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INSTRUCTION MANUAL

ST5189/ST5189E

Bioclave

Serial No. _____

For Research Use Only

www.wpiinc.com

020518

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ABOUT THIS MANUAL

The following symbols are used in this guide:



This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.



This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.



This symbol represents an electrical caution - ground protection



This symbol represents a warning of a potential hot surface.

NOTES and TIPS contain helpful information.



Fig. 1—A benchtop autoclave

INTRODUCTION

The sterilizer described in this manual is intended for the sterilization of research tools. It operates automatically with 134°C and 121°C sterilization temperatures. This sterilizer is in compliance with the European Directive 93/42/CEE, and it has been produced in accordance with the EN 13060. In addition, the chamber has been ASME certified.

Notes and Warnings

NOTE: If E88 appears on the screen when powered on, please call your distributor for local service maintenance.

Parts List

After unpacking, verify that there is no visible damage to the instrument. Verify that all items are included:

- (1) Steam sterilizer
- (2) Instrument tray
- (1) Instrument tray rack
- (1) Instrument tray handle
- (1) Door adjustment tool
- (2) Drain hose
- (1) Door seal
- (1) Instruction Manual

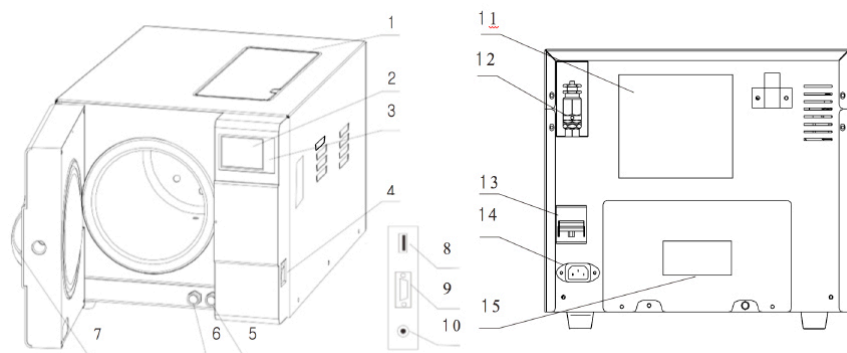
Unpacking

Upon receipt of this instrument, make a thorough inspection of the contents and check for possible damage. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed damage should be reported at once to the carrier and an inspection requested. Please read the section entitled "Claims and Returns" on page 19 of this manual. Please contact WPI Customer Service if any parts are missing at 941.371.1003 or customerservice@wpiinc.com.

Returns: Do not return any goods to WPI without obtaining prior approval (RMA # required) and instructions from WPI's Returns Department. Goods returned (unauthorized) by collect freight may be refused. If a return shipment is necessary, use the original container, if possible. If the original container is not available, use a suitable substitute that is rigid and of adequate size. Wrap the instrument in paper or plastic surrounded with at least 100mm (four inches) of shock absorbing material. For further details, please read the section entitled "Claims and Returns" on page 19 of this manual.

INSTRUMENT DESCRIPTION

Instrument Description



- 1 Distilled water tank
- 2 LCD screen
- 3 Control panel
- 4 Main Power switch
- 5 Drain connector of distilled water tank
- 6 Drain connector of used water tank
- 7 Door handle
- 8 USB port (optional)
- 9 Printer port
- 10 Printer power
- 11 Condenser ventilation
- 12 Safety valve
- 13 Circuit breaker
- 14 Power socket
- 15 Rating plate

Setup

Ensure that the sterilizer is installed with 2.5 in. (10 cm) ventilation on all sides of the sterilizer, and 5 in. (20 cm) on top side. The clearance required to open the door is 15.5 in. (40 cm).

- The sterilizer should be placed on a level worktable.
- Do not cover or block the door, ventilation or radiation openings on the sterilizer.
- Do not install the sterilizer near a sink or water source.
- Do not install the sterilizer near a heat source.

