Tuttnauer
Your Sterilization & Infection Control Partners

TECHNICIAN MANUAL

Pre/Post-vacuum Class B Table–top Autoclave

Model ELARA 11
(CAT Controller)

CE 0344

Cat. No. MAN205-0343001EN Rev. P 8-10-11

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1 INTRODUCTION

This Technician's Manual, together with the operator's manual, forms the complete set of the Operation and Maintenance instructions for the Elara 11 pre and post vacuum autoclave. This manual is intended for the use of the technician. It is strongly recommended that only qualified and Tuttnauer factory trained personnel service this autoclave and do so in accordance with the instructions in this manual. Any unauthorized service may result in the invalidation of the manufacturer's guarantee.

2 SYMBOL DESCRIPTION

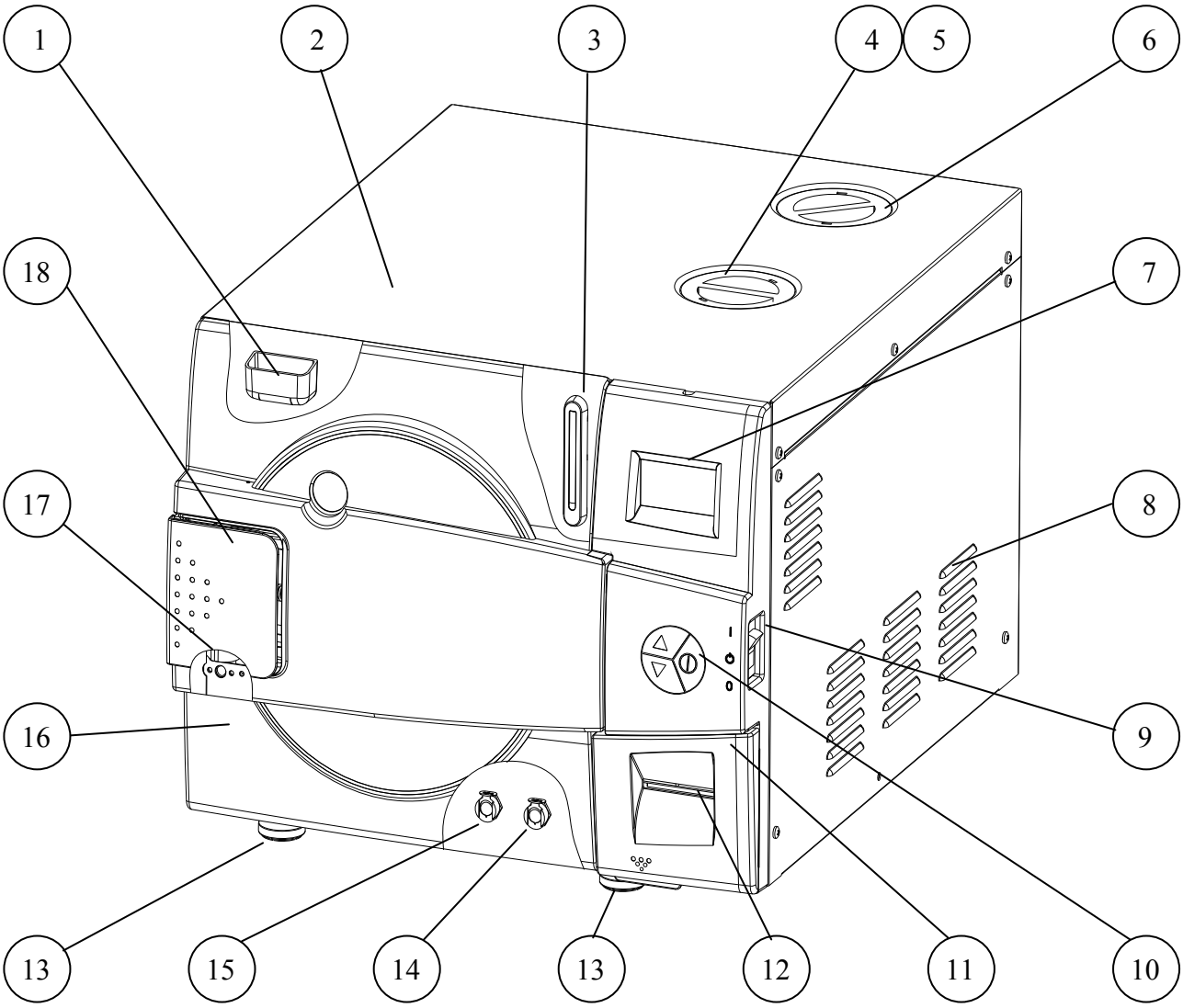
Caution! Consult accompanying documents

Caution! Hot surface

Caution! Hot steam.

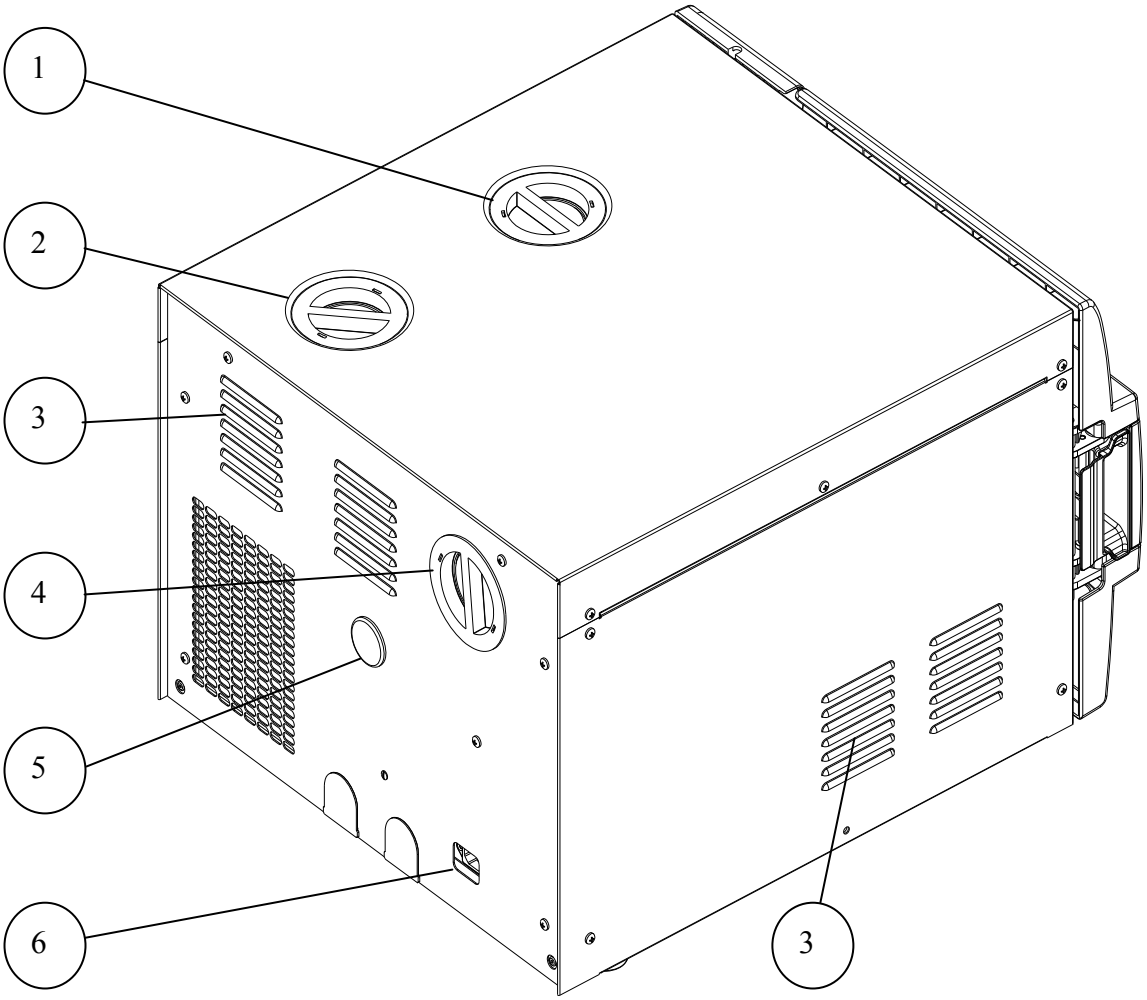
Protective earth (Ground)

FRONT VIEW



No.	Description	No.	Description
1	Water reservoir funnel	10	Operating keypad
2	Autoclave cover	11	Printer cover
3	Water level sight gauge	12	Printer (standard)
4	Mineral-free water reservoir cover	13	Legs
5	Chamber and steam generator safety valves	14	Mineral-free water reservoir drain valve
6	Waste water reservoir cover	15	Waste water reservoir drain valve
7	Display	16	Door cover
8	Ventilation grill	17	Door switch
9	Main switch/Circuit breaker	18	Door closing device

REAR VIEW



No.	Description
1	Mineral-free water reservoir cover
2	Waste water reservoir cover
3	Ventilation grills
4	Air filter service cover
5	Opening for calibration
6	Main power electric cable socket

3 INSTALLATION

CAUTION:
Any operation described in section 3 shall be performed by a qua lified technician only.

3.1 Lifting and carrying

CAUTION:

Before moving the a utoclave, Make sure that the electric cord is disconnected from the pow er, and there is no press ure in th e chamber and in the generator.

Attention! The pressure of th e generator does not decreas e immediately when the equipment is turned off. Wait approx. ½ an hour to ve rify that the pressu re has decreased to a tmospheric pressure.

1. Disconnect the power supply cord.
2. Drain the water from both reservoirs.

To avoid injuries, lifting and carrying should be done with at least two persons or by using a fork-lift or any other mechanical aid.
Do not drop the device!

3.2 Unpacking the autoclave

Unpack the autoclave and inspect for mechanical damage upon receipt. Observe packing method and retain packing materials until the unit has been inspected. Mechanical inspection involves checking for signs of physical damage such as: scratched panel surfaces, broken knobs, etc.
To avoid injuries, lifting and carrying of the autoclave should be done with at least two persons or by using a fork-lift or any other mechanical aid.

3.3 Installation preparations

1. Check and verify that the counter carrying the autoclave is a rigid and leveled surface and can carry a load of 225 lbs (102kg).

Attention:

The Elara11 is not designed for use on any standard slide out shelf. If it is necessary to use a slide out shelf, it must be tested and/or rated for 225 lb (102kg) or more.

Check and verify that the counter dimensions are, at least, 22” wide x 24” deep (55cm x 63.5cm).

2. Keep the back and the sides of the autoclave approximately 2” (5 cm) away from the wall to allow ventilation and facilitate the device disconnection.
3. If placed in a cabinet, verify that the rear of the cabinet is open to allow ventilation.
4. Insufficient space for ventilation may result in an increase of the autoclave's temperature that may cause a malfunction or damage the instrument.
5. It is recommended that enough space be left around the autoclave to give a technician access for servicing the machine.
6. Check and verify that the room ventilation is 10 cycles per hour minimum.

7. Check and verify that the ambient temperature range is 41˚F - 104˚F (5˚C - 40˚C), it is preferable not to exceed 86˚F (30˚C).
8. Check and verify that the ambient relative humidity does not exceed 85%.

Connections to Utility Supplies

1. Check and verify that the power supply is a 1 phase, 230Vac ±5%, 50/60Hz (as appropriate), 15A supply.
2. Check and verify that the autoclave is connected to separate power source to avoid flickers of light or sensitive devices.
3. Check and verify grounding of the autoclave.
4. Check and verify that the electrical net is protected with a current leakage safety relay.

3.5 Final adjustments

At the time of installation, before the autoclave can be okayed for daily operation the service technician needs to perform the following preliminary checks:

a. Integrity Check
Perform a visual check to verify that there are no dents, scratches or broken components on the autoclave.

b. Support surface check
Make a visual check that the surface is level and strong enough to support the autoclave.

c. The leakage current test
Test the precise operation of the earth leakage relay.

d. Ground Check
Test the continuity of the grounding connection.

e. Safety Valve Check
Test the safety valve as per the instructions in "Checking the Safety Valve" in the Operator's Manual.

f. Door check
Ensure that the door locking mechanism is functioning properly

g. Setting clock and date
See instruction in the user manual clause. 7.3.

h. Atmospheric Pressure check: the unit is set from the factory at 100 kpa, this is atmospheric pressure at sea level. If the unit is located more that 500 ft above or below sea level then the **Atmos. Press** parameter must be set, see sec 7.2.7

i. Cycle check: run a B&D Test to ensure that all systems in the unit are functioning properly.

j. Reset the autoclave see sec 8**.**

After the above steps are performed, the autoclave is ready for daily operation.

3.6 Operating the autoclave

1 Plug the power cord into the power socket.

2 Turn on the Main Switch / Circuit Breaker (see front view).

3 Select "Vacuum Test" cycle to keep the steam generator and heating elements from heating up. See Selecting a Program in the Operator's Manual.

4 Open the door of the autoclave and remove the trays and the packaging material.

5 Fill the Mineral Free Water Reservoir with water meeting the quality specs in section 5.1 as follows:

   5.1. Fill with 4 liters of mineral free water by pouring it into the front reservoir fill opening at the top of the machine (see front view).

   5.2. Fill the remaining quantity by pouring water gently, into the front funnel until it reaches the required level on the water level sight gauge (See Front View).

6 Insert a paper roll in the printer (see printer handling in the Operator's Manual).

7 Close the door and perform a Vacuum Test. If the test fails perform another test since the fail may be a result of moisture in the air. If the second test fails it may be necessary to run Program 2 with the long drying cycle to remove any excess moisture that is causing the test to fail.

8 If the Vacuum Test is successful then select the B&D Test cycle.

   At this stage the chamber and steam generator will be heating up. It will take approximately 15 minutes (from selecting the B&D Test).

9 While waiting for the unit to heat up explain and instruct the operator as follows (use the operation manual as reference):

   9.1. Operation principals of the autoclave.

   9.2. Preparation for sterilizing instruction including loading instructions.

   9.3. Intended use of each cycle.

   9.4. Selecting a cycle.

   9.5. Water filling method.

   9.6. Displayed error and operational messages.

   9.7. Monitoring and changing parameters.

   9.8. Printer handling.

   9.9. Maintenance instructions

10 Perform a B&D test with a chemical indicator.

11 The operator shall perform a cycle under supervision of the technician.

4 PERIODICAL TESTS

PERIOD	TEST
1 month	Test the safety valve by operating it.
6 months	Remove the autoclave's cover, tighten the heaters' screws and electrical connections, valves and connectors in the control box.
Year	Check the continuity of the grounding connections.
	Check the temperature and pressure calibration.
	Perform validation of the autoclave.
	Check the precise operation of the earth leakage relay.
	Check that the autoclave is leveled.
	Check the safety elements; safety valve, safety and cut-off thermostats door locking mechanisms.
	Run basic programs of the autoclave and check the operation sequences, the sterilization parameters etc.
	Check the water reservoir, piping, plastic parts and electric wires.
	Check and tighten the piping joints to avoid leakage.
	Check and tighten all screw connections in the control box, heaters and valves and instrumentation.
	Calibrate the temperature and pressure once a year or in reference to local rules or regulations (refer to the section on Calibration).
5 years	Observe the closing device for excessive wear
Safety tests (pressure vessel, efficiency, electrical) shall be performed in accordance with local rules or regulations, by an authorized inspector.	

Only an authorized technician shall perform the 6-months and yearly tests!

5 WATER QUALITY

5.1 Water for Generating Steam

The distilled or mineral – free water supplied to the sterilizer shall be according to the table below:

Physical Characteristics and Maximum acceptable contaminants levels in water for sterlizers (According to ANSI/AAMI ST79:2006).

Element	Condensate – allowable content
Evaporate residue	≤15 miligrams/liter (mg/l)
Silica	≤2 mg/l
Iron	≤0.2 mg/l
Cadmium	≤0.005 mg/l
Lead	≤ 0.05 mg/l
Rest of heavy metals	≤0.1 mg/l
Chloride	≤3 mg/l
Phosphate	≤0.5 mg/l
Conductivity	≤50 μs/cm
pH value	6.5 to 8
Appearance	Colorless, clean, without sediment
Hardness	≤0.1 mmol/l

Compliance with the above data should be tested in accordance with acknowledged analytical methods, by an authorized laboratory.

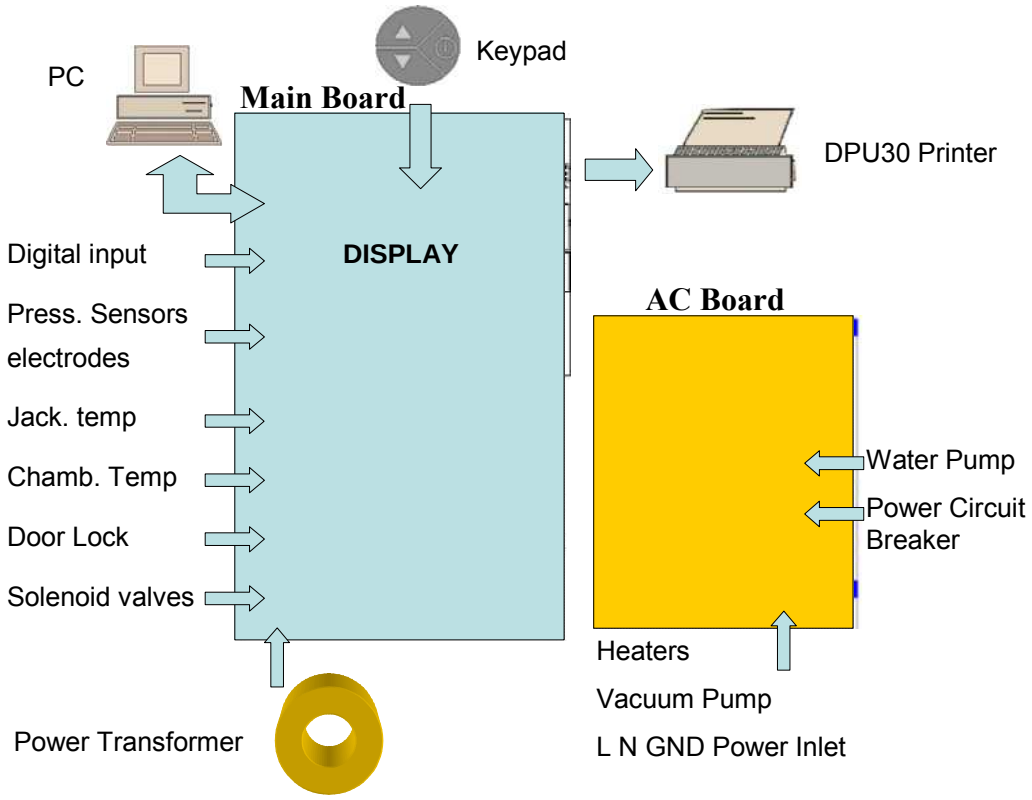
Attention:

We recommend testing the water quality once a month. The use of water that does not comply with the table above may have severe impact on the working life of the sterilizer and can invalidate the manufacturer's guarantee.

6 *CONTROL SYSTEM DESCRIPTION*

The control system is based on 2 electronic boards, see the diagram below.

Control system block diagram



The control system contains the parts listed below:

- Main board
- AC high voltage power board
- Transformer (230VAC primary / 6, 12, 18, 24VAC secondary)
- Electrical wires

6.1 The main board includes:

- Stabilized power supply 24VAC & 5VAC
- Analog inputs for reading the analog sensors (temperature sensors, pressure sensor, water level electrodes)
- Digital inputs for reading the digital indicators (door switch, float reservoir if available)
- Digital outputs to control the solenoid valves and the door lock.
- Digital outputs to send signal to high voltage board or power element drivers to control power elements.
- Display
- A memory logging the previous cycles
- Drivers for printer
- Real time clock to serve as clock to the system
- Connection to the printer. It is connected directly to this board through a flat cable 24 pins.

6.2 The high voltage board (AC Board) includes:

- High power outputs to control the heaters and the pumps.
- Circuit breaker
- The board provides four outputs for four high AC devices as follows:
  1. Steam generator heater (2200 Watt).
  2. Chamber wall heater (500 Watt).
  3. Vacuum pump.
  4. Water pump.
- Connection between the 2 cards

7 CHECKING AND CHANGING PARAMETERS AND OTHER DATA

For special application it may be required to change parameters.
Note!
The autoclave is sent from the manufacturer with validated parameters.
Any change of the parameters requires a validation of the autoclave.
The device is identified by its software and parameter versions.
Any change of the parameters will increase the parameter version number.

In order to change parameters and check various components, you can enter a few sub-directories and check or change the required data.

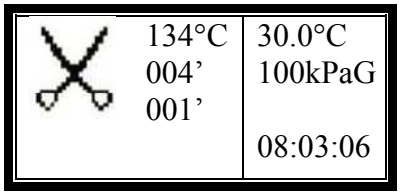
These sub-directories include the following:

Sub-directory	***Operation***
Parameters	Changing parameters
Digital Inputs	Checking digital inputs
Digital Outputs	Checking digital outputs
Analog Inputs	Checking analog inputs
Calibration	Calibration temperature and pressure
Set Clock	Setting the clock (time and date)
Printer Test	Testing the printer
History	Printing the last cycles

7.1 Menu

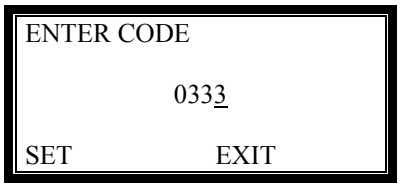
Follow the instructions below for entering the sub-directories and performing the menu operation.

1. Main screen



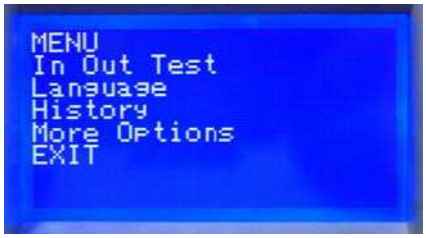
Turn on the autoclave with the main power switch located on the right side of the autoclave (see FRONT VIEW).
The main screen is displayed.
To enter the menu press **simultaneously** the **UP** ▲and **DOWN** ▼ pushbuttons.

2. Enter Code



ENTER CODE will be displayed.
Enter the technician code (**0333**) as follows:
The cursor is under the right digit. To change the right digit, press the **UP** ▲ or **DOWN** ▼pushbuttons. Each press on the **UP** ▲ pushbutton will increase the digit by 1 and each press on the **DOWN** ▼ pushbutton will decrease it by 1.
Change this digit as required and press the **START/STOP** pushbutton to move the cursor to the second digit from the right.
Repeat this until the curser is under **SET** (SET is blinking), and then press the **UP** ▲ pushbutton to enter the MENU.

3. Menu



The MENU contains 11 sub-directories (see display on the left).
The 7 top sub-directories are displayed when entering "Menu" and the remaining 4 directories are displayed when rolling down. Move to the required sub-directory using the UP ▲ and DOWN ▼ pushbutton. The pointed sub-directory is blinking.
Pressing **START/STOP** pushbutton will select the blinking directory and the required directory will be displayed.
To return to the previous display press the **UP** ▲and **DOWN** ▼ pushbuttons until reaching EXIT. When **EXIT** is blinking, press the **START/STOP** pushbutton and the previous screen will be displayed.

7.2 Parameters

This section describes the parameters, how they affect the process and the way to change them.
Listed bellow are all the available parameters.
Each section describes the parameter, the minimum and maximum allowed values and the changing resolution. Also included are the pre-set values of the parameters for each cycle (default value).
NOTE:

- ***If a parameter is modified, the only way to return to the original value is to manually reenter it.***
- ***A global parameter is a parameter that by changing its value in one program, it is changed in all the other programs to receive the same value.***
- ***To change a non-global value, i.e. specific parameter for each program, choose first the required sterilization program in the main screen of the autoclave and then enter the MENU and the sub-directory PARAMETERS.***

7.2.1 Ster Temp - sterilization temperature -

This parameter will set the desired temperature for sterilization

Resolution: 0.1°C
Minimum value: Default value
Maximum value: 136°C

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	134	134	121	121	121	Fixed value	Fixed value

7.2.2 Ster Time – sterilization time

This parameter will set the time desired for sterilization.

Resolution: 0.1 min
Minimum value: Default value
Maximum value: 99.9 min

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	4	4	20	20	20	Fixed value	Fixed value

7.2.3 Dry Time – drying time

This parameter will set the time desired for drying.

Resolution: 0.1 min
Minimum value: Default value
Maximum value: 99.9 min

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	1	20	0	20	0	Fixed value	Fixed value

7.2.4 Vac Pulses – number of pulses

This parameter sets the number of vacuum pulses during the air removal stage..

Resolution: 1
Minimum value: 0
Maximum value: 5

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	2	3	2	3	2	Fixed value	Fixed value

7.2.5 SterPressAdd - addition to the sterilization pressure

This defines the required addition to the sterilization pressure in kPa in order to increase the sterilization temperature.
For example, for a sterilization temperature of 121°C the required pressure is 205 kPa. Since the system controls the sterilization process according to pressure, if SterPressAdd equals “0”, the system will maintain the pressure at 205 kPa . If the value is at 5 kPa, the system will be maintained at 210 kPa and the temperature will be 121.8°C, and so on.

Resolution: 0.1 kPa
Minimum value: 0 kPa
Maximum value: 40 kPa

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	9	9	9	9	9	Fixed value	Fixed value

7.2.6 End Temp - temperature at the end of the cycle

This parameter will set the temperature that the chamber must reach before the cycle can end.

Resolution: 0.1°C
Minimum value: 50°C
Maximum value:136°C

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	120	120	110	110	110	Fixed value	Fixed value

7.2.7 ATMPressure – ambient pressure

This parameter tells the unit the atmospheric pressure of the location in which the autoclave is installed. The pressure entered must be with an accuracy of 5% of the actual atmospheric pressure for that location. It is a global parameter that means that you only need to enter this parameter once in anyone cycle and all cycles will be updated.
This value can easily be calculated by knowing the altitude of your location. The atmospheric pressure at Sea Level is 100 kPa

- For every 100 meter above sea level, the atmospheric pressure drops 1 kPa.
- For every 100 meter below sea level, the atmospheric pressure increases 1 kPa.

Changes in pressure do to weather will not affect the accuracy of this unit.

Resolution: 0.1 kPa
Minimum value: 70 kPa
Maximum value: 110 kPa

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	100 kPa (global parameter)						

7.2.8 Pulse vac 1 – Vacuum value in the first pulse

This parameter defines the vacuum value in pulse no.1 of the prevacuum stage.

Resolution: 0.1°kPa
Minimum value: 5kPa
Maximum value:100kPa

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	25.0	15.0	25.0	15.0	25.0	Fixed value	Fixed value

7.2.9 Pulse vac T1 – vacuum time after Pulse vac 1

This parameter defines the period that vacuum is built after reaching the value defined in Pulse vac 1.

Resolution: 1sec
Minimum value: 5sec
Maximum value:360sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	10	30	10	30	10	Fixed value	Fixed value

7.2.10 Pulse press 1 - Pressure value in the first pulse

This parameter defines the pressure value (above zero) in pulse no.1 of the prevacuum stage.

Resolution: 0.1kPa
Minimum value: 70kPa
Maximum value:200kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	140.0	140.0	140.0	140.0	140.0	Fixed value	Fixed value

7.2.11 Pulse vac 2 – Vacuum value in middle pulses

This parameter defines the vacuum value in all pulses except first and last pulse of the prevacuum stage.

Resolution: 0.1kPa
Minimum value: 5kPa
Maximum value:100kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	25.0	20.0	25.0	20.0	25.0	Fixed value	Fixed value

7.2.12 Pulse vac T2 - vacuum time after Pulse vac 2

This parameter defines the period that vacuum is built after reaching the value defined in all pulses defined by Pulse vac 2.

Resolution: 1sec
Minimum value: 1sec
Maximum value:300sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	10	30	10	30	10	Fixed value	Fixed value

7.2.13 Pulse press 2 - Pressure value in the middle pulses

This parameter defines the pressure value (above zero) in the middle pulses of the prevacuum stage.

Resolution: 0.1kPa
Minimum value: 70klPa
Maximum value:200kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	140.0	140.0	140.0	140.0	140.0	Fixed value	Fixed value

7.2.14 Pulse vac 3 - Pressure value in the last pulses

This parameter defines the vacuum value in the last pulse of the prevacuum stage.

Resolution: 0.1kPa
Minimum value: 5kPa
Maximum value:200kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	30.0	20.0	30.0	20.0	30.0	Fixed value	Fixed value

7.2.15 Pulse vac T3 - vacuum time after Pulse vac 3

This parameter defines the period that vacuum is built after reaching the value defined in all pulses defined by Pulse vac 3.

Resolution: 1sec
Minimum value: 1sec
Maximum value:360sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	10	30	10	30	10	Fixed value	Fixed value

7.2.16 Pulse press 3 - Pressure value in the last pulse

This parameter defines the pressure value (above zero) in the last pulse of the prevacuum stage.

Resolution: 0.1kPa
Minimum value: 7kPa
Maximum value:200kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	140.0	140.0	140.0	140.0	140.0	Fixed value	Fixed value

7.2.17 Heat Exh on – Opening time of exhaust valve

This parameter defines the period that the exhaust valve is open, during the heating stage, in order to remove the condensate.

Resolution: 0.1sec
Minimum value: 1sec
Maximum value: 50sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	10	10	10	10	10	Fixed value	Fixed value

7.2.18 Heat Exh off - Closing time of exhaust valve

This parameter defines the period that the exhaust valve is closed, during the heating stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	200	200	200	200	200	Fixed value	Fixed value

7.2.19 Ster Exh on - Opening time of exhaust valve

This parameter defines the period that the exhaust valve is open, during the sterilization stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 50sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	5	5	5	5	5	Fixed value	Fixed value

7.2.20 Ster Exh off - Closing time of exhaust valve

This parameter defines the period that the exhaust valve is closed, during the sterilization stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	200	200	200	200	200	Fixed value	Fixed value

7.2.21 Exh Shoot on - Opening time of exhaust valve

This parameter defines the period that the exhaust valve is open, during the exhaust stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	1	1	1	1	10	Fixed value	Fixed value

7.2.22 Exh Shoot off - Closing time of exhaust valve

This parameter defines the period that the exhaust valve is closed, during the exhaust stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	0	0	0	0	100	Fixed value	Fixed value

7.2.23 Dry Air on - Opening time of air valve

This parameter defines the period that the air valve is open, during the drying stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	20	20	20	20	20	Fixed value	Fixed value

7.2.24 Dry Air off - Closing time of air valve

This parameter defines the period that the air valve is closed, during the drying stage.

Resolution: 0.1sec
Minimum value: 0sec
Maximum value: 1000sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	200	200	200	200	200	Fixed value	Fixed value

7.2.25 SterGenPrsAd – Maximum pressure in the generator

The value of this parameter plus the sterilization pressure define the maximum pressure in the generator in each program.

Resolution: 0.1kPa
Minimum value: 0kPa
Maximum value:50kPa

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	20.0	20.0	20.0	20.0	20.0	Fixed value	Fixed value

7.2.26 Ster PrintT – printing rate during the sterilization stage

This parameter will set the interval between printings during the sterilization stage.

Resolution: 1 sec
Minimum value: 10 sec
Maximum value: 360 sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	60 sec (global parameter)						

7.2.27 Print Rate - printing rate except during the sterilization stage

This parameter will set the interval between printings during the other stages.

Resolution: 1 sec
Minimum value: 10 sec
Maximum value: 360 sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	180 sec (global parameter)						

7.2.28 HeatSter Time – Pre-sterilization heating time

This parameter defines the heating time before sterilization. Increasing the value of this parameter will decrease the heating gradient define.

Resolution: 1 sec
Minimum value: 0 sec
Maximum value: 1000 sec

Cycle	Flash 134	Wdry 134	No Dry 121	Wdry 121	Delicate 121	B&D Test	Vacuum Test
Default Value	1	1	1	1	1	Fixed value	Fixed value

7.2.29 WaterGen Time – Addition time for adding w ater into the generator

This parameter defines the addition time that water enters the generator after the generator's water level electrode senses water..

Resolution: 1 sec
Minimum value: 0 sec
Maximum value: 30 sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	10	10	10	10	10	Fixed value	Fixed value

7.2.30 SterPrsLimAd - maximum pressure in the chamber

This parameter plus the sterilization pressure define the maximum pressure in the chamber.

Resolution: 0.1kPa
Minimum value: 0kPa
Maximum value: 40kPa

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	14.0	14.0	14.0	14.0	14.0	Fixed value	Fixed value

7.2.31 Heat Time Err - maximum time of the heating stage

This parameter defines the maximum time of the heating stage until the beginning of the sterilization stage. If the heating continues beyond this limit "ERROR 15" message will be displayed and the cycle will fail.

Resolution: 1 sec
Minimum value: 1000 sec
Maximum value: 3600 sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	1500	1500	1500	1500	1500	Fixed value	Fixed value

7.2.32 Vac Time Err - maximum time of the vacuum stage

This parameter defines the maximum time of the vacuum stage. If the vacuum stage continues beyond this limit "ERROR 14" message will be displayed and the cycle will fail.

Resolution: 1 sec
Minimum value: 600 sec
Maximum value: 3600 sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	1000	1000	1000	1000	1000	Fixed value	Fixed value

7.2.33 WaterTimeErr - maximum generator water filling time.

This parameter defines the maximum time for filling water in the generator. If, before a cycle, the water pump has operated as long as defined by this parameter and the water level electrode did not sense water, "ERROR 20" will be displayed and a cycle cannot be started. If this will be during a cycle – the cycle will fail with "low temp" or "low pres".

