PRIMUS

GENERAL PURPOSE STEAM STERILIZER

PRIMUS PSS 500 CONTROL

ST. LOUIS COMMUNITY COLLEGE

STERILIZER MODEL NUMBER: PSS5-A-MESD
STERILIZER JOB NUMBER: 17413
STERILIZER SERIAL NUMBER: 17413

DECEMBER 2009

GENPURPOSE 196/1.07
Revision Date: July 2, 2008
SW VERSION 7923

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PRIMUS PSS 500 CONTROL

PART I

GENERAL INFORMATION

PSS-500 Controls
Software Version 7923

July 2, 2008
Version 1.07

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Printed in the United States of America

Steam Sterilizer Installation, Operation, and Maintenance Manual
V196 Controller
Includes Bibliographical References

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GP PSS5 Part I-7923 1.07070208

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PART I. GENERAL MANUAL

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SECTION 1.0 GENERAL INFORMATION

This section contains general information about the PRIMUS General Purpose Steam Sterilizer using the PSS500 Control. This sterilizer is specifically designed to process goods using only the cycles specified in the User's manual section of this document. If there is any doubt about the sterilization process of a specific material or product, we suggest you contact the manufacturer of the product for recommended sterilization technique.

1.1 Warranty

This sterilizer is not designed to process flammable liquids, nor liquids in containers, that are not designed for sterilization. Any alteration of the sterilizer, which affects its operation, will void the warranty. Any alterations could violate state and local regulations and jeopardize insurance coverage. Failure to perform suggested maintenance may cause the warranty to be null and void. Refer to the following PRIMUS Sterilizer Company, LLC. Equipment Warranty for further clarification on what is covered.

LIMITATIONS AND LIABILITY AND INDEMNITY

IN NO CASE, WHETHER AS A RESULT OF A BREACH OF CONTRACT, BREACH OF WARRANTY, OR TORT (INCLUDING PRIMUS' OR CUSTOMER'S WILLFUL ACT OF NEGLIGENCE OR STRICT LIABILITY), SHALL PRIMUS OR CUSTOMER BE LIABLE TO THE OTHER FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES INCURRED BY THE OTHER, INCLUDING, BUT NOT LIMITED TO, LOSS OF REVENUE, PROFITS, OR GOODWILL. HOWEVER, NOTHING CONTAINED IN THIS AGREEMENT IS INTENDED TO RELIEVE EITHER PRIMUS OR CUSTOMER FROM CLAIMS, LIABILITY, DAMAGES OR EXPENSES RESULTING FROM BODILY INJURY, INCLUDING DEATH, OR FROM PROPERTY DAMAGE INCURRED DUE TO THE WILLFUL ACTS, THE NEGLIGENCE OF, OR THE STRICT LIABILITY OF THAT PARTY.

PRIMUS AGREES TO DEFEND, INDEMNIFY AND HOLD CUSTOMER HARMLESS FROM ANY AND ALL CLAIMS, LIABILITY, DAMAGES OR EXPENSES DUE TO PERSONAL INJURIES, INCLUDING DEATH, TO EMPLOYEES OF PRIMUS AND CUSTOMER AND TO THIRD PARTIES AND FOR PROPERTY DAMAGE TO THE EXTENT OF THE WILLFUL ACTS OF THE NEGLIGENCE OF PRIMUS OR THE STRICT LIABILITY OF PRIMUS CAUSED BY THE ACTS OR OMISSIONS OF PRIMUS. CUSTOMER AGREES TO DEFEND, INDEMNIFY AND HOLD PRIMUS HARMLESS FROM ANY AND ALL CLAIMS, LIABILITY, DAMAGES OR EXPENSES DUE TO PERSONAL INJURIES, INCLUDING DEATH, TO EMPLOYEES OF CUSTOMER AND PRIMUS AND TO THIRD PARTIES AND FROM PROPERTY DAMAGE TO THE EXTENT OF THE WILLFUL ACTS, THE NEGLIGENCE OF CUSTOMER, OR THE STRICT LIABILITY OF CUSTOMER CAUSED BY THE ACTS OR OMISSIONS OF CUSTOMER.

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PRIMUS STERILIZER COMPANY EQUIPMENT WARRANTY

Primus Sterilizer Company, LLC (PRIMUS) makes the following warranty to the original owner with respect to its products:

WARRANTY: All PRIMUS manufactured equipment and products are fully warranted against defects in materials and workmanship under normal use and operation for one year from the installation and start up of the equipment or eighteen months from the date of delivery, whichever occurs first.

Additionally, PRIMUS Sterilizer pressure vessels are warranted against defects in materials and workmanship under normal use and operation for fifteen years where the sterilizer is maintained under a continuous PRIMUS Preventative Maintenance Service Contract. Where the sterilizer is not continuously maintained under PRIMUS Preventative Maintenance Contract, vessel shall be warranted for ten years from the date of delivery.

Unless otherwise specified, service labor required to repair or replace parts will be provided upon request, without further charge for a period of ninety (90) days from the start of the warranty period. Thereafter all repair costs shall be borne by the Purchaser. This warranty does not extend to any equipment or products which have been subjected to misuse, neglect, accident or improper installation or application, or which have been serviced or altered by persons not authorized by PRIMUS.

PRIMUS' sole liability and the Purchaser's sole remedy under this warranty is limited to repair or replacement of the defective equipment or product at PRIMUS' option. Repair or replacement of the defective equipment or product will be provided at Purchaser's facility, or at PRIMUS' plant by an authorized representative of PRIMUS. Replaced parts shall become the property of PRIMUS. All returns must be made under a 'Return Materials Authorization' (RMA) assigned by PRIMUS. PRIMUS shall not be liable for special, indirect or consequential damage or expense.

This warranty does not cover damage or defects caused by the following: Use of parts other than PRIMUS authorized parts, Acts of God, Labor disputes, Utility malfunction, errors in installation of the equipment; accidents; abuse; misuse; tampering; alteration; modification; improper service; chlorides and corrosive chemicals; or lack of documented preventive maintenance as specified by the maintenance manual.

No waiver or modification of any provisions of this warranty will be binding upon PRIMUS unless agreed to, in writing, by a duly authorized official of PRIMUS. PRIMUS does not authorize any person or company to create any warranty obligations on its behalf.

This warranty sets forth the only warranty applicable to PRIMUS equipment and parts. No other representation or warranty on the part of PRIMUS, expressed or implied, shall apply to equipment or parts, or their performance, all such warranties (including any warranty of merchantability or fitness for any purpose) being hereby disclaimed. PRIMUS shall in no event be liable in respect to loss of business or profits on any similar or dissimilar consequential or incidental damages or losses arising out of, or in connection with, this equipment.

**This warranty does not cover repair or replacement of expendable service parts, including but no limited to, doors seals, lubricants, valve kits, lamps, fuses, gaskets and filters.

F1071 PRIMUS Equipment Warranty 1.10

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1.2 Service Agreement

The cost-effective way to prevent downtime, due to equipment malfunction, is with regularly scheduled maintenance, performed by qualified technicians trained in the latest technology. PRIMUS, or your dealer, offers extended service agreements to provide regular maintenance of your sterilizer that will help correct little problems before they become big ones.

PRIMUS Service combines the precise maintenance program and factory-trained technicians to assure you of maximum productivity. Technicians thoroughly inspect, clean, adjust, and provide all necessary maintenance to keep your sterilizer performing according to factory specifications.

A service agreement with PRIMUS will ensure that the vessel will be warranted for fifteen years.

1.3 Safety Precautions

The following is a summary of how WARNINGS and CAUTIONS are denoted in this manual. WARNINGS indicate the potential for danger to personnel, and CAUTIONS indicate the potential for damage to the equipment. These precautions are found throughout the document where they are applicable. Carefully read the manual before proceeding to use or service the unit.

IN THIS MANUAL, WARNINGS DRAW ATTENTION TO THE POTENTIAL FOR DANGER TO PERSONNEL. AS DEMONSTRATED HERE, THE ENTIRE WARNING NOTATION IS EMPHASIZED BY THE ICON TO THE LEFT WITH BOLD, CAPITAL PRINT.

IN THIS MANUAL, CAUTIONS DRAW ATTENTION TO THE POTENTIAL FOR DAMAGE TO EQUIPMENT. AS DEMONSTRATED HERE, THE CAUTION INFORMATION IS EMPHASIZED BY THE ICON TO THE LEFT WITH CAPITAL PRINT.

1.4 Bibliography

American Society of Mechanical Engineers (ASME) Section VIII, Division 1

Association for the Advancement of Medical Instrumentation (AAMI) Standards and Recommended Practices, Volume 1 Sterilization; Arlington VA, 1992

Association for the Advancement of Medical Instrumentation (AAMI) Standards and Recommended Practices, Volume 1S, Sterilization Supplemental; Arlington VA, 1994

United States Food and Drug Administration (FDA), Part 820 of Title 21 of the Code of Federal Regulations (21CFR 820)

National Fire Protection Association, National Electrical Code; ANSI/NFPA 70. Boston, 1990.

National Plumbing Code (NPC)

Perkins, John J.; Principles and Methods of Sterilization in Health Sciences; Charles C. Thomas Co., 1970

1.5 Definitions and Terms

AAMI	-	Association for the Advancement of Medical Instrumentation.
BOWIE-DICK TEST	-	Used to test the efficacy of pre-vacuum high temperature steam sterilizers.
CALIBRATION	-	Process of checking and adjusting devices or instruments for accuracy of measurement.
CONTROLLER ASSEMBLY V2.0	-	Consists of the SBC196 computer and the A/D Board with the two EPROMs.
CYCLE	-	A set of events (phases) that occur over a period of time that can be repeated.
EEPROM	-	Electronically Erasable Programmable Read Only Memory. A non-volatile memory chip whose bit patterns can be electronically erased and reprogrammed by the user. All setpoints, parameters, and calibration values are stored on the EEPROM.
EPROM	-	Erasable Programmable Read Only Memory. A non-volatile memory chip whose bit patterns can be erased and reprogrammed by the factory. (Operational and Calibration)
FACTORY CONFIGURATION NO.	-	This is a preset number entered in the PSS500 control by the factory and determined by the type of machine.
LCD	-	Liquid Crystal Display.
LED	-	Light Emitting Diode.
NIST	-	National Institute of Standards and Testing.
OPERATOR	-	Person or persons charged with day-to-day operation of the sterilization equipment.
OPERATOR PANEL	-	Consists of the touchpad, printer, and chamber pressure gauge.
PARAMETER	-	Quantities or constant values that vary with the circumstances of application. Parameters are selected from menus that are accessible on the touchpad display.
PHASE	-	Any of the stages in a cycle.
PRESSURE TRANSDUCER	-	A device that converts pressure into an electrical signal.
PSIG	-	Pounds per Square Inch Gauge.
PSIA	-	Pounds per Square Inch Absolute.

RTD	-	Resistance Temperature Device - a device that converts temperature into a specific resistance value.
SBC196	-	The microcontroller circuit board attached above the A/D Board on the Controller.
SETPOINTS	-	Values entered for setting exact points in cycle parameters. These are global settings, applying to specific cycles.
U-1	-	A manufacturer's data report for pressure vessels as required by the Provisions of the ASME Code Rules, Section VIII, Division 1. This form is filed with the National Board of Boiler and Pressure Vessel Inspectors.
U-2	-	A manufacturer's data report for all types of electric boilers as required by the Provisions of the ASME Code Rules, Section 1.
USER	-	Equipment owner, persons, client, or parties having responsibility for the outcome of a particular type of sterilization process being done.

SECTION 2.0 STERILIZER DESCRIPTION

2.1 General

PRIMUS Sterilizers are available in a multi-functional Steam Sterilizer with Hi-Vacuum and Gravity capabilities or as a Laboratory/Lo-Temperature Steam Sterilizer. All units are available for installation, either recessed through a wall or freestanding. Freestanding sterilizers are cabinet mounted, with stainless steel panels. 16" X 16", 20" X 20" and 26" X 26"cross-section sterilizers have vertical, manual or power doors. Units larger than 26" X 26" are equipped with a power horizontal door.

Our sterilizers feature the PSS 500 MicroComputer control package with a digital printer. The PSS 500 MicroComputer controls steam sterilizers with a pulsing, pressure/vacuum, air removal system. Visual indicators monitor all cycle phases with audible and visual cycle completion indicators. It is designed for efficient sterilization with wrapped or unwrapped instruments, dry goods and flasked liquids.

2.2 Construction

2.2.1 Frame

The vessel is secured to a welded structural frame. The frame is constructed of carbon steel (stainless steel available as buyer's option) and covered with corrosion resistant paint. It is mounted on threaded leveling screws with supplemental steel weight distribution footpads.

2.2.2 Chamber

The chamber, including bulkhead, is fabricated of solid 316L stainless steel. Chambers are of entirely welded construction with interior, longitudinal corners that are radiused. The chamber is fully jacketed.

Steam baffles are positioned in the chamber to minimize wetting by condensate and insure proper steam distribution.

2.2.3 Jacket

The jacket is constructed of AISI Type 304 stainless steel and is mounted to the chamber over channel supports designed to achieve uniform distribution of steam. The jacket enables the stabilization of temperature around the chamber, thereby reducing the time required to bring the chamber up to sterilization temperatures. This provides superior temperature distribution and prevents the formation of condensation on the chamber walls. The jacket is constructed in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and is so stamped.

2.2.4 Doors

Door(s) are constructed of solid 316L stainless steel which provides ease of cleaning and uniform quality for all chamber surfaces. Door(s) are designed to prevent opening while under pressure. A silicon gasket recessed within the chamber head ring seals the Door(s). The gasket is retracted before a door may be opened.

Door(s) are vertical sliding, counter-balanced and manually operated, or optionally powered, for 16” x 16”, 20” x 20”, and 26” x 26” chamber sizes.

Door(s) are horizontal-sliding powered for chamber sizes larger than 26” X 26”. Horizontal door models are available with doors that slide from left-to-right, or right-to-left

2.2.5 Insulation

Superior heat loss reduction is achieved with one-inch rigid fiberglass insulation overlaid with 16-gage aluminum sheet metal. The sheet metal is formed, overlapped, and riveted. The aluminum makes the insulation system impervious to water, thus eliminating wet, sagging insulation.

2.2.6 Plumbing and Fixtures

All plumbing and piping components delivering steam or sterile air to the product are stainless steel threaded, brass or copper. All major piping and electrical components are tagged and numbered to match the P&ID diagrams. Threaded stainless steel is available as a customer option.

Traps are thermostatic, non-proprietary, and industrial grade. They are positioned and sized for maximum efficiency. Traps are used for the removal of air and condensate from the system.
Control valves are non-proprietary, industrial grade, brass or stainless steel. They are actuated by electric solenoids or air pressure. Safety valves are ASME approved, stamped, and sized for the vessel design pressure.

The steam source requires clean house steam or integral steam generator with particulates removed. Steam shall be suitably trapped to ensure that it is dry and supplied at 50-80 PSIG. An automatic steam condenser exhaust system reduces temperature of exhaust steam flowing to the drain.

2.2.7 Vacuum System

Rapid evacuation of chamber air, steam, and condensate is achieved with a water ejector provided as standard equipment with PRIMUS Sterilizers. Liquid ring vacuum pumps may be provided as an option and are standard on sterilizers that are greater then 75 cubic feet.. Both the ejector and the optional vacuum pump are capable of air evacuation to a "deep" vacuum (e.g., 2 PSIA) in the chamber. Effluent discharge temperature is further reduced by a dual pass, coil bundle, heat exchanger before entering the vacuum pump. The discharge temperature is further reduced by cool water at the floor drain (Drain Quench).

2.2.8 Air Filtration

The air inlet filter is a cellulose-medium type. It is 100% efficient at 0.2 microns, and mounted external to the chamber. An additional 0.3 micron filter element for outside air will be mounted for Air-In

2.2.9 Control Panel

The gauges, touchpad and printer are mounted in the stainless fascia panel.

2.2.9.1 PSS 500 Controls

The PRIMUS PSS 500 control system provides for automatic operation through all phases of the sterilization cycle. Cycle parameters can be selected and programmed by the operator. All cycle phases are monitored visually. Cycle completion indicators are provided both audibly and visually.

The control is an embedded MicroComputer system with non-volatile memory storage eliminating the need for battery back up. The computer consists of solid-state devices, isolated from heat and moisture in a NEMA-rated, shielded enclosure. The MicroComputer control is self-diagnostic and provides information to the operator on a 2-line, 16 character LCD located on the control touchpad. An audible tone accompanies all alarms indicating a problem with the cycle. When specified, cycle parameters may be locked out by the supervisor through the use of touchpad keystrokes. The control touchpad provides information on cycle progress by LED indicators. Specific information on cycle parameters and progress, in addition to alarms, are shown on the LCD display. Cycle selection and programming are entered by control panel pushbuttons, which provide an audible signal when pressed. Controls include a cycle advance button to allow the operator to manually advance the cycle. The control panel indicates the use of cycle advance, which phases were advanced, and continually displays this information until the door is opened at the end of the cycle. Cycle progress including time, temperature, pressure, and alarms are reported on a 24-character thermal or impact printer.

The touchpad contains pushbuttons and the LCD display. Cycle progress is displayed by LEDs on the Operator's Panel. Inputs are made using the numbered cycle buttons (See Part III, User's Manual, Figure 2.1-1, Touchpad Display). Double door sterilizers have a touchpad near each door.

2.2.10 Instrumentation/Sensors

An analog pressure transducer or transmitter senses pressure. Temperature is sensed by 100 ohm platinum RTDs. Temperature readouts are provided in either Fahrenheit or Centigrade as specified.

2.2.11 Gauges

PRIMUS sterilizers have, as a standard, digital display gauges located on both Side A and Side B of double door sterilizers, which display chamber pressure. Primus General Purpose sterilizers are also equipped with compound dial gauges offered as customer option in the service area.

2.2.12 Printer Devices

A compact reliable thermal or impact printer provides recording of time, temperature, pressure, cycle number, sterilizer number, and date for each cycle. Printed reports of calibration and operator selected parameters are provided.

2.2.13 Recording Instruments

The standard strip printer provides an alpha-numeric printout of cycle identification, cycle parameters, date/time, chamber temperature, chamber pressure, and alarm statements on 2¼" wide, single-ply thermal or impact printer paper. Additionally, a circular chart recorder may be provided when graphical or continuous multi-channel recording is required.

2.2.14 Accessories

Loading equipment - Bottom shelf with adjustable shelf(ves), or loading cart(s) with transfer carriage(s).

Integral Electric Steam Generator/Boiler - used when house steam is not available.

Boost Pump – used to increase water pressure in areas that do not have sufficient water pressure.

SECTION 3.0 SAFETY FEATURES

3.1 Door Pins

On horizontal sliding doors, security of the door is maintained by multiple two-inch stainless steel pins, which slide into stainless steel receivers. Pins and receivers are aligned along both vertical edges of the door. The number and size of pins and receivers on each side are dependent upon vessel size.

Vertical doors slide up and down in milled grooves in the stainless steel headring. When closed, the door is surrounded on all four sides by a retaining angle. The chamber and door mechanisms are hydro-tested at 150% of the operating pressure rating of 45 pounds.

Safety conscious design and construction of the door prevents opening while the chamber is under pressure.

3.2 Door Limit Switches/Pressure Settings

Horizontal doors have door-closed switch(es) that are adjustable. The sterilizer cannot enter cycle processing until a signal is received from the door-closed switch(es).

Manually operated Vertical doors have door-closed switch(es). The sterilizer cannot enter cycle until the door-closed signal(s) are received.

Power door(s) have door open and closed switches. The sterilizer cannot enter processing until a signal is received from the door-closed switch(es).

SECTION 4.0 CONTROLS

4.1 Facility Power Disconnect

A dedicated facility power line should be supplied for the sterilizer. The operator should be instructed where the main power disconnect is and how to disconnect the power. The customer should wire the dedicated power line to the junction box, which contains a surge suppressor for the incoming power. The sterilizer has a main power switch and indicator light on the side of the control box.

4.2 Manual Supply Valves

Manual supply valves should be provided by the customer/contractor at the sterilizer site. The Piping and Instrumentation Diagram identify where the customer should provide shut-off valves for water, steam and air to the sterilizer.

SECTION 5.0 MANUFACTURER'S RECORDS

Refer to Appendix A, Manufacturer's Records, for the manufacturer's records applicable to this unit.

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PRIMUS

GENERAL PURPOSE STEAM STERILIZER

PRIMUS PSS500 SERIES

PART II

INSTALLATION MANUAL

PSS-500 Controls
Software Version 7923

July 2, 2008
Version 1.07

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PART II INSTALLATION MANUAL

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SECTION 1.0 PRE-INSTALLATION

1.1 Review Installation Requirements

Review the installation information below prior to beginning the installation of the sterilizer. Check the Occupational Health and Safety Act and National Electric Code, as well as local electric and plumbing codes, for any special requirements that may pertain to the installation of this sterilizer. Refer to the Uncrating Instructions attached to the sterilizer to ensure the machine is not damaged during uncrating.

For recessed models refer to paragraph 2.1.1, Recessed Models item f, for instructions on how to assemble the front panel. For cabinet models refer to paragraph 2.1.2, Cabinet Models item e.

1.2 Examine Equipment

Inventory all delivered equipment against the packing list. Check all boxes and wrapping materials prior to removal. Any damage should be promptly reported to the transportation company responsible for delivery and also reported to PRIMUS Sterilizer Company, LLC.

NOTE Should you determine an item missing, notify PRIMUS Sterilizer Company, LLC immediately.

1.3 Review Drawings

Installation personnel should thoroughly familiarize themselves with the General Arrangement, P&ID, and Electrical drawings prior to installing the sterilizer. Refer to the Maintenance Section for all drawings applicable to this unit.

1.4 Pre-Installation Inspection

The following items should be checked prior to installing the sterilizer:

Access Clearance	A minimum of 18” on all sides and 24” on top.
Utility Service Lines	Check the Equipment Arrangement Diagram for supply line sizes, pressure and other utility requirements.
	Water Supply - Backflow prevention is by others. Check local codes for requirements. The sterilizer is not equipped with a vacuum breaker or backflow prevention device.
	Shutoff valves should be installed in steam and water supply lines near the sterilizer. This will enable the sterilizer to be serviced without shutting off the building supply.
	Disconnect switches, capable of being locked in the OFF position, must also be installed in electric supply lines near the sterilizer.
Electrical Requirements	Sterilizer Controls: Terminal box for 120VAC, 50/60 Hz, 10 amp.

Provide dedicated circuit of quality suitable for computer to sterilizer. If optional boiler is specified, do **not** share the service.

Steam Supply Line

Verify that the building steam supply line is well drained and trapped. This will ensure condensate free steam between 97 and 100% saturated vapor to the sterilizer. The customer should provide a trap in the steam line, before the shutoff valve, to remove condensate.

Connect to a medium pressure, steam supply line, regulated (±5 PSIG). Steam supplied with dynamic stability at 50-80 PSIG.

Confirm steam service requirements on the Equipment Arrangement drawing in the Maintenance Section of this manual.

DO NOT SUPPLY SUPER HEATED STEAM. IT IS HAZARDOUS AND WILL INHIBIT THE STEAM STERILIZATION PROCESS.

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Cold Water

Temperature is not to exceed 70°F. If an optional vacuum pump is used, temperature is not to exceed 60°F, so that the pump achieves maximum efficiency. Dynamic pressure of 50-70 PSIG with a water hardness of not more that 80 ppm is recommended.

CHAMBER SIZE	WATER FLOW
16” X 16” X 26” (980 lbs.*)	8 GPM (3/4” NPT)
20” X 20” X 39” (1520 lbs.*)	8 GPM (3/4” NPT)
26” X 26” X 39” (1840 lbs.*)	8 GPM. (3/4” NPT)
26” X 26” X 49” (2200 lbs.*)	14 GPM (3/4” NPT)
26” X 26” X 67” (2600 lbs.*)	14 GPM (3/4” NPT)

*Sterilizer Weight, Single Door

Table 1.4-2 Service Requirements - Water

Sterilizer Drain

A minimum 2” diameter is recommended for the floor drain. A floor sink is recommended. An atmospherically vented drain is required.

Confirm water service requirements on the Equipment Arrangement drawing in the Maintenance Section of this manual.

Electric Steam Boiler Drain (For units with a electric steam boiler only)

On the side of the Electric Steam Boiler is a 1/2 inch NPT shutoff valve. This must be piped to a 1/2 inch ODT drain terminal.

NOTE: If a hot blow-down is performed on the electric steam boiler, the drain line must be connected to a receiver capable of withstanding 212°F (100°C) water. If a cold blow-down is performed, the connection to a standard drain is acceptable. See User’s Manual and local codes for more information on blow-down.

IMPORTANT: Sizes shown are service connections only. Building drain lines must be increased by one pipe size to provide for sufficient flow rate.

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SECTION 2.0 INSTALLATION

LACERATION HAZARD - USING PLIERS OR OTHER CLAMPING DEVICE, HOLD THE BANDING STRAP WHILE IT IS BEING CUT. THIS WILL HELP AVOID INJURIES TO EYES AND HANDS WHEN TENSION IS RELEASED. ALWAYS WEAR PROTECTIVE EYE GOGGLES WHEN CUTTING STEEL BANDS.

PROTECTIVE PLASTIC COVERING SHOULD BE REMOVED SLOWLY TO REDUCE THE LEVEL OF STATIC DISCHARGE.

2.1 Stabilizing and Leveling

2.1.1 Recessed Model:

a. Move the sterilizer into position. Refer to the architect's approved drawings for location and vessel orientation.

b. If additional vertical clearance is required to move the unit into the wall opening, lower the vessel by screwing the feet counterclockwise into the frame.

c. Place the provided metal footpads under the adjustable feet to distribute the point loads and stabilize the sterilizer. If seismic anchoring is required, a drawing will be provided. The installation instructions are attached to the drawing.

d. Adjust the feet by screwing them clockwise or counterclockwise in the frame until the sterilizer chamber is level and centered in the wall opening. Use a carpenter's bubble level front-to-rear and side-to-side on the chamber floor, to level the sterilizer. Repeat the process periodically, during the installation.

ACCURATE LEVELING IS CRITICAL TO THE SAFE AND EFFICIENT OPERATION OF THE STERILIZER.

NOTE

If transfer carriages are used, align the height of the transfer carriage with the bottom of the chamber.

e. If applicable, position the seismic anchor plates as depicted in the drawing and anchor to the floor through the holes provided in the plates.

f. After rough positioning and initial leveling of the sterilizer, install fascia panels to verify the position of the unit in the wall opening. Adjust placement of unit until fascia panels are centered over wall opening and the back of the panels are flush and straight in relation to the wall. The panel mounting studs may also be used as a “fine” adjustment for a flush fit to the wall.

For double door installation, refer to the Equipment Arrangement Diagram in the Maintenance Section of this manual for proper placement of the fascia panels. NOTE: Ensure that the fascia panels are installed to the correct end of the sterilizer. Second fascia panel should be installed only after the unit is positioned through wall.

2.1.2 Cabinet Model:

a. Move the sterilizer into position. Refer to Part IV, Maintenance Manual, for the Equipment Arrangement drawing or drawings provided and approved by the customer's architect.

b. Adjust the height of the sterilizer, and anchor as outlined in paragraph 2.1.1, Recessed Models.

c. If the cabinet panel support brackets are not assembled on the frame, assemble them with the nuts, bolts, and washers provided.

d. Unpack and assemble the front and side panels using fastening hardware provided.

e. After rough positioning and initial leveling of the sterilizer, install fascia panels to verify position of unit in wall opening. Adjust placement of unit until fascia panels are centered over wall opening and the back of the panels are flush and straight in relation to the wall. The panel mounting studs may also be used as a “fine” adjustment for a flush fit to the wall.

2.2 Installing a Vertical Single Door Unit

NOTE It is critical to the overall operation of all sterilizer doors that the sterilizer chamber be level in all directions.

a. Remove the banding straps from the supports holding up the door.

1. On large units (e.g. 26 X 26) two people are required to hold the door and one person to remove the supports. Once the supports are removed, lower the door.

b. Ensure that the cable remains around the pulley as door is lowered.

c. Cut the banding strap on the counterweight.

d. Open the door counterweight cover and ensure the lead shot is evenly distributed across the box.

2.2.1 Recessed

Move the sterilizer back into the wall opening until the fascia panel fits tight against wall face.

2.2.2 Cabinet Enclosed

a. If the cabinet panel support brackets are not assembled on the frame, assemble them with the nuts, bolts and washers provided. Refer to the Equipment Arrangement Diagram in Part IV, Maintenance Manual.

b. Unpack and assemble the front and side panels using fastening hardware provided.

c. Adjust the panel mounting studs to provide flush connection of all panels.

2.3 Double Vertical Door Unit

Repeat the installation instructions in paragraph 2.2, for the second door.

2.3.1 Recessed

a. Move sterilizer through one or both wall openings until the fascia panel fits tight against the face of the wall. Install the second fascia panel.

b. Refer to the Equipment Arrangement Diagram provided in Part IV, Maintenance Manual, for the proper placement of the fascia panels.

2.3.2 Cabinet Enclosed

a. If the cabinet panel support brackets are not assembled on the frame, assemble them with the nuts, bolts and washers provided. Refer to the Equipment Arrangement Diagram in Part IV, Maintenance Manual.

b. Unpack and assemble the front and side panels using fastening hardware provided.

c. Refer to the Equipment Arrangement Diagram provided in Part IV, Maintenance Manual, for the proper placement of the fascia panels.

d. Adjust the panel mounting studs to provide flush connection of all panels.

2.4 Installing a Horizontal Door Unit

NOTE

On double door units, if the unit has outriggers they must be installed on the sterilizer **before** opening the doors.

a. Carefully remove the two trolleys from the door, making note of how the spacers and the trolley halves separate, so that they can be reassembled the same way they were removed.

b. Attach the I-Beam to the sterilizer with the eight bolts, lock washers, and flat washers provided. Line up the marks on the I-beam bracket and the sheet aluminum shell. Hand tighten the bolts, only at this time.

c. Attach the two trolleys, with the holes for the two ¼"-20 bolts facing the back of the sterilizer. Push the bolt through the two halves; placing the nut on the backside. Do not over-tighten. Install a cotter pin to secure in place.

d. Remove the banding straps from door(s).

e. Lock the two nuts on the trolleys and screw the stud into the door, thus raising the door until the pins are centered in the holes. (Required only if pins are not centered)

f. Door should be ready to open.

g. Loosen the two brass door guides on the bottom of the door. Attach the bottom track to the sterilizer frame with the two bolts provided. Line up the marks on the frame and the bottom of the track bracket. Move the track down and adjust the two track guides until they are in the track approximately ¼" - ½". Tighten the four bolts.

h. Attach the air cylinder bracket to the trolleys using the four bolts provided.

Attach the air cylinder to the bracket using the pin and hitch pin provided with the hardware. The two air lines are marked; attach accordingly. The door switches are marked such that they can only be installed one way; connect as indicated. Once the door switches are installed, apply power to the sterilizer to enable adjustment.

Open the door completely. Disconnect the air supply to the sterilizer. Open the lid on the electronic cabinet, and examine the white relay module that is labeled "DOOR OPEN". The LED indicator on the relay should be on. If the LED is not lit, loosen the proximity switch on the air cylinder, and slide it along the cylinder until the LED illuminates. Tighten the proximity switch to achieve correct positioning and provide for correct on and off operation. Some trial and error is to be expected.

i. Repeat step h. with the Door-Close relay. Close the door all the way and observe the relay labeled "DOOR CLOSED".

j. The door should move freely. If it does not, inspect and locate areas of binding and adjust as necessary. Note that the bottom track has two adjusting bolts that move the track in and out.

k The 3/8”-16 set screws on the door should have been preset at the time of manufacture. If further adjustment is required, adjust when the sterilizer is cold. Leave 0.035" clearance between each pin and setscrew.

l. Keep the I-beam and bottom track clear of obstructions, and lubricate the bottom track with powder graphite.

2.5 Connecting Utilities (without boiler)

2.5.1 Steam

The effectiveness of steam sterilization is dependent on the character and quality of the steam used. Steam generators based on evaporation from high pressure hot water should not be used, since the steam produced is of inferior quality for sterilization purposes.

Since the steam comes in physical contact with the goods to be sterilized, it should be free of additives, solid particles or other foreign matter.

The requirement for steam sterilization is medium pressure, saturated, "clean" steam supplied with dynamic stability at 50-80 PSIG. Since steam supply lines carry steam and condensate, additional steam line draining and separation of liquid may be required.

Refer to the utilities service requirements on the Equipment Arrangement drawing in Part IV, Maintenance Manual. Connect sterilizer to a medium pressure steam supply line (50-80 PSIG) or as otherwise specified on the drawing.

Ensure that steam supply line is properly trapped to prevent excess condensate from entering the sterilizer.

Refer to the National Plumbing Code, and local codes, to assure a proper installation in your location.

2.5.1.1 Other Steam Considerations

A connection should be provided on the steam supply line adjacent to the sterilizer to enable steam to be sampled for the presence of undissolved gases, wetness, and contaminants. A steam pressure gauge should be provided ahead of steam shut off.

When small electric steam boilers are used, the water supply pressure must be 50-110 PSIG to maintain the proper water level in the electric boiler. Keep feed water valves open at all times during operation.

LACK OF SUFFICIENT WATER CAN RESULT IN BOILER FAILURE.

During operation, keep drain valves closed. Pump and boiler must be separated by check valves to avoid damage to the pump.

Safety valve(s) shall not be piped with a discharge line extension that is of smaller bore size than the outlet of the safety valve. If discharge piping is added, it must be supported so that strain is not placed on the safety valve.

2.5.2 Water

Refer to the Equipment Arrangement Drawing, in Part IV, Maintenance Manual, for the water flow rate.

Connect the sterilizer to a cold water supply line capable of dynamic supply pressure of 50 - 70 PSIG, with a recommended water hardness of not more than 80 ppm.

Temperature of the water supply should not exceed 70° F. If an optional vacuum pump is used; water temperature should not exceed 60° F, so that the pump achieves maximum efficiency.

2.5.3 Electrical

INSTALLATION OF PROPER ELECTRICAL SERVICES IS THE RESPONSIBILITY OF THE PURCHASER. A QUALIFIED ELECTRICIAN SHOULD MAKE CONNECTION. STERILIZERS WITH OPTIONAL BOILER, FEEDWATER PUMP, OR VACUUM PUMP REQUIRES MULTIPLE POWER SOURCES.

Connect the primary sterilizer control to an electrical disconnect located in the same space as the equipment. This must be a dedicated circuit of 120VAC, 10 amp, 60 Hz, single phase. If a dedicated circuit is not used, interference to the computer may result.

Location of the primary electric service box on the sterilizer is indicated in the Equipment Arrangement Drawing, in Part IV, Maintenance Manual.

2.6 Connecting Utilities (with boiler)

Refer to the Piping and Instrumentation Diagram for connection of the water supply. If the optional steam boiler is used, treated water should be connected directly to the feed pump on the boiler.

CONSIDERATION SHOULD BE GIVEN TO THE EFFECTIVENESS OF THE BOILER'S WATER LEVEL CONTROL WHEN HIGH PURITY WATER IS USED. ENSURE THAT THE TYPE OF LOW WATER LEVEL CONTROL DEVICE IS SUITABLE FOR USE WITH HIGH RESISTANCE WATER. HIGH PURITY WATER SYSTEMS WORK BEST WITH FLOAT TYPE LEVEL CONTROLS. BEFORE OPERATING THE STERILIZER/BOILER SYSTEM, ALWAYS REFER TO THE MANUAL THAT IS SUPPLIED BY THE MANUFACTURER OF THE BOILER.

CERTAIN BOILER CLEANING PRODUCTS WILL CAUSE DAMAGE TO HEATING ELEMENTS. REFER TO THE MANUAL SUPPLIED BY THE MANUFACTURER OF THE BOILER.

If the sterilizer is fitted with a steam generator (boiler), refer to the boiler manual provided in Appendix A, Manufacturer's Records. The boiler requires a dedicated circuit as specified on its data plate. Refer to the tags on the sterilizer's electrical boxes for the correct wiring connections.

TO AVOID POTENTIAL SHOCK HAZARDS, PROVIDE A SECURE ELECTRICAL GROUND FOR THE VACUUM PUMP AND OPTIONAL BOILER ACCORDING TO NATIONAL ELECTRIC CODE (NFPA70) STANDARDS.
SERVICE WIRING TO BOILER SHOULD BE IN ACCORDANCE WITH LOCAL CODES OR N.E.C. REQUIREMENTS.
REFER TO THE WIRING DIAGRAM IN PART IV, MAINTENANCE MANUAL.

IMPROPER ELECTRICAL POWER CONNECTION, SUBSTITUTION OF COMPONENTS, OR MODIFICATIONS TO WIRING SYSTEMS SHALL VOID THE WARRANTY AND MAY LEAD TO DANGEROUS OPERATING CONDITIONS.

2.6.1 Power Service for Optional Boiler

Refer to the boiler manufacturer's installation, operation and maintenance manual on electrical installation requirements. The boiler requires a dedicated circuit, as specified on the boiler's data plate. Refer to the tags on the sterilizer's electrical boxes for correct wiring connections.

2.6.2 Drain

Sterilizers equipped with more than one waste water outlet should be piped separately to the floor drain. Check local regulations regarding waste drain requirements, such as waste water temperature, etc.