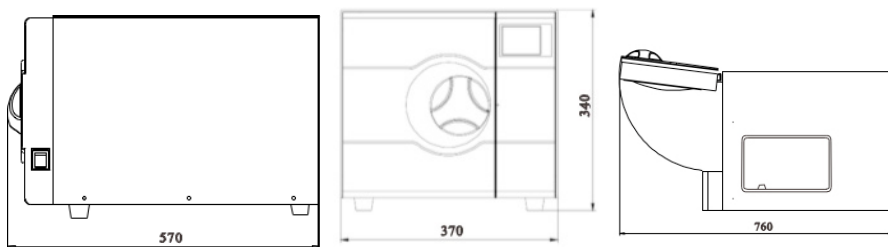


Fig. 2—(Left) Side view

Fig. 3—(Center) Front view

Fig. 4—(Right) Top view

1. Open the door and remove all the inner packing material.
2. Connect the power cord to an outlet of the appropriate voltage.
3. Turn the power on. The switch on the mains breaker is located on the back. The main power switch is located at the right side of the control panel. After switching the unit on, the LCD display will flash and show: the door position, water level, current program, date, time etc.

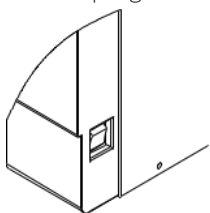


Fig. 5—The mains breaker switch is located on the back.

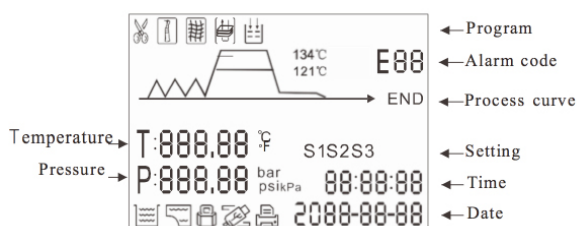



Fig. 6—The main display shows a lot of information.

- | | |
|--------------------------------------|------------------------------|
| Distilled water tank requires water. | Distilled water tank is full |
| Used water tank is full | Door locked |
| Information output to USB port | Printer is connected |

NOTE: Before using the sterilizer or when the low water icon blinks, fill the water tank with distilled water.

OPERATING INSTRUCTIONS

Filling the distilled water tank

Open the cover, and fill the tank with distilled water. If you hear a beep, it means the water level exceeds the maximum level. The display icon  illuminates, when the unit is full. The water level should not cover the port highlighted in the image below.

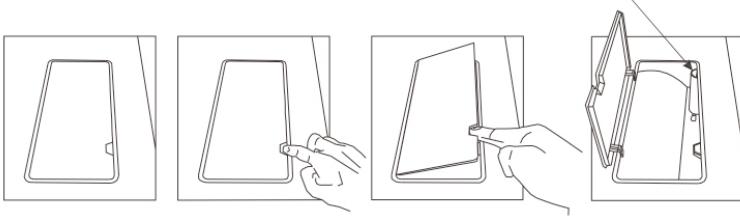


Fig. 7—Open the cover to fill the distilled water tank.

Preparing to sterilize materials

For the most effective sterilization and to preserve the sample, follow these tips:

- Arrange the samples on different trays or with at least 2" of space between them.
- Always insert a piece of sterilization paper or cloth between the tray and sample, to avoid direct contact between the different items.

Selecting the sterilization program

The LCD display panel shows the cycle temperature, pressure, error code, sterilization state and program.

Press the TEMP (temperature) button to toggle between 121°C and 134°C.

Press the TEMP (temperature) button to toggle between available sterilization cycles. (See below.)

Press the START/STOP button to start the sterilization cycle. To stop a cycle, press and hold this button for 3 seconds.



Unwrapped (Solid)



Drying



Liquid



Wrapped



Extensive (Prion)

Fig. 8—An icon displays in the upper left corner, indicating the running program.

NOTE: The button will be “locked” for the initial 10 seconds after power up for system initialization.

Running the sterilization program

1. After selecting a program, the materials to be sterilized should be placed on the tray, and the tray placed inside the chamber using the tray handle.

