Tuttnauer

Your Sterilization & Infection Control Partners

# OPERATION & MAINTENANCE MANUAL

## Models 5075 HSG

CE 0344

*Cat. No. MAN205-0466001EN Rev 2*

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# 1 GENERAL

***Read the Operating Instructions carefully, before beginning any operation on the autoclave!***

## *1.1 Incoming Inspection*

The autoclave should be unpacked and inspected for mechanical damage upon receipt. Observe packing method and retain packing materials until the unit has been inspected. Mechanical inspection involves checking for signs of physical damage such as: scratched panel surfaces, broken knobs, etc.

If damage is apparent, contact your dealer or point of purchase, so that they may notify the manufacturer and file a claim with the appropriate carrier.

All **Tuttnauer** products are carefully inspected prior to shipment and all reasonable precautions are taken in preparing them for shipment to assure safe arrival at their destination.

## *1.2 Warranty*

We certify that this instrument is guaranteed to be free from defects in material and workmanship for one year against faulty components and assembly with the exception of glassware, lamps and heaters.

**The warranty does not include and does not replace routine treatment and preventive maintenance to be performed according to instructions in paragraph 9.1 (Preventive and Scheduled Maintenance).**

Our obligation is limited to replacing the instrument or parts, after our examination, if within one year after the date of shipment they prove to be defective. This warranty does not apply to any instrument that has been subjected to misuse, neglect, accident or improper installation or application, nor shall it extend to autoclaves that have been repaired or altered outside the factory without prior authorization from us.

**The Autoclave should not be used in a manner not described in this manual!**

## *1.3 Warranty Statement*

The warranty registration must be completed and returned to our service departments; within fourteen (14) days of purchase or the warranty will be void.

Our Technical Service Depts can be reached at:

**Tuttnauer** USA 25 Power Dr., Hauppauge, NY 11788 631-737-4850, Fax: 631-737-1034, E-mail: info@tuttnauerusa.com

**Note**:

If there is any difficulty with this instrument, and the solution is not covered in this manual, contact our representative or us first. Do not attempt to service this instrument yourself. Describe the difficulty as clearly as possible so we may be able to diagnose the problem and provide a prompt solution.

If the autoclave is equipped with a printer, send along a copy of the last printout for our inspection. If replacement parts are needed, stipulate the model and serial number of the machine.

No autoclaves will be accepted for repair without proper authorization from us. All transportation charges must be paid both ways by the owner. This warranty will be void if the unit is not purchased from an authorized full service **Tuttnauer** dealer.

### *1.4 Safety Instructions*

The autoclave has unique characteristics. Please read and understand the operation instructions before first operation of the autoclave. The following issues may require guidance provided by the manufacturer: operation of the autoclave, the door safety mechanism, the dangers involved in circumventing safety means, how to ensure that the door is closed, and how to select a correct sterilization program.

Make sure that you know where the main power switch is, where the water cut-off valve is and where the steam and compressed air disconnection valves are located.

Protective equipment and clothes and other safety instructions should be implemented in accordance with local and national regulations and/or rules!

Autoclave maintenance is crucial for the correct and efficient function of the device. We enclose a log booklet that includes maintenance recommendations, with every device.

The daily B&D test and the weekly spore test is part of the preventive maintenance plan, along with the annual validation of the sterilization processes that ensures appropriate temperature dispersion within the chamber.

Never use the autoclave to sterilize corrosive products, such as: acids, bases and phenols, volatile compounds or solutions such ethanol, methanol or chloroform nor radioactive substances.

### *1.5 Operating Safety*

1. Never start using a new autoclave or a new steam generator, before the safety, licensing and authorization department has approved it for use.
2. All autoclave users must receive training in proper usage from an experienced employee. Every new employee must undergo a training period under an experienced employee.
3. A written procedure must be established for autoclave operation, including: daily safety tests, seal inspection and door hinge inspection, smooth action of the closing mechanism, chamber cleaning, prevention of clogging and preservation from corrosion, what is permitted and what is prohibited for sterilization and choosing a sterilization program.
4. Clean the steam generator daily.
5. Before use, check inside the autoclave chamber to ensure that no items have been left from the previous cycle.
6. Load trays in such a way as to allow steam to move freely among all items.

7. Only autoclavable products shall be used. Please refer to the manufacturer instructions for sterilization of unknown materials or instruments.
8. When sterilizing plastic materials, make sure that the item can withstand sterilization temperature. Plastic that melts in the chamber is liable to cause a great deal of damage.
9. On closing the autoclave's door, make sure it is properly locked before activating.
10. Verify once again that you have chosen the appropriate sterilization program.
11. Before withdrawing trays, wear heat resistant gloves.
12. Before opening the door, verify that there is no pressure in the chamber (chamber pressure gauge is located on the autoclave's front panel).
13. Open the door slowly to allow steam to escape and wait 5 minutes before you remove the load.
14. Once a month, ensure that the safety valves are functioning, and once annually a certified tester must conduct pressure chamber safety tests.
15. Once annually, or more frequently, effective tests must be performed, i.e., calibration and validation.
16. Examine the condition of assemblies on a regular basis. Make sure there are no leaks, breaks, blockages, whistles or strange noises.
17. It is required to conduct maintenance operations as instructed.
18. Immediately notify the person in charge of any deviation or risk for the proper function of the device.
19. This autoclave equipped with rear and front wheels, when moving the autoclave all utilities must be disconnected, at least 2 persons shall move the autoclave with caution. When the autoclave located in the required place the Wheels has to be locked for further information see FRONT/REAR VIEW OF THE AUTOCLAVE.

# 2 TECHNICAL DATA

## 2.1 Introduction

This Horizontal autoclave is designed for the sterilization of wrapped and unwrapped instruments and related items found in dental, medical and veterinary clinics, first aid rooms, hospitals, laboratories, etc.

The instrument is a steam-heated sterilizer, using steam as sterilizing agent.
Its control unit ensures a fully automatic sterilization cycle, precise control and monitoring of physical parameters and clear documentation of the sterilization cycle. Five automatic programs are available, according to the material to be sterilized + two test programs.

This Horizontal autoclave is designed for the sterilization of wrapped and unwrapped instruments and related items found in dental, medical and veterinary clinics, first aid rooms, hospitals, laboratories, etc.

This autoclave is equipped with a vacuum system and steam generator..

The advantages of the prevacuum sterilizer in comparison to the regular gravity displacement steam sterilizer are as follows:

- Removal of air pockets from packs and porous load and most kinds of tubes (rubber, plastic etc.) by vacuum at the first stage of the cycle.
- Better steam penetration into the load; resulting in effective sterilization.
- Better temperature uniformity.

### 2.1.1 The SUSSMAN generator

The steam generator is an electric heated unit, having electric power of 20kW.

It is equipped with immersion tubular heaters, connected to the three-phase power network, with line voltages 3x400V/50Hz, through switching and protective equipment.

The body of the generator is made of carbon steel.

The output steam pressure is regulated by an electro-mechanic pressure switch in the range 0.69-4.13 Barg (10-60 psig) by switching on and off the heating current

A second electro-mechanic pressure switch cuts off permanently the electric supply to the heaters, if the pressure rises above 5.86 Barg (85 psig)

To restore the system see sec. 10.1.

The water supply to the pressure vessel is achieved from a mineral-free or distilled water source through a water pump, and a servo-solenoid valve.

A check valve and an air operated valve prevent reverse water flow, from the generator's vessel to the water source.

The water level control is performed by means of an electronic board connected with two electrodes mounted on top of the pressure vessel.

To protect the personnel and the equipment against build-up of high pressure in case of control failure, a safety valve is fitted, blowing off when pressure exceeds 100 psiG = 6.89 barG.

The steam generator is fitted with the electrical and control equipment, necessary for the safe and reliable automatic operation, including heaters, water pump, servo solenoid, pressure switches, water level control and the electrical command switching and protective equipment.
The autoclave is equipped with a drain cooling system that controls the drain temperature to avoid damage to the drain system of the facility.
A manual valve enables the drainage of the water from the generator boiler, for maintenance and servicing purposes.
The fully automatic operation enables the electric steam generator to work continuously under full load condition.

This manual is intended to give the user a general understanding of how the instrument works and indicate the best ways to operate and take care of it in order to obtain optimum results and a trouble-free operation. After reading this manual, operating the autoclave will be an easy job. However, since the instrument is built using high technology sensitive components, no attempt should be made by the user or any other unauthorized person to repair or re-calibrate it.

Only technical personnel having the proper qualifications, and holding technical documentation and adequate instrumentation are authorized to service the instruments.

Model 5050 and 5075 HSG-D are table-top sterilizers designed especially for the sterilization of instruments, and other materials in hospital laboratories, medical laboratories, research institutes, food laboratories and pharmaceutical facilities.
A computerized control unit ensuring a fully automatic sterilization cycle controls the autoclave.

The temperature and pressure are controlled through sensors placed inside and outside the media container.

The sterilizer has multiple built - in safety devices, which provides adequate protection to ensure the safety of operating personnel.

On all models, a printer is an optional addition to the autoclave. The printer prints the preset and actual parameters of the cycle (temperature, time and pressure/vacuum).

The autoclave is provided with a pressure gauge that is used as guide only. Should there be a power failure during the operation of the autoclave, the pressure gauge indicates to the operator that there is pressure in the chamber.
A deviation of +1.6% is accepted.
The pressure scale, printer option can be set up at any time by a technician.

**NOTE:**
After operating the sterilizer, brown stains might appear on the bottom of the chamber. These stains are a result of the heating elements that are located at the lower external part of the chamber. The brown color is a

common phenomenon, can easily be removed, and will not have any effect on the steriliszed goods.

This manual is intended to give the user a general understanding of how the autoclave works and indicates the best ways to operate and take care of it in order to obtain optimum results and a trouble-free operation. After reading this manual, operating the autoclave should be straightforward. However, since the autoclave is built using high technology sensitive components, no attempt should be made by the user or any other unauthorized person to repair or recalibrate it.

**Only technical personnel having proper qualifications, holding technical documentation and adequate test instrumentation are authorized to undertake repair or service.**

### *2.2 Operating Conditions*

- Only autoclavable materials shall be used.
- The ambient temperature shall be 5°C to 40°C and a relative humidity respectively up to 85%
- Operate the autoclave only in the manner specified in the manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

***Cautions!***
*Waste water should be brought into the public net in accordance with the local rules or requirements i.e.*
*ONLY NON-HAZARDOUS LIQUIDS SHALL BE DISPOSED IN PUBLIC SEWAGE!*
*The sterilizer should be loaded only with autoclavable material!*
*The environment shall not exceed an ambient temperature of 40 °C and a relative humidity of 85% respectively.*

- The operation altitude shall not be over 2000 meters (6561 feet) (ambient pressure shall not be lower than 80 kPa (11.6 psi)).
- The autoclave shall not be used in a manner not specified in this manual!
- Do not use the autoclave in the presence of dangerous gases.
- The packed or unpacked device shall be stored in 'indoor' conditions.

**Attention:**
The electrical net must be protected with a current leakage safety relay.
The electrical network must comply with local rules or regulations.

### *2.3 Construction*

The main parts of the autoclave are made of materials as indicated below:

- Chamber is built of stainless steel 316 L.

- Door is made of stainless steel 304.
- Pressure vessel is made of stainless steel 316L.
- Cabinet is made of stainless steel 304.
- Trays are made of stainless steel 316L.
- Generator's vessel is made of carbon steel.
- Door closing handle is made of aluminum material, which is safe to touch and thermo-insulated.