The drain outlet from recessed sterilizers should terminate within the utility area. The drain outlet from cabinet sterilizers should terminate within the cabinet space.

A minimum diameter of 2" is recommended for the floor drain. A floor sink is recommended. Run a sloping pipe with unreduced bore from the sterilizer outlet to the drain.

The sterilizer must have an air break between the drain pipe and the floor drain.

NOTE The sterilizer **CANNOT** be hard piped to the drain.

The drain pipe(s) should terminate not closer than ½" above the highest liquid level of the water trap in the drain.

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2.9 Installation Checklist

The following items are to be checked after installation:

	ACCEPT		INITIAL	DATE
	YES	NO		
a. **Utilities**				
1. Water Supply				
Backflow prevention device installed				
Water Pressure measured (spec is 50-110 PSIG (dynamic))				
Supply piping adequately sized				
Shut-offs located nearby				
2. Steam Supply				
Supply is adequately trapped				
Supply pressure measured (spec 50-80 PSIG (dynamic))				
Supply piping adequate sized				
Shut-offs located nearby				
3. Electrical Power				
Voltage per Equipment Arrangement Diagram				
Disconnect located nearby				
Dedicated electrical circuit				
4. Waste				
Air gap				
Drain capacity adequate				
Pipes sloped properly				
b. **Units checks**				
Door properly opens, closes, lowers, and latches smoothly				
Door switches adjusted correctly				
Chamber strainer in place				
Rack and shelves/loading cart operates properly				
Pumps running in correct direction				
Unit properly leveled				

c. **Cycle Operations**				
Unit powers up correctly				
Typical cycle run				

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PRIMUS

GENERAL PURPOSE STEAM STERILIZER

PRIMUS PSS500 SERIES

PART III

USER'S MANUAL

PSS-500 Controls
Software Version 7923

June 30, 2008
Version 1.07

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PRIMUS Sterilizer Company, LLC, Omaha, NE 68131

Printed in the United States of America

Steam Sterilizer Installation, Operation, and Maintenance Manual
V196 Controller
Includes Bibliographical References

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SECTION 1.0 INTRODUCTION TO USER'S INFORMATION

1.1 Background

The PSS Steam Sterilizer is designed for a wide range of sterilizing applications suitable for clinical, laboratory, industrial and biopharmaceutical use. The sterilizer features fully automatic, computer-controlled operation of all cycles with application for processing the following items:

1. Wrapped or unwrapped instruments
2. Vented glassware and flasked liquids
3. Culture media
4. Laboratory supplies
5. Other temperature and moisture stable materials
6. Low Temperature Media*

The Control System is designed to be user friendly with straightforward operation. Any of the four available cycles, **VACUUM**, **GRAVITY**, **LIQUIDS**, or **TEST (VAC)**, have settable parameters that can be configured by the operator and stored in cycles 1 – 7; cycle eight is reserved as a test cycle. The cycle parameters of the eight stored programs are held in non-volatile memory for instant recall by the operator at the touch of a button.

NOTE

*Applications that require operating temperatures below 110.1°C (e.g., AGAR) require the Lab/Lo Temperature option. The intended use of this option is not for reprocessing items for direct patient contact.

WARNING

CYCLES THAT HAVE BEEN MODIFIED FROM FACTORY PRESET VALUES MUST BE VALIDATED BY THE END USER

1.2 Scope

This manual provides information and procedural steps for the supervisor and the operator. The sterilizer is designed to process goods using the cycles described in this section.

Preventive maintenance is essential to safe and effective use of the sterilizer. Refer to the Part IV, Maintenance Manual, for complete details.

1.3 Purpose

The purpose of this manual is to present important information on the setup and usage of the PRIMUS Sterilizer. These procedures are important to ensure safe operation of the sterilizer and to provide sterile products.

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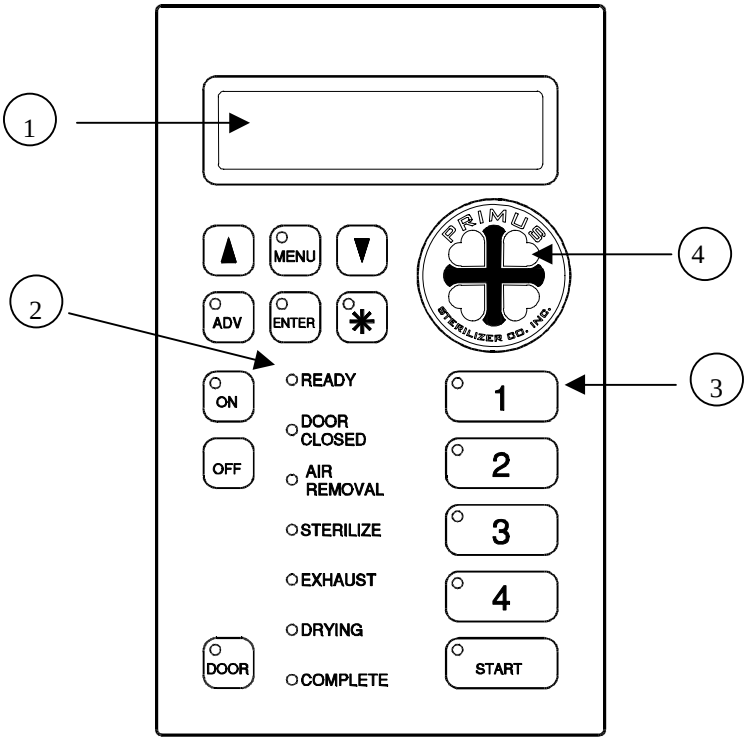
SECTION 2.0 CONTROL PANEL OPERATING INSTRUCTIONS

Primus sterilizers may have either a horizontal or vertical touchpad.

2.1 Vertical Touchpad

The vertical touchpad contains a Liquid Crystal Display (LCD) and is standard on all PRIMUS sterilizers. Cycle progression is displayed by Light Emitting Diodes (LEDs) on the Operator Panel. Cycle selection is made using the numbered buttons (See Figure 2.1-1). Changes to the settable cycle parameters (# of prevacs, temperature, time, etc.), are made using the appropriate button as described later in the manual. Double door units have a touchpad on both sides of the unit.



1. Liquid Crystal Display (LCD)
2. Light Emitting Diode (LED)
3. Cycle Button
4. ♥ "Heart" Button

FIGURE 2.1-1 VERTICAL TOUCHPAD DISPLAY

The LCD screen on the touchpad displays operator information. During programming, the settable parameter and its value are displayed. When the sterilizer is in operation, the LCD displays the phase, pressure, and temperature status of the cycle in progress. Any fault/error statements are also displayed on the LCD.

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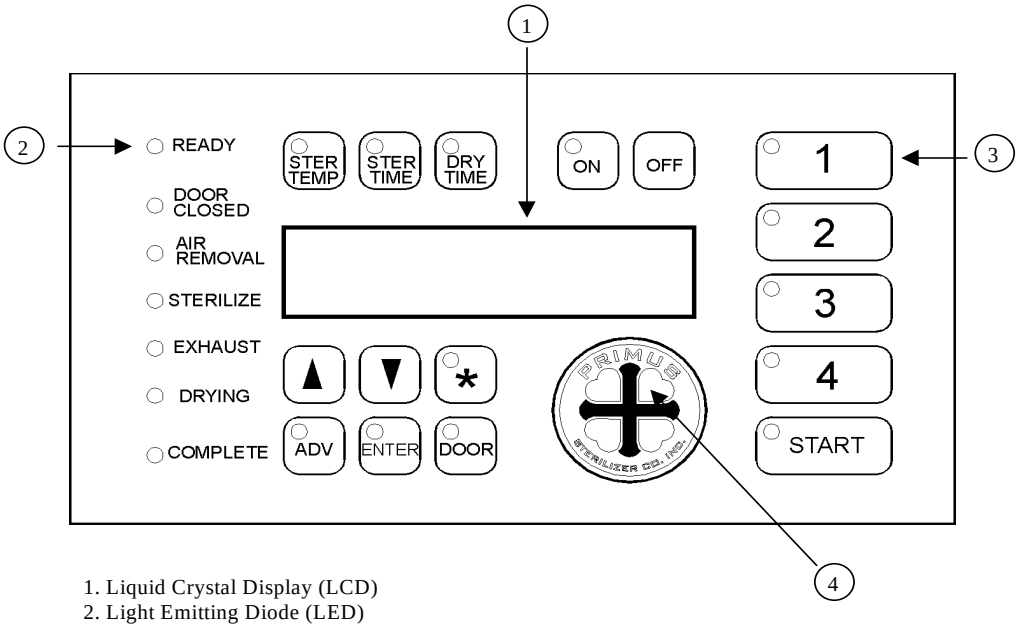
2.2 Horizontal Touchpad (Optional)

The horizontal touchpad contains a Liquid Crystal Display (LCD) and is optional on PRIMUS Sterilizers. Cycle progression is displayed by Light Emitting Diodes (LEDs) on the Operator Panel. Cycle selection is made using the numbered buttons (See Figure 2.2-1). Changes to the settable cycle parameters (# of prevacs, temperature, time, etc.), are made using the appropriate button as described later in the manual. Double door units have a touchpad on both sides of the unit.



1. Liquid Crystal Display (LCD)
2. Light Emitting Diode (LED)
3. Cycle Button
4. ♥ "Heart" Button

FIGURE 2.2-1 HORIZONTAL TOUCHPAD DISPLAY

The LCD screen on the touchpad displays operator information. During programming, the settable parameter and its value are displayed. When the sterilizer is in operation, the LCD displays the phase, pressure, and temperature status of the cycle in progress. Any fault/error statements are also displayed on the LCD.

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SECTION 3.0 STERILIZER OPERATION

This section describes the operation of the sterilizer.

3.1 Power Up

Turn on steam, water, and air. Turn the power to the sterilizer on by using the "Power On" toggle (circuit breaker) switch on the side of the control box. The LCD on the front panel will display the cycle name and number. If display is not lit, press the **[ON]** button located on the control touchpad.

3.2 Factory Validated Cycles

Primus sterilizers come with eight preset cycles from the factory including Sterilize Time, Sterilize Temperature, and Dry Time for various loads. Cycle number 8 is reserved for Vacuum Leak Test for sterilizers with that option. This is a 20 minute test that provides a pass/fail printed report. The vacuum end point and total allowable leak rate are the two settable parameters for Vacuum Leak Test. The cycle parameters for each preset cycle are defined in Table 3.2-1. Sterilize Time and Temperature, Dry Time and number of Pre-Vacs are programmable using the cycle parameter menu (Reference Section 4.0 Programming Cycle Parameters). Any deviation from factory preset values must be validated by the end user. Cycle numbers 1-4 are selected by pressing the corresponding button **[1]**, **[2]**, **[3]**, **[4]**, cycle numbers 5–8 are selected by pressing the **[▲] [1]**, **[▲] [2]**, **[▲] [3]**, and **[▲] [4]** respectively**.**

Cycle Number	Cycle Type	Sterilize Temp	Sterilize Time (Min)	Dry Time (Min)	No. of Prevacs
1	Vacuum	134^{O}C (273^{O}F)	15	30	3
2	Vacuum	134^{O}C (273^{O}F)	4	1	3
3	Vacuum	134^{O}C (273^{O}F)	4	30	3
4	Vacuum	134^{O}C (273 ^{O}F)	4	30	3
5	Gravity	134^{O}C (2753^{O}F)	4	1	0
6	Gravity	122.8^{O}C (253^{O}F)	30	30	0
7	Liquids	122.8^{O}C (253^{O}F)	30	15	0
8	Test (Vac)	134^{0}C (273^{O}F)	3-1/2	2	3
8	Vacuum Leak Test (Optional)	N/A	N/A	N/A	N/A

* Dry time in LIQUIDS cycle is liquid cool time.

ANY CYCLES WITH SETTINGS OTHER THAN THOSE LISTED ABOVE MUST BE VALIDATED BY THE END USER.

Table 3.2-1 FACTORY PRESET CYCLES

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3.3 Factory Preset Cycle Description

The following describes the Factory Preset Cycles as depicted in Table 3.2-1, Factory Preset Cycles, for Gravity, Vacuum, Liquid, Test(Vac) and Vacuum Leak Test.

GRAVITY Cycle: When a GRAVITY Cycle is selected, air removal is accomplished by a gravity air purge providing a rapid cycle with very fast temperature rise. GRAVITY cycles are appropriate for loads where air removal from porous materials (packs, etc.) is not required.

The sterilize phase is followed by a fast exhaust until the chamber pressure drops to at or below atmospheric pressure (0.0) PSI. Drying is achieved by drawing a vacuum in the chamber, hence removing steam and condensate through the chamber drain. After the drying phase time has elapsed, and the chamber pressure is at or below atmospheric pressure, the indicator lights and the buzzer indicates completion and the door gasket is automatically retracted. If the door gasket does not retract fully, pressing the **[DOOR]** button will cause the unit to retract the door gasket. After chamber pressure is reduced to atmospheric pressure, the door may be opened.

VACUUM Cycle: Selecting a VACUUM Cycle instructs the sterilizer to run a pulsing, pressure/vacuum, preconditioning cycle prior to entering the Sterilize Phase. The Sterilize Phase is followed by a Fast Exhaust Phase, until the chamber pressure drops to at or below atmospheric pressure. Drying begins and the normally required drying time is reduced by pulling one or more vacuum pulses in the chamber, thus removing moisture. The combination of the hot chamber walls and the vacuum in the chamber extracts moisture from the load through the chamber drain. After the drying phase time has elapsed, the chamber vacuum is relieved, and the indicator lights and the buzzer indicate completion. Pressing the **[DOOR]** button will retract the door gasket and the door may be opened.

LIQUIDS Cycle: When a LIQUIDS Cycle is selected, the sterilizer is instructed to process liquid loads. The LIQUIDS Cycle is the same as the GRAVITY Cycle but, in addition, provides an adjustable, slow exhaust that is intended to prevent boiling while the liquids cool. After the Sterilize Phase the chamber will enter a Slow Exhaust Phase, as previously determined by the Service Setup Procedure (see Part IV, Maintenance). When the operator selects parameters for a LIQUIDS Cycle, drying time is not offered for selection. Instead a FLOW COOL process pulls air through the chamber. Upon completion of sterilization, a pre-selected Slow Exhaust Phase reduces the chamber pressure to approximately atmospheric pressure. The indicator lights and the buzzer sounds to indicate completion.

To initiate FLOW COOL, SLOW EXHAUST END POINT must be set equal to or less than 0 PSIG. FLOW COOL at End of Cycle is an option.

NOTE

See warnings related to liquids processing prior to operating a LIQUIDS Cycle.

TEST(VAC) Cycles: A TEST(VAC) Cycle is provided as an option to accommodate Bowie-Dick Test parameters on vacuum sterilizers.

VACUUM LEAK TEST Cycle: (optional) A VACUUM LEAK TEST Cycle, provided as cycle number 8, is used to ensure a seal tight chamber. This cycle provides for a vacuum with a stabilization time followed by the actual Vacuum Leak Test. The last phase is 20 minutes long with all chamber valves closed and vacuum pump/ejector off. A pass/fail report is provided at the end of the Vacuum Leak Test.

3.4 Sterilizer Options

The following sterilizer options are available, if selected at time of order.

3.4.1 Optional Laboratory/Lo Temperature Control

Control of cycle temperature below 110.1°C/230.2°F is accomplished by the additional piping of the Laboratory/Lo unit which re-circulates steam from the chamber drain back into the chamber steam supply port. The LAB LOW T CUTOFF point must be set to a higher temperature than the set point for the STERILIZE TEMP of the sterilize phase of the cycle. For example, if the set point of STERILIZE TEMP of cycle #1 is 105.1°C/221.2°F, the LAB LOW T CUTOFF value in the configuration mode must be set to 105.1°C/221.2°F or higher. For setting the LAB LOW T CUTOFF value, please refer to the maintenance manual.

CAUTION

THE LABORATORY/LO TEMPERATURE CONTROL FEATURE IS NOT INTENDED FOR REPROCESSING REUSABLE MEDICAL DEVICES

3.4.2 Optional Effluent Control

For installations where bio-hazardous material of chamber (i.e., product, effluent condensate and vapor), cannot be discharged from the chamber prior to completion of the sterilization cycle without treatment. Chamber steam condensate is held inside the chamber throughout the sterilization cycle. Steam enters the chamber from the bottom of the chamber to ensure that the condensate is kept at the sterilization temperature throughout the cycle. Vacuum is pulled from the top of the chamber through a 0.2-micron filter to ensure adequate filtration before the drain.

3.4.3 Compressed Air Over

Air-over cooling incorporates air over-pressure during the cooling phase to ensure that the liquid media does not boil over when steam pressure is removed. Steam is displaced in the chamber

with cool air to cool chamber walls, promote cooling of load and shorten exhaust phase of a liquids cycle. Filtered compressed air is supplied by the end user. The cycle parameter that determines the length of time for Compressed Air Over is Liquid Cool Time.

3.4.4 Heated Air

This option requires a heat exchanger that utilizes the jacket steam. This provides for heated air to the chamber at the completion of the drying phase to assist in drying the load.

3.4.5 Drain Condensate Removal System

A sight glass in the chamber drain shall be provided for visual monitoring of the drain line for accumulation of condensate and for a water-in-drain sensor. This sensor provides an input to the control system that, when activated, provides for a controlled removal of condensate through the use of a special bleed valve.

3.4.6 Jacket Cooling

Jacket Cooling, displaces steam in jacket with water or air to cool chamber walls, promote cooling of load and shorten exhaust phase of liquids cycle. This option requires special construction of the vessel.

3.4.7 Load Probe

A single probe placed in load provides load temperature as a temperature parameter for the Heat Load phase of cycle. Conax type adapter provided over validation port, as an option

3.4.8 Centigrade

Centigrade Reading displays and prints temperature in degrees centigrade.

3.4.9 Serial Data

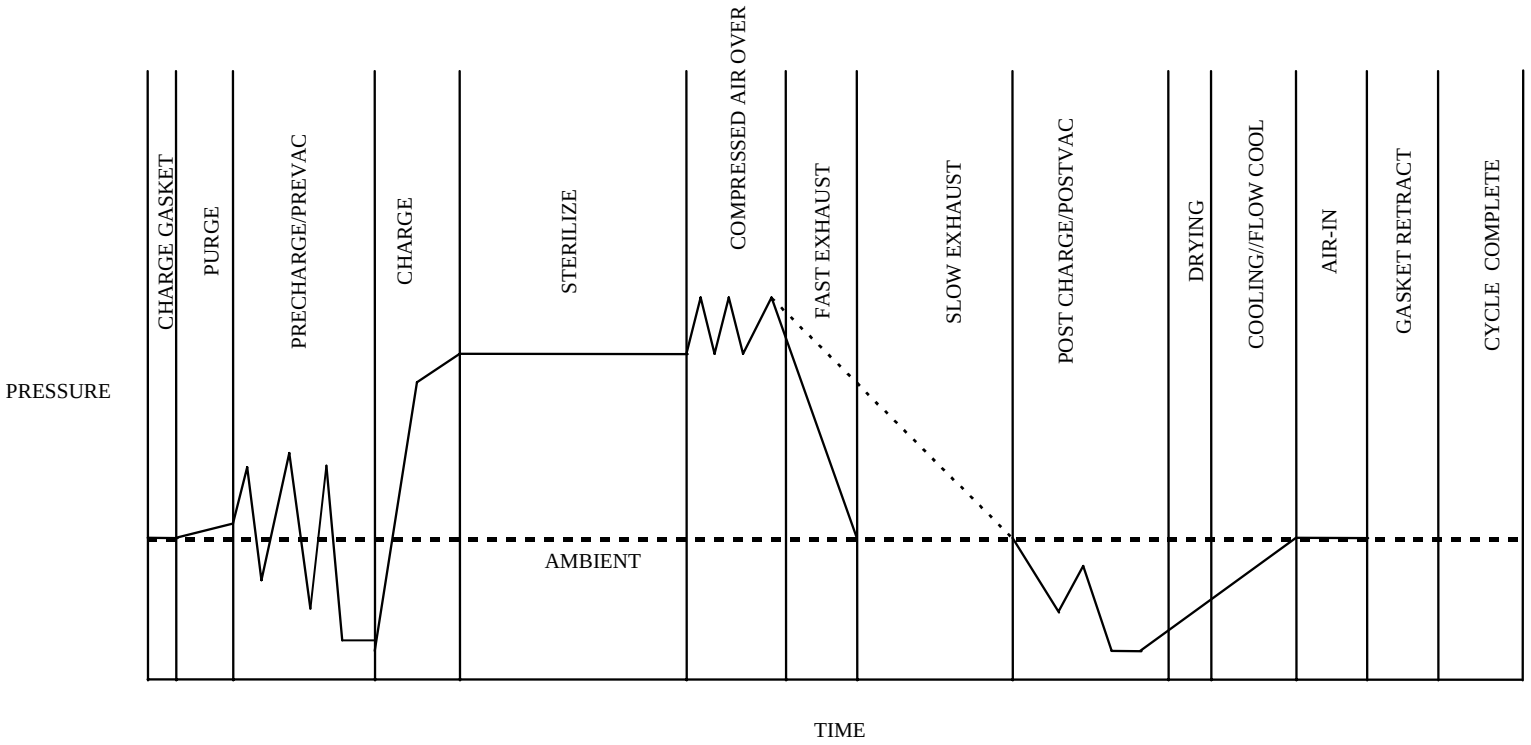
Serial Data Output provides RS232 connection to transmit cycle printouts to a remote PC to maintain a record of each cycle.

3.4.10 User ID

The optional user identification feature provides operator controlled access for starting a cycle. When the START button is pressed on the Control Panel, the operator is prompted to enter his or her user identification number and, if the user identification is correct, the cycle is started. If an incorrect password is entered, the Control Panel reverts back to the Idle mode. There are a total of 4 unique user identification numbers that can be entered into the Setpoints menu using the Cal EEPROM (ref. Part IV, Maintenance Manual, Cycle Parameters).

3.5 Phases

The following graph depicts pressure vs. time for sterilizer phases as they relate to VACUUM, GRAVITY, LIQUID and TEST (VAC) cycles.



1. Dashed line depicts Slow Exhaust for LIQUIDS cycle
2. TEST (VAC) equivalent to phases of the VACUUM Cycle

FIGURE 3.5-1 GRAVITY and VACUUM CYCLES

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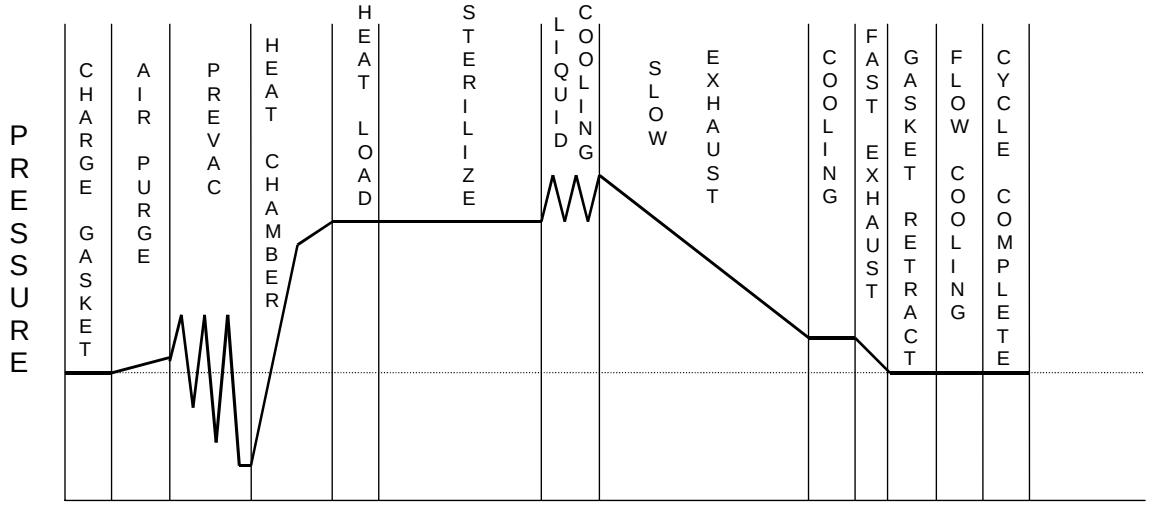

FIGURE 3.5-2 LIQUID CYCLES WITH SLOW EXHAUST END POINT SET ABOVE ATMOSPHERE PRESSURE

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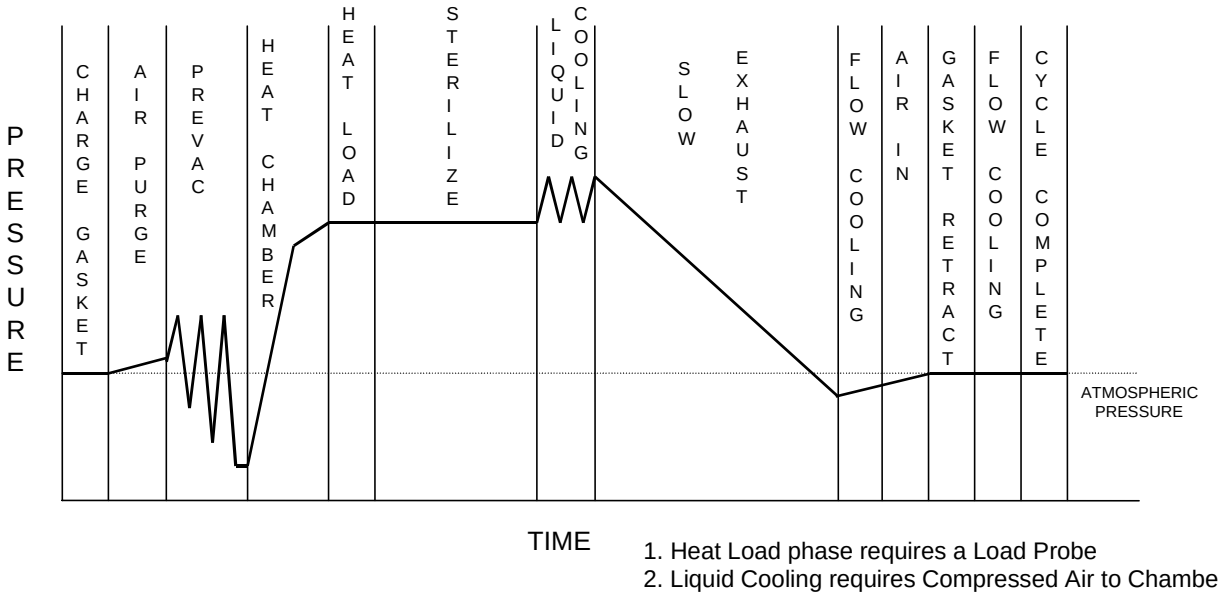

FIGURE 3.5-3 LIQUID CYCLES WITH SLOW EXHAUST END POINT SET BELOW ATMOSPHERE PRESSURE

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3.6 Starting the Cycle

1. To select a cycle, press the touchpad button **[1]**, **[2]**, **[3]**, **[4]**, (and for cycles 5-8) **[▲] [1]**, **▲] [2]**, **[▲] [3]**, **[▲] [4]** corresponding to the cycle number of the desired cycle that has been factory preset or previously configured and put into memory by an authorized user. The LED indicator on the button for the selected cycle number will light and the name of cycle type along with Sterilization Temp, Sterilization Time, and Dry/Cool Time will be indicated on the LCD.

NOTE

The "READY" light will not be lit, nor will the **[START]** button be operative, until the jacket temperature has reached 2°C / 6°F below operating temperature and all doors are closed. To view the jacket temperature, press the upper left hand heart on the touchpad.

2. Close the sterilizer door. The touchpad LED indicators (READY), (DOOR CLOSED), and (START) will light.

WARNING

THE GASKET RETRACT [DOOR] BUTTON IS USED ONLY IN THE EVENT OF AN ABNORMAL OR ABORTED CYCLE. IF IT IS NECESSARY TO USE THIS BUTTON TO COMPLETE A CYCLE, CONTACT AUTHORIZED SERVICE PERSONNEL.

WARNING

THE STERILIZER DOOR IS DESIGNED NOT TO OPEN UNTIL CHAMBER PRESSURE IS APPROXIMATELY AT ATMOSPHERIC PRESSURE (DISPLAYED IN PSIG/INHG). ATTEMPTING TO FORCE THE DOOR OPEN WHILE UNDER PRESSURE MAY DAMAGE THE DOOR OR CAUSE SERIOUS INJURY!

3. Push the touchpad **[START]** button. The (READY) and (START) LED indicators will go out. If USER ID option is selected, a User ID screen will appear. By pressing the **UP [▲]** or **DOWN [▼]** arrow enter an authorized password and then press **[ENTER]**. If the user enters an invalid password the display reverts back to the Ready screen. If Optional USER ID is not selected, pressing the start button will begin the cycle.

4. The cycle proceeds automatically, with Operator Panel indicator lights and LCD display, monitoring phases and conditions throughout the cycle.

   The cycle progresses automatically through the phases as follows: (See Figures 3.5-1and 3.5-2 and 3.5-3)

   - Charge Gasket (CHARGE GASKET)
     The Steam to Gasket valve opens to pressurize the door gasket, thus sealing the chamber and holding the door closed during the cycle.

   - Air Removal (PRECHARGE) (PURGE
     The chamber drain is opened and steam is admitted for a preset time to allow rapid removal of air from the chamber.

- Air Removal (PREVAC)
  Successive vacuum/pressure pulses optimize air removal prior to admitting steam for the sterilize cycle. As defined in 4.0 Programming Cycle Parameters, prevac pulses 1 and 2 have fixed end points for vacuum. The vacuum end point for pulses 3 – 6 is defined by the cycle parameter (PREVAC) VAC POINT. The charge end point for all prevac pulses is defined by the PRECHARGE cycle parameter. The number of prevacs is set by the # OF PREVACS cycle parameter. The number of PRE-VACUUM repetitions are adjustable from 0-6 pulses

- Charge Chamber (HEAT CHAMBER)
  The chamber drain is closed and steam is admitted to the chamber until the pre-selected setpoint temperature is reached. This is accomplished by using Half-Ramp and Final Ramp Slopes.

- Heat Load (Load Probe Control Option)
  While in this phase of the cycle, the sterilizer continues to control the temperature of the Chamber at the Chamber temperature setpoint until the Load Probe temperature reaches the value set in the LOADP TEMP parameter. When the Load Probe reaches temperature, the controller will allow the start of sterilization phase.

- Sterilize (STERILIZE)
  When sterilize temperature is reached, the sterilizing timer begins to count down. The chamber is controlled at sterilize temperature for the pre-selected sterilize time.

- Fast Exhaust (EXHAUST)
  Once the pre-selected sterilize time has elapsed, the Fast Exhaust Phase begins. Steam and condensate are drawn from the chamber, through the chamber drain, and further condensed in the drain system until the chamber pressure drops within 1.0 PSI of atmospheric pressure.

- Slow Exhaust (EXHAUST) (Liquid Cycle only)
  Once the pre-selected sterilize time has elapsed; the Slow Exhaust Phase begins. Steam and condensate are drawn from the chamber, through the chamber drain, and further condensed in the drain system until the chamber pressure drops to at or below atmospheric pressure.

- Steam and Condensate Removal (POST-VACS)
  At the conclusion of the exhaust phase, POST-VACUUM pulses begin the removal of steam and condensate from the chamber and the load. The charge end point is fixed at atmosphere pressure and the vacuum end point is set by the DRY VAC POINT in the cycle parameters for all pulses selected. The number of postvacs is set by the # OF POSTVACS cycle parameter. When the vacuum setpoint is reached for each selected postvac, the chamber drain remains open and a drying period commences for the amount of time set by the DRY TIME cycle parameter. The number of POST-VACUUM repetitions are adjustable from 0-6 pulses. Vacuum pulses assist drying by extracting moisture from the wrapped load. POST-VACUUM drying is not available for LIQUIDS Cycles.

- Drying (DRYING)
  The vacuum pump or ejector system continues to exhaust steam and condensate

through the chamber drain for the pre-selected drying time. As a result, a deep vacuum is created in the chamber to assist drying. Hot chamber walls contribute to this process.

- Cooling (COOLING) Cooling with Gasket Sealed
  This operation pulls air through the vessel by opening the Air-In valve and running the vacuum system and drain during a LIQUIDS Cycle.

- Flow Cool (FLOW COOL) Cooling with Gasket Unsealed
  Flow Cooling is provided for all LIQUID cycles. Following gasket retract, air is pulled through the vessel, around the door, to the drain by running the vacuum system.

If option to disregard this phase, not initiated.

NOTE

- Air-In (AIR-IN)
  The Air-In valve is opened and filtered air is drawn into the chamber, thus relieving the vacuum and returning the chamber to ambient pressure.

- Gasket Retract (GASKET RETRACT)
  The gasket drain valve opens and the vacuum in the drain system provides rapid retraction of the door gasket.

- Complete (COMPLETE)
  The buzzer sounds and the Operator Panel (COMPLETE) LED indicator signals conclusion of the cycle. Opening the door silences the buzzer and resets the controls, otherwise, the buzzer stops automatically after two (2) minutes.

5. At cycle completion, the Operator Panel (COMPLETE) LED indicator will come on and the buzzer will sound until the door is opened. The buzzer will stop automatically if the door is not opened within two (2) minutes.

6. The sterilizer returns to stand-by, jacket heated, and awaiting start of the next cycle.

3.7 Clock Setting

1. Press the **[∗]** button ("TIME HOUR" will appear)

2. Press **[ENTER]** to edit the hour, press **[▲]** or **[▼]** to change the HOUR, then press **[ENTER]** again to save the new setting. If the hour is OK press **[▲]** or **[▼]** to see the next item.

3. Repeat step #2 for "TIME MINUTE", DATE MONTH", DATE DAY" and "DATE YEAR".

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3.8 Print Interval Setting

Print Interval Setting is the frequency at which printout will occur during all phases. The interval setting is changed using the following instructions:

1. Press the **[∗]** button ("TIME HOUR" will appear)
2. Press **[▲]** to scroll to "PRINT_INTERVAL"
3. Press **[ENTER]**
4. Use **[▲]** or **[▼]** to change the PRINT_INTERVAL value
5. Press ENTER
6. Press **[ADV]** button twice to exit to idle mode

3.9 Sterilizer Doors

NOTE

Sterilizer doors should remain in the closed position unless the operator is loading or unloading the unit. Sterilizer doors in the closed position provide more efficient use of jacket steam and in addition, building air conditioning load is also conserved. Better dimensional stability is provided when doors are maintained closed, especially on larger sterilizers. Doors returned to the closed position after loading/unloading provide an additional margin of safety especially on double door units. In addition, the operator can start a cycle without physically closing the opposite side door.

The function of the Operator Panel **[DOOR]** button is dependent on the following:

MANUALLY OPERATED VERTICAL SLIDING DOORS

A. SINGLE DOOR MODELS:

Completion of cycle will cause automatic retraction of the door gasket, so the door may be opened.

If door gasket does not retract, pressing the **[DOOR]** button should provide the vacuum required to retract the gasket, so the door may be opened. If the **[DOOR]** button must be used to open the door, equipment failure may have occurred. Inform maintenance personnel. To Operate: Press and hold until door gasket begins release (about two seconds).

B. DOUBLE DOOR MODELS:

Completion of cycle will cause automatic retraction of both door gaskets, Load: **A**-side and Unload: **B**-side, so either door may be opened. If door gasket does not retract, pressing the **[DOOR]** button should provide the vacuum required to retract the gaskets so the door may be opened. If use of the **[DOOR]**

button is required, inform maintenance personnel. To Operate: Press and hold until door gasket begins release (about two seconds).

C. DOUBLE DOOR MODELS WITH BIOSEAL:

Double Door Bioseal sterilizers incorporate an additional door control feature intended to maintain biological separation through Door Interlock. This additional door control feature is achieved through use of the **[DOOR]** button as follows:

a. In most cases, cycles are initiated from the **A**-Side. Once the cycle is completed, the **B**-side gasket automatically retracts. However, the A side door gasket is not retracted and the door on side **A** remains sealed. At this point the sterilizer assumes that the **B**-door will be opened, but either door may be opened. If the expected **B**-side is opened, the **A**-side gasket remains sealed and the **A**-side door is prevented from opening until the **B**-side door is closed and sealed. When the door on side-**B** has been closed, the **B**-side is immediately resealed, and the **A**-side gasket is retracted. The **A**-side door may now be opened.

NOTE

Either side applies to only those sterilizers manufactured to provide both "Pass Through" (**A** to **B**), and either "Return" processing flow feature (**A** to **A**, or **B** to **B**). In Bioseal sterilizers limited to the optional feature of "Pass Through" only processing flow, only door **B** may be opened at conclusion of cycle. Also note that complete operational control of sterilizers (through the Operator Control) is only possible on the side with the door open. With one door open, the Operator Control on the side with the door closed will be limited to display only. Both sides will present identical messages at all times.

b. Alternately, if the door on the **A**-side is to be opened, the **[DOOR]** button on the **A** side must be pressed. Once pressed, the gasket on the **B**-side immediately reseals the **B** door. When the **B**-door is resealed, the **A**-door gasket retracts and the **A**-door may now be opened. This sequence of events occurs rapidly.