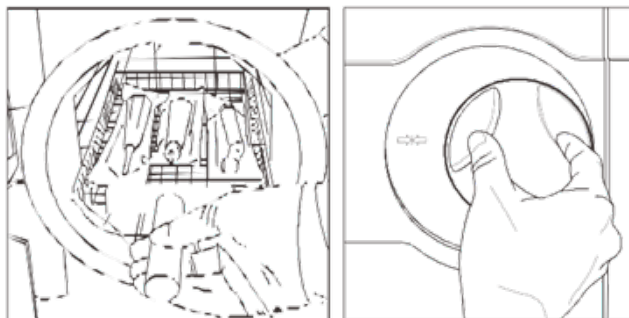



Fig. 9—(Left) Insert the sterilization tray into the autoclave.

Fig. 10—(Right) Lock the door by rotating the handle clockwise.

2. After the instruments are loaded, close and lock the door by turning the door handle clockwise until secure. The icon  displays.



CAUTION: The door handle must be securely closed, or the unit will sound an alarm and not complete the cycle.

3. Start the sterilization program. Press the START button. The unit will begin the cycle. It will take 30-75 minutes. (See “APPENDIX B: diagrams of the sterilization programs” on page 16.)

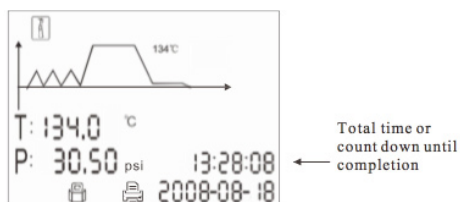



Fig. 11—The timer (total time or count down) displays in the bottom right corner.



CAUTION: When you press the START button, if the door is not fully closed. You will see the  blinking on the screen. A cycle will not start until you close the door securely and press the “Start” button again.

3. After a sterilization cycle is complete, the printer will print out a report of the cycle settings (if the optional printer has been connected).
4. Once the pressure returns to 0, the door will unlock, and the items may be removed.



CAUTION: Always use the tray handle to load or unload the tray into the autoclave. Failure to do so can result in burns.

NOTE: If you need to interrupt a cycle and remove items, press the START button for 3 seconds. The unit will complete the sterilization time set, but skip the dry cycle. This will prompt the program to skip directly to the last step and eliminate the drying stage. After one minute the cycle will end.

ADVANCED SETTING

Enter the setting

1. Power on the machine while holding the START button and hold for 5 seconds to select the advanced settings mode.
2. Select the stat (Stat 1 to 3) by pressing the PROG (program) button. Press the START button to enter the setting.

S1 Stat

If you select the S1, you can change the temperature and pressure units, and adjust time and date.

1. The first option is to select the temperature unit. Press TEMP (temperature) button to select °C or °F. The unit selected will illuminate. Press the PROG (program) button to advance to the next function.
2. You can select the pressure units in the same manner.
3. Then, press PROG (program) button to advance to the next selection to adjust the time and date. After the date or time are set, then the data is can be saved. To finish the setting press START. This will return you to the screen of selecting stats.

S2 Stat

1. You can check the minutes of sterilization cycle. This cannot be changed by operator.
2. Set the parameter for high altitude. If you have trouble completing a cycle in a high altitude location (above 2.0 km or atmospheric pressure is below 80 kPa) you might need to adjust this parameter.

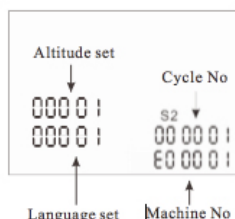


Fig. 12—The S2 Stat screen shows altitude set, language set, cycle and machine number.

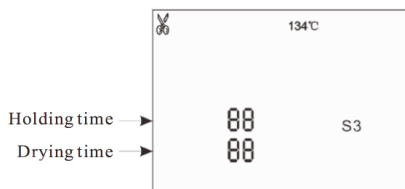
3. Set the language using the following options:

00 English	01 German	02 Spanish	03 Polish
04 French	05 Magyar	06 Romanian	07 Dutch
08 Lithuanian	09 Latvian	10 Czech	11 Italian

NOTE: The machine number and cycle number cannot be set by the operator.

