STURDY
APEX GROUP

“Sturdy” Autoclave Sterilizer

SA-202N / SA-232N
Instruction Manual

Please read manual carefully before using and keep it well.

CE 2460

422-02040 v.05 07 December 2018

Contents

1. Important Safety Instructions

⚠**Caution:** Please install, operate and maintain the sterilizer in accordance with this Instruction Manual. Failure to do so could result in serious injury or damage to the unit.

⚠**Warning:** The outer casing and metal surfaces of the sterilizer will be hot during operation, please do not touch it.

⚠**Warning:** Steam and hot water will be present when opening the door after a sterilizer cycle. Avoid contact.

⚠**Warning:** DO NOT place alcohol or other flammable items in the sterilizer. An explosion could occur, causing personal injury.

⚠**Warning:** DO NOT place any objects on the top of the sterilizer.

⚠**Warning:** It will require at least two (2) or more people to carry the sterilizer to avoid dropping it off by mistake.

⚠**Warning:** Always check the pressure gauge before opening the door. DO NOT attempt to open the door if the pressure is not at zero (0).

⚠**Warning:** Use only distilled water. Normal tap water contains minerals, especially chlorides, which have corrosive effects on stainless steel. Failure to use distilled water will invalidate the warranty.

⚠**Warning:** Always allow a minimum of 20 minutes between each sterilization cycle.

⚠**Warning:** The door must be closed completely during operation of the unit. If the “DOOR” indicator light illuminates, it means that the door is not closed properly.

⚠**Warning:** Use sterilization indicator test strips to check that sterilization has been successful.

⚠**Warning:** Always check the water level in the reservoir before running a sterilization cycle. If water level is less then “mini level” label please adds distilled water in to reservoir.

⚠**Warning:** Do not overfill the water reservoir. The water level must be maintained between the green Full and Minimum labels on the right hand side of the sterilizer.

⚠**Warning:** If the ALARM indicator light  illuminates, the machine is over-pressure or overheated. The sterilizer will shut down automatically. Contact your supplier for service support.

⚠**Warning:** Failure to follow the Maintenance Instructions will adversely affect performance and lifespan of the sterilizer, and may invalidate the warranty.

⚠**Warning:** Always keep the sterilizer clean.

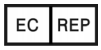
⚠**Warning:** In an emergency, or before carrying out any maintenance, always disconnect the power cord from the outlet.

⚠**Warning:** A separate (dedicated) circuit is recommended for the sterilizer. The sterilizer should not be connected to an electrical circuit with other appliances or equipment.

⚠**Warning:** Please unplug the power cord and drain off water from the reservoir if the sterilizer will not be used regularly.

⚠**Warning:** Always check the status of the electric wire; unplug the power cord if breakage comes up. Contact your supplier for service support.

2. Explanation of Safety Symbols and Notes

	Caution, consult instruction manual for use
	Protective earth (ground)
	Alternating Current
	Attention! Hot surface
	Disposal of Electrical & Electroic Equipment (WEEE): This product should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product. (European community only)
	Authorised representative in the European community
	Manufacturer
	Date of manufacture It is a 6-digit number. The first 4 digits represent the year and the last 2 digits represent the month.
	Consult instruction manual for use
	On, connection to the mains
	Off, disconnection from the mains
POWER	Power switch
NOTE	Indicates information that user should pay special attention to.
CAUTION	Indicates correct operating or maintenance procedures in order to prevent damage to or destruction of the equipment or other property.
WARNING	Indicates correct operating or maintenance procedures in order to prevent damage to or destruction of the equipment or other property.

3. Unpacking

⚠**Caution:** It will require at least two (2) or more people to carry the sterilizer to avoid dropping it off by mistake.

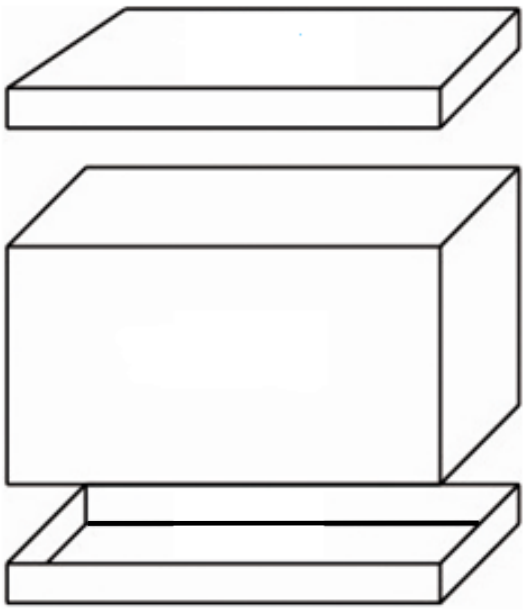


Figure 1

A Cut the banding

B Lift off the top cover of the carton

C Remove the wall and the foam packaging inserts

D Carefully lift the sterilizer from the packaging base

E Check all accessories are present as follows (accessories are packed inside the sterilizer chamber):

- Instruction Manual × 1
- Heater Cover × 1
- Sterilization Box × 1 (Standard)*
- Tray Frame × 1 (Optional) *
- Tray × 3 (Optional)*
- Holder × 1 (Optional)*
- Spring Pouch Rack (Optional)*

*The accessories will be different according to the order request.

We recommend that all packaging material is retained for possible re-use.

4. Installation

4.1 Environment

This equipment has been designed for use in accordance with the International EMC (Electromagnetic Compatibility) Standards. In view of different environments, please follow the instructions given below to eliminate interference, if necessary.

- Move the equipment or rotate its direction;
- Enlarge the space between the equipment and other machines;
- Put the plug into other outlets;
- Please consult with the local distributor or qualified electrician.
- Regarding the environmental temperature for installation, please refer to “9. Specifications”.

4.2 Install the sterilizer

⚠**Caution:** Please read and follow “5.2” on Page 11 in order to understand the operation of the sterilizer.

⚠**Caution:** While installation; please make sure that the bearing capacity of installation table is enough to carry the sterilizer. For the weight information of the sterilizer, please refer to “Specifications”.

⚠**Caution:** Position the sterilizer on a stable laboratory bench or work surface, ensuring at least 10 cm clearance between the wall or other pieces of equipment and the sides of the unit for free circulation of air.

⚠**Caution:** Make sure that the door can be opened freely after installation.

⚠**Warning:** Do not install or operate the sterilizer in areas where flammable items or volatile substances are used or stored. An explosion could occur, causing personal injury. An installation site with good air circulation is required.

A. Open the water reservoir cap; pour distilled water into the water reservoir as Figure 2.

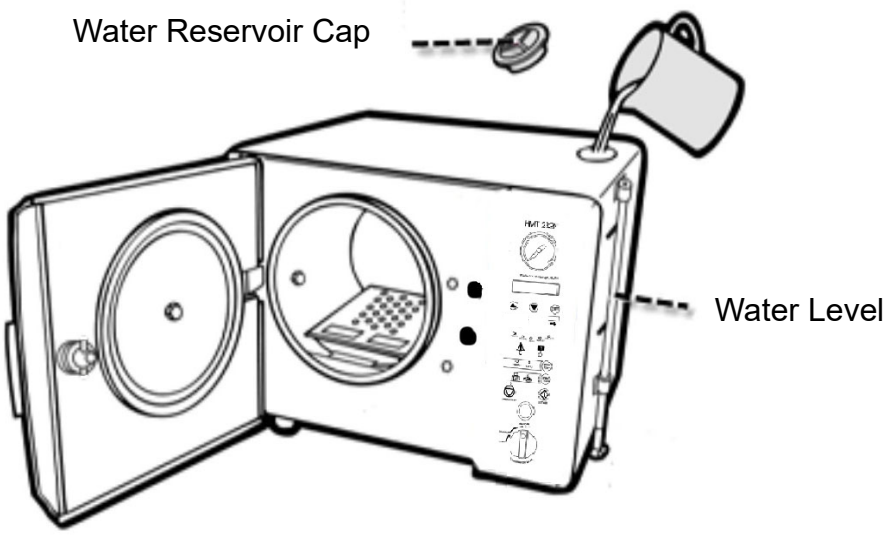


Figure 2

⚠Caution: Please fill Distilled Water Only into the unit. Take care not to overfill the yellow water level mark as Figure 3 and Figure 10.

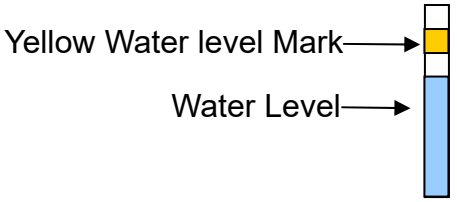


Figure 3

B. Water Quality

Physical characteristics and contaminants levels.

The distilled or mineral – free water supplied to the autoclave should have the physical characteristics and maximum acceptable level of contaminants indicated in the table below:

Physical Characteristics and Maximum acceptable contaminants levels in water for sterilizers.

(According to EN 13060-2004+A1-2009).

Table C.1 — Contaminants of condensate and feed water

	Feed water	Condensate
Evaporate residue	≤ 10 mg/l	≤ 1,0 mg/kg
Silicium oxide, SiO_2	≤ 1 mg/l	≤ 0,1 mg/kg
Iron	≤ 0,2 mg/l	≤ 0,1 mg/kg
Cadmium	≤ 0,005 mg/l	≤ 0,005 mg/kg
Lead	≤ 0,05 mg/l	≤ 0,05 mg/kg
Rest of heavy metals, excluding iron, cadmium, lead	≤ 0,1 mg/l	≤ 0,1 mg/kg
Chloride	≤ 2 mg/l	≤ 0,1 mg/kg
Phosphate	≤ 0,5 mg/l	≤ 0,1 mg/kg
Conductivity (at 20 °C)	≤ 15 µs/cm	≤ 3 µs/cm
pH value	5 to 7,5	5 to 7
Appearance	colourless, clean, without sediment	colourless, clean, without sediment
Hardness	≤ 0,02 mmol/l	≤ 0,02 mmol/l
NOTE 1 The use of water for steam generation with contaminants at levels exceeding those given in this Table can greatly shorten the working life of a sterilizer and can invalidate the manufacturer's warranty of guarantee.		
NOTE 2 The condensate is produced from steam that has been taken from the empty sterilizer chamber.		

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

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

C. Install the heater cover to the chamber as Figure 4. (standard accessory).

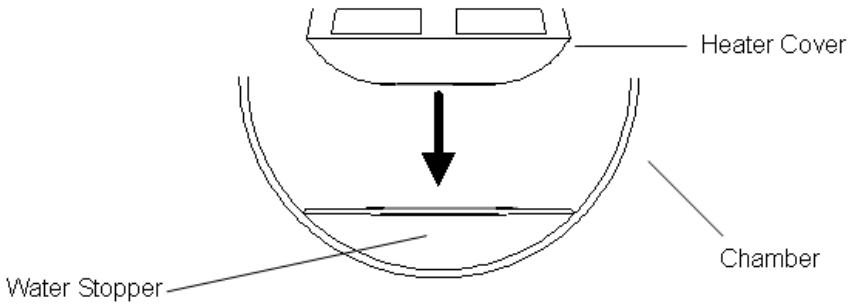


Figure 4

D. Install the Sterilization Box as Figure 5. (standard accessory)

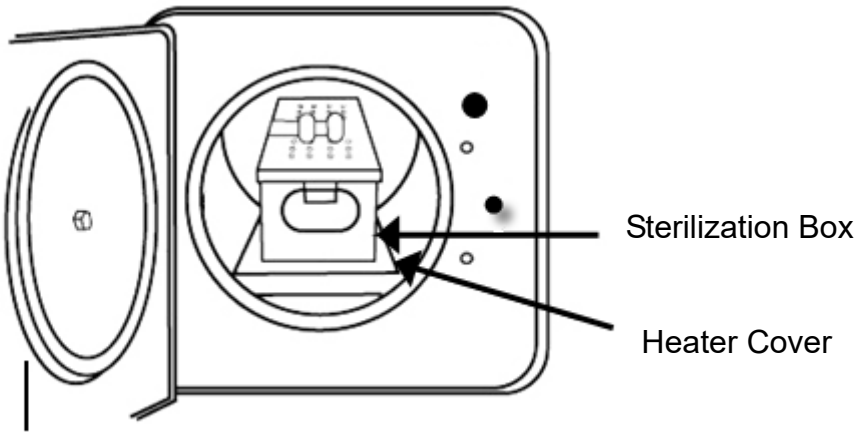


Figure 5

E. Install the tray frame as Figure 6. (optional accessory)

⚠**Caution:** The frame should be installed as Figure 6 below. The indention of the frame will pass the bushing in the chamber.

