Thermo
ELECTRON CORPORATION

Installation/Service Manual

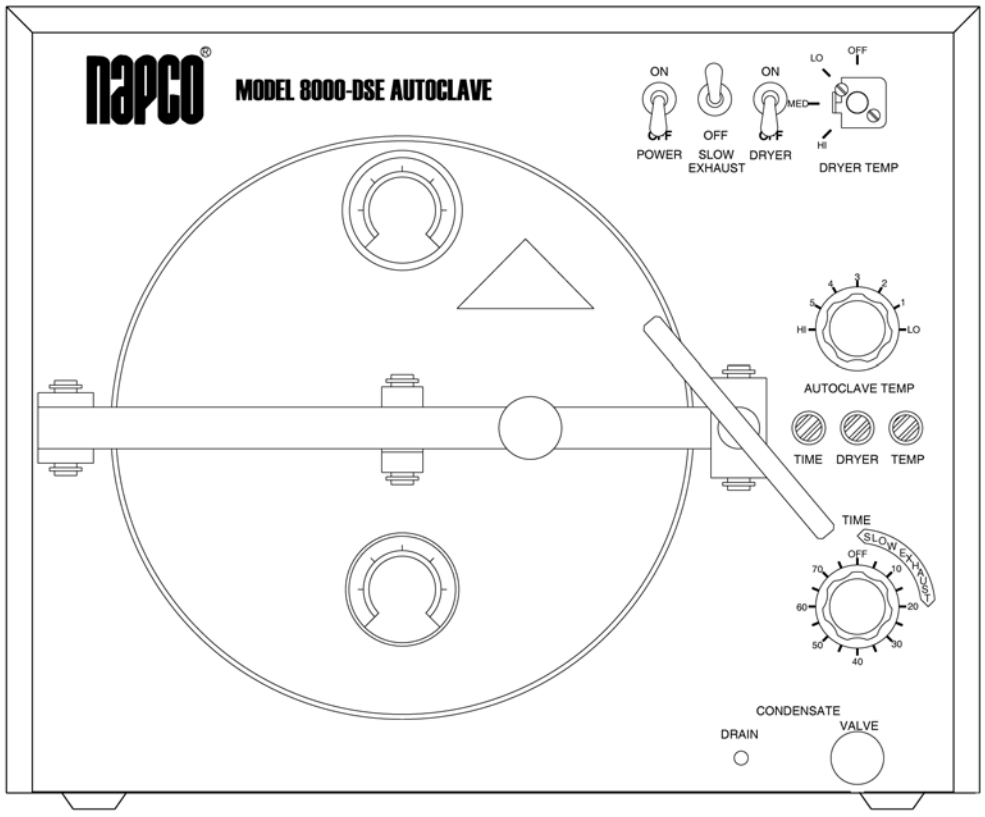
Slow Exhaust Autoclave

Model 8000-DSE (6600/6601)

&

Rapid Exhaust Autoclave

Model 9000-D (6605/6606)



NOTICE

For repair information or replacement parts assistance from the manufacturer, call Technical Services using our toll free telephone number.

Alfa Medical
265 Post Ave
Westbury, NY 11590

Email us
1-800-801-9934
Fax 516-977-7434
International 516-280-7822

REVISION STATUS

INDEX	DATE	AMENDED PAGES	NOTES
A			Initial release
D		All	Update spare parts list and manual format
E	05/00	20,21	Update wiring diagram
F	02/03	13	Addition of instructions to check solenoid valve components for debris
G	09/04	7	Addition of instructions to lubricate handle
H	05/05	P/N 34002704	manual #, manufacture location

Contents

Introduction 1

Unpacking and Damage 1

Specifications 2

General Information 3

Initial Procedure After Unpacking Unit 4

Procedure for Operation of Dryer Cycle 5

Sterilizing & Load Capacity Data 7

Maintenance 7

Troubleshooting 8

Test Procedure 10

Testing the Function & Power Switches 11

Testing the Temperature Controls 14

Testing the Elements 14

Testing the Safety Devices 15

Testing Gauges 16

Control Adjustments 17

Wiring Diagrams 20

Replacements Parts List 23

Assembly Drawings 25

Warranty 29

SPECIFICATIONS

Model:	8000-DSE	9000-D
Applications:	Solid or Liquid Sterilization	Solids Sterilization
Catalog No: 115V: 230V:	8000-120 8000-220	9000D-120 9000D-220
Chamber Dimensions:* (Diameter x Depth)	9 x 18 in. 230 x 457 mm	
Exterior Dimensions Inches: Millimeters:	(W x D x H) 18 x 21 x 14.5 457 x 533 x 368	
Temperature Range	121° to 132°C (250° to 270°F)	
Temperature Uniformity	±0.5°C	
Cool Down Capability	Fast or slow	Fast only
Pressure Range	15 to 27 PSI (1.0 to 1.9 bar)	
Electrical 115V: Requirements 230V:	60 Hz., 1750 W, 15.5 A** 50 Hz., 1750 W, 7.6 A	60 Hz., 1450 W, 13 A 50 Hz., 1450 W, 6.5 A
BTU Output	5,975	4,950
Net Weight	90 lbs. 40.9 Kg	
Shipping Weight	131 lbs. 59.4 Kg	
Shipping Volume	10.7 cu. ft. 0.3 cu. meter	
Shipping Dimensions Inches: Centimeters:	W x D x H 32 x 25 x 23 812 x 635 x 584	

* Working height of chamber is approximately 6.75 inches (172 mm).
** Catalog 8000-120 requires NEMA type 5-20R wall outlet.

Specifications subject to change without notice.

GENERAL INFORMATION ON SYSTEM OPERATION

With water level established, door tightened, (Model 8000DSE, Slow Exhaust switch "**OFF**"), Dryer Switch **"OFF"**, timer selection made, and the power switch "ON", the autoclave will begin heating. The heating light will be illuminated, verifying that the heating circuit is operational.

While the vessel is heating to the desired sterilization level, cold air will be continuously purged from the system to provide uniform heat and steam pressure throughout the vessel. A normally open solenoid valve provides venting of the vessel until the vessel atmosphere reaches a temperature of 3°C above the boiling point of water.

When the autoclave reaches this temperature (103°C) a temperature-sensitive device will be activated. The sensor switch is normally open until this point, at which time the sensor switch will close and activate (close) the solenoid valve. The vessel will begin to pressurize. Cold air pockets (less than 103°C) will be forced to the bottom of the vessel. The cold pockets of air will cool the sensor. The sensor switch will open. In turn the solenoid valve will open and the cold air will be vented from the vessel into the condenser tank., Once the cold air is eliminated, the sensor will detect the change in temperature. The sensor switch will close, which activates (closes) the solenoid valve. Continuous purging of cold air will occur whenever the sensor is open.

The temperature control is a pressure-sensitive switch. When the desired sterilizing temperature is reached, the normally closed temperature control switch will open according to the relationship that exists between temperature and steam pressure. At this point the temperature control switch will open the circuit to the heating element. The element will stop heating and the temperature indicator light will go off. The temperature will drop. Correspondingly, the pressure will drop. The temperature control is sensitive to a one pound drop in pressure. When it detects this one pound change, the temperature control switch will close. Current will be given a path to the heating element and the element will begin heating.

In this manner the temperature control regulates the temperature within the vessel. The temperature indicator light will verify the operation of the temperature control switch illuminating when the switch closes, going out when the switch opens.

The autoclaves are provided with two safety devices, a low water cutoff switch and a pressure relief valve. The **LOW WATER CUTOFF** switch will be activated if the unit is allowed to run out of water (caused by not filling to water indicator at the beginning of each cycle) or due to purge system failure in which the water is boiled out of the system. The normally closed (temperature sensitive) low water cutoff switch will open when it senses an outside vessel temperature of 149°C (minimum) 232°C (maximum). It opens the heating circuit, breaking the current path to the heating element.

The **PRESSURE RELIEF VALVE** is located in the condenser tank assembly. It is a safeguard against temperature control failure in which case the heating element would heat the vessel atmosphere beyond the limits of the temperature control. Since increases in steam pressure are proportional to increases in temperature, the pressure relief valve will open when the vessel pressure approaches 35 lbs. per square inch (tolerances ±3 lbs.). The valve will vent steam into the condenser tank. If no one is around to notice the malfunction, the relief valve will vent pressure from the vessel until the water is boiled out. The low water cutoff switch will then shut the unit off as previously described.

Both the 9000D and 8000-DSE are equipped with a dryer. With the door ajar (3" to 4"), make a selection with temperature-dryer switch, then dial the timer to the desired drying time. The temperature-dryer switch is a temperature sensitive switch. It regulates the temperature of the drying element by opening and closing the current path to the drying element.

NOTE

BE SURE THE DOOR REMAINS AJAR THROUGHOUT THE DRYING CYCLE.

INITIAL PROCEDURE AFTER UNPACKING UNIT

WARNING

FOR PERSONAL SAFETY, THIS APPARATUS MUST BE PROPERLY GROUNDED.

Electrical Connections

Units detailed in this manual are equipped with three-pronged (grounded) plug power cords. These mate with three-prong receptacles to minimize the possibility of electric shock. The user should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded.

Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three-prong wall receptacle. **Do not, under any circumstances, cut or remove the third (ground) prong from the power cord. Do not use a two-prong adapter plug.**

Determine the total amount of current being used by other apparatus connected to the circuit that will be used for this apparatus. It is critical that the added current demand (see nameplate) of this and other equipment used on the same circuit does not exceed the rating of the fuse or circuit breaker.

CAUTION

BE SURE THAT THE POWER SUPPLY IS OF THE SAME VOLTAGE AS SPECIFIED ON THE NAMEPLATE.

In compliance with the National Electrical Code the Model 8000-DSE Autoclave is equipped with a non-standard plug. The current draw is over 15 amperes and necessitates the use of a dedicated electrical circuit.

NOTE

CATALOG #8000-120 REQUIRES NEMA TYPE 5-20R WALL OUTLET RECEPTACLE. PLEASE BE ADVISED THE WARRANTY WILL BE VOIDED IF THE FURNISHED PLUG IS REPLACED.

