



Technician Manual

Electronic Table -Top Autoclaves Models EZ9Plus & EZ11Plus

Cat. No. MAN205-0443002EN Rev. E

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

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TABLE OF CONTENTS

PARAGRAPH	PAGE NO.
1 Introduction	4
2 Symbol Description	4
3 Description of the control system.	5
3.1 Block Diagram Hardware Software Components	5
3.2 Application system architecture	5
3.3 Hardware components:	6
3.4 Troubleshooting the inputs:	11
3.5 Troubleshooting the outputs:	13
4 Checking and Changing Parameters and Other Data	20
4.1 Browsing through the menus	21
4.2 Modifying any Parameter	23
4.3 Quick options screen	25
4.4 Logging in and entering the Main menu	25
4.5 Directories and subdirectories	27
4.6 Cycle Parameters (cycle specific)	27
4.7 System Parameters	27
4.8 Inputs/Outputs	29
4.9 Maintenance	32
4.10 Advanced Options	37
4.11 Version handling	43
4.12 Cycle parameters	48
4.13 Keep Heat	52
4.14 Heating	54
4.15 Sterilization	55
4.16 Exhaust	56
4.17 Drying	57
4.18 Ending	58
4.19 Global	58
5 Calibration	60
5.1 Calibration	60
5.2 Calibration Port	61
5.3 Accessing the Calibration mode	62
5.4 Calibration Procedure	68
5.5 Saturated Steam Table	70

6	Maintenance, Testing and Replacement Procedures	79
6.1	Preliminary Operations for Each Technician Call	79
6.2	Safety tests after repair	79
6.3	Dismantling the Outer Cover of the Autoclave	80
6.4	Replacing the Safety Valve	81
6.5	Testing and Replacing the Chamber Heating Elements	83
6.6	Testing or Replacing the Temperature Safety Thermostat or the Cut-Off Thermostat	87
6.7	Testing the safety thermostats	88
6.8	Replacing the safety thermostats	89
6.9	Cleaning, Testing and Replacing the chamber Water Level Electrode	91
6.10	Testing and Replacement of the PT100	93
6.11	Replacing the Water Reservoir Water Electrodes	96
6.12	Replacing the Drain Valve	97
6.13	Replacing the front funnel and water filling pipe.	98
6.14	Replacing the water reservoirs	101
6.15	Cleaning the water reservoirs	103
6.16	Replacing the Door Cover	105
6.17	Replacing the Door Handle	106
6.18	Replacing the Plastic Handle Cover	107
6.19	Replacing the door safety microswitch	108
6.20	Removing the Front Control Panel	109
6.21	Removing the Main Board and I/O board	111
6.22	Removing cables	113
6.23	Replacing the Printer Door	114
6.24	Replacing the Printer	115
6.25	Replacing the paper roll	116
6.26	Replacing the On/Off-Circuit Breaker	117
6.27	Replacing the water pump	118
6.28	Testing and Replacing the Solenoid valve's Plunger, Coil or base	119
6.29	Cleaning water inlet strainer	121
6.30	Replacing the Air Filter	122
6.31	Replacing the Pressure Transducer	123
6.32	Replacing the Door Safety Microswitch	125
6.33	Door Locking Solenoid	128
6.34	Replacing the Door Gasket	130
6.35	Replacing the power supplies	133
6.36	Replacing the Fuses	134
6.37	Testing and Replacing the Solid State Relay (SSR)	137

6.38	Replacing the Transformer	138
6.39	Replacing the Water Outlet Strainer	139
6.40	Testing and Replacing the Air Pump.	141
6.41	Fan Replacement	142
7	Troubleshooting	144
8	Electrical Diagram	164
9	Piping Diagram	173

1 Introduction

This technician's manual, together with the operator's manual, forms the complete set of the Operation and Maintenance instructions for the EZ9Plus and EZ11Plus autoclaves. 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 voiding the warranty.

2 Symbol Description



Caution! Consult accompanying documents



Caution! Hot surface



Caution! Hot steam.

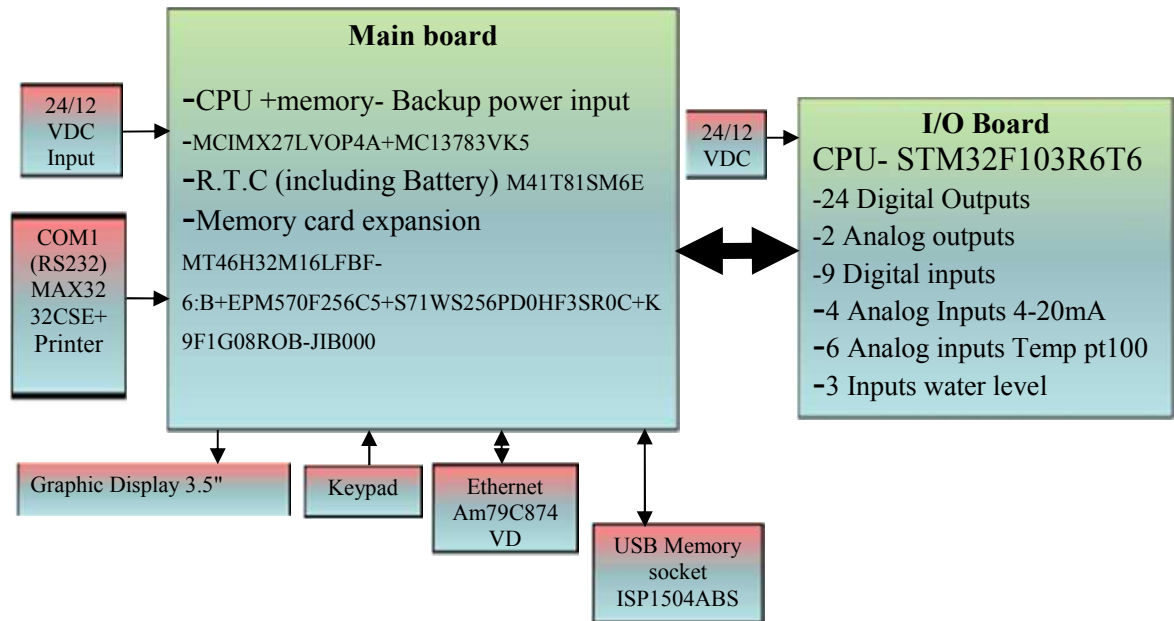


Protective earth (Ground)

Complete information on INSTALLATION, SPECIFICATIONS AND OPERATION can be found in the EZPlus Operator's Manual.

3 Description of the control system.

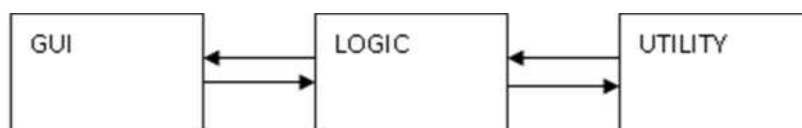
3.1 Block Diagram Hardware Software Components



3.2 Application system architecture

The system is divided into three main sections

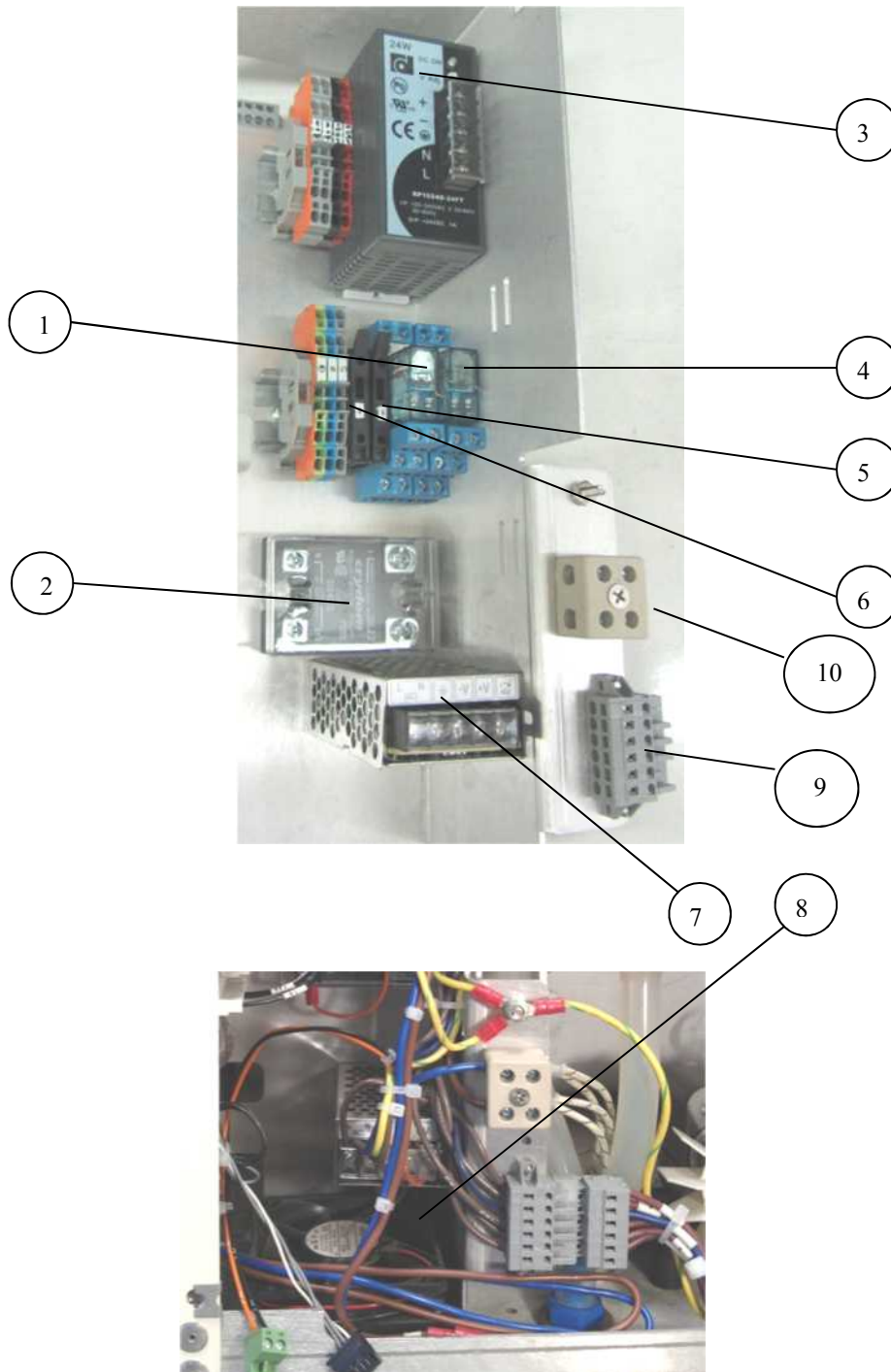
1. GUI – (Graphical User Interface) holds the entire Human Machine interface including the main application screen, keypad and all the configuration screens which enable the user to operate the machine.
2. Logic – holds all the operating system software for running the machine.
3. Utilities – Holds general functionality which is used by the logic section and the GUI section. This includes cycle parameters, display parameters and converting functions for displaying different pressure or temperature units, languages etc.



3.3 Hardware components:

The electrical hardware consists of the following components along with the number of those components in the system:

MAIN board	(1)
I/O board	(1)
Step down AC transformer (1 Toroidal)	
Power supplies 24VDC	(2)
Mechanical relays	(2)
Solid state relay	(1)
AC solenoid valves	(4)
Water pump	(1)
Air pump	(1)
Electronic door lock	(1)
Door switches	(2)
Heaters	(2)
Temp sensor	(1)
Pressure sensor	(1)
Safety thermostats	(2)
Fuses	(4)
Circuit breaker	(1)



DESCRIPTION OF ITEMS

No.	Cat. No.	Description
1	CTP201-0272 or CTP201-0273	Miniature Relay 24VDC, for the air pump
2	CTP201-0065	Relay, Solid State, 25A/24-280V, D2425, Crydom for heaters

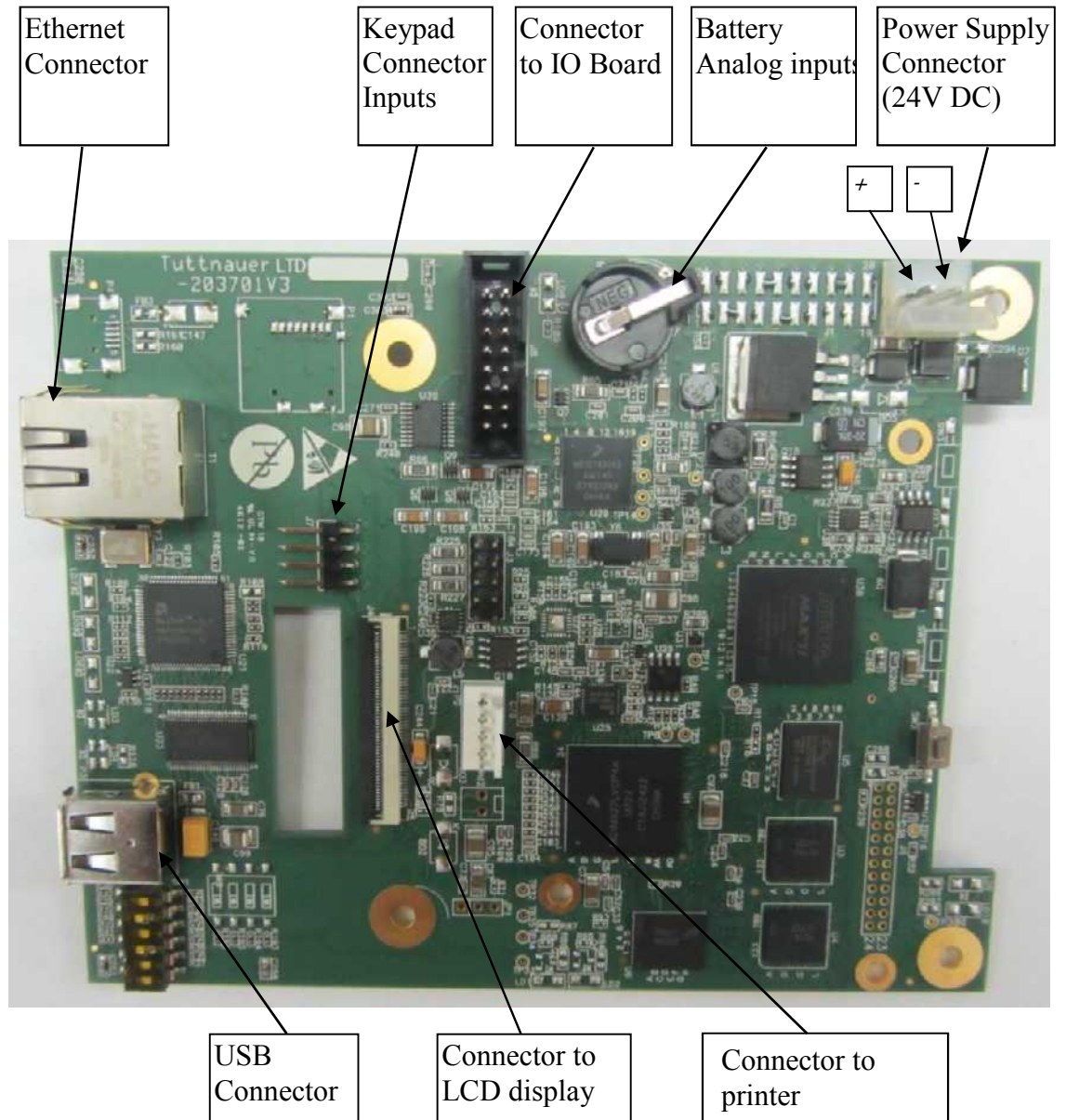
3	ELE035-0144	Power Supply 24VDC (1A) Reign Power
4	CTP201-0272 or CTP201-0273	Miniature Relay 24VDC, for the water pump
5	ELE035-0174	Water Pump Fuse
6	ELE035-0174	Air Pump Fuse
7	ELE035-0151	Power Supply 24VDC (1.1A) Lambda
8	CTP201-0318	Control System Cooling Fan
9	ELE039-1055	JP1 AC power to the control system and pumps
10	THE039-0037	JP2 ceramic heater connector

3.3.1 Main board

The main board holds all the operating system software (application and settings).

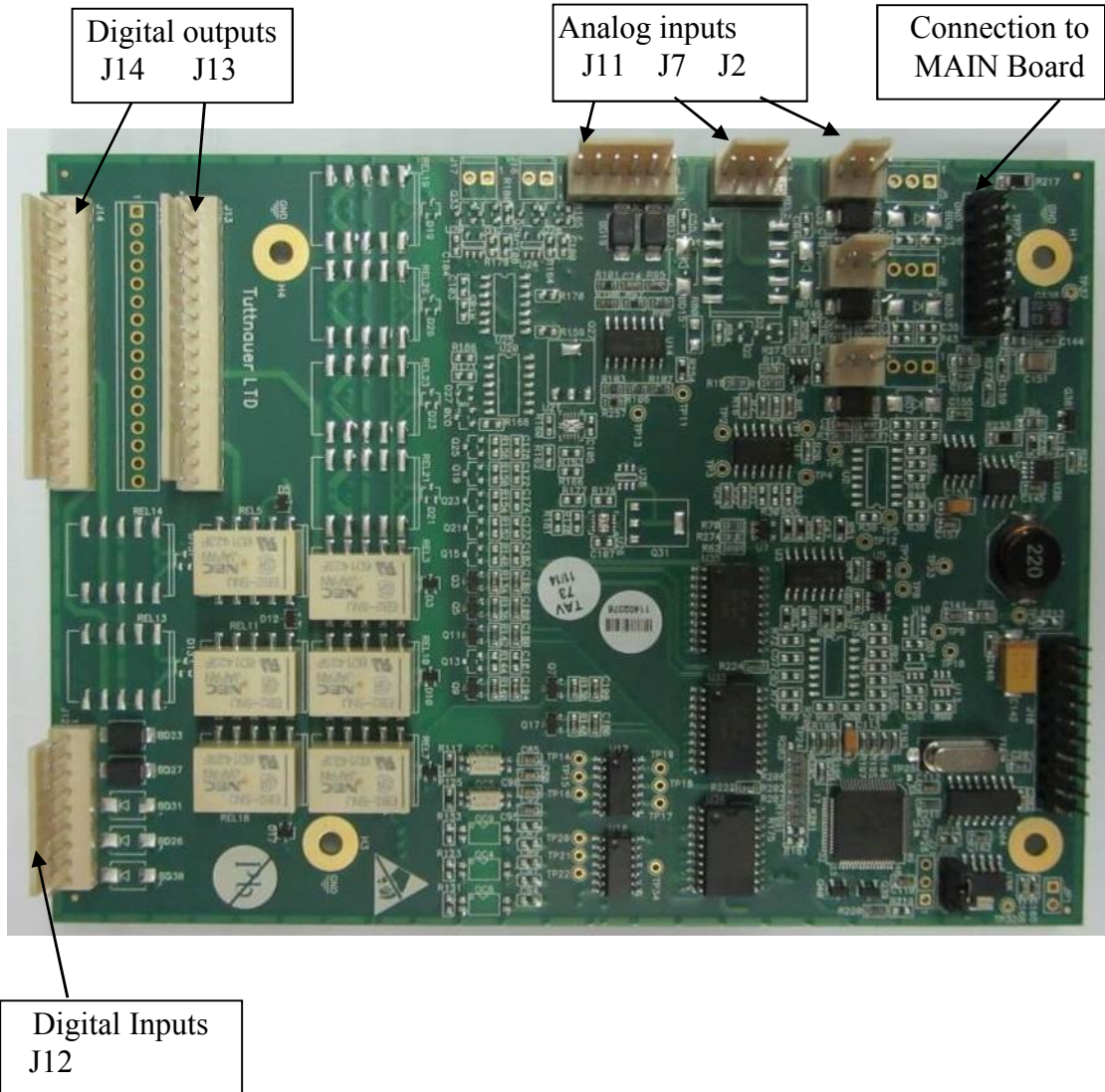
It handles interfacing with the operator through the keypad and display screen. The Main board also handles communications through the USB, printer and network ports.

It controls all functioning of the machine through a ribbon cable connection to the IO board.



3.3.2 I/O Board

The I/O board handles all the inputs and outputs for the machine. The I/O board does not hold any software and receives all instruction from the Main board.



3.3.3 Inputs and Outputs

3.3.3.1 Analog inputs

Analog inputs	Description	Connector & pin
PT100-1	PT-100 chamber temperature input	J2
Pressure 1	4mA-20mA chamber pressure input	J7/1
Electrode 1	Water level in the chamber	J11/1
Electrode 2	Water level in the reservoir	J11/2

3.3.3.2 Digital inputs

Digital Inputs	Description	Connector& Pin
Door 1 closed	Door closed switch input	J12/1

3.4 Troubleshooting the inputs:

Connector J2 is for the first PT100 temperature input

Disconnecting the J2 connector will result in the display showing Analog Input Error and no temperature reading.

Connecting a PT100 simulator (Test -7) can confirm that the control system is receiving a temperature input signal


Connector J7 is for the pressure sensor input

Disconnecting the J7 connector will result in the display showing Analog Input Error and no pressure reading.

Inputting 16mA (from an external source) should result in a display reading of 300 kPa +/- 3 kPa. This will confirm the control system is receiving a pressure input signal.

Connector J11 is for the water sensor inputs


J11-1 supplies 3.9 VDC to the water sensing electrode in the chamber. When water level rises to the tip of the sensor the signal is grounded and the computer knows the height of the water in the chamber.

Note: When the sensor is grounded and the door is closed the door lock will be engaged. The icon “Water in the Chamber”  will be displayed.

Note: Dirt on the electrode can cause the system to fill the chamber with too little water, resulting in a failed cycle.

Note: Dirt on the sensor can falsely indicate water in the chamber at the end of the cycle, causing the door to remain locked.

The output at J11-1 or the tip of the electrode can be read as 3.9 VDC to ground.

Shorting J11-1 or the tip of the electrode to ground will produce the “Water in the Chamber”  icon on the display AND, if the door is closed, the door lock will be engaged.

J11-2 supplies 3.9 VDC to one of the water sensing electrodes in the reservoir. The other electrode is connected to ground. When water

touches the electrodes the signal is grounded and the computer knows the height of the water in the reservoir.

The output at J11-2 or the black wire of the electrode can be read as 3.9 VDC to ground, when the reservoir is empty.

With the reservoir empty, shorting J11-2 to ground or shorting across the reservoir electrodes will remove the “Fill Reservoir” icon from the display.


Note: Dirt accumulation between the electrodes in the reservoir can short the signal to ground and make the system think there is water in the reservoir when it is empty.

With the reservoir full, removing either the black or green wire from the connector on the outside of the reservoir will produce the “Fill

Reservoir”  icon on the display.

Connector J12 contain the DC input from the door switches

J12-1 is the input for both door switches. The door switches are wired

in series so if either one is open the “Door Open”  icon will be displayed.

J12-1 needs to see +24 VDC to know the door is closed.

3.4.1.1 Digital outputs

Digital Outputs	Description	Connector & Pin
Door unlock	Energizes the door lock solenoid and unlocks the door	J13/4
Chamber heat	Energizes the SSR that controls the chamber heaters	J13/6
Water pump relay	Energizes the water pump relay that controls the fill solenoid & the water pump	J13/10
Air Pump relay	Energizes the air pump relay that controls the air pump solenoid & the air pump	J13/12
Slow exhaust	Energizes the slow exhaust valve	J14/6
Fast exhaust	Energizes the fast exhaust valve	J14/8

3.5 Troubleshooting the outputs:

Connector J13 contains the DC outputs

Utilizing the Test Digital Outputs option (under technician code 0321) allows you to turn the outputs on and off to verify the component operation.

With the J13 connector in place, inserting the probe from a DVM into any of the listed positions will show a reading of +24VDC with respect to ground when that component is toggled on.

J13-1 is the +24 VDC input to the circuit board from the power supply at the top of the electronic box.

J13-4 is the DC output to the electronic door lock solenoid

J13-6 is the DC output to the SSR that controls the heating elements

J13-10 is the DC output to the mechanical relay coil #1 that controls the water pump and water fill solenoid.

J13-12 is the DC output to the mechanical relay coil #2 that controls the air pump and air pump solenoid.

Connector J14 contains the AC outputs

Utilizing the Test Digital Outputs option (under technician code 0321) allows you to turn the outputs on and off to verify the component operation.

With the J14 connector in place, inserting the probe from a DVM into any of the listed positions will allow a reading of +18VAC with respect to the red lead on JP3 as the component is toggled on and off.

J14-1 is the 18 VAC input to the circuit board from the toroidal transformer at the back of the machine.

J14-6 is the AC output to the top/slow exhaust solenoid

J14-8 is the AC output to the fast exhaust solenoid

4.2.4 Power Supplies

3.5.1.1 *Toroidal step down transformer*

The incoming 120VAC is stepped down to 18VAC by the toroidal transformer at the back of the unit.

Since it is a step down transformer if the 120 volt input fluctuates up or down then the 18 volt output will also fluctuate up and down.

The only function of the transformer is to supply voltage for the coil of the solenoid valves.

Even though this transformer is protected by the ON/OFF – Circuit Breaker it also has an input and output fuse.

The input fuse is a 5x20 mm T1AL time delay fuse

The output fuse is a 5x20 mm F5AL fast acting fuse



If the input or output fuses on the transformer fail then the solenoids will not function even though the rest of the machine will.

3.5.1.2 *PS-1 24VDC Power Supply (at the top of the electronic box)*

PS-1 provides 24VDC to the Main board, the I/O board, the pressure transducer and the electronic door lock, door switches and the relays which control the water filling, drying and heating.

The PS-1 has an adjustment screw that is set at the factory and should not be field adjusted.

This power supply is protected by the main ON/OFF – Circuit Breaker located on the right side of the front panel.



3.5.1.3 *PS-2 24VDC Power Supply (at the bottom of the electronic box)*

PS-2 provides power for the fan and the optional printer.

The PS-2 has an adjustment screw that is set at the factory and should not be field adjusted.

This power supply is also protected by the main ON/OFF – Circuit Breaker located on the right side of the front panel.



3.5.2 Mechanical Relays

There are two mechanical relays, one for each of the pumps (air pump and water pump).

The relays are in sockets so they can be easily replaced.

The relays have two sets of contacts. One set turns the pump on and off. The other set allows the solenoid valve for that pump to open and close.

The relay coil receives a 24VDC signal voltage from the I/O board and the contacts close to allow the 120VAC to pass through and operate the pump. At the same time it also allows the 18VAC to pass through and open the solenoid valve.



3.5.3 Sold State Relay

The SSR is used to control the heating elements

The SSR receives a 24VDC signal voltage from the I/O board and closes to allow the 120VAC to pass through to the heaters.

The SSR is located in the electronic box below the mechanical relays.



3.5.4 AC solenoid valves

There are 4 solenoid valves that operate on 18 volts AC. Reading across the orange and black wire at the coil connection will show 18VAC when the coil is on and about 10VAC when it is off.

The Slow and Fast Exhaust solenoids work directly off the I/O board J14. The Water Pump and Air Pump solenoids work through the mechanical relays for the pumps.

3.5.5 Water Pump

The Water Pump is a 120VAC pump and works off Mechanical Relay #1.

The line voltage to the pump is protected by fuse #1 (2A).

3.5.6 Air Pump

The Air Pump is a 120VAC pump and works off Mechanical Relay #2.

The line voltage to the pump is protected by fuse #2 (2A).

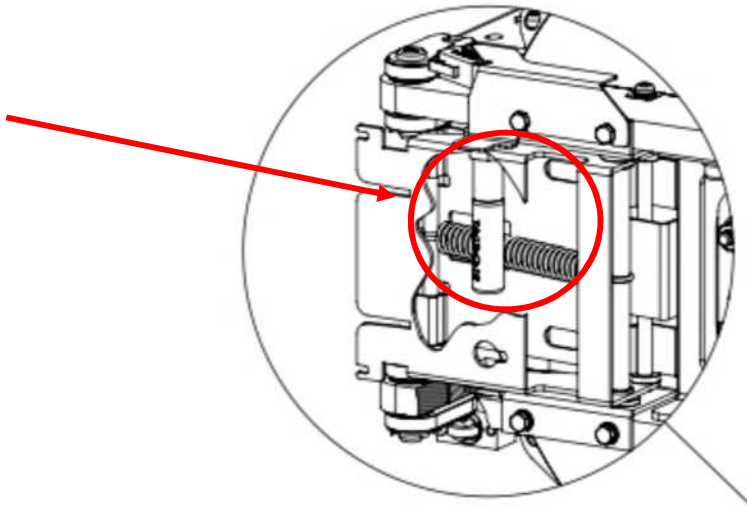
3.5.7 Electronic Door Lock

This unit is mandated to have an electronic door locking system.

The door lock is a 24VDC solenoid with a spring loaded locking pin.

When the solenoid is activated it retracts the pin and the door is unlocked.

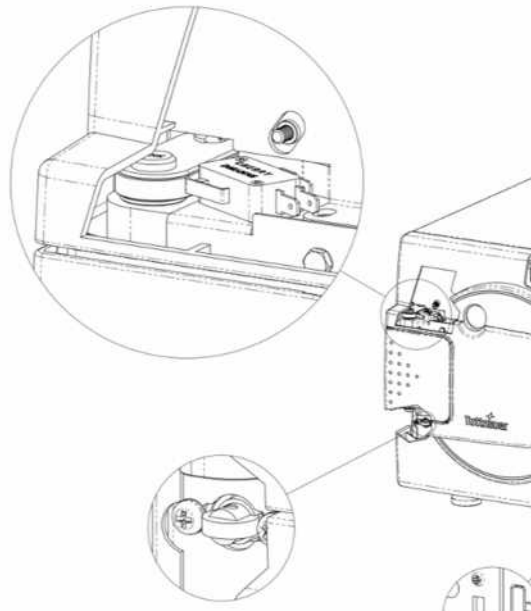
The locking solenoid is mounted in a vertical position with the spring loaded pin at the top.



3.5.8 Door Switches

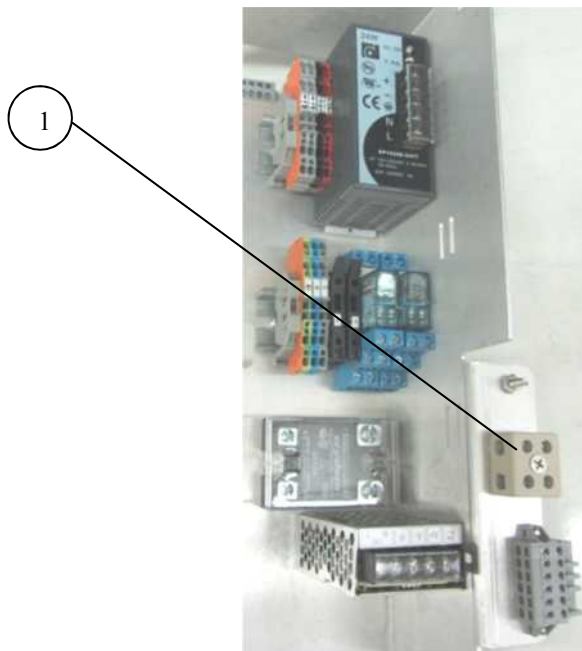
The door has an upper and a lower door switch to ensure that the door is properly closed before the cycle can start.

The door switches are in series so if one switch is open the door is considered unlocked and the cycle will not start.



3.5.9 Heaters

There are two 120 volt 700 watt heaters that wrap around the chamber. They have wire leads that are connected in a ceramic block by the electronic box.



1	THE039-0037	JP2 ceramic heater connector
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3.5.10 Temperature Sensor

The temperature sensor is a PT100 mounted inside the chamber at the bottom rear.

3.5.11 Pressure sensor

The pressure sensor is a Tecsia P3297 with an output of between 4 – 20ma. It is located at the back of the machine and is connected by copper tubing to the rear manifold at the top of the chamber.

3.5.12 Safety Thermostats

There are two safety thermostats. The Cut-Off and the Temperature Safety Thermostat. They are mounted at the back of the machine with probes that are mounted under the rear most heating element. They are connected in series and monitor only the heating element circuit.

3.5.13 Fuses

There are four fuses.

1. Two fuses for the Toroidal Transformer, one input and one output. The input fuse is 1A Time Delay (T1AL) and the output fuse is a 5A Fast Acting (F5AL).
2. Two fuses for the pumps. One for the air pump and one for the dry pump. The pump fuses are 2A each.

3.5.14 Circuit Breaker

The Circuit Breaker is also the On/Off switch and is located on the right side of the machine at the front.

4 Checking and Changing Parameters and Other Data

This section shows how to access system data and modify parameters.

The Cycle Parameters directory containing parameters for controlling the sterilization process is locked for programs 1 thru 4 and not available for modification from the default values (except for drying)

Program 5 is a cleaning program and all parameters are locked.

Program 6 is a calibration program for use by a technician and all parameters are locked.

Two programs are available for the user to modify as needed, Custom A and Custom B. These custom programs are not FDA cleared and it is the user's responsibility to validate these programs.

Spore testing is your only assurance of complete sterilization.

Once entering the programming mode, the technician will see and have access to the following directory items.

Directory		Subdirectory
Quick Options (does not require login) see sec. 4.3 in this manual and 7.1 in the Operator Manual		Add extra dry time Export to USB Print cycles Version information Start cycle by clock Set date and time Login Exit
Main Menu (requires login) see sec. 4.4	Cycle Parameters for all programs individually	Temperature sensors (not used) Displayed Inputs Drying (see Operator Manual)
	Cycle Parameters – applicable only for Custom programs (except Dry Time)	Cycle Parameters (see Operator Manual)
	System Parameters See	Print Rate All (see Operator Manual) Print Rate Sterilization (see Operator Manual)

	sec. 4.7	Screen Saver (see Operator Manual)
		Pressure Calibration High (not used)
		Pressure Calibration Low (not used)
		Temperature Calibration High (not used)
		Temperature Calibration Low (not used)
		Water Quality Level
		Cycle Print Gap (see Operator Manual)
	Inputs/Outputs	View digital inputs state
		View digital outputs state
		Test digital outputs
		View analog inputs state
		Analog inputs calibration
	Maintenance See sec. 4.9	Export gain and offset to USB
		Input gain and offset from USB
		Reset atmospheric pressure
		Test RTC
		Printer test (see Operator Manual)
		Print all gain and offset(see Operator Manual)
	Advanced Options	Enable cycles
		Set language (English)
		Set temperature units (°F)
Set pressure units (Psig)		
Duplicate cycle		
Delete custom cycles		
Set external IP-address (DHCP)		
Version Handling	Import application from USB	
	Import all settings from USB device	
	Import application and settings from USB	
	Return to factory default settings	

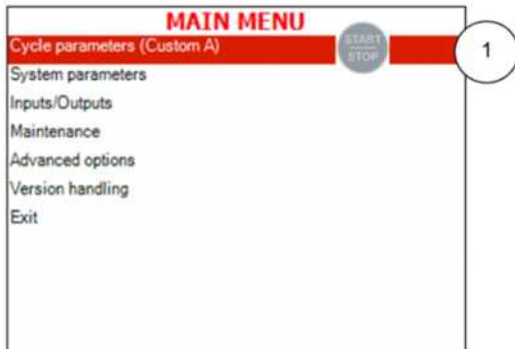
4.1 Browsing through the menus

The following example will show you how to browse through the directories and subdirectories and change parameters. This is all done by using the three button keypad.

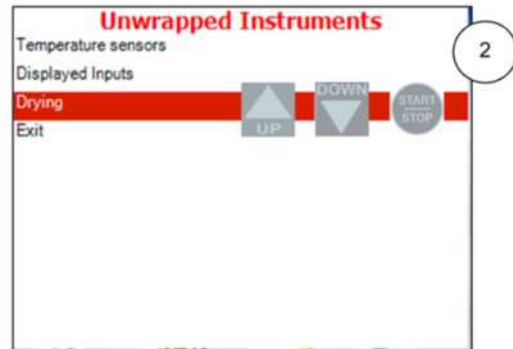
The keypad functioning is as follows:

1. Pressing the **UP** and **DOWN** keys **simultaneously** for 1-2 seconds will allow access to the menu options.
2. Use the Up and Down keys to advance the cursor and scroll through the menu.
3. Press the Start/Stop key to select and enter the menu selection that is highlighted.
4. Repeat steps 1 and 2 to enter the next menu selection until you get to required screen.
5. When no menu selections are available, as in a parameter screen, the keys are reversed. The Start/Stop key will advance the cursor and the Up or Down key will select the highlighted item.

