Connect the DVM to **D100.X63.DL IST** and **A GND** (⊥)

  Required value: 0V ±10 mV in standby (Fluoro **OFF**)

  If the display is > 10 mV, there is possibly of too much ambient light on the PDA. Corrective measure:

  ➪ Install the cover panel on the light distributor.
- See the Image Quality Test Procedure for general remarks about the dose measurements.
- Set the focus-I.I. distance:
  - OT units = 115 cm
  - UT units = max. distance
  - POLYSTAR = 100cm
- Position the dose chamber near the SDM measuring field in the horizontal center of the image.

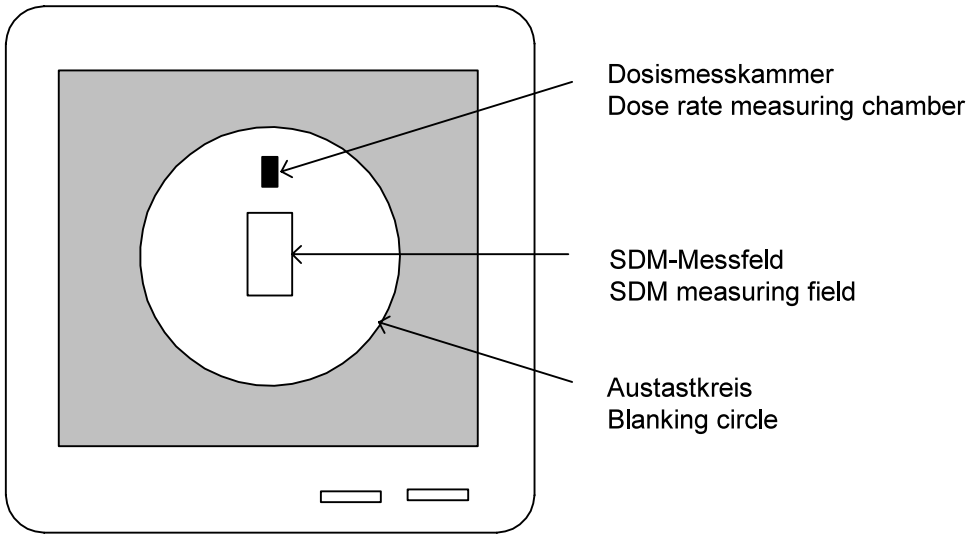


Fig. 23: Position of the dose measuring chamber

- Completely open the collimator.
- Insert 1.2 mm Cu into the collimator.
- Select I.I. full format, antiisowatt curve and round measuring field.
- Select **Dose rate** in XCS SSW / Components / Polydoros / Adjustment /.

- In the “Dose rate Adjust” window, select Fluoroscopy **ON**.
- Change the tube current ... mA until the desired dose rate = **870nGy/s** is displayed on the dose measurement meter.

NOTE

Take note of the equipment attenuation factor "m":

ICONOS R200

m = 1.0 --> 870nGy/s measured at the I.I. input (close to I.I.)

POLYSTAR

m = 1.8 --> 1566nGy/s measured at the I.I. input

SIRESKOP CX / SIREGRAPH T.O.P. 33 / SIREGRAPH CF

m = 1.0 --> 870nGy/s measured in the cassette shaft

SIRESKOP SX 33

m = 1.12 --> 974nGy/s measured in the cassette shaft

m = 2.0 --> 1740nGy/s measured outside on the spotfilm device

SIRESKOP SX 40

m = 1.7 --> 1480nGy/s measured outside on the spotfilm device

SIREGRAPH T.O.P. 40

m = 2.0 --> 1740nGy/s measured on the table

Perform the dose rate adjustment of 870nGy/s as accurately as possible, because all dose and dose rate values are derived from it.

- In the "Dose rate Adjust" window, select Fluoroscopy **OFF** and exit the window with **OK**.
- Remove the measuring chamber
- Remove the cover on the light distributor

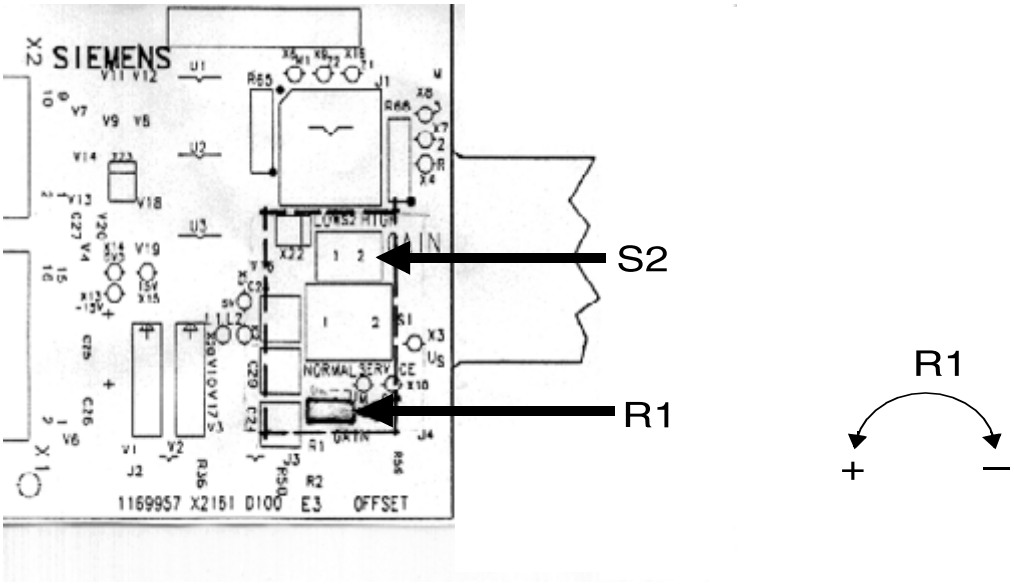


Fig. 24: Camera adapter

NOTE

During the adjustment, the room must be darkened, otherwise the adjustment will be falsified because of ambient light. Following each change of the R1, reinstall the cover.

Set the D100.S2 switch (amplification) to Position 1.

- In the “PDA Preadjust” window, select Fluoroscopy **ON**.
- Using R1 on the D100 in the camera adapter, set the compensation to **0** ±**1** (±1/4 EP). If an adjustment using the S2 switch in Position 1 is not possible, set the S2 switch on the D100 to Position 2 and repeat the adjustment.

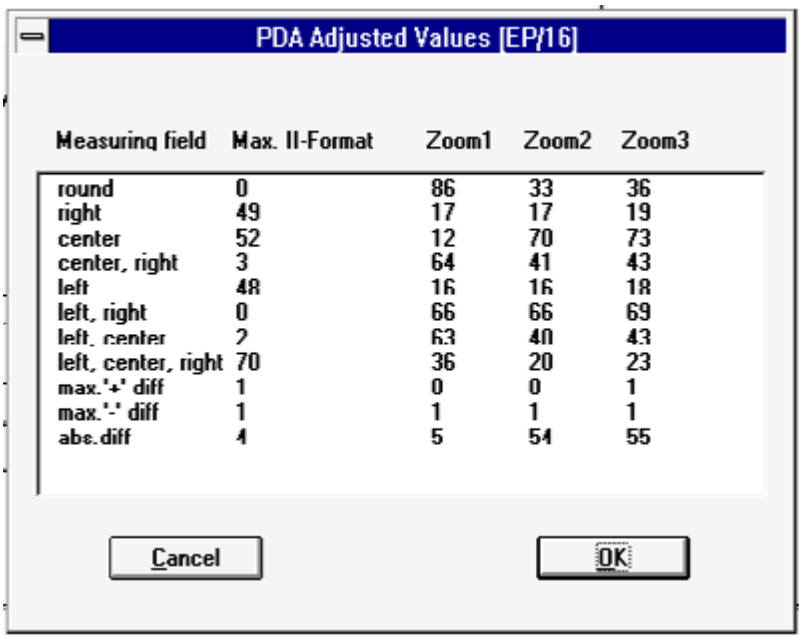
NOTE

Leave the S2 switch on the D100 board in the the position in which the camera adapter was adjusted (D100.R1).

- Exit the window with **OK**. (OK button is active when the adjustment is within the tolerance).
- Install the cover on the light distributor

Sensitivity Adjustment

- Start the adjustment in the "PDA Sensitivity Auto calibration" window. The adjustment takes place automatically for all I.I. formats and measuring field combinations. Fluoroscopy is automatically interrupted for approx. 1 second between the individual adjustments.
- Exit the window with **OK**.



Admissible deviation at max. I.I. format:
max. difference ± 8
absolute difference ± 16
only between the left, middle and right measuring field

Fig. 25: PDA Adjusted Values

NOTE

A combination of 2 measuring fields (e.g. the middle and right ones) has approx. the same area as the "round' measuring field and thus similar correction values.

The combination of all 3 measuring fields (middle, left, right) has the largest correction value.

Adjusting the Dose Rate with the B Signal (VIDEOMED DI)

- See the Image Quality Test Procedure for general remarks about the dose measurements.
- Set the focus-I.I. distance:
  - OT units = 115 cm
  - UT units = max. distance
- Place the semiconductor detector so it is centered on the I.I.

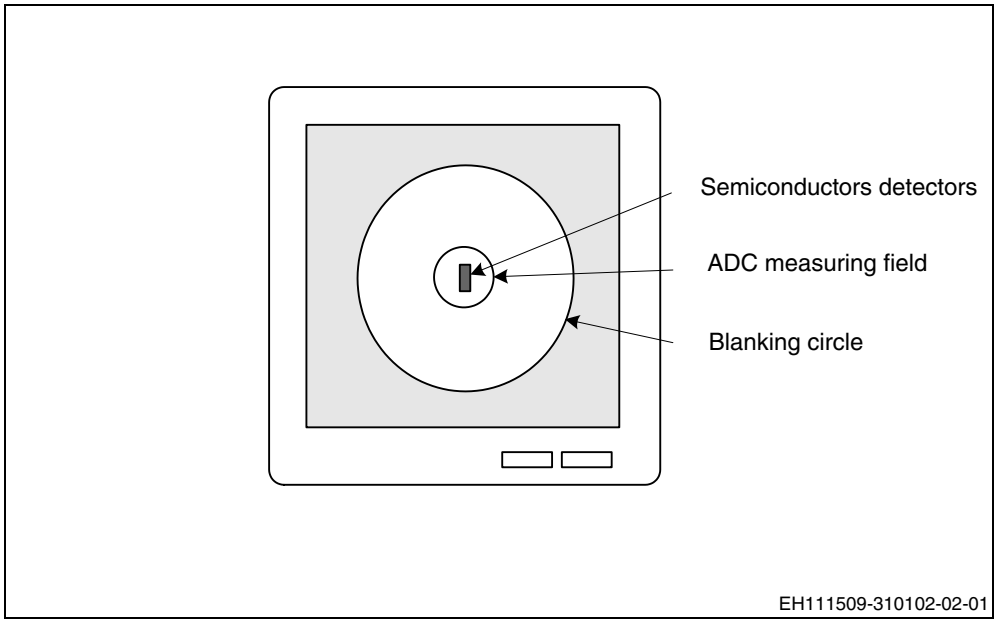


Fig. 26: Positioning of the semiconductor detector

- Completely open the collimator.
- Insert 1.2 mm Cu into the collimator.
- Move the grid into the beam path.
- Select I.I. full format.
- Select **Dose rate** in XCS SSW / Components / Polydoros / Adjustment /.
- Switch fluoroscopy **ON** in the "Dose Rate Adjust" window.
- Change the **Tube current ... mA** until the desired dose rate:
  - 261 nGy/s ±10% with a 23HDR I.I. (see Image Quality Test Certificate)
  - 113 nGy/s ±10% with a 33HDR I.I. (see Image Quality Test Certificate)

  is displayed on the dose measurement meter.

- Switch Fluoroscopy **OFF** in the "Dose rate Adjust" window and exit the window with **OK**.
- Remove the measuring chamber
- Enter the B-signal value (see the Image Quality Test Certificate) in the “Dialog" window.
- Verify the B-signal with **OK**.
- Click on "Fluoroscopy" "**ON**" in the "CCD Brightness Adjust" window.
- If the "Ref-Act display" (difference between anticipated and actual values) indicates **0** ± **1**, exit the window with **OK**.
- If the required Ref-Act display is not reached, click on Fluoroscopy **OFF** in the "CCD Brightness Adjust" window and adjust the iris diaphragm on the camera.

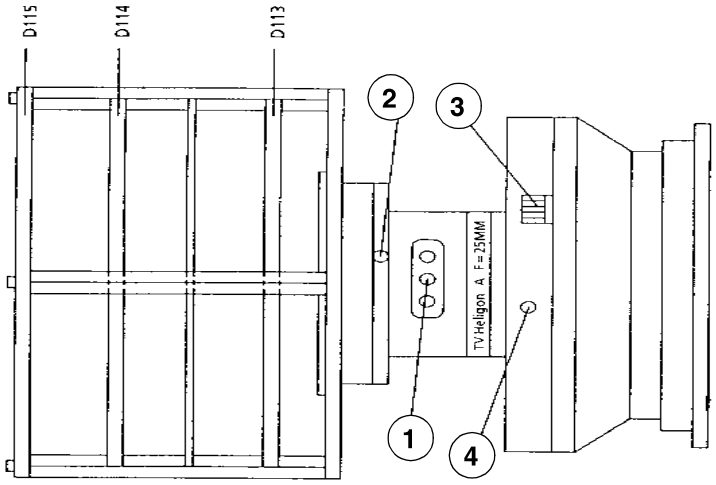


Fig. 27: Camera lens

Pos. 1 = Focusing
Pos. 2 = Securing screw
Pos. 3 = Diaphragm securingscrew
Pos. 4 = Securing screw

- Adjust the collimator closure screw (Pos. 3) on the camera so that die "Ref-Act display (difference between anticipated and actual value) indicates **0** ±**1** in the "CCD Brightness Adjust" window with Fluoroscopy **ON**.
- Exit the window with **OK**.
- Turn in the securing screw (Pos. 4) until it is up against the iris collimator adjustment wheel (noticeable tightness). Then turn the screw one quarter to one half turn further, check by observing the position of the slot on the screw head.
- If the "Ref-Act display" (difference between anticipated and actual values) indicates **0** ± **1**, check it again in the "CCD Brightness Adjust" window.

Adjusting the Dose Rate with the VIDEOMED DIC

- See the Image Quality Test Procedure for general remarks about the dose measurements.
- Set the focus-I.I. distance:
  - OT units = 115 cm

- UT units = max. distance

- Place the semiconductor detector so it is centered on the I.I.