POWER OPERATED VERTICAL SLIDING DOORS

A. SINGLE DOOR MODELS

Completion of cycle will automatically retract the door gasket. Once the door is fully open, the power door will close by pressing the **[DOOR]** button until the door is completely closed. The **[DOOR]** button must remain pressed until the door completely closes.

NOTE

All Vertical Sliding Power Doors feature a Mushroom Button as standard or a Kick Panel as an option used as the **[DOOR]** button.

NOTE

The power door cannot be opened once the door gasket is charged and the cycle has started, the door can only be opened at the end of a cycle after the door gasket is retracted.

POWER OPERATED HORIZONTAL SLIDING DOORS

A. SINGLE DOOR MODELS:

Horizontal Power Door models always requires pressing the **[DOOR]** button to open, or close doors.

Completion of cycle will automatically retract the door gasket. To Open: Press and release the **[DOOR]** button (approximately 2 seconds), and the door will automatically open. To Close: Press and hold the **[DOOR]** button until the door is completely closed. If the **[DOOR]** button is released before door is fully closed the door will automatically return to the door open position. Once the door is completely open the door will also shut manually.

B. DOUBLE DOOR MODELS:

Horizontal Power Door models always require pressing the **[DOOR]** button to open, or close doors.

Completion of cycle will automatically retract the door gasket. To Open: Press and release the **[DOOR]** button (approximately 2 seconds), and the door will automatically open. To Close: Press and hold the **[DOOR]** button until the door is completely closed. If the **[DOOR]** button is released before door is fully closed the door will automatically return to the door open position. Once the door is completely open the door will also shut manually.

C. DOUBLE DOOR MODELS WITH BIOSEAL:

Double Door sterilizers with Bioseal incorporate an additional door control feature intended to maintain biological separation through the Door Interlock feature. This additional door control feature is achieved through use of **[DOOR]** button as follows:

a. In most cases, cycles are initiated from the **A**-Side. Once the cycle is completed, the **B**-Side gasket retracts. The **A**-side door gasket is not retracted and the door remains sealed. At this point the sterilizer assumes that the **B** door will be opened, but either door may be opened. If the expected **B**-side is opened, the **A**-side gasket remains sealed and the **A**-side door is prevented from opening until the load has been removed from the **B**-side. Once the door on side **B** has been closed, and the **A**-side **[DOOR]** button pressed (and held); the **B**-side is immediately resealed and the **A**-side gasket is retracted. As the **[DOOR]** button remains pressed, the door on the **A**-side will begin to open. The **[DOOR]** button must remain depressed until the door is completely open.

b. Alternately, if the **[DOOR]** button on side **A** is pressed (and held); the gasket on the **B**-side immediately reseals the **B**-door. Once the **B**-door is resealed, the **A**-door gasket retracts and the door **A**-door begins to open.

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It may help to remember the following rule: Anytime the Side A Door is opened, a successful cycle must be run to enable opening the Side B Door. The above features are incorporated to further reduce your chance of cross contamination.

NOTE

THE STERILIZER DOOR IS DESIGNED TO NOT OPEN UNTIL CHAMBER PRESSURE IS APPROXIMATELY AT ATMOSPHERIC PRESSURE. ATTEMPTING TO FORCE THE DOOR OPEN WHILE UNDER PRESSURE MAY DAMAGE THE DOOR OR CAUSE SERIOUS INJURY!

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3.10 Loading the Sterilizer

NEVER OVERLOAD THE STERILIZER OR STERILIZATION MAY NOT BE ACHIEVED. APPROPRIATE STERILIZER LOADING MUST BE DETERMINED ACCORDING TO PUBLISHED STANDARDS (I.E., AAMI). CAREFULLY DOCUMENT LOAD PERFORMANCE STUDIES (PERFORMANCE QUALIFICATION).

IF THERE IS ANY DOUBT REGARDING THE CORRECT CYCLE FOR ANY STEAM STERILIZATION REQUIREMENT OR WHETHER AN ITEM WILL WITHSTAND STEAM STERILIZATION, CONTACT THE MANUFACTURER OF THE ITEM TO BE STERILIZED FOR RECOMMENDATIONS.

LIQUID CYCLES ARE INTENDED ONLY FOR THE STERILIZATION OF LIQUIDS. DO NOT USE ANY OTHER CYCLE FOR LIQUIDS.

WHEN PROCESSING LIQUIDS IN THE STERILIZER USE CONTAINERS WITH VENTED CLOSURES. DO NOT USE SCREW CAPS OR RUBBER STOPPERS WITH A CRIMPED SEAL. USE ONLY TYPE I BOROSILICATE (PYREX) GLASS BOTTLES. DO NOT USE ORDINARY GLASS BOTTLES OR ANY CONTAINERS THAT ARE NOT DESIGNED FOR STERILIZATION. FAILURE TO USE APPROVED CONTAINERS MAY RESULT IN VIOLENT AGITATION OF THE LIQUIDS, BOILING, OR BOTTLE EXPLOSION. USE CLOSURES MANUFACTURED FOR THE CONTAINERS USED, OTHERWISE, STERILIZE WITHOUT CAPS.

NEVER STERILIZE SEALED CONTAINERS IN A CYCLE OTHER THAN A LIQUIDS CYCLE. SLOW EXHAUST PROHIBITS A RAPID CHANGE IN PRESSURE BETWEEN THE CONTENTS OF PARTIALLY VENTED OR SEALED CONTAINERS AND THE PRESSURE BEING RELIEVED IN THE CHAMBER. RAPID CHANGES MAY LEAD TO EXPLOSIONS OF SEALED GLASS CONTAINERS. SLOW EXHAUST ALSO ALLOWS MORE COMPLETE REMOVAL OF VAPOR CREATED DURING STERILIZATION OF LIQUIDS.

Packs requiring an identical exposure cycle may be sterilized in the same load. Loading procedures must allow for free circulation of steam around each pack. Materials capable of holding water, such as solid bottomed pans, basins, and trays, should be arranged (normally on their sides) so that if water is present, the water will drain out. Placing packs with metal items above linen items should be avoided.

Never obstruct the drains in the bottom of the chamber. Shelving or other supports must be used to raise the load above the bottom of the chamber. The load should be positioned to avoid contact with all chamber surfaces, including door(s), so that steam penetration to the load is not obstructed.

3.11 Unloading the Sterilizer

LOADING CARTS, SHELVING, AND THE INTERIOR OF THE STERILIZER ARE HOT. CARE MUST BE TAKEN TO AVOID SKIN CONTACT. GLOVES AND OTHER PERSONAL PROTECTIVE EQUIPMENT SHOULD ALWAYS BE WORN WHEN UNLOADING ITEMS FROM THE STERILIZER. EYE PROTECTION SHOULD ALSO BE WORN WHEN STERILIZING GLASS CONTAINER LOADS.

Extreme care should always be taken when unloading sterilizer at the end of a cycle. If loading carts have been used for sterilization, then items should remain on cart until adequately cooled. They should not be touched during the cooling process. During cooling, the sterilizer cart should be placed in a low traffic area where there are no cold air vents in close proximity. Warm items should never be transferred from the cart to cold metal racks or shelves for cooling.

3.12 Shutdown

3.12.1 Sterilizer Off

Press **[OFF]** button on touchpad to turn sterilizer off.

3.12.2 Power Off

Turn power off using Power-off toggle (Circuit Breaker) Switch on side of the control box.

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3.13 Alarms, Timeouts, User Advance and Loss of Power

If the parameters of each phase are satisfied, PRIMUS sterilizer controls are designed to progress through each phase. Should an exception (alarm, timeout, user advance (by pressing the ADV key) or loss of power) error occur, a message will appear on the touchpad LCD display and printout. In addition, a buzzer sounds with all door and door gasket alarms. If no response is made within 30 seconds, the unit auto-advances (printout will read "AUTO ABORT"). Cycle timeouts will print out the specific timeout that occurred with no audible alarm and cycle will be auto-advanced to exhaust.

If the user advances the cycle before the Sterilize Phase is complete, Door Gasket A will retract at Cycle Complete. If the user advances the cycle after Sterilizer Phase, Door Gasket B will retract at Cycle Complete.

Refer to the following table for alarms, timeout and loss of power information.

Alarms and Timeouts are as follows::

ALARM/WARNINGS	SYMPTOM	CAUSE/SOLUTION
AUDIBLE ALARM **CONDITION: Door not closed during cycle** **DISPLAYED**: DOOR NOT CLOSED **PRINTOUT**: "DOOR NOT CLOSED"	Door switch out of adjustment or broken.	Press **[1]** (ABORT) - Advances to Exhaust Phase Press **[2]** (RETRY) - Checks to see if problem still exists Press **[3]** (Ignore) – Ignores problem If problem continues call maintenance technician.
AUDIBLE ALARM **CONDITION: Door gasket not charged during cycle** **DISPLAYED**: GASKET ERROR **PRINTOUT**: "DOOR GASKET ERROR"	Door gasket seal is lost. Steam pressure low.	Press **[1]** (ABORT) - Advances to Exhaust Phase Press **[2]** (RETRY) - Checks to see if problem still exists Press **[3]** (Ignore) – Ignores problem If problem continues call maintenance technician.

THIS STERILIZER USES A PRESSURIZED GASKET TO CONTAIN CHAMBER PRESSURE. IF GASKET PRESSURE FAILS, STEAM MAY BE RELEASED INTO THE ROOM. NOTIFY QUALIFIED SERVICE PERSONNEL.

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ALARM/WARNINGS	SYMPTOM	CAUSE/SOLUTION
AUDIBLE ALARM **CONDITION: Chamber temperature exceeds over temperature alarm offset during the sterilization phase of the cycle** **DISPLAYED**: OVER TEMPERATURE **PRINTOUT**: "!OVER TEMPERATURE!"	Temperature increases above the preset limits.	Press **[START]** to retry. If problem persists, press **[ADV]** to end cycle and call maintenance technician.
AUDIBLE ALARM **CONDITION: Chamber temperature drops below under temperature alarm offset during the sterilization phase of the cycle** **DISPLAYED**: LOW TEMPERATURE **PRINTOUT**: "!UNDER TEMPERATURE!"	Temperature falls below the preset limits.	Press **[START]** to retry. If problem persists, press **[ADV]** to end cycle and call maintenance technician.
TIMEOUT **CONDITION: Heat Chamber phase of cycle has exceeded the heat chamber time-out setpoint** **DISPLAYED**: **PRINTOUT**: "TIMEOUT: STEAM TO" "CHAMBER RETARDED" "AUTO ADVANCING"	Chamber does not reach STERILIZE TEMP within time specified by heat chamber time-out setpoint.	No response required by the user. Cycle auto-advances. The following message will flash on the display and print out "CYCLE MAY BE COMPRISED". Call maintenance technician.

ALARM/WARNINGS	SYMPTOM	CAUSE/SOLUTION
TIMEOUT **CONDITION: PRECHARGE PHASE OF CYCLE HAS EXCEEDED THE PRECHARGE TIME-OUT SETPOINT** **DISPLAYED**: **PRINTOUT**: "TIMEOUT: STEAM TO CHAMBER RETARDED" "PRECHARGE TIMEOUT" "AUTO ADVANCING"	"PRECHARGE" parameter not reached.	Maintenance required - call technician.
TIMEOUT **CONDITION: Prevac phase of cycle has exceeded the prevac time-out setpoint** **DISPLAYED**: **PRINTOUT**: "TIMEOUT: IN AIR REMOVAL" "PREVAC TIMEOUT" "AUTO ADVANCING"	Vacuum setpoint not reached in time allowed by PREVAC time-out.	Cycle auto-advances to cycle complete. Lights flash "LOAD MAY BE COMPRISED". Maintenance required - call technician.
TIMEOUT **CONDITION: Post-Vac phase of cycle has exceeded the post-vac time-out setpoint** **DISPLAYED**: **PRINTOUT**: "TIMEOUT" "IN POST VACUUM" "AUTO ADVANCING"	Post-Vac vacuum setpoint not reached in time allowed by Post-Vac time-out.	Maintenance required - call technician.

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ALARM/WARNINGS	SYMPTOM	CAUSE/SOLUTION
LOSS OF POWER **CONDITION: Loss of power during cycle** **DISPLAYED**: ERROR – LOAD MAY BE COMPROMISED **PRINTOUT**: "POWER FAILURE DETECTED" "AUTOMATIC POWER-UP "AUTO ADVANCING""	Power interrupted during cycle. (Someone pulls the plug or the wall power fails)	If power fluctuation no user response required, unit auto-advances when power is restored. If no power user should check power source.
Hot Liquid in Chamber	Displayed at the end of the Liquid Cycle.	This is a normal warning, no user action required.

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SECTION 4.0 PROGRAMMING CYCLE PARAMETERS

Cycle numbers 1 – 7 have four available types of sterilizer cycles. **VACUUM**, **GRAVITY**, **LIQUIDS**, or **TEST (VAC)**, have settable parameters that can be changed by the end user (see paragraph 4.3) and then stored in one of seven cycle numbers. Cycle number 8 is pre-configured for Vacuum Leak Test for units configured with that option (see Part IV, Maintenance manual for Vacuum Leak Test setup and operation). To configure a cycle, press the numbered button according to the desired cycle number to be set, changed, or reviewed. Cycle numbers 1-4 are selected by pressing the corresponding button **[1]**, **[2]**, **[3]**, **[4]**, cycle numbers 5-8 are selected by pressing **[▲] [1]**, **[▲] [2]**, **[▲] [3]**, and **[▲] [4].**

NOTE

The "Password Protection" feature may be used to provide controlled access to the entry or alteration of cycle parameters. For instructions, refer to paragraph 4.**3**.

4.1 Parameter Definitions

The following terms and definitions explain the parameters of the cycles depicted in Figure 4.1-1, Cycle Menu Configuration.

STERILIZE TIME	The amount of time spent in Sterilize phase (exposure time).
STERILIZE TEMP	The temperature at which the unit will begin the Sterilize phase.
DRY TIME/LIQ COOL TIME	The time spent removing moisture/cooling the chamber.
PURGE TIME	The time spent trying to remove air from the chamber (Air removal).
PRECHARGE	The pressure to be achieved during charge portion of all PREVAC phases selected. This setting applies to all pulses (1-6).
PREVAC VAC PNT	This sets the vacuum point end point for pulses 3, 4, 5 and 6. Pulse 1 has a fixed vacuum end point of 5.0 InHg and pulse 2 has a fixed vacuum end point of 10.0 InHg.
HALF-RAMP TIME	The amount of time in which the sterilizer will climb from its current temperature halfway to the STERILIZE TEMP.
FINAL RAMP SLP	Once the HALF-RAMP TIME is satisfied, the controller will ramp the chamber temperature to the STERILIZE TEMP in this amount of temperature per minute.
BOOST OFFSET (Optional)	The number of degrees below STERILIZE TEMP where the large steam valve is no longer operated, and a small steam valve begins to operate (Preventing overshoot). NOT ON ALL UNITS.
LOADP TEMP (Optional)	Load Probe Temperature at which the sterilization phase will begin. Maximum temperature setpoint is 1° (one degree) less than STERILIZATION TEMP.

PREVAC VACTIME	The time spent in vacuum after the PRE-VAC VAC PNT is reached while in PREVAC phase
DRY VAC POINT	The vacuum pressure that the sterilizer will try to reach before it starts to decrement the DRY TIME setting (on Post-Vacs #1 through #6).
# OF PREVACS	The number of pulses the sterilizer will pull a vacuum before STERILIZE.
# OF POSTVACS	The number of pulses the sterilizer will pull a vacuum after STERILIZE.
SLOW EX END PNT	The end point to be reached while in the SLOW EXHAUST phase.
SLOW EXH. RAMP	(LIQUIDS CYCLES ONLY) The rate at which the chamber will decrease in pressure after STERILIZE until SLOW EX END PNT is reached (To prevent boil over).

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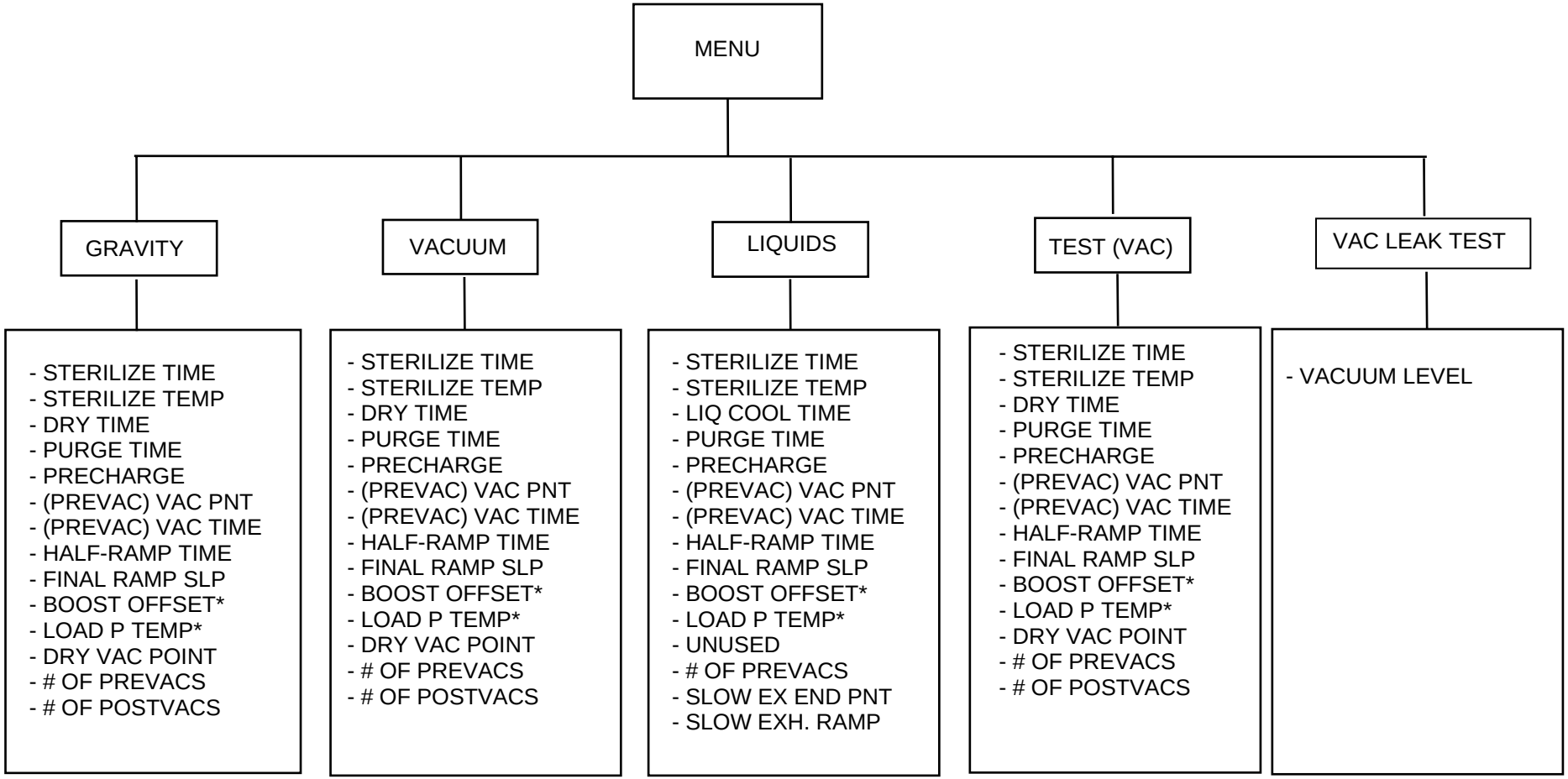

*NOTE: Optional items available only if the sterilizer is configured for these options

FIGURE 4.1-1 CYCLE MENU CONFIGURATION

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4.2 Programming

To review or change the parameters of the selected cycle number, press **[MENU] on the Vertical touchpad or [STER TEMP]**, **[STER TIME]**, or **[DRY TIME]** button on the Horizontal touchpad**.** The first parameter displayed is **"CYCLE TYPE"**. The cycle type can be changed to either, **"GRAVITY"**, **"VACUUM"**, **"LIQUID"**, or **"TEST (VAC)"**. See Tables 4.2-1 through 4.2-4 for a description of the cycle parameters relative to the types of cycles. To change the cycle type at this cycle number, press **[ENTER] followed by scroll [▲]** to display the different cycles. When the desired cycle is displayed, press **[ENTER]** to make the cycle selection. Press **[▲]** to scroll to the next settable parameter. Each parameter can be set by pressing **[ENTER]** then scrolling **[▲]** or **[▼]** to change the parameter value. When the LED on the **[*]** button is lit, the control is in rapid advance. To advance the control in smaller increments, press the **[*]** and the LED will turn off. The controller is now in slow advance. Once the parameter is set, press **[ENTER]** and scroll **[▲]** to the next parameter. After the last parameter is set, press **[ADV]** to return to the idle screen for operation. Pressing **[ADV]** any time during the process will exit the control to the next level. For units with the optional Vacuum Leak Test, to review or change the parameter of cycle #8 press **[MENU]** on the vertical touchpad or **[STER TEMP]**, **[STER TIME]**, or **[DRY TIME]** button on the Horizontal touchpad. See Table 4.2-5 for a description of the cycle parameters relating to cycle #8 (Vacuum Leak Test).

CYCLES THAT HAVE BEEN MODIFIED FROM FACTORY PRESET VALUES MUST BE VALIDATED BY THE END USER

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The various parameters, setting descriptions, and set point ranges are found in the index below. Cycle Parameters definitions are found in paragraph 4.1.

PARAMETER	UNIT	RANGE
STERILIZE TIME	MIN:SEC	3:00[1]-239:30
STERILIZE TEMP	DEG C (F)	70.0°C (158.0°F) – 138.0°C (280.4°F)
DRY TIME	MIN:SEC	0:00[2] – 239:00
PURGE TIME	MIN:SEC	0:00 - 60:00
PRECHARGE	PSIG	0.1 – 35.0
PREVAC VAC PNT	InHg	0 - 29
PREVAC VACTIME	MIN:SEC	0:00 – 30:00
HALF-RAMP	MIN:SEC	0:01 - 16:40
FINAL RAMP SLP	DEG/MINUTE	0.0 - 33.3°C (0.0 - 60°F)
BOOST OFFSET[3]	DEG C (F)	0.0 – 40.0°C (0.0 – 72.0°F)
LOADP TEMP #1[4]	DEG C (F)	70.0 – 138.0°C (158.0 – 280.4°F)
DRY VAC POINT	InHg	0 - 29
# OF PREVACS	#	0 – 6
# OF POSTVACS	#	0 – 6

[1] Minimum range is set in CAL mode SETPOINTS MENU – MIN. STERILIZE
[2] Minimum range is set in CAL mode SETPOINTS MENU – MINIMUM DRY TIME
[3] Requires additional steam to chamber valve
[4] Optional Load Probe Control
[5] Low end vacuum level is dependent on the vacuum system capabilities

TABLE 4.2-1 GRAVITY CYCLE PARAMETERS

PARAMETER	UNITS	RANGE
STERILIZE TIME	MIN:SEC	3:00[1]-239:30
STERILIZE TEMP	DEG C (F)	70.0°C (158.0°F) – 138.0°C (280.4°F)
DRY TIME	MIN:SEC	2:00[2] – 239:00
PURGE TIME	MIN:SEC	0:00 - 60:00
PRECHARGE	PSIG	0.1 – 35.0
PREVAC VAC PNT	InHg	0 - 29
PREVAC VACTIME	MIN:SEC	0:00 - 30:00
HALF-RAMP	MIN:SEC	0:01 - 16:40
FINAL RAMP SLP	DEG/MIN	0.0 - 33.3°C (0.0 - 60°F)
BOOST OFFSET[3]	DEG C (F)	0.0 – 40.0°C (0.0 – 72.0°F)
LOADP TEMP #1[4]	DEG C (F)	70.0 – 138.0°C (158.0 – 280.4°F)
DRY VAC POINT	InHg	0 - 29
# OF PREVACS	#	0 - 6
# OF POSTVACS	#	0 – 6

[1] Minimum range is set in CAL mode SETPOINTS MENU – MIN. STERILIZE
[2] Minimum range is set in CAL mode SETPOINTS MENU – MINIMUM DRY TIME
[3] Requires additional steam to chamber valve
[4] Optional Load Probe Control
[5] Low end vacuum level is dependent on the vacuum system capabilities

TABLE 4.2-2 VACUUM CYCLE PARAMETERS

PARAMETER	UNITS	RANGE
STERILIZE TIME	MIN:SEC	3:00[1]-239:30
STERILIZE TEMP	DEG C (F)	70.0°C (158.0°F) – 153.3°C (308°F)[2]
LIQ COOL TIME	MIN:SEC	0:00 - 239:00
PURGE TIME	MIN:SEC	0:00 - 60:00
PRECHARGE	PSIG	0.1 – 35.0
(PREVAC) VAC PNT	InHg	0 - 29
(PREVAC) VACTIME	MIN:SEC	0:00 - 30:00
HALF-RAMP	MIN:SEC	0:01 - 16:40
FINAL RAMP SLP	DEG/MIN	0.0 - 33.3°C (0.0 – 60.0°F)
BOOST OFFSET[3]	DEG C (F)	0.0 – 40.0°C (0.0 – 72.0°F)
LOADP TEMP #1[4]	DEG C (F)	70.0°C (158.0°F) – 153.3°C (308°F)
UNUSED	N/A	N/A
# OF PREVACS	#	0 - 6
SLO EX END PNT	PSIG/InHg	12.0 PSIG - 12.0 InHg
SLOW EXH. RAMP	PSI/MINUTE	0.1 to 8.0

[1] Minimum range is set in CAL mode SETPOINTS MENU – MIN. STERILIZE
[2] Maximum range is set in CAL mode SETPOINTS MENU – MAX LIQUID TEMP
[3] Requires additional steam to chamber valve
[4] Optional Load Probe Control
[5] Low end vacuum level is dependent on the vacuum system capabilities

TABLE 4.2.3 LIQUIDS CYCLE PARAMETERS

PARAMETER	UNITS	RANGE
STERILIZE TIME	MIN:SEC	3:00[1]-239:30
STERILIZE TEMP	DEG C (F)	70.0°C (158.0°F) – 138.0°C (280.4°F)
DRY TIME	MIN:SEC	2:00[2] – 239:00
PURGE TIME	MIN:SEC	0:00 - 60:00
PRECHARGE	PSIG	0.1 – 35.0
PREVAC VAC PNT	InHg	0 - 29
PREVAC VACTIME	MIN:SEC	0 - 30:00
HALF-RAMP	MIN:SEC	0:01 - 16:40
FINAL RAMP SLP	DEG/MIN	0.0 - 33.3°C (0.0 - 60°F)
BOOST OFFSET[3]	DEG C (F)	0.0 – 40.0°C (0.0 – 72.0°F)
LOADP TEMP #1[4]	DEG C (F)	70.0 – 138.0°C (158.0 – 280.4°F)
DRY VAC POINT	InHg	0 - 29
# OF PREVACS	#	0 - 6
# OF POSTVACS	#	0 - 6

[1] Minimum range is set in CAL mode SETPOINTS MENU – MIN. STERILIZE
[2] Minimum range is set in CAL mode SETPOINTS MENU – MINIMUM DRY TIME
[3] Requires additional steam to chamber valve
[4] Optional Load Probe Control
[5] Low end vacuum level is dependent on the vacuum system capabilities

TABLE 4.2-4 TEST(VAC) CYCLE PARAMETERS

PARAMETER	UNITS	RANGE
VACUUM LEVEL SETPOINT	InHg	0 - 29

TABLE 4.2-5 OPTIONAL VAC LEAK TEST CYCLE PARAMETERS

4.3 Password Protection

The "Password Protection" feature may be used to provide controlled access to the entry or alteration of cycle parameters.

Password Protection

Stored cycle parameters can be protected by a supervisor password.

1. Assure controller is in idle mode. Cycle type and jacket temperature should be displayed on the LCD. Press [ADV] to exit to idle mode.

2. Press upper right **[♥]** button on the Primus logo to access password function.

3. Enter current password

4. Controller prompts for new password

5. Enter new password

6. "0" means controller is not password protected

When changes are attempted to the cycle parameters, the operator will be prompted for a password. If the incorrect password is entered, the LCD will display "LOCKED FEATURE".

SECTION 5.0 Printer User Maintenance

The standard printer for the PRIMUS General Purpose sterilizer is a compact, 24 column thermal printer (refer to Figure 5.1-1, Front Panel - 24 Column Printer). This section provides information for loading paper into the 24 Column Printer.

Refer to the manufacture's User's Manual for user maintenance on all other Printers and Recording devices.

5.1 Thermal Dot Matrix Printer (Cybertech)

The multifunctional, thermal dot matrix printer is located on the fascia panel of the sterilizer, near the Operator Interface. All printer-operating controls are located on the front of the printer.

Figure 5.1 Thermal Dot-Matrix Printer

5.1.1 Printer Reprint/Feed Switch

When the printer is first powered on and the REPRINT switch is momentarily pressed, a test print will occur (refer to Figure 5.1, Thermal Dot-Matrix Printer). Once a cycle report is sent to the printer, it can be reprinted by momentarily pressing the REPRINT switch. Pressing the FEED switch will advance the paper.

NOTE If the switch is in the FEED position at power up the printing will be upside down. Note this condition stays set until the same FEED switch on power up cycle is repeated.

The status LED will be on in normal operation. A flashing LED indicates the printer has a fault condition. The fault may be out of paper, print head in the open position, or the printer is over temperature.

5.1.2 Loading Paper

The following steps should be followed to load the printer with paper.

1. Open the clear acrylic front cover of printer to access the paper take-up compartment.

2. If needed, follow steps in 54.1.4, Unloading Paper From the Take-Up Spool to remove any printed reports.

3. Open the paper supply compartment and remove any unused paper and the paper core.

4. Insert the new paper into the paper compartment with loose end of paper exiting front of printer (see Figure 5.1.2, Loading Thermal Printer Paper). The front panel LED should be flashing.

Figure 5.1.2 Loading Thermal Printer Paper

5. Close the paper supply compartment with paper exiting printer and ensure that the paper is properly aligned. The LED should now be "ON" continuously.

6. Depress the REPRINT/FEED switch to the REPRINT position switch. If there is no image on the paper, either the paper is in the printer backwards or the paper is not

thermal paper. Reverse the paper, or replace with thermal paper to correct this condition.

5.1.3 Loading Printer Take-Up Spool

1. The removable spool snaps between the two rotating discs (see Figure 5.1.3, Loading Printer Take-Up spool). The slot in the removable spool must be aligned with the drive pin on the right side of the disc.

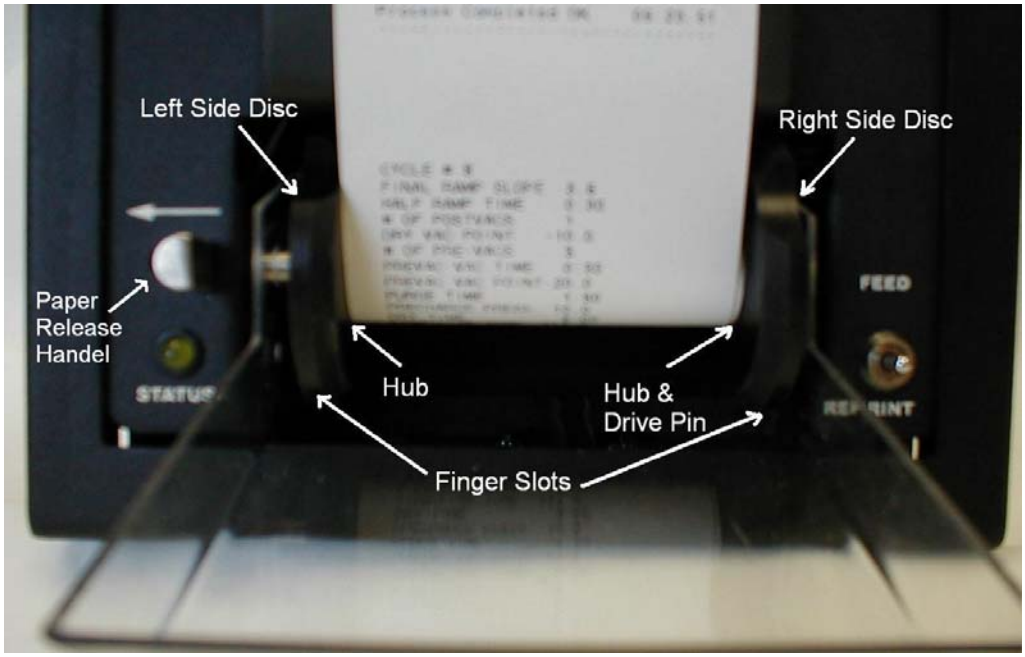

Figure 5.1.3 Loading Printer Take-Up Spool

2. Place the end of the spool onto the left side disc hub and apply slight pressure to move the spring loaded disc (use the paper release handle to assist). Then place the left end of the spool onto the right side disc hub making sure to align the drive pin.

3. Place the loose end of the paper exiting the printer into the slot in the removable spool. Fold the end of the paper into a "V" before placing into the slot to secure the paper in the spool.

4. Depress the REPRINT/FEED switch to the FEED position to feed and take up the paper. Do this until all the paper slack is taken up.

5.1.4 Unloading Paper From The Take-Up Spool

1. If there is still paper in the printer, tear off the paper using the printer cut off bar.

2. Align the finger slots on both the right and left side discs.

3. While grasping the paper roll in the take-up area, push the paper release to the left. (See Figure 5.1.3, Loading Printer Take-Up Spool)

4. Pull the roll out of the take-up area and if necessary gently move it side to side to clear the hubs on the discs.

5. Retrieve the take-up spool by pushing it out of the roll of paper.

5.2 Thermal Printer with Take-Up Reel (Keltron Optional)

The printer is located on the fascia panel near the Operator Interface. All printer-operating controls are located on the front of the printer.

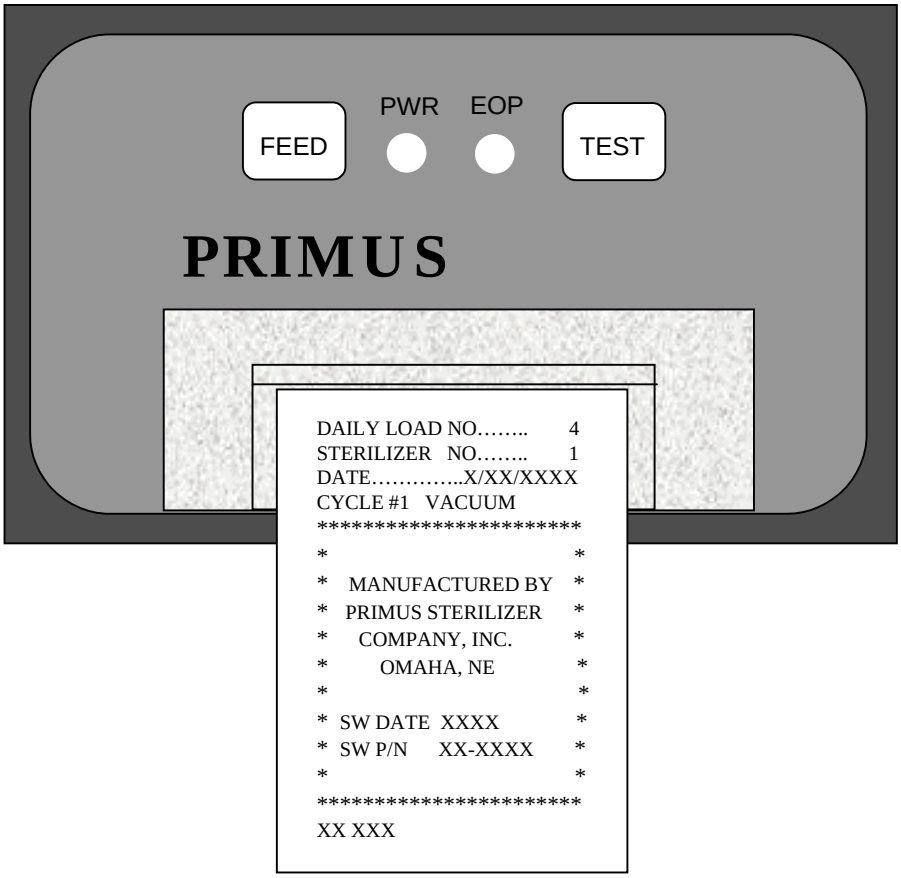

Figure 5.2-1 Thermal Printer Front Panel (Optional Keltron)

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5.2.1 Printer Indicators and Control

POWER ON indicator - The green LED, labeled **(PWR)**, is on if power is applied to the printer.

Paper - Out/Printer - Ready indicator - The yellow LED, labeled **(EOP)**, provides the following:

1. When the yellow LED is lit, the printer is ready to print.

2. When the EOP yellow LED is lit and blinks at 1 second intervals, the printer is out of paper. The full buffer (memory) is indicated with a rapid blinking rate.

3. Two membrane switch buttons are located on the front panel. These buttons are identified as **[FEED]** and **[TEST]**. The functions of these buttons are as follows:

   - **[FEED]** is used to advance paper. Each time **[FEED]** is pressed; the paper will advance one line.

   - **[TEST]** is used to test the printer. If pressed when the printer is on-line, the version of the printers operating program is printed.