Below are the example screens for the following menu (this option will normally require a Technicians code **0321** to login) Cycle Parameters\ Drying\ Dry Time:



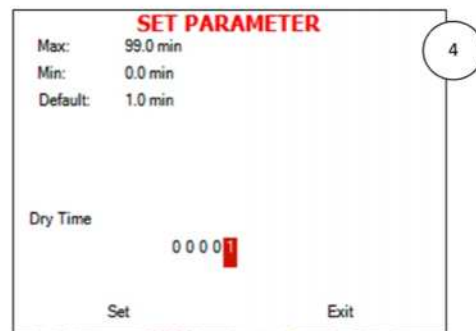
Login as Technician (see 1.4). The Main menu screen appears. Press the Start/Stop key to enter the Cycle parameters menu.



Press the Up and Down keys to scroll through the menus until you get to Drying, then press the Start/Stop key to enter the Drying menu.



Press the Start/Stop key again to enter the Dry Time menu.



Now you have reached the required screen: Changing the dry time parameter. The path is: Cycle parameters\Drying\Dry Time.

Note: To exit every screen and to return to the previous screen (to move one level up):

- move the cursor to Exit by pressing the UP or DOWN keys and then press the Start/Stop key.
- or-
- press the UP and DOWN keys simultaneously.

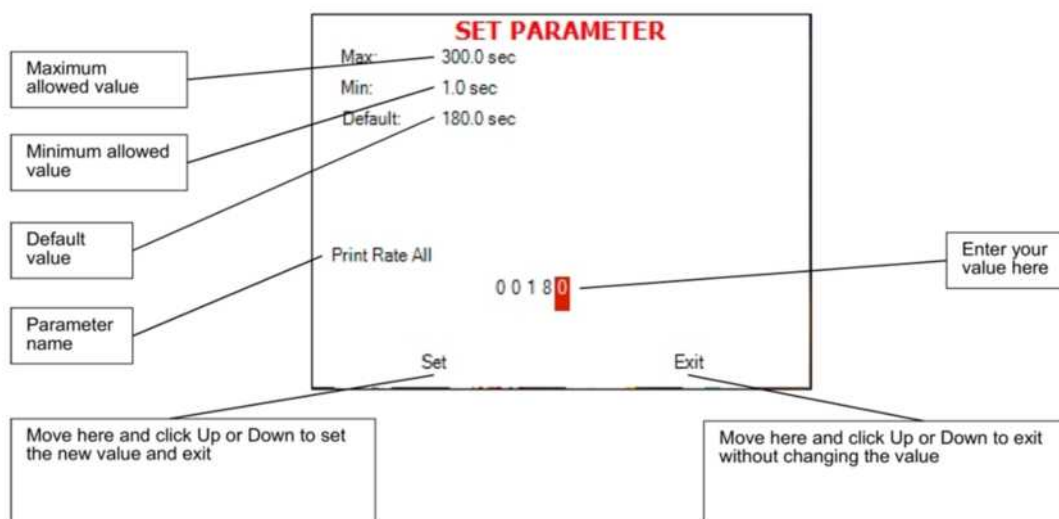
In the next section you will see how to make changes to a parameter.

4.2 Modifying any Parameter

You have browsed through the menus and reached the parameter changing screen as explained above. Now you can change the selected parameter as needed. To do so:

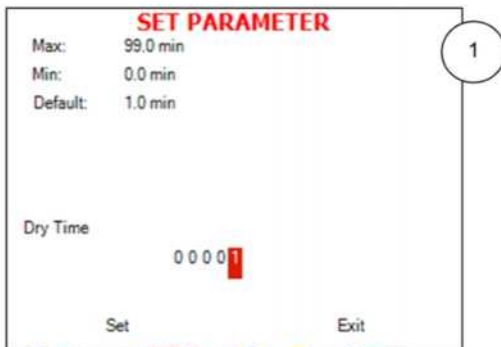
1. Enter the required value as follows:
 - Press the Up and Down keys to change the value of the digit.
 - Press the Start/Stop key to move the cursor to the next digit to the left.
2. When finished, press the Start/Stop key repeatedly until you move the cursor to Set.
3. Press the Up or Down key to confirm the new value and to exit the parameter changing screen.

Below is the typical parameter changing screen:



Note: Please note the maximum and minimum values for this parameter shown on the screen. Your value must be within these boundaries.

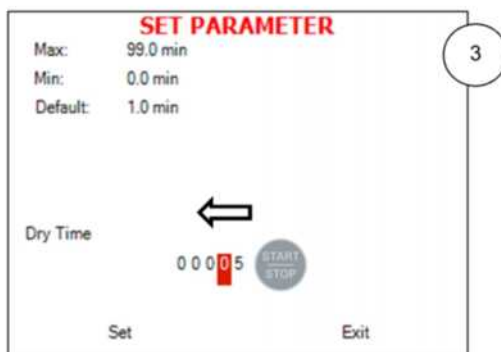
Below is the example of changing the Dry time parameter on the screen used in the previous section:



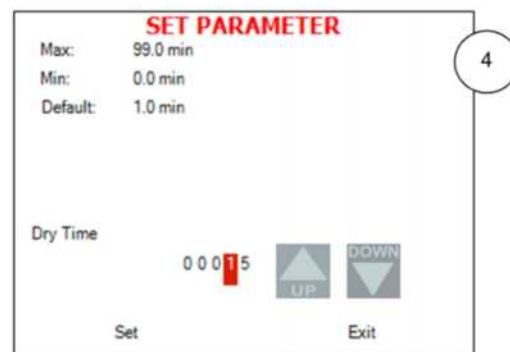
Browse to Changing dry time screen as explained in the previous chapter



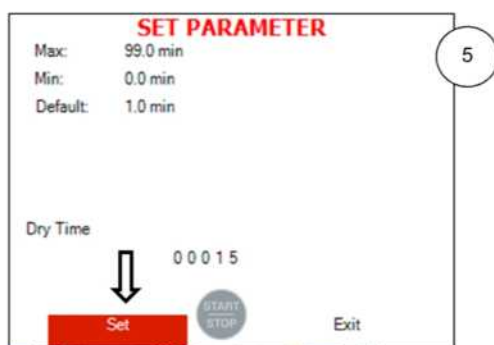
Use Up and Down keys to change the value of the digit



Press the Start/Stop key to move the cursor to the next digit to the left.



Press the Up and Down keys to change the value of the digit



When finished, press the Start/Stop key repeatedly until you move the cursor to Set.



Press the Up or Down key to confirm the new value and to exit the parameter changing screen.

Note: To exit every screen and to return to the previous screen:

- move the cursor to Exit by pressing the UP or DOWN keys and then press the Start/Stop key
- or -
- press the UP and DOWN keys simultaneously

4.3 Quick options screen

When the autoclave is on and no cycle is running, press the Up and Down keys simultaneously to enter the Quick options screen.

The Quick options menu offers easy access to the most frequently used features. All other options require logging in and their availability depends on your level of access (user code 0001 or technician code 0321).

Quick options

- Add extra dry time
- Export to USB
- Print cycles
- Version information
- Start cycle by clock (Disabled)
- Set date and time (12/MAY/2015 14:45:40)
- Login
- Exit

Below you can find instructions how to login and enter the Main menu. Section 7.1 above explains how to browse through the menus; section 7.2 explains how to change a parameter.

Note: A complete explanation of the Quick Options menu can be found in the EZPlus Operator Manual.

4.4 Logging in and entering the Main menu

Below you can find instructions how to login and enter the Main menu. Section 4.1 above explains how to browse through the menus, section 4.2 explains how to change a parameter.

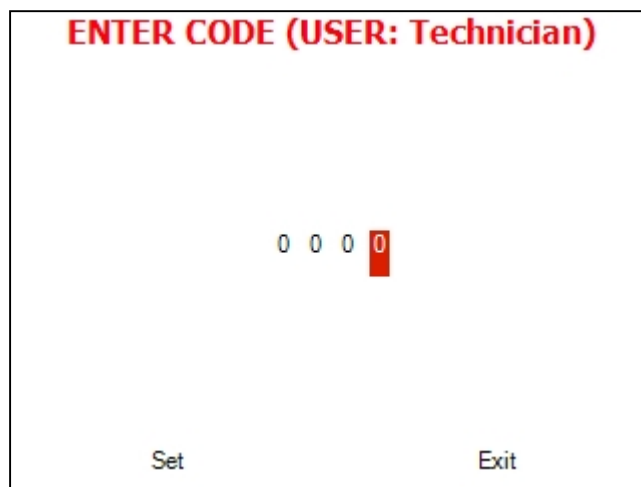
When the autoclave is on and no cycle is running, press the up and down keys simultaneously to enter the Quick Options screen (see 4.3). On this screen you can proceed to login .To login as technician:

1. On the Quick Options screen, choose login.

Select user screen appears.

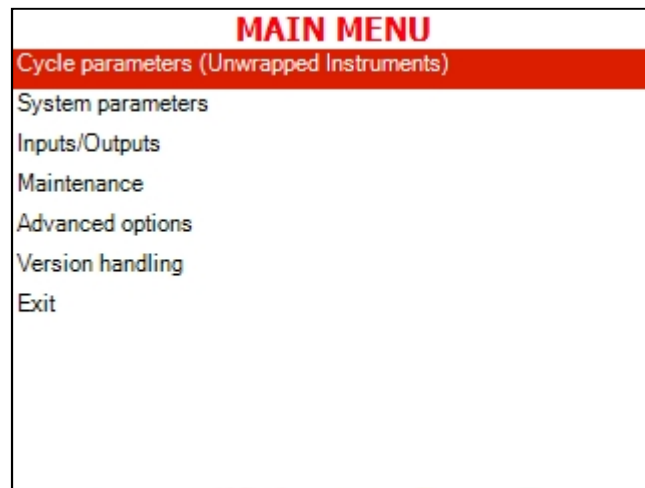


2. Choose Technician, then press the Start/Stop key to enter. The following screen will appear:



0000 is displayed on the screen with the cursor flashing on the right digit.

- Set the code to **0321**. You will get to the Main menu.



Below is the list and the explanation of the options available on the Main Menu.

4.5 Directories and subdirectories

Bacsoft control panel provides an interface that consists of control screens available through an easy scrollable menu tree.

To learn how to scroll through the menus, change the parameters, and perform some other functions using our three-button keypad, see 4.1 and 4.2.

The following chapter explains meaning and usage of the control screens.

4.6 Cycle Parameters (cycle specific)

- 4.6.1 **Temp Sensor** – this option is not used in this machine
- 4.6.2 **Display Inputs** – The screen space on the right consist of three display positions. The display position of the temperature and pressure can be changed using this parameter
- 4.6.3 **Drying** – Allows for changing the amount of drying time. The Wrapped and Handpiece cycles cannot be reduce below their default valve.

4.7 System Parameters

This menu is listing the system parameters that are the same for all cycles. Browse to the following folder:

Main menu\System parameters

You will see the following screen:

SYSTEM PARAMETERS	
Print Rate All	180.0 sec
Print Rate Sterilization	60.0 sec
Screen Saver	90.0 min
Pressure Calibration High	300.0 kPa
Pressure Calibration Low	25.0 kPa
Temperature Calibration High	130.0 °C
Temperature Calibration Low	60.0 °C
Cycle Print Gap	2.0
Exit	

Brief description of system parameters

Print Rate all – defines the printing rate during all stages of the cycle except the sterilization stage. This feature requires a printer to be installed.

Print Rate Sterilization – Defines the printing rate during the sterilization stage. This feature requires a printer to be installed.

Screen Saver – defines the time interval from the last use of the Keypad until the screen saver is activated. Setting this parameter to 0 minutes will disable the screen saver.

4.7.1 Pressure Calibration High – not used in this machine

4.7.2 Pressure Calibration Low - not used in this machine

4.7.3 Temperature Calibration High - not used in this machine

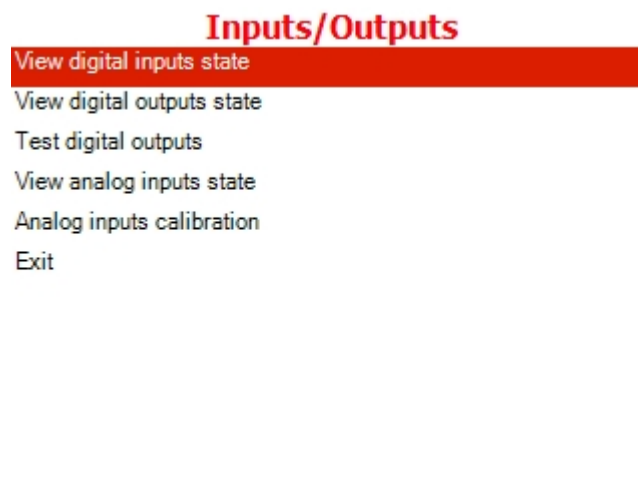
4.7.4 Temperature Calibration Low - not used in this machine

Water Quality Level – used to set the acceptable quality of the water in the water reservoir. On a scale of 0 – 4095, 0 being the poorest quality and 4095 being the best quality. The default setting is 0.

Cycle Print Gap – Defines the number of blank lines to advance at the end of the cycle.

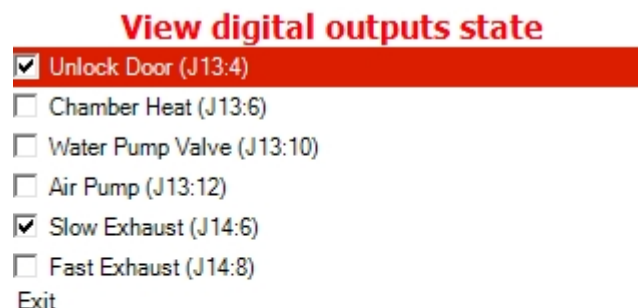
4.8 Inputs/Outputs

It is important for the technician to control the system down to the level of specific inputs and outputs. Viewing the outputs state at specific stages of the cycle helps you diagnose the malfunctions. You can also test and calibrate inputs and outputs.



These options will function with any program selected and can be viewed while the cycle is running.

Below is the typical screen for viewing/testing the inputs/outputs.



Below is the instruction for working with inputs/ outputs.

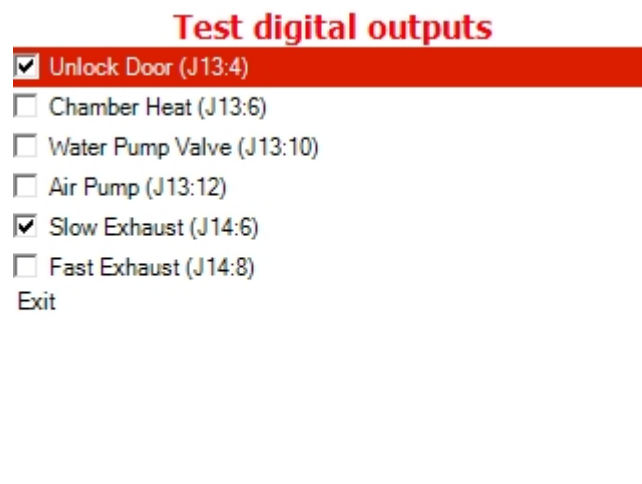
4.8.1 View digital inputs state

This screen shows in real time if the door is open or closed. A checked box indicates the door is closed.

4.8.2 View digital outputs state

This screen shows the status of each component in real time. A check mark means the component is energized. This screen can be viewed while a cycle is running and will show the various components cycling on and off.

4.8.3 Test digital outputs



Attention!

Violating the following instructions may endanger the technician and may cause severe damage to the autoclave!



Caution

Do not operate the heating elements for an extended period of time. This can damage the heaters, and cause possible personal injury.



Caution

Do not operate the water pump for an extended period of time. This can cause damage to the pump.

Exiting this screen will automatically set each component back to its normal state.

This test program allows the technician to activate and deactivate various components of the autoclave in order to evaluate that components performance.

1. Turn on the autoclave and press the Up and DN keys simultaneously. This will bring up the Quick Options Menu.
2. Scroll to Login and press the Start/Stop key.
3. Select Technician and press the Start/Stop key.
4. Enter the code 0321. Scroll to Set and press the Up key.
5. Scroll to Inputs Outputs and press the Start/Stop key.
6. Scroll to Test Digital Outputs and press the Start/Stop key.
7. A list of outputs will appear
8. Scroll to the item and press the Start/Stop key to check the box and turn on the component
9. Press the Start/Stop key again to uncheck the item and turn off the component
10. When finished Exit out of the menu
11. The components will automatically return to their normal state.

4.8.4 View analog inputs state

View analog inputs state	
Chamber Temperature (J2)	116.2°F (1200)
Chamber Pressure (J7:1)	00.03 inHg (1600)
Chamber Water Level (J11:1)	3200
Mineral Free Water Level (J11:2)	1500
Exit	

In this menu you can view, at any stage, the values of the analog inputs at the moment.

This screen allows for monitoring the chamber temperature, chamber pressure, chamber water lever and mineral free reservoir water level.

Chamber Temperature will be displayed in the same units as the main screen display

Chamber Pressure will be displayed in the same units as the main screen display.

Chamber Water and **Reservoir Water** indications at or close to 4095 indicate that no water is being sensed.

Chamber Water and **Reservoir Water** indications at or close to 0 indicate that water is being sensed .

This screen can be viewed while a cycle is running

4.8.5 Analog inputs calibration

This screen allows for calibrating each of 4 analog inputs.

Scroll up or down the screen and press the Start/Stop key to select the device to calibrate.

See sec 5 “Calibration”

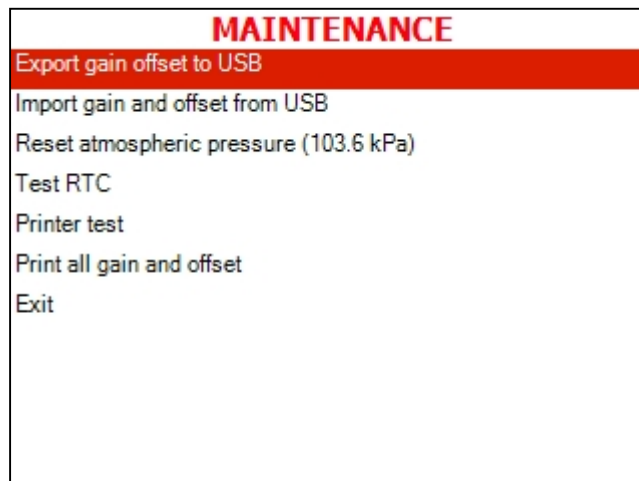
4.9 Maintenance

Maintenance procedures provided by Bacsoft software allow you additional tests and USB input/output options.

Browse to the following folder:

Main menu\Maintenance

You will see the following screen listing the maintenance options:



Below is the instruction for autoclave’s maintenance menu.

4.9.1 Export gain offset to USB

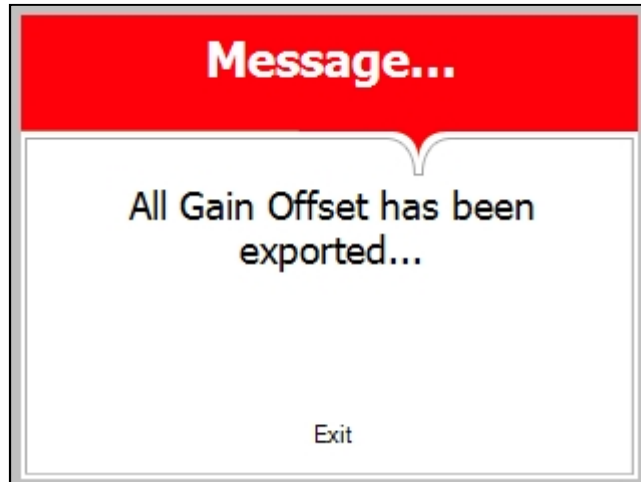
In this menu you can export, to a USB flash drive, the gain and offset that was calculated as a result of calibration.

The gain and offset values are the numerical representation derived from calibration.

Note: The USB flash drive needs to use FAT formatting.

1. Insert the USB device into the USB Socket located behind the printer door.
(See sec. 4 in the Operator Manual)
2. Move the cursor to Export gain offset to USB
3. Press the START/ STOP key.

The following screen will be displayed:



4. Remove the USB device from the USB socket.

4.9.2 Import gain and offset from USB

In this menu you can import, from a USB flash drive, the gain and offset that was calculated as a result of calibration.

The gain and offset values are the numerical representation derived from calibration.

Note: The USB flash drive needs to use FAT formatting.

1. Insert the USB device into the USB Socket located behind the printer door.
(See sec. 4 in the Operator Manual).
2. Move the cursor to IMPORT gain offset from USB
3. Press the START/ STOP key.

The following screen will be displayed:



4. Remove the USB device from the USB socket.

4.9.3 Reset atmospheric pressure

This is an option to manually reset the Atmospheric pressure parameter.

Note: The atmospheric pressure parameter needs to be reset after recalibrating the unit's pressure.

Note: Please reset the atmospheric pressure when you install the autoclave for the first time, and each time you relocate the autoclave.

Note: The atmospheric pressure parameter is set Automatically by the machine when;

1. Each time the machine is turned on and
2. The door is open for at least 2 minutes and
3. The chamber temperature is below 113°F (45 °C)

However, this parameter can be manually reset by using this option. Two conditions need to be met to correctly reset the atmospheric pressure.

1. The door needs to be open for 2 minutes
2. The chamber temperature needs to be below 113°F (45°C)

Move the cursor to Reset atmospheric pressure then press the **START/STOP** key.

The following screen will appear:



4.9.4 Test RTC

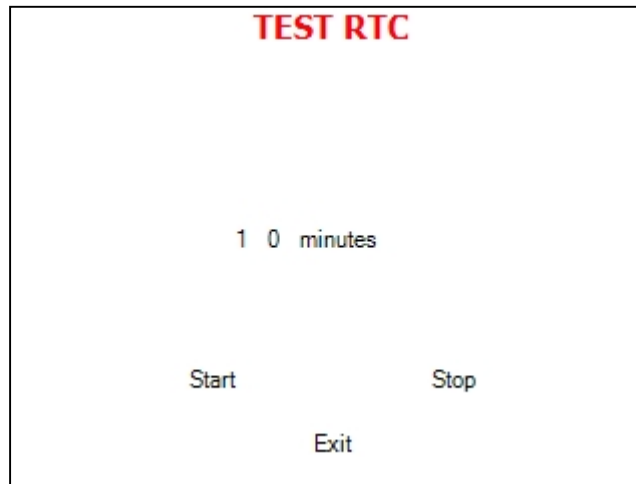
The EZPlus system contains two internal clocks (RTC & Windows) that are used to validate the time of the sterilization cycle. If these clocks are out of sync by more than four seconds the cycle will fail.

1. The RTC. This clock is charged from the battery on the main board. It keeps track of the time even if the power is off.
2. The windows clock restarts each time the machine is turned on. The clock is updated from the RTC.
3. When pressing start to run a cycle, the 2 clocks are synchronized. During the cycle, there are two readings from the clocks. One when sterilization starts and the other when the sterilization ends. If the difference between the clocks is more than 4 seconds, the cycle will fail – “TIME ERROR”

The Test RTC option allows for testing the clocks. Set the number of minutes for the test and enable Start by using the Up key.

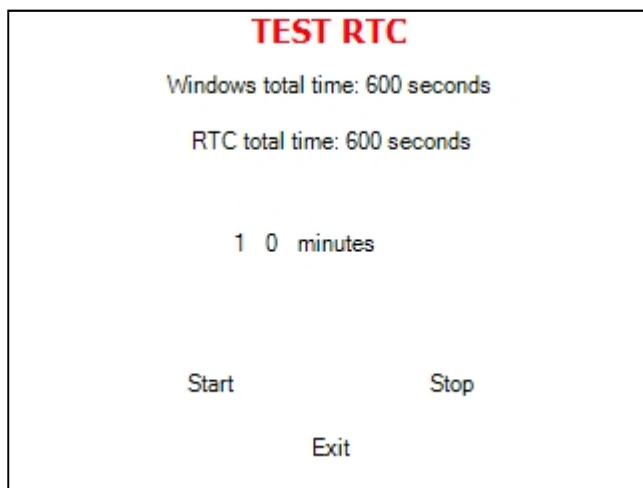
The test time should be set for the same time as the sterilization cycle being used. (i.e. 4 minute sterilization – 4 minute test, 30 minute sterilization – 30 minute test).

The following screen will appear:



1. Set the time interval as desired using the Up/Down keys.
2. Then using the Start/Stop key move the cursor to start and press the Up key.

At the end of the test, the following screen will appear:



3. At the end of the test using the Start/Stop key, move the cursor to Exit and press the Up key.
If the test fails then:
4. Go to the Set Date and Time option and set the correct date and time. Be sure to enable SET using the Up key even if no adjustment to the date or time is needed.
5. Change the battery on the Main board
6. Change the Main board

4.9.5 Printer test

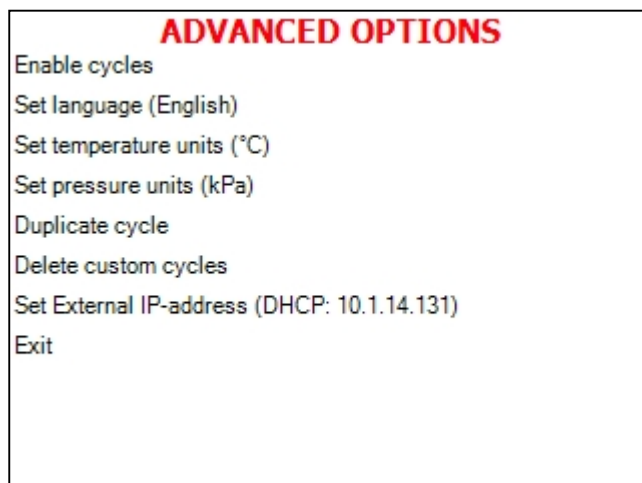
In this menu you can check the normal function of the printer. The printer will print the list of error messages. (see also the Operator Manual)

4.9.6 Print all gain and offset

In this menu you can print the gain and offset values for Chamber Temperature, Chamber Pressure, Chamber Water Level, Mineral Free Water Level. (see also the Operator Manual)

4.10 Advanced Options

Advanced options menu contains options for customizing the EZPlus autoclave



4.10.1 Enable/Disable cycles

This option allows for removing cycles from the rotation on the main screen.

Use the Up/Down keys to select the program to be removed and press the Start/Stop; key to uncheck that program. That program remains in the machine, but is removed from the rotation.

To return the program to the rotation just restore the check mark.

Note: The current cycle cannot be disabled. A different cycle must be selected prior to entering the ENABLE PROGRAMS subdirectory.

In order to exit this screen move the cursor to EXIT by pressing the Up/Down keys and select it by pressing the Start/Stop key.

Enable/Disable cycles

- Unwrapped Instruments
- Wrapped Instruments, Pouches
- Unwrapped Delicate Instruments
- Handpieces
- Chamber Brite Cleaning
- Calibration Cycle
- Extra Drying Time
- Custom A
- Custom B
- Set
- Exit

4.10.2 Set Language

In this menu you can choose the language for all the interface screens: menus, cycle information, system messages.

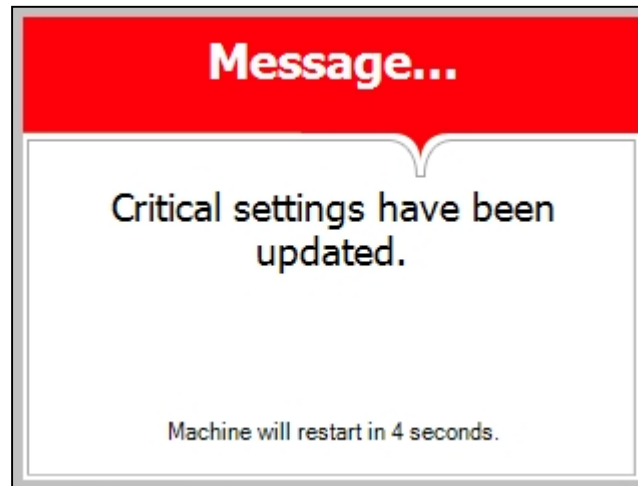
This option allows for changing the language on the main display, all the menu screens and the print out .

The only text that does not change are the program headings. Changing the language will cause the machine to reboot.



Note: There are more languages than you see on the screen above. Just scroll down to see more.

1. Move the cursor to the desired language and check it. The following screen will appear:



The machine will be restarted and the main screen (current cycle) will appear in the chosen language.



Caution: Do not set a language you cannot read!

4.10.3 Set temperature units

This option allows for selecting the temperature units to be displayed and printed, either Celsius or Fahrenheit.

In order to change the temperature units move the cursor to the desired temperature units and press the START/STOP key.

Changing the temperature units will cause the machine to reboot.

4.10.4 Set pressure units

This option allows for selecting the pressure units to be displayed and printed, kPa, Psia, Psig, BarA, BarG .

In order to change the pressure units move the cursor to the desired pressure units and press the START/STOP key.

Changing the pressure units will cause the machine to reboot.

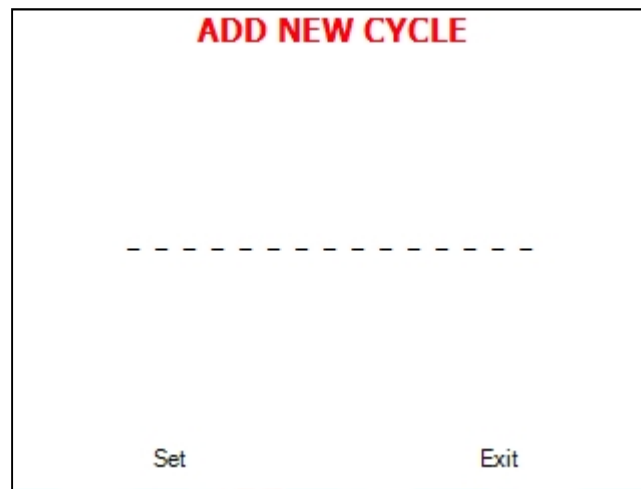
4.10.5 Duplicate cycles

In this menu you can create a copy of any of the programs on the list with all its current parameters. Once created this new program becomes a custom program and as a custom program all the settings are available for modification.

Select cycle

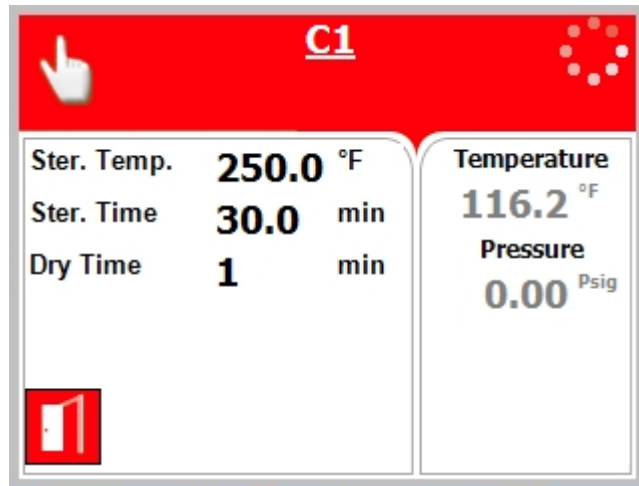
- Unwrapped Instruments
- Wrapped Instruments, Pouches
- Unwrapped Delicate Instruments
- Handpieces
- Chamber Brite Cleaning
- Calibration Cycle
- Extra Drying Time
- Custom A
- Custom B
- Exit

1. Using the Up/Down keys, move the cursor to the cycle you want to duplicate.
2. Press Start/Stop to select the cycle. A custom program has been created with the same settings.
3. You will be able to change the settings later. The following screen will appear:

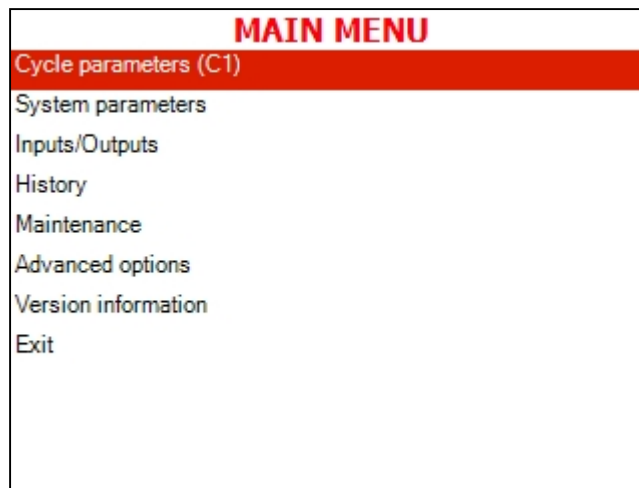


4. Using the Up/Down keys, to select letters and numbers, and the Start/Stop key, to advance, give this new program a name.
5. Advance to SET and press the Up key to save the program and exit.
6. Pressing Exit before Set will not save you changes.
7. Exit the menus until you get to the main screen.
8. Select your newly created program.

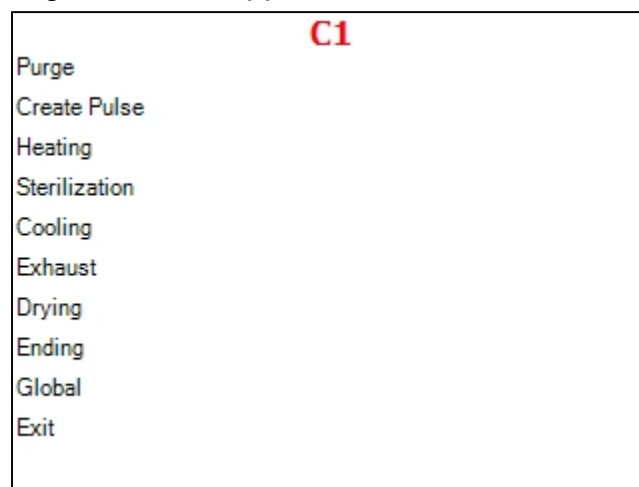
Note: you can select the program only when the autoclave door is open.



9. Login again as Technician (see 4.4).
10. In the main menu, select Cycle parameters and enter the Cycle Parameters screen.



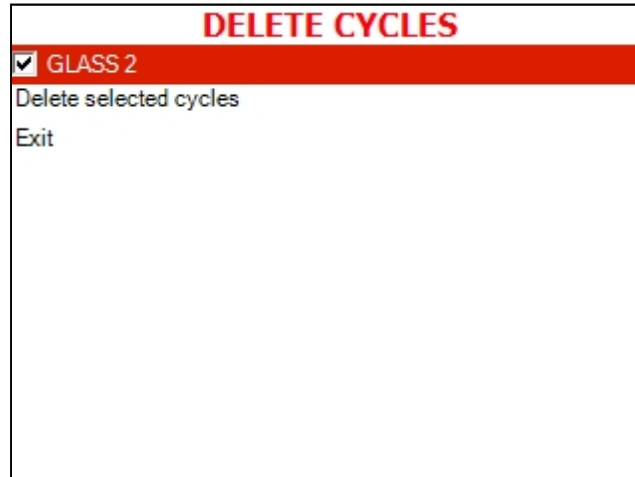
The following screen will appear:



Now you can alter the cycle parameters as desired.

4.10.6 Delete custom cycles

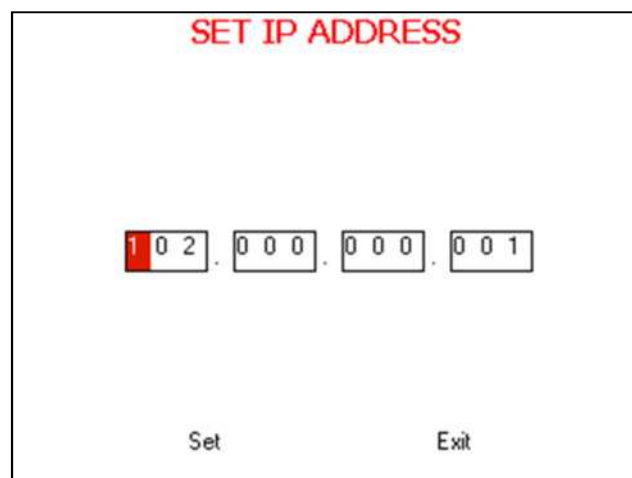
In this menu you can delete any of the custom cycles that appear on the list.



1. Use the Up/Down key to move the cursor to the cycle you wish to delete.
2. Press Start/Stop key to select/deselect the cycles.
3. Move the cursor to Delete selected cycles and press Start/Stop key to delete.
4. The selected custom cycle is now deleted.

4.10.7 Set external IP address

This option is for use with Tuttnauer's R.P.C.R. monitoring software and allows for setting the IP address in order to connect to a local network that does not have a DHCP server.



If the local area network has a DHCP server the IP address needs to be set to all zeros and the connection process will be automatic.

4.11 Version handling

The version handling menu provides tools to import, export, and restore the autoclave software.

There are two parts to the Tuttnauer autoclave operating software.

1. The Application – this part of the software tells the machine what kind of sterilizer it is.(table top, no generator, etc.)
2. The Settings – this part of the software tells the machine what programs it has and the parameters for each program (Wrapped, Unwrapped, sterilization temperature, sterilization time, etc...)