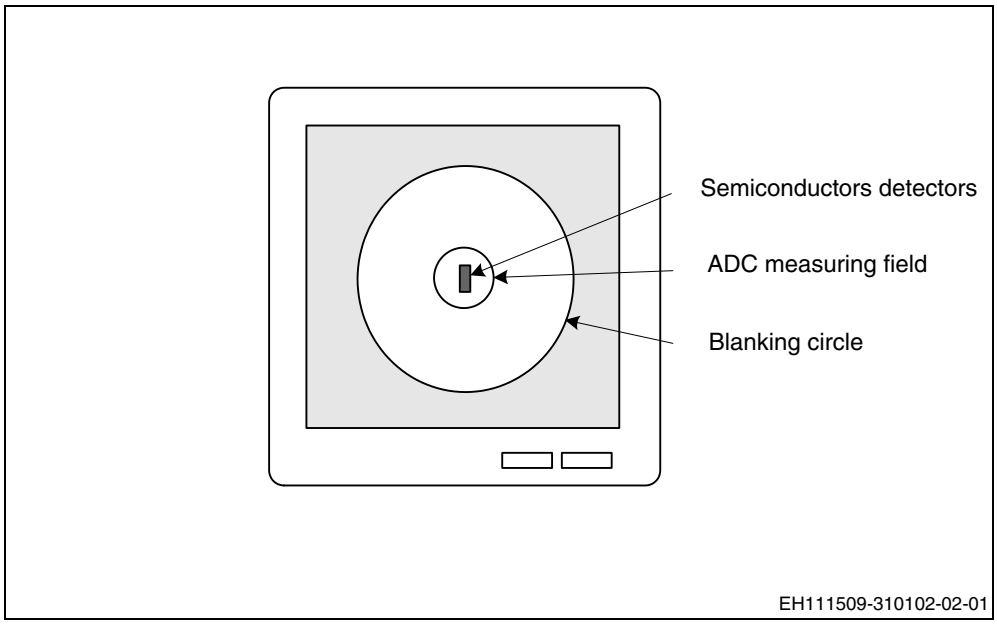


Fig. 28: Positioning of the semiconductor detector

- Open the collimator all the way (without filter).
- Place 1.2 mm Cu (2.1 Cu with the ICONOS R100) on the collimator.
- Move the grid in to the beam path.
- Select I.I. full format.
- Select **Dose rate** in XCS SSW / Components / Polydoros / Adjustment /.
- Switch fluoroscopy **ON** in the window "Dose rate Adjust" window.
- Change the **Tube current ... mA** until the desired dose rate:
  - 261 nGy/s ±10% with a 23HDR I.I. (see Image Quality Test Certificate)
  - 113 nGy/s ± 10% with a 33HDR I.I. (see Image Quality Test Certificate)

  is displayed on the dose measurement meter.
- Switch fluoroscopy **OFF** in the "Dose rate Adjust" Fluoroscopy and exit the window with **OK**.
- Remove the measuring chamber
- Enter **155mV** for the B-signal in the “Dialog" window.
- Verify the B-signal with **OK**.
- Click on "Fluoroscopy" **ON** in the "CCD Brightness Adjust" window.
- If the "Ref-Act display" (difference between anticipated and actual values) indicates **0** ± **1**, exit the window with **OK**.
- If the required Ref-Act display value is not reached, click on Fluoroscopy **OFF** in the "CCD Brightness Adjust" window.
- Loosen the securing screw (Pos.2 in the following illustration) on the iris diaphragm.

- Adjust the iris adjuster (Pos. 3) on the camera so that the "Ref-Act display" (difference between anticipated and actual value) indicates " **0** ±**1** in the "CCD Brightness Adjust" window with Fluoroscopy **ON**.

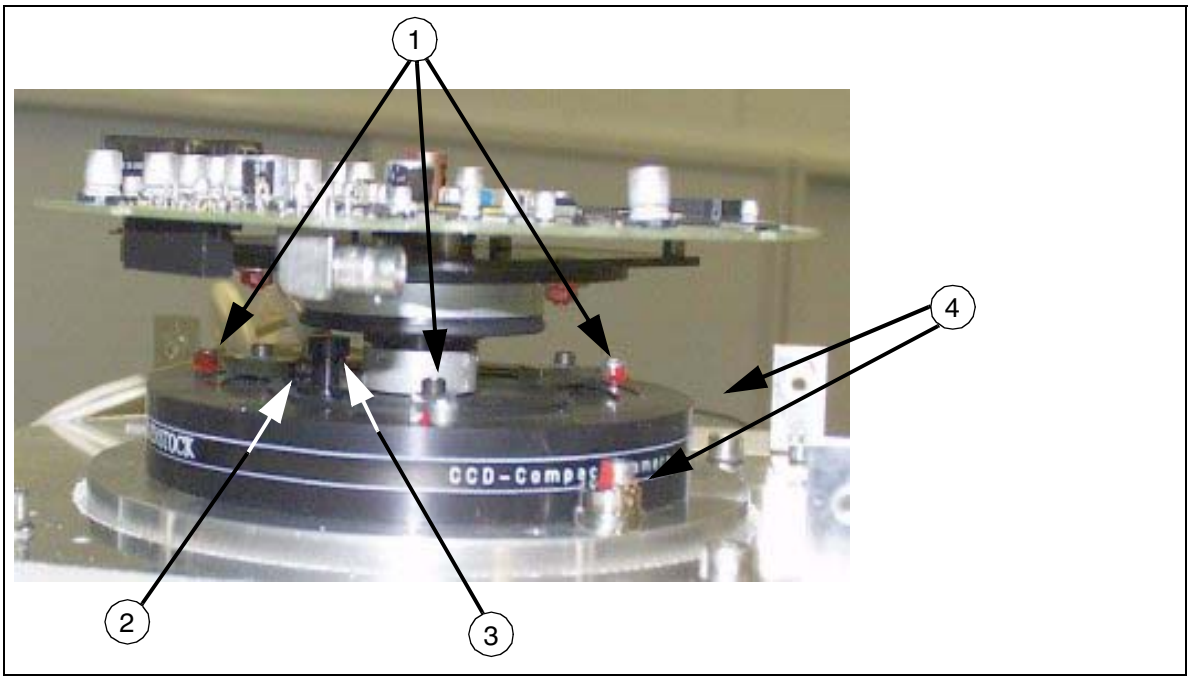


Fig. 29:

Pos. 1	Adjustment screw for I.I. optics
Pos. 2	Locking of the iris
Pos. 3	Iris adjustment
Pos. 4	Adjustment screw for centering

- Exit the window with **OK**.
- Set the iris diaphragm opening adjustment using the securing screw (Pos. 2).
- If the "Ref-Act display" (difference between anticipated and actual values) indicates **0** ± **1**, check it again in the "CCD Brightness Adjust" window.

TV Iris (not for VIDEOMED DHCF)

Adjusting the min./max. Iris Opening (not for VIDEOMED DH and FL-C)

NOTE

This adjustment window can be reached two ways:

- Adjustment/dose rate (following the adjustment of dose rate, "TV Iris" is automatically selected).

- "Adjustment/TV Iris"

If this adjustment is selected again, the values applicable up to this time are reset (Reference B to "0" and the actual adjustment with and without gray filter / mirror to 10.25 EP). The applicable values must be noted in the following table.

Date	Ref.A (max)	Ref.B (min)	Gray Filter/Mirror		Current
			without	with	

- Using Reference A (max.), change the iris opening until V29 on the D190 goes off.
- Using Reference B (min.), change the iris opening until V28 on the D190 goes off.
- Exit the window with **OK**.

Adjusting the min./max. Iris Opening for VIDEOMED DH and FL-C

NOTE

If the iris is controlled in the min./max. range, the PTC is strongly heated in the iris motor circuit (FL-C) within 3...4 sec. It is necessary to wait 5 minutes until it has cooled.

Date	Ref.A (max)	Ref.B (min)	Gray Filter/Mirror		Current
			without	with	

- Using Reference A (max.), change the iris opening until V29 on the D190 goes on, then change it **immediately** until V29 goes off.
- Using Reference B (min.), change the iris opening until V28 on the D190 goes on, then change it **immediately** until V28 goes off.

- Exit the window with **OK**.

TV Iris Diaphragm: Brightness Adjust

NOTE	**Completely open the collimator.**

Preparations (Test Setup)

- Set the focus-I.I. distance
  - Overtable units: 115 cm
  - Undertable units: max. SID (do not move out the Distator)
  - C-Arm units: 100 cm
- Select I.I. full format.
- Move in the grid.
- Connect the oscilloscope to test point 8 and 0 V (ground).
- Measure the B signal values (for reference values, see table) in one line in the center of the image (center of noise).

Exceptions:

- VIDEOMED HD
  - Connect the oscilloscope to TP BAK (VZ board), trigger to Ext.A on the AZ board (with SUPERVISION, trigger to BAS+).
- VIDEOMED K / Sirecon Compact
  - Connect the oscilloscope to test point M95 / D15.C 1 (+) versus TP F
- VIDEOMED DI / DIM / DIK
  - Connect the oscilloscope to test point D1.X401
- VIDEOMED SX
  - Connect the oscilloscope to TP 8 (X 230) on the D8 board in the TV CCU.
- VIDEOMED DH
  - XCS SSW, Iris Adjust, B-Signal, Get

NOTE	**In systems without a FLUOROSPOT TOP, the antiisowatt curve must be programmed to Automatic 1, with the FLUOROSPOT TOP, 70 kV are automatically output.**

Performing the Adjustment per the "TV Iris Diaphragm" Screen

- Step 1 with 2.1 mm Cu and
- Perform Step 2 and 3 with 1.2 mm Cu.

NOTE

In Steps 2 and 3, the same B signal values must be set; recommended is to set the corresponding value in Step 1 (see table).

Television CCU	Picture tube	Bias light or dark current portion	**B-Signal** without bias light or dark current portion
VIDEOMED H1X	Saticon	without DFR: 20 ± 5 mV with DFR: 40 ± 5 mV	110 mV; + 10 / - 20 mV *
VIDEOMED HD	DG Saticon	30 ± 5 mV	130 mV; + 10 / - 20 mV
VIDEOMED H1	Saticon	20 ± 5 mV	110 mV; + 10 / - 20 mV
VIDEOMED H1, N1	Hivicon	≤100 mV	180 mV; ± 15 mV
VIDEOMED N1	DG Saticon	20 ± 5 mV	110 mV; + 10 / - 20 mV
VIDEOMED K, Sir.Comp.	Hivicon	n.a.	27 ... 38 mV
VIDEOMED DI, DIM, DIK***	CCD Chip	n.a.	155 mV; ± 20mV Urology: 300 mV; ± 40 mV
VIDEOMED SX, H1X Emulation	Saticon	60 ± 10 mV	80 mV; + 10 / - 20 mV *
VIDEOMED SX HD Emulation	Saticon	70 ± 15 mV	180 mV; + 15 / - 20 mV **
VIDEOMED SX,*** FLUOROSPOT T.O.P.	Saticon	60 ± 10 mV	80 mV; + 20 /-10 mV
VIDEOMED H, N	Plumbicon	n.a.	165 mV; ±15 mV
VIDEOMED S	Saticon	60 ± 10 mV	80 mV; + 20 /-10 mV
VIDEOMED DH / DHC***	CCD Chip	n.a.	110 ± 10% gray steps

NOTE

With High Contrast Fluoroscopy, Supervision:

*** = ± 20 mV**

**** = + 25 mV / - 20 mV**

***** = For systems tested as a system, the reference values in the Image Quality Test Certificate RXD0-000.037... must be set.**

NOTE

During the adjustment, switch the FLUOROSPOT H or FLUOROSPOT TOP to the bypass mode (FLUOROSPOT TOP to the Dual Mode at the operating keyboard).

Gray Filter Correction (Mirror Correction)

NOTE

With DR exposures, the anticipated iris setting is inquired. Beginning at a defined opening (> 60 mm, with the SDM > 50 mm), the gray filter (mirror) moves out automatically and the iris opening becomes smaller.

Dose and TV Iris Adjustment with Videomed DHCF

NOTE	Should be used only for Artis U beginning with SSW VF00H!

Requirements:

- Configuration in the Fluorospot Compact
- System configuration in the XCS SSW
- X-ray tube unit, image intensifier and TV camera adjusted and centered

Checking the TV Iris Basic Setting

- Select I.I. full format and Fluoro Automatic 1
- Select service organ program 1 (Cont. Fluoro mode)
- Completely open the collimator.
- Place 2.1mm Cu on the collimator.
- Select XCS SSW / Adjustment / **TV Param**.
- In the “Adjustment window: select TV Parameters” Mode = **Continuous Fluoro**.

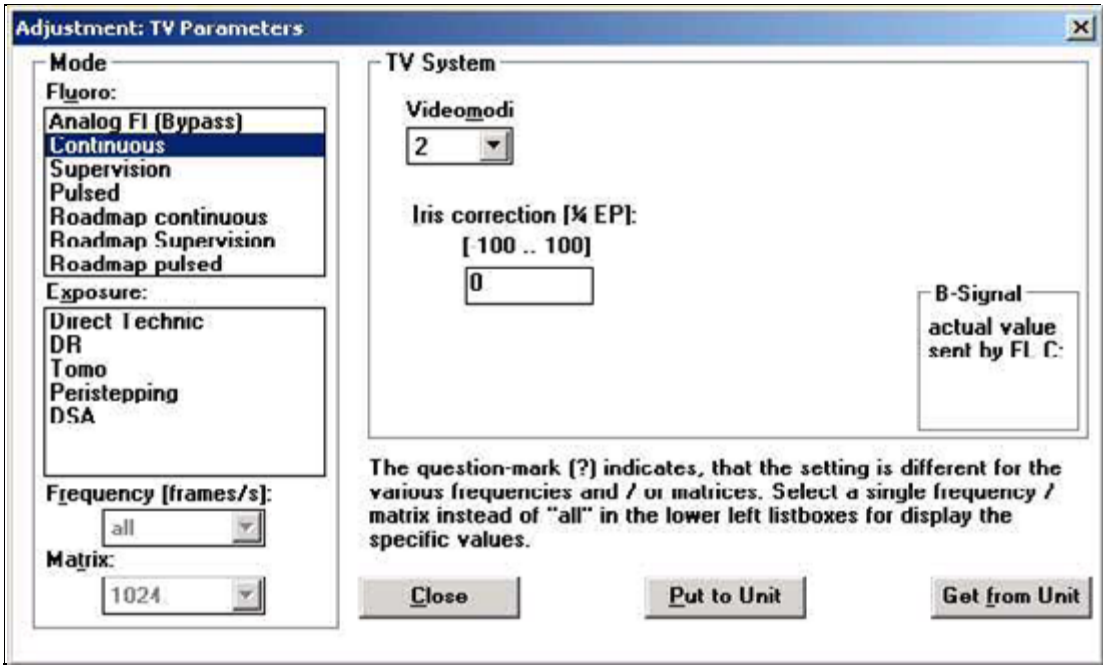


Fig. 30: XCS Adjustment - TV Param Continuous

- Switch fluoroscopy on; after approx. 5 seconds, the B signal reported by the FL C must correspond to the reference data of the IQAP document (113 nGy/s). Here, the iris correction must be = 0 EP.