S3 Setting

1. This setting can be used to adjust the autoclave's sterilization (holding) time and drying time. Power off the machine. Press and HOLD the START button while powering on the machine and continue to hold the START button for 5 seconds. S1 is illuminated. Press the PROG (program) button to toggle to the S3 mode. To select, press START.
2. Now press the PROG (program) button to toggle between the various programs (Unwrapped, Wrapped, Dry Only, Extensive, Liquid). Press the TEMP (temperature) button to toggle between the two temperature options (121°C or 134°C). Then press START.
3. Press TEMP to adjust the cycle time or Program to move the cursor to the next setting. (The top value is the hold time and the second is the drying time.)



4. Press Start, wait for S3 to be displayed and power off.
5. Here are the default settings:
Drying time: 0-19 minutes
121°C Holding time: 1-59 minutes
134°C Holding Time: 1-19 minutes

NOTE: The default sterilization parameters have been chosen to provide optimal sterilization. We do not suggest adjusting these parameters.

Printer (Optional)

1. Connect the printer cable.

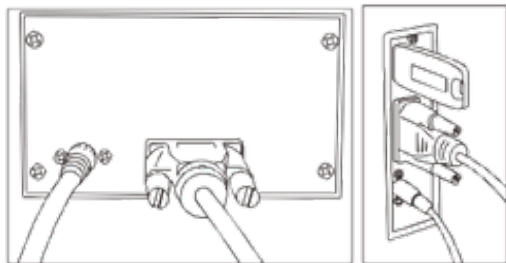


Fig. 13—(Left) Plug in the printer.

Fig. 14—(Right) The USB flash memory is plugged into the upper port.

2. Connect the printer power.

USB Flash memory (Optional)

A USB drive can be used as a method of storing a report of the cycle. To do so, insert the USB drive into the slot on the right side of the instrument (Fig. 14). The information will automatically upload to the USB after the cycle completes. The name of the file is determined by the serial number of the machine and the cycle number.

For example:
The serial number is E00001.
The cycle number is 00012.
The file name in the USB stick is 01 00 1200. txt.

The first two numbers represent machine number. The middle four numbers represent cycle number. The last two numbers represent error code.

00: no error 01: error E01

Retrieve information from a prior cycle

1. Press the PROG (program) button repeatedly until you enter the prior program storage screen. This will show the cycle number.

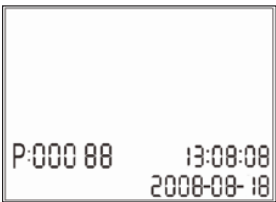


Fig. 15—The prior program storage screen is displayed.

2. Press the TEMP (temperature) button to toggle between different cycles.
3. To print or send details to the USB drive, press the START button. The most recent 20 records are stored.

When viewing printed data records, refer to the diagram below:

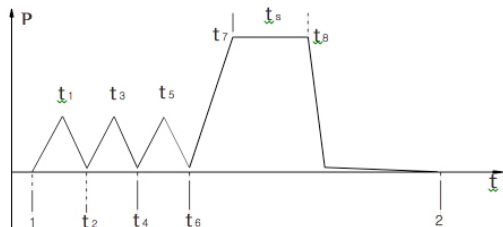


Fig. 16—Sample printouts of programs on the next page, reference this diagram.

Program	WRAPPED		
Temperature	134°C		
Pressure	30.0 psi		
Dry Time	02 Min.		
Ster Time	4.0 Min.		
	time	temp	pressure
Start	15:24:20	042.0°C	
T1	15:32:11	070.0°C	07.71 psi
T2	15:36:08	075.3°C	01.42 psi
T3	15:39:21	090.3°C	07.30 psi
T4	15:44:32	094.3°C	01.39 psi
T5	15:47:12	119.0°C	14.91 psi
T6	16:00:11	110.2°C	01.35 psi
TS		134.8°C	32.14 psi
Max. Temperature	135.1°C		
Min. Temperature	134.5°C		
Max. Pressure	33.42 psi		
Min. Pressure	30.88 psi		
T7	16:04:02	135.0°C	32.42 psi
T8	16:06:32	134.8°C	31.05 psi
End	16:14:12	78.2°C	
Cycle No	0005		
Ster Value	Success		
Date	2018-01-18		
SN	E00001		
Operator			

