SIEMENS

POLYDOROS LX 30/50

AX

Adjustment

POLYDOROS LX

Adjustment and Configuration

Also for:
POLYDOROS LX 30/50 Lite
POLYDOROS LX 80

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The document corresponds to the version/revision level effective at the time of system delivery. Revisions to hardcopy documentation are not automatically distributed.

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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. as well as 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 voltage at the T1 transformer and on the 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 on D220 lights up. 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 assemblies only with the generator switched off; when doing this, observe ESD guidelines.

⚠WARNING

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

➪ **While performing such work steps, wear suitable radiation protective clothing.**

Required Documents

- Wiring Diagram X2169

Required Tools and Test Equipment

- Service tool kit
- Service PC

- PC connection cable (Part No. 99 00 440)

Requirements

- Completed POLYDOROS LX 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**.

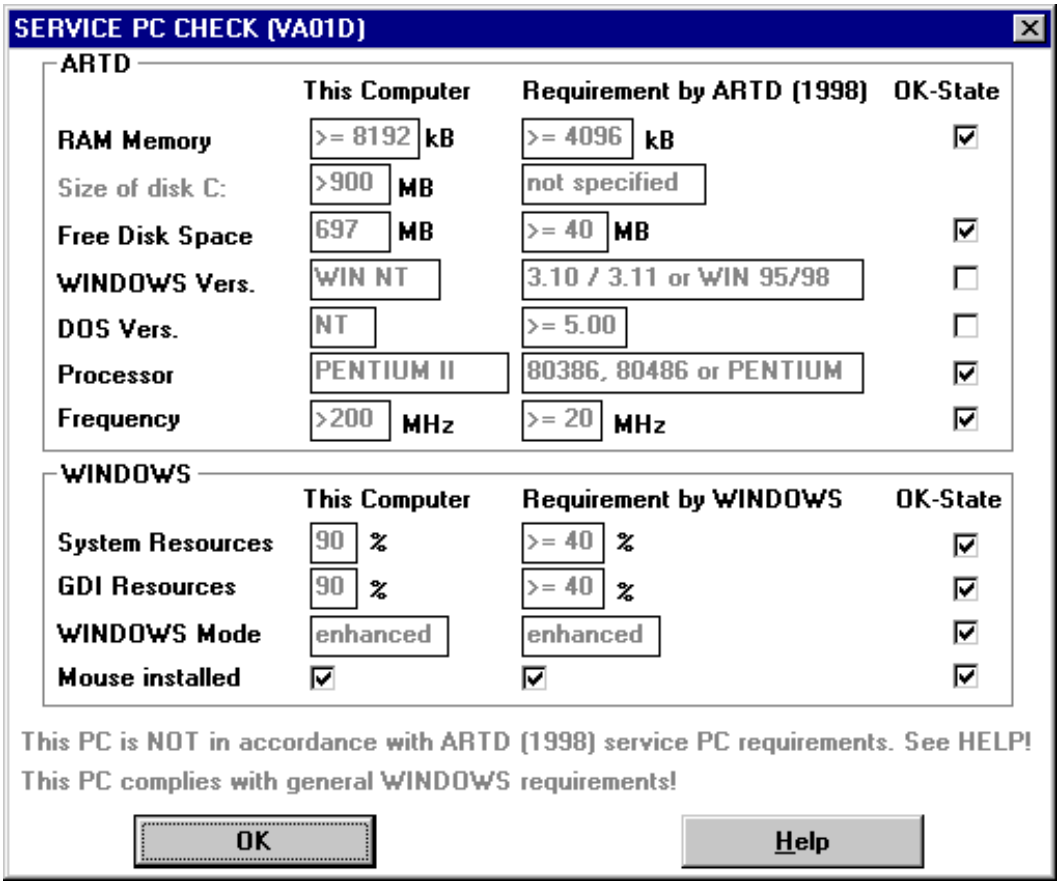


Fig. 1: SERVICE PC CHECK (VA01D)

- The Service PC " COM! serial interface" is connected to D200.X5 or if configured to the SX control unit, D320.X5 in the generator using the PC connection cable.
- To enable triggering of radiation from the Service PC, the S3 switch on the D100 must be set to the "Service" position.

Switching to a Different Power Line Voltage and Power Line Frequency

In the Test Certificate it can be seen at which line voltage and line frequency the generator was tested.

400V / 440V / 480V Power Line Voltage

If the generator needs to be connected to a different line voltage, perform the changes per Wiring Diagram X2169.

NOTE

With 440V and 480V power systems, a pre-transformer is also needed.

Adapting the 50Hz / 60Hz Power Line Frequency

If the generator needs to be connected to a different power line frequency, perform the changes per Wiring Diagram X2169.

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

Power Line Frequency	Jumper Setting on D160	
50 HZ	X20--X21	X23--X24
60 HZ	X21--X22	X24--X25

Checking the Phase Connection

NOTE

For units that use 3-phase power, check the phase connection of the power cables.

Using the field rotation meter, check for correct phase connection of the power cables at M16.L1, L2, L3.

- Connect the field rotation meter to the L1, L2, L3 (power side) terminals.
- Switch the system breaker **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 Line Resistance

Use the internal line resistance test meter connected to M16.L1, L3, L3 to measure the internal line resistance (one after the other, phase to phase).

- Always connect the internal line resistance meter between 2 phases of L1, L2 and L3.
- Switch the system breaker **ON**.
- Perform the measurement.
- Switch the system breaker **OFF**.
- Disconnect the test meter and perform the measurement for the other phases.

Internal Line Resistance, Ri

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

UN / P	30 KW	50 KW	80 KW
400 V	0.27 Ohm	0.17 Ohm	0.11 Ohm
440 V	0.34 Ohm	0.20 Ohm	0.14 Ohm
480 V	0.40 Ohm	0.24 Ohm	0.16 Ohm

Installing the XCS Service Software on the Service PC

NOTE

Beginning with the XCS SSW VE00D, there is a SSW Manager with which several XCS SSW versions can remain loaded on the Service PC and then selected accordingly as the current working version.

Installing the SSW with Diskettes

- Install the XCS Service SW version the PC; to do this:
  - either delete the existing service SW on the PC,
  - or use the File Manager to rename the existing SSW director to e.g. SSWold or SSWVxxx prior to installing the new SW.
- 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 appears to insert the appropriate diskette.
- Confirm the window that follows with **OK**.
  - Then the software creates a **SERVICE** program group.

Installing the SSW with CD

- Install the XCS Service SW version on the Service PC; to do this,
  - either delete the existing service SW on the PC,
  - or use the File Manager to rename the existing SSW directory to .e.g SSWold or SSWVxxx prior to installing the new SW.
- Insert the SSW CD into the CD drive.
- Start 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 following window with **OK**.
  - Then the software creates a **SERVICE** program group.

NOTE

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

Starting the XCS Service Program

- Select **XCS SERVICE**.

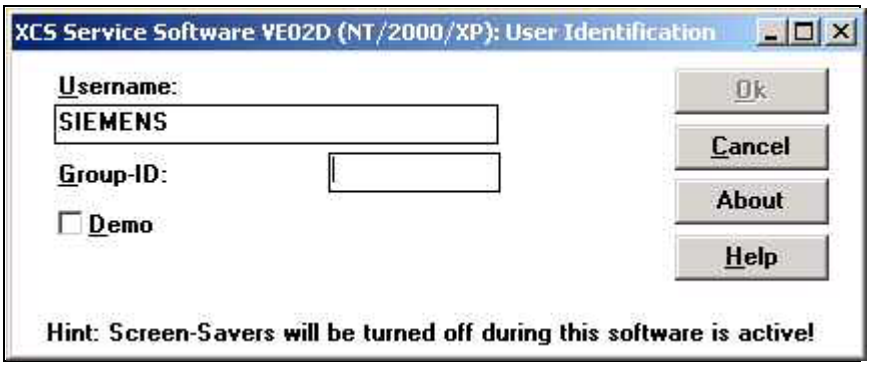


Fig. 2: XCS SSW, User Identification

- User name: Enter the **Name**.
- Group ID: "Enter _**siemens**".

NOTE

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

- Exit the window with **OK**.

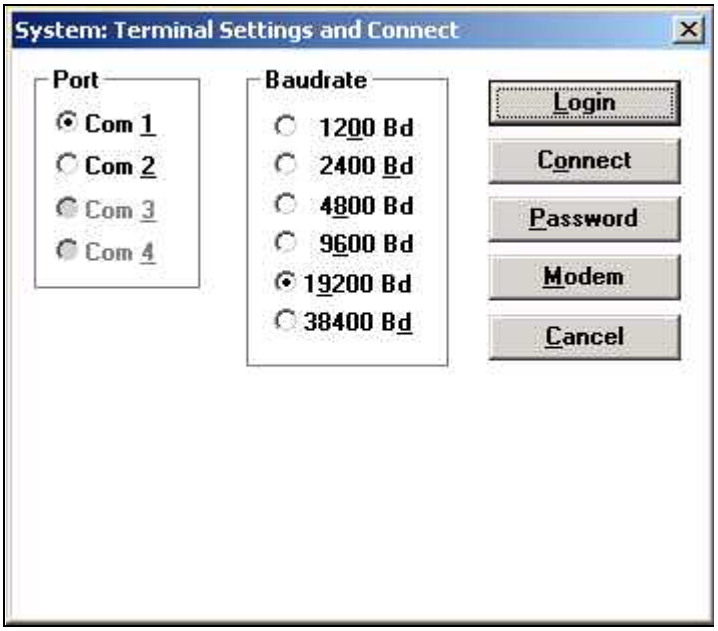


Fig. 3: XCS SSW Login

NOTE

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

If a password is selected, there is a request for a password, see "Variable Password".

- Exit the window with **Login**.

- If **Login** is selected, connection to the XCU is established.

ID Codes in the System Menu

NOTE	**Setting the System ID Code is required:** **- prior to entering the variable password** **- with the first login with newly installed XCS SSW**

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

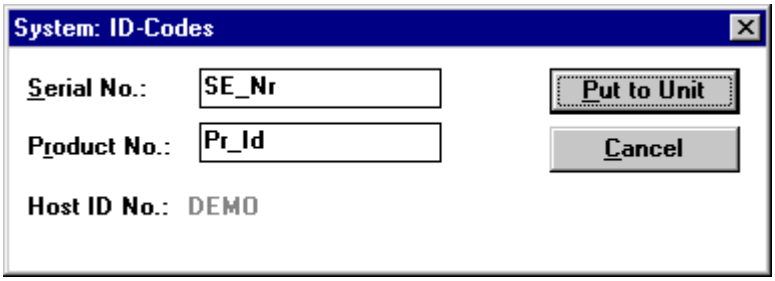


Fig. 4: System: ID-Codes

- Put to Unit — The data that have been set are saved in the system controller.
- Cancel — The data in the system controller are not changed
- Serial Number — **Entering the System Serial Number**
- Product No. — **Maintenance Unit No. of System (in Combination with the Variable Password)**

Variable Password

What is called 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 reached, in exceptional cases you can also have the password generated by the HSC.

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 using the Service PC under <System><ID Codes>.

NOTE

Prior to entering the variable password, the system Serial No. and the maintenance unit must be set under <System><ID Codes>.

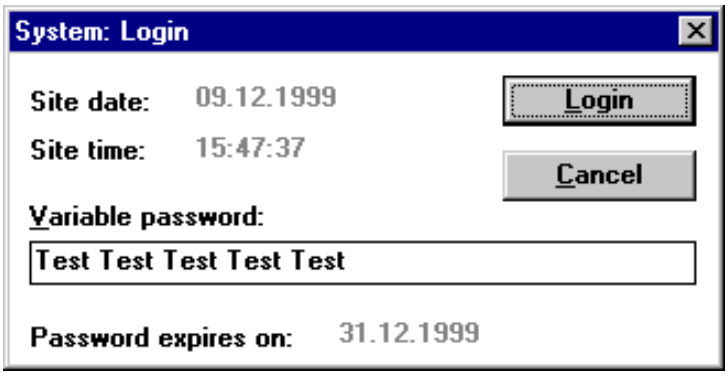


Fig. 5: System: Login

Exiting the Service Software

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

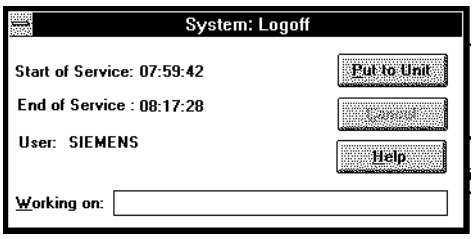


Fig. 6: System Logoff

- **Working on:**

  Enter text, e.g.“Restore performed”. (Texts can be read out in “Main Program / Info”).
- Select **Put to Unit**.

XCS Help

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

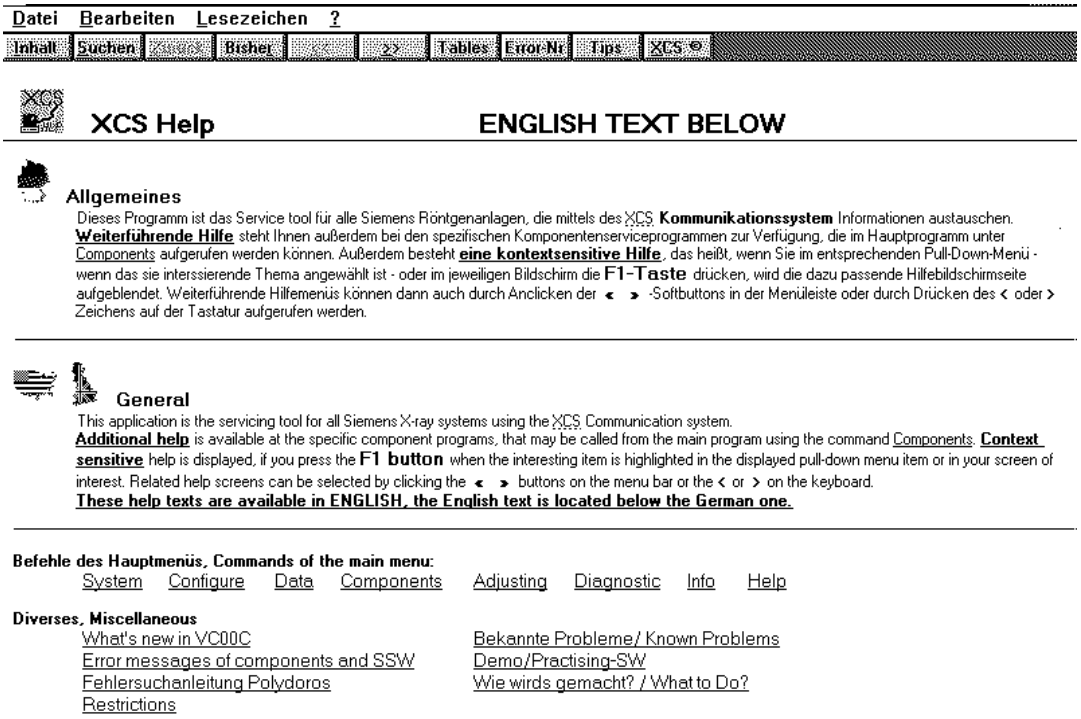


Fig. 7:

System Configuration

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

Remark

With units that are shipped as a system, the configuration and settings have already been performed. A backup is available on the "Site Data Disk" SSW diskette included in the shipment.

