SIEMENS

POLYDOROS IT / IT-S

CO

Troubleshooting Guide

POLYDOROS IT / IT-S

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General Safety Information

see (COPL-136.843.02 / General Safety Information)

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see (COPL-136.843.02 / Additional Safety Measures with the Power Storage Unit, ESU, Installed)

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see (COPL-136.843.02 / Service with the control consoles)

Procedure

What possibilities are there for troubleshooting?

1. Error numbers are displayed directly on the control console when errors occur.
2. The error lot (error numbers with date and time) can be displayed on the control console.
3. No (error) display on the control console.
4. LED displays (D500 / D501) in the generator.
5. 7-segment displays (D500) in the generator.
6. Incorrect (varying) exposures.

General Procedure:

- In a malfunction situation, first the voltages should be checked per the Wiring Diagram.
  - If the intermediate circuit voltage is not constant or not in the admissible tolerance range, sporadic errors will occur, .e.g. high voltage errors or in rotating anode operation (possibly incorrect power line voltage adaptation).
  - If the low voltages are too low / too high or are not constant, sporadic errors will occur, e.g. "Err010" or "Err032". The low voltages should be checked per the Wiring Diagram.
- In particular if there are problems with the inverter, pay special attention to good shielding of the HV cables or the STTR cables. In addition, all ground connections must be securely connected.
- With error numbers on the control console (error log), perform troubleshooting per the "Error Messages".
- If an error occurs during initialization or if there is no (error) display on the control console, proceed according to chapter (Initialization / p. 51).
- The functions of the LEDs on the D500/D501 boards in the generator are described in the Wiring Diagram.
- The functions of the 7-segment display on the D500 board in the generator are described in the Wiring Diagram.
- In the IONTOMAT mode, varying exposure can occur if the IONTOMAT cable is grounded on the unit side. The check can be found in chapter (Ground Loop Measurement / p. 50).

Installation of Replacement Parts

NOTE

Replacement parts are only those Part Numbers listed in the Spare Parts Catalogue. As a rule, the Part Numbers on individual boards, etc. are not replacement parts.

For the following reasons, work must always be performed according to the Replacement Instructions.

1. All relevant (replacement) parts are listed. With many parts, adjustment, configuration must be performed.
2. Which data must be saved on which replacement part is described only in the Replacement Instructions (configuration, organ programs...).
3. The function of the generator is ensured only if the parts are installed per the Replacement Instructions and the configurations and adjustments area performed properly.
4. When returning REP or even in the case of a warranty, some replacement parts must have special handling.

Error Numbers on the Standard Console

NOTE **With the standard console, only the error itself with the date and time are stored.**

Standard Console			
	Error	Date	Time
Example 1	0013: dec-04.08:56:03		
Example 2	0015: dec-04.08:56:03		

With the standard condole, there is no further help other than the error.

- Example 1 in the table means:

  "Door contact was opened during an exposure". See Err013 under Error Messages.
- Example 2 in the table means:

  "Switch mAs_meas_on is incorrectly set". See Err015 under Error Messages.

Error Numbers on the Touch Panel

NOTE

With the Touch Panel, in addition to the error, date and time, the Error No., system and parameters are stored.

	Err	Err.No.	System	Parameters	Date	Time
Sample	Err.0007	0x04	Gen	0x0100	aug-20	09:56:43

- The example in the table means:

  Err.0007 “Inverter/ Parallel coil temperature sensor” The additional infos: In the example of Err. No. “0x04” with system “Gen” and parameter “0x100”, inquiries to the HSC should also be listed. These data are intended for Engineering.

General Note regarding "Error Messages"

Every "Error Message" error is listed individually. Whereby the following breakdown is maintained:

1. Description
2. Possible Cause of Error
3. Corrective Measures.

With the corrective measures, reference is frequently made to a connection or a cable.

The cable connections are described in more detail in the Wiring Diagram on the overview pages.

The following documents are provided for further support:

- Wiring Diagram COPL-136.844...
- Adjustment Instructions COPL-136.842...
- Configuration Instructions COPL-136.843...
- Configuration List COPL-136.843...
- Replacement Instructions COPL-136.841...

Error Messages Err01 to Err029

Err001: No communication between control console and generator

Description:

- Control console could not establish a connection to the generator

Possible Causes of Error:

- D300 processor (MCB2) or D500 not running.
- W515 console cable defective.
- D501 defective.

Corrective Measures:

- Check the LEDs and 7-segment displays on the D500:
  - No LED on:
    D500 power supply -> check 5 Volt
    Check the D501 "F1" fuses, check power supply cable connection to D501 (W503) and D501 to D500 (W500).
- Check D500 ribbon cable to D501 (W509).
- Check D500 cable to D501 (W510).
- Check console cables.
- Replace D500 / D501/ D300.

Err002: D300 MCB Error

Description:

- SW error or D300 MCB defective.

Possible Causes of Error:

- D300 MCB3 defective
- FW on MCB3 is not compatible with the FW in the Touch Panel.

Corrective Measures:

- Check the D300 MCB FW and Touch Panel per the Compatibility List.
- Download the FW again per the Compatibility List to the D300 MCB.
- Replace D300 MCB3.

Err003: D500 Error

Description:

- A malfunction has been detected on the D500.

Possible Causes of Error:

- The board to which the D500 is connected signals errors during switch-on.
- D500 defective.

Corrective Measures:

- Check the D500 per "Initialization/D500 Board".