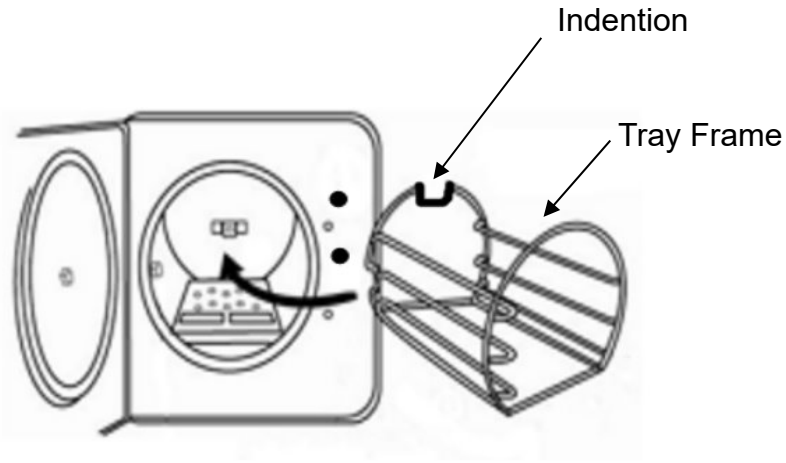


Figure 6

F. Install the tray as Figure 7. (optional accessory)

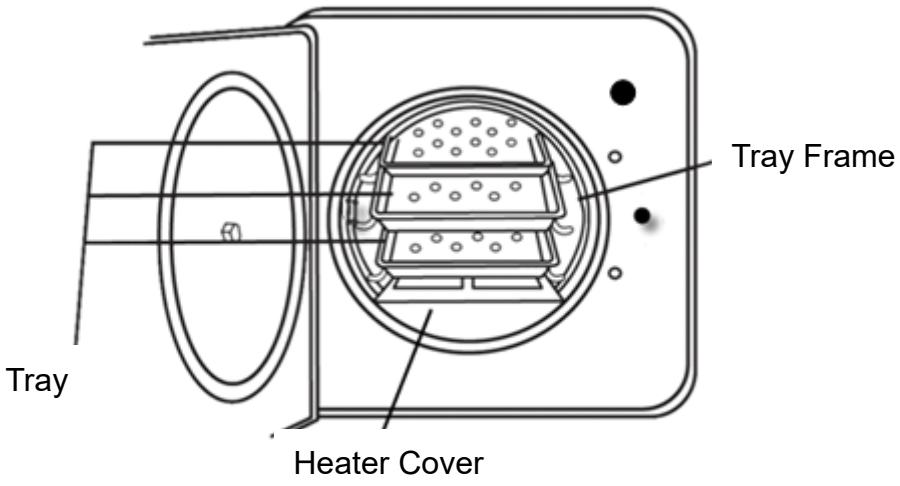


Figure 7

G. The maximum useable space is 6.5L which is 170 mm (W) x 320 mm(L) x 120 mm(H)

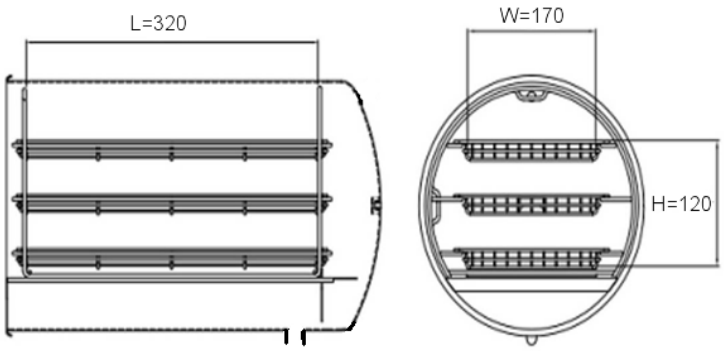


Figure 8

H. Close the door and turn the door knob clockwise and see “A parts” to touch the “Blue ring” as Figure 9.

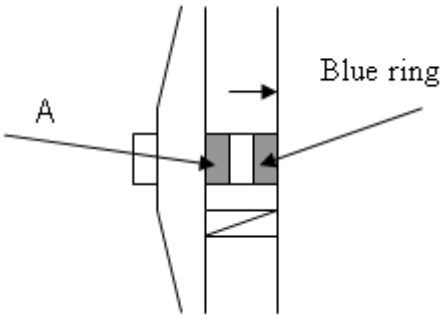


Figure 9

I. Ensure the Power Switch is in OFF “O” position, and then plug the power cord into a separate (dedicated) mains socket.

⚠**Warning:** A separate (dedicated) socket is required for the sterilizer. Make sure the socket is earthed and can offer the capacity of 15 A / 230V AC.

⚠**Warning:** The plug is one of the measures of emergency cutoff; please make sure that the plug is accessible after installation.

J. Press the “POWER” switch to ON “I” position, the power indicator light should illuminate with a short beep. The “DOOR” indicator light should be off. If the sterilizer does not perform as above-mentioned, please turn off the power and unplug the sterilizer, repeat the steps from 4.2.A to 4.2.F. If the problem still presents, please turn off the power and unplug the sterilizer. Contact the local distributor for help.

K. For battery of recorder charge please keep power on one day after install autoclave.

L. Please drain off water from the chamber by piping as Figure 10 after cool off the cycle finish.

⚠ **Warning:** Always allow cool off the water of chamber before drain off water.

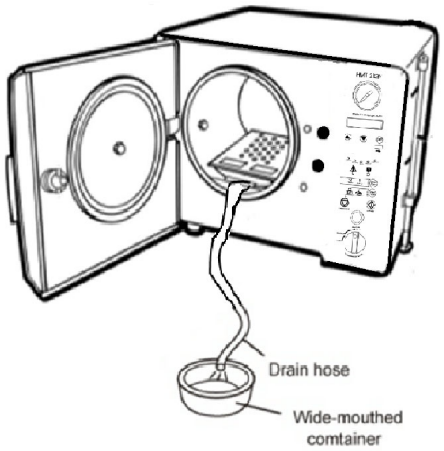


Figure 10

5. Introduction

5.1 Intended Use

This product is a tabletop high pressure steam sterilizer which is designed and developed for the sterilization of wrapped and unwrapped items.