### *2.4 Environment Emission Information*

1. The peak sound level generated by the autoclave is less than 70 dBa with background noise of 60 dBa.
2. The total heat per hour transmitted by the autoclave is < 300 W/h for all models.

### *2.5 Directives and Standards*

Every autoclave meets the provisions of the following Directives and is constructed in compliance with the following Standards:

#### *2.5.1 Technical Directives*

1. Pressure Equipment Directive 97/23/EC.
2. Council Directive for low voltage equipment 73/23/EEC.
3. Electromagnetic Compatibility Requirements Directive 89/336/EC.

#### *2.5.2 Technical Standards*

1. ASME code
2. IEC-61010-1 & IEC-61010-2-040 - Safety requirements for medical device.
3. EN 61326 – EMC Requirements .

#### *2.5.3 Quality standards*

The manufacturing plant meets the following quality standards:

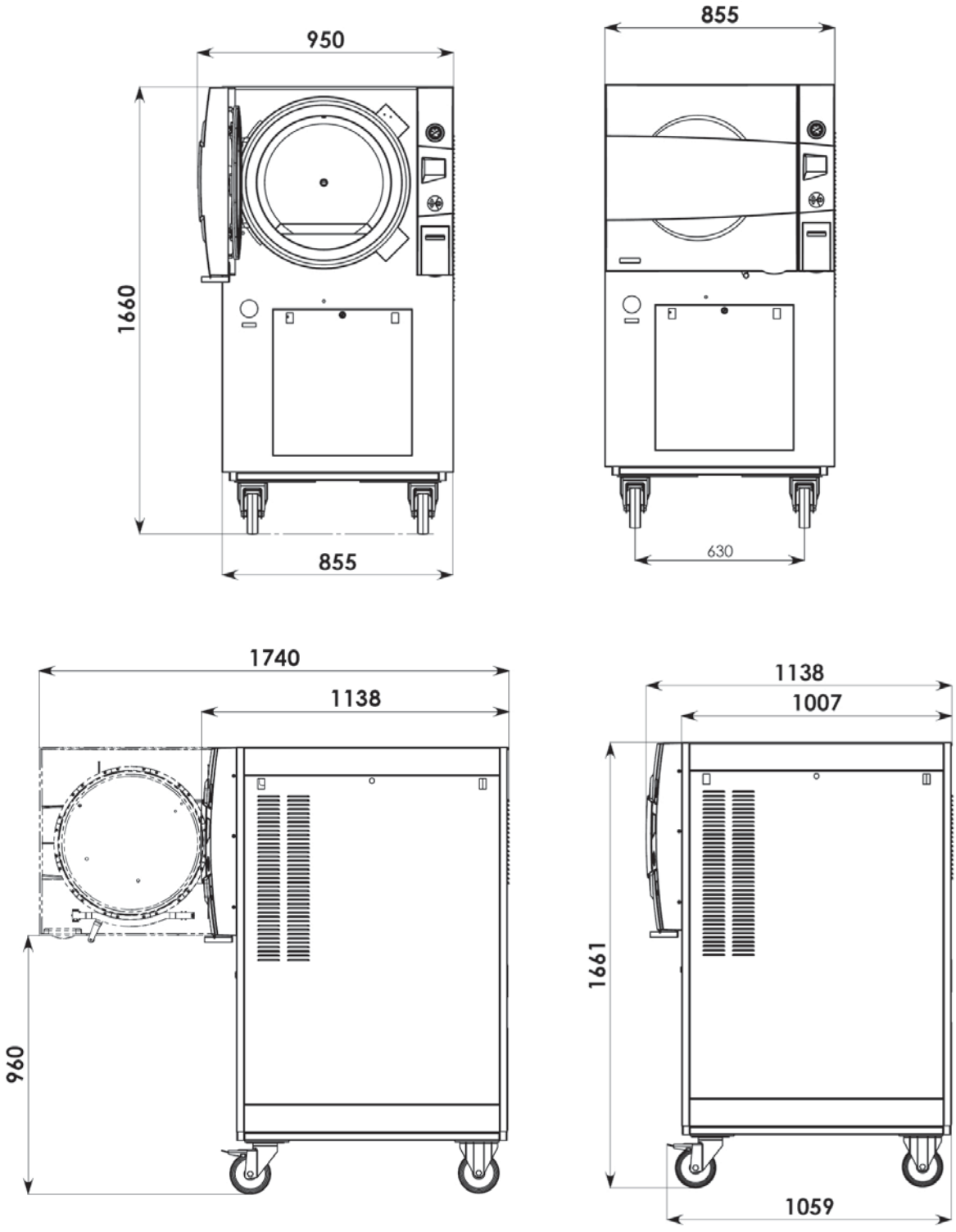
1. EN ISO 9001:2008– Quality System
2. ISO 13485:2003 – Quality systems – Medical devices.

## *2.6 Technical Specifications*

(See drawing on next page)

| ***Property*** | | ***Value*** |
|---|---|---|
| Chamber | Diam. | ***19.0***" (49.4 cm) |
| | Depth | 29.5" (75.0 cm) |
| Chamber volume | | 42.3 gal (160 lit.) |
| External dimensions | Width | 33.6" (85.5 cm) |
| | Height | 65.2" (166.0 cm) |
| | Length | 44.8" (113.8 cm) |
| Maximum dimensions (door open) | Width | 35.8" (91.0 cm) |
| | Length | 66.9" (170.0 cm) |
| Max. Allowable Working pressure (MAWP) | | 2.8 bar (40 psi) |
| Overall weight | | 807 lb (366 kg) |
| Floor loading requirements | | According to the Overall weight and floor requirements |
| Max load | | ***30*** kg solid load or 14 kg textile |
| Tray dimensions | Big | 18.6" x 27.6" x 0.8" (47.3 x 70 x 2 cm) |
| | Small | 11.9" x 27.6" x 0.8" (30.3 x 70 x 2 cm) |
| No. of trays | | 2 |
| Load No. counter | Counting from 0 to 9999 and nullifies. | |

***OVERALL DIMENSIONS***



### *2.7 Generator's Steam Data*

| Property | 20Kw |
|---|---|
| Max. working pressure | 5.86 BarG (85 psiG) |
| Safety relief valve | 6.89 BarG (100 psiG) |
| Steam output | 60lbs./hr (27.2kg/hr) |

### *2.8 Generator's Electrical data*

| | |
|---|---|
| Voltage | 3 Ph, 480V, or 3Ph 208V |
| Frequency (Hz) | 60 Hz |
| Consumption | 24A (480V)or 56A (208V) |
| Heaters | 20kW/(480V) |

### *2.9 Generator's control Electrical data*

| | |
|---|---|
| Voltage | 120V |
| Frequency (Hz) | 60 Hz |
| Consumption | 4A |

### *2.10 Autoclave's Electrical data*

| | |
|---|---|
| Voltage | 120V |
| Frequency (Hz) | 60 Hz |
| Consumption | 4A |
| Total power | 400W |
| Degree of protection by enclosure | IP31 |

### *2.11 Utilities*

| | | |
|---|---|---|
| Electric Power Supply | Power Supply | 3 Ph, 480V, or ~~3Ph 208V~~ |
| | Recommended circuit breaker | 40A (480V)or 63A (208V) |
| Water inlet (to generator) | | 5-7 Barg |
| Water connection(to generator) | | 1/2 NPT |
| Steam outlet | | 1/2 NPT |
| Drain | | 2" or bigger Withstanding temp. of 80°C |

- A switch or circuit-breaker must be included in the building installation. This switch or circuit-breaker shall be in close proximity to the equipment, within easy reach of the operator; and marked as the disconnecting device for the equipment.
- The electrical net must be protected with a current leakage safety relay.
- The electrical network must comply with local rules or regulations.
- Verify that there is an easy access to the main power switch, to the water cut-off valve and to the current leakage safety relay.
- Make sure while placing the autoclave, to leave space around the machine, to give the technician access to service the machine.

- All water connections to autoclave must be performed through "BACK FLOW PREVENTION SYSTEM" only, as per IEC 61770.

### *2.12 Symbol Description*

**Caution! Consult accompanying documents**

**Caution! Hot surface.**

**Caution! Hot steam.**

**Protective earth (Ground)**

**On-Off**

### *2.13 Water Quality Information for Carbon Steel Boilers*

For optimum results, the feedwater supply should be tested prior to initial startup, if the mineral content exceeds the following recommended limits, various external treatment processes (water softener, reverse osmosis, etc,) may be used to correct the problem.

**Note:** an analysis of the on-site boiler feedwater must be made by a recognized and reliable water treatment company to ascertain the existing condition and treatment required.

**Recommended Feedwater Quality**

| | |
|---|---|
| HARDNESS, ppm | 8 – 85 (~0.5 – 5 gpg) |
| P-ALKALINITY, ppm | 85 – 410 (~5 – 24 gpg) |
| T-ALKALINITY, ppm | 200 – 500 (~7 – 0 gpg) |
| pH (strength of alkalinity) | 8.0 – 11.4 |
| SPECIFIC RESISTIVITY | ~50k Ω-cm (50,000 ohm-centimeter) |

Blow down boiler on at least a once a day basis. if boiler water or feedwater are outside the above limits, a more frequent blowdown is required.

**Recommended Limits Within A Boiler**

| | |
|---|---|
| Total dissolved solids, ppm | 3500 |
| Total alkalinity, ppm | 850 |
| Suspended solids, ppm | 300 |
| Silica (SiO2), ppm | 125 |
| Sulfite (SO3), ppm | 25–50 |
| Phosphate, ppm | 30–60 |
| p-alkalinity as CaCO3, ppm | 900 |
| Iron, ppm | 2 |

Water quality can affect efficiency or result in boiler damage if neglected. Boiler feedwater contains impurities in solution and suspension. These impurities concentrate in the boiler since the steam generated is essentially pure. The concentration of these impurities increases as more feedwater is introduced into the boiler and steam is produced. if the suspended solids are allowed to concentrate beyond certain limits, a deposit or "scale" will form on the boiler internal surfaces. This deposit can interfere with proper boiler operation and cause boiler failure.

The concentration of these impurities is generally controlled by the feedwater quality and by blowdown. Blowdown refers to removing a portion of the boiler water with high solids concentration and replacing it with makeup water of a lower concentration.

