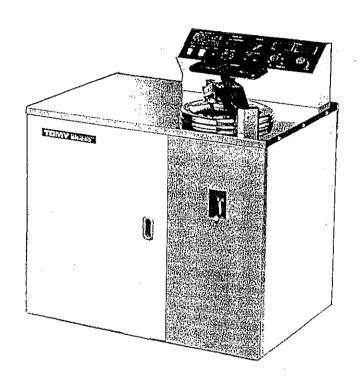
SR-240 RETORT FOOD AUTOCLAVE INSTRUCTION MANUAL



TOMY SEIKO CO.,LTD.

3-14-17 Tagara, Nerima-ku, Tokyo 179-0073, Japan Tel: 81-3-5987-3115

Fax: 81-3-3577-1655

Email:intnl@tomys.co.jp

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INTRODUCTION

The RETORT FOOD AUTOCLAVE, SR-240 has a sterilizing chamber with a capacity of 22 liters. The autoclave can be used for sterilization in products development and basic research for retort, canned and bottled food.

A range of facilities including an electronic temperature control, temperature indication, status indicators and leakage breaker makes the SR-240 excellent in terms of safety and operationability.

For a maximum performance and safe operation, read this manual thoroughly before using the SR-240 autoclave. Keep this manual for future reference.

GENERAL PRECAUTIONS

Although the RETORT FOOD AUTOCLAVE, SR-240 is carefully designed for simple installation and to be resistant to varied environmental conditions and power line voltage, the following general precautions must be observed for safety and long service life.

•Installation floor:

The installation floor must be flat, level and heavy-duty durable, and preferably made of concrete.

Direct sunshine, high humidity, high temperature and duty place should be avoided for long service life of the autoclave.

Do not install near gas generating facilities or chemicals.

•Power line :

The power line must satisfy the required ratings - voltage, frequency and amperage;

Rated power	Rated power	Operational
line voltage	line current	current
AC220V, 50/60Hz, single phase	15A	14A
AC230V, 50/60Hz, single phase	15A	13A
AC240V, 50/60Hz, single phase	15A	13A

It is dangerous to operate the autoclave on other power line than specified. Connect the autoclave to an independent power outlet that is properly rated and grounded.

Power cord handling:

Make sure that the power cord is not placed under heavy equipment or between sharp-edged articles that may rupture the power cord jacket and cause an electrical hazard.

Cutting the cord for connection to other cord for extension is forbidden. Before connecting the power cord to the outlet, be sure to connect the ground terminal of the autoclave to the ground. •Keeping autoclave interior free from foreign articles:

Do not enter any foreign article into the interior of the autoclave. Especially such metal pieces as clips, hairpins, coins etc. may cause electrical hazard or mechanical damage.

•Checking before turning power on :

Double check the main line voltage and drawable amperage of the outlet from which the autoclave is powered.

If the power cord plug is replaced with a local type, check it for possible erroneous connection and / or short-circuit.

•Never stay just in front of autoclave while operation :

Steam comes out from the sterilizing chamber in case of insufficient door locking. Never stay just in front of autoclave during operation. Steam may cause wounds and burns.

•Keeping autoclave lid closed during sterilization :

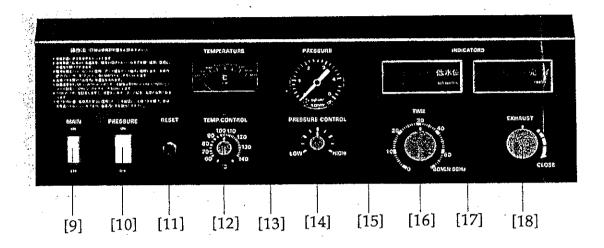
Never try to open the lid until the chamber pressure is observed by pressure gauge to have reduced to 0 kgf/cm2, a flow of hot steam may cause a burn.