Resolution: 1 sec
Minimum value: 10 sec
Maximum value: 200 sec

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	90	90	90	90	90	Fixed value	Fixed value

7.2.34 Sleep Power - time until the autoclave turns into "sleep mode"

This parameter defines the time until the autoclave turns into "sleep mode". This time is counted from the last operation of the autoclave or the last time a pushbutton has been pressed.

Resolution: 0.1hour
Minimum value: 0.1hour
Maximum value: 999.9hour

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	4.0	4.0	4.0	4.0	4.0	Fixed value	Fixed value

7.2.35 TempInF – units of the temperature

This parameter enables the technician to set the displayed temperature in ºC or in ºF.

Changing this parameter in one of the cycles will change this parameter in all the other cycles to the value.

Access Code – available upon request
Resolution – 1
Value – 0 or 1
If TemInf = 1 the temperature is expressed in ºF.
If TemInf = 0 the temperature is expressed in ºC.

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	0 (global parameter)						

7.2.36 PressInPSI – units of the pressure

This parameter enables the technician to set the displayed pressure in Kpa, psig or psia.

Changing this parameter in one of the cycles will change this parameter in all the other cycles to the value.

Access Code – available upon request
Resolution – 1
Value – 0, 1 or 2
If PresInPSI = 0 the pressure is expressed in kPa.
If PresInPSI = 1 the pressure is expressed in psia.
If PresInPSI = 2 the pressure is expressed in psig.

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	0 (global parameter)						

7.2.37 Auto Add Water – automatic water filling

This parameter defines the possibility for automatic mineral free water filling.

NOTES: 1. Automatic water filling requires connection to mineral free water supply and to drain.
2. Not applicable on this unit

Automatic water filling 1
Manual water filling 0

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	0	0	0	0	0	Fixed value	Fixed value

7.2.38 ElectFillWtr – water conductivity

This parameter defines the conductivity level of the mineral free water in which the water level electrode senses water. .

Resolution: 1
Minimum value: 0 – infinite conductivity
Maximum value:9999 – infinite resistance (zero conductivity)

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	6000	6000	6000	6000	6000	Fixed value	Fixed value

7.2.39 JackTempStBy - temperature during the Stand-By mode

This parameter defines the temperature of the chamber's heating element during the Stand-By mode.

Resolution: 0.1°F
Minimum value: 68°F
Maximum value:284°F

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	140.0	140.0	140.0	140.0	140.0	Fixed value	Fixed value

7.2.40 JackTempProc – temperature of the chamber's heating element

This parameter defines the temperature of the chamber's heating element during the sterilization stage.

Resolution: 0.1°F
Minimum value: 32.1°F
Maximum value:284°F

Cycle	 Flash 134	 Wdry 134	 No Dry 121	 Wdry 121	 Delicate 121	 B&D Test	 Vacuum Test
Default Value	248.8	248.0	239.0	239.0	239.0	Fixed value	Fixed value

7.2.41 FixGenPress

N/A

7.3 Digital Inputs

This directory enables monitoring the status of the digital inputs. It is possible to view the digital inputs during cycle.

1. To move from one item to another item use the **UP** ▲ and **DOWN** ▼ pushbuttons.
2. To exit to the menu go to **EXIT** and when it is blinking press the **START/STOP** pushbuttons.

Displayed item	***Displayed symbol***	***Operation***	***Status***
Thermostat (not applicable on this model)	○	Thermostat disconnects the heaters.	The temperature is above the acceptable temperature.
	●		The temperature is below the acceptable temperature.
Float RESERV (not applicable on this model)	○	Senses water in the clean water reservoir.	The float doesn't sense water in the clean water reservoir.
	●		The float senses water in the clean water reservoir.
Door Switch	○	Senses if the door is open or closed.	The sensor senses the door is closed.
	●		The sensor senses the door is open.
Float Res (not applicable on this model)	○	Senses water in the waste water reservoir.	The float doesn't sense water in the waste water reservoir.
	●		The float senses water in the waste water reservoir.

7.4 Digital Outputs

This directory enables monitoring the status of the digital Outputs. It is possible to view the Digital Outputs during cycle.

1. To move from one item to another item use the **UP** ▲ and **DOWN** ▼ pushbuttons.
2. To exit to the menu go to **EXIT** and when it is blinking press the **START/STOP** pushbuttons.

Displayed item	***Displayed symbol***	***Operation***	***Remarks***
Air	○	Not operating	Air valve (valve 43)
	●	Operating	
Vac valve	○	Not operating	Vacuum valve (valve 52)
	●	Operating	
Chamb Steam	○	Not operating	Steam inlet valve to the chamber (valve 93)
	●	Operating	
Fast exh	○	Not operating	Fast exhaust valve to the reservoir (valve 73)
	●	Operating	
Dig Out #5	○	Not operating	Optional
	●	Operating	
Wtr to Res	○	Not operating	N/A
	●	Operating	
Air VacPump	○	Not operating	Air inlet valve to the vacuum pump (valve 44)
	●	Operating	
Water Valve	○	Not operating	Mineral free water to generator (valve 21)
Dig Out #9	○	Not operating	Optional
	●	Operating	
Door lock	○	Locked position	Door locking pin
	●	Unlocked position	
Heater 1	○	Not operating	Steam generator heating element
	●	Operating	
Heater 2	○	Not operating	Chamber heating element
	●	Operating	
Vacuum pump	○	Not operating	Vacuum pump
	●	Operating	
Water pump	○	Not operating	Water pump
	●	Operating	
Buzzer	○	Off	Buzzer
	●	Buzzing	
Backlight	○	On	Screen
	●	Off	

7.5 Analog Inputs

This directory enables checking the analog Inputs. It is possible to enter this directory while the autoclave is performing a cycle in order to check the devices sending these inputs.

1. To move from one item to another item use the **UP ▲** and **DOWN ▼** pushbuttons.
2. To exit to the menu go to EXIT and when it is blinking press the START/STOP key.

Displayed item	***Description***
ChambPress	Pressure inside the chamber
Chamb Temp	Temperature in the chamber
Coil Temp	Temperature in jacket of the chamber
Gen Press	Pressure in the steam generator
Electr Gen	Level of water in the steam generator
ElectrLow	This analog input measures the level of water in the clean water reservoir.
ElectrLow2	This analog input measures the level of water in the waste water reservoir.

7.6 Calibration

7.6.1 Calibration components

This directory describes the calibration of the following 4 sensors:

Sensor name		Sensor function
1.	**ChambPress**	Reads the pressure in the chamber.
2.	**ChambTemp**	Reads the temperature in the chamber.
3.	**CoilTemp**	Reads the temperature in the jacket.
4.	**GenPress**	Reads the pressure in the steam generator.

7.6.2 Required equipment for calibration

- Reference temperature tool: (a bead probe thermocouple)
- Single element sealing gland (to insert the thermocouple through the validation port).
- ¼" BSP adaptor (for the validation port)
- Reference pressure tool: vacuum / pressure gauge in kPa.

7.6.3 Calibrating the sensors

Choose the sensor required to calibrate among the 4 sensors available with the UP ▲ and DOWN ▼ keys.
When it is blinking select it by pressing the START/STOP key.

Move to Calc. GainOffset with the UP ▲ and DOWN ▼ keys, and then when it is blinking select it with the START/STOP key

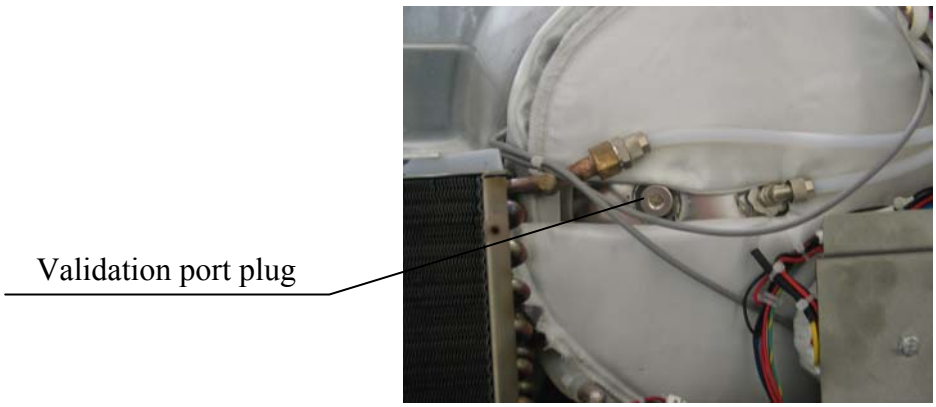
This is a typical calibration screen.
There are two rows of data, each row has two values.
RH, AH are for calibrating the upper end of the range
RL, AL are for calibrating the lower end of the range
AH, AL are the values from your test equipment
RH, RL are the values from the autoclaves display

7.6.4 Calibration port

In order to perform the calibration it is required to measure the temperature or pressure inside the chamber. This is done as follows:

1. Remove the rear cover of the autoclave (see para. 9.3).
2. Unscrew the plug sealing the validation port.
3. The validation port size is ¼"BSP

4. Assemble to this port the required measuring tool (temperature sensor or vacuum/pressure gauge) as specified in the calibration instruction.



7.6.5 Calibration operation

Calibration can be preformed in psi and °F, HOWEVER, it is recommended that the calibrations be performed in kPa and °C (see changing parameters sec 7.2.35 & 7.2.36).
Make sure the insulation is securely wrapped around the chamber. The side and top panels should also be attached.

When calibrating the autoclave you will:

First, acquire the appropriate data, as instructed below.
Second, access the calibration page of the software (see sec 7.1 & 7.6.3)
Third, use the **START/STOP** key to move from digit to digit and the **UP ▲ / DOWN ▼** keys to increase and decrease the values according to your data.

7.6.5.1 Calibrating the pressure in the chamber "ChambPress"

Calibrate the low pressure of the chamber

Attach your reference pressure gauge to the validation port on the back of the chamber and operate a vacuum test. When the unit has reached its lowest vacuum level record the reading of your gauge and the pressure reading for the chamber on the screen of the autoclave.
It is not necessary to abort the cycle, the calibration can be done while the unit is running the cycle. access the calibration page for ChambPress then enter the data as follows (if necessary refer back to 7.6.3):

- **AL** (actual pressure low value): change the AL to the value shown by your reference pressure gauge. **RL** (displayed pressure low value): change the RL to the value read from the autoclave display.

- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- If you did not abort the cycle then the chamber pressure on the screen should match your reference gauge.

Calibrate the high pressure of the chamber

Attach your reference pressure gauge to the validation port on the back of the chamber and operate a program of 134°C. When the unit has reached sterilization record the reading of your gauge and the pressure reading for the chamber on the screen of the autoclave.
It is not necessary to abort the cycle, the calibration can be done while the unit is running the cycle. access the calibration page for ChambPress then enter the data as follows (if necessary refer back to 7.6.3):

- **AH** (actual pressure high value): change the AH to the value shown by your reference pressure gauge. **RH** (displayed pressure high value): change the RH to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- If you did not abort the cycle then the chamber pressure on the screen should match your reference gauge.

7.6.5.2 Calibrating the temperature in the ch amber "ChambTemp"

Calibrate the low temperature of the chamber

When the autoclave is cold, using the sealing gland insert your reference thermocouple through the validation port and into the chamber. Position it near the Pt100 inside the chamber. Close the chamber door to allow the temperature inside the chamber to stabilize, then record the reading of your thermocouple and the reading on the screen of the autoclave. Access the calibration page for Chamb Temp then enter the data as follows (if necessary refer back to 7.6.3):

- **AL** (actual temperature low value): change the AL to the value shown by your reference thermocouple. **RL** (displayed temperature low value): change the RL to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- Now chamber temperature on the screen should match your reference thermocouple.

Calibrate the high temperature of the chamber

Using the sealing gland, insert your reference thermocouple through the validation port and into the chamber. Position it near the PT100 and operate a program of 134°C. When the unit has reached sterilization record the reading of your thermocouple and the reading on the screen of the autoclave.

It is not necessary to abort the cycle, the calibration can be done while the unit is running the cycle. access the calibration page for Chamb Temp then enter the data as follows (if necessary refer back to 7.6.3):

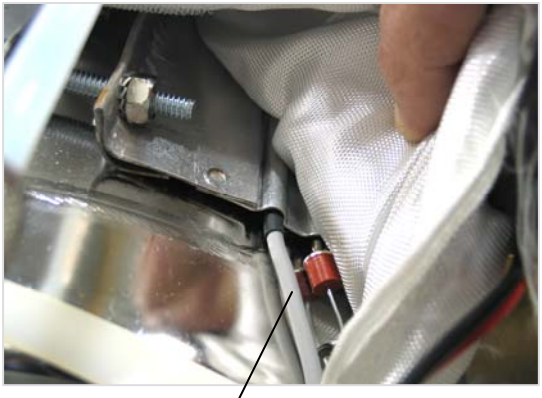
- **AH** (actual temperature high value): change the AH to the value shown by your reference thermocouple. **RH** (displayed temperature high value): change the RH to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- If you did not abort the cycle then the chamber temperature on the screen should match your reference thermocouple.

7.6.5.3 Calibrating the temperature in the jacket "CoilTemp"

Calibrate the low temperature of the jacket

When the autoclave is cold and turned off, peel back the insulation at the back top of the chamber. On your right will be a PT100 inserted under the heating element (see picture). Insert the reference thermocouple between the heating element and the chamber next to the PT100.

Turn the unit on and immediately select the Vacuum Test Cycle, this will keep the heaters from turning on. Access the calibration page for Coil Temp calibration. Record the reading of your thermocouple and the reading on the screen of the autoclave then enter the data as follows (if necessary refer back to 7.6.3):



Jacket PT100

- **AL** (actual temperature low value): change the AL to the value shown by your reference thermocouple. **RL** (displayed temperature low value): change the RL to the value read from the autoclave display.

- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- Now the jacket temperature on the screen should match your reference thermocouple.

Calibrate the high temperature of the chamber wall

Peel back the insulation at the back top of the chamber. On your right will be a PT100 inserted under the heating element (see picture). Insert the reference thermocouple between the heating element and the chamber next to the PT100.

Select a cycle of 134°C and wait for the autoclave-preheating icon to go off the screen. Access the calibration page for Coil Temp calibration. Record the reading of your thermocouple and the reading on the screen of the autoclave then enter the data as follows (if necessary refer back to 7.6.3):

- **AH** (actual temperature high value): change the AH to the value shown by your reference thermocouple. **RH** (displayed temperature high value): change the RH to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- Now the jacket temperature on the screen should match your reference thermocouple.

7.6.5.4 Calibrating the pressure in the steam generator "GenPress"

Calibrate the low pressure of the steam generator

When the unit is off and the steam generator is cold and there is no pressure in it, attach your reference pressure gauge to the calibration port on the generator manifold (see picture). Turn the unit on and immediately select the Vacuum Test Cycle, this will keep the heaters from turning on. Access the calibration page for GenPress calibration. Record the reading of your reference pressure gauge and the pressure reading for the generator on the screen of the autoclave then enter the data as follows (if necessary refer back to 7.6.3):

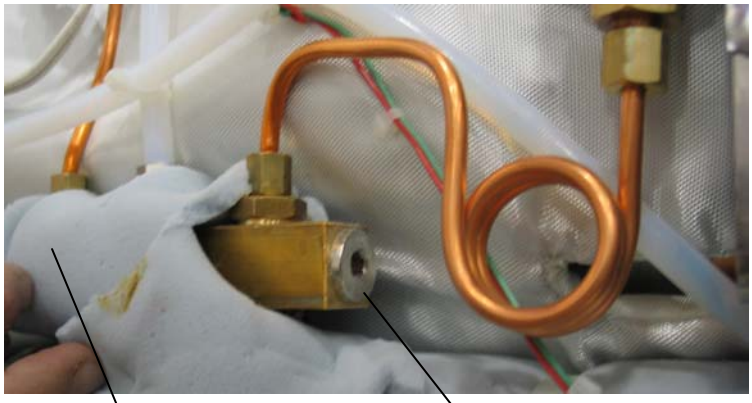
- **AL** (actual pressure low value): change the AL to the value shown by your reference pressure gauge.
- **RL** (displayed pressure low value): change the RL to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- The steam generator pressure on the screen should match your reference gauge.

Calibrate the high pressure of the steam generator

When the unit is off and the steam generator is cold and there is no pressure in it, attach your reference pressure gauge to the calibration port on the generator manifold (see picture). Select a program of 134°C the generator will begin to heat. When the unit has reached the ready state record the reading of your gauge and the reading for the generator on the screen of the autoclave.

Access the calibration page for GenPress then enter the data as follows (if necessary refer back to 7.6.3):

- **AH** (actual pressure high value): change the AH to the value shown by your reference pressure gauge. **RH** (displayed pressure high value): change the RH to the value read from the autoclave display.
- To save the data move to **SET** by pressing the **START/STOP** key and when it is blinking press the **UP** ▲ key.
- The steam generator pressure on the screen should match your reference gauge.



7.7 Setting the Clock

This directory enables the operator to set the time and date.
The **SET CLOCK** screen is displayed when entering the **SET CLOCK** directory:

When entering the directory the curser will be blinking on the "hour" digit.

The time is displayed in the upper row in the form “hh:mm:ss”. The hour range is 24 hour (i.e. from “0” to “24”).

The date is displayed in the lower row in the form “DD:MM:YYYY”.

1. To increase or decrease the time or the date use the **UP** and **DOWN** keys.
2. To move the curser from one digit to another press the **START/STOP** key.
3. After changing the time and the date move the curser to “**SAVE**”.
4. Confirm the new time and date by pressing the **UP** key. While the new time and date are being saved the following screen is displayed:

5. After saving is completed, the **SET CLOCK** screen is displayed again, move the cursor to **EXIT** and press **UP** to return to the previous **MENU** screen.
6. The printer will print the date in the format DD:MM:YYYY if the chamber temperature is being displayed in ˚C. It will print the date in the format MM:DD:YYYY if the chamber temperature is being displayed in ˚F.”

7.8 Printer Test

This option checks the good functioning of the printer.

1. Select "Printer Test" as described in section 7.1 "Menu".
2. Press the **START/STOP** key to perform the Printer Test.
3. Check that the message “Printer Test” is written on the paper.

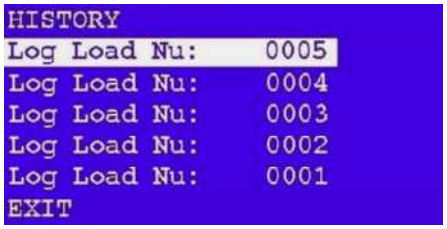
7.9 Language

THIS OPTION IS NOT AVAILABLE YET

7.10 History

This directory enables you to print the 40 previous cycles.

The **HISTORY** screen is displayed when entering the HISTORY directory:

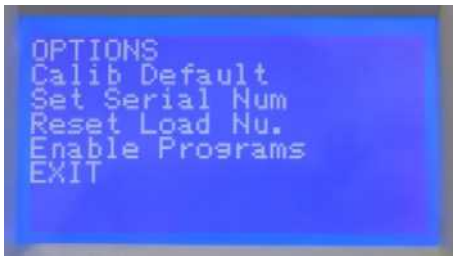


1. Choose the required cycle according to its number (Log Load Nu) with the **UP** and **DOWN** key
2. The words "Log Load Nu" are replaced by "printing" and the required cycle data is printed by the built in printer.
3. In order to leave this screen go to the **EXIT** option by using the **DOWN** key and select it by pressing the **START/STOP** key.

7.11 More options

This sub-directory enable the technician to perform a few additional operation.

1. To enter this sub-directory Select "more options" as described in



   section 7.1 "Menu".
2. Use UP ▲ and DOWN ▼ keys to browse through the 4 options + "EXIT".

7.11.1 Calib Default

This option enables the technician to return to the default calibration data as defined at the factory.

Caution

This operation is a non-retur n operation. Activating this option will delete all calibration data and it will be impossible to retrieve it.

1. Press the **START/STOP** key to return to the default calibration values..
2. To return to the main menu– move the cursor to "EXIT"

7.11.2 Set Serial Num

This option enables the technician to set the autoclave's serial number. This is necessary after replacing the electronic unit.

1. Press the **START/STOP** key to enter the "SERIAL NUMBER" display.
2. Press the **START/STOP** key to move the cursor from the right digit leftward.
3. Use UP ▲ and DOWN ▼ keys to change the value of each digit.
4. Complete the change by moving the cursor to "SAVE" and save the number by pressing UP ▲ or DOWN ▼ keys.

7.11.3 Reset Load Nu.

This option enables the technician to reset the autoclave's load number.

Caution
This operation is a non-retur n operation. Activating this option will reset the load num ber to "0" and it w ill be impossible to return to the previous setting it.

1. Press the **START/STOP** key to reset the load number.
2. The load number will reset to "0" and the following will be displayed.

7.11.4 Enable Programs

This option enables the technician to choose the programs that will be enabled or disabled.
When entering this option the following is displayed.

1. Use UP ▲ and DOWN ▼ keys to browse through the programs.
2. The number on the right side of the program name defines the status of the program.
   1 – enabled
   0 – disabled
   Press the START/STOP key to switch between 1 and 0.
3. It is possible to enable or disable any program, but at least one program must remain enabled.
4. To exit this option press both UP ▲ and DOWN ▼ keys simultaneously.

8 RESETTING THE AUTOCLAVE

Whenever it becomes necessary to restore the system to normal operation, the system must be reset. This will remove corrupted data from memory and restore a healthy program. On occasion other situations require that a reset be performed, they are as follows:

- When the machine is operated for the first time.
- If the machine has been sitting unused for a long period of time.

To reset the system proceed as follows:

- Turn-off the main power switch on the right side of the autoclave.
- Turn-on the main switch while pressing and holding the **DOWN ▼**key until the message **"RESET DONE!!!"** is displayed.
- This will not erase any settings or history.

9 MAINTENANCE AND REPLACEMENT PROCEDURES

9.1 Preliminary Operations for Each Technician Call

1. In order to mainta in efficient service, the technician must perform the following:

1. Inspect and clean if needed, the following:
   - ♦ Chamber, trays and trays holder (see Maintenance Instructions in the Operator's Manual).
   - ♦ Filters.
   - ♦ Seats and plungers of the solenoid valves (see sec. 9.21).
   - ♦ Water level electrode in the generator (see sec. 9.8).
   - ♦ Water reservoir(see sec. 9.27).
   - ♦ Steam generator (including descaling) (see sec. 9.32).
2. Visual inspection for leaks or corrosion in the piping elements
3. Tightening loose screws and piping joints.
4. Visual inspection of the wiring.
5. Calibration and logging the calibration of the temperature and pressure.

2. After completing the work, the technician must perfo rm the following cycles:

1. A Wdry 134 cycle with out load
2. A Vacuum Test
3. A B&D Test.

Note:
The warranty does not cover cleaning or maintenance. These procedures are the responsibility of the equipment owner."

9.2 Safety tests after repair

ATTENTION!

After every repair or dismantling of the enclosure, the technician should perform the following two electrical safety tests.

1. **Enclosure Leakage Current Test.**
   Every autoclave should pass this test as follows:
   1. Connect the electrical cord to the autoclave. **DO NOT** plug into the power outlet.
   2. Turn on the main switch on the right side of the autoclave.
   3. Short-circuit the L and L pins on the cord's plug.
   4. Connect the Short-circuit pins to the L pole on the Megger.
   5. Connect the GND pin to the GND pole on the Megger.
   6. Impose an electrical potential of 1000V±10% on the tested autoclave. The insulation resistance should be at least 2 MΩ.

   The test is successful if there was no leakage.

2. **Protective Earth Impedance Test**
   1. Connect the grounding pin of the power cord plug to one pole of an Ohmmeter.
   2. Connect any other metallic part (preferable – the metallic part of the locking screw) to the second pole of the Ohmmeter.
   3. The resistance should not exceed 0.3 Ω.

   After performing these tests, the Service Engineer should complete and sign the Work Order.

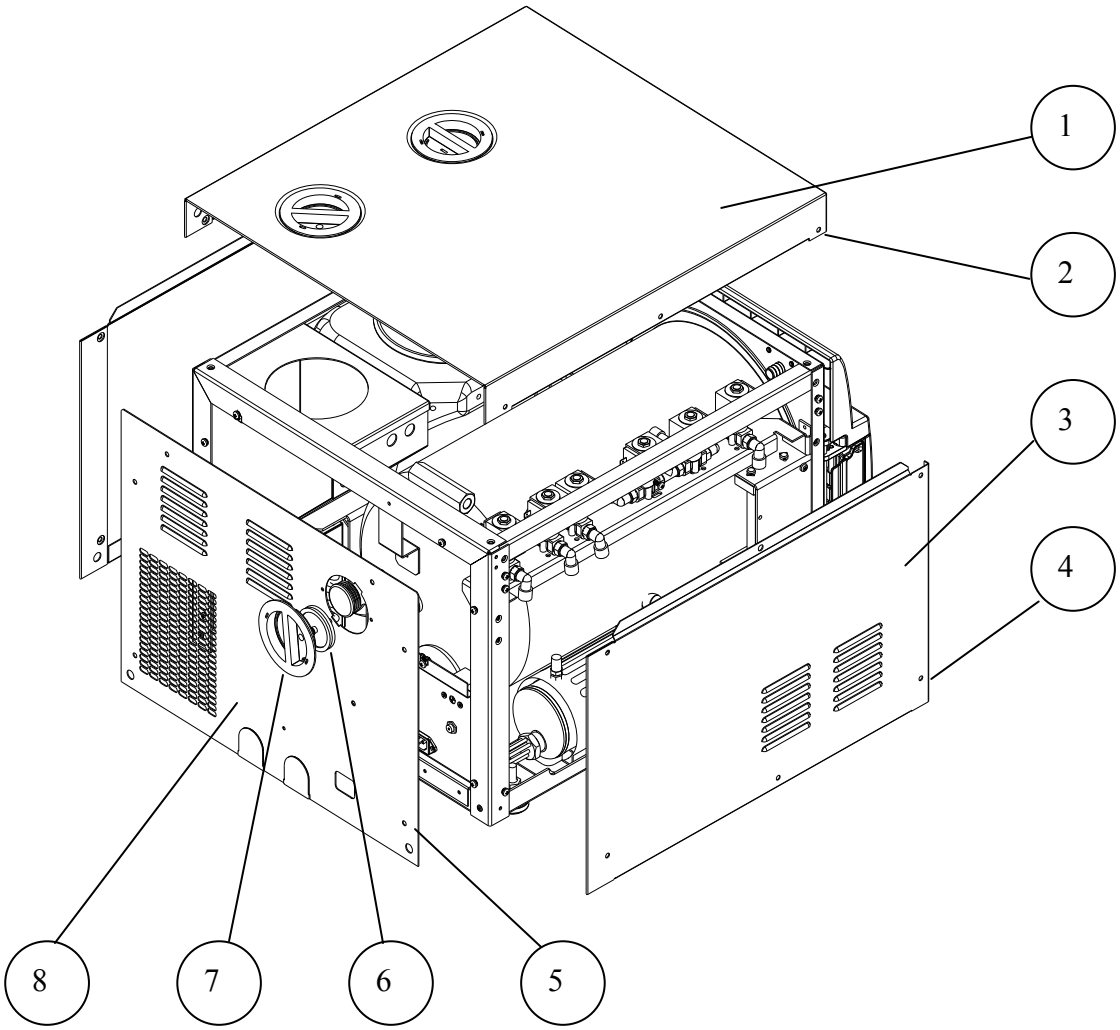
9.3 Dismantling the Outer Covers of the Autoclave

Caution!

Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the autoclave.

Allow the autoclave to cool before removing outer covers.

1. Unscrew the screws (2) holding the upper cover (1).
2. Remove the upper cover.
3. Unscrew the screws (4) holding the side covers (3).
4. Remove the side covers (3).
5. Disconnect the air filter (6) from the air filter cover (7).
6. Unscrew the screws (5) holding the rear covers (8).
7. Remove the rear cover (8).
8. Remove the grounding wires from the rear cover.



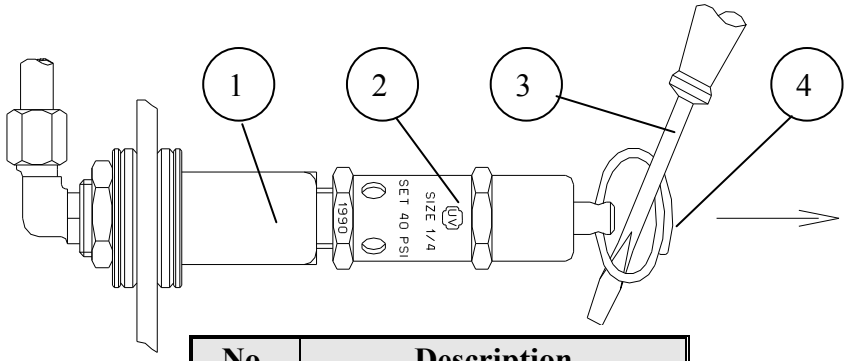
9.4 Replacing the Safety Valve

Caution!

Before starting, be sure that the electric cord is disconnected and that there is no pressure in the chamber or generator.
Allow the autoclave to cool before removing outer covers.

The safety valve is installed to protect the system from over pressurizing should all the electrical controls fail.

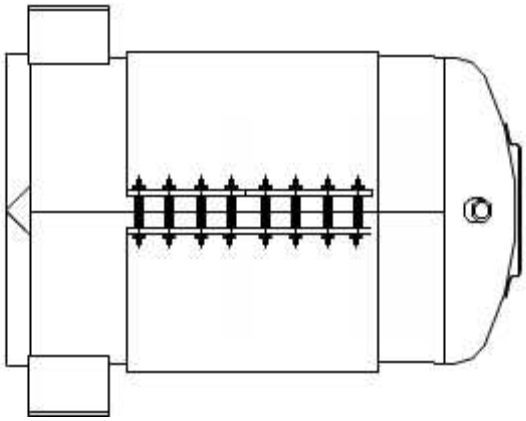
1. Take off the autoclave cover (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
2. Remove the water reservoir cover.
3. Unscrew the safety valve (2) and remove it from the safety valve base (1).
4. Replace the valve with a new safety valve (install only an original equipment replacement!). Use liquid thread seal on the threads to seal it. Tighten the safety valve to prevent leaking.
5. To check the new safety valve, perform the following:



No.	Description
1	Safety valve base
2	Safety valve
3	Pulling device
4	Pressure relief ring

6. Operate the sterilization cycle according to the manual but with no instruments.
7. Allow a pressure of approximately 300 kPa (29-psig) to build up in the generator and the chamber.
8. Remove water reservoir cover.
9. Pull the ring (4) of each safety valve in turn using a tool, i.e. screwdriver, hook etc. (3). Pull the safety valve ring for 2 seconds. Be careful not to burn your hands.
10. Press the STOP key to stop operation, and exhaust steam from chamber.
11. Wait until pressure decreases to zero, only then can the door be opened.

9.5 Replacing chamber heater



Be careful not to bend the tubing or over-tighten with tie wraps. Kinking the tubing will weaken that area of the tube and it will leak. Replace any tubes that become damaged.

1. Perform this procedure only when the unit is cool and there is no pressure in the chamber.
2. Unplug the unit
3. Drain the steam generator using a 6 mm Allen wrench to remove the bottom plug.
4. Drain both reservoirs
5. Unscrew the screw holding the cooler to the right rear vertical frame support.
6. Remove the left and right top frame supports.
7. Disconnect the chamber pressure transducer tubing from top rear chamber manifold. Move the transducer and tubing out of your work area.
8. Disconnect the air valve 52 tubing from the top rear chamber manifold.
9. Disconnect tubing from the air check valve on the top rear chamber manifold.
10. Remove the generator pressure transducer from generator manifold. Move the transducer and tubing out of your work area.
11. Remove the safety valve tube from generator manifold and also from safety valve at the reservoir.
12. Remove steam generator tube from steam valve 93.
13. Remove generator water inlet tube from water valve 21 at the check valve.
14. Remove wires from generator pressostat.
15. Remove wire from generator water electrode.
16. Disconnect generator heater wires from both sides of terminal block on back of valve assembly bracket.
17. Remove three screws holding the Toroidal transformer rear mounting bracket and lay it back on the counter.
18. Remove the generator cut-off thermostat probe
19. Remove four screws from bottom of chassis holding steam generator and remove steam generator.

20. Remove the water tube from the water pump outlet.
21. Remove air filter tube from valve 43.
22. Remove the fast exhaust tube from valve 73.
23. Remove the steam tube from valve 93 at the connector on the back center of the chamber.
24. Remove the vacuum tube from the top connection of the cooler.
25. Remove two wires from the door switch.
26. Remove three screws holding the valve assembly bracket and position bracket and valves over reservoirs.
27. Remove the fill tube from the fill cup and move out of the way.
28. Disconnect the two chamber heating element wires.
29. Cut tie wrap holding insulation blanket and discard.
30. Carefully remove insulation blanket. Pulling too hard will tear the blanket. Be aware the two screws holding the waste reservoir bracket to the chassis my snag the blanket. The rear of the chamber can move sideways slightly to add clearance for removing the blanket.
31. Mark edge of heating element down length of chamber for positioning the replacement.
32. Loosen the four bolts holding the chamber heating element.
33. Remove the chamber temperature sensor and cut-off thermostat probe. Note their location for reinstallation.
34. Remove completely the four bolts holding the chamber heating element.
35. Carefully remove the heating element. The rear of the chamber can move sideways slightly to add clearance for removing the heater.
36. Install the new heating element and follow these steps in reverse to reassemble the unit.
37. When tightening the bolts on the heating element, tighten as tight as possible.
38. When reinstalling the insulation make sure it is tucked in, in all the proper places.
39. When the installation is complete run a cycle to verify proper operation.
40. The steam generator may fail to heat initially due to air pressure in the generator. If this occurs purge the air by opening the generator safety valve.