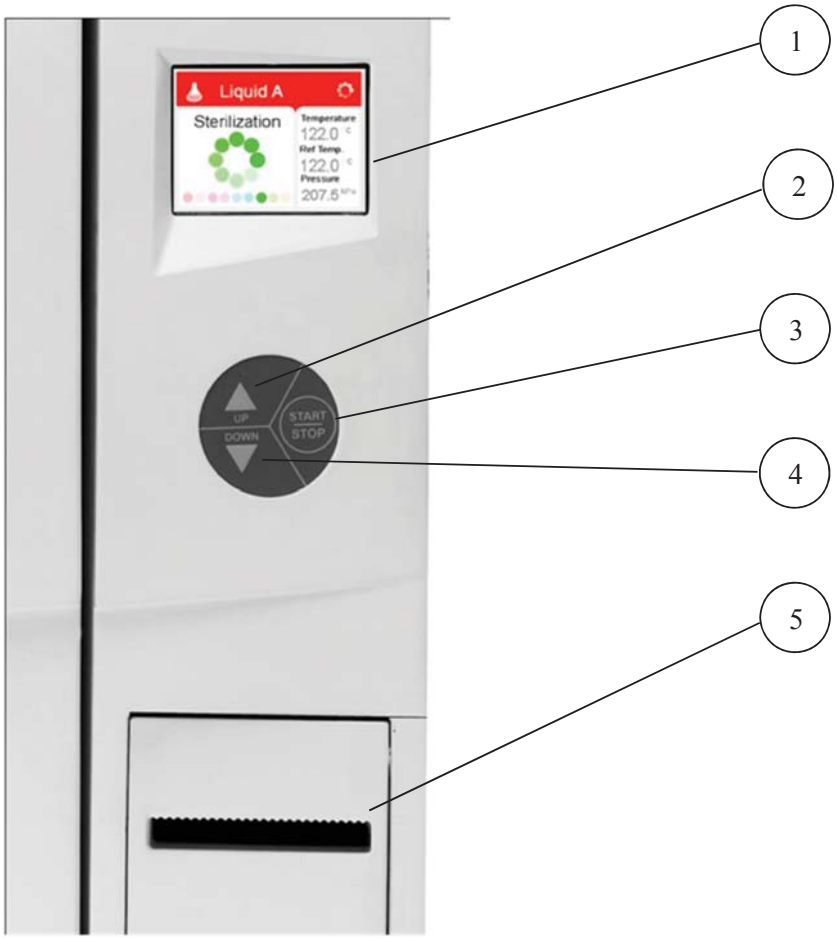
**FRONT VIEW**

| No. | Description | No. | Description |
|---|---|---|---|
| 1 | Left service Door lock | 8 | Left service door |
| 2 | Left service door latch | 9 | Rear service cover |
| 3 | Rear service door latch | 10 | Rear wheel, fixed |
| 4 | Rear service Door lock | 11 | Drain |
| 5 | Rear service door | 12 | Electrical cord |
| 6 | Feed water inlet strainer | 13 | Autoclave circuit breaker |
| 7 | Feed water Inlet 1/2” | 14 | Air filter cover |

**REAR VIEW**

| No. | Description | No. | Description |
|---|---|---|---|
| 1 | Safety Valve | 8 | Water Supply for the Generator |
| 2 | Power Switch | 9 | Vacuum Pump Air Inlet |
| 3 | Autoclave Power Cord | 10 | Drain |
| 4 | Chamber Filter | 11 | Rear service cover |
| 5 | Generator Power Cord | 12 | Rear service door |
| 6 | Opening for the Generator Power Inlet | 13 | Left service door |
| 7 | Water Supply for the Pump | | |

## *3 CONTROL PANEL*




| No. | Description |
|---|---|
| 1 | Display |
| 2 | Keypad: Up Button |
| 3 | Keypad: Start/Stop Button |
| 4 | Keypad: Down Button |
| 5 | Printer |

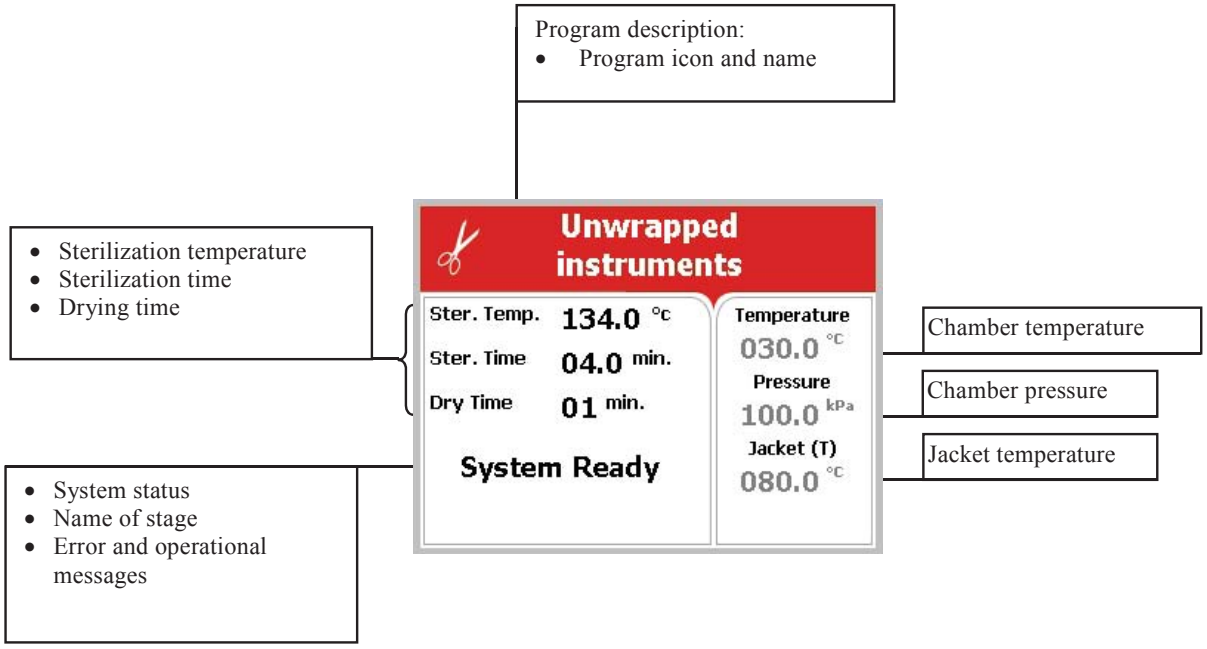
### *3.1 Description and Functions of the Front Panel Keyboard*

The front panel is composed of 3 sections:

1. Display screen.
2. Keypad.
3. Printer

#### *3.1.1 Display screen*

The display is a LCD panel used to display the current status of the autoclave while using Operational Messages and Error Messages.



### *3.1.2 Keypad*

The keypad consists of three keys as described below:

| | |
|---|---|
| | **UP key**<br>This key has the following functions:<br>• In the menu directories:<br>o This key enables the operator to browse through the cycles.<br>• In the directories available:<br>o When the cursor is blinking on a number, the **UP ▲** key increases its value.<br>o When the cursor is blinking on a menu selection, the **UP ▲** key allows browsing backward through the menu.<br>o When adjusting a parameter and the cursor is blinking on "SET" or "EXIT" the **UP ▲** key activates that procedure." |
| | **DOWN key**<br>This key has the following functions:<br>• In the menu directories:<br>o This key enables the operator to browse through the cycles.<br>• In the directories available:<br>o When the cursor is blinking on a number, the **DOWN ▼** key decreases its value.<br>o When the cursor is blinking on menu selection, the **DOWN ▼** key allows browsing forward through the menu.<br>o When adjusting a parameter and the cursor is blinking on "SET" or "EXIT" the **DOWN ▼** key activates that procedure. |
| | **START/STOP key**<br>This key has the following functions:<br>• In the main screen:<br>o Starts the process when the required program was chosen.<br>o Stops the current process.<br>o Cancels the ERROR message displayed on the screen and opens the electric door lock.<br>• In the menu directories:<br>o When the cursor is blinking on a number, the **START/STOP** ⏻ key enables moving to the next position.<br>o When the cursor is blinking on a menu selection, the **START/STOP** ⏻ key activates that selection. |

### *3.1.3 Printer*

The printer is an optional device.

It prints the detailed history of each cycle performed by the autoclave. The printing is on thermal paper with 24 characters per line and records the sterilization cycle information for subsequent consideration.

## *3.2 Displayed Error Messages / Symbols*

The failures are divided into two categories.

a. Failure that occur before completing the sterilization stage, which in this case will leave the load unsterilized
b. Failure that occur after completing the sterilization stage, which in this case will leave the load sterilized

For the list of *Displayed Error Messages / Symbols*
see sec. 12. TROUBLESHOOTING

### *3.3 Displayed operational messages / Symbols*

| Message / Symbol Name | Message / Symbol Description | Required Action |
|---|---|---|
| | This symbol is displayed when the door is open. | Close the door. |
| Door is open (during stand by) | This message is displayed when the door is opened: In standby - if **START/STOP** is preset. | Close the door to perform a new cycle. |
| Cycle Ended | This message is displayed when the cycle ended successfully. | Press **START/STOP** in order to perform a new cycle. |
| Test Ended | This message is displayed when the test ended. | Press **START/STOP** in order to perform a new test |
| | This symbol is displayed when Cycle by Clock mode is performed. | Enter the Admin menu as described in this manual to change the time or to cancel this option. |
| | This symbol is displayed when the temperature in the jacket did not reach the preset value | Wait until the temperature in the jacket reaches the preset value |
| Cycle by clock | This message is displayed if the user presses **START/STOP** key while the "cycle by clock" mode is active. | Enter the Admin menu as described in this manual to change the time or to cancel this option. |
| Atmospheric pressure not set | This message id displayed in order to set the atmosphere pressure by opening the door for 5 minutes. | Open the door for 5 minutes in order to set the Atmospheric pressure. |
| Critical settings have been updated, Please restart machine in order for changes to be updated | If a change of the autoclave setting was made, a restart operation is required. | Restart the autoclave in order for changes to be updated. |

## *4 STERILIZATION PROGRAMS*

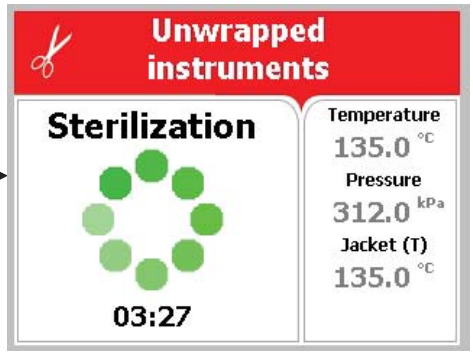
The autoclave offers five sterilization programs and two test programs as follows:

| Sterilization Programs | | Temp | Sterilization time (minutes) | Dry time (minutes) |
|---|---|---|---|---|
| Program | Description | | | |
| 1 | Unwrapped instruments | 134°C (273°F) | 4 | 1 |
| 2 | Wrapped instruments | 134°C (273°F) | 4 | 20 |
| | | | | |
| 3 | Wrapped pouches | 134°C (273°F) | 7 | 30 |
| 4 | Unwrapped delicate instruments | 121°C (250°F) | 20 | 0 |
| 5 | Wrapped delicate instruments | 121°C (250°F) | 20 | 20 |

| Test Programs | | Temp | Sterilization time (minutes) | Dry time (minutes) |
|---|---|---|---|---|
| Test | Description | | | |
| 1 | Leak test | | 5 + 10 min test time | |
| 2 | B&D test | 134°C | 4 | 2 |

During the process, the stages of the cycle will be displayed on the screen:

The stages names are as follows:
Start
Pulse H
Pulse L
Keep Heat (*option)
Heating
Sterilization
Exhaust
Drying (**option)
Ending

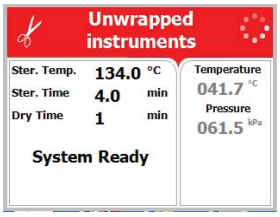



* Can be changed only by an authorized technician.

** Can be changed by the operator.

### *4.1 Program 1: Unwrapped instruments*

For unwrapped instruments and materials, when the manufacturer recommends autoclaving at temperatures of 134°C (273°F) no preset drying stage required.