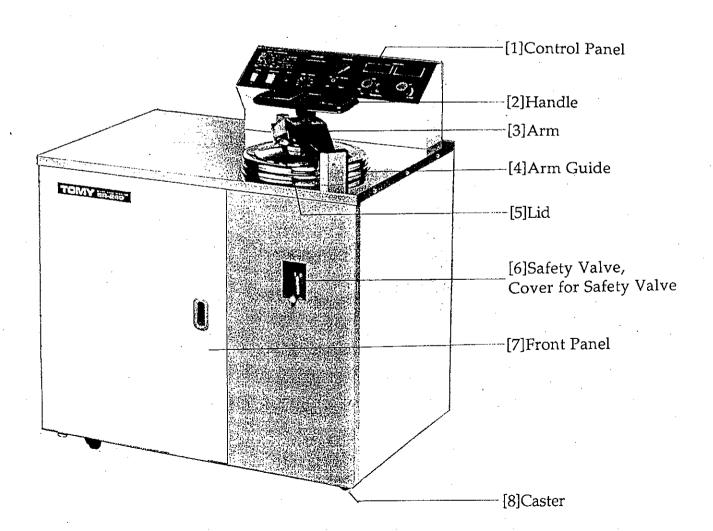
SPECIFICATIONS

Temperature	Control, Control range	Electronic , 100 - 140°C
Temperature gauge	Display , Display range	Analog, 80 - 160°C
Pressure	Control range, Max range	0 - 2.8 kgf/cm2, 3.5kgf/cm2
Pressure gauge	Display , Display range	Analog, 0 - 5.0kgf/cm2
Timer	Control, Control range	Motor rised , 0 - 60 minutes
Heat source		Element heater 3kW stainless
Safety devices	1)Status indicator	MAIN ON
		STERILIZER
		NO WATER
		COOL
		EXHAUST
		END
	2)Insufficient sterilization water	Low water lebel sensor detector
	protection	
	3)Leakage breaker	30mA
	4)Over pressure protection	Over 3.5kgf/cm2
	5)Safety valve for chamber	Spring valve
	6)Safety valve for cooling	Spring valve
	7)Compressor overheat protection	Current ditection
Pressurized sterilization	System	Pressurised by compressor
	Setting range	0 - 3.0 kgf/cm2
Pressurized cooling	System	Pressurised by compressor
	Setting range	0 - 3.5 kgf/cm2
Cooling		Supplying water
Caster		Plastic caster with stopper
Lid gasket	Shape	Three-dimentional self-sealing
	Material	Silicon Rubber
Sterilization chamber	Capacity	248 x 450 mm 22 l
	Material	Stainless Steel SUS-304
Cooling water tank	Capacity	248 × 300 15 1
	Material	Stainless Steel SUS-304
Dimension of main unit		820W x 560D x 950H mm
		(excluding projections)
Net weight of main unit		150 kg (including transformer)
Accessories		2 Stainless steel basket
		1 Hose kit for supplying water
•		1 Hose kit for draining water
		1 Customer card
		1 Warranty card
		1 Operator's manual

DISPLAYS AND CONTROLS

CONTROL PANEL





[1]Control Panel

[2]Handle

[3]Arm

[4]Arm Guide

[5]Lid

[6]Safety Valve, Cover for Safety Valve

[7]Front Panel

[8]Caster

[9]Main Switch(MAIN)

Turns power on and off.

[10]Pressure Switch(PRESSURE)

Turns on when sterilizing retort food. Turns off when not pressurized sterilizing as canned food.

[11]Reset(RESET)

Is used to release the function of the low water level sensor when purified water or too cool water is used for sterilizing water.

[12]Temperature Control Knob(TEMP.CONTROL)

Sets the chamber temperature.

Range of setting: 60 - 140°C

[13]Temperature Gauge(TEMPERATÜRE)

Analog gauge displays the chamber temperature controlled electrically.

Range of display: 80 -160°C

[14]Pressure Control Knob(PRESSURE CONTROL)

Sets the chamber pressure so that the retort food would not be broken by the sudden change of pressure and temperature while cooling.