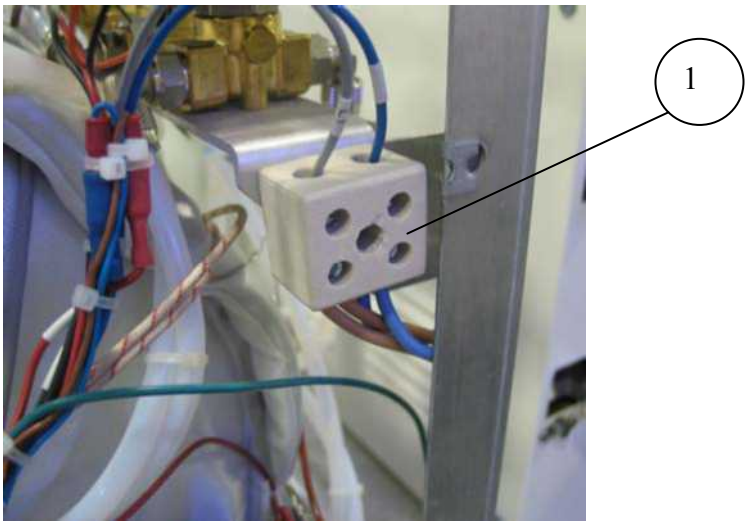
9.6 Replacing steam generator heater

Caution:

Before starting, be sure that the electric cord is disconnected from the power source and that there is no pressure in the autoclave chamber or steam generator.

Allow the autoclave and the steam generator to cool before removing outer covers.

1. Remove the autoclave cover (see para. 9.3 “Removing the autoclave’s outer covers”).
2. Drain the water from the generator by opening the drain plug. Wait until all the water has drained from the generator (see sec. 9.24).
3. Disconnect the heating element wires from the porcelain connector (1).
4. Remove three screws holding rear mounting bracket and lay it back on the counter.
5. Remove the cut-out thermostat probe from the generator.
6. Remove the heating element from the generator.
7. Install the new heating element using liquid Teflon sealant.
8. Insert the cut-out thermostat probe into the new heating element.
9. Reconnect the heating element wires.
10. Reattach the rear mounting bracket.
11. Run a test cycle.



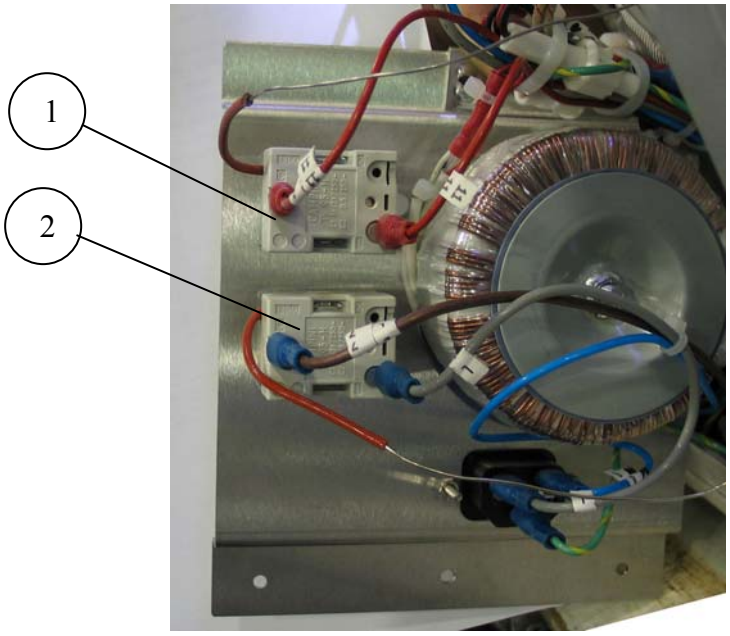
9.7 Replacing the steam generator cut-off thermostat

The autoclave is equipped with a cut-off thermostat, which protects the steam generator heating element from overheating.

Caution

Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber or steam generator. Allow the autoclave to cool before removing outer covers.

1. Remove the rear cover (see para. 9.3 “Removing the autoclave’s outer covers”).
2. Remove three screws holding rear mounting bracket and lay it back on the counter.
3. Remove the probe of cut-out thermostat (2) from the generator.
4. Remove the cut-out thermostat probe from the generator.
5. Unscrew the nut holding the cut-off thermostat (2) to the rear mounting bracket.
6. Insert the new cut-off thermostat probe into the generator as far as it will go. Secure the cut-off thermostat with the nut removed earlier.
7. Reattach the rear mounting bracket.
8. Reassemble the rear cover.



No.	*Description*
1	Chamber heater cut-off thermostat
2	Steam generator heater cut-off thermostat

9.8 Replacing and cleaning the generator's water level electrode

The electrode that controls the water level of the generator is located in the rear of the generator.

The Electrode performs the following:

a. It protects the heating element by switching it off when there is not enough water in the generator.

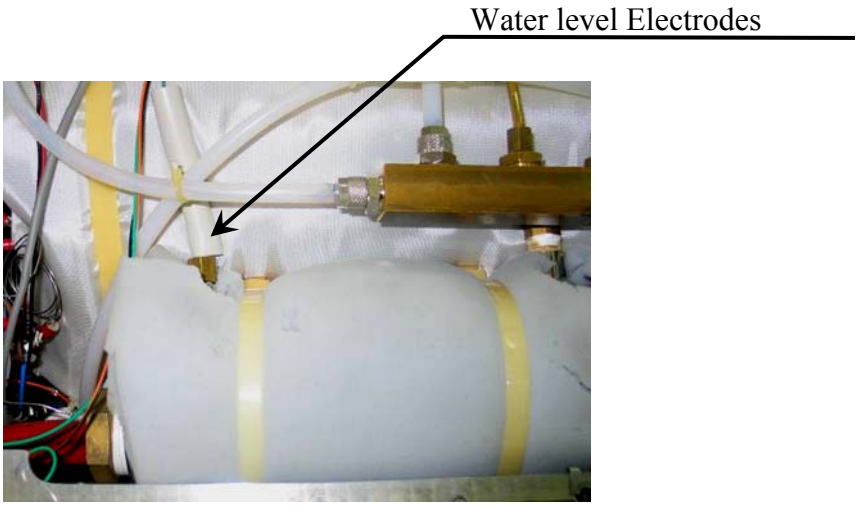
b. It maintains the water level in the generator by switching the water pump on and off as required.

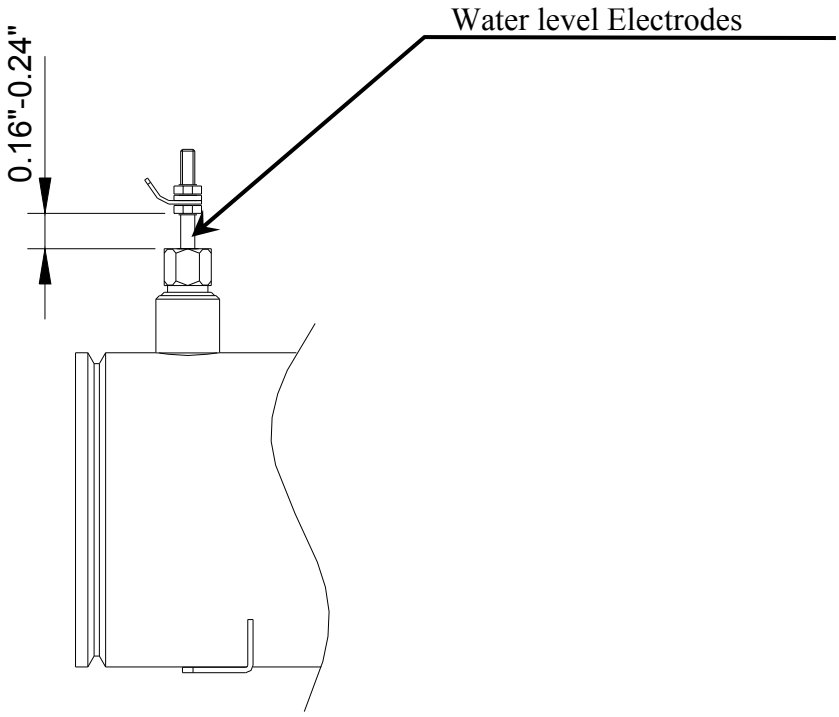
To clean or replace the electrode proceed as follows (refer to the picture and the drawings on the next page):

Caution!
Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the chamber or the generator.
Allow the autoclave to cool before removing outer covers.

1. Take off the autoclave cover (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
2. Remove the electrical connection from the terminal of the electrode.
3. Unscrew the locking nut and remove the electrode from the top of the housing.
4. Replace the electrode with a new one or reinstall the same electrode after cleaning.
   4.1 To clean the electrode, use a damp cloth or sponge. A mild soapy solution may be used, rinse thoroughly. **DO NOT** use any harsh chemicals
   4.2 When installing a new electrode, **make sure** that the electrode is positioned exactly as described in drawing "water level electrode (see drawing ahead).
5. Tighten the locking nut to prevent any steam or water leakage.
6. Reconnect the electrical wire to the electrode terminal.
7. Turn the autoclave on. The generator will automatically fill with water. Observe that the unit is heating. Wait for the unit to reach 30 psig (44.7 psi 308 kPa), and then check for leaks around the locking nuts.
8. Reassemble the cover.

WATER LEVEL ELECTRODE





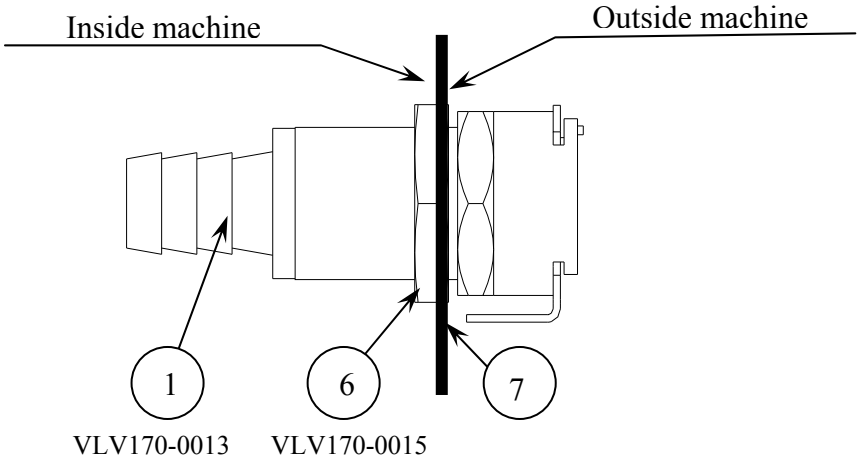
9.9 Replacing the Drain Valve

There are two drain valves on the front of the autoclave. One drains the mineral free water from the clean reservoir and the other drains the water from the waste water reservoir.

Caution!

Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.
Allow the autoclave to cool before removing outer covers.

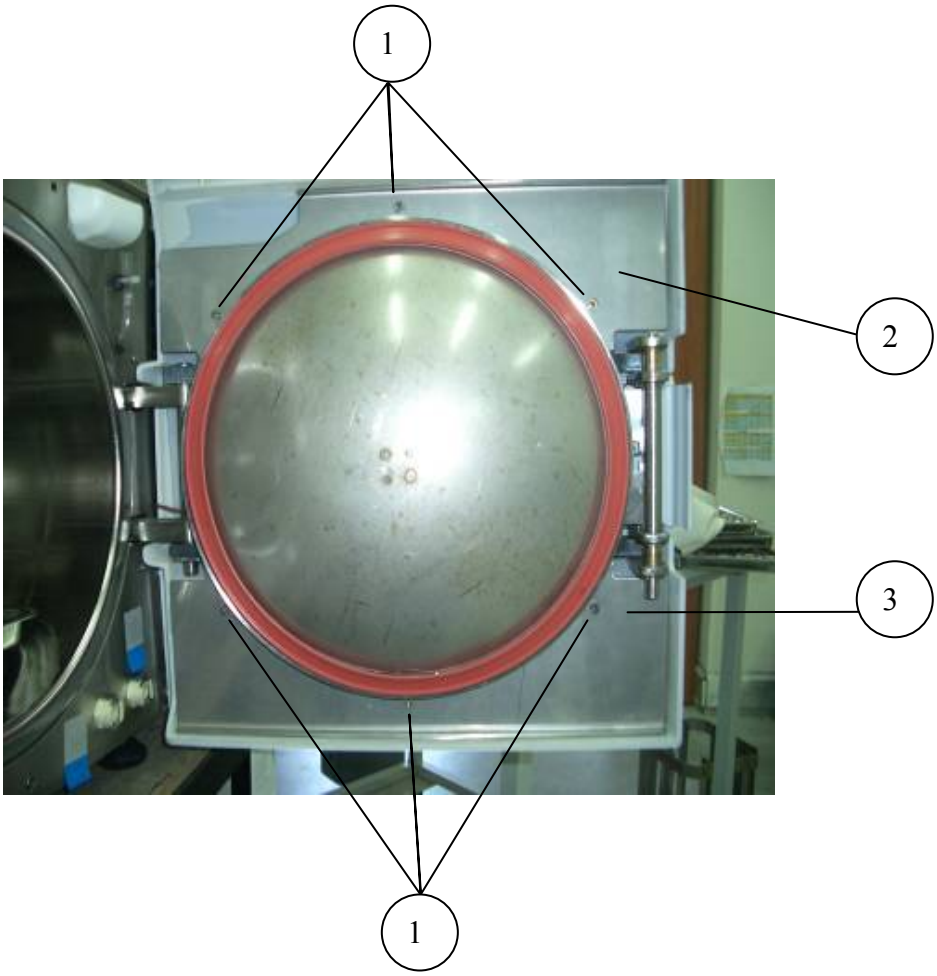
1. Drain the reservoir (See sec "Draining the Reservoirs" in the Operator's Manual). If the drain is not operational it will be necessary to suction the water out of the reservoir from the top.
2. Remove the autoclave cover (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
3. Remove the right top frame support over the reservoirs..
4. Remove the metal shroud shielding the electronic components.
5. Remove the drain hose from the inside portion of the drain valve (1).
6. Unscrew the inside nut (6) using a 21mm socket wrench.
7. Remove the drain valve (1) from the panel (7).
8. Install the new valve and reattach the drain tube. Use a tie wrap to secure the drain tube to the valve.
9. Verify there is no leakage.
10. Replace the metal shroud and right frame support.



9.10 Replacing the Door Cover

Caution!
Before starting, open the door first, then disconnect the instrument from the power source and ensure that there is no pressure in the chamber or generator.
Allow the autoclave to cool before removing outer covers.

1. Remove the two screws holding the Door Handle Cover and slide it out from the door. It might be tight, but it will slide (see sec 9.14).
2. Unscrew the 6 screws (1) attaching the Door Cover to the upper (2) and lower (3) cover holders.
3. Remove the Door Cover.
4. Install the new Door Cover and fasten with the 6 screws.
5. Reinstall the Door Handle Cover (see sec 9.14).



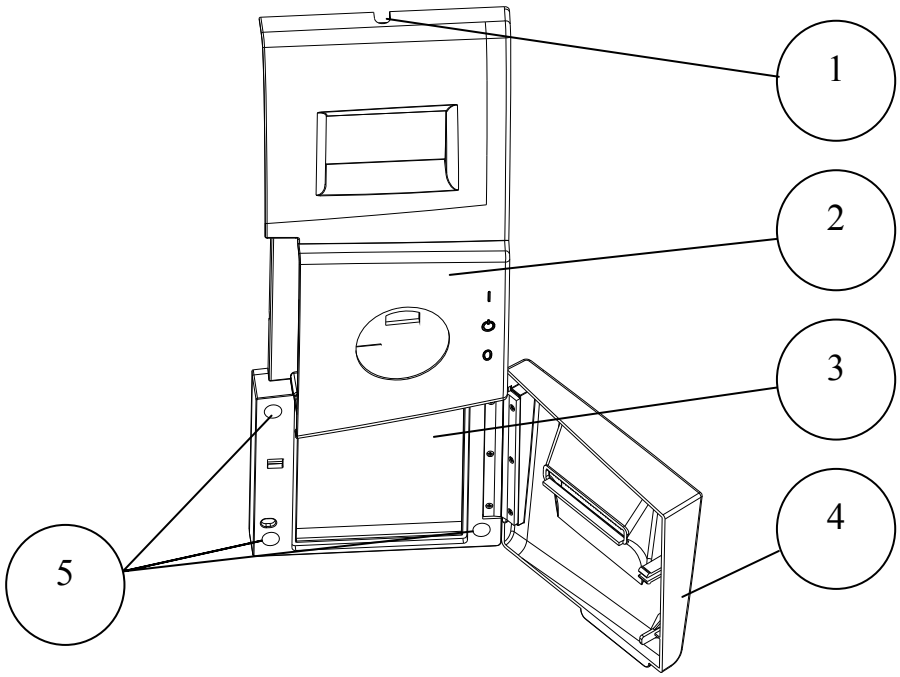
No.	*description*
1	Fastening screws
2	Upper cover-holder
3	Lower cover-holder

9.11 Replacing the Front Panel

***Caution*!**

Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the autoclave.
Allow the autoclave to cool before replacing the Panel.

1. Open the printer's door (4).
2. Unscrew the three bottom fastening screws (5).
3. Unscrew the top fastening screw (1).
4. Pull the panel approx. 30 centimeters.
5. Remove the digital card (located on the rear side of the panel – as per instructions in sec.9.22).
6. Remove the printer (3) (see sec. 9.15 "Replacing the Printer").
7. Assemble the digital card on the new panel (see sec. 9.22).
8. Assemble the printer on the new panel.
9. Assemble the panel and fasten it to the autoclave with the 4 fastening screws (1 & 5).



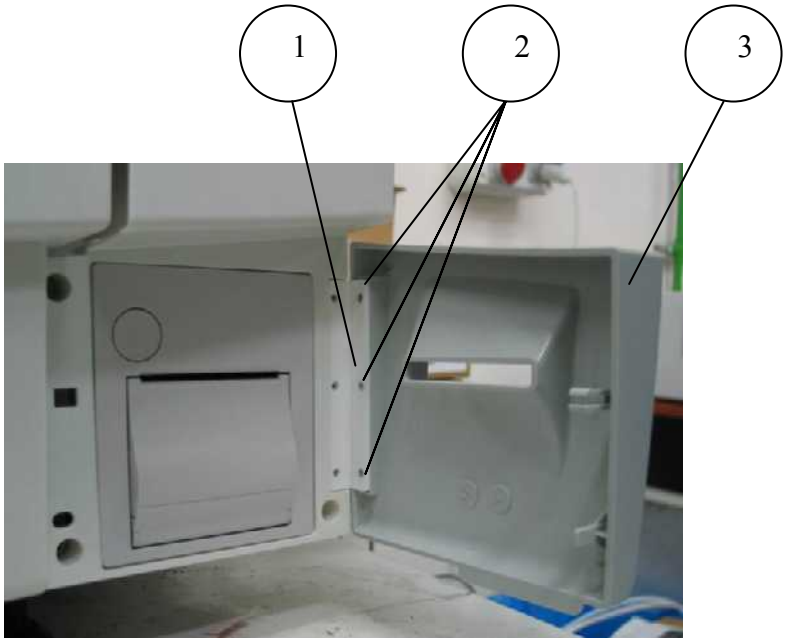
9.12 Replacing the Printer Door

Caution!

Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the autoclave.

Allow the autoclave to cool before replacing the Printer Door.

1. Open the printer's door (3).
2. Unscrew and remove the 3 screws (2) holding the Printer Door to the Integral Hinge (1).
3. Remove the Printer Door.
4. Assemble the new Printer Door to the Integral Hinge with the 3 screws (2).

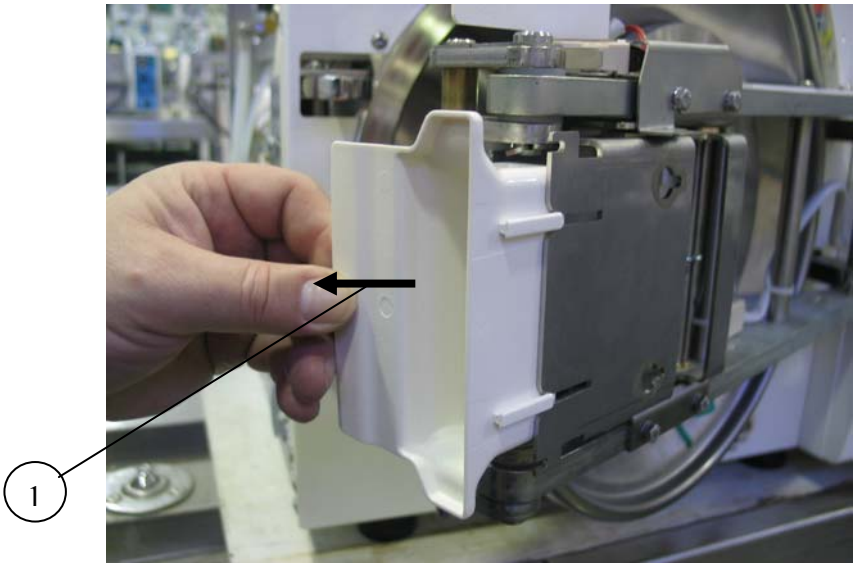


9.13 Replacing the Door Handle

Caution!

Before starting, ensure that there is no pressure in the autoclave.
Allow the autoclave to cool before replacing the Door Handle.
<u>Do not</u> disconnect the electric po wer, since disconnecting the po wer will lock the handle and prevent replacement of the handle.

1. Open the autoclave's door.
2. Remove the two screws holding the Door Handle Cover and slide it out from the door. It might be tight, but it will slide (see sec 9.14).
3. Remove the Door Handle by pulling it in the direction of the arrow (1). It might be tight, but it will slide out of its holder.
4. Slide the new handle into position.
5. Reinstall the Door Handle Cover (see sec 9.14).

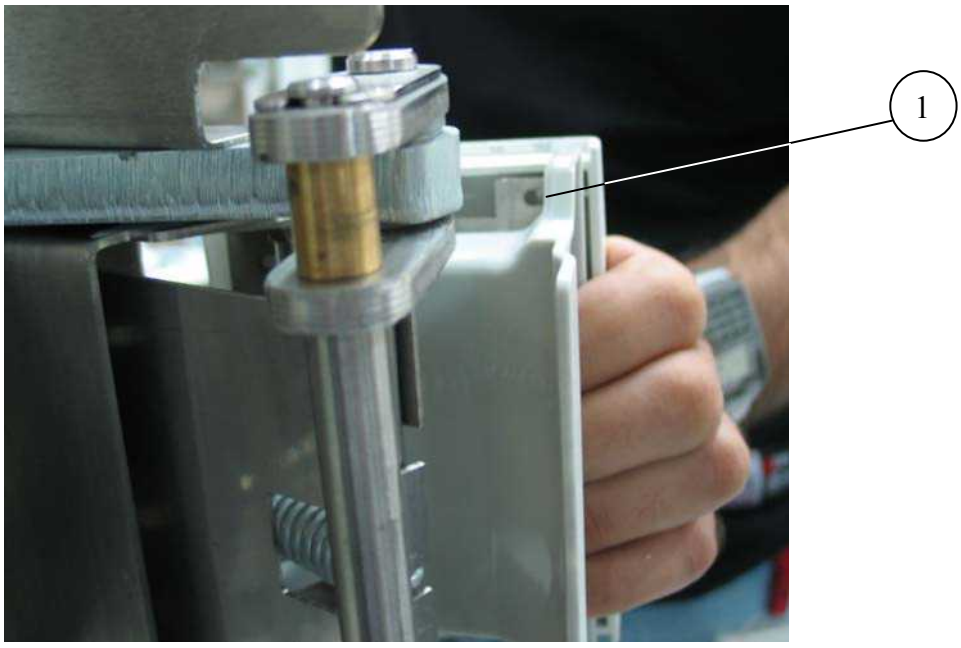


9.14 Replacing the Plastic Handle Cover

Caution!

Before starting, ensure that there is no pressure in the autoclave. Allow the autoclave to cool before replacing the Door Handle Cover. <u>Do not</u> disconnect the electric po wer, since disconnecting the power will lock the handle and prevent replacement of the handle cover.

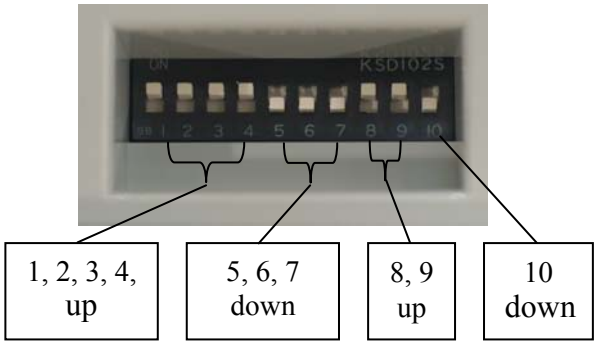
1. Open the autoclave's door.
2. Open the handle and release the two screws (1).
3. Slide the handle cover out from the door. It might be tight, but it will slide.
4. Transfer the two screws (2) from the rear of the old cover to the new cover and tighten so as to provide a snug fit when the cover is slid back into the slots on the metal bracket.
5. inserted screws (1) in the cover until two threads are above the cover's surface.
6. Now insert the cover into the handle bracket.
7. Now with the cover in position tighten the two front screws (1).



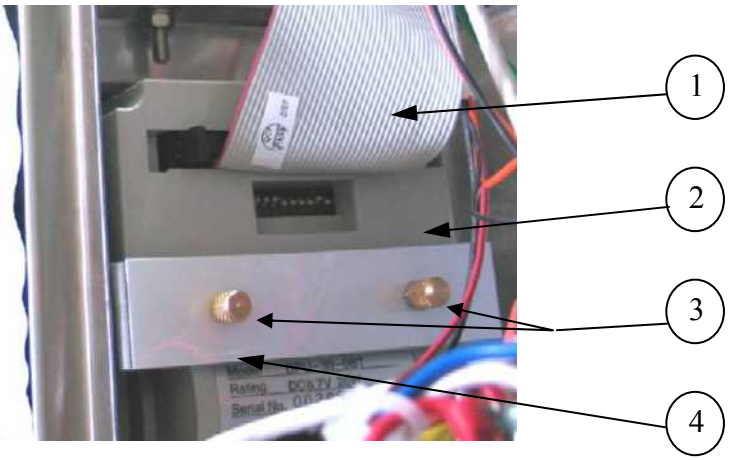
9.15 Replacing the Printer

Caution!
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber or the generator.
Allow the autoclave to cool before removing outer covers.

1. Remove the autoclave cover (see sec. 9.3 “Dismantling the Outer Covers of the Autoclave”).
2. Disconnect the cable (1) from the back of the printer.
3. Unscrew the two screws (3) attaching the fastening bracket (4) to the printer.
4. Remove the printer.
5. Set the dip switches on the new printer, located on the back side of the printer, as follows:



6. Insert the new printer into its frame.
7. Assemble the mounting bracket (4) to the printer (2) with the two screws (3) and verify that it is securely in position.
8. Connect the cable (1) to the printer.
9. Verify connection of power by performing a printer test (see sec. 7.8).
10. Run a cycle and verify that the printer operates correctly.

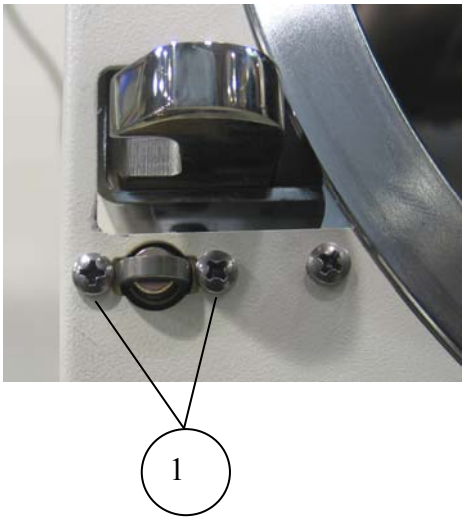


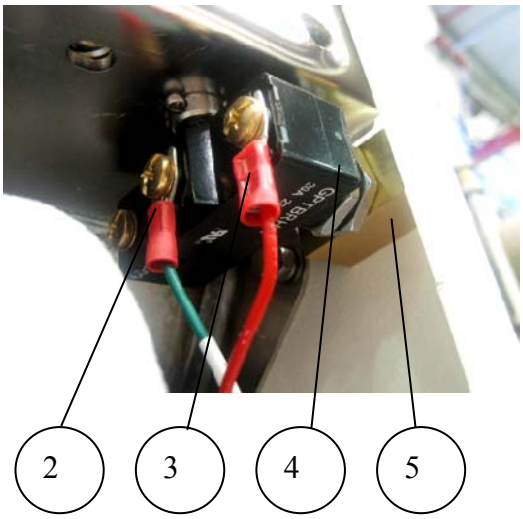
No.	Cat. No.	Description
1	CTP201-0127	Cable, Printer, DPU-30, 30cm, 34p
2	THE002-0022	Printer, DPU-30, Seiko

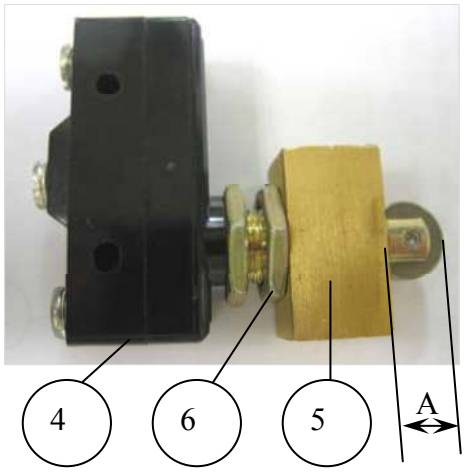
9.16 Replacing the Door Switch

Caution!
Before starting, disconnect the instrument from the po wer source and verify that there is no pressure in the chamber or the generator. Allow the autoclave to cool before removing outer covers.

1. Remove the autoclave top and left covers (see para. 9.3 “Dismantling the Outer Covers of the Autoclave”).
2. Open the door
3. Unscrew the 2 screws (1) holding the door switch adapter (5) on the front panel of the autoclave.
4. Disconnect the 2 wires (2, 3) from the door switch (4).
5. Remove the door switch from the autoclave.



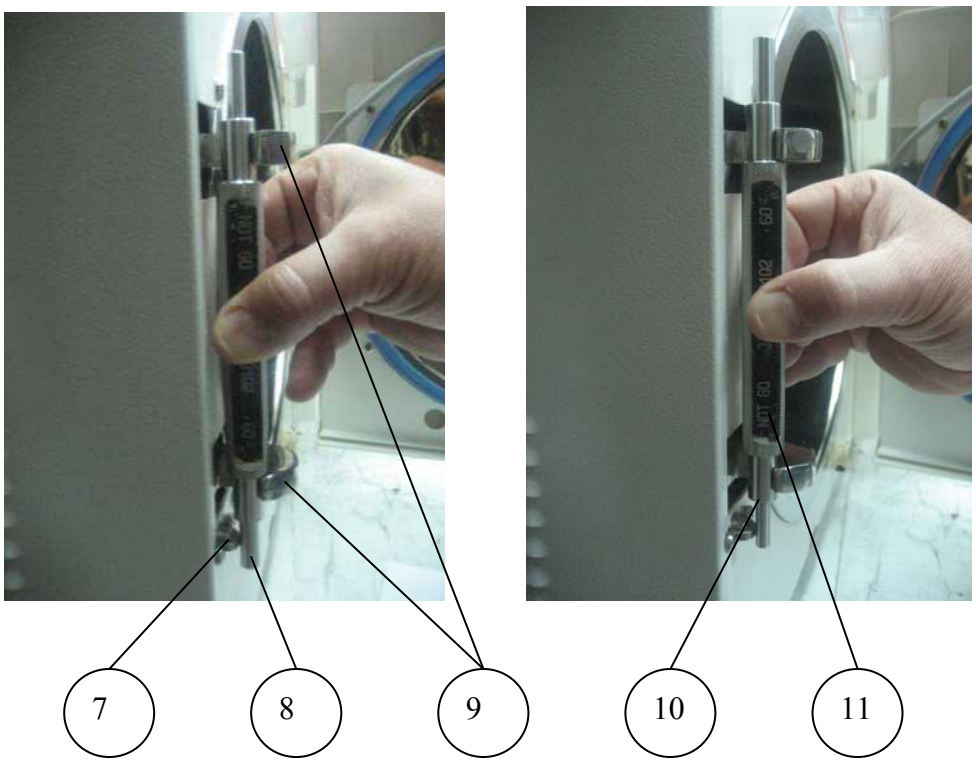




6. Release nut (6) and unscrew the door switch (4) from the door switch adapter (5).
7. Assemble the new door switch to the adapter. Verify that the wheel protrudes (A) approx. 0.37"-0.38" (9.5-10mm) from the adapter (5) and tighten nut (6).
8. Assemble the door switch with its adapter to the front panel. Do not tighten the two screws (1).
9. Perform final adjustment of the microswitch using a GO-NO GO gauge (P/N JIG411-0102) as follows:

9.1 Insert the GO side (8) of the gauge (11) between the wheel (7) of the microswitch and the door locking hooks (9) while pressing the gauge to the hooks. Verify that you hear a "click" indicating the closing of the switch.