Open door by turning the handle counterclockwise and swing the yoke off the door bar. Remove the contents from the chamber.

OPERATION of 9000D and 8000DSE

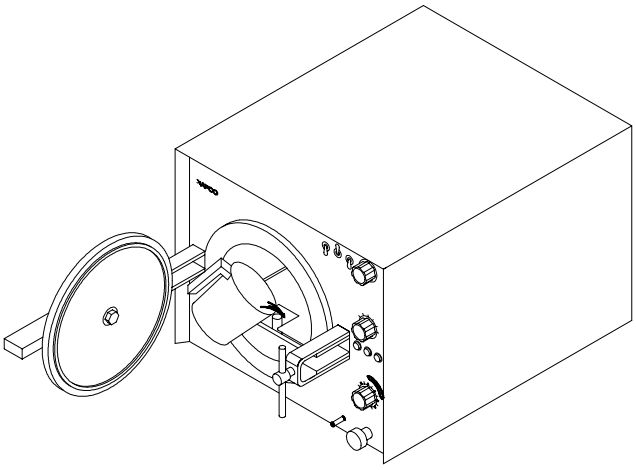
Sterilization of "Solid" Materials Only

Step 1

Ensure that the power switch and dryer switch are at the "OFF" position.

Step 2

Pour distilled water into chamber reservoir. Use measuring cup supplied. Fill until water level reaches the level indicator on the shelf.



NOTE

WATER MUST REACH LEVEL INDICATOR BEFORE THE START OF EACH CYCLE.

Step 3

Use proper sterilizer loading procedures when placing materials in the autoclave chamber.

1. All solid containers or instruments must be placed so that water and air will not be trapped in them.

2. Place empty jars, canisters, and other containers on their side to allow displacement of air and complete contact of steam to surfaces.

3. Petri dishes, pipettes, and similar items should be inverted or angled at a slant to facilitate drying.

4. Place instruments, utensils, and other items on edge to facilitate drying.

5. Loosen the caps on all containers placed inside the autoclave chamber.

6. It is recommended that a sterilization indicator be used with each load. Place indicator near materials being sterilized.

Step 4

Set autoclave temperature control to position 3 at the center of the dial. This position will set the sterilization temperature at about 127°C (260°F). When the temperature is achieved, the thermometer pointer will be positioned in the red area.

If an autoclave temperature other than the temperature set above is desired, the following information will be helpful for setting the temperature control.

The point referenced low on the dial face corresponds to a temperature of 121°C (250°F). The point referenced high on the dial face corresponds to a temperature of 132°C (270°F). Numbers between the reference points correspond to temperatures within the range. The range is indicated by a red area on the thermometer face.

Step 5

Set the timer to desired sterilization time. Then set the power switch to "ON" position. The timer will begin timing down.

NOTE

-9000D ONLY-

IT TAKES APPROXIMATELY 20 MINUTES TO REACH THE DESIRED TEMPERATURE.
BE SURE TO ADD THIS TIME FACTOR TO THE DESIRED STERILIZATION TIME.

-FOR MODELS 8000-DSE ONLY-

Disregard slow exhaust marking on the timer face. This special function will be described in the procedure for sterilization of liquid media.

Step 6

At the end of set time interval, the autoclave will automatically vent and stop heating.

-FOR MODELS 8000-DSE ONLY-

At the end of set time interval, an alarm will sound. The alarm will continue to sound until the power switch is set to "OFF" position. The autoclave will automatically vent and stop heating.

Allow the chamber temperature to decrease to less than 100°C (212°F) before opening the door. Open the door and leave ajar.

Step 7

Before the next cycle, "drain condensate". Condensate should be drained after each cycle. The chamber reservoir should be refilled to the water level indicator.

NOTE

WHEN THE AUTOCLAVE IS NEW, IT MAY REQUIRE 3 OR 4 CYCLES BEFORE CONDENSATE WILL DRAIN. THIS IS NORMAL. DRAIN VALVE IS CONNECTED TO THE CONDENSER TANK NOT TO THE AUTOCLAVE CHAMBER.

PROCEDURE FOR OPERATION OF DRYER CYCLE

NOTE

BE SURE THE DOOR IS SLIGHTLY AJAR (OPEN APPROX. 3" TO 4") THROUGHOUT DRYING CYCLE.

To operate the dryer cycle, set the dryer switch to "ON" position. Set the dryer temperature control to the desired control position and set the timer to desired drying time interval. Set the power switch to "ON" position. (Suggested Dryer setting is "LOW")

-FOR MODELS 8000-DSE ONLY-

At the end of the set time interval, an alarm will sound. The alarm will continue to sound until the power switch is set to "OFF" position.

-FOR MODELS 9000-D ONLY-

The "TIME" light will come on, but the "TEMP" light will remain off. When the timer turns off, turn power switch off.

Check contents and remove if dry. The dryer temperature control also has a medium and high setting. Select a higher temperature if desired, but use caution to avoid scorching contents.

Subsequent loads may be run by repeating steps 1 through 7. Refer to the chart on the next page for suggested sterilization temperatures and time intervals.

Procedure for Sterilization of Liquid Media

-FOR MODELS 8000-DSE ONLY-

Step 1
Ensure that the power switch, slow exhaust switch, and dryer switch are in the "OFF" position.

Step 2
Set the autoclave temperature control to "LOW" position. This will set the sterilization temperature at about 121°C (250°F).

Step 3
Set the timer to desired sterilization time interval. The timer will begin timing down after sterilization temperature is achieved. Allow 20 minutes at the end of cycle for slow exhaust. As an example: If media is to be at sterilization temperature for 15 minutes, the time should be set at 35 minutes (15 minutes sterilization + 20 minutes slow exhaust = 35 minute cycle time).

Step 4
Pour distilled water into chamber reservoir. Use measuring cup supplied. Fill until water level reaches the level indicator on the shelf.

Step 5
Use proper sterilizer loading procedures when placing materials in the autoclave chamber.

Step 6
It is recommended that a sterilization indicator be used with each load. Place indicator near materials being sterilized.

Step 7
Set the power switch and slow exhaust switch to "ON" position.

Step 8
Sterilize all media, except sugar broths or other time sensitive media, in autoclave for 15 minutes after the temperature has reached 121°C (250°F). To permit uniform heating and cooling, pack materials loosely and in small containers.

The maximum elapsed time for exposure of sugar broths to any heat (from time of closing loaded autoclave to unloading) is 45 minutes. Preheat the autoclave chamber before loading to reduce total heating time to within the 45 minute limit.

Step 9
To operate a preheat cycle, follow the previous steps with chamber unloaded. Watch the thermometer pointer until a temperature of 100°C (212°F) is indicated. Then set the power switch to "OFF" position, open door, and load chamber. Close door and set the power switch to "ON" position.

Step 10
At the end of the set time interval, the alarm will sound. The alarm will continue to sound until the power switch is set to "OFF" position. Remove medium from autoclave and cool quickly to avoid decomposition of sugars by prolonged exposure to heat.

Step 11
Before the next cycle, "drain condensate". Condensate should be drained after each cycle. The chamber reservoir should be refilled to the water level indicator. Refer to the chart on the next page for suggested sterilization temperatures and time intervals.

MODEL 8000-DSE/9000-D
STERILIZING CYCLE DATA

ITEM TO BE STERILIZED	STERILIZING TEMPERATURE (C°)	STERILIZING TEMPERATURE (F°)	PRESSURE	TIME REQUIRED TO STERILIZE (IN MINUTES) (AT STERILIZING TEMPERATURE)
INSTRUMENTS	121° 132°	250° 270°	15 27	20 3 TO 6
COTTON	121° 132°	250° 270°	15 27	30 15
RUBBER	121° 132°	250° 270°	15 27	30 15
250cc Flask(thin glass) 125cc Flask (thin glass) 50cc Flask (thin glass) 2 oz. Commercial Bottle	121°/123° 121°/123° 121°/123° 121°/123°	250°/254° 250°/254° 250°/254° 250°/254°	--- --- --- ---	8 to 10 8 to 10 6 to 8 8 to 10

NOTE: Sterilizing time will vary with the quantity of items in the autoclave vessel. Use a sterilization indicator with each load.

LOAD CAPACITY DATA

Here are some examples of **NAPCO** Autoclaves' "load capacity" for common equipment used in food and water bacterial analysis.

ITEM AND APPLICATION	WITH RACK	WITHOUT RACK
4 oz. sample bottle for water testing	24	26
8 oz. blending jar with lid for 25 gram food samples	8	10
Milk dilution bottle (99 mls) for food and water testing	24	26
500 ml screw cap Erlenmeyer flask for bacteria media	5	8
5 x 4 inch basket for test tubes or equipment	3	3
Pipette cans (2-1/2 inches in diameter)	4	6
Coliform fermentation tubes (16 x 150 mm) in 3 baskets	150	150
1.0 or 2.2 ml pipettes inside pipette cans	216	324
Agar slants for bacteria cultures	150	150
Glass petri dishes (100 x 150 mm)	60	80
Bacteria impingers for air sampling	10	10
Culture tubes for thermophilic spoor analysis	100	100
250 ml culture bottles for media sterilization	10	10

NOTE: specification subject to change without notice

MAINTENANCE SUGGESTIONS

At the end of the day: Remove screw fastener which holds shelf in place. Remove shelf to gain access to water reservoir. Add mild detergent to water and scrub reservoir and chamber walls. Then sponge water from reservoir and rinse chamber thoroughly with distilled water. Replace shelf as above.

Cleaning the exterior: The exterior finish is high quality stainless steel and hybrid epoxy coatings. Simply wipe the unit with a mild soap and water solution followed by rinsing. For more stubborn stains, a non-abrasive household cleaner may be used, followed by a rinse if necessary.

Door Handle: Lubricate the "T" handle threads twice a year or as often as needed.

TROUBLESHOOTING

WARNING

SERVICE SHOULD BE PERFORMED BY A QUALIFIED TECHNICIAN. BEFORE REPLACING ANY ELECTRICAL OR MECHANICAL COMPONENTS, UNPLUG THE LINE CORD. IF ELECTRICAL POWER IS REQUIRED FOR SERVICE, USE EXTREME CAUTION.