[15]Pressure Gauge(PRESSURE)

Analog gauge displays the chamber pressure.

Range of display: 0 - 5.0 kgf/cm2

[16] Time Setting Knob (TIME)

Sets the sterilizing time.

Rang of setting: 0 - 60 minutes

[17]Status Indicator(INDICATORS)

Indicates the working statuses as following 6 patterns.

MAIN ON

While turning on the electricity

STERILIZER

While sterilizing

NO WATER

When running short of water

COOL

While supplying water in the sterilizing chamber

and cooling

EXHAUST

While exhausting the cooling water and decrease

pressure

END

When sterilizing and cooling completed

[18]Exhaust Knob(EXHAUST)

Controls the chamber pressure after sterilizing.

INSTALLATION

The installation place must be level and capable of supporting heavy loads such as a concrete floor.

The RETORT FOOD AUTOCLAVE, SR-240 needs the system for supplying water and drainage. Connect a water pipe to a water tap on the left side body, and a vent and overflow to a drain pipe, and turn the tap on. Do not contact the tip of drain hose to the sewage because the sewage may flow backward.

The power cord and ground wire are at the back of autoclave. Connect the autoclave to an independent power outlet that is properly rated and grounded. If not, a fire due to spark and a short circuit can be caused.

Power Supply;

Rated power	Rated power	Operational
line voltage	line current	current
AC220V, 50/60Hz, single phase	15A	14A
AC230V, 50/60Hz, single phase	15A	13A
AC240V, 50/60Hz, single phase	15A	13A

OPERATION

At the time of delivery, the sterilizing chamber contains a set of standard accessory including a stainless basket. Be sure to take these articles out before trying to operate the autoclave.

It is possible to use with both sterilizing systems, steam and boiling water. In case of steam sterilization, it is possible to sterilize with both saturated vapor and pressurization by air.

But SR-240 can not be operated without the cooling process in every sterilizing systems.

[Sterilization Pattern]

- (A)Steam sterilization, No pressurized cooling
 - •Sterilized articles......Canned food
 - Process......(a) Air exhaust, Temperature raise, Pressure raise
 - (b)Sterilization
 - (c)Decompression
 - (d)Supplying water for water
 - (e)Cooling under 70°C
 - (f)End
- (B)Steam sterilization, Pressurized cooling
 - Sterilized articles.....Bottled food
 - Process......(a) Air exhaust, Temperature raise, Pressure raise
 - (b)Sterilization
 - (c)Pressurization by air
 - (d)Supplying water for cooling
 - (e)Cooling under 70°C, Air and water exhaust
 - (f)End
- (C)Pressurized steam sterilization, Pressurized cooling
 - •Sterilized articles.....Retort food
 - Process......(a) Air exhaust, Temperature raise, Pressure raise
 - (b)Pressurization after reaching the set temperature,
 - Pressurized sterilization
 - (c)Pressurization by air
 - (d)Supplying water for cooling
 - (e)Cooling under 70°C, Air and water exhaust
 - (f)End

(D)Boiling water sterilization, No pressurized cooling

•Sterilized articles......Sausage, Ham that needs to pour water in chamber fully and put into water