Program	WRAPPED		
Temperature	134°C		
Pressure	30.0 psi		
Dry Time	02 Min.		
Ster Time	4.0 Min.		
	time	temp	pressure
Start	17:34:20	82.0°C	
T1	17:42:11	090.0°C	07.57 psi
T2	17:46:08	085.3°C	01.41 psi
T3	17:49:21	108.3°C	07.75 psi
T4	17:54:32	100.3°C	01.39 psi
T5	00:00:00	100.3°C	000.0 psi
T6	00:00:00	000.0°C	000.0 psi
TS		000.0°C	000.0 psi
Max. Temperature	000.0 °C		
Min. Temperature	000.0 °C		
Max. Pressure	000.0 psi		
Min. Pressure	000.0 psi		
T7	00:00:00	000.0°C	000.0 psi
T8	00:00:00	000.0°C	000.0 psi 01.46
End	17:54:42	100.2°C	psi
Cycle No	0007		
Ster Value	Failure E01		
Date	2018-01-18		
SN	E00001		
Operator			

MAINTENANCE

Frequency	Maintenance Operation
Daily	Clean the door seal.
	Clean the external surface.
Weekly	Clean the distilled water tank.
	Clean the sterilization chamber.
Every month (depending on the use)	Clean the filter inside the chamber and tank.
Every year	Replace the door seal.

1. Clean the distilled water tank every week with isopropyl alcohol or a medical disinfectant.

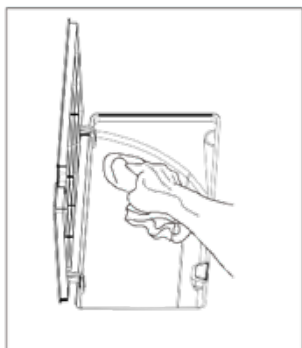


Fig. 17—(Left) Wipe the distilled water tank with isopropyl alcohol.



Fig. 18—(Right) Wipe the chamber area weekly.

2. Clean the chamber weekly. Remove all trays and the tray rack from the chamber. Clean the chamber with a smooth cloth saturated with distilled water. Apply the same procedure for the trays and rack.
3. Clean the door seal. Clean the door seal weekly with a smooth cloth saturated with the distilled water.



Fig. 19—(Left) Wipe down the door seal outside with distilled water.



Fig. 20—(Right) Wipe down the door seal inside with distilled water.

4. Under normal circumstance the chamber door does not require adjustments. However, if the seal fails (resulting in steam leaking from the front of the chamber), you may use the door adjustment tool to tighten the door seal.
 - Open the door.
 - Insert the spanner tool into the gap beneath the plastic cover.
 - Use the spanner tool to grip the adjusting nut (Fig. 21).
 - Turn the nut counter-clockwise as the figure below (Fig. 22). This will tighten the sealing plate.
 - Turn the nut until the sealing plate is tight. If the door knob is too tight, turn the nut clockwise to loosen it.

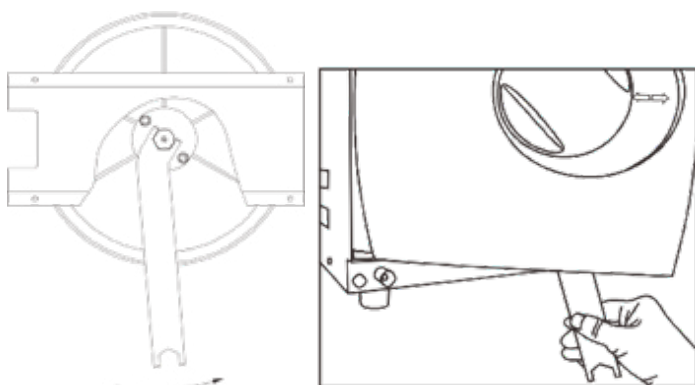


Fig. 21—(Left) Spanner tool in position.

Fig. 22—(Right) Rotate the tool counter-clockwise to tighten the sealing plate.