5.2 Description of the Sterilizer

5.2.1 External View

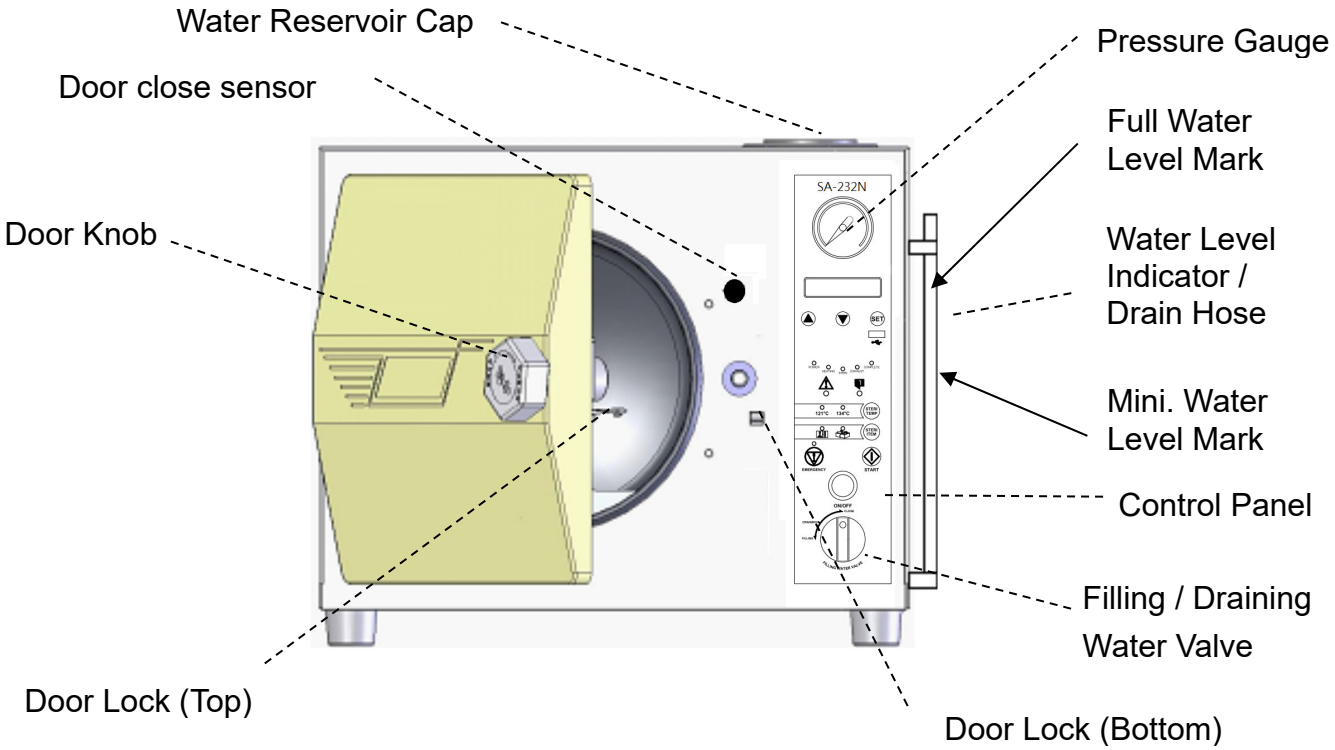


Figure 11

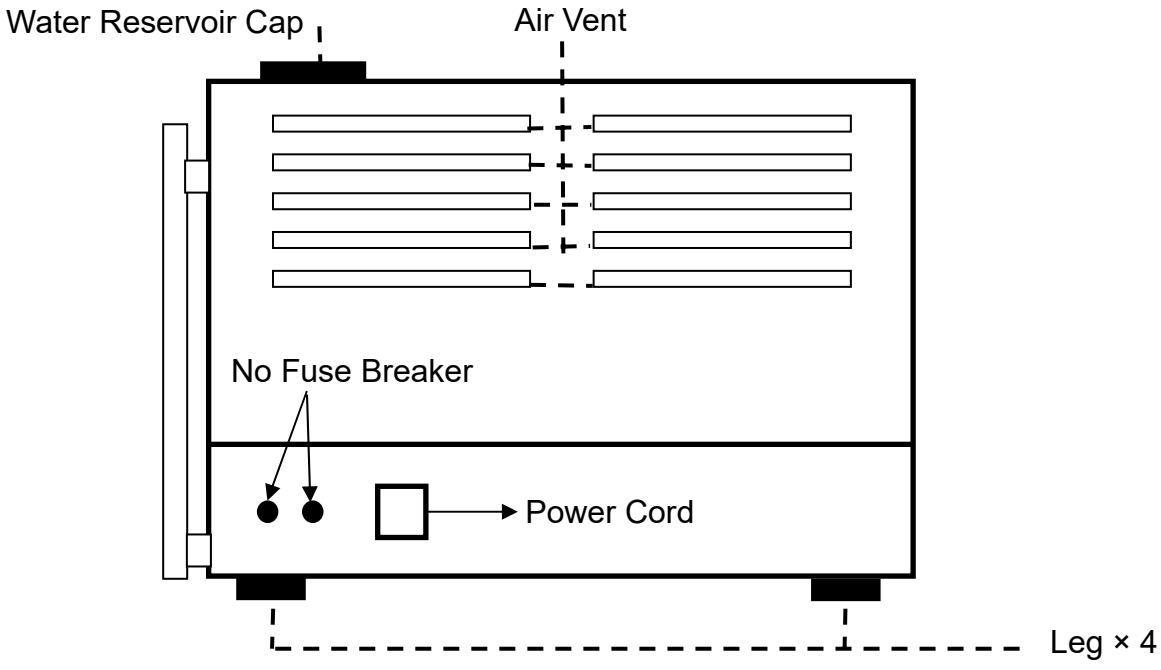


Figure 12

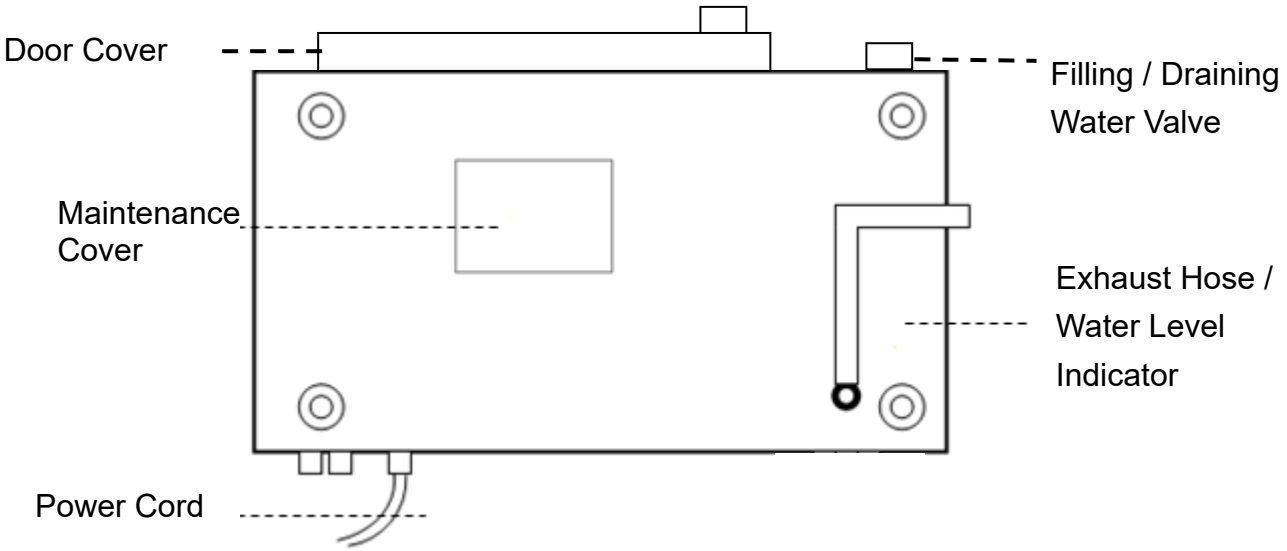


Figure 13

5.2.2 Internal Configuration

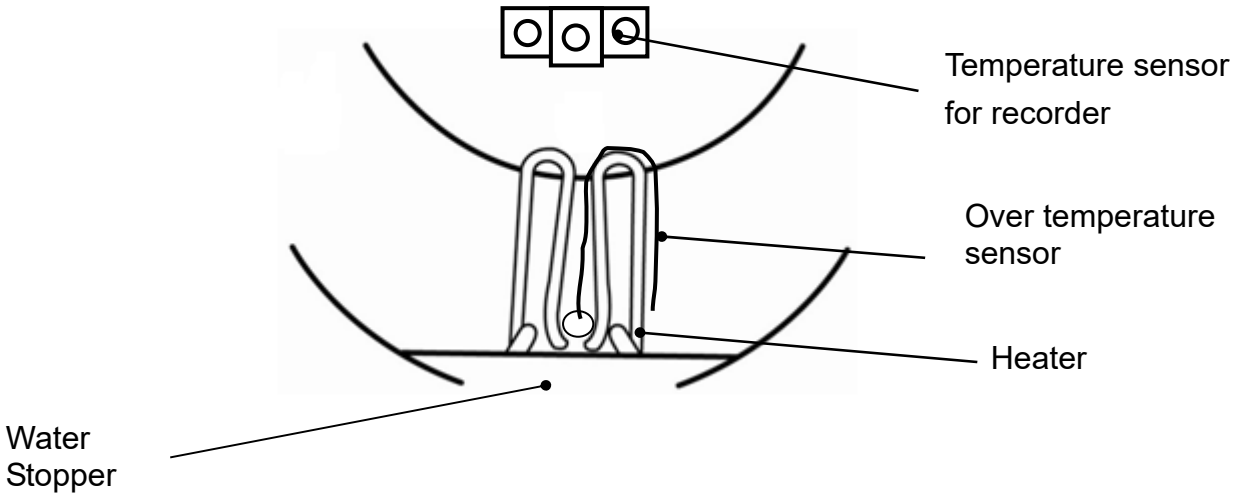
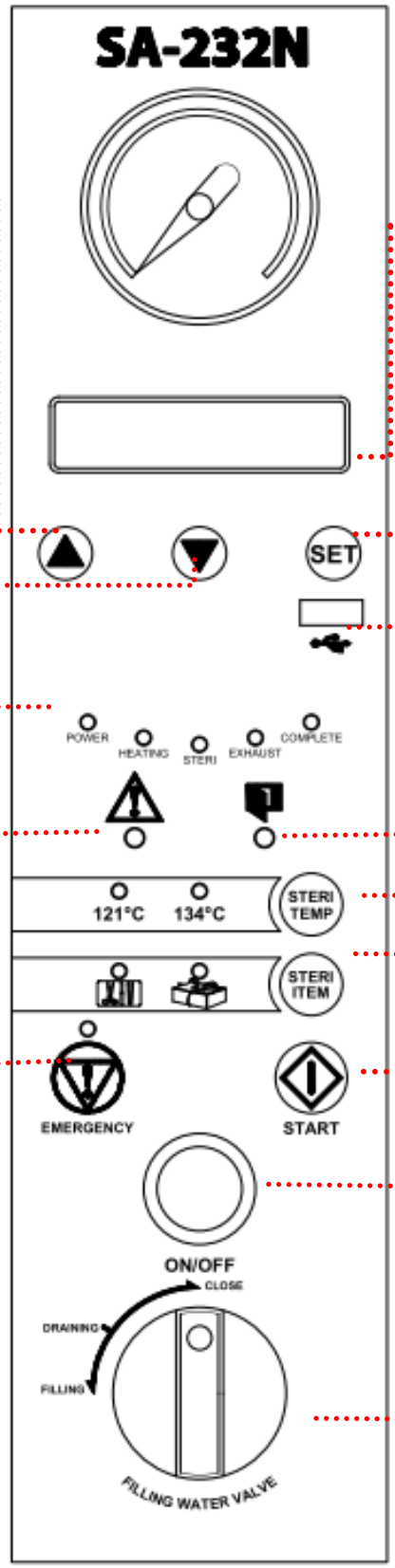


Figure 14

5.2.3 Control Panel



▲Increase button
1) to move cursor backward
2) to advance digits

▼Decrease button
1) to move cursor forward
2) to decrease digits

Process Status Indicator
Individual LED light to indicate the current status of the sterilization program.

- Power
- Heating
- Sterilization
- Exhaust – pressure release
- Complete

Visual Alarm Indicator Light
Indicates over-temperature or over-pressure in the chamber

Emergency Stop Button
Stop program and release pressure.

LCD:
1）Display date and time
2）Display chamber temperature
3）Recording status

SET Button
1）to set the parameter
2）to confirm adjustment

USB port

Door Open Indicator Light
Indicates the chamber door is open or not closed fully.

Sterilization Temperature Button
Select the required sterilization temperature of 121°C or 134°C. The selected temperature light will illuminate.

Sterilization Item Button
Select between unwrapped or wrapped items. The selected item light will illuminate.

Start Button
Start the selected Program.

Power Switch
ON/OFF switch and power indicator (Illuminates when ON)

Filling / Draining Water Valve
Filling : Water flows from the water reservoir into the chamber.
Draining: Exhausts the steam from the chamber into the water reservoir after the sterilization cycle is finished.

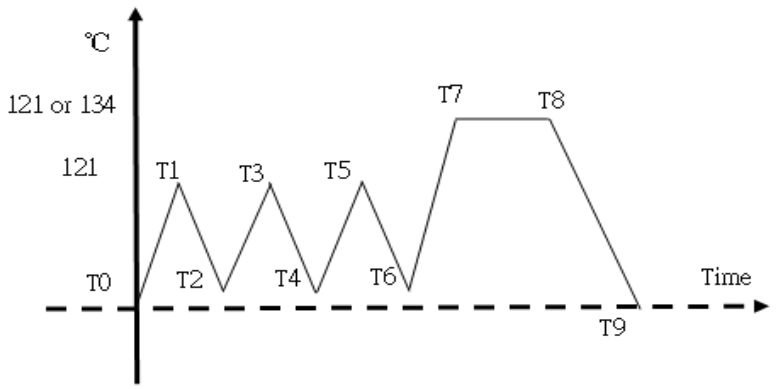
Figure 15

6. Operation

The “Table 1” describes the build-in programs that can be used by the sterilizer model SA-232N.

Table 1

Cycle Program	Description
UNWRAPPED 121°C	The sterilization of non wrapped solid products. Pre - pulses step with 3 times, Sterilization temp 121°C, Sterilization time 22 minutes
UNWRAPPED 134°C	The sterilization of non wrapped solid products. Pre - pulses step with 3 times, Sterilization temp 134°C, Sterilization time 4 minutes.
WARAPPED 121°C (Option function)	The sterilization of wrapped items solid products. Pre - pulses step with 3 times, Sterilization temp 121°C, Sterilization time 30 minutes.
WARAPPED 134°C (Option function)	The sterilization of wrapped items solid products. Pre - pulses step with 3 times, Sterilization temp 134°C, Sterilization time 15 minutes.