• Process......(a) Air exhaust, Temperature raise, Pressure raise

(b)Sterilization with water sinking

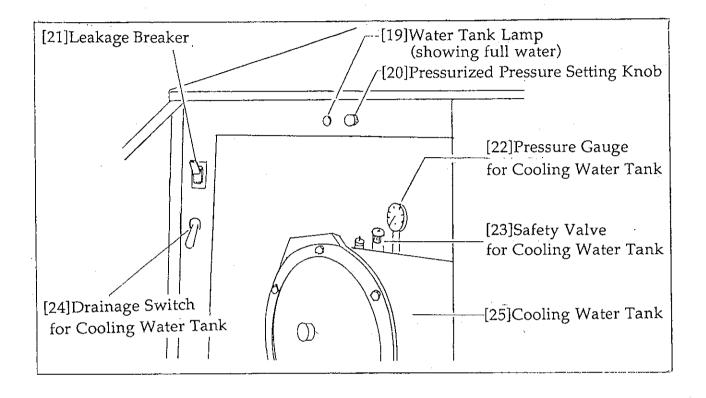
(c)Supplying water

(d)Cooling under 70°C, Air exhaust

(e)End

(1)To turn on the leakage breaker

There are two switches at the upper left when opening the Front Panel[7]. The upper of two switches is the Leakage breaker[21] and the lower is the Drainage Switch for Water Tank[24]. Turn on the Leakage Breaker[21] only.



(2)To supply sterilizing water

Turn the Handle[2] counterclockwise until it stops.

While holding the Handle[2], slide the Lid[5] toward the left side to open.

•Steam sterilization

When looking down the sterilizing chamber, a stainless plate can be seen at the bottom. Take tap water in a jar and pour it into the sterilizing chamber so that the bottom plate will be dipped under water. The amount of water required is about 1.5 liters.

Boiling water sterilization

Take tap water in a jar and pour it into the sterilizing chamber so that the depth of the water will be lower than about 200 mm from a stainless plate due to the exhaust systems. The amount of water required is about 12 liters.

When loading articles in the sterilizing chamber practically, be lower than about 250 mm from a stainless plate. Control the amount of water depending on the amount of articles.

CAUTION

- •Use tap water as sterilizing water. If purified water or too cold water is used, the low water detector in the sterilizing chamber can not function properly.
- •When boiling water sterilizing, the depth of water should be lower than 250 mm from a stainless plate certainly because the exhaust systems and other systems can be damage.

(3) To close the exhaust valve

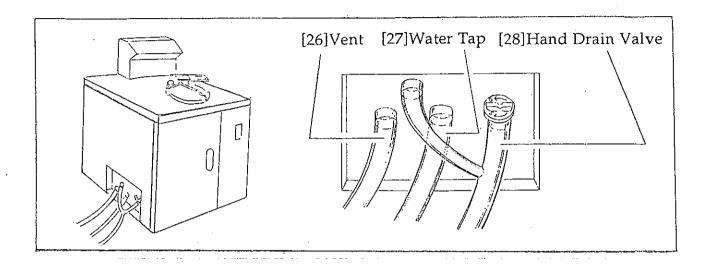
Turn the Exhaust Valve Knob[18] clockwise until it stops. At the final stage, use an increased strength to secure tightness for assurance.

CAUTION

Though the exhaust valve knob is not closed completely or it is opening slightly, the autoclave regards those states as "the exhaust knob is closed". In this case the chamber pressure does not go up and also the chamber temperature does not go over 100°C.

(4)To close hand drain valve

Turn the tap of Hand Drain Valve[28] in the direction of "S" (clockwise) until it stops.



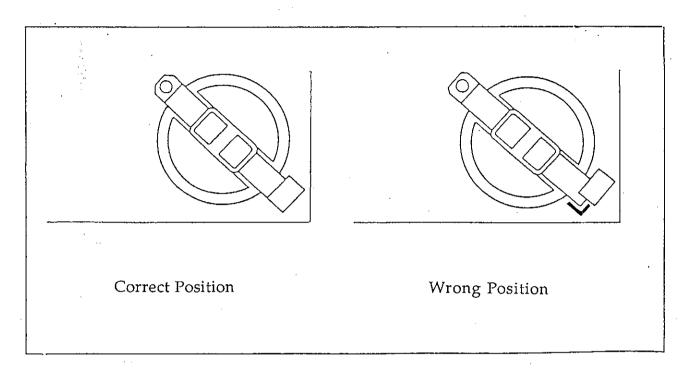
(5)To load articles to be sterilized

Gently place articles to be sterilized in the stainless basket (standard accessory) and load it into the sterilizing chamber. When using two basket, leave the space more than 120 mm from articles of the upper basket to the top of the sterilizing chamber because the cooling water overflow at the lower position (120 mm) from the top of upper basket when cooling.

