



**NÜVE SANAYİ MALZEMELERİ İMALAT VE TİCARET A.Ş.**

**OT 100V**

# **VERTICAL STEAM STERILIZER**

## **SERVICE MANUAL**



**Z14.K 25 135 Rev. No:00 Tarihi: 04/2012**

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# SECTION 1

## INTRODUCTION

### 1.1 PURPOSE OF THE SERVICE MANUAL

This manual includes servicing and maintenance information for OT 100V Vertical Steam Sterilizer. It is prepared to be used by technicians who were formerly trained by Nuve. This manual informs the technicians about the operating principles, diagnosing and repairing methods and spare part replacing.

If any problem is detected which is not identified in this manual, please contact to Nuve Servicing Team.

### 1.2 GENERAL PURPOSE OF THE UNIT

The heating function is provided by means of the heater placed outside the sterilization chamber and steam generator. The sterilization cycle consists of the vacuum, heating, sterilization, steam discharge and drying phases.

**Vacuum:** When the device is started, the vacuum cycle starts. The chamber pressure is reduced under the ambient pressure and the air is discharged.

**Heating:** Before the sterilization cycle, the sterilization chamber is heated in order to reach required steam temperature.

**Sterilization:** When the sterilization chamber temperature reaches the set temperature sterilization starts. The sterilization chamber is kept at the required temperature and pressure for the set time.

**Steam Discharging and Drying:** The steam discharging phase is the phase after the sterilization during which the steam in the sterilization chamber is discharged in order to reduce the pressure to the ambient pressure. Humidity is removed from the chamber during the drying phase.

# SECTION 2

## OPERATING PRINCIPLES

### 2.1 GENERAL OVERVIEW

The OT 100V can be examined in 5 main categories:

- Power supply
- Control unit
- Vacuum unit
- Heating unit
- Water and steam unit.

### 2.2 EXPLANATIONS OF THE FUNCTIONS

#### 2.2.1 Power Supply Values

The power supply values are listed in Table 1:

Table 1

Model	Thermal Switch	Power Supply	Power Inlet	Heater Type	Steam Generator Power
OT 100 V	3x16 A	7500 W	400 V~ 50 Hz.	Heater 2* 500 W	6000 W

#### 2.2.2 Main Board Structure

OT 100V vertical steam sterilizer operates on the microprocessor controlled basis. The microprocessor controlled main structure consists of the following parts:

- Main PCB
- Steam Generator Water Level PCB
- Control and Display PCB.

##### 2.2.2.1 Main PCB

The microprocessor controlled main PCB operates based on “proportional” control system. The main PCB, firstly, prepares the steam generator according to the chosen program. Vacuum process starts, after user gives the start command. The chamber pressure is dropped below the ambient pressure and the air in the chamber is discharged. After the vacuum process, sterilization, steam discharging and drying phases are completed by the main PCB as described in section 1.2.

Main PCB controls the sterilization process according to measurements of temperature and pressure sensors which are located in sterilization chamber. It also prepares the steam generator based on the user preferences on the command and display unit.

### 2.2.2.2 Steam Generator Water Level PCB

Steam generator water level PBC works in conjunction with water level sensors. Steam generator supplies water when the water level reaches to the minimum level. Water supply is stopped if water level reaches to maximum level.

### 2.2.2.3 Control and Display PCB

Control and display PCB enables user to monitor the values which are measured by the temperature and pressure sensors located in different points of the OT 100V vertical steam sterilizer; to see water level information of the steam generator; to select and monitor the program.



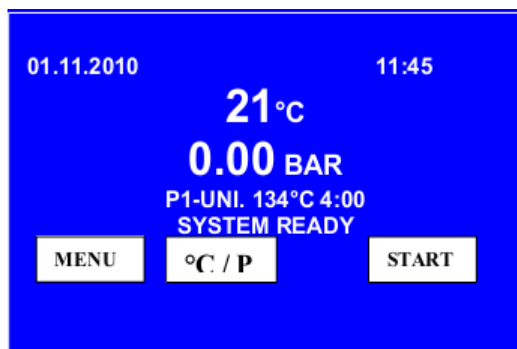
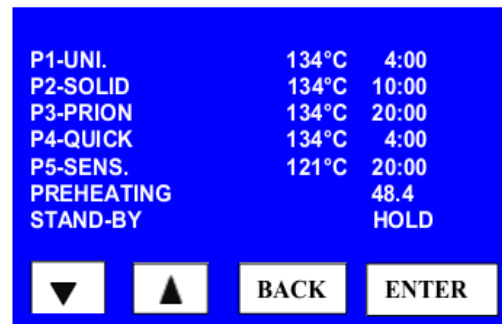
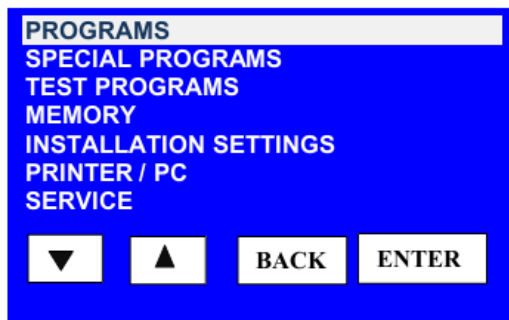
Figure 1

F1, F2, F3 and F4 button names are starting with letter 'F' that is the first letter of function, since their functions are related to the commands on the screen.

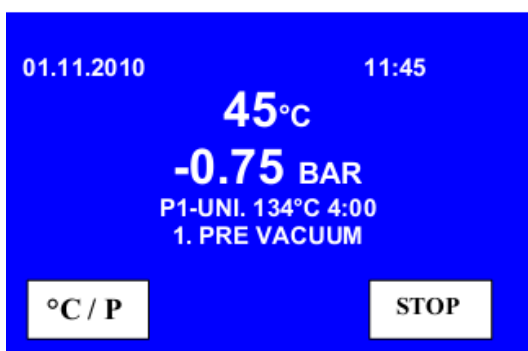
When the OT 100V is turned on, NUVE logo appears for 5 seconds on the screen and then date and time appears. After that "door lock is opening" message shows up on the screen and finally the last program run values can be seen.



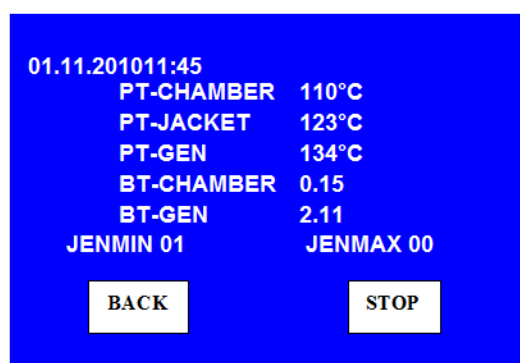
When F1 button that corresponds to 'Menu' is pushed, the display shows the menu items which are Programs, Special Programs, Test Programs, Memory, Cleaning & Maintenance, Installation Settings, Printer and Service. Up and down buttons (F1-F2) are used to choose the requested programs and enter F4 to select.



The stand-by screen of the selected program appears on the screen after selecting a program. If "START" button (F4) is pushed, the first phase i.e. pre-vacuum phase begins and other phases will continue automatically.



The °C/P button (F1) enables the user to monitor the chamber and jacket (pre-heating) temperatures.



- **PT-CHAMBER** : Temperature of the sterilization chamber.
- **PT-JACKET** : Temperature of the jacket which surrounds the sterilization chamber.
- **PT-GEN.** : Temperature of the steam generator.
- **BT-CHAMBER** : Pressure of the sterilization chamber.
- **BT-GEN.** : Pressure of the steam generator.



- **GENMIN** : Minimum water level of the steam generator tank.  
00– Water is below the minimum level in the steam generator.  
01– Water is on the minimum level in the steam generator.
- **GENMAX** : The maximum water level of the steam generator tank.  
00– Water is below the maximum level in the steam generator.  
01– Water is on maximum level in the steam generator.

### 2.2.3 Heating Unit

Heating of the chamber of OT 100V is provided by steam generator and a heater that is located outside the jacket and surrounded by glass wool. Surface thermostat on the jacket and safety valve on the steam generator guarantee the safety working of the OT 100V. In addition to the mechanical and electrical safety protections, heating unit is secured by the software.

### 2.2.4 Water and Steam Unit

The steam required for the sterilization is produced by boiling the distilled water which comes from the reserve tank.

The steam charge, steam discharge, air intake and vacuum line solenoid valves are controlled by the main PCB as mentioned in Section 1.2.

The sterilization chamber safety valve operates if the pressure inside the chamber exceeds 3 Bar as a result of any malfunction and it discharges the steam which causes over-pressure.

The distilled water level taken into steam generator is controlled by the two water level electrodes. Heating in the steam generator which is filled by required water level is provided by a group of heaters. Steam trap located on the steam generator takes out the condensate which is produced as a result of condensation. On the other hand, safety valve takes out the steam which causes over-pressure in the case of uncontrollable pressure.

In order to avoid the contact of sample and condensate that is caused by heat loss, a steam trap should be used and it should be situated on the upper basket.

Heater thermic guarantees the safety of the user and OT 100V by switching off the cycle in a case of malfunction in the mains phases or in heaters.

Water gauges in the reserve tank which contains the water required by steam generator are used to monitor the minimum and maximum water level. Storage chamber is the place to store the distilled water to be used in sterilization cycle.

The components of the water and steam unit are listed below:

- Reserve tank
- Water pump
- Water filling solenoid valve
- Steam generator
- Steam discharge solenoid valve
- Vacuum line solenoid valve
- Steam discharge / vacuum bridge solenoid valve
- Vacuum pump

- Safety valve (3 bars)
- Steam generator water level PCB
- Reserve tank water level PCB

### **2.2.5 Vacuum Unit**

During pre-vacuum process air is taken in order to discharge the air in the sterilization chamber. Vacuum line consists of membrane vacuum pump, condenser, and solenoid valves.

# SECTION 3

## SERVICING

**CAUTION:** Before servicing the instrument, please take the necessary precautions for your health. Please respect to the warnings on the unit!!

### 3.1 GENERAL OVERVIEW

Various troubleshooting that can be encountered with OT 100V device can be fixed with the guidance of the table provided below.

Majority of the potential problems can be determined by the help of a multimeter.

The components on the main PCB cannot be replaced even the failure is caused by one of the components on the main PCB. In such cases, please send the failed PCB to the factory service along with a note on which the failure explanations are written.

Please make sure that the failure is not caused by weak wire and terminal connections before replacing the PCB or any control element.

## 3.2 GENERAL FAILURES

FAILURE	PROBABLE CAUSES	SOLUTION
<b>1)</b> The on/off switch is ON, but LED is off and no display.	Power supply inlet failure.	Check the mains voltage supplied to the unit. Check that the terminal connections and power supply socket connections are not loose.
	Automatic fuse has blown.	Check the automatic fuse. Check for short circuit that may cause automatic fuse blown.
<b>2)</b> The on/off switch LED is ON but no display or some segments are not on.	Loose connection of cable between the main PCB and command and display PCB.	Disconnect the connection cable and re-connect it carefully.
	The connection cable is defective.	Replace the cable.
	The main PCB is defective.	Replace the main PCB.
	The command and display PCB is defective.	Replace the command and display PCB.
<b>3)</b> The on/off switch is OFF but the LED is ON.	The on/off switch cable connections are wrong.	Check the cable connection and reconnect them.
<b>4)</b> The fuse has blown permanently.	Short circuit.	Check whether short circuit caused by the steam generator and jacket heater with a multimeter. If short-circuit is detected, replace the steam generator/jacket heater.
		Check all solenoid valve bobbins for short circuit with a multimeter. If short circuit is detected in any bobbin, replace it.
		Check the vacuum and water pump. If short circuit is detected, replace that pump.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>5)</b> The pressure in the sterilization chamber does not increase.	Sterilization chamber safety valve is open.	Close the safety valve by twisting it to clockwise direction.
	The lid leaks steam.	Check the gasket on the lid. If it is deformed, replace it.
	Chamber steam supply solenoid valve is defective.	Disassemble chamber steam supply solenoid valve core and clean it.
		If problem is not solved, replace the solenoid valve.
	Main PCB is defective.	Check the chamber steam supply solenoid valve terminal outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
	The pressure sensor is defective.	Check the pressure sensor. Replace it if it is defective.
	The steam generator heater is defective.	Check the steam generator heater and replace it if it is defective.
	The SSR of the steam generator is defective.	Check SSR whether it is defective (see Section 3.4).
	Steam generator SSR terminal outlet on the main PCB is defective.	Check the terminal outlet with a multimeter and if it does not show 12 Vdc, replace the main PCB.
<b>6)</b> The lid leaks steam.	The lid gasket does not fit well to the canal.	Adjust the length to fit properly.
	The gasket is deformed or torn.	Replace the gasket.
	Unadjusted lid.	Fasten the lid adjustment screw by twisting it to the clockwise direction.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>7)</b> The steam in sterilizer chamber is not discharged.	The steam discharge line filter is clogged.	Remove the filter and clean it.
		Replace the filter if it is defective.
	The pressure sensor is defective.	Replace the pressure sensor.
	The steam discharge solenoid valve is defective.	Take out the steam discharge solenoid valve core and clean it.
		Replace the solenoid valve if the problem is not solved.
	The main PCB is defective.	Check the steam discharge solenoid valve outlet with a multimeter and if it does not show 220 Vac, replace the main PCB.
		Check the main PCB steam discharge / vacuum bridge solenoid valve outlet with a multimeter and if it does not show 220 Vac, replace the main PCB.
	The steam discharge / vacuum bridge solenoid valve is defective.	Take out the steam discharge / vacuum bridge solenoid valve core and clean it.
		Replace the steam discharge / vacuum bridge solenoid valve.
<b>8)</b> The door is not being locked when the steam sterilizer starts to operate.	The locking mechanism is defective.	Check the locking mechanism if it is defective, replace it.
	The locking bobbin is defective.	Replace the locking mechanism.
	The main PCB is defective.	Check the main PCB locking bobbin outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>9)</b> The locking pin does not operate although the pressure in the chamber is zero at the end of the sterilization cycle.	The locking mechanism is defective.	Check the locking mechanism if it is defective, replace it.
	The locking bobbin is defective.	Replace the locking bobbin.
	The main PCB is defective.	Check the main PCB locking bobbin outlet with a multimeter, if it does not show 220 Vac, replace the main PCB.
<b>10)</b> The samples are wet at the end of the sterilization cycle.	Samples overloading.	Check the loading according to the user manual. Please leave spaces between the samples.
	Steam trap is not located properly on the basket.	Locate the steam trap on the basket at the top.
	The steam discharge solenoid valve is defective.	Take out the chamber steam supply solenoid valve core and clean it.
		Replace the steam supply solenoid valve.
	Open circuit on the surface thermostat in the jacket heater.	Check for short circuit on the surface thermostat terminals in the jacket heater with a multimeter. If there is no short circuit, replace the surface thermostat.
	The SSR of the jacket heater is defective.	Check the SSR whether it is defective, (see Section 3.4).
	Jacket heater SSR terminal outlet on the main PCB is defective.	Check the terminal outlet with a multimeter, if it does not show 12 Vdc, replace the main PCB.
	The jacket heater is defective.	Check the jacket heater resistance values with a multimeter, if it is defective, replace it.