***Nominal parameters default settings***

- Sterilization temperature: 134°C (273°F)
- Sterilization time: 4 minutes.
- Drying time: 1 minute

***Operations Sequence***

- Air-removal stage; vacuum pulses are performed.
- Heating stage: steam is inserted into the chamber until the sterilization temperature is reached.
- Sterilization stage; temperature and pressure are maintained constant at the pre-set level for the sterilization time.
- Fast exhaust stage; steam is exhausted out of the chamber at a fast rate until pressure decreases to ambient pressure.
- Dry stage; heating of chamber followed by a vacuum break (air inlet) to remove leftover moisture from the instruments and wraps.

**Note:**

**The sterility of instruments processed in unwrapped cycles cannot be maintained if exposed to non-sterile environment.**

### *4.2 Program 2 - Wrapped instruments*

For wrapped instruments and materials, when the manufacturer recommends autoclaving at temperatures of 134°C (273°F) with a drying stage.

***Nominal parameters default settings***

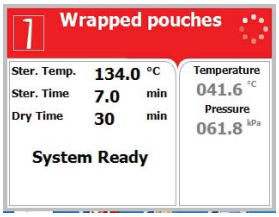
- Sterilization temperature: 134°C (273°F)
- Sterilization time : 4 minutes
- Drying time: 20 minutes (may be altered by the operator).

***Operations sequence:***

- Air-removal stage; vacuum pulses are performed.
- Heating stage: steam is inserted into the chamber until the sterilization temperature is reached.
- Sterilization stage; temperature and pressure are maintained constant at the pre-set level for the sterilization time.
- Fast exhaust stage; steam is exhausted out of the chamber at a fast rate until pressure decreases to ambient pressure.
- Dry stage; heating of chamber followed by a vacuum break (air inlet) to remove leftover moisture from the instruments and wraps.

### *4.3 Program 3 - Wrapped pouches*

For wrapped pouches and materials, when the manufacturer recommends autoclaving at temperatures of 134°C (273°F) with a drying stage.




***Nominal parameters default settings***

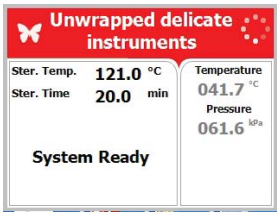
- Sterilization temperature: 134°C (273°F)
- Sterilization time: 7 minutes.
- Drying time: 30 minutes (may be altered by the operator)

***Operations Sequence***

- Air-removal stage; vacuum pulses are performed.
- Heating stage: steam is inserted into the chamber until the sterilization temperature is reached.
- Sterilization stage; temperature and pressure are maintained constant at the pre-set level for the sterilization time.
- Fast exhaust stage; steam is exhausted out of the chamber at a fast rate until pressure decreases to ambient pressure.
- Dry stage; heating of chamber followed by a vacuum break (air inlet) to remove leftover moisture from the instruments and wraps.

### *4.4 Program 4 - Unwrapped delicate instruments*

For unwrapped delicate instruments, when the manufacturer recommends autoclaving at temperatures of 121°C (250°F) with a drying stage.




***Nominal parameters default settings***

- Sterilization temperature: 121°C (250°F)
- Sterilization time : 20 minutes

***Operations sequence:***

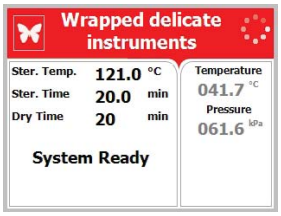
- Air-removal stage; vacuum pulses are performed.
- Heating stage: steam is inserted into the chamber until the sterilization temperature is reached.
- Sterilization stage; temperature and pressure are maintained constant at the pre-set level for the sterilization time.
- Slow exhaust phase; steam is slowly exhausted from the chamber by pulses of the exhaust valve, until the chamber pressure equals atmospheric pressure.

**Note:**

**The sterility of instruments processed in unwrapped cycles cannot be maintained if exposed to non-sterile environment.**

### *4.5 Program 5 - Wrapped delicate instruments*

For wrapped delicate instruments, when the manufacturer recommends autoclaving at a temperature of 121°C (250°F).



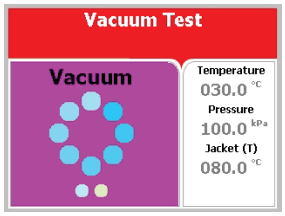

***Nominal parameters default settings***

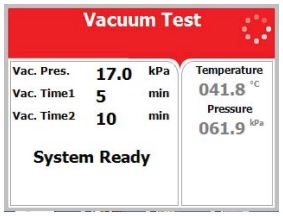
- Sterilization temperature: 121°C (250°F).
- Sterilization time: 20 minutes.
- Drying time: 20 minutes (may be altered by the operator).

***Operations sequence:***

- Air-removal stage; vacuum pulses are performed.
- Heating stage: steam is inserted into the chamber until the sterilization temperature is reached.
- Sterilization stage; temperature and pressure are maintained constant at the pre-set level for the sterilization time.
- Fast exhaust stage; steam is exhausted out of the chamber at a fast rate until pressure decreases to ambient pressure.
- Dry stage; heating of chamber followed by a vacuum break (air inlet) to remove leftover moisture from the instruments and wraps.

### *4.6 TEST 1 – LEAK TEST*



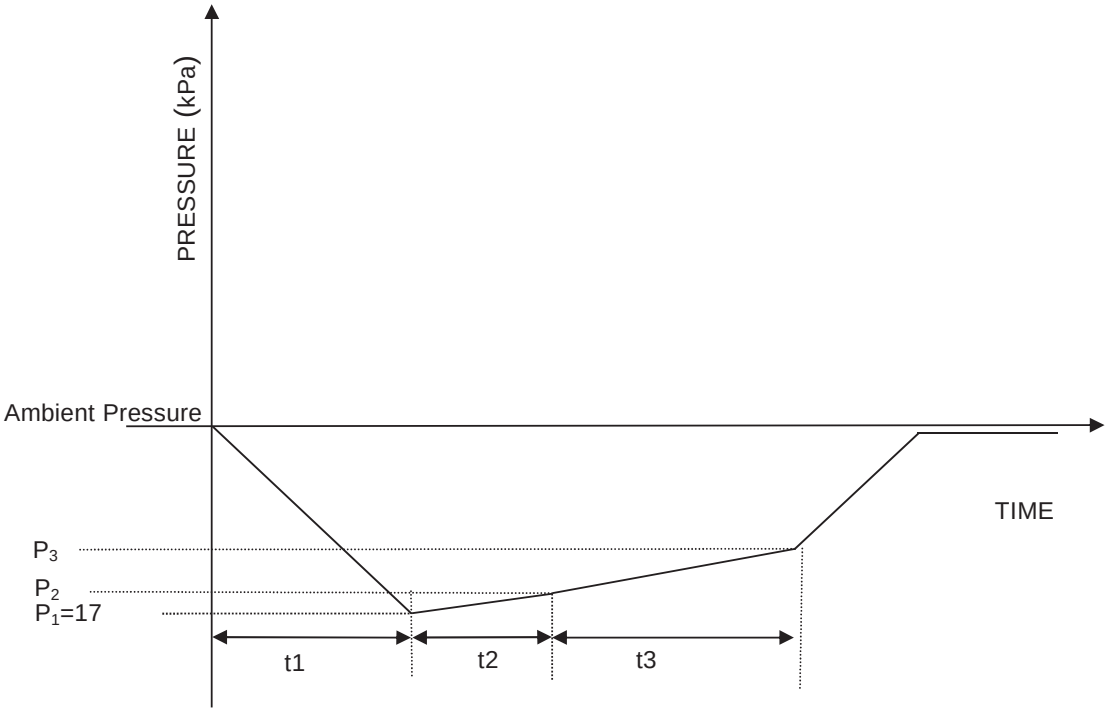




Vacuum is produced in the chamber down to $P_1$=17 kPa. At this stage all the valves close. The autoclave remains in this stage for 5 minutes. This period enables the condition in the chamber to reach equilibrium. After the 5 minutes have elapsed the printer records the pressure that is referred to as $P_2$. At this point the test begins and lasts 10 minutes. At the end of the test, the printer records the results. The pressure at the end of the test is referred to as $P_3$.

**Operations Sequence**

- Vacuum is produced into the chamber down to 17kPa.
- The vacuum pump stops.

**Note: During the test period the autoclave is not heated.**
**Note: During the test period the screen color is purple.**
If the vacuum test failed, the screen color changes from purple to yellow
If the vacuum test is completed, the screen color will remain purple
Even if the vacuum test is completed, the operator shall check the test results and consider whether the test results are acceptable or not



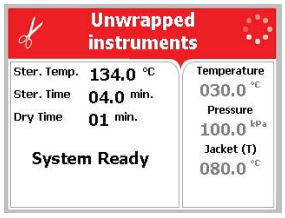

$P_1$ = lowest pressure level, which is equal to or lower than the level set for the cycle, during the air removal and steam penetration stage
$p_2$ = pressure after a period of 300 s
$p_3$ = pressure after a leakage time of 600 s

$t_1$ = Approx. 20 minutes
$t_2$ = 5 minutes
$t_3$ = 10 minutes

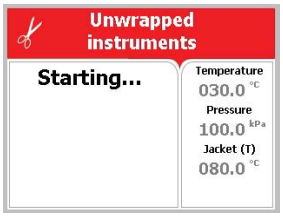
# 5 SCREENS

## 5.1 Screens following a complete successfully cycle – "Cycle Ended"

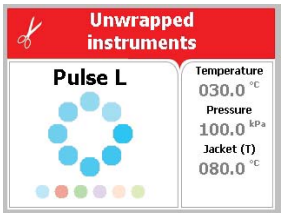
1. System Ready



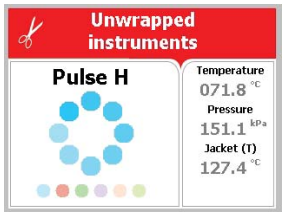

2. Starting



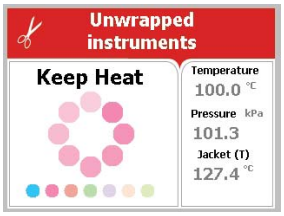

3. Pulse L



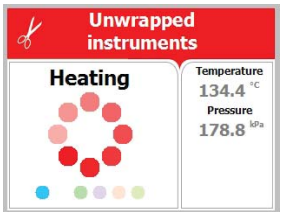

4. Pulse H



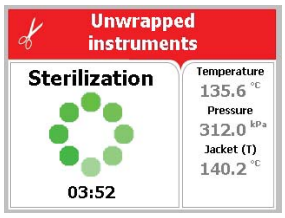

5. Keep Heat*



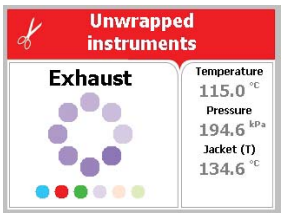

6. Heat



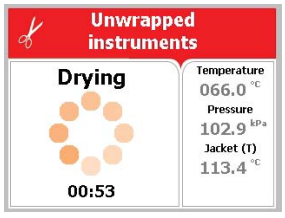

7. Sterilization



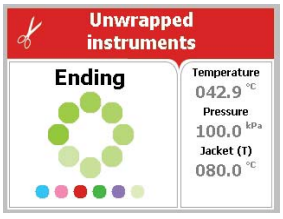

8. Exhaust



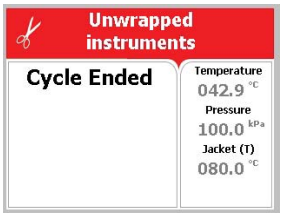

9. Drying (option)




10. Ending




11. Cycle Ended (successfully cycle)




**Note:** "Jacket" line is configuration-dependant.

* Display can be activated only by an authorized person.