TROUBLESHOOTING PROCEDURES	
Problem	**Procedure**
1. No power. Temperature light out. Unit does not heat.	**1. Check plug and electrical outlet; See Electrical Service, pg. 16.** **2. Check fuse; See Electrical Service, pg. 16.** **3. Check switches; See pages 10 & 11.** **4. Check timer; See pg 10.**
2. Steam pressure is lost. Water boils out before sterilization is achieved.	**1. Check water level at start of each cycle.** **2. Check for water leaks in tubing and fittings; See pg. 16.** **3. Check purge systems; See pgs. 12 & 13, "Sensor" & "Solenoid Valve".** **4. Re-calibration of sensor is advised for operation at high elevations see "Adjusting the Sensor, pg. 17.**
3. Temperature light fails to illuminate. Unit heats normally.	**1. Check temperature light; pg. 12.**
4. Time light fails to illuminate. Timer functions normally.	**1. Check timer light; pg. 12.**
5. Unit does not heat. Time light illuminated. Temperature light out.	**1. Check low water cut-off switch; pg. 15.** **2. Check dryer switch; pg. 11.** **3. Check autoclave temperature control; pg. 13.**
6. Unit does not heat. Temperature light illuminated.	**1. Check heating element; pg. 14.**
7. Autoclaving temperature control cannot be achieved or maintained. Pressure gauge has a pressure reading.	**1. Check autoclave temperature control; pg. 13.** **2. Check calibration adjustments; on pgs. 13 & 14 "Testing the Temperature Controls".**
8. Autoclave temperature control cannot reach maximum or minimum limits (121°C to 132°C) by turning knob (tolerance ± 3°C.).	**1. Check calibration adjustment for temperature control; pg. 12,**
9. Temperature fluctuations of 4°C or more detected on temperature gauge at preset autoclaving temperature.	**1. Check gauges; See pg. 16.** **2. Check autoclave temperature control; See pg. 13.** **NOTE: 10 minutes should be allowed between shutdown and restart.**

TROUBLESHOOTING PROCEDURES	
Problem	**Procedure**
10. Timer does not function properly. Time light is illuminated.	**1. Check timer; See pg. 10.**
11. Drying element does not heat. Time light illuminated. Dryer light illuminated. Temperature light out.	**1. Check dryer temperature control; pg. 14.** **2. Check drying element; pg. 14.**
12. Fan motor does not run. (8000 DSE Only)	**1. Unit must be in slow exhaust function.**
13. Unit runs out of water. Unit fails to shut off at excessive temperature resulting in heat damage.	**1. Check low water cut-off switch; pg. 15.**
14. Autoclave temperature control failure (excessive heating). Pressure is relieved at safety pressure relief of 35 lbs. (tolerance ± 3 lbs.).	**1. Check autoclave temperature control; pg. 17.**

TEST PROCEDURE

TESTING THE TIMER (8000 DSE ONLY)

1. Turn power and dryer switch "ON", set timer for 20 minutes and observe the timer in operation.

TROUBLESHOOTING PROCEDURES
TESTING THE TIMER (8000DSE ONLY)

1. Turn power and dryer switch "ON", set timer for 20 minutes and observe the timer in operation.

2. If the rotation speed of the timer is not accurate it is defective and should be replaced.

3. If the time light is on but the timer does not operate, test with voltmeter across terminal L-1 and L-5 (see wiring diagram). If no voltage here make sure all the connections are tight and there is power to the timer. Retest and if still defective, replace the timer.

4. To test timer switches - First disconnect unit from electrical outlet.

5. Remove the wires from switch terminals CAREFULLY noting which terminals they were removed from.

6. Connect an ohmmeter across the common terminal and N.O. terminal on switch number one. With the timer now at the "OFF" position, meter should read less than 2 OHMS (continuity). With the timer knob turned at five (5) minutes or more, the meter should read infinity.

7. Connect an ohmmeter across the common terminal and N.C. terminal on switch number one. With the timer knob at the "OFF" position, meter should read infinity. With the timer knob turned at five (5) minutes or more, the meter should read less than 2 OHMS (continuity).

8. Now connect the Ohmmeter across the terminal and N.O. terminal on switch number two. With the timer knob at the "OFF" position, the meter should read infinity. With the timer knob turned at 20 minutes or more, the meter should read less than 2 OHMS.

9. Finally, connect the meter across the common terminal and the N.C. terminal on switch number two. The meter should read less than 2 OHMS with the knob in the "OFF" position, and infinity when the knob is set for 20 minutes or more. Replace faulty timer if the above conditions are not met. Return all wires to their respective terminals.

10. To replace the timer - disconnect the timer motor wires from the terminal block terminal L-1 and L-5. Remove all wires from timer switches CAREFULLY noting their location.

11. Loosen two set screws and remove knob.

12. Loosen hex nut on timer shaft and remove. Lift timer out from rear of control panel.

13. Install new timer and connect all wires.

14. Turn the timer shaft counterclockwise until it stops. This is the "OFF" position. The indicator on the knob should be adjusted to the "OFF" position. Tighten the set screws securely.

TESTING THE TIMER (9000D ONLY)

1. Turn Power Switch "ON", set Timer for 20 minutes and observe the Timer in operation.

2. If the rotation speed of the Timer is not accurate it is defective and should be replaced.

3. If the Time Light is "ON" but the Timer does not operate, test with voltmeter across terminals R-1 and L-3 (see wiring diagram). If no voltage here make sure all the connections are tight and there is power to the Timer. Retest and if still defective replace the Timer.

4. To replace the Timer - first remove the service cord from the electrical outlet.

5. Disconnect the wires from the Terminal Block and at the Timer body.

6. Loosen (2) set screws and remove Indicator Knob.

7. Remove (2) mounting screws and lift Timer out from rear of panel.

8. Install the new Timer, secure mounting screws and connect all wires.

9. Push Indicator Knob on shaft. Orient the indicator by locating the audible "click" when the timer shaft is rotated. This "click" sound indicates the "OFF" position. The Indicator Knob should be adjusted to the "OFF" position and set screws tightened.

10. Plug service cord into electrical outlet, turn Power Switch "ON" and test the new Timer.

TESTING THE FUNCTION AND POWER SWITCHES

POWER SWITCH

1. Test with voltmeter. Power switch in "ON" position. Check voltage across the (2) lower terminals on the switch.

2. If there is no voltage the switch is defective and should be replaced.

3. To replace the switch first remove the service cord from electrical outlet.

4. Disconnect all wires from the switch.

5. Loosen the retaining nut on the front of the panel.

6. Spin the ring off the switch on the front of the panel.

7. Pull switch out through rear panel.

8. Install the new switch. Note that the threaded shaft of the switch is keyed. This is to assure that the switch can only be installed in the correct position, over the tooth in the mounting hole.

9. Attach wires to the new switch. Refer to wiring diagram.

DRYER SWITCH - (inclusive of testing both heating circuits)

1. Test the switch with voltmeter. (Make sure timer and power switch are on). Place one lead on the center terminal of the switch and the other lead on the neutral terminal L-1 or L-2 at the terminal block.

2. If there is no power, refer to low water cutoff switch procedure (section 14.1). If there is power then check upper terminal of switch in dryer off position. Place one lead of meter on upper terminal, other lead on neutral terminal L-1 or L-2 at terminal block.

3. If there is power here, turn switch to dryer on and test with one lead on lower terminal and one lead on neutral terminal L-1 or L-2 at the terminal block.

4. If either the upper terminal or the lower terminal show no voltage the switch is defective.

5. To replace the dryer switch first disconnect the service cord from electrical outlet.

6. Disconnect all wires from the switch.

7. Loosen the retaining nut on the switch at the back side of the panel.

8. Spin the ring nut off the switch on the front of the panel.

9 . Pull switch out through rear of panel.

10. Install the new switch. Note that the threaded shaft of the switch is keyed. This is to assure that the switch can only be installed in the correct position, over the tooth in the mounting hole.

11. Attach wires to new switch. Refer to wiring diagram.

12. Test new switch per #1 of "Dryer Switch".

SLOW EXHAUST SWITCH (8000 DSE Only)

NOTE

DISCONNECT SERVICE CORD FROM ELECTRICAL OUTLET.

1. Test the switch with an Ohmmeter.

2. Remove five (5) wires from the slow exhaust switch CAREFULLY noting their location for replacement purposes.

3. With one lead on one of the center terminals, and the other lead on the upper terminal, the meter should read less than 2 ohms with the slow exhaust switch in the "OFF" position, and infinity in the "ON" position.

4 Now move the upper test lead to the lower terminal. The meter should read less than 2 ohms in the "ON" position and infinity in the "OFF" position.

5. Repeat the above procedure for the other section of the switch. Replace if found faulty.

6. To replace the slow exhaust switch, loosen the retaining nut on the switch at the back side of the panel.

7. Spin the ring nut off the switch on the front of the panel.

8. Pull switch out through rear of panel.

9. Install the new switch. Note that the threaded shaft of the switch is keyed. This is to assure that the switch can only be installed in the correct position, over the tooth in the mounting hole.

10. Attach wires to the new switch. Consult wiring diagram.

TEMPERATURE LIGHT

1. To test the temperature light turn power switch "ON", dryer switch and slow exhaust switch "OFF", and turn "ON" the timer.

2. With voltmeter test for power across terminals L-1 and L-8 at the terminal block.

3. If there is power and the light is out, the light should be replaced.

4. To replace the temperature light, first remove the service cord from the electrical outlet.

5. Disconnect the temperature light wires at the back of the lamp.

6. Push the light through and out from the rear of the control panel.

7. Install in the reverse of the above procedure.

TIMER LIGHT

1. To test the time light, turn power switch and dryer switch "ON" and start timer.

2. With a voltmeter, test across terminals L-2 and L-5 at terminal block.

3. If there is power and the light is out, the light should be replaced.

4. To replace the time light, first remove the service cord from the electrical outlet.

5. Disconnect the time light wires at the back of the lamp.

6. Install in the reverse of the above procedure.

DRYER LIGHT

1. To test the dryer light, turn power switch, dryer switch and dryer temperature control switch "ON" and start the timer.