9.2 Insert the NO GO side (10) of the gauge (11) between the wheel (7) of the microswitch and the door locking hooks (9) while pressing the gauge to the hooks. Verify that you **DO NOT** hear the "click" indicating the closing of the switch.



9.3 If these two conditions are fulfilled, dimension "A" is correct, tighten screws (1).

9.4 If dimension "A" is not correct, remove the microswitch from the panel, turn the adapter 1/2 a turn clockwise or counterclockwise as required and reassemble it to the panel.

9.5 Repeat steps 9.1-9.4.

10. Reconnect the 2 wires (2, 3) to the door switch. Verify that one wire is connected to screw no. 1 ("COM" - marked on the switch) and the other wire is connected to screw no. 3 ("NO" marked on the switch).

Make sure that the door switch is installed correctly (the wheel of the microswitch is parallel to the floor)!
Check that the operational message "Door is Open" is displayed when the door is opened and that the message disappears when the door is closed.

9.17 Replacing the fuse on the Electronic Board

Caution!

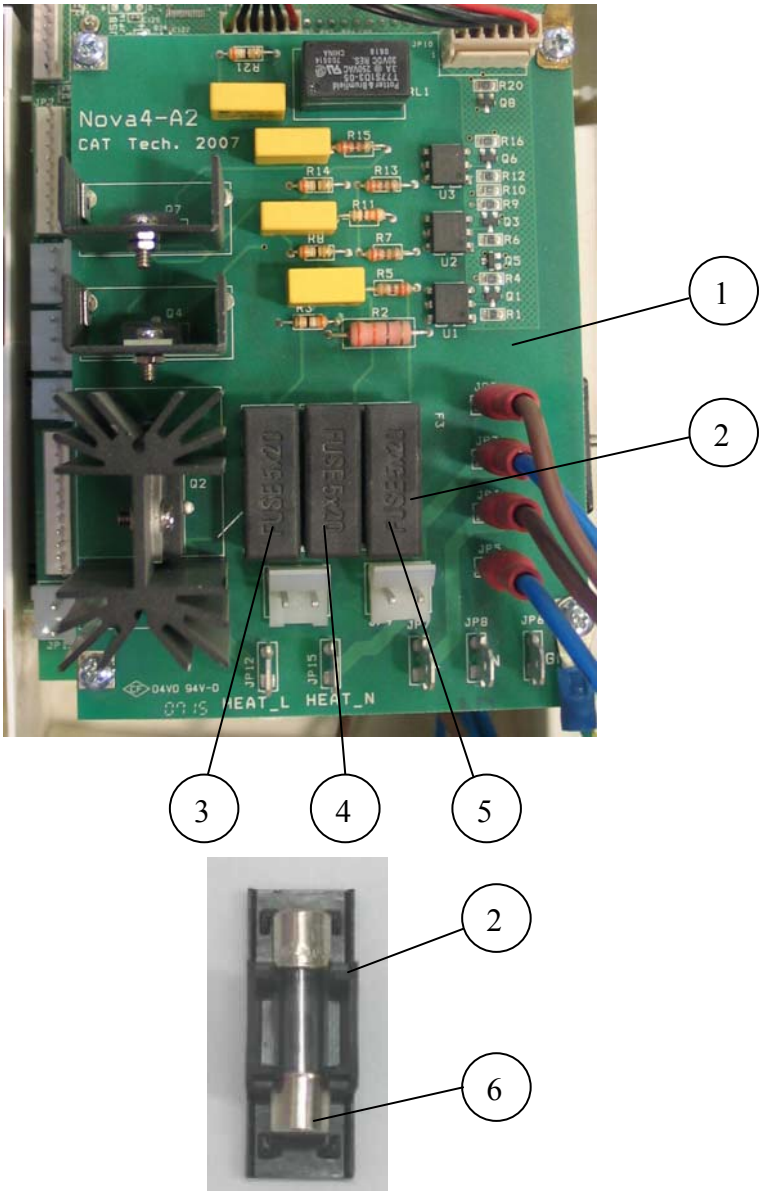
Before starting, disconnect the instrument from the power source.

There are 3 fuses on the AC high voltage power board (Nova4-A2) board. All fuses are 5x20mm.

1. fuse 3.15A FAST (3) to the chamber heater
2. fuse 2A FAST (4) to the vacuum pump
3. fuse 2A FAST (5) to the water pump

To replace the fuses proceed as following:

6. Separate the front panel from the autoclave (see sec. 9.11 " Replacing the Panel").
7. Pull it outwards as far as possible.
8. With a small screwdriver disconnect the fuse holder (2) from the board (1).
9. Remove the faulty fuse (6) from the holder and replace it with a new one.
10. Return the fuse holder with the new fuse to the board.
11. Reassemble the panel.

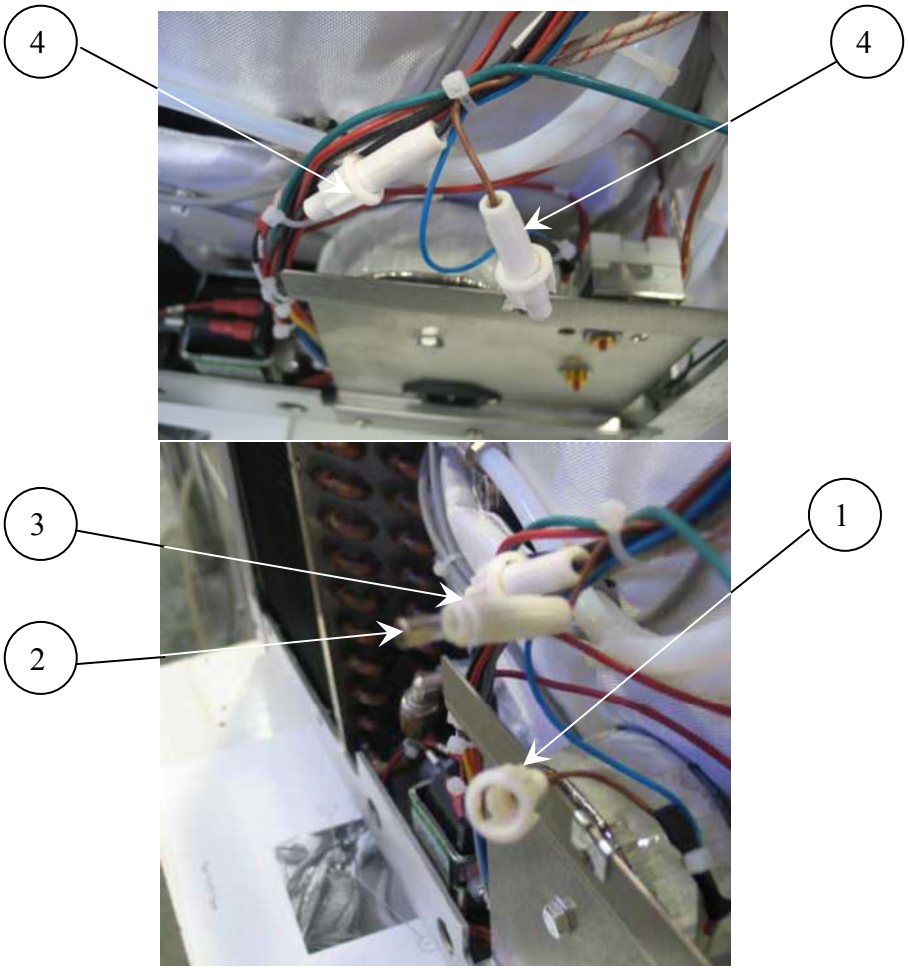


9.18 Replacing the fuses of the transformer

Caution!
Before starting, disconnect the instrument from the power source.
Allow the autoclave to cool before removing outer covers.

There are 2 fuses, an input fuse 800ma slow blow located in the brown wire and an output fuse 5A fast blow located in the black wire. Both fuses are 5x20mm**.**

1. Remove the rear cover (see sec. 9.3 “Dismantling the Outer Covers of the Autoclave”).
2. If necessary, cut one plastic cable tie to release the fuse capsule (4).
3. Twist and gently pull the two halves of the fuse capsule apart (1) and (3).
4. Take out the burnt fuse and replace it with a new fuse (2).
5. Reassemble the fuse holder.
6. Replace the cut cable holder.
7. Re-assemble the covers.



9.19 Replacing the water pump

Caution!

Before starting, disconnect the instrument from the power source.
Allow the autoclave to cool before removing outer covers.

1. Empty the water reservoir (See Draining the Water Reservoir in the Operator's Manual).
2. Remove the autoclave rear cover (see sec. 9.3 "Dismantling the Outer Covers of the Autoclave").
3. Remove the three screws holding the electrical socket rear mounting bracket and set it aside.
4. Disconnect the wires from the pump.
5. Disconnect the piping from the pump.
6. Remove the pump (7) from the rubber shock absorbers (1). If the rubber shock absorbers are damaged, replace them.
7. Replace the damaged pump with a new pump.
8. Reconnect wiring and piping.

9. Reassemble the electrical socket bracket.
10. Reassemble the rear cover.
11. Refill the mineral-free water reservoir.
12. Turn on the autoclave and verify it operates correctly.

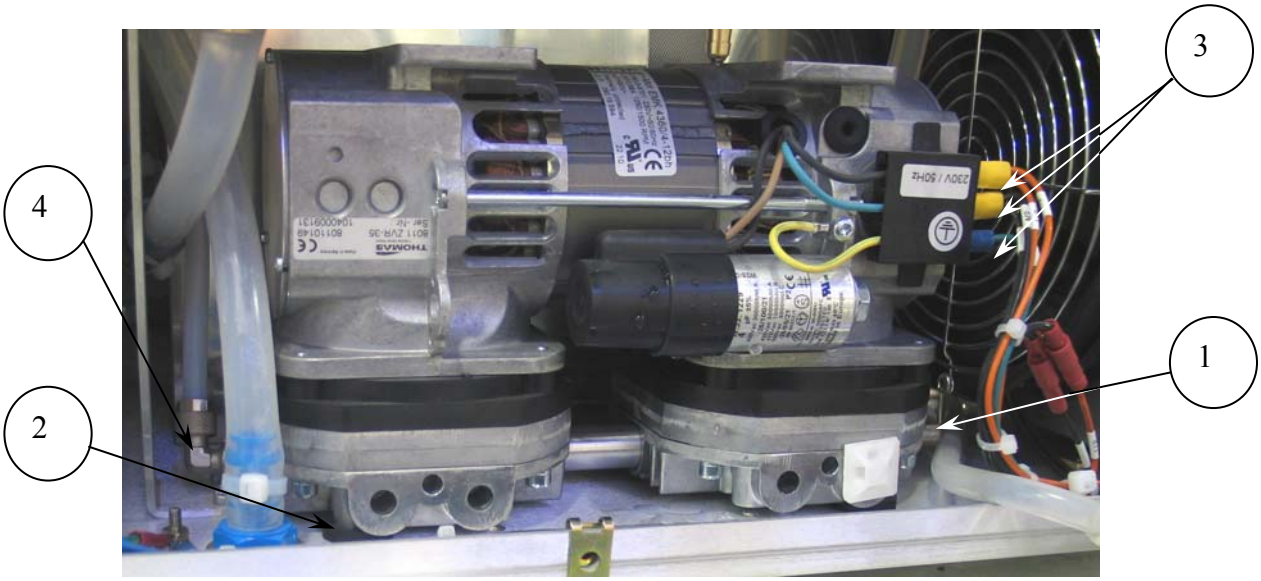
No.	Description		Cat. No.
1	Rubber shock absorber		SKR203-0006
2	Fitting 5/16"x1/8" (straight)		FIT100-0803
3	Screw	Fastening the shock absorber	BOL191-0142
4	Nut		NUT192-0155
5	washer		NUT193-0283
6	Spring washer		NUT193-0317
7	ULKA water pump		PUM055-0019

9.20 Replacing the vacuum pump

Caution!

Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber or steam generator. Allow the autoclave to cool before removing outer covers.

1. Take off the autoclave cover (see para. 9.3 “Dismantling the Outer Covers of the Autoclave”).
2. Disconnect the electrical wires (Orange, Black & Green wires) (3).
3. Remove fittings for inlet tube (1) and outlet tube (4).
4. Unscrew the 4 pump-leg screws (2) from the bottom of the chassis.
5. Remove the vacuum pump.
6. Install the new pump and assemble the leg screws (2).
7. Install the inlet and outlet tube fittings (1) and (4) on to the new pump.
8. Connect the electrical wires. Verify that the wires are connected as they were originally.
9. Reassemble the covers.
10. Connect the autoclave to the power supply and turn on the autoclave. Run program 2 (Wdry 134) to verify that the vacuum pump operates O.K.



9.21 Replacing the Plunger or Coil of the 1/4" Solenoid Valve

Caution!
Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in th e chamber or steam generator.
Allow the autoclave to cool before removing outer covers.

1. Take off the autoclave top cover (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
2. Remove nut (3) and washer (2).
3. Remove the coil (1).
4. Unscrew the plunger and replace it with a new kit. The plunger kit consists of the plunger housing (6) and the plunger & spring (5).
5. Using a magnifying glass, inspect the seat in the valve base for chips or cracks. If any are found the base will need to be replaced."
6. Reassemble the coil (1) the nut (3) and the washer (2). If a new coil is needed then unplug the electrical connector (4) from the old coil and plug it into the new coil.
7. Reassemble the coil (1) and the nut (3).
8. Re-install the autoclave's cover.

9.22 Replacing the Electronic Boards

Caution!
Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the chamber.
Allow the autoclave to cool before removing outer covers.
See drawings "Nova4-D2" and "Nova4-A2 on the following pages to assist in locating connectors marked by JP.

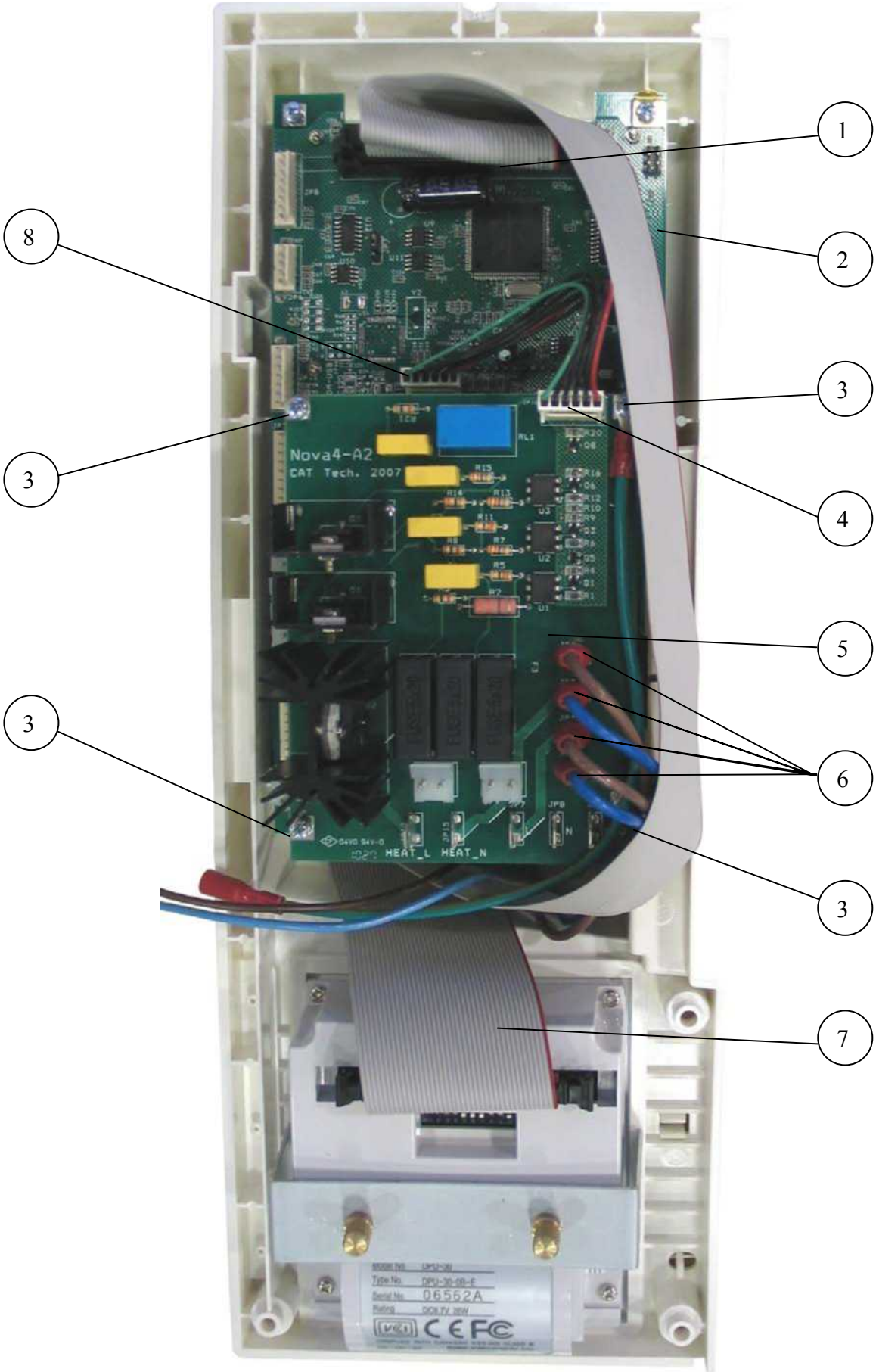
9.22.1 Removing the Front Panel Assembly

1. Remove the control panel assembly (see sec 9.11 “Replacing the Front Panel;”).
2. Disconnect the flat cable (7) from the flat cable socket (1) at the top of the big board (Nova4-D2).
3. Disconnect all the connectors along the outside edge of the big board (Nova4-D2), JP11, JP2, JP3, JP1, JP12, JP13, JP15, making note of their location.
4. Disconnect the GND wire at the top of the Nova4-D2 board
5. Disconnect the connectors at JP11, JP9, JP12, JP15, JP7, JP8 and JP6 on the small board (Nova4-A2).
6. Disconnect the small green wire at the bottom right
7. Lay the front panel on a table with the keyboard down.

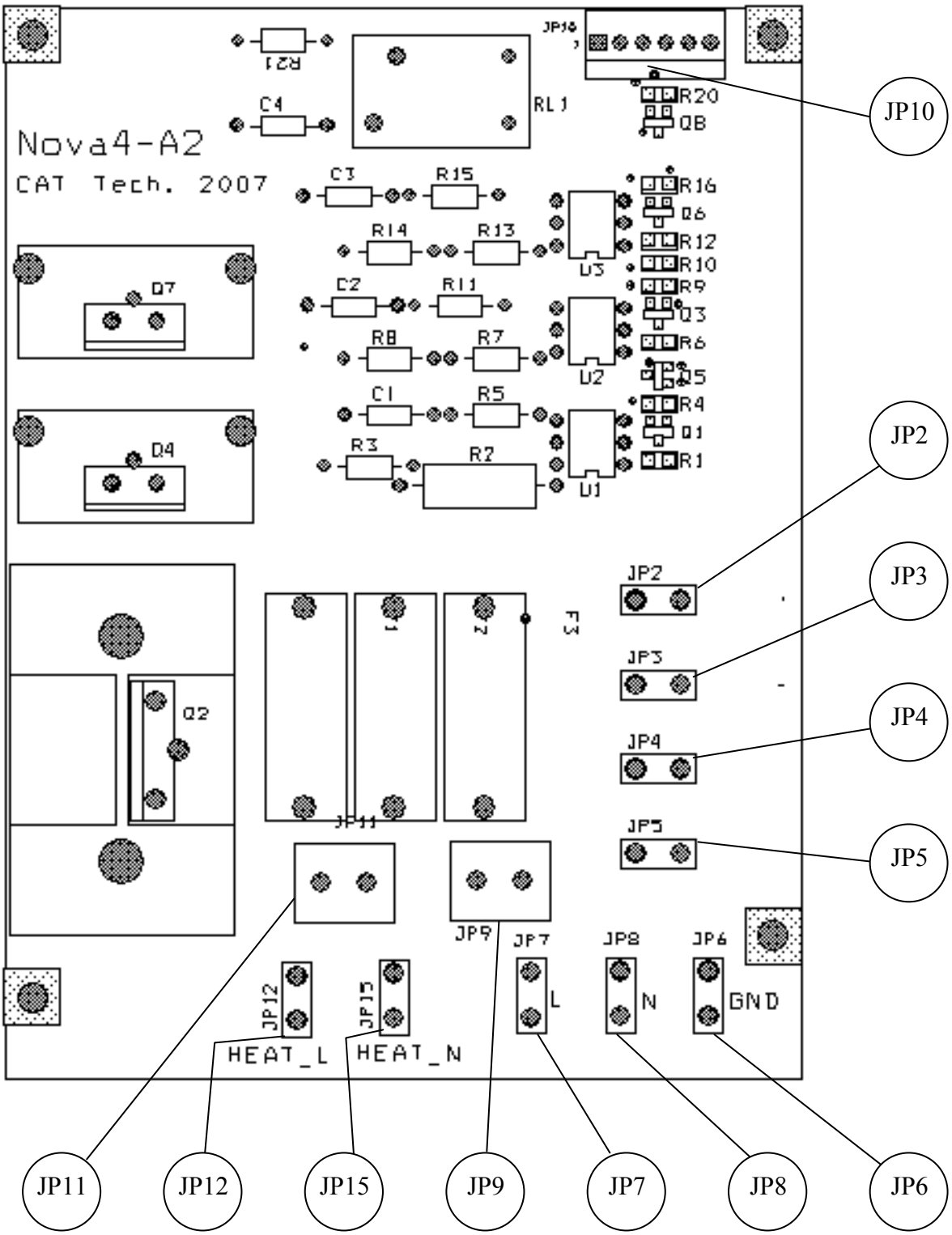
9.22.2 Replacing the "Nova4-A2" (small) board

1. Disconnect wires from JP2, JP3, JP4, JP5 (6), making sure to note the location of each wire on the circuit board.
2. Disconnect connector JP10 (4).
3. Unscrew the 4 screws (3) attaching the small board (5) to the big board (2).
4. Remove the small board.
5. Check the isolation sheet that is placed under the board. Replace if damaged.
6. Place the new board and fasten it with the 4 screws (3).
7. Connect the connector JP10 and the wires JP2-JP5.
8. Return the control unit to the autoclave and reconnect the wires and connectors following, in reverse order, the instructions in sec 9.22.1.
9. Re-assemble the control panel to the autoclave

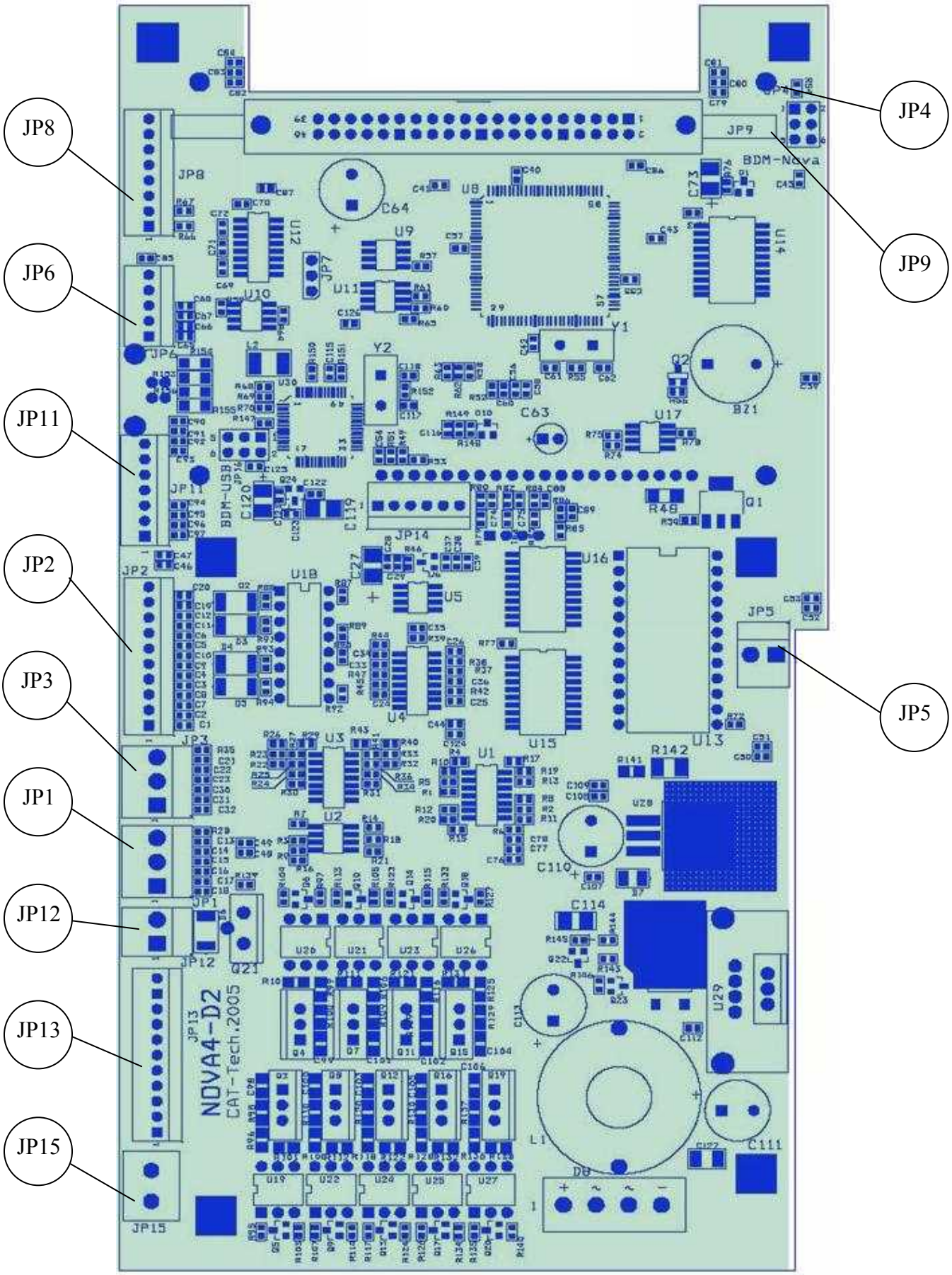
Assembled Nova4-D2 and Nova4-A2 Boards



Nova4-A2 Board

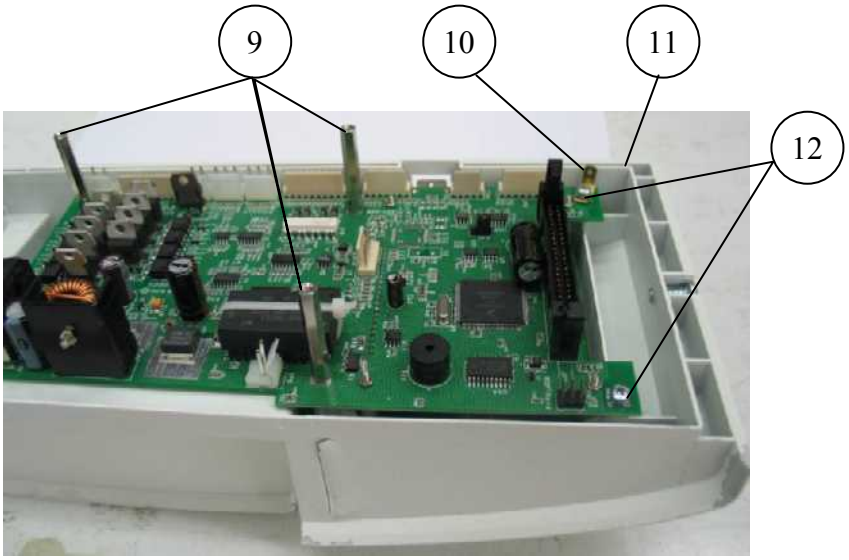


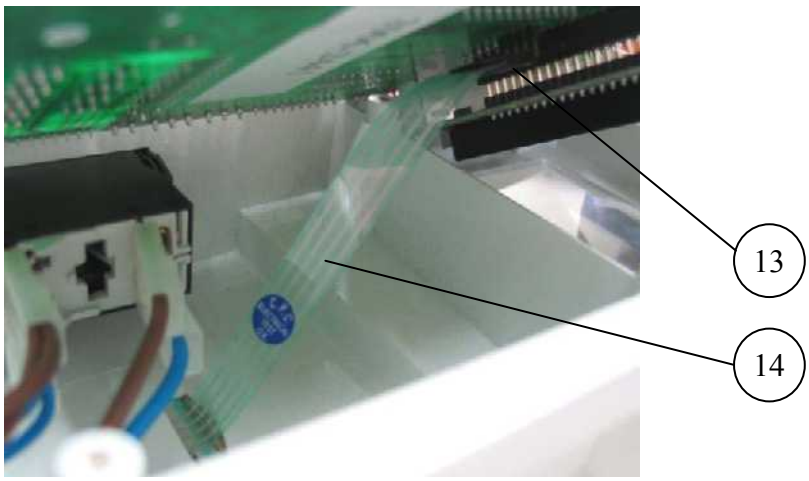
Nova4-D2 Board



9.22.3 Replacing the "Nova4-D2" (big) board

1. Disconnect wires from JP2, JP3, JP4, JP5 (6 on previous page) on the Nova4-A2 board. Making sure to note the location of each wire on the circuit board.
2. Disconnect connector JP14 (8).
3. Unscrew the 4 screws (3) attaching the small board (5) to the big board (2).
4. Remove the small board.
5. Check the isolation sheet that is placed under the board. Replace if damaged.
6. Unscrew the 4 long spacers (9) connecting the small board to the big board.
7. Unscrew the 2 screws (12) connecting the big board to the plastic panel (11). Be careful not to lose the grounding terminal (10) fastened by one of the screws.
8. Lift the board slightly and disconnect the keypad flat cable (14) from its connector (13) on the rear side of the board.
9. Replace the big board with a new board.
10. Reassemble by following steps 1 thru 8 in reverse order.

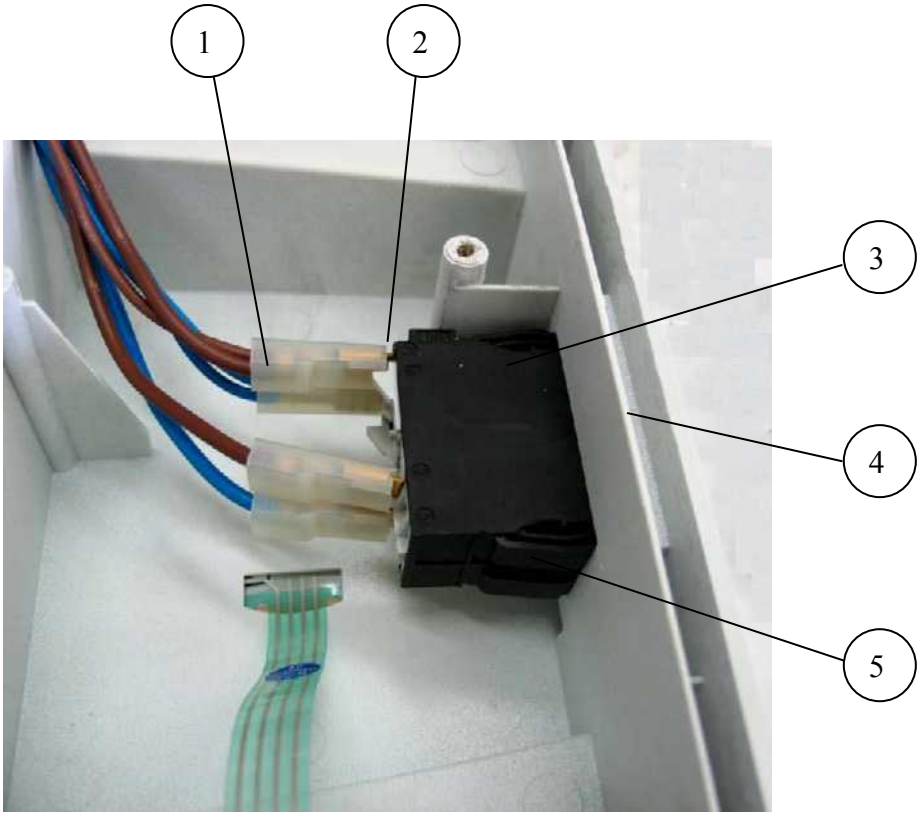




9.23 Replacing the switch

Caution!
Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in the chamber.
Allow the autoclave to cool before removing outer covers.

1. Remove the control electronic boards (see para. 9.22 "Replacing the Electronic Boards").
2. Disconnect the wires (1) from the switch (3). Log which wire is connected to each leg (2) of the switch.
3. Press the switch's fasteners (5) and push the switch inwards to release it from its seat on the panel (4).
4. Remove the switch and replace it with a new one. Pay attention to the switch's position. The "0" on the switch must be opposite the "0" in the plastic panel and the "|" on the switch must be opposite the "|" on the panel.
5. Connect the wires to the switch verifying that the wires are reconnected in the same positions as they were removed in instruction #2.
6. Place the Nova4-D2 board on the panel and reconnect the keypads flat cable to the board.
7. Reassemble the electronic boards according to para. 9.22.



9.24 Draining the generator

Caution!
Before starting, disconnect the instrument from the po wer source and ensure that there is no pressure in th e chamber or steam generator.
Allow the autoclave to cool before draining the generator.