For safety, a written document of the configuration and settings can also be printed out.

- **Printing Out the Configuration of the Site Structure:**
  - Under **Configure / Site Structure**, press the **List** button in the Component Selection window.
  - Under **Configure / Site Structure**, press the **OK** button in the **Component Selection** window, press the **List** button in the **Edit System** window.
  - Under **Configure / Site Structure**, press the **OK** button in the **Component Selection** window, press the **OK** button in the **Edit System** window, press the **List** button in the **Fluoro Details** window.
  - Under **Configure / Site Structure**, press the **OK** button in the **Component Selection** window, press the **OK** button in the **Edit System** window, press the **OK** button in the **Fluoro Details** window, press the **List** button in the **Edit Fluoro Programs** window.
  - Under **Configure / Site Structure**, press the **OK** button in the **Component Selection** window, press the **OK** button 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 the **Site Adjustment** window.

    Tip: If you always enter the same name for the file names in all print dialogs in Site Structure Configure, all Print to Files will be written in the same file, one after the other.
- **Printing Out the Adjustment Results:**
  - Component / Polydoros LX / Diagnostics / Adjustment Results / Display all Parameters.

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

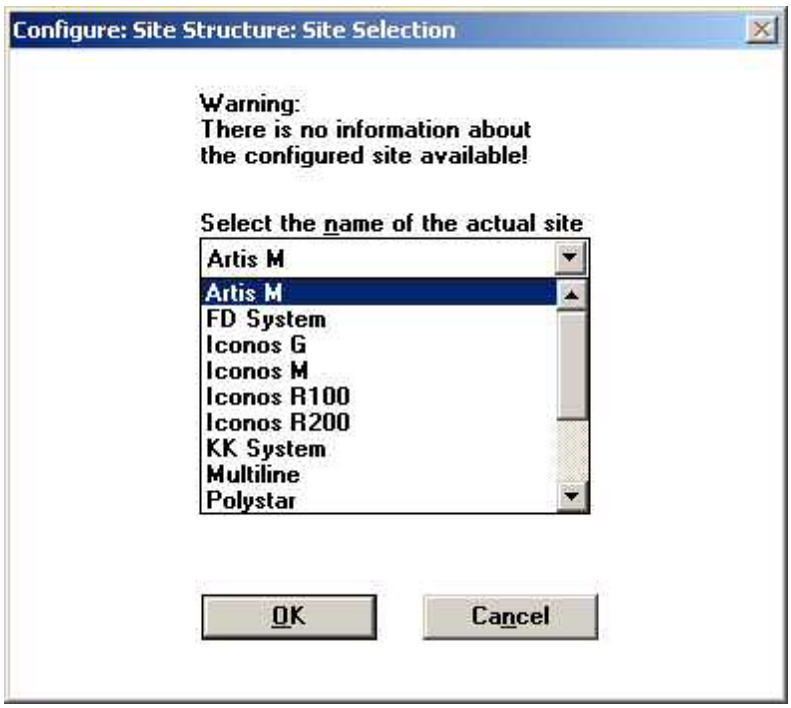


Fig. 8: Configure - Site Structure, Site Selection

NOTE

If the Configure / Site Structure / Site Adjustments have been saved, the Configure / Site Structure / Component Selection window will also be selected at the same time when Configure / Site Structure is selected. Changing the Configure / Site Structure / Site Selection is possible only if first a Data / Erase Configuration has been performed. When Data / Erase Configuration is selected, all configuration and adjustment data are lost.

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

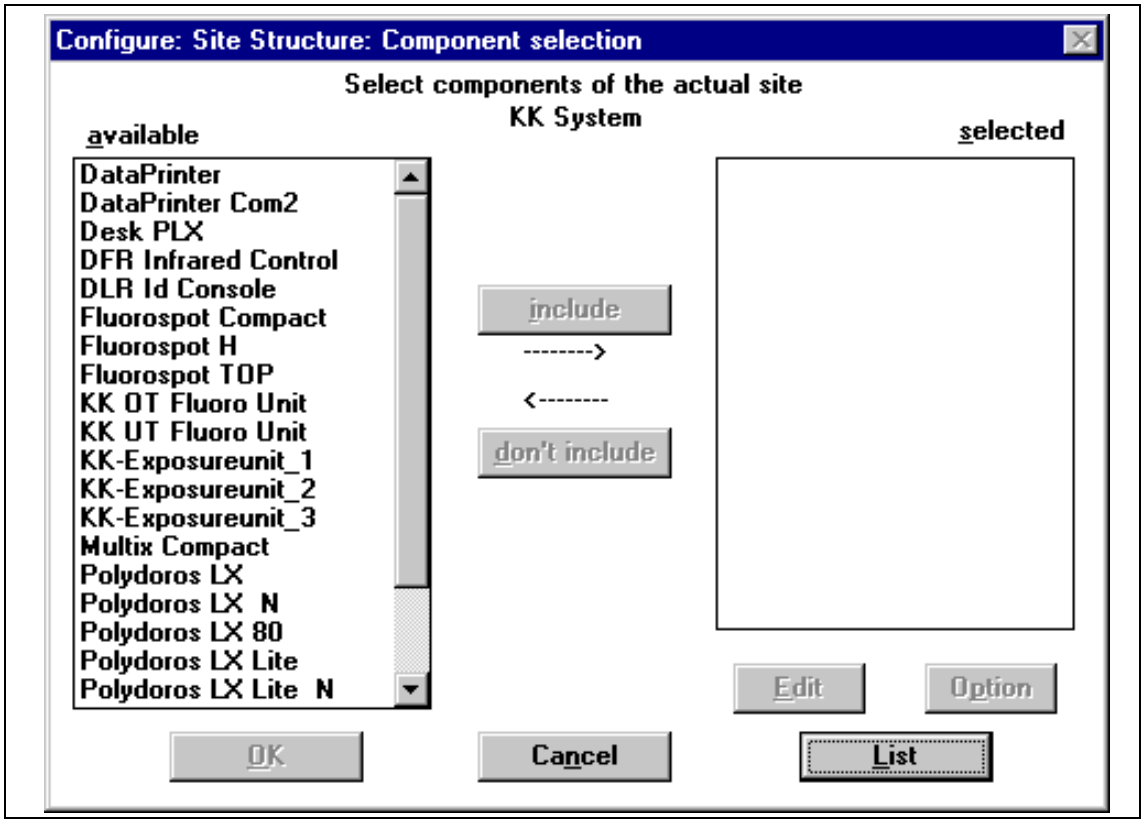


Fig. 9: Configure:Site Structure:Component selection

NOTE

Beginning with SSW VE02A, the "POLYDOROS LX N" generator must be selected for the POLYDOROS LX 30/50 and the "POLYDOROS LX Lite N" generator must be selected for the POLYDOROS LX30/50 Lite in the configuration (N stands for "NEW").

Prerequisite for this is the D100 with Part No.: 37 75 256.

When this is done, the following changes result:

- The minimum mAs that can be set was reduced from 1.25 mAs to 0.5 mAs.

- The minimum tube current was reduced from 10 mA to 1 mA.

- The minimum switch time with Iontomat was reduced from 2 ms to 1ms.

If the "POLYDOROS LX" was selected for the POLYDOROS LX 30/50 generator, or the "POLYDOROS LX Lite" generator was selected for the POLYDOROS LX 30/50, ERROR 057 APID 89 will appear every time power is switched on!

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

⚠WARNING

If a tube is replaced with a different type of tube, especially if a tube with a 0.3 filament is replaced by a tube with a 0.22 mm filament:

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

NOTE

Window: Configure / Site Structure / Edit System:

When the tube model is clicked on, even if it is not changed, the tube data is immediately set to the default data. This means that the tube must be conditioned again every time this is clicked on.

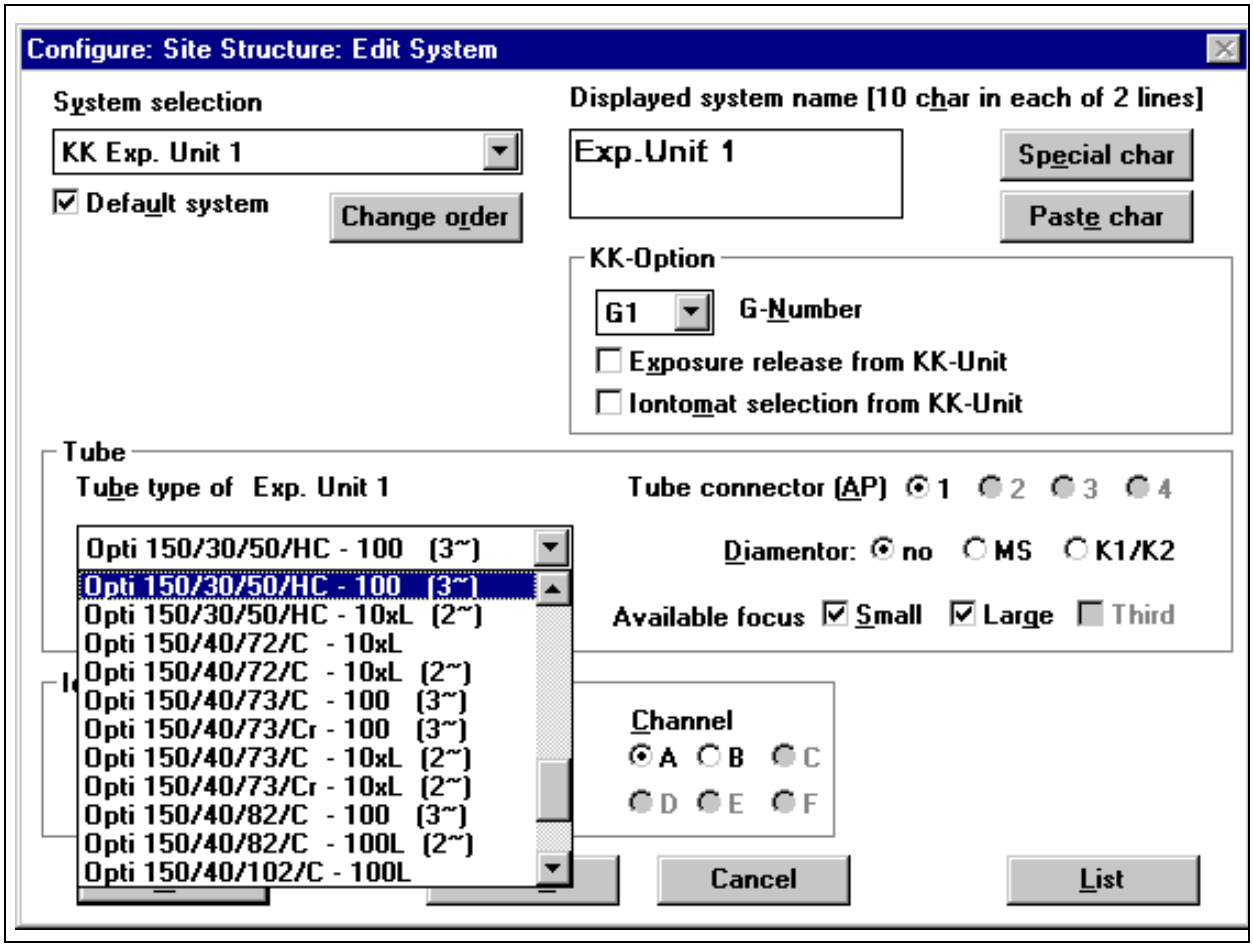


Fig. 10: Configure:Site Structure:Edit System

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

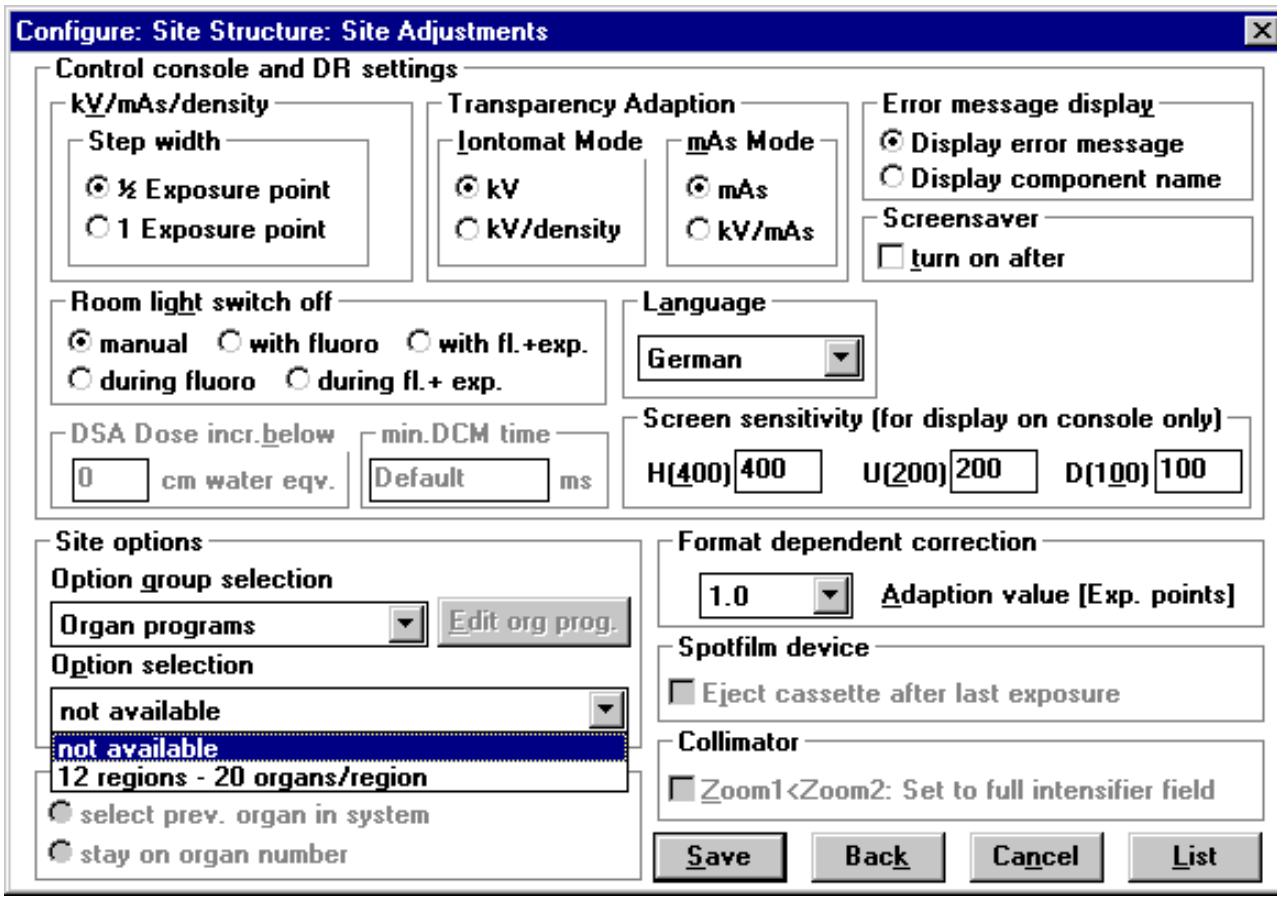


Fig. 11: Configure:Site Structure:Site Adjustments

- 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 following message windows with **OK**.
- **Language Download for Texts Displayed on the Touchscreen Console**

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

- Select **Component / PLSX Desk**.