2. With a voltmeter, test across terminal L-2 at terminal block, and P-1 terminal on dryer temperature control.

3. If there is no power and the light is out, the light should be replaced.

4. To replace the dryer light, first remove the service cord from the electrical outlet.

5. Disconnect the dryer light wires at the back of the lamp.

6. Push the light through and out from the rear of the control panel.

7. Install in the reverse of the above procedure.

SENSOR

1. With power switch and timer "ON" and dryer switch and slow exhaust switch "OFF", check wire #21 at the sensor with a voltmeter. If no power is indicated, refer to "LOW-WATER CUTOFF" test procedure (pg. 15).

2 . If there is power at wire #21 then either the sensor or the solenoid valve is defective.

3 To isolate which is defective, place a jumper wire between wire #21 and #39 at the sensor. When the timer is turned on (as stated in paragraph #1), the solenoid valve should make an audible "click". If not, see next section "SOLENOID VALVE" for replacement. If it does, continue with next step.

4 Remove the jumper wire and activate the sensor switch plunger CAREFULLY with an INSULATED screwdriver (timer on). The solenoid valve should make an audible "click". If not, the sensor is defective. Replace in the following manner:

5. Remove service cord from electrical outlet.

6. Disconnect the wires at the end of the sensor.
7. Disconnect pipe fitting on top of the sensor.

8. Turn unit on side, remove inspection plate and disconnect pipe fitting on top of the sensor.

9. Install new sensor assembly. Reconnect wires and fittings. Seal all fittings with Loc-Tite #92-31 or equivalent.

10. Adjust new sensor - pg. 17, "ADJUSTING THE SENSOR".

SOLENOID VALVE

1. If the solenoid appears defective, it should be replaced.

NOTE

IF THE SOLENOID IS "STICKING" (AS INDICATED BY A BUZZING SOUND) IT MAY REQUIRE CLEANING. THIS MAY ALSO BE INDICATED BY A STEADY DRIPPING OF WATER OUT OF THE CONDENSER TUBE. A SMALL AMOUNT OF DEBRIS SOMETIMES PREVENTS THE SOLENOID VALVE FROM SEALING PROPERLY. TO INSPECT FOR DEBRIS, FOLLOW THIS PROCEDURE: REMOVE SERVICE CORD FROM ELECTRICAL OUTLET.

2. Remove the 3/4 hex head plug on solenoid valve body.

3. Lift plunger spring and inspect for debris.

4. Check internal thread and O-ring and remove any debris.

5. Replace 3/4" hex head plug.

6. Remove retaining clip from shaft, and remove solenoid coil + spring washer from shaft.

7. Remove threaded retaining collar from valve body and remove shaft.

8. Check plunger body, spring, valve internal thread and o-ring, and remove any debris.

9. Replace parts in reverse order.

10. Retest solenoid.

11. If the solenoid is still not functioning it should be replaced.

12. Disconnect solenoid (red) wire at sensor and at terminal R-3 on terminal block.

13. Disconnect tube fitting.

14. Lift out solenoid and remove brass tee fitting, plug, and connector.

15. Install tee fitting, plug and connector in new solenoid (pg. 16, paragraph 7 of "TESTING FOR LEAKS").

16. Install new solenoid in unit, connect fittings, and attach wires. See port direction in illustration.

17. Test the new solenoid by repeating steps #2 & #3 "SENSOR".

TESTING THE TEMPERATURE CONTROLS

AUTOCLAVE TEMPERATURE CONTROL

1. Check the water level and fill to gauge level.

2. Turn dryer switch and slow exhaust switch to "OFF". Turn power switch "ON". Start timer.

3. The temperature light should be on. If not, check wire #9 and #11 on temperature control. If neither wire shows voltage, check for loose connections. If there are no loose connections the temperature control is probably defective. To prove this, the low water cutoff switch must be tested (see "LOW WATER Cutoff).

4. If there is voltage only on wire #9 of the temperature control, the control shaft should be rotated to raise the temperature. To gain access to the temperature control shaft, remove the knob by loosening two setscrews. The slotted shaft can now be seen. Turn the shaft counterclockwise to raise temperature. If after three turns the light does not come on and there is no voltage reading on both terminals, replace the temperature control.

5. To replace the temperature control, remove the service cord from the power source. Remove the two setscrews and pull off the indicator knob.

6. Remove the nut from the mounting stud. Disconnect the brass tee fitting behind the temperature control.

7. Disconnect wires at terminals on temperature control CAREFULLY noting their location for replacement purposes.

8. If necessary, loosen jam nut at condenser tank so tubing can be pushed away from the temperature control. This will allow clearance so that the control can be lifted out.

9. Install the new temperature control. Make sure the mounting stud protrudes through the front panel a minimum of 3/8". When assembling fittings, seal with LOC-TITE #92-31 or Teflon tape. The new temperature control needs to be calibrated after assembly. To calibrate the unit follow the procedure "AUTOCLAVE TEMPERATURE CONTROL".

DRYER TEMPERATURE CONTROL

1. To test the dryer-temperature control, turn dryer switch and power switch "ON". Start the timer.

2. With the door open slightly, turn the dryer-temperature control to low. After about five (5) seconds you should hear a click. After ten (10) seconds, hold your hand under the top element. It should be warm. **DO NOT TOUCH!**

3. If the element is not heating, test the dryer temperature control with a voltmeter. With dryer switch "ON", check with voltmeter from terminals H-1 to H-2 on the dryer temperature control switch itself. The voltage should cycle on and off with the switch. If no voltage the switch is defective.

4. Remove service cord from electrical outlet. To replace the dryer-temperature control loosen the two setscrews and remove indicator knob. Remove two screws holding metal retaining plate. Lift control out through rear of panel.

5. When installing new control, refer to wiring diagram and attach wire lugs accordingly.

TESTING THE ELEMENTS

DRYING ELEMENT (UPPER)

1. If the dryer element is not heating, test across the terminals with voltmeter. It should indicate line voltage and cycle on and off with dryer-temperature control. If element is defective order a replacement kit. Each kit includes the required element plus all necessary attaching hardware.

2. To replace the dryer element, first remove service cord from electrical outlet, then disconnect the wires at element terminals. Remove the two (2) clamping nuts from the element. (On top of autoclave vessel).

3. Pull element out of autoclave.

4. Install new element.

CAUTION

BE SURE TO HOLD ELEMENT ON INSIDE OF VESSEL WHILE TIGHTENING NUT ON OUTSIDE. THIS WILL PREVENT TWISTING THE TERMINALS DURING INSTALLATION.

Apply 20 lbs. torque. Make sure the fiber gaskets are in position as shown in the illustration.

5. Test new element by cycling the dryer-temperature control. Make sure dryer switch is "ON" and power switch in "ON".

HEATING ELEMENT (LOWER)

1. To test the heating element, test across the terminals with a voltmeter. The element should register line voltage and cycle on and off with the autoclave temperature control (make sure the power switch is "ON", the dryer switch and slow exhaust switches are "OFF", and the timer is activated). If the element is defective order a replacement element kit. Each kit includes the required element plus all necessary attaching hardware (see illustration).

2. To replace the heating element first remove the service cord from electrical outlet, then remove the shelf by removing one screw at the front of the shelf (inside chamber).

3. Turn the unit on its side and remove access cover from bottom front of the unit. Remove the wires, then the nuts from element out through the door.

4. To install the element place fiber washers on the element terminals and place element in vessel.

NOTE

WHEN INSTALLING ELEMENTS , BE SURE THE FIBER WASHERS ARE IN POSITION AS SHOWN IN THE ILLUSTRATION. FAILURE TO DO SO CAN CAUSE SEVERE DAMAGE TO THE UNIT.

5. Make sure the element is positioned level at front and rear. The rear of the element has a tendency to "ride up" the side of the vessel while being tightened. The element must be level during operation. This also insures that the element will be positioned correctly over the low water cutoff switch.

6. Install nuts and washers on element terminal as shown, and tighten the nuts using approximately 20 lbs. torque. Be sure to hold the retaining nut on the inside of the vessel while tightening the nut on the outside. This will prevent twisting the terminals and keep the element positioned correctly.

7. Replace the shelf and install one screw.

8. Reconnect electrical wiring per the illustration.

TESTING SAFETY DEVICES

LOW WATER Cutoff SWITCH

1. The low water cutoff switch is designed to automatically cut off power to the solenoid and heating element. This prevents overheating the unit in the event the water level gets too low. The switch is located on the underside of the autoclave vessel in the center of the unit. Before testing it, make sure the heating element is held down firmly and directly over the low water cutoff.

2. To test the low water cutoff switch operate the unit with no water in the vessel. Set the timer for ten (10) minutes. Turn dryer switch and slow exhaust switches "OFF". Turn power switch "ON". The temperature light should be on.

3. If the temperature light is not on, check the low water cutoff with a voltmeter. If there is line voltage on wire #19 and #31 then refer to "AUTOCLAVE TEMPERATURE CONTROL ADJUSTMENT" and the dryer switch is defective and should be replaced.

4. If there is line voltage to one terminal only, the switch is defective and should be replaced.

5. If the temperature light is "ON", then observe the unit as the temperature increases. The temperature light should go out within five (5) minutes when the heat exceeds the tolerance of the switch. The time light should stay on and the timer continue to run.

6. If the switch fails to function as above, it should be replaced.

7. Remove the service plug from the electrical outlet. To replace low water cutoff switch allow the unit to cool until it is safe to touch the autoclave vessel.

8. Remove the switch by removing nuts and washers from weld studs and disconnecting the wire lugs from the switch.

9. Install new switch and test it by repeating steps #1 to #8.

PRESSURE RELIEF VALVE

1. The pressure relief valve is designed to open at 35 P.S.I., ±3 P.S.I.. To test the valve, it is necessary to increase the pressure to that amount.