Legend of each cycle:

Table 2

PP1- PP3	Pre - pulses (Air removal stage)	T1-T2, T3-T4, T5-T6
H1-H4	Heating stage	T0-T1, T2-T3, T4-T5, T6-T7
S0-S60	Sterilizing stage (Holding stage)	T7-T8
EX	Exhaust stage	T8-T9

Maximum load of each build-in program:

Table 3

SA-202N

		Program		Program (Option)	
		Unwrapped	Unwrapped	Wrapped	Wrapped
Temperature (°C)		121	134	121	134
Pressure (bar)		1.1	2.1	1.1	2.1
Sterilization time (minutes)		22	4	30	15
Total time (minutes)		51	35	60	48
Max. load	Solid unwrapped (g)	3000		-	
	Wrapped (g)	-		700	

Table 4

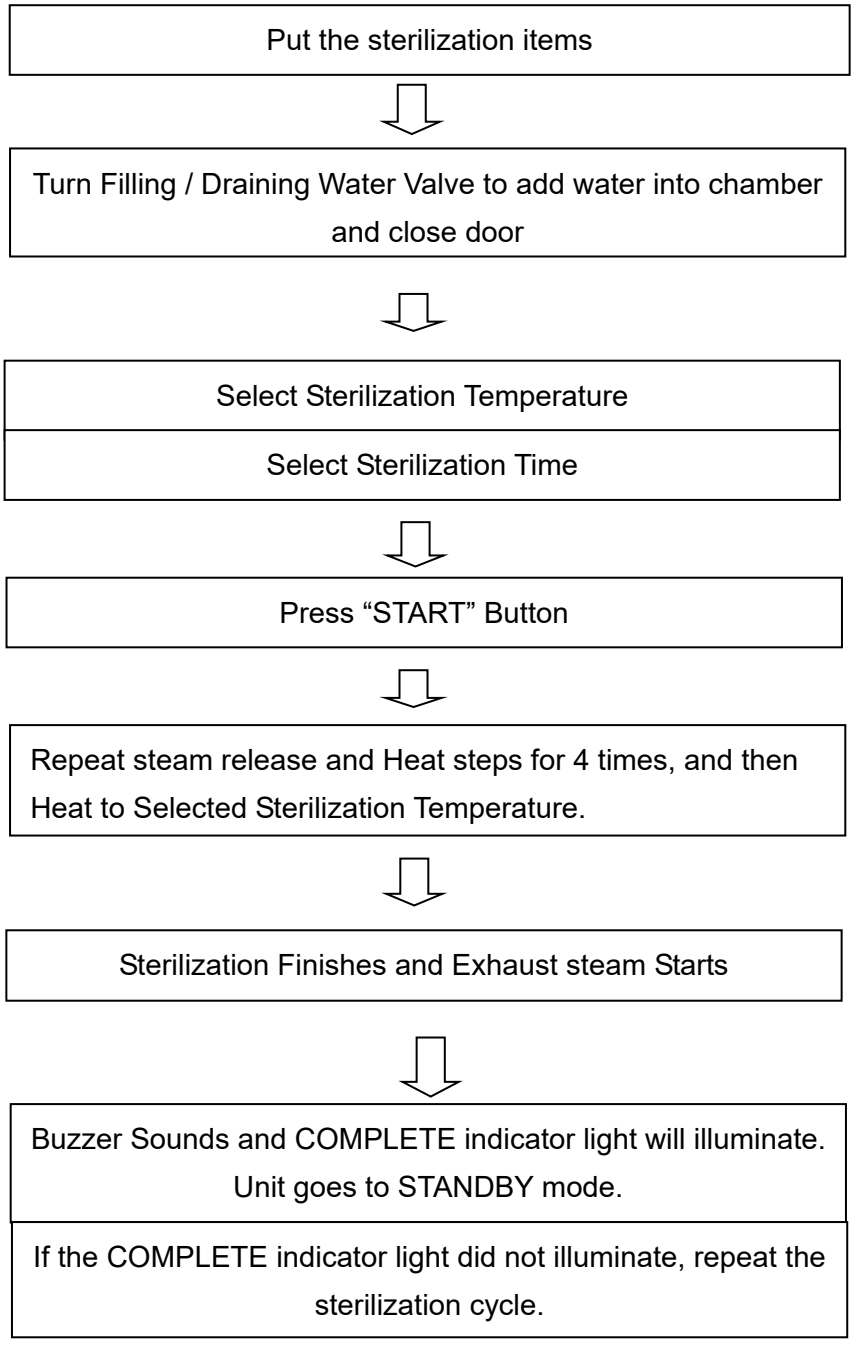
SA-232N:

		Program		Program (Option)	
		Unwrapped	Unwrapped	Wrapped	Wrapped
Temperature (°C)		121	134	121	134
Pressure (bar)		1.1	2.1	1.1	2.1
Sterilization time (minutes)		22	4	30	15
Total time (minutes)		51	35	60	48
Max. load	Solid unwrapped (g)	5000		-	
	Wrapped (g)	-		1000	

⚠CAUTION: The manufacturer does not guarantee any sterilization loads that exceed the above specifications.

6.1 Operation Overview

6.1.1 Operation Overview



6.2 Unwrapped sterilization Program

A. Follow “4. Installation” on Page 5 to finish installation first.

B. Follow “4.2 Install the sterilizer” on Page 5 to make sure the water inside reservoir is sufficient.

C. Check the Pressure Gauge is reading ZERO, and then open the door by turning the door knob counterclockwise.

D. Place the items to be sterilized and the sterilization indicator strips into the box as required. Remember to open both side windows before placing the box into the sterilizer as Figure 16.

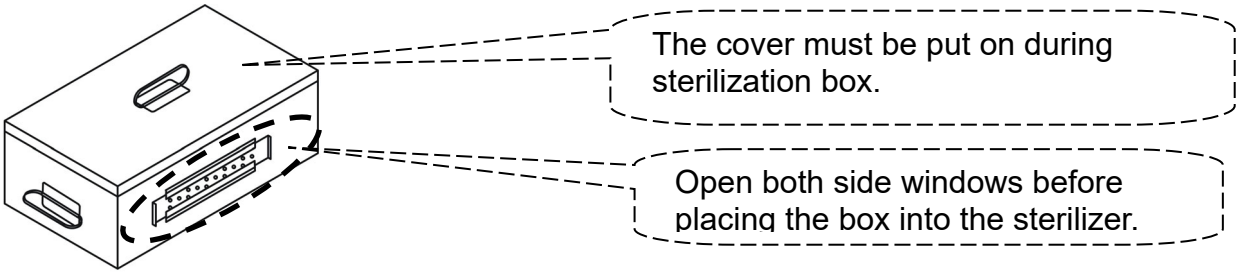


Figure 16

⚠**Caution:** Before loading, ensure instruments are cleaned and rinsed.

⚠**Warning:** Refer to “10. Specifications” for the maximum permissible load. Failure to follow these instructions may cause the sterilizer to malfunction and result in an unsuccessful sterilization cycle.

E. Turn the water valve to “**FILLING**” to fill water into chamber. (Water level must approaching to water stopper) Then turn the valve to “**CLOSE**” to stop filling.

F. Close the door and turn the door knob clockwise and see “A parts” to touch the “Blue ring” as Figure 17.

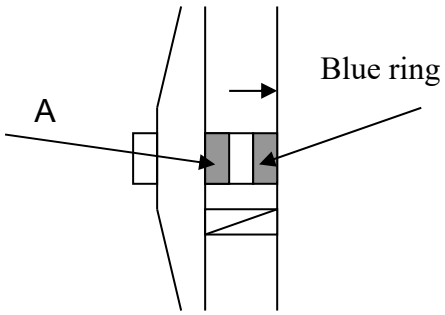


Figure 17

G. Press the “POWER” switch to ON “I” position, the power indicator light should illuminate with a short beep. The “DOOR” indicator light should be off.

H. How to set the normal program:

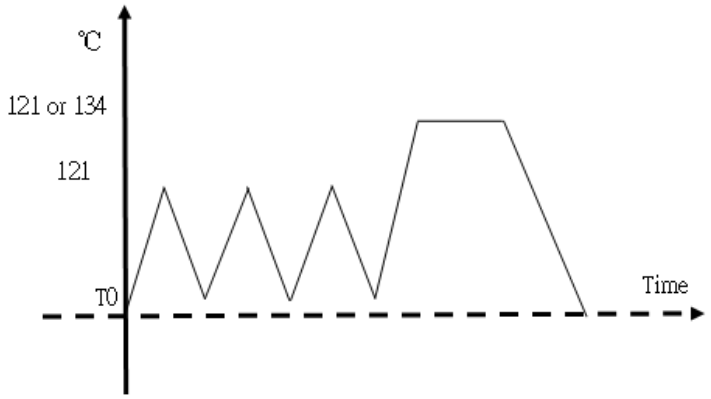


Figure 18

G.1 Press “STERI TEMP” 

to select 121°C or 134°C.

G.2 Press “STERI ITEM” 

to select unwrapped instruments or wrapped items. The corresponding parameters will be:

	Sterilization Temperature 121°C	Sterilization Temperature 134°C
Unwrapped	22 Mins	4 Mins

G.4 Press the START Button 

and the sterilizer will automatically run through the selected program. The current progress of the sterilization cycle is indicated by the illuminated LED on the Process Status Indicator. (Figure 19)

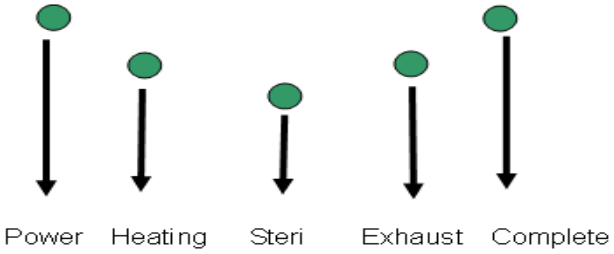


Figure 19

On completion, the buzzer will sound (long beep). The program has finished when the buzzer STOPS and the COMPLETE indicator light is illuminated on the Process Status Indicator.

⚠**Warning:** The hot water inside chamber when you open the door.

⚠**Warning:** If the COMPLETE indicator light was not lit, the cycle has failed and should be re-run.

G.5 Open the door and take out the sterilized items. Check the status of the indicators. If failed, repeat the cycle. Consult with the qualified technician for calibration if necessary. Please refer to “9. Troubleshooting”.

⚠**Warning:** Check the Pressure Gauge is reading ZERO before opening the door.

⚠**Warning:** Beware of steam when opening door after a sterilization cycle.

⚠**Warning:** Be careful when removing the sterilized items as the metal surfaces might still be hot. Always wear suitable hand protection to remove the box or use the appropriate aids (tray holder) to lift the trays.

⚠**Warning:** If using the sterilizer continuously, it’s required to have a 20-minute interval between each sterilization cycle to allow the unit to cool.

6.3 Wrapped sterilization Program (Option program)

⚠WARNING: Users who is the program should take their own responsibilities and obligations to undertaken the risk of sterilization uncertainty.

A. Follow “4. Installation” on Page 5 to finish installation first.

B. Follow “4.2 Install the sterilizer” on Page 5 to make sure the water inside reservoir is sufficient.

C. Check the Pressure Gauge is reading ZERO, and then open the door by turning the door knob counterclockwise.

D. Place the items to be sterilized and the sterilization indicator strips into the box as required. Remember to open both side windows before placing the box into the sterilizer as Figure 16.

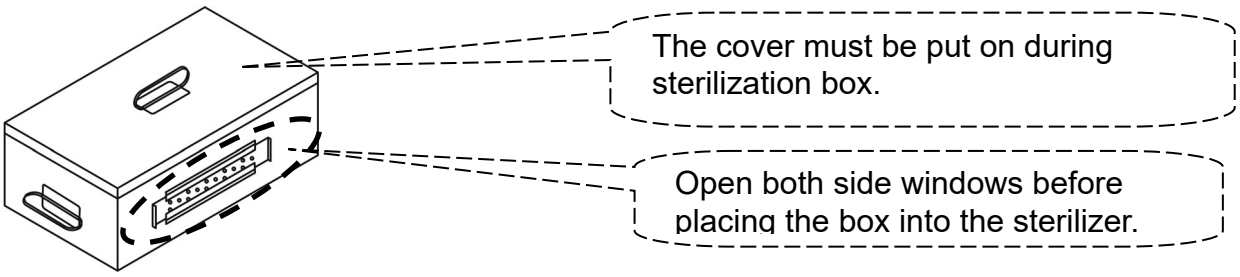


Figure 20

⚠**Caution:** Before loading, ensure instruments are cleaned and rinsed.

⚠**Warning:** Refer to “10. Specifications” for the maximum permissible load. Failure to follow these instructions may cause the sterilizer to malfunction and result in an unsuccessful sterilization cycle.

E. Turn the water valve to “**FILLING**” to fill water into chamber. (Water level must approaching to water stopper) Then turn the valve to “**CLOSE**” to stop filling.