NOTE

If the B-signal reported back from the FL-C does not match the reference values in the IQAP, perform the following basic adjustment for the dose and TV iris.

Basic Adjustment of Dose and TV Iris

- Select I.I. full format and Fluoro Automatic 1
- Completely open the collimator.
- Place 2.1mm Cu on the collimator.
- Select “Examination” in the Fluorospot Compact service mode.
- Place the dose measurement chamber in front of the I.I. Under fluoroscopy, position the measurement chamber centered to the I.I., but outside of the AGC dominant.

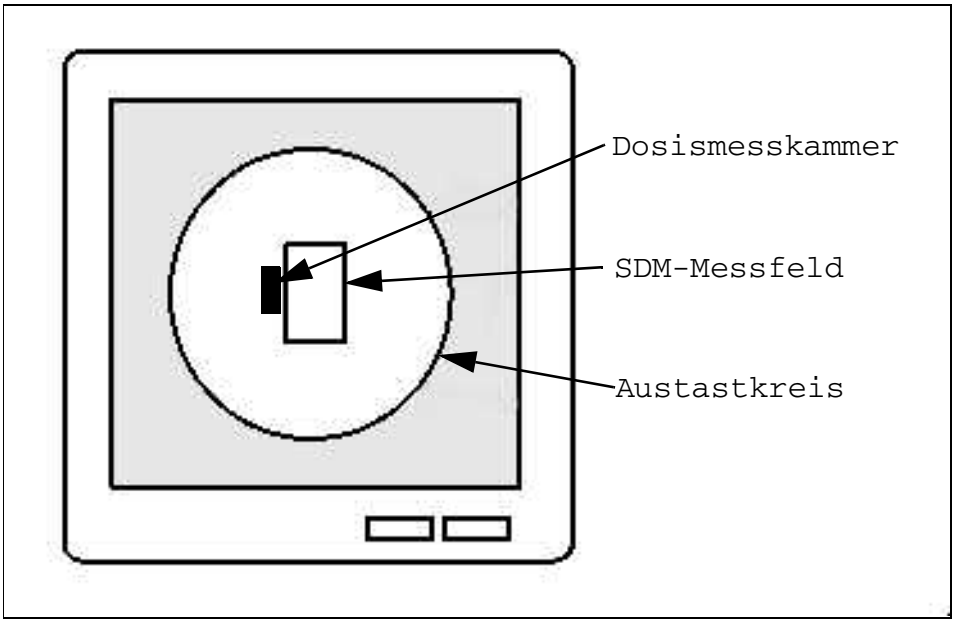


Fig. 31: Dose measuring chamber

- Select **Dose and TV Iris** in XCS SSW / Components / POLYDOROS / Adjustment /.

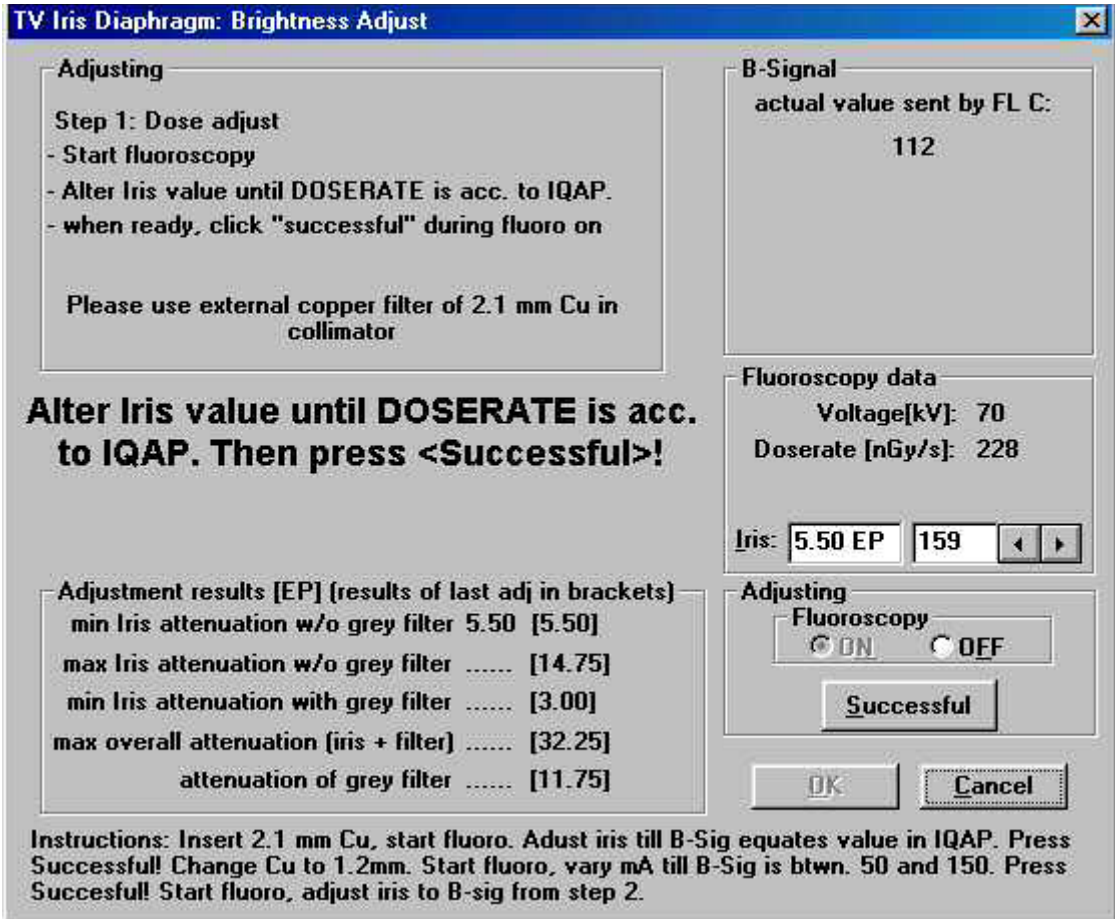


Fig. 32: XCS Components - Polydoros Adjustment, Dose and TV Iris 1

- Click on Fluoroscopy **ON** in the TV Iris Diaphragm window (Step 1)
- Change the **Iris** value until the dose read on the dose measurement meter corresponds to the reference value data in the IQAP document.
- End Step 1 by clicking on **Successful**.

- Change from 2.1 mm Cu to 1.2 Cu on the collimator.

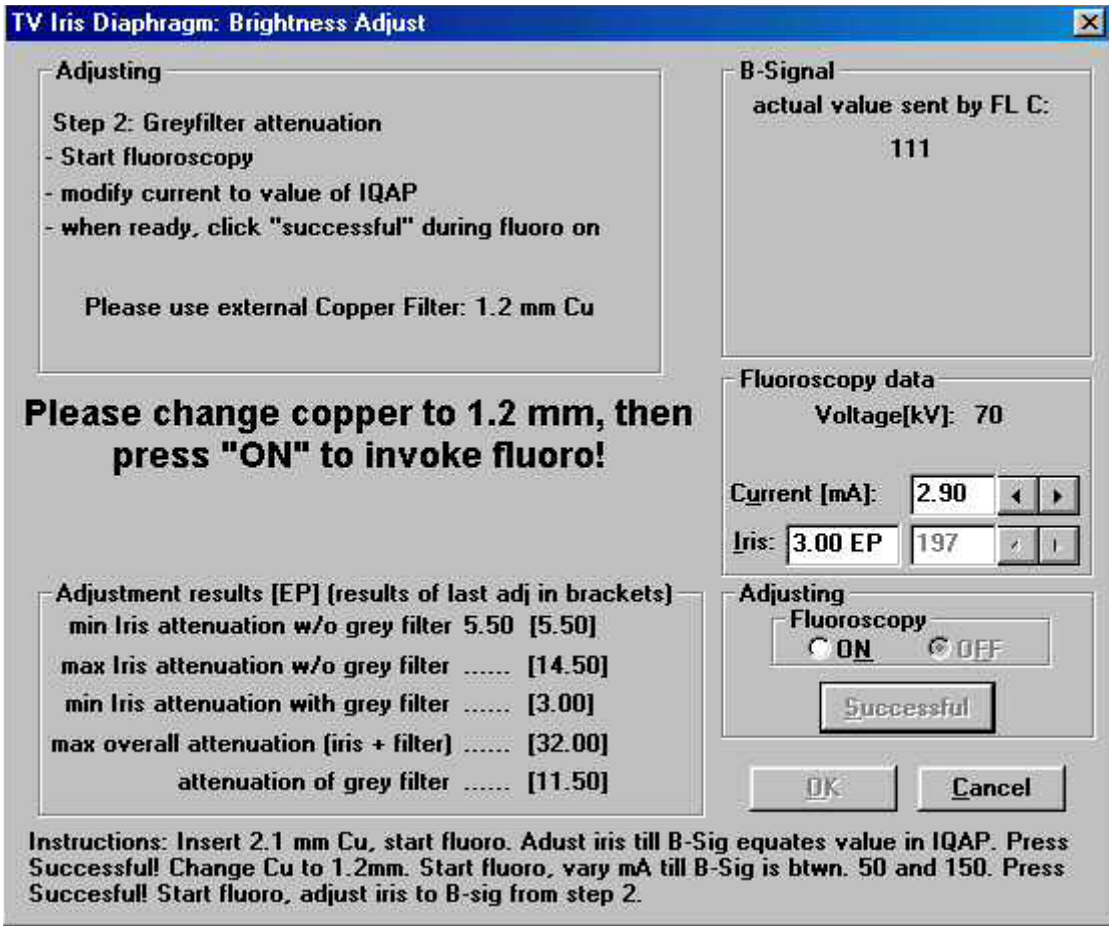


Fig. 33: XCS Components - Polydoros Adjustment, Dose and TV Iris 2

- Click on Fluoroscopy **ON** in the TV Iris Diaphragm window (Step 2)
- Change the **Current (mA)** value until a value between **70 and 80** is displayed under the B-signal (actual value sent by FL C).

- End Step 2 by clicking on **Successful**.

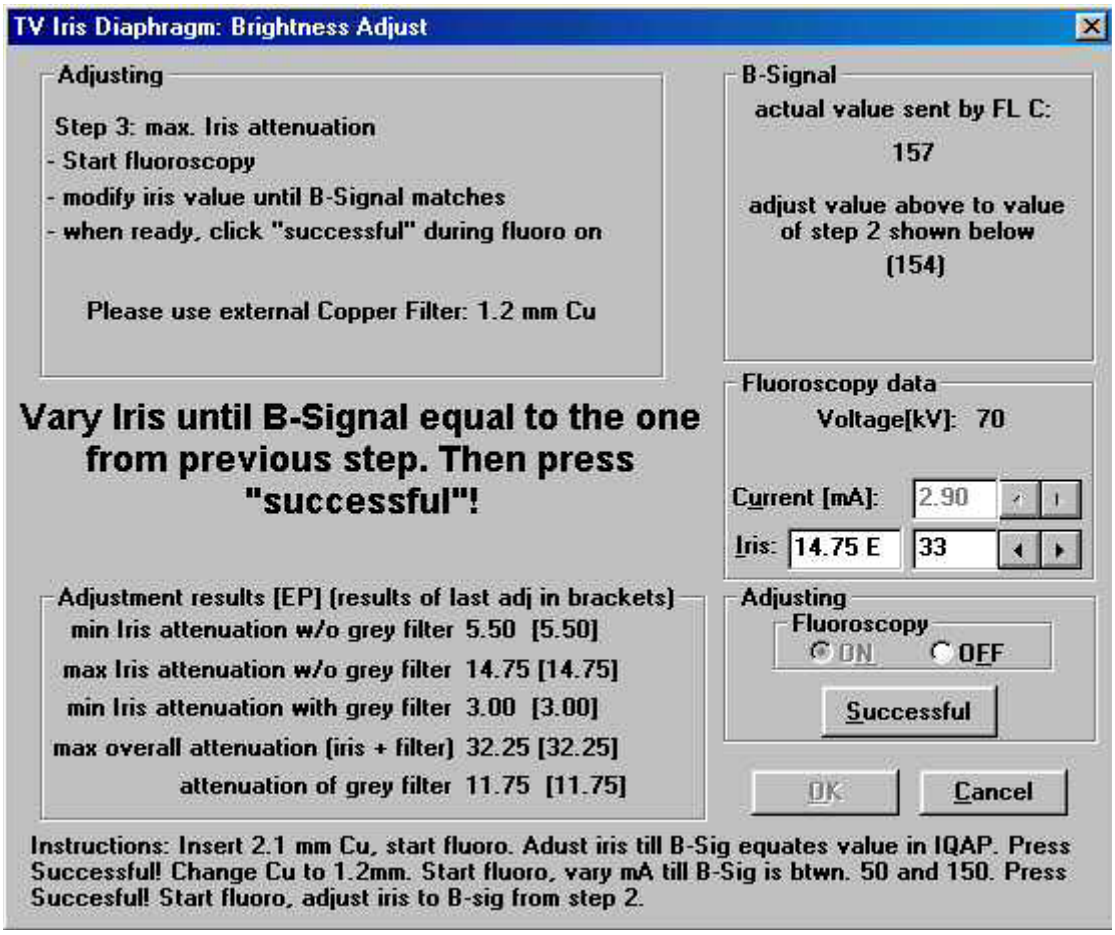


Fig. 34: XCS Components - Polydoros Adjustment, Dose and TV Iris 3

- Click on Fluoroscopy **ON** in the TV Iris Diaphragm window (Step 3)
- Change the **Iris** value until the B-signal set under Step 2 (actual value sent by FL C) is displayed.

- End Step 3 by clicking on **Successful**.