The following options are available.

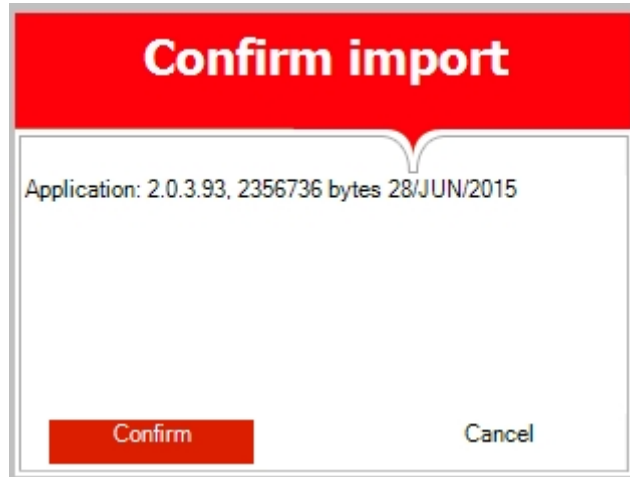


4.11.1 Import application from USB

This option may be needed if in the future there is an application upgrade available.

Software is imported from a USB flash drive.

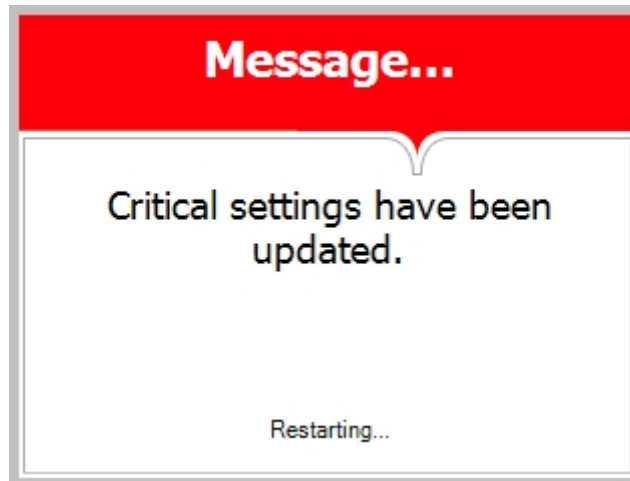
1. Insert the USB device with the Application software into the USB slot on the front of the machine.
2. Select Import application from USB and press the Start/Stop key
3. The system will prompt you to confirm import, showing the Application version to be imported.



4. The cursor will be blinking on Confirm.
5. Press the Start/Stop key to confirm.
6. Selecting Cancel will cancel the import.
7. The application will be imported from the USB device.



8. Importing a new application will cause the machine to reboot.

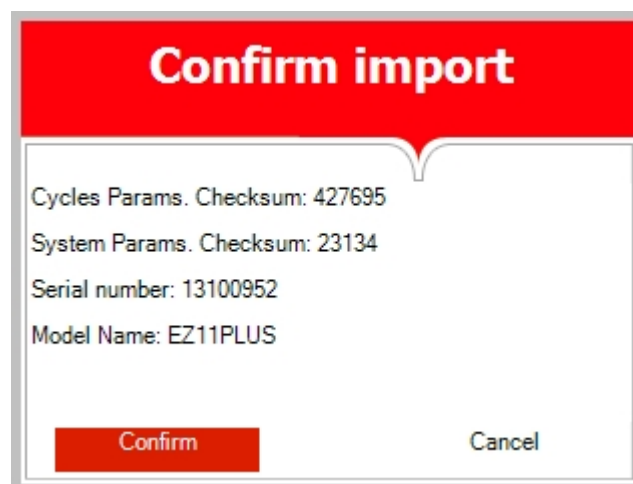


4.11.2 Import all settings from USB device

This option may be needed if in the future there are upgrades available for cycle parameters.

Software is imported from a USB flash drive.

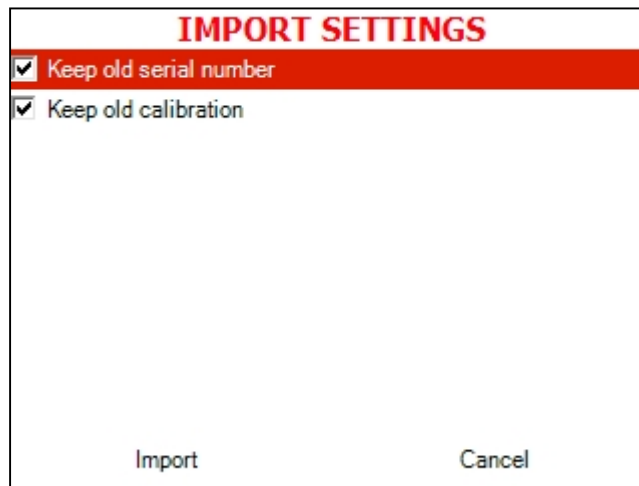
1. Insert the USB device with the Settings software into the USB slot on the front of the machine.
2. Select Import settings from USB and press the Start/Stop key
3. The system will prompt you to confirm import



On this screen, you will see the model name and parameters checksum of the settings saved on the USB device.

4. The cursor will be blinking on Confirm.
5. Press the Start/Stop key to confirm.
6. Selecting Cancel will cancel the import.

The following screen will appear:



7. Keep old serial number and Keep old calibration will be checked. They should remain checked.
8. Use the Up/Down keys to advance to Import
9. Use the Start/Stop key to import the settings
10. Selecting Cancel will cancel the import.
11. Importing new settings will cause the machine to reboot.

The following screen will appear



All the autoclave settings will be imported from the USB device.

4.11.3 Import application and setting from USB

1. This option allow for importing the Application and Settings software at the same time.

2. This option may be needed if in the future there are upgrades available for application and settings
3. Software is imported from a USB flash drive.

4.11.4 Return to factory default settings

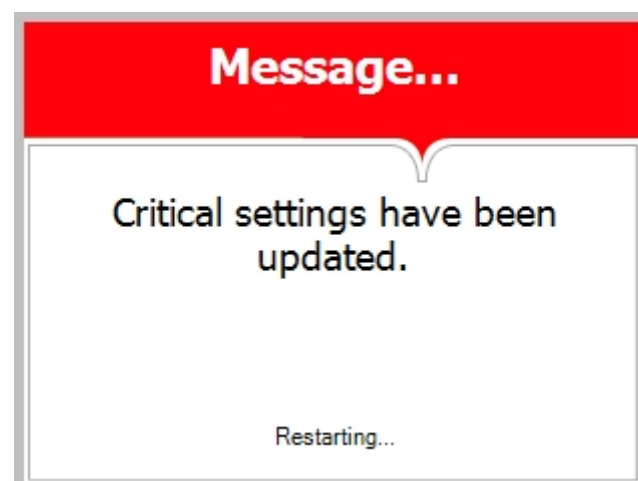
This option allows for resetting all the personal software settings back to the default factory settings.

Note: This includes the calibration. The machine will have to be recalibrated after resetting.



1. Move the cursor to Confirm and press Start/Stop.
2. The default factory settings will be restored.
3. Selecting Cancel will cancel this operation.

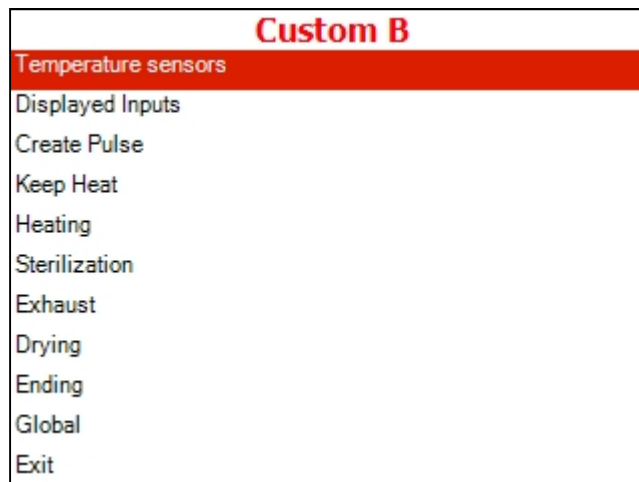
The following screen will appear



4.12 Cycle parameters

This directory enables the technician to see and change all the cycle parameters for any custom cycle including Custom A and Custom B cycles. To modify a program it is necessary to select that program from the Main Screen before entering the "MAIN MENU" directory

After logging in and selecting Cycle Parameters the following screen will be displayed.



The Cycle parameters directory includes the following subdirectories

Subdirectory		Property
Temperature sensors		Chamber Temperature
Displayed inputs		First
		Second
		Third
For custom programs only	Create Pulse	Pulse A Count
		Pulse A Stay Time
		Pulse A Low Pressure
		Pulse A High Pressure
		Pulse B Count
		Pulse B Stay Time
		Pulse B Low Pressure
		Pulse B High Pressure
		Pulse C Count

		Pulse C Stay Time
		Pulse C Low Pressure
		Pulse C High Pressure
		Pulse D Count
		Pulse D Stay Time
		Pulse D Low Pressure
		Pulse D High Pressure
	Keep Heat	Temperature 1 stay
		Temperature 1 stay time
		Temperature 2 stay
		Temperature 2 stay time
	Heating	Sterilization Temperature
	Sterilization	Sterilization Temperature
Sterilization Time		
	Exhaust	Exhaust Mode
	Drying	Dry Time
		Dry Heat On 1
		Dry Heat Off 1
		Dry First Stage Time
		Dry Heat On 2
		Dry Heat Off 2
		Add Dry Time
	Ending	End Temperature
	Global	Check RTC
Jacket Temperature		

The following sections explain the meaning and usage of the individual parameters under cycle parameters.

Note: The following 3 options are available in the FDA Cleared programs as well as the Custom Cycles;

- Temperature Sensors

- Displayed Input
- Drying

4.12.1 Temperature Sensors

EZ9Plus & EZ11Plus use only the Main Chamber Temperature sensor.

Displayed inputs

This option allows for deciding which input values will be shown on the display and the order in which the inputs are displayed.

There are three display positions. The default for each program uses only the first two. They are the Chamber Temperature and the Chamber Pressure.

Additional inputs, that can be displayed, are Chamber Water and Mineral Free Water.

SET DISPLAY SEQUENCE

None

Chamber Temperature

Chamber Pressure

Chamber Water Level

Mineral Free Water Level

Exit

Using the Up/Down keys, choose the input position to be modified and press the Start/Stop key.

CYCLE DISPLAYED INPUTS

First	Chamber Temperature
Second	Chamber Pressure
Third	None
Exit	

1. The following screen will appear:

SET DISPLAY SEQUENCE

None
 Chamber Temperature
 Chamber Pressure
 Chamber Water Level
 Mineral Free Water Level
 Exit

2. Using Up/Down keys, move the cursor to the desired input and choose it by pressing Start/Stop.

4.12.2 Create Pulse

This subdirectory allows for setting the parameters for each pulse of the program (see Operator Manual for more detailed explanation).

Custom B	
Pulse A Count	2
Pulse A Stay Time	10 sec
Pulse A Low Pressure	18.85 Psia
Pulse A High Pressure	26.11 Psia
Pulse B Count	0
Pulse B Stay Time	2 sec
Pulse B Low Pressure	26.11 Psia
Pulse B High Pressure	29.01 Psia
Pulse C Count	0
Pulse C Stay Time	2 sec
Pulse C Low Pressure	23.20 Psia

4.13 Keep Heat

Custom B	
Temperature 1 Stay	239.0 °F
Temp 1 Stay Time	0.0 min
Temperature 2 Stay	248.0 °F
Temp 2 Stay Time	0.0 min
Temperature Heat Gap	3.6 °F
Exit	

Keep Heat offers the option of locking in a specific temperature for a specified amount of time at two steps in the process.

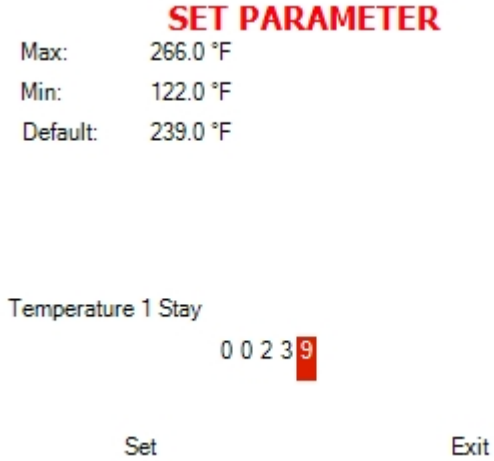
Below are instructions for changing the Temperature and Temperature stay time.

4.13.1 Temperature 1 stay

Custom B	
Temperature 1 Stay	239.0 °F
Temp 1 Stay Time	0.0 min
Temperature 2 Stay	248.0 °F
Temp 2 Stay Time	0.0 min
Temperature Heat Gap	3.6 °F
Exit	

Using the Up/Down keys, choose the Temperature (1 or 2) to be modified and press the Start/Stop key.

The following screen is displayed



Use the Up/Down keys to modify the temperature making sure to stay within the Min/Max limits displayed.

4.13.2 Temperature 1 stay time



Using the Up/Down keys, choose the Temp Stay Time (1 or 2) to be modified and press the Start/Stop key. The following screen will be displayed

SET PARAMETER

Max: 999.0 min
Min: 0.0 min
Default: 0.0 min

Temp 1 Stay Time
0 0 0 0 0

Set

Exit

Use the Up/Down keys to modify the minutes making sure to stay within the Min/Max limits displayed.

4.13.3 Temperature Heat Gap

This parameter sets the additional temperature above the “stay temperature” in “keep heat” stage.

For example, if the stay temperature parameter is set for 220°F and the “Temperature Heat Gap” parameter is 3°F, it will keep the temperature around 223°F.

This will prevent the temperature from dropping below the set temperature of 220°F

4.14 Heating

This subdirectory allows for setting the target sterilization temperature for the cycle. Once this temperature is reached the Sterilization phase can start.

The Sterilization Temperature parameter in Heating must be equal to the sterilization temperature parameter of the sterilization phase.

The Heat Pressure Safe Gap parameter is not active in the EZ9Plus and EZ11Plus units.

Custom B

Sterilization Temperature	250.0 °F
Heat Pressure Safe Gap	0.00 Psia
Exit	

4.15 Sterilization

This screen shows the sterilization temperature and time for the selected program.

Custom B

Sterilization Temperature	250.0 °F
Sterilization Time	30.0 min
Exit	

4.15.1 Sterilization Temperature

This parameter defines the sterilization temperature for the cycle. Select this parameter and use the Up/Down keys to modify the temperature making sure to stay within the Min/Max limits displayed.



4.15.2 Sterilization Time

This parameter defines duration of the sterilization stage for the cycle. Select this parameter and use the Up/Down keys to modify the time making sure to stay within the Min/Max limits displayed.



4.16 Exhaust

This parameter defines options available for the exhaust stage.

4.16.1 Exhaust Mode

After selecting Exhaust use the Up/Down keys to select the number that corresponds to the type of exhaust desired.

- 1 Fast exhaust
- 2 Slow exhaust until the pressure is lower than 30kPa + atmospheric then fast exhaust.

- 3 Slow exhaust
- 4 Fast exhaust is used if cycle has run with no errors. If the cycle fails before sterilization has been completed then slow exhaust. (This mode is usually used on a bio cycle, but can be used whenever this logic is needed).

4.17 Drying

This subdirectory lists the parameters available for modifying the drying phase. There are two stages to the drying phase each with their own set of controlling parameters.

Custom B	
Dry Time	1 min
Dry Heat On 1	4 sec
Dry Heat Off 1	12 sec
Dry First Stage Time	5 min
Dry Heat On 2	3 sec
Dry Heat Off 2	12 sec
Additional Dry Time	0 min
Exit	

Below are explanations and instructions for each of the drying parameters.

4.17.1 Dry Time

Dry Time is the total drying time of the drying phase of the program.

The total drying time is divided into two stages. In each stage the, on and off, duty cycle of the heating can be controlled separately.

4.17.2 Dry Heat On 1

This parameter defines how long the heating elements will be ON for the first stage of drying.

4.17.3 Dry Heat Off 1

This parameter defines how long the heating elements will be OFF for the first stage of drying.

4.17.4 Dry First Stage Time

This parameter defines duration of the first stage of drying.
The second stage of drying will be equal to the remaining dry time. (Dry Time – Dry first stage time)

4.17.5 Dry Heat On 2

This parameter defines how long the heating elements will be ON for the second stage of drying.

4.17.6 Dry Heat Off 2

This parameter defines how long the heating elements will be OFF for the second stage of drying.

4.17.7 Add Dry Time

This parameter allows you to add additional Drying Time to the total Dry time for the current cycle.
The total dry time will be divided as per the settings under the Dry Time parameter.

4.18 Ending

This subdirectory allows for setting the temperature at which the cycle is officially completed.

4.18.1 End Temperature

This parameter defines the temperature when the cycle ends. The cycle will not end and the door will not open until the autoclave chamber has cooled down to this temperature.

4.19 Global

This subdirectory defines the global cycle parameters.

Custom B	
Check RTC	1.0
Jacket Temperature	32.0 °F
Exit	

4.19.1 Check RTC

This option allows for turning on or off the time validation of the cycle and is only available in the Custom Cycles.

Note: It is a requirement that the time validation be functional.

During the cycle, there are two readings from the two clocks. One when sterilization starts and the other when the sterilization ends. If the difference between the clocks is more than 4 seconds the cycle will fail displaying a message "TIME ERROR".

If the Check RTC parameter is "1" (default in EZPLUS machines) the time validation will be turned on

If the Check RTC parameter is "0" the time validation will be turned off and no error message will be generated.

4.19.2 Jacket Temperature

This parameter defines the pre-heat temperature of the chamber. This feature is only available for modification in the Custom cycles. The system is ready, but will not start the cycle until the chamber reaches the pre-heat temperature. The selected cycle will start automatically when the temperature is reached.

5 Calibration

5.1 Calibration

It is recommended that all calibrations be performed using Celsius and KPA

Calibrations can be done while the machine is running a cycle

Calibrations are required **ONLY** when one of the following components is changed.

1. Main board
2. I/O board
3. Temperature sensor
4. Pressure sensor

Sensors to calibrate

Chamber Temperature Reads the temperature in the chamber.

Chamber Pressure Reads the pressure in the chamber.

Note: Upon completion of the calibration the Atmospheric Pressure parameter needs to be reset.

Required equipment for calibration

Reference temperature tool reading in Celsius

Reference pressure tool reading in kPa.

¼" BSP adaptor (for the validation port)

Or

Tuttnauer's calibration tool Test – 13. This test device is set to display °C and kPa.



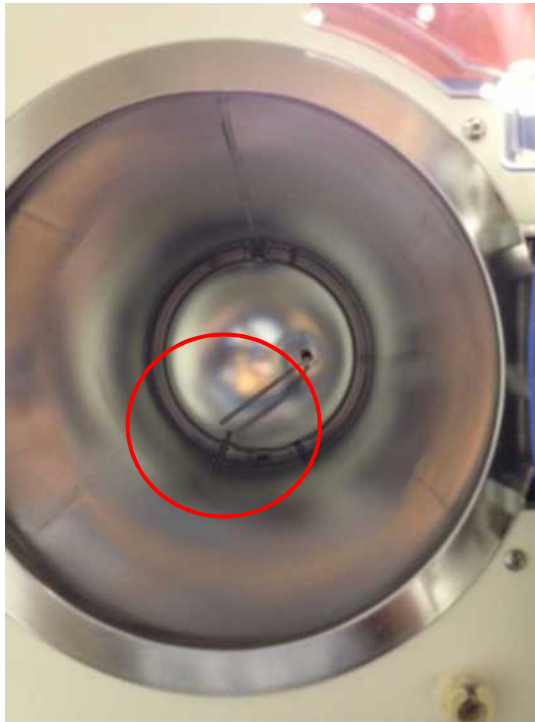
TEST - 13

5.2 Calibration Port

Chamber port: Located at the rear of the chamber for measuring temperature and pressure in the chamber,
Install the test equipment as shown. Make sure all nuts are tight to prevent leaks.



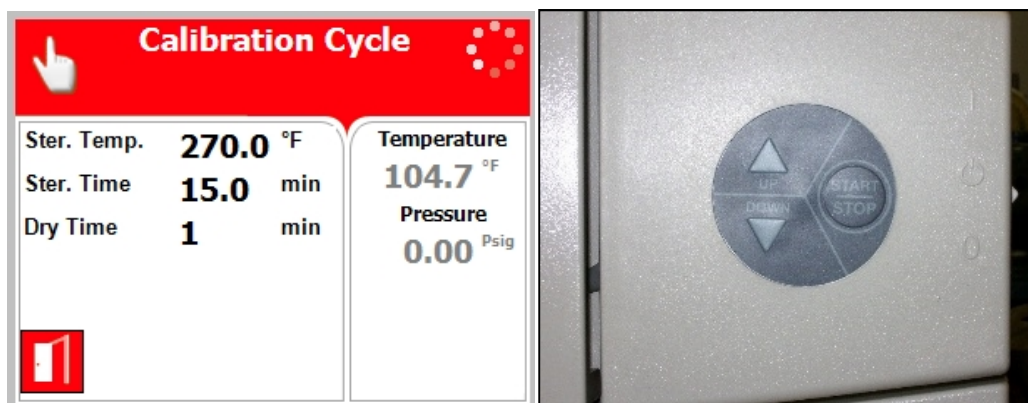
Position the temperature probe so it is in the same general location as the machine temperature sensor.



5.3 Accessing the Calibration mode

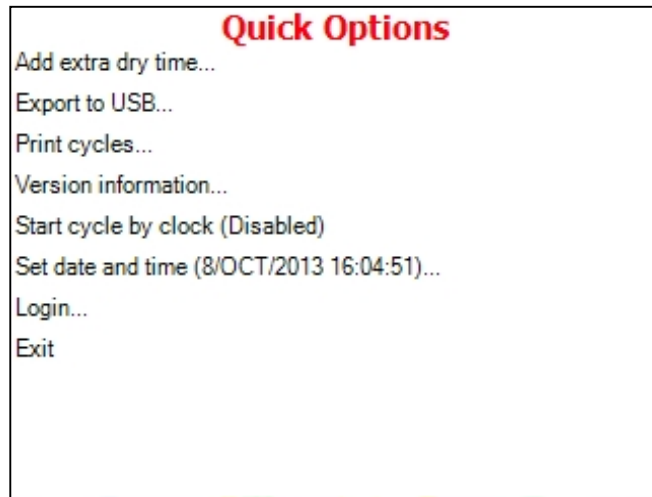
First select the Calibration cycle

The Calibration Cycle is designed with an extra-long sterilization time

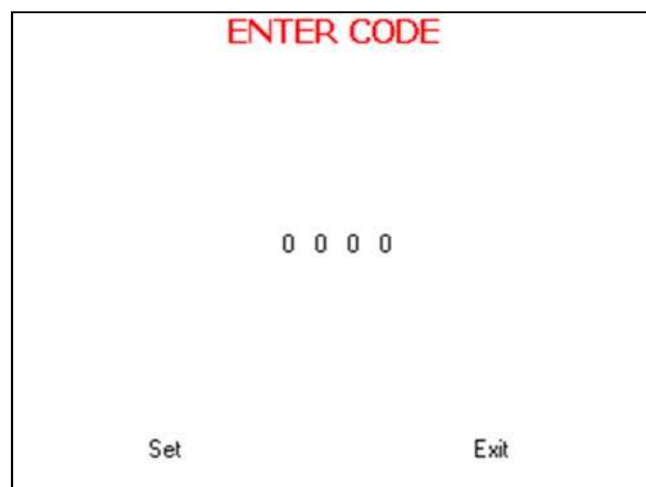


Now press the UP and DOWN keys, on the keypad, simultaneously to begin accessing the calibration software.

The screen that will appear is the Quick Options screen
Scroll to "Login" and press Start/Stop

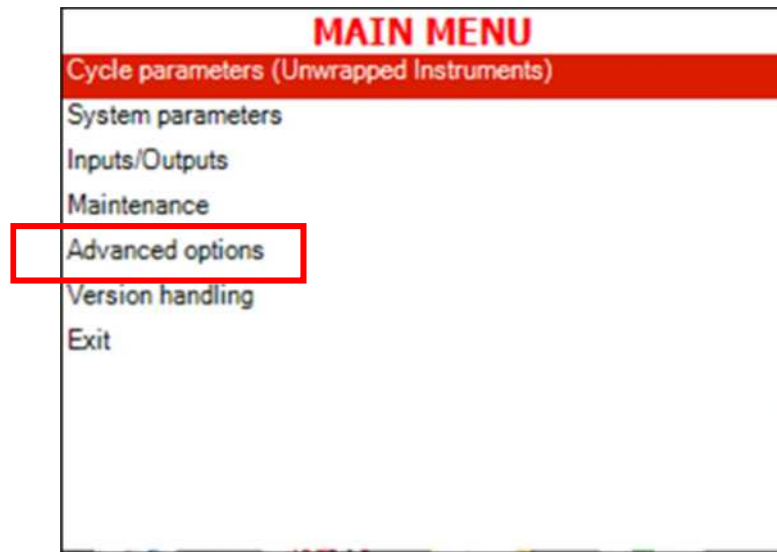


The screen that will appear is the Select User screen. Scroll to “Technician” and press Start/Stop

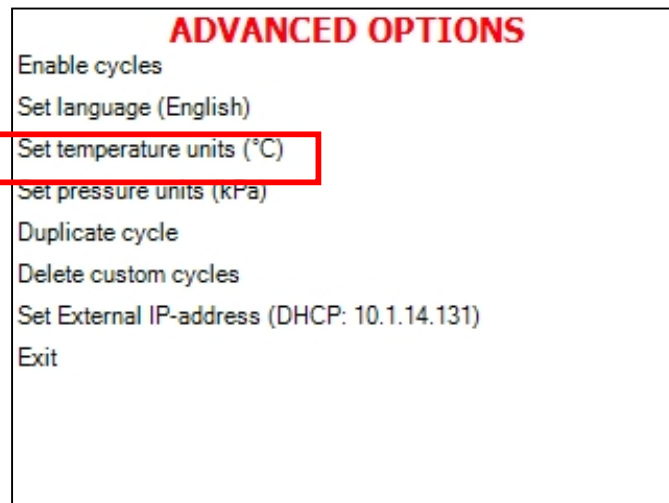


Using the Up/Down keys to enter the digits and the Start/Stop key to advance to the next digit enter the Technicians code **0321**

Advance to Set and press the Up key. The next screen will be the Main Menu screen.



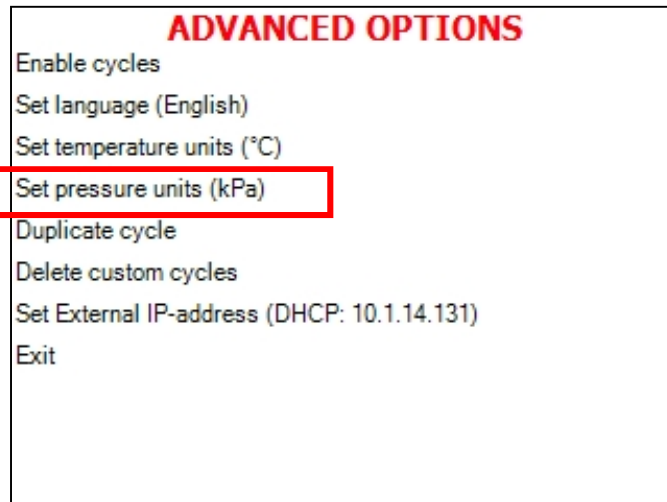
Scroll to “Advanced Options” and press Start/Stop.
The Advanced Options screen will appear



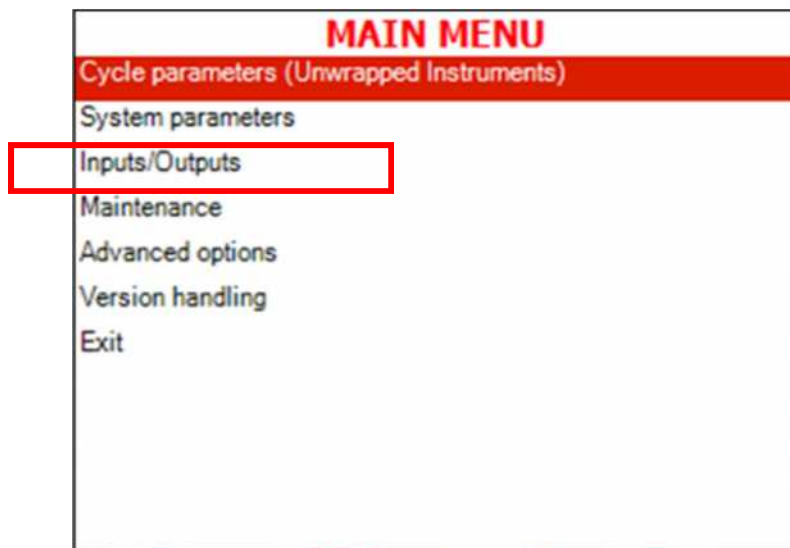
Scroll to Set temperature units and press the Start/Stop key

Celsius will be blinking, press the Start/Stop key. The system will reboot and the display will be in Celsius.

Repeat this procedure for changing the pressure to kPa.



When finished reenter the Main Menu and proceed as follows
Scroll to “Inputs/Output” and press Start/Stop



Then scroll to “Analog Inputs Calibration” and press Start/Stop

The Calibrate analog inputs screen will appear.

INPUTS/OUTPUTS

- View digital inputs state
- View digital outputs state
- Test digital outputs
- View analog inputs state
- Analog inputs calibration
- Exit

Scroll to the input to calibrate and press Start/Stop

Analog inputs calibration

Chamber Temperature (J2)	046.8°C (1200)
Chamber Pressure (J7:1)	098.7 kPa (1600)
Chamber Water Level (J11:1)	3200
Mineral Free Water Level (J11:2)	1500
Exit	

The Calibration Options screen will appear.

Calibration options

- Auto calibrate analog input
- Calibrate analog input
- Set gain and offset
- Restore last calibration
- Restore default calibration
- Exit

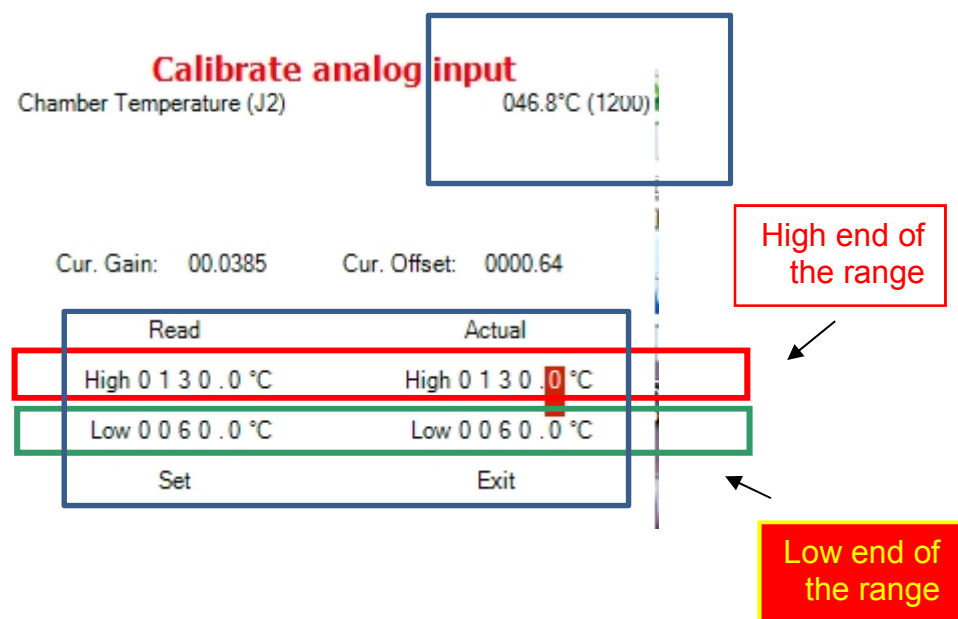
Chamber Temperature (J2) 046.8°C (1200)

Scroll to Calibrate analog input and press Start/Stop
The calibration screen will appear

It is recommended that all calibrations be performed using Celsius and KPA

Calibration is performed using **ACTUAL** readings from your test equipment.

This is a typical calibration screen: There are two rows of data each row having two values. **Read High, Actual High / Read Low, Actual Low.**

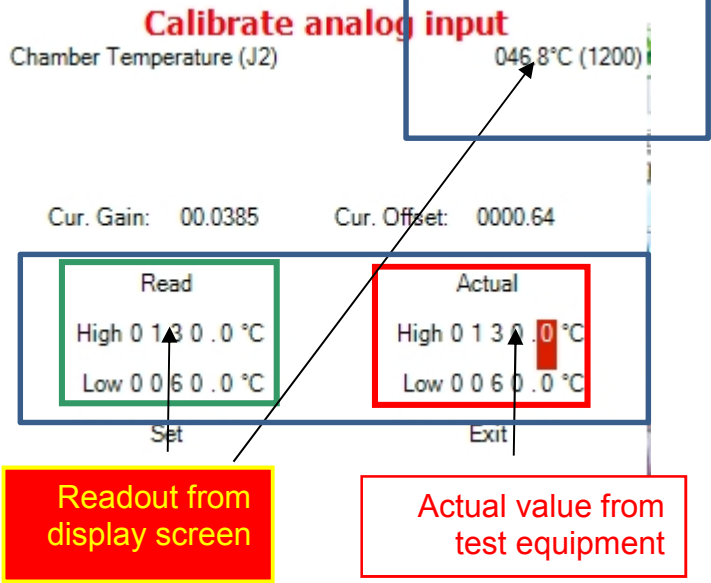


Read High - this is what the sterilizer thinks the HIGH end temperature or pressure reading is. As shown on the display screen

Actual High - this is what is read from the calibration device showing the HIGH end temperature or pressure reading.

Read Low - this is what the sterilizer thinks the LOW end temperature or pressure reading is. As shown on the display screen

Actual Low - this is what is read from the calibration device showing the LOW end temperature or pressure reading.



Entering the values from the test device and the screen readings then selecting SET will instruct the machine to calibrate that sensor.

5.4 Calibration Procedure

The EZPlus sterilizer should be on and in the Calibration cycle. The above preliminary steps should have been completed.



Calibrate the LOW end of the temperature.

With the door of the machine closed and the temperature stabilized record the Actual temperature and Read temperature.

Enter these values into the appropriate locations on the Calibrate Analog Input screen. Using the Up/Down keys to change the digit value and the Start/Stop key to advance to the next position.

Advance to Set and press the Up key the system will recalibrate the low end of the temperature.

Calibrate the LOW end of the pressure.

With the door of the machine open record the Actual pressure and Read pressure.

Enter these values into the appropriate location on the Calibrate Analog Input screen. Using the Up/Down keys to change the digit value and the Start/Stop key to advance to the next position

Advance to Set and press the Up key the system will recalibrate the low end of the pressure.

Calibrate the HIGH end of the temperature and pressure.

With the door of the machine closed and the Calibration Cycle selected, press the Start/Stop key. Allow the machine to reach sterilization and record the Actual temperature and Read temperature. Record the Actual pressure and Read pressure.

While the cycle is running, reenter the Analog Input Calibration screen, first for temperature then pressure.

Enter these values into the appropriate location on the Calibrate Analog Input screen. Using the Up/Down keys to change the digit value and the Start/Stop key to advance to the next position

Advance to Set and press the Up key the system will recalibrate the high end of the input selected.

The machine temperature must be within +/- 0.3°C of the temperature shown on the calibration device.

The machine pressure must be within +/- 3 kPa of the pressure shown on the calibration device.

After calibrating the temperature and pressure consult the Saturated Steam Table (below) to confirm that the temperature is also within +/- 0.3°C of the pressure reading according to the table

AND the pressure is also within +/- 3 kPa of the temperature reading according to the table. Make adjustments as appropriate.

Note: If during the Heating phase the Slow Exhaust releases steam more than twice this indicates the temperature and pressure are out of balance.

Consult the Saturated Steam Table (below) for the proper temperature / pressure correlation and make an adjustment, while the cycle is running. This will allow the cycle to move to the sterilization phase where the final calibration can be done.

When the calibration is completed go back to Advanced Options and reset the temperature and pressure to °F and psig **also reset the Atmospheric Pressure parameter.**

If the temperature or pressure cannot be calibrated and the calibration was performed correctly then replace the device that will not calibrate.