2. Increase the temperature by adjusting the autoclave-temperature control shaft . When the temperature reaches 138°C (280°F) the valve should open. This temperature will vary somewhat with altitude (see Table, pg. 19).

NOTE

AFTER THIS TEST, RESET THE TEMPERATURE CONTROL TO OPERATING TEMPERATURE PER "AUTOCLAVE TEMPERATURE CONTROL.

3. Observe the pressure gauge and note the pressure at which the relief valve is activated. If this pressure exceeds 38 P.S.I., the relief valve is defective and should be replaced.

4. To replace the pressure relief valve, remove the defective valve by unscrewing it from its brass fitting.

5. Replace in the reverse of the above procedure. Be sure to use a pipe sealant on the threads.

TESTING GAUGES

TEMPERATURE GAUGE AND PRESSURE GAUGE

1. When observing the gauges, be sure to consider the effect of altitude on the boiling point of water (see Table).

2. If a gauge appears to be malfunctioning, test as follows: Remove the temperature gauge and test it against a reliable thermometer in boiling water. If the temperature gauge is defective order a replacement.

3. To test the pressure gauge, first make sure the temperature is accurate and then that the pressure gauge corresponds. If not, the gauge is defective and should be replaced.

TESTING FOR LEAKS

1. To check for leaks, it is necessary to observe the unit through the complete autoclave cycle. Remove the service cord from the electrical outlet.

2. Remove the cover housing of the unit and strip the insulation material from around the vessel.

3. To test the system for leaks, operate the unit through the complete autoclave cycle.

4. If a leak is observed at any of the fittings, allow the unit to cool before repairing.

5. Tighten the leaking fitting up to 1/4 turn. Do not tighten excessively.

NOTE

DISCONNECT SERVICE CORD FROM ELECTRICAL OUTLET WHEN THERE IS DANGER OF TOOL ARCING AGAINST ELECTRICAL TERMINALS.

6. If the fitting still leaks after retesting, it should be replaced. Order the preformed copper tube section by part number.

7. When reassembling compression fittings, we suggest the use of "LOC-TITE" 92-31, pipe sealant with Teflon.

CAUTION

DO NOT TWIST THE TUBING OR FITTINGS WHEN TIGHTENING.

8. The condensation tank is fitted with a gasket to prevent moisture from escaping. Observe the condition of the gasket material. It is important that a good seal be maintained.

9. The cover housing gasket is adhesive backed and should be installed carefully so it will be positioned correctly over the condenser tank when the cover housing is installed.

10. If steam is escaping from the door of the autoclave, order a replacement door gasket.

ELECTRICAL SERVICE

1. The unit is available with several options of power service.

    1. 115/120V and 60 Hz.
    2. 220V and 50/60 Hz.

    When servicing the unit check the data plate to make sure the power of the unit is compatible with the power source. (The data plate is located on the housing cover at the rear of the unit, directly above the power cord access).

2. In the event of a failure of the electrical system first inspect the fuse.

3. Remove the fuse by twisting the cap off the fuse holder. (see illustration)

4. If the fuse is defective replace it. The fuse is 20 AMP size MDA (10 AMP MDA on 220V) for 8000DSE; for 9000D it is 15 AMP (8 AMP for 220V).

5. After testing the fuse, if there is no power to the unit test with a voltmeter across the two top terminals of the power switch (with switch "ON").

6. Next, test the cord with a voltmeter across the soldered fuse connection and the white neutral wire (remove plastic wire nut).

7. If there is no power through the cord, inspect the connections at the terminals in the plug itself.

CONTROL ADJUSTMENTS

AUTOCLAVE-TEMPERATURE CONTROL

1. The autoclave temperature control may require adjustment. The function of this control is to maintain a maximum stabilized temperature of 132°C. (270°F). The control requires calibration to assure that it is at the proper setting.

NOTE

TO CALIBRATE THE CONTROL, THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED:

2. Check the water level and fill to gauge level.

3. Turn the dryer and slow exhaust switches "OFF". Turn power switch "ON". Start timer.

4. Heat unit to 132°C (270°F) by adjusting the autoclave temperature control knob to high.

5. To gain access to the temperature control shaft, remove the knob by loosening two setscrews. The slotted shaft can now be seen. Turn the shaft counterclockwise to raise temperature. Turn clockwise to lower temperature. Watch temperature gauge on door and adjust by 1/2 turn increments until temperature is reached.

6. Allow the unit to stabilize. Watch the temperature gauge. Temperature light will flash on and off at intervals holding the temperature within tolerance.

7. Adjust as necessary during the stabilization time. Temperature light should flash on each time there is a 1°C drop in temperature. When the light has flashed several times the unit is stabilized.

8. Place knob on temperature control shaft with indicator at high position and tighten both setscrews. Check operation of shaft and knob by turning to low position and back to high position.

ADJUSTING THE SENSOR

1. The sensor is set at the factory (near sea level) to close the solenoid at 3° above the boiling point of water. Since the boiling point will vary with altitude the sensor may need adjustment when setting up the unit for operation at higher elevations. Note the applicable temperature on the following chart on the next page.

2. Set autoclave temperature control on position three (3), turn power switch "ON", dryer and slow exhaust switches "OFF", and activate timer (check water level in chamber before turning unit on).

3. Observe the temperature at which the solenoid is activated. Listen for the first click of the solenoid during warm-up.

4. If sensor requires adjustment above the boiling point, locate adjustment screw at end of sensor.

CAUTION

THE TERMINAL NEXT TO THE ADJUSTMENT SCREW IS ELECTRICALLY HOT. USE INSULATED SCREWDRIVER TO MAKE ADJUSTMENT.

NOTE

CLOCKWISE ADJUSTMENT INCREASES TEMPERATURE SET POINT, COUNTERCLOCKWISE DECREASES SET POINT.

5. Turn the power switch "OFF" and allow the unit to cool for ten (10) minutes.

6. Repeat Step 2 and observe the temperature gauge.

7. When the predetermined temperature is obtained 3° above local boiling point of water, turn sensor adjusting screw until the solenoid is activated. The unit should then be cooled and reheated to activate the solenoid again. This will confirm that the sensor adjustment is now correct.

CONTROL RELAYS- for Model 8000DSE Only

1. The functions of control relay number one are the following:

   A. To energize the timer motor when the autoclave reaches sterilizing temperature, by receiving a signal from the autoclave temperature control (wire #35).

   B. To energize the timer motor when the autoclave is in a low-water condition during initial start-up. This is accomplished by receiving a signal from the low-water cutoff (wire #32).

   C. To energize the timer motor when the unit is in the drying mode. During this function, the relay coil is not activated.

2. The functions of control relay number two are the following:

   A. To energize the fan motor during the 20 minute slow-exhaust cycle, by receiving a signal from timer switch #2 (wire #26).

   B. To maintain the solenoid valve in the closed condition during the 20 minute slow-exhaust cycle, also by receiving a signal from timer switch #2 (wire #25).

   C. When the slow-exhaust cycle is not desired, (slow exhaust switch "OFF"), the switch removes power from the fan motor, and the relay coil will be activated off and on with the autoclave temperature control. During this mode of operation, the relay is disconnected from the circuit, except for the relay coil

3. If problems are experienced and it is suspected that a relay is defective, pull the relays out of their sockets and reverse them. (Both relays are identical).

4. If the problem is corrected, then replaced faulty relay.

FAN MOTOR- for Model 8000DSE Only

1. The fan motor operates only during the 20 minute slow-exhaust cycle.

2. To test the fan motor turn the power switch and slow exhaust switch "ON", dryer switch "OFF", and set the timer for ten (10) minutes.

3. If the fan motor is not running, check for power at the fan motor plug with a voltmeter.

4. To replace faulty fan motor, first disconnect unit from electrical outlet.

5. Remove four screws holding fan motor and guard to motor bracket.
6. Replace in the reverse of the above procedure.

NOTE

OBSERVE AIR FLOW DIRECTION WHEN REPLACING MOTOR. AIR SHOULD BE DRAWN THROUGH THE FAN MOTOR AND BLOW ONTO AUTOCLAVE VESSEL.