### 3.3 TROUBLESHOOTING ERROR CODES

FAILURE	PROBABLE CAUSES	SOLUTION
1) The error message “ <b>Error 01-Vacuum Time Exceeded</b> ” is displayed.	Inappropriate loading of samples.	Check the loading according to the user manual. Please leave spaces between the samples.
	Leakage in the chamber leak proofing gasket.	Check the leak proofing gasket, if it is loosen, clean the gasket. If the gasket is deformed, replace it.
	Leakage in the vacuum line.	Check the vacuum line teflon hose installation. If the teflon installation is broken or torn, replace it.
	Leakage in the sterilization chamber safety valve or it is open.	Close the safety valve by twisting it to clockwise direction. If there is still leakage, replace the safety valve.
	The pressure sensor is defective.	Replace the pressure sensor.
	Leakage in the steam discharge or in the air intake solenoid valve and/or they are defective.	Take out the steam discharge or air intake solenoid valve core and clean it.
		Replace the steam discharge and air intake solenoid valve.
	The steam discharge / vacuum bridge solenoid valve is defective.	Take out the steam discharge / vacuum bridge solenoid valve core and clean it.
		Replace the steam discharge / vacuum bridge solenoid valve.
	The vacuum line solenoid valve is defective.	Take out the vacuum line solenoid valve core and clean it.
		Replace the vacuum line solenoid valve.
	The vacuum pump is defective.	Replace the vacuum pump.



FAILURE	PROBABLE CAUSES	SOLUTION
	The SSR of the vacuum pump is defective.	Check whether SSR is defective. If it is defective, replace it (see Section 3.4).
	Leakage in the chamber steam supply solenoid valve or it is defective.	Take the out the chamber steam supply solenoid valve core and clean it.
		Replace the chamber steam supply solenoid valve.
	Condenser fan is defective.	Replace the condenser fan.
	Leakage in the condenser.	Check the condenser whether there is leakage in condenser. If there is, then replace it.
	The condenser fan SSR is defective.	Check whether condenser fan is defective. If it is defective, replace it (see Section 3.4).
	Vacuum pump SSR terminal outlet on the main PCB is defective.	Check the SSR terminal outlet with a multimeter. If it does not show 12 Vdc, replace the PCB.
	Main PCB the steam discharge / vacuum bridge solenoid valve terminal outlet is defective.	Check the steam discharge / vacuum bridge solenoid valve terminal outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
	Condenser fan SSR terminal outlet on the main PCB is defective.	Check the terminal outlet with a multimeter. If it does not show 12 Vdc, replace the main PCB.

FAILURE	PROBABLE CAUSES	SOLUTION
2) The error message " <b>Error 3 – Steam Discharge</b> " is displayed.	The steam discharge line filter is clogged.	Take out the filter and clean it.
	The steam discharge solenoid valve is defective.	Take out the steam discharge core and clean it.
		Replace the steam discharge solenoid valve.
	The chamber pressure sensor is defective.	Replace the chamber pressure sensor.
	The steam discharge / vacuum bridge solenoid valve is defective.	Take out the steam discharge / vacuum bridge solenoid valve core and clean it.
		Replace the steam discharge / vacuum bridge solenoid valve.
	The main PCB is defective.	Check the main PCB steam discharge / vacuum bridge solenoid valve outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
		Check the main PCB chamber steam supply solenoid valve outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
		Check the main PCB steam discharge solenoid valve outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
	Leakage in the chamber steam supply solenoid valve or it is defective.	Take out the chamber steam supply solenoid valve core and clean it.
		Replace the chamber steam supply solenoid valve.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>3)</b> The error message “ <b>Error 4 - Air Intake</b> ” is displayed.	Air intake line is clogged.	Replace the hepa filter.
	Chamber pressure sensor is defective.	Replace the chamber pressure sensor.
	Air intake line solenoid valve is defective.	Take out the air intake solenoid valve core and clean it.
		Replace the air intake solenoid valve.
	The main PCB is defective.	Check the main PCB air intake solenoid valve outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
<b>4)</b> The error message “ <b>Error 6 - Door Open</b> ” is displayed.	The door switch is defective.	Replace the door switch.
	Loose connection in the door switch.	Check whether door switch arm touches the connection point properly when the door is closed. If any touching problem is detected, make sure door switch arm fits to the connection point.
	Loose connection in the main PCB door on/off terminal.	Check the door switch terminals and the main PCB connections.
<b>5)</b> The error Message “ <b>Error 7 – Steam Generator-Over Heating</b> ” is displayed.	Pt-100 reads incorrectly.	Calibrate the steam generator temperature sensor according to the temperature-pressure values. (See Section 8.1).
		Replace the steam generator temperature sensor.
	Steam generator SSR terminal is defective.	Check the SSR terminal whether it is defective (See Section 3.4).
	The main PCB is defective.	Check the main PCB steam generator SSR terminal outlet with a multimeter. If it does not show 12 Vdc, replace the main PCB.
	There is no water in the steam generator.	Check the steam generator water level electrodes. Replace the water level electrodes if there is no water in the steam generator although it seems there is water.
	The steam generator water level PCB is defective.	Replace the water level PCB, if there is 0 Vdc on the terminal outlet, although there is no water in the steam generator.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>6)</b> The error message ' <b>Error 08 – Door Lock</b> ' is displayed.	Locking bobbin is defective.	Check the locking bobbin and if it is defective, replace it.
	Overheating on the locking bobbin surface.	Check locking bobbin body and if it is deformed, replace it.
	Main PCB is defective.	Replace the main PCB.
<b>7)</b> The error message ' <b>Error 09 – Water Failure</b> ' is displayed.	Insufficient water in the reserve tank.	Fill reserve tank with distilled water.
	Water level sensor in reserve tank which indicates the minimum water level is defective.	Check the water level sensor. If it is defective, replace it.
	Water pump SSR is defective.	Check the SSR water pump terminal with a multimeter. If it does not show 12 Vdc, replace the card.
		Check SSR whether it is defective (See Section 3.4).
	Steam generator water filling solenoid valve is defective.	Take out the water pump solenoid valve core and clean it.
		Replace the water pump solenoid valve.
	Water pump is defective.	Replace the water pump.
	Insufficient water in steam generator.	If there is sufficient water in the water reserve tank but insufficient water error is displayed or genmax water level is 01 while genmin water level is 00 on the display, check the min water level electrode whether it is defective. If it is, replace it.
	Steam generator water level PCB is defective.	Check the steam generator water level PCB. If there is water at the maximum level in the steam generator and there is no 0 Vdc on the minimum water level terminal outlet, replace the water level PCB.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>8)</b> For the products with automatic water supply unit.  Insufficient water is displayed.	Automatic water supply unit is inactive.	Automatic water unit should be activated from the menu.
	No water inlet to the reserve tank.	Check the distilled water line inlet to the product.
	Water supply solenoid valve is defective.	Check whether water supply solenoid valve is defective. Replace it, if it is defective.
	The main PCB is defective.	Check the main PCB automatic water supply outlet with a multimeter. If it does not show 220 Vac, replace the main PCB.
<b>9)</b> The error message ' <b>Error 10-Sensor Failure PT1, PT2, PT3, BT1, BT2</b> ' is displayed.	Temperature sensor or pressure transmitter tips are disconnected or connections are loose.	Check the temperature sensor or pressure transmitter tips whether they are disconnected and whether PCB clamps connections are loose. If one of these failures is detected, replace the relevant one (temperature sensor or pressure transmitter).
	Mentioned sensor is defective.	Replace the sensor.
	The main PCB is defective.	Replace the main PCB.
<b>10)</b> The error message ' <b>Error 11-Pre-Heating</b> ' is displayed.	Pt – 100 is defective.	Check whether the jacket temperature sensor is defective. If it is, replace it.
	SSR is defective.	Check the main PCB SSR terminal outlet with a multimeter, if it does not show 12 Vdc, replace it.
	The jacket heater SSR is defective.	Check whether SSR is defective (See Section 3.4).
	The jacket heater is defective.	Check the heater resistance values. If it is defective, replace it.
	Surface thermostat is defective.	Check the surface thermostat for short circuit with a multimeter. Replace it, if it is defective.

FAILURE	PROBABLE CAUSES	SOLUTION
11) The error message ' <b>Error 12-Pre-Heating High Temperature</b> ' is displayed.	Pt-100 is defective.	Check whether the jacket temperature sensor is defective. If it is, replace it.
	The jacket heater SSR is defective.	Check whether SSR is defective (See Section 3.4).
	SSR is defective.	Check the main PCB SSR terminal outlet with a multimeter. If it does not show 12 Vdc, replace the main PCB.
12) The error message ' <b>Error 16-Power Failure</b> ' is displayed.	Power blackout.	If the chamber is pressured during blackout, pressure is discharged from the pressure air line, after blackout is over. Before the next run, sterilize the filter in the air line in the quick program.
13) The error message ' <b>Error 17-Heater Failure</b> ' is displayed.	Thermal has blown.	Check the thermal whether it works. If it does not work, check the steam generator heater group with a multimeter. Replace the heater, if it is defective. If thermal works properly, check the thermal "NC" outlet with a multimeter. Replace the thermic, if short circuit is detected.
	The main PCB is defective.	Check for short circuit on the main PCB heater inlet. If there is short circuit, replace the main PCB.

FAILURE	PROBABLE CAUSES	SOLUTION
14) The error message ' <b>Error 19-Low Temperature</b> ' is displayed.	Pt -100 reads incorrectly.	Check the sensor terminal connections.
		Control the sterilization chamber temperature sensor according to the temperature-pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel.
	Steam generator Pt-100 is defective.	Control the sterilization chamber temperature sensor according to the temperature-pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel. (Heating cannot be performed in steam generator, if temperature sensor reads incorrect values)
	Steam generator steam trap is defective.	Clean the steam trap.
		Replace the steam trap.
	Steam generator heater SSR is defective.	Check whether SSR is defective. (See Section 3.4).
	The main PCB is defective.	Check the main PCB outlet with a multimeter. If it shows 12 Vdc continuously, replace it.
	Chamber supply solenoid valve is defective.	Take out the chamber supply solenoid valve core and clean it.
		Replace the chamber supply solenoid valve.
	Steam discharge/vacuum bridge solenoid valve is defective.	Take out the steam discharge/vacuum bridge solenoid valve core and clean it.
		Replace the steam discharge/vacuum bridge solenoid valve.

FAILURE	PROBABLE CAUSES	SOLUTION
<b>15)</b> The error message ' <b>Error 20 – High Temperature</b> ' is displayed.	Chamber supply solenoid valve is defective.	Take out the chamber supply solenoid valve core and clean it.
	PT-100 reads incorrectly.	Check sensor terminal connections. Control the sterilization chamber temperature sensor according to the temperature-pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel.
	The main PCB is defective.	Check the main PCB chamber supply solenoid valve outlet with a multimeter. If it shows 220 Vac, replace it.
<b>16)</b> The error message ' <b>Error 21- Low Pressure</b> ' is displayed.	Overloading.	Check the loads and load the samples according to the explanations in user manual.
	Steam leakage in gasket.	Check the leak proofing gasket. If connection is loose, adjust the length to fit properly. If gasket is deformed, replace it.
	Steam generator Pf-100 is defective.	Control the steam generator temperature sensor according to the temperature-pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel. (Heating cannot be performed in steam generator, if temperature sensor reads incorrect values)



FAILURE	PROBABLE CAUSES	SOLUTION
	Sterilization chamber pressure sensor (Bt) reads incorrectly.	Check the pressure transmitter according to temperature – pressure diagram. Make the necessary calibration, if temperature-pressure diagram does not move parallel. Replace the pressure sensor.
	Chamber steam supply solenoid valve is defective.	Take out the chamber steam supply solenoid valve core and clean it. Replace the chamber steam supply solenoid valve.
	Main PCB is defective.	Check the main PCB chamber steam supply solenoid valve SSR terminal outlet with a multimeter. If it does not show 12 Vdc, replace the main PCB.
	Sterilization chamber safety valve is open.	Check the safety valve, if it is open, close it.
	Steam discharge/vacuum bridge solenoid valve is defective.	Take out the steam discharge/solenoid valve core and clean it. Replace the steam discharge/vacuum bridge solenoid valve.
	Steam generator SSR terminal is defective.	Check whether the SSR is defective (See Section 3.4). If it is defective, replace it.
	Main PCB is defective.	Check main PCB steam generator SSR terminal outlet with a multimeter. If it shows 12 Vdc continuously, replace it.
	Steam generator water level sensor is defective.	Check steam generator water level sensor. If it is defective, replace it. (Heating cannot be performed in steam generator, if water level sensor reads incorrect values)
	Steam generator water level PCB is defective.	If the voltage is 6 Vdc on terminal outlets, although there is water in steam generator, then replace the water level PCB. (Heating cannot be performed in steam generator, if water level sensor reads incorrect values)

FAILURE	PROBABLE CAUSES	SOLUTION
17) The error message ' <b>Error 22 – High Temperature</b> ' is displayed.	Chamber steam supply solenoid valve is defective.	Take out the chamber steam supply solenoid valve core and clean it.
		Replace the chamber steam supply solenoid valve.
	Sterilization chamber Pt-100 reads incorrectly.	Check the steam generator temperature sensor according to temperature – pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel. (Heating cannot be performed in steam generator, if temperature sensor reads incorrect values)
	Pressure sensor (Bt) reads incorrectly.	Check the steam generator pressure sensor according to temperature – pressure diagram (See Section 8.1). Make the necessary calibration, if temperature-pressure diagram does not move parallel.
		Replace it, if it is defective.
	Main PCB is defective.	Check main PCB chamber supply solenoid valve terminal outlet with a multimeter. If it shows 220 Vac continuously, replace it.