  If "initialization" differs, the defective board (assembly) is displayed by the corresponding LED.
- Replace the D500.

Err004: D501 Error

Description:

- Error on D501

Possible Causes of Error:

- Connections between D500 and D501 defective or contact problems.
- D501 defective.

Corrective Measures:

- Check low voltages (Wiring Diagram).
- Check, and if needed, replace cables and connectors between D500 and D501.
  - D501 X1 cable to D500 X1
  - Check D501 X20 ribbon cable to D501 X11 (W509).
  - D501 X21 cable to D500 X16 (W510)
- Replace the D501.

Err005: D115 Error

Description:

- Rotating anode error, error on the D115

Possible Causes of Error:

- Intermediate circuit voltage missing / incorrect.
- Tube unit incorrectly connected / defective.

- Rotating anode cable incorrectly connected / defective.
- No UHF voltage.
- Connections between D500 and D115 defective or contact problems.
- D115 defective.

Corrective Measures:

- Check low voltages (Wiring Diagram).
- Check the ribbon cable from D500 to D115 (W521); if needed, replace.
- Check the "VHF" voltage on the D115 board between X21, Pin 1 and Pin 3.
  ➪ Approx. 15 V, approx. 50 kHz
- Measure the intermediate circuit voltage on the D115 board between Pins X5 and X6.
  ➪ 565V (± 10%) in the Standby mode.
- Check the stator resistances on D115:

  OPTITOP, OPTILIX (3-Phase)

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 2.0 - 2.6 Ohm at 20°C

  OPTITOP / OPTILIX (2-Phase)

  - Pins X7(I) and X8(0), Pins X8(0) and X9(II)
    ➪ 18.0 - 20.0 Ohm at 20°C
  - Pins X7(I) and X9(II)
    ➪ 13.0 - 16.0 Ohm at 20°C

  Single Tank (STTA), Single Tank Tube Assembly, 50 Hz

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 8.5 - 10.5 Ohm at 20°C

  Single Tank (STTA), Single Tank Tube Assembly, 150 Hz

  - Pins X7(I) and X9(0)
    ➪ 8.5 - 10.5 Ohm at 20°C
  - Pins X8(0) and X9(II)
    ➪ 4.5 - 6.5 Ohm at 20°C
  - Pins X7(I) and X9(II)
    ➪ 13.5 - 16.5 Ohm at 20°C

  Optilix 154/30/50R

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 7.0 - 9.0 Ohm at 20°C
  - Pins X7(I) and X9(II)
    ➪ 15.0 - 18.0 Ohm at 20°C

  RAY... (2-Phase)

- Pins X7(I) and X9(0)

  ➪ 20.4 - 22.6 Ohm at 20°C
- Pins X8(0) and X9(II)

  ➪ 48.9 - 54.1 Ohm at 20°C

RAY... (3-Phase)

- Pins X7(I) and X8(0), and Pins X8(0) and X9(II) and Pins X7 (I) and X9(II)

  ➪ 22.8 - 24.8 Ohm at 20°C

- Replace the D115

Err006: D470 Error

Description:

- Heating error, error on the D470.

Possible Causes of Error:

- None; too high or too low heating current was detected.
- Heating not learned if error occurred during exposure.
- Heating filament (focus) or high voltage cable broken.
- Cabling from and to the D470
- D470 defective

Corrective Measures:

- Check low voltages (Wiring Diagram).
- Check ribbon cable from D500 X13 to D470 X3 (W522).
- Check the small and large focus of the X-ray tube. Pre-heating takes place in standby by both focuses; if needed, replace the tube unit.
- Check the high voltage cable (cathode side); if needed, replace the high voltage cable.
- Check the "VHF" voltage on the D479 board between X1, Pin 1 and Pin 3.

  ➪ Approx. 15 V, approx. 50 kHz
- Measure the intermediate circuit voltage on the D470 board between Pins X4.3 and X4.6.
  - Pins X4.3 and X4.6

    ➪ 565 V (± 10%) in the standby mode.
  - Pins X4.1 and X4.6

    ➪ 282 V (± 10%) in the standby mode.
  - Pins X4.1 and X4.6

    ➪ 282 V (± 10%) in the standby mode.
- Adjustment: Perform Learn filament.
- On HVT/D530 (D532), check cable connection X1 (large focus) and X3 (small focus).

- Replace the D470.

Err007: Inverter / Parallel Coil Temperature Sensor

Description:

- Temperature sensor for the inverter or Lpar. parallel coil was detected.

Possible Causes of Error:

- Temperature sensor (TF1 or TF2) responded.
- Cable from inverter to sensors TF1 and TF2 defective.
- Inverter (D510) defective.

Corrective Measures:

- Check the temperature of the inverter at the heat sink and at the parallel coil.
  - If hot:
    ➪ Operating error (limit operation) or inverter defective.
  - If cold:
    ➪ Cable from the D510 inverter to the sensors has contact problems.
    ➪ Measure the TF1 or TF2 temperature sensor: Required: approx. 2-10 kOhm
    ➪ Ribbon cable between X10 D500 and X10 D510 (W520) has contact problems.
    ➪ Inverter or Lpar parallel coil defective.

Err008: HVT Error /STTA Error

Description:

- A high voltage transformer (HVT) or STTA error occurred.

Possible Cause of Error

- W523 defective or contact problems
- HVT or STTA defective

Corrective Measures:

- Check the W523 cable; if needed, replace
- Replace the HVT or STTA

Err009: D510 Error

Description:

- A D510 inverter error has occurred.