When articles to be sterilized are directly loaded into the sterilizing chamber, it is required neither to close the exhaust port and safety valve port located on the sterilizing chamber wall nor to give a strong stress to the temperature sensor.

(6)To close and lock the lid

While holding the Handle[2] with both hands, bring the Lid[5] back to its home position. Make sure that the Arm[3] is completely engaged with the Arm Guide[4]. Gently give the Handle[2] about two clockwise turns and when a greater mechanical resistance is felt, additionally give it a quoter turn to increase lock tightness for assurance. This completes a positive lid locked.



(7)To turn on the main switch

When turning on the Main Switch[9] on the Control Panel[1], the indication of "MAIN ON" on the status indicator turns to red meaning to be powered.

(8)To control the pressure switch

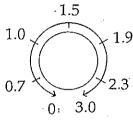
Turn "OFF" the Pressure Switch[10] when not pressurized steam sterilizing and not pressurized cooling.

Turn "ON" the Pressure Switch[10] when pressurized cooling only or pressurized steam sterilizing and pressurized cooling.

(9)To set the pressurized pressure

Set the pressurized pressure by the Pressurized Pressure Setting Knob[20] inside the Front Panel[7] when pressurized sterilizing. It means 3.0 kgf/cm2(max.) to turn the Pressurized Pressure Setting Knob[20] clockwise till it stops.

The pressurized pressure should be set higher than the steam sterilization pressure. When not pressurized sterilizing, the Pressurized Pressure Setting Knob[20] should be set the position of "L".



kgf/cm2 L H

Pressure (kgf/cm2)	Temperature (°C)	Pressure (kgf/cm2)	Temperature (°C)
(Pressure gauge)	_	(Pressure gauge)	
0.7	115.0	1.9	132.1
0.8	116.9	2.0	133.3
0.9	118.5	2.1	134.3
1.0	120.6	2.2	135.5
1.1	121.7	2.3	136.5
1.2	123.5	2.4	137.5
1.3	124.6	2.5	138.5
1.4	125.9	2.6	139.6
1.5	127.3	2.7	140.4
1.6	128.5	2.8	141.6
1.7	129.7	2.9	142.3
1.8	130.9	3.0	143.2

Relation between pressure and temperature for saturated vapor

(10)To set the cooling pressure

When pressurized cooling, set the cooling pressure by the Pressure Setting Knob[14] on the control panel. It means 3.5 kgf/cm2(max.) to turn the Pressure Setting Knob[14] clockwise till it stops. The cooling pressure should be set higher than steam sterilization pressure and pressurized pressure. When not pressurized cooling, the Pressure Setting Knob[14] should be turned counterclockwise until it stops.

kgf/cm2 MIN MAX

(11)To set the sterilizing temperature

Set the sterilizing temperature by the Temperature Control Knob[12].

(12)To set the sterilizing time and start sterilizing

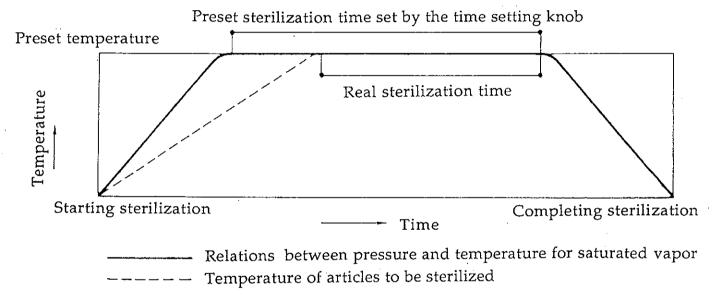
Set the sterilizing time by the Time Setting Knob[16]. At the same time the indication of "STERILIZER" on the Status Indicator[17] turns to green meaning "the sterilization starts".

The term "sterilizing time" here means a time that a chamber temperature keeps its preset level after reaching a preset temperature. It is not necessary, therefore, to consider the time required to reach a preset temperature.