F. Close the door and turn the door knob clockwise and see “A parts” to touch the “Blue ring” as Figure 17.

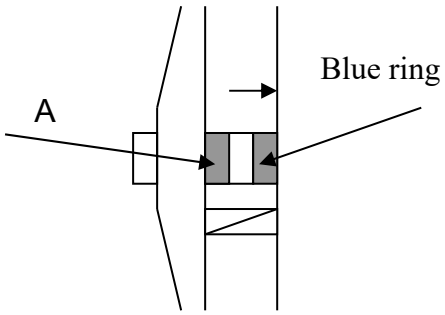


Figure 21

G. Press the “POWER” switch to ON “I” position, the power indicator light should illuminate with a short beep. The “DOOR” indicator light should be off.

H. How to set the normal program:

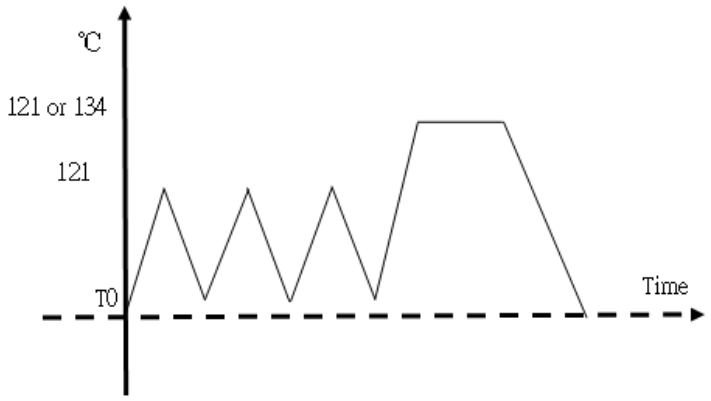


Figure 22

G.1 Press “STERI TEMP” 

to select 121°C or 134°C.

G.2 Press “STERI ITEM” 

to select unwrapped instruments or wrapped items. The corresponding parameters will be:

	Sterilization Temperature 121°C	Sterilization Temperature 134°C
Wrapped	30 Mins	15 Mins

G.4 Press the START Button 

and the sterilizer will automatically run through the selected program. The current progress of the sterilization cycle is indicated by the illuminated LED on the Process Status Indicator. (Figure 19)

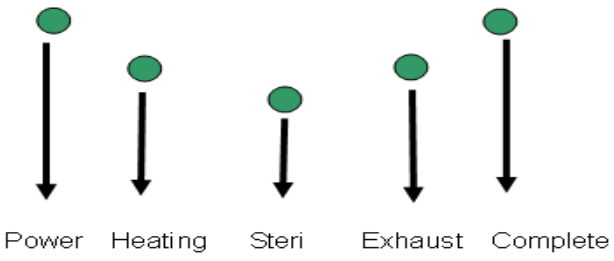


Figure 23

On completion, the buzzer will sound (long beep). The program has finished when the buzzer STOPS and the COMPLETE indicator light is illuminated on the Process Status Indicator.

⚠**Warning:** The hot water inside chamber when you open the door.

⚠**Warning:** If the COMPLETE indicator light was not lit, the cycle has failed and should be re-run.

G.5 Open the door and take out the sterilized items. Check the status of the indicators. If failed, repeat the cycle. Consult with the qualified technician for calibration if necessary. Please refer to “9. Troubleshooting”.

⚠**Warning:** Check the Pressure Gauge is reading ZERO before opening the door.

⚠**Warning:** Beware of steam when opening door after a sterilization cycle.

⚠**Warning:** Be careful when removing the sterilized items as the metal surfaces might still be hot. Always wear suitable hand protection to remove the box or use the appropriate aids (tray holder) to lift the trays.

⚠**Warning:** If using the sterilizer continuously, it’s required to have a 20-minute interval between each sterilization cycle to allow the unit to cool.

6.4 Emergency Stop

Press the Emergency Button 

3 seconds to stop the program and release the pressure. The sterilizer will sound to alert. Please wait till the pressure gauge is reading ZERO, or turn .off/on the power switch to reset the program.

.

⚠**Warning:** The Emergency Button can only been pressed when there’s an unusual event or emergency. The sterility of the sterilized items should be verified again.

⚠**Warning:** Disposal of the items which is sterilized by unfinished cycle should be in accordance with the local laws. Do not handle them as general waste.

6.5 Placement for items to be sterilized

Please place items to be sterilized on the tray properly in order to have the best drying result.

⚠**Warning:** To sterilize absorbent cotton or woolen, please wrap it with sterilizing pouch to avoid piping clog.

6.5.1 Sterilization for Implements

Place implements on the tray evenly according to Figure 24. Do not pile up nor overlap each implement.

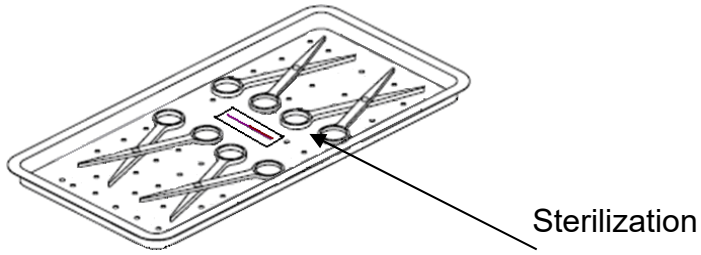


Figure 24

⚠**Warning:** If implements are packed with sterilizing pouches, please make sure not to pile them up. Follow Figure 25 for correct placement and do not overlap pouches like Figure 26 to ensure the sterilization quality.

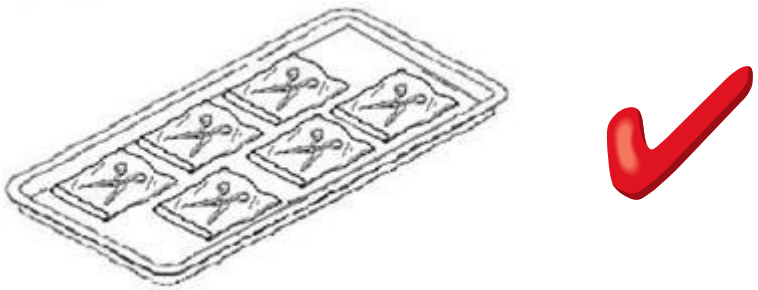


Figure 25

Figure 26

Warning: We suggest using Spring Holder for items with sterilizing pouches to assure sterilization result. Follow Figure 27 or Figure 28 to place each pouch separately. Spring holder is available as an optional accessory.

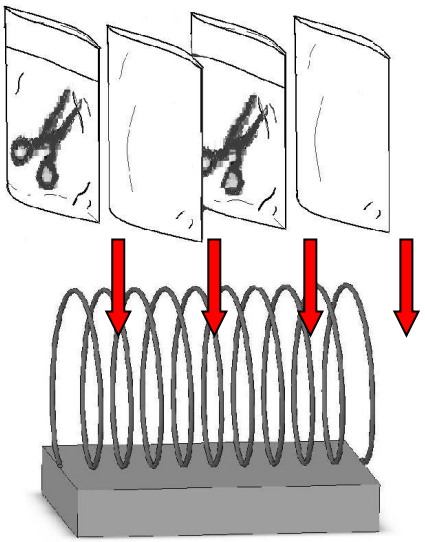


Figure 27

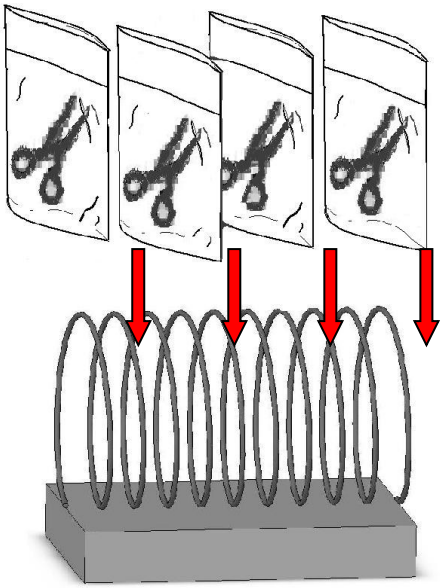


Figure 28

Warning: If implements are packed with sterilizing pouches and placed inside a sterilization box, make sure to display items as Figure 29.

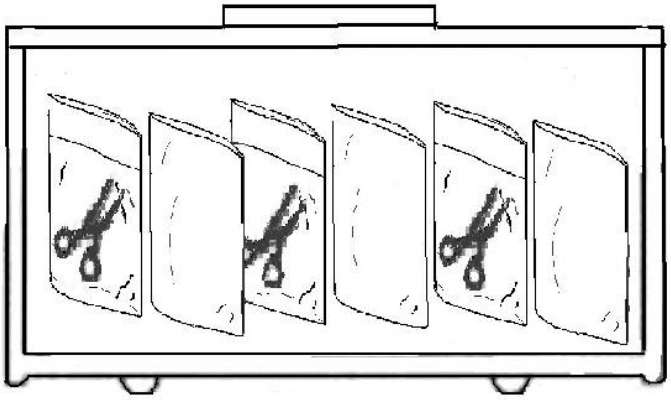


Figure 29

6.5.2 Sterilization for Wrap

⚠**Warning:** To sterilize absorbent cotton or woolen, please wrap it with a thin towel, covering cloth, linen, or sterilizing pouch to avoid piping clog according to Figure 30.

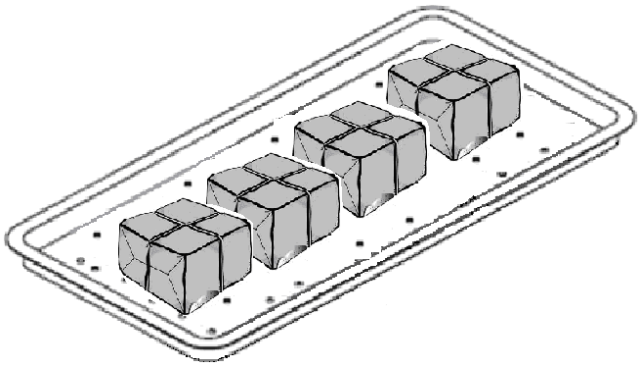


Figure 30

- Place wrap upright on the tray.
- Be careful not to let wrap touching the inner side of chamber.
- Make sure the openings of wraps are perpendicular to the tray in order to improve sterilization performance.
- Arrange openings of wraps toward same direction.
- When place sterilizing pouch on the sterilization box or tray, make sure the medical grade paper is facing upward.

6.5.3 Placement for sterilization box

- Insert chemical indicator into wrap, then place wrap inside the sterilization box.
- Be sure there will be enough space between each wrap for better air flow.
- Make sure to close the cover of sterilization box properly.

Figure 31

⚠**Warning:** Please follow above Figure and place wrap vertically inside the sterilization box.

7. Recorder

7.1 Intended use

This paperless Recorder records the sterilization temperature, theoretical steam pressure and real time information during each cycle as an optional method of printer. It records the specified information onto an USB flash drive, in the Excel csv (Comma Separated Values) format which compatible with Microsoft® Office Excel or Windows® WordPad.

⚠ Note: Insert a formatted USB flash drive before commencing a sterilization cycle.

⚠ Note: Microsoft Office Excel and Microsoft WordPad are registered trademarks of Microsoft, Inc. Microsoft is a registered trademark.

⚠ Note: A minimum 20 minutes is recommended between each sterilization cycles, and be sure of “Data transfer complete” has been completed to a USB before starting a new sterilization cycle.

7.2 Recording contents

Description of recording contents:

Two type of recording files will be created for each sterilization cycle. One is Detail Contents in the format of “YYMMDD_HHMMSS.csv”, and the other is the Summary Contents in the format of “SYYMMDD_HHMMSS.csv”.