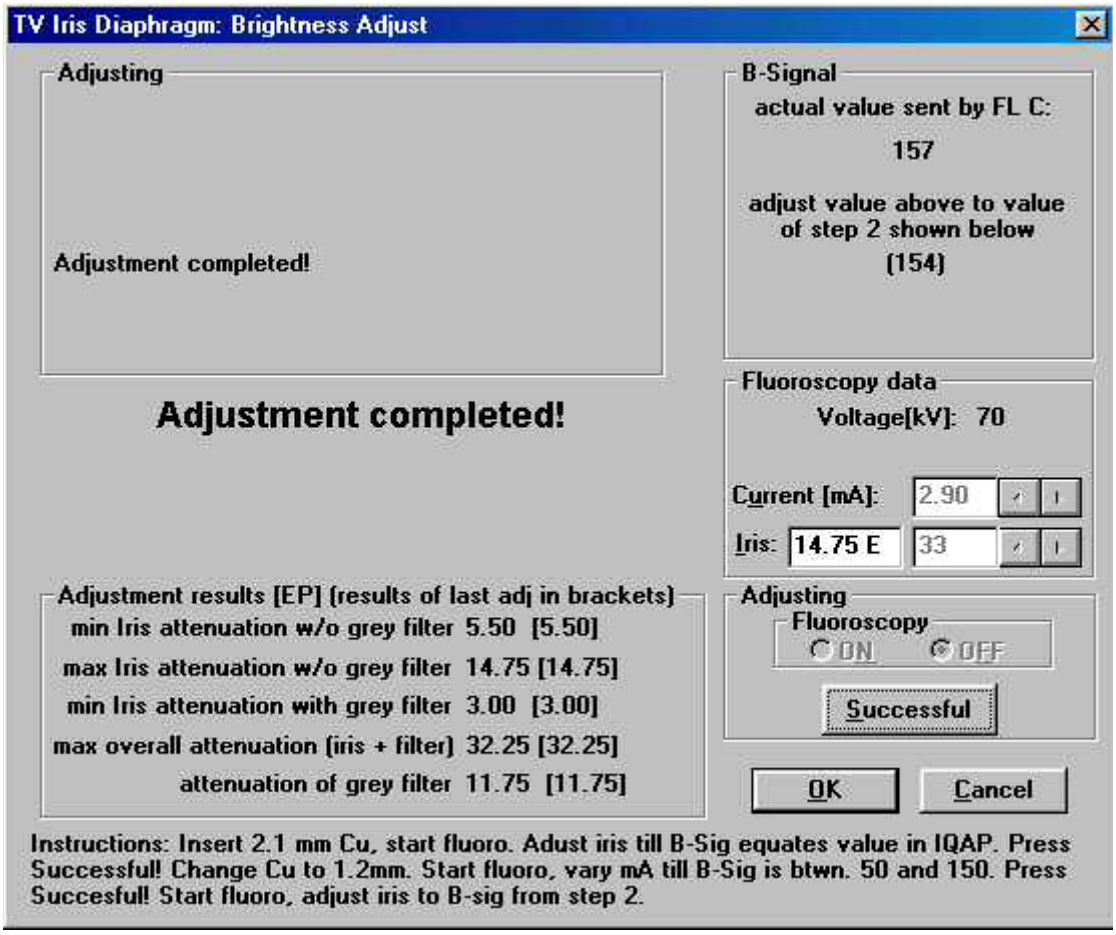


Fig. 35: XCS Components - Polydoros Adjustment, Dose and TV Iris 4

- If “Adjustment completed!” appears, close the window with **OK**.

Zoom Iris Correction

- Place 2.1 mm Cu in the collimator and place the dose measurement chamber in the beam path.
- Select I.I. full format.

- Select **Zoom Iris Correction** in XCS SSW / Components / Polydoros / Adjustment /.

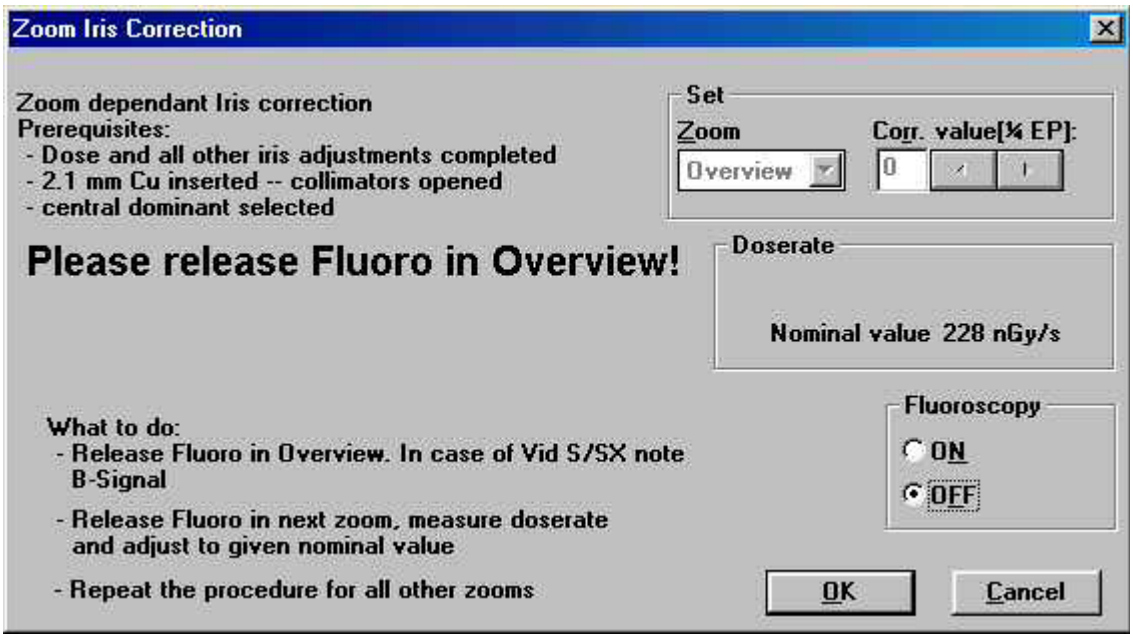


Fig. 36: XCS Components - Polydoros Adjustment - Zoom Iris Correction 1

- Click on Fluoroscopy **ON** in the Zoom Iris Correction window.

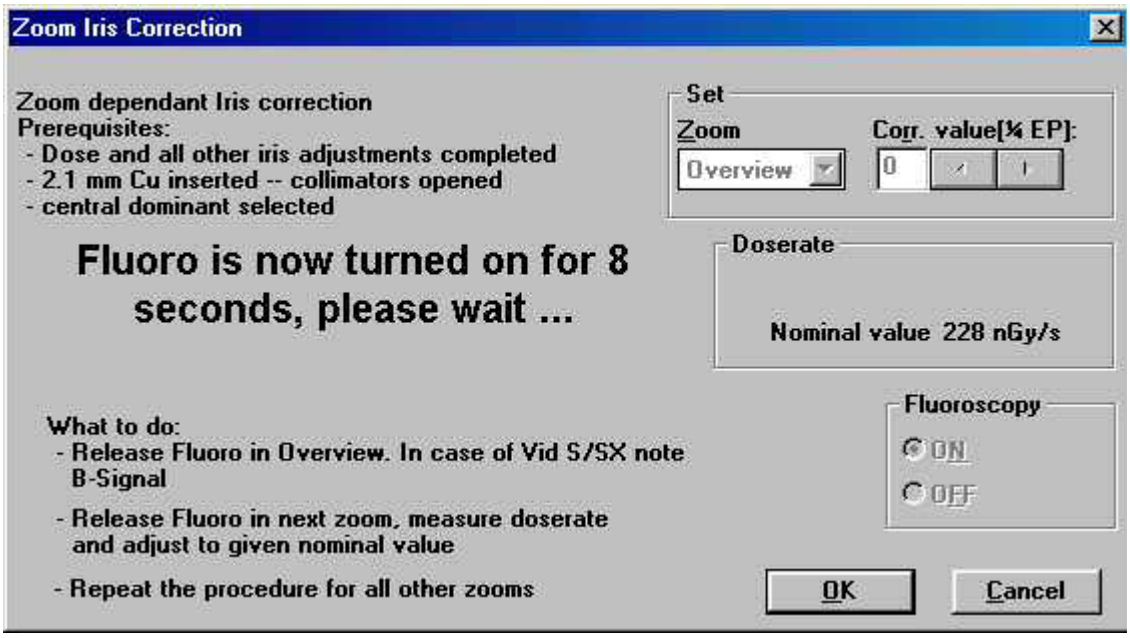


Fig. 37: XCS Components - Polydoros Adjustment - Zoom Iris Correction 2

- The SSW will interrupt fluoroscopy after 8 seconds with Fluoroscopy **OFF** and will automatically select the next zoom step.

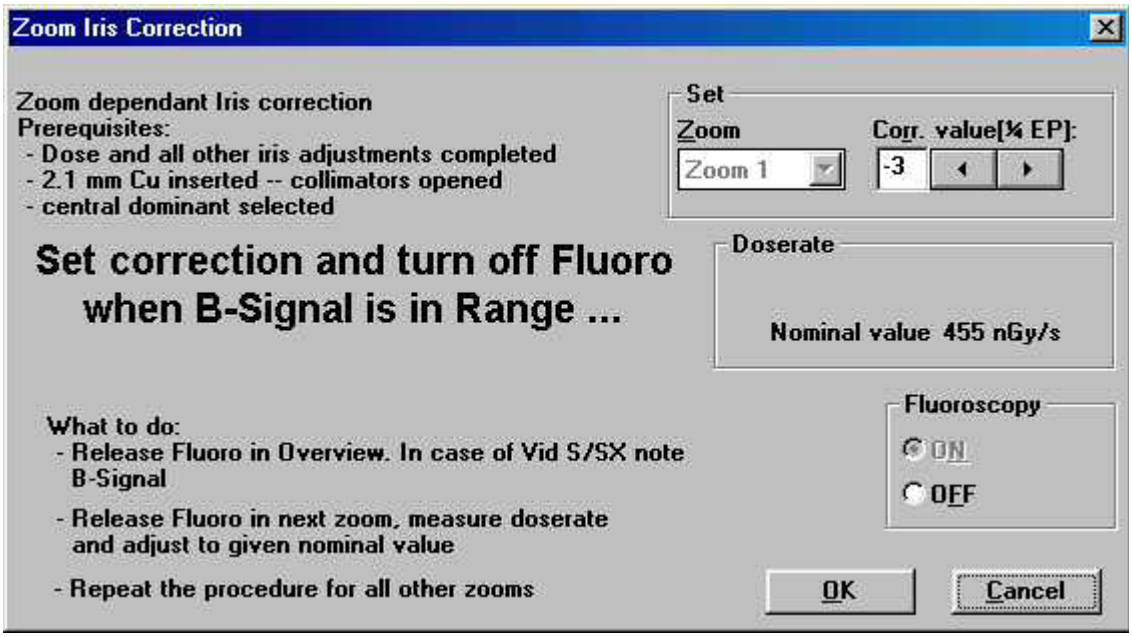


Fig. 38: XCS Components - Polydoros Adjustment - Zoom Iris Correction 3

- Click on Fluoroscopy **ON** in the Zoom Iris Correction window and adjust the **Corr. value (1/4 EP)** so that the value in the IQAP documentation results (see Nominal Value under Dose Rate).
- All other zoom steps are adjusted in the same way as described for Zoom 1.
- After completing the “Zoom Iris Correction” adjustment, exit the window with **OK**.

TV Iris Correction

- Place 2.1mm Cu on the collimator.

- Place the dose measurement chamber in front of the I.I. Under fluoroscopy, position the measurement chamber centered to the I.I., but outside of the AGC dominant.

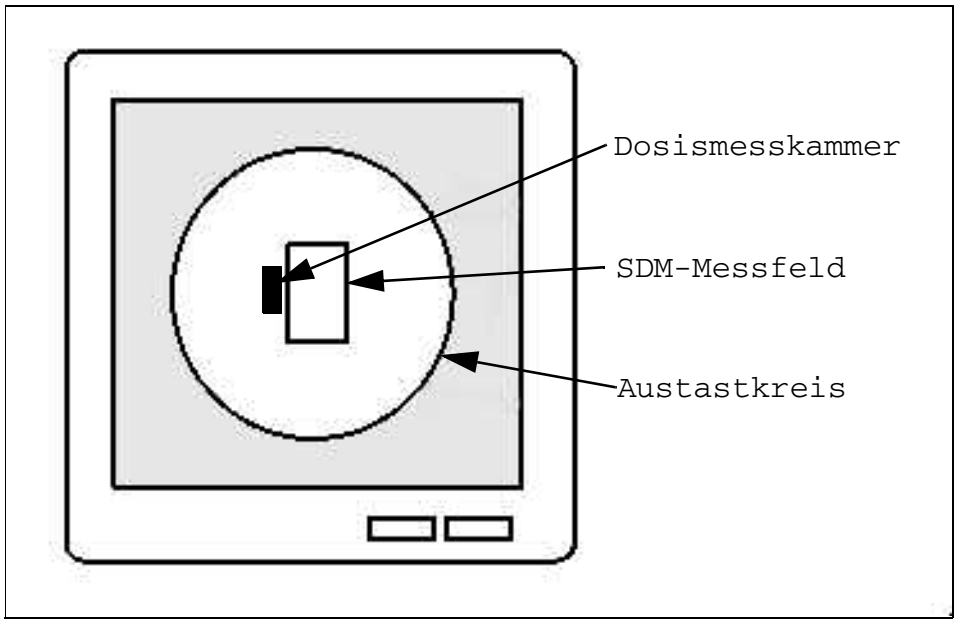


Fig. 39: Dose measuring chamber

- Select I.I. full format.
- Completely open the collimator.
- Select XCS SSW / Adjustment / **TV Parameters**.