1. The generator's drain plug is located under the autoclave on the left side. In order to drain the generator it will be necessary to position the autoclave so it is partially hanging over the edge of the counter. CAUTION when attempting to drain the generator make sure the autoclave is well supported and will not fall.
2. Place a vessel under the autoclave to collect the drain water.
3. Unscrew the drain plug, using a 6mm allen wrench.

4. If the water does not drain out easily then pull on the ring of the generator safety valve to break the vacuum in the generator."
5. After draining the water, reassemble the drain plug.
6. Move the autoclave back to its leveled position, reconnect it to the power source and turn the autoclave on.
7. Check and verify that the generator is filled with water and that the plug does not leak.

9.25 Emergency Door Opening

Caution!

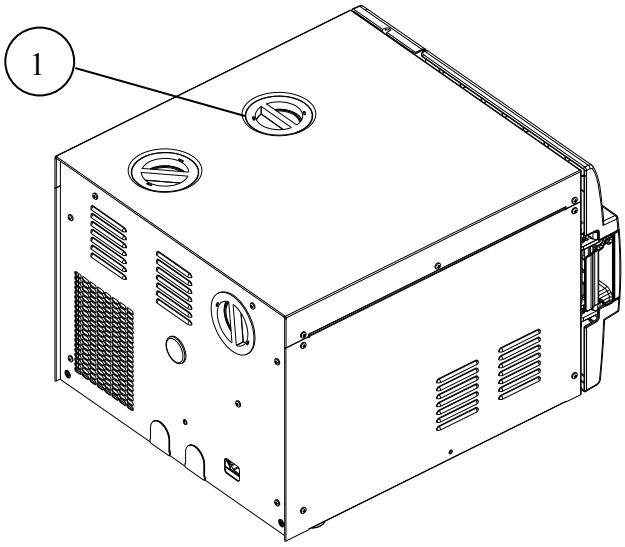
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

Caution!

Keep hands and face away from the safety valve to avoid being burned by hot steam."

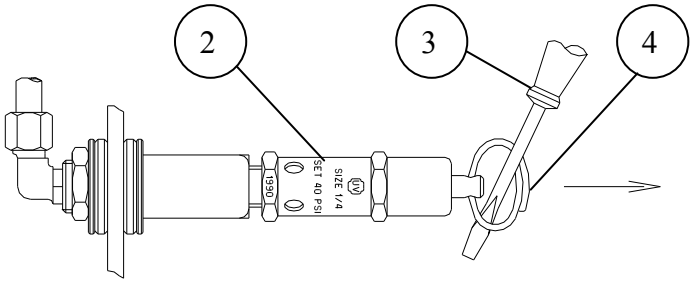
9.25.1 Decreasing the pressure

Since the autoclave is not equipped with an analogue pressure gauge, and the display is off (no electrical power), it is recommended to wait approximately one hour to verify that the pressure and temperature have decreased to ambient conditions.
If it is required to open the door urgently, decrease the pressure by opening both, the chamber's and generator's safety valves as follows. The safety valves are located in the mineral-free water reservoir.



A. ASME-approved type safety valve

1. Remove water reservoir cover (1).
2. Pull the ring (4) of the safety valve using a tool, i.e. screwdriver, hook etc. (3). Pull the safety valve ring until steam ceases to escape from the safety valve. Be careful not to burn your hands.



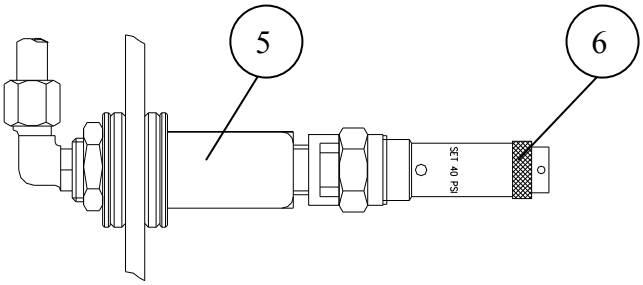
No.	Description
1	water reservoir cover
2	Safety valve
3	Pulling device
4	Pressure relief ring

B. PED-approved type safety valve

1. Remove the water reservoir cover.
2. Turn the pressure relief nut clockwise until steam ceases to escape from the safety valve.

Attention:

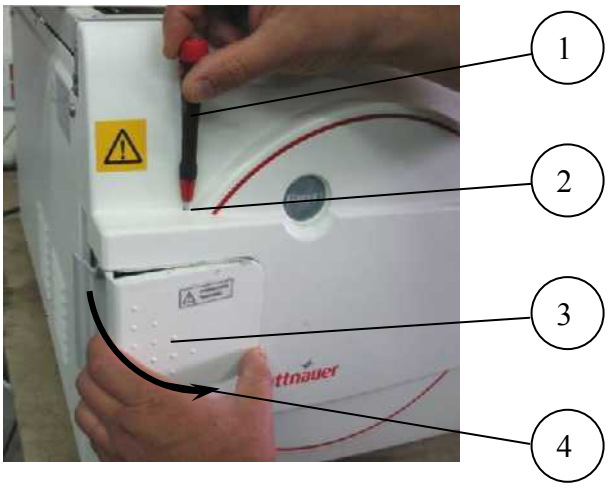
Use protective gloves in order not to burn your hands with the hot steam.



No.	Description
1	Water reservoir cover
5	Safety valve
6	Pressure relief nut

9.25.2 Opening the door

1. Insert a 2 mm (0.08") metal pin (1) into the hole (2) located above the door opening handle (3).
2. Press the pin downwards and, simultaneously open the door by pulling the door handle (3) in the direction of the arrow (4).

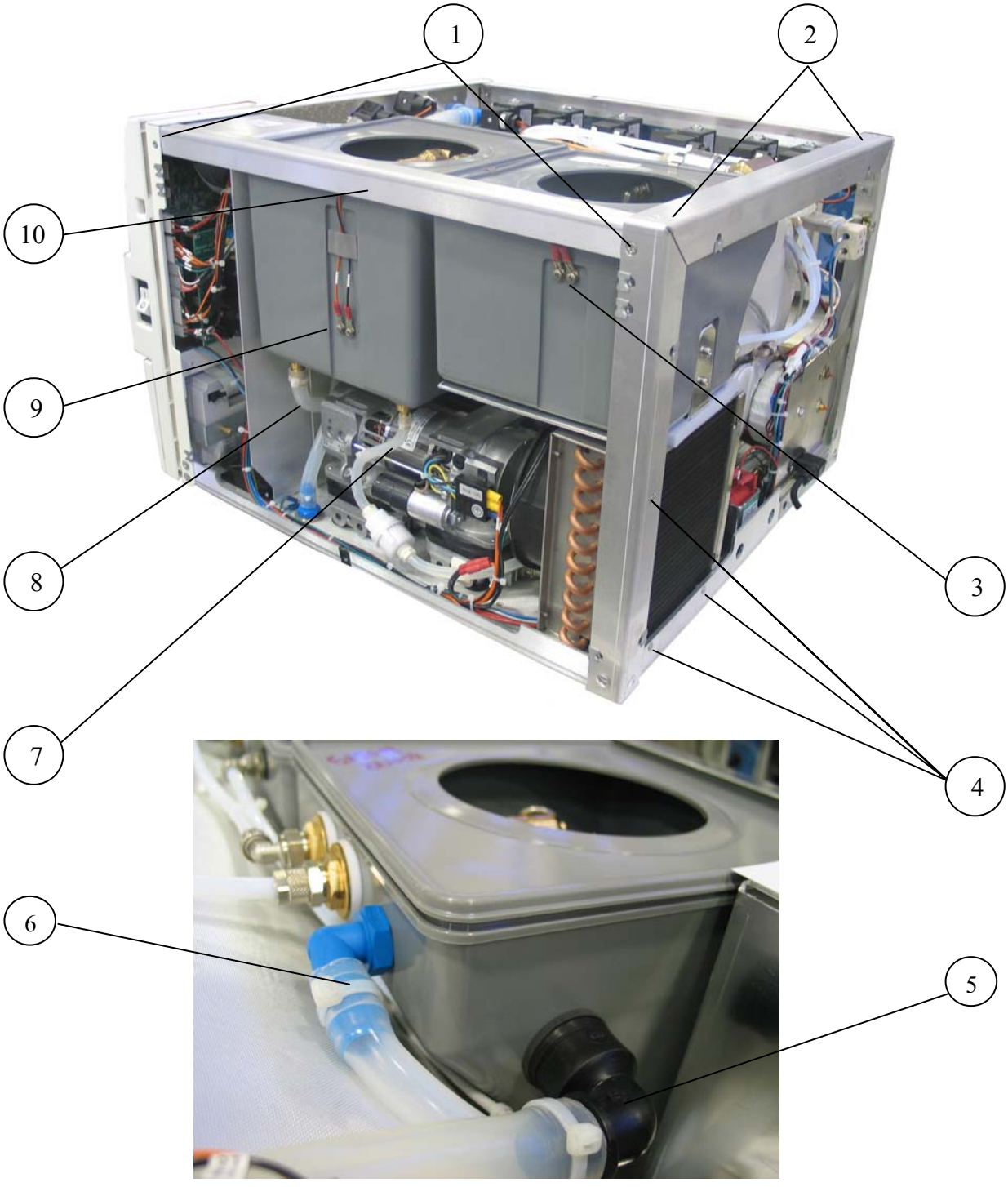


9.26 Replacing the water reservoirs

Caution!
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

***Note*:**
The following instructions refer to both, the mineral-free water reservoir and to the waste-water reservoir.

1. Drain the water reservoir (See sec "Draining the Reservoirs" in the Operator's Manual).
2. Remove the right, rear and top covers of the autoclave (see para. 9.3 "Dismantling the Outer Covers of the Autoclave").
3. Unscrew the screws (4) holding the cooler to the right rear vertical frame support and bottom frame.
4. Unscrew screws (1 & 2) and remove the right top frame support (10).
5. Disconnect the relevant cable terminals (3 or 9) from the water level electrodes of the reservoir to be removed.
6. Disconnect the tubing and fittings (5, 6, 7, 8 etc.) from the bottom and top of the reservoir to be replaced.
7. Pull the reservoir straight up and out of the machine.
8. Insert the new reservoir and follow the steps in this section in the reverse order to reassemble the unit.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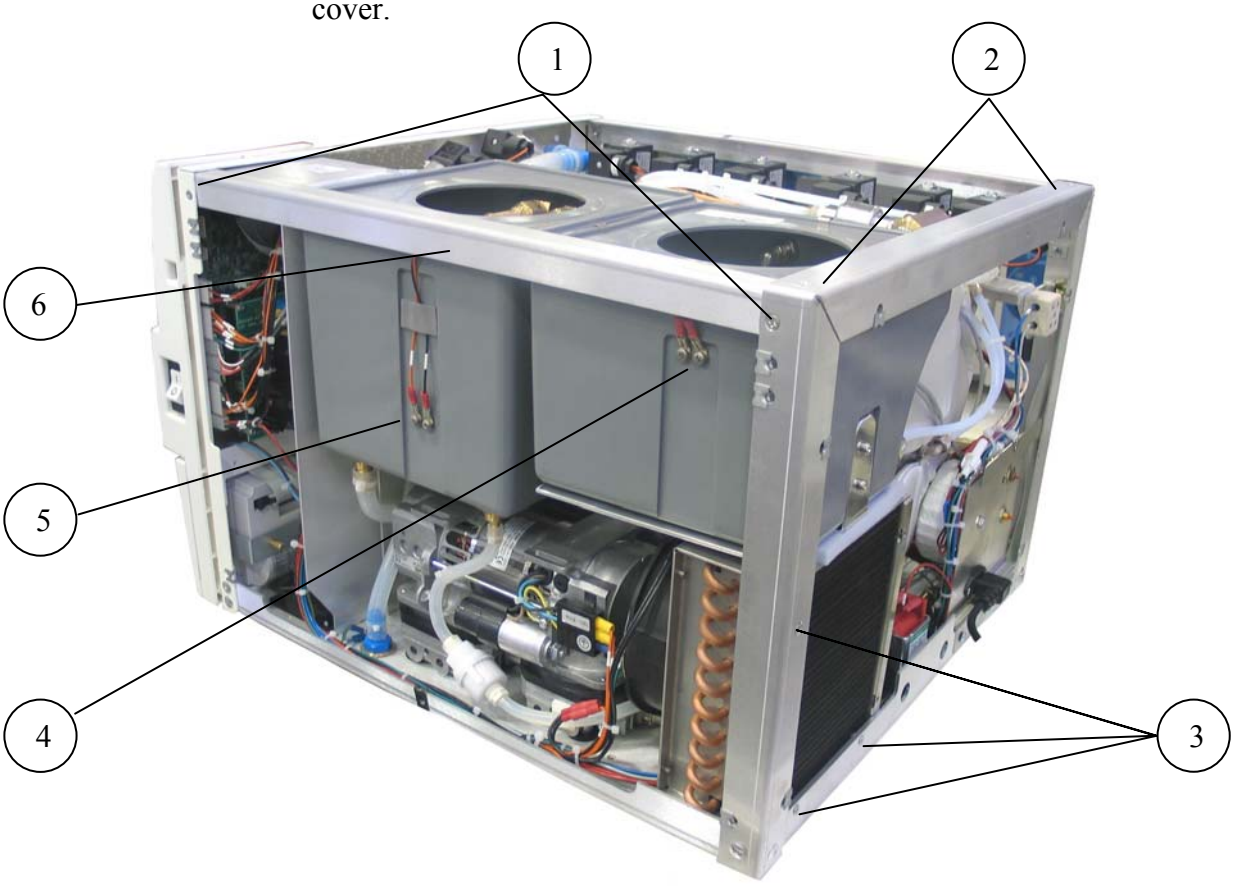
9.27 Cleaning the water reservoirs

Caution!
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

***Note*:**
The following instructions refer to both, the mineral-free water reservoir and to the waste-water reservoir.

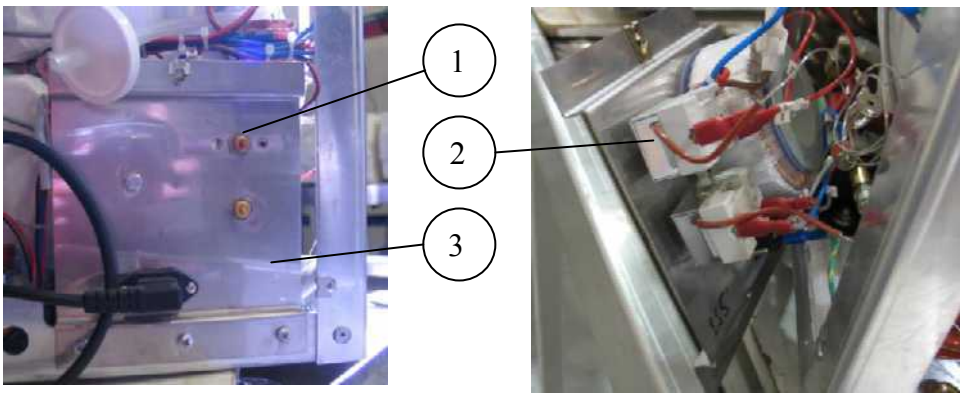
1. Drain the water reservoir(See sec "Draining the Reservoirs" in the Operator's Manual).
2. Remove the top, right and rear covers of the autoclave (see para. 9.3 "Dismantling the Outer Covers of the Autoclave").
3. Unscrew the screw (3) holding the cooler to the right rear vertical frame support.
4. Unscrew screws (1 & 2) and remove the right top frame support (6).
5. Remove any clips holding the reservoir cover.
6. Remove the top cover of the reservoir.
7. Clean the inside of the reservoir by wiping with a clean cloth.
8. Clean the water level electrodes (connected to 4, 5) inside the reservoir with a soft cloth.
9. Verify the electrode terminals (4, 5) are connected firmly to the electrodes.
10. Follow the steps in this section in the reverse order to reassemble the unit. Be sure to reattach clips to the waste-water reservoir cover.



9.28 Replacing the cut-of thermostat for the Chamber Heater

These instructions refer to pictures on the following page.

1. Perform this procedure only when the unit is cool and there is no pressure in the chamber.
2. Unplug the unit
3. Drain both reservoirs
4. Unscrew the screw holding the cooler to the right rear vertical frame support.
5. Remove the left (15) and right (16) top frame supports.
6. Disconnect the chamber pressure transducer tubing (10) from top rear chamber manifold (8). Move the transducer and tubing out of your work area.
7. Disconnect the air valve 52 tubing (11) from the top rear chamber manifold (8).
8. Disconnect tubing (9) from the air check valve on the top rear chamber manifold
9. Remove three screws (7, 13, 14) holding the valve assembly bracket (12) and move the assembly down to give clearance for removing the insulation blanket.
10. Cut tie wrap holding insulation blanket and discard.
11. Carefully move the insulation blanket (5) to expose the cut-off thermostat sensor (6).
12. Loosen the two bolts (18) holding the section of the chamber heating element (17) that secures the temperature sensor and cut-off thermostat.
13. Remove the chamber cut-off thermostat probe.
14. Trace the cut-off thermostat tubing back to the cut-off thermostat control box (2).
15. Remove the two wires on the control box
16. Unscrew the nut (1) holding the control box to the mounting plate (3).
17. Install the new cut-off thermostat and follow these steps in reverse to reassemble the unit. Position the probe as shown in the picture (6).
18. When tightening the bolts on the heating element, tighten as tight as possible.
19. When reinstalling the insulation make sure it is tucked in, in all the proper places.
20. When the installation is complete run a cycle to verify proper operation
21. The steam generator may fail to heat initially due to air pressure in the generator. If this occurs purge the air by opening the generator safety valve.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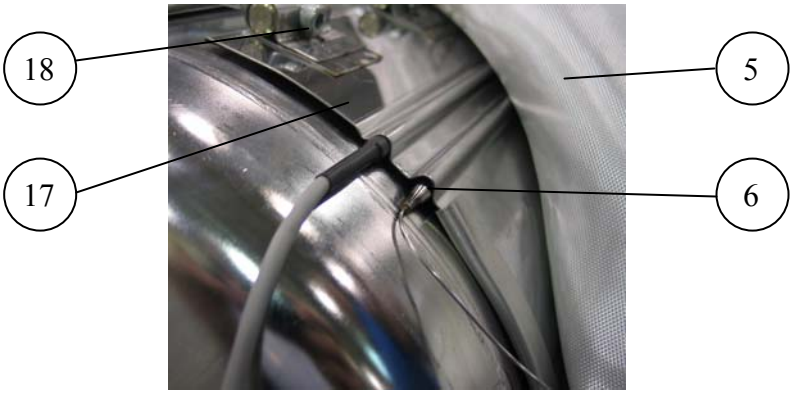
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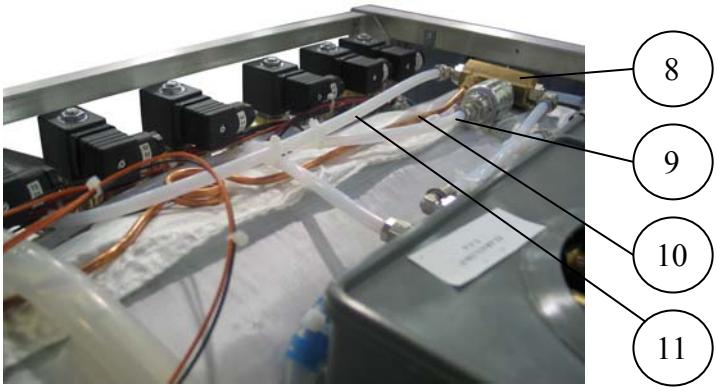
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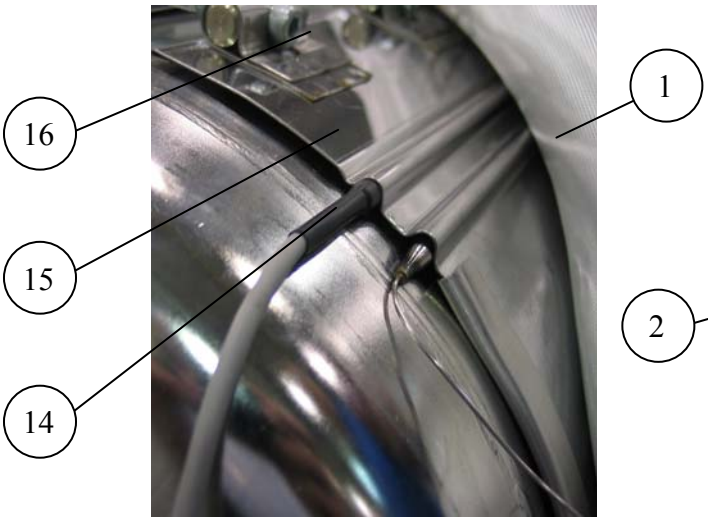
9.29 Replacing the PT100 temperature sensor for the Chamber Heater

These instructions refer to pictures on the following page.

1. Perform this procedure only when the unit is cool and there is no pressure in the chamber.
2. Unplug the unit
3. Drain both reservoirs
4. Unscrew the screw holding the cooler to the right rear vertical frame support.
5. Disconnect the chamber pressure transducer tubing (6) from top rear chamber manifold (4). Move the transducer and tubing out of your work area.
6. Disconnect the air valve 52 tubing (7) from the top rear chamber manifold (4).
7. Disconnect tubing (5) from the air check valve on the top rear chamber manifold
8. Remove three screws (3, 10, 11) holding the valve assembly bracket (8) and move the assembly down to give clearance for removing the insulation blanket.
9. Cut tie wrap holding insulation blanket and discard.
10. Carefully move the insulation blanket (9) and (1) to expose the PT100 (14).
11. Loosen the two bolts (16) holding the section of the chamber heating element (15) that secures the temperature sensor and cut-off thermostat.
12. Remove the PT100 temperature sensor.
13. Trace the sensor cable back to the electronic box and main control board.
14. Remove the connector from the main control board (2) (JP3).
15. Install the new PT100 and follow these steps in reverse to reassemble the unit. Position the probe as shown in the picture (14).
16. When tightening the bolts on the heating element, tighten as tight as possible.
17. When reinstalling the insulation make sure it is tucked in, in all the proper places.
18. When the installation is complete run a cycle to verify proper operation
19. The steam generator may fail to heat initially due to air pressure in the generator. If this occurs purge the air by opening the generator safety valve.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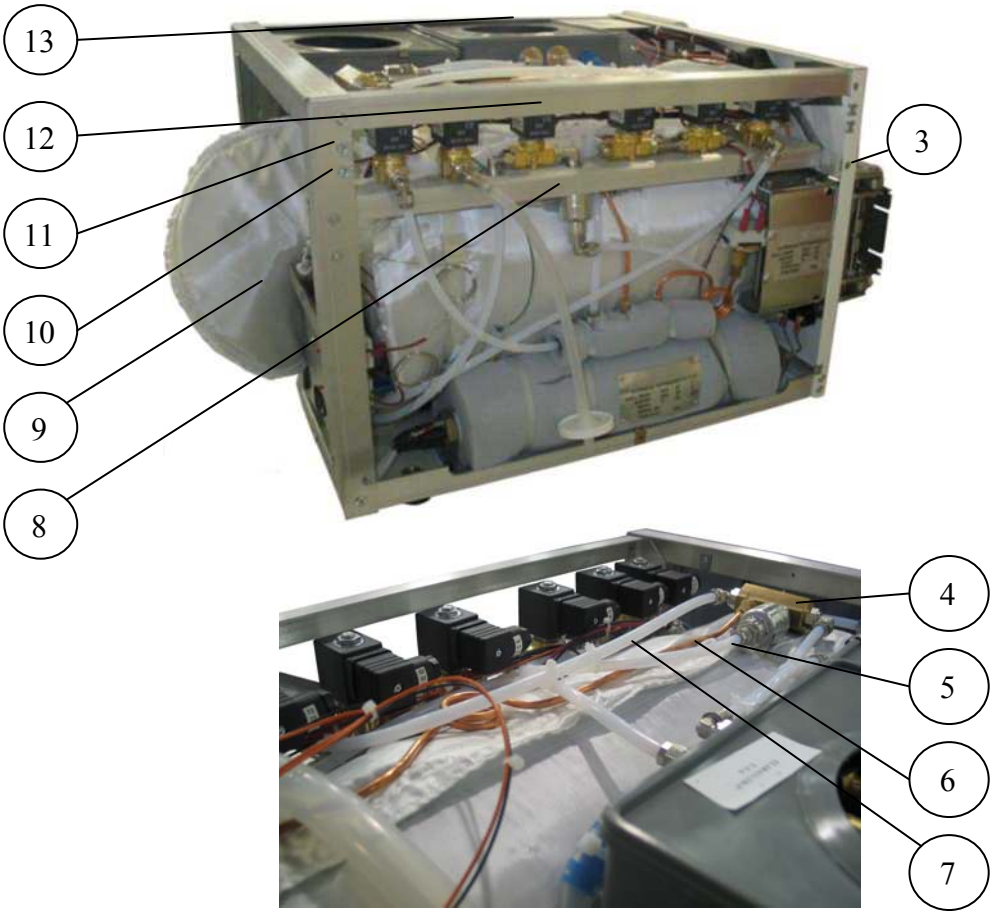
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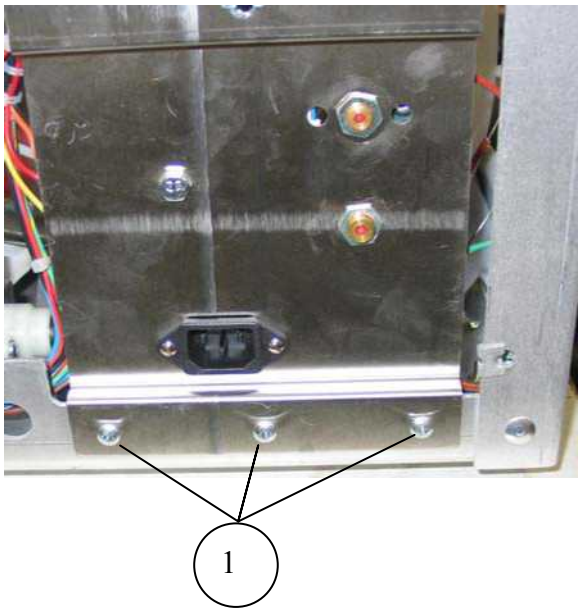
9.30 Replacing the internal PT100

Caution!
Before starting, disconnect the in strument from the po wer source and ensure that there is no pressure in the chamber.
Allow the autoclave to cool before removing outer covers.

1. Remove the autoclave's rear and right covers (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
2. Unscrew 3 screws (1) holding the rear electrical socket bracket.
3. Cut the tie wrap (3) around the PT100 isolation (2). Be careful not to damage the isolation.
4. Reveal the PT100 (5) and unscrew its nut (4) with a 1/2" wrench (6).
5. Cut all the tie wraps holding the cable of the PT100.
6. Disconnect the plug of the PT100 (7) from the Nova4-D2 board connector JP1.
7. Replace the PT100 with a new one. use only an original PT100 supplied by Tuttnauer.
8. Place the isolation sleeve on the new PT100.
9. Insert the PT100 into its seat and tighten its nut (4) loosely. Verify that dimension "A" is 0.3"-0.5" (8-13 mm) and that the electrode's tip does not touch the bottom tray. Continue tightening nut (4) to lock the PT100 in position.
10. Cover the PT100 with the isolation sleeve and tighten it with tie wraps.
11. Attach the cable of the internal PT100 to the cable of Chamber Heater PT100 with tie wraps.
12. Connect the plug of the internal PT100 to the Nova4-D2 board connector JP1.
13. Reassemble the electrical bracket to the autoclave's frame.
14. Reassemble the covers.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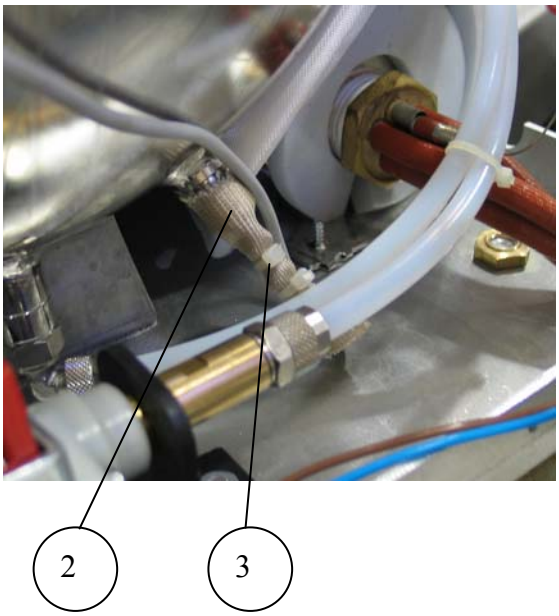
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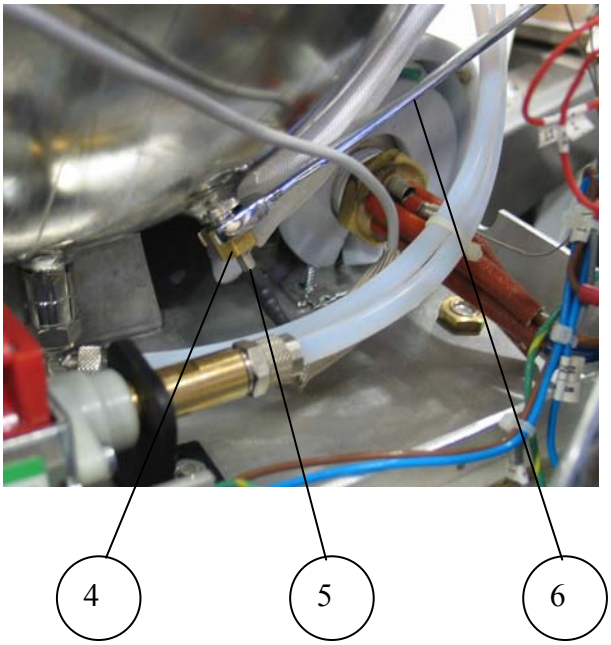
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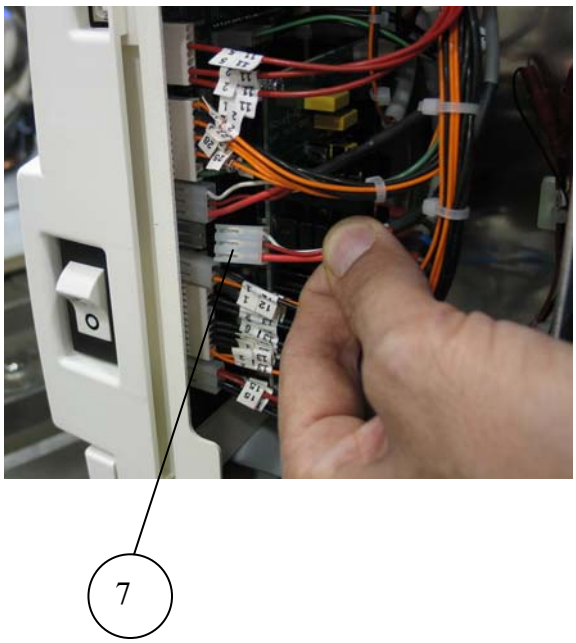
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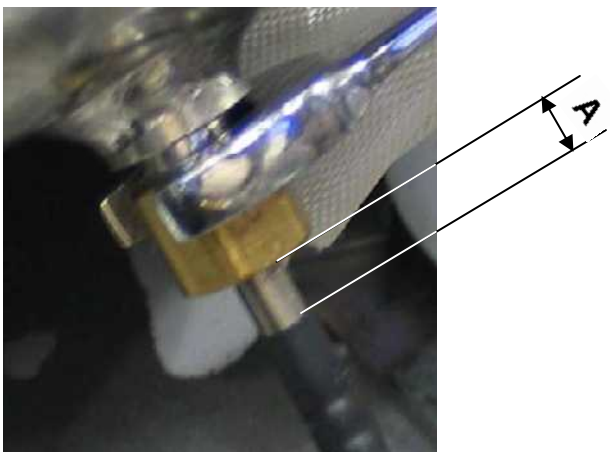
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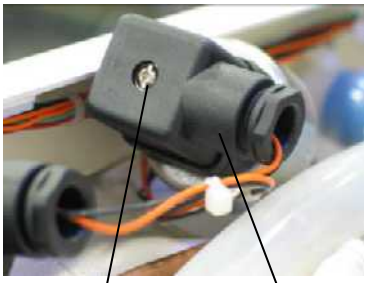
9.31 Replacing the pressure transducer

Caution!
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber and in the generator.

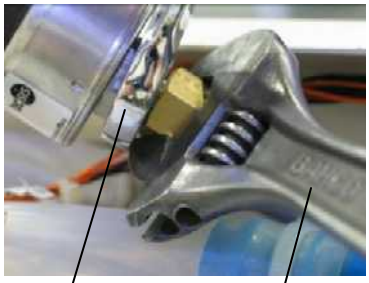
***Note*:**
The following instructions refer to both, the chamber and the generator pressure transducer.

1. Remove the top cover (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).



Picture 1

Picture 2



Picture 3

2. Lift slightly the pressure transducer (1) as in picture 1.
3. Unscrew screw (2) as in picture 1.
4. Remove the connector (3) as in picture 2.
5. Unscrew the pressure transducer. Use two open wrenches (5) as shown in picture 3.
6. Remove the pressure transducer and replace it with a new one.
7. Fasten the new pressure transducer. Use two wrenches as in picture 3.
8. Assemble the connector (3) and fasten it with the screw (2).push down the pressure transducer to its place, below the front panel top (4).