### 3.4 SSR CONTROL

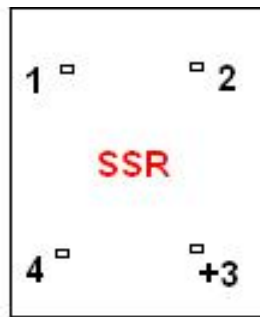


Figure 2

SSR has 4 terminals (Figure 2). Terminal 1 and 2 are used for phase flow, Terminal 3 and 4 are connected to the main PCB. Terminal 3 is connected to the (+) end and terminal 4 is connected to the (-) end. Terminal 1 is the phase inlet and terminal 2 is the phase outlet.

DC voltage supplied by SSR to the Terminal 3 and 4 enable phase flow by causing short circuit on the terminal 1 and 2. If there is no voltage on Terminal 3 and 4, terminal 1 and 2 are open circuit.

Circuit component to be controlled (heaters, compressor, solenoid valve, etc.) should be connected to Terminal 2.

Following states indicates the SSR failure:

State - 1: There is voltage on the main card and Terminal 1 and 2 are open circuit,

State - 2: There is no voltage on the main card and Terminal 1 and 2 are short circuit.

At State-1, if a heater is connected to Terminal 2, the unit does not heat.

At State-2, if a heater is connected to Terminal 2, the unit cannot control the heating and it overheats.

If a cooling element is connected to Terminal 2, the unit cannot control cooling and overcooling is observed in the unit.

### 3.5 GENERAL WARNINGS

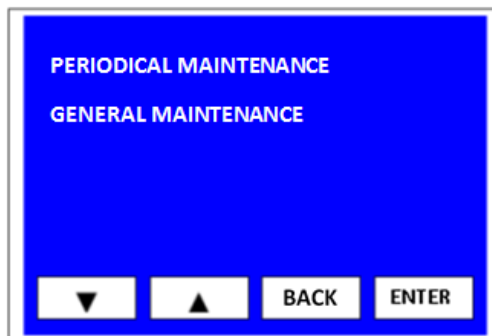


Figure 3

Use Up and Down (F1-F2) buttons to choose “Cleaning and Maintenance” and enter (F4) to select. This page contains two entries, namely “Periodical Maintenance” and “General Maintenance” (Figure 3).

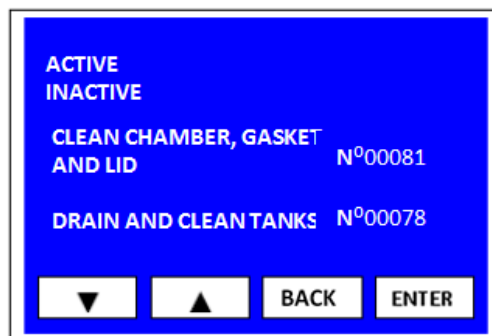


Figure 4

The “Periodical Maintenance” entry displays two periodical maintenance options as “Clean Chamber, Gasket and Lid” and “Drain and Clean Tanks” as seen in Figure 4. In the case of activation of these options, the unit warns the user to perform the first option weekly and to perform the second option at the beginning of each day. The warnings may be deleted by F4 button or cancelled by selecting “INACTIVE”.

The “General Maintenance” entry displays two options as “Replace Microbiological Filter” and “Replace Gasket” (See Figure 5). The unit warns the user for the first option at every 400 cycles, whereas the frequency for the second option is once per 1000 cycles.

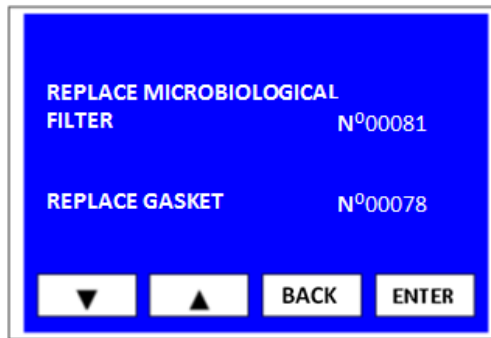


Figure 5

The counter near the maintenance options shall be approved upon performance to validate the maintenance (Figure 5). If not, the warning will appear at the beginning of every cycle until the performed maintenance is approved Warnings may be deleted by the (F4) button (Figure 6).



Figure 6

Use the Up and Down (F1-F2) buttons to choose "SERVICE" and enter (F4) to go to open the Service Code page. The code is '2111'. When enter the code make '00000' Service and Maintenance Messages. (Figure 7)



Figure 7

# SECTION 4

## SPARE PART REPLACEMENT

**CAUTION:** Disconnect the steam sterilizer before replacing any component!

### 4.1 ACCESS TO THE COMMAND AND CONTROL UNIT

- Unscrew the screws on the bottom and the top to remove the left side metal sheet (1).
- Remove the command and control unit metal sheet (5) by unscrewing the screws.

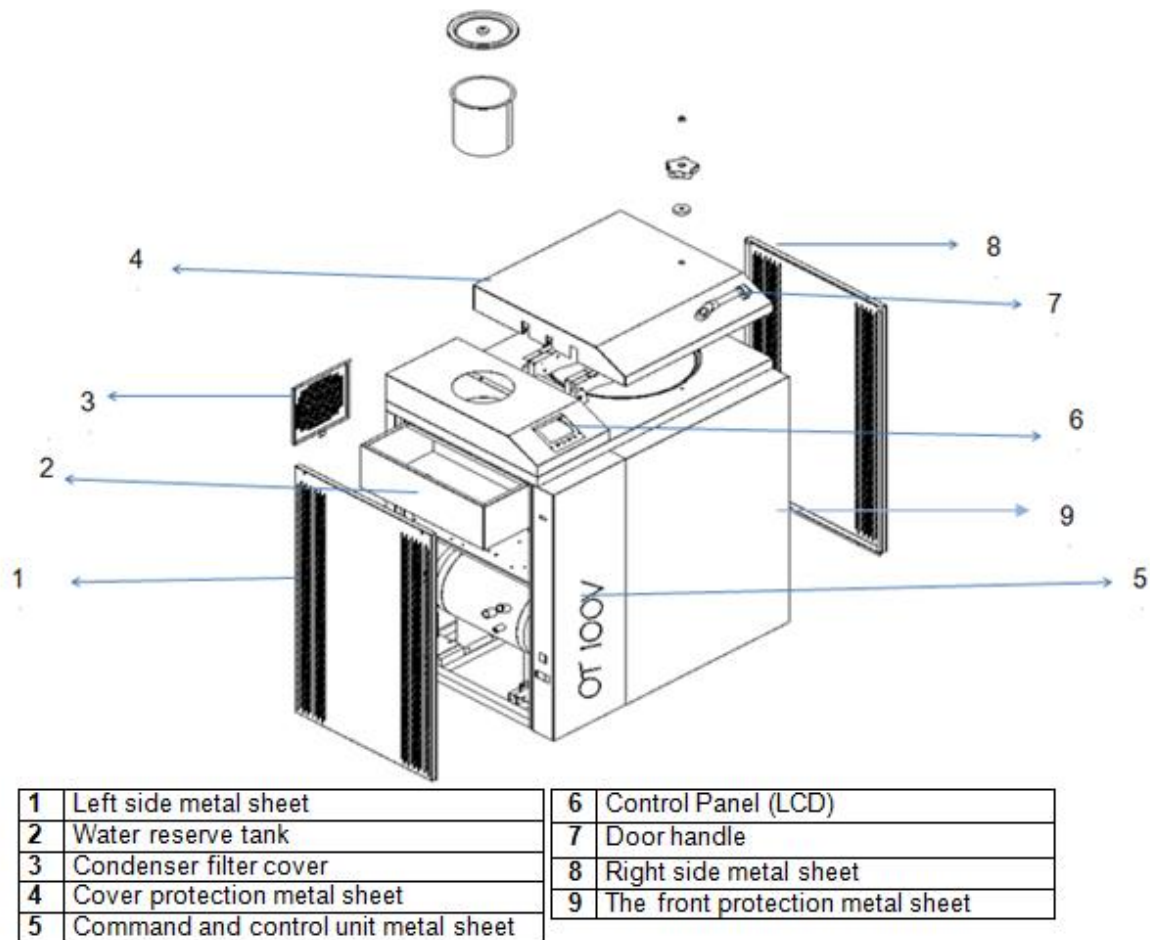


Figure 8

### 4.2 REPLACING MAIN PCB

- Unscrew the screws on the bottom and the top to remove the left side metal sheet (1).
- Remove the command and control unit metal sheet (5) by unscrewing the screws.
- Disconnect all cable terminals which are connected to main PCB clamps.
- Disconnect the main PCB – command and display PCB connection cable.
- Remove the clips on edges of the PCB and pull out the PCB.
- Assemble the new PCB and connect the terminals precisely according to the electrical circuit diagram.
- Connect the command and display cables.

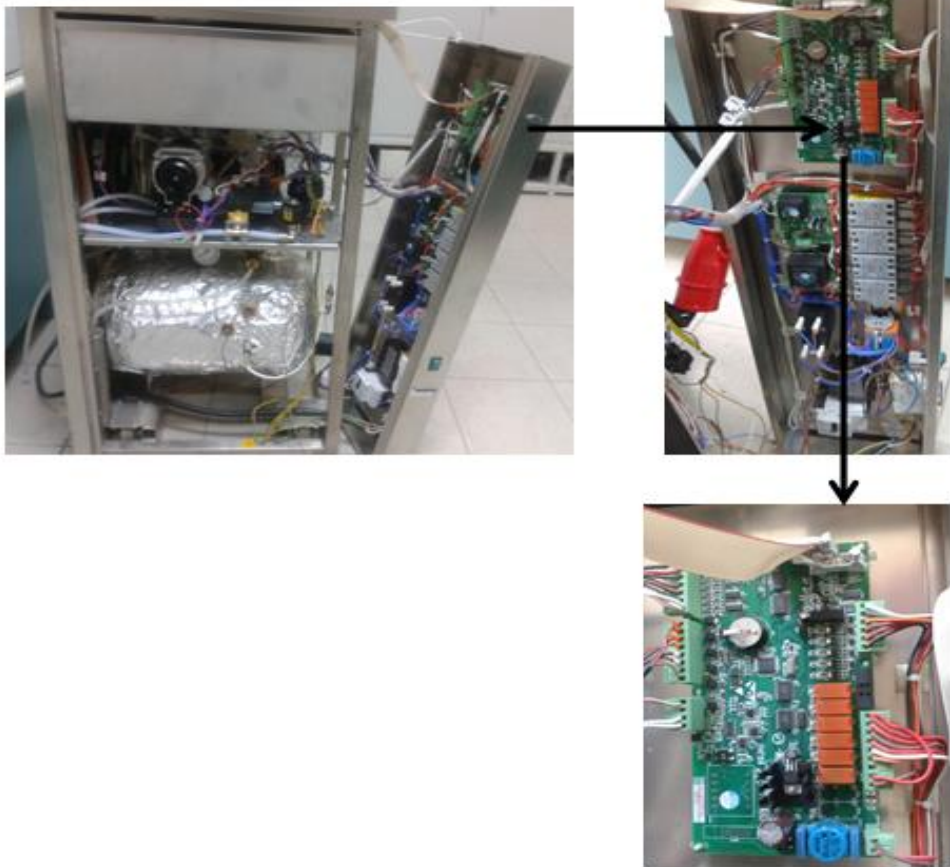


Figure 9

### 4.3 REPLACING THE CONTROL AND DISPLAY PCB

- Unscrew the screws on the bottom and the top to remove the left side metal sheet (1).
- Remove the command and control unit metal sheet (5) by unscrewing the screws.
- Disconnect the terminals of the reserve tank and take out the reserve tank (2).
- Disconnect the main PCB - display PCB connection cable from the main PCB.
- Unscrew the screws on the edges of the control and display PCB and take out the PCB.
- Place the new control and display PCB on the panel sheet. Do not forget to meet the display keys to the corresponding slots on the panel sheet.
- Re-connect the main PCB - display PCB cable.



Figure 10

#### 4.4 REPLACING TEMPERATURE SENSOR (PT-CHAMBER (PT-1), PT-JACKET (PT-2), PT- GEN (PT- 3))

- Unscrew the screws on the bottom and the top to remove the left side metal sheet (1).
- Remove the command and control unit metal sheet (5) by unscrewing the screws.
- Disconnect the terminals of the temperature sensor which needs to be replaced.
- Take out the temperature sensor and place the new one.
- Apply gasket sealant on threaded connection of the new temperature sensor for sealing and assemble it. (Please pay attention to the connection cable not to twist.)
- Connect the terminals of the temperature sensor according to the electrical circuit diagram.