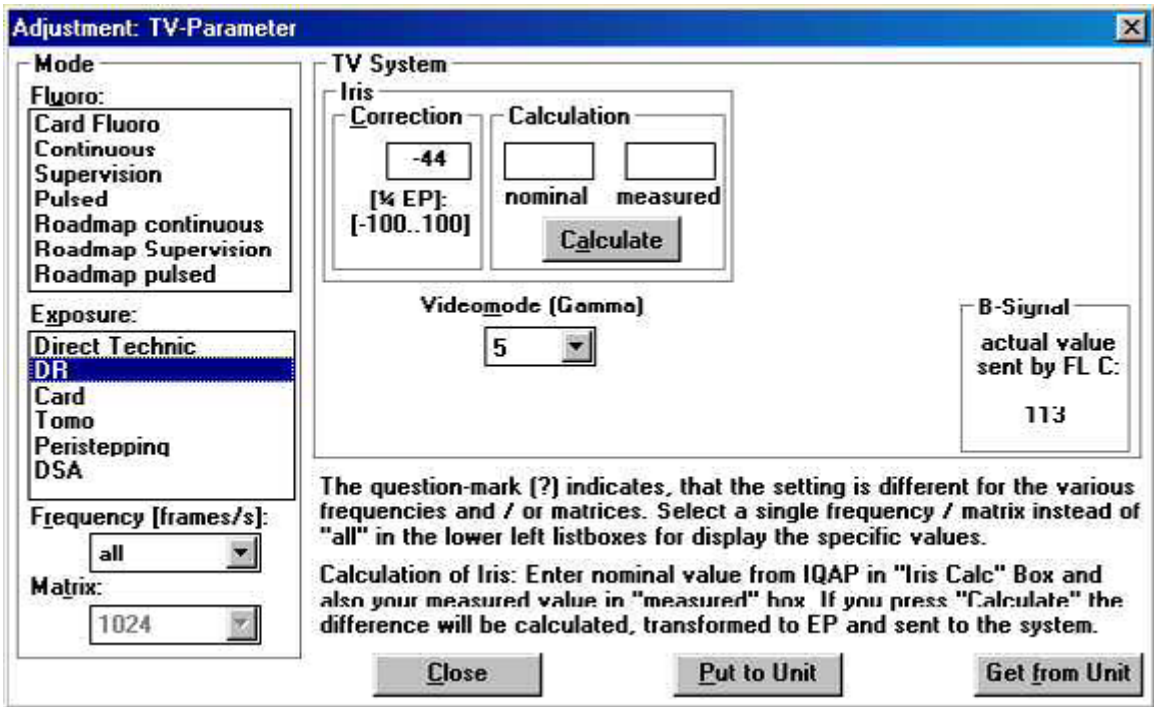


Fig. 40: XCS Adjustment - TV Param 2

The following adjustments must be performed for the following options, if configured:

- **Continuous Fluoro**
  - Select **Organ Program 1** (Continuous) in the Fluorospot Compact service menu.
  - Select **Continuous** in the mode box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy and after approx. 5 seconds, read the dose on the dose measurement meter and compare the value to determine whether it corresponds to the reference value data in the IQAP document.

NOTE

The Iris Connection may not be changed for the Continuous mode. If the dose does not correspond to the reference value data in the IQAP document, repeat the basic adjustment of the dose (Basic Adjustment of Dose and TV Iris / p. 58)!

- **Pulsed Fluoro**
  - Select **Organ Program 2** (Pulsed 15 f/s) in the Fluorospot Compact service menu.
  - Select **Pulsed** in the mode box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy and after approx. 5 seconds, read the dose on the dose measurement meter and compare the value to determine whether it corresponds to the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- **Roadmap Continuous**
  - Select **Organ Program 6** (RM Cont.) in the Fluorospot Compact service menu.
  - Select **Roadmap continuous** in the mode box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy and after approx. 5 seconds, read the dose on the dose measurement meter and compare the value to determine whether it corresponds to the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement, for this, deselect **Roadmap continuous** in the Mode box in the “Adjustment window: TV Parameters" and select it again.
- **Roadmap Pulsed**
  - Select **Organ Program 7** (RM Pulsed 15f/s) in the Fluorospot Compact service menu.
  - Select **Roadmap pulsed** in the mode box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

- Trigger fluoroscopy and after approx. 5 seconds, read the dose on the dose measurement meter and compare the value to determine whether it corresponds to the reference value data in the IQAP document.
- If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
- Press the **Put to Unit** button.
- After approx. 2 seconds, repeat the measurement, for this, deselect **Roadmap pulsed** in the Mode box in the “Adjustment window: TV Parameters" and select it again.

- **DR Acquisition, 1f/s**
  - Select **Organ Program 2** (DR 1f/s) in the Fluorospot Compact service menu and verify with “Store Default Values” and “Store OGP”.
  - Select **DR** in the Exposure box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- **DR Acquisition, 6f/s**
  - Select **Organ Program 1** (DR 6f/s) in the Fluorospot Compact service menu and verify with “Store Default Values” and “Store OGP”.
  - Select **DR** in the Exposure box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- **DSA Acquisition, 1f/s**
  - Select **Organ Program 11** in the Fluorospot Compact service menu and verify with “Store Default Values”.

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.

- If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
- Press the **Put to Unit** button.
- After approx. 2 seconds, repeat the measurement.

- **DSA Acquisition, 4f/s**
  - Select **Organ Program 12** in the Fluorospot Compact service menu and verify with “Store Default Values”.

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- **Card Acquisition, 15f/s**
  - Select **Organ Program 13** in the Fluorospot Compact service menu and verify with “Store Default Values”.

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- **Card Acquisition, 30f/s**
  - Select **Organ Program 13** in the Fluorospot Compact service menu and verify with “Store Default Values”.
  - Select **Card** in the Exposure box in the Adjustment window: TV Parameters (Fig. 40 / p. 65)

  - Trigger fluoroscopy for approx. 4 seconds.
  - Trigger exposure; while doing this, read the dose on the dose measurement meter and compare this to determine if it matches the reference value data in the IQAP document.
  - If the displayed dose does not match the reference value in the IQAP, change the value for the **Iris correction (1/4EP)** in the window.
  - Press the **Put to Unit** button.
  - After approx. 2 seconds, repeat the measurement.
- Use **Close** to close the “Adjustment: TV-Parameter” window and exit the SSW.

Water Equivalency

Setting the Water Value Acquisition

- Select **Water Equivalency** in the XCS SSW / Components / Polydoros / Adjustment /.
- Insert 20 cm water phantom (make sure it is exact) into the beam path.
- Set the focus-I.I. distance

  - Overtable units: 115 cm

  - Undertable units: min. focus-I.I. distance

  - C-Arm unit: 100 cm
- Select I.I. full format.
- Move in the grid.
- With 40 / 33 / 23cm I.I.:

  - with Multiplier: select the round, central ADC measuring field

  - with PDA/SDM: select the middle, rectangular measuring field.

- Switch fluoro **ON** in the "Water Equivalency" window.
- The new correction factor is calculated by pressing the "**Start button**" and fluoroscopy is switched off again.

  ➪ 70 kV must be set as the exposure voltage; admissible tolerance: 68....71.5 kV
- Save the correction factor with **OK** and exit the adjustment window.

Skin Dose Rate

Adjusting the Maximum Skin Dose Rate

NOTE **The adjustment should be performed only in countries in which a limitation of the skin dose rate is mandatory.**

Country-specific, the maximum admissible values should be set as defined by the regulations.

In the area covered by DHHS, for

Normal fluoro	9 R/min (1305 μGy/s)
High Contrast Fluoro	18 R/min (2610 μGy/s) must be set.

If no such regulations exist, perform the window with SS" **OFF**. For 110 kV and 70 kV, set **18 mA** for each.

NOTE **For the Artis U, permanently set 70kV = 6.4 mA and for 100kV = 4.1 mA!**

- Select I.I. full format.
- Set the maximum focus-I.I. distance **(SID)**.
  - OT units: 115 cm
  - UT units: min. SID (do not move out the Distator)
  - C-Arm units: min. SID (POLYSTAR: 86.6 cm)
- Place on the dose measurement chamber for:
  - OT units at a distance of 30 cm above the tabletop
  - UT units, on the tabletop
  - C-Arm units at a distance of 30 cm from the I.I.
    This distance must be maintained, regardless of the SID.
- Collimate to the dose measurement chamber.
- Remove the fuses from the I.I. power supply:
  - with the POLYSTAR and SIRESKOP SX: M3, F7 automatic trip breaker
- Also cover the I.I. input, e.g. with lead (risk of burn-in).
- Select **Skin Dose Rate** in XCS SSW / Components / Polydoros / Adjustment /.
- Exit the message window with **OK**.

- Switch fluoro **ON** in the "Skin Dose Rate" window.
- Change the tube current until a max. skin dose rate of 9 R/min. is measured.
- "Exit the service program".

- After completing the POLYDOROS adjustment, exit the adjustment program in: "SYSTEM QUIT". Select System/Quit in the main program -> "System Logoff" window, exit with "Put to Unit", DISCONNECTED is displayed at the bottom in the status line.

Checking the Skin Dose Rate

NOTE	**With the Artis U, the check of skin dose rate is skipped!**

- Establish the test setup that was made for "Adjusting the max. Skin Dose Rate".
- Change the focus-I.I. distance and check the dose rate.
- The dose rate of 9 R/min. may not be exceeded at any of the distances.
- Set the minimum focus-I.I. distance.

- Select all automatic steps (with the first and second pressure points, if configured).
- The value that result for
  - the dose rate that is obtained and
  - the stabilized kV and mA values must be recorded.
- Reinstall the fuses in the I.I. power supply.

Zoom Iris Correction (not for VIDEOMED DHCF)

- Select **Zoom Iris Correction** in XCS SSW / Components / Polydoros / Adjustment /.
- Insert 2.1 mm Cu in the collimator.

NOTE	**Completely open the collimator.**

- Exit the message window with **OK**.

- Switch fluoro **ON** in the "Zoom Iris Correction" window.

  The fluoroscopy current must be between 0.5 mA and 3.5 mA. If not, add or remove Cu disks and perform the adjustment again.

- With fluoroscopy **ON**, set the required B-signal for all zoom formats (Zoom 1, 2, 3) by changing the correction value (see the table in the chap. “Adjusting the TV Iris Diaphragm”).
- Save the values with **OK** and exit the window.

TV Parameters

NOTE

To change the camera parameters for service on the Videomed SX/DH,

- select XCS SSW / Adjustment / **TV Parameters**.
- For the possible parameter settings, see POLYDOROS HELP “TV Parameters”

Iris Correction

NOTE

To adjust the TV iris in the Fluorospot TOP, depending on the exposure and fluoro mode,

- select XCS SSW / Adjustment / **Iris Correction**.
- For the possible parameter settings, see POLYDOROS HELP “Iris Correction”

Error Log

- Select the **Error Log** in XCS SSW / Components / Polydoros / Diagnostic /.

NOTE	**The logged errors from the POLYDOROS components can be displayed here. Unlike the menu item in the XCS main shell, error messages from other components are left out here.**

Adjustment Results

- Select the **Adjustment Results** in XCS SSW / Components / Polydoros / Diagnostic /.

NOTE

All POLYDOROS adjustment parameters can be displayed and printed out under "Display All Parameters".

The complete list is printed out on a printer connected to a PC using "Print".

An ASCII file is generated with "Print to file"; this can be saved to a freely selectable medium (floppy/hard drive).

Iontomat Drift

Checking the Drift and Hum Voltage

Checking the Drift

- Generator **OFF**.
- Connect the oscilloscope to:
  - D100.X63 VION and D100.X63 AGND
  - Trigger D100.X64. SWR
- Generator **ON**.
- Perform the following checks for all connected detectors; to do this, select the corresponding IONTOMAT work station. Depending on the unit, insert, e.g. an empty cassette.

NOTE

The generator must be switched on for at least 5 minutes prior to performing the checks.

If a digital oscilloscope is used, do not measure in the "Glitch Detect mode" (mean value calculation, smoothing) because if this is done, the measuring results will be falsified.

The drift measurement is relative to the integrator output of the U/F converter, i.e., if the SWR is ON and the threshold voltage of 0 V is reached, the output voltage will be set to 1,5 ± 0,3 V.

- Select **Iontomat Drift** in XCS SSW / Components / Polydoros / Diagnostic /.

- Perform the further work steps per the SW window “Measure steps".

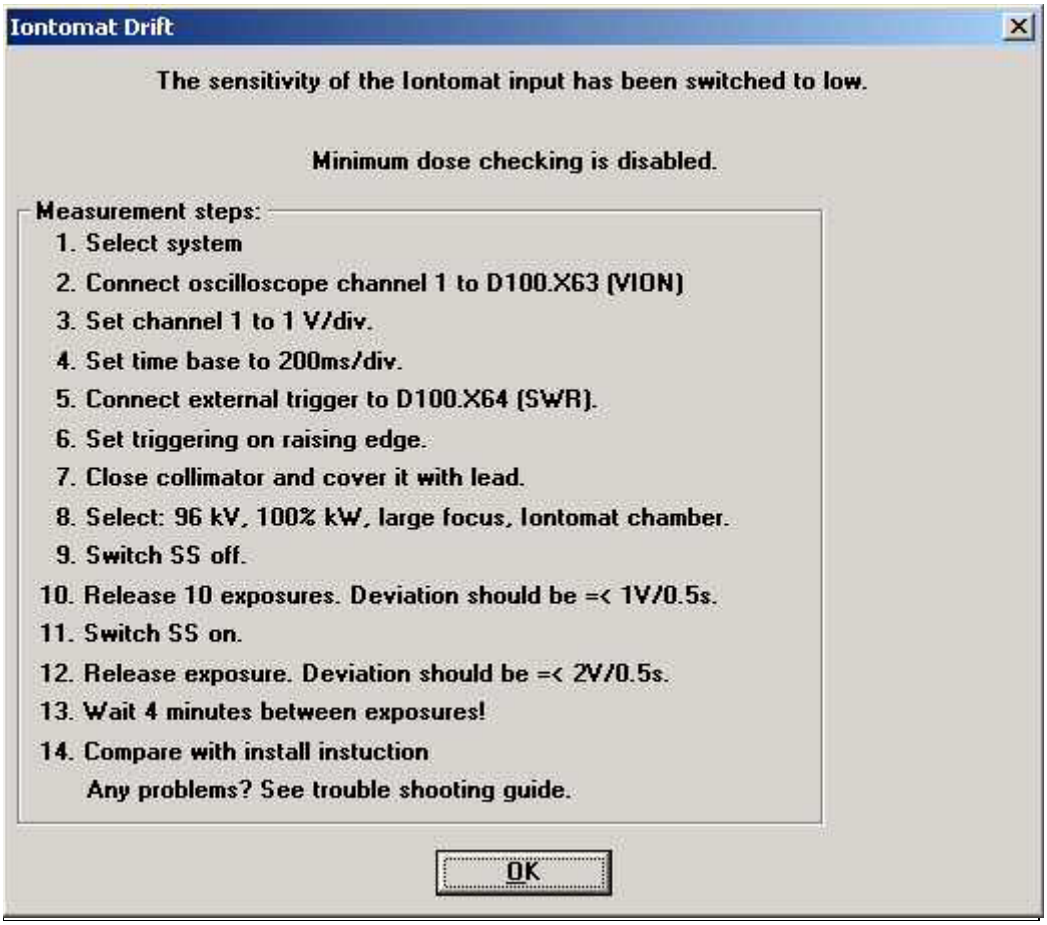


Fig. 41: XCS Components, Polydoros Diagnostics, Iontomat Drift

- Enter the measurement values in the Test Certificate (Quality Certificate or Test Certificate 1).