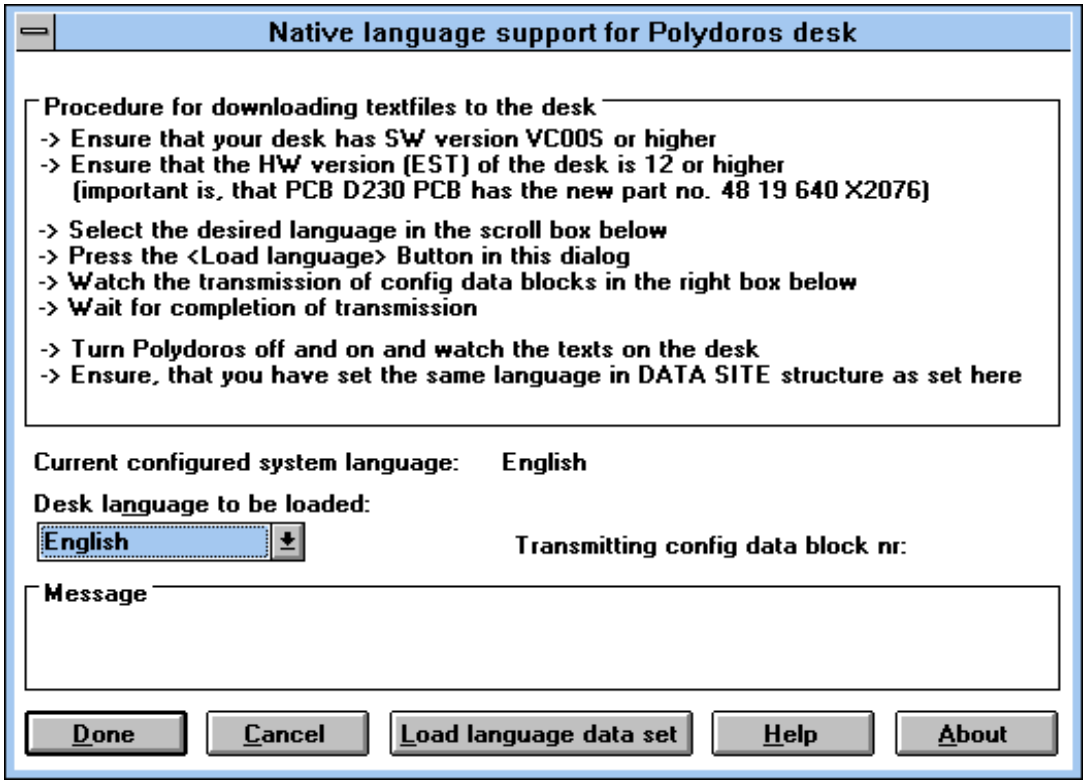


Fig. 12: Native language support for Polydoros desk

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

Generator-Parameter

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

Warm-Up

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

⚠CAUTION	**Radiation is triggered in the next work step.** ➪ **Close the collimator, cover the I.I. with lead-rubber.**

- In the "Warm-Up" window: click on "Fluoroscopy **ON**". Fluoroscopy is 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. Here, fluoroscopy or exposure must be switched on each time in the window until the "**OK button**" is on.

NOTE	**Firs the small focus, then the large focus is completely calibrated (conditioned).**

- Exit the window with **OK**.

Checking the Exposure Heating

- At the console, select both the kV value and the tube current values (mAs/ms).
  - 3-point technique
  - 81 kV
  - 40 mAs
  - ■
  - 100 ms or the next possible value

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

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

  If the measurement values differ from the specifications, the tube must be conditioned (calibrated) again.

Checking 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 flat during exposure.

  The tube current should stabilize within 50 ms to ±10% of the reference value and should be flat during exposure. If the measurement values differ from the specification, the tube must be conditioned (calibrated) again.

mAs Relay Adjustment

NOTE

A relay adjustment in the SSW is not possible with the POLYDOROS LX with D100, Part No. 1171169.

In this case, the mAs relay must be adjusted according to Speed Info RX 21-95.

1) Connect the oscilloscope to D100.X22 and ground to D100.X6 (2V/div. and 1s/div.).

2) Connect the mAs meter (200 mAS) to the test socket on the D220.

3) Select 77 kV, large focus, 100%, 80 mAs.

4) Use potentiometer R494 on the D100 to set a threshold value and check it on the oscilloscope. Adjust the potentiometer so that the saw-tooth voltage (2-3V) on D100.X22 can be measured. Then turn the potentiometer in the opposite direction until the saw-tooth just disappears and approx. 13 V remains constant.

5) Trigger exposure and adjust 80 mAs with the R122 potentiometer on the D100.

6) Then check to ensure that no saw-tooth voltage is present on D100.X22 when there is no radiation. If necessary, repeat Points 4 and 5.

- Select XCS SSW / Components / Polydoros / Adjustment / **mAs Relay Adjust**.
- 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 with a system shipment)

2. Following replacement of the D100

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

- Select "**Exposure ON**".
- Use the arrow keys to 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 sockets on the D220 board (on the H1).
- Connect the mAs meter to the mAs test sockets.
- Connect the oscilloscope to the following points: D100/X61.kVist
- Trigger D100/X64 SWR
- 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.

Iontomat Empfindlickeit

General Remarks

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 determined 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) K_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 “Appendix Sensitivity of Film-Screen Systems, calculate the theoretical required dose, K_S, and document this:

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

- 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.

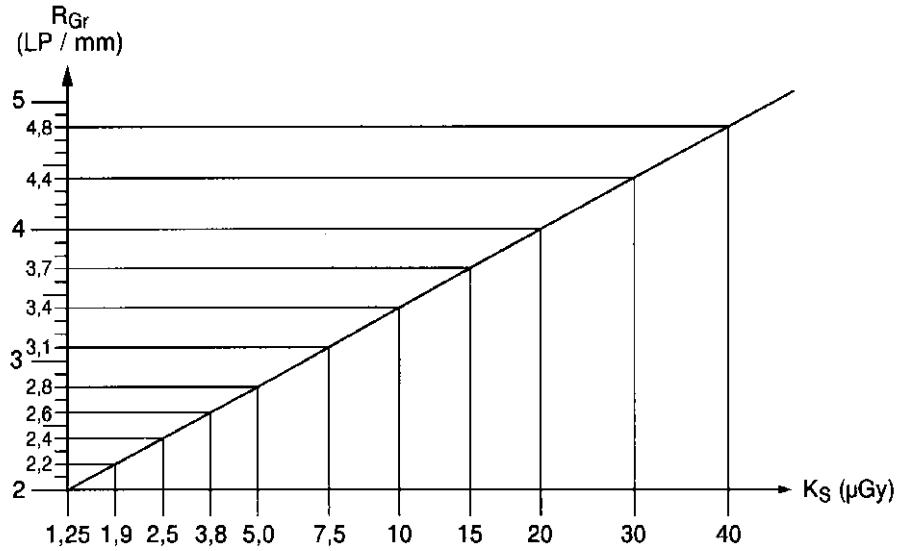


Fig. 13:

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 console.

- Open the collimator at the unit so that the measuring fields for the IONTOMAT chambers are fully exposed.
- Switch 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 is done at the unit (Configurate: Site Structure: Edit System"), all measuring fields will be dark (touch-screen console) when the generator is switched ON at the generator console - only with KK systems!!!

Determining the Optical Density

NOTE

In the chapter, "Sensitivity of the Film-Screen Systems" there are tables from which the values can be determined.

- Make test exposures for all screens and work stations at 81 kV, small focus, 80% with **20 ± 0,5 cm** and **5 ± 1 cm** water (film format ≥ 18 x 24 cm) and check the film blackening in 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 settings) under XCS SSW / Components / Polydoros / Adjustment / **Iontomat Sensitivity**.

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

Iontomat Adjustment

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

- Determine and program the delay according to the system-specific object path

Recommended Values for the Basic Setting

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

NOTE

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

- Exit the window with **OK**.

Voltage Response Correction

NOTE

The following default values have been defined for FD systems for the "Voltage Response Correction":

- **< 81 KV = 9**
- **>81 KV = -9**

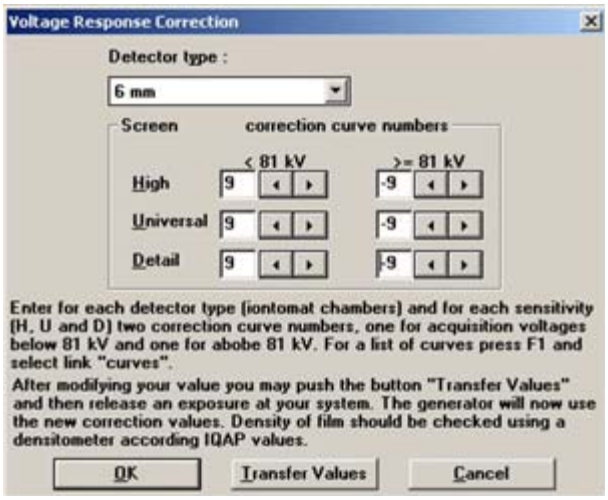


Fig. 14: Voltage Response Correction with FD systems

These default values may not be changed in FD systems.

- 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 XCS SSW / Components / Polydoros / Adjustment / **Voltage Response Corr.**.
- Select the particular detector type.
- Determine and enter the correction values for the film-screen combinations used.

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

≥ 81 kV: - 13.. 0

NOTE

The data can be updated in the XCU 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 (EP) results in a change in density of approx. Δ S = 0.25.

Determining the Voltage Correction for IONTOMAT Chambers

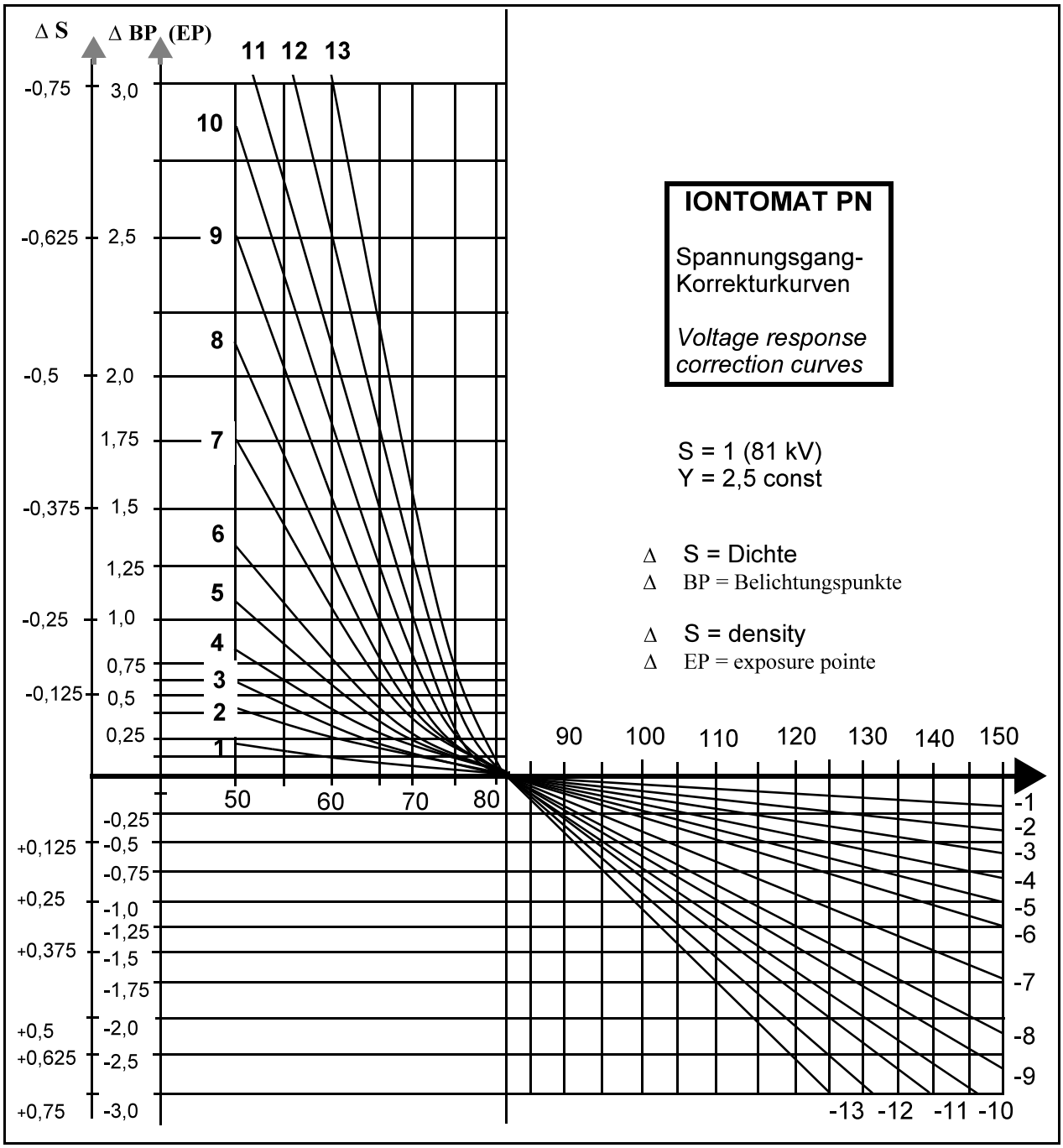


Fig. 15:

(≤ 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	**DBPin $^{1}/_{8}$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 B-Signal (VIDEOMED DI)

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

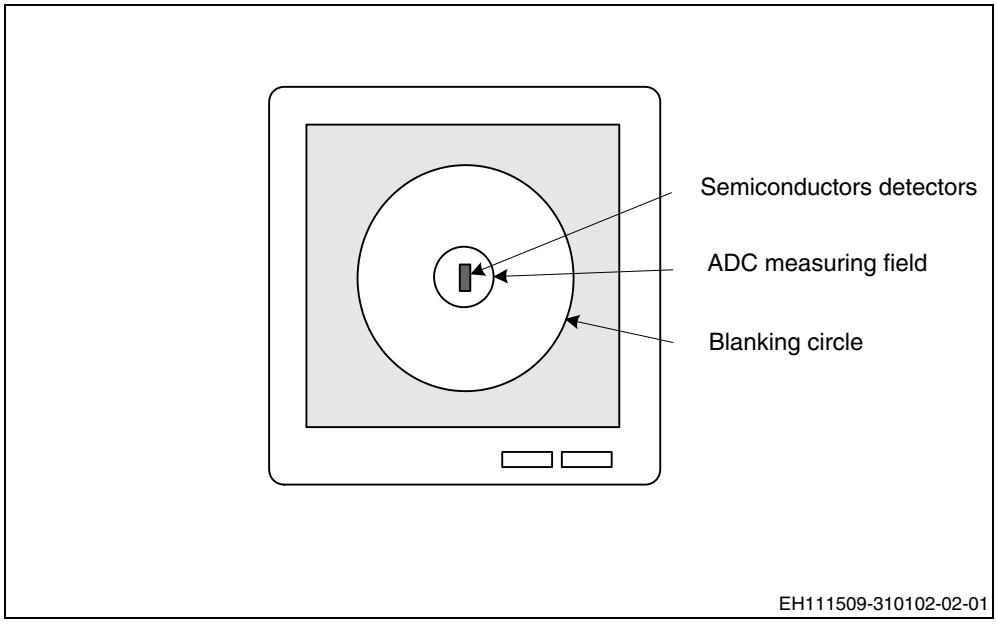


Fig. 16: Positioning of the semiconductor detector

- Open the collimator all the way.
- Place 1.2 mm Cu on the collimator.
- Move the grid in to the beam path.
- Select I.I. full format.
- Select XCS SSW / Components / Polydoros / Adjustment / **Dose Rate**.

- 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.

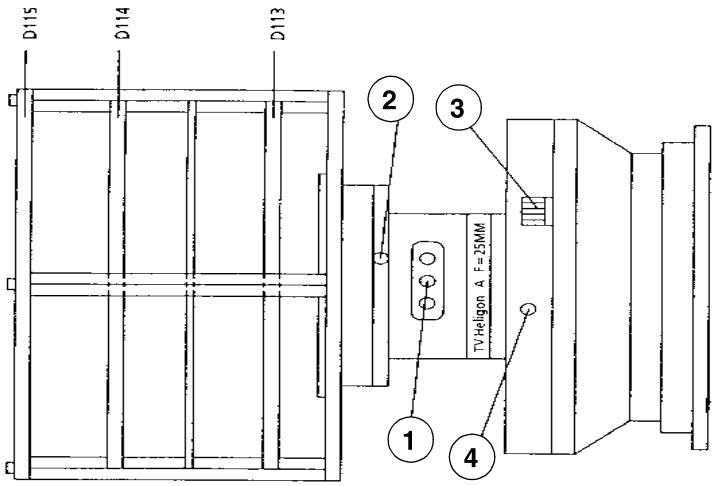


Fig. 17: Camera lens

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 again in the "CCD Brightness Adjust" window.

Adjusting the Dose Rate with the VIDEOMED DIC

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

- Place the semiconductor detector centered on the I.I.

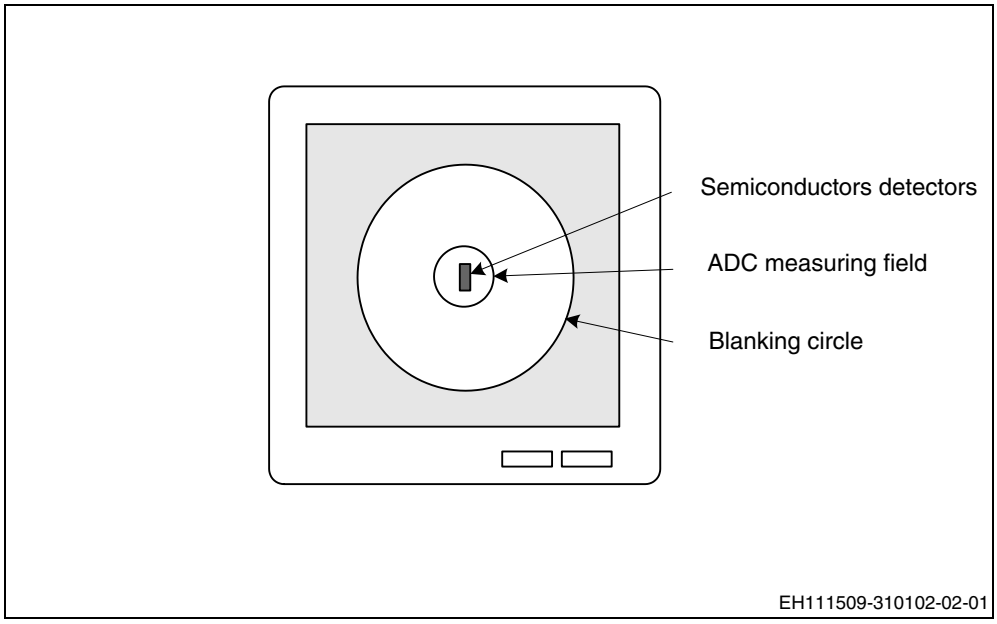
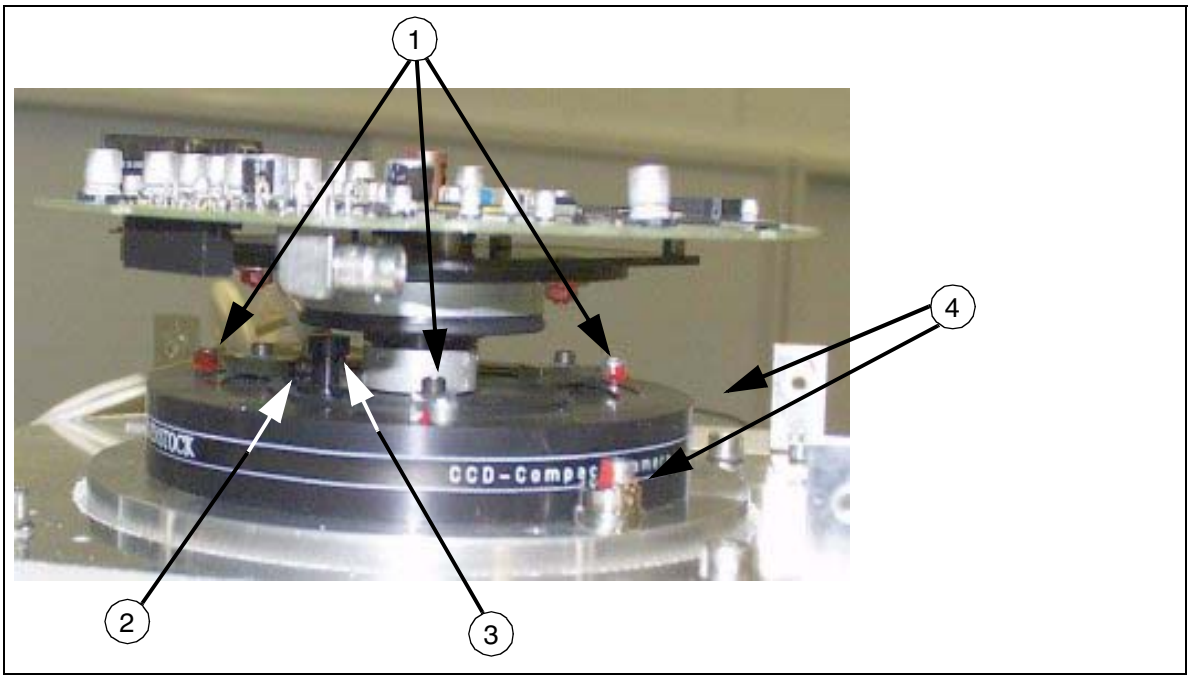


Fig. 18: Positioning of the semiconductor detector

- Open the collimator all the way (without filter).
- Place 1.2 mm Cu (2.1 mm Cu with the ICONOS R100) on the collimator.
- Move the grid in to the beam path.
- Select I.I. full format.
- Select XCS SSW / Components / Polydoros / Adjustment / **Dose Rate**.
- 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 **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 adjustment screw (Pos. 2 in the following illustration) on the iris diaphragm.



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

- Adjust the iris adjuster (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**.
- 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 again in the "CCD Brightness Adjust" window.

Adjusting the Dose Rate with the B-Signal (SIRECON Compact)

- For the settings during startup, see the SIRECON Compact Appendix.
- See the Image Quality Test Procedure for:
  - General Remarks regarding the Dose Measurements
  - Test Conditions
  - Test Preparations
- Select the window "Polydoros .. -Select Service / Adjustment/**Dose Rate**".
- Exit the message window with **OK**.
- Switch Fluoroscopy **ON** in the window "Dose Rate Adjust" window.
- Change the mA until the desired dose is displayed on the dose measurement meter.
- Exit the window with **OK**.
- Exit the message window with **OK**.

- Remove the dose measurement chamber from the beam path.
- Switch fluoro **ON** at the unit.

  The display appears following the adjustment (approx. 3 sec.) and fluoro is automatically switched off.

Dose and TV Iris Adjustment with Videomed DHCF

NOTE	Use only with ICONOS MD beginning with SSW VF00G!

Requirements:

- Configuration in the Fluorospot Compact
- System Configuration in the XCS SSW
- X-ray tube, 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.
- Set the maximum focus-I.I. distance.
- Place 2.1mm Cu on the collimator.
- Select XCS SSW / Adjustment / **TV Param**.
- In the window “Adjustment TV Parameters”, select the = **Continuous Fluoro** mode.

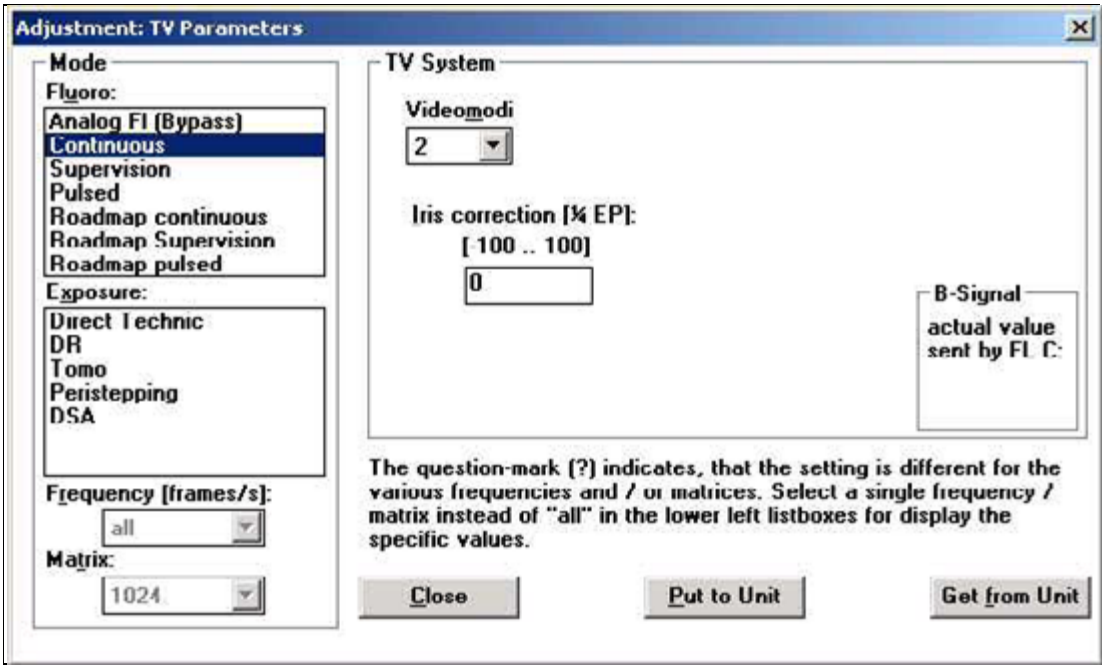


Fig. 19: XCS Adjustment - TV Param Continuous

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

NOTE

If the B-signal reported back by the FL-C does not match the reference value data in the IQAP, perform the following basic setting for the dose and TV iris.

Dose and TV Iris Basic Setting

- Select I.I. full format and Fluoro Automatic 1.
- Completely open the collimator.
- Set the maximum focus-I.I. distance.
- 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, center the measuring chamber to the I.I., but outside of the AGC dominant.