In order to open the door press **START / STOP** key

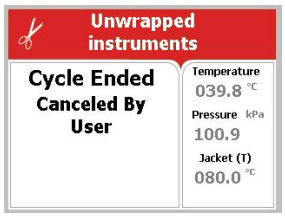
## *5.2 Screens following aborted cycles after complete sterilization stage*

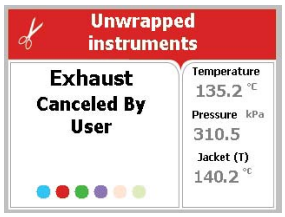
The sterilization phase ended successfully – cycle ended and the reason of failure is displayed

For example the next two scenarios:

### *5.2.1 Canceled by user after complete sterilization stage*

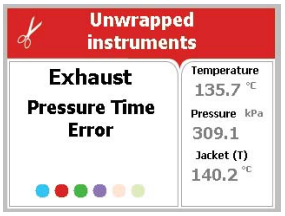
The cycle ended successfully, the reason for aborted cycle is displayed.

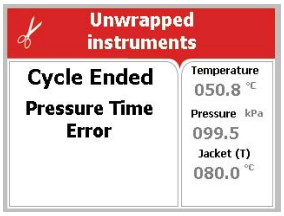



### *5.2.2 Door is open after sterilization stage has finished*

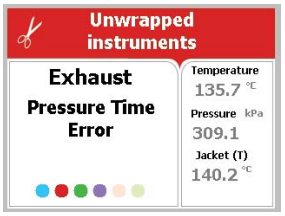
The cycle ended successfully, the reason for aborted cycle is displayed.

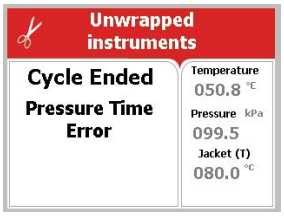



### *5.2.3 Screens following a Failure occurrence after complete sterilization stage*

The cycle ended successfully, the reason of failure is displayed.

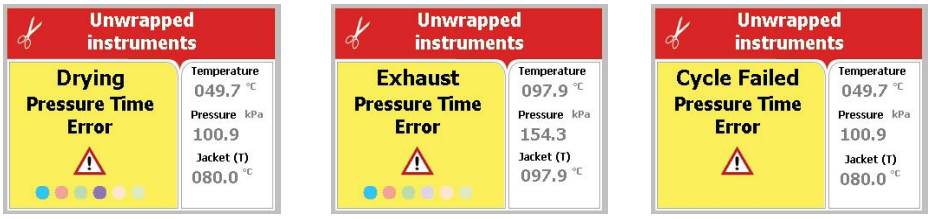


### *5.3 Screens following a fail cycle:*

In this case, the display becomes yellow, a warning sign ⚠ and the reason of failure will be displayed.
For example the next two scenarios:

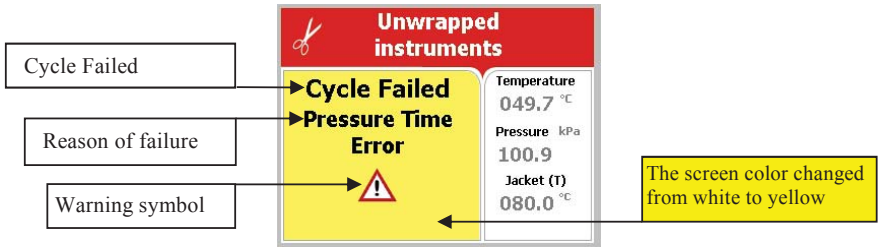
#### *7.3.1 Failure according to Pressure Time Error*



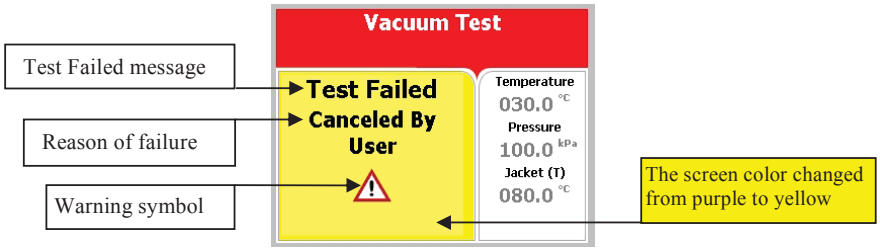

#### *7.3.2 Failure according to Cancellation by user before complete sterilization stage*

When "Cycle Failed" appears on the screen, the user shall press **START/STOP** key in order to delete the "Cycle Failed" message

An example for all displayed warnings according to Cycle Failed:




An example for all displayed warnings according to Test Failed:



# 6 PRINTER

## 6.1 Printer Output

The printing is on thermal paper with 24 characters per line and contains the following information:

- Date:
- Time:
- Ser. Num:
- Model:
- Version:
- Cycle Num:
- Cycle:
- Dry Time:
- Ster Temp:
- Ster Time:

When the sterilization cycle begins the printer starts printing the above data.

After the preliminary printing, the autoclave starts performing the sequence of operations of the cycle. The measured values of temperature and pressure are printed at fixed time intervals, according to the phase of the process, as shown in the table on the next page.
The data is printed from the bottom up, beginning with the date and ending with "Cycle Ended". For an aborted cycle, "Cycle Failed" and the Error message are printed (refer to "Displayed Error Messages/Symbols"). For an example of a typical printout, see next page.

**Note:** Please note that the print out goes from the bottom upwards.

| PRINTER OUTPUT | | | DESCRIPTION |
|---|---|---|---|
| Operator**:** | _____ | | To be filled in manually by operator |
| Time: | 12:14:47 | | Time sterilization cycle ended |
| Status: Cycle Ended | | | |
| *00:24:43* | 101.3 | 099.7 | Cycle finished time |
| D 00:27:40 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| D 00:35:12 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| D 00:32:32 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| D 00:28:22 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| D 00:26:45 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| D 00:23:01 | 107.0 | 107.4 | The time, temperature and pressure during Drying Stage |
| E 00:23:43 | 107.0 | 107.4 | The time, temperature and pressure during exhaust |
| E 00:22:08 | 134.5 | 311.9 | The time, temperature and pressure during exhaust |
| CLK 2: | 12:12:10:00 | | Sterilization Process End time as registered by two clocks |
| CLK 1: | 12:12:10:00 | | |
| S 00:22:07 | 134.5 | 311.6 | The time, temperature and pressure during sterilization |
| S 00:22:06 | 134.5 | 311.6 | The time, temperature and pressure during sterilization |
| S 00:21:06 | 134.6 | 311.0 | The time, temperature and pressure during sterilization |
| S 00:20:06 | 134.5 | 310.1 | The time, temperature and pressure during sterilization |
| S 00:19:06 | 134.8 | 311.1 | The time, temperature and pressure during sterilization |
| S 00:18:06 | 134.5 | 315.8 | The time, temperature and pressure during sterilization |
| CLK 2: | 12:08:08:00 | | Sterilization Process Start time as registered by two clocks |
| CLK 1: | 12:08:08:00 | | |
| H 00:18:04 | 134.4 | 315.1 | The time, temperature and pressure during heating |
| H 00:16:35 | 128.9 | 268.4 | The time, temperature and pressure during heating |
| H 00:13:35 | 116.3 | 180.9 | The time, temperature and pressure during heating |
| K 00:13:04 | 107.0 | 162.9 | The time, temperature and pressure during Keep Heat |
| K 00:12:22 | 115.1 | 200.4 | The time, temperature and pressure during Keep Heat |
| K 00:11:10 | 113.7 | 162.5 | The time, temperature and pressure during Keep Heat |
| A 00:11:04 | 107.0 | 162.9 | The time, temperature and pressure during Air removal |
| A 00:10:22 | 115.1 | 200.4 | The time, temperature and pressure during Air removal |
| A 00:10:00 | 113.7 | 162.5 | The time, temperature and pressure during Air removal |
| A 00:07:00 | 098.7 | 200.5 | The time, temperature and pressure during Air removal |
| A 00:06:45 | 097.6 | 165.4 | The time, temperature and pressure during Air removal |
| A 00:03:45 | 080.2 | 200.4 | The time, temperature and pressure during Air removal |
| A 00:00:45 | 053.7 | 154.4 | The time, temperature and pressure during Air removal |
| A 00:00:04 | 046.5 | 097.0 | The time, temperature and pressure during Air removal |
| F 00:10:18 | 092.8 | 096.6 | The time, temperature and pressure during Steam Flush |
| F 00:07:18 | 074.7 | 096.4 | The time, temperature and pressure during Steam Flush |
| F 00:04:18 | 047.4 | 096.3 | The time, temperature and pressure during Steam Flush |
| F 00:01:18 | 025.4 | 101.4 | The time, temperature and pressure during Steam Flush |
| W 00:00:05 | 029.3 | 096.0 | The time, temperature and pressure during Water inlet |
| **TIME** | **°C** | **kPa** | |
| End Temp: | 120.0 °C | | |
| Ster Time: | 4.0min | | Sterilization time for selected program |
| Ster Temp: | 134.0°C | | Sterilization temperature in chamber for selected program |
| Cycle: | Unwrapped instru | | Cycle name |
| Cycle Num: | 000001 | | Cycle number |
| Version: | 1.0.00.00 | | Version A.B.CC.DD = 1.0.00.00<br>A: Door Type: Single Manual = 1<br>B: Vacuum Type = 0<br>C: Total number of Input/Output functionality that are not as default = 00<br>D: Total number of parameters values that are not as default = 00 |
| Model: | 5075HSG | | Model name |
| Ser. Num: | 000000000001 | | Model Serial number |
| Time: | 11:50:05 | | Time sterilization cycle started |
| Date: | 9/FEB/2010 | | Date sterilization cycle started |
| ---------- | | | |

| | | |
|---|---|---|
| Time: | 08:51:39 | Time of turning on |
| Date: | 9/FEB/2010 | Date of turning on |
| POWER ON | | The device is turned on |
| Time: | 00:00:00 | Time of turning off |
| Date: | 9/FEB/2010 | Date of turning off |
| POWER OFF | | The device is turned off |

| Legend | | | |
|---|---|---|---|
| A | Air removal stage (Pulse L & Pulse H) | D | Drying stage |
| H | Heating stage | CLK 1 | Real Time Clock |
| S | Sterilization stage | CLK 2 | Software clock |
| E | Exhaust stage | | |
| | | | |
| | | | |

## *6.2 Printer Handling*

### *6.2.1 Maintenance*

Wipe off the soiling on the printer surface with a dry soft cloth with a weak neutral detergent. After that, wipe the printer with a dry cloth.