7.2.1 Description of Detail Content

Printer output	Description
MODEL:SA-232N	Model number
Version:V0.99	Software version installed in this autoclave
SN：161005004-003	Series number
Program： 134 Unwrapped	Program selected
Ster. Temp：134 ºC	Sterilization temperature
Ster. Time： 4 m	Sterilization duration
Dry Time： 0 m	Dry duration
Date：2016/12/13 Time：11:45:57 AM	Date and Time of sterilization
Cycle Counter ：59	Cycles that had been started

Step	Time mmm:ss	Temp. ºC	Pres. bar
Start	000:00	25.4	0.01
	000:01	25.4	0.01
	000:02	25.4	0.01
	~		
H1	000:05	25.5	0.01
	000:06	25.5	0.01
	~		
PZ1	021:17	123.6	1.13
	021:18	123.6	1.12
	~		
H2	022:19	109.2	0.34
	022:20	109.3	0.35
	~		
H4	032:50	108.1	0.30
	032:51	109.1	0.31
	~		
S00	040.13	136.9	2.16
	040:14	136.9	2.16
	~		
S01	041:13	136.6	2.14
	041:14	136.5	2.14
	~		
EXH	044:20	136.7	2.11
	044:21	136.6	1.97
	~		
END	046:23	101.2	0.04

Step	action
Time mmm:ss	mmm: minutes starting record, ss: seconds starting record
Temp(ºC)	chamber temperature in ºC
Pres(bar)	Chamber pressure in bar
Start	start time
H1	1st heating
PZ1	1st Pre - pulses
H2	2st heating
PZ2	2st Pre - pulses
H3	3st heating
PZ3	3st Pre - pulses
H4	4st heating
S00	start of sterilization
S02	sterilization time recorded every 1 minutes after “S00”; and also the last sterilization time
EXH	exhaust of water and steam
END	end of recording

Ster. Temp ： 135.3 ~ 136.9 ºC	The maximum and minimum temperature detected during sterilization period
Ster. Pres ： 2.12 ~ 2.20 bar	The maximum and minimum pressure detected during sterilization period
Ster. Time ： 004:05	Sterilization period
Total time ： 046:24	Time elapsed between start and program complete
Program complete	Message of ending recording
Signature:_____	Signature office

7.2.2 Description of Summary Contents

<table>
<tr><th>Printer output</th><th>Description</th></tr>
<tr><td>MODEL:SA-232N</td><td>Model number</td></tr>
<tr><td>Version:V0.99</td><td>Software version installed in this autoclave</td></tr>
<tr><td>SN：161005004-003</td><td>Series number</td></tr>
<tr><td>Program： 134 Unwrapped</td><td>Program selected</td></tr>
<tr><td>Ster. Temp：134 ºC</td><td>Sterilization temperature</td></tr>
<tr><td>Ster. Time： 4 m</td><td>Sterilization duration</td></tr>
<tr><td>Dry Time： 0 m</td><td>Dry duration</td></tr>
<tr><td>Date：2016/12/13
Time：11:45:57 AM</td><td>Date and Time of sterilization</td></tr>
<tr><td>Cycle Counter ：59</td><td>Cycles that had been started</td></tr>
<tr><td>
<table>
<tr><th>Step</th><th>Time mmm:ss</th><th>Temp. ºC</th><th>Pres. bar</th></tr>
<tr><td>Start</td><td>000:00</td><td>25.4</td><td>0.01</td></tr>
<tr><td>H1</td><td>000:05</td><td>25.5</td><td>0.01</td></tr>
<tr><td>PZ1</td><td>021:17</td><td>123.6</td><td>1.13</td></tr>
<tr><td>H2</td><td>022:19</td><td>109.2</td><td>0.34</td></tr>
<tr><td>PZ2</td><td>026:44</td><td>123.7</td><td>1.11</td></tr>
<tr><td>H3</td><td>027:46</td><td>108.7</td><td>0.31</td></tr>
<tr><td>PZ3</td><td>031:48</td><td>123.6</td><td>1.13</td></tr>
<tr><td>H4</td><td>032:50</td><td>108.1</td><td>0.29</td></tr>
<tr><td>S00</td><td>040:13</td><td>136.9</td><td>2.16</td></tr>
<tr><td>S01</td><td>041:13</td><td>136.6</td><td>2.14</td></tr>
<tr><td>S02</td><td>042:13</td><td>136.5</td><td>2.13</td></tr>
<tr><td>S03</td><td>043:13</td><td>136.8</td><td>2.15</td></tr>
<tr><td>S04</td><td>044:13</td><td>136.6</td><td>2.15</td></tr>
<tr><td>S05</td><td>044:18</td><td>136.7</td><td>2.16</td></tr>
<tr><td>EXH</td><td>044:20</td><td>136.2</td><td>2.11</td></tr>
<tr><td>END</td><td>046:23</td><td>101.2</td><td>0.04</td></tr>
</table>
</td><td>
<table>
<tr><td>Step</td><td>action</td></tr>
<tr><td>Time mmm:ss</td><td>mmm: minutes starting record,
ss: seconds starting record</td></tr>
<tr><td>Temp(ºC)</td><td>chamber temperature in ºC</td></tr>
<tr><td>Pres(bar)</td><td>Chamber pressure in bar</td></tr>
<tr><td>Start</td><td>start time</td></tr>
<tr><td>H1</td><td>1st heating</td></tr>
<tr><td>PZ1</td><td>1st Pre - pulses</td></tr>
<tr><td>H2</td><td>2st heating</td></tr>
<tr><td>PZ2</td><td>2st Pre - pulses</td></tr>
<tr><td>H3</td><td>3st heating</td></tr>
<tr><td>PZ3</td><td>3st Pre - pulses</td></tr>
<tr><td>H4</td><td>4st heating</td></tr>
<tr><td>S00</td><td>start of sterilization</td></tr>
<tr><td>S02</td><td>sterilization time recorded every 1 minutes after “S00”; and also the last sterilization time</td></tr>
<tr><td>EXH</td><td>exhaust of water and steam</td></tr>
<tr><td>END</td><td>end of recording</td></tr>
</table>
</td></tr>
<tr><td>Steri. Temp ： 135.3 ~ 136.9 ºC</td><td>The maximum and minimum temperature detected during sterilization period</td></tr>
<tr><td>Steri. Pres ： 2.12 ~ 2.20 bar</td><td>The maximum and minimum pressure detected during sterilization period</td></tr>
<tr><td>Steri. Time ： 004:05</td><td>Sterilization period</td></tr>
<tr><td>Total time ： 046:24</td><td>Time elapsed between start and program complete</td></tr>
<tr><td>Program complete</td><td>Message of ending recording</td></tr>
<tr><td>Signature:_____</td><td>Signature office</td></tr>
</table>

7.3 Storage medium

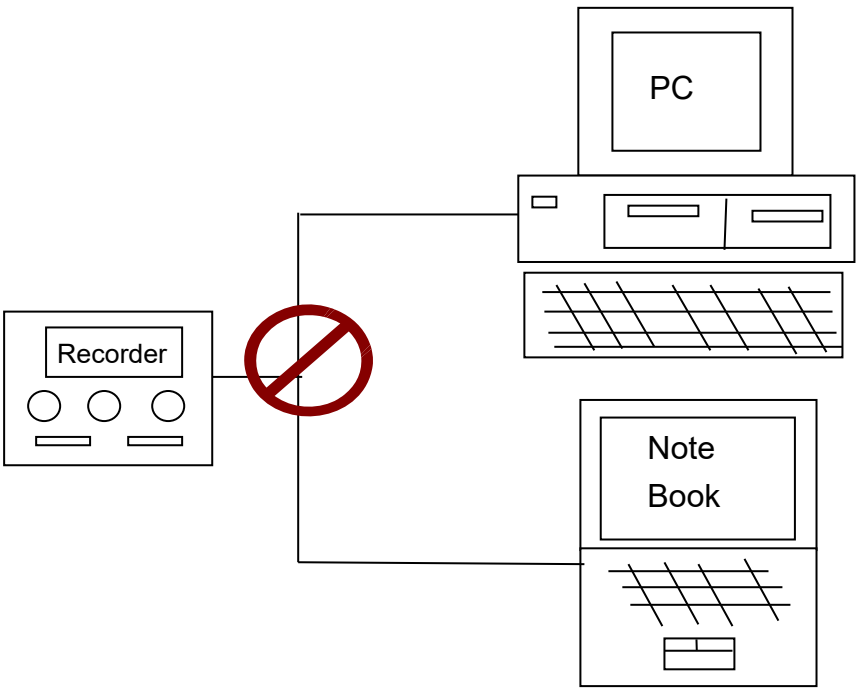
Use only recommended storage medium by the manufacturer such as SD, SD/HC (up to 32GB), or USB (2.0) flash drive.

You should format your storage medium prior insert into the Recorder for the first time. SD card supports FAT file system, and SD/HC card support FAT32 file system. You can operate on the files in this card in PC via a card reader or SD card interface. Data will be stored under the root directory only.

⚠ CAUTION: You should backup your storage medium to a safe medium periodally.

⚠ CAUTION: External hard drive is not allowed for connecting to the recorder.

⚠ CAUTION: Do not connect the Recorder to a PC or mobile devices such as notebooks.



7.4 Function description of the recorder

Refer to Figure 32 for the flow chart of recorder.

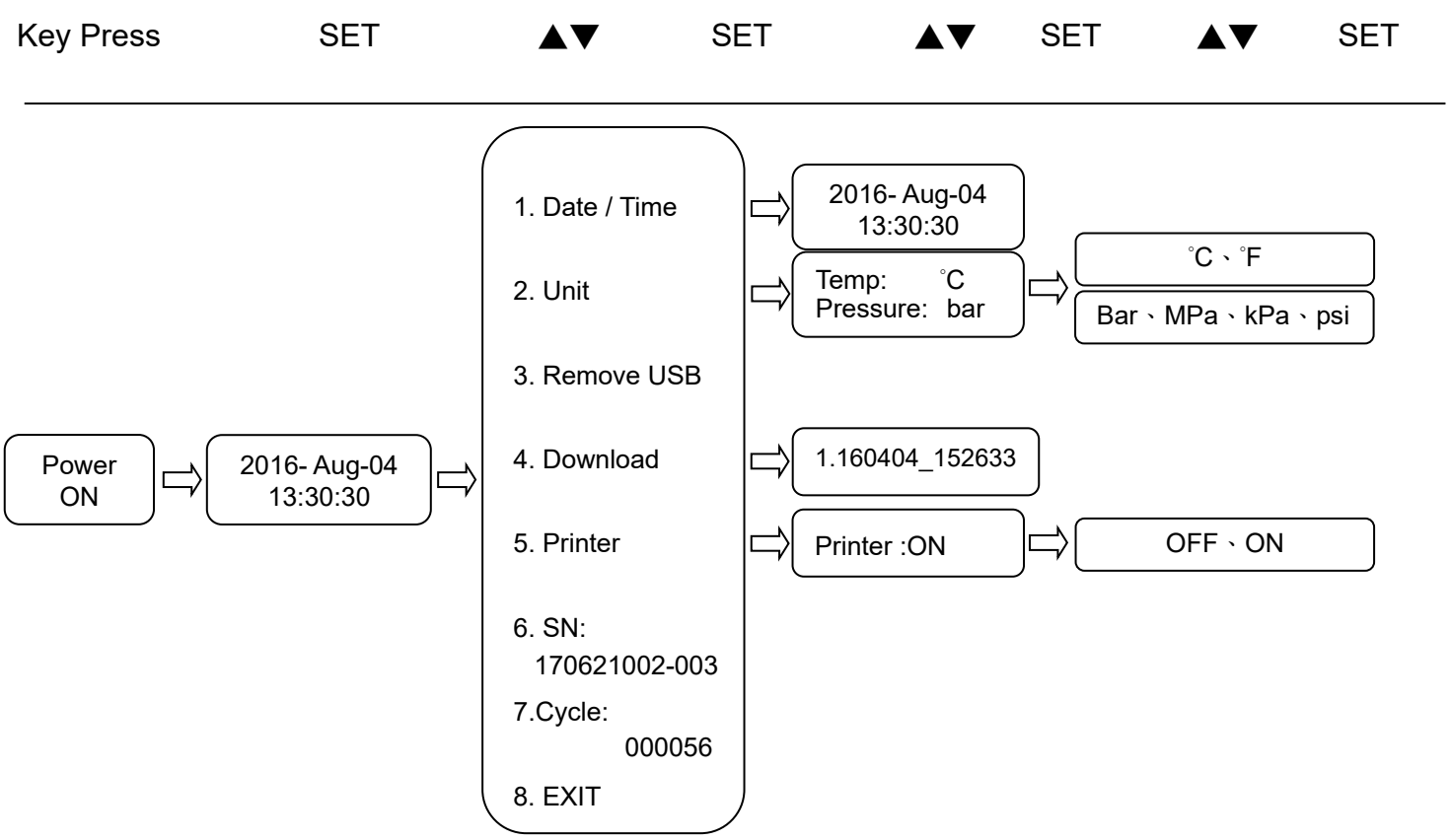


Figure 32

7.4.1 General

There are 3 types of operation modes for the recorder, they are stand-by mode, recording mode, and adjusting mode.