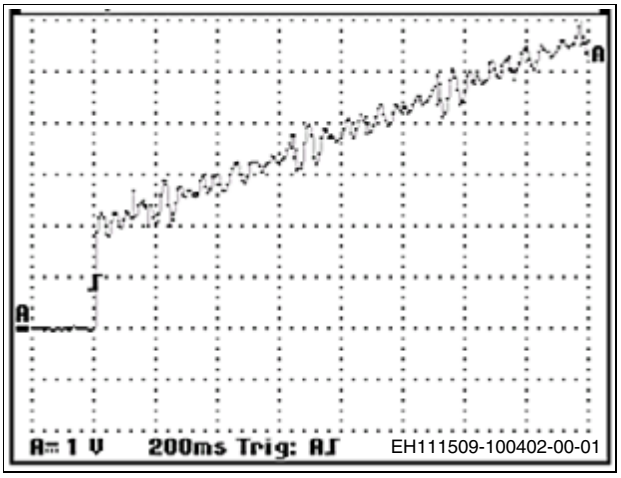


Fig. 42: Oscillogram 1 example: Drift measurement

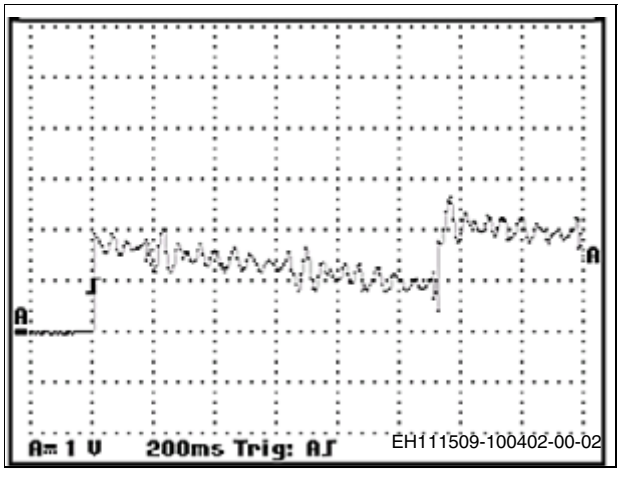
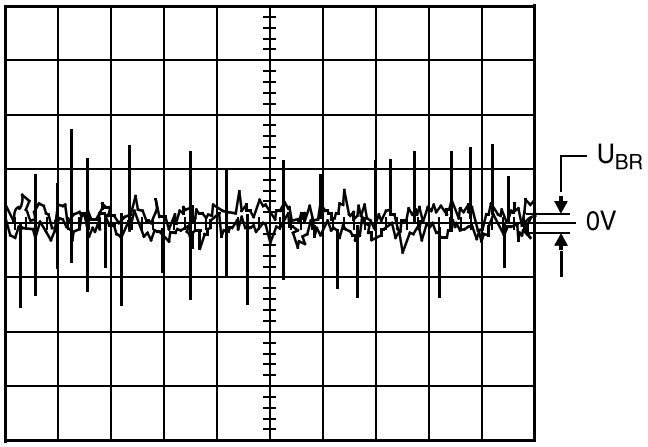


Fig. 43: Oscillogram 2 example: Drift measurement

Checking Hum Voltage

- Connect the test sensor to D100.63 DL IN.

- SS **OFF**.
- Trigger exposure and measure the hum voltage U_{BR} for all 3 chambers.
  ➪ Maximum admissible hum voltage: ≤20 mVpp



Hum voltage at D100.X63.DL IN (example)

10 mV/div.

10 ms/div.

Fig. 44: Oscillogram: Hum at D100.X63.DLIN

Causes and Corrective Measures for Drift and Hum Voltage Values that are too High

NOTE

Undefined switch times and malfunctions in IONTOMAT operation can be caused by directly laying the IONTOMAT cables along with the power line and high voltage cables in the cable duct.

The IONTOMAT cable must be a minimum of 10 cm away from the signal and power cables. The IONTOMAT cable may not be laid in loops.

Insufficient insulation of the IONTOMAT chambers.

➪ **Remedy:** See ”Connecting the Detectors” in the Generator or System Installation Instructions.

Disturbances over the IONTOMAT cable.

➪ **Remedy:** Check how the entire cable is laid. If needed, replace the IONTOMAT cable.

Only with Multiplier Operation:

If the drift or hum is too high, it can be caused by the following:

- Multiplier incorrectly connected to the base.
- Multiplier cable shielding defective.

mAs Counter Test

Fig. 45: XCS Components, Polydoros Diagnostics, mAs Counter Test

- Select **mAs Counter Test** in XCS SSW / Components / Polydoros / Diagnostic /.
- A test voltage is applied to the mAs counter input when **"Start Test"** is selected.
- The mAs counter should count up to 10,000 pulses within 50 ms.
- If there is a difference of more than 10%, the message "not OK" is displayed.
- If the difference is less than 10%, the message "OK" is displayed.
- The test is aborted if **"Cancel"** is selected.

Inverter Test

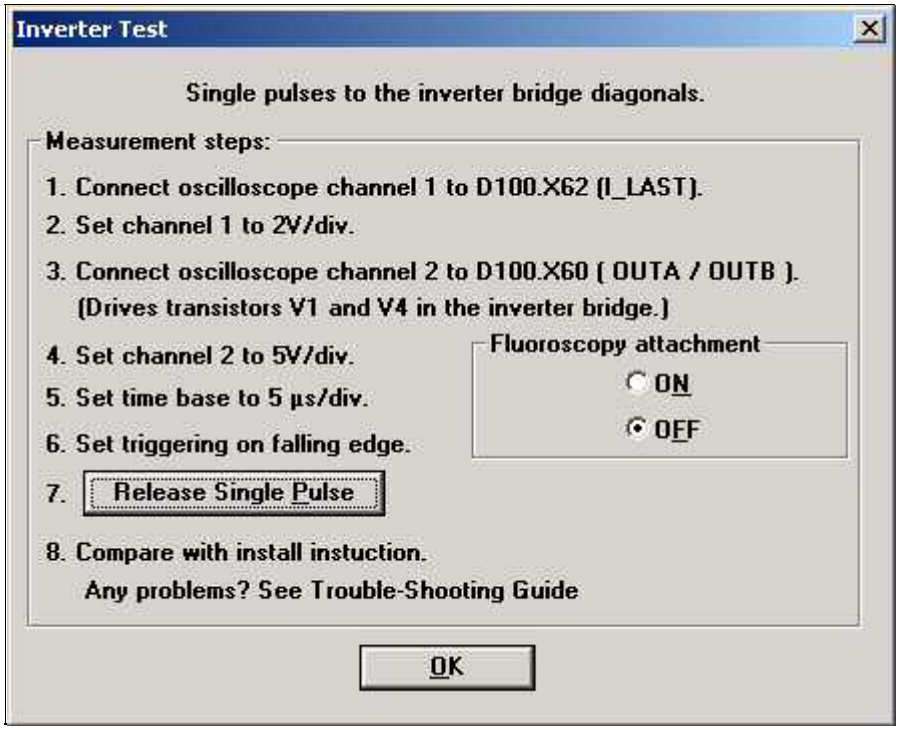


Fig. 46: XCS Components, Polydoros Diagnostics, Inverter Test

- Select the **Inverter Test** in XCS SSW / Components / Polydoros / Diagnostic /.
- A single pulse is generated if **"Release Single Pulse"** is selected.
- The I-Last current for single pulse must have the following appearance:

Pos. Signal (500 mV = 50A) Neg. Signal (500 mV = 50A)

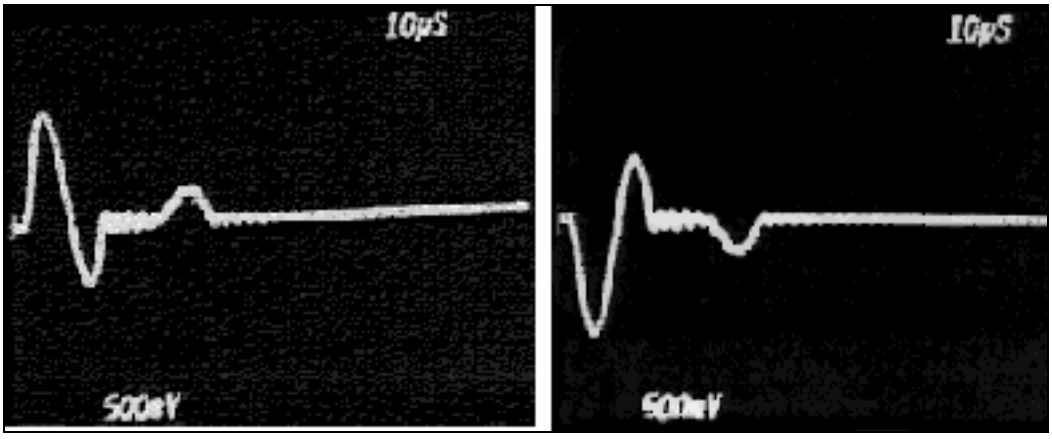


Fig. 47:

- The following conditions must be checked in both oscillograms:
  - "Forward oscillation": 120A ±10%
  - "Backward oscillation": 50A ±10%
- Return to the Polydoros service software main program by selecting **"OK"**.

Manual Fluoroscopy

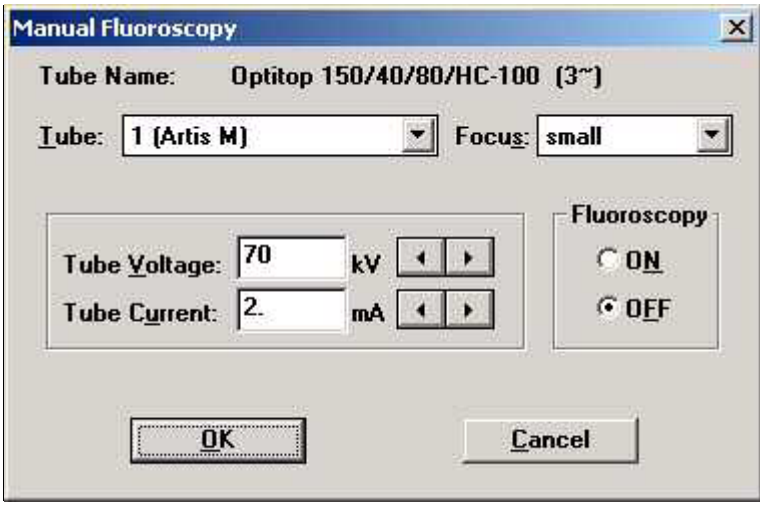


Fig. 48: XCS Components, Polydoros Diagnostics, Manual Fluoroscopy

- Select the **Manual Fluoroscopy** in XCS SSW / Components / Polydoros / Diagnostic /.
- Possible parameter settings:
  - Selection of focus: small / large
  - Tube Voltage: 40 - 110KV
  - Tube Current: 0.1 - 9 mA

- If **"Fluoroscopy ON"** is selected, fluoroscopy is triggered with the parameters that have been set.

Manual Exposure

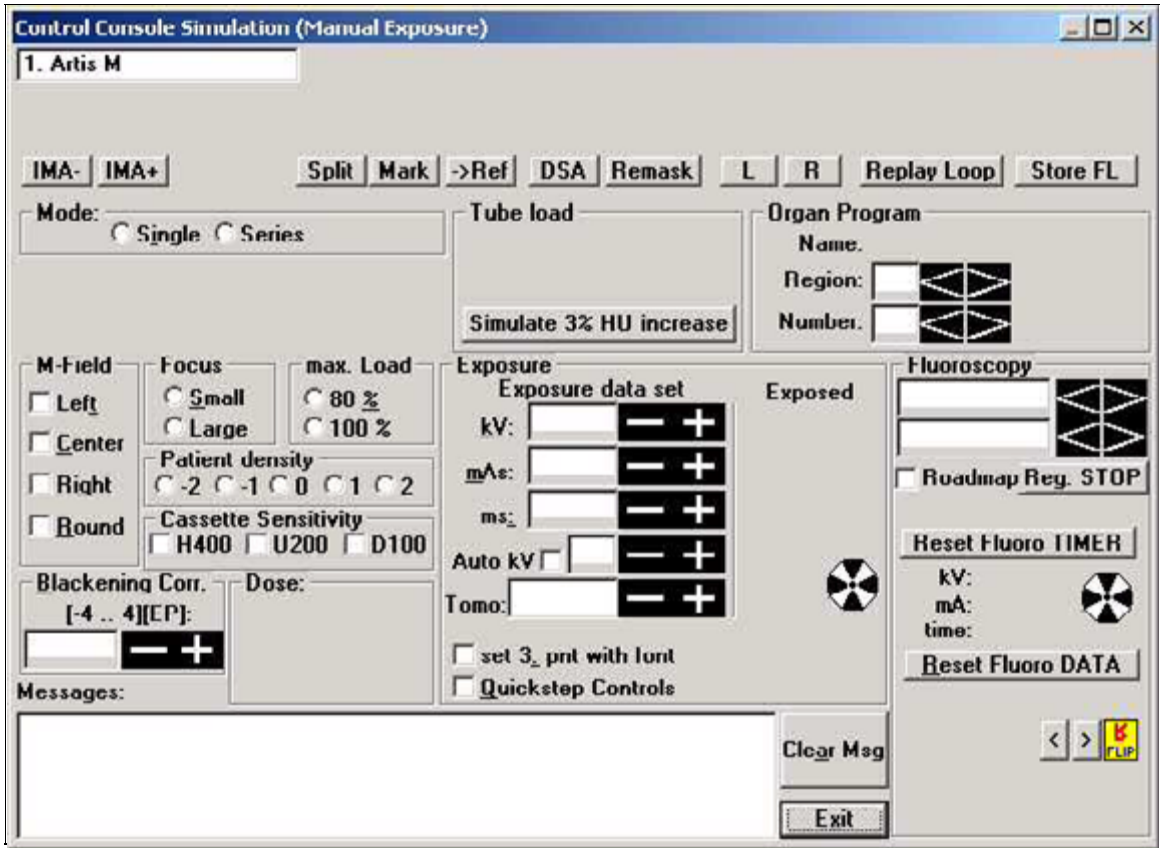


Fig. 49: XCS Components, Polydoros Diagnostics, Manual Exposure

- Select the **Manual Exposure** in XCS SSW / Components / Polydoros / Diagnostic /.
- For the possible parameter settings, see POLYDOROS HELP “Manual Exposure”
- An exposure is triggered with the parameters that have been set by selecting the **“radiation symbol”** in the Exposure window.
- Fluoroscopy is triggered with the parameters that have been set by selecting the **“radiation symbol”** in the Fluoroscopy window.

Checking Skin Dose Rate

NOTE	Selectable only if fluoroscopy is configured in the Site Structure.