### *6.2.2 Setting paper*

**PLUS II Front view**

1-Paper mouth
2-STATUS Led
3-OPEN key (for paper roll compartment opening)
4-FEED key
5-Paper roll compartment
6-Paper end sensor

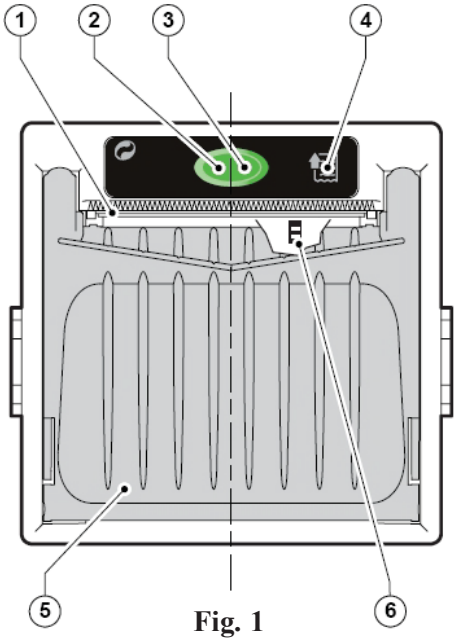



**Fig. 1**

1. Open the printer's cover door (1) by pulling it up (see Fig. 2).

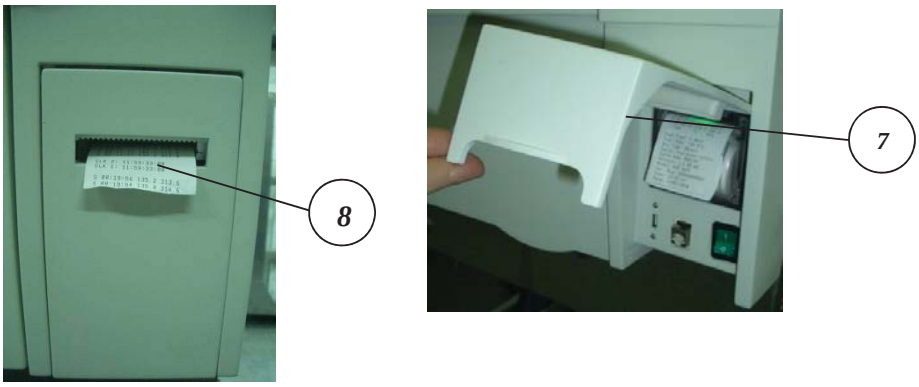



**Fig. 2**

2. Press the OPEN key to open the printer cover as shown (see Fig. 3/1). Handle the paper cutter carefully not to cut your hand.
3. Place the paper roll making sure it unrolls in the proper direction as shown (see Fig. 3/2).
4. Take out the paper and re-close the cover as shown (see Fig. 3/3) the printer cover is locked.
5. Tear off the exceeding paper using the jagged edge (see Fig. 3/4).

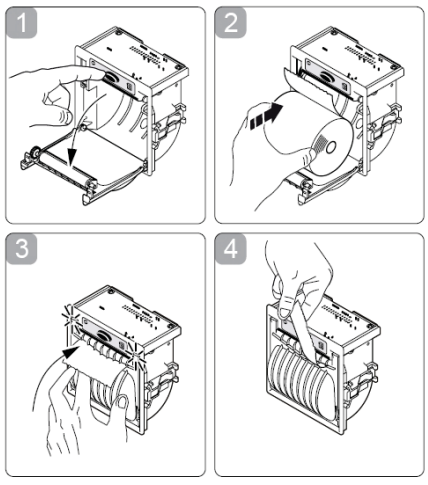



**Fig. 3**

**6.** Close the printer's cover door (see Fig. 2/7) by pulling it down, with the tip end of the paper emerging from the slot (see Fig. 2/8).

### *6.3 Treating the thermal papers:*

- Store the papers in a dry, cool and dark place.
- Do not rub the papers with hard substance.
- Keep the papers away from organic solvent.

***Cautions***

**Never disassemble the printer. Failure to follow this instruction may cause overheating or burning of the printer or the AC adapter. Or an electric shock, which may lead to fires or accidents.**

**Never use the printer in a place of extreme humidity or any place where it can possibly be splashed by any liquids. If any liquids get into the printer, it could lead to fire, electric shock, or other serious accidents.**

**Never touch the thermal head immediately after printing because it becomes very hot. Make sure that the thermal head is cool before setting papers or cleaning the thermal head.**

**Power OFF the printer in any of the following cases:**

- The printer does not recover from an error.
- Smoke, strange noise or smells erupt from the printer.
- A piece of metal or any liquid touches the internal parts or slot of the printer.

## *7 PREPARATION BEFORE STERILIZATION*

The purpose of packaging and wrapping of items for sterilization is to provide an effective barrier against sources of potential contamination in order to maintain sterility and to permit aseptic removal of the contents of the pack. Packaging and wrapping materials should permit the removal of air from the pack, penetration of the sterilizing water vapor into the pack and removal of the sterilizing vapor.

The basic principle determining the size, mass and contents of instrument and hollowware packs is that the contents are sterile and dry immediately on completion of the drying cycle and removal of the pack from the sterilizer chamber.

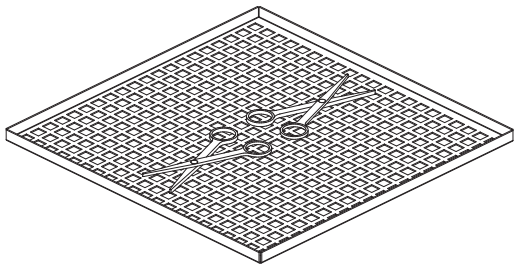
Instruments to be sterilized must be clean, free from any residual matter, such as debris, blood, pads or any other material. Such substances may cause damage to the contents being sterilized and to the sterilizer.

1. Before use, check inside the autoclave chamber to ensure that no items have been left from the previous cycle.
2. Immediately after use, clean instruments thoroughly to dispose of any residue.
3. It is recommended to wash instruments with an ultrasonic cleaner, using detergent and mineral-free water.
4. Launder textile wraps prior to reuse.
5. After cleaning, rinse instruments for 30 seconds. (Follow manufacturer's instructions on the use of products for cleaning and lubricating instruments after using the ultrasonic cleaner).
6. Materials, including materials used for inner wraps, shall be compatible with the item being packed and the sterilizing method selected.
7. Do not place materials to be sterilized directly on the chamber's wall. Place the material only on trays, rack, etc.
8. Before placing an instrument into the sterilizer tray, make sure that instruments which are not of the same metal, (stainless steel, carbon steel, etc.) are separated and placed on different trays.

**Note:**

**Check manufacturer's instructions for the sterilization of each item.**

7. In case carbon steel instruments are placed on stainless steel trays, the trays should be lined with a towel or paper wrap before placing the instruments on the trays. There should be no direct contact between the carbon steel and the stainless steel trays.



### *7.1 Instruments*

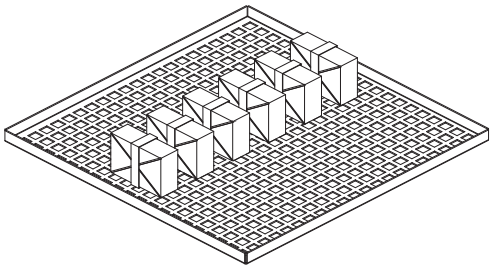
9. Place empty containers upside down to prevent accumulation of water.

10. All instruments must be sterilized in an open position.
11. Use single-use wraps once only and discard after use.
12. Place a sterilization indicator strip on the tray.
13. Place instruments with ratchets opened and unlocked or clipped on the first ratchet position.
14. Disassemble or sufficiently loosen multiple-part instruments prior to packaging to permit the sterilizing agent to come into contact with all parts of the instrument.
15. Tilt on edge items prone to entrap air and moisture, e.g. hollowware, so that only minimal resistance to removal of air, the passage of steam and condensate will be met.
16. Load items within the boundaries of the tray so that they do not touch the chamber walls.
17. The operator may use racks to allow for adequate separation of packaged instruments.
18. Allow a distance of approximately 2.5 cm (1") between trays to permit steam circulation.
19. Once a week, use a biological spore test indicator in any load to make sure sterilization is performed efficiently.
20. Make sure that all instruments remain apart during the sterilization cycle.
21. Empty canisters should be placed upside-down, in order to prevent accumulation of water.

### *7.2 Packs*

22. Place packs upright on trays, side by side.
23. Packs should not touch the chamber walls.
24. Pack instrument sets in a manner that prevents damage to delicate items.
25. Pack hollowware sets so that all openings face the same direction and so that the contents cannot move inside the pack.
26. Load packs of folded operating room drapes with layers vertical, allowing air to be removed from the packs rapidly.

27. Do not place packs of hollowware and trays of instruments above textile packs or soft goods in order to avoid wetting caused by condensation from items above.



28. Load items packed in flexible packaging materials on edge with paper to laminate, or flat with the paper surface downwards.

**Note:**
**The manufacturer's recommendations shall be observed, concerning the sterilization data for each type of material.**

### *7.3 Tubing*

Rinse tubing after cleaning with pyrogen free water. When placing in a tray, Make sure that both ends are open, without sharp bends or twists.

# 8 OPERATING INSTRUCTIONS

## 8.1 Operating the generator

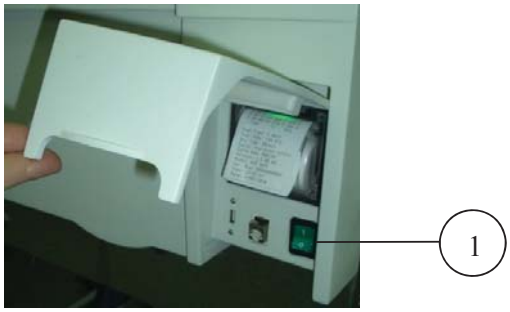
Refer to the operating instruction in the generator manual attached to this manual.

## 8.2 Operating the autoclave

Open the manual tap to the water supply network.

### 8.2.1 Turning on the autoclave

To start the system, turn on the main switch (1), located behind the printer's door.




### 8.2.2 Opening the door

- Move the door handle (***1***) from position "locked" (2) to position "unlocked" (3).
- Open the door.

## 8.3 Safety

Protective equipment and clothes and other safety instructions should be implemented in accordance with local and national regulations and/or rules!

For proper sterilization - Do not overload the chamber. Only autoclavable products shall be used; please refer to the manufacturer instructions for sterilization of unknown materials or instruments.

### *8.4 Loading*

Correct loading of the autoclave is essential to successful sterilizing for several reasons. Efficient air removal from the chamber and the load will permit total steam penetration and saturation, and allow proper drainage of condensate. Additionally, correct loading will reduce damage to packs and their contents and maximize efficient use of the sterilizer.
For detailed loading instructions, see para. 9 (Preparation before sterilization)

### *8.5 Selecting the Program*

1. Select the program.
   - **UP** key: next program.
   - **DOWN** key: previous program.
2. Make sure Verify that you chose the required program.
3. If the autoclave is equipped with a printer verify that a paper roll is inserted in the printer. If not - insert as per para. 5.2.

**Attention:**

**Selecting a program is possible only when the door is open.**

### *8.6 Closing the door*

1. Close the door.
2. Move the door handle (1) from position "unlocked" (3) to position "locked" (2).
3. The open door symbol is replaced by the message "System Ready".

### *8.7 Starting cycle*

1. Start the cycle by pressing the START/STOP key.
   The autoclave starts performing sequence of operations. The actual measured values of pressure and temperature are displayed continuously and printed every minute at STE stage, and every 5 minutes at the other stages. The phase in progress is displayed at the right side of the upper line (see Printer).
   If the operator presses the START key and the door is not completely closed, the process will not start.