CAUTION: Never adjust the chamber door while the door is closed.

Replacement of the door seal



CAUTION: Make sure the chamber and the door have cooled prior to replacing the seal ring.

1. Open the chamber door.
2. Remove the door seal ring carefully by hand.
3. Clean the new door seal ring carefully with a smooth cloth saturated with distilled water.
4. Moisten the new seal with medical disinfectant or isopropyl alcohol.
5. Insert the new seal and press in sequence as follows:
 - A—Press in the top and bottom of the seal ring.
 - B—Press in the left and right sides of the seal ring.
 - C—Press the remaining sections of the seal ring.
 - D—Press all areas of the seal surface for a smooth finish.



Fig. 23—How to replace the door seal.

Draining the used water tank

1. Firmly press the hose onto the drain valve.
2. Pull the drain valve out, the tank will begin to drain.
3. When the tank is empty, push the drain valve in.

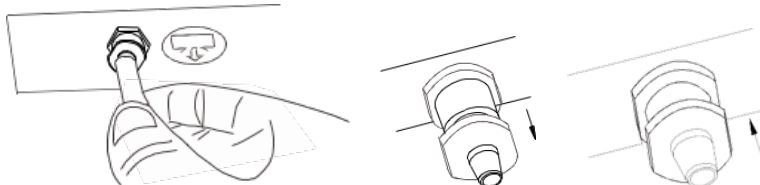


Fig. 24—(Left) Press the hose into the drain valve.

Fig. 25—(Center) Pull the drain valve out.

Fig. 26—(Right) Push the drain valve in.

TRANSPORTATION AND STORAGE

1. Switch off the sterilizer before transport or storage. Let the machine cool down.
2. Drain the distilled water tank and the used water tank.
3. Conditions for transportation and storage:
 - Temperature: -20°C to $+55^{\circ}\text{C}$.
 - Relative humidity: $\leq 85\%$.
 - Atmospheric pressure: $50\text{ kPa} \sim 106\text{ kPa}$.

SAFETY DEVICES

- Main fuses: Protects the instrument against possible failures of the heating resistor.
Action: Interrupts the electric power supply.
- Thermal cutouts on the main transformer windings: Protects against possible short circuit and protects the main transformer's primary winding from overheating.
Action: Temporary interruption of the winding.
- Safety valve: Protects against possible sterilization chamber over-pressure.
Action: Releases the steam and restores the safety pressure.
- Safety micro-switch for the door status: Verifies that the door is closed correctly.
Action: Signals an improperly closed door.
- Manually thermostat reset on the chamber heating resistors: Protects against possible overheating of the chamber heating resistors.
Action: Interrupts the power supply of the chamber resistors.
- Manually thermostat reset on the steam generator heating resistors: Protects against possible overheating of the steam generator heating resistors.
Action: Interrupts the power supply of the steam generator resistors.

- Door safety lock: Protects against accidental door opening.
Action: Prevents the accidental door opening during the program.
- Self-leveling hydraulic system: Hydraulic system for the natural pressure leveling in case of manual cycle interruption, alarm or black-out.
Action: Automatic restoration of the atmospheric pressure inside chamber.

TROUBLESHOOTING

Error codes

Code	Description	Proposed solution
E1	Steam generator temperature sensor error	Power off, and run a new cycle. Contact your supplier if error persists.
E2	Inner temperature sensor error	Power off, and run a new cycle. Contact your supplier if error persists.
E3	Temperature sensor of the chamber wall error	Carefully ensure that the chamber wall is heated and contact your supplier.
E4	Failure to raise the temperature	Power off, and run a new cycle. Contact your supplier if error persist.
E5	Failure to raise the pressure	Power off, and run a new cycle. Contact your supplier if error persists.
E6	Door lock problem during the cycle	Make sure you have turned the door handle to the max. position, or check the door switch.
E7	The switch of the lock system is disconnected (when autoclave is powered on)	Check the door locking switch. Check the solenoid of the door lock. Check the connections of the mainboard.
E9	Failure to hold temperature	Ensure the distilled tank isn't empty. Check the inner temperature sensor. Check for leaking.
E11	Failure to preheat the steam generator	Power off, and run a new cycle. Contact your supplier if error persists.
E12	Failure to preheat the chamber	Power off, and run a new cycle. Contact your supplier if error persists.
E20	Program manually interrupted	Shut off the power and restart the unit.
E21	Failure to reach the holding time. (sterilization time)	Check for leaking inside the autoclave.