5.5 Saturated Steam Table

psia	InHg	°F	Bar	kPa	°C	psia	psig	°F	Bar	kPa	°C
1.5	2.95	114.5	0.10	10	45.8	17.1	2.4	219.7	1.18	117.9	104.3
2.2	4.44	129.3	0.15	15	54.1	17.2	2.5	219.9	1.18	118.6	104.4
2.9	5.90	140.2	0.20	20	60.1	17.2	2.5	220.1	1.19	118.6	104.5
3.6	7.39	149.1	0.25	25	65.0	17.3	2.6	220.3	1.19	119.3	104.6
4.4	8.86	156.4	0.30	30	68.9	17.4	2.7	220.5	1.20	120.0	104.7
5.1	10.34	162.9	0.35	35	72.7	17.4	2.7	220.6	1.20	120.0	104.8
5.8	11.81	168.6	0.40	40	75.9	17.5	2.8	220.8	1.20	120.4	104.9
6.5	13.30	173.8	0.45	45	78.8	17.5	2.8	221.0	1.21	120.7	105.0
7.3	14.76	178.4	0.50	50	81.3	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
psia	psig	°F	Bar	kPa	°C	17.8	3.1	221.7	1.23	122.7	105.4
14.7	0.0	212.0	1.01	101.3	100.0	17.8	3.1	221.9	1.23	122.7	105.5
14.8	0.1	212.2	1.02	101.7	100.1	17.9	3.2	222.1	1.23	123.4	105.6
14.8	0.1	212.4	1.02	102.1	100.2	18.0	3.3	222.3	1.24	124.1	105.7
14.9	0.2	212.5	1.02	102.4	100.3	18.0	3.3	222.4	1.24	124.1	105.8
14.9	0.2	212.7	1.03	102.8	100.4	18.1	3.4	222.6	1.24	124.7	105.9
15.0	0.3	212.9	1.03	103.2	100.5	18.2	3.5	222.8	1.25	125.1	106.0
15.0	0.3	213.1	1.04	103.6	100.6						

15.1	0.4	213.3	1.04	104.0	100.7	18.2	3.5	223.0	1.26	125.5	106.1
15.1	0.4	213.4	1.04	104.3	100.8	18.3	3.6	223.2	1.26	126.0	106.2
15.2	0.5	213.6	1.05	104.7	100.9	18.3	3.6	223.3	1.26	126.2	106.3
15.2	0.5	213.8	1.05	105.1	101.0	18.4	3.7	223.5	1.27	126.8	106.4
15.3	0.6	214.0	1.05	105.4	101.1	18.5	3.8	223.7	1.27	127.2	106.5
15.4	0.7	214.2	1.06	105.8	101.2	18.5	3.8	223.9	1.28	127.7	106.6
15.4	0.7	214.3	1.06	106.2	101.3	18.6	3.9	224.1	1.28	128.1	106.7
15.5	0.8	214.5	1.07	106.6	101.4	18.6	3.9	224.2	1.29	128.5	106.8
15.5	0.8	214.7	1.07	106.9	101.5	18.7	4.0	224.4	1.29	129.0	106.9
15.6	0.9	214.9	1.07	107.3	101.6	18.8	4.1	224.6	1.29	129.6	107.0
15.6	0.9	215.1	1.08	107.7	101.7	18.9	4.2	224.8	1.30	129.9	107.1
15.7	1.0	215.2	1.08	108.1	101.8	18.9	4.2	225.0	1.30	130.4	107.2
15.7	1.0	215.4	1.08	108.4	101.9	19.0	4.3	225.1	1.31	130.8	107.3
15.8	1.1	215.6	1.09	108.8	102.0	19.0	4.3	225.3	1.31	131.3	107.4
15.8	1.1	215.8	1.09	109.2	102.1	19.1	4.4	225.5	1.32	131.7	107.5
15.9	1.2	216.0	1.10	109.6	102.2	19.2	4.5	225.7	1.32	132.2	107.6
16.0	1.3	216.3	1.10	110.0	102.4	19.3	4.6	225.9	1.33	132.6	107.7
16.1	1.4	216.5	1.11	110.7	102.5	19.3	4.6	226.0	1.33	133.1	107.8
16.1	1.4	216.7	1.11	111.1	102.6	19.4	4.7	226.2	1.34	133.5	107.9
16.2	1.5	216.9	1.12	111.5	102.7	19.4	4.7	226.4	1.34	134.0	108.0
16.2	1.5	217.0	1.12	111.9	102.8	19.5	4.8	226.6	1.34	134.4	108.1
16.3	1.6	217.2	1.12	112.3	102.9	19.6	4.9	226.8	1.35	134.9	108.2
16.4	1.7	217.4	1.13	112.7	103.0	19.6	4.9	226.9	1.35	135.3	108.3
16.4	1.7	217.6	1.13	113.1	103.1	19.7	5.0	227.1	1.36	135.8	108.4
16.5	1.8	217.8	1.14	113.5	103.2	19.8	5.1	227.3	1.36	136.2	108.5
16.5	1.8	217.9	1.14	114.0	103.3	19.8	5.1	227.5	1.37	136.7	108.6
16.6	1.9	218.1	1.14	114.3	103.4	19.9	5.2	227.7	1.37	137.1	108.7
16.6	1.9	218.3	1.15	114.7	103.5	19.9	5.2	227.8	1.38	137.6	108.8
16.7	2.0	218.5	1.15	115.1	103.6	20.0	5.3	228.0	1.38	138.1	108.9
16.8	2.1	218.7	1.16	115.6	103.7	20.1	5.4	228.2	1.39	138.5	109.0
16.8	2.1	218.8	1.16	116.0	103.8	20.2	5.5	228.4	1.39	139.0	109.1
16.9	2.2	219.0	1.16	116.3	103.9	20.3	5.6	228.6	1.39	139.5	109.2
16.9	2.2	219.2	1.17	116.7	104.0	20.3	5.6	228.7	1.40	140.0	109.3
17.0	2.3	219.4	1.17	117.1	104.1	20.4	5.7	228.9	1.40	140.5	109.4
17.1	2.4	219.6	1.18	117.5	104.2	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

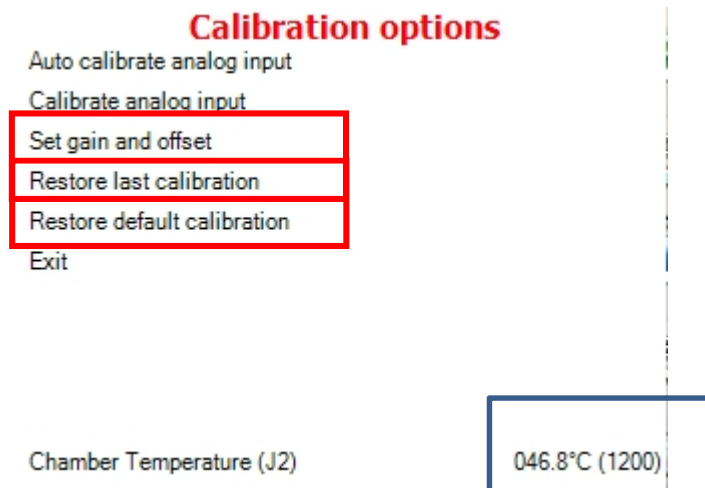
psia	psig	°F	Bar	kPa	°C	psia	psig	°F	Bar	kPa	°C
40.6	25.9	268.2	2.80	280.0	131.2	45.7	31.2	275.4	3.15	315.0	135.2
40.7	26.0	268.3	2.81	280.9	131.3	45.8	31.3	275.5	3.16	315.9	135.3
40.9	26.2	268.5	2.82	281.7	131.4	45.9	31.5	275.7	3.17	316.8	135.4
41.0	26.3	268.7	2.83	282.6	131.5	46.1	31.6	275.9	3.18	317.7	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	3.10	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

In the event of an error in calibration the calibration can be returned to the previous settings “**Restore last calibration**”. The calibration can then be tried again.



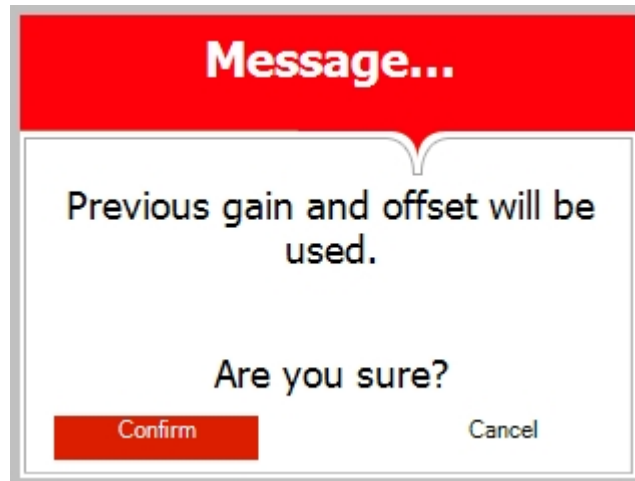
In the event of a serious error in calibration the unit can be set back to the factory default calibration “**Restore default calibration**”. The calibration can then be tried again.

5.5.1 Restore last calibration

There is an option to restore the gain and offset values set at previous calibration.

1. On the calibration options screen, choose Restore last calibration.

The following screen will appear:



2. Using the up and down keys, move your cursor to confirm and press Start/Stop.

The following screen will appear:

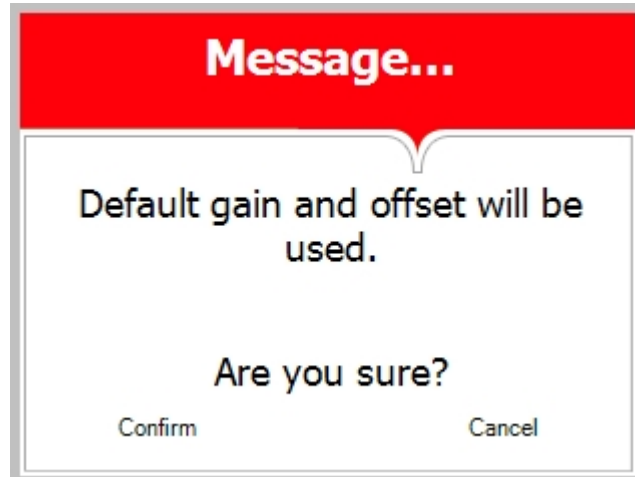


5.5.2 Restore default calibration

There is an option to restore the default (factory) gain and offset values

1. On the calibration options screen, choose Restore last calibration.

The following screen will appear:



2. Using the up and down keys, move your cursor to confirm and press Start/Stop.

The following screen will appear:



Calibrating the chamber water level

N/A

Calibrating the mineral free water level

N/A

6 Maintenance, Testing and Replacement Procedures

6.1 Preliminary Operations for Each Technician Call

1. **In order to maintain efficient service, the technician must perform the following:**
 - a. Cleaning or replacing the following if necessary;
 - ◆ Chamber, trays and trays holder. (Not covered under warranty)
 - ◆ Door gasket (Not covered under warranty)
 - ◆ Filters. (HEPA filter not covered under warranty)
 - ◆ Bottom parts and plungers of the solenoid valves. (Not covered under warranty)
 - ◆ Water reservoir.(Not covered under warranty)
 - b. Visual inspection for leaks or corrosion in the piping elements, plungers and solenoid valves.
 - c. Fastening loose screws and piping joints.
 - d. Visual inspection of the wiring.
 - e. If circuit boards, pressure or temperature sensors were replaced then calibration and logging the calibration of the temperature and pressure – see sec 5 Calibration.

2. **After completing the work, the technician must perform the following cycles:**
 - ◆ A 270°F (132°C) cycle with full load.

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

6.2 Safety tests after repair



ATTENTION!

After every repair or dismantling of the enclosure, the autoclave must pass two electrical safety tests administered by the Technician. The following shall be performed:

1. **Enclosure Leakage Current Test.**

Equipment needed – Megohmmeter

The test procedure is as follows:

1. Connect the electrical cord to the autoclave.
2. Do not connect to a power source.
3. Turn on the main switch on the right side of the autoclave.
4. Short-circuit the L and N pins on the cord's plug.
5. Connect the Short-circuit pins to the L pole on the electrical tester.
6. Connect the earth pins to the earth pole on the electrical tester.
7. Impose an electrical potential of 500-1000V on the tested autoclave. The insulation resistance should be at least 2 M Ω .

The test is successful if there was no leakage.

2. Protective Earth Impedance Test

Equipment needed – ohm meter

The test procedure is as follows:

1. Connect the electrical cord to the autoclave.
2. Do not connect to a power source.
3. Connect the grounding pin of the power cord plug to one pole of the Ohmmeter.
4. Connect any other metallic part (preferable – the metallic part of a locking screw) to the second pole of the Ohmmeter.
5. The resistance should not exceed 0.3 Ω .

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

6.3 Dismantling the Outer Cover of the Autoclave



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. Remove the power cord from the back of the machine.
2. Unscrew the screws (2) on both sides of the outer cover, holding the outer cover (1).
3. Remove the outer cover (1).
4. Remove the grounding wires from the outer cover.

5. Unscrew the screws (4) holding the back cover (3).
6. Remove the back outer cover (3).
7. Remove the grounding wires from the back cover.



6.4 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 coil

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.

6.4.1 Testing the Safety Valve

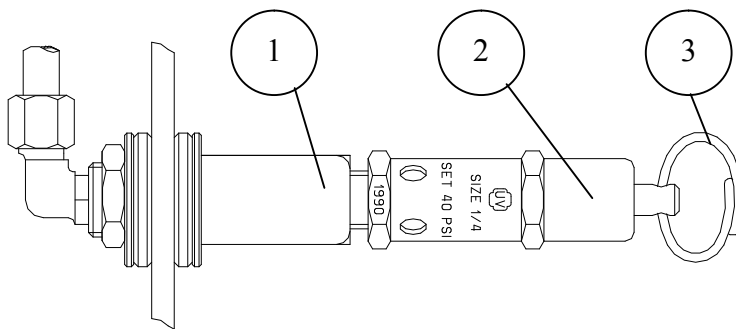
1. Turn on the autoclave and perform a cycle.
2. Allow a pressure of approximately 29-psig (300 kPa) to build up in the chamber.
3. Pull the ring of the safety valve using a tool, i.e. screwdriver, hook etc. and lift the safety valve ring for 2 seconds. Be careful not to burn your hands.

4. Steam should be release for several seconds and the valve will automatically close.
5. Once closed the valve must not show signs of leaking.
6. Press the Start/Stop key to stop the cycle and exhaust steam from chamber.
7. Wait until pressure goes down to zero, only then can the door be opened.

6.4.2 Replacing the safety valve

1. Take off the autoclave cover (see sec. 6.3 “Removing the Autoclave’s Outer Covers”).
2. Remove the water reservoir cover.
3. Using a on wrench on the base and another on the safety valve, unscrew the safety valve (2) and remove it from the safety valve base (1).
4. Replace the valve with a new safety valve. Use liquid thread seal on the threads to seal it. Tighten the safety valve to prevent leaking.
5. Replace the reservoir cover making sure all four sides have snapped back on to the base. This will prevent steam leaking out of the reservoir.
6. Replace the outer cabinet
7. Test the new safety valve using the test procedure above.

ASME



No.	Description
1	Safety valve base
2	Safety valve
3	Pressure relief nut

6.5 Testing and Replacing the Chamber Heating Elements



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.

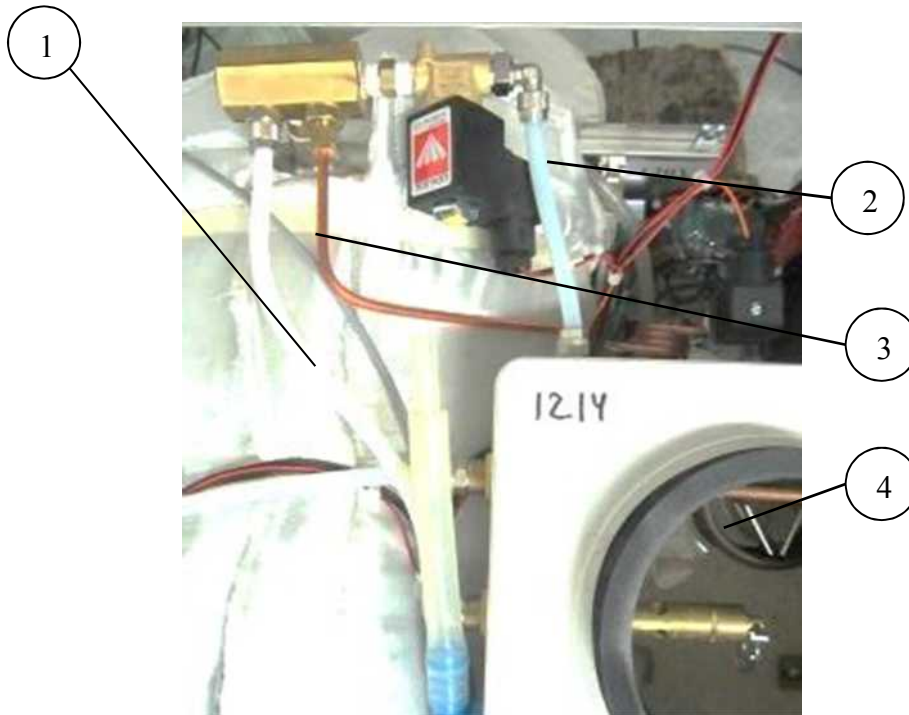
Allow the autoclave to cool before removing outer covers.

6.5.1 Test the heaters

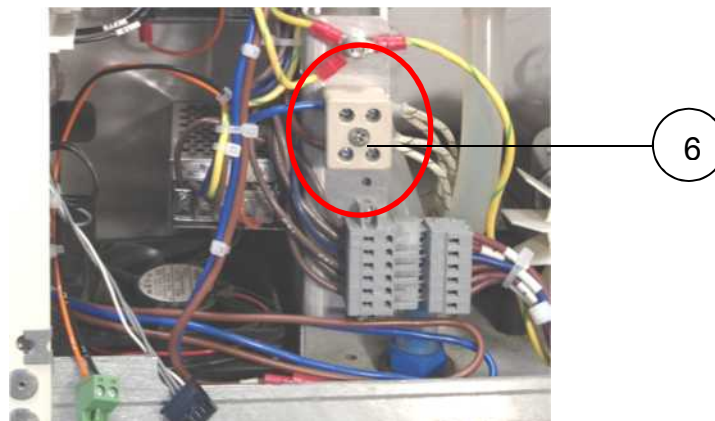
1. Take off the autoclave covers (see para. 6.3 “Removing the autoclave’s covers”).
2. Remove both pairs of power wires from the ceramic terminal block
3. Take an ohm reading across the wire pairs.
4. The ohm reading for both elements together should be 10 ohms.
5. The individual elements should read 20 ohms +/-10%.
6. Take a reading from the element wires to the element band to check for a ground short.
7. Replace any heater that gives a bad reading

6.5.2 Replacing the elements

1. Take off the autoclave covers (see para. 6.3 “Removing the autoclave’s covers”).
2. Drain the reservoir (see sec 12.2 in the Operator Manual)
3. Remove 3 solenoid coils on the left side of the chamber (coils only, leave wires attached).
4. Remove completely the plastic tubing going to the safety valve and exhaust coil. Set these aside for reinstallation (1 & 2)
5. Disconnect the copper tube at the top of the chamber going to the pressure sensor. (3)
6. Remove solenoid coil at the top of the chamber (coil only, leave wires attached). (4)



7. Disconnect large gray connector outside of the electronic box at the top. (5)
8. Disconnect white heating element wires from ceramic terminal block behind the electronic box. (6)

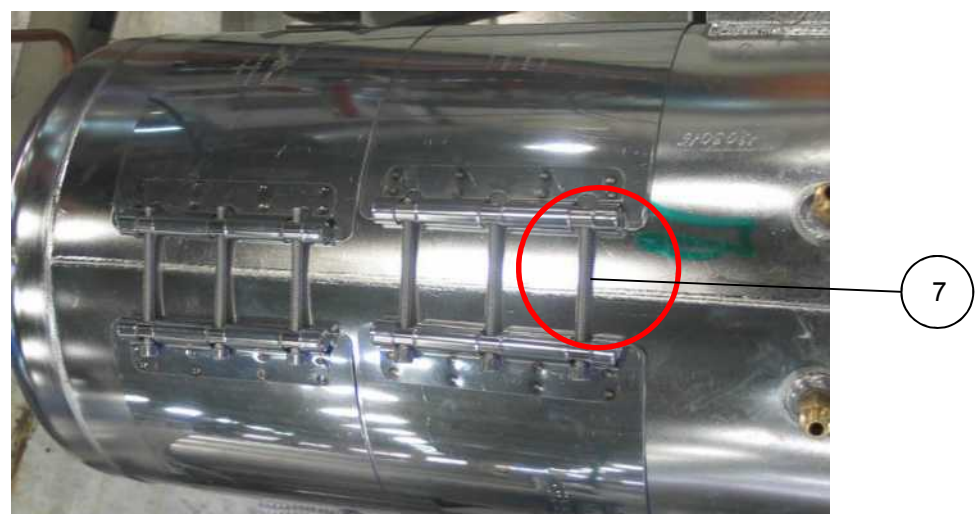


9. The wires for both elements are crimped and tie wrapped together.
10. Remove the crimps and ty wraps
11. Remove the round insulation pad at the rear of the chamber.
12. Remove the large tie wrap around the back of the chamber.
13. Unzip insulation blanket Velcro at the top of the chamber
14. Spread the insulation blanket at the top to reveal the heating element mounting bolts.

15. Remove the heating element mounting bolts (7)
16. Remove the two safety thermostat probes from the rear heating element
17. The wires for the heaters protrude through slots in the bottom of the insulation blanket.
18. Gently remove the heaters and blanket as a unit.
19. Install both new heaters loosely around the chamber using one mounting bolt in the center position
20. The heaters should be positioned so the channels for the safety thermostats are on the reservoir side of the chamber.



21. Rotate the heaters so the mounting bolts are between the reservoir and the chamber.
22. Slip the insulation blanket under the bottom of the chamber and up between the chamber and reservoir.
23. When half way up slip the wires from the heaters through the slits in the insulation blanket and route them toward the ceramic terminal block
24. Continue pulling up the insulation and rotating the heater into their normal position. The pad of the heating element should be centered under the bottom of the chamber.
25. When the mounting bolts are at the top of the chamber move the first heater as far forward as possible. This distance between the edge of the heater band and the front ring of the chamber should be 4.5 inches. Tighten till snug



26. The second heater should be butted up to the first with no gaps.
27. Position the heating pad of the second element so it is visually centered with the bottom of the chamber
28. Insert the Cut-Out thermostat and Temperature Safety Thermostat probes in the channels of the rear heater (Cut-out in the top channel and safety in the bottom). Tighten the mounting bolt fully. The probes must not be loose in their channels. Tighten the band or flatten the channel slightly to make a tight fit.
29. Loosen the mounting bolt of the first heater rotate it so the edges of the heating pad line up with the second heater and tighten in position
30. Insert the remaining mounting bolts and tighten fully. Hand tighten as much as possible.
31. Finish wrapping the insulation and apply the round insulation pad on the rear of the chamber.
32. Install a new tie wrap around the rear of the chamber over the installation, making sure to catch the lip of the rear support foot. The tie wrap secures the rear of the chamber to the rear support foot mounted to the chassis.

33. Reconnect all the tubing removed previously and reinstall all the solenoid coils removed previously
34. Pair the heating element wires so that in each pair there is one wire from each element.
35. If the conductor is not exposed then strip away a half inch of insulation exposing the conductor.
36. Crimp together the two conductors of each pair.
37. Insert the crimped pairs into the two positions of the ceramic terminal block.
38. Tie-wrap the wires together and make sure they are routed away from any moving components in the machine.

6.6 Testing or Replacing the Temperature Safety Thermostat or the Cut-Off Thermostat

The autoclave is equipped with a temperature safety thermostat and cut-off thermostat, which protects the heaters and the autoclave against overheating.

Note: Both safety thermostats are adjusted at the factory and their adjustment screws are fixed. **DO NOT ADJUST THEM IN THE FIELD!**

Field adjustment will defeat the safety feature of these devices.

These safety thermostats are present in the heating element circuit only (see schematics at the back of this manual)

Activation of a safety thermostat will only effect the functioning of the heaters.

The temperature safety thermostat resets automatically when the chamber cools down.

The cut-Off thermostat has a reset button that needs to be reset for the power to be restored.

Under normal conditions the contacts in these Safety Thermostats are closed, completing the circuit it is in. When an overheating occurs, the Temperature Safety Thermostat opens and the circuit is now broken. Once the autoclave cools, the Temperature Safety Thermostat will reset itself.

The Cut-Off Thermostat will stay open until it is manually reset. This is done by pushing in the red reset button.

These thermostats are installed on the autoclave to act as a safety to detect overheating problems. If one becomes activated, do not

automatically assume it is defective. Check out the autoclave thoroughly. If no other problem is found that could be causing this thermostat to be activated, then and only then change this device

The two temperature safety thermostats are located on the power plug panel on the rear of the autoclave.

Each has a sensing probe that is inserted in channels in the rear heating element.

The Temperature Safety is mounted below the Cut-Off on the panel and the probe is in the lower channel. Reversing these sensors will defeat the safety feature of these devices.

6.7 Testing the safety thermostats



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. Remove the autoclave outer covers (see para. 6.3 “Removing the autoclave’s outer covers”).
2. If the device does not reset:
 - a. Disconnect the two wires going to the thermostat and take an ohm reading across the two terminals. You should be reading a closed circuit. Take into account that a hot autoclave will delay the resetting of the thermostat.
 - b. If the autoclave is not hot and the device has not automatically reset or pressing the reset button does not reset the device then replace the thermostat.
3. if the device trips too soon:
 - a. Remove the two wires.
 - b. Connect the two wires together.
 - c. Connect an ohmmeter across the two empty terminals of the thermostat.
 - d. Plug the unit in and run several cycles.
 - e. The ohmmeter should show a closed circuit.

- f. If the ohmmeter shows an open circuit and no problem can be found that would cause overheating in the autoclave, replace the thermostat.

Note: Both safety thermostats are adjusted at the factory and their adjustment screws are fixed. **DO NOT ADJUST THEM IN THE FIELD!**

Field adjustment will defeat the safety feature of these devices.

6.8 Replacing the safety thermostats

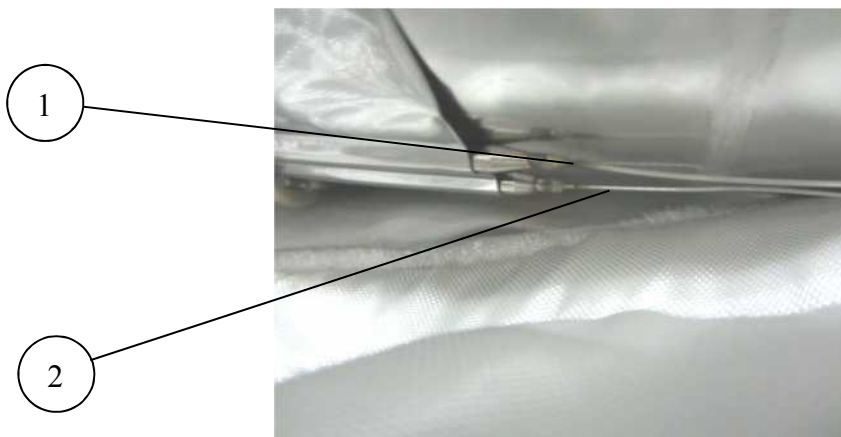
1. Remove the autoclave outer covers (see para. 6.3 “Removing the autoclave’s outer covers”).
2. Loosen the rear heating band (see para. 6.5 “Replacing chamber heater”).
3. Unscrew the temperature safety thermostat or cut-off thermostat from the power plug panel and remove its sensing probe from the loosened heater (see the figure below).
4. Replace the defective thermostat with a new one, by first mounting it to the power plug panel, then securing the probe in the appropriate channel of the heater.
 - a. The Temperature safety thermostat goes in the bottom channel
 - b. The Cut-out thermostat goes in the top channel
 - c. Reversing these will defeat the safety feature of these devices.
5. The heater should be as tight as possible
6. The thermostat probe should not be loose in the channel of the heater.

If the thermostat is loose:

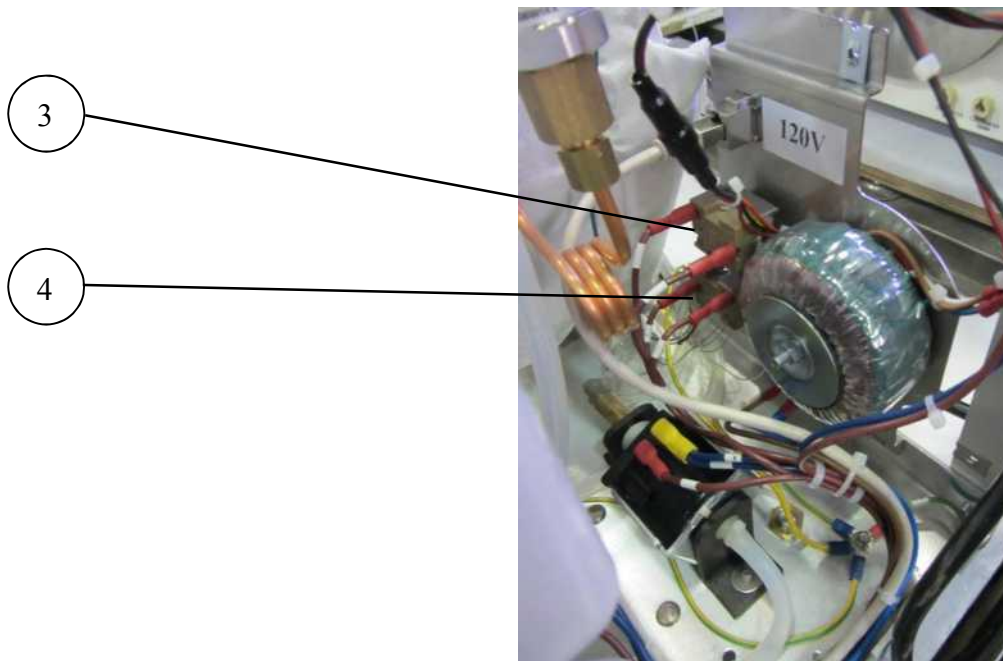
- a. tighten the heater
 - b. remove the probe and flatten the channel slightly.
7. Perform any cycle to verify that the temperature safety thermostat and cut-out thermostat do not interrupt the cycle.

Note: Both safety thermostats are adjusted at the factory and their adjustment screws are fixed. **DO NOT ADJUST THEM IN THE FIELD!**

Field adjustment will defeat the safety feature of these devices.



No.	Description
1	Cut-off thermostat top position at the heater
2	Temperature Safety thermostat bottom position at the heater



No.	Description
3	Cut-off thermostat top position on the power plug panel
4	Temperature Safety thermostat bottom position on the power plug panel

6.9 Cleaning, Testing and Replacing the chamber Water Level Electrode

The chambers water level electrode is located at the rear bottom area of the chamber.



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 attempting to clean or replace the electrode.

6.9.1 Cleaning

Using a damp cloth or sponge, you may use a mild soapy solution if you like; wipe down the Water Sensing Electrode. The electrode is located at the rear of the Chamber. It is important to wipe the sides of the electrode as well as the tip, to remove any dirt and debris that may have built up.

6.9.2 Testing the Electrode

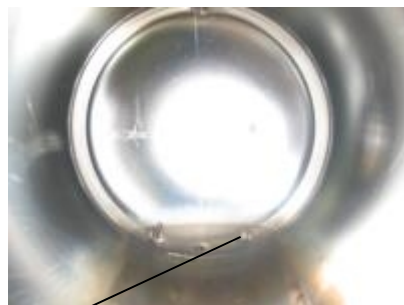
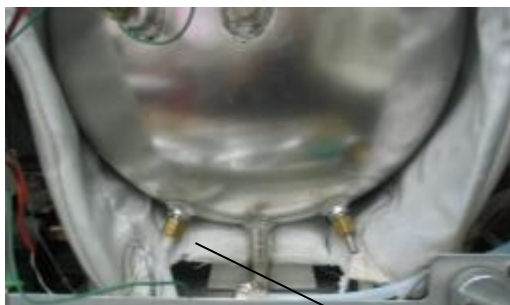
1. Using the technician's code access View Analog Inputs
2. Select Chamber Water Level
3. With no water in the chamber the reading should be 4095
4. Wet a cloth, sponge or paper towel and place over the electrode on the inside of the chamber. The read out should drop to less than 2000. If not then:
 - a. Make sure the wire connection from the Electrode to the I/O Board is in good condition.
 - b. If needed continuity can be checked by taking an ohm reading from J11 pin 1 on the I/O board to the electrode.

6.9.3 Testing the Electrode with an ohmmeter

1. Push up the insulation blanket at the rear of the Chamber.
2. Locate the back end of the Electrode.
3. Remove the small green wire connected to the Electrode.
4. Connect an ohmmeter to the tab of the Electrode and the Chassis.
5. With no water in the Chamber, the meter will show an open circuit.
6. Fill the Chamber with water by pouring water in through the front Door.
7. Once water is touching the tip of the Electrode continuously, the meter should read continuity.
8. If the meter reads continuity before the water reaches the tip, either the sensor is dirty or there is a problem with the sensor. Clean or replace the sensor
9. This test confirms that the Electrode is in good condition and working properly.
 - a. Be sure to replace the small green wire on the back of the Electrode.
 - b. If the Electrode checks out good and the wiring is good, there is a control problem, replace the I/O board].

6.9.4 Replacing the chamber electrode

1. Remove the outer cover of the autoclave.
2. Disconnect the wire from the electrode connection.
3. Loosen the nut that holds the electrode (1).
3. Remove the old electrode.
4. Insert a new electrode, to a measured height inside the chamber of 5mm and tighten the nut.
5. The nut should be tightened enough to prevent the electrode from moving up and down and to prevent any leakage.
6. Reconnect the wire to the electrode.
7. Test the electrode as outlined in 6.9.3



1

6.10 Testing and Replacement of the PT100

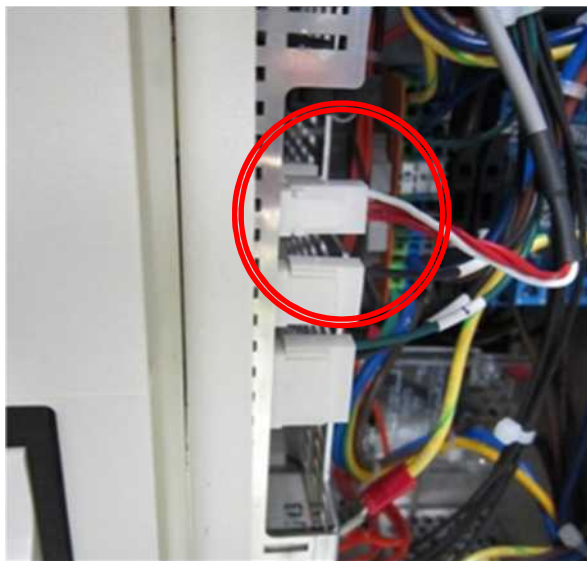
6.10.1 Testing the PT100

If after carefully calibrating the temperature the temperature does not read correctly, change the PT100 temperature sensor.

6.10.2 Replacing the PT100

Note: Ensure that the new PT100 does **NOT** have an identification tag on the grey cable near the wire connectors. (Using a PT100 with a tag will not produce suitable temperature readings)

1. If the PT100 has arrived without a connector
 - a. Remove the outer cabinet and rear panel
 - b. Unplug the sensor from the J2 connector on the Main control board



- c. Once the wires are removed, unscrew the compression fitting at the back of the chamber and remove the sensor from the chamber and the machine.



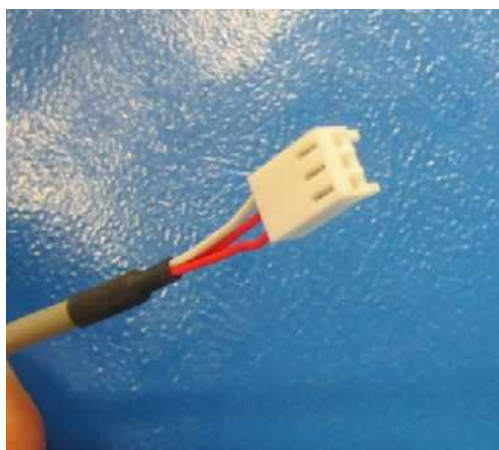
- d. remove the connector from the old sensor and install the wires as follows:
- e. Through the window on the plastic connector, press down on the metal catch with a pointed tool. This will release the pin for that wire.

The wires:



- f. Referring to the picture below; the white wire is on the left, the order of the red wires does not matter.

Assembled connector:



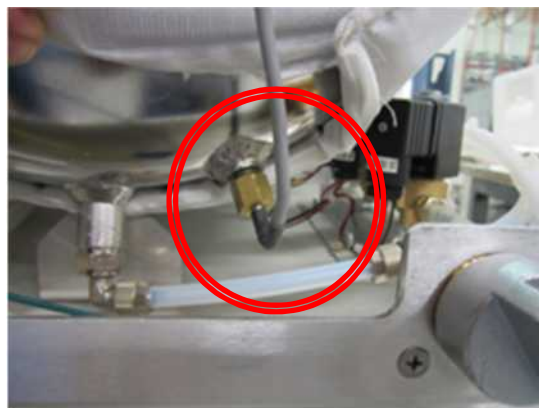
- g. The wires are connected by just inserting them into the slots, making sure the metal catch locks them in position.