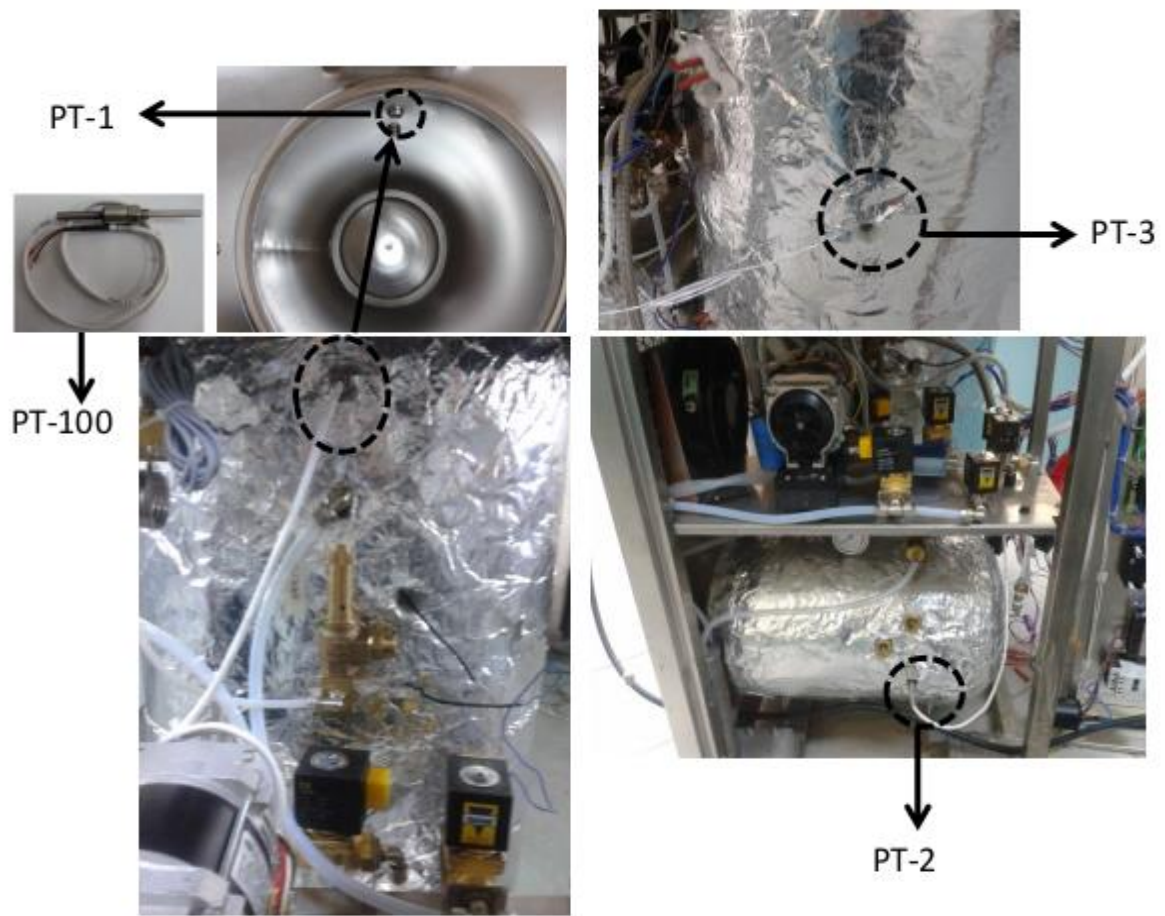


Figure 11

## 4.5 REPLACING SOLENOID VALVE

### 4.5.1 Solenoid Valves

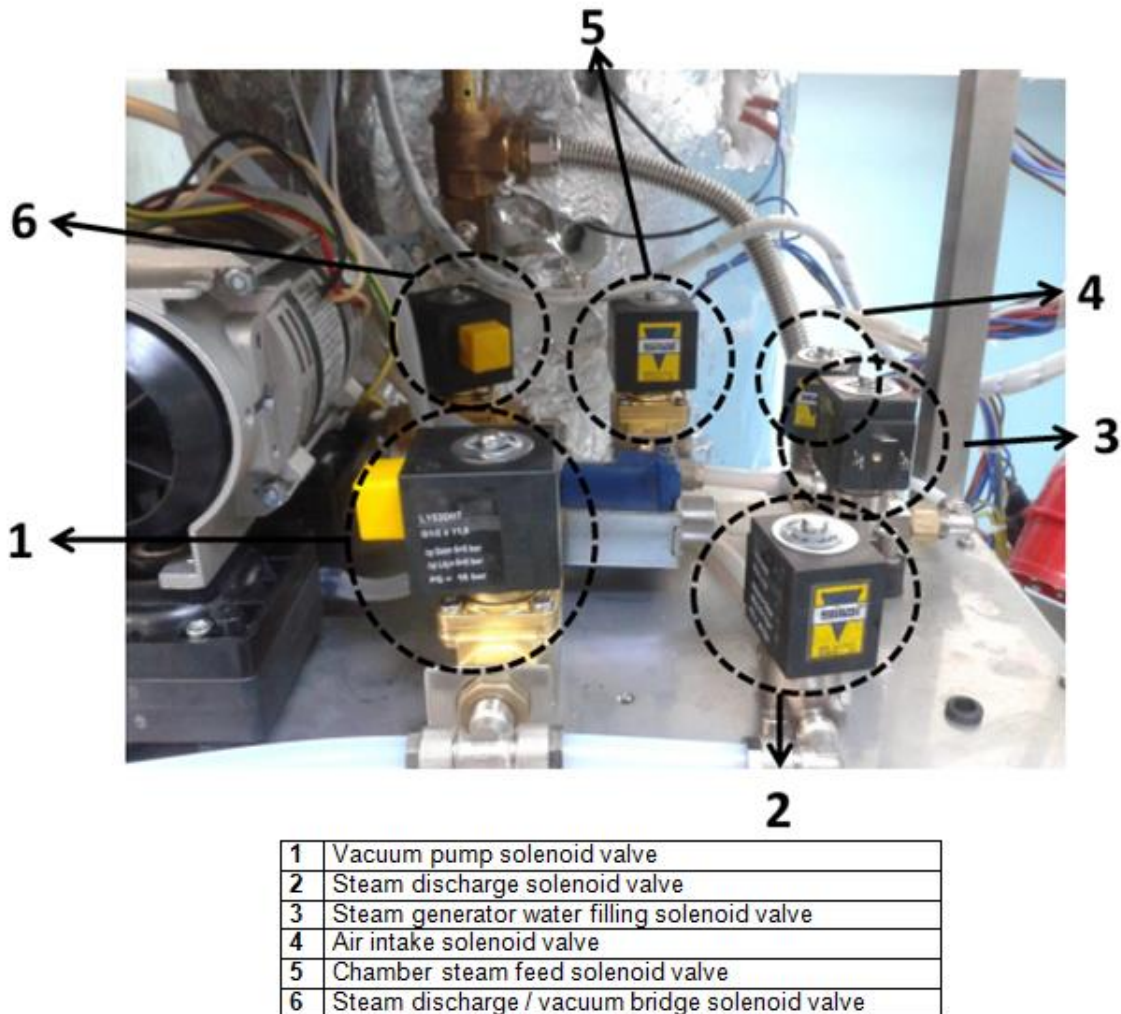


Figure 12

#### 4.5.1.1 Replacing the Steam Generator Water Filling Solenoid Valve

- Disassemble the left side metal sheet (1).
- Be sure that the steam generator pressure is zero before replacing the steam generator water filling solenoid valve (3).
- Unscrew the solenoid valve bobbin socket and remove it.
- Unscrew the solenoid valve and water pump assembly screw from the bottom of the product.
- Remove the solenoid valve water pump while holding it steady and disconnect the adaptor connections.
- Apply gasket sealant on the new solenoid valve inlet and outlet and assemble the connection adaptor.
- Assemble the new solenoid valve according to water and steam flow chart.
- Assemble the solenoid valve inlet hose and water pump so that it does not leak.
- Assemble solenoid valve bobbin socket precisely.



Figure 13

#### 4.5.1.2 Replacing Steam Discharge Solenoid Valve

- Remove left side metal sheet (1).
- Unscrew bobbin socket screw of the steam discharge solenoid valve (2).
- Unscrew the assemble screw of the solenoid valve which is located on the bottom.
- Unfasten the nuts on the solenoid valve inlet and outlet hoses and separate the hoses.
- Remove the connection adaptor at the inlet and outlet of the solenoid valve and fasten them to the new solenoid valve.
- Assemble new solenoid valve with the filter according to the water and steam flow chart.
- Connect solenoid valve bobbin socket.

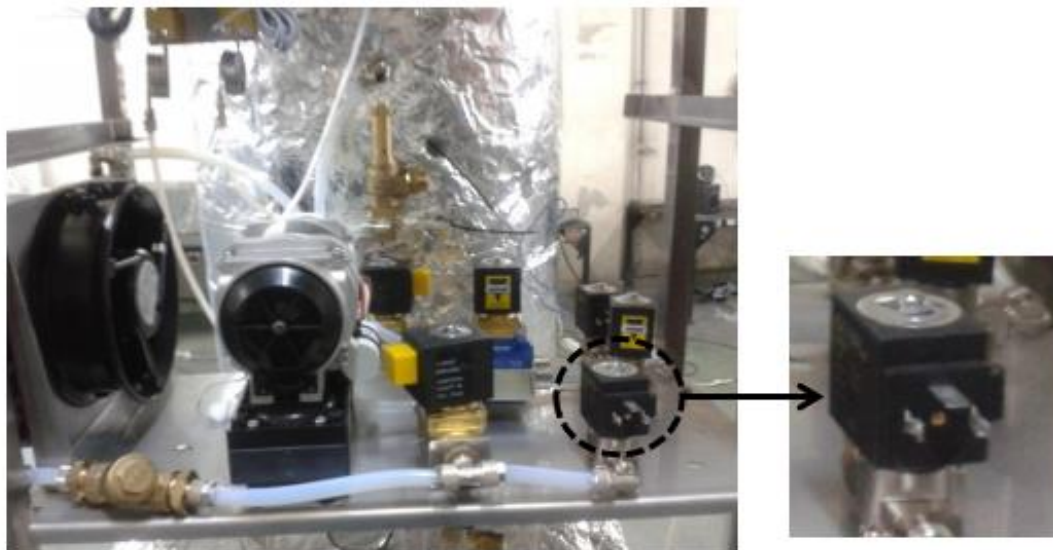


Figure 14

#### 4.5.1.3 Replacing Steam Discharge / Vacuum Bridge Solenoid Valve

- Remove left side metal sheet (1).
- Unscrew bobbin socket screw of the steam discharge / vacuum discharge solenoid valve (6).
- Unfasten the nuts on the solenoid valve inlet and outlet hoses and separate the hoses.
- Remove the connection adaptor at the inlet and outlet of the solenoid valve and fasten them to the new solenoid valve.
- Assemble new solenoid valve with the filter according to the water and steam flow chart.
- Connect solenoid valve bobbin socket.

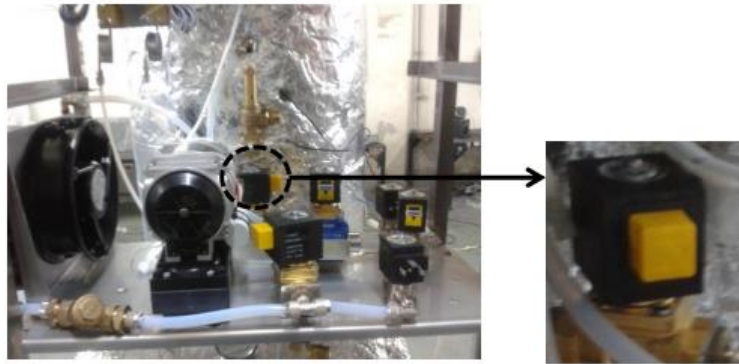


Figure 15

#### 4.5.1.4 Replacing Vacuum Pump Solenoid Valve

- Remove left side metal sheet (1).
- Unscrew bobbin socket screw of the vacuum pump solenoid valve (1).
- Unfasten the nuts on the solenoid valve inlet and outlet hoses and separate the hoses.
- Remove the connection adaptor at the inlet and outlet of the solenoid valve and fasten them to the new solenoid valve.
- Assemble new solenoid valve with the filter according to the water and steam flow chart.
- Connect solenoid valve bobbin socket.

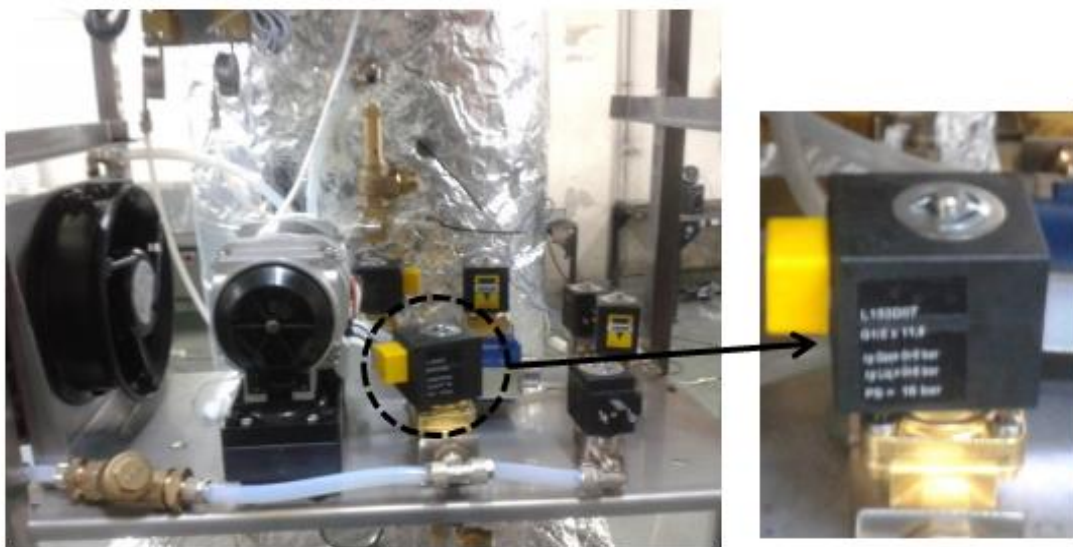


Figure 16

#### 4.5.1.5 Replacing Air Intake Solenoid Valve

- Remove left side metal sheet (1).
- Unscrew bobbin socket screw of the air intake solenoid valve (4).
- Unscrew the solenoid valve metal sheet connection screw and remove the solenoid valve.
- Unfasten the nut on the solenoid valve outlet hose and separate it.
- Remove the connection adaptor at the inlet and outlet of the solenoid valve and fasten them to the new solenoid valve.
- Assemble the new solenoid valve as described arrow direction.
- Connect solenoid valve bobbin socket.



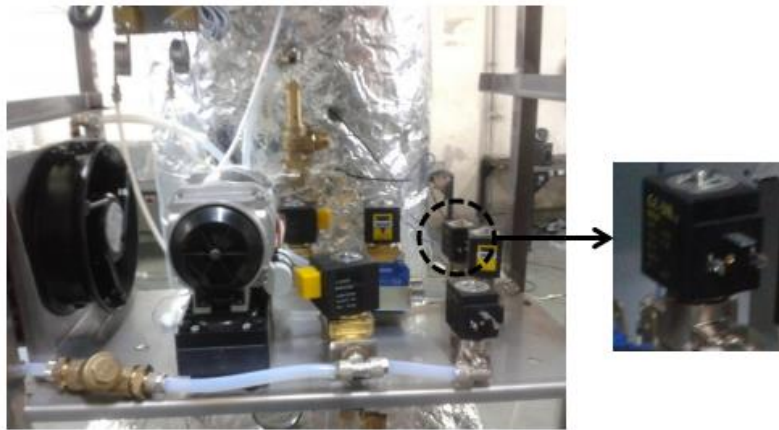


Figure 17

#### 4.5.1.6 Replacing Chamber Steam Supply Solenoid Valve

- Remove left side metal sheet (1).
- Be sure steam generator pressure is zero before replacing the chamber steam supply solenoid valve.
- Unscrew bobbin socket screw of the chamber steam supply solenoid valve (5).
- Unfasten the nuts on the solenoid valve inlet and outlet hoses and separate the hoses.
- Remove the connection adaptor at the inlet and outlet of the solenoid valve and fasten them to the new solenoid valve.
- Assemble new solenoid valve with the filter according to the water and steam flow chart.
- Connect solenoid valve bobbin socket.