**Caution!**

**Do not touch the strainer's cover, mounted on the exhaust line, during and short after operation.**

**Touching the hot strainer's cover may cause severe injuries.**

### *8.8 Unloading*

1. When the cycle ended, press START/STOP key to verify the status. Message "Cycle Ended" (and the relevant failure message, if applicable) is displayed on the screen.
2. Verify that there is no pressure in the chamber, according to the reading on the display. Only then you may open the door.
3. Open the autoclave. (see sec. 11.2 Opening the door)

**Warning!**
**To avoid severe injuries by hot steam when opening the door:**
**It is strictly forbidden to lean on the autoclave.**
**It is strictly forbidden to place your hand or any part of your body over the door.**
**Wear heat-resistant gloves or use the tray handle to remove the load from the autoclave**

4. To release the door locking at the end of operation, press the UP key. The same applies at power up after fail. Rotate the handle counter-clockwise to pull out the locking arms handle from the retaining brackets.
5. At the end of each working day close the main water valve.

#### *8.8.1 Stopping the process and cancelling the ERROR message*

- It is possible to stop the program while the autoclave is operating. Pressing the START/STOP key at any stage of the process stops the operation. If the cycle was aborted before completing the sterilization stage, it will leave the load unsterilized.
- At the end of the aborted process (before completing the sterilization stage), **"Cycle Failed"** message, error message and a warning symbol ⚠ are displayed on the screen. Refer to "Displayed Error Messages/Symbols".
- Pressing the **START/STOP** key cancels the displayed message and enables opening the door.

**Warning**
**The load has not completed a sterilization cycle, therefore it is not sterile. Handle it as contaminated load.**

### *8.9 Start Cycle by Clock mode*

1. This mode enables the operator to define the time of the beginning of the cycle. The maximum possible delay is 24 hours.

# *9 SERVICE AND MAINTENANCE*

## *9.1 Preventive and Scheduled Maintenance*

The maintenance operations described in this chapter have to be fulfilled periodically to keep the device in good condition and to reduce the breakdown time to a minimum.

The user maintenance personnel can easily execute these operations in accordance with further instructions.

The owner of the autoclave is responsible to order an authorized technician to perform the periodical tests and preventive maintenance operations, as specified in the technician manual.

Use only mineral-free water as detailed in para. 2.13 (water quality).

**Warning!**

**Before carrying out any preventive maintenance operation, ensure that the electrical cord is disconnected and that there is no pressure in the autoclave.**

### *9.1.1 Daily*

Clean door gasket with a soft cloth. The gasket should be clean and smooth.

### *9.1.2 Weekly*

1. Take out the tray holder and trays. Clean the tray holder, trays and chamber's interior (especially its bottom part) with a commercial cleaning agent & water. Wipe off the sediments from the chamber bottom with a sponge. Immediately after cleaning, rinse the tray holder, trays and chamber's interior with water to avoid stains on the metal.

**Caution**

**Do not use steel wool or steel brush as this can damage the chamber!**

2. Put a few oil drops on the 2 door pins and door tightening bolt.
3. Clean the outer parts of the autoclave with a soft cloth.

Clean the water strainers once a month as per sec. 11.2, Cleaning frequency may be reduced according to experience.

### *9.1.3 Periodically*

1. Replace the air filter, every 6 months (to be performed by a technician).

1. In hard water areas, blowdown is necessary at least once a day. In soft water areas, once a week. See blowdown instruction in the generator's manual.

2. Check the door gasket every 12 months and replace it if required (see para. 9.5). Replacing the gasket shall be done by a technician.
3. Once a year check and tighten the piping joints to avoid leakage.

4. Once a year check and tighten all screw connections in the control box, heaters and valves and instrumentation.
5. Once a month clean the strainer as per para. 9.3. Cleaning frequency may be reduced according to experience.
6. Once every six months clean the fan grid, from the inside outward, with a vacuum cleaner.

### *9.1.4 Periodical Tests*

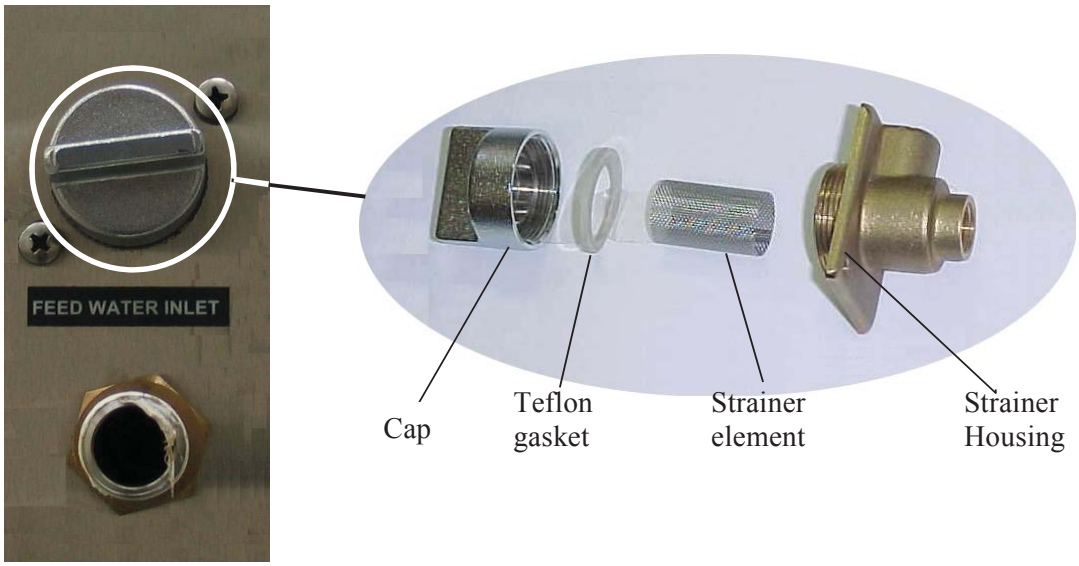
1. Once every month activate the safety valve (see para. 9.4).

## *9.2 Cleaning water strainer*

**Caution!**

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

1. Open the strainer cover (see "Rear view of the autoclave").
2. Remove the strainer element.
3. Rinse the strainer with water. Use a brush if necessary.
4. Reinstall the strainer element.
5. Close the strainer cover.




**Caution!**

**Do not touch the strainer's cover, mounted on the exhaust line, during and short after operation.**

**Touching the hot strainer's cover may cause severe injuries.**

## *9.3 Checking Safety Valves*

### *9.3.1 Checking the chamber Safety Valve*

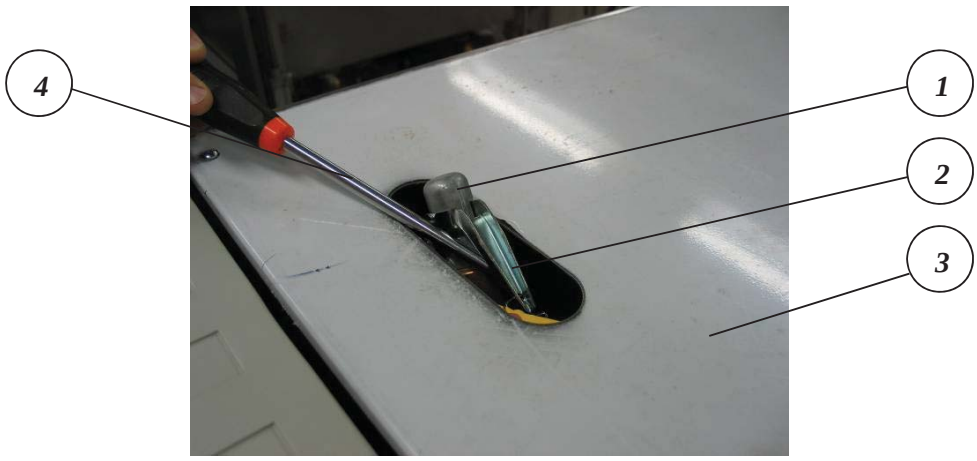
In order to prevent the safety valve from a blockage, operate it once a month.

The safety valve is located on the left upper-forward part of the autoclave, under the upper cover. Its top part (1) and activating handle (2) are above the top cover (3).

1. Operate the sterilization cycle according to the manual.
2. Allow a pressure of approx. 29 psi (200 kPa) to build up in the chamber.
3. Operate the safety valve. With a screw driver (or any similar tool) (4) pull the valve's handle (2) and verify that steam escapes from the valve.
4. Press the **START/STOP** key to pause operation, and exhaust steam from chamber.
5. Wait until pressure goes down to zero, only then can the door be opened.

***Attention:***

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




### *9.3.2 Generator's safety valve*

Refer to the operating instruction in the generator manual attached to this manual.

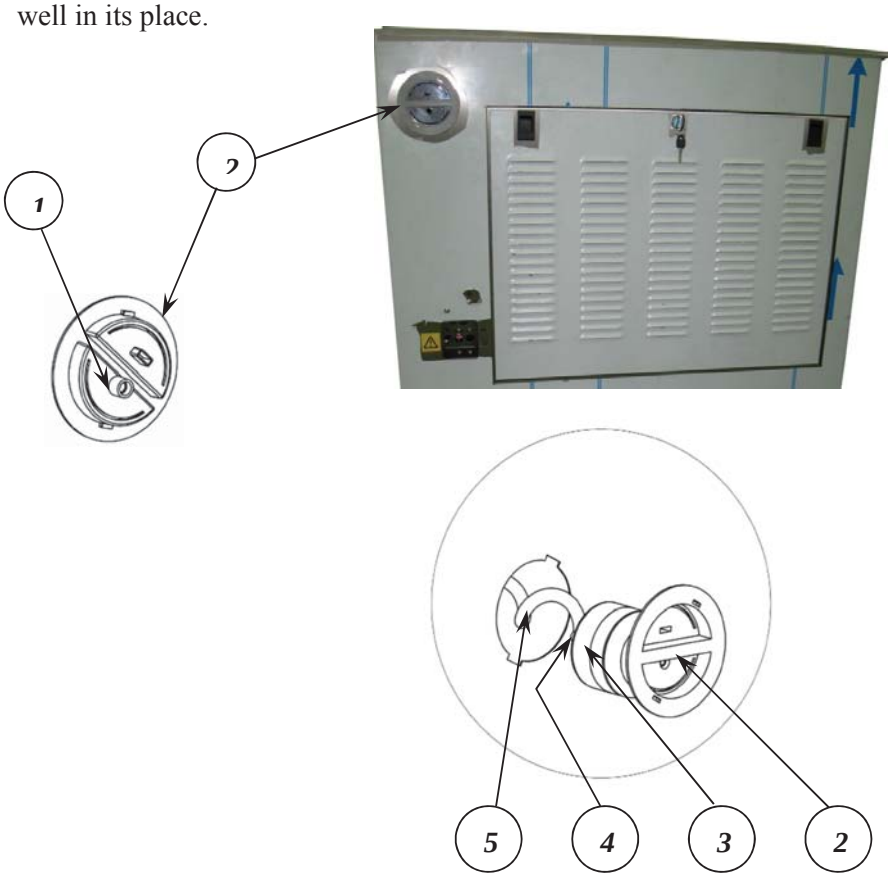
### *9.3.3 Replacing the Air Filter*

In order to "break" the vacuum, at the end of the dry phase, filtered atmospheric air enters the chamber via a solenoid valve. The filtration of the air is performed by the bacteriological filter that is placed at the inlet of the chamber, through a solenoid valve.

The filter is mounted near an opening on the left sidewall of the autoclave enclosure, to ease access for replacing it.