7.4.1.1 Stand-by mode

The date and time will be displayed after turn on the main power, and low battery symbol will flash for charging and/or low battery as shown in Figure 33.

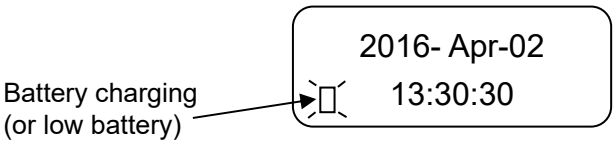


Figure 33

⚠Note: Call for service to replace the rechargeable battery if the exhaust battery symbol "□" presented after some cycles. After replacing and servicing, you have to set the date, time and unit again.

7.4.1.2 Recording mode

a) Recording of the sterilization data is activated automatically after press "Start" button on autoclave panel, and then the chamber temperature and flashing message "Rec" will be displayed.

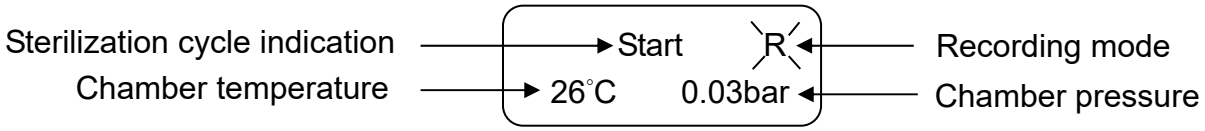


Figure 34

⚠ Note 1: Insert a formatted USB flash drive before commencing a sterilization cycle.

⚠ Note 2: If none of the USB flash drive being detected before commencing a sterilization cycle, the warming message "E105: No USB memory" is presented and the buzzer alarmed. This message will not affect the operation of sterilization work because the data will be stored onto the built-in memory for one cycle. Refer to "7.4.2.4 Download" for the further instructions to download the data onto a USB flash drive.

b) After completing a sterilization cycle, the data will be stored to USB flash drive; and the recorder returns to stand-by mode. The sequences of storage message are shown in the Figure 35.

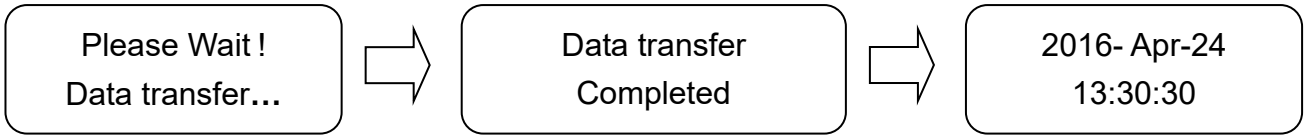


Figure 35

⚠ Note 1: If none of the USB flash drive being detected before completing a sterilization cycle, 2 warming messages “E105: No USB memory” followed by a buzzer alarm are presented.
The warning messages do not affect the operation of recording work. Refer to “7.4.2.4 Download” for the further instructions to download the data onto a USB flash drive.

⚠ Note 2: You may insert a USB flash drive before completing a sterilization cycle. Use a USB flash drive as the storage medium is highly recommended by the manufacturer, and always backup your USB flash drive to a secure zone.

7.4.1.3 Adjusting mode

Press “SET” button for adjusting the parameters of the recorder while in the stand-by mode.

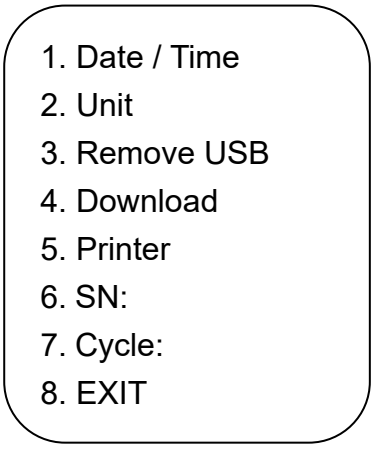


Figure 36 – Set manual

⚠Note: 1. The recorder returns to default stand-by mode after 15 seconds without any key been pressed in the “Set” manual.
2. The recorder returns to Set manual after 15 seconds without any key been pressed.

7.4.2 Set up

7.4.2.1 Set up date and time

Press “SET” button for adjusting the parameters of the recorder while in the stand-by mode. Press increase (▲) or decrease (▼) until “1. Date / Time” displayed as shown in Figure 37.

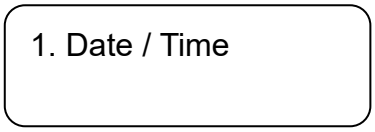


Figure 37

Press “Set” button for editing the contents, and then press increase (▲) and/or decrease (▼) button until current Date and Time presented.

The “Set” Button should be press for entering the parameter that you have changed, and shift to next parameter.

The sequence is in the order of Year-Month-Date-Hour-Minute-Second each time you press the “Set” button.

After entering the current Date and Time, press “Set” button returns to the Set manual, and then to choose “8 EXIT” press “Set” button again returns to the stand-by mode as shown in Figure 38.

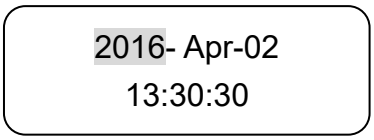


Figure 38

7.4.2.2 Set up unit (temperature and pressure)

Press “SET” button for adjusting the parameters of the recorder while in the stand-by mode. Press increase (▲) or decrease (▼) until “2. Unit” displayed as shown in Figure 39.

Figure 39

Press “Set” button for editing the temperature unit or pressure unit, and then press increase (▲) and/or decrease (▼) button until the desired temperature unit or pressure unit presented as shown in Figure 40.

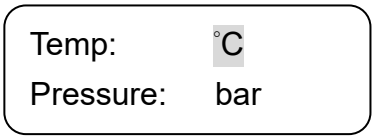


Figure 40

The sequence is in the order of Temperature - Pressure each time you press the “Set” button. After entering the unit, press “Set” button returns to the Set manual, and then to choose “8. EXIT” press “Set” button again returns to the stand-by mode as shown in Figure 38.

7.4.2.3 Remove USB

⚠ Caution: The data may be damaged if not follow this operation to detach the USB flash drive properly.

Press “SET” button in the stand-by mode and then press increase (▲) or decrease (▼) until “3. Remove USB” displayed as shown in Figure 41.

Figure 41

Press “SET” button, you will be prompt “Please remove USB Memory”, and then remove the USB memory safely. This message will be lasted until you have detached the USB memory.

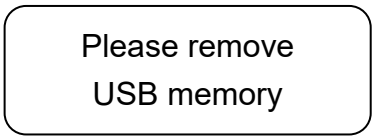


Figure 42

Press "Settings" to return to the previous page, as shown in Figure 38. Then select "8. Exit" and press "Set" to return to standby mode.

7.4.2.4 Download

⚠ Warning: The recorder can operate without a USB flash drive, but the data stored in the recorder will be overwritten by the next sterilization data if the recorder memory is full. Manufacturers strongly recommend that you use a USB flash drive as a storage medium and always back up the USB flash drive to a secure area.
If you must perform sterilization without a USB flash drive, you must follow the steps below to download the data.

Insert a formatted USB flash drive to appropriate port as shown in. Press “SET” button in the stand-by mode and then press increase (▲) or decrease (▼) until “4. Download” displayed as shown in Figure 43

Figure 43

Press the "SET" button, then press the increase (▲) or decrease (▼) to select the file to download, as shown in Figure 41.

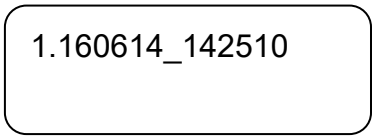


Figure 44

Press “SET” button, you will be prompt “Please Wait ! Data transfer.” and then followed by “Data transfer completed” as shown in Figure 45.

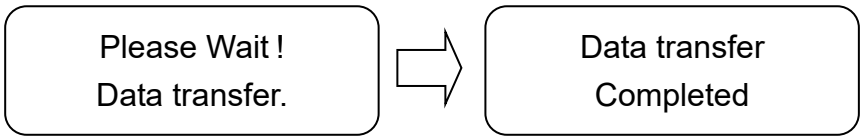


Figure 45

⚠Note: If none of the storage medium been detected, an message “E105: No USB memory” is presented and buzzer alarmed, the recorder than returns to previous manual after 15 seconds.

7.4.2.5 Printer

Press “SET” button in the stand-by mode and then press increase (▲) or decrease (▼) until “5. Printer” displayed as shown in Figure 41.

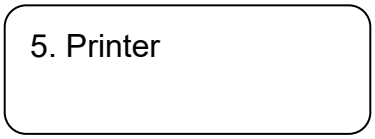


Figure 46

Press the Setup button to select the printer contents, then press the (▲) and/or (▼) buttons to select as shown in Figure 41.

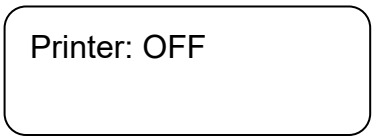


Figure 47

Press “SET” button returns to the Back to previous page.

7.4.2.6 SN:

Press the "SET" key in the standby mode, and then press the increase (▲) or decrease (▼) until the "6. SN:" shows the machine serial number as shown in Figure 41.

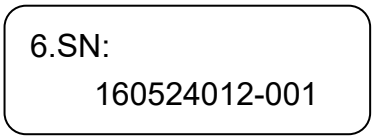


Figure 48

7.4.2.7 Cycle:

Press the "SET" key in the standby mode, and then press the increase (▲) or decrease (▼) until the "7. Cycle:" shows the number of machine uses, as shown in Figure 46.

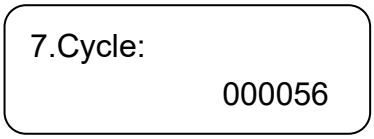


Figure 49

7.4.2.8 Exit

Press “SET” button in the stand-by mode and then press increase (▲) or decrease (▼) until the “8. Exit” displayed as shown in Figure 50.

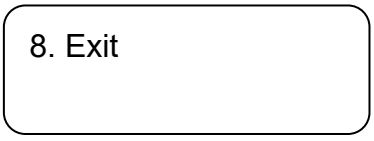


Figure 50

Press “SET” button returns to the stand-by mode.

7.5 Message and troubleshooting (for recorder)

Symptom	Solution
No display	- Turn on the main switch. - Plug the power cable. - Check if bad connection. - Contact local distributor for service
E101: Temp. Sensor fail	- Contact local distributor for service
E103: Pressure sensor fail	- Contact local distributor for service
E105: No USB memory	- Insert a USB flash drive. - Detach and re-insert memory card again
E107: USB is full	The data stored on the medium have reached its maximum limit, please backup the storage medium onto a secure zone immediately, and then followed the procedure “7.4.2.4 Download” to download the last record.
E108: USB formatter error	- Re-format the USB flash drive. - Replace another USB flash drive. - Contact local distributor for service
E109: EEPRM fail	- Replace another USB flash drive. - Contact local distributor for service
E125: Keyboard fail	Contact local distributor for service
E135: Abnormal of the cycle	- Check the power supply to the Autoclave. - Contact local distributor for service
E155: Password fail	Authorized person only. This function is reserved for diagnostic purpose by the manufacturer, users are password protected. Contact local distributor or manufacturer for information.