5.2.2 Tearing Paper Strip

The paper cutting edge of the printer is the top edge of the paper opening. To tear the paper, hold the paper from the right side and pull the paper up against the cutting edge while moving your hand up and to the left.

5.2.3 Thermal Paper

The Thermal Printer paper is permanent for 10 years.

CAUTION

DO NOT OVERRIDE THE FACTORY SETTING THAT EVACUATES STEAM FROM THE CHAMBER AT CYCLE COMPLETE. CONTACT WITH STEAM WILL OBLITERATE PRINTED COPY. ALWAYS MAINTAIN A DRY TIME SUFFICIENT TO EVACUATE THE CHAMBER OF ALL RESIDUAL STEAM.

PRIMUS has long recognized the potential danger to an operator from residual steam when opening the door upon completion of a cycle. To protect the operator, PRIMUS incorporates a factory setting to evacuate the chamber of steam prior to releasing the door to be opened. Steam contacting the paper will obliterate printed copy and is an indication of unsafe operation. If the operator chooses to operate in an unsafe manner, printer paper should be torn from the printer prior to opening the door.

5.2.4 Paper Replacement

When the printer is out of paper, the yellow **(EOP)**, out-of-paper LED will blink at 1 second intervals. PRIMUS recommends that the paper be replaced when the end-of-paper indicator appears at the edge of the paper. The end-of-paper indicator is usually a red line on the edge of the paper strip. The use of PRIMUS printer paper is recommended.

CAUTION

DO NOT RUN ANOTHER CYCLE AFTER THE RED LINE APPEARS.

The paper compartment is located behind the front bezel. To access the paper tray assembly and replace paper, proceed as follows:

1. Prepare a roll of 2¼" wide thermal printer paper. (See Part IV, Maintenance Manual, for the spare parts lists).

2. Printer power must be ON to replace the paper.

3. To access the printer tray assembly, pull the front bezel forward and down. Bezel is hinged and latched magnetically.

When the printer is out of paper, it is placed Off-line automatically. The Yellow LED will be BLINKING for the out of paper indication. When the paper is replaced the printer will automatically be placed back on-line.

NOTE

4. Insert a new roll of paper on the paper holder axle and guide the edge of the paper into the printer mechanism paper input. Exposed circuit components do not contain perceptible voltages, but care should be taken to avoid damaging delicate electronic components. Thread the paper as shown in Figure 5.2.4-1 with the paper coming off the top of the roll rather than the bottom of the roll. The Thermal Printer has an autofeed feature—simply line the paper up in the slot and the printer mechanism will grab and pull it through to the front.

5. After loading paper press feed button on face of printer until sufficient quantity of paper is fed to insert into take-up slot and put 3-4 wraps onto take-up reel spool.

6. After rolling excess paper onto take-up reel spool, place spool into holder making sure drive gears mesh.

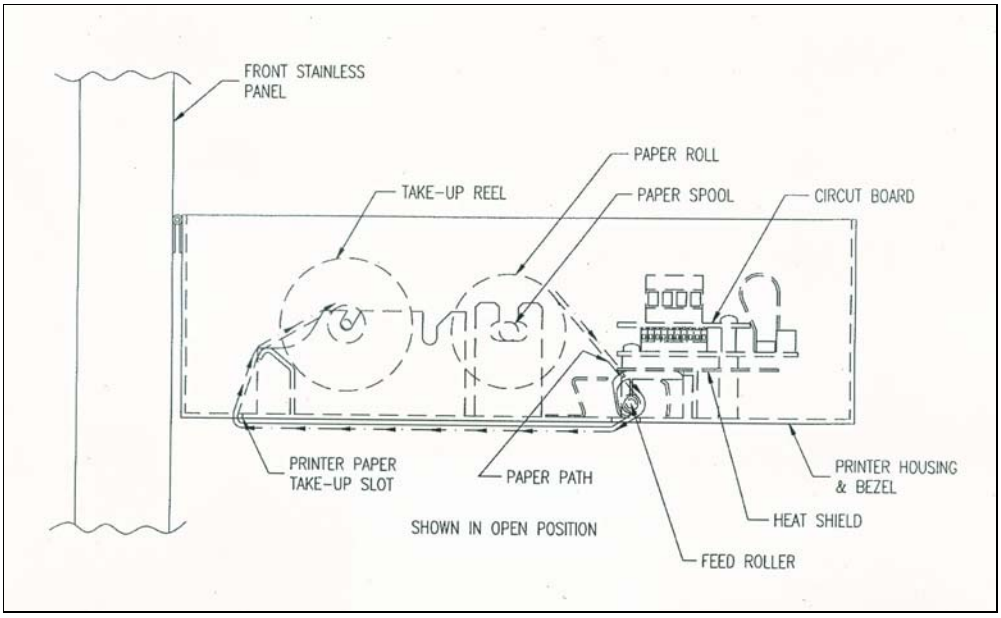

Figure 5.2.4-1 Paper Loading

7. When the paper is replaced the printer is automatically placed on-line.

8. Close printer case up to fascia until magnetic latch engages.

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5.3 Impact Printer (optional)

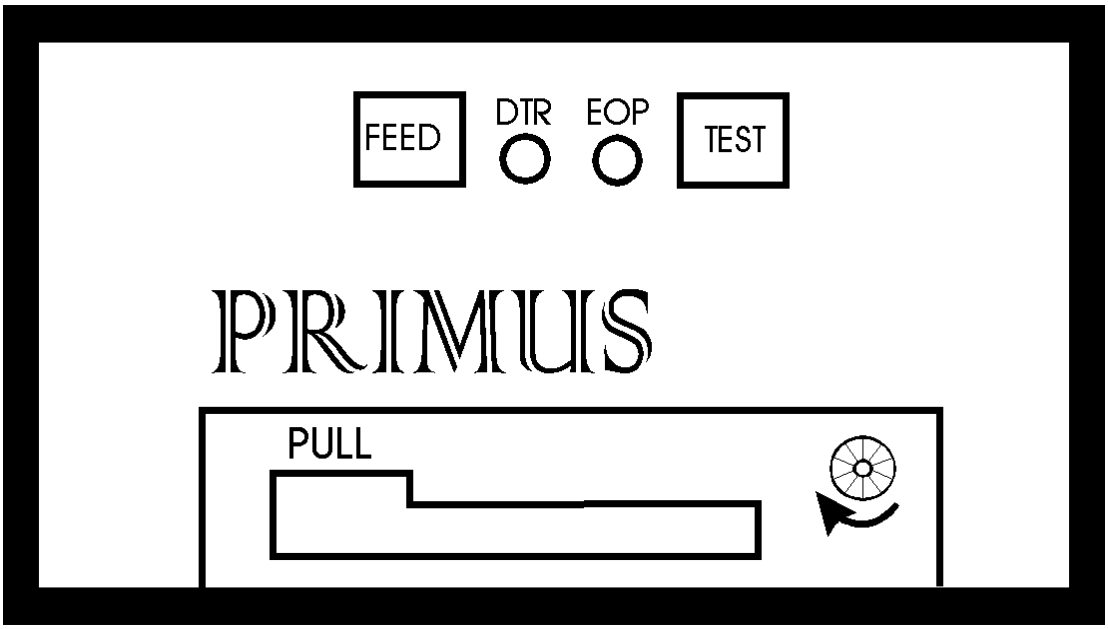

Figure 5.3-1 Front Panel - 24 Column Printer

5.3.1 Printer Indicators and Control

POWER ON indicator - The green LED, labeled DTR, is ON if power is applied to the printer.

Paper Out / Printer Ready indicator / Buffer Full - The yellow LED, labeled EOP, provides the following:

1. When the yellow LED is lit, the printer is ready to print.
2. When the EOP yellow LED is lit and blinking, the printer is out of paper.
3. A rapid blinking rate indicates that the character buffer is full (the paper may need changing).
4. Two membrane push buttons are located on the front panel. These push buttons are identified as FEED and TEST. The functions of these buttons are as follows:
   - The FEED button is used to advance paper. Each time the FEED button is pressed, the paper will advance one line.
   - The TEST button is used to test the printer. If pressed when the printer is on-line, the printer's operating system version and related time/date is printed.

5.3.2 Removing the Paper Report

The paper cutting edge of the printer is located under the paper at the edge of the printer mechanism. To tear off the report, hold the paper from the right side and pull the paper down (snap it) against the cutting from right to left.

5.3.3 Paper Replacement

When the printer is out of paper, the yellow EOP, out-of-paper LED will blink slowly. PRIMUS recommends that the paper be replaced when the end-of-paper indicator appears at the edge of the paper. The end-of-paper indicator is usually a red line on the edge of the paper strip. The use of PRIMUS printer paper is recommended.

CAUTION

DO NOT RUN ANOTHER CYCLE AFTER THE RED LINE APPEARS. THE STERILIZER SHOULD BE TURNED OFF TO REPLACE THE PAPER, OR DATA IN THE STERILIZER CONTROL OR PRINTER BUFFER MAY BE LOST.

The paper compartment is located behind the front bezel. To access the paper tray assembly and replace paper, proceed as follows:

1. Prepare a roll of 2¼" printer paper. (See Part IV, Maintenance Manual, for the spare parts lists).

2. Grasp the black edges of the printer front bezel and pull the printer forward from the operating position.

3. Lift the paper holder shaft and remove the expended paper core.

4. Insert a new roll of paper on the paper holder shaft and guide the edge of the paper into the printer mechanism paper input. Exposed circuit components do not contain perceptible voltages, but care should be taken to avoid damaging delicate electronic components. The paper path illustrated in Figure 5.3.3-1, shows the paper coming off the top of the roll, rather than from the bottom. Feed the paper forward, while pressing the FEED button, until paper feeds correctly through the front of the printer.

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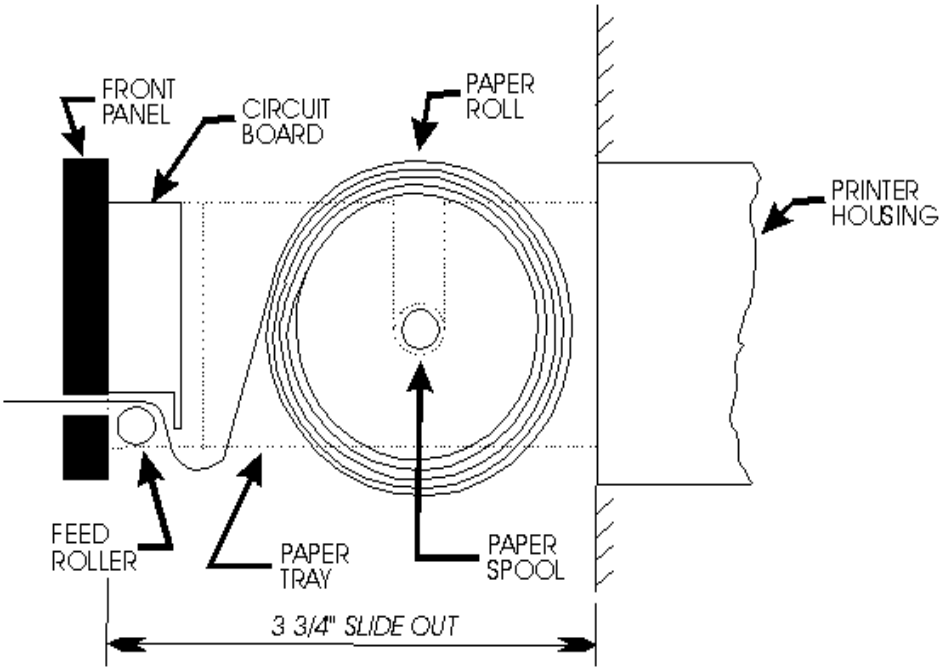

Figure 5.3.3-1 Paper Loading

5. Carefully push the printer back into the operating position. This completes paper loading for the printer.

5.3.4 Ribbon Replacement

1. Remove the new ribbon cartridge from its plastic wrap. (reference Part IV, Maintenance Manual, Spare Parts List.).

2. Tighten the ribbon on the new cartridge by rotating the ribbed wheel on the front of the ribbon cartridge clockwise until the ribbon is taut.

3. Remove the old ribbon by placing a finger in the notched portion of the upper left corners of the paper slot marked PULL (refer to Figure 5.3.4-1, Printer Ribbon Replacement). Note the relationship of the paper ribbon and print head as the old ribbon is removed.

4. Press the FEED push button to run out 2 to 3 inches of paper. Slip the new ribbon over the paper and gently push the cartridge in place so the ribbon is positioned between the paper and the print head.

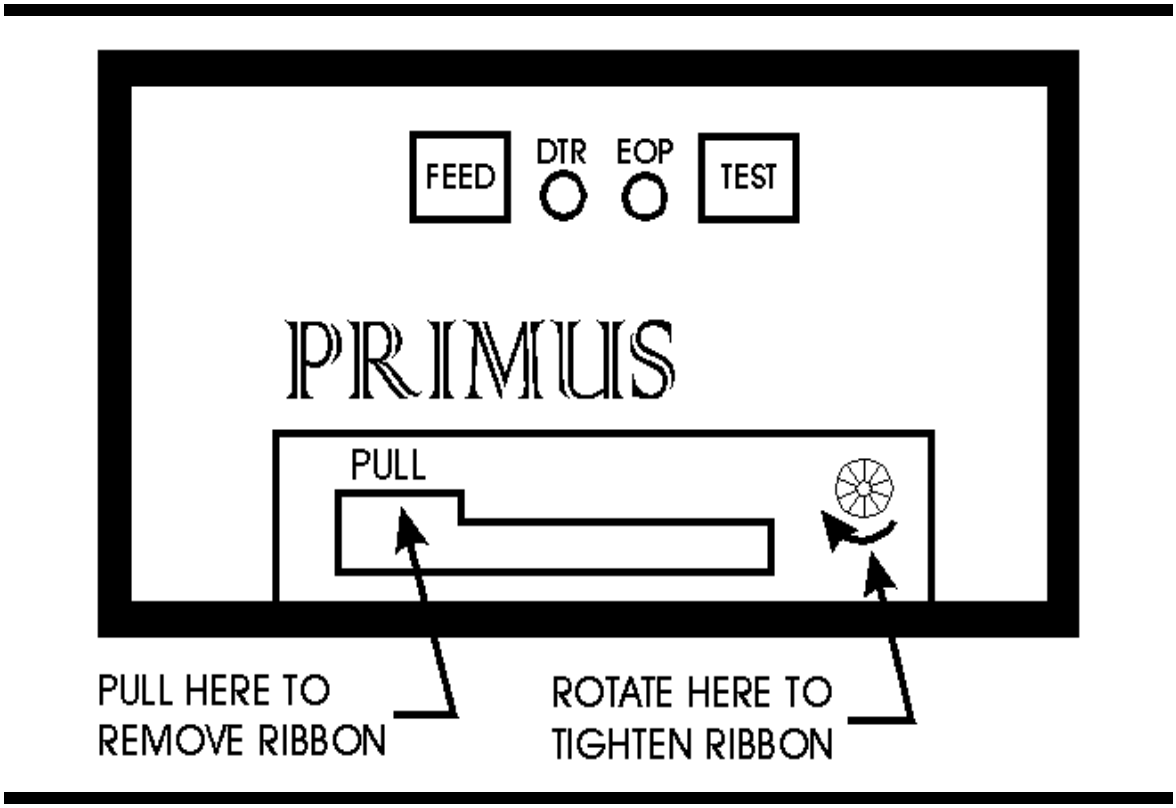

Figure 5.3.4-1 Printer Ribbon Replacement

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SECTION 6.0 CONTROL MEASURES FOR STERILITY ASSURANCE

6.1 Sterilizer Efficacy

Sterilizer must be monitored routinely to evaluate its efficacy. Verify that appropriate cycle time, temperature, and pressure is met in each cycle using the Printer report for verification.

Biological indicators and chemical indicators provide additional information on sterilization efficacy. When selecting biological and chemical indicators for saturated steam cycles, always inspect the indicator label. Verify the indicator is intended to monitor your specific cycle temperature.

When performing routine monitoring. Place indicators in an appropriate test pack or your most challenging load. Place the test pack or load in the most difficult to sterilize chamber location. The most difficult to sterilize location in the Primus PSS 500 Series sterilizer is the lowest shelf closet to the drain.

PRIMUS

GENERAL PURPOSE STEAM STERILIZER

PRIMUS PSS500 SERIES

PART IV

MAINTENANCE MANUAL

PSS-500 Controls
Software Version 7923

July 27, 2009
Version 1.08

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PRIMUS Sterilizer Company, LLC, Omaha, NE 68131

Printed in the United States of America

Steam Sterilizer Installation, Operation, and Maintenance Manual

V196 Controller

Includes Bibliographical References

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SECTION 1.0 PREVENTIVE MAINTENANCE

Maintenance procedures described in this section should be performed regularly at the intervals indicated to provide the longest useful life possible for your sterilizer. Refer to the maintenance log for daily, weekly, quarterly, annually, and as needed procedures. For units with optional steam generator (boiler) or a steam-to-steam generator refer to the additional maintenance recommendations in Appendix A, Manufacturer's Records. Refer to the recommended spare parts list (Section 5.0) for any replacement parts needed and call your service representative.

Preventive Maintenance and failures resulting from a lack of preventive maintenance are not covered under warranty. Refer to Part 1, General Information, for full details.

WHEN REMOVING ANY EQUIPMENT COVERS, OR ENTERING THE CHAMBER FOR MAINTENANCE, SHUT OFF ALL UTILITIES, AND ALLOW THE STERILIZER AND PIPES TO COOL PRIOR TO PERFORMING MAINTENANCE. CHECK SURFACE TEMPERATURES BEFORE ATTEMPTING WORK. USE HEAT RESISTANT PROTECTIVE CLOTHING AUTHORIZED BY THE SAFETY OFFICER EMPLOYED BY THE OWNER.

DO NOT USE STEEL WIRE BRUSHES OR STEEL WOOL ON THE SURFACES OF THE CHAMBER OR THE CHAMBER DOOR. IF INTENSIVE CLEANING IS REQUIRED, USE NYLON BRUSHES OR CLEANING PADS, SUCH AS 3M SCOTCHBRITE®, OR EQUIVALENT.

WHEN CHECKING VESSEL SAFETY VALVES, AVOID THE DISCHARGE OUTLET OF THE SAFETY VALVE WHEN OPERATING THE PRESSURE RELEASE LEVER. THE HANDLE OF THE PRESSURE RELIEF VALVE MAY BE HOT. CARE SHOULD BE TAKEN TO AVOID BURNS WHEN TEST OPERATING THESE VALVES.

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
Clean Chamber and remove spill residue and staining	X				
If optional pin traps are used, remove and inspect for accumulation of residue such as, paper, fabric, or other materials. THIS IS VERY IMPORTANT FOLLOWING ANY BREAKAGE OF GLASS OR LOAD CONTAINERS.	X				
Remove and clean shelving, transfer carts, and loading equipment. A mild cleaning solution is recommended. If stubborn stains remain use detergent or a cleaner for stainless steel. Be sure to rinse thoroughly.		X			
Clean exterior stainless steel surfaces with Stainless Steel Polish.		X			

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
Inspect the pneumatic lines, switches, and cylinder components. Remove lint and dirt from the areas.			X		
Test that door operates smoothly. Horizontal power doors move on an overhead beam/trolley assembly. The cylindrical lugs on the door (s) should mate smoothly with the tabs on the vessel. Wheel bearings in the trolley assemblies are sealed and do not require lubrication. Adjust the trolley assembly only if necessary.			X		
Remove the door gasket and determine the need for replacement or reseating. To remove gasket insert a flat blade screwdriver between the gasket groove and the gasket. Gently remove the gasket by prying it forward from the groove. **NOTE: Take care not to nick or gouge the gasket when removing**. When a portion of the gasket is out of the groove, carefully pull the remainder from the groove. Irregular retraction of the gasket into the gasket groove may be due to an aging gasket. Inspect the entire circumference for cuts, nicks, gouges or irregularities caused by wear. Ensure gasket is still pliable. Replace gasket if damage or wear is evident. If no damage is determined, rinse with clean water and dry with lint-free cloth. If reusing, reverse the gasket so that the sides that faced the head rings will now face the doors. Gasket grooves should be cleaned with detergent and a cloth. Allow time to dry. Clean the inside surface of the door where the gasket contact is made. On vertical sliding door units, the door guide assembly may need to be removed. Reinstall gasket, locating the seam of the door gasket and placing seam of gasket in the top of the groove. Press the gasket into the head ring groove, working from the side, top and bottom. Equally distribute the excess and use your			X	X	X

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
fingers to press the gasket as deeply as possible into the door gasket groove.					
Test (operate) steam pressure relief valves by lifting the test lever on the valve. For your safety identify the discharge path from the valve before proceeding with the test. It should be routed into a discharge pipe. If not, make sure no one is in the path of the steam discharge			X		
Remove and clean strainers that may be located in the supply lines. Refer to the piping schematic for locations. It is critical that the strainers remain clean. Remove the metal strainer from the holder. Clean inside and outside using compressed air or a brush and mild detergent. Replace strainer in the holder. Replace strainer cap by turning clockwise until it is securely seated			X		
Check the pressure of the incoming steam. If the optional steam regulator is used, readjust the steam supply regulator to meet PRIMUS Sterilizer Company, LLC installation specifications found **in the Installation Manual.**			X		
Check the pressure of the incoming water supply. If necessary, readjust supply regulator's service booster system to meet PRIMUS Sterilizer Company, LLC installation specifications found **in the Installation Manual**.			X		
Sterilizers with optional air operated gasket, check the pressure of the incoming air supply. Readjust, if necessary, the supply regulator's to meet PRIMUS Sterilizer Company, LLC installation specifications found **in the Installation Manual**.			X		
Inspect all pipes fittings, valves, and connections for visible evidence of leaks or corrosion. CONTACT YOUR PRIMUS STERILIZER COMPANY, LLC SERVICE REPRESENTATIVE FOR REPAIR.			X		
Check all solenoid valves for internal and external leaks. Verify impeded and smooth,			X		X

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
"snappy" operation. Install repair kit as needed.					
Inspect and "tap" all check valves. Replace as necessary.			X		X
Replace the air filter(s) and o-ring gasket. The assembly must be airtight. Refer to Volume II for the manufacture's information regarding this sterilizer's air filtration.					X
Clean all exterior surfaces of the cabinet.			X		
Sterilizers with an optional pressure regulator are to be tested for correct and consistent steam operating pressures after the regulator. Examine Manufacturer's Cutsheet Manual for manufacturer's information regarding the optional pressure regulator.					
Run test cycles and verify proper timing, cycle progression, and operation of all LCD indicators, the Operator Panel(s), and the audible alarm.			X		
Replace the Over Pressure Rupture Disk. Refer to the manufacturer's instructions in the Manufacturer's Cutsheet Manual.				X	
Verify the presence of a secure electrical ground.				X	
Inspect the entire assembly for steam, water, or (as applicable) air leaks.				X	
Clean the sterilizer's mechanical space.				X	
Perform a complete calibration for the sterilizer using the calibration procedures. The user determines the frequency of calibrations; however, this period should not be greater than one year. PRIMUS Sterilizer Company, LLC recommends that sterilizers subject to validation and cGMP standards be revalidated at one-year intervals.					X
Inspect the inside surfaces of the chamber for deposits of scale. If scale is present, use a cleaner and descaler according to the directions on the container. While the rate of scale accumulation varies between facilities, PRIMUS Sterilizer Company, LLC recommends that a regular schedule for descaling be adopted according to individual user requirements.				X	

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
Install new steam trap kit when a steam trap fails.					X

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1.1 Preventive Maintenance - Electrically Heated Units Only

Maintenance Required	Daily	Weekly	Quarterly	Annually	AS NEED
Optional boiler units refer to the boiler manufacturers' instructions. All boiler maintenance should be provided by qualified personnel. (See Appendix A, Manufacturer's Records)					X
WARNING **TURN OFF THE ELECTRICAL POWER SWITCH TO THE UNIT BEFORE REMOVING ANY COVERS FOR MAINTENANCE OR PROCEEDING WITH THE BOILER BLOW DOWN PROCEDURE.**					
Check the condition of heating elements.				X	
Inspect all boiler pressure controls.		X			
Optional Steam-to-Steam generator units refer to the manufacturers' instructions. All generator maintenance should be provided by qualified personnel. (See Appendix A, Manufacturer's Records)					X
WARNING **ALLOW THERMOSTATIC TRAPS TO COOL BEFORE REMOVING COVERS. SINCE THERE IS NOTHING TO LIMIT ITS EXPANSION, THE DIAPHRAGM ON THE INSIDE MAY RUPTURE OR FATIGUE IF TRAP IS OPENED WHEN HOT.**					
If the user added a vacuum breaker in the cold water supply to sterilizer, consider cleaning the vacuum breaker.					X
WARNING **FOR ELECTRICAL MAINTENANCE, DISCONNECT ELECTRICAL POWER TO THE STERILIZER PRIOR TO REMOVING ANY ELECTRICAL COVERS. VOLTAGE PRESENT IS DANGEROUS AND MAY BE FATAL IF CONTACTED.**					

SECTION 2.0 CONFIGURATION/CALIBRATION

2.1 Turning on the Sterilizer

Prior to turning on the machine, make sure that the switch on the A/D Revision 2.0 board (inside control box) has been switched to the Configuration EPROM (CAL mode) and not the Operational EEPROM (OPS mode). (See Figure 2.1.10-1)

2.1.1 Power Up

Turn the power on to the sterilizer by using the “Power On” switch on the side of the control box. The touchpad display on the front panel will read **(HIT ANY BUTTON)** and the LEDs will light briefly and rotate through the buttons on the touchpad.

2.1.2 Entering the Diagnostics Menu

Hit any button on the touchpad and the display will read **(OUTPUT DIAGS)**. “OUTPUT DIAGS” is one of the six parameters under the Diagnostics Menu (see Table 2.1.2-1). If it is not displayed, scroll **[▲]** or **[▼]** until the proper display is read.

OUTPUT DIAGS
INPUT DIAGS
PRINTER DIAGS
SENSOR DIAGS
EEPROM DIAGS
CALIBRATE
END

Table 2.1.2-1 Diagnostics Menu

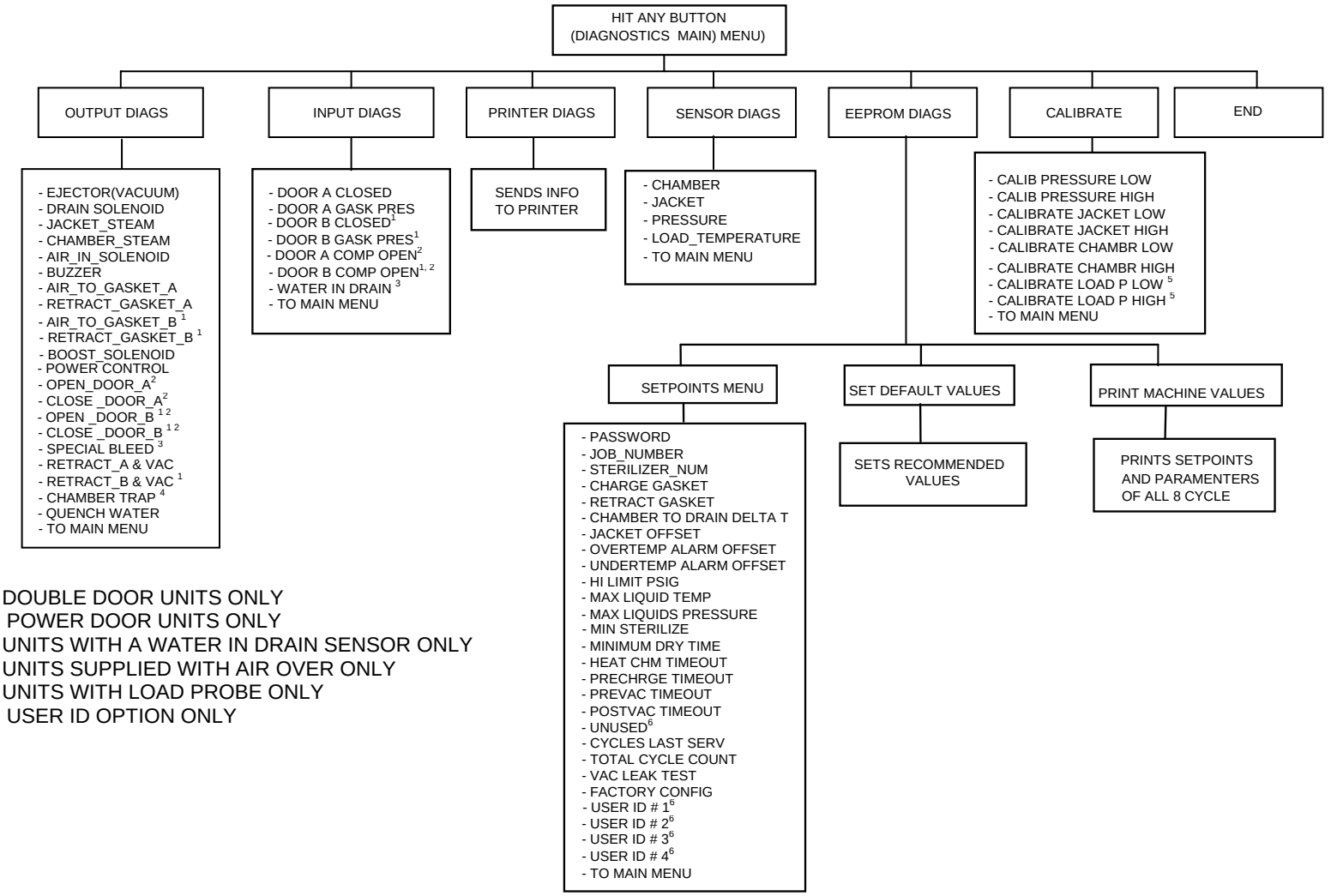
2.1.3 Setpoints Definitions

The following terms and definitions explain the setpoints menu found in Figure 2.1.3-1, Diagnostics Menu.

PASSWORD	Selectable number from 0 (meaning no password set) to 32123. The “PASSWORD” prevents the cycle parameters from being changed.
JOB_NUMBER	Selectable number from 90 0 to 21 999 (Factory setting
STERILIZER_NUM	For users with more than one sterilizer (A means of sterilizer identification)
CHARGE_GASKET	Time spent charging the gasket before gasket pressure switch input is checked.
RETRACT_GASKET	Time spent retracting the gasket.
CHAMBER TO DRAIN DELTA T	This is compensation for the difference between the chamber temperature compared to the drain temperature (typically less than .3°C).
JACKET OFFSET	Applied to the “STERILIZE TEMP”. This is where the jacket will maintain its temperature.
OVERTEMP ALARM OFFSET	The number of degrees above “STERILIZE TEMP” at which an alarm will alert the user.
UNDER TEMP ALARM OFFSET	The number of degrees below “STERILIZE TEMP” at which an alarm will alert the user.
HI LIMIT PSIG	The maximum pressure during sterilization that is allowed for non-liquid cycles.
MAX LIQUID TEMP	The maximum allowable “STERILIZE TEMP” for liquids cycle.
MAX LIQUIDS PRESSURE	The maximum allowable pressure during sterilization of liquid cycle before all steam to chamber is turned off.
MIN. STERILIZE	The minimum amount of time user can set for “STERILIZE TIME”.
MINIMUM DRY TIME	The minimum amount of time the user can set for “DRY TIME/LIQ COOLTIME”.
HEAT CHM TIMEOUT	The amount of time spent trying to reach the “STERILIZE TEMP” before the unit auto-advances (aborts the cycle).
PRECHARGE TIMEOUT	The amount of time spent trying to reach the “PRECHARGE” setting (used in the “VACUUM” cycles) before the unit auto-advances (aborts the cycle).

PREVAC TIMEOUT	The amount of time spent trying to reach the "(PREVAC) VAC PNT" before the unit auto-advances (aborts the cycle).
POSTVAC TIMEOUT	The amount of time spent trying to reach the "DRY VAC POINT" before the unit auto-advances (aborts the cycle).
*LAB LOW T CUTOFF	The "STERILIZE TEMP" below which all cycles will be ran in a "Low Temperature" (recirculating steam) manner. NOT ON ALL UNITS.
CYCLES LAST SERV	A means of determining how many cycles have been ran on the unit since it's first run.
TOTAL CYCLES COUNT	Cycle count over the life of the sterilizer.
VAC LEAK TEST VALUE	(Optional) The amount of leakage allowed for the pre-configured 20 minute cycle.
FACTORY CONFIG #	A number set at the factory determining unit configuration and options.
USER ID #1-#4	(Optional) Selectable number from 0 (meaning no ID set) to 32123. A number which allows up to four users to start the sterilizer.

* Option only on LAB-LOW Units



1 - FOR DOUBLE DOOR UNITS ONLY
2 – FOR POWER DOOR UNITS ONLY
3 - FOR UNITS WITH A WATER IN DRAIN SENSOR ONLY
4 - FOR UNITS SUPPLIED WITH AIR OVER ONLY
5 - FOR UNITS WITH LOAD PROBE ONLY
6 – FOR USER ID OPTION ONLY

FIGURE 2.1.3-1 DIAGNOSTICS MENU

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2.1.4 Testing Outputs

Press **[ENTER]** to reach the "OUTPUT DIAGS" Menu. The "OUTPUT DIAGS" Menu contains each output necessary to operate the sterilizer (see Table 2.1.4-1). These outputs are selected by scrolling **[▲]** or **[▼]** and pressing **[ENTER]**. This procedure assures that each device and its corresponding relay is operating properly. This can be verified by listening for the appropriate solenoid to engage and watching to see if the LED on the relay will light. Relays are located in the control box. **[ENTER]** can be pressed and held as many times as necessary.

HOT STEAM COULD BE EXPELLED WHEN TESTING CHAMBER STEAM OR STEAM TO GASKET VALVES DURING OUTPUT DIAGNOSTICS CHECK.

EJECTOR (VACUUM)
DRAIN SOLENOID
JACKET STEAM
CHAMBER STEAM
AIR IN SOLENOID
BUZZER
STEAM[1] TO GASKET A
RETRACT GASKET A
STEAM[1,2] TO GASKET B
RETRACT[2] GASKET B
BOOST SOLENOID[4]
POWER CONTROL
OPEN[3] DOOR A
CLOSE[3] DOOR A
OPEN[2,3] DOOR A
CLOSE[2,3] DOOR B

SPECIAL BLEED[5]
RETRACT A & VAC
RETRACT B[2] & VAC
CHAMBER TRAP [3]
QUENCH WATER

[1]Air is optional; [2]Optional for Double Door; [3]Optional for Power Door, [4]Available only if optional Precise Control is selected, [5]Optional for Water-in-Drain

Table 2.1.4-1 OUTPUT DIAGS Parameters

When this procedure is complete, press **[ADV]** to return to **(OUTPUT DIAGS)**.

2.1.5 Testing Inputs

Scroll **[▲]** to display **(INPUT DIAGS)**. Press **[ENTER]** to enter the "INPUT DIAGS" Menu. The "INPUT DIAGS" Menu contains each input necessary to operate the sterilizer (see Table 2.1.5-1). These inputs are selected by scrolling **[▲]** or **[▼]** and pressing **[ENTER]**. This procedure assures that each device and its corresponding relay is operating properly. This can be verified by watching to see if the LED on the relay will light or by pressing and holding **[ENTER]**. The LCD will display "YES YES YES" or "NO NO NO". Relays are located in the control box. **[ENTER]** can be pressed and held as many times as necessary. If no other input is desired, press **[ADV]** to exit this menu.

DOOR A CLOSED
DOOR A GASK PRES
DOOR[2] B CLOSED
DOOR[2] B GASK PRES
DOOR[1] A COMP OPEN
DOOR[2] B COMP OPEN
WATER[3] IN DRAIN

[1]Optional for Power Door; [2]Optional for Double Door; [3]Optional for Water-In-Drain

Table 2.1.5-1 INPUT DIAGS Parameters

2.1.6 Printer Diagnostics

Scroll **[▲]** to display **(PRINTER DIAGS)**. Press **[ENTER]** to test block. The display will return to **(OUTPUT DIAGS)**. If no other input is desired, press **[ADV]** to exit this menu.

2.1.7 Sensor Diagnostics

Scroll **[▲]** to **(SENSOR DIAGS)**. Press **[ENTER]** to display one of the six parameters (see Table 2.1.76-1). This display is for monitoring actual operating values only. If no other input is desired, press **[ADV]** to exit this menu.

CHAMBER (Temperature)
JACKET (Temperature)
(Chamber) PRESSURE
LOAD TEMPERATURE

Table 2.1.7-1 SENSOR DIAGS Parameters

2.1.8 Entering EEPROM DIAGS Menu

Scroll **[▲]** to reach the "EEPROM DIAGS" Menu. The "EEPROM DIAGS" menu contains the "SET SETPOINTS" menu and will display **(SETPOINTS MENU)**. Press **[ENTER]** to display one of the settable parameters (see Table 2.1.8-1). To change settings press **[ENTER]**, use **[▲]** or **[▼]** to increment/decrement values. Use the **[*]** button to switch between fast and slow advance increments. Press **[ENTER]** to accept values. Press **[ADV]** to exit to "EEPROM DIAGS" menu. If no other input is desired, press **[ADV]** to exit this menu.