Possible Causes of Error:

- W520 cable defective or contact problems
- Power Supply defective
- D510 defective

Corrective Measures:

- Check low voltages (Wiring Diagram).
- Check the ribbon cable between D500 X10 and D510 X10 (W520); if needed, replace
- Replace the inverter

Err010: Power Supply error

Description:

- The generator has detected a power supply voltage error.

Possible Causes of Error:

- +15/-15 Volt low voltages too low or are missing.
- D500 defective.

Corrective Measures:

- Check low voltages (Wiring Diagram).
- D501 connections X7 and X8 are incorrectly connected. Causes a short-circuit of the 24 Volt.
- Measure the voltage directly at the test points on the D500 board. Alternatively, if no test points are available, the voltage can be measured at connector X1, D500. If the low voltages are present on the D500 board:

  -> replace the D500

Err011: External Console Error

Reserved for future error message

Err012: High Voltage Error

Description:

- A high voltage error has occurred.

Possible Causes of Error:

- Oscillation circuit not adjusted.
- Tube data not learned.

- Defective high voltage cable
- High voltage transformer (HVT) or STTA defective
- Electrical grid problems
- Connection cables for large and small focus switched at HVT/D530 X1 and X3.
- D510 defective

Corrective Measures:

- Adjustment: Perform the Static Inverter adjustment
- Adjustment: Perform Learn filament.
- Check the power grid quality.
- Check the high voltage cables/connectors
  - Check the HV cable for traces of creep burn. → If traces are present →, replace the HV cable.
  - The Ohm value of the shielding braid may be 1 Ohm per meter. → If it is suspected that the HV cable is no longer voltage-stable → , the HV cable must be replaced.
- On HVT/D530, check cable connection X1 (large focus) and X3 (small focus).
- Replace the HVT
- Replace the inverter

Err013: Door Position

Description:

- The door signal (door open) was detected during exposure.

Possible Causes of Error:

- Operating error
- Hardware error

Corrective Measures:

- Inform the operator of the operating error.
- Check whether the door symbol in the operating console display is blinking.
- Check, and if needed, replace the door contact or cables.
- Check the W500, W509, W510 cables; if needed, replace
- D501

Err014: Single Tank Error (STTA Error)

Description:

- An STTA error occurred during initialization.

Possible Causes of Error:

- High pressure switch has responded.
- Hardware error

-> Error occurs only with POLYDOROS IT S 30/55.

Err015: D500 S2 Incorrect Position

Description:

- The D500 S2 **_mA_Meas_On** switch is out of the service mode in the mAs measurement position.

Possible Causes of Error:

- S2 switch not set correctly.
- D500 defective.

Corrective Measures:

- Set the S2 switch to the correct position.
- Replace the D500.

Err016: Exposure time exceeded

In preparation.

Err017: Grid Error

Description:

- A malfunction of the external grid contact has been detected.

Possible Causes of Error:

- The grid contact may be closed only during exposure triggering.
- D501 X10 configured with a jumper between Pin 1 and Pin 5 and a movable grid.
- Or there is a malfunction in the connected unit.

Corrective Measures:

- Check grid connection/contact.
- Remofe the D501 X10 jumper.
- Replace the D501.

Err018: Tube Unit Error

Description:

- High pressure switch has responded. (contact has been interrupted, i.e., switch opens with high pressure)

Possible Causes of Error:

- X-ray tube too hot
- Tube unit pressure switch defective
- Cable between pressure switch and D501 X8 is interrupted.

Corrective Measures:

- Check the tube unit:
  - If the temperature is very high, let the tube unit cool down.
  - If the temperature is normal/cold, check the pressure switch and cabling.
- Check the tube unit pressure switch
- Cable between pressure switch and D501 X8 is interrupted.
- Cable to D501 X8.5 and X8.6 not connected or plugged in
- D501 defective.

Err019: Dongle Error

Description:

- D502 dongle missing; system working in minimum configuration.

Possible Causes of Error:

- D502 dongle not connected correctly
- D502 dongle defective

Corrective Measures:

- Check the D502 dongle for contact problems; if needed, replace it.

Err020: Reconfiguration Required

Description:

- Unnecessary configuration data were detected in the E2PROM on the D500 board.

Possible Causes of Error:

- System configuration not correct.
- D500 defective.

Corrective Measures:

- Perform a reconfiguration of the generator (for configuration data, see the Operating Instructions) and New Adjustment: Perform Static Inverter adjust[J] and Learn filament[J] -> if the error persists

  -> replace the D500.

Err021: Operating Error (Technician)

Description:

- An abort of exposure triggering was detected in service.

Possible Causes of Error:

- The exposure triggering button was released too soon during an adjustment procedure.

Corrective Measures:

- Perform the adjustment again.

Err022: K1 Main Contactor

Description:

- An error with the K1 Main Contactor was detected.

Possible Causes of Error:

- K1 main contactor (line power breaker) defective
- Cabling between D501 and main contactor defective.

Corrective Measures:

- Check whether the K1 breaker is active during switch-on; if needed, replace it.
- Check, and if needed, replace the cables between D501 and the main contactor (W504).

Err023: K2 Charger Contactor

Description:

- An error with the K2 charger contactor was detected.

Possible Causes of Error:

- K2 charger contactor (charge breaker) defective
- Cabling between D501 and charger contactor defective.

Corrective Measures:

- Check whether the K2 breaker is active during switch-on; if needed, replace it.
- Check, and if needed, replace the cables between D501 X5 and the charger contactor (W504).