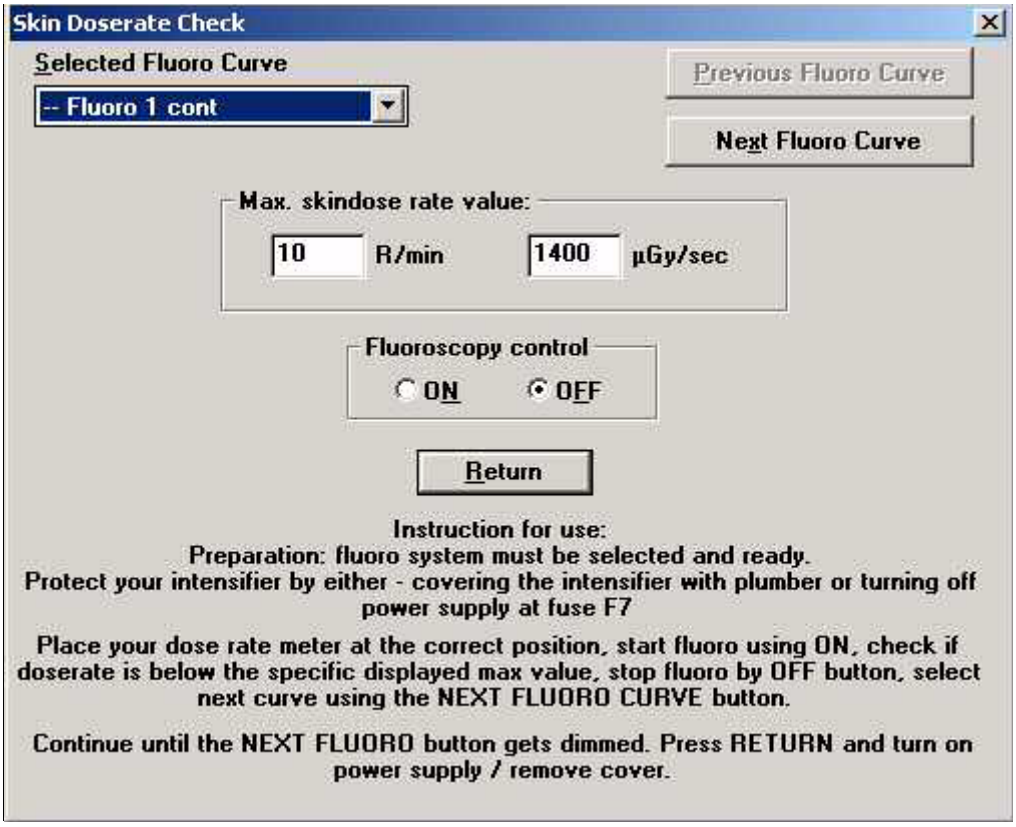


Fig. 50: XCS Components, Polydoros Diagnostics, Check of Skin Dose Rate

- Select the **Check Skin Dose Rate** in XCS SSW / Components / Polydoros / Diagnostic /.
- Requirements:
  - Fluoroscopy system is selected.
  - Image intensifier covered with lead or I.I. power supply switched off.
  - S3 service switch = ON
  - Dose rate measurement meter present, dose measurement chamber in beam path
- The 1st fluoro curve is automatically selected when “Check Skin dose rate is selected
- Fluoroscopy is switched on when **“Fluoroscopy ON”** is selected.
- The dose rate limit values are displayed in the Program window.
- Compare them with the displayed value on the dose measurement meter; exceeding the value is not permitted.
- Fluoroscopy is switched off when **“Fluoroscopy OFF”** selected.
- Check all other fluoro curves by selecting **“Next Fluoro Curve”**.

Open TV Iris

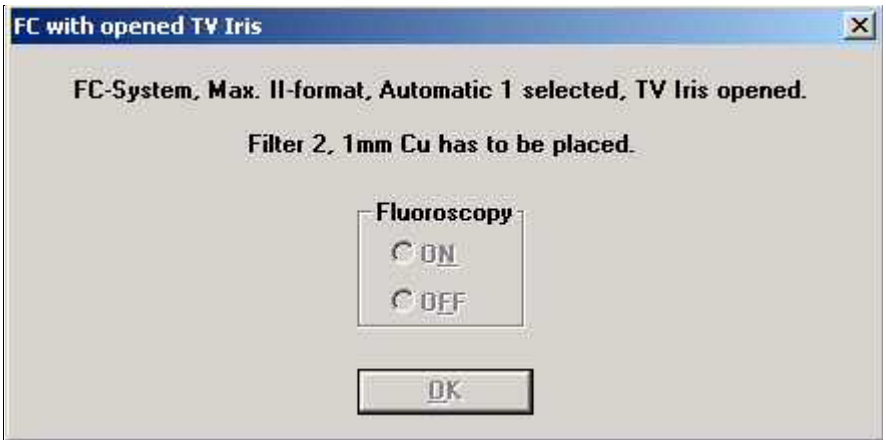


Fig. 51: XCS Components, Polydoros Diagnostics, Open TV Iris

- Select **Open TV Iris** in XCS SSW / Components / Polydoros / Diagnostic /.
- Requirements:
  - Fluoroscopy system is selected.
  - Image intensifier is set to full format
  - Fluoro automatic curve 1 is selected
  - 2.1 mm Cu is in the beam path

- Fluoroscopy is performed with the TV iris completely opened when **"Fluoroscopy ON"** is selected.
- The B-signal can be measured at the pre-amplifier in the Videomed SX at test point P8.

Nominal Power

- Select **Nominal Power** in XCS SSW / Components / Polydoros / Diagnostic /.
- An exposure is triggered when **"Exposure ON"** is selected.
- Measure the kV and mA with the oscilloscope.
- Calculate the max. power from the measured kV and mA.

$$P_{kWmax} = \frac{kV \times mA}{1000}$$

For the tolerance, see the Test Certificate.

- Record the measured mA value and the calculated power value (kW) in the Test Certificate.

Saving the Data on a Backup Diskette

NOTE	**After completing adjustment, perform a "backup".**

- Insert the backup diskette into drive **A** .
- Select **Backup to disk** in the XCS Data window.

Restoring the Data from a Backup Diskette

- Insert the backup diskette into drive **A** .
- Select **Restore to disk** in the XCS Data window.

POLYDOROS SX 65/80 XCU Download

NOTE

Perform the XCU download only after:

- Changing the software

- Replacing the XCU

Performing the XCU Download:

- Switch the generator **OFF**.
- Insert the download diskette into the XCU drive.
- Switch the generator **ON**.
- The download takes place automatically.
- Switch the generator **OFF**.
- Remove the download diskette from the XCU drive.
- Switch the generator **ON**.

POLYDOROS SX 65/80 Heating Download:

NOTE

Perform the heating download only if:

- The red LED on D220 blinks

- If there is a replacement of the D220, a download is not necessary because it has already been performed at the factory.

If problems occur during download of heating:

- Check the 5V voltage, D220.X18.A1

Performing the Heating Download:

- Insert the download diskette into the **Service PC**.
- In the "XCS Service Application-Main Program/Data/ window, select **Download to Unit"** .
- In the "Data/Download Select Component" window, select**"SX_Heating"**.
- In the "Data/Download" window, select the **"Start" button**.

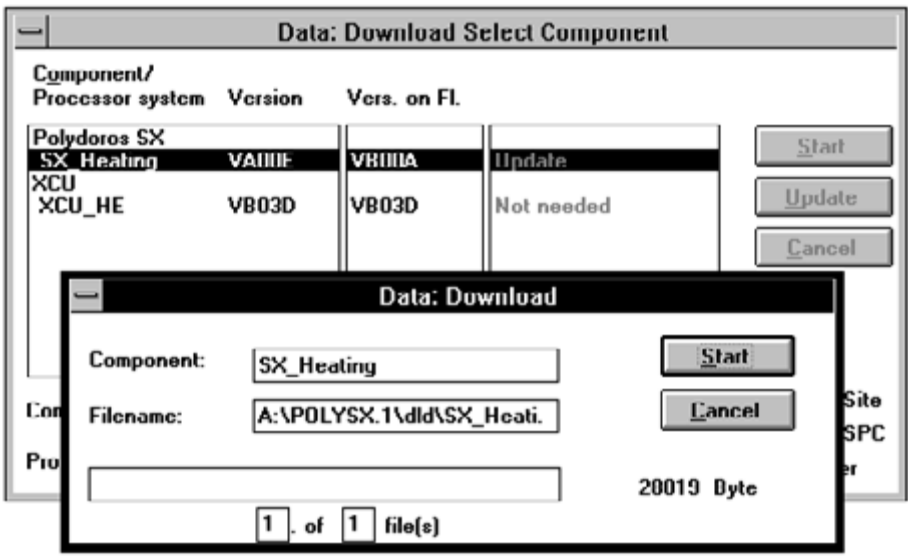


Fig. 52: Data: Download Select Component

Checking the Anode rpm (without Radiation)

Check with the Fluke 8060A

NOTE

If a FLUKE 8060A is available, the frequency can be measured directly with it. Perform the measurement as described below; for this, set 200 mV AC and Hz on the FLUKE.

Check with the Oscilloscope

- Select the tube unit to be checked at the deck.
- Press the S27 switch to "Prep" (the rotating anode will start up).

⚠CAUTION

Voltage approx. 1500 V!

➪ **Do not yet connect the oscilloscope!**

- Switch the generator **OFF**.
- Now attach the oscilloscope according to the tube unit selected.
  - For tube unit I to K3.R2 and K3.R4
  - For tube unit II to K3.2 and K3.4

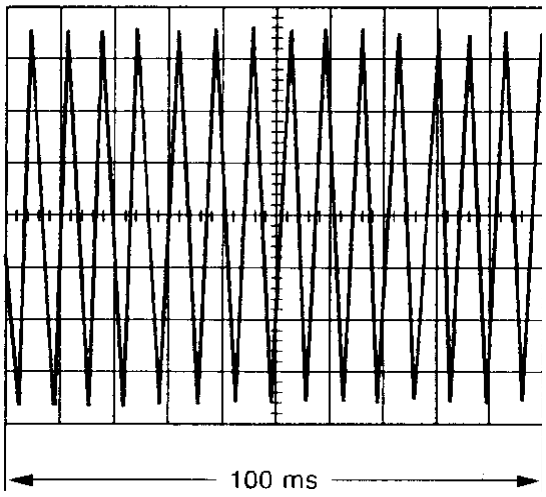


Fig. 53: Oscillogram: X-ray tube rpm

- Evaluate the oscillogram:
  - Count the number of periods in 100 ms.
  - The number of period multiplied by 10 is the frequency.
  - For 3-phase or high-speed tubes: rpm **143 ± 10 Hz** (Rapid Tubes).
  - With low-speed tubes: rpm = **50 ± 5 Hz**

NOTE

Prior to switching on the generator again, disconnect the oscilloscope!

With the OPTI 154, measurement of the anode rpm is not possible.

Checking the X-ray Tube Unit Oil Pressure Switch

- Unplug the D160.X61/X62/X63 connectors
- Check:
  - Exposure triggering must be blocked.
  - At the control console, the message "Error 628 APID 80" appears, the red tube symbol lights up.
  - The message "door is open" appears on the touchscreen console
- Plug the D160.X61/X62/X63 connectors back in.

Conditioning the X-ray Tube

The following program must be performed by Siemens Service during initial startup of the X-ray tube, or following extended system down time during a service call, as well as when there are operating malfunctions of the system with a suspicion that there is electrical instability of the X-ray tube. After extended idle time of the X-ray tube (more than 2 weeks), it is recommended that the operator perform an abbreviated warm-up procedure as described under Point 2.

⚠CAUTION **Radiation!**

➪ **Here, sufficient radiation protection must be ensured and a configured image intensifier must be protected from radiation (e.g. place lead aprons in the beam path).**

Program (for start with a cold anode)[1]

Switch on fluoroscopy at 40-70 kV (depending on the generator model). Power up to 100 kV/4,1 mA within approx. 1 minute and hold for 10 minutes. 5 minutes cooling pause.

for tubes and idle times of > 2 weeks:

Conditioning the X-ray Tube

- Select 80% kW and large focus; trigger the following exposures in rapid succession and without braking the rotating anode between the two exposures.

70 kV / 100 mAs	2x	1 min. pause
90 kV / 400 mAs	2x	3 min. pause
109 kV / 400 mAs	2x	3 min. pause

Perform only for installation of a new tube unit

- 125 kV / 63 mAs - 2x
  Pause 1 minute
- 150 kV / 50 mAs - 2x
  Pause 1 minute

1. If the tube tends to repeatedly and strongly arc, abort the procedure (risk to sensitive parts of the system electronics).

Entering and Editing Organ Data

Information about the organ programs: by a system, the exposure system selected is understood. To make the organ programs available, in the "Configurate: Site Structure: Site Adjustments" window, in the box: Option Selection, "12 regions-20 organs/region" must be programmed. In this window, the default organ programs can be reloaded by selecting: "not available" -> "ok" -> **"12 regions-20 organs/region"**.

- To generate organ programs, in the "Configure: Site Structure: Site Adjustments" window, select the **"Edit org prog." button**.
- Exit the window with **"OK"** and **"Save"**.

NOTE	**Make a backup.**

- Select Main Program/System/Quit →and exit "System Logoff" with "Put to Unit".
- Switch the generator **OFF**.

General Information

The sensitivity, S, of a film-screen system is defined according to DIN 6867 as the quotient of 1000 mGy and the air kerma (dose), KS required to achieve an optical density (blackening) of 1 ,+ 0.2 above base fog.

➪ S = 1000 mGy / KS

If the sensitivity, S, is known, the dose, KS, can be calculated:

➪ KS = 1000 mGy / S

In the following tables, the approximate sensitivity values, S", for a selection of intensifier screens from different manufacturers in combination with blue and green sensitive standard X-ray film (sensitivity factor F = 1) are summarized. Another table provides the sensitivity factors, F, for a selection of X-ray films. From the data in these two tables, calculation of the sensitivity number, S, for a film-screen system is very easy to perform: All that is needed is to multiply the sensitivity S" listed on the film by the sensitivity factor of the film, F.

➪ S = S´ x F

The values that are obtained should be viewed as reference values. The most important reasons for differences are production variations (particularly with the film) and changed development conditions.