CYCLE PARAMETER	DESCRIPTION	RANGE MINIMUM	RANGE MAXIMUM	DEFAULT
PASSWORD	Some machines have a hardware keylock. This menu will not appear on machines without the password. Password protected items are: Cycle Parameters (STER TIME, DRY TIME, STER TEMP, CYCLE TYPE) Setting the Clock (not all machines) Configuration EPROM has no password protections. Only trained personnel should work in the Configuration program.	0	32123	0 = no password
JOB_NUMBER	Factory assigned number to each unit (######)	90 000	21 999	Job Number
STERILIZER_NUM	For users with more than one sterilizer.	0	255	1

Table 2.1.8-1 EEPROM Setpoints (Page 1 of 3)

CYCLE PARAMETER	DESCRIPTION	RANGE MINIMUM	RANGE MAXIMUM	DEFAULT
CHARGE GASKET (LOCK TIME)	Time spent sealing gaskets and time spent retracting gaskets. ONLY ON MACHINES WITH POWERED GASKETS. KITS WITH A “STEERING WHEEL” DO NOT HAVE POWERED GASKETS.	0:00 min:sec	4:15 min:sec	0:10 min:sec
RETRACT GASKET (UNLOCK TIME)	Time spent retracting gaskets. ONLY ON MACHINES WITH POWERED GASKETS. KITS WITH A “STEERING WHEEL” DO NOT HAVE POWERED GASKETS.	0:00 min:sec	4:15 min:sec	0:10 min:sec
CHAMBER TO DRAIN DELTA T	Sets the amount of temperature difference we expect to see between the chamber and drain.	-1.0°C, -1.8°F	0.0°C/F	0.0° C/F
JACKET OFFSET	Applies the offset for sterilization temperature to the current cycle and maintains the jacket at this temperature.	-20.0°C -36.0°F	20.0°C 36.0°F	-2.0°C -3.6°F
OVERTEMP ALARM OFFSET	If average temperature goes above the OVERTEMP offset, user will get this alarm.	0.0°C/F	44.4°C 80.0°F	5.0°C 9.0°F
UNDERTEMP ALARM OFFSET	If average temperature goes below the UNDERTEMP offset, the user will get this alarm.	0.0°C/F	44.4°C 80.0°F	1.3°C 2.3°F
HI LIMIT PSIG	Maximum pressure during sterilization that allows non-liquids cycles to reach before turning off steam and boost steam.	0.1 PSIG	40.0 PSIG	32.0 PSIG
MAX LIQUID TEMP	Maximum temperature allowed for liquids to reach during sterilization before all the steam is turned off	70.0°C 158.0°F	153.3°C 308.9°F	125°C 257°F

Table 2.1.8-1 EEPROM Setpoints (Page 2 of 3)

CYCLE PARAMETER	DESCRIPTION	RANGE MINIMUM	RANGE MAXIMUM	DEFAULT
MAX LIQUIDS PRESSURE	Maximum pressure allowed for liquids to reach during sterilization before all the steam is turned off.	0.0 PSIG	40.0 PSIG	18.0 PSIG
MIN. STERILIZE	Sets the minimum amount of time the user can enter as a sterilization time using the STER TIME button.	3:00	99:00	3:00 minutes
MINIMUM DRY TIME	Sets the minimum amount of time the user can enter as the dry time using the DRY TIME button.	0:00	120:00	1:00 minutes
HEAT CHM TIMEOUT	Time allowed for chamber to rise to “STERILIZE TEMP”.	1:00	239:00	20:00 minutes
PRECHARGE TIMEOUT	Time allowed for chamber to charge to “precharge” setting.	1:00	239:00	20:00 minutes
PREVAC TIMEOUT	Time allowed for a vacuum “PREVAC VAC PNT” to be reached.	1:00	239:00	20:00 minutes
POSTVAC TIMEOUT	Time allowed for a vacuum “DRY VAC POINT” to be reached.	1:00	239:00	20:00 minutes
*LAB LOW T CUTOFF	Temperature setting at which all cycles with the sterilize temp set below this point will be ran in low temperature manner.	33.3°C 92.0°F	153.3°C 308°F	112.8°C 235°F
CYCLES LAST SERV	Provides an accurate means of determining how many cycles have been ran since unit was last serviced.	-32767	32767	0
TOTAL CYCLE COUNT	Provides an accurate count of the number of cycles that have been ran on unit.	-32767	32767	0
*Vac Leak Test Value PSIG	The amount of allowable leakage for 20 Vac Leak Test	0.1 InHg	10.0 InHg	1.1 InHg
FACTORY CONFIG	Configuration setables	-32767	32767	Factory Set
*USER ID #1	User ID number 1	0	32123	320
*USER ID #2	User ID number 2	0	32123	0
*USER ID #3	User ID number 3	0	32123	0
*USER ID #4	User ID number 4	0	32123	0

*Option

Table 2.1.8-1 EEPROM Setpoints (Page 3 of 3)

2.1.9 Entering CALIBRATE Menu

Scroll **[▲]** to reach the "CALIBRATE" menu. Press **[ENTER]** to display one of the setable parameters (see Table 2.1.9-1). To change settings press **[ENTER]**, use **[▲]** or **[▼]** to increment/decrement values. Use the **[*]** button to switch decimal place increments. Press **[ENTER]** to accept values. If no other calibration is desired, press **[ADV]** to exit this menu.

CALIB PRESSURE ZERO
CALIB PRESSURE HIGH
CALIB JACKET LOW
CALIB JACKET HIGH
CALIB CHMBR LOW
CALIB CHMBR HIGH
*CALIB LOAD P HIGH
*CALIB LOAD P LOW

*Available on units with Load Probe Option Selected

Table 2.1.9-1 CALIBRATE Parameters

2.1.10 Easy Cal Procedures

The purpose of EASY CAL is to allow field calibration for units where N.I.S.T. traceability, in calibration, is not required. The maximum sterilization dwell temperature should always be verified with a LAG thermometer or other reliable temperature indicator.

EASY CAL allows the service technician to calibrate pressure and temperature using steam pressure and room temperature. Calibration may also be achieved with a heat well and outside pressure source, if desired, or in those cases where N.I.S.T. in traceable calibration is preferred.

ONLY QUALIFIED MAINTENANCE PERSONNEL EXPERIENCED IN CALIBRATION AND REPAIR OF ELECTRONIC DEVICES, SHOULD INSTALL AND USE THE CONFIGURATION EPROM. ONCE INSTALLED, THE CONFIGURATION EPROM ALLOWS BYPASS OF ALL INTERLOCK CONTROLS. FOR INSTANCE, STEAM MAY BE INJECTED INTO THE CHAMBER WITH DOORS OPEN!

ALWAYS TURN OFF THE ELECTRICAL POWER TO THE STERILIZER BEFORE PROCEEDING WITH EITHER OF THE FOLLOWING:

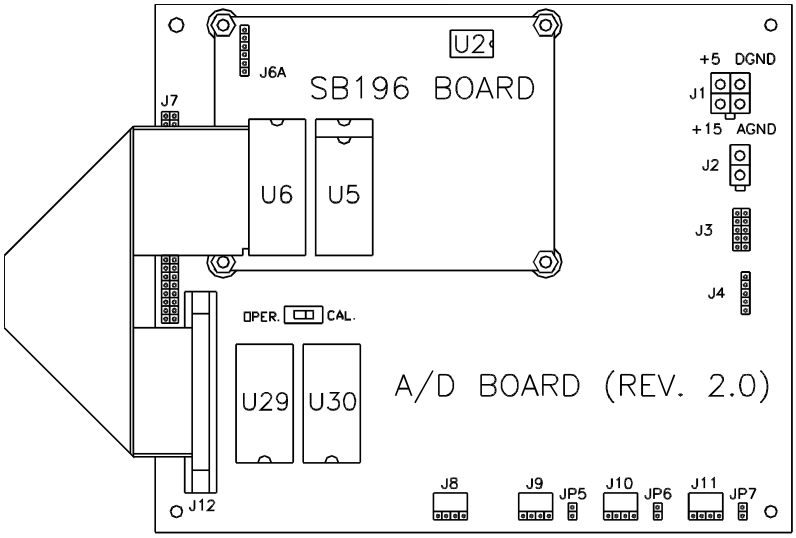
- REMOVAL OR INSTALLATION OF AN EPROM.
- SWITCHING BETWEEN EPROMS.

PREPARATION

STEP 1. Turn power off at the Control Cabinet.

STEP 2. Open the cover on the Control Cabinet and locate the two Electronic Controller circuit boards.

The “SBC196” board is located on top of the A/D Revision 2.0 Board (see Figure 2.1.10-1). Move the EPROM Selector Switch (S1) to CAL.



J1 - 5 VDC & 15 VDC Supply Voltages
J2 - Not Used
J3 - Keypad/Display Interface
J4 - Not Used
J6A - Com1 (Printer, Pins 2 & 3)
J7 - Input/Output Communications
J8 - Pressure Input
J9 - 3 or 4 wire RTD Input (Chamber)
J10 - 3 or 4 wire RTD Input (Jacket)
J11 - 3 or 4 wire RTD Input (Load)
J12 - EPROM Communication Cable
JP5, JP6, & JP7 - Shunt/Jumper for 3 wire RD’s. Do not shunt for 4 wire RTD’s.

U2 - EEPROM (Hold’s all settable values)
U5 - RAM chip
U6 - EPROM communication Cable
U29 - EPROM (Operational)
U30 - EPROM (Calibration)

Figure 2.1.10-1 Electronic Controller

2.1.10.1 CALIBRATING CHAMBER PRESSURE

STEP 1 Turn on power to the machine by placing the “POWER ON” switch to “ON” position.

The LCD will display the message: **(HIT ANY BUTTON)** and the LED indicator lamps on the operator panel will flash on and off.

STEP 2. Press any button on the Operator Panel. This will cause a display of OUTPUT DIAGS, or one of the other CONFIGURATION EPROM menus.

STEP 3. Use the arrows **[▲,▼]** to scroll the menu until the LCD displays: CALIBRATE.

NOTE

During calibration, the functions of the buttons on the Operator Panel change. After entering the CALIBRATE menu, the LEDs on the number buttons are illuminated which indicate alternate functions. Below are the alternate functions used during the calibration procedure:

[1] Introduces steam to chamber, simultaneously through the Chamber Boost valve and Chamber Trim valve. If only one valve supplies steam to the chamber, it will be designated as the Chamber Trim valve.

[2] Opens Chamber Drain valve; activates the vacuum system, and introduces fresh steam to chamber as a purge cycle.

[3] Activates Chamber Drain valve to allow chamber to empty in a gravity flow fashion.

[4] Activates Chamber Drain valve and vacuum system to allow rapid evacuation of the chamber as in PREVAC

[5] Upper right ♥ button activates Jacket solenoid valve to allow steam to jacket

[START] Charges gasket. When gasket is fully engaged the LEDs will illuminate.

STEP 4. Press **[ENTER]** and CALIB PRESSURE LOW will be displayed.

STEP 5. Open the chamber door.

STEP 6. Press **[ENTER]**. "0.0" will appear in the lower right corner. Press [ENTER] to store above setting.

STEP 7. Close the chamber door.

STEP 8. CALIB PRESSURE LOW will appear on the display again. Use the arrows **[▲,▼]** to scroll to CALIB PRESSURE HIGH.

STEP 9. Press **[START]** to charge the door gasket.

NOTE

Observe that all four cycle lights on the touchpad are illuminated, indicating that the pressure switch contact is made and the door gasket(s) are sealed.

STEP 10. Press and hold button **[2]** on the touchpad for at least one (1) minute to purge the chamber.

STEP 11. Press and hold button **[1]** until 36 pounds of pressure is reached on the chamber pressure gauge. When the button is released the pressure will begin to slowly decrease. If pressure decrease is too rapid, or too slow, close off the chamber bleed valve and back it off ¼ to ½ turn.

STEP 12. Press the **[ENTER]** button. The number 32 will appear in the lower right corner of the LCD. When the falling pressure in the chamber reaches 32 lbs., press **[ENTER]** immediately. The printer will print a calibration report.

STEP 13. This completes Chamber Pressure Calibration.

NOTE

There is no Jacket Pressure Calibration.

STEP 14. Press the **[DOOR]** button on the touchpad. This initiates depressurization of the vessel. After approximately 1 1/2 minutes, press the **[DOOR]** button again to retract the gasket. The door can now be opened.

TEMPERATURE CALIBRATION PREPARATION

STEP 15. Using the touchpad arrows **[▲,▼]** scroll to the calibration menu. You may scroll up or down in the menu to reach Calibration.

NOTE

Verify there is no pressure in the jacket or chamber by checking vessel gauges.

STEP 16. Carefully remove Jacket and Chamber RTD's.

STEP 17. Select either room temperature or heat well for use as a low temperature reference. If a heat well is chosen, 44^0 C is the recommended setting.

STEP 18. Scroll to display CALIBRATE and press **[ENTER]**. You will be in the Calibration Menu.

NOTE

If using chamber drain for temperature reference, read "Calibration Procedure for Jacket and Chamber Temperature using Chamber Drain as the Heat Source", beginning on page 19.

CALIBRATE JACKET TEMPERATURE LOW

STEP 19. Using the touch pad arrows **[▲,▼]**, scroll to CALIBRATE JACKET LOW. Press **[ENTER]** to select. A number will appear in the lower right corner of the LCD. Use the arrows **[▲,▼]** to increase, or decrease, the number to match the Low Temp Reference, e.g., the room or heat well temperature. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

NOTE

If room temperature is being used as the reference temperature, ensure RTD is suspended at least 3" from any heat source. If the heat well is to be used, place RTD in the heat well. Allow time for temperature of RTD and heat source to stabilize. The required time to stabilize will vary depending on the reference temperature source.

STEP 20. Press **[ENTER]** to store JACKET LOW value and print calibration report.

CALIBRATE CHAMBER TEMPERATURE LOW

STEP 21. Use the touchpad arrows **[▲,▼]** to scroll to CALIBRATE CHAMBER LOW, and press **[ENTER]** to select.

A number will appear in the lower right corner of the LCD. Use the arrows **[▲,▼]** to increase, or decrease, the number to match the Low Temperature Reference, e.g., room or heat well temperature.

Allow time for temperature of RTD and heat source to stabilize. The time will vary depending on the reference temperature source. During calibration the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

When Chamber temperature has stabilized, press **[ENTER]** to store CALIBRATE CHAMBER LOW.

***CALIBRATE LOAD TEMPERATURE LOW**

STEP 22. Use the touchpad arrows **[▲,▼]** to scroll to CALIBRATE LOAD TEMP LOW, and press **[ENTER]** to select.

A number will appear in the lower right corner of the LCD. Use the arrows **[▲,▼]** to increase, or decrease, the number to match the Low Temperature Reference, e.g., room or heat well temperature.

Allow time for temperature of RTD and heat source to stabilize. The time will vary depending on the reference temperature source. During calibration the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

When Chamber temperature has stabilized, press **[ENTER]** to store CALIBRATE LOAD LOW.

* Option available on units with Load Probe Selected

CALIBRATE JACKET TEMPERATURE HIGH

STEP 23. Use the touchpad arrows **[▲,▼]** to scroll to CALIBRATE JACKET HIGH and press **[ENTER]** to select.

A number will appear in the lower right corner of the LCD. Use the arrows to increase, or decrease, the number to match the High Temperature Reference (suggested 132.2^0 C or 270^0 F) when heat well is used.

Allow time for temperature of RTD and heat source to stabilize. The time will vary depending on the reference temperature source. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

When Jacket temperature has stabilized, press **[ENTER]** to store Jacket High Temperature.

CALIBRATE CHAMBER TEMPERATURE HIGH

STEP 24. Use the touchpad arrows **[▲,▼]** to scroll to CALIBRATE CHAMBER HIGH and press **[ENTER]** to select.

A number will appear in the lower right corner of the LCD. Use the arrows to increase, or decrease, the number to match the High Temperature Reference (suggested 132.2^0 C or 270^0 F) when heat well is used.

Allow time for temperature of RTD and heat source to stabilize. The time will vary depending on the reference temperature source. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

When Jacket temperature has stabilized, press **[ENTER]** to store Chamber High Temperature.

***CALIBRATE LOAD TEMPERATURE HIGH**

STEP 25. Use the touchpad arrows **[▲,▼]** to scroll to CALIBRATE LOAD HIGH, and press **[ENTER]** to select.

A number will appear in the lower right corner of the LCD. Use **[▲,▼]** to increase or decrease, the number to match the High Temperature Reference (suggested 132.2^0 C or 270^0 F).

Allow time for temperature of RTD and heat source to stabilize. This time will vary depending on the reference temperature source. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

When load probe temperature has stabilized, press **[ENTER]** to store Load High Temperature.

* Option available on units with Load Probe Selected

2.1.10.2 Calibration Procedure for Jacket and Chamber Temperature using Chamber Drain as the Heat Source

The following EASY CAL procedures are provided for qualified trained technicians or factory representatives using Chamber Drain as the Heat Source.

STEP 1. Install the Jacket RTD in the chamber drain receptacle. Close the chamber door and press **[START]** to charge the gasket(s). Refer to Steam Table (Table 1-0) and select pressure to use for temperature correlation during calibration (32.0 PSIG is suggested.)

STEP 2. Press and hold button **[2]** on the touchpad to allow the chamber to purge for one (1) minute.

STEP 3. Press and hold button **[1]** until there is at least a ten (10) pound reading on the chamber pressure gauge.

STEP 4. Press and hold button **[4]** until a reading of 5 inches of vacuum is registered on the chamber pressure gauge.

Repeat Steps 2-4 three times increasing the vacuum by five-inch increments for each cycle. This will result in a final vacuum reading of twenty inches (20").

STEP 5. Use the **[▲,▼]** to scroll to CALIBRATE JACKET HIGH and press **[ENTER]**.

STEP 6. Charge the chamber to 32.0 PSIG and press **[ENTER]**. A number representing temperature will appear in the lower right corner of the touchpad LCD.

STEP 7. Use the arrows **[▲,▼]**, to change the number in the lower right corner to match the number determined earlier in STEP 1. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

Press **[ENTER]** when the chamber pressure drops to the selected pressure temperature from the Steam Table (Table 1-0). The printer will print a Calibration Report.

*LOAD TEMP may be calibrated at this point. (Start from Step 5 using CALIBRATE LOAD HIGH.)

NOTE

If the value drops below the desired pressure before the **[ENTER]** button is pressed, press the **[ADV]** button and then the **[1]** button to build Chamber pressure back to 32.0 PSIG. Use the **[▲,▼]** to scroll to CALIBRATE JACKET HIGH and press **[ENTER]**. Repeat Steps 6 and 7.

STEP 8. Press the **[DOOR]** button to de-pressurize the vessel. After 1 1/2 minutes press the **[DOOR]** button to retract the gasket. The door can now be opened.

STEP 9. Remove the Jacket RTD from the Chamber Drain RTD receptacle and reinstall it in the Jacket RTD receptacle.

STEP 10. Install Chamber Drain RTD in the Chamber Drain RTD Receptacle.

STEP 11. Close the Chamber Door and press **[START]** to charge the gasket(s).

STEP 12. Select the pressure from the Steam Table (Table 1-0) to use for temperature correlation during calibration (32.0 PSIG is suggested.)

STEP 13. Press and hold button **[2]** on the touchpad to allow the chamber to purge for one (1) minute. Then, release button **[2]** and press and hold button **[1]** until there is at least a ten (10) pound reading on the chamber pressure gauge. Release button **[1]** and press and hold button **[4]** until a 5-inch vacuum is reading on the chamber pressure gauge.

Repeat these Steps 12-13 three times increasing the vacuum by five-inch increments for each cycle. This will result in a final vacuum reading of twenty inches (20"). Use the **[▲,▼]** to scroll to CALIBRATE CHAMBER HIGH and press **[ENTER]**.

STEP 14. Charge the chamber to 32.0 PSIG and press **[ENTER]**. A number will appear in the lower right corner of the touchpad LCD.

STEP 15. Use the arrows **[▲,▼]**, to change the number in the lower right corner to match the number determined earlier in Step 1. During calibration, the asterisk **[*]** button will toggle between tenths of a degree or whole degrees.

Press **[ENTER]** when the chamber pressure drops to the selected pressure temperature from the Steam Table (Table 1-0). The printer will print a Calibration Report.

NOTE

If the value drops below the desired pressure before the **[ENTER]** button is pressed, press the **[ADV]** button and press and hold button **[1]** to build chamber pressure back to 32.0 PSIG. Use the **[▲,▼]** to scroll to CALIBRATE CHAMBER HIGH and press **[ENTER]**. Repeat Steps 14 and 15.

STEP 16. Press the **[DOOR]** button to depressurize the vessel. After 1 1/2 minutes press the **[DOOR]** button to retract the gasket. The door can now be opened.

STEP 17. When all of the above steps have been completed, turn power OFF at the electronic control cabinet and switch back to "OPER".

* Option available on units with Load Probe Selected

2.1.10.3 Set Cycle Parameters

After cycle is selected (Refer to Part III, User's Manual, paragraph 3.3.2.3), scroll **[▲]** to see the first cycle parameter (see tables below). Each parameter can be set by pressing **[ENTER]** then scrolling **[▲]** or **[▼]** and using the **[*]**. Once the parameter is set, press **[ENTER]** and scroll **[▲]** to the next parameter. After the last parameter is set, the display will return to the Cycle Menu, which displays the cycle number and type. Press **[ADV]** to exit the cycle menu. Repeat paragraph 3.3.2.3 and 3.3.2.4 to select additional cycles and parameters. Press **[ADV]** to return to the idle screen for operation.

CYCLE PARAMETERS	DESCRIPTION	DEFAULT
STERILIZE TIME	Time spent during sterilization phase	30:00 minutes
STERILIZE TEMP	Sterilization temperature set point	125°C /275°F
DRY TIME/ LIQUID COOL TIME	Drying time spent after exhaust phase	2:00 minutes
PURGE TIME MIN:SEC	Time spent passing steam through the chamber to remove air	1:30 minutes
PRECHARGE PSIG	During each precharge portion of the precharge/prevac cycle, amount of steam pumped in until we reach this pressure.	10 PSIG
PREVAC VAC POINT INCHES HG	Vacuum to attain and on prevacs 3, 4, 5, and 6 before timer starts.	20 InHg
PREVAC VAC TIME	Amount of time to hold vacuum on prevacs	2:00 minutes
HALF-RAMP TIME MIN:SEC	Amount of time which the sterilizer takes to go from current temperature to HALF WAY to the sterilization temperature.	0:30 seconds
FINAL RAMP SLOPE DEG/MIN	As the temperature ramps up to sterilization temperature, the slope gradually decreases. When the slope reaches this value, maintain this rate the rest of the way to the sterilization temperature.	2.0 °C 3.6°F
BOOST OFFSET DEG C	Used only on machines with a second (boost) steam valve. Offset specifies the number of degrees below sterilization set point above which boost steam valve will not turn on.	4.0°C 7.2°F

Table 2.1.10.3-1 Parameters Menu (Page 1 of 2)

CYCLE PARAMETERS	DESCRIPTION	DEFAULT
*LOAD P TEMP	Temperature at which the sterilization phase will begin.	Maximum of one degree under STERILIZATION TEMP
# OF PREVACS	Number of prevacs. (Applicable to vacuum type cycles only)	3
# OF POSTVACS	Number of postvacs. (Applicable to vacuum cycles only)	1
SLO EX END POINT +PSI/-INHG	Liquids Slow Exhaust - pressure at which this phase ends	0.3 InHg
SLOW EXH. RAMP PSI/MIN	Rate of allowed pressure to decay during liquids cycle slow exhaust	.7 PSI
DRY VAC POINT	Chamber pressure setpoint to determine when to start Drying time. If set at ambient pressure then POSTVACS setpoint must be set to zero. Postvacs - each postvac pulls down to the DRY VAC POINT and then times for the DRY TIME. Traditional Dry - the dry timer does not start until DRY VAC POINT is reached	10 PSIG

* Option available on units with Optional Load Probe Control

Table 2.1.10.3-1 Parameters Menu (Page 2 of 2)

Adjust parameter for each cycle type and test the cycles. Collect temperature and pressure data during the sterilization phase to ensure that cycles perform as required. Compare the data with the Steam Table (see Table 2.1.10.3-2) to ensure correct temperature/pressure correlation.

ALTITUDE IN FEET		(Sea Level)	1000	2000	3000	4000	5000
INCHES OF HG		29.92	28.92	27.92	26.92	25.92	24.92
	PSIA	14.70	14.21	13.72	13.21	12.74	12.24
TEMPERATURE(S)		PSIG	PSIG	PSIG	PSIG	PSIG	PSIG
100.0°C = 212.0°F	14.70	00.00	00.49	00.98	01.47	01.96	02.45
105.0°C = 221.0°F	17.86	03.16	03.65	04.14	04.64	05.13	05.62
110.0°C = 230.0°F	20.78	06.08	06.57	07.06	07.55	08.04	08.54
115.0°C = 239.0°F	24.52	09.82	10.31	10.81	11.30	11.79	12.28
120.0°C = 248.0°F	28.80	14.10	14.59	15.08	15.57	16.06	16.55
121.1°C = 250.0°F	29.83	15.13	15.62	16.11	16.60	17.09	17.58
125.0°C = 257.0°F	33.67	18.97	19.46	19.95	20.44	20.93	21.42
130.0°C = 266.0°F	39.18	24.48	24.97	25.46	25.96	26.45	26.94
132.2°C = 270.0°F	41.86	27.16	27.65	28.14	28.63	29.12	29.61
135.0°C = 275.0°F	49.60	32.20	32.69	33.18	33.67	34.16	34.66
140.0°C = 284.0°F	54.42	39.72	40.21	40.70	41.19	41.68	42.17

NOTES:

- 1 Atmosphere @ Sea Level = 14.70 PSIA = 29.92 Inches of Hg.
- 0.06804 Atmospheres = 0.01414 Inches of Hg.
- 0.0342 Atmosphere = 0.4912 PSIA = 1 Inch Hg.
- Each 1000 Ft. of Altitude = 1 Inch of Hg Displacement$_2$.
- All Hg expressed @ 0.0°C.

Table 2.1.10.3-2 SATURATED STEAM TABLE CORRECTED FOR ALTITUDE INCREMENTS OF 1000 FEET

PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
TE: (402) 344-4200; FAX (402) 344-4242
info@primus-sterilizer.com
www.primus-sterilizer.com

2.2 Vacuum Leak Test (Optional)

The Vacuum Leak Test is fixed in cycle #8. The following provides a functional description of the Vacuum Leak Test cycle:

The Jacket temperature must be at least 257.0° F (125.0° C) before the START push button on the touchpad can be activated. An LED on the START push button lights to indicate the jacket is up to the required temperature. After start is initiated, the sterilizer seals the gasket(s) then turns on the vacuum system (the drain valve is activated in IDLE mode and remains activated during the vacuum phase). A report header is generated by the printer.

The sterilizer begins to pull a vacuum in the chamber and the printer provides the pressure every minute on the report. When the VACUUM LEVEL setpoint is reached, the vacuum system and drain valve are deactivated and a five minute stabilization period begins. At the end of the stabilization period, the 20-minute leak test begins. At the end of the test, the control system provides a "VAC TEST PASSED/FAILED" report along with the amount of "VACUUM LOST".

An exhaust, then an air-in phase follows to equalize the chamber to atmospheric pressure. The door gasket is then unsealed, completing the cycle.

The following steps are to be used to perform the vacuum leak test:

1. Turn power off at control cabinet. In the control box, switch S1 on the A/D Board (Rev 2.0) Circuit board to CAL and turn power on.
2. Scroll up or down to "EEPROM DIAGS", press **[ENTER]**.
3. Scroll up or down to "SETPOINT MENU", press **[ENTER]**.
4. Scroll up or down to "VAC LEAK TEST VALUE", press **[ENTER]**. Limits for this setpoint are 1.1 – 10.0 InHg.
5. Enter a value which will be the maximum vacuum lost to determine PASS/FAIL. This value is the total allowable vacuum lost after 20 minutes hold time. Press **[ENTER]** to store this value.
6. Press the **[ADV]** button until "HIT ANY BUTTON" appears.
7. Turn power off, switch S1 to OPER and turn power back on.
8. Press the **[▲]** and then the number button **[4]** to choose cycle number 8.
9. Press the **[MENU]** or **[STER TEMP, STER TIME, DRY TIME]** button to enter into the cycle parameter menu.
10. Set the "VACUUM LEVEL", and press **[ENTER]**. Limits for this setpoint is 0 – 30 InHg.
11. Press the **[ENTER]** button and then the **[▲,▼]** to set the desired vacuum level at which to perform the vacuum leak test. Press **[ENTER]** again to save this setpoint.
12. Press the **[ADV]** button to return to IDLE mode.
13. Close the door and ensure that the Jacket has reached operating temperature. Press the **[START]** button to start the Vacuum Leak Test.

SECTION 3.0 Troubleshooting

The problems and cause/solutions described here are intended to be performed by a trained maintenance technician.

 WARNING	ONLY A FULLY QUALIFIED MAINTENANCE TECHNICIAN MUST MAKE REPAIRS AND ADJUSTMENTS TO THIS UNIT. MAINTENANCE PERFORMED BY INEXPERIENCED, UNQUALIFIED PERSONS OR INSTALLATION OF UNAUTHORIZED PARTS COULD CAUSE PERSONAL INJURY OR VOID WARRANTY. (SEE WARRANTY)
 WARNING	SHUT OFF ALL UTILITIES TO STERILIZER BEFORE SERVICING TO PREVENT ELECTRIC SHOCK HAZARD.
 WARNING	TO PREVENT BURNS ALLOW STERILIZER AND GENERATOR (IF APPLICABLE) TO COOL TO ROOM TEMPERATURE BEFORE PERFORMING ANY CLEANING OR MAINTENANCE PROCEDURES.

3.1 Mechanical

PROBLEM	CAUSE/SOLUTIONS
"DOOR OPEN" LED does not light when door is open.	Open the door all the way. Disconnect the air supply to the sterilizer. Open the lid on the electronic cabinet and examine the white relay module that is labeled "DOOR OPEN". The LED indicator on the relay should be on. If the LED is not lit, loosen the proximity switch on the air cylinder and slide it along the cylinder until the LED illuminates. Carefully tighten the proximity switch just as the LED comes on.
Door screws are not preset correctly.	The 3/8-16 set screws on the door should have been preset at the time of manufacture. If further adjustment is required, adjust when the sterilizer is cold. Leave .035" clearance between each pin and setscrew.

3.2 Electrical

PROBLEM	CAUSE/SOLUTIONS
Unit has no power.	Turn unit back on at the main power switch or reset the circuit breaker to the wall power. Power failure will not cause the unit to lose any settings, however, if the power is off for 24 hours the date and time will need to be reset. If the power failure occurred during a cycle, when power is restored you will receive a printout "POWER FAILURE DETECTED" "AUTO-ADVANCING". The unit will auto-advance to the Exhaust Phase. The cycle that was interrupted should be rerun.

3.3 Software

If the parameters of each phase are satisfied, PRIMUS sterilizers are designed to progress through each phase. Should an error occur, a message will appear on the touchpad LCD display. The user has the following options for most error messages:

Button Selection	Results
Press **[1]** (ABORT)	Advances to Exhaust Phase
Press **[2]** (RETRY)	Checks to see if problem still exists
Press **[3]** (IGNORE)	Ignore error and continue through cycle

Error messages are as follows:

ALARM/WARNINGS	CAUSE	RECOMMENDED ACTION
Door Not Closed	Door switch out of adjustment or broken.	Ensure door switch properly adjusted. Ensure wiring is not broken or loose
Door Gasket Error (Single Door) Door A Gasket Error (Double Door)	Door gasket seat is damaged. Low steam pressure.	Replace door gasket. Ensure air pressure is above 30 PSIG

ALARM/WARNINGS	CAUSE	RECOMMENDED ACTION
 WARNING	**THIS STERILIZER USES A PRESSURIZED GASKET TO CONTAIN CHAMBER PRESSURE. IF GASKET PRESSURE FAILS, STEAM MAY BE RELEASED INTO THE ROOM. NOTIFY QUALIFIED SERVICE PERSONNEL.**	
Pressure Bad PRINTOUT: “PRESSURE OUT OF RANGE”	Pressure out of range	Bad pressure transducer/transmitter Pressure above 45 PSIG
Over Temperature DISPLAY: “START OR ADVANCE”	Temperature increases above the preset limits.	Check Half Ramp/Final Ramp setpoints Ensure drain bleed valve is properly set Check for moisture in the drain Check Chamber RTD
Under Temperature DISPLAY: “START OR ADVANCE”	Temperature falls below the preset limits.	Low steam pressure Moisture in Drain Check the Steam to Chamber valve Check pressure regulator for failure Check Chamber RTD
Heat Chamber Time-out PRINT OUT: “STEAM TO CHAMBER RETARDED” “AUTO ADVANCING”	Chamber does not reach specified setpoint in allowable time period.	Ensure steam supply is sufficient. Ensure setpoints are properly set
Precharge Time-out PRINT OUT: “TIMEOUT: STEAM TO CHAMBER RETARDED” “AUTO ADVANCING”	Low steam supply.	Ensure steam supply is sufficient Ensure setpoints are properly set
PREVAC Time-out	Vacuum setpoint not reached in	Low water pressure.

ALARM/WARNINGS	CAUSE	RECOMMENDED ACTION
PRINT OUT: “AUTO ADVANCES”	time allowed by PREVAC time-out.	Bad vacuum pump Check proper water pressure Check vacuum pump Check piping integrity
Post-Vac Time-out PRINT OUT: “AUTO ADVANCES”	Post-Vac vacuum setpoint not reached in time allowed by Post-Vac time-out.	Check proper water pressure Check piping integrity
Power Failure	Power interrupted during cycle.	Check electrical service Once power restored - Unit auto-advances to exhaust
*Water in Drain	Water detected in Chamber drain.	Fixed automatically by opening special bleed valve to get water out of the chamber drain.
Pressure Out of Range	Pressure in the system exceeds 45 PSIG or drops below 30 InHg	Check Transducer/transmitter Recalibrate pressure setpoints Control out of calibration, recalibrate Check the main control pressure input circuitry
Hot Liquid in Chamber	Displayed at the end of the LIQUIDS Cycle.	This is normal.

* OPTIONAL

3.3 Effluent Sterilizer – Error Handling Procedure

If any error occurs during cycle, the LCD touch pad will display: LOCKOUT ACTIVE, * KEY = BUZR OFF and the sterilizer cycle will be halted with the chamber door gaskets sealed and drain closed. All other valves will be in a fail-safe mode. The only thing that the user (operator) can perform when LOCKOUT mode occurs is to press the asterisk key to silence the buzzer. After pressing the asterisk key (button) the LCD touch pad will display: LOCKOUT ACTIVE, CALL MAINTENANCE. The printer will document the error and lockout condition.

Designated personnel will need to perform the following steps and rectify the situation:

1. Open the control cabinet and locate the small slide switch marked OPER. CAL. mounted along side of the two program EPROMS on the analog circuit board (500083 REV 2.0).

2. Perform this step quickly so as to maintain door gasket pressure during power off. Turn off the electrical power to the control system (on the side of the control cabinet) and slide the small switch marked OPER / CAL to the CAL position and turn the electrical power to the control system back on. The control system maintains both door gaskets sealed as indicated by the related output relay LEDs.

3. If needed, refer to Part IV of the User's manual for a complete description of OUTPUT DIAGS. To use the manual outputs (e.g., RETRACT_A_&_VAC - retracts the Side A Door Gasket), press the up arrow key to scroll to OUTPUT DIAGS. Press the ENTER key and continue to press the up arrow key until the desired manual output function is displayed. Pressing the ENTER key causes the function to be active. Both door gaskets will remain sealed unless door gasket A or B is retracted using OUTPUT DIAGS. To return to the main menu, press the ADV key.

4. Once the situation is clear, LOCKOUT needs to be reset (this is set when an error occurs during a cycle in operational mode). In order to reset LOCKOUT, scroll through the main menu, using the up arrow key, to access the EPROM DIAGS menu. Press the ENTER key, then scroll to RESET LOCKOUT MODE and press the ENTER key.

To re-run the cycle, perform the following additional step:

5. If the door gaskets were not retracted while in the maintenance mode (CAL) and the RESET LOCKOUT MODE was activated, the control system can be changed back to the OPER mode. Use the procedure provided in step #2 to switch from CAL back to OPER. Restart the cycle by pressing the START key. The cycle can be initiated with both door gasket sealed. If the START LED is not lit, the Jacket temperature may need to come up to set point.

Section 4.0 Printer Paper Replacement

4.1 Loading Paper (Cybertech Printer)

The following steps should be followed to load the printer with paper.

1. Open the clear acrylic front cover of printer to access the paper take-up compartment.

2. If needed, follow steps in 4.1.1, Unloading Paper From the Take-Up Spool to remove any printed reports.

3. Open the paper supply compartment and remove any unused paper and the paper core.

4. Insert the new paper (See Section 5.0, Recommended Spare Parts List) into the paper compartment with loose end of paper exiting front of printer (see Figure 4.1-1, Loading Thermal Printer Paper). The front panel LED should be flashing.