Err024: Intermediate Circuit Error

Description:

- An error in the intermediate circuit voltage has been detected.

Possible Causes of Error:

- Line power not correctly connected (observe phases)
- Fuses F1, F2 or F3 defective
- Pre-transformer defective or required
- Cabling defective
- K1 power line breaker or K2 charger breaker defective
- Intermediate circuit components defective (D510, D115, D470)

Corrective Measures:

- Check the power line connection.
- Replace fuses F1, F2, F3
- Replace pre-transformer or required
- Check/replace K1 power line breaker or K2 charger breaker; replace cabling
- Measure the intermediate circuit voltage with the DVM opn the D115 board between Pins X5 and X6; 565 V (±10%) must be present; if not, disconnect the cable to D115 and D470 and check on D500_X110/UDCact whether the voltage is present -> one after the other, repeat the procedure for all other components.
- Replace the inverter
- Replace the D115, D470

Err025: Rotating Anode Operating Error

Description:

- During rotating anode operation (start, run or braking), an error occurred.

Possible Causes of Error:

- Wrong tube unit configured
- Defective stator
- Missing intermediate circuit voltage
- W521, W540, W541, rotating anode cable defective or contact problems
- D115 defective.

Corrective Measures:

- Check tube unit configuration
- Check the ribbon cable from D500 to D115 (W521); if needed, replace.
- Measure the intermediate circuit voltage on the D115 board between Pins X5 and X6.
  ➪ 565V (± 10%) in the Standby mode.
- Check the stator resistances on D115:

  OPTITOP, OPTILIX (3-Phase)

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 2.0 - 2.6 Ohm at 20°C

  OPTITOP / OPTILIX (2-Phase)

  - Pins X7(I) and X8(0), Pins X8(0) and X9(II)
    ➪ 18.0 - 20.0 Ohm at 20°C
  - Pins X7(I) and X9(II)
    ➪ 13.0 - 16.0 Ohm at 20°C

  Single Tank (STTA), Single Tank Tube Assembly, 50 Hz

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 8.5 - 10.5 Ohm at 20°C

  Single Tank (STTA), Single Tank Tube Assembly, 150 Hz

  - Pins X7(I) and X9(0)
    ➪ 8.5 - 10.5 Ohm at 20°C
  - Pins X8(0) and X9(II)
    ➪ 4.5 - 6.5 Ohm at 20°C
  - Pins X7(I) and X9(II)
    ➪ 13.5 - 16.5 Ohm at 20°C

  Optilix 154/30/50R

  - Pins X7(I) and X8(0), and Pins X8(0) and X9(II)
    ➪ 7.0 - 9.0 Ohm at 20°C

- Pins X7(I) and X9(II)

  ➪ 15.0 - 18.0 Ohm at 20°C

RAY... (2-Phase)

- Pins X7(I) and X9(0)

  ➪ 20.4 - 22.6 Ohm at 20°C

- Pins X8(0) and X9(II)

  ➪ 48.9 - 54.1 Ohm at 20°C

RAY... (3-Phase)

- Pins X7(I) and X8(0), and Pins X8(0) and X9(II) and Pins X7 (I) and X9(II)

  ➪ 22.8 - 24.8 Ohm at 20°C

- Replace the D115

Err026: HVT High Pressure

Description:

- A high pressure error has been detected in the high voltage transformer.

Possible Causes of Error:

- W523 cable defective or contact problems
- HVT is overheated or defective

- W523 cable defective or contact problems

Corrective Measures:

- Check on the HVT whether there is high external temperature; if yes, let the HVT cool down; if the error continues, then disconnect:
  - at HVT. X9 and check the pressure switch, it must be closed; if open, then check the HVT.
- Check the W523 cable; if needed, replace

Err027: Dongle Position

Description:

- System working in the minimum configuration.

Possible Causes of Error:

- The D502 dongle is plugged in turned 180°
- D502 dongle not connected correctly in its position

- D502 dongle defective

Corrective Measures:

- Check the position of the dongle
- Replace the D502 dongle

Err028: Filament Operating Error

Description:

- A heating error occurred during the exposure.

Possible Causes of Error:

- Wrong tube unit configured
- Tube unit not warmed up
- Connection cables for large and small focus switched at HVT/D530 X1 and X3.
- Tube unit or high voltage cable defective
- D470 defective

Corrective Measures:

- Check the tube unit configuration (see data in the Operating Instructions)
- Readjustment: Perform tube warm-up and learn filament
- On the HVT/D530(532): check cable connection X1 (large focus) and X3 (small focus); if needed -> replace tube unit.
- Replace the D470.

Err029: D510 Power

Description:

- The 15V power supply for D510 is out of tolerance (±10%).

Possible Causes of Error:

- Power supply defective
- W501, W503 cable defective or contact problems
- D501 fuses defective.
- D510 defective

Corrective Measures:

- Check D501power supply voltages/LEDs; if needed, replace fuses
- Check the W501 and W503 cables; if needed, replace

- Replace power supply
- Replace the inverter

Err 030 to Err 053 Error Messages

Err030: Console HW

Description:

- An error in the console hardware has occurred.

Possible Causes of Error:

- 24 V power supply malfunctioning
- D501 connections X7 and X8 switched
- Console defective
- W515 or W500, W509, W510 cable defective or contact problems
- D501 defective.

Corrective Measures:

- Check the 24 V power supply
- Correctly connect D501 connections X7 and X8
- Replace console
- Check the W515 or W500, W509, W510 cables; if needed, replace
- Replace the D501.