NOTE: If you have a problem/issue with that falls outside the definitions of this troubleshooting section, contact the WPI Technical Support team at 941.371.1003 or technicalsupport@wpiinc.com.

SPECIFICATIONS

This unit conforms to the following specifications:

Item	Parameter
Chamber	Φ170 mm X 320 mm
Rated voltage	120V AC, 60 Hz
Main fuses	F20 A/250 V
Nominal power	1600 VA
Sterilization temperature	121°C /134°C
Capacity of the distilled water tank	Approx. 2.5 L (water at level MAX) Approx. 0.5 L (water at level MIN)
Operation temperature	5 - 40°C
Exterior dimensions	370 mm (w) X 340 mm (h) X 570 mm (depth)
Weight	66 lb.
Noise level	<70 dB
Relative humidity	max. 80%, non-condensing
Atmospheric pressure	11.0 - 15.4 psi

APPENDIX A: WATER PROPERTIES/
CHARACTERISTICS

DESCRIPTION	FEED WATER	CONDENSATE
Evaporate residue	≥10 mg/L	≥1.0 mg/kg
Silicon dioxide (SiO ₂)	≥1 mg/L	≥0.1 mg/kg
Iron	≥0.2 mg/L	≥0.1 mg/kg
Cadmium	≥0.005 mg/L	≥0.05 mg/kg
Lead	≥0.05 mg/L	≥0.1 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/L
Phosphates	≥0.5 mg/L	≥0.1 mg/L
Conductivity (at 20°C)	≥15µs/cm	≥3µs/cm
pH value	5-7.5	5-7
Appearance	Colorless, clean, without sediments	Colorless, clean, without sediments
Hardness	≥0.02 mmol/L	≥0.02 mmol/L

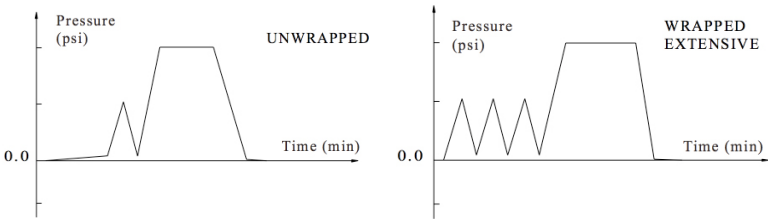
APPENDIX B: DIAGRAMS OF THE STERILIZATION PROGRAMS

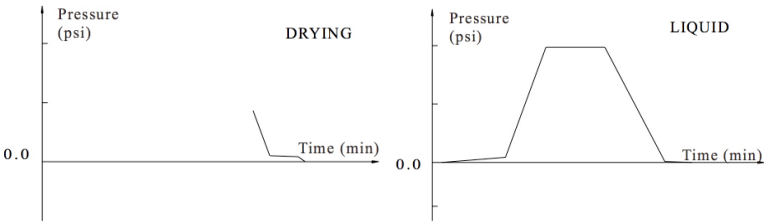
Program	Temperature (°C)	Pressure (PSI)	Holding Time (min.)	Total Time (min.)	Type	Max. Load (kg)	Max .Load per tray (kg)
Unwrapped (solid)	134	30.5	4	14–25	Unwrapped solid material	2.00	0.60
	121	16.0	20	25–40			
Liquid	134	30.5	10	25–50	Liquid	0.60	0.20
	121	16.0	30	30–55			
Wrapped	134	30.5	6	25–45	Unwrapped porous material	1.50	0.60
	121	16.0	20	25–50	Single-wrapped solid		0.60
Extensive (Prion)	134	30.5	18	30–50	Unwrapped porous mat.	0.50	0.15
					Single-wrapped pourus mat.	0.35	0.10
					Dual-wrapped porous mat.	.025	0.10
					Single-wrapped hollow mat.	1.50	0.50
					Dual-wrapped solid & hollow material	1.00	0.30
Drying	–	–	–	1–20	–	–	–

NOTE: You may adjust the drying time to 0 if you are sterilizing agar. (See “S3 Setting” on page 8.) It will reduce the risk of boiling.