2. Assemble the new PT100 sensor to the chamber as follows:

- a. Insert the PT100 into the nut, then into the silicon bushing, so that the thread and the cone of the bushing face forward (see figure below).

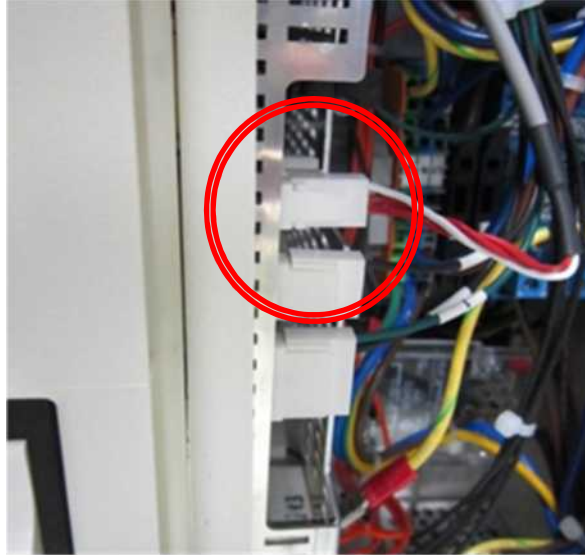


- b. Insert the PT100 into the hole on the outside rear of the chamber. The sensor should be inserted as far as possible.



- c. Tighten the compression nut so the sensor is securely locked in position

3. Connect the PT100 to the J2 connector on the Main control board.



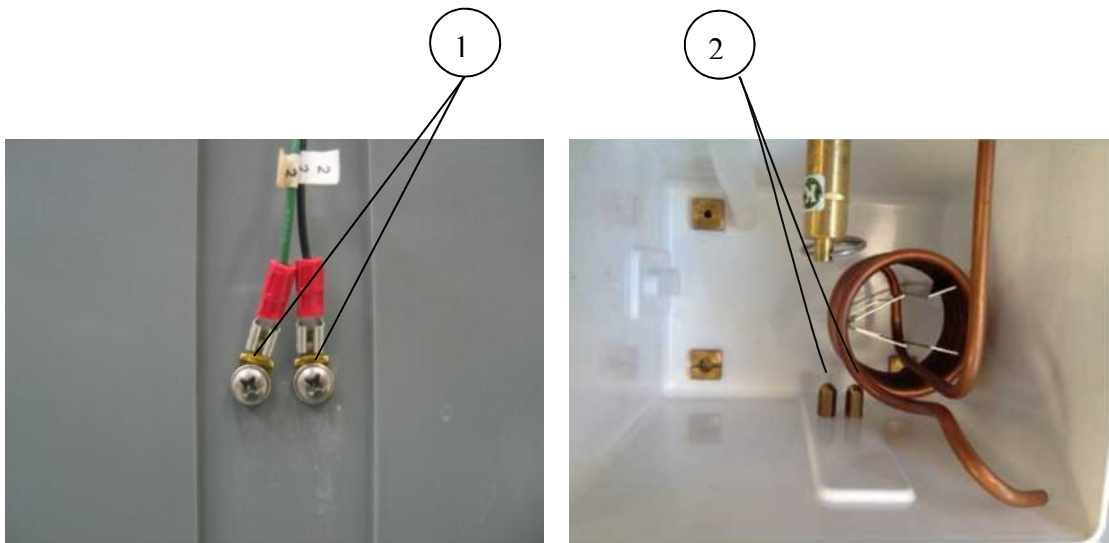
4. The machine will now need to be calibrated. (see sec 5)

6.11 Replacing the Water Reservoir Water Electrodes

1. Remove the outer cover of the autoclave
2. Disconnect the wires from the electrode screw on the outside of the reservoir. (1)
3. Unscrew the brass nut (2) on the inside of the reservoir
4. If replacing the electrode screw remove it from the outside of the reservoir.
5. Insert the new electrode screw making sure the washers and wire connector are in the proper order.

Note: The screw must protrude into the chamber 5mm.

1. the brass nut and black o ring are applied from the inside of the reservoir
2. Tighten to ensure the o ring is seated and preventing any leaking.
3. Reconnect the wires and close the cover.



6.12 Replacing the Drain Valve

The drain valve is located on the front of the autoclave. The drain valve function is to drain the mineral free water from the reservoir (see the figure below).

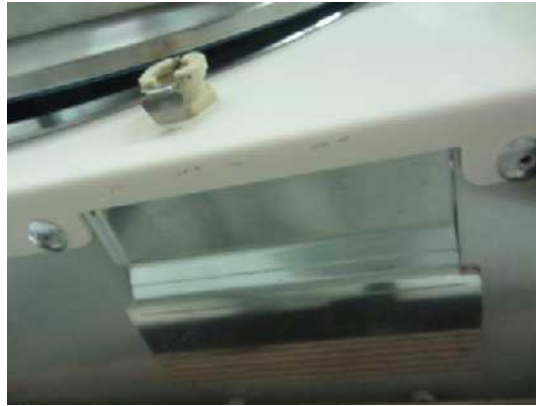


Caution!

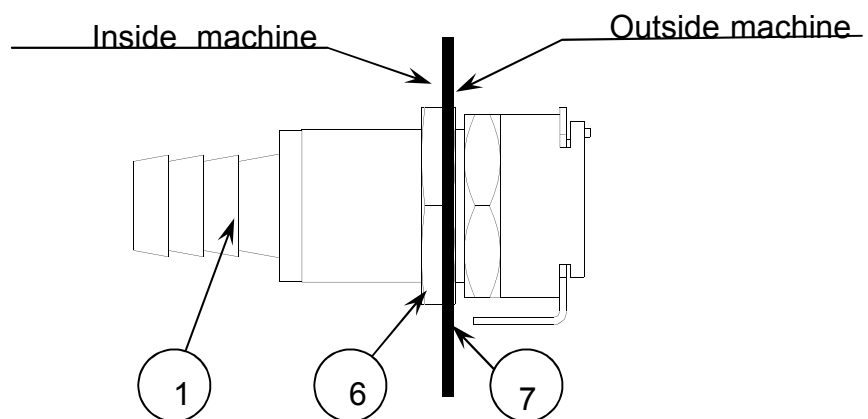
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

Allow the autoclave to cool before removing outer covers.

1. Remove the autoclave cover (see sec. 6.3 “Dismantling the Outer Covers of the Autoclave”).
2. 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.
3. Remove the drain valve access panel from the bottom of the chassis (see the figure below).



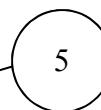
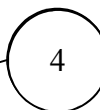
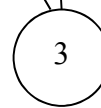
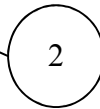
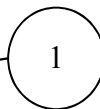
4. Remove the drain hose from the inside portion of the drain valve (1).
5. Unscrew the inside nut (6) using a 13/16” (21mm) open end wrench.
6. Remove the drain valve (1) from the panel (7).
7. Install the new valve and secure with the inside nut (6)
8. Reattach the drain tube. Use a tie wrap to secure the drain tube to the valve.
9. Verify there is no leakage.
10. Replace the drain valve access panel.



6.13 Replacing the front funnel and water filling pipe.

The water fill funnel is located on the front of the machine and can be seen when the door is open. The funnel is connected to the reservoir by the fill pipe.

1. Remove the autoclave cover (see 0 Dismantling the Outer Cover of the Autoclave).
2. Remove the door cover
3. Remove the reservoir cover
4. Cut the tie wrap and remove the plastic fitting on the end of the flexible fill pipe in the water reservoir (1).
5. Cut the tie wrap at the other end of the flexible tubing (5) and on the small tube below it (6). Then remove both from the fill funnel.
6. Press on the plastic pins (3) on the inner side of the front panel to release the funnel from the panel (4).
7. Slide the funnel forward to remove it from the front panel.





1. Replace the funnel and pipe assembly with the new one.
2. Using a screw driver, insert it into the slot in the plastic pin (7) and twist to spread the pin and lock the funnel in position.



3. Reattach the large and small flexible tubes to the fill funnel and secure with a tie wrap (a very small amount of silicone grease helps)
4. Insert the other end of the large tube through the black grommet of the reservoir.
5. Insert the 90 degree fitting into the open end of the large flexible tubing inside the reservoir and secure with a tie wrap.
6. There should be a short piece of flexible tubing to extend the fill to the bottom of the reservoir.



7. Replace the reservoir cover making sure all four sides have snapped back on to the base. This will prevent steam leaking out of the reservoir.
8. Replace the outer cabinet and door cover.

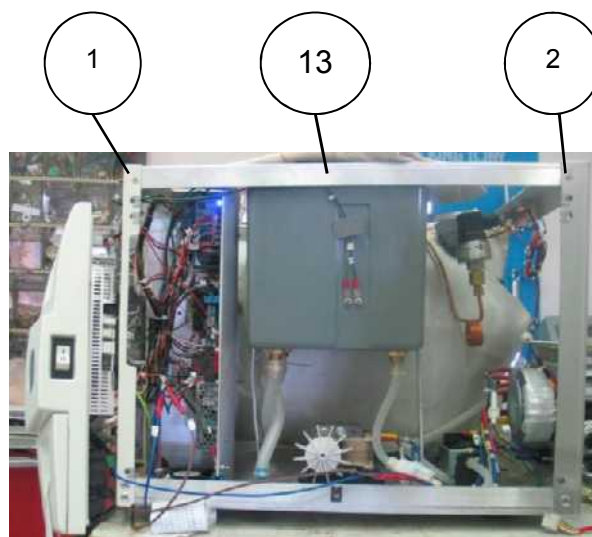
6.14 Replacing the water reservoirs



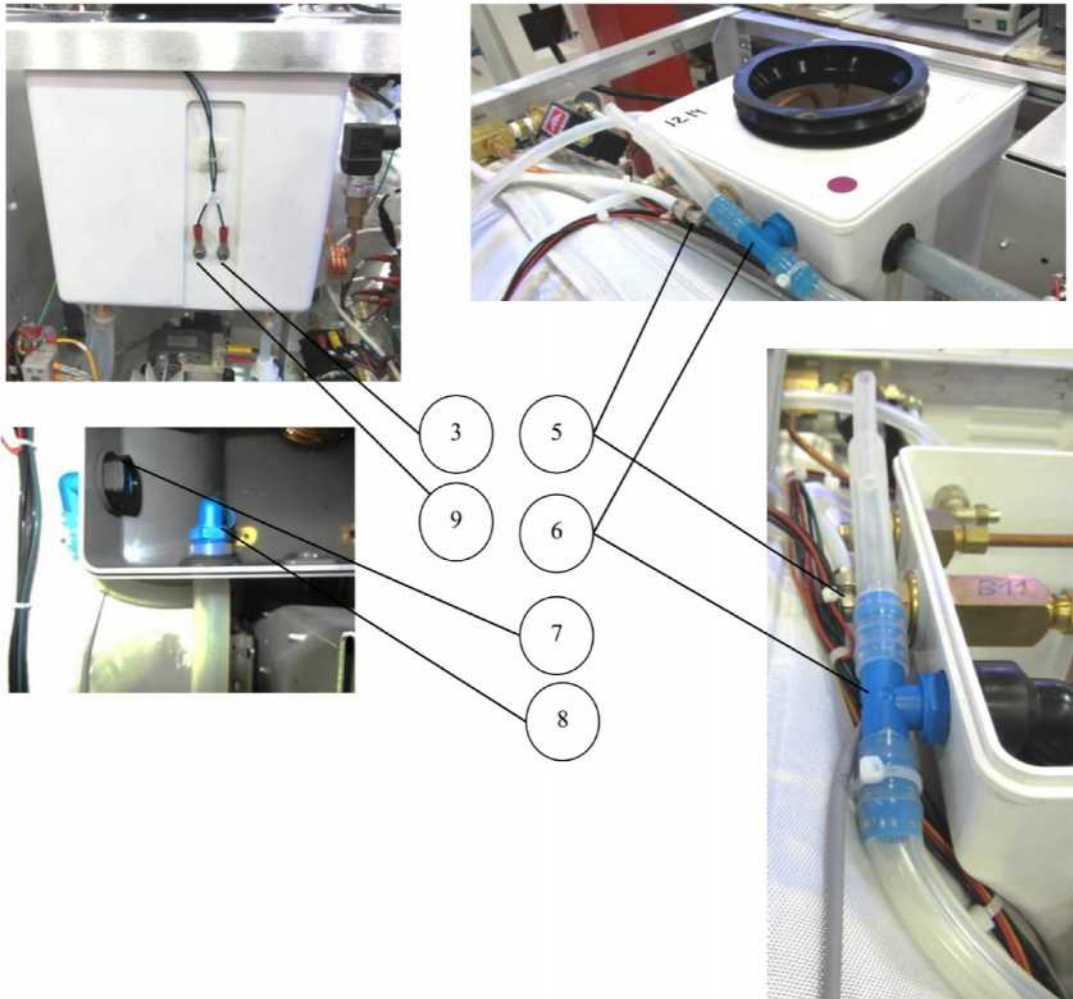
Caution!

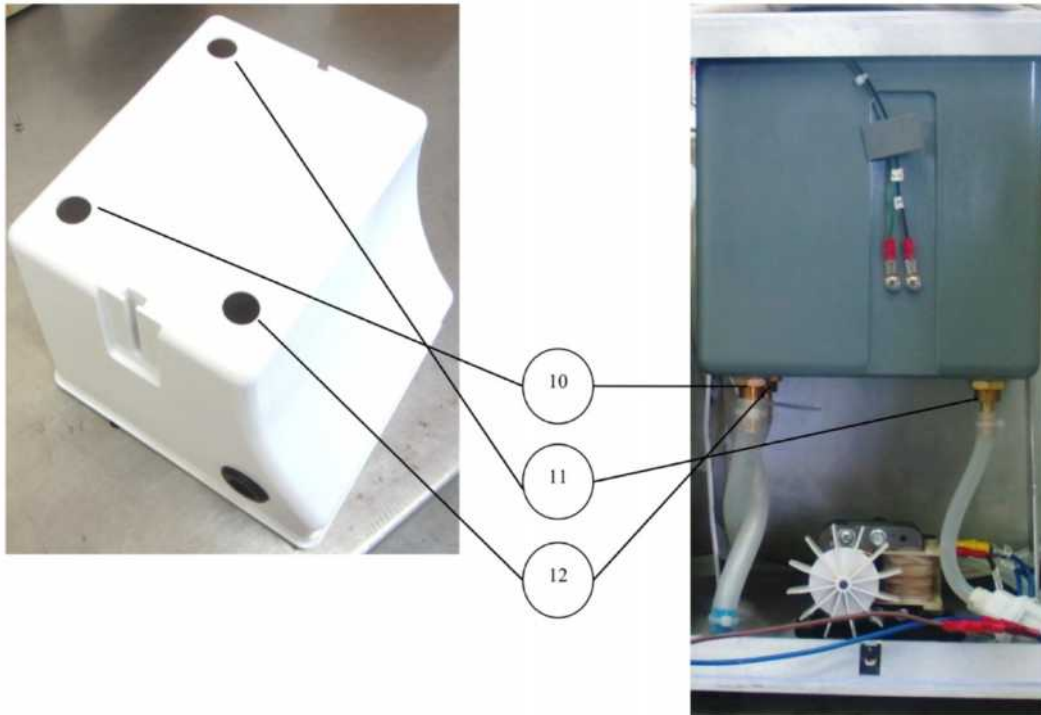
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

1. Drain the water reservoir (See sec "Draining the Reservoirs" in the Operator's Manual).
2. Remove the outer cover of the autoclave (see para. 6.3 "Dismantling the Outer Covers of the Autoclave").
4. Unscrew screws (1 & 2) and remove the left top frame support (13).



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.





No.	Description
10	Drain
11	Water outlet to the chamber
12	Water inlet from the funnel

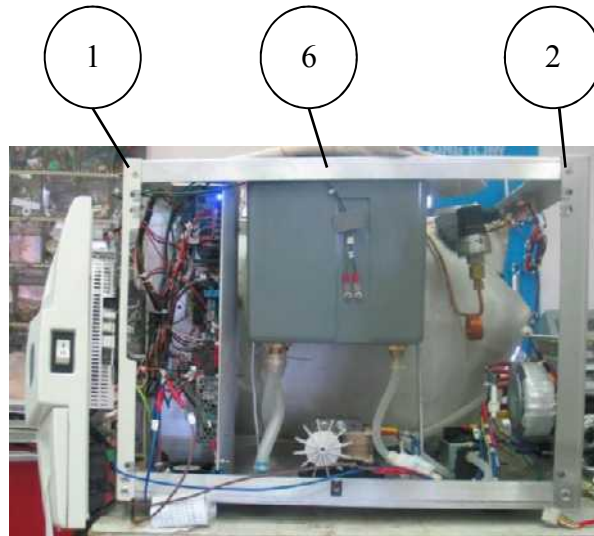
6.15 Cleaning the water reservoirs



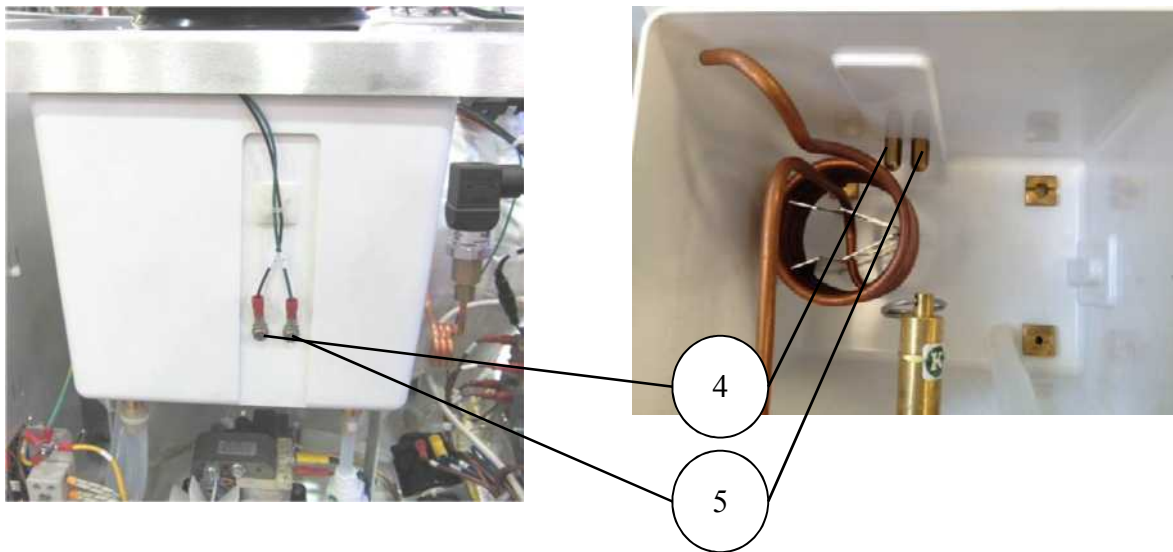
Caution!

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

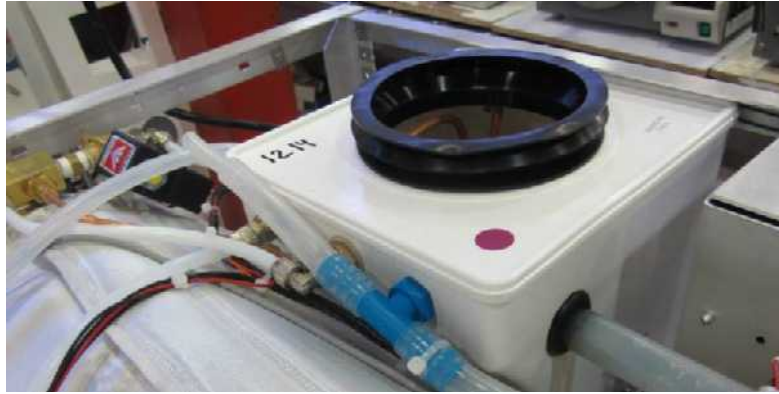
1. Drain the water reservoir (See sec "Draining the Reservoirs" in the Operator's Manual).
2. Remove the outer cover of the autoclave (see para. 6.3 "Dismantling the Outer Covers of the Autoclave").
4. Unscrew screws (1 & 2) and remove the right top frame support (6).



6. Remove the top cover of the reservoir.
7. Clean the inside of the reservoir by wiping with a clean cloth.
8. Clean the brass nuts inside the reservoir connected to the water level electrodes (connected to 4, 5) inside the reservoir with a soft cloth.



9. Verify the brass nuts inside the reservoir are connected firmly to the electrodes. (4, 5)
10. Follow the steps in this section in the reverse order to reassemble the unit. Replace the reservoir cover making sure all four sides have snapped back on to the base. This will prevent steam leaking out of the reservoir.



6.16 Replacing the Door Cover



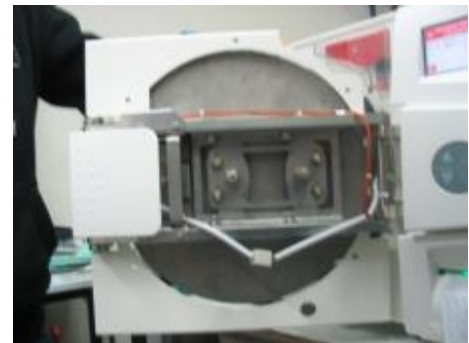
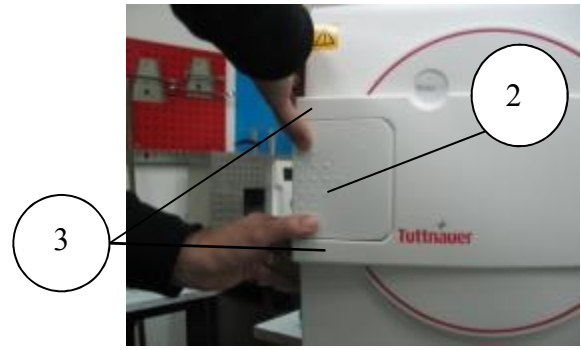
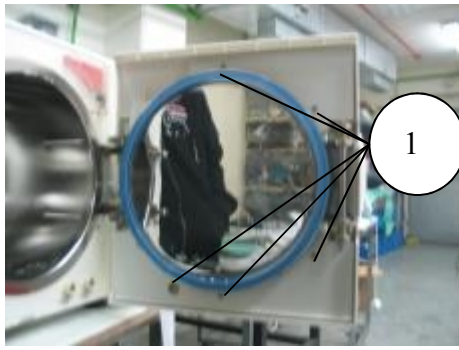
Caution!

Before starting, open the door first, and then disconnect the unit from the power source.

If the door is hot use caution to avoid touching the door's metal surface

6.16.1 Disassembling the door cover

1. Unscrew the 6 screws (1) that connect the door plastic cover to the metal frame.
2. While holding the door handle (2) with your thumbs, gently press the cover (3) outwards to click it open. (4)
3. This is best done with the door in the almost closed position but not latched.
4. Install the new door cover with the door in the same position
5. Snap the cover into position and replace the 6 screws.



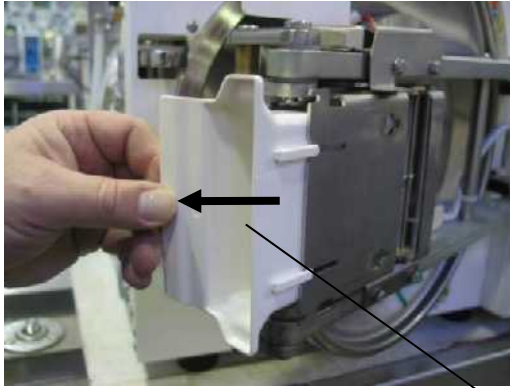
6.17 Replacing the Door Handle



Caution!

Before starting, ensure that there is no pressure in the autoclave. Allow the autoclave to cool before replacing the Door Handle. Do not disconnect the electric power, since disconnecting the power 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 6.18).
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 6.18).



1

6.18 Replacing the Plastic Handle Cover

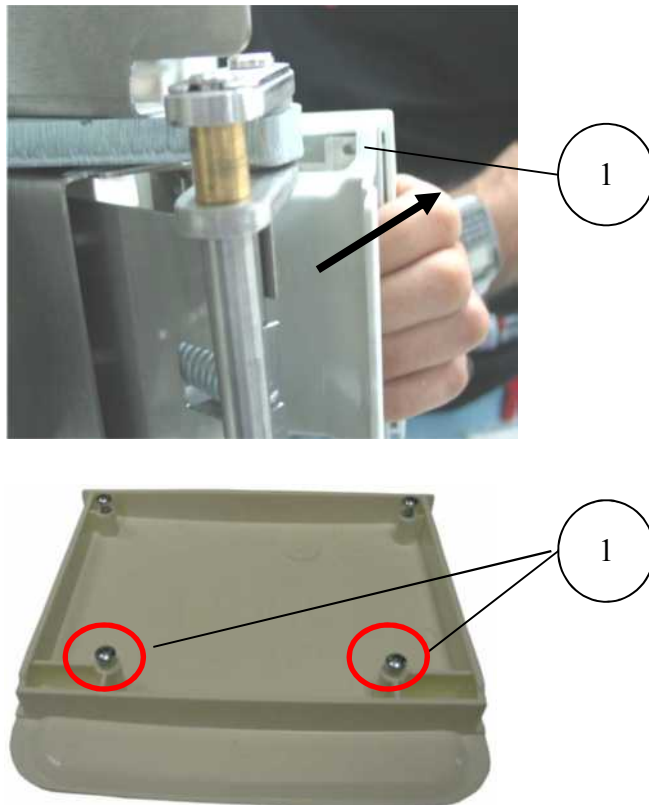


Caution!

Before starting, ensure that there is no pressure in the autoclave. Allow the autoclave to cool before replacing the Door Handle Cover.

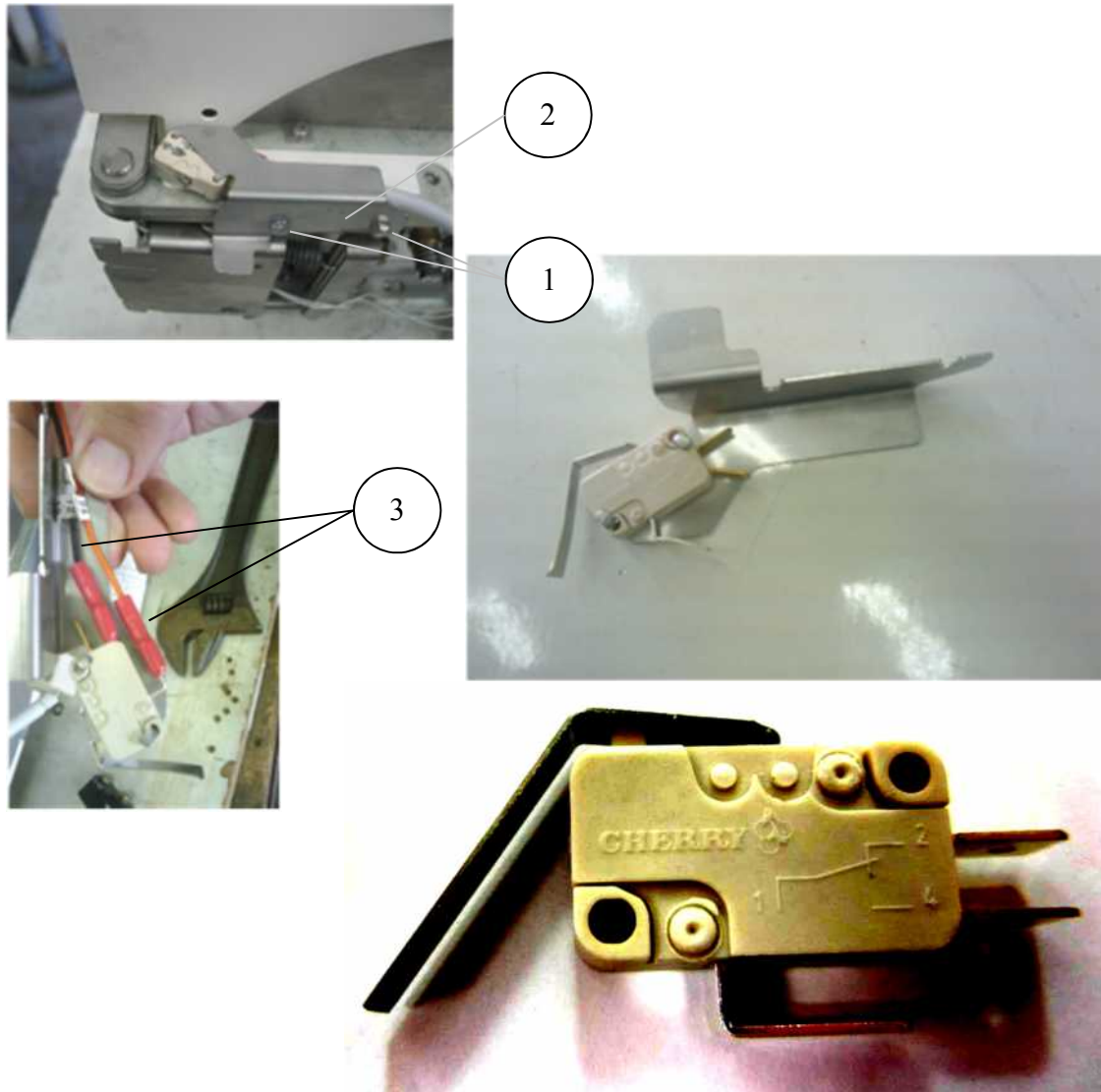
Do not disconnect the electric power, since disconnecting the power will lock the handle and prevent replacement of the handle cover.

1. Open the autoclave's door.
2. Open the handle and loosen 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. Insert screws (1) in the cover and tighten until only the last two threads are showing.
6. Now insert the cover into the handle bracket.
7. Now with the cover in position tighten the two front screws (1).



6.19 Replacing the door safety microswitch

1. Remove the door cover (see sec 6.16)
2. Unscrew the 2 screws (1) holding the microswitch bracket (2).
3. Disconnect the wires (3) from the microswitch assembly.
4. Connect the wires to the new microswitch at terminals 1 & 4 as shown in the picture below.
5. Assemble the new microswitch and bracket using the two screws (1).
6. There is no further adjustment



6.20 Removing the Front Control Panel



Caution!

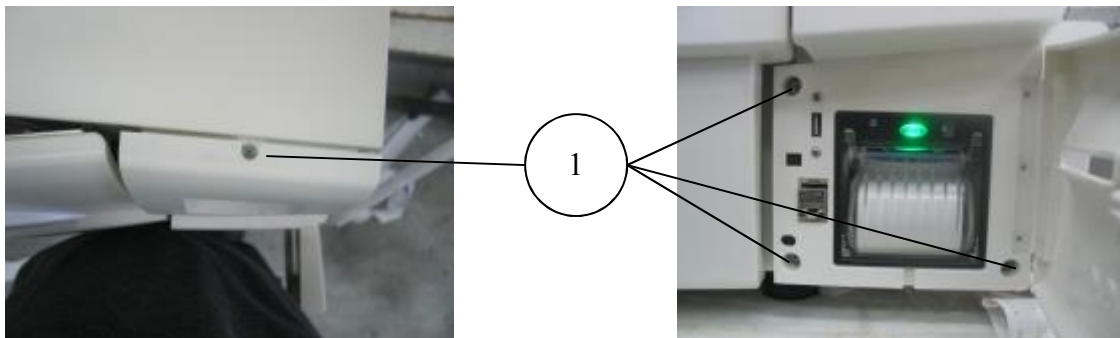
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

Allow the autoclave to cool before replacing the Panel.

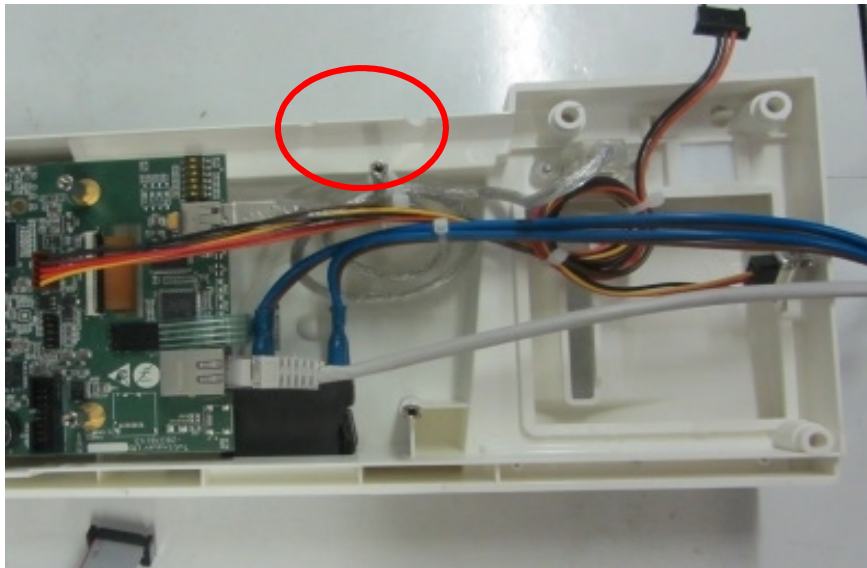
1. Remove the outer cabinet (see sec 6.3)
2. Remove each connector from the circuit board making note of where each connector goes.



3. Unscrew the four fastening screws (1).



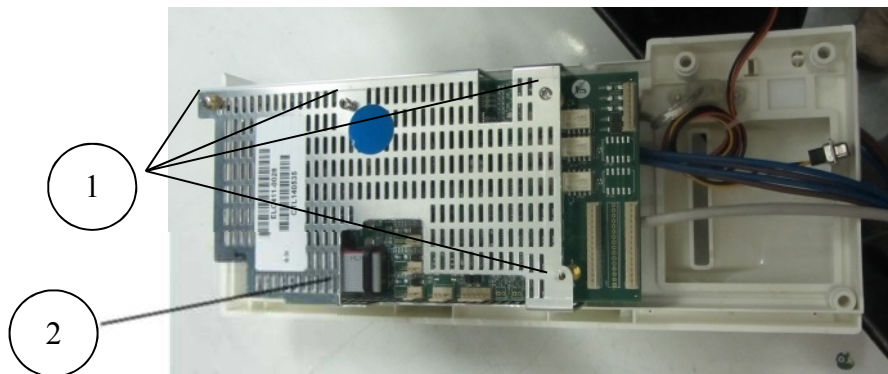
4. When reinstalling the Front Panel make sure the door switch and door locking solenoid cables are positioned in the notch of the front panel housing.



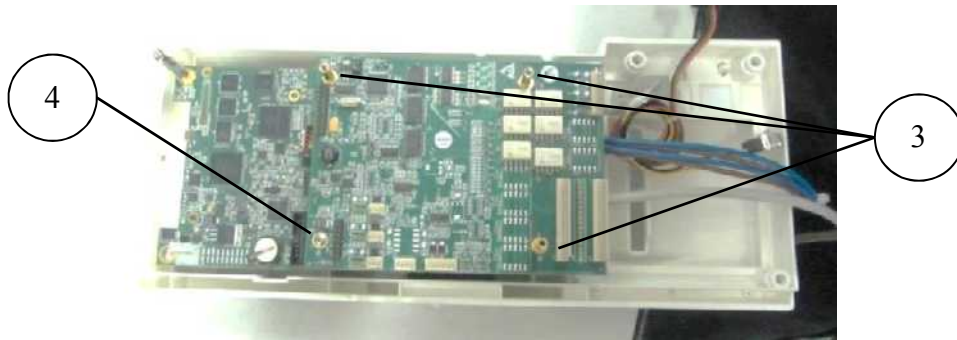
5. Screw the front panel in and reconnect the connectors

6.21 Removing the Main Board and I/O board

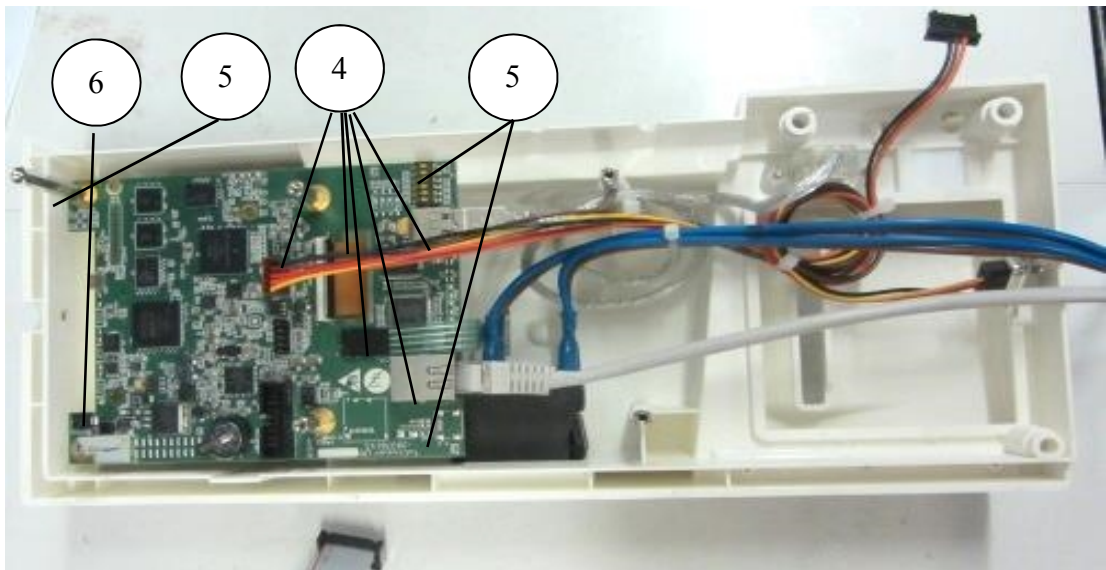
1. Remove the Front Panel (see sec 6.20)
2. Remove the screws (1) holding the metal shield protecting the circuit boards. Note the location of the two ground tabs.