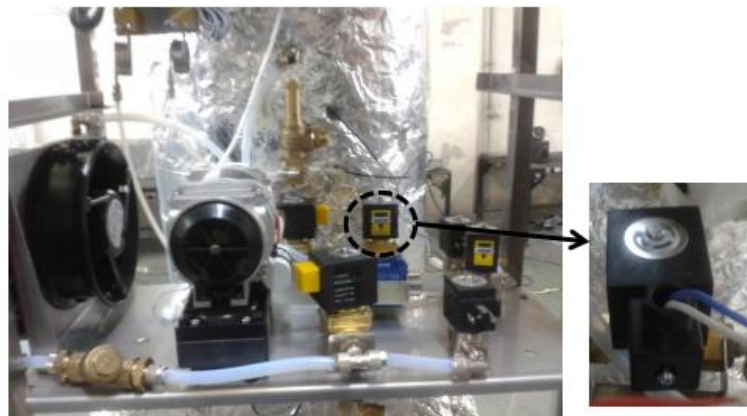


Figure 18

#### 4.6 REPLACING THE FILTER

- Remove left side metal sheet (1). Unscrew the filter assembly screw.
- Disconnect the solenoid hoses which are located on the filter.
- Assemble the new filter according to the water and steam flow chart.

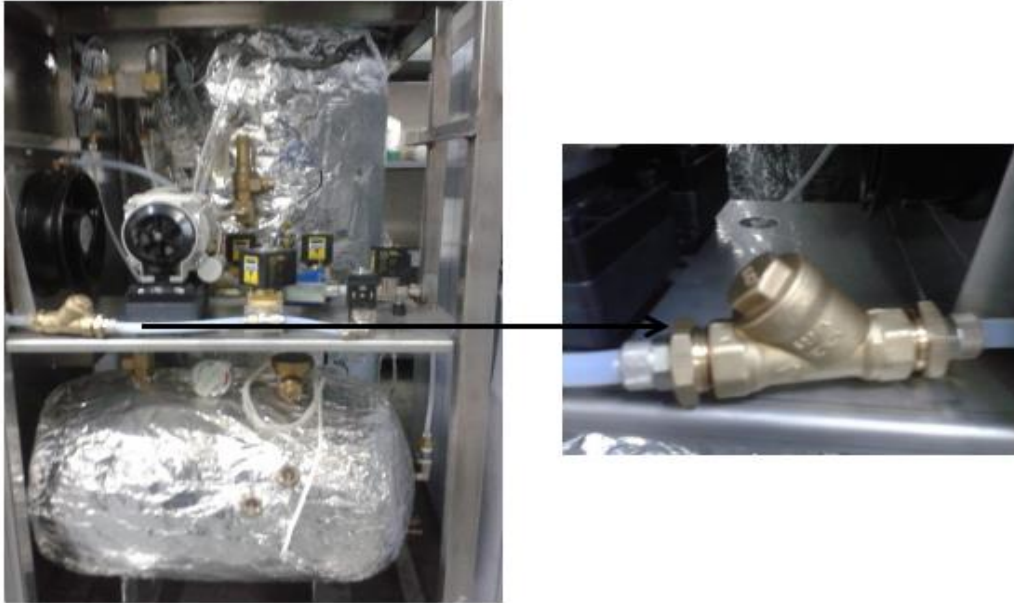


Figure 19

#### 4.7 REPLACING VACUUM PUMP

- Remove left side metal sheet (1).
- Disconnect vacuum pump terminals.
- Disconnect vacuum pump inlet and outlet hoses.
- Unscrew vacuum pump assembly screws (4 pieces).
- Assemble the new vacuum pump and connect the hoses and terminals precisely.

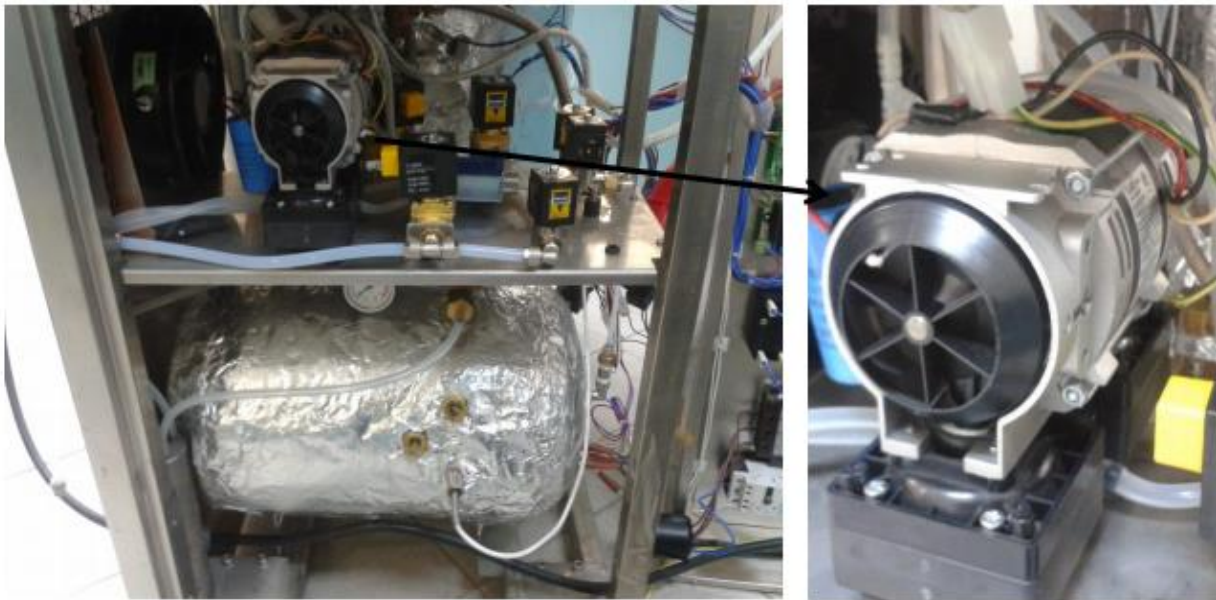


Figure 20

## 4.8 REPLACING WATER PUMP

- Remove left side metal sheet (1).
- Disconnect the water pump electrical connection from water filling solenoid valve bobbin socket.
- Disconnect water pump inlet hose.
- Unscrew the assemble screw of the water pump and water pump solenoid valve which are on the bottom of the product.
- Remove the solenoid valve water pump while holding it steady.
- Connect the new water pump to the solenoid valve and assemble it to its position. Be sure that hoses and electrical connections are connected precisely.

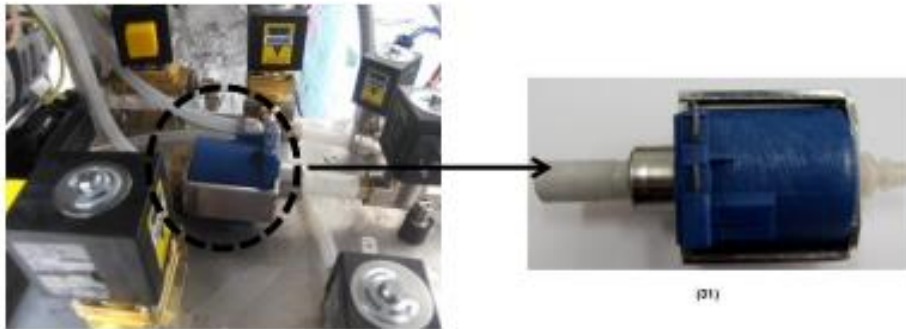


Figure 21

## 4.9 REPLACING SSR

- Unscrew the bottom and top screws of the left side metal sheet (1) to remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect the SSR terminal.
- Unscrew the SSR screws and remove the SSR.
- Assemble the new SSR to its position and connect terminals according to electrical circuit diagram.

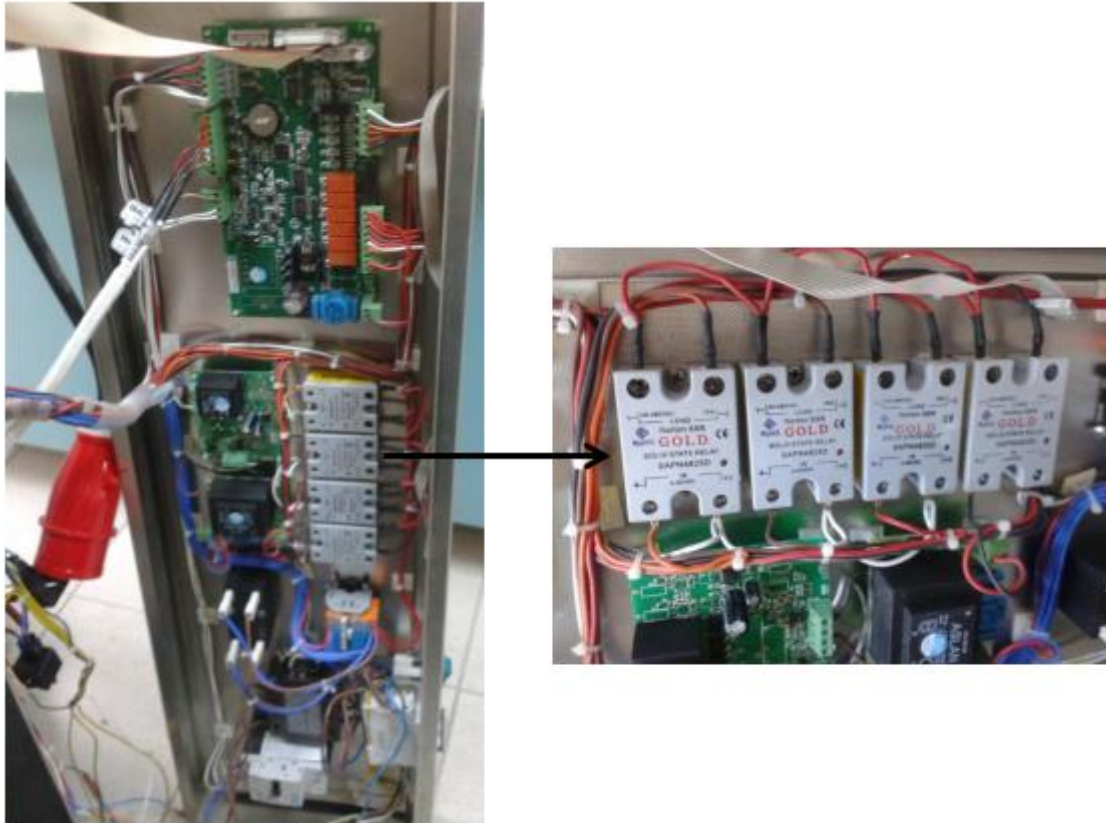


Figure 22

#### 4.10 REPLACING SAFETY VALVE

- Remove the left side (1) and back side metal sheets.
- Be sure steam generator pressure is zero before removing the safety valve.
- Unfasten the safety valve nut while holding the safety valve outlet hose adaptor steady.
- Remove the safety valve by twisting it to the left with a wrench.
- Assemble the new safety valve to its location precisely.





Figure 23

#### 4.11 REPLACING WATER LEVEL SENSOR

- Remove the left side metal sheet (1).
- Disconnect the terminals between reserve tank and water level sensor and remove the reserve tank (2).
- Unfasten the water level sensor nut on the reserve tank with a wrench.
- Remove the water level sensor.
- Assemble the new water level sensor.
- Connect the terminals according to electrical circuit diagram.



Figure 24

#### 4.12 REPLACING PRESSURE SENSOR

- Remove the left side metal sheet (1).
- Be sure the steam generator pressure is zero before replacing the steam generator pressure sensor.
- Disconnect the reserve tank connection terminals and remove the reserve tank (2).
- Disconnect the pressure sensor terminals from the board precisely according to the electrical circuit diagram.
- Unfasten the pressure sensor nut.
- Assemble the new pressure sensor precisely.
- Connect the new pressure sensor terminals precisely according to the electrical circuit diagram.

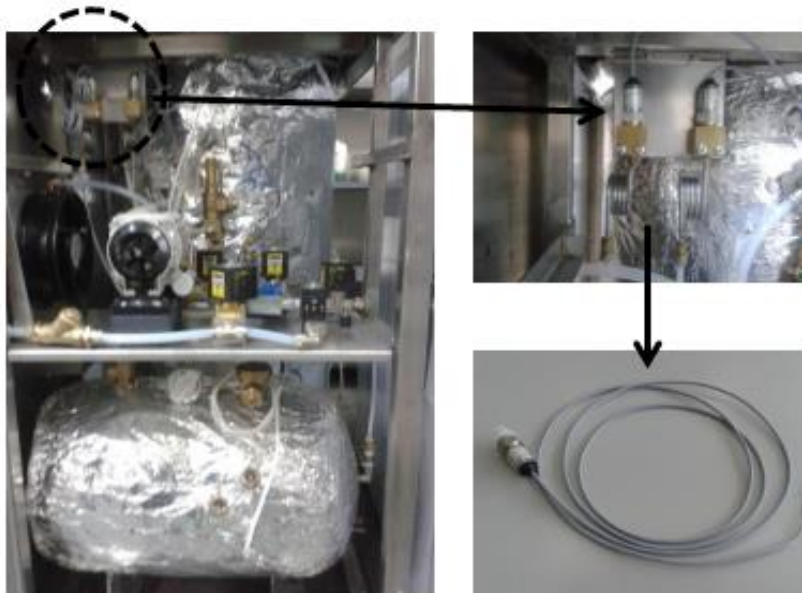


Figure 25

#### 4.13 REPLACING COOLING FAN

- Unscrew the left side metal sheet (1) screws and remove it. Unscrew the back side metal sheet assemble screws and remove it.
- Disconnect the cooling fan electrical connections precisely.
- Unscrew the cooling fan assemble screws and remove the cooling fan.
- Assemble the new cooling fan and connect the terminals.
- Assemble it with the two screws of the chamber's two sides.