CAUTION

•Sterilization Time

In case that the articles to be sterilized have much moisture or the containers to be sterilized have shapes which are difficult to exhaust the air quickly, it takes a more longer time to sterilize than normal case, because the temperature of the articles to be sterilized rise slightly slower than the chamber temperature.



•The differences of the sterilization systems depending on the container to be sterilized

In case that the containers to be sterilized have shapes which are difficult to exhaust the air quickly, the chamber temperature rises slowly, and moreover the chamber temperature may drop a little lower than a preset temperature because the remaining air flow out gradually from the containers.

In case that the containers to be sterilized have shapes which are difficult to exhaust the air quickly, take following measures to get stable sterilization.

*If the container has a long shape and the bottom of container is deep, pour a little water into the bottom of container.

*Open the hole to exhaust the air near the bottom of container.

Thermometer to confirm the chamber temperature is available as optional parts. Ex.)When steam sterilizing vial bottle 500 ml X 8 in 121°C, the time difference is about 15 minutes.

(13)To start cooling

After the sterilization completes, the cooling water is supplied automatically. Though the cooling water is supplied until the chamber temperature becomes lower than 70°C, the cooling water can run short depending on the sterilization temperature and the supplied water temperature. In this case, SR-240 supplies again the cooling water in the sterilizing chamber automatically. Keep on turning on the water connected to SR-240 while operating.

(14)To complete the sterilization and open the lid

When the cooling process completes, the chamber temperature becomes lower than 70°C and the pressure becomes 0 kgf/cm2, the indication of "END" on the status indicator lights.

Confirm that the chamber pressure has become 0 kgf/cm2 by the indication of Pressure Gauge[15] and turn the Handle[2] counterclockwise till it stops. Drain water with this state.

(15)To drain water from the sterilizing chamber

Turn the tap of Hand Drain Valve[28] on the left side in the direction of "0" (counterclockwise) and drain water from the sterilizing chamber.

(16)To take out articles to be sterilized

Hold the Handle[2] with both hands and slide the Lid[5] toward the left side. Carefully lift the basket and bring it out of the sterilizing chamber.

CAUTION

- •Never try to open the Lid[5] before the indication of the Pressure Gauge[15] reaches 0 kgf/cm2. It is very dangerous because pressurized steam flushes out from a slight opening.
- •Be careful when handling the sterilized articles because they are still too hot to handle easily.

(17)To continue operating

When continuous sterilizing operation, turn off the Main Switch[9] after completing the cooling process, the indication of "END" lights and taking out articles to be sterilized. Then, start again from the first operation(1).

(18)To turn off the main switch

When the sterilizing operation is completed, turn off the Main Switch[9].

(19)To turn off the leakage breaker

In case of not use for a long time after completing sterilization, turn off the Leakage Breaker[21].

ROUTINE MAINTENANCE

(1)To supply or replace sterilizing water

Before starting sterilizing operation, make sure that an enough amount of sterilizing water remains in the sterilizing chamber. See P-11, (2)To supply sterilizing water and P-17, (15)To drain water from the sterilizing chamber. The sterilizing water must be daily replaced with fresh tap water.