Figure 4.1-1 Loading Thermal Printer Paper (Cybertech Printer)

5. Close the paper supply compartment with paper exiting printer and ensure that the paper is properly aligned. The LED should now be “ON” continuously.

6. Depress the REPRINT/FEED switch to the REPRINT position switch. If there is no image on the paper, either the paper is in the printer backwards or the paper is not thermal paper. Reverse the paper, or replace with thermal paper to correct this condition.

4.1.1 Loading Printer Take-Up Spool

1. The removable spool snaps between the two rotating discs (see Figure 4.1.1-1, Loading Printer Take-Up spool). The slot in the removable spool must be aligned with the drive pin on the right side of the disc.

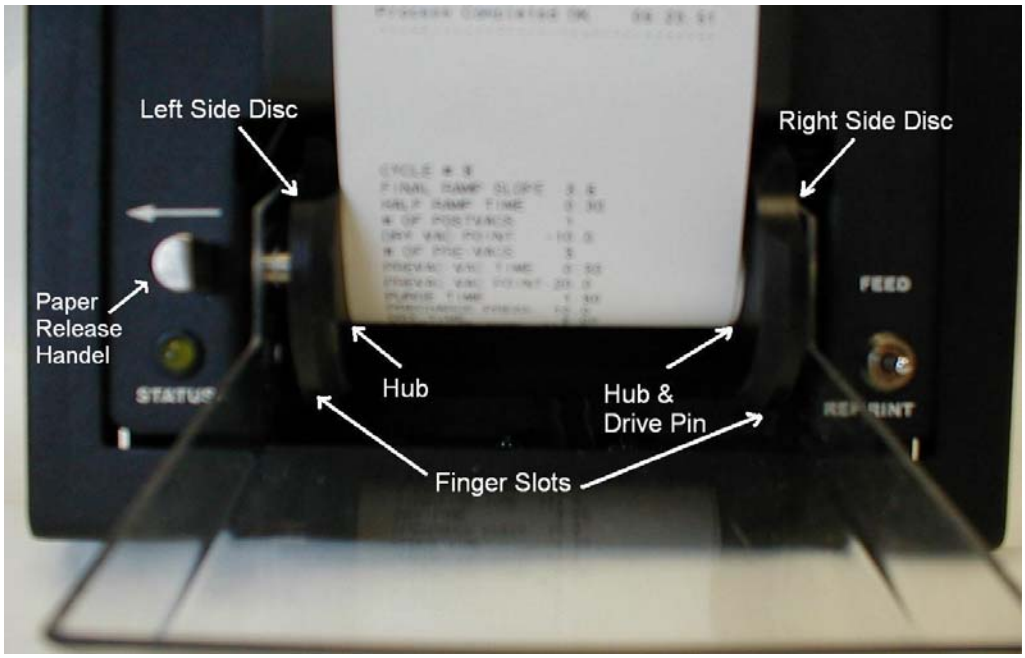


Figure 4.1.1-1 Loading Printer Take-Up Spool (Cybertech Printer)

2. Place the end of the spool onto the left side disc hub and apply slight pressure to move the spring loaded disc (use the paper release handle to assist). Then place the left end of the spool onto the right side disc hub making sure to align the drive pin.

3. Place the loose end of the paper exiting the printer into the slot in the removable spool. Fold the end of the paper into a “V” before placing into the slot to secure the paper in the spool.

4. Depress the REPRINT/FEED switch to the FEED position to feed and take up the paper. Do this until all the paper slack is taken up.

4.1.2 Unloading Paper From The Take-Up Spool

1. If there is still paper in the printer, tear off the paper using the printer cut off bar.

2. Align the finger slots on both the right and left side discs.

3. While grasping the paper roll in the take-up area, push the paper release to the left. (See Figure 4.1.1-1, Loading Printer Take-Up Spool)

4. Pull the roll out of the take-up area and if necessary gently move it side to side to clear the hubs on the discs.

5. Retrieve the take-up spool by pushing it out of the roll of paper.

4.2 Paper Replacement (Optional Keltron Printer)

When the printer is out of paper, the yellow **(EOP)**, out-of-paper LED will blink at 1 second intervals. PRIMUS recommends that the paper be replaced when the end-of-paper indicator appears at the edge of the paper. The end-of-paper indicator is usually a red line on the edge of the paper strip. The use of PRIMUS printer paper is recommended.

DO NOT RUN ANOTHER CYCLE AFTER THE RED LINE APPEARSTO AVOID LOSS OF DATA STORED IN THE PRINT BUFFER, THE PRINTER MUST BE PLACED OFF-LINE WHILE REPLACING THE PAPER.

The paper compartment is located behind the front bezel. To access the paper tray assembly and replace paper, proceed as follows:

1. Prepare a roll of 2¼" thermal printer paper. (See Section 5.0 for the spare parts lists).

2. Printer power must be ON to replace the paper.

3. Press the **[SLCT]** switch once to place the printer Off-line, the EOP LED turns off to indicate the printer is Off-line. To access the printer tray assembly, pull the front bezel forward.


NOTE

When the printer is out of paper, it is placed Off-line automatically. The Yellow LED will be BLINKING for the out of paper indication. When the paper is replaced the Yellow LED will be out because the printer is still Off-line. Press the [SLCT] switch to place the printer On-line.

4. Insert a new roll of paper on the paper holder shaft and guide the edge of the paper into the printer mechanism paper input. Exposed circuit components do not contain perceptible voltages, but use care to avoid damaging delicate electronic components. Thread paper as shown in Figure 4.2-1 with the paper coming off the top of the roll rather than the bottom of the roll. The Thermal Printer has an autofeed feature-simply line the paper up in the slot and the printer mechanism will grab and pull it through to the front.

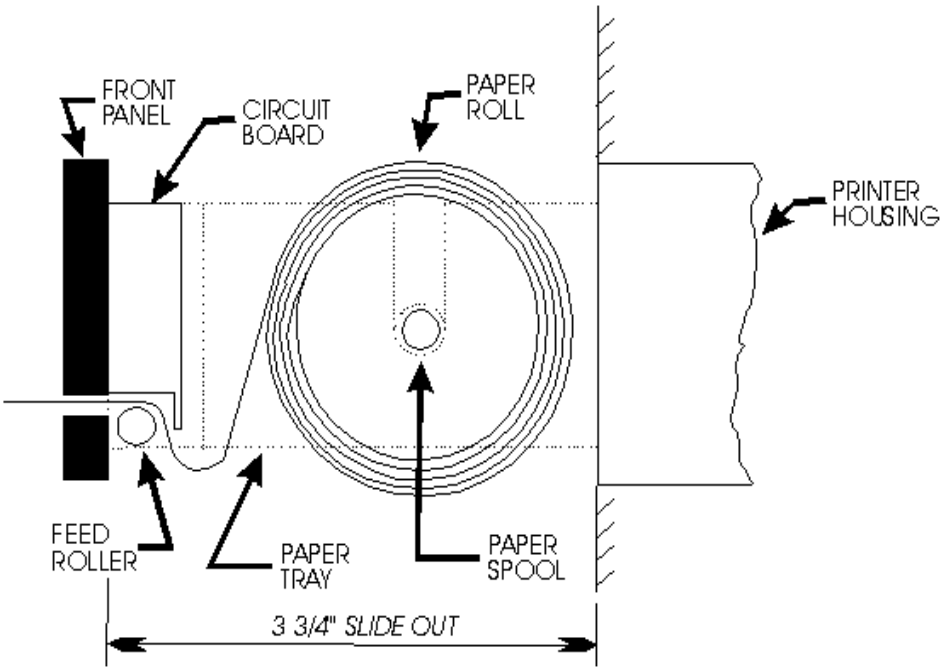


FIGURE 4.2-1 PAPER LOADING (Optional Keltron Printer)

5. When the paper is replaced, printer auto on line.

SECTION 5.0 RECOMMENDED SPARE PARTS LIST

PRIMUS SPARE PARTS LIST	
Part Number	**Description**
400040	VALVE,SAFETY,BR,3/4,45#
400057	VALVE,CHECK,SWING,BR,1/2
400062	FILTER,0.3 MICRON (Used with Air-In Filter Assembly)
400142	RTD ELEMENT,SGL,72” LEAD,1/4
400216	REGULATOR,PRESS,BR,3/4,7-60
400694	TRAP,THERMATIC,BR,1/2,10-125
400695	KIT,TRAP,THERMATIC,BR,1/2,10-125 PSIG (400694)
463265	VALVE,SOLENOID,BR,1/4”,STM,WTR,N/C
463265K	KIT,VALVE,SOLENOID,BR,1/4”,STM,WTR,N/C
463263	VALVE,SOLENOID,BR,1/2”,LP STM,N/C
463263K	KIT,VALVE,SOLENOID,BR,1/2”,LP STM,N/C
500286	SWITCH,TEMP,BR,SETTING,110R
500287	SWITCH,PRESS,BR,SETTING,10R/EP
600093	STRAINER,”Y”,BR,1/2,50X50
600094	STRAINER,”Y”,BR,3/4,20X20
800107	POLISH, STAINLESS STEEL
800735	PAPER, THERMAL, PRINTER, Fo PRINT,SIX PACK (Cybertech)
800612	GASKET, DOOR

PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
TE: (402) 344-4200; FAX (402) 344-4242
info@primus-sterilizer.com
www.primus-sterilizer.com

Part Number	Description
ELECTRICAL PARTS	
200238	TOUCHPAD ASSEMBLY, VERTICAL
400116	RELAY OUTPUT, 120VAC,N/O3 AMPS
400117	RELAY OUTPUT, 240VAC,N/C,3 AMP
400118	RELAY OUTPUT, DRY CONTACT
400119	RELAY INPUT,2.5-28VDC
500030	FUSE,1/2AMP,250V
500145	FUSE,1AMP,250V,FAST-ACTING
500575	RELAY,SOLID STATE,5-24/120V

SECTION 6.0 DRAWINGS AND BILL OF MATERIALS

6.1 Equipment Layout

6.2 Major Plumbing List

6.3 Piping and Instrument Diagram

6.4 Electrical Diagram

6.5 Major Electrical List

PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
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www.primus-sterilizer.com

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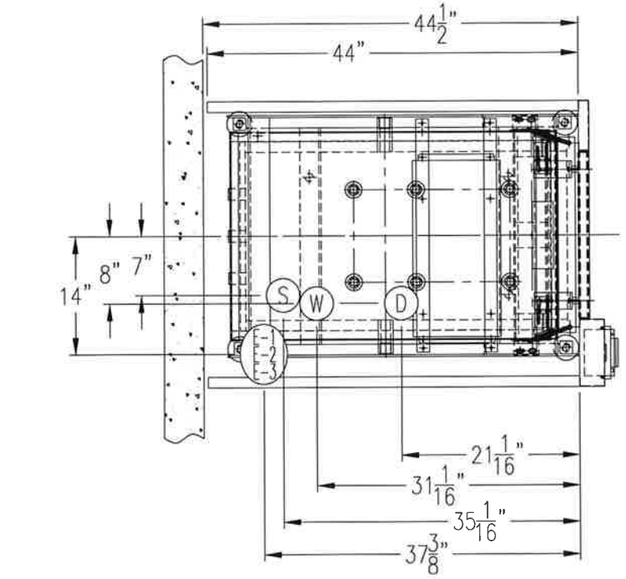
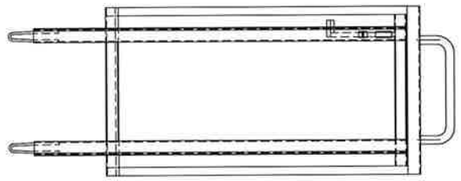
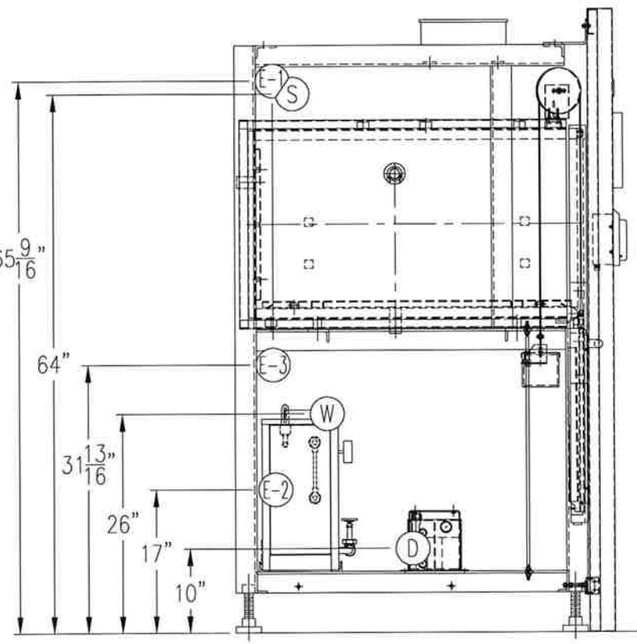
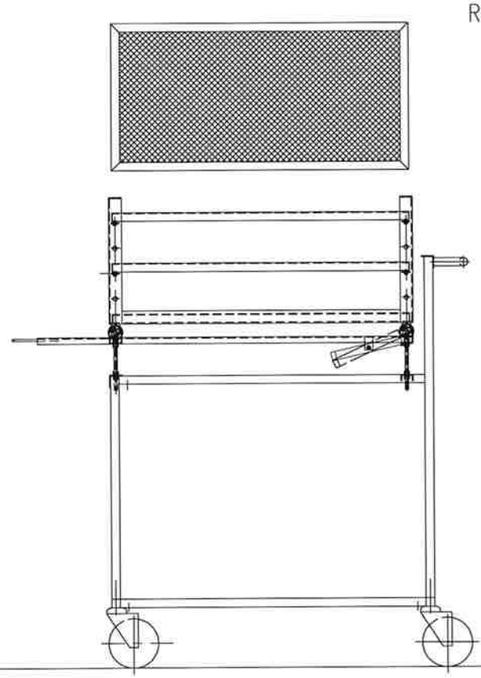
info@primus-sterilizer.com
www.primus-sterilizer.com

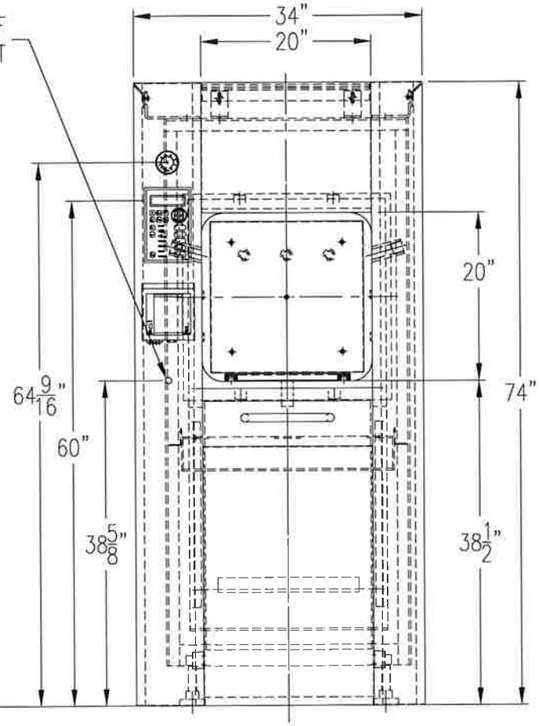






CAB SIDE PANELS
REMOVED FOR CLARITY





UTILITY CONNECTION REQUIREMENTS

(S) STEAM SUPPLY: SHOULD BE SUITABLY TRAPPED TO INSURE DRY STEAM (BETWEEN 97 & 100% SATURATED VAPOR) AND FILTERED TO REMOVE PARTICULATE – 50–80 PSIG DYNAMIC. 65#/HR. AVG. (3/4" NPT).

(W) COLD WATER: (70 F. OR LESS) 50 TO 70 PSIG. 10 GPM MAX. (3/4" NPT).

(D) FLOOR DRAIN CONNECTION: A 2" FLOOR DRAIN IS REQUIRED. A FLOOR SINK IS RECOMMENDED FOR ALL INSTALLATIONS.

(E-1) ELECTRICAL: 110VAC – 1ø – 10 AMPS @ 60HZ. WHEN ANY OTHER ELECTRICAL SOURCE IS USED A TRANSFORMER WILL BE REQUIRED.

(E-2) ELECTRICAL STEAM GENERATOR – REQUIREMENTS:
24KW STEAM GENREATOR: 240 VOLTS, 3 PHASE, 58 AMPS.
(ELECTRICAL CONNECTION FOR GENERATOR MADE DIRECTLY TO GENERATOR.) 110/20A 1ø FEED PUMP CIRCUIT REQUIRED.

(E-3) ELECTRICAL: WATER RECIRCULATION PUMP
DEDICATED 110V/15A 1ø CONTROL CIRCUIT REQUIRED

HEAT LOSS: (BTU/HR @ 70 F.) – 4100 FROM CONTROL END OF STERILIZER AND 5700 TO UTILITY SPACE.

OPERATING WEIGHT: 1900 LBS.

LOADING EQUIPMENT

(1) LOADING CART, (1) ADDITIONAL CART SHELF, & (1) TRANSFER CARRIAGE.

NOTE:

SHUTOFFS FOR ALL UTILITIES BY CUSTOMER ARE REQUIRED AT THE STERILIZER SITE.

CUSTOMER WILL PROVIDE MAINTENANCE ACCESS FROM THE REAR WITH AT LEAST 18" ACCESS ON EACH SIDE.

DIMENSIONS ARE TAKEN FROM THE FACE OF FINISHED WALL ON CONTROL SIDE OF STERILIZER. UTILITY PLACEMENT DIMENSIONS ARE APPROXIMATE. DIMENSIONS SHOWN ARE FOR REFERENCE ONLY AND ARE NOT CERTIFIED. CONTACT PRIMUS FOR CERTIFICATION OF DIMENSIONS REQUIRED.

CLEARANCE AT FRONT SHOULD BE EQUAL TO TWICE THE LENGTH OF THE STERILIZER TO ACCOMMODATE WITHDRAWAL & MANEUVERING OF THE SHELVES.

WATER QUALITY INFORMATION:

FOR BEST RESULTS, THE FEED WATER SUPPLY SHOULD BE EVALUATED PRIOR TO INITIAL START UP BY A REPUTABLE WATER CONDITIONING COMPANY. IF THE MINERAL CONTENT EXCEEDS THE FOLLOWING RECOMMENDED LIMITS, VARIOUS EXTERNAL TREATMENT PROCESSES (WATER SOFTENER, WATER CONDITIONING ETC.) MAY BE USED TO CORRECT THE PROBLEM.

NOTE: AN ANALYSIS OF THE ON–SITE STERILIZER FEED WATER SHOULD BE MADE BY A RECOGNIZED AND RELIABLE WATER TREATMENT COMPANY TO ASCERTAIN THE EXISTING CONDITION AND TREATMENT REQUIRED.

RECOMMENDED FEED WATER QUALITY:

HARDNESS, PPM – 8–85 (–.05 –5GPG)
P–ALKALINITY, PPM – 85–410 (–5 –24 GPG)
T–ALKALINITY, PPM – 200–500 (–7 –30 GPG)
pH (STRENGTH OF ALKALINITY) – 8 –11.4

REV	DESCRIPTION	BY	DATE
	REVISIONS		

THESE DRAWINGS ARE:
- ☐ FOR APPROVAL
- ☐ FOR INFORMATION ONLY
- ☒ AS BUILT
- ☐ DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:
STLCC CENTER PLANT & LIFE SCIENCE
1005 N WARSON ROAD – ROOM 122
ST. LOUIS, MO. 63132

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
.X ±.03
.XX ±.010
.XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

TITLE
EQUIPMENT ARRANGEMENT
W/24KW BOILER, WATER RECIRCULATION, & DRAIN WATER QUENCH

DRAWN BY: NT
DATE: 12-28-09
CHECKED BY: BS
DATE: 12-28-09
APPROVED BY:
DATE:
SCALE: N.T.S.

JOB NO: 17413
MODEL: PSS5–A–MESD
PLUMBING DWG: 17413P
SIZE: 20 X 20 X 38

PRIMUS
STERILIZER COMPANY, LLC
117 SOUTH 25th ST.
OMAHA, NE 68131
PH. (402) 344–4200
FAX (402) 344–4242

DRAWING NO.: 17413A
REV:

MAJOR PLUMBING LIST
PLUMBING DWG: 17413P REV:

TAG	ID.	PRIMUS P/N	MFR.	MFR. P/N	DESCRIPTION	FUNCTION
	CV 01	400057	UNITED BRASS	62SE1/2 W/EPDM	VALVE,CHECK,SWING,BR,1/2,	AIR-IN CHECK
	CV 02	400057	UNITED BRASS	62SE1/2 W/EPDM	VALVE,CHECK,SWING,BR,1/2,	SPECIAL BLEED CHECK
	CV 03	400057	UNITED BRASS	62SE1/2 W/EPDM	VALVE,CHECK,SWING,BR,1/2,	CHAMBER DRAIN
	HNH 01	600093	CONBRACO	59-003-02	STRAINER,"Y",BR,1/2,50X50	COLD WATER IN
	HNH 02	600094	CONBRACO	59-004-02	STRAINER,"Y",BR,3/4,20X20	WATER CONSERVATION TANK
	HV 01	600091	ANDERSON	103CC	VALVE,NEEDLE,BR,1/8"M,WTR	WATER QUENCH
	HV 02	400071	PARKER	4M4Z-VL4AR-B	VALVE,NEEDLE,1/4,STM	GASKET BLEED
	HV 03	400071	PARKER	4M4Z-VL4AR-B	VALVE,NEEDLE,1/4,STM	CHAMBER BLEED
	HVY 01	400062	MEISSNER	D03-97PE	FILTER,AIR,0.3,10"	AIR-IN
	KAL 01	400028	SCHUTTE&KOERTIN	99SX010J0010	EJECTOR,SS,3/4	WATER TO EJECTOR
	LCV 01	400694	Watson McDaniel	TT125	TRAP,THERMATIC,BR,1/2,10-125	CHAMBER DRAIN TRAP
	LCV 02	400694	Watson McDaniel	TT125	TRAP,THERMATIC,BR,1/2,10-125	JACKET TRAP
	OR 01	600754	Primus	600754	ORIFICE,1/2" PIPE, BR, PRESS FIT, 1/4" ID	STEAM TO CHAMBER
	PCV 01	400216	ARMSTRONG	GD-30,3/4"	REGULATOR,PRESS,BR,3/4,7-60PSI	STEAM TO CHAMBER
	PI 01	400020	WIKA	3101696	GAUGE,PRESS,CHMB,30HG-60PSI	CHAMBER PRESSURE
	PMP 01	400600	TEEL	4P923	PUMP,ROTARY VANE,CARBNATOR MNT	WATER PUMP
	PS 09	500287	NASON	SM-2A-10R/HR/EP	SWITCH,PRESS,BR,SETTING 10R/EP	GASKET PRESSURE
	PSV 01	400040	CONBRACO	29-302-L-45-UV	VALVE,SAFETY,BR,3/4,45#	JACKET PRESSURE
	PSV 02	400040	CONBRACO	29-302-L-45-UV	VALVE,SAFETY,BR,3/4,45#	CHAMBER PRESSURE
	PT 01	400281	BARKSDALE	422H2-03-A	TRANSDUCER,PRESS,0-100 MV,0-50	CHAMBER PRESSURE
	SV 00	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	STEAM TO GASKET
	SV 01	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	GASKET RETRACT
	SV 03	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	CHAMBER DRAIN
	SV 04	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	STEAM TO JACKET
	SV 05	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	CHAMBER TRIM
	SV 06	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	AIR-IN
	SV 24	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	WATER QUENCH
	TE 01	400142	SENSORTEC	RBBJL-KW04A-00-0072B	RTD ELEMENT,SGL,72"LEAD,1/4	TO CPU (JACKET RTD)
	TE 02	400142	SENSORTEC	RBBJL-KW04A-00-0072B	RTD ELEMENT,SGL,72"LEAD,1/4	TO CPU (CHAMBER RTD)
	TS 24	500286	NASON	TM-1A-110R/HR	SWITCH,TEMP,BR,SETTING 110R	WATER QUENCH
	WC 01	G1257W2	PRIMUS	G1257W2	WATER CONSERVATION TANK	WATER CONSERVATION TANK

MAJOR BOILER PLUMBING LIST
BOILER PLUMBING DWG: 1211Y8 REV: F

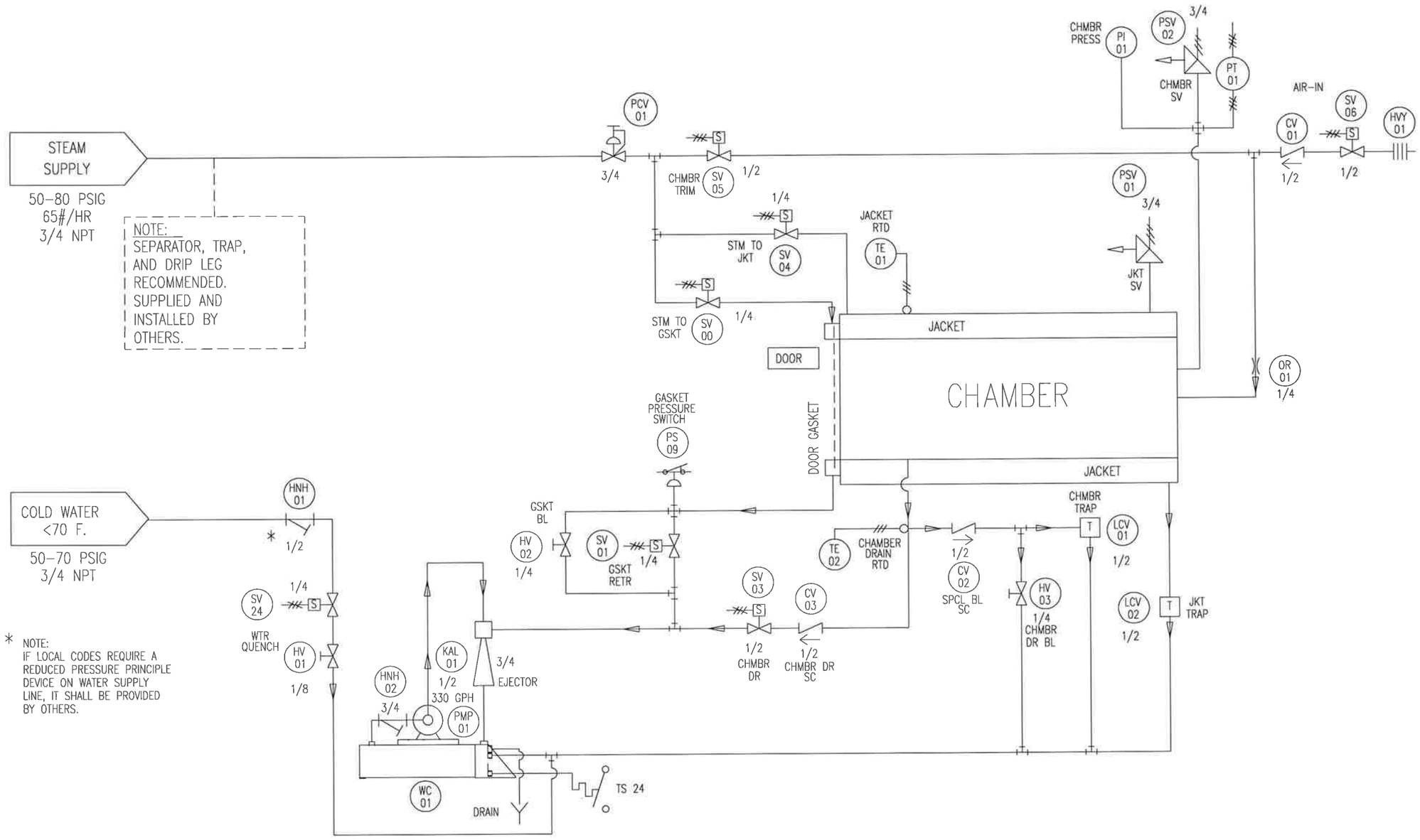
TAG	ID.	PRIMUS P/N	MFR.	MFR. P/N	DESCRIPTION	FUNCTION
	BOILER	400036	SUSSMAN	ES24AC3-PRI	BOILER,24KW,240V,3PHASE	BOILER
	BV 01	400110	NIBCO	03-11 1/2"	VALVE,BALL,MANUAL,BR,1/2	STEAM FROM BOILER
	CV 01	400047	CONBRACO	61-103-01	VALVE,CHECK,BALL-CONE,BR,1/2	
	MOTOR	400074	DAYTON	6K160E	MOTOR,FEED WATER,1/4HP,120V	
	PUMP	400072	PROCON	101A100F11BB	PUMP,FEED WATER,BR,100GPH	

DRAWN BY: D.S.
DATE: 03/02/99
REV DATE: 12/02/09

JOB NO:
MODEL: BOILER, 24KW, 240 VAC, 3 P, INTEGRAL

SYMBOL LEGEND

- CV 101 — CHECK VALVE
- HNH 101 — STRAINER
- HV 101 — HAND VALVE
- HVY 101 — FILTER
- KAL 101 — EJECTOR
- LCV 101 — T — TRAP
- PI 101 — PRESSURE INDICATOR
- PS 102 — PRESSURE SWITCH
- PSV 101 — PRESSURE SAFETY VALVE
- SV 101 — S — SOLENOID VALVE
- TE 101 — RESISTANCE TEMPERATURE DEVICE
- PT 101 — PRESSURE ELEMENT
- PCV 101 — PRESSURE REGULATOR
- OR 101 — RESTRICTOR
- TS 124 — TEMPERATURE SENSOR



REV	DESCRIPTION	BY	DATE
	REVISIONS		

THESE DRAWINGS ARE:
- [ ] FOR APPROVAL
- [ ] FOR INFORMATION ONLY
- [x] AS BUILT
- [ ] DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:
STLCC CENTER PLANT & LIFE SCIENCE
1005 N WARSON ROAD – ROOM 122
ST. LOUIS, MO. 63132

TITLE
PIPING & INSTRUMENTATION DIAGRAM
W/24KW BOILER, WATER RECIRCULATION, & DRAIN WATER QUENCH

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
X ±.03
.XX ±.010
.XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

DRAWN BY:	NT
DATE:	12-28-09
CHECKED BY:	BS
DATE:	12-28-09
APPROVED BY:	
DATE:	
SCALE:	N.T.S.
JOB NO:	17413
MODEL:	PSS5-A-MESD
ELEC DWG:	17413E
SIZE:	20 X 20 X 38
DRAWING NO.:	17413P
REV:	

PRIMUS
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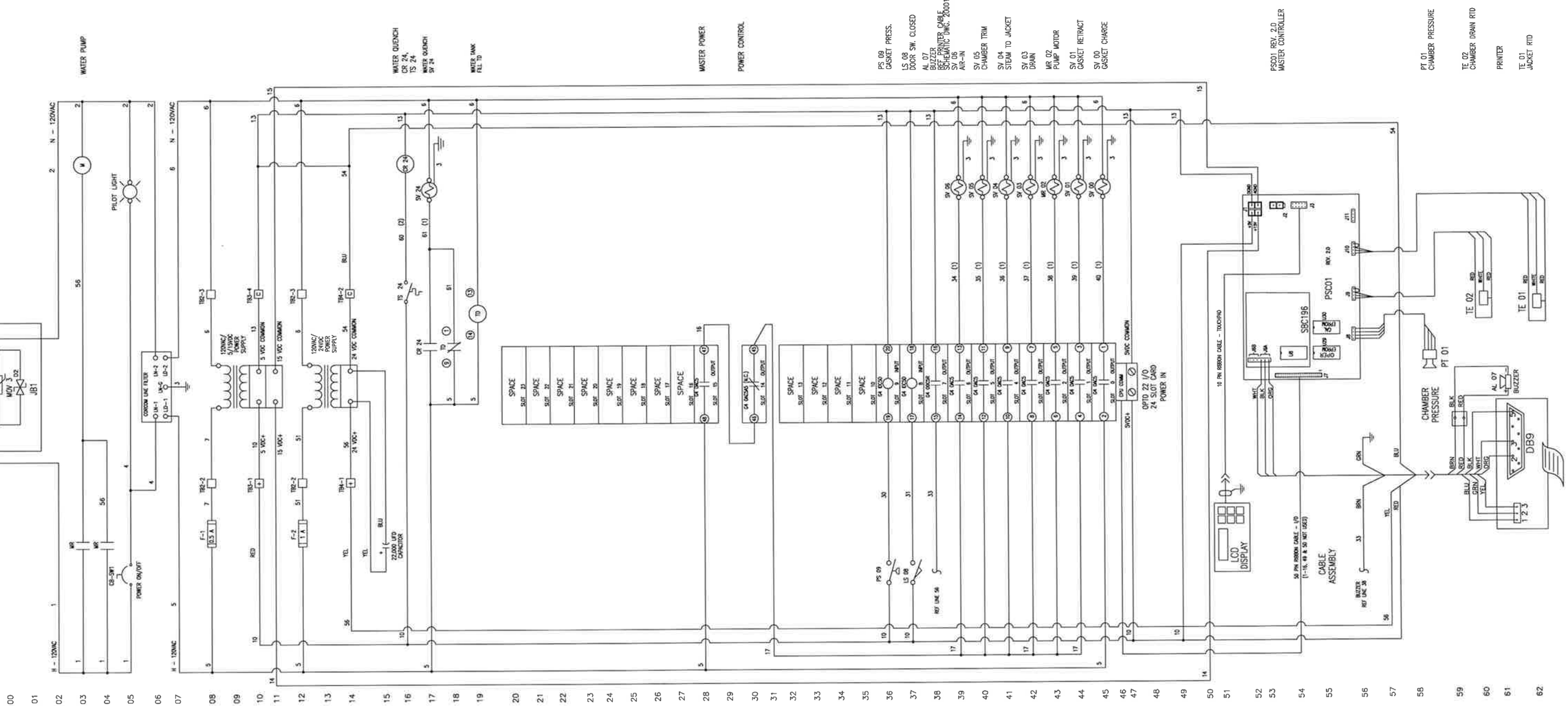
OMAHA, NE 68131
PH. (402) 344-4200
FAX (402) 344-4242



NOTES:

1. WIRE NUMBERS NOT USED: 8, 9, 11, 12, 18 – 29, 32, 41–50, 53, 55 & 57–59.
2. LAST WIRE NUMBER USED: 62
3. TO CONNECT SOLENOIDS WITH CABLE 500047 USE G/Y WIRE FOR GROUND
   #1 – TO OPTO 22
   #2 – TO COMMON
4. 34 (1) – 34 – WIRE MARKER, (1) WIRE NUMBER IN CABLE 500047
5. CUT OFF GREEN & WHITE WIRES FROM 2 PAIR IN CABLE 500048

REV	DESCRIPTION	BY	DATE
	REVISIONS		

THESE DRAWINGS ARE:
- ☐ FOR APPROVAL
- ☐ FOR INFORMATION ONLY
- ☒ AS BUILT
- ☐ DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:
STLCC CENTER PLANT & LIFE SCIENCE
1005 N WARSON ROAD – ROOM 122
ST. LOUIS, MO. 63132

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
.X ±.03
.XX ±.010
.XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

DRAWN BY:	N.T.
DATE:	12-28-09
CHECKED BY:	B.S.
DATE:	12-28-09
SOFTWARE P/N:	580200
DATE:	
SCALE:	N.T.S.
JOB NO:	17413
MODEL:	PSS5-A-MESD
CODE:	S1MGNNNN
SIZE:	

TITLE
ELECTRICAL DIAGRAM
W/24KW BOILER, WATER RECIRCULATION, & DRAIN WATER QUENCH

PRIMUS
STERILIZER COMPANY, LLC
117 SOUTH 25th ST.
OMAHA, NE 68131
PH. (402) 344-4200
FAX (402) 344-4242

DRAWING NO.: 17413E
REV:

MAJOR ELECTRICAL LIST
PLUMBING DWG: 17413P REV:
ELECTRCIAL DWG: 17413E REV:

LINE	PRIMUS P/N	MFR.	MFR. P/N	DESCRIPTION	FUNCTION
0	800021	CONTROL ENG	C9049888&C9049889	BOX,CONTROL,21X10X5,W/HOLES,	ELECTRICAL ENCLOSURE
1	500001	LITTLEFUSE	V130LA20A	MOV-SURGE SUPPRESSOR,130V RMS	SURGE SUPPRESSOR
3	500153	POTTER & BRUMFI	PRD-7AGO-120	RELAY,POWER,240VAC,30A	WATER PUMP
5	500005	AIRPAX	T11-62-5.00A-03-20AL-V	SWITCH/CIRCUIT BREAKER,SPST	POWER ON/OFF
5	500003	CHICAGO MINI	93F3532	PILOT LIGHT,125VAC,RED LENSE	POWER ON/OFF VISUAL INDICATOR
6	500028	MECHATRONICS	MDH06DL5/M	FILTER,LINE,1PHASE,6AMP	NOISE FILTER
8	500029	LITTLEFUSE	846S-354002GY	FUSE HOLDER,2 FUSE	SYSTEM PROTECTION
8	500030	BUSSMAN	28F055	FUSE,1/2AMP,250V	SYSTEM PROTECTION
9	500224	POWER ONE	HAA-512-A	POWER SUPPLY, 5VDC & 15VDC	POWER SUPPLY
12	500029	LITTLEFUSE	846S-354002GY	FUSE HOLDER,2 FUSE	PRINTER POWER SUPPLY PROTECTION
12	500145	BUSSMAN	AGC-1	FUSE,1AMP,250V,FAST-ACTING	PRINTER POWER SUPPLY PROTECTION
13	500069	POWER ONE	HB24-1.2-A	POWER SUPPLY,24VDC	THERMAL PRINTER POWER SUPPLY
15	500537	CORNELL DUBLIER	380LX223M035A042	CAPACITOR,22000 UFD,35VDC	CAPACITOR
16	500575	Omron	120D10	RELAY,SOLID STATE,5-24/120V	WATER QUENCH (CR 24)
16	500286	NASON	TM-1A-110R/HR	SWITCH,TEMP,BR,SETTING 110R	WATER QUENCH (TS 24)
17	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	WATER QUENCH (SV 24)
19	500775	Omron	120D10	RELAY,SOLID STATE,5-24/120V	WATER TANK
28	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	MASTER POWER
30	400117	OPTO 22	G40AC5A5	RELAY,OUTPUT,240VAC,N/C,3AMP	POWER CONTROL
36	500287	NASON	SM-2A-10R/HR/EP	SWITCH,PRESS,BR,SETTING 10R/EP	GASKET PRESS. SWITCH (PS 09)
36	400119	OPTO 22	G41DC5K	RELAY,INPUT,2.5-28VDC	GASKET PRESS. SWITCH
37	400119	OPTO 22	G41DC5K	RELAY,INPUT,2.5-28VDC	DOOR SWITCH CLOSED
37	200126	Primus	200126	DOOR SWITCH ASSEMBLY, 16	DOOR SWITCH CLOSED (LS 08)
38	400118	OPTO 22	G40DC5R	RELAY,OUTPUT DRY CONTACT	BUZZER
39	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	CHAMBER AIR IN
39	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	CHAMBER AIR IN (SV 06)
40	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	CHAMBER TRIM
40	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	CHAMBER TRIM (SV 05)
41	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	JACKET STEAM
41	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	JACKET STEAM (SV 04)
42	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	CHAMBER DRAIN
42	463263	BURKERT	00463263	VALVE,SOL,BR,1/2",STM,AIR	CHAMBER DRAIN (SV 03)
43	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	PUMP MOTOR
43	400808	PROCON	6XE95	PUMP, FEED WATER, BR, 330GPH	PUMP MOTOR
43	400600	TEEL	4P923	PUMP,ROTARY VANE,CARBNATOR MNT	PUMP MOTOR (MR 02)
44	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	GASKET RETRACT
44	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	GASKET RETRACT (SV 01)
45	400116	OPTO 22	G40AC5	RELAY,OUTPUT,120VAC,3AMP	GASKET PRESSURE
45	463265	BURKERT	00463265	VALVE,SOL,BR,1/4",STM,WTR,AIR	GASKET PRESSURE (SV 00)

DRAWN BY: N.T.
DATE: 12-28-09

JOB NO: 17413
MODEL NO: PSS5-A-MESD

MAJOR ELECTRICAL LIST
PLUMBING DWG: 17413P REV:
ELECTRCIAL DWG: 17413E REV:

51	200238	Primus	200238	TOUCHPAD ASSEMBLY,VERTICAL,COMPLETE	OPERATOR INPUT
52-56	200128	Primus	200128	CONTROLLER ASSEMBLY, V2.0, STEP-C1	SYSTEM CONTROL
56	500004	STAR MICRONICS	RMB-06	BUZZER ELEMENT,6V	PRINTER ALARM
58	400281	BARKSDALE	422H2-03-A	TRANSDUCER,PRESS,0-100 MV,0-50	CHAMBER PRESS.
60	400142	SENSORTEC	RBBJL-KW04A-00-0072B	RTD ELEMENT,SGL,72"LEAD,1/4	CHAMBER DRAIN RTD
61	400638	CyberTech	PRNTR0004JPR	PRINTER,THERMAL,FO CONTROL	HARD COPY WITNESS DEVICE
62	400142	SENSORTEC	RBBJL-KW04A-00-0072B	RTD ELEMENT,SGL,72"LEAD,1/4	JACKET RTD

PRIMUS

PRIMUS 500 MicroComputer Controlled, Steam Sterilizer

PART V.
FACTORY ACCEPTANCE TEST
GENERAL PURPOSE STERILIZER

Date	12-21-09
Customer	St. Louis Community College
Model Number	PSSS-A-MESD
Job No.	17413
Sterilizer Serial No.	17413
Computer Serial No.	9035088
Printer Serial No.	1938
Touch Pad Serial No.	300196
Software Serial No.	02007923
Software Rev. No.	2.034
Nat. Board No.	2313

PSS-500 Controls
Software Version 7923

March 25, 2009
Version 1.10

PRIMUS Sterilizer Company, LLC.
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TE: (402) 344-4200; FAX (402) 344-4242
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TABLE OF CONTENTS

Page

GENERAL PURPOSE STERILIZER

PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
TE: (402)344-4200; FAX: (402) 344-4242
Email: info@primus-sterilizer.com
URL: www.primus-sterilizer.com

SECTION 1.0 PURPOSE

Factory acceptance testing is a process that evaluates and documents the sterilizer following assembly and verifies its operations are in accordance with design specifications. Sterilizer system components and software are confirmed in this testing phase. Functionality of the sterilizer is qualified, verified and documented.