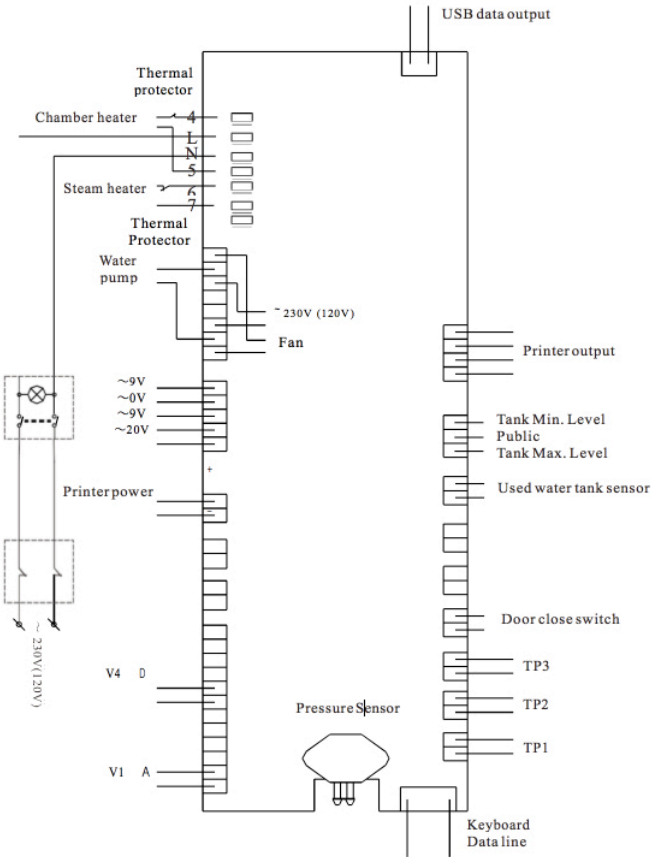
The time required by the sterilizer for routine use after the power is switched on is less than 5 minutes.

The maximum temperature of the 134°C sterilization cycle is 137°C.
The maximum temperature of the 121°C sterilization cycle is 124°C.



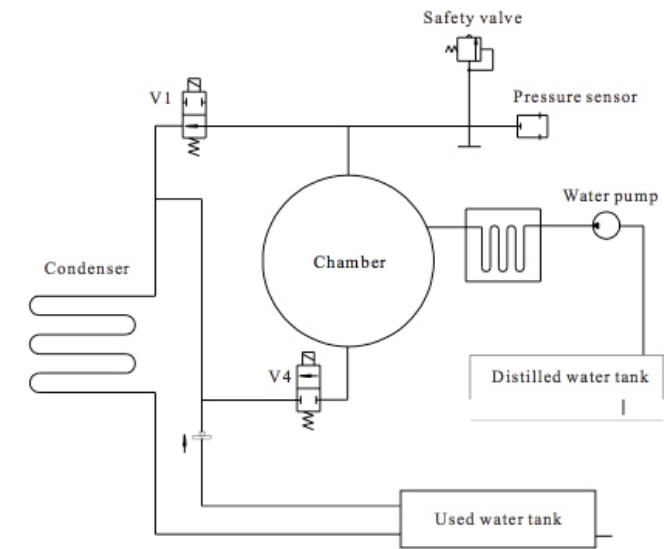


APPENDIX C: WIRING DIAGRAM



- TP1: Steam generator temperature sensor
- TP2: Inner temperature sensor
- TP3: Temperature sensor of chamber wall
- V1: Air release valve
- V4: Water release valve

APPENDIX D: HYDRAULIC DIAGRAM



V1: Air release valve
V4: Water release valve

WARRANTY

WPI (World Precision Instruments) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of 2 years* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*

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