9.32 Cleaning the steam generator

Caution!
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber and in the generator.

1. Drain the generator (see sec. 9.24).
2. Remove the generator's heating element (see sec. 9.6).
3. Place a vessel to collect water under the drain opening.
4. Insert a tap-water hose in the heating element opening.
5. Clean the inner part of the generator with water under low pressure.
6. Verify that no water is left in the generator
7. Reinstall the drain plug.
8. Reinstall the heating element (see sec. 9.6).
9. If the generator has an excessive build up of mineral deposits then proceed as follows”
10. Drain the generator see sec 9.24”
11. Disconnect all the piping connected to the generator manifold”
12. Disconnect piping at the front of the generator”
13. Remove the water sensing electrode”
14. Remove the generator heating element see sec 9.6”
15. Remove the four screws holding the generator to the chassis and remove the generator
16. Remover the foam insulation material”
17. Soak the generator in a mineral dissolving solution.”
18. Flush thoroughly with clean water and reinstall following these instructions in reverse order”

9.33 Replacing the cooler and the cooler's fan

Caution!

Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber and in the generator.

1. Drain the waste reservoir.
2. Remove the autoclave's covers (see para. 9.3 **"**Removing the Autoclave's Outer Covers**"**).
3. Disassemble and remove the right top frame (1).
4. Disconnect the wires (2) from the water level electrodes of the waste reservoir.
5. Remove the two rear screws from the left top frame.
6. Disconnect the waste water inlet hoses on the left side of the reservoir and the drain hose (4) below the reservoir.
7. Pull the rear top frame back and remove the waste water reservoir from the autoclave by pulling it upward. The reservoir bracket supports are slotted so the reservoir will slide straight up.
8. Disassemble the inlet and outlet hoses from the cooler (7).
9. Unscrew 3 screws (8, 9, 10).
10. Remove the cooler (5) with the fan (6) from the autoclave.
11. Disconnect the fan's electrical connector (3).
12. Detach the fan from the cooler.
13. Replace the fan or the cooler as required.
14. Reconnect the fan to the cooler.
15. Connect the fan's electrical connector.
16. Insert the assembled cooler into the autoclave.
17. Assemble the cooler to the autoclave with the 3 screws (8, 9, 10).
18. Reattach the hoses to the inlet and outlet of the cooler (7). Use tie wraps to secure the hoses**.**
19. Insert the waste water reservoir into its place.
20. Connect the hoses to the reservoir. Use tie wraps to secure the hoses.
21. Connect the electrical wires to the water level electrodes.
22. Reassemble the covers.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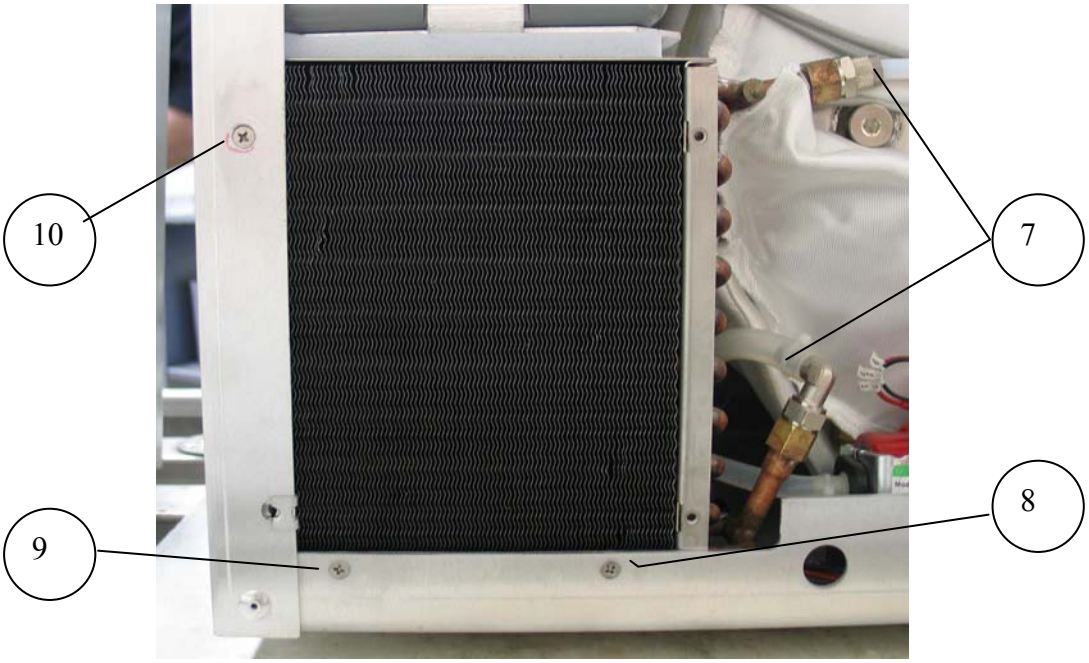
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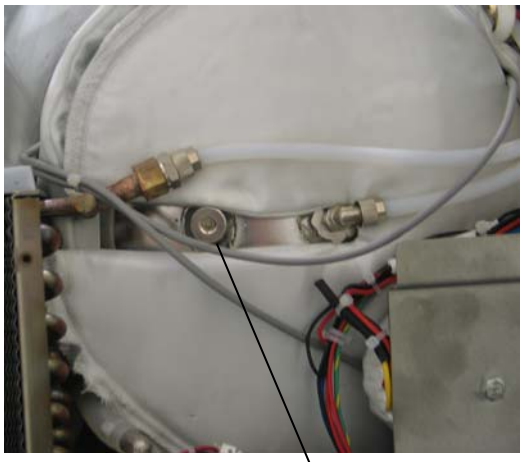
9.34 Testing procedure for the chamber PT100

Caution!
Before starting ensure that the autoclave is off and that there is no pressure in chamber.
For items numbering – see pictures on the next page.

1. Prepare a flexible temperature probe with a reading device, a 1/4"BSP sealing nut and a PT100 simulator.
2. Verify using a DVM that the PT100 simulator reads 100Ω at 0˚C and 151.4 Ω at 134˚C
3. Disconnect the connector of the internal PT100 from the electronic board (2) JP1.
4. Connect a PT100 simulator to the socket of the PT100 JP1.
5. Turn on the autoclave and select the Vacuum Test Cycle to keep the unit from heating up.
6. Change the temperature display to ˚C by changing parameter TempInF (see sec 7.2.35) to 0.
7. Set the simulator to 70˚C and verify that the reading on the display is 70˚C Using the PT100 simulator recalibrate if necessary (See sec 7.6).
8. Set the simulator to 134˚C and verify that the reading on the display is 134˚C Using the PT100 simulator recalibrate if necessary (see sec. 7.6).
9. If the readings on the display are correct the electronic system is functional and you can proceed. If the calibration does not align the simulator with the display readout, then replace the Nova4-D2 board."
10. Disconnect the simulator and reconnect the PT100 (2).
11. Using the sealing nut insert the temperature probe into the chamber through the Validation port (1) and place it close to the PT100.
12. With the door closed and the Vacuum Test cycle still selected allow the chamber temperature to stabilize.
13. Verify that the Elara display and the independent temperature reading device show the same temperature. Recalibrate if necessary (see sec 7.6).
14. Select and run a 134°C cycle
15. When the pressure has stabilized, verify that the deviation between the reading of the PT100 and the probe does not exceed ±1/2°C.
16. If the deviation is greater than ±1/2˚C then calibrate the Chamber Temperature Sensor. (see sec 7.6).
17. If the calibration is not successful then change the Chamber PT100.



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9.35 Testing procedure for the heating element PT100

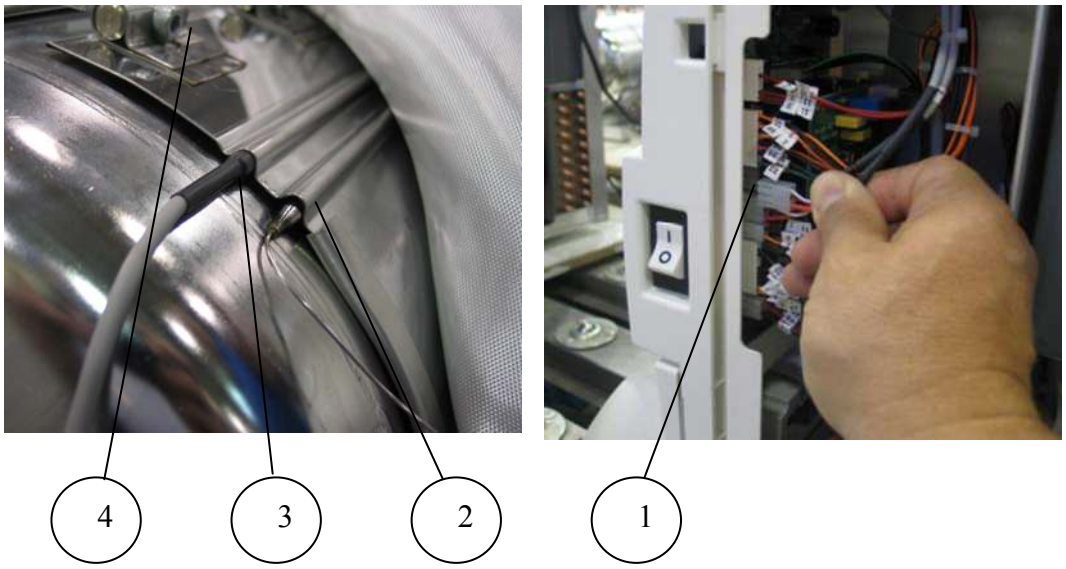
***Caution*!**

Before starting ensure that the autoclave is off and that there is no pressure in chamber.

For items numbering – see pictures on the next page.

1. Prepare a flexible temperature probe with a reading device and a PT100 simulator.
2. Verify using a DVM that the PT100 simulator reads 100Ω at 0˚C and 151.4 Ω at 134˚C.
3. Disconnect the connector of the heating element PT100 (1) from the electronic board JP3.
4. Connect a PT100 simulator to the socket of the PT100 JP3.
5. Turn on the autoclave and select the Vacuum Test Cycle to keep the unit from heating up.
6. Change the temperature display to ˚C by changing parameter TempInF (see sec 7.2.35) to 0.
7. Set the simulator to 70˚C and verify that the reading on the display is 70˚C. Using the PT100 simulator recalibrate the Coil Temp if necessary (See sec 7.6).
8. Set the simulator to 134˚C and verify that the reading on the display is 134˚C. Using the PT100 simulator recalibrate the Coil Temp if necessary (See sec 7.6).
9. If the readings on the display are correct the electronic system is functional and you can proceed. If the calibration does not align the simulator with the display readout, then replace the Nova4-D2 board.
10. Turn off the autoclave.
11. Disconnect the simulator and reconnect the PT100 (1).
12. Release the bolts of the heating element. Follow instructions #4 thru #12 sec 9.29.
13. If the probe has a small diameter insert it into the groove of the PT100 (3) (together with the PT100). If the diameter of the probe is too big for this, remove the cut-off sensor and place the probe in the cut-off groove(2).
14. Turn on the autoclave.
15. With the door closed and the Vacuum Test cycle still selected allow the chamber temperature to stabilize.
16. Enter the calibration display for the heating element PT100 (Coil Temp).
17. Verify that the Coil Temp display and the independent temperature reading device show the same temperature. Recalibrate if necessary (see sec 7.6).
18. Select any cycle except vacuum test cycle.
19. Enter the calibration display for the heating element PT100 (Coil Temp).
20. Wait approx 1/2 hour or until the temperature readings have stabilized and verify that the deviation between the reading of the PT100 and the probe does not exceed ±1/2°C.

21. If the deviation is greater than ±1/2˚C then calibrate the Heating element PT100 (see sec 7.6).
22. If the calibration is not successful then change the Heating element PT100.

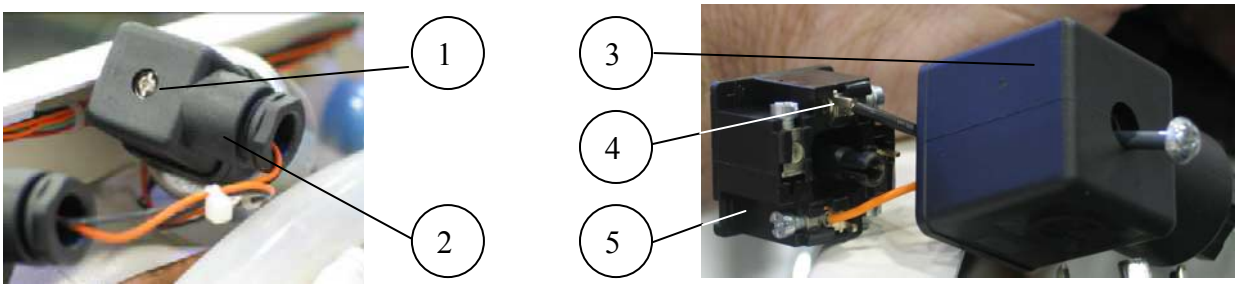


9.36 Testing procedure for the chamber pressure transducer

Caution!

Before starting ensure that there is no pressure in the autoclave chamber.

1. Prepare a current loop calibrator-simulator 4-20mA .
2. Turn the autoclave on and select the Vacuum Test Cycle to keep the unit from heating up.
3. Change the pressure display to kPa by changing parameter PressInPSI (see sec. 7.2.36) to 0.
4. Unscrew screw (1) and disconnect the chamber transducer's plug (2).
5. Disassemble the plug by pulling it (5) out from its housing (3) and attach the "+" lead of the loop calibrator to the black wire (4).

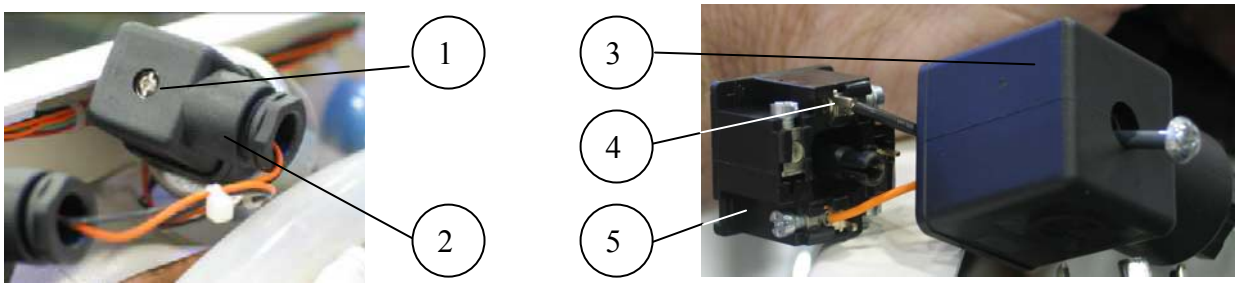


6. Attach the "–" lead of the loop calibrator to the GND (ground) point on the frame of the autoclave.
7. Apply a 5mA signal. The pressure displayed on the autoclave's display must be 25±3 kPa. With the Current Loop Calibrator attached calibrate the low pressure as necessary (See sec 7.6).
8. Apply a 16mA signal. The pressure displayed on the autoclave's display must be 300±3 kPa. With the Current Loop Calibrator attached calibrate the high pressure as necessary (See sec 7.6).
9. If the displayed pressure is within the required limits the electronic circuit is functioning correctly.
10. If the calibration does not align the Current Loop Calibrator with the display readout, then replace the Nova4-D2 board.
11. Reconnect the pressure transducer.
12. Connect a test pressure gauge to the validation port.
13. Select and run the Vacuum Test.
14. When the vacuum pump stops running verify that the chamber pressure on the autoclave display matches the test gauge. The allowable deviation is +/-3kPa. Recalibrate if necessary. See sec 7.6.
15. Select and run a 273˚F (134˚C) cycle.
16. When the pressure has stabilized verify that the pressure deviation is no greater than +/-3kPa
17. Calibrate low and high pressure as needed (see sec 7.6).
18. If calibration is not successful then change pressure transducer

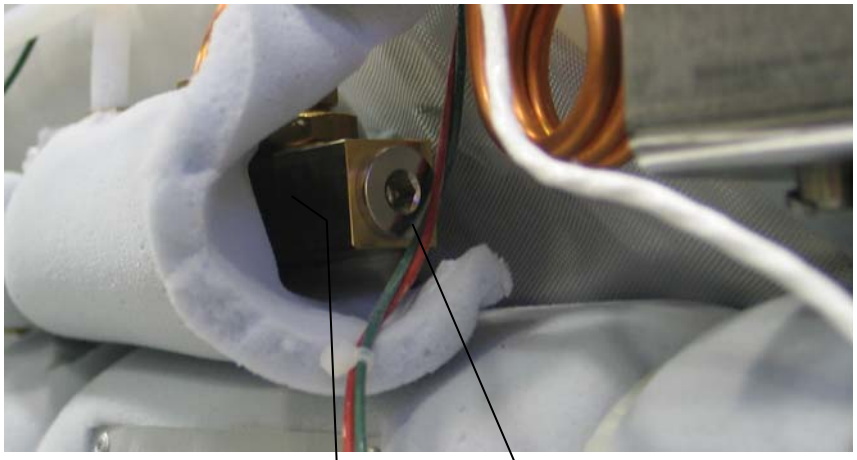
9.37 Testing procedure for the Generator pressure transducer"

Caution!
Before starting ensure that there is no pressure in the generator.
For items numbering – see also pictures on the next page.

1. Prepare a current loop calibrator-simulator 4-20mA .
2. Turn the autoclave on and select the Vacuum Test Cycle to keep the unit from heating up."
3. Change the pressure display to kPa by changing parameter PressInPSI (see sec. 7.2.36) to 0.
4. Unscrew screw (1) and disconnect the steam generator transducer's plug (2).
5. Disassemble the plug by pulling it (5) out from its housing (3) and attach the "+" lead of the loop calibrator to the black wire (4).



6. Attach the "–" lead of the loop calibrator to the GND (ground) point on the frame of the autoclave.
7. Apply a 5mA signal. The pressure displayed on the autoclave's display must be 25±3 kPa. With the Current Loop Calibrator attached calibrate the low pressure as necessary (see sec 7.6).
8. Apply a 16mA signal. The pressure displayed on the autoclave's display must be 300±3 kPa. With the Current Loop Calibrator attached calibrate the high pressure as necessary (see sec 7.6).
9. If the displayed pressure is within the required limits the electronic circuit is functioning correctly.
10. If the calibration does not align the Current Loop Calibrator with the display readout, then replace the Nova4-D2 board.
11. Reconnect the pressure transducer.
12. Ensure that the generator is cold and did not heat or build pressure.
13. Remove the plug (8) from the generator manifold (7) port and connect a test pressure gauge (6) to the manifold
14. With the vacuum test still selected, verify that the generator pressure on the autoclave display matches the test gauge. The allowable deviation is +/-3kPa. Recalibrate if necessary. See sec 7.6.
15. Select a 273˚F (134˚C) cycle. This will cause the generator to heat.
16. When the pressure has stabilized verify that the pressure deviation is no greater than +/-3kPa.
17. Calibrate low and high pressure as needed (see sec 7.6)
18. If calibration is not successful then change pressure transducer

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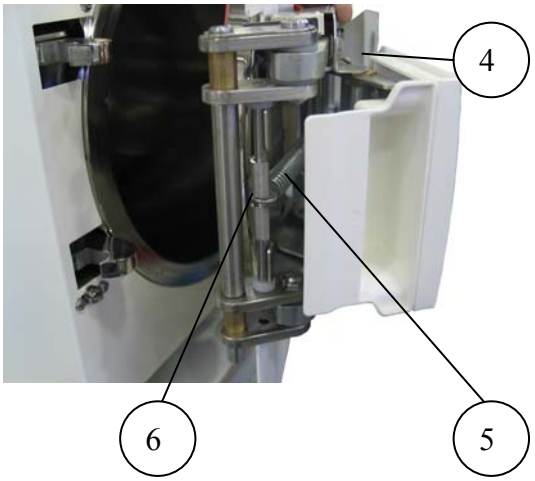
9.38 Door Locking Solenoid

Caution!

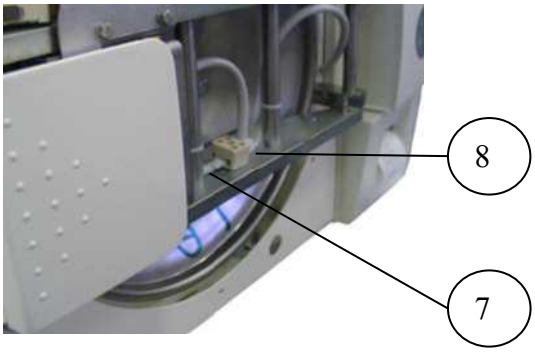
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the chamber.

1. Insert a pin (1) into the hole (2) in the handle, pressing down the locking pin.
2. Open the door.

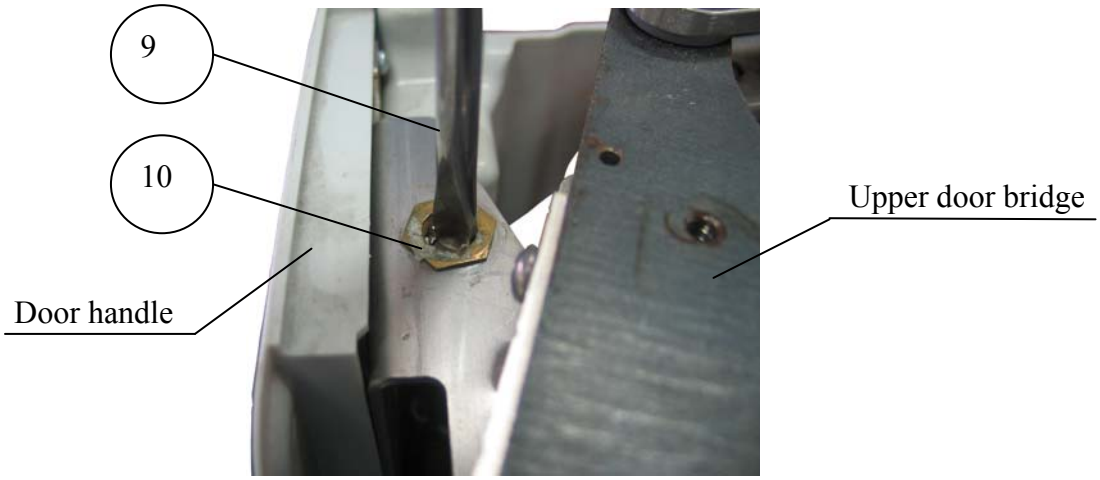
3. Remove the door cover (3) (see sec. 9.10).
4. Release the locking mechanism spring (5) from the front spring holder (6) or brace the locking mechanism so it will not move while you are working on it..
5. Remove the solenoid pin stop bracket (4).



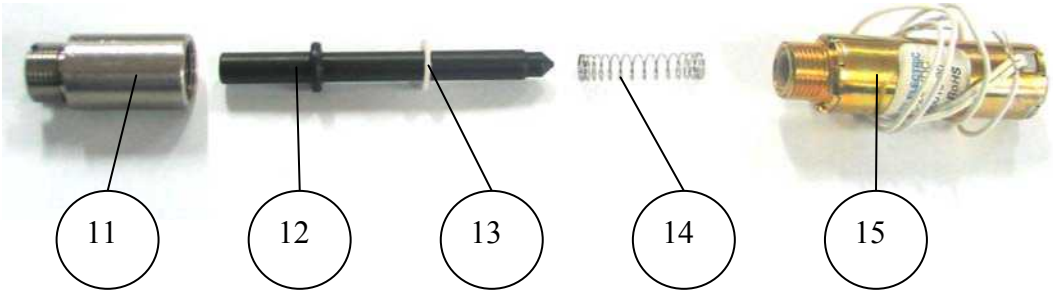
6. Disconnect the door solenoid wires (7) at the terminal block (8).



7. Using the correct size screwdriver (9) insert it from the top and unscrew the door solenoid mounting cylinder (11) from the door locking mechanism brass holder (10).



8. Disassemble the solenoid (15) from the mounting cylinder (11).



9. Insert a new spring (14) and reassemble the solenoid and mounting cylinder screw the assembly into the door locking mechanism.
10. Tighten with the screwdriver.
11. Follow instructions in the reverse order to complete the installation.

LIST OF DOOR LOCKING SOLENOID

Item	Cat. No.	Description
11	LOK411-0019	Solenoid extension adaptor T4x12
12	LOK411-0018	Solenoid pin -Elara
13	LOK254-0001	Washer, locking solenoid pin
14	SPR177-0004	Spring, door locking solenoid
15	SOL027-0003	Solenoid, door lock

10 IN-OUT TEST

Attention

Violating the following instructions may endanger the technician and may cause sever damage to the autoclave.

Caution

Do Not operate the heating elements for an extended period of time. This can damage the heaters, the s team generator and cause possible persona l injury."

Caution

Remember to turn off all co mponents before exiting the In-Out Test o r power down and power back up to clear component ON commands."

Caution

Do Not operate the w ater pump or vacuum pump for an extended period of time. This can cause damage to the pump.

To aid in trouble shooting the autoclave the technician can perform an "In-Out Test". This test program allows the technician to activate and deactivate various components of the autoclave in order to evaluate that components performance. Turn on the autoclave and press the Up and DN keys simultaneously This will bring up the "Enter Code" display, with the curser under the right most digit.

1. Use the UP key to enter the code 0333.
2. Use the START/STOP key to advance the curser.
3. Advance the curser to SET and press the UP key to enter the menu page.
4. Scroll down until "In Out Test" is highlighted.
5. Press the START/STOP key to enter this submenu, which will display all the components that can be controlled.
6. To activate a component, use the UP or DN key to scroll to that component, then use the START/STOP key to activate or deactivate it.
7. To exit the "In-Out Test" scroll down to EXIT and press the START/STOP key. On the next page again scroll down to EXIT and press the START/STOP key. This will return you to the program screen.

DISPLAYED NOTICE	ITEM ACTIVATED	REMARKS
Air	Vacuum break valve (43)	Vacuum break valve is opened.
Vac Valve	Vacuum valve (52)	Vacuum valve is opened.
Chamb Steam	Steam to chamber valve (93)	Steam to chamber valve is opened. **Warning: Do not insert any part of you body into the chamber**
Fast Exh	Fast exhaust valve (73)	Fast exhaust valve is opened.
Dig Out #5	N/A	N/A
Wtr to Res	Waste water to water reservoir valve.	Applicable only if the autoclave is equipped with a waste water recycling system.

DISPLAYED NOTICE	ITEM ACTIVATED	REMARKS
Air VacPump	Atmospheric air to vacuum pump valve (44).	Air valve is opened.
Water Valve	Water inlet valve to generator (21).	Water inlet valve is opened.
Dig Out #9	N/A	N/A
Door Lock	Door locking mechanism.	Door locking mechanism is released. **Warning:** **Do not attempt to open the door if there is pressure in the chamber.**
Heater 1	Generator heating element.	Generator heating element is heating. **Warning:** **Do not operate the heating element for maximum 30 seconds to avoid damage to the heating elements.**
Heater 2	Upper (jacket) heating element.	Upper (jacket) heating element is heating. **Warning:** **Do not operate the heating element for maximum 30 seconds to avoid damage to the heating elements.**
Vacuum Pump	Vacuum pump	Vacuum pump and fan are operating.
Water Pump	Water pump	Water pump is operating. **Warning:** **To avoid pump damage, operate the pump together with the water valve for maximum 30 seconds.**
Buzzer	Buzzer	Buzzer turns on.
Backlight	Display illumination	Display illumination turns off.

11 TROUBLESHOOTING

NOTE
Cleaning and maintenance are the responsibility of the user"

11.1 Preliminary Check

NOTE!
Most of the autoclave's malfunctions result from dirt.
Before performing troubleshooting at the customer location we recommend to follow the procedure described bellow:

- Disconnect the autoclave from the electric power source.
- Remove the covers.
- Clean the trays and the trays holder.
- Clean the filters.
- Remove the plungers of the solenoid and clean the solenoid base. Replace plungers if required.
- Inspect that there are no sign of water leaks or sediments.
- Inspect and make sure that there are no sign of electric loose connections.
- Tighten all the loose screws, nuts and piping connections.

11.2 Troubleshooting procedure

Symptom	Possible cause check-up and tests	Corrections
No light in the display	Main switch is off.	Turn main switch on.
	The electrical power or the connections at the autoclave input are faulty.	Make sure that there is power source according to the utilities.
		Make sure that the power cord is not damaged and that it is connected well.
		If the safety circuit breaker shuts off the power make sure that there are no sign of water. Make sure that there are no un-isolated wires.
	The steam generator Cut-off thermostat tripped.	Reset cut-off thermostat. If problem persists, clean or replace the generator's water level electrode.
	The steam generator Cut-off thermostat is faulty.	Replace the faulty cut-off thermostat.
	One of the fuses of the transformer are burnt.	Replace the burnt fuse.
	Transformer is faulty.	Replace the transformer.
	Main switch is faulty.	Replace the main switch.
	Electrical wiring loose or making short-circuit.	Find the loosing wire or connector.

Symptom		Possible cause check-up and tests	Corrections
Err:001 is displayed 	PT1 out	PT100 No. 1 of the chamber is disconnected.	Reconnect the PT100.
		PT100 of the chamber is faulty (JP1).	Test the sensor circuit according to sec 9.34.
		Nova4-D2 board is faulty.	Replace the faulty Nova4-A2.

Symptom		Possible cause check-up and tests		Corrections
Err:002 is displayed	Low Temperature	Heating elements do not heat.	Heating element wire disconnected	Reconnect wires to the heating elements.
			Faulty heating elements.	Unplug the unit then disconnect the generator heating element wires from the terminal block. Take an ohm reading on the heating element - 23 ohms. Replace faulty heating elements as needed.
				Check piping for blockage. Check water pump. Check water solenoid valve. Check for faulty check valve.

Symptom		Possible cause check-up and tests		Corrections
Err:002 is displayed (cont.)	Low Temperature (cont.)	Generator's water level electrode has a scale build up.		Clean or replace the generator's water electrode.
		Chamber's temperature sensor is:	Not calibrated.	Calibrate the sensor.
			Faulty.	Test the sensor circuit according to sec 9.34.
		Dirt or sediments in the steam generator.		Take out the steam generator clean the sediments.
		A solenoid valve is leaking - Fast Exhaust (73), Vacuum valve (52) or Air (43).		Take apart, clean and inspect seats - replace if worn or damaged
		Door gasket is leaking		Clean with mild soapy water - replace if worn or damaged
		Sterilization time set to long		Reduce Sterilization time
		Generator cut-off faulty turning off the heat prematurely		Replace cut-off if faulty - do not attempt to adjust
		Steam valve (93) is faulty restricting the steam to chamber		Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil
		Steam valve (93) control circuit faulty		Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 5. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 5 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
		Safety valve leaking		Replace the safety valve

Symptom		Possible cause check-up and tests	Corrections
Err:003 is displayed	High Temperature	Chamber's temperature sensor is not calibrated.	Calibrate the sensor.
		Chamber's temperature sensor is faulty.	Test the sensor circuit according to sec 9.34.

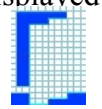
Symptom		Possible cause check-up and tests		Corrections
Err:005 is displayed	High Gen Press	Generator's pressure sensor is not calibrated.		Calibrate the sensor.
		Generator's pressure sensor is faulty		Test the sensor circuit according to sec 9.37.
		The heater in the generator does not stop heating as a result of a problem:	In the pressure switch.	With the generator at or above the target pressure disconnect the wire of the pressure switch. If the heater turns off the switch is faulty. Replace the faulty switch.
			In the AC high voltage power board (Nova4-A2) board.	Replace the faulty Nova4-A2.

Symptom		Possible cause check-up and tests	Corrections
Err:007 is displayed	High pressure	Steam to chamber valve (93) does not close as a result of a dirty or faulty plunger.	Take apart, clean and inspect seats - replace if worn or damaged.
		Chamber's pressure sensor is not calibrated.	Open the autoclave's door and read chamber pressure on the display if reading is not accurate than check that the atmospheric pressure parameter is set correctly, calibrate the chamber's pressure sensor if needed.
		Chamber's pressure sensor is faulty.	Test the sensor circuit according to sec 9.36.

Symptom		Possible cause check-up and tests	Corrections
Err:008 is displayed	Low Pressure	Door seal is dirty or faulty.	Clean or replace door seal.
		Piping is leaking.	Fix the leaking point.
		Air valve (43) is leaking.	Take apart, clean and inspect seats - replace if worn or damaged.
		Exhaust valve (73) is leaking.	Take apart, clean and inspect seats - replace if worn or damaged.
		Vacuum valve (52) is leaking.	Take apart, clean and inspect seats - replace if worn or damaged.
		Steam valve (93) is leaking.	Take apart, clean and inspect seats - replace if worn or damaged.

Symptom		Possible cause check-up and tests	Corrections
		Safety valve is leaking.	Close Pressure Relief Nut or replace the valve.
		Chamber’s pressure sensor is not calibrated.	Open the autoclave's door and read the chamber pressure on the display If the reading is not accurate then check that the atmospheric pressure parameter is set correctly. Calibrate the chamber's pressure sensor if needed.
		Chamber’s pressure sensor is faulty.	Test the sensor circuit according to sec 9.36.
		Steam valve (93) is faulty restricting the steam to chamber	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil.
		Steam valve (93) control circuit faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 5. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 5 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
		Generator’s pressure sensor is not calibrated.	Calibrate the sensor.
		Generator’s pressure sensor is faulty.	Test the sensor circuit according to sec 9.37.