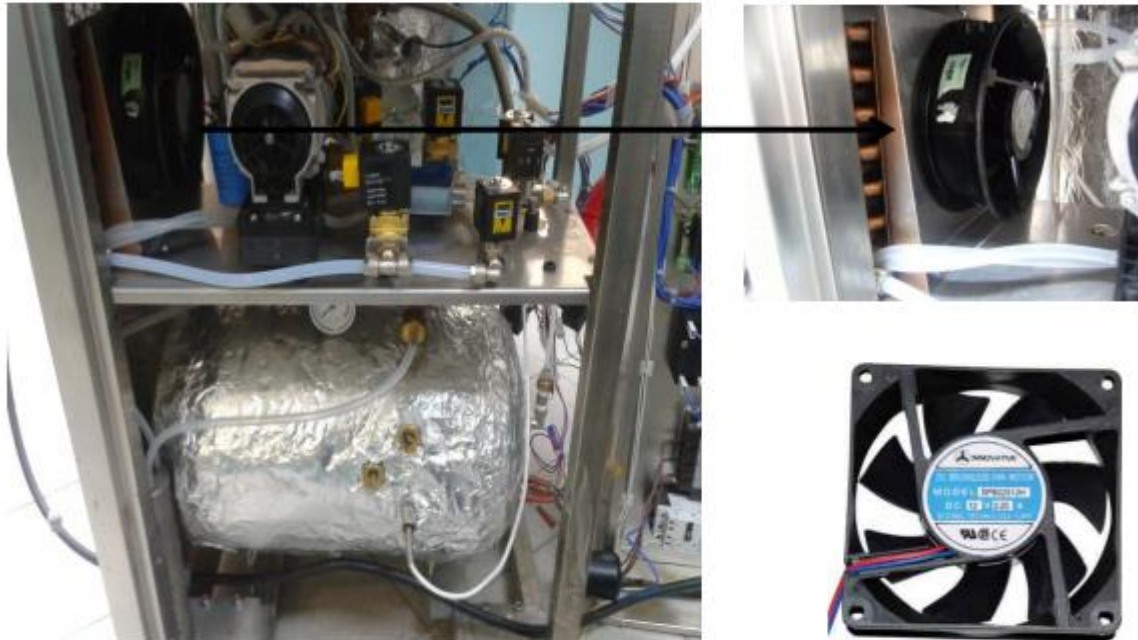


Figure 26

#### 4.14 REPLACING THERMAL RELAY

- Unscrew the bottom and top screws of the left side metal sheet (1) to remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect the thermal relay terminal.
- Move the thermal relay to upwards and remove it from the steel track.
- Connect the new thermal relay terminals according to the electrical circuit diagram precisely and put it to its position.

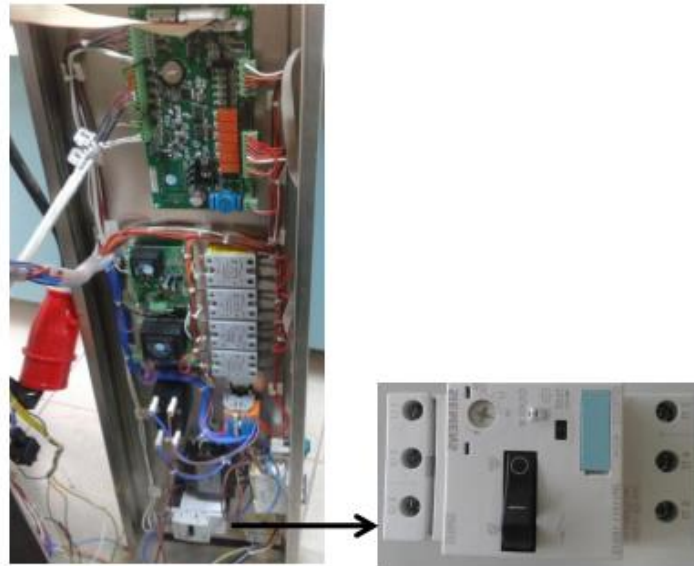


Figure 27

#### 4.15 REPLACING CONDENSER

- Remove the side metal sheet of the chamber (1).
- Remove the back side metal sheet by unscrewing the screws.
- Disconnect all the condenser connections precisely.
- Unscrew the metal sheet assemble screws on all sides of the condenser and remove the condenser.
- Assemble the new condenser to its position.



Figure 28



#### 4.16 REPLACING SURFACE THERMOSTAT

- Disassemble the front protection metal sheet (9) by unscrewing and remove it.
- Disconnect the surface thermostat terminals precisely.
- Pull out the chamber isolation around the surface thermostat and remove the surface thermostat.
- Assemble the new surface thermostat to its position and connect its terminals precisely.

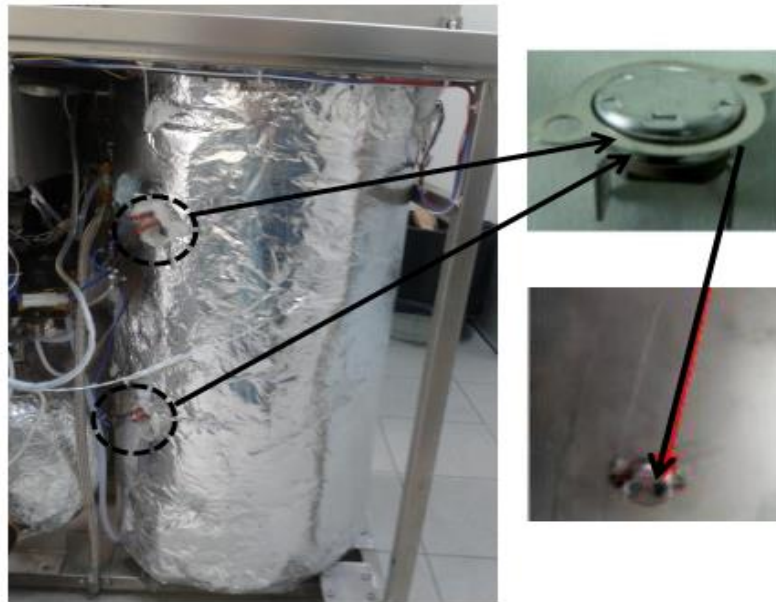


Figure 29

#### 4.17 REPLACING STEAM TRAP

- Be sure the steam generator pressure is zero before replacing the steam trap.
- Unscrew the left side metal sheet (1) assembly screws and remove it.
- Disconnect the steam trap hose precisely.
- Disconnect the steam trap union precisely.
- Assemble the new steam trap to its position precisely.



Figure 30

#### 4.18 REPLACING DOOR SWITCH

- Unscrew the right side metal sheet (8) screws and remove the right side metal sheet.
- Disconnect the door switch terminals.
- Remove the door switch by unscrewing the screws on the metal sheet.
- Assemble new door switch to its position.
- Connect door switch terminals precisely according to electrical circuit diagram.

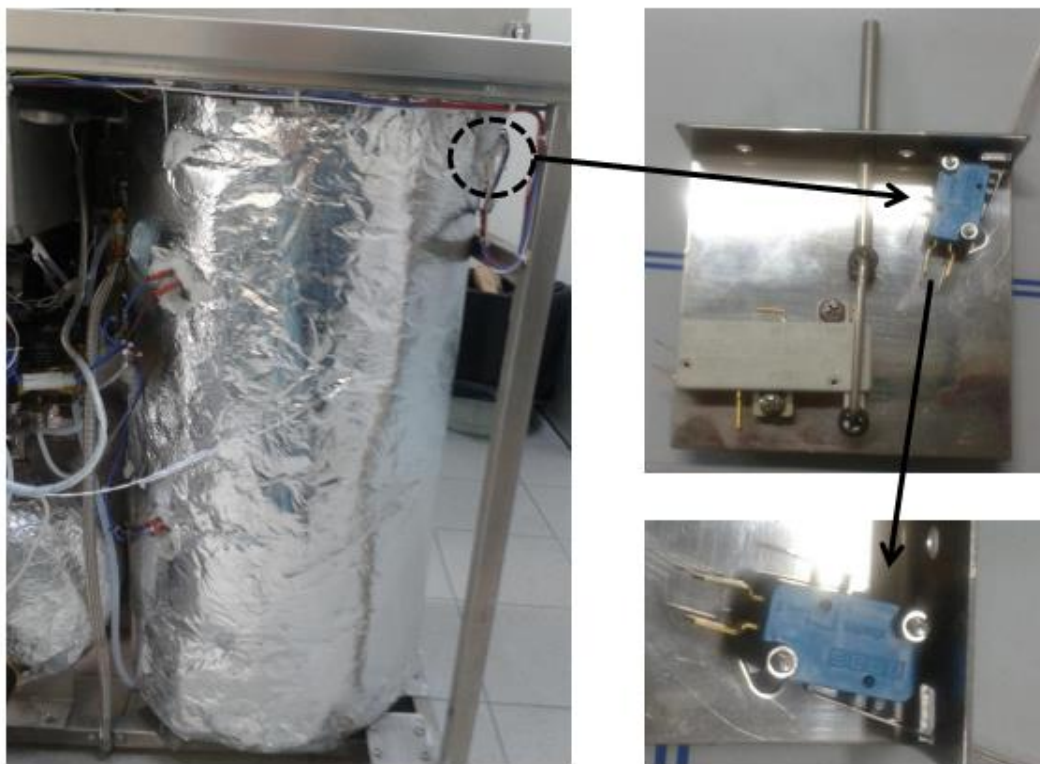


Figure 31

#### 4.19 REPLACING LOCKING BOBBIN

- Unscrew the right side metal sheet (8) screws and remove the right side metal sheet.
- Disconnect the locking bobbin terminals.
- Remove the locking bobbin by unscrewing the screws on the metal sheet.
- Assemble new locking bobbin to its position.
- Connect the locking bobbin terminals precisely according to electrical circuit diagram.

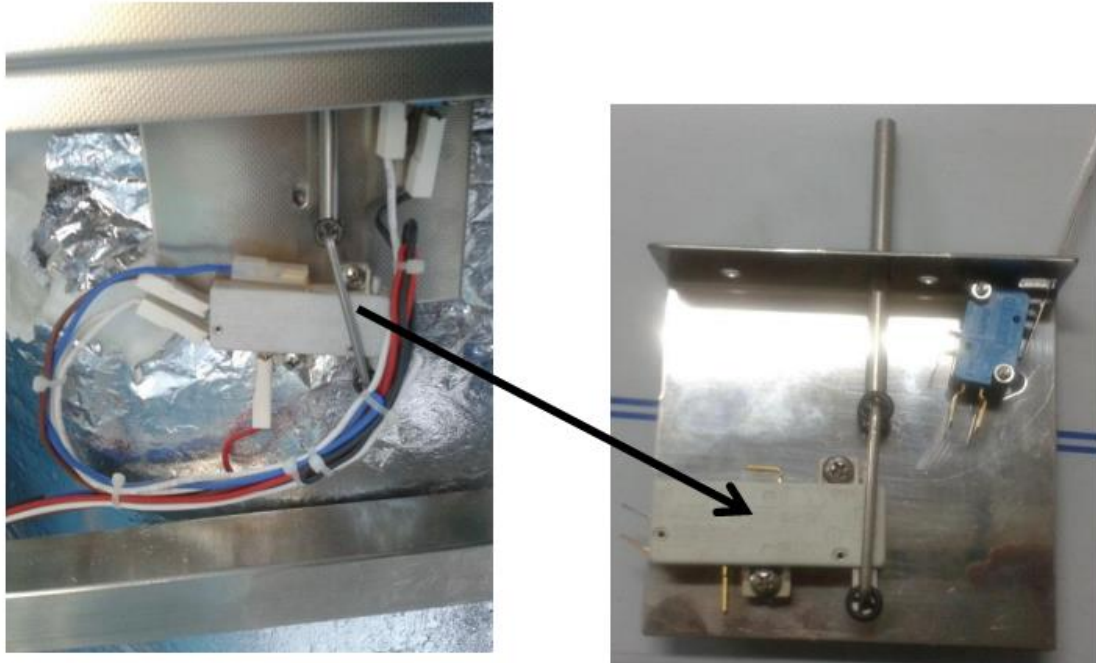


Figure 32

#### 4.20 REPLACING JACKET HEATER

- Remove the protection metal sheets which surround the sterilization chamber by unscrewing.
- Disconnect the heater terminals precisely according to electrical circuit diagram.
- Separate the isolation on the chamber.
- Unfasten the clamp and remove the heater from chamber.
- Assemble the new heater onto chamber with a clamp.
- Connect new heater terminals precisely according to the electrical circuit diagram.
- Place the chamber isolation without damaging it. Do not forget to take into consideration the assembly position of the jacket heater surface thermostat while placing it to its position.

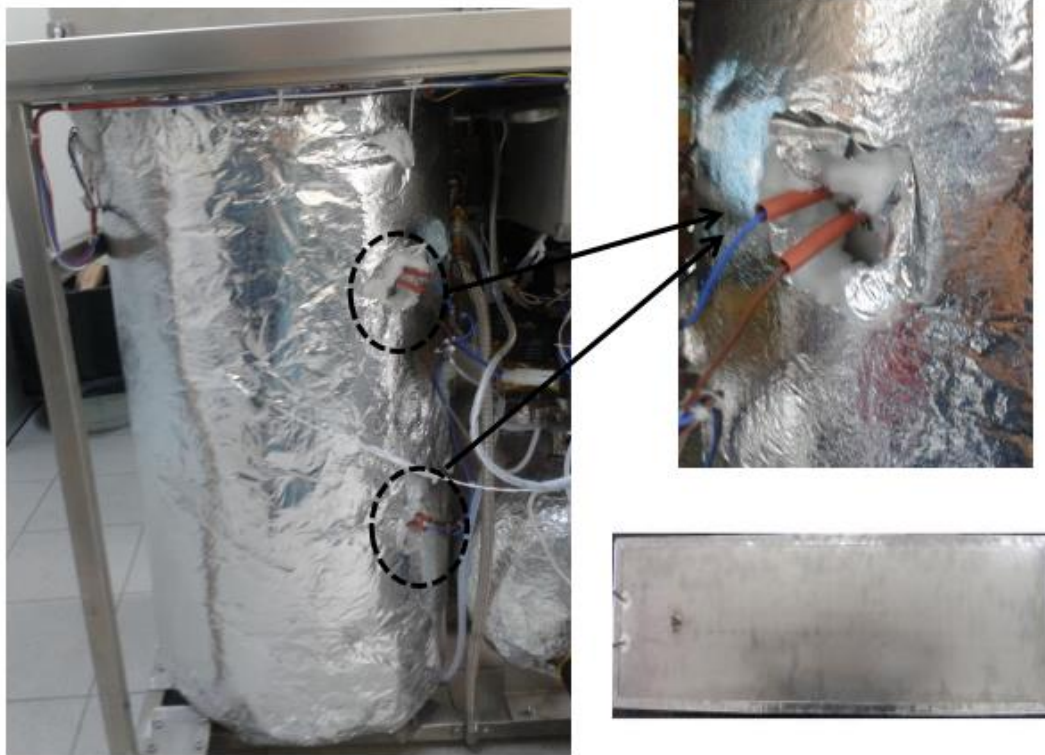


Figure 33

#### 4.21 REPLACING AUTOMATIC FUSE

- Unscrew the bottom and top screws of the left side metal sheet (1) and remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect the automatic fuse terminals.
- Remove the clips on the automatic fuse with a screwdriver and pull out the automatic fuse from the steel track.
- Connect the new automatic fuse terminals according to electrical circuit diagram and fix it to its position.