3. Disconnect the ribbon cable (2) in the upper left corner of the I/O board
4. Remove the three standoffs (3) and one screw (4) holding the I/O board and set them aside.



5. Remove the I/O board and set it aside
6. Remove the following cables; network cable, USB cable, printer cable, keypad cable and display screen cable (4) from the Main board (See “Removing cables” sec 6.22).
7. Remove the five standoffs (5) and one screw (6) holding the Main board and set them aside. Note the location of the standoffs as they are different sizes.



8. Remove the Main board.
9. Assemble the digital cards on the new panel.
10. Position the front panel assembly to the front of the machine making sure the door switch and door locking solenoid cables are positioned in the notch of the front panel housing.
11. Fasten the front panel to the autoclave with the 4 fastening screws (1).see sec 6.20
12. Reassemble the cable connections to the circuit board.

6.22 Removing cables

The USB cable connector unplugs from the Main board directly

The printer cable has a release tab that needs to be pried away from the connector for the connector to be removed.



The network cable has a release tab underneath that needs to be pressed to release the connector.



The keypad cable:

- a. Pull up and back on the cable to release it from the connector.
- b. Pulling too hard will break the connector



The display screen connector locking tab needs to be pried up to release the cable. Use a thin bladed knife or your finger nail to release the tab.



6.23 Replacing the Printer Door

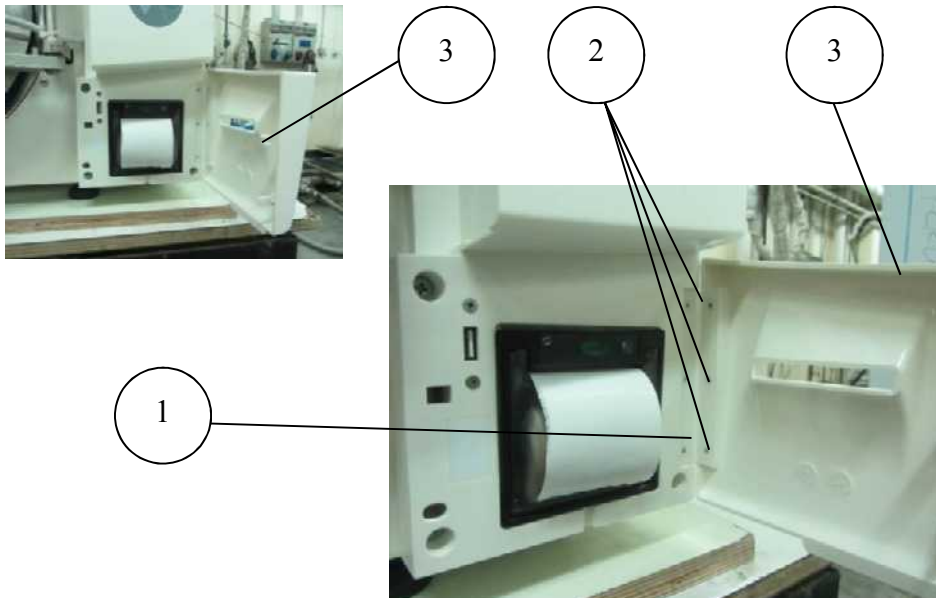


Caution!

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 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. Slide the Printer Door aside to remove it.
4. Assemble the new Printer Door to the Integral Hinge with the 3 screws (2).



6.24 Replacing the Printer

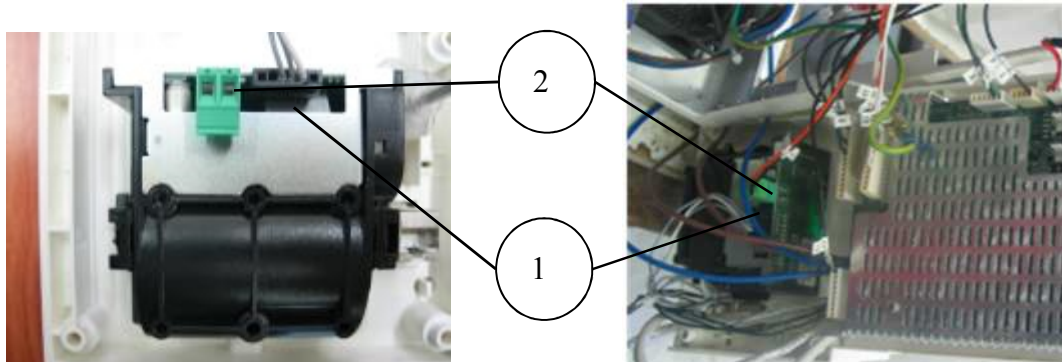


Caution

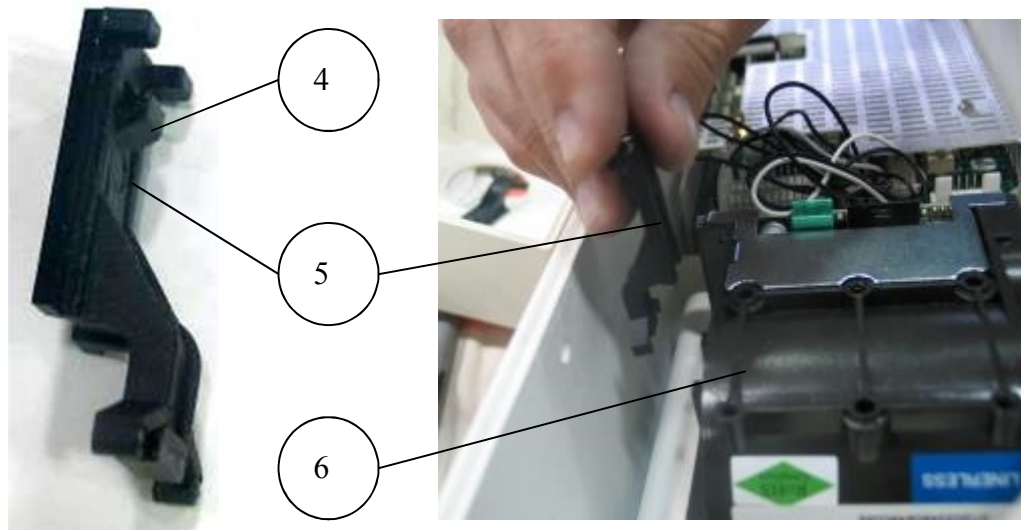
Before starting, disconnect the instrument from the power source and ensure that there is no pressure in the autoclave.

Allow the autoclave to cool before removing outer covers.

1. Remove the front panel (see sec. 6.20 Removing the Front Control Panel) to reveal the internal parts and the electrical connectors.
2. Unplug the data connector (1) and the power connector (2). Verify that you know where each connector is plugged in.



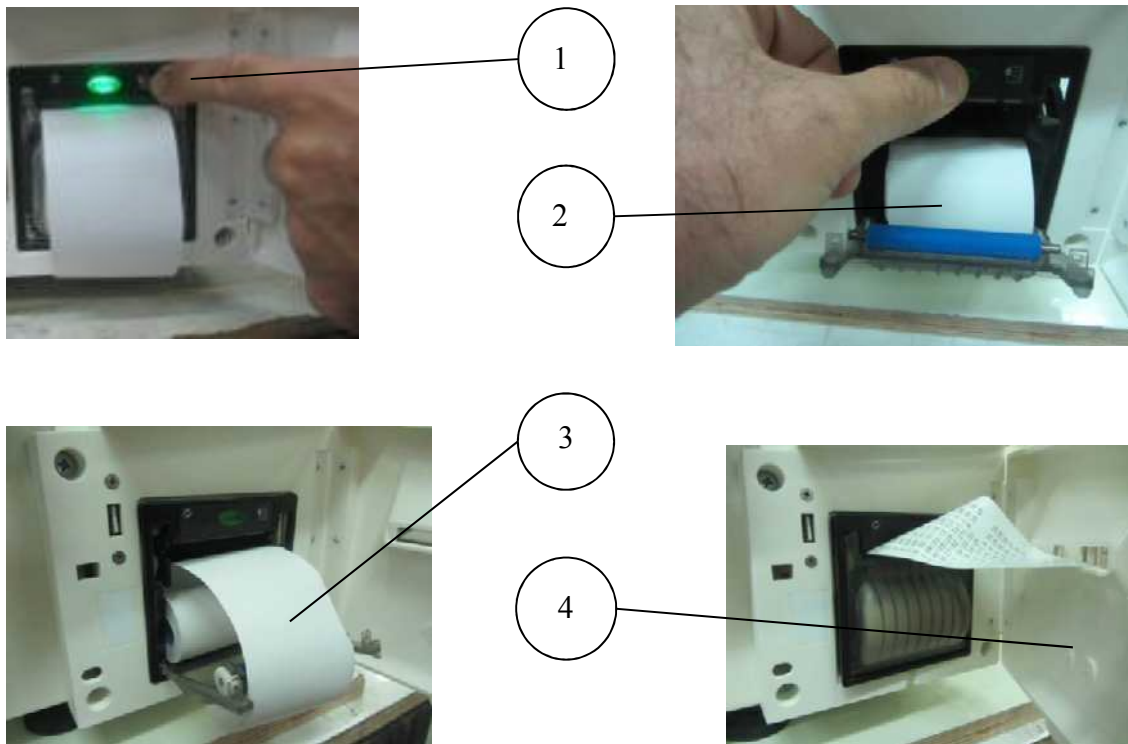
3. The printer (6) is fastened to its seat with two fasteners (5). To release the fasteners, using a flat screwdriver, pry out gently the part marked (4) and pull the fastener upward. Repeat this with the second fastener.
4. Pull the printer out of its seat (the hole in the panel).
5. Replace the printer with a new printer.
6. Insert the fasteners by holding the printer from the front and sliding the fastener into place. Verify that they are inserted firmly.
7. Connect the printer's power and data connectors
8. Reconnect any the connectors that were removed from the board earlier.
9. Position the front panel assembly to the front of the machine making sure the door switch and door locking solenoid cables are positioned in the notch of the front panel housing
10. Assemble the panel (see 6.20 Removing the Front Control Panel).



6.25 Replacing the paper roll

When the printer's green LED flashes, it means that the printer is out of paper, or the paper is misaligned. In either case, proceed as follows:

1. Open the printer door (4)
2. Press the green printer button (1) to open the paper compartment (2) and realign the paper as necessary. Otherwise follow the next two steps to replace the paper.
3. Replace the paper roll with the new one (3) as shown on the picture below.
4. Push the green button to open the printer compartment.
5. Remove the old roll tube
6. Install a new roll of paper making sure the paper rolls off the top of the roll.
7. Pull out about 6 inches of paper and close the printer compartment making sure the paper exiting the printer compartment is properly aligned.
8. Poke the paper through the slot in the printer door (4), and then close the door.



6.26 Replacing the On/Off-Circuit Breaker

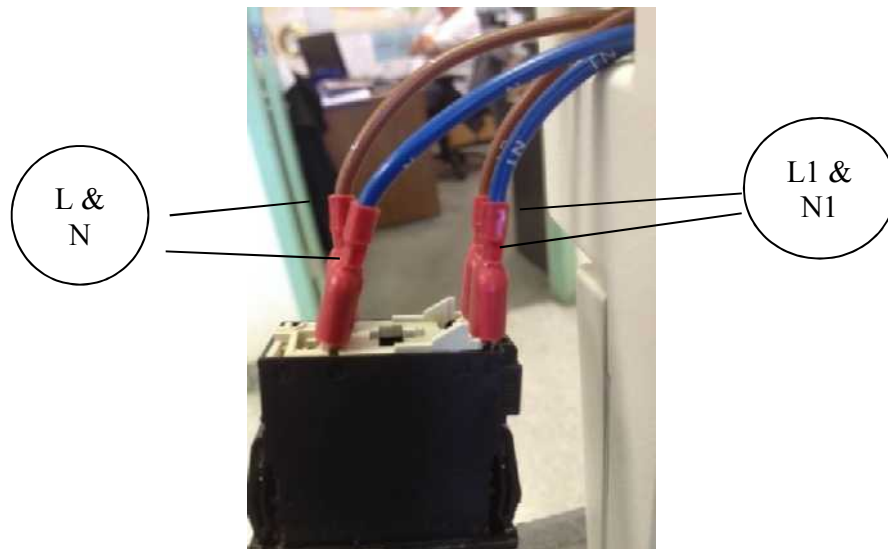


Caution!

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

Allow the autoclave to cool before removing outer covers.

1. Using a medium size flat blade screwdriver gently pry the On/Off-Circuit Breaker out of the Front Panel.
2. Remove the four wires making careful note as to their proper position
3. Replace the main switch with a new switch.
4. Install the wires in their correct positions
 - a. Blue wires on one side of the switch. Brown wires on the other side.
 - b. Brown L and Blue N at the top of the switch
 - c. Brown L1 and Blue N1 at the bottom
5. Push the switch back into its seat until it clicks. Verify that it is inserted firmly.



6.27 Replacing the water pump

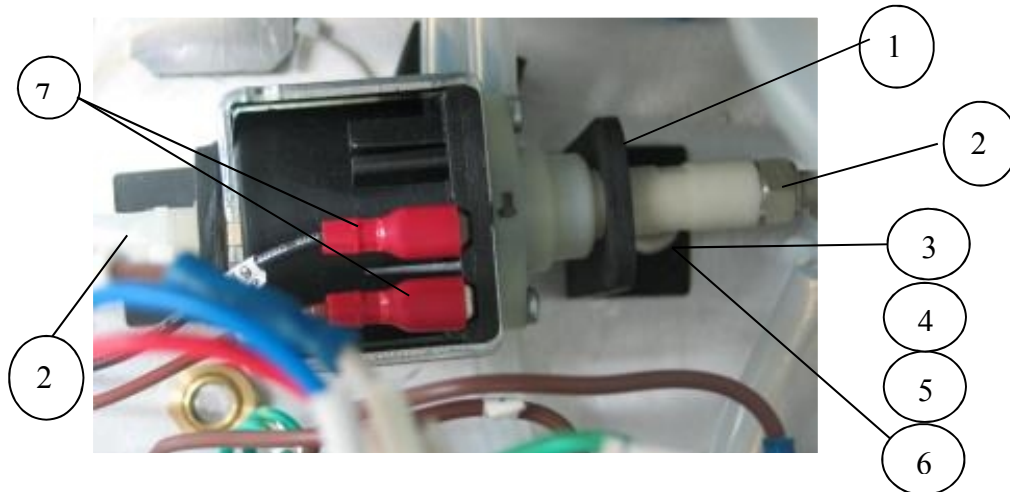


Caution!

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

1. Empty the water reservoir.
2. Remove the autoclave outer cover (see sec. 6.3 “Dismantling the Outer Covers of the Autoclave”).
3. Disconnect the wires from the pump (7).
4. Disconnect the piping from the pump (2).
5. Remove the pump from the rubber shock absorbers (1).

- If the rubber shock absorbers are damaged, replace them.
6. Replace the damaged pump with a new pump.
 7. Reconnect wiring and piping.



8. Reassemble the outer cover.
9. Refill the mineral-free water reservoir.
10. Turn on the autoclave and verify the pump operates correctly.

No.	Description	Cat. No.
1	Rubber shock absorber	SKR203-0006
2	Fitting 5/16"x1/8" (straight)	—
3	Screw	BOL191-0140
4	Nut	NUT192-0191
5	washer	NUT193-0250
6	Spring washer	NUT193-0315

6.28 Testing and Replacing the Solenoid valve's Plunger, Coil or base

The solenoid valves may not be working due to a cracked base, faulty plunger or faulty electrical coil. To repair the solenoid valve proceed as follows:



Caution!

**Ensure that there is no pressure in the chamber or coil.
Allow the autoclave to cool before removing outer covers.**

1. Testing the solenoids electrical coil (2). The solenoids used on this machine have AC coils.
 - a. The easiest test to tell if the solenoid is active is to take a steel or iron object and touch it to the center post of the solenoid valve assembly. If the metal object is magnetically attracted to the post, it can be concluded that the coil has been energized.
 - b. If the valve is operating intermittently or not at all, turn off the autoclave and disconnect from the power source. Remove the connection box from the solenoid coil. Disassemble the connection box and check that the connectors are solidly in place and making good contact with the terminals on the solenoid coil.
 - c. While the connection box is disassembled, check that the red and black wires are not broken or loose.
 - d. Reinstall only the inner assembly of the connection box onto the solenoid coil and onto the plunger assembly.

Caution: Do not apply power to the coil unless it is attached to the plunger.

- e. Turn the unit back on and monitor the voltage across the terminals.
- f. Using the “Test Digital Outputs” option the solenoid can be toggled on and off.
- g. When the solenoid is off, there should be between 0 volts AC across the terminals.
- h. When the solenoid is on, there should be between 18 and 21 volts AC across the terminals.
- i. If the voltages are not correct, remove the inner assembly from the coil and check again. When the solenoid is off the voltage across the terminals should be ~ 12v AC. When the solenoid is on the voltage should be 18 – 21 volts AC.
- j. If the voltages remain incorrect, check for a damaged wire or loose JP3 connector.
- k. If the problem is still not resolved, check for a control problem at the J14 connector. See J14 in the schematic at the back of this book.
- l. If the problem clears up when the coil is disconnected, take an Ohm reading on the Solenoid Coil. The reading across the two side terminals should be approximately 8 ohms.
- m. There should be **no** continuity from either of the side terminals to the center terminal.
- n. If a problem is found with the coil, it should be replaced.

2. Checking and replacing the plunger assembly (3, 4)
 - a. Remove the coil as outlined above
 - b. Unscrew the plunger housing (3) with the plunger & spring (4). The housing has a built in 7/8" (23mm) nut for easy assembly and disassembly.
 - c. Check that the plunger and spring are free of debris and free to move within the housing.
 - d. Check that the seat of the plunger is in good condition and not worn.
 - e. Replace as needed. The plunger, spring and housing are available as a kit and should be replaced together

3. Checking and replacing the solenoid base (5)
 - a. Remove the coil and plunger as outlined above.
 - b. Check for any debris
 - c. Using a magnifying glass inspect the seat of the base for cracks or chips.
 - d. Replace the base if any defects are found.
 - e. Observe the directional arrow when installing the new base.



6.29 Cleaning water inlet strainer



Caution!

Before proceeding, make sure that the electric cord is disconnected and there is no pressure in the autoclave.

1. Remove the cover of the autoclave. See sec 6.3
2. Drain the water from the water reservoir.
3. Remove the water filter from the silicon tube.
4. Open the filter by unscrewing the two filter parts.

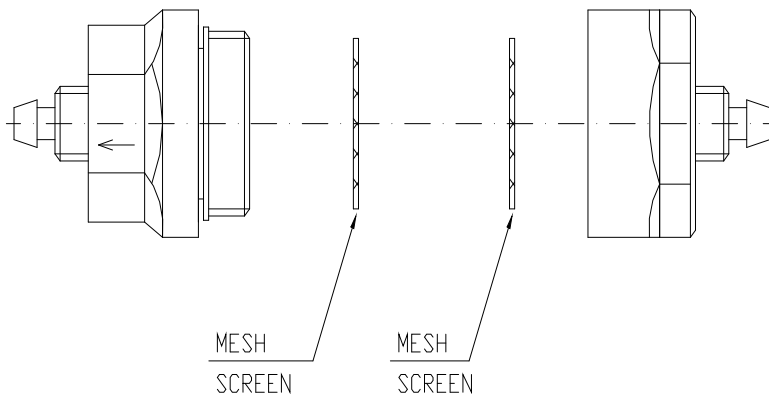
5. Clean the metal mesh filter by flushing it under running water for a few minutes. Use a brush if necessary.
6. Replace the filter parts and reconnect it to the silicon tube.
7. Open the water valve.

Note: When reassembling the filter do not over tighten. Screw both sides together until the black o ring is contacted, then ½ additional.

Note: Overtightening will cause the filter to leak.

Note: If NOT removing the flexible tubing when disassembling the filter, then it is important to pre-wind the tubing before screwing the filter back together. Failure to follow this step will cause the filter to unscrew itself over time.

Water Reservoir Filter



6.30 Replacing the Air Filter



Caution!

Before proceeding, make sure that the electric cord is disconnected and there is no pressure in the autoclave.

1. Turn the filter cover so the tabs on the cover line up with the cutouts in the cabinet. Now pull out the filter cover
2. Pull off the silicone hose from the back of the filter.
3. With two fingers on either side of the seat and supporting the plastic cover pull out the air filter from its seat in the cover.
4. Insert a new filter by pressing it into the filter seat. Make sure the arrow on the filter is pointing to the inside of the machine and away from the cover.
5. Reattach the silicone hose to the back of the filter.

6. Insert the filter into the machine making sure not to bend the silicone hose in a way that will restrict air flow.
7. Replace the filter cover making sure to turn the cover so the tabs lock the cover to the cabinet.

Note: Make sure that you don't bend the flexible tubing, in a way that will restrict the flow of air, when reinstalling the filter and reattaching the cover to the machine.



Note: It is recommended to replace the HEPA filter, every 6 months or after 1000 cycles (whichever is the shorter period). Surrounding conditions can make it necessary to replace the filter after a shorter interval of time.

6.31 Replacing the Pressure Transducer

6.31.1 Testing the Pressure Transducer

If after carefully calibrating the pressure and resetting the atmospheric pressure the pressure does not read correctly, change the pressure transducer.

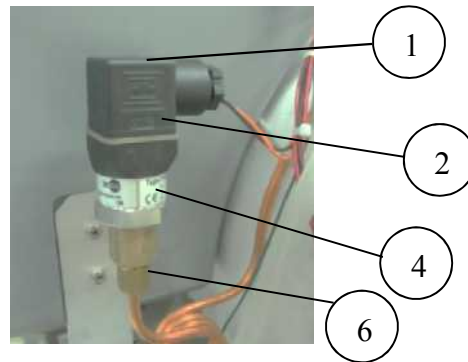
6.31.2 Replacing the Pressure transducer



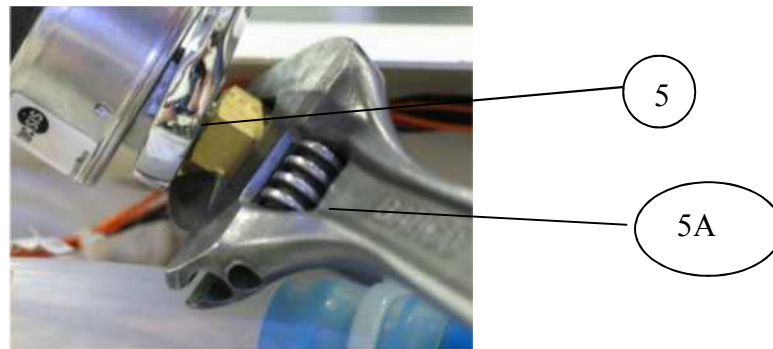
Caution!

Before proceeding, make sure that the electric cord is disconnected and there is no pressure in the autoclave.

1. Remove the outer cover of the autoclave.
2. Unscrew the screw (1).

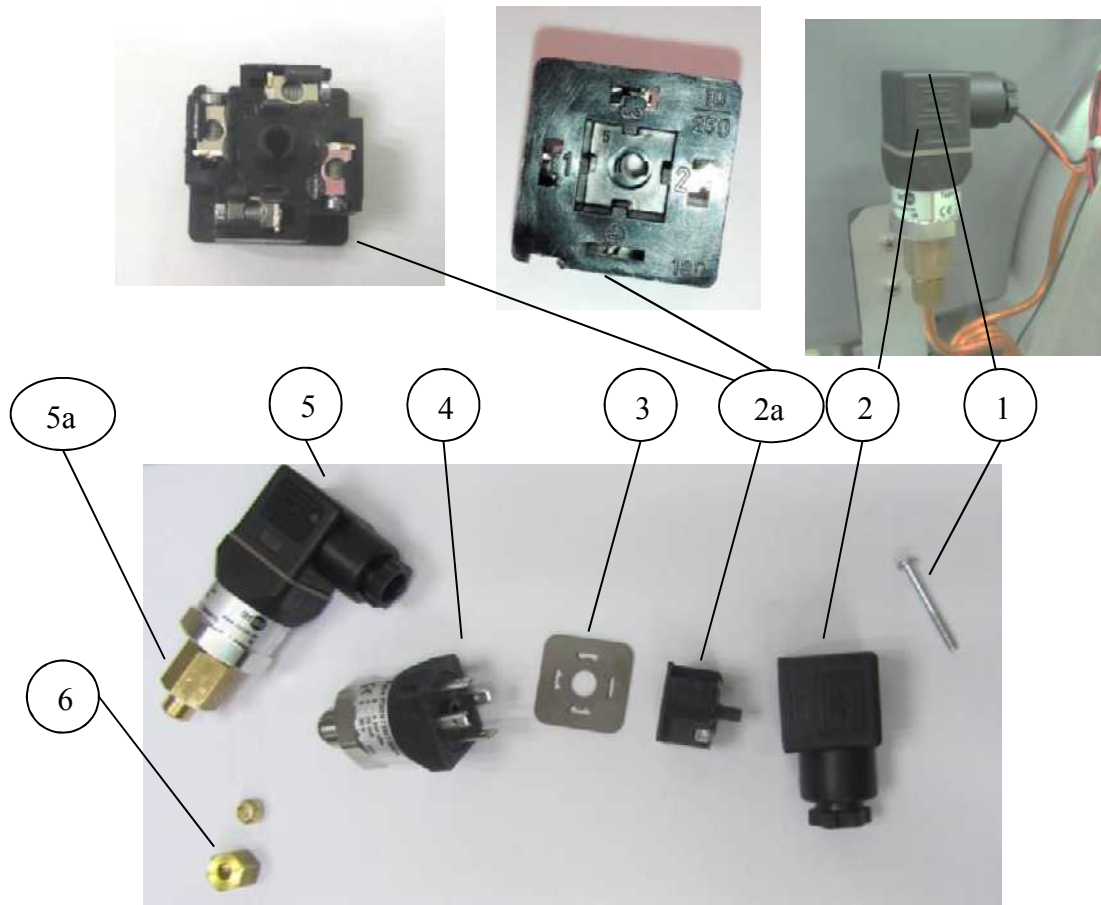


3. Lift and remove the transducer's cap (2) from the transducer (4).
4. Unscrew the compression nut (6).
5. Unscrew the faulty transducer (5) from the brass adapter (5A).



6. If the square gasket (3) remains on the transducer, remove it and install it on the new transducer.
7. Screw a new transducer (5) to the brass adapter (5A).
8. Reattach the transducer to the copper pipe using the compression nut (6)
9. The original transducer cap can be reused.
10. If the new cap is to be used then:
 - a. Release the connection block (2A) from the new cap and the original cap (2), insert a small screwdriver into the notch in the connection block (2A, right picture below) and pry the block out of the cap (2).
 - b. Make note of the wire connection on the original block and transfer them exactly to the new block.

- c. The wires will have to be removed from the original cap and inserted into the new cap.
11. Press the connection block into the transducer cap and assemble the cap to the new transducer and tighten it with screw (1).
 12. Reassemble the outer cover.



6.32 Replacing the Door Safety Microswitch

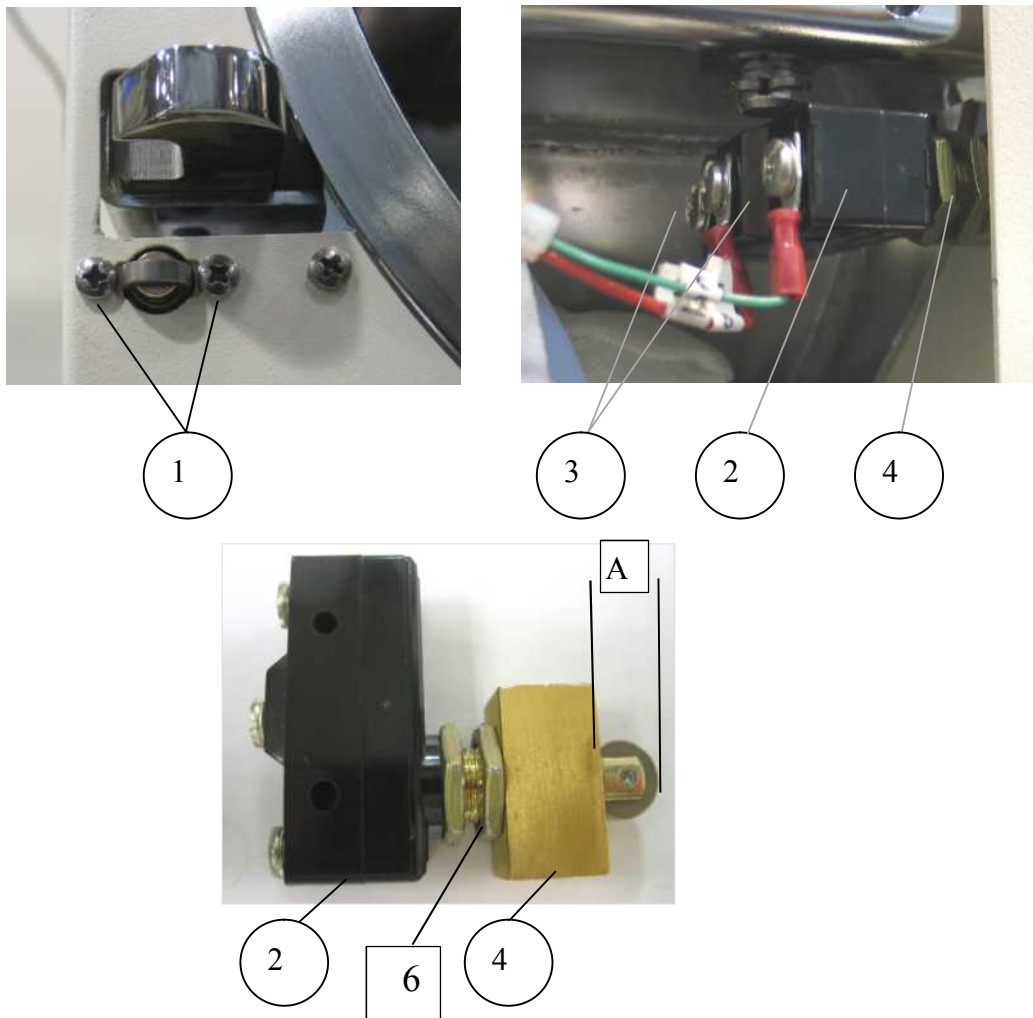


Caution!

Before starting, open the autoclave door and disconnect the instrument from the power source and verify that there is no pressure in the chamber.

Allow the autoclave to cool before removing outer covers.

1. Remove the autoclave outer cabinet (see sec 6.3)
2. Unscrew the 2 screws (1) holding the door switch adapter (4) on the front panel of the autoclave.



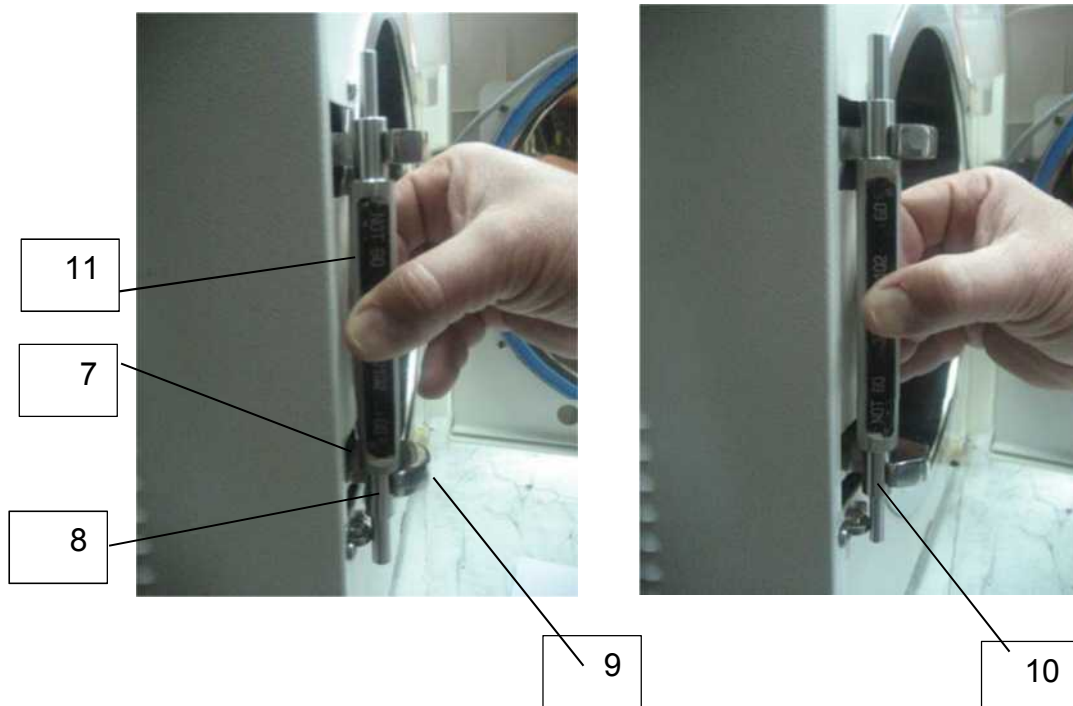
3. Disconnect the 2 wires (3) from the door switch (2).
4. Remove the door switch from the autoclave.
5. Release the nut (6) and unscrew the door switch (2) from the door switch adapter (4).
6. Assemble the new door switch to the adapter. Verify that the wheel protrudes (A) approx. 0.37"-0.38" (9.5-10mm) from the adapter (4) and tighten nut (6)
7. Reconnect the 2 wires (3) to the door switch. Verify that the green wire is connected to screw no. 1 (marked on the switch) and the red wire is connected to screw no. 3 (marked on the switch).
8. Reassemble the door switch with its adapter to the front panel. Do not completely tighten the two screws (1).

Make sure that the door switch is installed correctly (the wheel of the microswitch should be parallel to the floor)

See picture above for orientation of switch wheel with respect to the microswitch.

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 switch has not closed.



- 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.



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.

6.33 Door Locking Solenoid



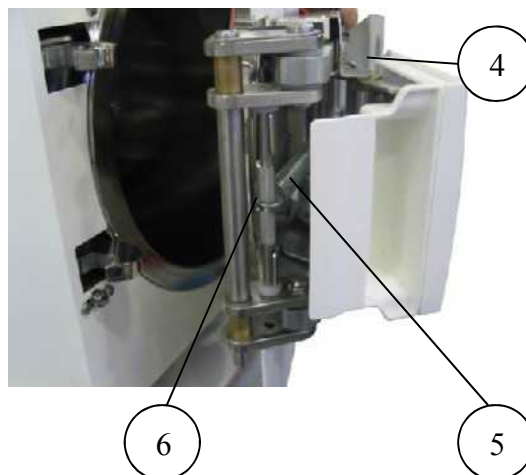
Caution!