Symptom		Possible cause check-up and tests	Corrections
Err:009 is displayed	System Error	This message displayed if the real time clock is faulty.	Replace the Nova4-D2 board.

Symptom		Possible cause check-up and tests	Corrections
Err:011 is displayed 	Door is Open	The error is displayed despite that the door is closed. The door switch is faulty.	Replace the door switch.
		The error is displayed despite that the door is closed. The door switch is out of adjustment.	Remove the two screws holding the door switch mounting block to the front panel. Adjust the door switch (see sec. 9.16)..
		The error is displayed despite that the door is closed. The door is not fully closed.	Close the door with more force.
		The error is displayed despite that the door is closed. The control wire from the door switch is not connected.	Repair the broken control wire

Symptom		Possible cause check-up and tests	Corrections
Err:012 is displayed	Manual Stop	The **START/STOP** key was pressed and the cycle is aborted.	Press the START/STOP key to delete the error message. To open the door, wait until the pressure decreases to ambient pressure.

Symptom		Possible cause check-up and tests	Corrections
Err:013 is displayed	Air Valve (43) Error	Air filter is clogged.	Replace the air filter.
		Air inlet tube is clogged or kinked.	Clear the air inlet tube.
		Air valve (43) plunger is clogged.	Take apart, clean and inspect seats. Replace if worn or damaged.
		Air valve (43) coil is faulty	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil
		Air valve (43) control circuit is faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 3. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 3 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.

Symptom		Possible cause check-up and tests		Corrections
Err:014 is displayed	Low Vacuum	Vacuum pump runs but no vacuum is produced due to:	Door is not fully closed	Close the door with more force.
			Door seal is dirty or faulty.	Clean or replace the door seal.
			Piping is leaking.	Fix the leak.
			A valve is leaking - Fast Exhaust (73), Air to Vac (44), Air (43) or Steam to Chamber (93).	Take apart, clean and inspect seats - replace if worn or damaged
			Vacuum valve (52) coil is faulty	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil,
			Vacuum valve (52) control circuit is faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 4. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 4 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
			Air to vacuum valve (44) coil is faulty.	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil.
			Air to vacuum valve (44) control circuit is faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 9. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 9 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.

Symptom		Possible cause check-up and tests		Corrections
			Cooler is blocked.	1. Ensure there is a minimum 2" clearance at the back of the unit. Inside a cabinet the rear cabinet panel needs to be removed. 2. Blow air through the fins of the radiator to remove dust and dirt that may be restricting air flow.
			Cooler is leaking.	Disconnect the inlet and outlet tube and run water through the piping to check for a blockage. Pressure test with water and check for leaks. Replace cooler.
			Cooler fan is faulty.	Clean fan blades of dirt build up. Replace fan.
			Pump need to be rebuilt.	Install rebuilding kit.
		Vacuum pump does not operate due to:	Pump's fuse burnt	Replace fuse on the Nova4-A2 board.
			Disconnected wire.	Reconnect wires.
			Faulty vacuum pump	Replace the faulty vacuum pump.
			AC high voltage power board (Nova4-A2) board is faulty.	Replace the-Nova4-A2 board.

Symptom		Possible cause check-up and tests	Corrections
Err:015 is displayed	Low Heat	Generator's heating element is disconnected or burnt.	Unplug the unit then disconnect the generator heating element wires from the terminal block. Take an ohm reading on the heating element - 23 ohms. Reconnect or replace the heating element as needed.
		Chamber's heating element is disconnected or burnt.	Unplug the unit then trace the chamber heating element wires to the two plug in connectors then disconnect the heating element wires. Take an ohm reading on the chamber heating element - 105 ohms. Reconnect or replace the heating element as needed.

Symptom		Possible cause check-up and tests		Corrections
		Generator's water level electrode has a scale build up.		Clean or replace the generator's water electrode.
		Insufficient or no water supply to the generator.	Piping to and from water pump is clogged.	Clean water pump filter. Unclog piping.
			Water valve (21) is clogged	Take apart, clean and inspect seats - replace if worn or damaged.
			Water valve (21) is faulty.	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil.
			Water valve (21) control circuit is faulty.	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 10. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 10 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
			Water pump fuse is burnt.	Replace fuse on the Nova4-A2 board.
			Faulty water pump.	Replace water pump
			Water pump does not run - AC high voltage power board is faulty.	Replace the Nova4-A2 board.
			Water check valve is faulty.	Replace check valve.

Symptom		Possible cause check-up and tests		Corrections
Err:016 is displayed 	Press Sensor Cutout	Chamber's pressure sensor is:	Disconnected	Reconnect the chamber's pressure sensor.
			Faulty	Test the sensor circuit according to sec 9.36.
		Faulty Nova4-D2 board		Replace faulty board.

Symptom		Possible cause check-up and tests		Corrections
Err:017 is displayed 	Pt2 out	Chamber's wall temperature sensor (JP3) is:	Disconnected	Reconnect the chamber's wall PT100.
			Faulty	Test the sensor circuit according to sec 9.35.
		Faulty Nova4-D2 board		Replace faulty board.

Symptom		Possible cause check-up and tests		Corrections
Err:018 	Press Sensor Cutout	Generator's pressure sensor is	Disconnected	Reconnect the chamber's wall PT100.
			Faulty	Test the sensor circuit according to sec 9.37.
		Faulty Nova4-D2 board		Replace faulty board.

Symptom		Possible cause check-up and tests	Corrections
Err:020 is displayed	No Gen water	Insufficient or no water supply to the generator. Piping to and from water pump is clogged.	Clean water pump filter. Unclog piping.
		Water pump is faulty.	Check water pump fuse. Check water pump is receiving power. Replace water pump.
		Generator's water level electrode has a scale build up.	Clean or replace the generator's water level electrode.
		Water sensor wire is disconnected.	Reconnect sensor wire.
		insufficient or no water supply to the generator. Water valve plunger (21) is clogged.	Take apart, clean and inspect seats - replace if worn or damaged
		insufficient or no water supply to the generator. Water valve coil (21) is faulty	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil

Symptom		Possible cause check-up and tests	Corrections
		insufficient or no water supply to the generator. Water valve (21) control circuit is faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and 10. A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and 10 and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
		insufficient or no water supply to the generator. Water check valve is faulty	Replace check valve

Symptom		Possible cause check-up and tests	Corrections
Err:021 is displayed	Vacuum Test Fail	Door seal is dirty or faulty.	Clean or replace the door seal.
		Piping is leaking.	Fix the leaking point.

Symptom		Possible cause check-up and tests	Corrections
This symbol is displayed 	No water	Mineral free water reservoir is empty.	Pour mineral-free water in the front funnel until it reaches the "full" level.
		The symbol appears despite that the reservoir is full: water level electrodes are disconnected, dirty or faulty.	Fix, clean or replace water level electrodes in the mineral-free water reservoir.

Symptom		Possible cause check-up and tests	Corrections
	Mineral free water reservoir is empty but "no water" symbol does not appear.	The two water level electrodes may be connected with dirt,	Clean water level electrodes in the mineral-free water reservoir.
		The water level electrodes may be short-circuited.	Locate and Fix the short circuit.

Symptom		Possible cause check-up and tests	Corrections
This symbol is displayed 	Remove water	The waste water reservoir is full.	Empty the waste water reservoir.
		The symbol appears despite that the reservoir is empty: water level electrodes are dirty, disconnected or faulty.	Fix, clean or replace water level electrodes of the waste water reservoir.

Symptom		Possible cause check-up and tests		Corrections
This symbol is displayed 	Low Chamber wall Temp	The autoclave is preheating (not ready).		Wait for the autoclave to reach the proper operating conditions for starting a new cycle.
		Heating element wire disconnected.		reconnect wire to the heating elements
		Faulty heating elements		Unplug the unit then trace the chamber heating element wires to the two plug in connectors then disconnect the heating element wires. Take an ohm reading on the chamber heating element - 105 ohms. Reconnect or replace heating elements as needed
		Chamber's wall temperature sensor is:	Disconnected (JP3)	Reconnect the chamber's wall PT100.
			Not calibrated	Calibrate the chamber's wall PT100.
			Faulty	Test the sensor circuit according to sec 9.35.

Symptom	Possible cause check-up and tests	Corrections
Door does not open	The autoclave is not powered.	Turn-on the autoclave.
	The locking solenoid is disconnected.	See emergency opening sec 938. Check connection block behind door cover. Check connection on Nova4-D2 board.
	The locking solenoid is faulty.	Replace the locking solenoid.

Symptom	Possible cause check-up and tests	Corrections
Operational screen does not appear	"Loading" message is displayed for more than 10 seconds	The software program is corrupted. Replace the Nova4-D2 board

Symptom	Possible cause check-up and tests	Corrections
Solenoid valve not working	valve coil is faulty	Check for magnetism at the coil. With coil disconnected read ~7 ohms across coil. Read 0 ohms between the coil terminal and the ground terminal. Replace the faulty coil
	valve control circuit is faulty	Check for proper voltage to the machine (230 VAC). Insert test leads into JP13 pins 1 and (see schematic for specific pin #). A properly working solenoid will show ~0 VAC when off, ~18 VAC when on. With test lead in JP 13 pin 1 and (see schematic for specific pin #) and the coil disconnected there should be ~18 VAC across the pins with the valve turned on or off. Replace a faulty circuit board. With the coil disconnected there should be ~18 VAC on connection box terminals with the valve turned on or off. Repair broken wire.
	Solenoid valve is clogged or leaking	Take apart, clean and inspect seats - replace if worn or damaged

12 PRESSURE VS TEMPERATURE FOR SATURATED STEAM

psia	InHg	°F	Bar	kPa	°C
1.5	2.95	114.5	0.10	10	45.8
2.2	4.44	129.3	0.15	15	54.1
2.9	5.90	140.2	0.20	20	60.1
3.6	7.39	149.1	0.25	25	65.0
4.4	8.86	156.4	0.30	30	68.9
5.1	10.34	162.9	0.35	35	72.7
5.8	11.81	168.6	0.40	40	75.9
6.5	13.30	173.8	0.45	45	78.8
7.3	14.76	178.4	0.50	50	81.3

psia	psig	°F	Bar	kPa	°C
14.7	0.0	212.0	1.01	101.3	100.0
14.8	0.1	212.2	1.02	101.7	100.1
14.8	0.1	212.4	1.02	102.1	100.2
14.9	0.2	212.5	1.02	102.4	100.3
14.9	0.2	212.7	1.03	102.8	100.4
15.0	0.3	212.9	1.03	103.2	100.5
15.0	0.3	213.1	1.04	103.6	100.6
15.1	0.4	213.3	1.04	104.0	100.7
15.1	0.4	213.4	1.04	104.3	100.8
15.2	0.5	213.6	1.05	104.7	100.9
15.2	0.5	213.8	1.05	105.1	101.0
15.3	0.6	214.0	1.05	105.4	101.1
15.4	0.7	214.2	1.06	105.8	101.2
15.4	0.7	214.3	1.06	106.2	101.3
15.5	0.8	214.5	1.07	106.6	101.4
15.5	0.8	214.7	1.07	106.9	101.5
15.6	0.9	214.9	1.07	107.3	101.6
15.6	0.9	215.1	1.08	107.7	101.7
15.7	1.0	215.2	1.08	108.1	101.8
15.7	1.0	215.4	1.08	108.4	101.9
15.8	1.1	215.6	1.09	108.8	102.0
15.8	1.1	215.8	1.09	109.2	102.1
15.9	1.2	216.0	1.10	109.6	102.2
16.0	1.3	216.3	1.10	110.0	102.4
16.1	1.4	216.5	1.11	110.7	102.5
16.1	1.4	216.7	1.11	111.1	102.6
16.2	1.5	216.9	1.12	111.5	102.7
16.2	1.5	217.0	1.12	111.9	102.8
16.3	1.6	217.2	1.12	112.3	102.9
16.4	1.7	217.4	1.13	112.7	103.0
16.4	1.7	217.6	1.13	113.1	103.1
16.5	1.8	217.8	1.14	113.5	103.2
16.5	1.8	217.9	1.14	114.0	103.3
16.6	1.9	218.1	1.14	114.3	103.4
16.6	1.9	218.3	1.15	114.7	103.5
16.7	2.0	218.5	1.15	115.1	103.6
16.8	2.1	218.7	1.16	115.6	103.7
16.8	2.1	218.8	1.16	116.0	103.8
16.9	2.2	219.0	1.16	116.3	103.9
16.9	2.2	219.2	1.17	116.7	104.0
17.0	2.3	219.4	1.17	117.1	104.1
17.1	2.4	219.6	1.18	117.5	104.2

psia	psig	°F	Bar	kPa	°C
17.1	2.4	219.7	1.18	117.9	104.3
17.2	2.5	219.9	1.18	118.6	104.4
17.2	2.5	220.1	1.19	118.6	104.5
17.3	2.6	220.3	1.19	119.3	104.6
17.4	2.7	220.5	1.20	120.0	104.7
17.4	2.7	220.6	1.20	120.0	104.8
17.5	2.8	220.8	1.20	120.4	104.9
17.5	2.8	221.0	1.21	120.7	105.0
17.6	2.9	221.2	1.21	121.3	105.1
17.7	3.0	221.4	1.22	122.0	105.2
17.7	3.0	221.5	1.22	122.0	105.3
17.8	3.1	221.7	1.23	122.7	105.4
17.8	3.1	221.9	1.23	122.7	105.5
17.9	3.2	222.1	1.23	123.4	105.6
18.0	3.3	222.3	1.24	124.1	105.7
18.0	3.3	222.4	1.24	124.1	105.8
18.1	3.4	222.6	1.24	124.7	105.9
18.2	3.5	222.8	1.25	125.1	106.0
18.2	3.5	223.0	1.26	125.5	106.1
18.3	3.6	223.2	1.26	126.0	106.2
18.3	3.6	223.3	1.26	126.2	106.3
18.4	3.7	223.5	1.27	126.8	106.4
18.5	3.8	223.7	1.27	127.2	106.5
18.5	3.8	223.9	1.28	127.7	106.6
18.6	3.9	224.1	1.28	128.1	106.7
18.6	3.9	224.2	1.29	128.5	106.8
18.7	4.0	224.4	1.29	129.0	106.9
18.8	4.1	224.6	1.29	129.6	107.0
18.9	4.2	224.8	1.30	129.9	107.1
18.9	4.2	225.0	1.30	130.4	107.2
19.0	4.3	225.1	1.31	130.8	107.3
19.0	4.3	225.3	1.31	131.3	107.4
19.1	4.4	225.5	1.32	131.7	107.5
19.2	4.5	225.7	1.32	132.2	107.6
19.3	4.6	225.9	1.33	132.6	107.7
19.3	4.6	226.0	1.33	133.1	107.8
19.4	4.7	226.2	1.34	133.5	107.9
19.4	4.7	226.4	1.34	134.0	108.0
19.5	4.8	226.6	1.34	134.4	108.1
19.6	4.9	226.8	1.35	134.9	108.2
19.6	4.9	226.9	1.35	135.3	108.3
19.7	5.0	227.1	1.36	135.8	108.4
19.8	5.1	227.3	1.36	136.2	108.5
19.8	5.1	227.5	1.37	136.7	108.6
19.9	5.2	227.7	1.37	137.1	108.7
19.9	5.2	227.8	1.38	137.6	108.8
20.0	5.3	228.0	1.38	138.1	108.9
20.1	5.4	228.2	1.39	138.5	109.0
20.2	5.5	228.4	1.39	139.0	109.1
20.3	5.6	228.6	1.39	139.5	109.2
20.3	5.6	228.7	1.40	140.0	109.3
20.4	5.7	228.9	1.40	140.5	109.4
20.4	5.7	229.1	1.41	140.9	109.5

psia	psig	°F	Bar	kPa	°C	psia	psig	°F	Bar	kPa	°C
20.5	5.8	229.3	1.41	141.4	109.6	24.6	9.9	239.2	1.70	169.7	115.1
20.6	5.9	229.5	1.42	142.0	109.7	24.7	10.0	239.4	1.70	170.2	115.2
20.6	5.9	229.6	1.42	142.4	109.8	24.7	10.0	239.5	1.71	170.8	115.3
20.7	6.0	229.8	1.43	142.9	109.9	24.8	10.1	239.7	1.71	171.3	115.4
20.8	6.1	230.0	1.43	143.3	110.0	24.9	10.2	239.9	1.72	171.8	115.5
20.9	6.2	230.2	1.44	143.9	110.1	25.0	10.3	240.1	1.72	172.4	115.6
21.0	6.3	230.4	1.44	144.3	110.2	25.1	10.4	240.3	1.73	173.1	115.7
21.0	6.3	230.5	1.45	144.8	110.3	25.2	10.5	240.4	1.74	173.6	115.8
21.1	6.4	230.7	1.45	145.3	110.4	25.3	10.6	240.6	1.74	174.1	115.9
21.1	6.4	230.9	1.46	145.8	110.5	25.3	10.6	240.8	1.75	174.7	116.0
21.2	6.5	231.1	1.46	146.2	110.6	25.4	10.7	241.0	1.75	175.3	116.1
21.3	6.6	231.3	1.47	146.7	110.7	25.5	10.8	241.2	1.76	175.9	116.2
21.3	6.6	231.4	1.47	147.2	110.8	25.6	10.9	241.3	1.76	176.4	116.3
21.4	6.7	231.6	1.48	147.7	110.9	25.7	11.0	241.5	1.77	177.0	116.4
21.5	6.8	231.8	1.48	148.2	111.0	25.8	11.1	241.7	1.78	177.6	116.5
21.6	6.9	232.0	1.49	148.6	111.1	25.9	11.2	241.9	1.78	178.2	116.6
21.7	7.0	232.2	1.49	149.6	111.2	25.9	11.2	242.1	1.79	178.7	116.7
21.7	7.0	232.3	1.50	149.6	111.3	26.0	11.3	242.2	1.79	179.3	116.8
21.8	7.1	232.5	1.50	150.3	111.4	26.1	11.4	242.4	1.80	180.0	116.9
21.9	7.2	232.7	1.51	151.0	111.5	26.2	11.5	242.6	1.80	180.5	117.0
21.9	7.2	232.9	1.51	151.0	111.6	26.3	11.6	242.8	1.81	181.1	117.1
22.0	7.3	233.1	1.52	151.7	111.7	26.4	11.7	243.0	1.82	181.6	117.2
22.1	7.4	233.2	1.52	152.2	111.8	26.4	11.7	243.1	1.82	182.2	117.3
22.1	7.4	233.4	1.53	152.7	111.9	26.5	11.8	243.3	1.83	182.8	117.4
22.2	7.5	233.6	1.53	153.2	112.0	26.6	11.9	243.5	1.83	183.4	117.5
22.3	7.6	233.8	1.54	153.8	112.1	26.7	12.0	243.7	1.84	184.0	117.6
22.4	7.7	234.0	1.54	154.3	112.2	26.8	12.1	243.9	1.85	184.5	117.7
22.4	7.7	234.1	1.55	154.8	112.3	26.8	12.1	244.0	1.85	185.1	117.8
22.5	7.8	234.3	1.55	155.3	112.4	26.9	12.2	244.2	1.86	185.7	117.9
22.6	7.9	234.5	1.56	155.8	112.5	27.0	12.3	244.4	1.86	186.3	118.0
22.7	8.0	234.7	1.56	156.3	112.6	27.1	12.4	244.6	1.87	186.9	118.1
22.8	8.1	234.9	1.57	156.8	112.7	27.2	12.5	244.8	1.88	187.5	118.2
22.8	8.1	235.0	1.57	157.3	112.8	27.3	12.6	244.9	1.88	188.2	118.3
22.9	8.2	235.2	1.58	157.9	112.9	27.4	12.7	245.1	1.89	188.8	118.4
23.0	8.3	235.4	1.58	158.4	113.0	27.5	12.8	245.3	1.89	189.4	118.5
23.1	8.4	235.6	1.59	158.9	113.1	27.6	12.9	245.5	1.90	190.0	118.6
23.1	8.4	235.8	1.59	159.4	113.2	27.7	13.0	245.7	1.91	190.6	118.7
23.2	8.5	235.9	1.60	159.9	113.3	27.7	13.0	245.8	1.91	191.2	118.8
23.3	8.6	236.1	1.60	160.4	113.4	27.8	13.1	246.0	1.92	191.8	118.9
23.4	8.7	236.3	1.61	160.0	113.5	27.9	13.2	246.2	1.92	192.4	119.0
23.4	8.7	236.5	1.62	161.5	113.6	28.0	13.3	246.4	1.93	193.0	119.1
23.5	8.8	236.7	1.62	162.1	113.7	28.1	13.4	246.6	1.94	193.7	119.2
23.6	8.9	236.8	1.63	162.6	113.8	28.2	13.5	246.7	1.94	194.3	119.3
23.7	9.0	237.0	1.63	163.1	113.9	28.3	13.6	246.9	1.95	194.9	119.4
23.7	9.0	237.2	1.64	163.7	114.0	28.4	13.7	247.1	1.95	195.5	119.5
23.8	9.1	237.4	1.64	164.2	114.1	28.5	13.8	247.3	1.96	196.1	119.6
23.9	9.2	237.6	1.65	164.8	114.2	28.6	13.9	247.5	1.97	196.7	119.7
24.0	9.3	237.7	1.65	165.3	114.3	28.6	13.9	247.6	1.97	197.3	119.8
24.1	9.4	237.9	1.66	165.9	114.4	28.7	14.0	247.8	1.98	197.9	119.9
24.1	9.4	238.1	1.66	166.4	114.5	28.8	14.1	248.0	1.99	198.5	120.0
24.2	9.5	238.3	1.67	167.0	114.6	28.9	14.2	248.2	1.99	199.2	120.1
24.3	9.6	238.5	1.67	167.5	114.7	29.0	14.3	248.4	2.00	199.8	120.2
24.4	9.7	238.6	1.68	168.0	114.8	29.1	14.4	248.5	2.00	200.5	120.3
24.4	9.7	238.8	1.69	168.6	114.9	29.2	14.5	248.7	2.01	201.1	120.4
24.5	9.8	239.0	1.69	169.1	115.0	29.3	14.6	248.9	2.02	201.8	120.5

psia	psig	°F	Bar	kPa	°C	psia	psig	°F	Bar	kPa	°C
29.4	14.7	249.1	2.02	202.4	120.6	34.6	19.9	258.6	2.39	238.7	125.9
29.5	14.8	249.3	2.03	203.1	120.7	34.7	20.0	258.8	2.39	239.4	126.0
29.5	14.8	249.4	2.04	203.7	120.8	34.8	20.1	259.0	2.40	240.2	126.1
29.6	14.9	249.6	2.04	204.4	120.9	34.9	20.2	259.2	2.41	240.9	126.2
29.7	15.0	249.8	2.05	205.0	121.0	35.0	20.3	259.3	2.42	241.6	126.3
29.8	15.3	250.0	2.06	205.7	121.1	35.1	20.4	259.5	2.42	242.3	126.4
29.9	15.4	250.2	2.06	206.3	121.2	35.3	20.6	259.7	2.43	243.1	126.5
30.0	15.5	250.3	2.07	207.0	121.3	35.4	20.7	259.9	2.44	243.8	126.6
30.1	15.6	250.5	2.08	207.6	121.4	35.5	20.8	260.1	2.45	244.5	126.7
30.3	15.6	250.7	2.08	208.3	121.5	35.6	20.9	260.2	2.45	245.3	126.8
30.5	15.8	250.9	2.09	208.9	121.6	35.7	21.0	260.4	2.46	246.0	126.9
30.5	15.8	251.1	2.10	209.6	121.7	35.8	21.1	260.6	2.47	246.8	127.0
30.6	15.9	251.2	2.10	210.2	121.8	35.9	21.2	260.8	2.48	247.6	127.1
30.7	16.0	251.4	2.11	210.8	121.9	36.0	21.3	261.0	2.48	248.3	127.2
30.8	16.1	251.6	2.11	211.5	122.0	36.1	21.4	261.1	2.49	249.1	127.3
31.0	16.3	251.8	2.12	212.1	122.1	36.2	21.5	261.3	2.50	249.9	127.4
31.0	16.3	252.0	2.13	212.8	122.2	36.5	21.8	261.5	2.51	250.6	127.5
31.1	16.4	252.1	2.13	213.5	122.3	36.5	21.8	261.7	2.51	251.4	127.6
31.2	16.5	252.3	2.14	214.2	122.4	36.6	21.9	261.9	2.52	252.2	127.7
31.3	16.6	252.5	2.15	214.8	122.5	36.7	22.0	262.0	2.53	252.9	127.8
31.4	16.7	252.7	2.16	215.2	122.6	36.8	22.1	262.2	2.54	253.7	127.9
31.5	16.8	252.9	2.16	216.2	122.7	36.9	22.2	262.4	2.54	254.5	128.0
31.6	16.9	253.0	2.17	216.9	122.8	37.0	22.3	262.6	2.55	255.2	128.1
31.7	17.0	253.2	2.18	217.6	122.9	37.1	22.4	262.8	2.56	256.0	128.2
31.8	17.1	253.4	2.18	218.3	123.0	37.2	22.5	262.9	2.57	256.8	128.3
31.8	17.1	253.6	2.19	218.9	123.1	37.4	22.7	263.1	2.58	257.5	128.4
31.9	17.2	253.8	2.20	219.6	123.2	37.5	22.8	263.3	2.58	258.3	128.5
32.0	17.3	253.9	2.20	220.3	123.3	37.6	22.9	263.5	2.59	259.1	128.6
32.1	17.4	254.1	2.21	221.0	123.4	37.7	23.0	263.7	2.60	259.8	128.7
32.2	17.5	254.3	2.22	221.7	123.5	37.8	23.1	263.8	2.61	260.6	128.8
32.3	17.6	254.5	2.22	222.4	123.6	37.9	23.2	264.0	2.61	261.4	128.9
32.4	17.7	254.7	2.23	223.1	123.7	38.0	23.3	264.2	2.62	262.2	129.0
32.5	17.8	254.8	2.24	223.7	123.8	38.1	23.4	264.4	2.63	263.0	129.1
32.6	17.9	255.0	2.24	224.4	123.9	38.3	23.6	264.6	2.64	263.8	129.2
32.6	17.9	255.2	2.25	225.1	124.0	38.4	23.7	264.7	2.65	264.6	129.3
32.7	18.0	255.4	2.26	225.8	124.1	38.5	23.8	264.9	2.65	265.4	129.4
32.8	18.1	255.6	2.26	226.5	124.2	38.6	23.9	265.1	2.66	266.2	129.5
32.9	18.2	255.7	2.27	227.2	124.3	38.7	24.0	265.3	2.67	267.0	129.6
33.0	18.3	255.9	2.28	227.9	124.4	38.8	24.1	265.5	2.68	267.8	129.7
33.1	18.4	256.1	2.29	228.6	124.5	39.0	24.3	265.6	2.69	268.6	129.8
33.3	18.6	256.3	2.29	229.3	124.6	39.1	24.4	265.8	2.69	269.4	129.9
33.4	18.7	256.5	2.30	230.0	124.7	39.2	24.5	266.0	2.70	270.3	130.0
33.5	18.8	256.6	2.31	230.7	124.8	39.3	24.6	266.2	2.71	271.1	130.1
33.6	18.9	256.8	2.31	231.5	124.9	39.4	24.7	266.4	2.72	271.9	130.2
33.7	19.0	257.0	2.32	232.2	125.0	39.5	24.8	266.5	2.73	272.7	130.3
33.8	19.1	257.2	2.33	232.9	125.1	39.7	25.0	266.7	2.73	273.5	130.4
33.9	19.2	257.4	2.34	233.6	125.2	39.8	25.1	266.9	2.74	274.3	130.5
34.0	19.3	257.5	2.34	234.4	125.3	39.9	25.2	267.1	2.75	275.1	130.6
34.1	19.4	257.7	2.35	235.1	125.4	40.0	25.3	267.3	2.76	275.9	130.7
34.2	19.5	257.9	2.36	235.8	125.5	40.1	25.4	267.4	2.77	276.7	130.8
34.3	19.6	258.1	2.37	236.5	125.6	40.3	25.6	267.6	2.78	277.5	130.9
34.4	19.7	258.3	2.37	237.3	125.7	40.4	25.7	267.8	2.78	278.3	131.0
34.5	19.8	258.4	2.38	238.0	125.8	40.5	25.8	268.0	2.79	279.1	131.1

psia	psig	°F	Bar	kPa	°C	psia	psig	°F	Bar	kPa	°C
40.6	25.9	268.2	2.80	280.0	131.2	45.7	31.2	275.4	3.15	315.0	135.2
40.7	26.0	268.3	2.81	280.9	131.3	45.8	31.3	275.5	3.16	315.9	135.3
40.9	26.2	268.5	2.82	281.7	131.4	45.9	31.5	275.7	3.17	316.8	135.4
41.0	26.3	268.7	2.83	282.6	131.5	46.1	31.6	275.9	3.18	317.7	135.5
41.1	26.4	268.9	2.83	283.4	131.6	46.2	31.7	276.1	3.19	318.6	135.6
41.2	26.5	269.1	2.84	284.3	131.7	46.3	31.9	276.2	3.20	319.5	135.7
41.4	26.7	269.2	2.85	285.1	131.8	46.5	32.0	276.4	3.20	320.5	135.8
41.5	26.8	269.4	2.86	286.0	131.9	46.6	32.1	276.6	3.21	321.4	135.9
41.6	26.9	269.6	2.87	286.8	132.0	46.8	32.3	276.8	3.22	322.4	136.0
41.7	27.0	269.8	2.88	287.7	132.1	46.9	32.4	277.0	3.23	323.3	136.1
41.8	27.1	270.0	2.89	288.5	132.2	47.0	32.6	277.2	3.24	324.3	136.2
42.0	27.3	270.1	2.89	289.4	132.3	47.2	32.7	277.3	3.25	325.2	136.3
42.1	27.4	270.3	2.90	290.2	132.4	47.3	32.8	277.5	3.26	326.2	136.4
42.2	27.5	270.5	2.91	291.1	132.5	47.4	33.0	277.7	3.27	327.1	136.5
42.3	27.6	270.7	2.92	291.9	132.6	47.6	33.1	277.9	3.28	328.1	136.6
42.5	27.8	270.9	2.93	292.8	132.7	47.7	33.2	278.1	3.29	329.0	136.7
42.6	27.9	271.0	2.94	293.6	132.8	47.9	33.3	278.2	3.30	330.0	136.8
42.7	28.0	271.2	2.94	294.5	132.9	48.0	33.3	278.4	3.31	330.9	136.9
42.8	28.1	271.4	2.95	295.4	133.0	48.1	33.4	278.6	3.32	331.9	137.0
43.0	28.3	271.6	2.96	296.2	133.1	48.3	33.6	278.8	3.33	332.8	137.1
43.1	28.4	271.8	2.97	297.1	133.2	48.4	33.7	279.0	3.34	333.8	137.2
43.2	28.5	271.9	2.98	297.9	133.3	48.5	33.8	279.1	3.35	334.7	137.3
43.3	28.6	272.1	2.99	298.8	133.4	48.7	34.0	279.3	3.36	335.6	137.4
43.5	28.8	272.3	3.00	299.7	133.5	48.8	34.1	279.5	3.37	336.6	137.5
43.6	28.9	272.5	3.01	300.6	133.6	49.0	34.3	279.7	3.38	337.5	137.6
43.7	29.0	272.7	3.01	301.5	133.7	49.1	34.4	279.9	3.38	338.5	137.7
43.9	29.2	272.8	3.02	302.4	133.8	49.2	34.5	280.0	3.39	339.4	137.8
44.0	29.3	273.0	3.03	303.3	133.9	49.4	34.7	280.2	3.40	340.4	137.9
44.1	29.4	273.2	3.04	304.2	134.0	49.5	34.8	280.4	3.41	341.4	138.0
44.2	29.5	273.4	3.05	305.1	134.1	49.7	35.0	280.6	3.42	342.4	138.1
44.4	29.7	273.6	3.06	306.0	134.2	49.8	35.1	280.8	3.43	343.4	138.2
44.5	29.8	273.7	3.07	306.9	134.3	49.9	35.2	280.9	3.44	344.4	138.3
44.6	29.9	273.9	3.08	307.8	134.4	50.1	35.4	281.1	3.45	345.4	138.4
44.8	30.1	274.1	3.09	308.7	134.5	50.2	35.5	281.3	3.46	346.4	138.5
44.9	30.2	274.3	310	309.6	134.6	50.4	35.7	281.5	3.47	347.4	138.6
45.0	30.3	274.5	3.10	310.5	134.7	50.6	35.9	281.7	3.48	348.4	138.7
45.2	30.5	274.6	3.11	311.4	134.8	50.7	36.0	281.8	3.49	349.4	138.8
45.3	30.6	274.8	3.12	312.3	134.9	50.8	36.1	282.0	3.50	350.4	138.9
45.4	30.7	275.0	3.13	313.2	135.0	51.0	36.3	282.2	3.51	351.4	139.0
45.6	31.1	275.2	3.14	314.1	135.1	51.1	36.4	282.4	3.52	352.4	139.1

Legend:
psia ─ absolute pressure in psi
Psig ─ gauge pressure in psi
kPa ─ absolute pressure in kilo-Pascal
InHg ─ pressure (vacuum) in inch-Mercury