⚠**Caution:** Contact local distributor for service if encountered any other problems. Do not attempt to disassemble the sterilizer or recorder by yourself. Failure to do so could result in serious injury or damage to the unit.

8. Maintenance Instructions

⚠**Warning:** Before conducting maintenance, please turn off the sterilizer and disconnect from the power supply. Check the sterilizer has cooled down to room temperature.

⚠**Warning:** Make sure that pressure gauge is reading ZERO before opening the door.

⚠**Caution:** Before conducting maintenance, confirm that the chamber is empty without loads.

Correct and regular maintenance is required to optimize the performance of the sterilizer.
Failure to follow the Maintenance Instructions will adversely affect performance and lifespan of the sterilizer.

8.1 Daily

- Clean the external surfaces with soft cloth.
  Note: Use only quaternary disinfectants to clean the units. Use of alcohol cleaner containing substantial of alcohol in the formula may damage the faceplate.
- Wipe the inside of the chamber, door and the gasket with a damp, lint-free cloth.
- Check the water level. Top up with distilled water only.
- Ensure the vent holes in the water reservoir cap (Figure 8) are not blocked.
- Check the status of the power cord. Call for service if breakage comes up.

8.2 Weekly

- Clean the box, tray frame and trays with detergent, or a non-corrosive stainless steel cleaner and water, using cloth or sponge.
- Replace the distilled water in water reservoir:
  Drain water from the water reservoir using Drain Hose (Figure 11) located on the right side of the unit. Fill clean distilled water.

8.3 Monthly

- Clean the chamber and piping system with “CHAM-MATE” following the instructions on the sachet.
- Check the safety valve

  Turn off the power and unplug the sterilizer. Remove the water reservoir cap as Figure 51. Use a screw driver to pull the metal ring of the safety valve for approx. 3 seconds; then release. Perform the check 3 times. Put the water reservoir cover back.

⚠**Warning:** If excessive force is required to pull the safety valve, it must be replaced. Call for service.

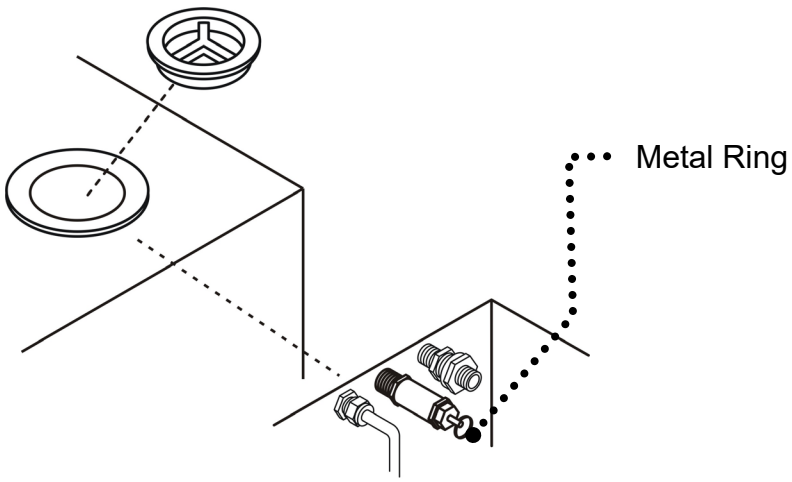


Figure 51

8.4 Annually

⚠**Caution:** An annual maintenance service by a trained engineer is necessary. Contact your distributor for details. The following maintenance instructions are for your reference only.

- Calibrate the temperature during sterilization process. (Use biological indicators to test the validity of sterilization)
- Check if there’s any leakage of the piping.
- Check if the Process Status Indicator lights are functioning normally.
- Check the working status of steam trap, safety valve, and heater.
- Check if the silicone door gasket is chapped or worn. Silicone door gaskets are consumable parts, replace the silicone door gasket every year is recommended.

8.4.1 SA-202N & SA232N

How to replace the silicone door gasket:

Install the gasket to the door groove following the order of Figure 52, Figure 53 and Figure 54.

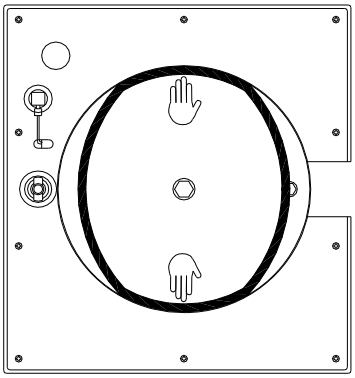


Figure 52

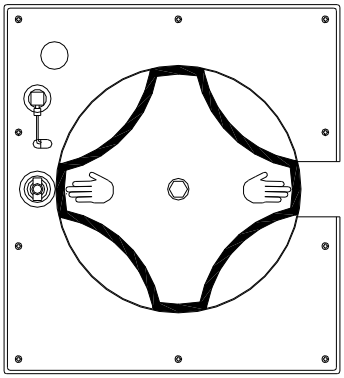


Figure 53

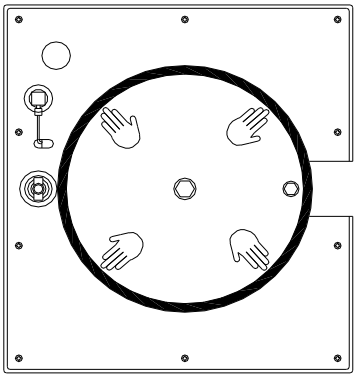


Figure 54

⚠**Caution:** The old gasket should be disposed in accordance with the local laws.

9. Troubleshooting and error code

Problem	Possible Cause	Solution
Power indicator isn't Illuminated	The main cable is unplugged or the socket switch is off.	Plug in the sterilizer and turn on the socket switch.
	Forget to turn on the switch.	Press the Power switch to ON "I" position.
	No Fuse Breaker tripped.	Wait till the sterilizer cool down the room temperature. Press the buttons of two No Fuse Breakers on rear of unit to reset.
Steam leaks from the door	Dirty or worn silicone door gasket	Clean the silicone door gasket. If the silicone door gasket was used over one (1) year, please follow "7.4 Annually" maintenance to replace it.
Door cannot be opened	Pressure persists inside chamber	Follow "6.4 " to press "Emergency Button" and release the pressure. Contact local distributor for service if problem persists.
Excessive force is required to pull the safety valve	1. Do not use the tool.	1. Please use the tool (e.g. screw driver or pliers) to pull the ring.
	2. Faulty safety valve	2. Contact local distributor for service.
No display	The main cable is unplugged or the socket switch is off.	- Plug the power cable.
	Forget to turn on the switch.	- Turn on the main switch.
	Other reasons	- Check if bad connection. - Contact local distributor for service
E101: Sensor error	1) Sensor is bad contact or other reasons. 2) Start signal fail.	- Chamber temperature higher than 110°C, open the door of chamber to cool down. - Control signal fail, contact local distributor for service
E103: Over temp.	System gets over temperature.	- Contact local distributor for service
E105: No memory card	Can't writ to memory card.	- Insert a SD card or USB flash drive. - Detach and re-insert memory card again
E107: The card is full	Bad memory card.	The data stored on the medium have reached its maximum limit, please backup the storage medium onto a secure zone immediately, and then followed the procedure "7.4.2.4 Download" to download the last record.
E108: Wrong format	Different operating systems.	- Re-format the SD card or USB flash drive. - Replace another SD card or USB flash

Problem	Possible Cause	Solution
		drive. - Contact local distributor for service
E109: Memory fail	Bad memory card.	- Replace another SD card or USB flash drive. - Contact local distributor for service
E125: Keyboard fail	Bad contact or other reasons.	Contact local distributor for service
E135: Power fail during the cycle	Lose power during running.	- Check the power supply to the Autoclave. - Contact local distributor for service
E155: Password fail	Password error.	Authorized person only. This function is reserved for diagnostic purpose by the manufacturer, users are password protected. Contact local distributor or manufacturer for information.

⚠**Caution:** Contact local distributor for service anytime if encountered other any other problems. Please do not attempt to disassemble the sterilizer by yourself Failure to do so could result in serious injury or damage to the unit.

⚠**Caution:** Contact local distributor for service if encountered any other problems. Do not attempt to disassemble the sterilizer or recorder by yourself. Failure to do so could result in serious injury or damage to the unit.

10. Specifications

Model	SA-202N	SA-232N
Chamber Capacity (L)	10	16
Maximum Instrument Length (mm)	280	350
Maximum Load (un-pouched) (g)	3,000	5,000
Maximum Load (pouched)* (g)	700	1,000
External Dimensions (mm)	537 (D) x 501 (W) x 406 (H)	537 (D) x 501 (W) x 406 (H)
Chamber Size (mm)	200 Diameter × 310 Depth	230 Diameter × 410 Depth
Gross Weight (kg)	39	39
Voltage/Wattage	220V~240V 50/60 Hz 1400W	
Fuses	10A × 2, No Fuse (circuit) Breaker	
Water Reservoir Capacity (ml)	4200	
Water Capacity per Cycle (ml)	450	650
Sterilization Temperature (°C)	121 / 134	
Working Environment	● Indoor use; ● Under 1,000m (altitude); ● Temperature 5°C to 40°C; ● Relative Humidity 80%RH@31°C to Relative Humidity 50%RH@40°C; ● Voltage fluctuation ±10 %; ● Transient overvoltages category II); ● (Pollution degree 2)	
Transportation Conditions	-10°C to 70°C, 10%RH to 90%RH	
Storage Conditions	-10°C to 50°C, 10%RH - 70%RH	
Over Pressure Protection	Safety valve 2.6 kgf/cm² (2.55 bar)	
Over Pressure Indication	Pressure protection switch with warning lamp	
Over Temperature Indication	Independent temperature protection device (EGO) with warning lamp	
Water Level Indication	NA	
Door Lock Indication	Micro switch sensor with warning LED	
Pressure Display	Analog Pressure and Thermo gauge	
Function Display	LED	
Program Selections	Wrapped/Unwrapped	
Temperature Selection (°C)	121 / 134	
Recorder	Yes, with USB & SD/HC storage	
Additional controls	Start, Emergency	

11. Warranty

WARRANTY

Your “**STURDY**” product has a one (1) year guarantee of defective in materials and workmanship under normal use from the date of purchase.

This warranty does not apply to any product damaged by accident, misuse, abuse, neglect, improper line voltage, drop, fire, flood. Or the products were altered or repaired by anyone other than qualified service personnel.

The liability of Sturdy Industrial Co., Ltd. is limited to repair of replacement and under no circumstances shall “**STURDY**” be liable for any collateral consequential damages or loss. This guarantee specifically excludes the expendables and consumable.

All warranty claims must be directed to the distributors or agents authorized by Sturdy Industrial Co.,Ltd. whom are responsible for the sales of this equipment. The customers are responsible for shipping expense.

User’s Name:_____

Address:

_____

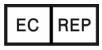
Country:_____ Tel:_____ Fax: _____

Date of Purchase: _____ Model No.: _____

Series No.:_____

Distributor:

Manufacturer: Sturdy Industrial Co.,Ltd. (ISO 9001 & 13485 Certificated Firm)

Name	Sturdy Autoclave Sterilizer
Model	SA-202N / SA-232N
Manufacturer 	Sturdy Industrial Co. Ltd.
Address	168, Sec. 1, Zhongxing Rd., Wugu District, New Taipei City, 24872, Taiwan
EC Representative 	APEX MEDICAL S.L. Elcano 9, 6 ª planta 48008 Bilbao. Vizcaya SPAIN