Manufacturer	Screen	Film	Sensitivity
Agfa	CURIX fin	blue	50
	CURIX universal	blue	100
	CURIX	blue	200
	CURIX MR 50	blue	50
	CURIX MR 200	blue	200
	CURIX MR 400	blue	400
	CURIX MR 600	blue	600
	CURIX MR 800	blue	700
	CURIX Ortho fine	green	100
	CURIX Ortho medium	green	200
	CURIX Ortho regular	green	400
Auer	Sinissima	blue	30
	F Z	blue	70
	Universal	blue	100

Manufacturer	Screen	Film	Sensitivity
	H V	blue	160
	Special	blue	160
	Gravina	blue	300
CAWO	Universal	blue	100
	Special	blue	200
	SE 2	blue	200
	SE 4	blue	400
	SE 6	blue	600
Dr. Goos	Ultra Detail	blue	50
	Fine resolution	blue	80
	Universal	blue	100
	Ultra Rapid	blue	200
	Special	blue	200
	Superma LGY	blue	300
	Superma LGY	green	200
Kodak	X-OMATIC Fine	blue	40
	X-OMATIC Regular	blue	200
	X-OMATIC Rapid	blue	400
	Super Rapid	blue	800
	LANEX Fine	green	125
	LANEX Medium	green	230
	LANEX Regular	green	450
	LANEX Fast	green	700
Konika / Sakura	Konika ND	blue	100
	Konika NH	blue	200

Manufacturer	Screen	Film	Sensitivity
	Konika KF	green	100
	Konika KM	green	200
	Konika KR	green	400
Kruppa	Fine structure	blue	40
	Universal	blue	100
	Express	blue	160
	Special	blue	200
	TR 2	blue	200
	TR 4	blue	400
	TR 6	blue	600
Kyokko / Fuji	FS	blue	70
	MS	blue	100
	HS	blue	160
	LF-II	blue	70
	LT-II	blue	100
	LH-II	blue	160
	Super HS	blue	200
	BF-III	blue	70
	BM-III	blue	100
	BH-III	blue	200
	BX-III	blue	250
	Special	blue	400
	GF-1	green	100
	GM-1	green	200
	GH-1	green	400
	GX-1	green	600

Manufacturer	Screen	Film	Sensitivity
3M	TRIMAX 2	green	100
	TRIMAX 4	green	200
	TRIMAX 6	green	300
	TRIMAX 8	green	400
	TRIMAX 16	green	600
Philips	Micro	blue	40
	Universal	blue	100
	Ultra S	blue	200
	Azuray N	blue	300
	Azuray S	blue	400
	Ampli GR 2	green	140
	Ampli GR 4	green	400
	Ampli GR 6	green	500
Du Pont	Detail	blue	25
	Fast Detail	blue	50
	Par Speed	blue	100
	HI-Plus	blue	200
	Quanta Detail	blue	100
	Quanta Fast Detail	blue	400
	Quanta II	blue	400
	Quanta II	blue	800
	Cronex Ortho Fine	green	100
	Cronex Ortho Medium	green	200
	Cronex Ortho Regular	green	400

Manufacturer	Screen	Film	Sensitivity
Siemens	Super Rubin	blue	25
	Rubin	blue	40
	Saphir	blue	80
	Diamant	blue	200
	Special	blue	200
	Titan 2 UD	blue	50
	Titan 2 D	blue	80
	Titan 2 U	blue	200
	Titan 2 HS	blue	400
	Titan 2 UD	green	30
	Titan 2 D	green	50
	Titan 2 U	green	125
	Titan 2 UD	green	30
	Orthex D 110	green	100
	Orthex U 220	green	200
	Orthex HS 440	green	400

Manufacturer	Film	Light Color	Sensitivity Factor
Agfa	Curix MR 4	blue	0,5
	Curix RP 1	blue	1
	Curix RP 1L	blue	1
	Curix RP 2	blue	1,4
	Medichrom	blue	0,5
	Curix Ortho L	green	1
	Curix Ortho GS	green	1
	Curix Ortho ST-G	green	1

Manufacturer	Film	Light Color	Sensitivity Factor
CEA	Wicor XRP	blue	1
	Wicor L	blue	1
	Wicor XOG	blue	1
Fuji	RX-G	blue	0,5
	RX-L	blue	1
	RX	blue	1
	RXO-G	green	1
	HR-G	green	1
Kodak	X-Omat S	blue	1
	X-Omat L	blue	1
	X-Omat G	blue	0,5
	Ortho G	green	1
	Ortho H	green	2
	T-MAT G	green	1
	T-MAT-L	green	1
Konika / Sakura	A 2	blue	1
	AOG	green	1
	MGH	green	1
	Medical AX	blue	1
3M	Type R 2	blue	1
	Trimax XUD	green	1
	Trimax XDA	green	1
	Trimax L	green	1
	Trimax XD	green	1
	Trimax XM	green	2
Du Pont	Cronex 7	blue	0,5

Manufacturer	Film	Light Color	Sensitivity Factor
	Cronex 10	blue	0,5
	Cronex 7L	blue	0,5
	Cronex 2	blue	1
	Cronex 4	blue	1
	Cronex L	blue	1
	Cronex 8	green	1
	Cronex 8L	green	1

Selective Dominant Measurement (SDM)

NOTE	Not used for the Artis U!

General Information

SDM (**S**elective **D**ominant **M**easurement) is a multi-field measuring system to determine the starting brightness of the image intensifier for all indirect techniques (fluoroscopy, DSA, DFR).

A PDA (**P**hoto **D**iode **A**rray) is used as the detector that in principle takes over the function of the multiplier. The PDA is comprised of individual segments that are switched together as ADC measuring fields.

The measuring fields can also be selected parallel and are comparable to Iontomat measuring fields. In addition, there is a round measuring field available that can be combined with other measuring fields.

The size of the measuring fields are changed depending on the zoom.

Checking the Size of the PDA

Requirements

- The television system and DFR system must be in operation and the TV camera must be centered.
- Select I.I. full format at the unit.
- SS **OFF**.
- Highlight the brightness/contrast adjuster on the monitor and disengage the latching mechanism.
- Switch on Fluoro with the footswitch and leave it switched on for the following steps.
- Remove the cap on the light distributor.
- D100, set the S1 to "Service" in the camera adapter/light distributor (PDA is illuminated).
- Switch fluoro **OFF**.
- D100, set the S1 to "Normal".
- Change the brightness and contrast on the monitor until the PDA is visible; if needed, save the LIH image and change windowing and edge enhancement on the DFR system.
- Measure the size of the PDA as shown in (Fig. 54 / p. 104) and compare the value to table 1.

- Reinstall the cap on the light distributor.

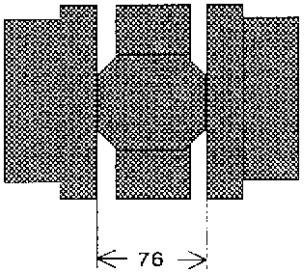


Fig. 54: PDA

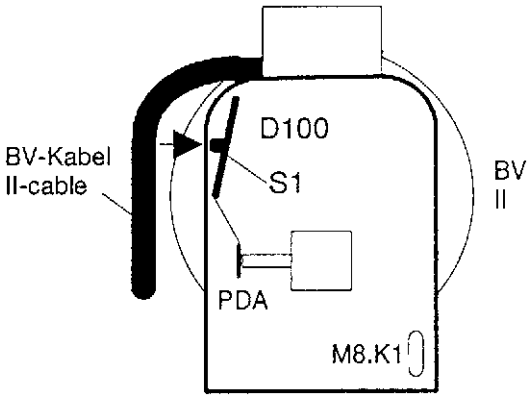


Fig. 55: Light distributor

PDA Measured on the 44 cm SIMOMED H

	40 cm I.I.	33 cm I.I.	23 cm I.I.	Urology 40 cm I.I.	Urology 33 cm I.I.
PDA Size (mm)	76	91	116	76	91
Tolerance (mm)	±7	±9	±11	±7	±9

Table 1

NOTE

For other monitor sizes, convert the reference values:
Relationship factor M = 24.5 cm: Monitor height (in cm)

If the size of the PDA is not within tolerance, proceed as follows:

- Loosen the PDA set screw on the optics.
- D100, switch S1 **ON** (SS **OFF**)
- Switch fluoro **ON** with the footswitch.
  Adjust the PDA size per table 1 by turning the optics (plastic ring).
- Retighten the set screw.

Checking the Selected ADC Measuring Field

Prerequisite

- Dose rate must be adjusted; for this, see chapter: "Adjustment" / "Dose Rate"
- Select the left, rectangular measuring field at the unit.
- Switch fluoro **ON** with the footswitch.
- Move the DSA finger in the universal collimator over the left ADC measuring field (with the FLUOROSPOT, the measuring field is displayed on the monitor).

- The fluoro kV and the fluoro mA must increase on the generator control console.

NOTE

In systems with a digital collimator, perform the check with 2.1 mm Cu on the tabletop.

- Switch fluoro OFF.

- Repeat the test with the right measuring field.

Only in Combination with FLUOROSPOT H

Checking the Measuring Field Device on the Monitor

- Select I.I. full format and the octagonal measuring field at the unit.
- Make the PDA visible as described previously.
- Mark the width and center of the octagonal measuring field.
- Briefly switch fluoro **ON** with the footswitch (SS **OFF**) until the measuring field from the FLUOROSPOT appears.
- The width and position of the appearance must coincide with the marks. Admissible difference of the size and position:

for the 40 HDR	is 1.4 cm
for the 33 HDR	is 1.8 cm

- The size of the appearance is adjustment using the Fluorospot System Configuration in Mask 6, "Measurement field scale factor".
- The position of the field that appears cannot be changed.

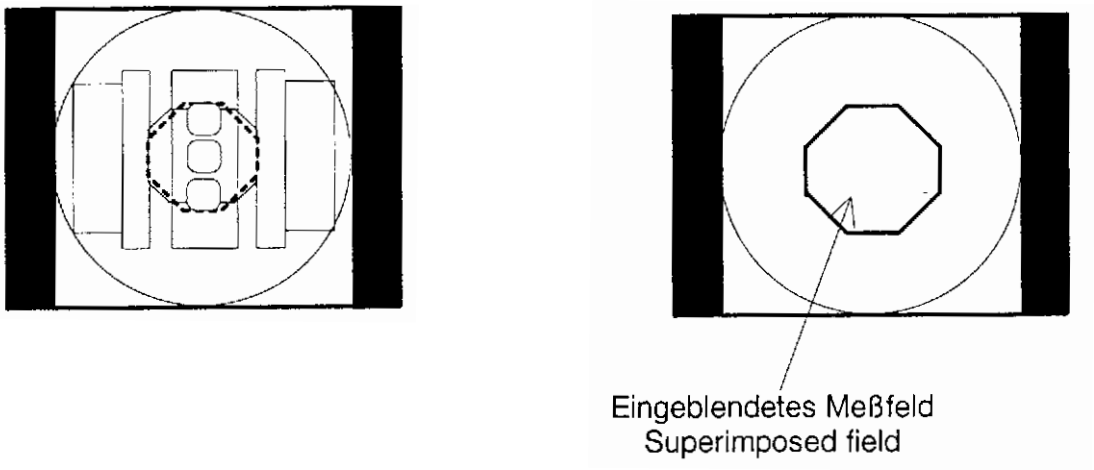


Fig. 56: Measuring Fields on the Monitor

Measuring field sizes with Zoom (with 40 cm HDR I.I.)

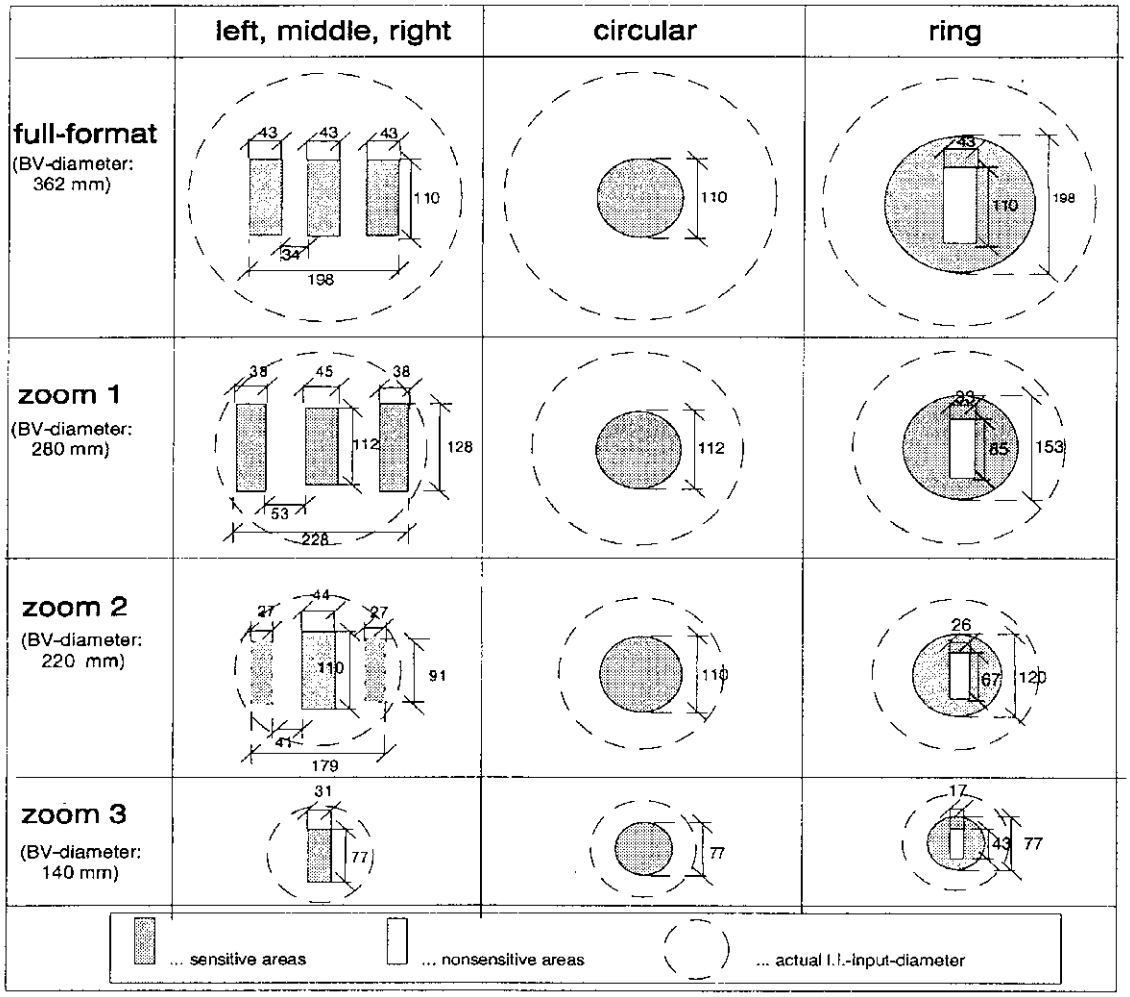


Fig. 57:Measuring field sizes in zoom mode

Chapter	Section	Changes
POLYDOROS SX Adjustment	Adjusting the Dose Rate with the PDA / SDM	Note for the S2 switch on the D100 added.