EXPLODED DRAWING – REAR

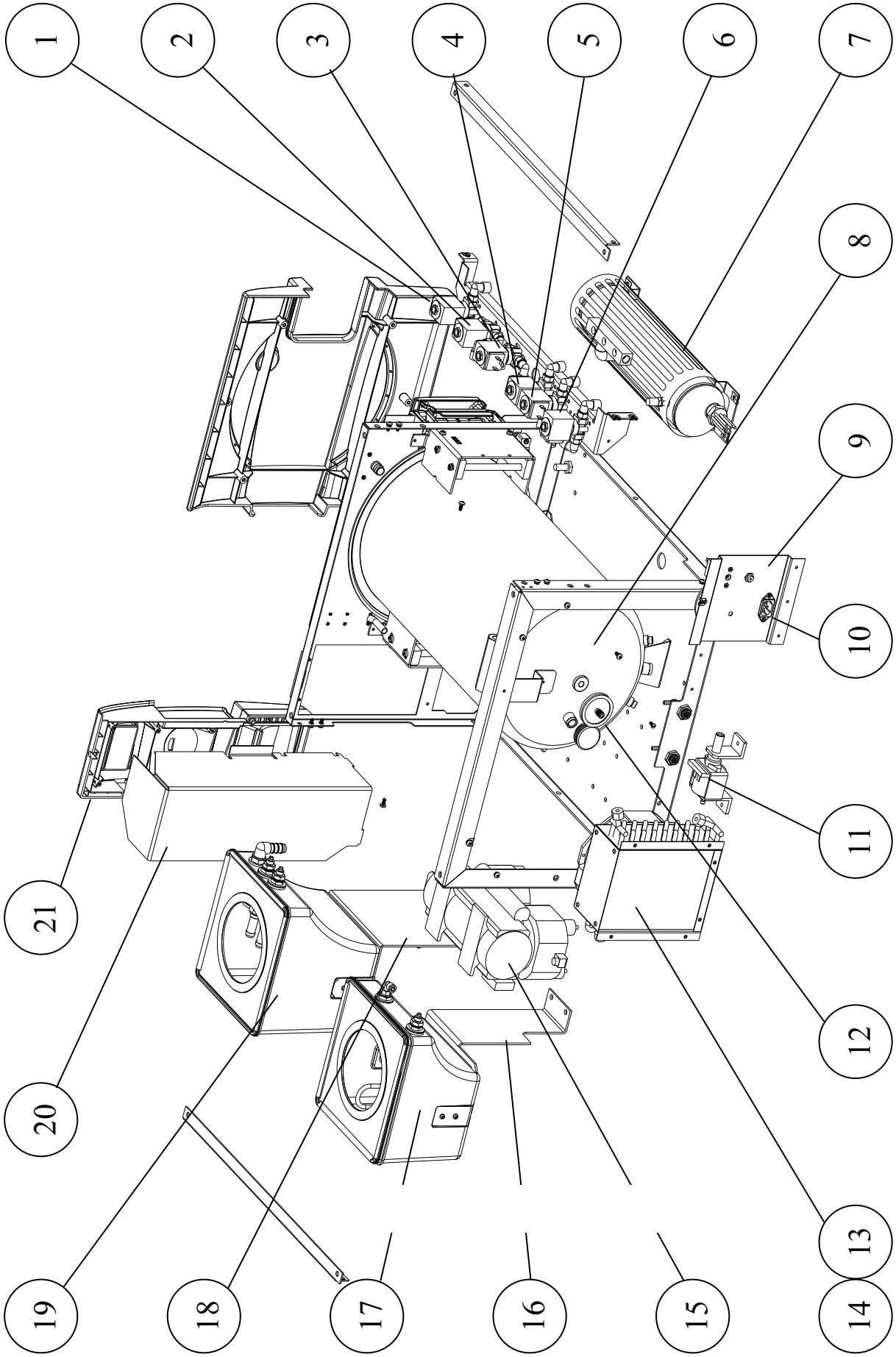


TABLE FOR EXPLODED DRAWING – REAR

No.	*Description*	*Cat. No.*
1	Valve 73 – fast exhaust	SOL026-0039
2	Valve 52 – vacuum valve	SOL026-0039
3	Valve 44 – air vacuum pump	SOL026-0039
4	Valve 21 – water inlet to generator	SOL026-0039
5	Valve 43 – air valve	SOL026-0039
6	Valve 93 – steam to chamber	SOL026-0039
7	Steam generator	GEN411-0002
8	Chamber	CHM411-0003
9	Electrical bracket	ELC411-0001
10	Socket	WIR040-0016
11	Water pump	PUM055-0019
12	Air filter	FIL175-0042
13	Cooler	ARM100-0152
14	Fan	CTP201-0159
15	Vacuum pump	PUM057-0055
16	Waste water reservoir support bracket	CMT411-0071
17	Waste water reservoir, assembly	CMT411-0073
18	Mineral-free water reservoir support bracket	CMT411-0070
19	Mineral-free water reservoir, assembly	CMT411-0072
20	Electronic unit cover	COV411-0005
21	Control panel	POL067-0029

EXPLODED DRAWING – DOOR

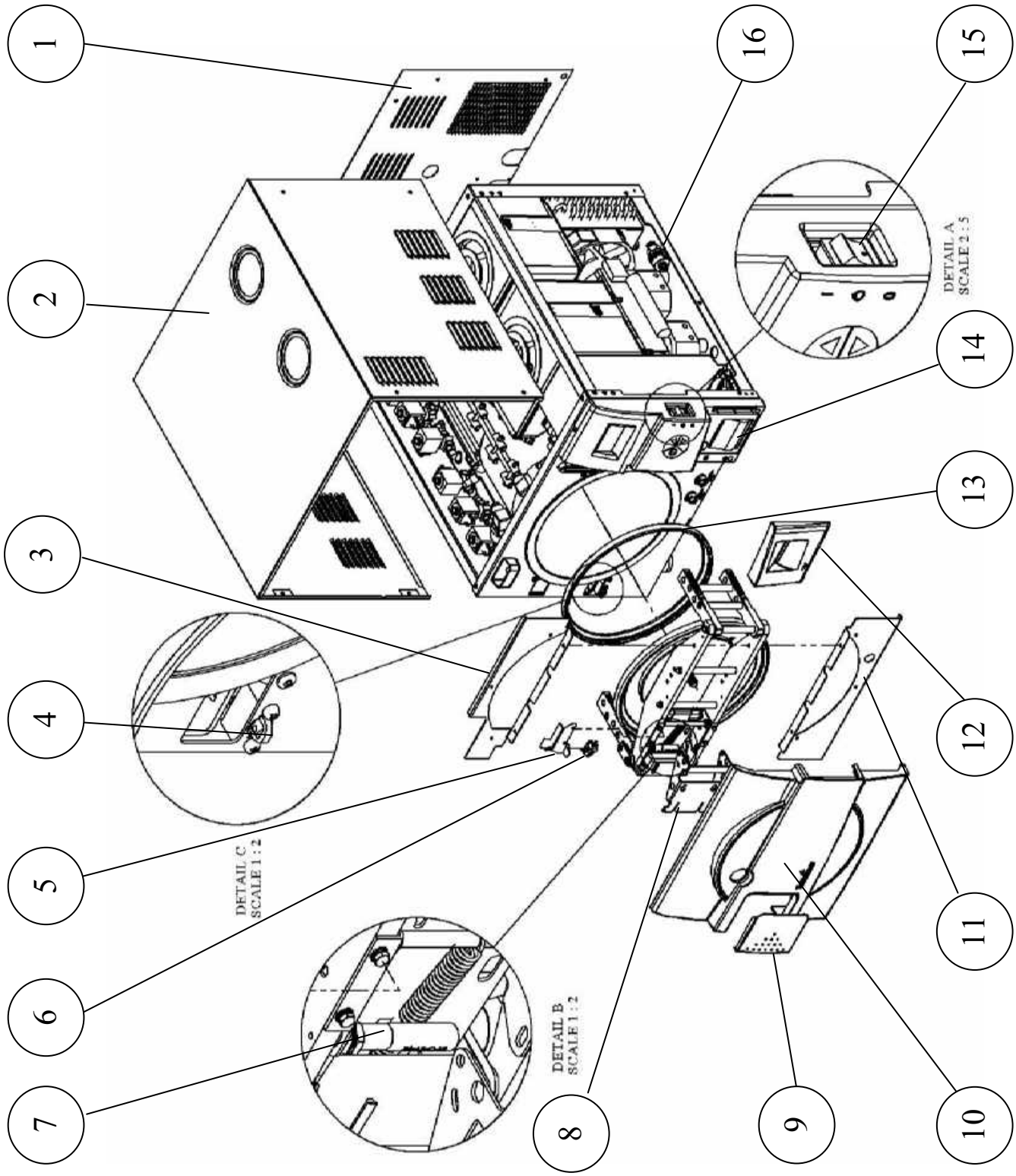


TABLE FOR EXPLODED DRAWING – DOOR

No.	*Description*	*Cat. No.*
1	Rear Cover	COV411-0006
2	Autoclave's cover	COV411-0011
3	Upper door cover holder	HLD411-0010
4	Door switch	LOK411-0024
5	Bracket for door locking verification microswitch	LOK411-0044
6	door locking verification microswitch	ELE036-0036
7	Door locking solenoid	LOK411-0023
8	Door handle, assembly	LOK411-0026
9	Door handle cover	POL067-0012
10	Door cover	POL065-0041
11	Lower door cover holder	HLD411-0009
12	Door, Printer Opening, ELARA	POL067-0010
13	Door gasket	GAS080-0055
14	Printer, DPU-30, Seiko	THE002-0059
15	Main switch/Circuit breaker	ELE035-0102
16	Water strainer	FIL175-0087

EXPLODED DRAWING – PT-100 AND CUT-OFF

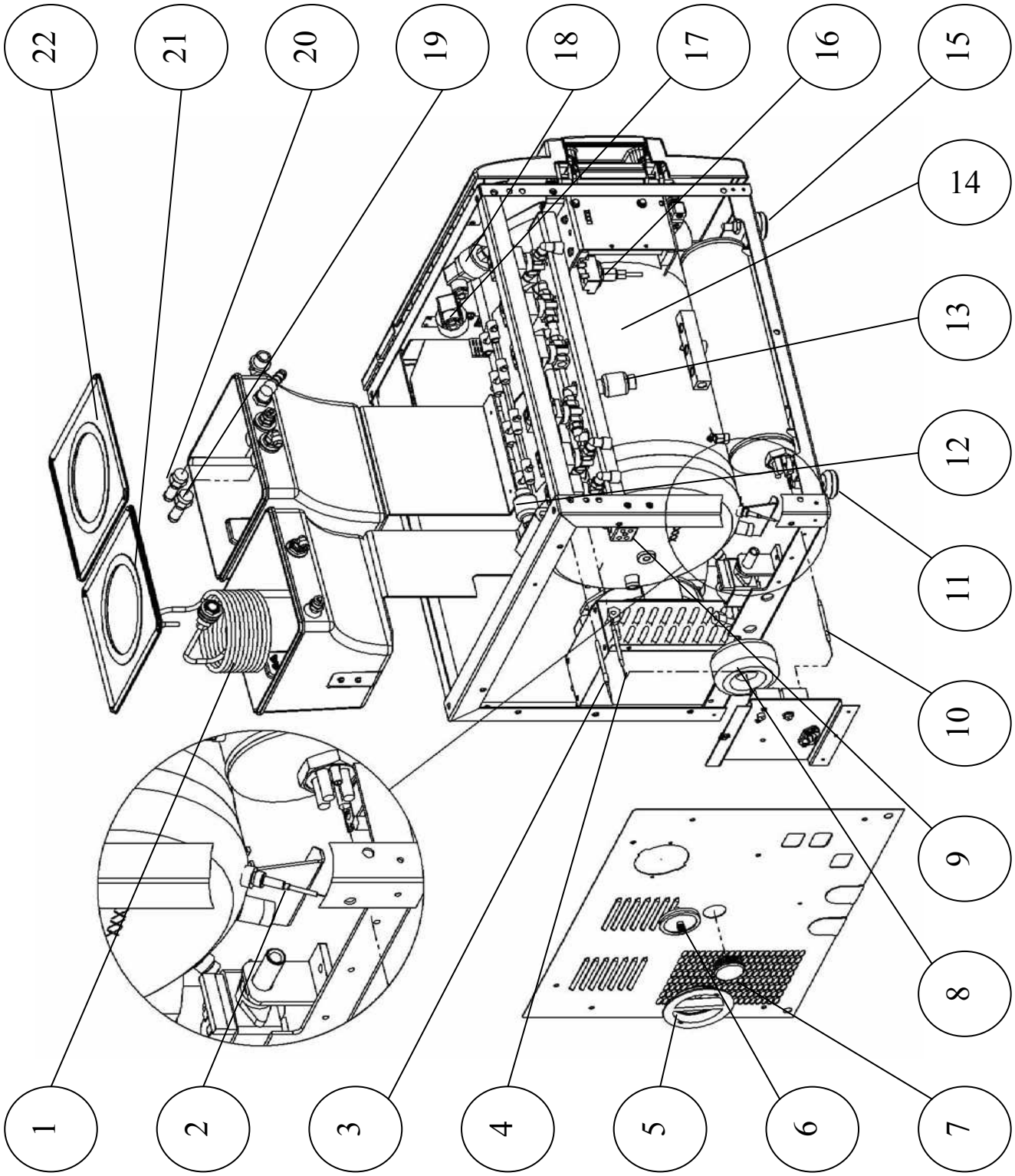
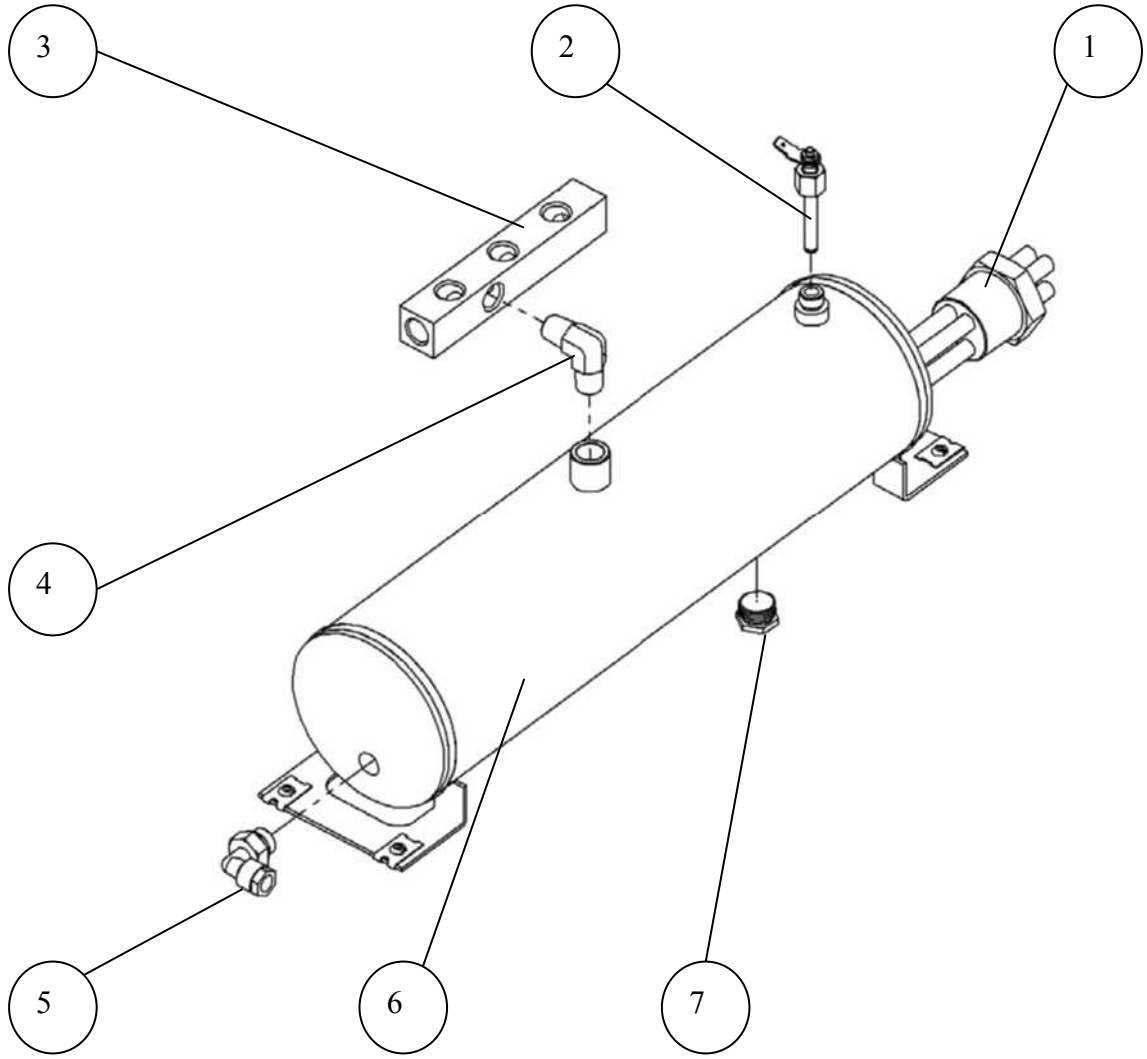


TABLE FOR EXPLODED DRAWING – PT-100 AND CUT-OFF

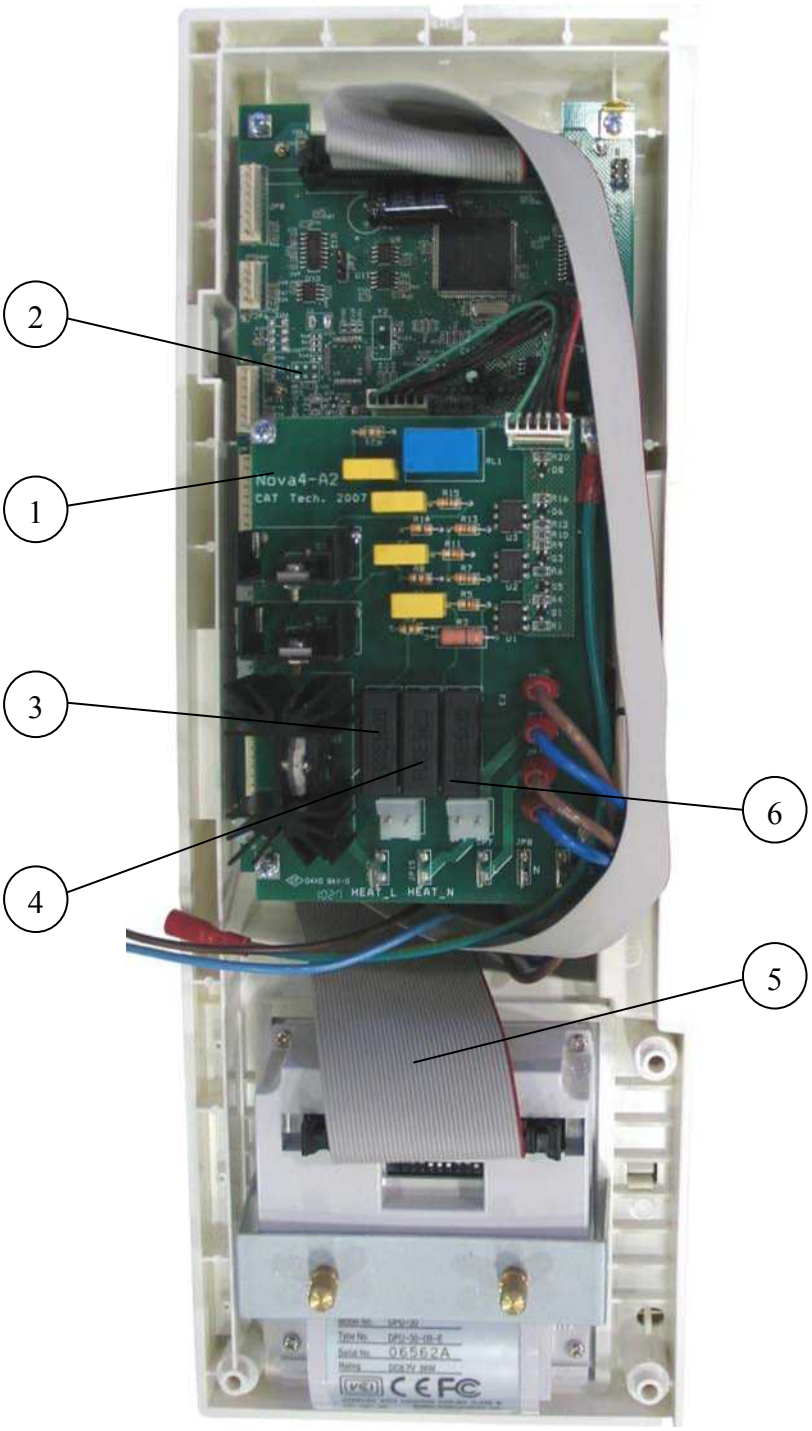
No.	*Description*	*Cat. No.*
1	Cooling coil	PIP411-0002
2	Internal PT100	ELC258-0003
3	Chamber heater PT100	ELC258-0003
4	Chamber heater Cut-off 155˚C	THE005-0016
5	Air filter opening cover	POL067-0004
6	Air filter	FIL175-0042
7	Validation port opening cover	POL065-0006
8	Transformer, 2x115 / 2x12, 50/60 hz	ELE035-0092
9	Ceramic connector for generator heater	THE039-0036
10	Generator cut-off 170˚C	THE005-0019
11	Adjustable Rear Leg	WHE070-0035
12	Check valve Mondeo 1/4	ARM172-0008
13	Check valve Mondeo 1/4	ARM172-0008
14	Chamber heating element	HEA010-0017
15	Adjustable Front Leg	WHE070-0034
16	Pressure Switch, TY85	THE005-0006
17	Chamber pressure transducer, -1+3 Bar abs	THE006-0006
18	Generator pressure transducer, -1+3 Bar abs	THE006-0006
19	Chamber safety valve	SVL029-0028
20	Steam generator safety valve	SVL029-0028
21	Waste Water reservoir cover	RES411-0006
22	Mineral-free water reservoir cover	RES411-0005

EXPLODED DRAWING – GENERATOR



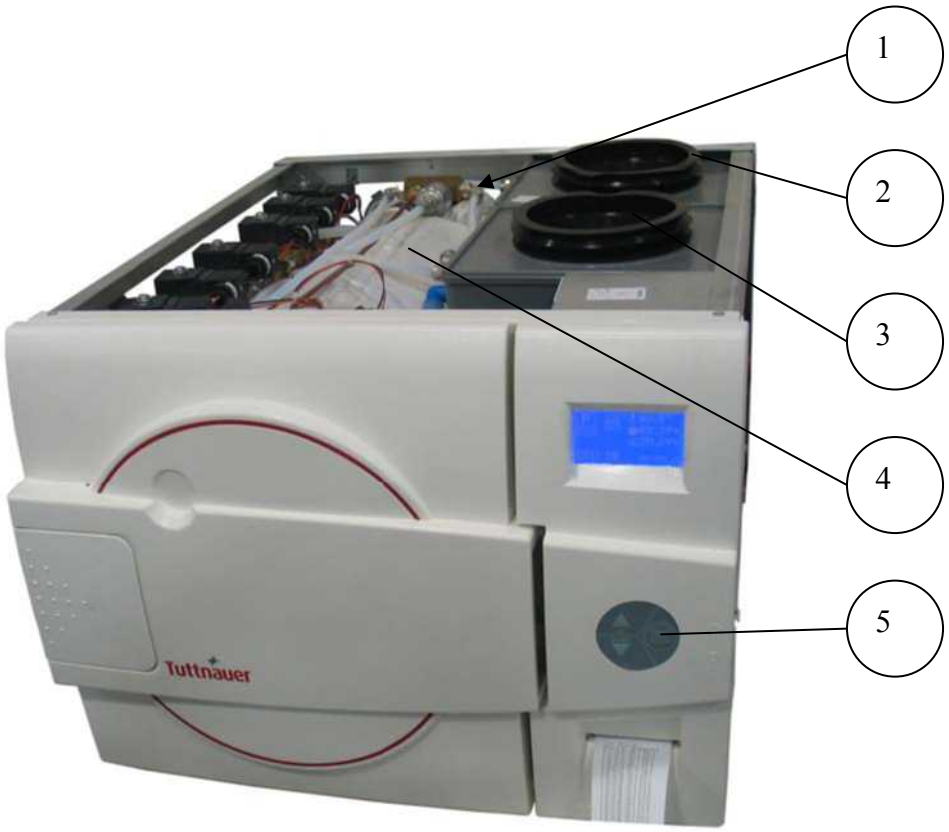
No.	*Description*	*Cat. No.*
1	Heating element	HEA016-0031
2	Water level electrode	CMT196-0004
3	Manifold	CMT253-0022
4	Elbow	FIT100-0083
5	Elbow	FIT100-0809
6	Generator body	GEN411-0001
7	Drain plug	PNE195-0161

CONTROL UNIT



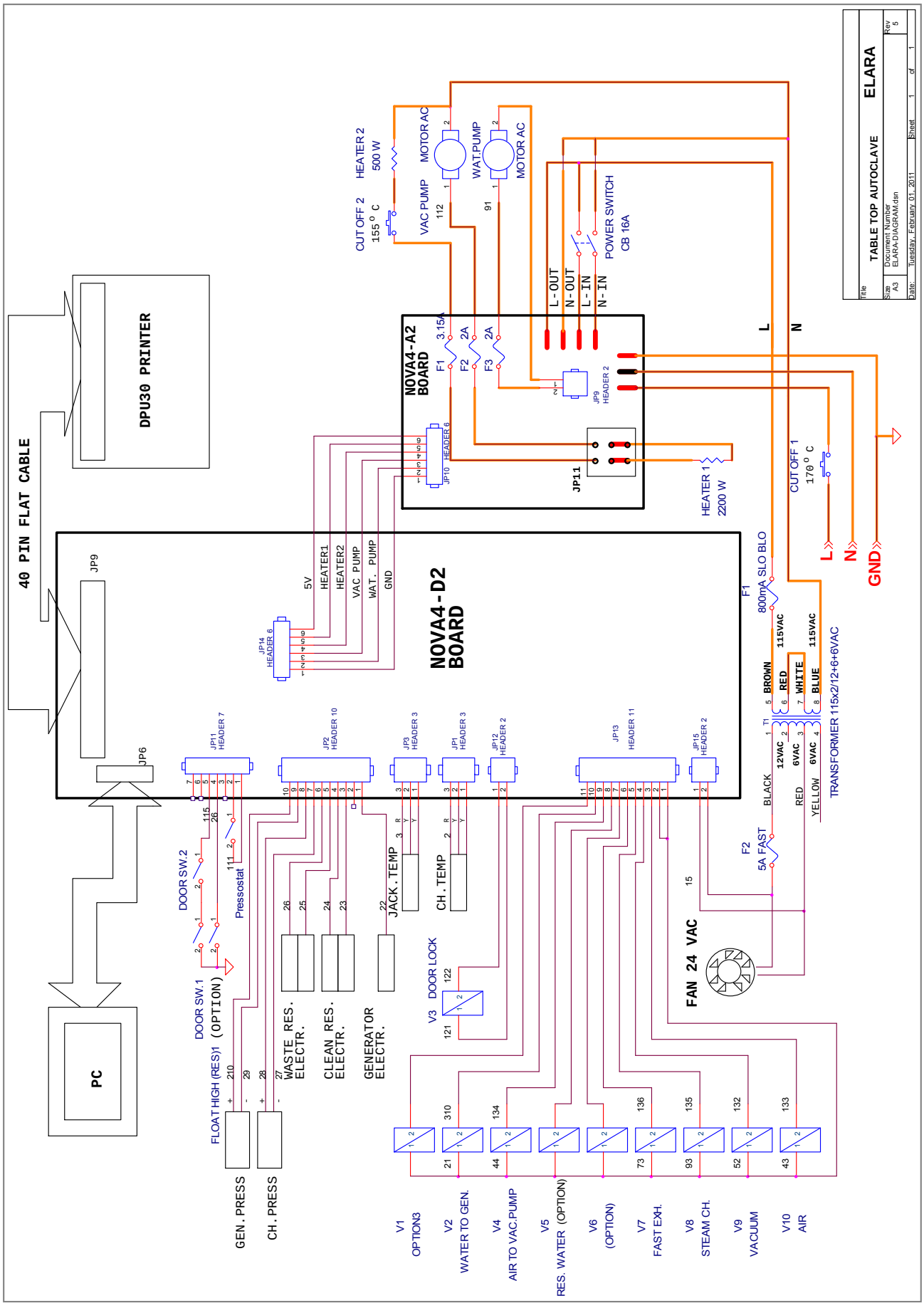
No.	*Description*	*Cat. No.*
1	Board, Electronic, AC, NOVA4-A2	CTP201-0165
2	Board, Electronic, Main, NOVA4-DN2, Elara	CTP201-0164
3	Fuse 3.15 A FAST (chamber heater)	ELE035-0128
4	Fuse 2A FAST (vacuum pump)	ELE035-0009
5	Cable, Flat, for Printer, 50cm, 40P	CTP201-0174
6	Fuse 2A FAST (water pump)	ELE035-0009

PARTIAL FRONT VIEW

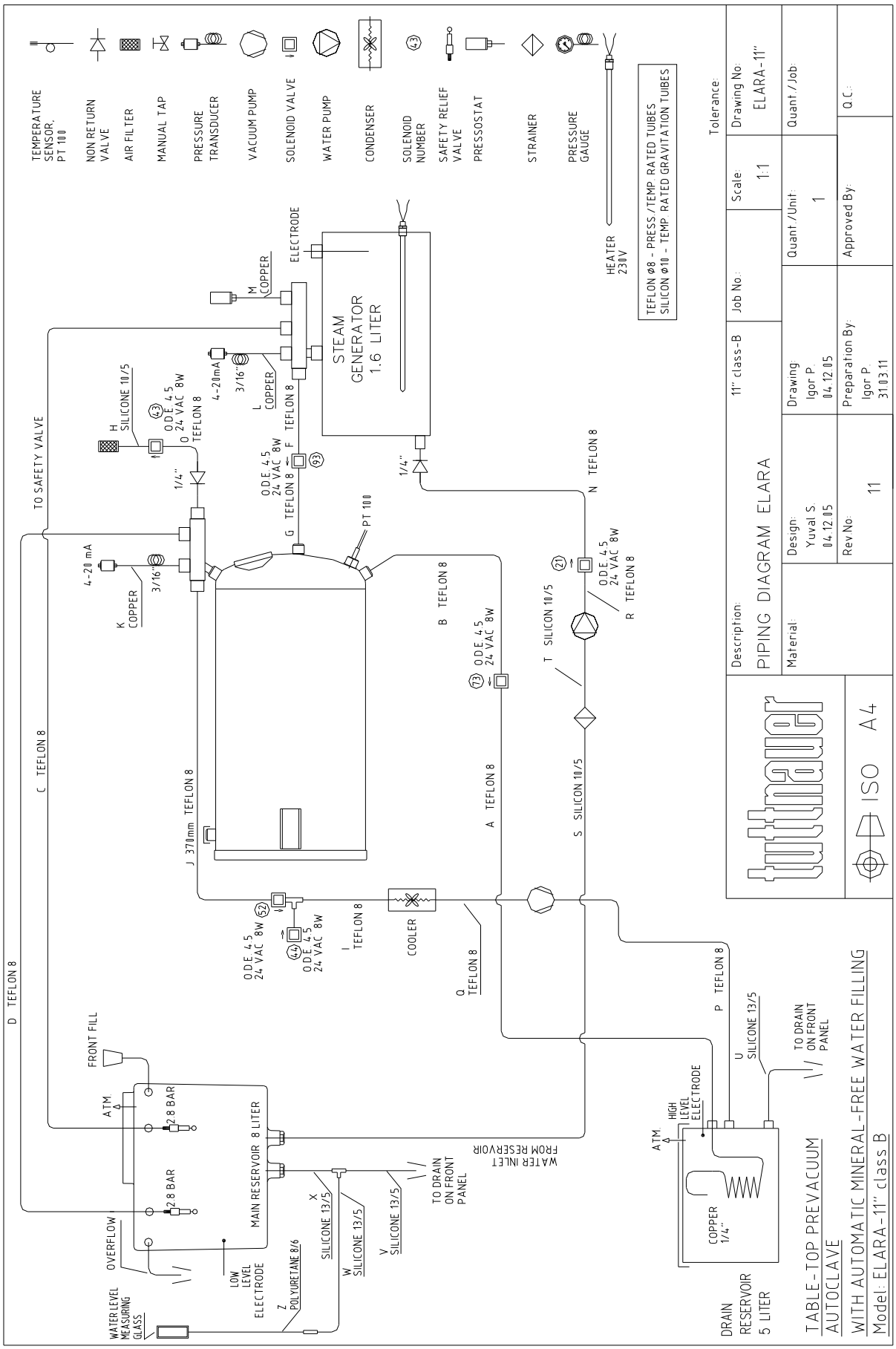


No.	*Description*	*Cat. No.*
1	Isolation cover, rear of chamber Elara 11" (hidden)	COV411-0008
2	Silicone gasket, waste water reservoir	GAS080-0007
3	Silicone gasket, mineral free water reservoir	GAS080-0007
4	Isolation Cover, Chamber, ELARA 11	COV411-0001
5	Keypad	CPN064-0031

ELECTRICAL DIAGRAM



PIPING DIAGRAM



PIPING LAYOUT