(2)To drain cooling water

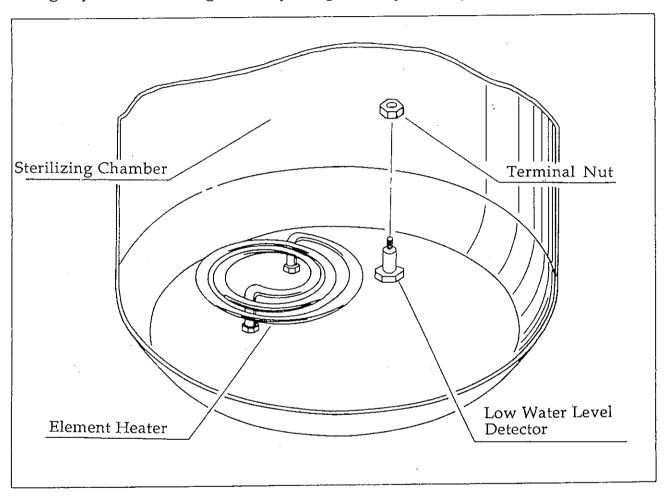
Drain cooling water from the Cooling Water Tank[25] after a daily operation. Turn on the Leakage Breaker[21] and Main Switch[9]. Close the Lid[5] lightly. Open the Front Panel[7] and turn on the Drain Switch for Water Tank[24]. Turn the top of Hand Drain Valve[28] on the left side in the direction of "0" counterclockwise and drain the cooling water. Wait for about 20 minutes.

(3)To check the electric leakage

Open the Front Panel[7] and confirm the Leakage Breaker[21] is at the upper left. To check the function of Leakage Breaker[21], turn on the switch (keep on raising the switch) and press a red-colored test button with a tip of small screwdriver. If this action automatically turns off the switch for leakage breaker, the ground leakage level of the electrical system of the autoclave remains within normal range. This test should be performed monthly or more frequently.

(4)To inspect and clean the low water level sensor

Confirm the low water level sensor is on the bottom of the sterilizing chamber. The terminal nut and detector of sensor need to polish once or twice a month. However replace the terminal nut when the dirt of the nut surface can not be removed and the autoclave can not sterilize though using tap water more higher than 10°C. The terminal nut can be loosen by using hand tight strength without using any tool and it is tightened by using hand tight strength.



- a)Drain all sterilizing water from the sterilizing chamber. See P-17, (5)To drain water from the sterilizing chamber.
- b)Remove the bottom plate at the bottom of the sterilizing chamber.
- c)Turn the terminal nut counterclockwise by using hand tight strength and remove it from the detector of sensor. In this moment, take care not to drop the nut in the sterilizing chamber.
- d)Polish the nut by using polishing powder or cleanser until it shows silver color plated surface. If the nut is badly dirty, use an emery paper or file.
- e)Fit the nut to the detector by turning clockwise. To fix the nut, use hand-tight strength.

(5)To inspect and clean the lid gasket

Confirm the lid gasket around the rim of the back of lid. Wipe the surface of lid gasket with soft cloth giving an upward pressure. Also wipe and clean the mouth of the sterilizing chamber with soft cloth to remove any foreign materials which may cause steam leakage. This maintenance is required weekly.

CAUTION

Do not try to pull the lid gasket out of its seat, nor give it any strength to cause deformation which may result steam leakage.

(6)To check the pressure gauge

The chamber pressure must remain within the green region even during sterilizing process. If the indication of the pressure gauge shows a greater value than the green region, stop the operation immediately to avoid a danger.

(7)To clean the inside of the sterilizing chamber

Although the sterilizing chamber is made of corrosion-resistant high-quarity stainless steel, it is required to remove dirt periodically to keep it in good condition. To clean the interior of the sterilizing chamber, put cleanser on water-moistened soft cloth and rub off the dirt on the surface. Then, wash off the cleanser with an abundant supply of water, and drain it outside the sterilizing chamber.

While cleaning the sterilizing chamber, do not give a strong stress to the inside of the sterilizing chamber because a stick-shaped temperature sensor is embedded in the sterilizing chamber shell.