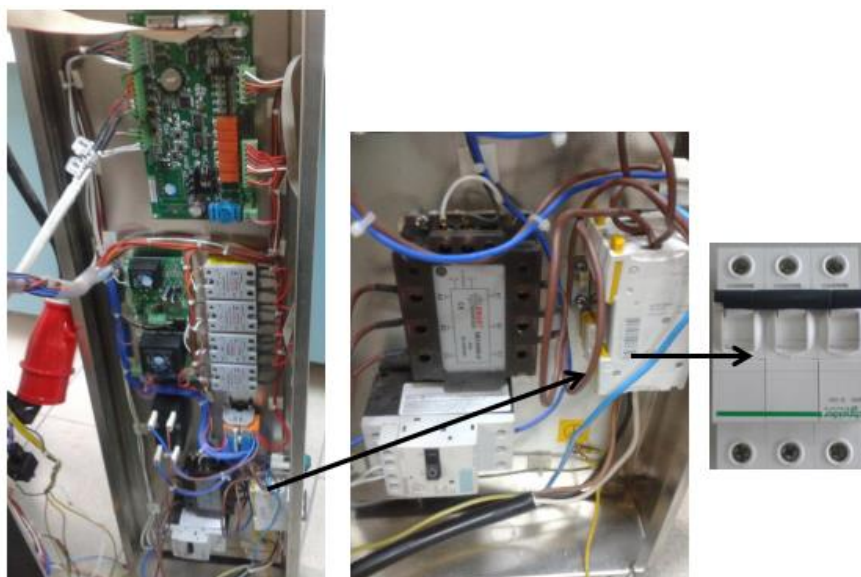


Figure 34



## 4.22 REPLACING ELECTRONIC TRANSFORMER BOARD

- Unscrew the bottom and top screws of the left side metal sheet (1) and remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect all the transformer board terminals.
- Pull out the board by removing the clips on the edges.
- Assemble the new board and connect the terminals precisely according to the electrical circuit diagram.

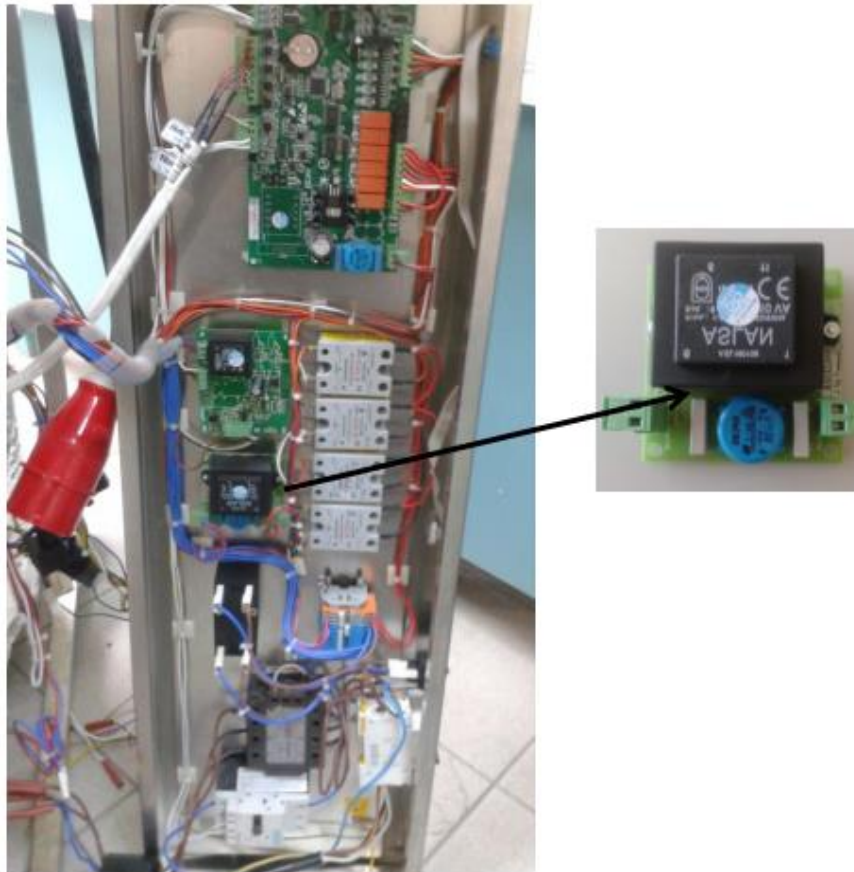


Figure 35

## 4.23 REPLACING STEAM GENERATOR HEATER

- Be sure steam generator pressure is zero before replacing the heater. After that, turn the tap on in order to drain the steam generator.
- Unscrew the bottom and top screws of the left side metal sheet (1) and remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect the heater terminals and remove it from the steam generator.
- Assemble the new heater to the generator.
- Connect the steam generator heater terminals according to the electrical circuit diagram.

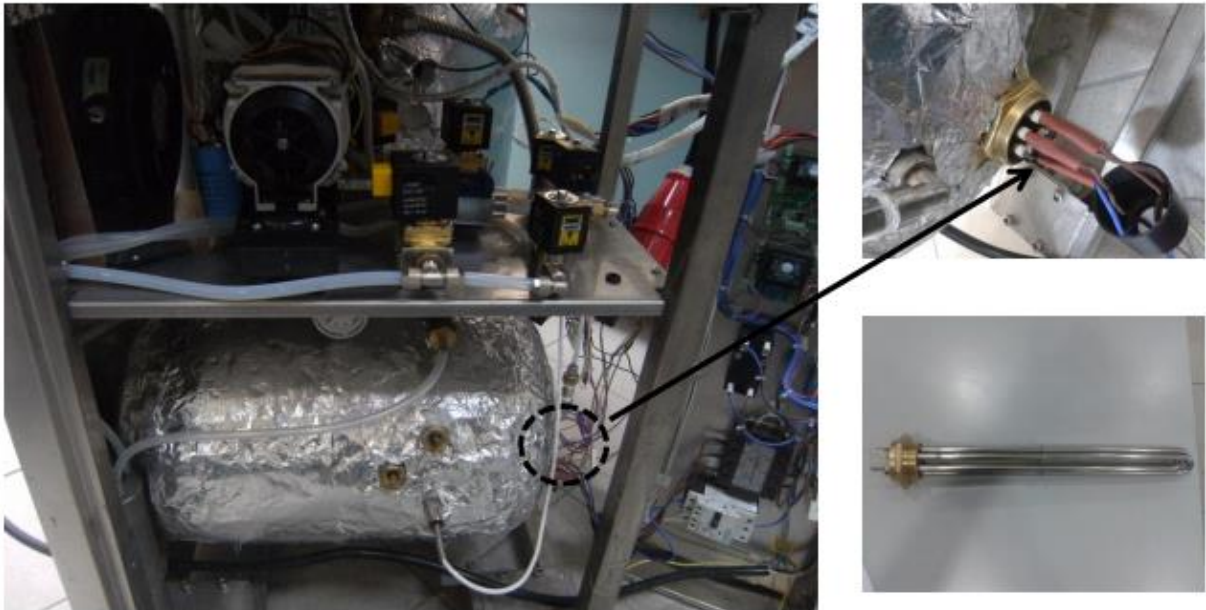


Figure 36

#### 4.24 REPLACING STEAM GENERATOR MANOMETER

- Be sure steam generator pressure is zero before replacing the manometer.
- Unscrew the assemble screws of the right side metal sheet (1) and remove it.
- Unfasten the manometer inlet hose union and remove it.
- Unfasten the manometer nuts and remove it.
- Remove the manometer from top of the steam generator.
- Place the new manometer on top of the steam generator and do the necessary connections.

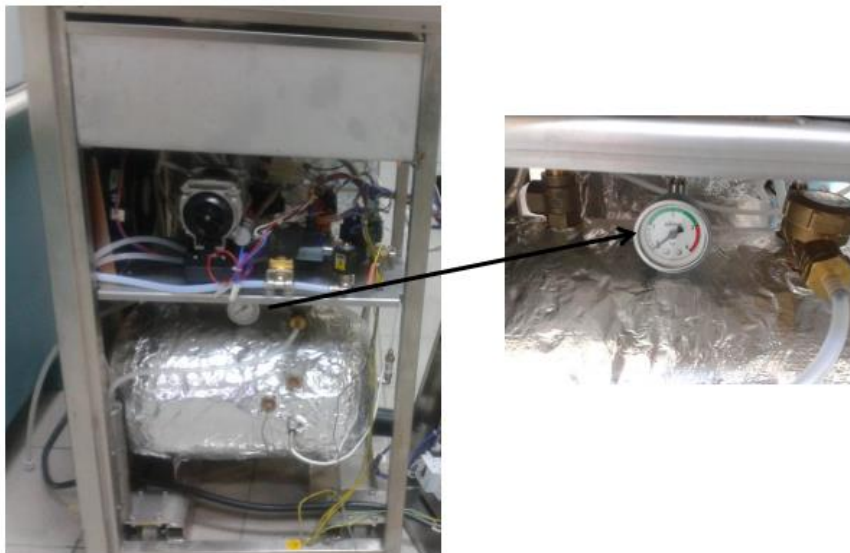


Figure 37

#### 4.25 STEAM GENERATOR ELECTRONIC WATER LEVEL PCB

- Unscrew the bottom and top screws of the left side metal sheet (1) and remove it.
- Unscrew the control unit metal sheet screws and remove the metal sheet.
- Disconnect the water level PCB terminals.
- Remove the clips on edges of the PCB and pull out the PCB.
- Assemble the new PCB and connect the new PCB terminals according to electrical circuit diagram.

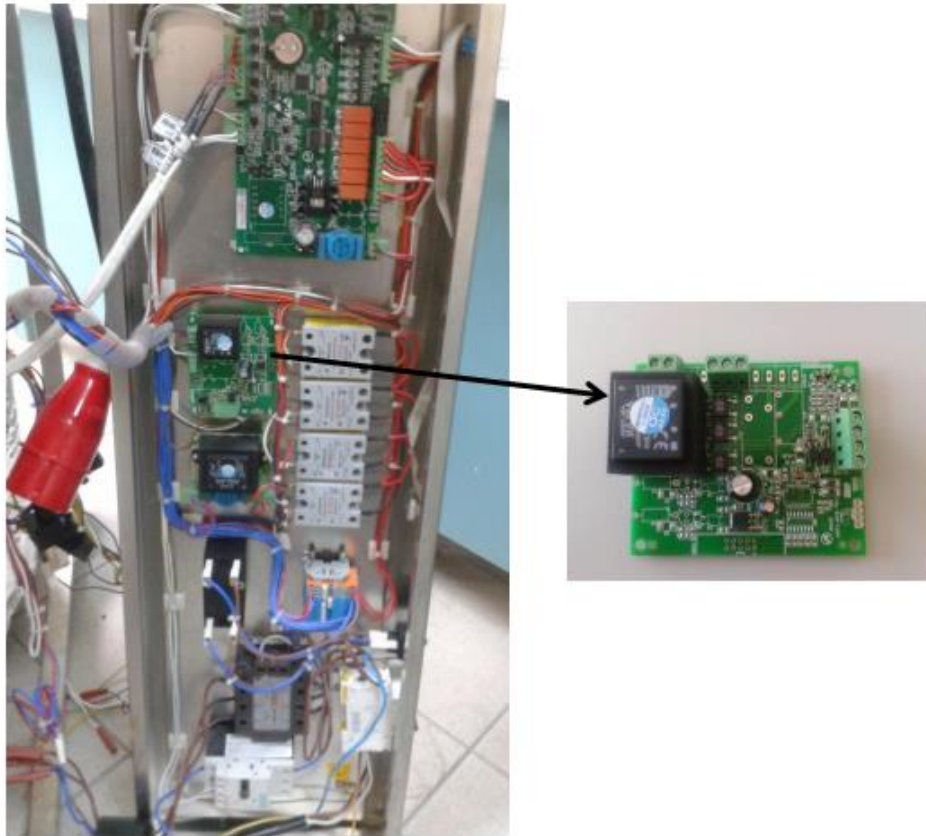


Figure 38

#### 4.26 REPLACING CONDENSER FILTER

- Unscrew cartridge filter metal sheet screw and remove it.
- Replace the condenser filter behind the sheet metal.
- Assemble the sheet metal by placing the sheet metal nails on the right positions and leaving the cartridge filter behind the metal sheet.