SEALED WATER BAFFLE

1. If the baffle appears to be leaking or needs to be replaced, proceed as follows:

2. Remove the elevated exhaust port by turning counterclockwise with a wrench.

3. Carefully pry the baffle away from the vessel.

NOTE

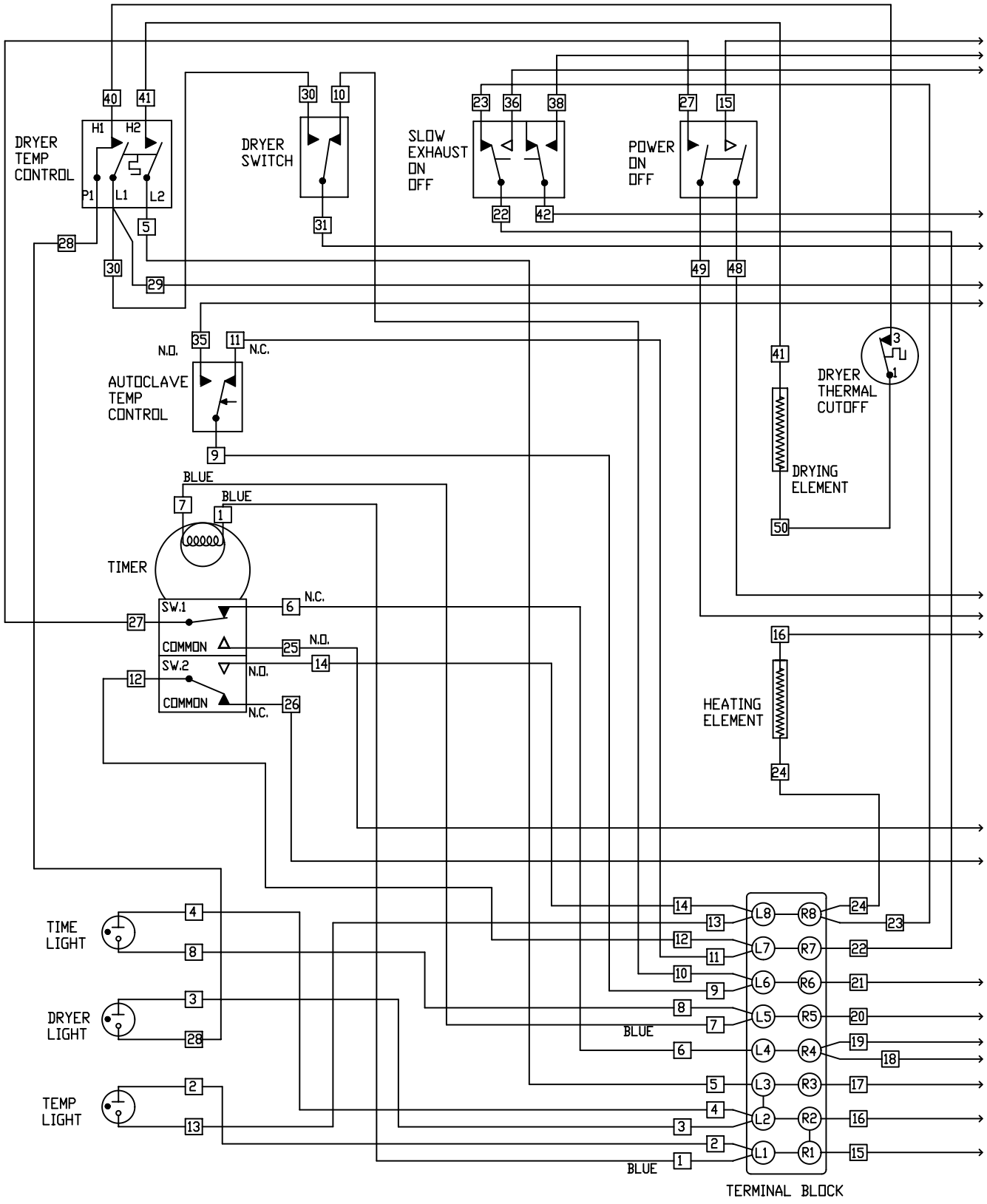
IT IS ESSENTIAL THAT THIS AREA BE CLEAN FOR PROPER SEALING. APPLY AN EVEN FILM OF SILICONE RUBBER ADHESIVE (G.E. #1200 RTV OR EQUIVALENT) TO THE UNDERNEATH SIDE OF THE BAFFLE.

5. Carefully place the baffle in place, along with the elevated exhaust post and washer. Tighten the port while holding the baffle in place. Wipe off excess silicone rubber, allow to cure. (24 Hours)

6. Add water and check for leaks.

BOILING TEMPERATURE OF WATER VS. ALTITUDE

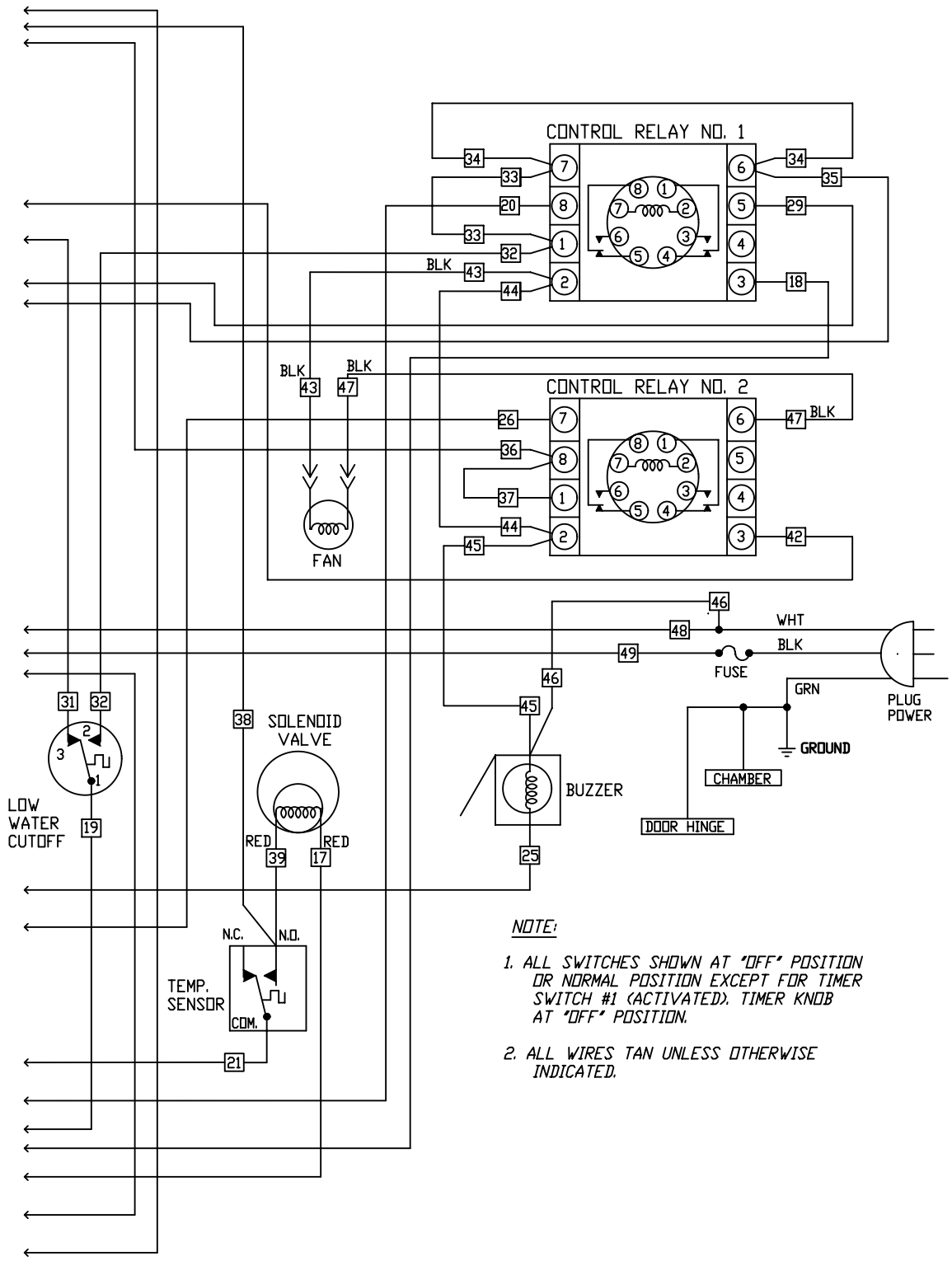
ALTITUDE (METERS)	TEMP. °C	ALTITUDE (FT.)	TEMP. °F
0	100	0	212
150	99.5	1000	210.1
300	98.9	2000	208.3
600	97.9	3000	206.5
900	96.9	4000	204.6
1200	95.9	5000	202.8
1500	94.8	6000	201.0
2000	92.9	7000	199.3