(8)To clean the main unit

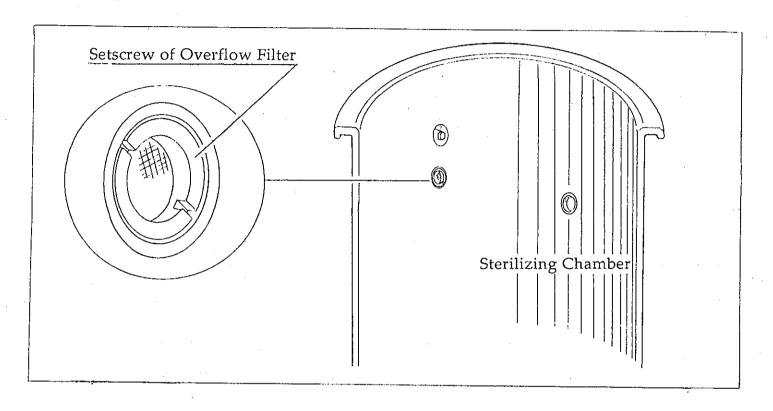
Clean the main unit with soft cloth soaked with neutral detergent, and further wipe with water-rinsed and well-squueezed soft cloth to remove detergent.

(9)To clean the overflow filter

Clean the overflow filter when the inside of the sterilizing chamber is dirty depending on the retort food package.

Turn the setscrew of overflow filter counterclockwise and remove it. Take out the overflow filter by using a tip of small screwdriver and clean it.

Fit the overflow filter and tighten the setscrew of overflow filter.



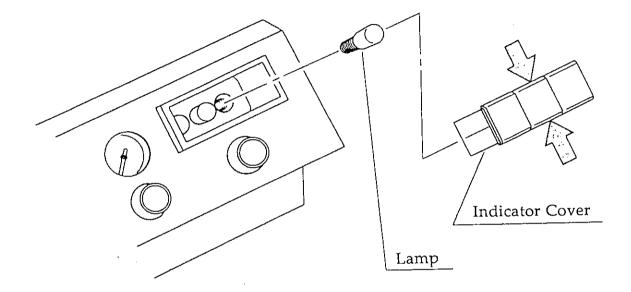
TROUBLESHOOTING

Although the autoclave is operated in accordance with the procedures described in the instruction manual, if the autoclave does not properly function, use the following troubleshooting procedures. However if the autoclave still does not run properly, call the repair service or contact your local distributor.

SYMPTOMS	PROBABLE COUSE	SOLUTION
The indication	*The power plug is not plugged	*Check the power cord
"MAIN ON"	in.	connection and/or main outlet
in the status indicator		voltage.
when the power switch	*Fuse of the power distribution	*Change power distribution
is turned on.	system is blown.	system to another being able to
		supply sufficient amperage.
	*The indicator lamp is damaged.	*Exchange the indicator lamp.
The indication	*The exhaust valve is remained	*Press the stop key and turn the
"STERILIZER"	open.	exhaust knob on the control
in the status indicator		panel.
when the power switch	*The indicator lamp is damaged.	*Exchange the indicator lamp.
is turned on.		
The indication	*Insufficient sterilizing water.	*Press the stop key and supply
"NO WATER"	·	sterilizing water additionally.
in the status indicator	*The ternimal nut of low water	*Press the stop key and clean and
when the power switch	level detector id dirty.	polish the terminal nut.
is turned on.	*Purified water is used as	*Press the stop key and replace it
	sterilizeing water.	with tap water.
	*The temperature of sterilizing	*Press the stop key and check
	water is too cool, or the	heat key for approx. 30 seconds
	proporties of the water are	to warm sterilizing water.
	almost the same as those of	
	purified water.	
Insfficient sterilizing	*Shorter sterilizing time.	*Increase sterilizing time.
effect.		
Leaking steam from	*Insufficiently locked the	*Increase tightness of the lock by
safety valve.	chamber lid.	turning thelid hundle clockwise.
	*The lid gasket and the chamber	*Clean the lid gasket and mouth.
	mouth gets foreign matters.	

To exchange the lamp inside the status indicator

- a)Turn "OFF" the Main Switch[9] and Leakage Breaker[21], and pull out the power plug from the outlet.
- b)Hold the arrow part and pull out the indicator cover.
- c)Turn the damaged lamp counterclockwise and remove it from the indicator.
- d)Fit the new lamp by your hand surely.
- e)Push the indicator cover into the indicator gently.



ID NO.21003 Issued on Jul.1,2001