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

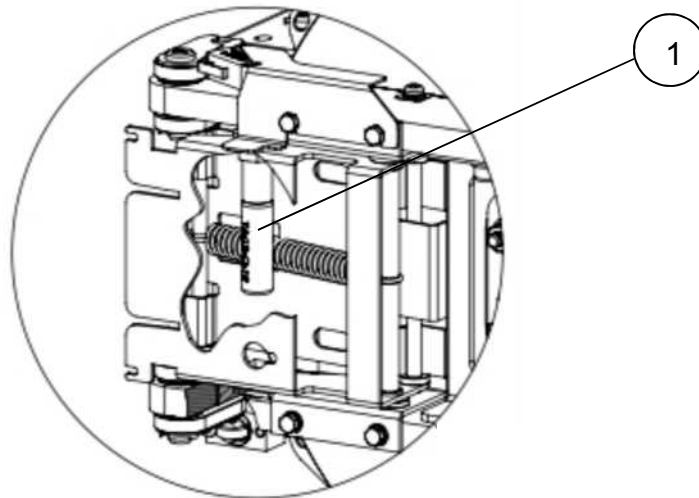
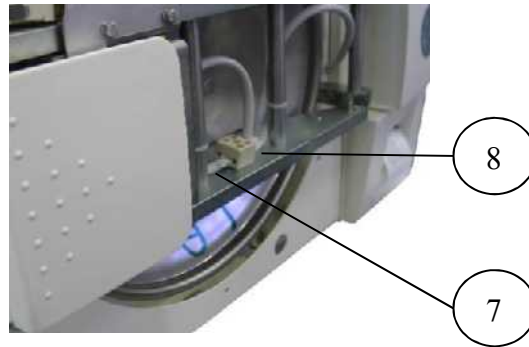
1. Insert a pin (1) into the hole (2) in the handle, pressing down the locking pin.
2. Open the door.



3. Remove the door cover (3) (see sec. 6.16).
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).

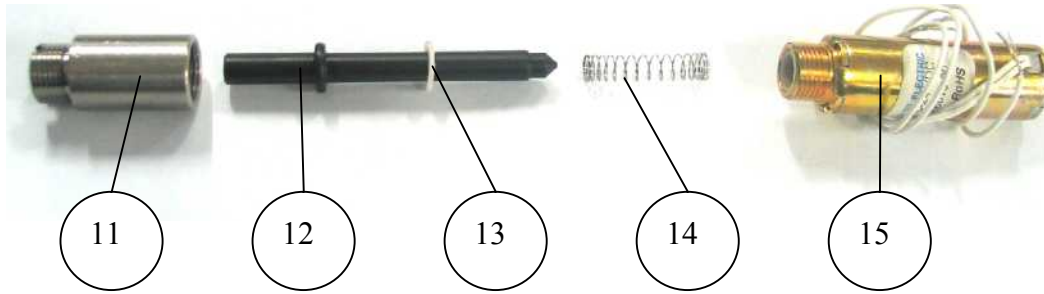


6. Disconnect the door solenoid wires (7) at the terminal block (8).



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





8. Install the replacement locking solenoid assembly LOK411-0023, which includes parts 11-15 into the door locking mechanism.
9. Tighten with the screwdriver.
10. 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
	LOK411-0023	Complete lock assembly

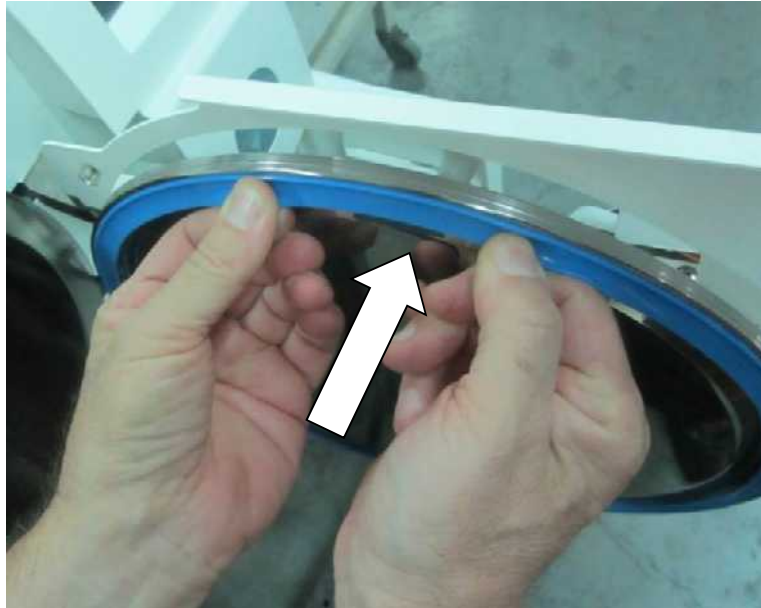
6.34 Replacing the Door Gasket



To avoid injuries replace the gasket while the autoclave and autoclave door are cold.

Pull off the gasket from the door groove and install the new gasket referring to the directions below.

1. Pull off the gasket from the groove.



2. Clean the groove of any remnants of the old gasket (use a plastic scraper and plain water as needed).



3. Line the inside of both sides/walls of the gasket groove with a small amount of silicon lubricant. This can be sprayed in or brushed in depending on the type lubricant you use. Make sure to fully coat the inside of the groove.



Note: It is necessary to use a silicone based lubricant such as Würth Silicone Lubricant or Dow Corning 111, when installing the door gasket.



Caution! If insufficient lubricant is applied - replacing the gasket will be difficult. If excess lubricant is applied, the gasket will 'spring' out of the groove.

4. Place the gasket inside the groove and press it in with a finger or a tool using one continuous movement all the way around the groove.



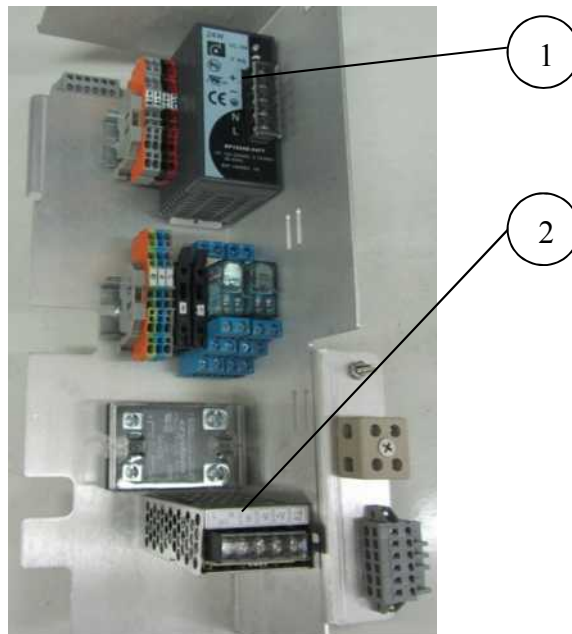
Caution!
Make sure the gasket sits evenly without waves, humps, or cavities. If the door gasket is not perfectly smooth it will not seal the chamber properly
This drawing shows the correct direction of the gasket.



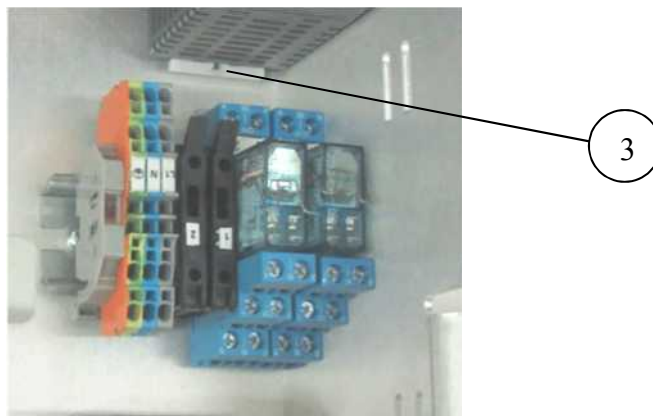
6.35 Replacing the power supplies

There are two 24 volt DC power supplies.

The logic power supply (1) is located inside and at the top of the electronic box. This power supply provides 1 amp of power to the circuit boards, door switches, electric door lock, pressure transducer and relays controlling the water, and to the air pumps and heating elements.

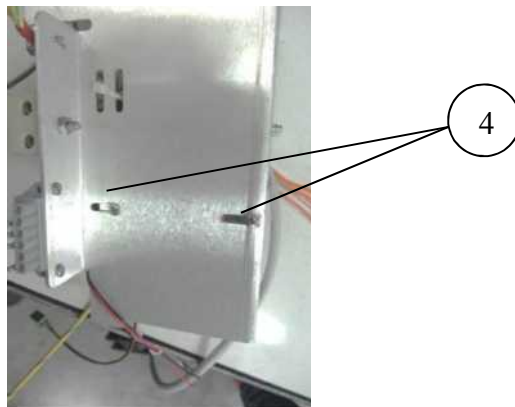


The logic supply is mounted to a rail at the top of the electronic box and is removed by disconnecting all the wires and pulling down on the white tab (3) at the back bottom of the supply (see the figure below).



The auxiliary power supply (2) provides 1.1 amps of power for the fan and printer.

The auxiliary power supply is mounted to the bottom back wall of the electronic box with two screws (4). The screws come through the back wall of the box from the outside and screw into two inserts that are part of the sidewall of the power supply.



6.36 Replacing the Fuses

There are four fuses in the unit. Two for the Toroidal Transformer, one for the water pump and one for the air pump.



Caution!

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

6.36.1 Replacing the transformer Fuses

1. Remove the outer cover. (see sec 6.3)
2. Unscrew the two halves of the fuse capsule apart (2) and (3).
3. Take out the burnt fuse and replace it with a new fuse (3).

Note: The output fuse is a standard 5A fuse and is connected to the black wire coming from the transformer.

Note: The input fuse is T1A (time delay) and connected on the one side to the brown/white wire connected to the transformer. On the other it is connected to the brown wire going to the On/Off switch at the front of the machine.

4. Reassemble the fuse holder.
5. Replace the wire tie cable holder.

Note: It is important to make sure the fuse holder is secured and not loose. Vibration from the machine operation can cause the fuse holder to vibrate and create an intermittent connect with the fuse. This will cause the cycle to fail.

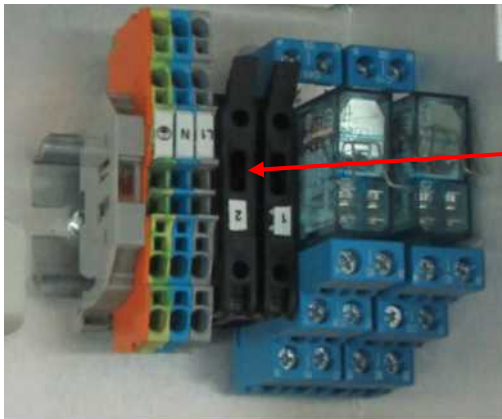
6. Re-assemble the covers.



6.36.2 Replacing the water and air pump fuses

Open the fuse holder by pressing down on the tab and then snapping the holder out of base. See pictures below.

1. Replace the water pump 2A fuse #1 (R1)
2. Replace the air pump 2A fuse #2 (R2)

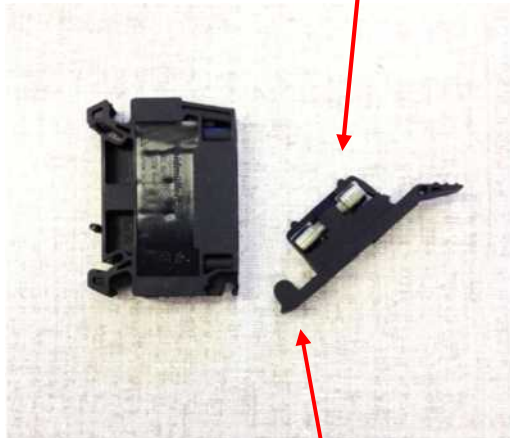


Fuse holders for Air and Water pumps. Fuse #1 is to the right and fuse #2 is to the left.

Press down on the top tab and the fuse holder will swing out.



Fuse holder and fuse. The fuse is in a pull out holder.



The fuse holder rotates out on the bottom hinge and can be snapped out of the holder.

6.37 Testing and Replacing the Solid State Relay (SSR)



Caution!

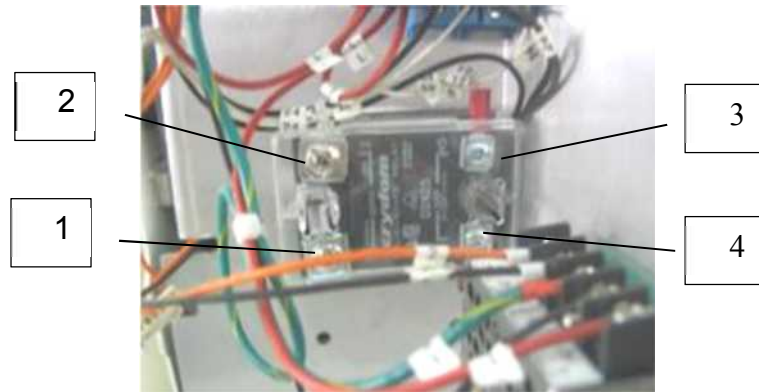
**Before starting, disconnect the instrument from the power source.
Allow the autoclave to cool before removing outer covers.**

6.37.1 Testing the SSR

1. Remove the protective plastic shield from the SSR
2. Label and then remove the four wires connected to the SSR.
3. Using an ohmmeter, check for a short circuit between terminals 3 & 4 and 1 & 2 and 3 & 1 and 4 & 2 and 3 & 2 and 4 & 1. Make sure there are no direct shorts. If a direct short is found in the SSR, replace it
4. Next, using an ohmmeter, check for an open between terminals 1 & 2. Be sure to reverse the meter leads and check in the opposite direction.
5. Repeat the procedure for terminals 3 & 4. If an open is found, replace the SSR

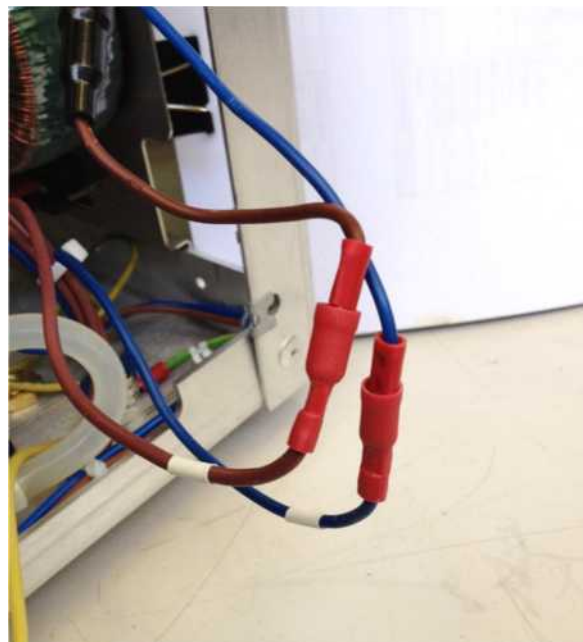
6.37.2 Replacing the SSR

1. Remove the Front Panel
2. Remove the protective plastic shield from the SSR
3. Disconnect the AC from the larger terminals 1 & 2 and DC from the smaller terminals 3 & 4 connectors.
4. Unscrew the screws connecting the SSR to the control system base (2).
5. Disassemble the SSR from the base.
6. Apply a thin coating of heat transfer compound to the new SSR. Failure to apply the heat transfer compound will result in the SSR overheating and burning out.
7. Replace the SSR with the new one. Using the screws removed previously, screw it to the control system base.
8. Reconnect the AC wires to 1 & 2 and the DC wires to 3 & 4.
9. Replace the protective cover removed previously.
10. Reinstall the Front Panel.



6.38 Replacing the Transformer

1. Cut all the wire ties holding the wire harness surrounding the transformer.
2. Disconnect the input and output wires by separating the butt connectors



3. Unscrew the nut and bolt in the center (1) that mounts the transformer to the mounting bracket.



4. Mount the replacement transformer using the nut and bolt and large plate to the mounting bracket.
5. Reconnect the butt connectors
6. Add tie wraps to secure the wire harness and the fuses.

Note: It is important to make sure the fuse holder is secured and not loose. Vibration from the machine operation can cause the fuse holder to vibrate and create an intermittent connect with the fuse. This will cause the cycle to fail.

6.39 Replacing the Water Outlet Strainer

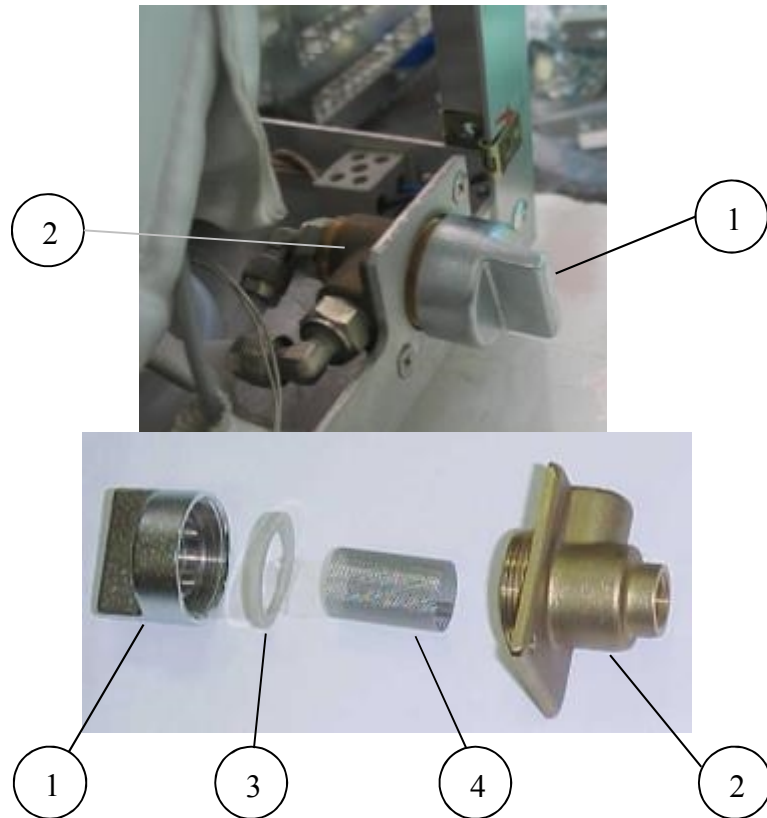


Caution!

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

1. Unscrew the water outlet strainer cap (1) from the strainer housing (2).
2. Take out the gasket (3) and the strainer element (4).
3. Replace the gasket and the strainer with the new ones.
4. Assemble the filter, close the cap.

Note: Tighten the cap with hand, but not too much. Don't use instruments like spanners, etc.



No.	Description	Cat. No.
1	Cap for 1/4" strainer	FIL175-0027
2	Strainer Housing, gasket, screen & Cap	FIL175-0053
3	Teflon gasket 4 mm	GAS082-0008
4	Strainer element	FIL175-0006

6.40 Testing and Replacing the Air Pump.



Caution!

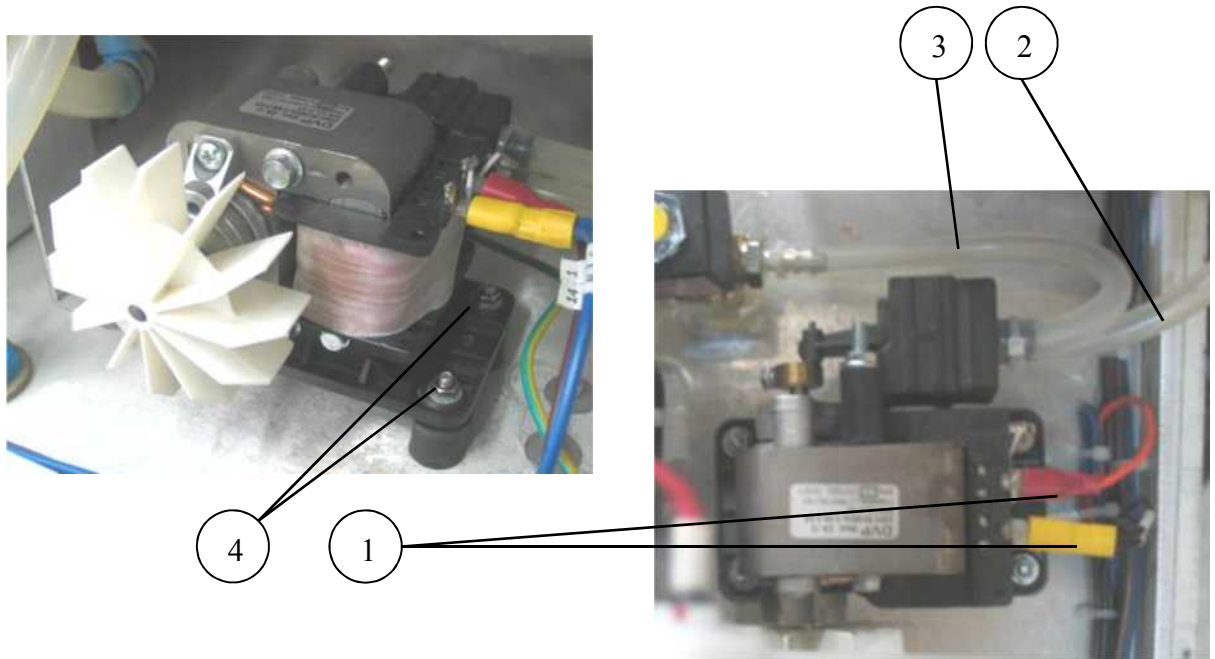
**Before starting, disconnect the instrument from the power source.
Allow the autoclave to cool before removing outer covers.**

6.40.1 Testing the Air pump

1. Turn on the air pump from the Test Digital Outputs option. (see sec 4.8.3)
2. Place a finger over the inlet tube. There should be a suction present.
3. If the pump is running and there is no suction then the pump is damaged internally and needs to be replaced.

6.40.2 Replacing the Air pump

1. Disconnect the wires (1).
2. Disconnect the air inlet (2).
3. Disconnect the output to chamber (3)
4. From under neath the autoclave unscrew the four screws (4) attaching the pump to the autoclave body.
5. Replace the pump with the new one.
6. Tighten the screws.
7. Reconnect inlets and secure with a plastic tie.
8. Reconnect wires



6.41 Fan Replacement



Caution!

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

1. Remove the outer cabinet (see sec 6.3)
2. Disconnect the fan's power wires from the power supply PS-2 (2)
3. From underneath the autoclave remove the four screws holding the fan (1).
4. Replace the fan with a new one and follow these steps in reverse to complete the replacement.



7 Troubleshooting

This troubleshooting chart enables the technician to repair the autoclave. Only technical personnel having proper qualifications and holding technical documentation (including a technician manual) and adequate information are authorized to service the apparatus. It is recommended to use the technician function: view digital output; view analog outputs; test digital output; see section 7.5 inputs outputs, in order to diagnose which part is faulty.

Symptoms	Possible causes Check-ups and tests	Corrective Action
The screen does not turn on.	1 The On Off/Circuit Breaker switch is in 'OFF' position.	1 Turn the On Off/Circuit Breaker switch to the 'On' position. (see front view drawing).
	2 The power cord is disconnected from the machine or the mains.	2 Make sure the power cord is connected properly to the machine and the mains. (see rear view drawing)
	3 The On Off/Circuit Breaker has tripped.	3 Turn off and then back on the On Off/Circuit Breaker.
	4. Power supply PS-1 is faulty	4.1. Confirm that PS-1 is receiving AC power. 4.2. Check that PS-1 is generating 24 VDC 4.3. Check for 24 VDC at J5 on the Main board 4.4. Replace the power supply PS-1.
	5. The LCD screen is faulty	5. Replace the LCD screen
	6. The Main board is faulty	6. Replace the Main board

Symptoms	Possible causes Check-ups and tests	Corrective Action
The EZPad keypad does not respond	<ol style="list-style-type: none"> 1. The keypad is not communicating with the control system 2. The key pad is not connected to the main board. 3. The key pad is faulty 4. The Main board is faulty 	<ol style="list-style-type: none"> 1.1. Power down and then restart the autoclave 2.1. Verify the keypad is connected to the Main board 3.2. Replace the keypad 4. Replace the Main board
Printer does not print	<ol style="list-style-type: none"> 1 If printer's LED is on, the printer is OK. 2 If printer's LED is off, – faulty printer or no power to the printer. 3 If printer's LED is blinking, no paper is inserted in the printer. 	<ol style="list-style-type: none"> 1.1. Check that the data cable is properly connected to the printer 1.2. Check that the data cable is connected to the Main board. 1.3. Printer paper is not thermal paper 2.1. Check that the printer power cable is connected 2.2. Check that the printer power cable is connected to the PS-2 power supply. 2.3. Verify that the power supply is outputting 24 VDC 2.4. Verify that PS-2 is receiving AC power. 2.5. Replace the printer

Symptoms	Possible causes Check-ups and tests	Corrective Action
	<p>4 The control system is not communicating with the printer.</p>	<p>2.6. Replace the Main board</p> <p>3.1. Make sure the paper roll is properly inserted in the printer.(see Printer Handling in operator's manual)</p> <p>4.1. Power down and then restart the autoclave</p> <p>4.2. Replace the printer</p> <p>4.3. Replace the Main board</p>
<p>Cannot open door</p>	<p>The power is off</p> <p>The unit has not finished running a cycle</p> <p>The Door Locking solenoid has lost power</p> <p>The Water Electrode is sensing water in the chamber</p> <p>An error message is displayed</p> <p>High temperature or pressure in exhaust</p>	<p>Turn on the machine and wait for the system to boot.</p> <p>Wait for the cycle to finish, including the drying portion.</p> <p>3.1 Check that J13-4 is outputting 24vdc</p> <p>3.2 Check for a broken wire at the terminal block behind the plastic door cover.</p> <p>4.1 See water left in the chamber</p> <p>4.2 Tray holder, tray or instrument is touching the chamber water electrode giving a false reading</p> <p>5. Press the Start/Stop key to clear the error message.</p> <p>6.1 Wait for temperature or pressure to return to normal levels</p> <p>6.2 Open safety valve to relieve pressure</p> <p>6.3 Unit needs calibration</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
<p>Water left in the chamber</p>	<p>Cycle stopped before pressure could build</p> <p>Top Exhaust fitting in reservoir is pointed down</p> <p>Chamber is overloaded causing poor exhaust</p> <p>Fast Exhaust valve failed to open</p> <p>Water electrode is dirty and shorting to the chamber</p> <p>Reservoir is overfilled</p>	<p>1.1 Run another cycle to allow exhaust to clear water</p> <p>1.2. Don't stop the cycle prematurely</p> <p>1.3. Under the technician's code go to Test Digital outputs. Close the Slow and Fast Exhaust, turn on the air pump for 30 seconds, turn off the air pump and open the Fast Exhaust to clear the water.</p> <p>2. Reposition the fitting so it is pointing horizontally</p> <p>3. Reduce the size of the load and restart the cycle.</p> <p>4.1. Check the input and output fuse for the toroidal transformer.</p> <p>4.2. Check that J14-8 is outputting 18vac</p> <p>4.3. Check that the Fast exhaust valve is receiving 18vac</p> <p>4.4. Check the Fast exhaust plunger is free to move.</p> <p>4.5. Check that the JP3 connector is not loose.</p> <p>5. Clean the water electrode</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
		6. Drain off excess water using the front drain
Pouches are wet	<p>Chamber is overloaded causing poor drying Dry time is not long enough HEPA filter is clogged</p> <p>Air pump is not running</p> <p>Air pump is running but not sucking air</p> <p>Air pump solenoid is not opening</p> <p>Top slow exhaust solenoid is not opening</p>	1. Reduce the size of the load 2. Add drying time 3. Replace the HEPA filter 4.1. Check for a blown fuse 4.2. Check for a loose JP3 connector 4.3. Check for a bad relay 4.4. Control voltage to relay is missing 4.5. Replace the pump 5.1. Hose to HEPA filter is bent restricting air 5.2. HEPA filter is clogged 5.3. Pump is damaged internally, replace pump 6.1. Check control voltage to solenoid 6.2. Check of blown input or output fuse at Toroidal transformer. 6.3. Check for voltage or bad connection at the solenoid 6.4. Check for a loose JP3 connector 7.1. Check control voltage to solenoid 7.2. Check of blown input or output fuse at Toroidal transformer. 7.3. Check for voltage or bad connection at the solenoid

Symptoms	Possible causes Check-ups and tests	Corrective Action
		7.4. Check for a loose JP3 connector
Cassettes are wet	Drying stage is not long enough Cassettes are loaded incorrectly	1. Use the Quick Options menu to add drying time 2.1. EZ11Plus cassettes need to be vertical, rotate rack 90 degrees 2.2. EZ9Plus the cassettes need to be horizontal
Door gasket makes a crackling sound	The door gasket is dirty.	Clean the door gasket. (see Daily Maintenance in Operator's manual).
Water under the unit	1. The reservoir has been over filled. 2.the water filter may be leaking Check for other internal leaks.	1. Use the drain hose to reduce the amount of water in the reservoir. Don't fill any higher than the blue level on the fill funnel. 2.1. The filter may have been overtightened causing the plastic thread to slip. Unscrew and retighten ¼ of a turn after the o-ring makes contact. 2.2. The filter tubing may have been twisted causing the filter to unscrew. Pre-wind the tubing before screwing the filter together. 3. Tighten loose fittings or replace damaged tubing.
Cannot down load history	USB drive is not recognized	Use a USB that is FAT formatted.

Symptoms	Possible causes Check-ups and tests	Corrective Action
Steam leaks around the door gasket	<ol style="list-style-type: none"> 1. The door gasket is dirty. 2. There are cuts or nicks in the gasket. 3. The gasket is not smooth 	<ol style="list-style-type: none"> 1. Clean the door gasket 2.1. Replace the door gasket 3.1. Smooth the gasket so that there are NO lumps 3.2. Remove and reinstall using silicone lubricant 3.3. Replace the gasket.
The safety valve does not release pressure when blow-off test is performed.	<ol style="list-style-type: none"> 1. Check for a blockage in the tubing to the safety valve 2. Safety relief valve is faulty 	<ol style="list-style-type: none"> 1. Remove the blockage 2. Replace the faulty valve.
Safety relief valve opens at pressure lower than specified.	Safety relief valve is faulty.	Replace relief valve
Safety relief valve opens at pressure higher (more than 10%) than specified.	<ol style="list-style-type: none"> 1. Check for a blockage in the tubing to the safety valve 2. Safety relief valve is faulty. 	<ol style="list-style-type: none"> 1. Remove the blockage 2. Replace relief valve

Symptoms	Possible causes Check-ups and tests	Corrective Action
Safety relief valve does not close in time (up to 10 seconds).	Safety relief valve is faulty.	Replace relief valve
Safety relief valve leaks constantly.	Safety relief valve is faulty.	Replace relief valve and check the water quality for a high mineral or debris content.
Pressure releases too slowly	1.Exhaust tubing is clogged 2.Exhaust valve is faulty.	1. Remove clog 2.1. Check for a worn seat on the plunger 2.2. Replace exhaust valve plunger.
Chamber does not fill with enough water	The chamber water electrode is dirty The top slow exhaust valve is not opening The water filter is clogged The water pump is clogged No water in the reservoir. The reservoir water electrode is dirty and shorted The reservoir water electrode wire is disconnected The water fill solenoid is not opening The water pump is weak	1. Clean the water electrode in the chamber 2.1. Check that the valve is receiving power 2.2. Check that the plunger is free to move 3. check and clean the water filter. 4. Clean debris out of the pump or replace 5.a. Clean the water electrode in the reservoir 5.b. Reconnect the wire 6.1. Check the water inlet solenoid is receiving power 6.2. Check that the plunger is free to move. 7. Replace the water pump

Symptoms	Possible causes Check-ups and tests	Corrective Action
Unit will not calibrate	1. Atmospheric pressure is not set 2. The temperature or pressure sensor is faulty 3. the I/O board is faulty	1. Reset the atmospheric pressure 2. Replace the temperature or pressure sensor. 3. Replace the I/O board.
Water or air pump not running	Fuse is blown JP1 is loose or disconnected	Replace the fuse in the electronic box Reconnect the JP1 connector
Menu item / option does not appear on the screen	1. Autoclave is still running a cycle 2. Option is not available for the cycle selected.	1. Wait for cycle to complete or press stop 2. Select a different cycle.
Failure messages		
High temp. (ending)	<p>This message is displayed if during the 'Ending' stage the chamber temperature does not go below the temperature defined in the parameter 'End Temperature' within the time defined in the parameter 'Normal Temperature Timeout'</p> <p>Possible causes:</p> 1. The temperature is not calibrated correctly 2. Atmospheric pressure is not set 3. Temperature sensor is faulty	1. Calibrate the unit 2. Reset the atmospheric pressure 3.1. Check that the temperature sensor is connected properly 3.2. Replace the temperature sensor

Symptoms	Possible causes Check-ups and tests	Corrective Action
	<p>4. Heater has a high resistance short to ground</p> <p>5.Exhaust valve does not open due to mechanical or electrical malfunction</p>	<p>4. Take a resistance reading between the heaters and ground. Replace the faulty heater.</p> <p>5.1. Check that the exhaust valve is energized</p> <p>5.2. Check that the valve plunger is free to move inside the sleeve</p> <p>5.3. Check that the valve is receiving power</p> <p>5.4. Check that the I/O board is turning the valve on</p> <p>5.5. Check for a blown fuse at the Toroidal transformer</p> <p>5.6. Check for a loose JP3 connector</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
<p>High pressure (ending or exhaust)</p>	<p>This message will be displayed if during the 'Ending' or "Exhaust" stage the chamber pressure does not go below the atmospheric pressure + 5 kPa within the time defined in the parameter 'Normal Pressure Timeout'.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> 1.The pressure is not calibrated correctly 2. Atmospheric pressure is not set 3.Pressure sensor is faulty 4. Heater has a high resistance short to ground 5.Exhaust valve does not open due to mechanical or electrical malfunction 	<p>First, perform a new cycle. If the problem persists:</p> <ol style="list-style-type: none"> 1. Calibrate the unit 2. Reset the atmospheric pressure 3.1. Check that the pressure sensor is connected properly 3.2. Replace the pressure sensor 4. Take a resistance reading between the heaters and ground. Replace the faulty heater. 5.1. Check that the exhaust valve is energized 5.2. Check that the valve plunger is free to move inside the sleeve 5.3. Check that the valve is receiving power 5.4. Check that the I/O board is turning the valve on 5.5. Check for a blown fuse at the Toroidal transformer 5.6. Check for a loose JP3 connector

Symptoms	Possible causes Check-ups and tests	Corrective Action
<p>High pressure (dry)</p>	<p>This message will be displayed if during the “Drying” stage the chamber pressure does not go below the atmospheric pressure + 5 kPa within the time defined in the parameter 'Normal Pressure Timeout'.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> 1.The pressure is not calibrated correctly 2. Atmospheric pressure is not set 3.Pressure sensor is faulty 4. Heater has a high resistance short to ground 5.Exhaust valve does not open due to mechanical or electrical malfunction 	<p>First, perform a new cycle. If the problem persists:</p> <ol style="list-style-type: none"> 1. Calibrate the unit 2. Reset the atmospheric pressure 3.1. Check that the pressure sensor is connected properly 3.2. Replace the pressure sensor 4. Take a resistance reading between the heaters and ground. Replace the faulty heater. 5.1. Check that the exhaust valve is energized 5.2. Check that the valve plunger is free to move inside the sleeve 5.3. Check that the valve is receiving power 5.4. Check that the I/O board is turning the valve on 5.5. Check for a blown fuse at the Toroidal transformer 5.6. Check for a loose JP3 connector

Symptoms	Possible causes Check-ups and tests	Corrective Action
<p>Time error</p>	<p>This message is displayed if the difference between the two internal clocks, at the end of the sterilization stage, is more than 4 seconds.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> 1.the date and time have not been set 2.the backup battery is bad 3.the main board is faulty 	<p>First, perform a new cycle. If the problem persists:</p> <ol style="list-style-type: none"> 1. Set the date and time 2. Replace the backup battery on the main board 3. Replace the main board
<p>High temp</p>	<p>This message will be displayed if during the 'Sterilization' stage, the chamber temperature goes above the value defined in parameter 'Sterilization Temperature' + value of parameter 'Sterilization temperature Range'.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> 1.The temperature is not calibrated correctly 2. Atmospheric pressure is not set 3.temperature sensor is faulty 4.the pressure sensor is faulty 5.the SSR is faulty keeping the heaters on 6.the I/O board is faulty keeping the heater SSR on 7, Heater has a high resistance short to ground. 	<p>First, perform a new cycle. If the problem persists:</p> <ol style="list-style-type: none"> 1. calibrate the temperature 2. manually reset the Atmospheric pressure 3. replace the temperature sensor 4. replace the pressure sensor 5. replace the faulty SSR 6. replace the faulty I/O board 7. replace the shorted heater

Symptoms	Possible causes Check-ups and tests	Corrective Action
Low Temp	<p>This message will be displayed, if during the 'Sterilization' stage, the temperature drops below the sterilization temperature for more than 1 second</p> <p>Possible causes:</p> <p>Door gasket is leaking. Chamber is overloaded Water pump is faulty not pumping enough water The Top Exhaust valve is not opening</p> <p>A solenoid valve is leaking</p> <p>Safety valve is leaking Temperature and pressure not calibrated properly. Faulty temperature or pressure sensors. Temperature Safety Thermostat opening prematurely</p>	<p>First, perform a new cycle (make sure not to overload the chamber). If the problem persists:</p> <p>Clean or Replace the door gasket. Remove some material from the chamber Replace the water pump Check that the Top Exhaust valve has power and the plunger is free to move. Check all valves are functional and the plunger seats and base seats are in good condition and there is no dirt or debris stopping the plunger from seating Replace the safety valve Calibrate unit. Replace faulty temperature or pressure sensor Replace faulty temperature safety thermostat</p>
High pressure	<p>This message will be displayed if during the 'Sterilization' stage, the chamber pressure goes above the value of 'Sterilization Pressure' plus the value of parameter 'Sterilization pressure Range'. The 'Sterilization Pressure' value is calculated according to parameter 'Sterilization Temperature'</p>	

Symptoms	Possible causes Check-ups and tests	Corrective Action
	<p>using a predefined lookup table.</p> <p>Possible causes:</p> <p>The pressure is not calibrated correctly Atmospheric pressure is not set temperature sensor is faulty the pressure sensor is faulty the SSR is faulty keeping the heaters on the I/O board is faulty keeping the heater SSR on Heater has a high resistance short to ground.</p>	<p>calibrate the pressure manually reset the Atmospheric pressure replace the temperature sensor replace the pressure sensor replace the faulty SSR replace the faulty I/O board replace the shorted heater</p>
<p>Low pressure</p>	<p>This message will be displayed if during the 'Sterilization' stage, the chamber pressure goes below the value of 'Sterilization Pressure'. The 'Sterilization Pressure' value is calculated according to parameter 'Sterilization Temperature' using a predefined lookup table.</p> <p>Possible causes:</p> <p>Door gasket is leaking. Chamber is overloaded Water pump is faulty not pumping enough water The Top Exhaust valve is not opening</p>	<p>Clean or Replace the door gasket. Remove some material from the chamber Replace the water pump Check that the Top Exhaust valve has power and the plunger is free to move.</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
	<p>A solenoid valve is leaking</p> <p>Safety valve is leaking</p> <p>Temperature and pressure not calibrated properly.</p> <p>Faulty temperature or pressure sensors.</p> <p>Temperature Safety Thermostat opening prematurely</p> <p>Leakage in the piping</p>	<p>Check all valves are functional and the plunger seats and base seats are in good condition and there is no dirt or debris stopping the plunger from seating</p> <p>Replace the safety valve</p> <p>Calibrate unit.</p> <p>Replace faulty temperature or pressure sensor</p> <p>Replace faulty temperature safety thermostat</p> <p>Find and replace the leaking pipes.</p>
<p>Heat time error/ Heat time error (keep)</p>	<p>This message will be displayed if during the 'Heat' stage, chamber temperature has not reached the requested temperature (defined by cycle parameter 'Sterilization Temperature') after X minutes as defined in parameter 'Heat Time Error'</p> <p>Possible causes:</p> <p>Door gasket is leaking.</p> <p>Chamber is overloaded</p> <p>Faulty heating element</p> <p>Faulty calibration of temperature and pressure sensors.</p> <p>Faulty temperature or pressure sensors.</p>	<p>Clean or Replace the door gasket.</p> <p>Remove some material from the chamber</p> <p>Replace the faulty heater</p> <p>Calibrate the unit</p> <p>Replace the faulty sensor</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
Pressure time error	<p>Chamber pressure has not reached the requested high pressure after the time defined by cycle parameter 'Pressure Time Error'</p> <p>Possible causes:</p> <p>Door gasket is leaking. Chamber is overloaded Faulty heating element Faulty SSR Faulty I/O board Water pump is faulty not pumping enough water The Top Exhaust valve is not opening</p> <p>A solenoid valve is leaking</p> <p>Safety valve is leaking Temperature and pressure not calibrated properly. Faulty temperature or pressure sensors. Temperature Safety Thermostat opening prematurely Leakage in the piping</p>	<p>If the problem persists, replace the door gasket.</p> <p>Clean or Replace the door gasket. Remove some material from the chamber Replace the faulty heater Replace SSR Replace the I/O board Replace the water pump Check that the Top Exhaust valve has power and the plunger is free to move. Check all valves are functional and the plunger seats and base seats are in good condition and there is no dirt or debris stopping the plunger from seating</p> <p>Replace the safety valve Calibrate unit. Replace faulty temperature or pressure sensor Replace faulty temperature safety thermostat</p> <p>Find and replace the leaking pipes.</p> <p>Replace the input or output fuse whichever is</p>

Symptoms	Possible causes Check-ups and tests	Corrective Action
	Blown fuse at the toroidal transformer	blown
No water	<p>The 'No Water' parameter defines the maximum time to wait for water to be detected in the chamber. If no water detected in the chamber (during water filling stage) after the time defined by the parameter, a 'No Water' error will be displayed and the cycle will fail.</p> <p>Possible causes:</p> <p>No water in the reservoir. The water electrode is dirty and shorted The water electrode wire is disconnected</p> <p>Water filter clogged Water pump does not pump water</p> <p>The water inlet solenoid is not opening</p>	<p>1.a.Clean the water electrode in the reservoir 1.b.Reconnect the loose or broken wire</p> <p>2.check and clean the water filter. 3.1.Check the water pump fuse 3.2.Confirm the pump is receiving line voltage 3.3.Check the pump relay is functioning 4.1.Check the water inlet solenoid is receiving power 4.2.Check that the plunger is free to move.</p>
Power down	Power down has occurred during the cycle.	If it happened before or during the sterilization stage the cycle will fail and a yellow error message will be displayed. The load is not sterile and the cycle should be run again.