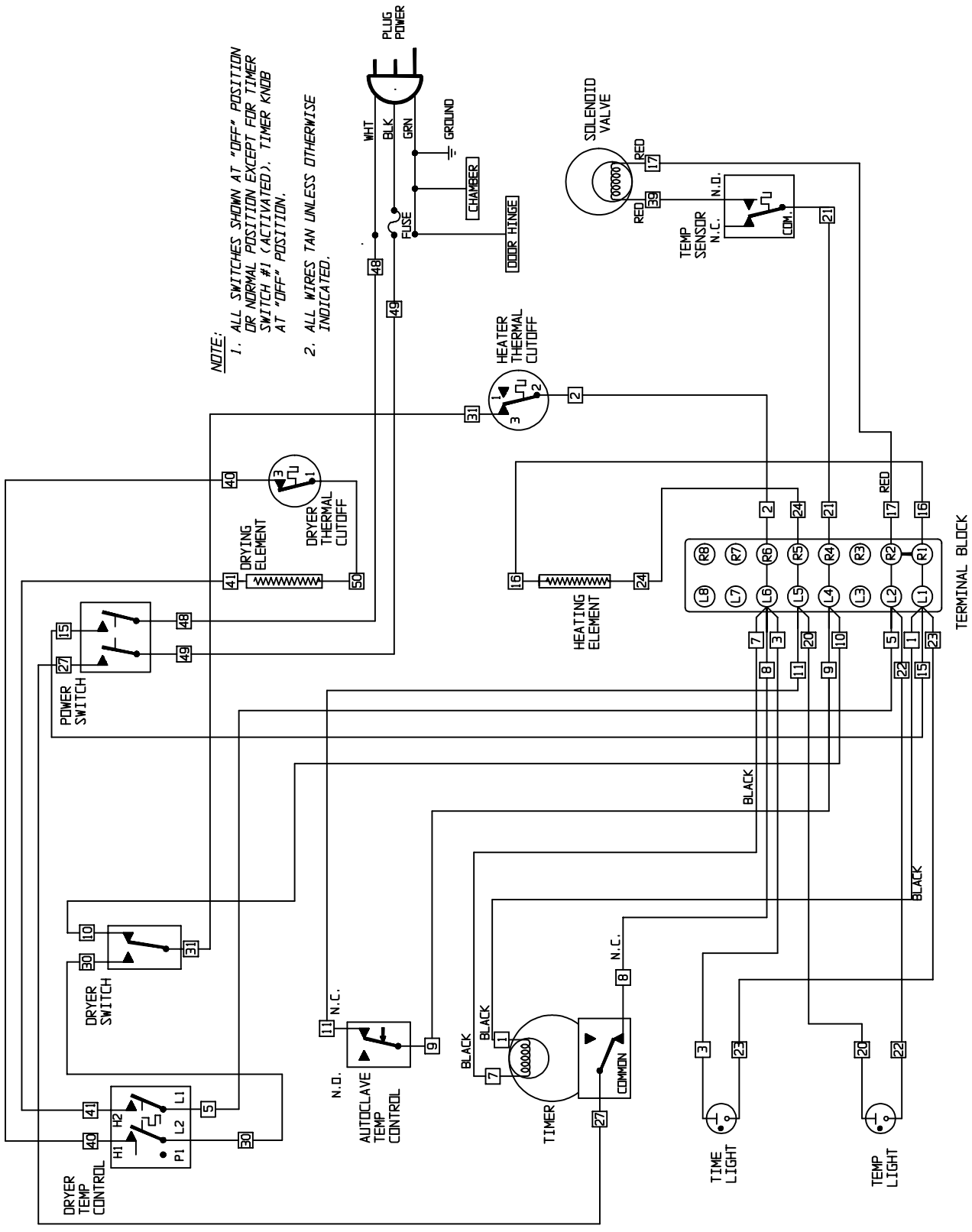
WIRING DIAGRAM

8000 DSE AUTOCLAVE

ARROWS CONNECT TO THOSE ON FACING PAGE



ARROWS CONNECT TO THOSE ON FACING PAGE

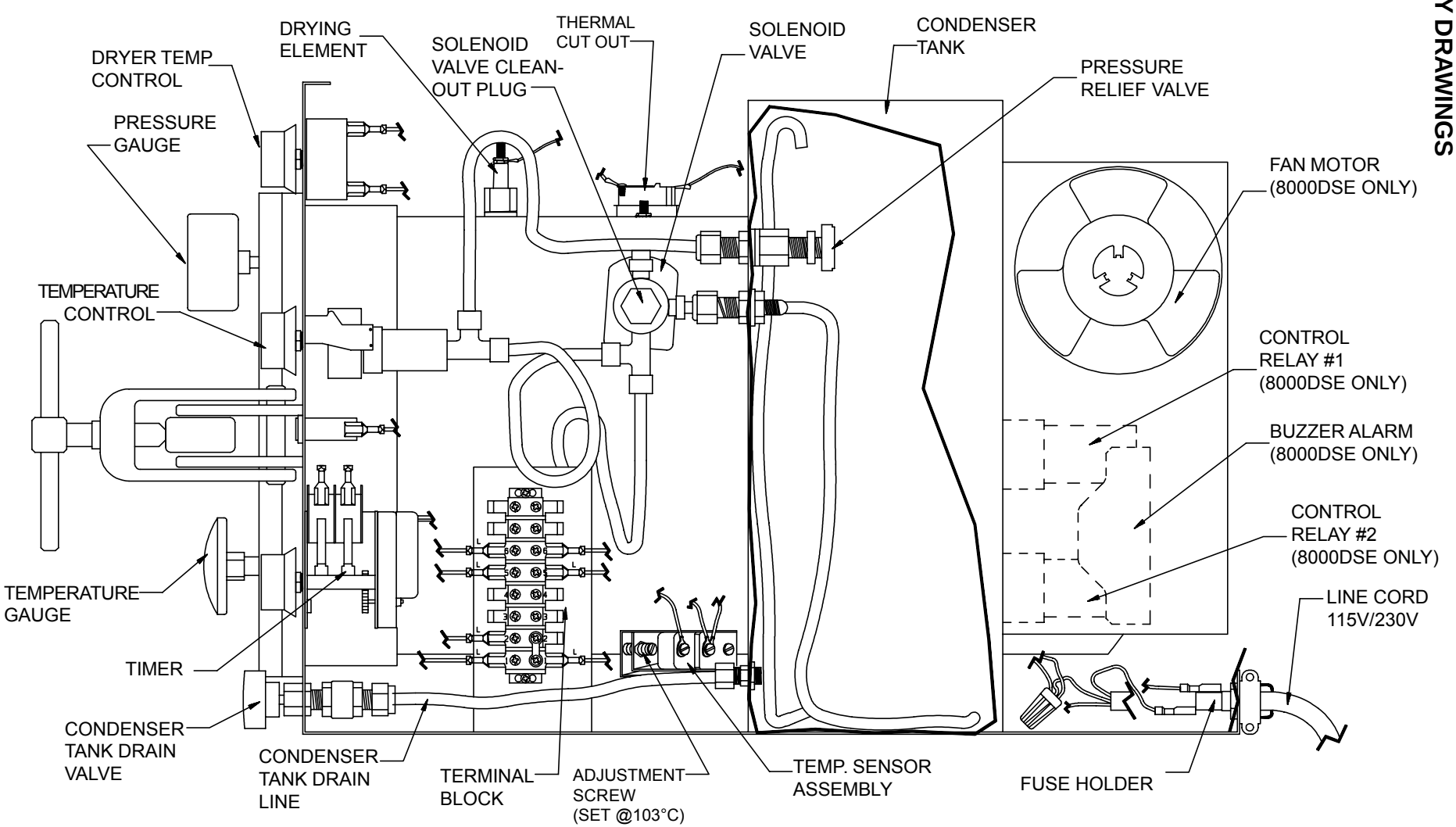


WIRING DIAGRAM

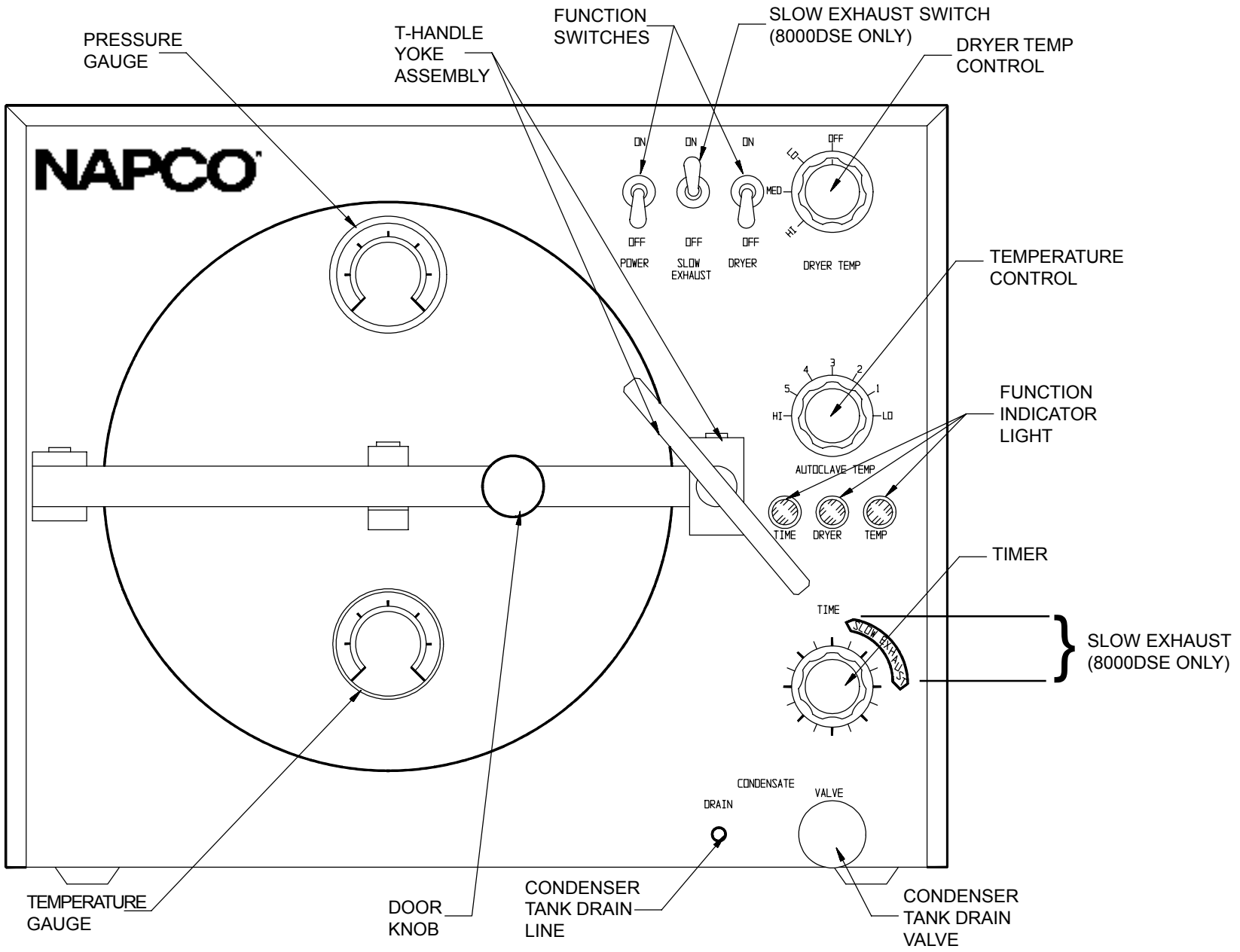
9000D AUTOCLAVE

REPLACEMENTS PARTS LIST				
PART DESCRIPTION	8000-120	8000-220	9000D-120	9000D-220
Power Switch	MZZA100300			
Dryer Switch	MZZA100301			
Slow Exhaust Switch	MZZA100302		N/A	
Dryer Temperature Control Kit	MZZA100303	MZZA100304	MZZA100305	MZZA100306
Temperature Assembly Control Kit	MZZA100307			
Temperature Gauge	MZZA100308			
Pressure Gauge	MZZA100309			
Timer Kit	MZZA100310	MZZA100311	MZZA100312	MZZA100313
Temperature Sensor Assembly	MZZA100314			
Heating Element Kit	MZZA100315	MZZA100316	MZZA100317	MZZA100318
Drying Element Kit	MZZA100319	MZZA100320	MZZA100321	MZZA100322
Dryer Thermal Cutoff	MZZA100323			
Heater Thermal Cutoff	MZZA100324			
Solenoid Assembly	MZZA100325	MZZA100326	MZZA100327	MZZA100328
Power Cord	MZZA100329	MZZA100330	MZZA100331	MZZA100332
Knob, Temperature and Timer	MZZA100333			
Fan Motor	MZZA100334	MZZA100335	N/A	
Relay	MZZA100336	MZZA100337	N/A	
Relay Octal Socket	MZZA100338		N/A	
Alarm Buzzer	MZZA100339	MZZA100340	N/A	
Fuse Kit	MZZA100341	MZZA100342	MZZA100343	MZZA100344
Door	MZZA100345			
Door Gasket	MZZA100346			