Err031: D500 S4 IGNITION switch

Description:

- The D500 S4_IGNITION switch is in the wrong position

Possible Causes of Error:

- S4 switch is in the wrong position or has contact problems
- D500 defective.

Corrective Measures:

- Set the S4 switch to the correct position (ON = normal position)
- Replace the D500.

Err032: Real Time Clock Data Error

Description:

- The real-time clock on the D500 contains invalid data.

Possible Causes of Error:

- 5 V VCC on the D500 board too low
- Missing configuration data
- D500 defective.

Corrective Measures:

- Adjust the low voltages (Adjustment Instructions)
- D500 reconfiguration (for data: see Operating Instructions); if there is still an error message -> replace D500

Err033: HVT Temperature Sensor

Description:

- An error in the high voltage transformer (HVT) has occurred.

Possible Causes of Error:

- Temperature sensor has responded.
- High voltage transformer defective

Corrective Measures:

- Check temperatue of high voltage transformer
  - If hot: 1) Operating error (limit operation) or 2) inverter defective -> replace inverter
  - If cold: The temperature sensor in the HVT is defective; unplug the 14 connector on the D500 and measure Pins 5 and 8 with the DVM. The value must be 47.5 kOhm at a temp. of 25 °C (please note: at temp. < 25°C, the value becomes > ; at temp. > 25°C, the value becomes < !).

Err034: Init_Radiation Triggering active

Description:

- The radiation release signal was active during initialization.

Possible Causes of Error:

- Incorrect operation
- W515 cable defective or contact problems
- Console defective

Corrective Measures:

- Do not activate release of radiation during initialization.
- Check the W515 cable; if needed, replace
- Replace console

Err035: Plus_kV_Max

Description:

- Over-voltage on the kV Plus side has occurred

Possible Causes of Error:

- If the error occurs only at low powers, low kV and mAs, this points to an incorrect oscillation circuit adjustment.
- There is no ground connection to the high voltage transformer (HVT) and tube unit
- Short circuit on one side in the high voltage circuit

Corrective Measures:

- Reperform the Static Inverter adjustment
- Check the ground connections, HVT and tube unit, to the M16
- Check kV Plus and kV Minus on D500_X186 at Pin P_UT and Pin N_UT to determine whether a short circuit is present on one side; if yes, -> replace the tube unit, but first read out/not the tube data.

Err036: Minus_kV_Max

Description:

- Over-voltage on the kV Minus side has occurred

Possible Causes of Error:

- If the error occurs only at low powers, low kV and mAs, this points to an incorrect oscillation circuit adjustment.
- There is no ground connection to the high voltage transformer (HVT) and tube unit
- Short circuit on one side in the high voltage circuit

Corrective Measures:

- Reperform the Static Inverter adjustment
- Check the ground connections, HVT and tube unit, to the M16
- Check kV Plus and kV Minus on D500_X186 at Pin P_UT and Pin N_UT to determine whether a short circuit is present on one side; if yes, -> replace the tube unit.

Err037: Delta_kV

Description:

- Difference in value between positive and negative high voltage side is too great

Possible Causes of Error:

- Short circuit on one side in the high voltage circuit
- Strong non-symmetry in the high voltage transformer
- Defective measurement sensing on one side

Corrective Measures:

- Check whether the difference in high voltage is less than 20%; measure between kV Plus and kV Minus on D500_X186 at Pin P_UT and Pin N_UT:
  - if the difference is greater than 20%
    -> replace tube unit or high voltage transformer, but first read out/note the tube data
  - If there is no difference -> replace D500

Err038: Tube voltage UT_Tolerance

Description:

- The tube voltage, Ut_act, is not within the admissible tolerance.

Possible Causes of Error:

- S2/D500 switch is on mAs measurement without a test meter connected
- High voltage cable connector (kV-) is not plugged in correctly
- Tube unit not warmed up
- Instable line power
- Tube unit defective

Corrective Measures:

- Check the S2 switch on D500
- Check the high voltage cable connectors for correct positioning
- Adjustment: Perform the Static Inverter adjustment
- Adjustment: Perform Learn filament.
- Check the line power stability
- Replace tube unit, but first read out/note the tube data

Err039: Tube Current IT_Tolerance

Description:

- The tube voltage, I_{t_act}, is not within the admissible tolerance.

Possible Causes of Error:

- S2/D500 switch is on mAs measurement without a test meter connected

- Tube unit not warmed up
- Small and large focus switched
- Tube unit defective

Corrective Measures:

- Check the S2 switch on D500
- On HVT/D530, check cable connection X1 (large focus) and X3 (small focus).
- Adjustment: Perform the Static Inverter adjustment
- Adjustment: Perform Learn filament.
- Replace tube unit, but first read out/note the tube data

Err040: Main inverter, jumper short circuit

Description:

- A jumper short circuit error has been detected in the main inverter

Possible Causes of Error:

- If the error occurs only at low powers, low kV and mAs, this points to an incorrect oscillation circuit adjustment.
- Tube data not learned.
- Electrical grid problems
- Tube unit defective
- Inverter defective
- Disturbances caused by poort ground connection

Corrective Measures:

- Reperform the Static Inverter adjustment
- Check ground connections
- Adjustment: Perform the Static Inverter adjustment
- Adjustment: Perform Learn filament.
- Check the stability of power line voltage
- Measure the intermediate circuit voltage with the DVM on the D115 board between Pin X5 and X6; 565 V (±10%) must be present.
- Make exposures at different kV steps to detect voltage stability problems; if problems continue: -> Replace tube unit, but first read out/note the tube data
- Replace the inverter

Err041: Iload Error

Description:

- An over-current was detected in the inverter.