Symptoms	Possible causes Check-ups and tests	Corrective Action
I/O card failed	<p>The I/O card (connected to the main through RS232 connector) is not responding.</p> <p>Possible causes:</p> <p>Communication was lost between I/O board and Main board</p> <p>Loose or bad ribbon cable connection between I/O board and Main board.</p> <p>I/O card is bad</p>	<p>If power down happened after the sterilization stage the cycle will fail with a white error message. The load is sterile but may not be completely dry.</p> <p>1.1.Turn off then restart the system</p> <p>2.1.Check the connections are tight 2.2.Check the ribbon cable is not damaged or worn 2.3.Spray with contact cleaner to remove corrosion</p> <p>3.Restarting the system does not solve the problem - Replace the I/O card</p>
Analog input error	<p>1.Temperature sensor has no reading</p> <p>2.Pressure sensor has no reading</p>	<p>1.1.check the temperature sensor is connected to J2 on the I/O board 1.2. Machine is below 40°F 1.3.I/O board is bad</p> <p>2.1. Check the pressure sensor is connected to J7-1 on the I/O board. 2.2.Check that the JP3 connector is properly connected</p>


Symptoms	Possible causes Check-ups and tests	Corrective Action
		2.3. Check that the pressure sensor is receiving +24vdc from PS-1. 2.4. Check the output of the pressure sensor – replace the sensor of no output.
Door is open	During the cycle the door switch indicates that the door is open. Possible causes: 1. Lower door switch not adjusted correctly 2. Door switch is broken 3. Door switch wire is broken	There are two door switches, an upper and a lower. 1. Using the Go-No Go tool adjust the lower door switch 2. Replace the broken door switch 3.1. Check for +24vdc going to the door switch from PS-1 3.2. Check the door switch is connected to J12-1 3.3. Check for continuity in the door switch circuit.
Oscillator Fail	1. Date and time not set 2. Battery low or bad 3. Main board defective	1. Set date and time, even if date and time are correct 2. Allow time for the battery to charge or replace battery 3. Replace main board.
Low Battery	1. Machine has been left off for a long time 2. Battery is bad	1. Turn on the machine and allow time for the battery to charge 2. Replace battery

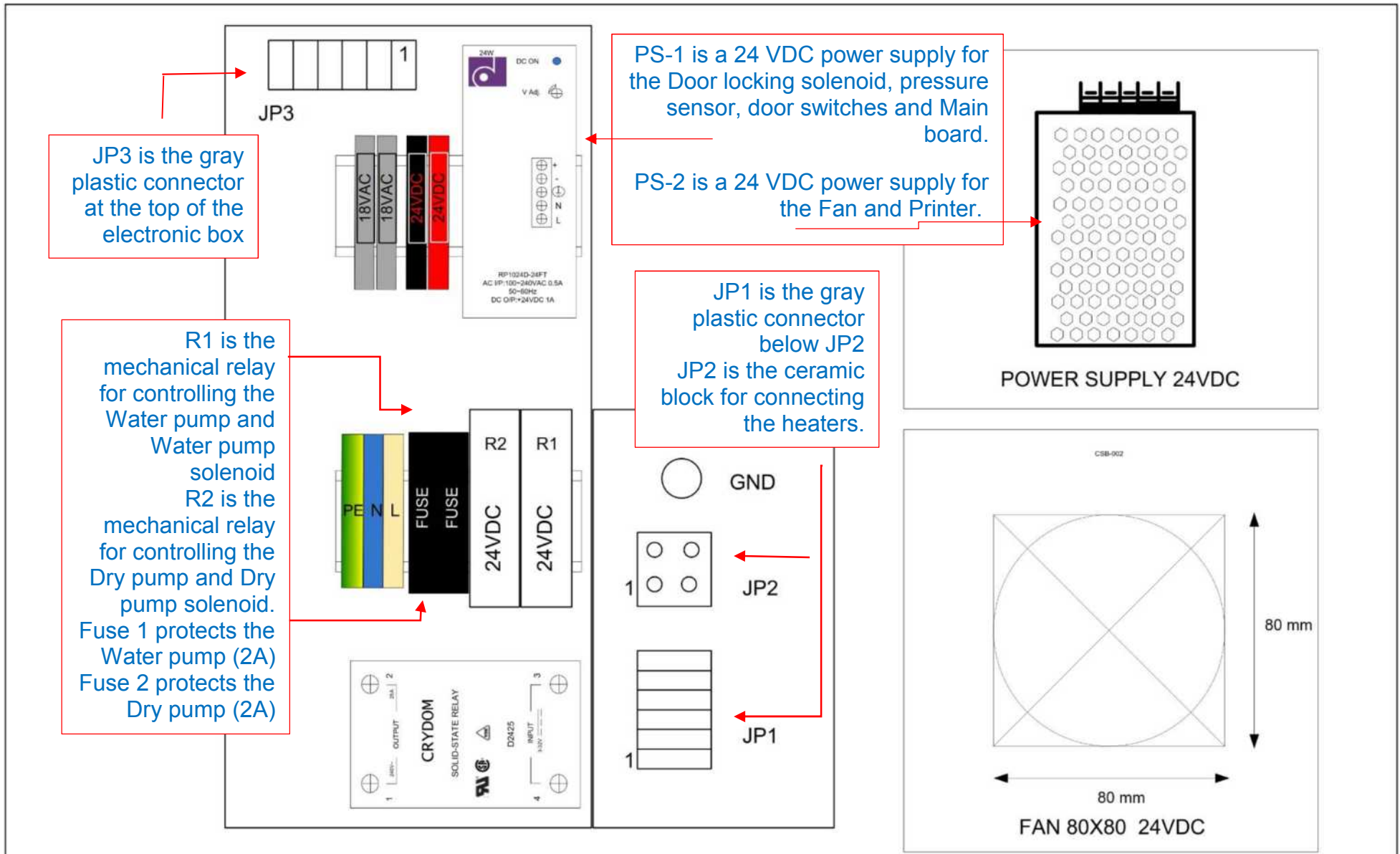
8 Electrical Diagram

List of Drawings for autoclave model EZ9, EZ11 and EZ11K with Tuttnauer control system

No.	Drawing No.	Description	Rev.	Quantity
1	ES1T01-0001	List of Drawings for autoclave model EZ9, EZ11 and EZ11K with Tuttnauer control system	02	1
2	ES1T01-0001	Electrical layout for autoclave models EZ9, EZ11 and EZ11K with Tuttnauer control system	02	1
3	ES1T01-0001	Autoclave model EZ11K electrical drawing high voltage 220V AC, 10A , 50/60Hz	02	1
4	ES1T01-0001	Schematic I/O & MAIN Boards Tuttnauer control system	02	1
5	ES1T01-0001	EZ9, EZ11 and EZ11K - ANALOG INPUTS Tuttnauer control system	02	1
6	ES1T01-0001	EZ9, EZ11 and EZ11K - ANALOG OUTPUTS Tuttnauer control system	02	1
7	ES1T01-0001	EZ9, EZ11 and EZ11K - DIGITAL INPUTS Tuttnauer control system	02	1
8	ES1T01-0001	EZ9, EZ11 and EZ11K - DIGITAL OUTPUTS Tuttnauer control system	02	1

Prepared By:	Description	Date	Rev. No	ECO
Yan S.	Change connection Jp13/3 to Relay 2/24	14.03.2012	01	

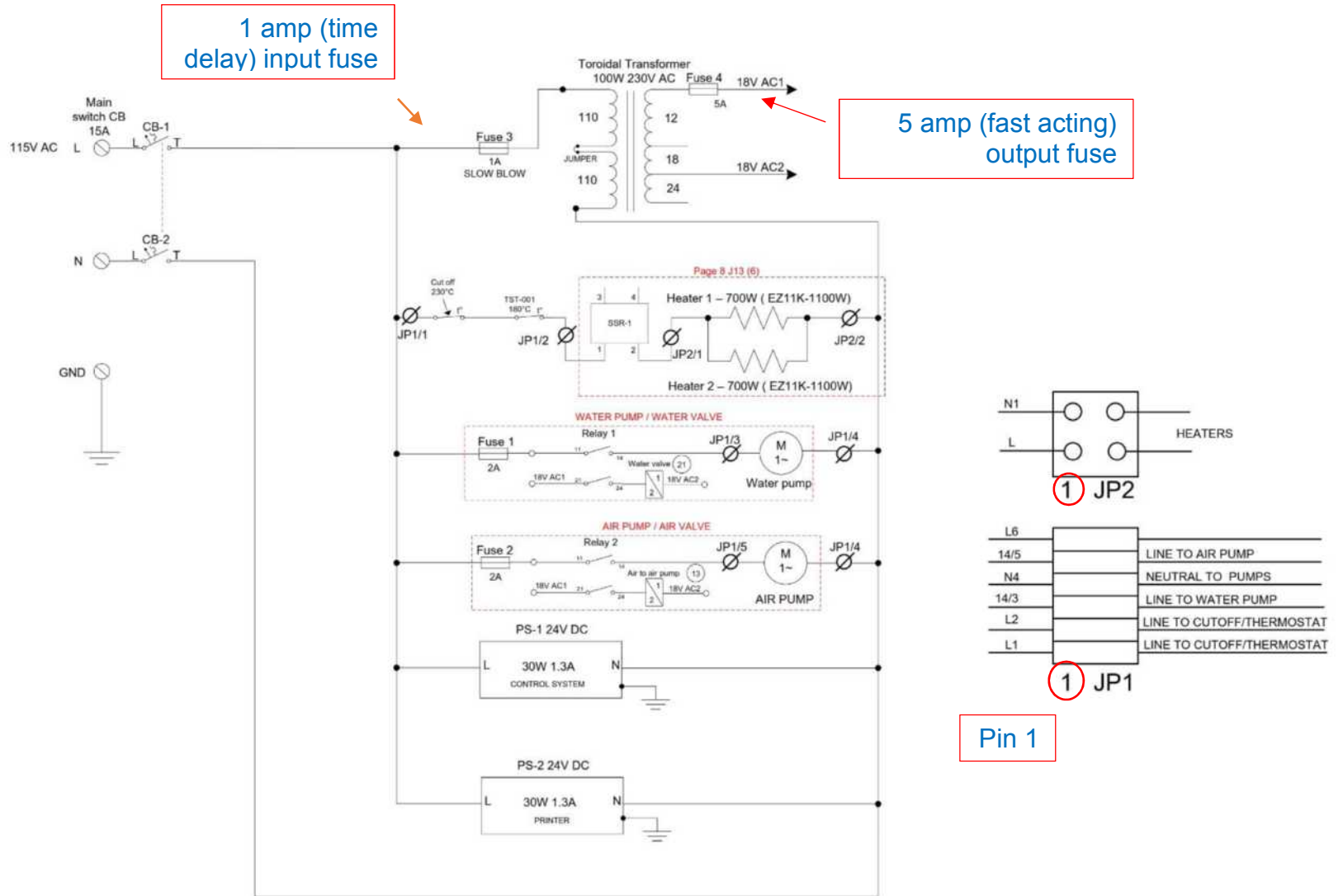
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		Page 1	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:
		From 8	REV. No. 02	Approved by: Yuval S. 26.06.2014	Q. C.	



Preparation By:	Description	Date	Rev. No	ECO

TUTTNAUER	Description: Electrical layout for autoclave models EZ9, EZ11 and EZ11K with Tuttnauer control system		Job No.	Scale:	Drawing No. ES1T01-0001
	Page 2	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Cat. No.
From 8	REV. No. 02	Approved by: Yuval S. 26.06.2014			Q. C.

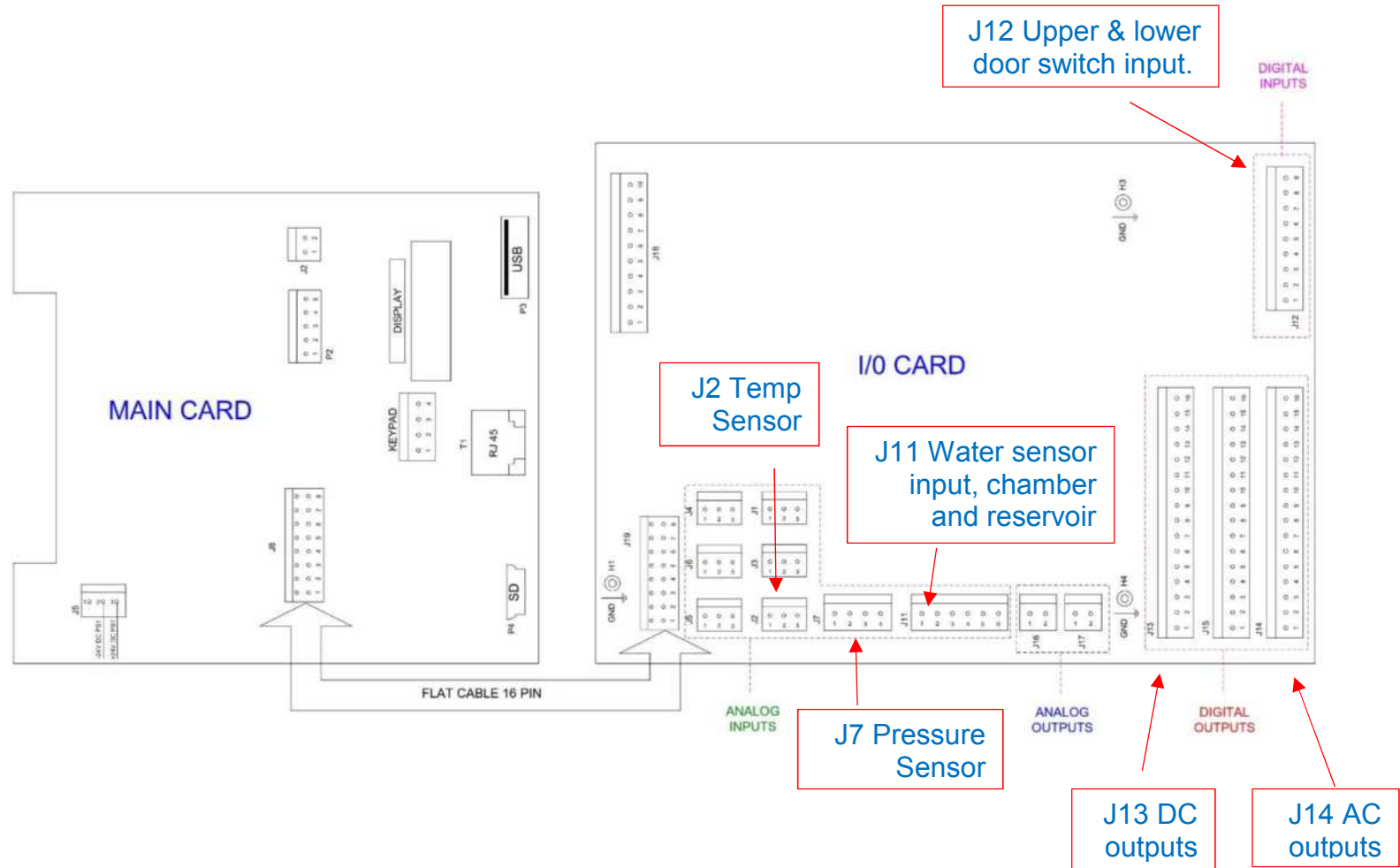




Prepared By:	Description	Date	Rev. No	ECO

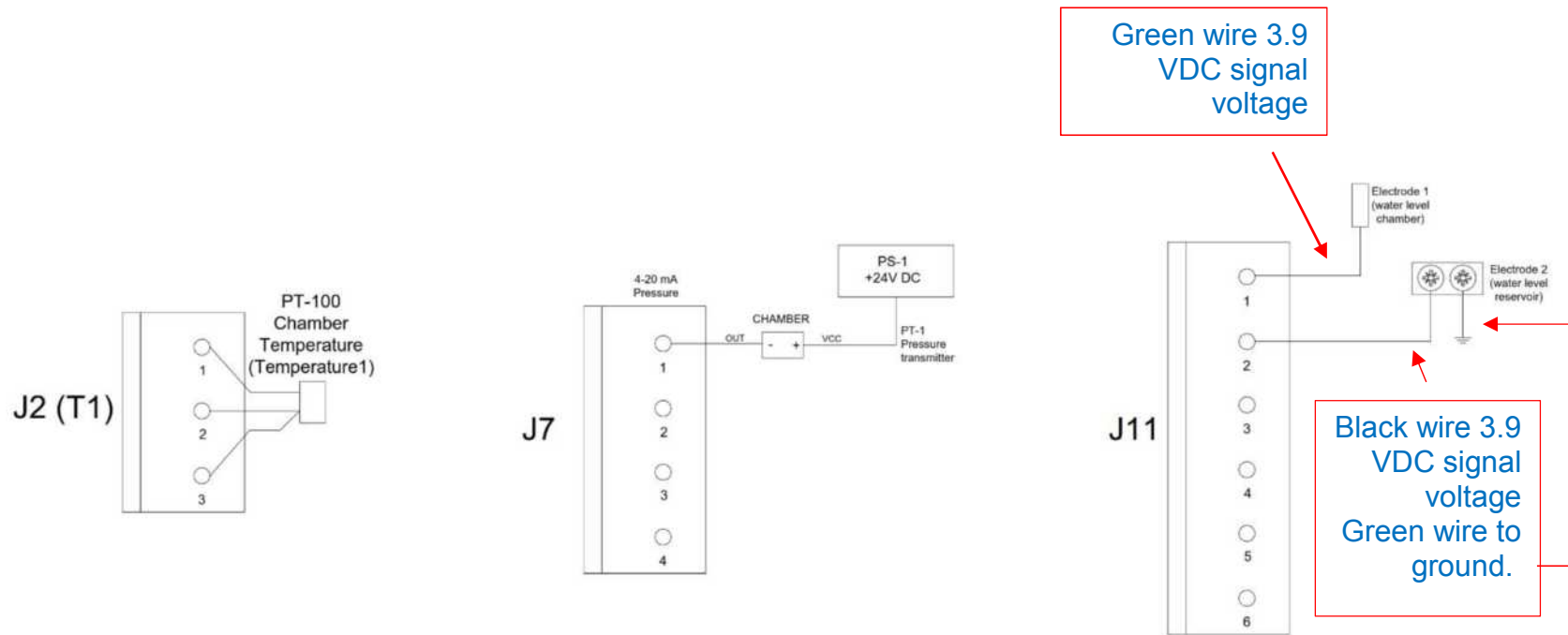
TUTTNAUER 	Description: Autoclave model EZ11K electrical drawing high voltage 230V AC , 10A , 60Hz		Job No.	Scale:	Drawing No. ES1T01-0001
	Page 3	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:
	From 8	Rev. No. 02	Approved by: Yuval S. 26.06.2014	Cat. No. Q. C.	

Main board and I/O board connectors



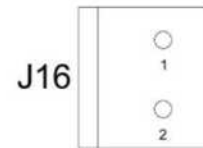
Prepared By:	Description	Date	Rev. No	ECO

TUTTNAUER	Description: Schematic I/O & MAIN Boards Tuttinauer control system		Job No.	Scale:	Drawing No. ES1T01-0001
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	From 8	REV. No. 02	Approved by: Yuval S. 26.06.2014	Q. C.	Cat. No.



Prepared By:	Description	Date	Rev. No	ECO

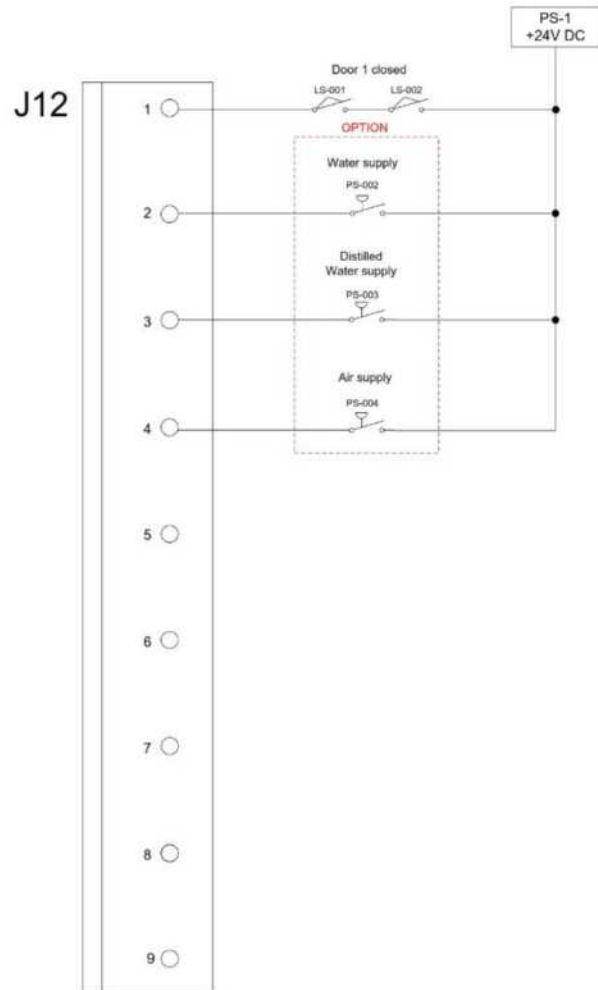
	Description: EZ9, EZ11 and EZ11K - ANALOG INPUTS Tuttnauer control system		Job No.	Scale:	Drawing No. ES1T01-0001
	Page 5	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:
	From 8	REV. No: 02		Approved by: Yuval S. 26.06.2014	Cat. No.
					Q. C.



Prepared By:	Description	Date	Rev. No	ECO

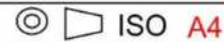
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	Page 6	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:
	From 8	REV. No. 02		Approved by: Yuval S. 26.06.2014	O. C.

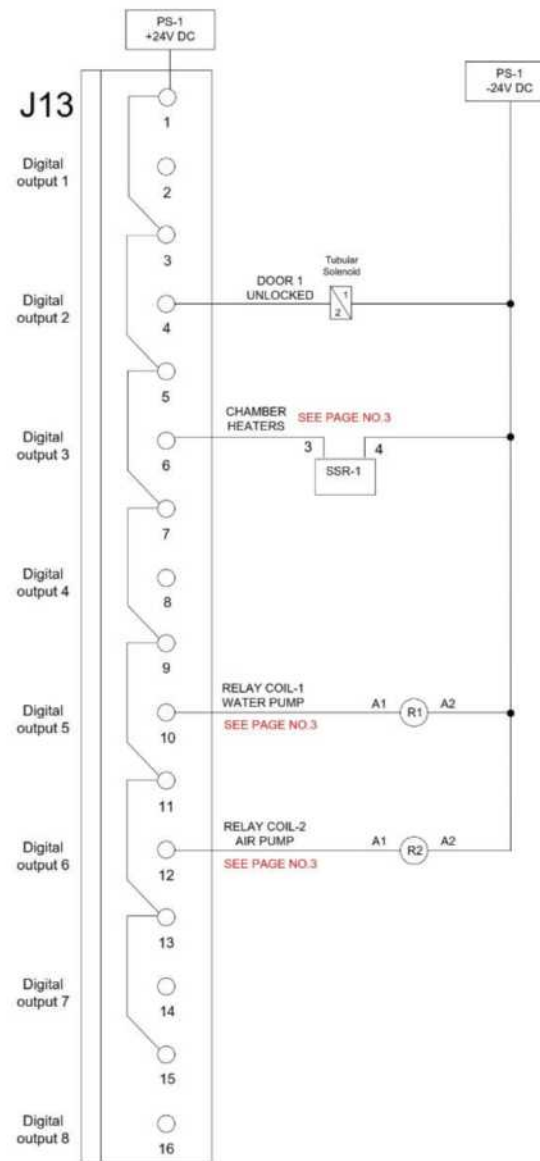
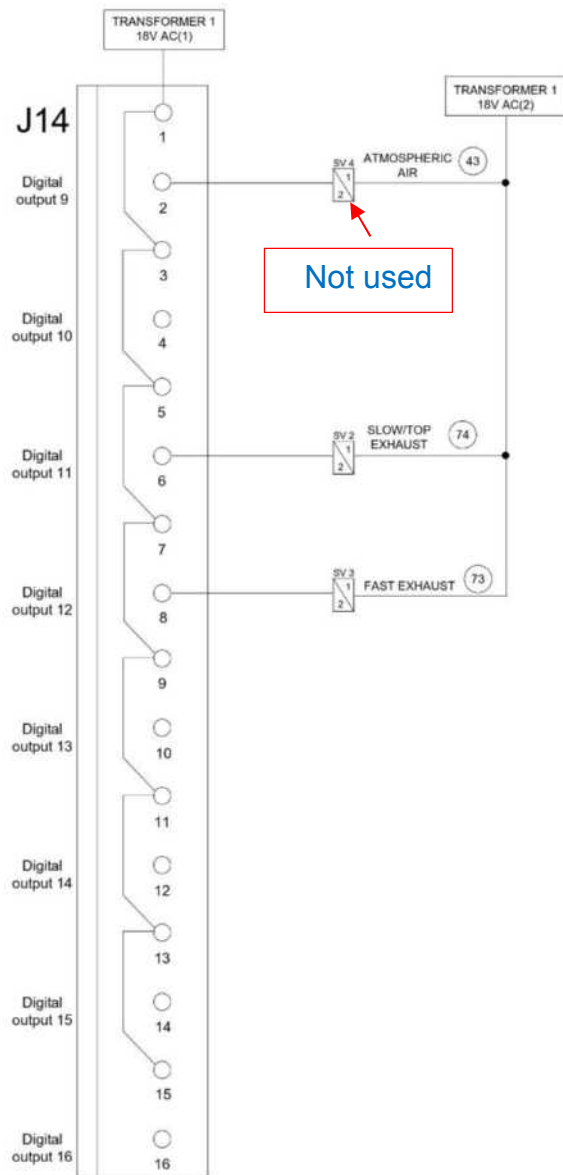
© ISO A4



Prepared By:	Description	Date	Rev. No	ECO

TUTTNAUER	Description: E29, EZ11 and EZ11K DIGITAL INPUTS Tuttnauer control system		Job No.	Scale:	Drawing No. ES1T01-0001
	Page 7	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:
	From 8	REV. No. 02	Approved by: Yuval S. 26.06.2014	Cat. No.	





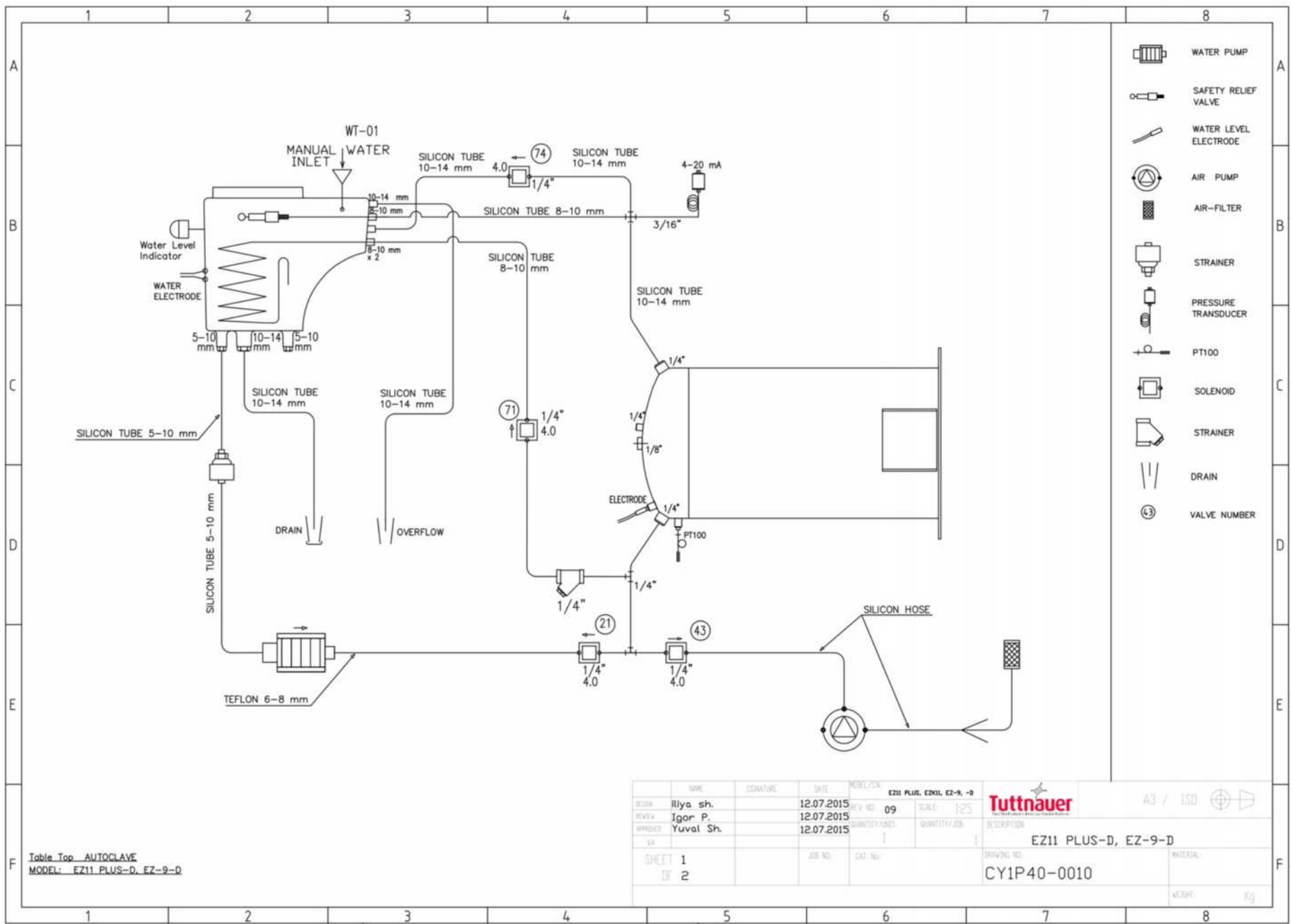
1 JP3













JP3 gray connector at the top of the electronic box

Date	Prepared By:	Description	Rev. No	ECO

TUTTNAUER 	Description: E29, EZ11 and EZ11K - DIGITAL OUTPUTS Tuttnauer control system		Job No.	Scale:	Drawing No.	
	Page 8	Design: Yuval S. 26.06.2014	Drawing: Yan S. 26.06.2014	Quant./Unit:	Quant./Job:	Cat. No.
	From 8	REV. No. 02	Approved by: Yuval S. 26.06.2014	Q. C.		

9 Piping Diagram



-  WATER PUMP
-  SAFETY RELIEF VALVE
-  WATER LEVEL ELECTRODE
-  AIR PUMP
-  AIR-FILTER
-  STRAINER
-  PRESSURE TRANSDUCER
-  PT100
-  SOLENOID
-  STRAINER
-  DRAIN
-  VALVE NUMBER

NAME	SIGNATURE	DATE	MODEL/NO.	REV. NO.	SCALE	DESCRIPTION
DESIGN	Iliya Sh.	12.07.2015	EZ11 PLUS, EZ01, EZ-9, -B	09	1:25	EZ11 PLUS-D, EZ-9-D
REVIEW	Igor P.	12.07.2015				
APPROVE	Yuval Sh.	12.07.2015				
SA						DRAWING NO.
SHEET	1	JOB NO.	CAT. NO.			CY1P40-0010
OF	2					MATERIAL
						WEIGHT
						Fig



A3 / ISO 

Table_Top AUTOCLAVE
MODEL: EZ11 PLUS-D, EZ-9-D