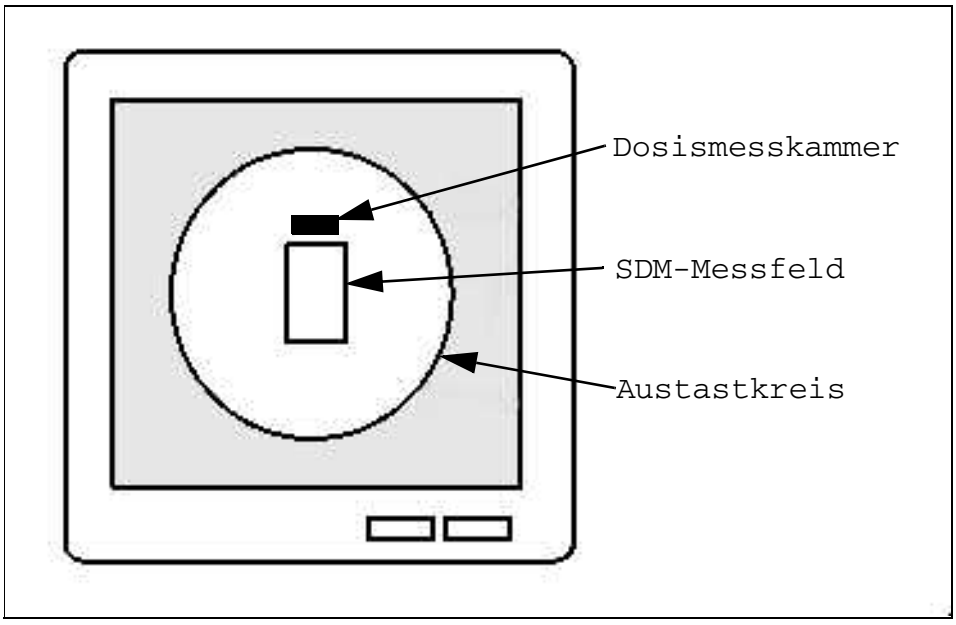


Fig. 20: Dose measuring chamber

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

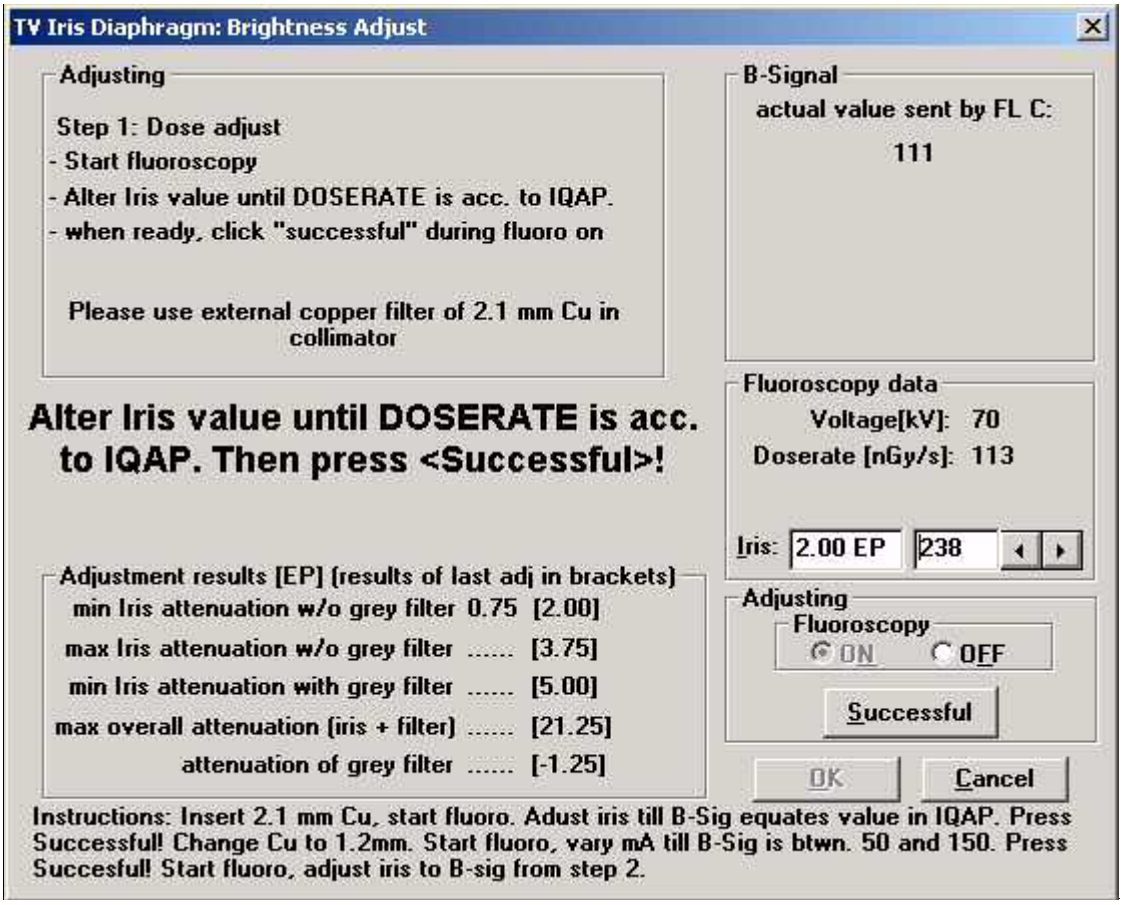


Fig. 21: XCS Components, Polydoros Adjustment, Dose and TV Iris 2

- Click on Fluoroscopy **ON** in the TV Iris Diaphragm window (Step 1).
- Change the **Iris** value until the dose read on the dose measuring meter corresponds to the reference value data in the IQAP document (113nGy/s).
- End Step 1 by clicking on **Successful**.
- Change from 2.1 mm Cu to 1.2 mm Cu on the collimator.

- Click on Fluoroscopy **ON** in the TV Iris Diaphragm window (Step 2).

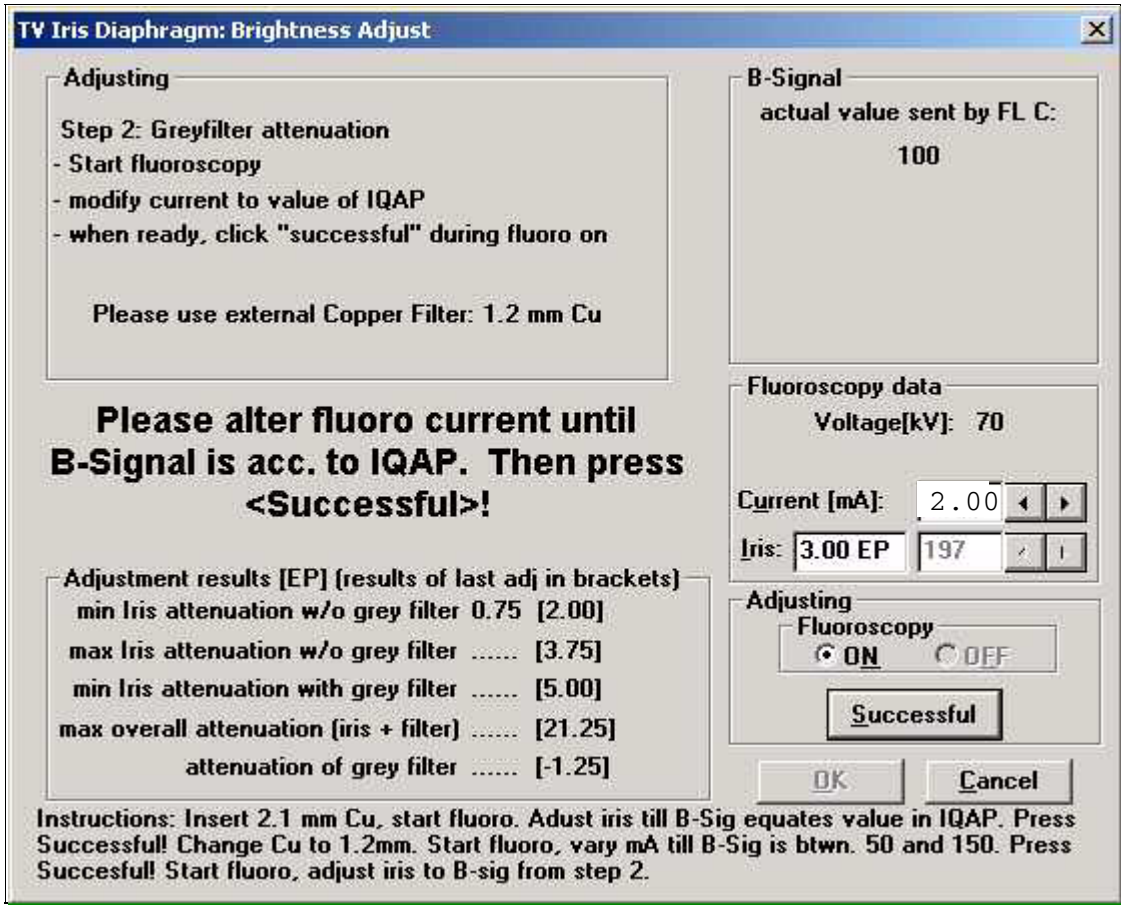


Fig. 22: XCS Components, Polydoros Adjustment, Dose and TV Iris 2

- Change the **Current (mA)** value until a value of **70 (tolerance +10)** is displayed under B-Signal (Actual value sent by FL C).