Possible Causes of Error:

- Tube unit not correctly warmed up.
- Power too high with unfavorable power line conditions.
- Tube unit defective
- D510 defective

Corrective Measures:

- On HVT/D530, check cable connection X1 (large focus) and X3 (small focus).
- Adjustment: Perform the Static Inverter adjustment
- Adjustment: Perform Learn filament.
- Check the internal line resistance, Ri; for this, see the Startup Instructions.
- Replace tube unit or high voltage tank, but first read out/note the tube data
- Replace the inverter

Err042: XRAY_On

- High voltage could not be switched on.

Possible Causes of Error:

- S4/D500 IGNITION switch is set to the OFF position or is defective.
- The high voltage is generated only to less than 20 kV, this indicates a defective X-ray tube.

Corrective Measures:

- Set the S4 IGNITION switch to the ON position; if needed, check it
- Check the high voltage; if the high voltage is generated to less than 20 kV (check on D500_X186 at Pin UTact), then -> replace the tube unit, but first readout/note the tube data.
- If no high voltage is generated, check the oscillation current signal on D500, Pin X210_Iload -> if the oscillation current signal is present, there is a short circuit in the HVT or in the high voltage circuit; for this, check for a short circuit on D530 X13 and X11 if there is no short circuit, then:
  - Replace tube unit, but first read out/note the tube data

- Determine the oscillation with the single oscillation TestS, check the control (D500_X100_F_INV) and oscillation pulse (D500_X210_I_load):
  - 1) If there is no control, then replace the D500.
  - 2) If no oscillation pulse is generated, replace the inverter

Err043: Tube Configuration

Description:

- The tube configuration must be performed.

Possible Causes of Error:

- System configuration not correct; tube unit is not detected
- D500 defective.

Corrective Measures:

- D500_Jumper not installed correctly (for this, see the Wiring Diagram)
- Check the tube unit configuration (see data in the Operating Instructions)
- If the error occurs again following reconfiguration, replace the D500.

Err044: Automatic Exposure Control Configuration

Description:

- The automatic exposure control configuration must be performed.

Possible Causes of Error:

- System configuration not correct.
- D500 defective.

Corrective Measures:

- Correctly configure the automatic exposure control (Iontomat)
- If the error occurs again following reconfiguration, replace the D500.

Err045: High Voltage Cable Configuration

Description:

- Configuration of the high voltage cable length must be performed.

Possible Causes of Error:

- System configuration not correct.

- D500 defective.

Corrective Measures:

- Correctly configure the high voltage cable lengths
- If the error occurs again following reconfiguration, replace the D500.

Err046: Tube Temperature Error

Description:

- The tube temperature switch in the tube unit has responded.

Possible Causes of Error:

- Overheating of the tube unit
- The input circuit of the D501. X8 not closed

Corrective Measures:

- At the tube unit, measure whether the switch is closed; if open, then -> replace the tube unit, but first read out/note the tube data.
- Let the tube unit cool down; if the error is still present, perform startup again: Perform tube warm-up and learn filament
- Check on the D501 at X8, Points 3 and 4 whether the tube unit is correctly connected; if needed, replace the cable or if no connection cable is present, jumper Points 3 and 4.

Err047: Tomo Device Error

Description:

- A malfunction of the external tomo device has been detected.

Possible Causes of Error:

- Tomo device not connected
- Tomo device defective
- D501 defective.

Corrective Measures:

- Check tomo device contacts
- Check tomo device HW; if needed, replace HW
- Replace the D501.

Err048: IT_Learn

Description:

- The expected emission value was not reached; error during heating learn routine.

Possible Causes of Error:

- W523 actual value sensor cable defective or not connected
- W506 heating current cable defective or not connected
- Tube unit defective
- Heating transformer in HVT defective
- D470 defective

Corrective Measures:

- Replace W523 or W506
- Replace tube unit, but first read out/note the tube data
- Replace the HVT
- Replace the D470.

Err049: Heating Learn Routine Error

Description:

- Error during heating learn routine.

Possible Causes of Error:

- Focus connections switched
- Tube unit defective

Corrective Measures:

- On high voltage transformer, check cable connection D530.X1 (large focus) and X3 (small focus).
- Replace tube unit, but first read out/note the tube data

Err050: Gen. not Adjusted

Description:

- Triggering radiation attempted with the oscillation current not adjusted.

Possible Causes of Error:

- System was not correctly adjusted.

Corrective Measures:

- Oscillation circuit adjustment: Perform the Static Inverter adjustment again
- If the error still occurs,
  -> replace the D500

Err051: Gen DUMMY RAC

Description:

A DUMMY RAC is entered into the system configuration.

Possible Causes of Error:

- Check the D500 DIP switch settings
- If error occurs again, replace the D500

Err052: Ion X16

Description:

D500 X16 not connected

Possible Causes of Error:

- W510 not plugged into D500 X16 or D501 X21
- W510 defective
- D500 defective.
- D501 defective.

Err053: Generator K10

Description:

The ocscillation circuit switch relay reacted incorrectly.

Possible Causes of Error:

- W708 (D501 X34-K10) defective
- 24V power supply
- D501 defective.
- D500 defective.