To replace the filter proceed as follows:

1. Open the left service door.
2. Remove the filter cover (2), by turning the cover counterclockwise until it is released.
3. Remove the filter (3) from the filter cover by pulling the filter apart from the filter cover.
4. Cut the tie wrap (4) fixing the flexible tubing (5) connecting the filter to the copper pipe, and pull off the filter.
5. Replace the filter with a new one. Connect the filter (3) to the flexible tubing (5) and tightening it with a tie wrap (4).
6. Connect the filter to the filter cover by pressing the filter (3) into the hole in the cover (1).
7. Insert the filter to its place inside the autoclave and reassemble the filter cover by turning it a ¼ turn clockwise. Verify that the cover is fastened well in its place.



## *10 TROUBLESHOOTING*

This troubleshooting chart enables the user to solve minor malfunctions, prior to contacting our service department.

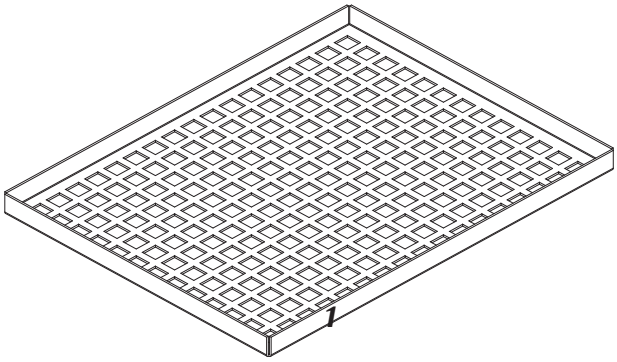
Only technical personnel having proper qualifications and holding technical documentation (including a technician manual) and adequate information are authorized to service the apparatus.

| Problem / Failure message | Message / Symbol Description | Corrective Action |
|---|---|---|
| The machine is not responding. | 1. The main switch is in 'OFF' position.<br>2. The power cord is disconnected from the machine or the mains.<br>3. The circuit breaker has tripped. | 1. Turn the main switch is to the 'On' position. (see front view drawing).<br>2. Make sure the power cord is connected properly to the machine and the mains. (see rear view drawing)<br>3. Lift the circuit breaker lever. |
| The printer prints, but nothing is printed on the paper. | 1. The Paper roll is not installed in the right way. (see sec. 8.2, Printer handling) | 1. Install the paper roll in the right way. Only one side of the paper is printable. (see sec. 8.2, Printer handling) |
| The printer does not print. | 1. No paper is inserted in the printer. (see sec. 8.2, Printer handling)<br>2. No obvious reason. | 1. Make sure the paper roll is inserted in the printer. (see sec. 8.2, Printer handling)<br>2. Switch off the machine and switch it back on for restart |
| The machine is leaking at the door. | 1. Door is not tightened enough.<br>2. The door gasket is damaged. (see sec. 11.1.1 daily maintenance and 11.1.3 Periodically maintenance) | 1. Hand tighten the door.<br>2. Replace the door gasket. (see sec. 11.1.3 Periodically maintenance) |
| Water does not exit chamber. | 1. Outlet strainer is clogged. | 1. Clean strainer according to instructions. |
| "Low Temp" message is displayed. | Temperature dropped for more than 1 second below the sterilization temperature during sterilization cycle. | Perform a new cycle. |
| "High Temp" message is displayed. | The temperature raised 7°F (4°C) above sterilization temperature during the sterilization stage for 2 seconds during sterilization cycle. | Perform a new cycle. |

| | | |
|---|---|---|
| "Heat Time Error" is displayed. | The system cannot reach the required temperature, in the chamber, within the preset time. | Check that the autoclave is not overloaded. |
| "Low Pressure" is displayed. | Pressure drops below the sterilization pressure (134°C = 304 kPa, 121°C = 205 kPa) for 2 seconds during the sterilization stage. | Perform a new cycle. |
| "High Pressure" is displayed. | Chamber Pressure raised 4.2 psi-29 kPa above sterilization pressure (134°C = 304 kPa, 121°C = 205 kPa) for 2 seconds during the sterilization stage. | Perform a new cycle. |
| "Pressure Time Error" is displayed. | The system cannot reach the required pressure conditions in the chamber, after preset time, during the air removal stage. | Check that the autoclave is not overloaded. |
| "RTC Error - Please Set Current Date and Time" is displayed. | Date and the time are not set. | Set Current Date And Time. If the problem persists, call the technician. |
| "Time Error" is displayed. | The real time clock is faulty. | Call the technician. |
| "Door is open (During the cycle)" is displayed. | The door is open: During the cycle. | Close the door to perform a new cycle. |
| "Canceled By User" is displayed. | The START/STOP key is pressed and cycle aborted. | Wait until "cycle failed – canceled by user" or "cycle end – canceled by user" is displayed.<br>Perform a new cycle. |
| "Cycle Failed" and the following symbol are displayed. | An error occurred before sterilization cycle is completed. | Perform a new cycle. |
| "Air Error" is displayed at the end of the cycle. | The autoclave does not reach the atmospheric pressure after 10 minutes. | Wait until the autoclave reaches the atmospheric pressure and perform a new cycle. |
| I/O Card Failed | This message is displayed if I/O card is faulty or disconnected (both while cycle is running or not). | Call the technician. |

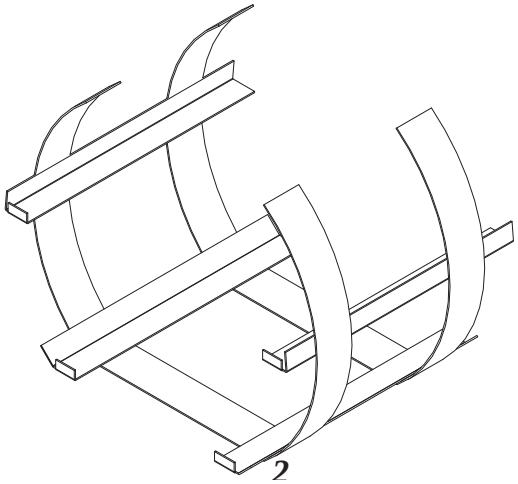
| | | |
|---|---|---|
| "Power Down" is displayed. | power down occurred during the cycle. (this message will be printed by the printer after the autoclave will turn on). | Turn on the autoclave and wait until the autoclave is ready (reaches the safe condition) and perform a new cycle. |
| If the problem is not covered by this section or if the problem persists, contact your dealer or point of purchase for further assistance. | | |

| | ***Cat. No.*** |
|---|---|
| ***Big*** | TRY507-0003 |
| ***Small*** | TRY507-0005 |



***1***

***TRAY HOLDER – TRH507-0001***



***2***

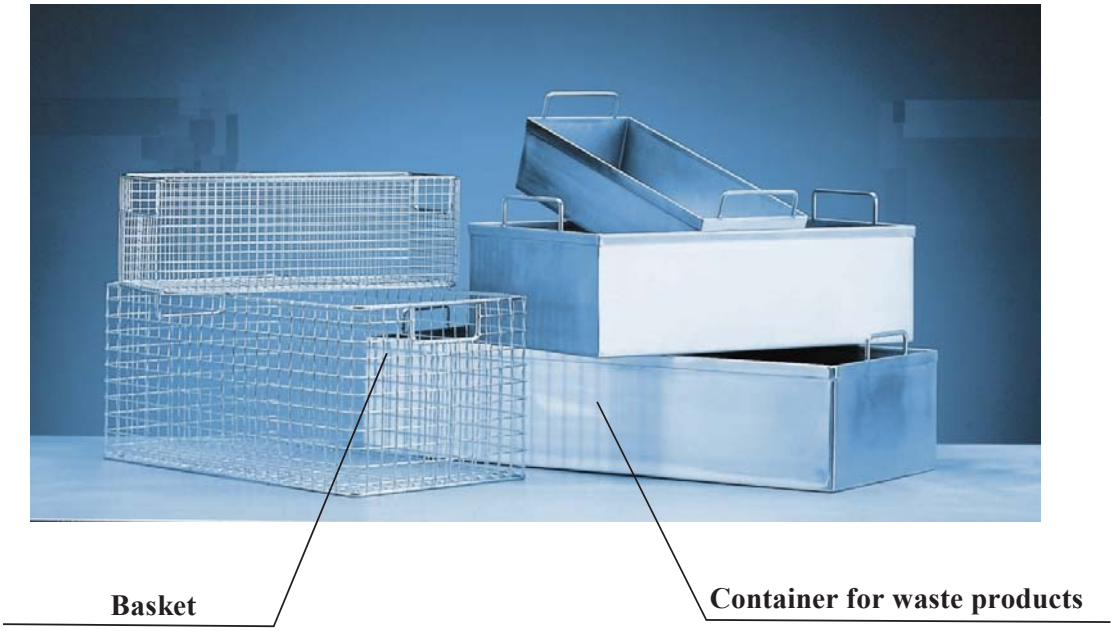
## *11 ACCESSORIES LIST*

| *PART NUMBER* | *DESCRIPTION* |
|---|---|
| GAS084-0007 | Silicon drain tube |
| THE002-0052 | Printer, PLUSII-S2B-0004 |
| TRH507-0001 | Tray holder |
| TRY507-0003 | Big tray |
| TRY507-0005 | Small tray |

## *12 SPARE PARTS LIST*

| *PART NUMBER* | *DESCRIPTION* |
|---|---|
| FIL175-0027 | Cap for ¼" strainer |
| FIL175-0046 | Strainer element |
| GAS082-0008 | Teflon gasket 4mm for strainer |
| POL067-0004 | Water reservoir cover |

**BASKETS AND CONTAINERS**




| Model | Stainless steel wire baskets | | Stainless steel container for waste products | |
|---|---|---|---|---|
| | L x D x H (mm) | Capacity | L x D x H (mm) | Capacity |
| **5050** | 500 x 380 x 250 | 1 | 500 x 380 x 250 | 1 |
| **5075** | 715 x 380 x 250 | 2 | 715 x 380 x 250 | 2 |

CANNONDESIGN

# SUBMITTAL IDENTIFICATION SHEET

**To be completed by Contractor/CM**

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

DEVIN D GATES
SUBMITTED BY

115300-001
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

115300
SPECIFICATION SECTION / PARAGRAPH

MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

CRITICAL

ITEM BEING SUBMITTED (check only one)

- ○ Shop Drawings
- ○ Samples ( _____ copies)
- ○ LEED Submittal
- ○ Certification / Qualifications
- ◉ Record Documents
- ○ Product Data
- ○ Coordination Drawing
- ○ Calculations
- ○ Schedules
- ○ O&M Manuals
- ○ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ○ Information Only ○ Record

REMARKS OR DEVIATIONS

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

DEVIN D GATES — 092916
REVIEWED BY — DATE

**To be completed by Reviewer**

11 5300-001
CANNON DESIGN SUBMITTAL NUMBER

9/29/16
RECEIVED DATE

- ○ A. No Exceptions Taken
  No further review of submittal is required.
- ◉ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ○ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ○ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ○ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ○ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

● APPROVAL PENDING WEBSTER UNIVERSITY'S REVIEW

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ○ See attached sheet(s) for additional comments

Provide 3 Ph, 480v unit.

Approval pending Webster University's review.

Kelvin Patel — Digitally signed by Kelvin Patel DN: C=US, E=kpatel@cannondesign.com, O=Cannon Design, OU=Architect, CN=Kelvin Patel Date: 2016.11.09 15:36:39-06'00' — 11/9/16
REVIEWED BY — DATE