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

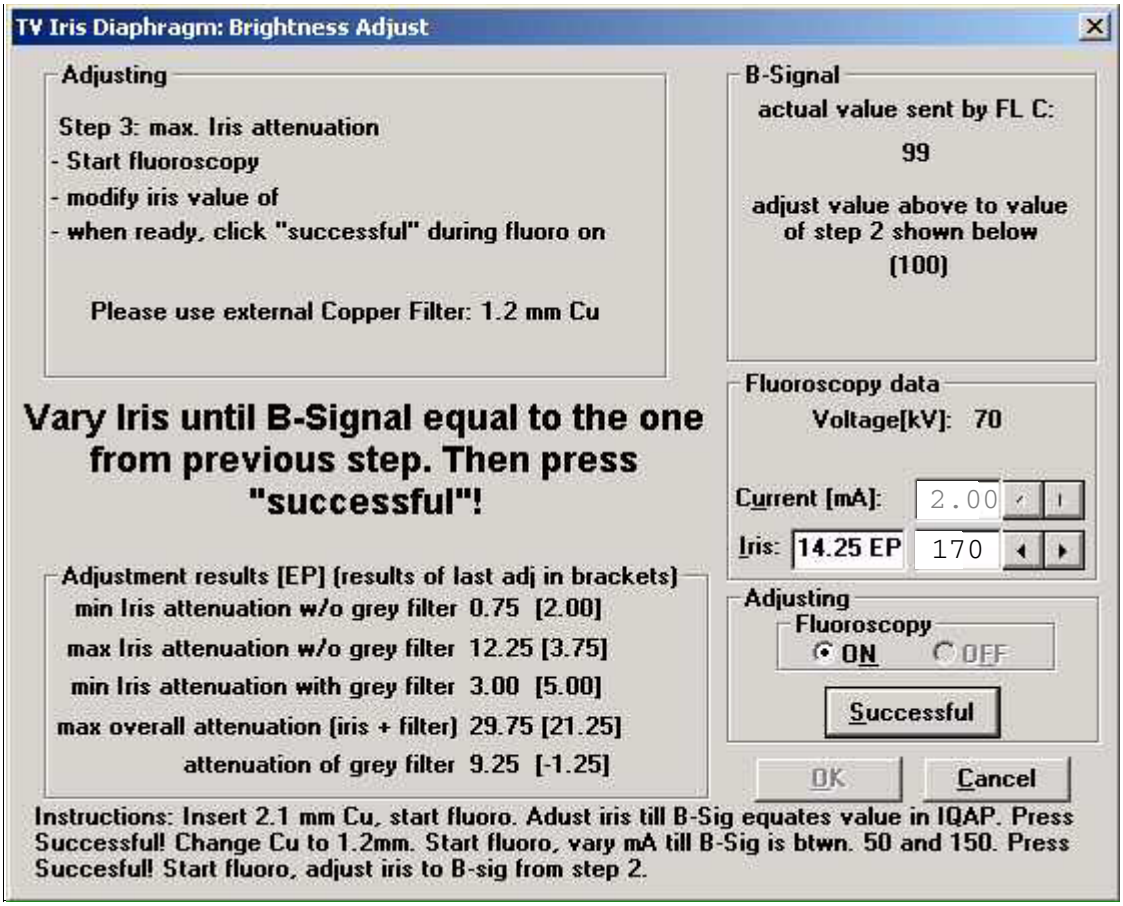


Fig. 23: XCS Components, Polydoros Adjustment, Dose and TV Iris 3

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

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

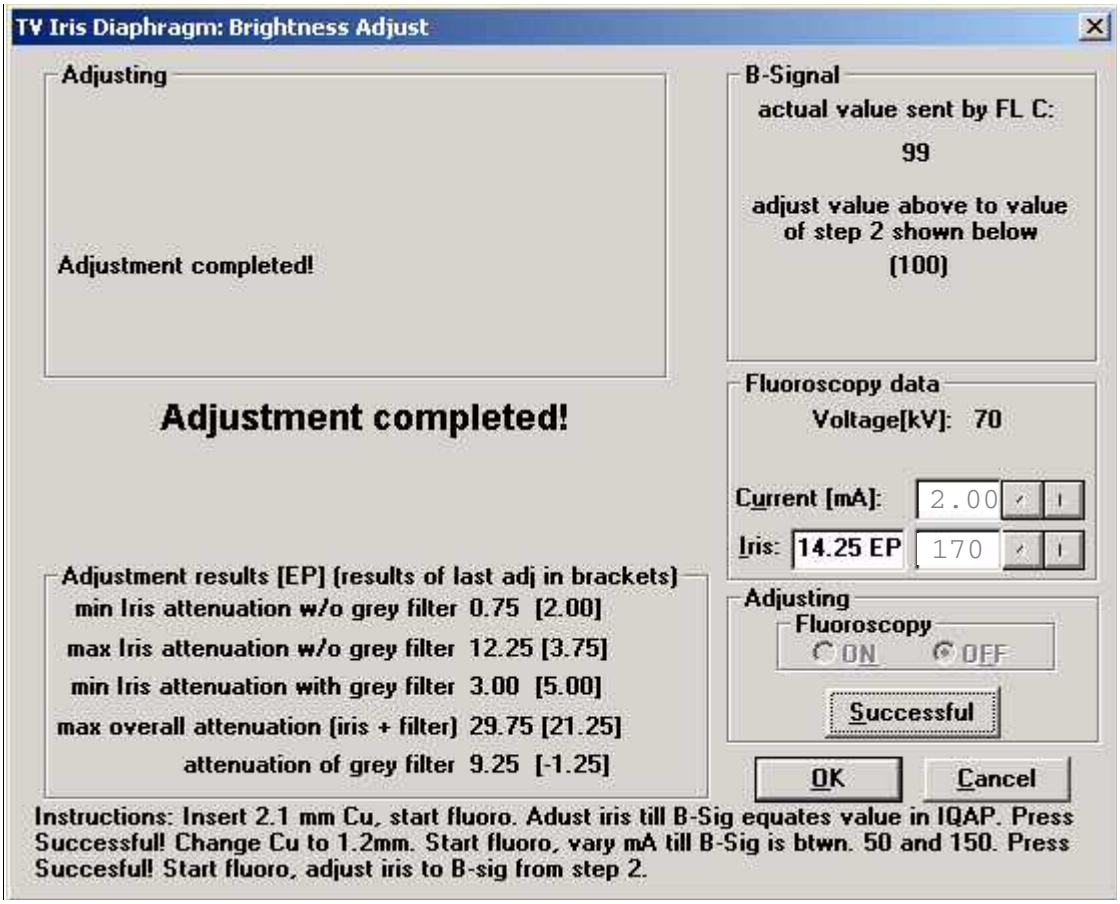


Fig. 24: XCS Components, Polydoros Adjustment, Dose and TV Iris 4

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

Zoom Iris Correction

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

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

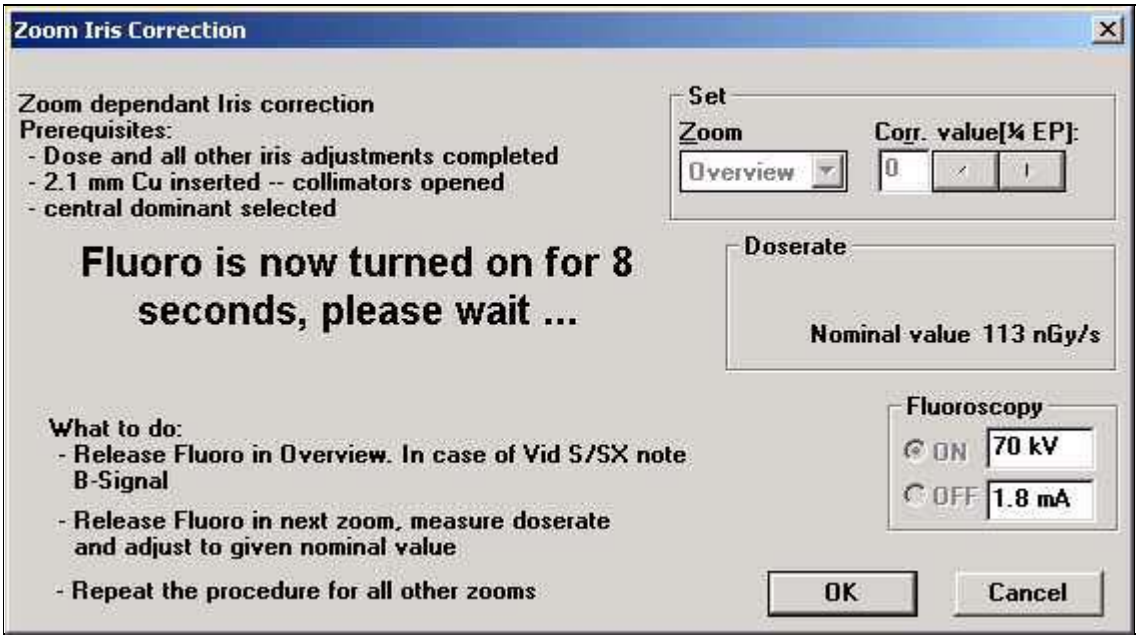


Fig. 25: XCS Components, Polydoros Adjustment, Zoom Iris Correction 1

- Click on Fluoroscopy **ON** in the Zoom Iris Correction window; the SSW will interrupt fluoroscopy after 8 seconds with Fluoroscopy **OFF** and will automatically select the next zoom step.
- The DVP value displayed on the Live monitor must match the dose value that was set.

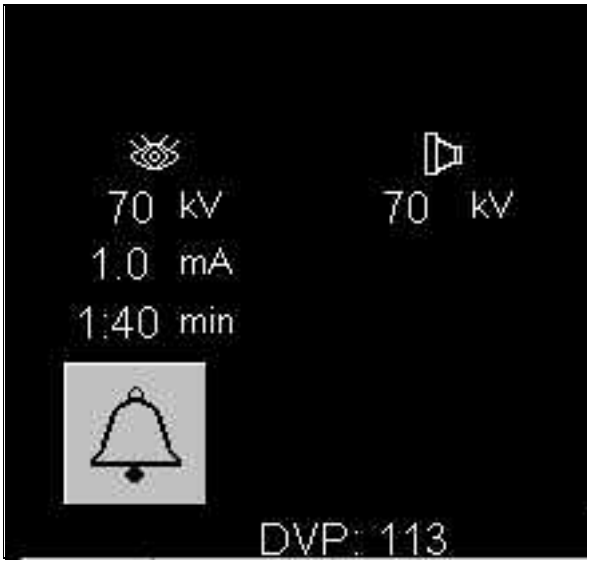


Fig. 26: Live monitor, DVP display

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

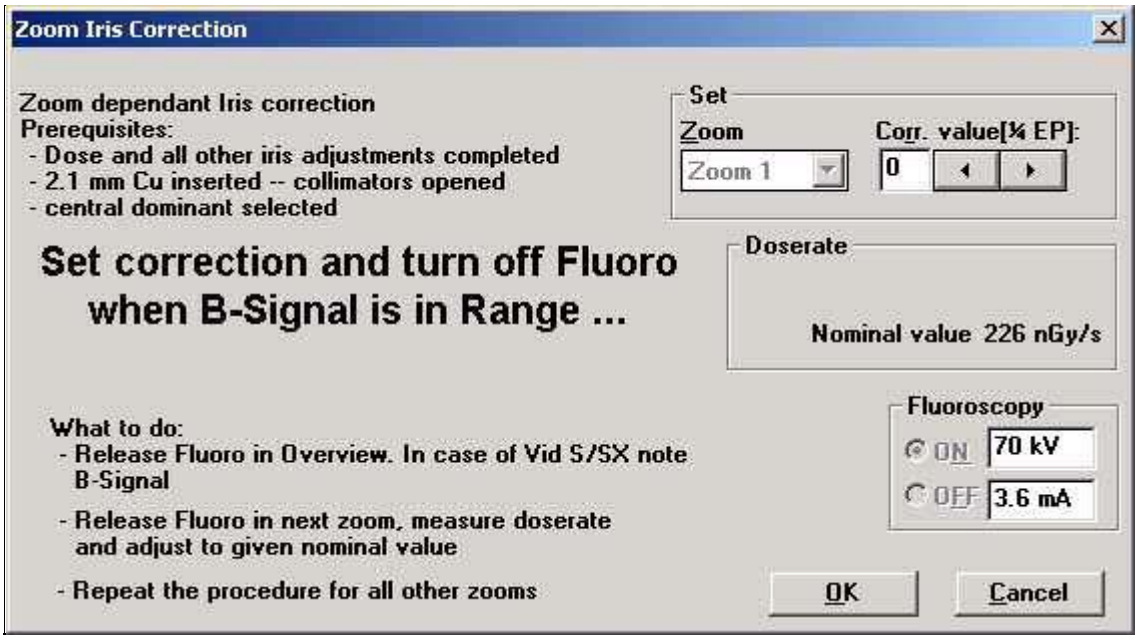


Fig. 27: XCS Components, Polydoros Adjustment, Zoom Iris Correction 2

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

DR Dose Adjustment

- Prerequisite is still 2.1 mm Cu in the collimator and the dose measurement chamber in the beam path.
- Change the setting on the dose measurement meter to Dose/Pulse.

- Select XCS SSW / Components / POLYDOROS / Adjustment / **Generator Parameters** and check the displayed DR Dose Factor value. This should be between 0.8 and 1.6.

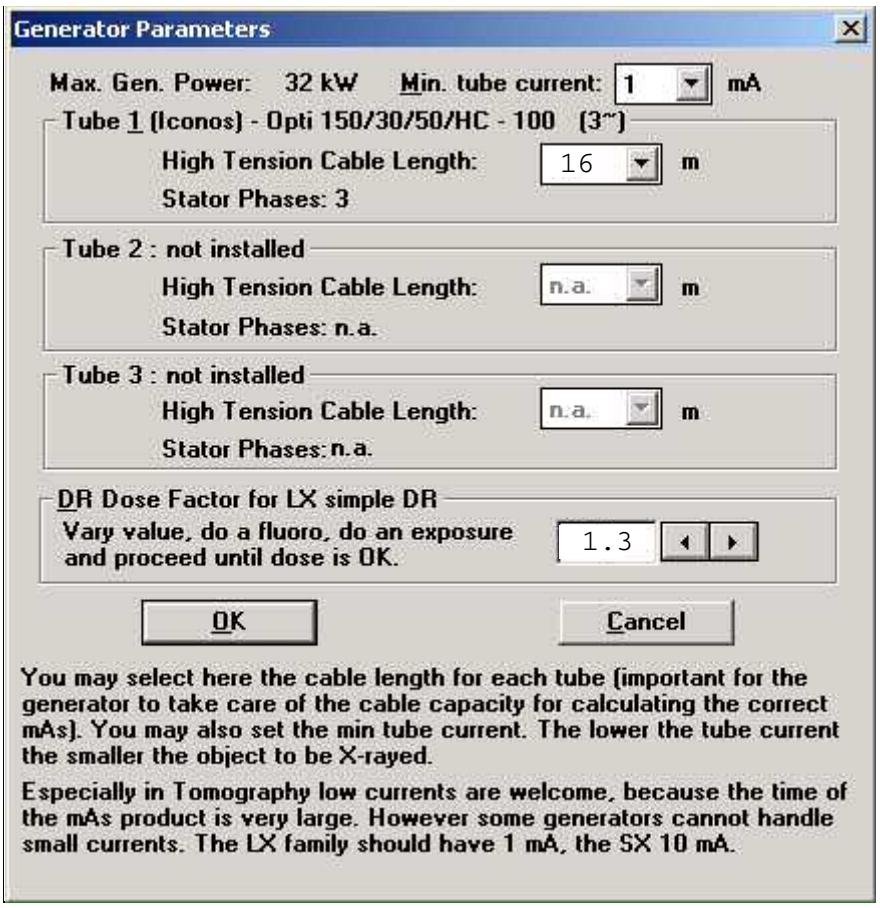


Fig. 28: XCS Components, POLYDOROS Adjustment, Generator Parameters

- Exit the window with **Cancel** and the POLYDOROS SSW with **Quit**.
- Select Zoom 1.
- Trigger fluoroscopy for approx. 10 seconds.
- Start a DR series (approx. 10 exposures), and measure the dose/pulse.

NOTE	**The reference values can be found in the IQAP document.**

- If the measured dose/pulse does not match the reference value in the IQAP, select XCS SSW / Components / POLYDOROS / Adjustment / **Generator Parameters** and change the displayed **DR Dose Factor** value until the dose/pulse matches. The procedure is the same as described above.
- After completing the adjustment, exit the window with **OK**.

DR Iris Correction

- In the Fluorospot Compact service menu, select Organ Program 1 with a frame rate of 1 F/s.

- Select XCS SSW / Adjustment / **TV Parameters**.

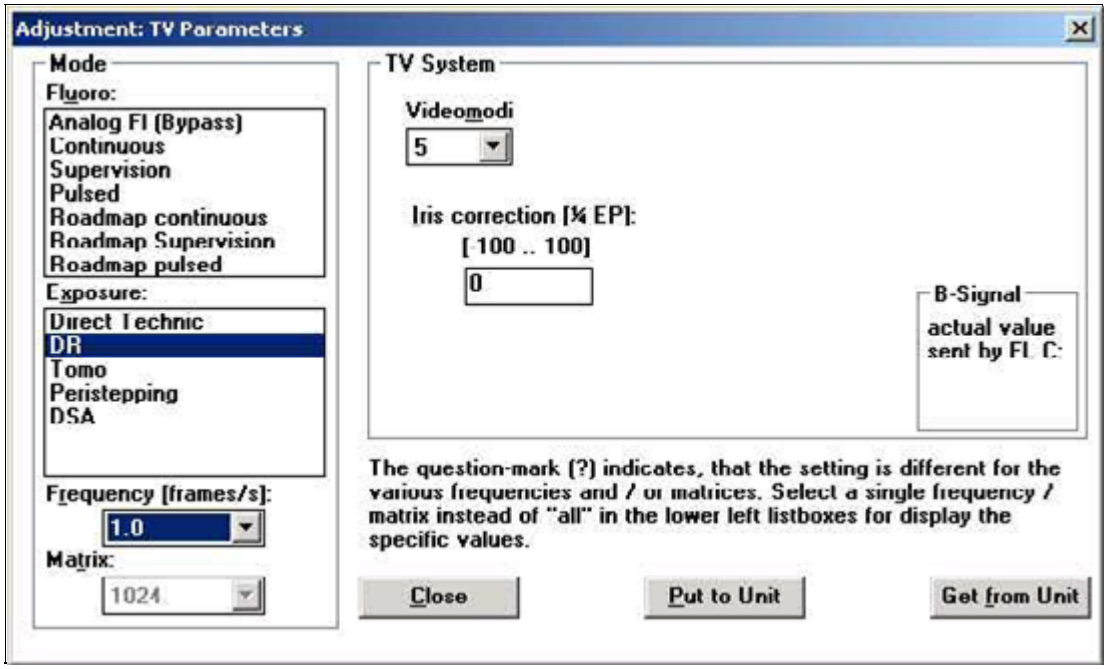


Fig. 29: XCS Adjustment, DR TV Param

- Select Exposure mode = **DR** and Video mode = **5**.
- Start a DR series (approx. 10 exposures); compare the B-signal displayed in the window (actual value sent by FL C) with the reference value in the IQAP document.
- If the displayed B-signal does not match the reference value from the IQAP, change the value in the window for the **Iris correction (1/4EP)**.

NOTE	**Positive values for iris correction result in a higher B-signal.**

- If the displayed B-signal agrees with the reference value from the IQAP document, press the **Put to Unit** button.
- Check of all other frame rates (0.5 - 4 F/s).
- Close the window by pressing **Close** and exit the SSW.

Checking the Dose with Supervision

- Prerequisite is still 2.1 mm Cu in the collimator and the dose measurement chamber in the beam path.
- In the Fluorospot Compact service menu, select Organ Program 2 (5) “Supervision”.
- Select Zoom 1.

- Select XCS SSW / Adjustment / **TV Parameter**.