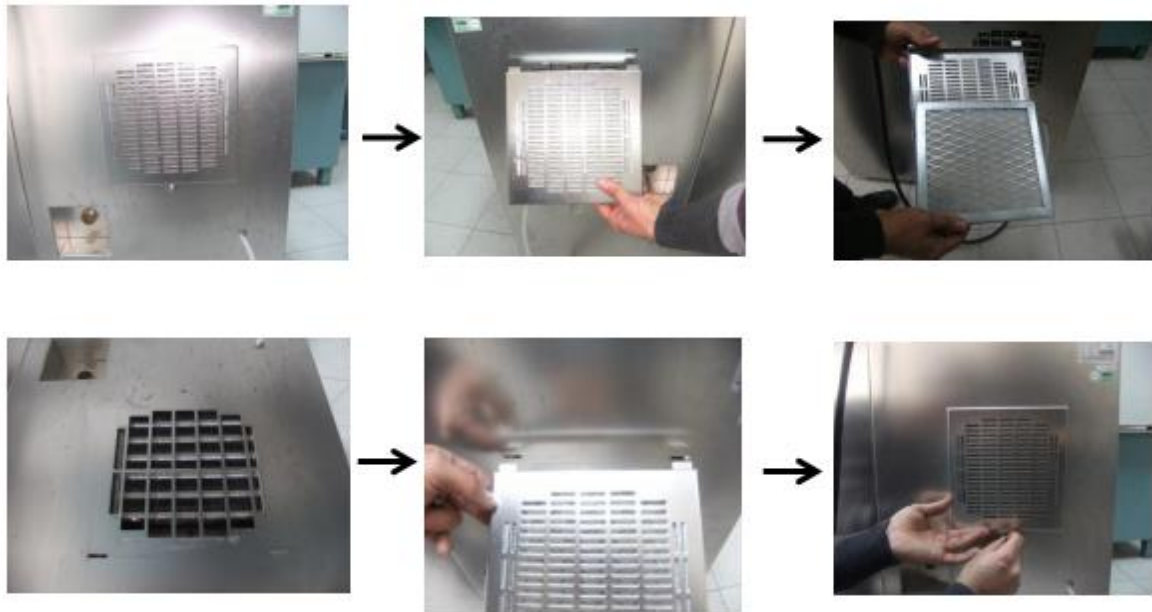
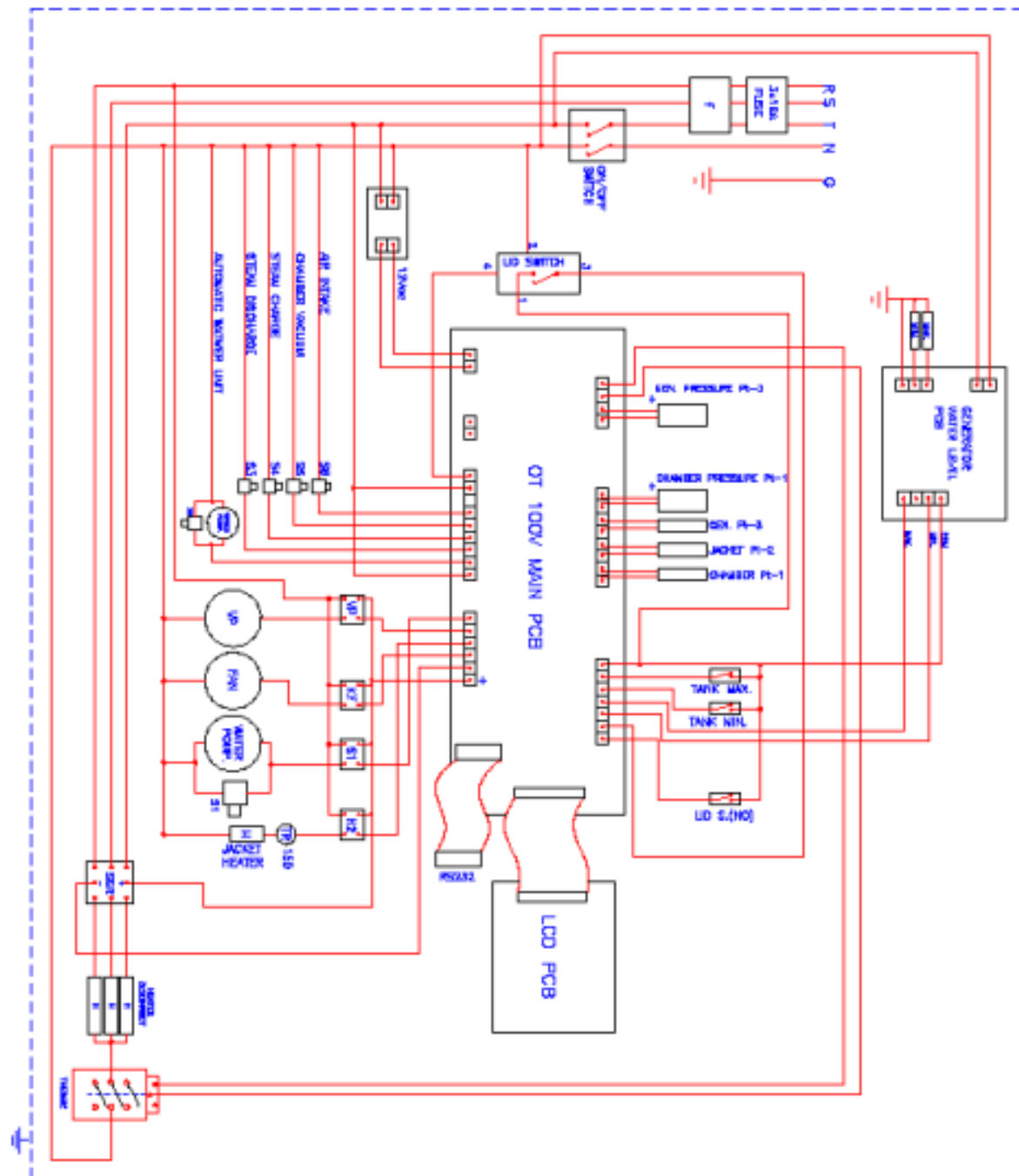


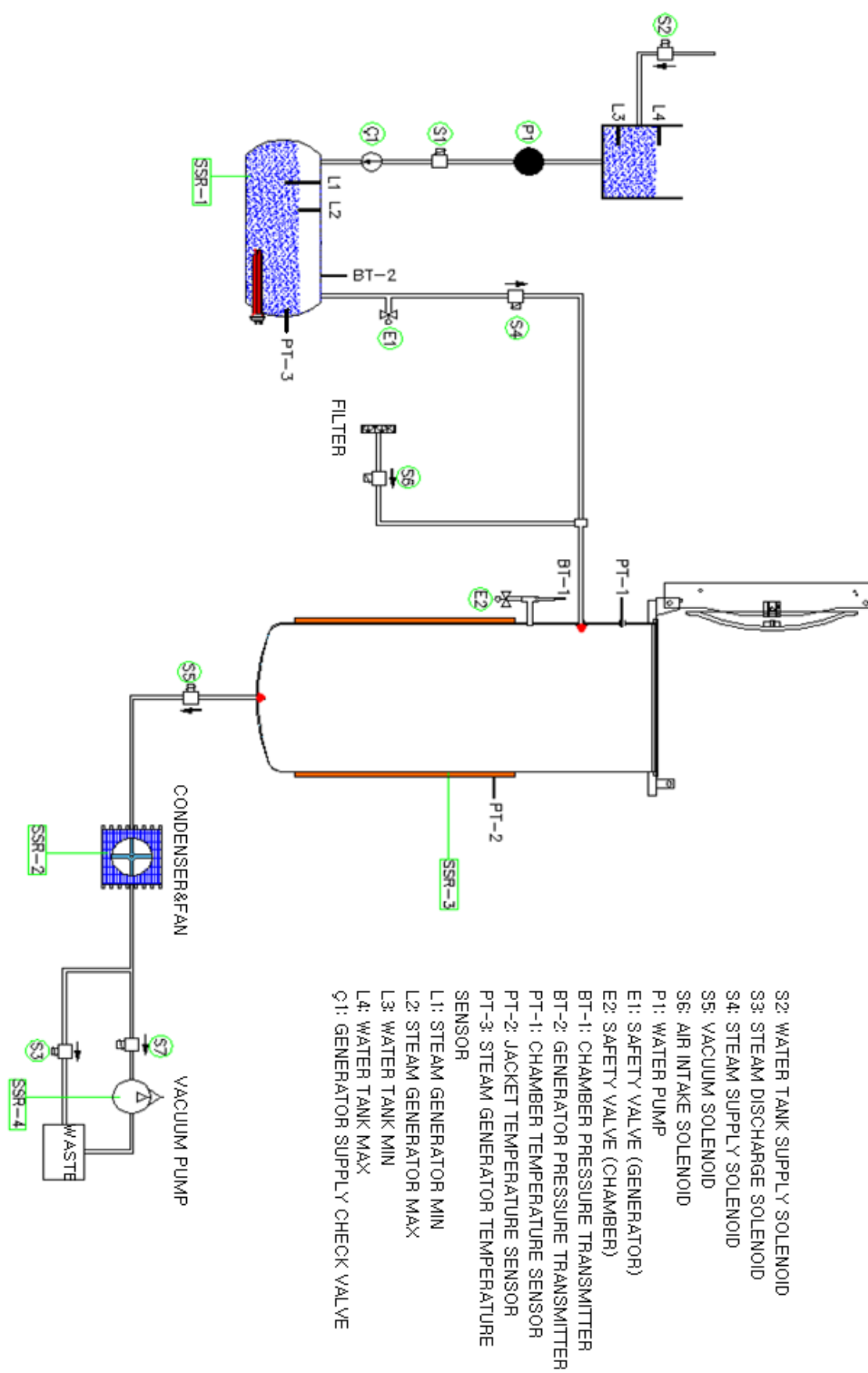
Figure 39

## DRAWINGS AND DIAGRAMS

## 5.1 ELECTRICAL CIRCUIT DIAGRAM



## 5.2 WATER AND STEAM FLOW CHART



# SECTION 6

## SPARE PARTS LIST

NO	ITEM	ITEM CODE	QUANTITY
1	DISPLAY PCB	Z15.G 05 040	1
2	INTERNAL COMMUNICATION	Z15.K 01 204	1
3	EXTERNAL COMMUNICATION CABLE	Z15. K 01 205	1
4	ELECTRONIC CARD - TRANSFORMER	Z15.E 05 087	1
5	ELECTRONIC CARD - STEAM	Z15. E 05 092	1
6	FILTER - EMC	Z15. F 06 008	1
7	DUST FILTER CONDENSER	Z15. F 06 050	1
8	THERMOCOUPLE	Z15. I 06 076	1
9	CONDENSER	Z15. K 20 019	1
10	MONOMETER	Z15. M 11 006	1
11	THERMAL FUSE	Z15. S 08 044	1
12	MAIN PCB	Z15. T 09 117	1
13	THERMOCOUPLE	Z19. I 01 025	2
14	ON / OFF SWITCH	Z12.A 03 052	1
15	MICROSWITCH	Z12.A 03 005	1
16	FAN - ENGINE	Z12. F 04 020	1
17	CONDENSER FILTER	Z12. F 06 048	1
18	STEAM TRAP	Z12. P 11 019	1
19	WATER PUMP	Z12. P 12 012	1
20	VACUUM PUMP	Z12.P 12 016	1
21	THERMAL RELAY	Z12.R 07 019	1
22	LOCK RELAY	Z12.R 07 021	1
23	RELAY - SSR / 4-32 VDC	Z12.R 07 028	4
24	RELAY - SOLID STATE 50 AMP. 3 PHASE	Z12.R 07 035	1
25	THERMAL SWITCH 3*16 A	Z12.S 08 019	1
26	WATER LEVEL SENSOR	Z12.S 20 009	2
27	PRESSURE TRANSMITTER 0-4 BAR	Z12.S 20 012	2
28	SURFACE THERMOSTAT	Z12.T 09 106	2
29	VALVES - BALL	Z12.V 01 004	1
30	CHECK VALVE - IN / OUT1/4"	Z12. V 01 017	1

31	SOLENOID VALVE- 1/4"	Z12. V 06 013	3
32	SOLENOID VALVE- 1/2 V 230/50 HZ	Z12. V 01 086	3
33	SAFETY VALVE	Z12. V 06 013	2



# SECTION 7

## TEMPERATURE PRESSURE TABLE

Manometer pressure Bar	Absolute pressure Bar	Temperature °C
	0.05	32.88
	0.10	45.81
	0.15	53.97
	0.20	60.06
	0.25	64.97
	0.30	69.10
	0.35	72.70
	0.40	75.87
	0.45	78.70
	0.50	81.33
	0.55	83.72
	0.60	85.97
	0.65	88.01
	0.70	89.95
	0.75	91.87
	0.80	93.50
	0.85	95.14
	0.90	96.71
	0.95	98.20
	1.00	99.63
0	1.013	100.0
0.05	1.063	101.4
0.10	1.113	102.5
0.15	1.163	103.8
0.20	1.213	105.1
0.25	1.263	106.2
0.30	1.313	107.3
0.35	1.363	108.5
0.40	1.413	109.5
0.45	1.463	110.5
0.50	1.513	111.6
0.55	1.563	112.6
0.60	1.613	113.5
0.65	1.663	114.5
0.70	1.713	115.4
0.75	1.763	116.2
0.80	1.813	117.1
0.85	1.863	117.9
0.90	1.913	118.8
0.95	1.963	119.6
1.00	2.013	120.4
1.05	2.063	121.2
1.10	2.113	121.9
1.15	2.163	122.7
1.20	2.213	123.4

<b>Manometer pressure Bar</b>	<b>Absolute pressure Bar</b>	<b>Temperature °C</b>
1.25	2.263	124.1
1.30	2.313	124.9
1.35	2.363	125.5
1.40	2.413	126.2
1.45	2.463	126.9
1.50	2.513	127.6
1.55	2.563	128.2
1.60	2.613	128.8
1.65	2.663	129.51
1.70	2.713	130.13
1.75	2.763	130.75
1.80	2.813	131.37
1.85	2.863	131.96
1.90	2.913	132.54
1.95	2.963	133.13
2.00	3.013	133.69
2.05	3.063	134.25
2.10	3.113	134.82
2.15	3.163	135.36
2.20	3.213	135.88
2.25	3.263	136.43
2.30	3.313	136.98
2.35	3.363	137.50
2.40	3.413	138.01
2.45	3.463	138.53
2.50	3.513	139.02
2.55	3.563	139.52
2.60	3.613	140.00
2.65	3.663	140.48
2.70	3.713	140.96
2.75	3.763	141.44
2.80	3.813	141.92
2.85	3.863	142.40
2.90	3.913	142.86
2.95	3.963	143.28
3.00	4.013	143.75
3.10	4.113	144.67
3.20	4.213	145.46
3.30	4.313	146.36
3.40	4.413	147.20
3.50	4.513	148.02
3.60	4.613	148.84
3.70	4.713	149.64
3.80	4.813	150.44
3.90	4.913	151.23
4.00	5.013	151.96
4.10	5.113	152.68
4.20	5.213	153.40
4.30	5.313	154.12
4.40	5.413	154.84
4.50	5.513	155.55
4.60	5.613	156.24
4.70	5.713	156.94
4.80	5.813	157.62
<b>Manometer</b>	<b>Absolute</b>	<b>Temperature</b>

<b>pressure Bar</b>	<b>pressure Bar</b>	<b>°C</b>
4.90	5.913	158.28
5.00	6.013	158.92
5.10	6.113	159.56
5.20	6.213	160.20
5.30	6.313	160.82
5.40	6.413	161.45
5.50	6.513	162.08