SECTION 2.0 REFERENCED DOCUMENTS

a. National Electrical Code, **ANSI/NFPA 70**

b. American National Standards Institute, Association for the Advancement of Medical Instrumentation, International Standards Organization; Sterilization of Health care Products - Requirements for validation and routine control - Industrial Moist Heat Sterilization, **ANSI/AAMI/ISO 11134-1993**

c. ANSI/AAMI ST8 Volume 1S, 1994, AAMI Standards and Recommended Practices

2.1 Required Test Equipment and Materials

List of the instruments/equipment/material, that are not permanently installed on or part of the equipment being qualified, but is temporarily required for the equipment validation.

Description	Manufacturer	Model No.	Serial No.	Calib. Date
Hi Pot Tester	Biddle	230315	12702	8-31-2010
Heat Well	Hart	9100-1DRC	A16711	9-16-2010

PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
TE: (402)344-4200; FAX: (402) 344-4242
Email: info@primus-sterilizer.com
URL: www.primus-sterilizer.com

SECTION 3.0 PSS500 CONTROLLER ASSEMBLY ACCEPTANCE CRITERIA

This section provides the criteria for acceptance of the PSS500 Controller assembly.

3.1 Control Box – Verify Acceptability

No Scratches, Dents, Hinge Problems	YES (✓) NO ( )
Lid seals tight to box, not warped, no metal filing in seal	YES (✓) NO ( )
Holes filled, connectors tight, D shells secure, check D shell pins	YES (✓) NO ( )
Switch and pilot light in straight and secure	YES (✓) NO ( )
Box is clean and free of wire clippings, metal filings, drill shavings	YES (✓) NO ( )
Check top of circuit boards and terminals for debris, need to be clean	YES (✓) NO ( )
Are correct chips installed and seated properly	YES (✓) NO ( )
Are components mounted to back panel tight, Opto board, circuit boards, power supplies, etc.	YES (✓) NO ( )
Ribbon cables assembled correctly and pressed down on boards, locked where necessary	YES (✓) NO ( )
Correct Opto22 modules are present	YES (✓) NO ( )
Fuses on Opto22 modules are present	YES (✓) NO ( )
Panel mounted fuses sized correctly and present	YES (✓) NO ( )
Check for missing labels on wires, cables, Opto modules, etc.	YES (✓) NO ( )
Check all wiring, screw terminals, crimp connections, D shell wiring, etc. (pull test)	YES (✓) NO ( )
Electrical Diagram adhered to inside of Control Box door	YES (✓) NO ( )

3.2 Cables (External Box) – Verify Acceptability

Backshells assembled properly and securely fastened to cable	YES (✓) NO ( )
Check all ends where strain relief is needed	YES (✓) NO ( )
Check all D shell ends for loose pins or sockets that push in	YES (✓) NO ( )
Check for wire damage, nicks, cuts, kinks, breaks, etc.	YES (✓) NO ( )
Check the continuity of the cables to insure correct pin outs and wiring	YES (✓) NO ( )

3.3 Printer – Verify Acceptability

Buzzer mounted securely	YES (✓) NO ( )
Paper and/or ribbon (N/A for thermal printer) are present and in correctly	N/A ~~YES ( ) NO ( )~~

3.4 Touchpad Box or Corian Panel – Verify Acceptability

Panel or box in good condition. No cracks	YES (✓) NO ( )
Lids on boxes are tight	YES (✓) NO ( )
Touchpad securely mounted	YES (✓) NO ( )
Cables are secure	YES (✓) NO ( )
Gauges, Printer, Touchpad aligned properly and secure	YES (✓) NO ( )
No damage to gauges	YES (✓) NO ( )
Components mounted correctly (Left/Right)	YES (✓) NO ( )

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SECTION 4.0 STERILIZER ASSEMBLY ACCEPTANCE CRITERIA

This section provides the criteria for the acceptance of the sterilizer assembly.

4.1 Vessel Set Up Check List - Verify Acceptability

Sterilizer square and level with frame	YES (✓) NO ( )
Double door Sterilizer centered front to back of frame	N/A YES ( ) NO ( )
Aluminum insulation covering free of defects	YES (✓) NO ( )
Overall appearance of vessel approved	YES (✓) NO ( )
Lock Washers placed where needed	YES (✓) NO ( )
All hardware is stainless (unless otherwise specified (USO))	YES (✓) NO ( )

Problem Resolution: _____

_____

Completed by: _____

Date: 12-30-2009

4.2 Door Assembly - Verify Acceptability

Gasket groove free of defect or damage	YES (✓) NO ( )
Head ring is free of defect or damage	YES (✓) NO ( )
Gasket groove is clean and free of polish compound	YES (✓) NO ( )
Counter weight is level and cables are not frayed	YES (✓) NO ( )
Door is balanced and operates easily from open to close	YES (✓) NO ( )

Problem Resolution: _____

Completed by: _____

Date: 12-30-2009

4.2.1 Door Assembly - Verify Acceptability (Horizontal Doors Only)

Check proper amount of insulation on back of door panel	YES ( ) NO ( )
Check bottom door guide is tight	YES ( ) NO ( )
Door pins are centered in receiver bars	YES ( ) NO ( )
Door adjustment screws are set at .035"	YES ( ) NO ( )
Check to see if door hardware is all stainless steel	YES ( ) NO ( )

Problem Resolution: _____

Completed by: _____

Date: _____

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4.3 Electrical Inspection- Verify Acceptability

Electrical Boxes securely fastened to sterilizer	YES (✓) NO ( )
Correct voltage for boiler (list voltage below)	YES (✓) NO ( )
Correct voltage for vacuum pump (list voltage below)	NA YES ( ) NO ( )
Wire connections in control box and all other boxes tightly connected	YES (✓) NO ( )
No frayed wires	YES (✓) NO ( )
Sterilizer wiring, including the control box, matches the wiring diagram	YES (✓) NO ( )
Wire runs are straight, secured, and free of any sharp or hot objects that could damage the insulation	YES (✓) NO ( )
Low voltage wires run separate of high voltage wires	YES (✓) NO ( )
All seal tight flex connectors are adequately tightened) to provide a water tight seal	YES (✓) NO ( )
All DIN connectors are adequately tightened to provide a water tight seal	YES (✓) NO ( )
Hi-Pot Test successfully completed (see paragraph 6.4)	YES (✓) NO ( )

Boiler Voltage: 240 VAC

Vacuum Pump Voltage: NA

Problem Resolution: _____

Completed by: _____

Date: 12-30-2009

4.4 Plumbing Inspection - Verify Acceptability

a. All valves are in full upright position.

b. All valves and tubing runs are straight and have been installed to promote proper drainage.

c. All piping, fittings and tubing free of burrs and defects.

Inspect steam to chamber plumbing	YES (✓) NO ( )
Inspect steam to jacket plumbing	YES (✓) NO ( )
Inspect gasket plumbing	YES (✓) NO ( )
Inspect drain plumbing	YES (✓) NO ( )
Inspect water supply plumbing	YES (✓) NO ( )
Inspect boiler plumbing	YES (✓) NO ( )
Inspect all safety valves	YES (✓) NO ( )
Inspect air-in plumbing	YES (✓) NO ( )
Inspect powered door plumbing	NA YES ( ) NO ( )

Problem Resolution: _____

_____

Completed by: [signature]

Date: 12-30-2009

SECTION 5.0 STERILIZER DEVICES - VERIFY ACCEPTABILITY

All control panel devices securely fastened, flush and square	YES (✓) NO ( )
Turn on power to controller – verify power on is successful	YES (✓) NO ( )
Touchpad(s) operate satisfactorily	YES (✓) NO ( )
Pumps/Ejectors operate satisfactorily.	YES (✓) NO ( )
Temperature and pressure readings are correct and accurately displayed	YES (✓) NO ( )
No leaks detected during operations	YES (✓) NO ( )
No fault indicators activated during operations	YES (✓) NO ( )
Printouts and recordings are satisfactory	YES (✓) NO ( )
Power Off operates correctly and disables all controller output	YES (✓) NO ( )
Alarms are audible	YES (✓) NO ( )
Indicator lamps illuminate	YES (✓) NO ( )
Temperature and pressure is calibrated for controllers and recorders	YES (✓) NO ( )
Door switches adjusted and operating properly	YES (✓) NO ( )
Gasket pressure switches adjusted and operating properly	YES (✓) NO ( )
Adjust vessel door offset from the head ring to achieve proper seal and clearance	YES (✓) NO ( )

Problem Resolution: _____

_____

Completed by: [signature]

Date: 12-30-2009

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SECTION 6.0 OPERATIONAL TESTING

6.1 Sterilizer Cycles – Verify Acceptable

Run the following cycles:

Button	Cycle Type	Sterilize Temperature	Sterilize Time (minutes)	Dry Time (minutes)	Pre-Vacs	Verification
1	Vacuum	134°C(273°F)	15	3	3	YES (✓) NO ( )
6	Gravity	122.8°C(253°F)	15	3	0	YES (✓) NO ( )
7	Liquids	122.8°C(253°F)	15	4*	0	YES (✓) NO ( )

*Dry time in LIQUIDS cycle is liquid cool time.

Cycle printouts attached YES (✓) NO ( )

Problem Resolution:_____

_____

Completed by: _____

Date: 12-30-2009

6.2 Vacuum Leak Test

Perform a Vacuum Leak Test (Cycle # 8) as per the following procedures:

1. In the control box switch S1 on the PSC01 Circuit board to CAL and turn power On.
2. Scroll up or down to EEPROM DIAGS and press **[ENTER]**.
3. Press **[ENTER]** again.
4. Scroll up or down to VAC LEAK TEST VALUE and press **[ENTER]**.
5. Enter the value of 1.1 PSIA which will be the maximum vacuum lost to determine PASS/FAIL. This value is the total allowable vacuum lost after 20 minutes hold time. Press **[ENTER]** to store this value.
6. Press the **[ADV]** button until HIT ANY BUTTON is displayed on the Control Panel.
7. Turn power Off at control cabinet. Switch S1 to OPER and turn power back On.
8. Press the up arrow **[▲]** and then the number button **[4]** to choose cycle number 8 (Vac Leak Test).

9. Press the **[MENU]** or **[STER TEMP or STER TIME or DRY TIME]** button to enter the cycle parameter menu.

10. Press the **[ENTER]** button and then the up or down button **[▲ ▼]** to set the desired vacuum level at which to perform the vacuum leak test. Press **[ENTER]** again to save this setpoint.

11. Press the **[ADV]** button to return to IDLE mode.

12. With the door closed press the **[START]** button to start the Vacuum Leak Test.

13. At Cycle Complete, note PASS or FAIL on the printout.

Final test result PASS ( ) FAIL ( )

Printed Report Attached YES ( ) NO ( )

Comments: _____

_____

_____

Tester:

Approved:

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6.3 Chamber Mapping

If required, perform chamber mapping as per the following procedures:

Location of all thermocouples used in the chamber mapping identified on the Chamber Map Layout YES ( ) NO ( )

Three typical gravity cycles are to be captured using 16 thermocouples connected to the Kay Validator, evenly distributed within the chamber. These three cycles must be repeated at 118.0 degrees Celsius for 30 minutes sterilization. YES ( ) NO ( )

One typical vacuum cycle is captured in the same manner as the three gravity cycles. This cycle is to be set for 132.0 degrees Celsius for 30 minutes sterilization. YES ( ) NO ( )

One typical liquids cycle is captured in the same manner. This cycle is to be set for 121.1 degrees Celsius for 60 minutes sterilization. YES ( ) NO ( )

Chamber temperature control maintained for all cycles within 60.5°C of setpoint. YES ( ) NO ( )

The following documentation is attached:

Pre and Post Calibration (Kay Validator) YES ( ) NO ( )
Calibration printout from the sterilizer control YES ( ) NO ( )
Text data soft and hard copy from each cycle from the Kay Validator YES ( ) NO ( )
Exposure graphs of each of the cycles YES ( ) NO ( )

Problem Resolution:_____

_____

Completed by:_____

Date:_____

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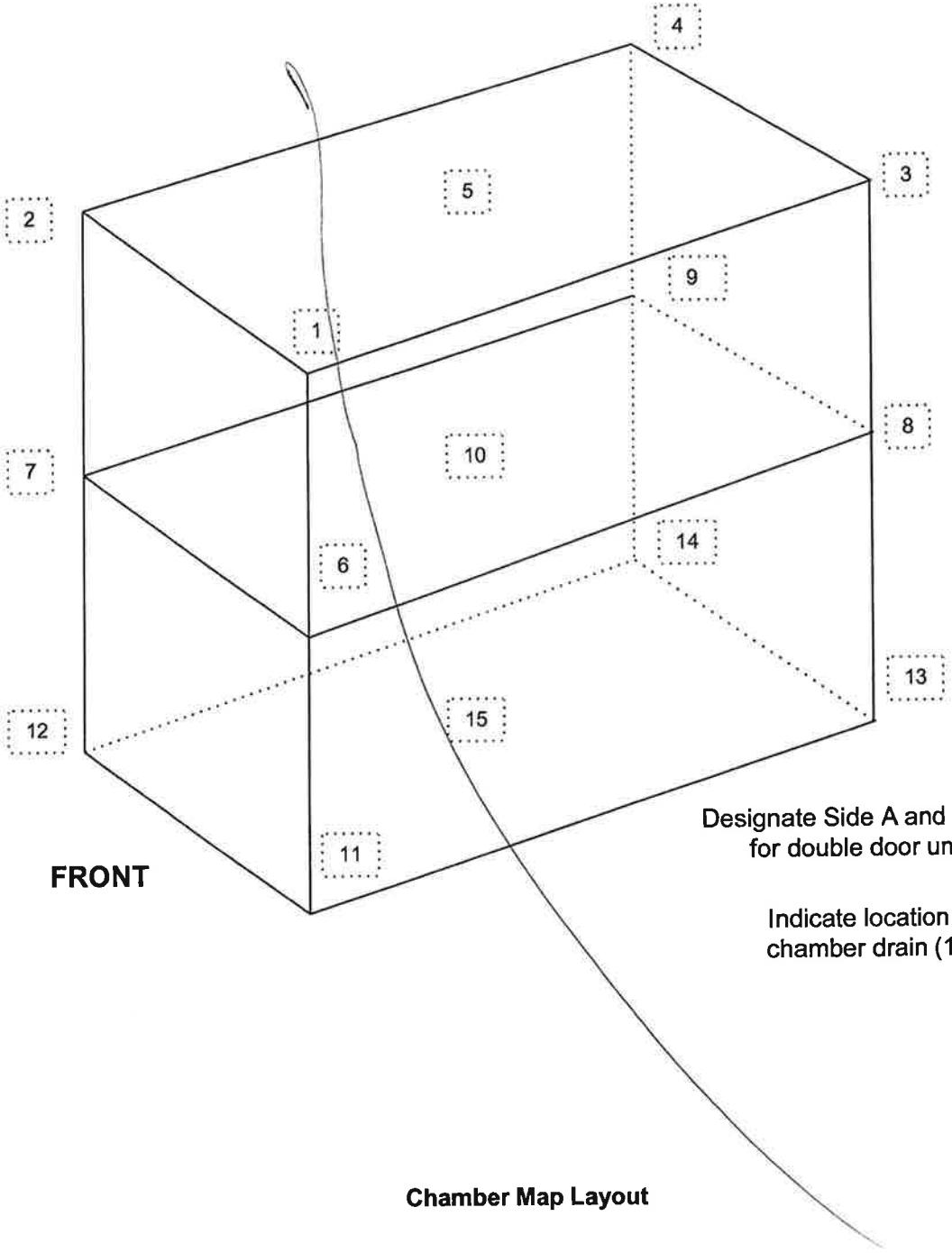

Chamber Map Layout

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6.4 Sterilizer AC Hi-Pot Test and Results

The sterilizer must withstand a test potential of 1000 volts for 60 seconds.

6.4.1 AVTM 23-1J AC High Pot Tester Setup Procedure (refer to Figure 6.4.1-1, AC High Pot Tester)

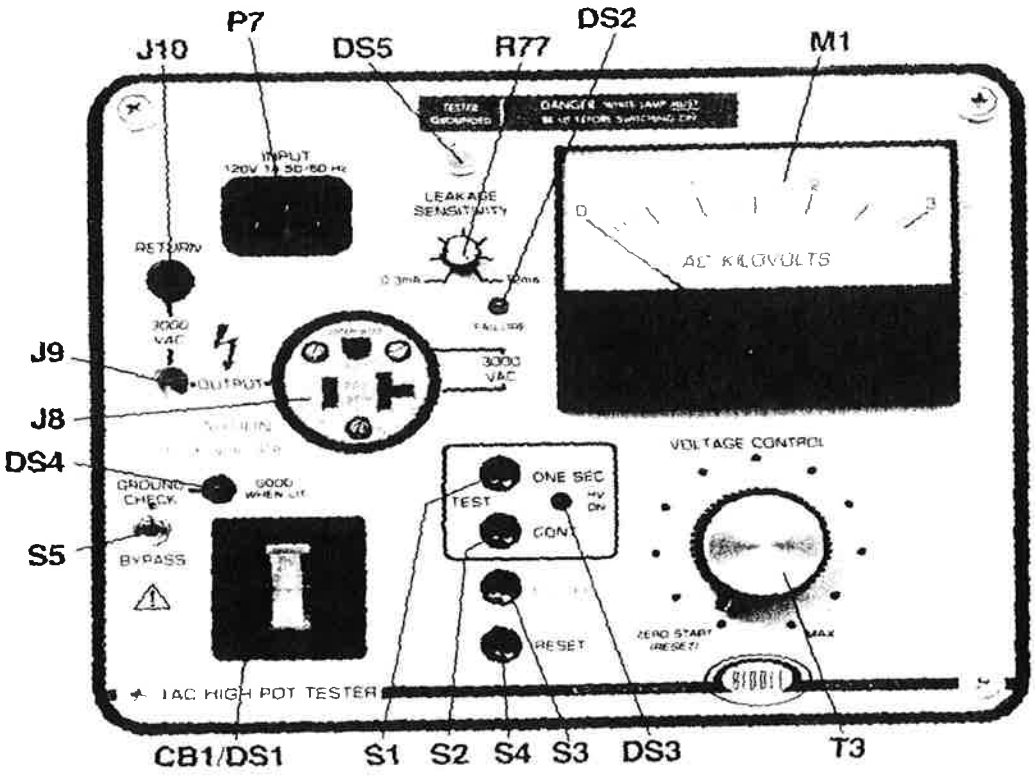

Figure 6.4.1-1 AC High Pot Tester

1. With the POWER switch (CB1) OFF, connect the INPUT POWER CORD (W3) to the Tester INPUT inlet (P7), then plug the INPUT POWER CORD (W3) into a grounded outlet.

2. Verify that the TESTER GROUNDED lamp (DS5) is lit.

WARNING

DANGER! IF THE TESTER GROUNDED LAMP (DS5) IS NOT LIT, DO NOT PROCEED ANY FURTHER, UNPLUG THE INPUT POWER CORD (W3) AND REFER TO SECTION I TROUBLESHOOTING AND REPAIR, OF THIS MANUAL (refer to the Instruction Manual for the AVTM 23-1J AC High Pot Tester).

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3. Connect the RETURN PROBE to the RETURN connector (J10).

4. Set the GROUND CHECK/BYPASS switch (S5) to GROUND CHECK position.

5. Set LEAKAGE SENSITIVITY control (R77) to 9.0 ma (second mark counterclockwise from the 12 ma setting).

6. Set the VOLTAGE CONTROL (T3) to the ZERO START (RESET) position.

6.4.2 Sterilizer Setup Procedure

1. Isolate the sterilizer from ground using insulation pads.

2. Remove the three MOVs located in the 110 volt junction box on the sterilizer.

3. Connect the sterilizer under test to the Test Outlet (J8) AC of the High Pot Tester and the RETURN PROBE to the sterilizer chassis (unpainted).

Do not plug in the HIGH VOLTAGE TEST probe when using the OUTPUT receptacle (J8) for testing

6.4.3 AC High Pot Test Procedure

1. Turn the POWER switch (CB1) ON; the rocker POWER switch (CB1) should light.

2. The GOOD WHEN LIT lamp (DS4) should be lit.

If the GOOD WHEN LIT lamp (DS4) is not lit, set the POWER SWITCH (CB1) to the OFF position. Disconnect the sterilizer from the tester and repair its ground circuit BEFORE proceeding with any further testing.

3. Press the CONT pushbutton (S2). The HV ON lamp (DS3) will light.

THE TESTER IS NOW CAPABLE OF PRODUCING HIGH VOLTAGE.

4. Observing the KILOVOLTAMETTER (M1) indication, raise the voltage to 1000 volts by clockwise rotation of the VOLTAGE CONTROL (T3) and maintain at 1000 volts for 60 seconds.

5. During high voltage testing, watch for failure of systems such as: audible alarm sounds and FAILURE lamp (DS2) lights, or a sudden voltage drop or erratic KILOVOLTMETER (M1) reading.

6. When the tester detects a failure, the audible alarm sounds, the FAILURE lamp (DS2) lights

and high voltage is switched off. To turn off the failure signals and continue testing, return the VOLTAGE CONTROL (T3) to the ZERO START (RESET) position or press the RESET pushbutton (S4).

7. To end the test, return the VOLTAGE CONTROL (T3) to the ZERO START (RESET) position, then press the HV OFF pushbutton (S3). The HV ON lamp (DS3) will go out.

8. A successful test is indicated when the FAILURE lamp (DS2) does not light and no alarm sounds.

Final test result PASS (✓) FAIL ( )

Comments: _____

_____

_____

Tester: _____

Approved: _____

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SECTION 7.0 STERILIZER CONTROLLER SET-UP - VERIFY ACCEPTABILITY

Verify correct time and date YES (✓) NO ( )
Verify calibration of sterilizer sensor devices YES (✓) NO ( )
Verify global set points including correct factory configuration number YES (✓) NO ( )
Verify correct parameter settings for Factory Preset Cycles using the following table:

Button	Cycle Type	Sterilize Temperature	Sterilize Time (minutes)	Dry Time (minutes)	Pre-Vacs	Verification
1	Vacuum	134°C(273°F)	15	30	3	YES (✓) NO ( )
2	Vacuum	134°C(273°F)	4	1	3	YES (✓) NO ( )
3	Vacuum	134°C(273°F)	4	30	3	YES (✓) NO ( )
4	Vacuum	134°C(273°F)	4	30	3	YES (✓) NO ( )
5	Gravity	134°C(273°F)	4	1	0	YES (✓) NO ( )
6	Gravity	122.8°C(253°F)	30	30	0	YES (✓) NO ( )
7	Liquids	122.8°C(253°F)	30	15*	0	YES (✓) NO ( )
8	Test (Vac)	134°C(273°F)	3-1/2	2	3	YES (✓) NO ( )

*Dry time in LIQUIDS cycle is liquid cool time.

Problem Resolution: _____

Completed by: 

Date: 12-30-2009

Software high limit pressure set to 32 PSIG YES (✓) NO ( )
Software Liquid high limit pressure set 19 PSIG YES (✓) NO ( )

Problem Resolution: _____

Completed by: 

Date: 12-30-2009

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SECTION 8.0 STERILIZER CABINET - VERIFY ACCEPTABILITY

Brackets mounted in correct location and secured to frame	YES (✓) NO ( )
All panels are straight and level	YES (✓) NO ( )
Seams are smooth and free of air gap	YES (✓) NO ( )
All sharp edges deburred and corners filed	YES (✓) NO ( )
All panels free of scratches, nicks, or dents	YES (✓) NO ( )

Problem Resolution: _____

_____

Completed by: _____

Date: 12-30-2009

SECTION 9.0 STERILIZER LABELING - VERIFY ACCEPTABILITY

Serial number/Model number plate located above the electrical service box	YES (✓) NO ( )
Shock hazard warning label is located on control box/electrical service. Boiler electric box if applicable	YES (✓) NO ( )
ETL/CSA label attached to sterilizer	YES (✓) NO ( )
Door counter weight safety warning label is located on the weight box	YES (✓) NO ( )
Steam supply label attached to steam inlet line	YES (✓) NO ( )
Floor drain label attached to floor drain outlet	YES (✓) NO ( )
Cold water supply label attached to cold water inlet	YES (✓) NO ( )
Electric supply label attached to electrical supply connection	YES (✓) NO ( )
Electric supply label attached to pump motor	YES (✓) NO ( )
Air supply label attached to connection point	NA ~~YES ( ) NO ( )~~

Problem Resolution: _____

_____

Completed by: _____

Date: 12-30-2009

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Attach a copy of the Primus Black and Silver Label containing: Model and Job Number, Serial Number and National Board Number to this page.

PRIMUS
Sterilizer Company LLC

Rating	120V, 60Hz, 1Ø, 10 Amps		
Model #	PSS5-A-MESD		
Loc. Iden.	GB1		
Serial #	17413	Nat. Bd.	2313

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SECTION 10.0 PACKAGING - VERIFY ACCEPTABILITY

Take photos of all sides of the unit prior to hanging cabinet sides	YES (✓) NO ( )
Clean and wipe internal surface of chamber	YES (✓) NO ( )
Clean and wipe external surfaces of sterilizer	YES (✓) NO ( )
Sterilizer Winterized (October 1 to April 15)	YES (✓) NO ( )
Block door shut	YES (✓) NO ( )
Band weight box in place	YES (✓) NO ( )
Tag Unit	YES (✓) NO ( )
Fill vacuum pump with antifreeze for rust/freeze inhibition	NA YES ( ) NO ( )
Tape shipping information, Uncrating and Installation Manual, and copy of test runs to front door	YES (✓) NO ( )
Care package packed in chamber of unit	YES (✓) NO ( )
Foot pads packed with machine	YES (✓) NO ( )
All shelves and loading equipment included and secured	YES (✓) NO ( )
Sterilizer is wrapped in plastic	YES (✓) NO ( )
Sterilizer is packed/crated per instructions from the work order	YES (✓) NO ( )
Complete the following paperwork and submit to accounting:	
Bill of Lading	YES (✓) NO ( )
Call Report	YES (✓) NO ( )
Sterilizer Shipping Form	YES (✓) NO ( )
Door cables fastened securely around cable pulleys	YES (✓) NO ( )
Manuals located in chamber (unless other shipping instructions)	YES ( ) NO (✓)
Uncrating Instructions and Cycle runs prepared for attaching to front of crate	YES ( ) NO (✓)

Method used to prepare unit for shipping, check all applicable:
Pallet (✓) Shrink Wrap (✓) Tarp ( ) Tiger Cage ( ) Full Crate (✓) Export Crating ( )

Take photos of unit crated and prepared for shipment	YES (✓) NO ( )
Photos included in Device History Record (DHR)	YES (✓) NO ( )

Problem Resolution as Required: _____

_____

Completed by: _____

Date: 12-30-2009

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SECTION 11.0 FACTORY ACCEPTANCE TESTING PARTICIPANT SIGNATURES

11.1 Factory Acceptance Test Performed/Observed by:

TYPED/PRINTED NAME	SIGNATURE	DATE
Allen D. Hahn		12-30-2009
LARRY McCORD	Larry McCord	12-31-09

11.2 Quality Assurance

TYPED/PRINTED NAME	SIGNATURE	DATE
Brian Sullivan	Brian Sullivan	12-31-09

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```
CYCLE # 3
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     3
PREVAC VAC TIME   1:00
PREVAC VAC POINT-10.0
PURGE TIME        2:00
PRECHARGE PRESS  20.0
DRY TIME         30:00
STERILIZE TEMP  273.0
STERILIZE TIME    4:00
TYPE    VACUUM
CYCLE # 3
CYCLE # 2
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     3
PREVAC VAC TIME   1:00
PREVAC VAC POINT-10.0
PURGE TIME        2:00
PRECHARGE PRESS  20.0
DRY TIME          1:00
STERILIZE TEMP  273.0
STERILIZE TIME    4:00
TYPE    VACUUM
CYCLE # 2
CYCLE # 1
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     3
PREVAC VAC TIME   1:00
PREVAC VAC POINT-10.0
PURGE TIME        2:00
PRECHARGE PRESS  10.0
DRY TIME         30:00
STERILIZE TEMP  273.0
STERILIZE TIME   15:00
TYPE    VACUUM
CYCLE # 1
POSTVAC  TIMEOUT 20:00
PREVAC   TIMEOUT 20:00
PRECHARG TIMEOUT 20:00
HEAT CH TIMEOUT  20:00
CHAMBER-TO-DRAIN  0.0
SERVICE CYCLES      4
FACTORY CONFIG #   65
JACKET OFFSET   - 4.0
UNDERTEMP ALARM   2.5
OVERTEMP  ALARM   9.0
LIQUID MAX PRES  19.0
LIQUID MAX TEMP 257.0
MINIM DRY TIME    1:00
MINIM STER TIME   3:00
HI LIMIT PSIG    32.0
GASKET RETRACT    0:20
GASKET CHARGE     0:10
TEMPS IN FAHRENHEIT
TOTAL CYCLES    4
JOB NUMBER 17 413
*  REV. 2.034          *
SW DATE 7923
SW P/N 58-0200
STERILIZER #    1
TIME 13:07:36
DATE.....12/30/2009
DOOR OPEN      12:58:45

12:58:44
AUTOMATIC POWER-UP



DATE.....12/30/2009
---POWER OFF---12:35:04
```

```
CYCLE # 8
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     3
PREVAC VAC TIME   1:00
PREVAC VAC POINT-10.0
PURGE TIME        2:00
PRECHARGE PRESS  20.0
DRY TIME          2:00
STERILIZE TEMP  273.0
STERILIZE TIME    3:30
TYPE    TESTVAC
CYCLE # 8
CYCLE # 7
FINAL RAMP SLOPE  5.0
HALF RAMP TIME    0:30
SLO EX RAMP       2.0
SLO EX END POINT- 0.1
# OF PRE-VACS     0
PREVAC VAC TIME   0:00
PREVAC VAC POINT  0.0
PURGE TIME        2:00
PRECHARGE PRESS  10.0
LIQ COOL TIME    15:00
STERILIZE TEMP  253.0
STERILIZE TIME   30:00
TYPE    LIQUIDS
CYCLE # 7
CYCLE # 6
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     0
PREVAC VAC TIME   0:00
PREVAC VAC POINT  0.0
PURGE TIME        2:00
PRECHARGE PRESS  10.0
DRY TIME         30:00
STERILIZE TEMP  253.0
STERILIZE TIME   30:00
TYPE    GRAVITY
CYCLE # 6
CYCLE # 5
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     0
PREVAC VAC TIME   0:00
PREVAC VAC POINT  0.0
PURGE TIME        2:00
PRECHARGE PRESS  20.0
DRY TIME          1:00
STERILIZE TEMP  273.0
STERILIZE TIME    4:00
TYPE    GRAVITY
CYCLE # 5
CYCLE # 4
FINAL RAMP SLOPE  9.0
HALF RAMP TIME    0:15
# OF POSTVACS     1
DRY VAC POINT   -10.0
# OF PRE-VACS     3
PREVAC VAC TIME   1:00
PREVAC VAC POINT-10.0
PURGE TIME        2:00
PRECHARGE PRESS  20.0
DRY TIME         30:00
STERILIZE TEMP  273.0
STERILIZE TIME    4:00
TYPE    VACUUM
CYCLE # 4
```

```
DOOR OPEN        12:35:01

** WARNING
** HOT LIQUIDS
** IN CHAMBER

SIGN 

216.0 D     0.0  12:25:23
COMPLETE         12:25:23
-------------------------

216.1 D     0.0  12:25:23
216.1 D     0.0  12:25:22
217.6 D     0.0  12:24:22
214.3 D     0.0  12:23:22
FLOW COOLING     12:23:22
-------------------------

UNSEAL DOOR GASKET
216.1 D -   0.2  12:23:01
216.1 D -   0.3  12:23:00
AIR-IN           12:23:00
-------------------------

216.1 D -   0.3  12:23:00
216.1 D -   0.3  12:22:59
216.8 D -   0.4  12:21:59
214.9 D -   0.2  12:20:59
FLOW COOLING     12:20:58
-------------------------