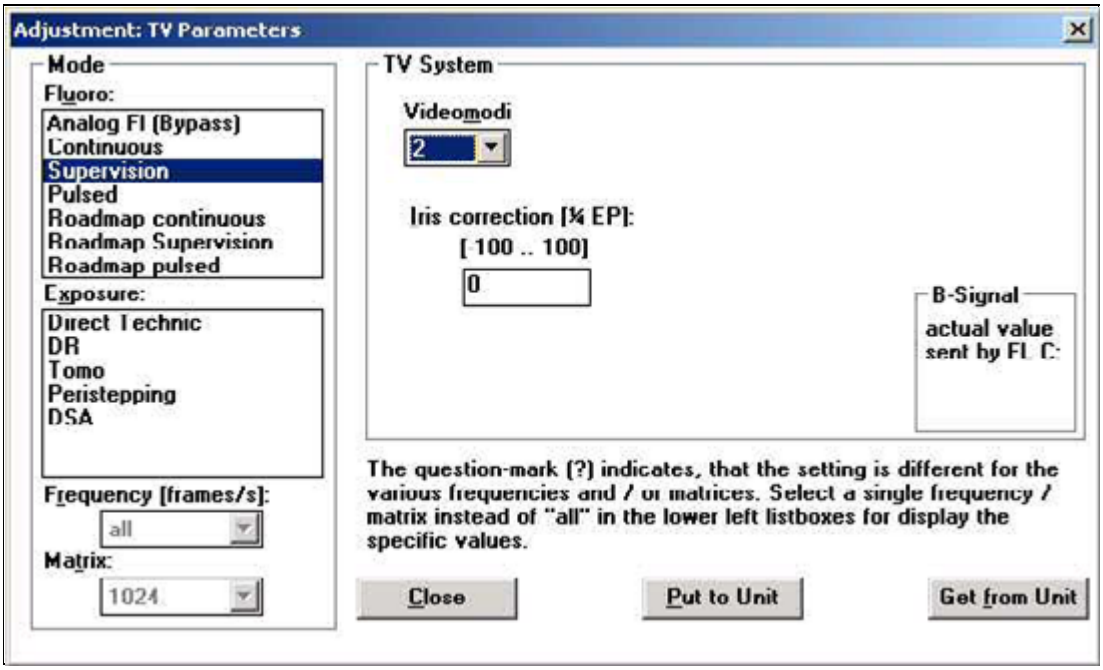


Fig. 30: XCS Adjustment, Supervision TV Param

- Select Fluoro mode = **Supervision** and Video modes = **2**
- Trigger fluoroscopy; compare the B-signal displayed in the window (actual value sent by FL C) and the dose displayed on the dose measurement meter to the reference value in the IQAP document.
- If the displayed B-signal does not match the reference value from the IQAP, change the value in the window for the **Iris correction (1/4EP)**.

NOTE	**Positive values for iris correction result in a lower B-signal.**

- If the displayed B-signal matches the reference value from the IQAP document, press the **Put to Unit** button.
- Close the window by pressing **Close** and exit the SSW.
- Perform a restart for the system.

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.**

The maximum permissible values should be set according to the regulations in the specific country.

In the area covered by DHHS, they are:

for normal fluoro 9 R/min (1305 µGy/s)

If there are no such regulations, perform the window with "SS" switched **OFF**. Select **18 mA** for both 110 kV and 70 kV.

- 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 in 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 XCS SSW / Components / Polydoros / Adjustment / **Skin Dose Rate**.
- Exit the message window with **OK**.

- Switch fluoro **ON** in the "Skin Dose Rate' window.
- Change the tube current until the max. skin dose rate of 9 R/min. is measured.
- Exit the "Service Program".
- After completing the POLYDOROS adjustment, using "SYSTEM: QUIT", exit the Adjustment Program. In the Main Program, select System/Quit -> exit the "System Logoff" window with "Put to Unit"; DISCONNECTED will be displayed below in the status line.

Checking the Skin Dose Rate

- Establish the same test conditions as for "Adjusting the Max. Skin Dose Rate".

- Change the focus-I.I. distance and check the dose rate.
- The dose rate of 8 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).
- Record the values that result for
  - the dose rate and
  - the kV and mA values that stabilize.
- Reinstall the fuses in the I.I. power supply.

TV Parameters

NOTE

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

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

Error Log

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

NOTE

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

Adjustment Results

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

NOTE

Under “Display All Parameters”, all POLYDOROS adjustment parameter can be displayed and printed out.

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 on a freely selectable medium (floppy / hard disk).

Iontomat Drift

Checking the Drift and Hum Voltage

Checking the Drift

- Switch the generator **OFF**.
- Connect the oscilloscope to:
  - D100.X63 VION and D100.X63 AGND
  - Trigger D100.X64. SWR
- Switch the 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

Prior to performing the checks, the generator must be switched on for at least 5 minutes.

If a digital oscilloscope is used for the measurements, do not measure in the "Glitch Detect Mode" (mean value calculation, smoothing), because this can falsify the measurement results.

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

- Select XCS SSW / Components / Polydoros / Diagnostic / **Iontomat Drift** .
- Perform the other work steps per the SW in the “Measure steps” window.

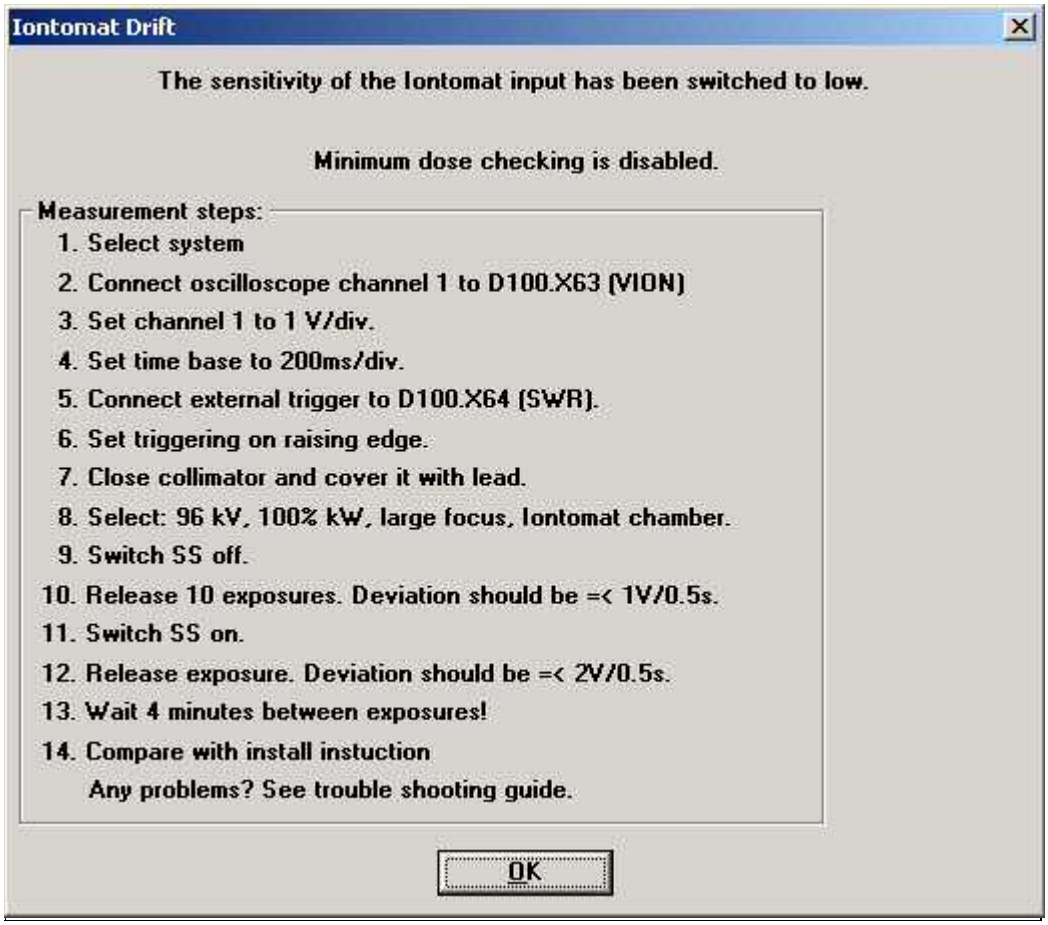


Fig. 31: XCS Components, Polydoros Diagnostics, Iontomat Drift

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

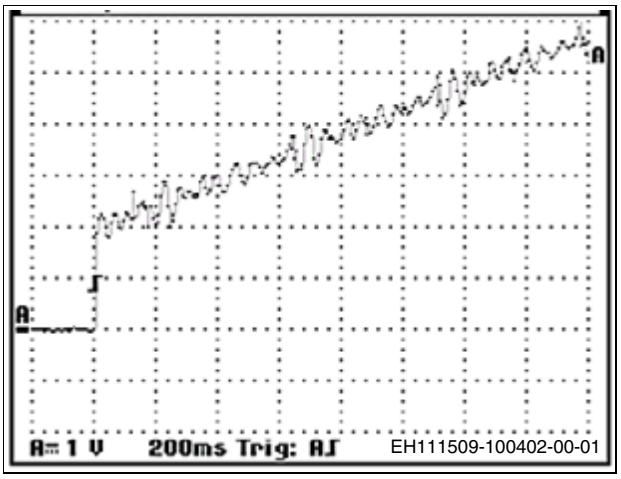


Fig. 32: Oscillogram 1 example: Drift measurement

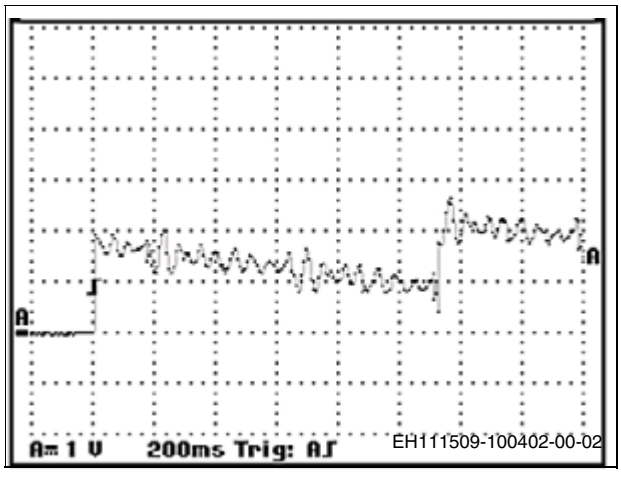
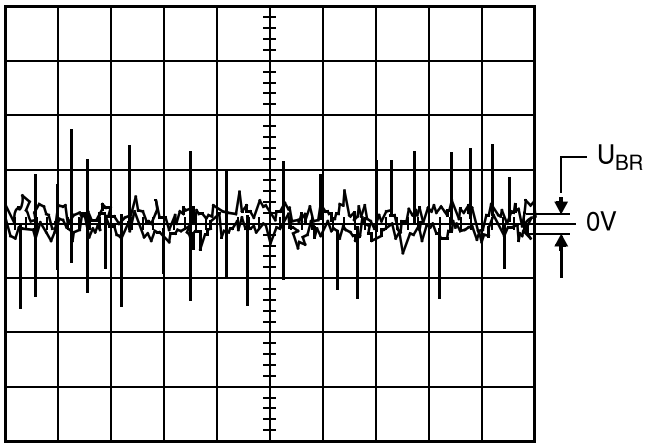


Fig. 33: Oscillogram 2 example: Drift measurement

Checking the Hum Voltage

- Connect the test sensor to D100.X63 DL IN.
- Set the SS to **OFF**.

- Trigger exposures 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. 34: 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 mode can be caused by directly laying the IONTOMAT cables with the power line and high voltage cables in a cable duct.

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

Insufficient insulation of the IONTOMAT chambers

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

Disturbances over the IONTOMAT cable

➪ **Corrective Measure:** Check the way the entire cable is laid. If needed, replace the IONTOMAT cable.

Only with Multiplier Mode:

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

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

mAs Counter Test

Fig. 35: XCS Components, Polydoros Diagnostics, mAs Counter Test

- Select XCS SSW / Components / Polydoros / Diagnostic / **mAs Counter Test** .
- A test voltage is applied to the mAs counter input by selecting **"Start Test"**.
- 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 there is a difference of less than 10%, the message "OK" is displayed.
- The test is aborted by selecting **"Cancel"**.

Inverter Test

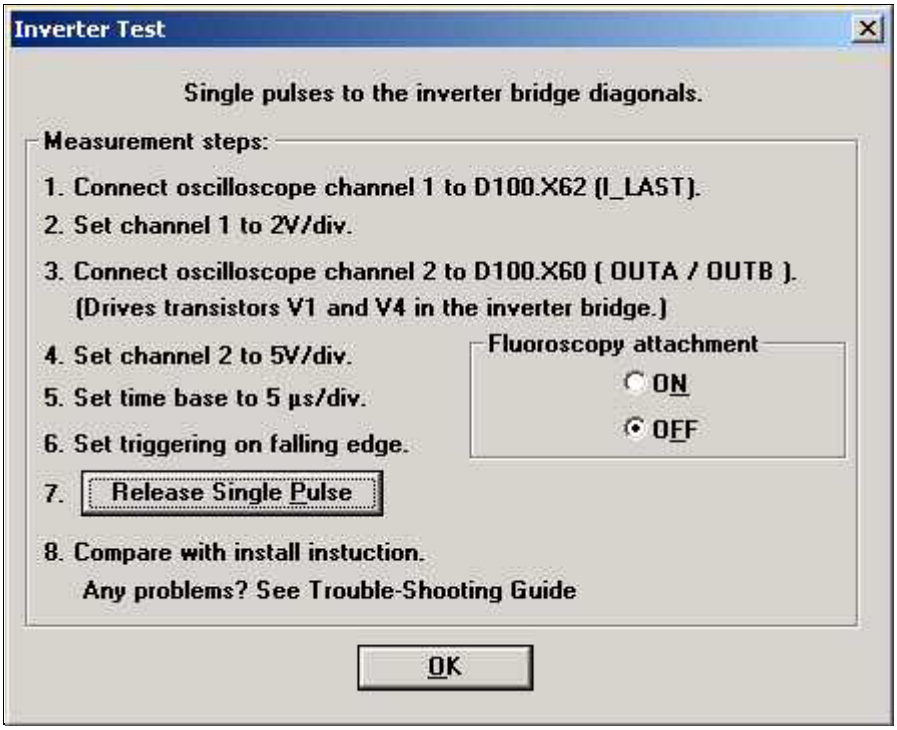


Fig. 36: XCS Components, Polydoros Diagnostics, Inverter Test

- Select XCS SSW / Components / Polydoros / Diagnostic / **Inverter Test** .
- A single pulse is triggered by selecting **"Release Single Pulse"**.
- The current I-Load must have the following appearance for a single pulse:

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

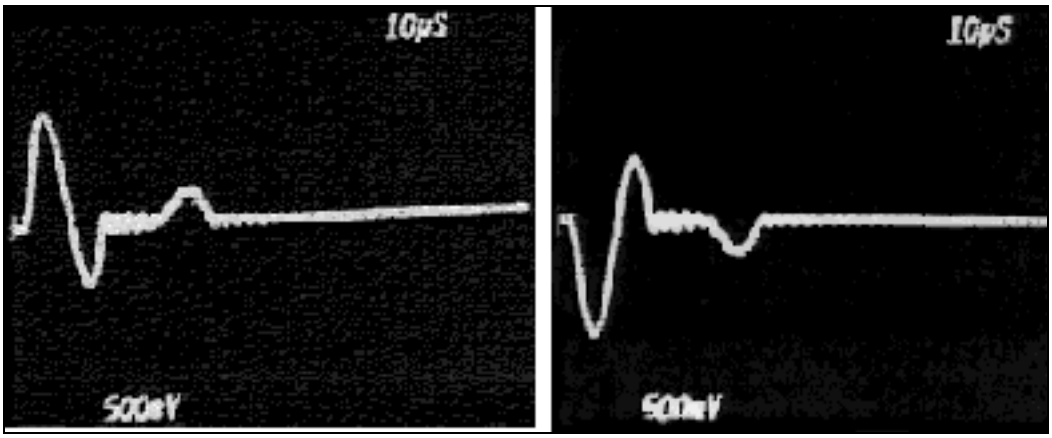


Fig. 37:

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

Manual Fluoroscopy

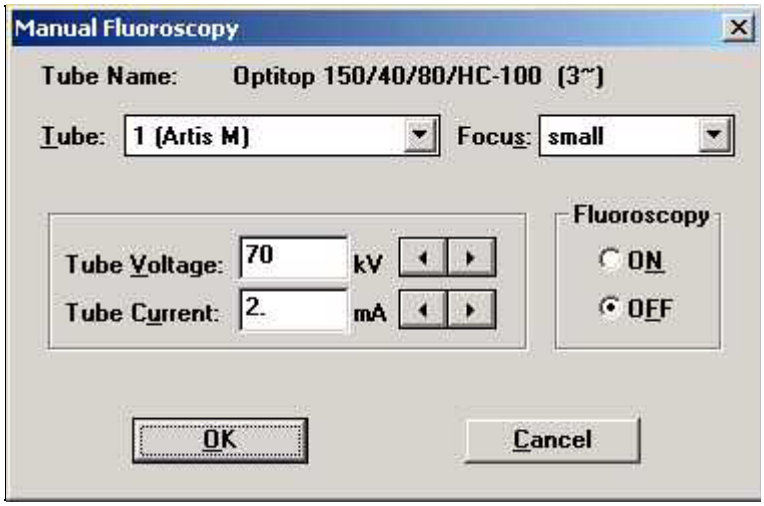


Fig. 38: XCS Components, Polydoros Diagnostics, Manual Fluoroscopy

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

- Fluoroscopy is triggered with the parameters that have been set by selecting **"Fluoroscopy ON"**.

Manual Exposure

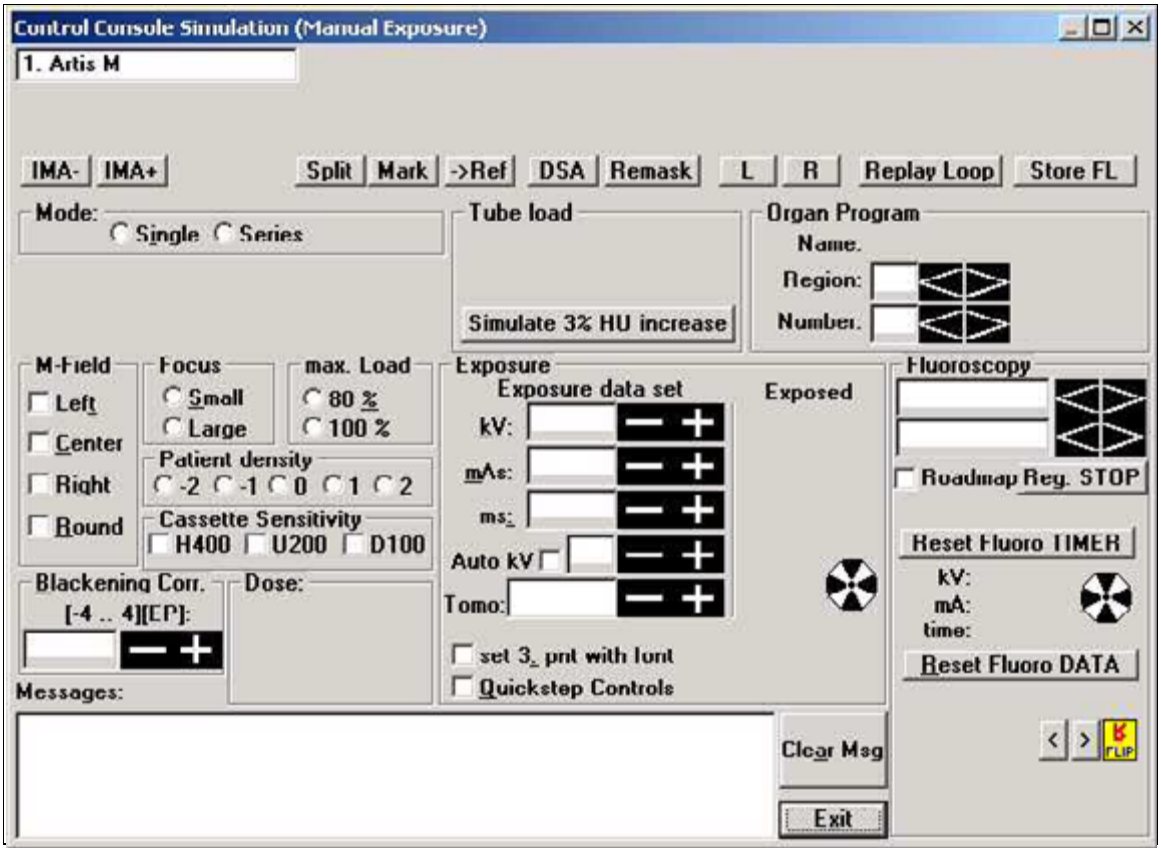


Fig. 39: XCS Components, Polydoros Diagnostics, Manual Exposure

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

Checking the Skin Dose Rate

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

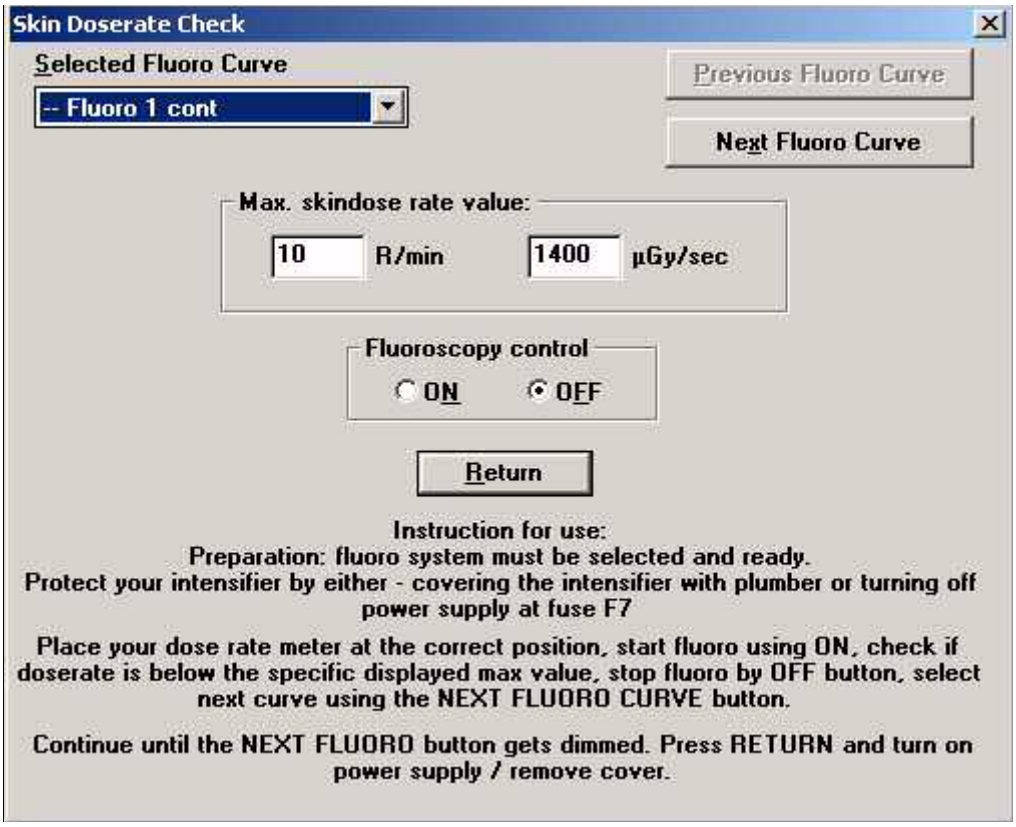


Fig. 40: XCS Components, Polydoros Diagnostics, Check of Skin Dose Rate

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

Nominal Power

- Select XCS SSW / Components / Polydoros / Diagnostic / **Nominal Power**.
- An exposure is triggered by selecting **"Exposure ON"**.
- 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.

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

Saving Data on a Backup Diskette

NOTE	**Once adjustment is completed, perform a "backup".**

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

Restoring Data from a Backup Diskette

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

POLYDOROS LX 30/50 (Lite)/80 with D200 XCU Download

NOTE

The software for the XCU and the D220 heating for the generator have already been downloaded at the factory.

Perform the XCU download only after:

- Changing the software

- Replacing the XCU

Performing the XCU Download:

- Switch the generator **ON**.
- Connect the Service PC to the XCU.
- Log in to the XCU in the XCS SSW.
- Insert the XCU loadware diskette into the SPC drive.
- Select the XCS Service Application-Main Program/Data/**Download to Unit** window.
- Select the **XCU Vxxxx** line in the service screen and select the download with **Start**.
- Confirm the message with **OK** and exit with **Done**.

POLYDOROS LX 30/50 (Lite)/80 with SX Control Unit XCU Download

NOTE

The software for the XCU and the D220 heating for the generator have already been downloaded at the factory.

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 is performed automatically.
- Switch the generator **OFF**.
- Remove the download diskette from the XCU drive.
- Switch the generator **ON**.

POLYDOROS LX 30/50 (Lite)/80 Heating Download:

NOTE

Perform the heating download only if:

- the red LED on the D220 blinks

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

If problems occur during the heating download:

- check the 5V voltage on D220.X18.A1

Performing the Heating Download:

- Connect the Service PC to the XCU.
- Log in to the XCU in the XCS SSW.
- Insert the XCU loadware diskette into the SPC drive.
- Select the XCS Service Application-Main Program/Data/**Download to Unit** window.
- Select the **Heating Vxxxx** line in the service screen and select the download with **Start**.
- Confirm the message with **OK** and exit with Done.

Checking the Anode rpm (without Radiation)

Checking 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.

Checking with the Oscilloscope

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

⚠CAUTION

Voltage approx. 1500 V!

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

- Switch the generator **OFF**.
- Then connect the oscilloscope according to the tube unit selected:
  - For Tube Unit 1 to K3.R2 and K3.R4
  - For Tube Unit II to K3.2 and K3.4

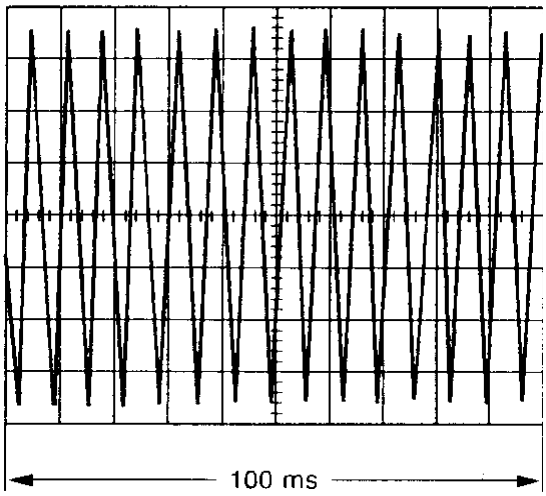


Fig. 41: Oscillogram: X-ray tube rpm

- Evaluate the oscillogram:
  - Count the number of periods within 100 ms.
  - The number of periods multiplied by 10 provides the frequency.
  - For 3-phase or high-speed tube units: rpm **143 ± 10 Hz** (Rapid tube units).
  - For low-speed tube units: 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 Tube Unit Oil Pressure Switch

- Unplug the D160.X6 connector.
- Check:
  - Triggering of exposure must be blocked.
  - At the control console, the message "Error 628 APID 80" appears; the red tube symbol goes on.
  - At the touchscreen console, the message "door is open" appears.
- Plug the D160.X6 connector back in.

Conditioning the X-ray Tube

The following program must be performed by Siemens service the first time the tube unit is started up or after an extended interruption of system operation during a service call as well as when there are system operation malfunctions with the suspicion of electrical instability of the X-ray tube. After extended idle time of the tube unit (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 prior to exposure (e.g. using 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 110 kV/4.1 mA within approx. 1 minute and hold this for 10 minutes. 5 minutes cooling pause.

With tubes and idle times of > 2 weeks:

Condition the X-ray tube.

- Select 80% kW and large focus, trigger the following exposures in rapid succession 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 with installation of 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 selected exposure system is understood. To make the organ programs available, in the configuration 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 downloaded again by selecting: "not available" -> "ok" -> **"12 regions-20 organs/region"**.

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

NOTE	**Make a backup.**

- In the Main Program select System/Quit → and exit the ”System Logoff” window with ”Put to Unit”.
- Switch the generator **OFF**.

General Remarks

The sensitivity, S, of a film-screen system according to DIN 6867 is defined 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 amplification screens from different manufacturers in combination with blue and green-sensitive standard X-ray films (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, the sensitivity number, S, for a film-screen system can be calculated very easily: All that is needed is to multiply the sensitivity,S", listed on the screen by the sensitivity factor of the film, F.

➪ S = S´ x F

The values obtained this way should be viewed as reference values. The primary reason for differences are production fluctuations (particularly in the film) and changed developing conditions.

Manufacturer	Screen	Film	Sensitivity
Agfa	CURIX fine	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

Chapter	Section	Change
POLYDOROS LX Adjustment	Voltage Response Correction	Default values for FD systems added.