Error Message Err550 to Err634

Err550: Dose_min

Description:

- Dose monitoring has responded. With an exposure controlled by automatic format control, the dose counter on the D500 is read out after 100 ms exposure time. If at least one minimum dose is not measured at this time, this error is signaled.

Possible Causes of Error:

- Operating error
  - Tube unit is in wrong position!
  - Wrong workstation selected
  - Wrong (too low) exposure kV selected. Iontomat chamber covered.
  - Collimator is closed.
- Hardware error

Corrective Measures:

- Inform the operator of the operating error.
- Check the system configuration; for this, see the Configuration Instructions.
- Check the IONTOMAT hardware; if needed, replace it;
- Check the W500, W509, W510 low voltage cables; if needed, replace
- Replace the D501.

Err551: Operator cut off exposure too soon.

Description:

- Operator cut off the exposure too soon

Possible Causes of Error:

- Operating error
- Hardware error

Corrective Measures:

- Inform the operator of the operating error.
- Check, and if needed, replace the console or handswitch.
- Check the console cable; if needed, replace
- Replace the D501.
- Replace the D500.

Err600: MDM Focus

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal Focus Code)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err601: MDM Rad_Flag

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal exposure / Radioscopy flag)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err602: MDM Exposure_Film

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal Film Code flag)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.

- Check data cable between MDM and generator and, if needed, replace.

Err603: MDM Photo_Timer

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal Iontomat code)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err604: MDM Film_Sen

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal film sensitivity value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err605: MDM Film_Sen

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal film sensitivity value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err606: MDM Tube_Voltage

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal kV value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err607: MDM Film_Current

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal kV value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err608: MDM_Time

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal ms value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged

- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err609: MDM_mAs

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal mAs value)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err610: MDM_Exposure_Method

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal type of exposure)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err611: MDM_3Pkt

Description:

- The generator received incorrect exposure data from the MDM detector. (3-point technique not supported!)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err612: MDM_Channel

Description:

- The generator received incorrect exposure data from the MDM detector. (illegal detector selection)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err613: MDM_kV_Tube

Description:

- The generator received incorrect exposure data from the MDM detector. (kV value outside of the permissible value range of the installed tube unit)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err614: MDM_Tube_T

Description:

- The generator received incorrect exposure data from the MDM detector. (kV value outside of the permissible value range of the installed tube unit)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err615: MDM_No_Iontomat

Description:

- The generator does not have an Iontomat

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err616: MDM_Bed_Iontomat

Description:

- Iontomat exposure cannot be used for "Bed exposure"

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err617: MDM_Channel_1

Description:

- Programmed Iontomat channel does not match the selected exposure system.

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err618: MDM_Channel_2

Description:

- Programmed Iontomat channel does not match the selected exposure system.

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err619: MDM_Ch1_Not_Config

Description:

- Iontomat channel 1 is not configured in the generator

Possible Causes of Error:

- Configuration problem
- Incorrect organ program

Corrective Measures:

- Configure Iontomat channel 1 in the generator
- Check affected organ program, and if needed, download again.

Err620: MDM_Ch2_Not_Config

Description:

- Iontomat channel 2 is not configured in the generator

Possible Causes of Error:

- Configuration problem
- Incorrect organ program

Corrective Measures:

- Configure Iontomat channel 2 in the generator
- Check affected organ program, and if needed, download again.

Err621: MDM_Timeout

Description:

- Timeout during communication with the host

Possible Causes of Error:

- Data cable defective

Corrective Measures:

- Check the data cable; if needed, replace

Err622: MDM_Small_Focus_Disabled

Description:

- In preparation.

Err623: MDM_Large_Focus_Disabled

Description:

- In preparation.

Err624: MDM_Tube_Imax_Step

Description:

- The generator received incorrect exposure data from the MDM detector. (mA value outside of the permissible value range of the installed tube unit)

Possible Causes of Error:

- Affected organ program on MDM detector is defective or damaged
- Data transfer between MDM and generator is disturbed.

Corrective Measures:

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.

Err625: MDM_Plani_Active_Bed_Selected

Description:

- Bed exposure was selected in the MDM system while tomo device was in operation.

Possible Causes of Error:

- Operating error

Corrective Measures:

- Only table exposure is permitted while tomo device is active.

Err626: MDM_Plani_Active_Wall_Select

Description:

- Wall stand was selected in the MDM system while tomo device was in operation.

Possible Causes of Error:

- Operating error

Corrective Measures:

- Only table exposure is permitted while tomo device is active.

Err627: MDM_Plani_Active_Wall_Select

Description:

- Iontomat was selected in the MDM system while tomo device was in operation.

Possible Causes of Error:

- Operating error

Corrective Measures:

- Only table exposure is permitted while tomo device is active.

Err628: MDM_Active_Prep

Description:

- MDM detector was active during exposure preparation

Possible Causes of Error:

- MDM Detector Error
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Detector may not be active during exposure preparation.
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err629: MDM_Active_Reset

Description:

- MDM detector was active during reset

Possible Causes of Error:

- MDM Detector Error
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Detector may not be active during reset.
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err630: MDM_Active_Init

Description:

- MDM detector was active during initialization

Possible Causes of Error:

- MDM Detector Error
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Detector may not be active during initialization.
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err631: MDM_Idle

Description:

- MDM detector did not react to exposure start

Possible Causes of Error:

- MDM Detector Error
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Check the detector
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err632: MDM_Stopped

Description:

- MDM detector broke off exposure

Possible Causes of Error:

- MDM Detector Error
- Affected organ program on MDM detector is defective or damaged (1s instead of 3 s sample time)
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Check the detector

- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err633: MDM_Stopped

Description:

- MDM detector stopped tomo exposure

Possible Causes of Error:

- MDM Detector Error
- Affected organ program on MDM detector is defective or damaged (1s instead of 3 s sample time)
- Data transfer between MDM and generator is disturbed.
- D501

Corrective Measures:

- Check the detector
- Check affected organ program, and if needed, download again.
- Check data cable between MDM and generator and, if needed, replace.
- Replace the D501.