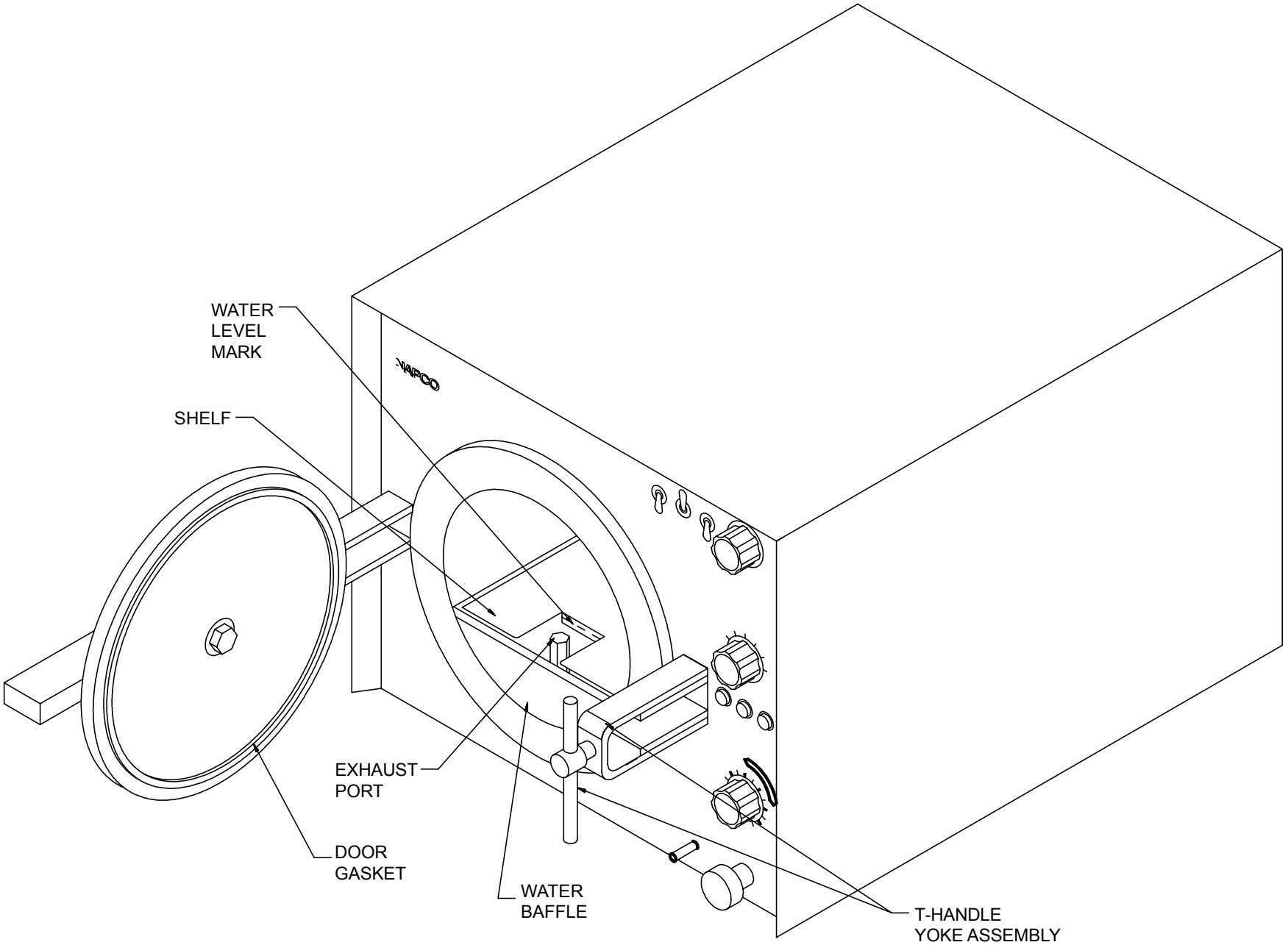
REPLACEMENTS PARTS LIST(Cont.)				
PART DESCRIPTION	8000-120	8000-220	9000D-120	9000D-220
Door Clevis/ Yoke Kit (w/ T-Handle)	MZZA100347			
Door Bar Assembly Kit	MZZA100348			
Condenser Tank Gasket	MZZA100349			
Water Baffle Kit	MZZA100350			
Condenser Tank Weldment	MZZA100351			
Pressure Relief Valve	MZZA100352			
Drain Valve Assembly	MZZA100353			
Tube, Temp. Sensor to Vessel	MZZA100354			
Tube, Sensor to Solenoid	MZZA100355			
Tube, Condenser Coil	MZZA100356			
Instrument Tray	MZZA100357			
Shelf	MZZA100358			
User Manual	MZZA100359			
Hinge Support	MZZA100360			
Hinge	MZZA100361			
Wire Harness	MZZA100362		MZZA100363	
Plug and Cord	MZZA100364		N/A	



8000-DSE/9000D AUTOCLAVE
SIDE VIEW - COVER REMOVED

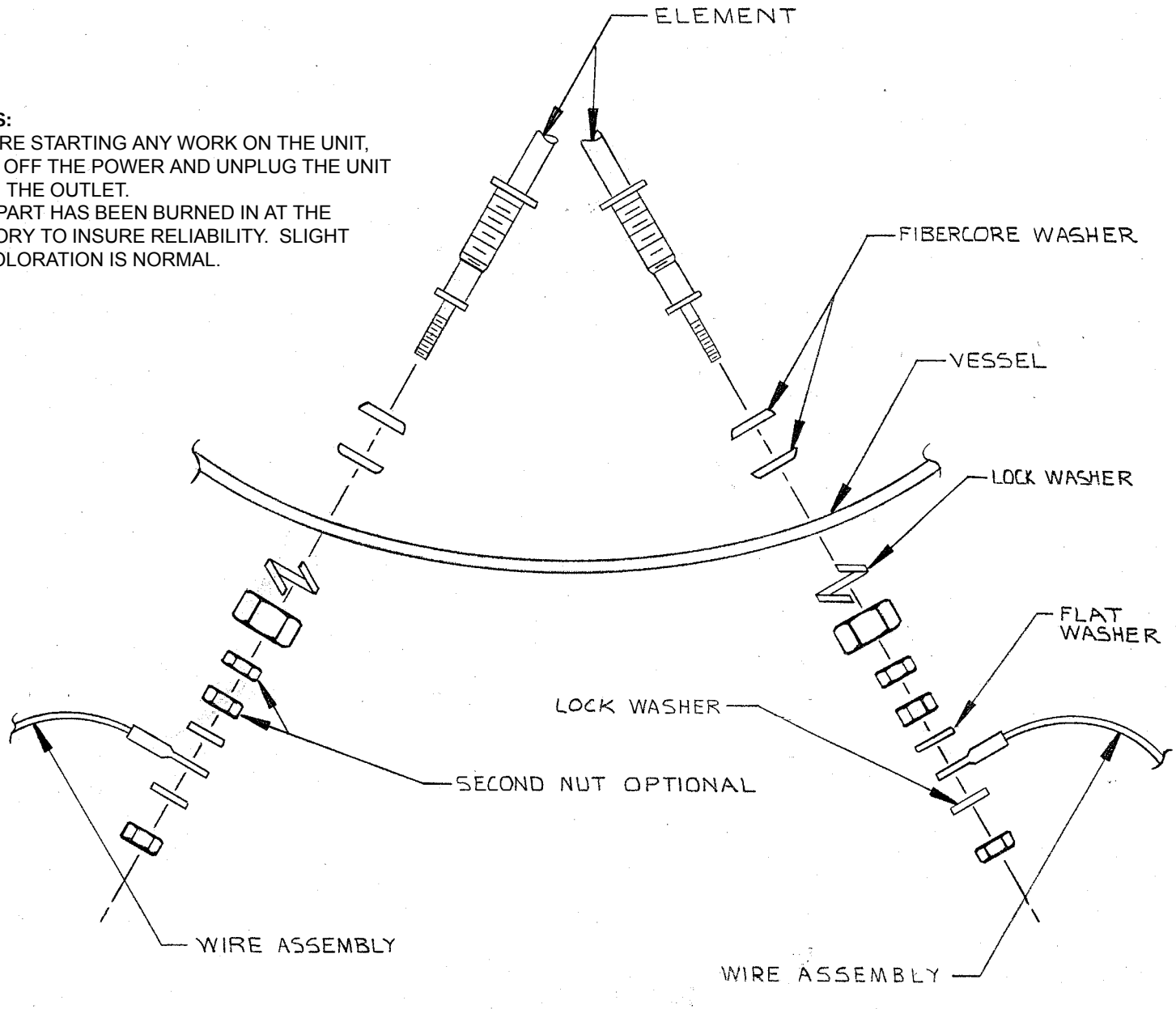

PRESSURE GAUGE
T-HANDLE YOKE ASSEMBLY
FUNCTION SWITCHES
SLOW EXHAUST SWITCH (8000DSE ONLY)
DRYER TEMP CONTROL
NAPCO
ON
ON
ON
OFF
LO
MED
HI
OFF
OFF
OFF
POWER
SLOW EXHAUST
DRYER
DRYER TEMP
TEMPERATURE CONTROL
4
3
2
5
1
HI
LO
AUTOCLAVE TEMP
FUNCTION INDICATOR LIGHT
TIME
DRYER
TEMP
TIMER
TIME
SLOW EXHAUST
SLOW EXHAUST (8000DSE ONLY)
CONDENSATE DRAIN
VALVE
TEMPERATURE GAUGE
DOOR KNOB
CONDENSER TANK DRAIN LINE
CONDENSER TANK DRAIN VALVE

FRONT VIEW



INNER BODY VIEW

NOTES:
-BEFORE STARTING ANY WORK ON THE UNIT, TURN OFF THE POWER AND UNPLUG THE UNIT FROM THE OUTLET.
-THIS PART HAS BEEN BURNED IN AT THE FACTORY TO INSURE RELIABILITY. SLIGHT DISCOLORATION IS NORMAL.



BOTTOM HEATER INSTALLATION