Err634: MDM_Stopped

Description:

- MDM Data Error

Possible Causes of Error:

- Data transfer disturbed

Corrective Measures:

- Check the data cable; if needed, replace
- MDM hardware error

Ground Loop Measurement

This measurement ensures that no inadmissible ground loops that can cause disturbances on the Iontomat cable are present.

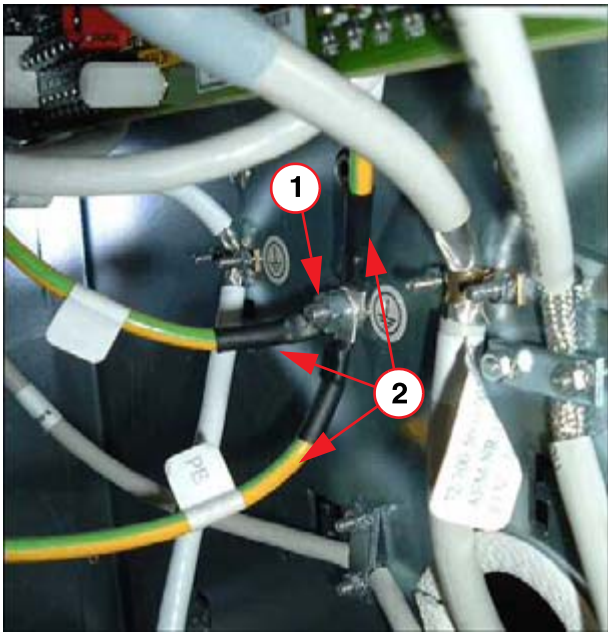

Fig. 1: Grounding point

Pos. 1 Nut

Pos. 2 PE cable

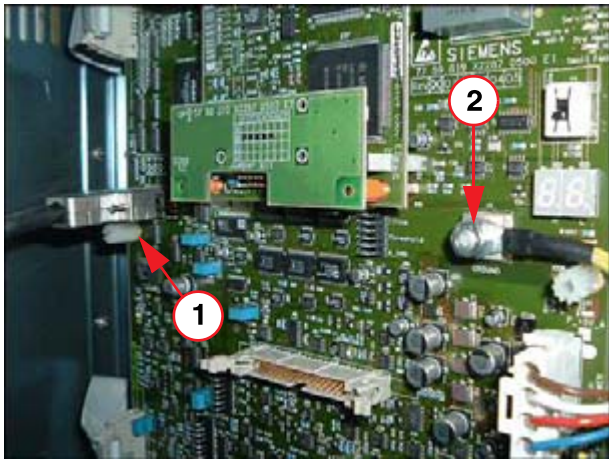

Fig. 2: D500 ground connections

Pos. 1 D500.X31 RS232

Pos. 2 D500.X2 grounding point

- Remove the nut on the grounding point below the D501 (1/Fig. 1 / p. 50) and disconnect the three ground cables (2/Fig. 1 / p. 50) from the grounding point. Let the ground cables hang down so that there is no connection to the housing; if needed, insulate them.
- Disconnect the cable for the D501.X19 control console from the D501.
- If present, disconnect the cable for the D500.X31 RS232 connection (1/Fig. 2 / p. 50) from the D500.
- Use the multimeter to measure the resistance between the grounding point on D500, Ground X2 (2/Fig. 2 / p. 50) and the grounding point on the generator (1/Fig. 1 / p. 50).

  ➪ The resistance measured may not be less than 15 kOhm.
- After completing the measurement, reconnect the D500.X31 and D501.X19 cables and reconnect the three ground cables.

NOTE

If the required resistance is not reached, there is an inadmissible ground loop present that must be corrected. For troubleshooting, disconnect all connectors from the D501 board, one after the other, until the required resistance value is reached. Correct the ground connection in this cable segment.

Initialization

Control Consoles

Standard Console

During bootup of the console, the following displays appear:

1. An hour glass
2. A darkened display
3. Information about the generator, such as model / SW version... (only if communication to the generator could be established). Then "the normal display"
4. Error 001, if no communication could be established within approx. 1 minute.

Touch Panel

During bootup of the console, the following displays appear on the Touch Panel:

1. The typical Windows bootup. RAM Test / Press F2.....
2. A darkened display
3. A dot "line" that indicates the progress of the initialization.
4. A darkened display
5. Windows ICONs very briefly
6. INIT is displayed in the middle
7. Error 001, if no communication could be established within approx. 1 minute. If communication to the generator could be established, there is a normal display.

D500 Board

Flex LEDs on the board (see Wiring Diagram).

1. All LEDs go on briefly (exception is the Service LED).
2. All LEDs go off.
3. “V16” FIL_INV_fault blinks.
4. V8 blinks, V9 on, V20 on.

NOTE	**The same display is found on the D500 board if no control console has been connected, but the switch-on switch is held pressed on the D501 board.**

Chapter	Section	Changes