218.0 D     0.9  12:20:27
223.5 D     2.9  12:19:26
228.5 D     5.2  12:18:25
231.8 D     6.5  12:17:24
236.0 D     8.3  12:16:23
240.2 D    10.3  12:15:22
244.2 D    12.3  12:14:21
248.3 D    14.5  12:13:20
253.1 D    17.2  12:12:19
SLOW EXHAUST     12:12:19
-------------------------

253.1 D    17.2  12:12:19
253.1 D    18.6  12:11:22
253.9 D    18.0  12:10:22
253.3 D    17.4  12:09:22
253.4 D    18.8  12:08:22
253.6 D    18.0  12:07:21
253.9 D    18.1  12:06:20
254.0 D    17.9  12:05:20
253.7 D    17.7  12:04:20
253.5 D    17.5  12:03:20
253.2 D    17.3  12:02:19
254.0 D    18.2  12:01:19
254.0 D    18.1  12:00:19
253.9 D    17.8  11:59:19
253.5 D    17.5  11:58:18
253.2 D    18.0  11:57:18
    < STERILIZE >

249.1 D    15.6  11:56:30
HEAT CHAMBER     11:55:30
-------------------------

235.6 D     9.2  11:55:30
234.0 D     9.9  11:54:30
187.3 D     0.0  11:53:30
AIR-PURGE        11:53:30
-------------------------


D = CHAMBER TEMPERATURE
P = CHAMBER PRESSURE
        (+PSIG/-InHg)

CYCLE START... 11:53:17
COOL TIME.....   4:00
STER TIME.....  15:00
STER TEMP...F.... 253.0
CHARGE NO.....      3
DAILY LOAD NO.....  5
STERILIZER NO.....  1
DATE.....12/30/2009
CYCLE #7  LIQUIDS
************************
*                      *
*   MANUFACTURED BY    *
*  PRIMUS STERILIZER   *
*    COMPANY, INC.     *
*      OMAHA, NE       *
*                      *
*  REV. 2.034          *
*  SW DATE 7923        *
*  SW P/N  58-0200     *
```

```
DOOR OPEN        11:52:53

SIGN 

194.3 D     0.0  11:51:55
COMPLETE         11:51:54
-------------------------

UNSEAL DOOR GASKET
196.0 D -   0.6  11:51:33
196.9 D -  26.0  11:51:14
AIR-IN           11:51:13
-------------------------

199.3 D -  26.1  11:50:29
194.1 D -  24.9  11:49:29
197.0 D -  15.4  11:48:29
POST VACUUM      11:47:29
-------------------------

216.1 D -   0.1  11:47:29
252.9 D    17.2  11:46:47
EXHAUST          11:46:46
-------------------------

252.9 D    17.5  11:46:46
253.7 D    17.6  11:45:50
252.9 D    17.6  11:44:50
253.8 D    17.7  11:43:49
253.8 D    17.6  11:42:49
253.5 D    19.1  11:41:49
253.8 D    17.6  11:40:49
253.4 D    19.0  11:39:48
253.6 D    17.4  11:38:47
253.9 D    18.6  11:37:47
253.7 D    17.6  11:36:47
254.0 D    18.8  11:35:47
253.7 D    17.4  11:34:46
254.0 D    18.9  11:33:46
254.0 D    18.3  11:32:46
253.3 D    18.1  11:31:45
    < STERILIZE >

HEAT CHAMBER     11:30:50
-------------------------

235.9 D     9.5  11:30:49
233.5 D     9.8  11:29:50
167.3 D -   0.1  11:28:49
AIR-PURGE        11:28:48
-------------------------


D = CHAMBER TEMPERATURE
P = CHAMBER PRESSURE
        (+PSIG/-InHg)

CYCLE START... 11:28:37
DRY TIME.....    3:00
STER TIME.....  15:00
STER TEMP...F.... 253.0
CHARGE NO.....      2
DAILY LOAD NO.....  4
STERILIZER NO.....  1
DATE.....12/30/2009
CYCLE #6  GRAVITY
************************
*                      *
*   MANUFACTURED BY    *
*  PRIMUS STERILIZER   *
*    COMPANY, INC.     *
*      OMAHA, NE       *
*                      *
*  REV. 2.034          *
*  SW DATE 7923        *
*  SW P/N  58-0200     *
*                      *
************************
17 413

DOOR OPEN        11:27:48
```

```
DOOR OPEN        15:48:08

SIGN 

185.1 D     0.0  15:46:54
COMPLETE         15:46:53
-------------------------

UNSEAL DOOR GASKET
186.5 D -   0.6  15:46:32
187.2 D -  25.6  15:46:13
AIR-IN           15:46:13
-------------------------

190.2 D -  25.8  15:45:26
194.2 D -  26.0  15:44:26
198.6 D -  26.2  15:43:26
189.2 D -  24.6  15:42:25
194.7 D -  14.7  15:41:25
POST VACUUM      15:40:25
-------------------------

214.5 D -   0.2  15:40:25
216.3 D     0.4  15:40:21
273.0 D    31.5  15:39:21
EXHAUST          15:39:21
-------------------------

272.9 D    31.6  15:39:21
273.0 D    31.4  15:38:27
273.1 D    31.3  15:37:27
273.1 D    31.2  15:36:27
272.9 D    31.3  15:35:26
273.0 D    31.2  15:34:25
273.2 D    31.2  15:33:24
273.0 D    31.2  15:32:24
272.9 D    31.4  15:31:24
272.9 D    31.5  15:30:24
273.1 D    31.7  15:29:23
273.3 D    31.3  15:28:22
273.3 D    31.0  15:27:22
272.8 D    31.2  15:26:22
273.2 D    31.3  15:25:21
273.1 D    30.9  15:24:20
    < STERILIZE >

271.5 D    30.2  15:24:03
262.1 D    24.2  15:23:03
HEAT CHAMBER     15:22:04
-------------------------

194.0 D -  24.4  15:22:03
187.3 D -  15.9  15:21:19
254.2 D    20.2  15:20:19
199.6 D -  10.1  15:19:41
200.9 D -   7.5  15:19:25
256.1 D    20.1  15:18:25
252.5 D    18.1  15:18:04
204.8 D -   5.1  15:17:04
211.8 D -   1.1  15:16:41
252.0 D    20.2  15:15:41
AIR REMOVAL      15:15:21
-------------------------

238.4 D    10.5  15:15:21
238.9 D    12.5  15:14:22
178.9 D     0.0  15:13:21
AIR-PURGE        15:13:20
-------------------------


D = CHAMBER TEMPERATURE
P = CHAMBER PRESSURE
        (+PSIG/-InHg)

CYCLE START... 15:13:09
DRY TIME.....    5:00
STER TIME.....  15:00
STER TEMP...F.... 273.0
CHARGE NO.....      0
DAILY LOAD NO.....  2
STERILIZER NO.....  1
DATE..... 1/01/1996
CYCLE #1  VACUUM
************************
*                      *
*   MANUFACTURED BY    *
*  PRIMUS STERILIZER   *
*    COMPANY, INC.     *
*      OMAHA, NE       *
*                      *
*  REV. 2.034          *
*  SW DATE 7923        *
*  SW P/N  58-0200     *
*                      *
************************
```

* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 9:32:56
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

JACKET TEMP LOW
REFERENCE TEMP 240 0

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 9:21:04
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

CALIBRATE HI PRESSURE
W/REFERENCE PRESSURE
PRESSURE-- 32 0

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 9:04:35
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

CALIBRATE LOW PRESSURE
PRESSURE-- 0.0
CALIBRATE 0 PSIG

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 9:03:53
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

#17413

**CALIBRATE*CALIBRATE*

CALIBRATE LOW PRESSURE
PRESSURE-- 0 0
CALIBRATE 0 PSIG

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 11:11:23
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

CHAMBER TEMP HIGH
REFERENCE TEMP 280 0

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 11:11:19
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

JACKET TEMP HIGH
REFERENCE TEMP 280 0

REF
TOTAL CYCLES 0
JOB NUMBER 90 0
* REV. 2.034 *
SW DATE 7923
SW P/N 58-0200
STERILIZER # 1
TIME 10:15:24
DATE 12/23/2009

SIGN DEJ

**CALIBRATE*CALIBRATE*

**CALIBRATE*CALIBRATE*

CHAMBER TEMP LOW
REFERENCE TEMP 240 0

REF
TOTAL CYCLES 0
JOB NUMBER 90 0

PRIMUS

GENERAL PURPOSE STEAM STERILIZER

PRIMUS PSS 500 CONTROL

APPENDIX A

MANUFACTURER'S RECORDS

PSS-500 Controls
Software Version 7923

July 2, 2008
Version 1.07

PRIMUS STERILIZER COMPANY, LLC
117 South 25th Street, Omaha NE 68131
TE: (402) 344-4200; FAX: (402) 344-4242
info@primus-sterilizer.com
www.primus-sterilizer.com

PRIMUS Sterilizer Company, LLC, Omaha, NE 68131

Printed in the United States of America

Steam Sterilizer General Information, Installation, User's Manual
V196 controller
Includes Bibliographical References

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GP PSS5 APPA-7923 1_08/070208

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URL: www.primus-sterilizer.com

APPENDIX A. Manufacturer's Records

10.1 Heat Records

Manufacturer's heat records are provided where applicable for sanitary fittings. Heat records provide a record of the components of the stainless used in the development of the sanitary fittings.

10.2 U-1s

A Form U-1 Manufacturer's Data Report for Pressure Vessels that registers this unit with the National Board of Boiler and Pressure Vessel Inspectors follows.

10.3 Boiler Manual or Steam to Steam Generator

If your sterilizer has an optional stainless steel boiler or a steam to steam generator installed, than the manufacturer's Installation, Operation, and Maintenance Manual and the U-2 (applies to boilers only) specific to your unit will follow.

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PRIMUS Sterilizer Company, LLC
117 South 25th Street, Omaha, NE 68131
TE: (402) 344-4200; FAX (402) 344-4242
E-mail: info@primus-sterilizer.com
URL: www.primus-sterilizer.com

FORM U-1 MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by PRIMUS STERILIZER CO., LLC. 3707 MAIN GREAT BEND, KS. 67530
(Name and address of Manufacturer)

2. Manufactured for "STOCK"
(Name and address of Purchaser)

3. Location of installation
(Name and address)

4. Type: HORIZONTAL (Horiz., vert., or sphere) | JACKETED VESSEL (Tank, separator, jkt. vessels, heat exh., etc.) | 17413 (Mfg's serial No.)

K4410.5618 (CRN) | 2768W11 (Dwg.No.) | 2313 (Natl Bd.No.) | 2009 (Yr.Built)

5. ASME Code, Section VIII, Div.1 2007/A08 (Edition and Addenda (date)) | 2148 (Code Case No.) | N/A (Special Service per UG-120(d))

Items 6-11 incl. to be completed for single wall vessels, jackets of jacketed vessels, shell of heat exchangers, or chamber of multi-chamber vessels.

6. Shell (a) No. of course(s): ONE (b) Overall length (ft & in.): 3' 7/8"

Course(s)			Material	Thickness		Long Joint (Cat.A)			Circum. Joint (Cat. A, B, &C)			Heat Treatment	
No.	Diameter,in.	Length(ft&in.)	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp	Time
1	22"X22"	3'-7/8"	SA240-304	.135	0	7	NONE	70%	7				

7. Heads: (a) (Mat'l Spec. No., Grade or Type)H.T.-Time&Temp (b) (Mat'l Spec. No., Grade or Type)H.T.-Time &Temp

	Location (Top, Bottom, Ends)	Thickness Min.	Thickness Corr.	Radius Crown	Radius Knuckle	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure Convex	Side to Pressure Concave	Category A Type	Category A Full, Spot, None	Category A Eff.
(a)														
(b)														

If removable, bolts used (describe other fastening) N/A
(Mat'l Spec. No., Grade, size, No.)

8. Type of jacket TYPE 1 Jacket Closure (d-1) & (e-2)
(Describe as ogee & weld, bar, etc.)

If bar, give dimensions If bolted, describe or sketch.

9. MAWP 45 (internal) (external) psi at max. temp. 300 (internal) (external) °F. Min. design metal temp. -20 °F at 45 psi.

10. Impact test NO- PER UHA 51 (a) at test temperature of °F.
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneu., or comb. test press. 90 (PSI) Proof test NO

Items 12 and 13 to be completed for tub sections.

12. Tubesheet:

Stationary(Mat'l Spec No.)	Dia., in.(subject to press.)	Nom. thk., in.	Corr. Allow., in.	Attachment (welded or bolted)

Floating (Mat'l Spec. No.)	Dia., in.	Nom. thk., in.	Corr. Allow., in.	Attachment

13. Tubes:

Mat'l Spec. No., Grade or Type	O.D., in.	Nom.Thk., in. or gauge	Number	Type(Straight or U)

Items 14-18 incl. to be completed for inner chambers of jacketed vessels or channels of heat exchangers.

14. Shell (a) No. of course(s): ONE (b) Overall length (ft & in.): 3' 2 1/4"

Course(s)			Material	Thickness		Long Joint (Cat.A)			Circum. Joint (Cat. A, B, &C)			Heat Treatment	
No.	Diameter,in.	Length(ft&in.)	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp	Time
1	20"X20"	3' 2 1/4"	SA240-316L	.187	0	1	NONE	70%	7				

15. Heads: (a) SA-240-316L (Mat'l Spec. No., Grade or Type)H.T.-Time&Temp (b) (Mat'l Spec. No., Grade or Type)H.T.-Time &Temp

	Location (Top, Bottom, Ends)	Thickness Min.	Thickness Corr.	Radius Crown	Radius Knuckle	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure Convex	Side to Pressure Concave	Category A Type	Category A Full, Spot, None	Category A Eff.
(a)	END	.625	0						22"X22"				NONE	
(b)	DOOR	.625	0						22"X24"				NONE	

If removable, bolts used (describe other fastening) (a) IS A END, (b) IS A SLIDING DOOR
(Mat'l Spec. No., Grade, Size, No.)

16. MAWP 45 (internal) 45 (external) psi at max. temp. 300 (internal) 300 (external) °F. Min. design metal temp. -20 °F at 45 psi.

17. Impact test NO- PER UHA 51 (a) at test temperature of °F.
(Indicate yes or no and the component(s) impact tested)

18. Hydro., pneu., or comb. test press. 59 (PSI) Proof test NO

19. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
INLET	3	3/4"	Coupling	SA-182		3000#			WELD		CHAMBER
OUTLET	1	3/4"	Coupling	SA-182		3000#			WELD		CHAMBER
INLET	6	3/4"	Coupling	SA-182		3000#			WELD		JACKET
OUTLET	2	3/4"	Coupling	SA-182		3000#			WELD		JACKET
INLET	2	1"	Coupling	SA-182		3000#			WELD		CHAMBER

20. Supports: Skirt NO (Yes or No) Lugs (No.) Legs (No.) Others (Describe) Attached (Where and How)

21. Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report:
(List the name of part, item number, mfg's. name and identifying number)

22. Remarks:
*NON-CIRCULAR DESIGN IN ACCORDANCE WITH APPENDIX 13
FIGURE 13-2(a)

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1,

U Certificate of Authorization No. 23910 Expires 2-20 2010

Date 12-9-09 Name PRIMUS STERILIZER COMPANY LLC. (Manufacturer) Signed (Representative)

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of KS. and employed by HSB CT. of HARTFORD, CT. have inspected the pressure vessel described in this Manufacturer's Data Report on 12/9 2009, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 12/9/09 Signed (Authorized Inspector) Commissions 13855A KS658 (Nat'l Board incl. endorsement, State, Province and No.)

CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the statements on this report are correct and that the field assembly construction of all parts of this vessel conforms with the requirements of ASME Code, Section VIII, Division 1,

U Certificate of Authorization No. Expires , 20

Date Name (Assembler) Signed (Representative)

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of and employed by of have compared the statements in this Manufacturer's Data Report with the described pressure vessel and state that parts referred to as data items , not included in the certificate of shop inspection, have been inspected by me and to the best of my knowledge and belief, the Manufacturer has constructed and assembled this pressure vessel in accordance with ASME Code, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of psi. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date Signed (Authorized Inspector) Commissions (Nat'l Board incl. endorsement, State, Province and No.)

17413

101167
November 1985
Rev.: November 1992

Installation, Operation and Maintenance Manual

ES24A STEAM GENERATOR
CONTROL CIRCUIT
WITH MANUAL RESET AUXILIARY LOW
WATER CUT-OFF
WIRING DIAGRAM

Catalog Numbers 20A, 24A

MODEL: ES24AB3-PRI 11/18/2009

Model No. .....

Boiler Serial No. .....

National Board No. .....

kW: 24 VOLTS: 208 PH: 3 50/60HZ .....

S/N: SS- 88092 100PSI NB#: 73718 .....

AMPS: 67 PPH: 80

WO 286089 CONTROL: 120VAC 8AMP .Hz .....

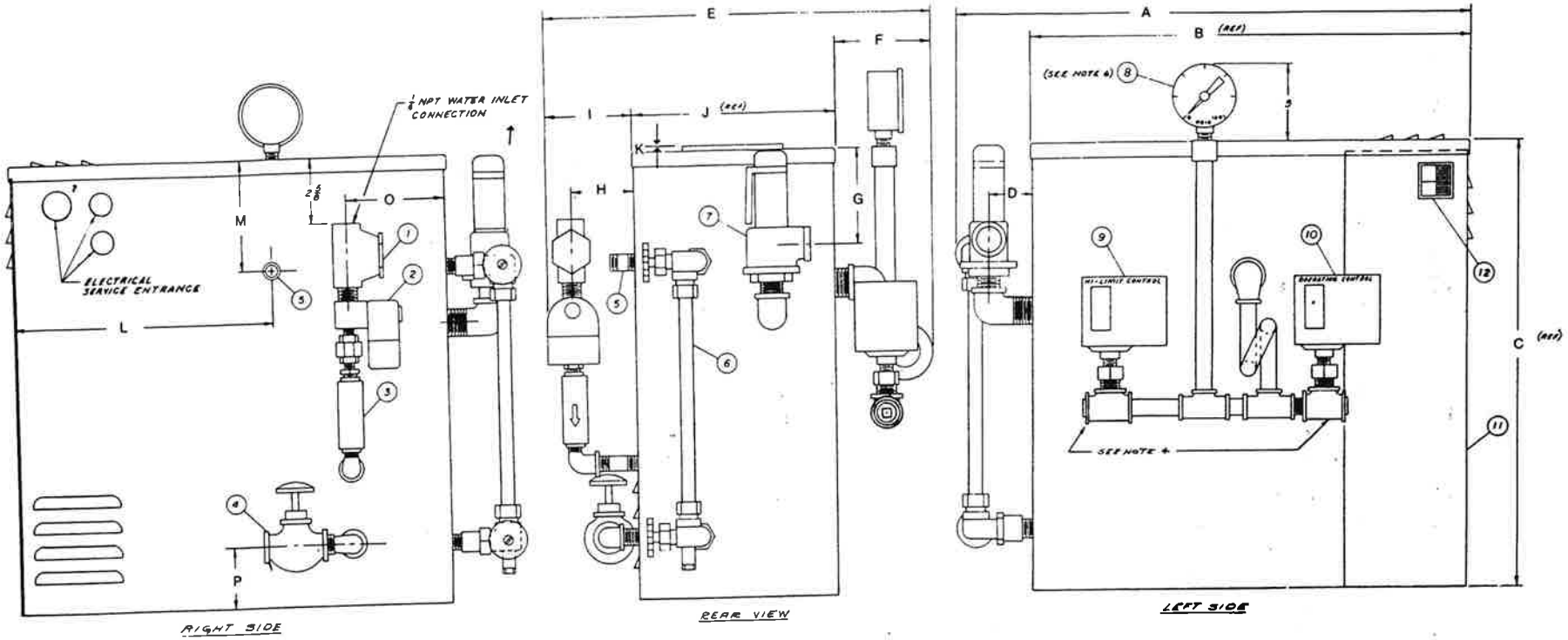
IMPORTANT: This data file contains the National Board Registration Certificate approving your boiler. It must be kept near the boiler at all times.

PRODUCTS COVERED BY THIS MANUAL

Series	KW Range	Steam Rate	BHP	Design Pres.	Max. Work. Pres.
20A	20	61 lbs/hr.	2.04	100 psig	90 psig
24A	24	73 lbs/hr.	2.44	100 psig	90 psig

COMPONENT IDENTIFICATION DIMENSIONAL INFORMATION

Models 20A/24A



Dimensional Table Model 20A,20P; 24A,24P		
DIM. FIND LETTER	Model 20A, 20F	Model 24A,24P
A	20-1/2	25-3/16
B	17-7/16 (REF)	22-1/8 (REF)
C	17-13/16 (REF)	17-13/16 (REF)
D	1-3/4	1-3/4
E	15-11/16	16-11/16
F	4-1/16	4-1/16
G	2-15/16	2-15/16
H	2-1/2	2-1/2
I	3-1/2	3-1/2
J	8-1/2 (REF)	9-1/8
K	— — —	2-1/4
L	10-5/16	10-5/16
M	4-5/16	4-5/16
N	2-5/8	2-5/8
O	4	8-3/4
P	2-1/2	2-1/2

SYMBOL	DESCRIPTION	PART NO.
1	1/4 NPT STRAINER	93806
2	1/4 NPT 120V/60HZ SOLENOID, 1/8 ORIF.	99042
3	3/8 NPT CHECK VALVE	99162
4	1/2 NPT DRAIN VALVE	991788
5	1/2 NPT STEAM OUTLET NIPPLE	100380
6	1/2 NPT GAUGE GLASS ASSEMBLY	85331
7	1/2 NPT 100 PSIG S. VALVE	99136
8	1/4 NPT PRESSURE GAUGE	99197
9	HI-LIMIT PRESSURE CONTROL	99066
10	OPERATING PRESSURE CONTROL	99066
11	ACCESS PANEL	———
12	MAIN ON-OFF SWITCH	92830
13	PROBE ISOLATOR	100378
14	PROBE SPARK PLUG	90225
15	PROBE, SINCH.	93807F

NOTES:
1. "REF" DIMENSIONS WITH ± 1/16 INCH. OTHER DIMENSIONS APPROXIMATE DUE TO MAKE-UP OF TAPERED PIPING CONNECTIONS.
2. REFERENCE DRAWING C-100382 FOR ELECTRICAL SCHEMATIC.
3. TEES WITH PLUGS PROVIDED FOR CLEAN OUT PURPOSES AT EACH END OF PRESSURE CONTROL MANIFOLD AS SHOWN.
4. SET HI-LIMIT AND OPERATING PRESSURE CONTROLS AT 90 PSIG AND MAX. 80 PSIG RESPECTIVELY.
5. ITEM 8, PRESSURE GAUGE, SHIPPED LOOSE.

Note: Model 20P same as 20A, Model 24P same as Model 24A except pressure controls and gauge, and steam outlet on reverse sides.

INSTALLATION

Caution

Refer to National and all applicable Local Codes for specific Installation Requirements.

Note

Reference heating element clearance requirements for particular boiler to allow for removal of elements.

1. The boiler should be mounted on a solid, level foundation.
2. All piping should be installed by a licensed plumber.
3. When any type water feed other than a pump feed is used, the existing water supply pressure must be 10 psig greater than boiler operating pressure to assure water supply maintains proper water level in boiler. Lack of water can result in improper boiler operation. Keep feed water valves open at all times during normal operation.
4. Connect steam line with customer supplied outlet valve to boiler steam outlet.
5. During normal operation, keep drain valves closed.
6. If pump and boiler are plumbed within 30 ft. (pipe length) a minimum of 2 check valves are required on boiler to avoid damage to pump.

Note

The safety valve shall not be plumbed with a drain line sized less than the outlet size of the safety valve.

WIRING

Caution

Ground boiler according to National Electric Code requirements to avoid shock. Use proper sized wire. Power wiring to boiler should be in accordance with Local and N.E.C. requirements following wiring diagram supplied. Wire size specified adjacent to field wiring terminal block(s). Use 90 °C copper wire **only**.

Purchaser should use a disconnect switch employing circuit breakers or fuses between the main power source and the boiler.

Caution

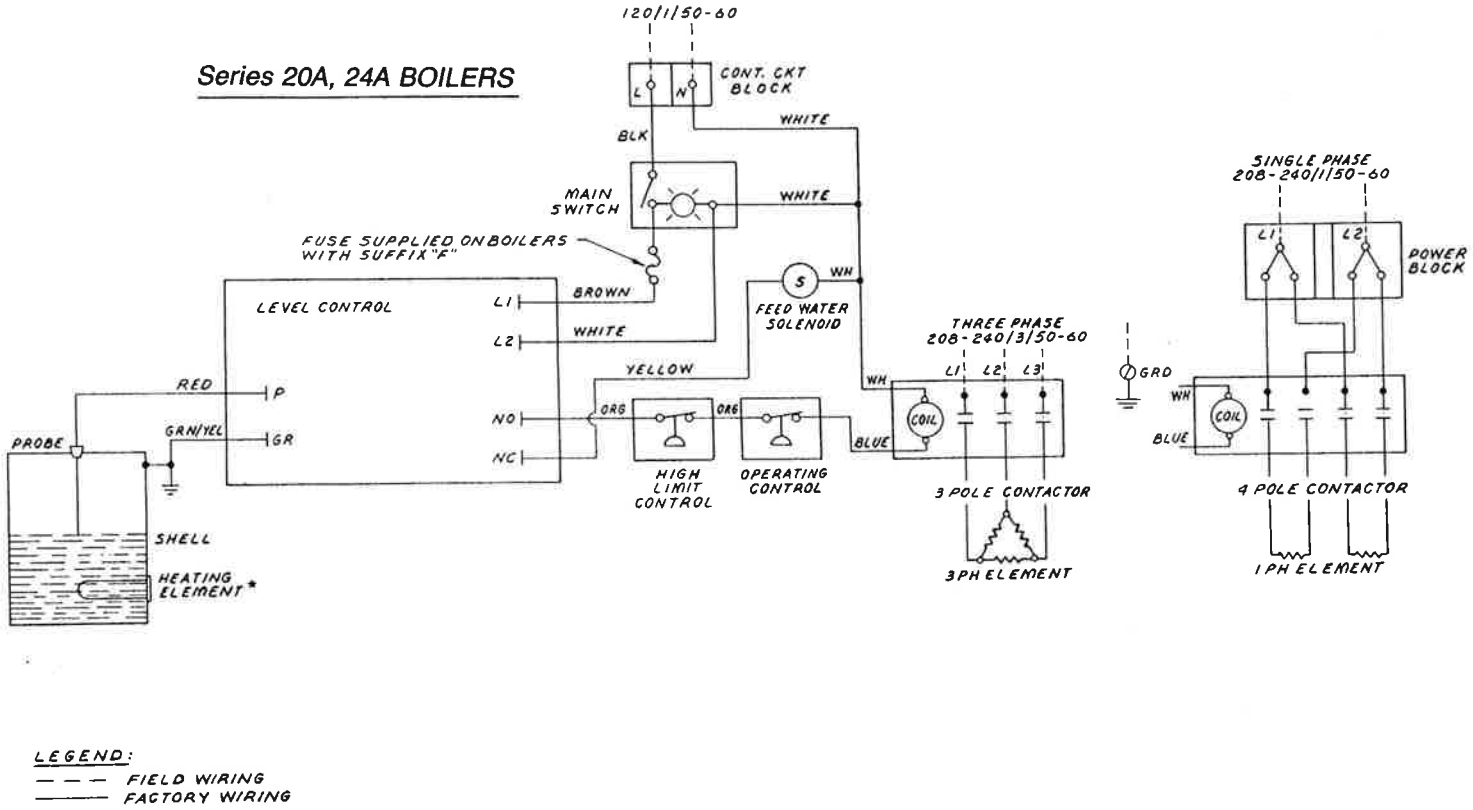
Boilers are susceptible to lightning damage because of plumbing water lines. Industrial-type lightning/surge protectors should be installed according to the manufacturers recommendation at your service entrance. Consult your contractor or electrical dealer.

1. The unit is completely pre-wired and tested. If a separate control circuit is used, it should be connected at the control circuit terminal block.
2. With the main power off, make sure that all wiring terminations are tight to avoid arcing, carbonizing and/or overheating of contacts.

Warning

Substitution of components or modification of wiring systems voids the warranty and may lead to dangerous operating conditions.

3. Instructions for water feed control systems (i.e. condensate return, motor & pump or solenoid feed):
   a. Check the voltage of the motor or solenoid before making electrical connection.
   b. The water feed circuit should be wired to the "Pump Control" terminal block or junction box provided.
   c. Motors rated greater than 1/3HP or are not 120VAC single phase require the use of a suitable motor starter.
   d. **Amperage/Wire Size:** For correct sizing refer to the label on the boiler located next to the field wiring terminals. This label states the wire size (AWG or MCM), minimum temperature rating (90 C) and conductor material (copper only). Deviation from this information may result in improper or unsafe boiler operation.



LEGEND:
— — — FIELD WIRING
——— FACTORY WIRING

Typical Wiring Diagram 20A, 24A

*Replacement Heating Elements

P/N	DESCRIPTION	MODELS
39201B	20kw 208/1/50-60	20A, 20P
39201C	20kw 240/1/50-60	20A, 20P
39203B	20kw 208/3/50-60	20A, 20P
39203C	20kw 240/3/50-60	20A, 20P
39203F	20kw 480/3/50-60	20A, 20P
39243B	24kw 208/3/50-60	24A, 24P
39243C	24kw 240/3/50-60	24A, 24P
39243F	24kw 2/80/3/50-60	24A, 24P

PRE-OPERATION CHECK
ALL BOILERS

I. LWCO/PUMP CONTROL, OPERATION AND TESTING

1. All valves for incoming water supply are to be fully opened. Main disconnect switch to be in "on" position. Boiler switch to be in "on" position. Since boiler will be empty, pump (or solenoid) will be energized allowing boiler to fill with water. Control will allow for automatic reaching of proper water level. Contactors will be energized applying voltage to heating elements.
2. Pump Switch Operation — at this point water should be visible approximately half way up sight glass. Slowly open drain valve located at bottom of boiler. Water level will fall allowing low water cutoff/pump control to energize feed water system. Close drain valve for proper operation.
3. Low Water Cut-out Switch Performance — open drain valve completely. Maintain this condition until water level falls within gauge glass enough to cause low water cutout switch to de-energize heating elements. All contactors will be in the de-energized state at this time. Close the drain valve. For automatic resetting type low water cutout switches, feed system will return water level to normal. Boiler is now qualified for proper low water cutout and normal liquid-level operating conditions.

II. PRESSURE CONTROLS, OPERATION AND TESTING

Note

All steam boilers are provided with one hi-limit pressure control and at least one operating pressure control.

1. All pressure controls are equipped with a screw allowing for setting of the desired operational and hi-limit pressures. To reduce pressure setting, rotate screw in direction which allows indicator to point to a lower pressure setting.

Note

It is recommended that the hi-limit control be set 10 psig above desired normal operation pressure.

2. A differential pressure can be obtained on all automatic re-setting operating pressure controls in the same manner as operating pressure control is set. Differential indicates pressure below the main operating maximum pressure the pressure control will re-set.
3. Pressure Control Operation Check:
   Close steam outlet valve (by customer) and adjust operating pressure control to a low pressure setting. Set hi-limit control at 10 psig above that setting. Switch boiler on to allow for steam pressure build-up. Pressure gauge reading will build and the operating pressure control will shut off boiler at its pressure setting. Re-setting of operating pressure control is accomplished by bleeding off pressure through steam outlet valve (by customer) and allowing pressure to drop below set point.
4. Hi-Limit Pressure Control Check:
   See item 3 above but in doing so, **assure for this test purpose only** that the operating control is set **above** the pressure setting of the hi-limit control. The hi-limit trip will de-energize the contactors. Resetting of the hi-limit occurs after bleeding steam to reduce pressure inside the boiler.

Note

Insure operating pressure control is reset to proper desired boiler operating pressure.

OPERATION

Caution

WITH MAIN DISCONNECT "OFF" TIGHTEN ALL ELECTRICAL CONNECTIONS BEFORE ENERGIZING BOILER TO PREVENT ARCING, CARBONIZING OF CONTACTS AND/OR OVERHEATING.

1. **Turn on water supply.** Turn main switch on. Turn boiler switch to ON position; when approximately halfway up the gauge glass, the pump or solenoid feed will automatically shut off and the contactors will switch ON.
2. **Operation of Low Water Cutoff.** The boiler is equipped with a probe type liquid level control which is coupled to an internal amplifier.
3. **Adjust operating pressure of boiler.** The pressure control has a visual pressure adjustment. The top screw of the control adjusts the scale in the large indicator window. By turning the screw the pressure setting can be adjusted. Selection of desirable pressure is very easily made. Some pressure controls have an additional screw for adjustment of pressure differential (OFF/ON pressure operating range) which is factory set for the maximum allowable rating.
4. Close steam outlet valves. Boiler will build up to desired pressure and shut off automatically.
5. **High Pressure Control.** This control will de-energize the boiler should pressure within the boiler exceed the set pressure.
7. **Slowly** open steam outlet valve and use steam as needed.
8. Boiler should be blown down daily (see blowdown instructions following).

BLOWDOWN

Blowdown is an essential part of boiler operation. It is the best preventive maintenance you can give your boiler and will add years of life to the unit. Make sure a blowdown schedule is established and followed regularly.

In extremely hard water areas blowdown is necessary once a day. In soft water areas, once a week. If there is a particular problem which applies to your own local water condition other than mineral content, take this into consideration in determining which schedule is to be followed.

1. At the end of the working day, while boiler is still operating, turn switch to the OFF position and close water supply valve. De-energize wall mounted safety switch.
2. It is preferable to connect the blowdown valve directly into a drainage system. If this is done, the boiler can be discharged at operating pressure. Consult local plumbing codes.
3. If blowing-down into a receptacle allow pressure to decrease to 15-20 psi before opening blowdown valve.
4. When discharge is complete and boiler is drained - (a) close the blowdown valve; (b) open water supply valve; (c) put boiler switch in the ON position; and (d) close wall mounted safety switch.
5. When refilling is complete turn off the boiler switch unless further operation is desirable.
6. If you have been supplied with a Manual Reset Low Water control as required in some states, the reset button on the control must be pushed before boiler will begin developing pressure. (Do not push reset until boiler has filled with water.)

The use of chemical boiler cleaning compounds in these boiler voids all warranties unless approved by manufacturer. Some compounds will damage copper sheathed heating elements to shorten useful life.

MAINTENANCE

CAUTION

Hazard of electrical shock. Disconnect all power before working on boiler.

Sussman Electric Steam Boilers are designed for years of trouble-free performance. To establish a good preventative maintenance program, we suggest that the building maintenance man or engineer familiarize himself with these simple rules.

1. The use of chemical boiler cleaning compounds voids all warranties. We recommend that a reputable firm of water treatment engineers be consulted regarding conditioning boiler water. Proper selection must be made of a compound to prevent damage to copper sheath heating elements.
2. The sight glass should be checked daily to ensure that boiler has adequate water.
3. A monthly inspection should be made on the internal wiring. All electrical connections should be checked for tightness. A check for water leaks should also be made and any loose fittings immediately tightened.
4. Every four months the low water cutoff and pump control should be checked to insure that it is functioning properly.
5. Every four months the probe should be checked for deposits and cleaned, if necessary. This is accomplished by removing the inspection plate, removing the probe (with a standard spark plug wrench) cleaning and replacing.

Note

The system will not operate if the boiler is using distilled, demineralized or deionized water.

6. Every four months, the heating element should be removed. If scale has begun to form, the element should be cleaned and the boiler be drained and flushed.

INSTRUCTIONS FOR ELEMENT REPLACEMENT READ COMPLETELY BEFORE STARTING WORK

All elements are thoroughly checked before shipment. The manufacturer cannot be responsible for burnouts caused by a faulty low water cut-off.

1. Disconnect boiler from electric power supply at **main safety switch or fuse panel.** Then turn boiler switch to "off" position.
2. On automatic feed units, close valve on incoming water line. Drain boiler completely of water.
3. Open boiler door to expose heating element.
4. Disconnect wire (electric) leads connecting element to main power system of boiler. Again note wire connections to facilitate re-assembly. Proceed to remove (6) $\frac{5}{16}$-18 bolts from flange.
5. Thoroughly clean boiler flange of all foreign material. Be certain no part of old gasket remains on boiler flange.
6. Apply "Slic-Tite" Gasket Compound or equal to both surfaces of new gasket supplied with replacement element. Proceed to install element flange assembly with gasket between boiler flange and element flange. In doing this, be careful to align flange holes so wire connection terminals on element assembly are in line with previously disconnected wire leads to facilitate easy connections.
7. When all (6) flange bolts are tight, connect all wires to terminals. Make certain wires are clean and bright to assure good electrical contact and nuts on screws are firmly secured.

Caution

Bolts should be tightened to a torque of 22 ft lbs.

8. Open water valve so water supply can reach boiler feed mechanism.
9. Put Main safety switch to "on" position.
10. Turn boiler switch to "on" position.
11. As boiler automatically refills, observe the new flange assembly for possible leaks. If water is noticed, the bolts must be retightened. Before doing this turn the boiler off at the main fuse safety switch.
12. As boiler is heated to working pressure, check flange assembly again for leaks.

Caution

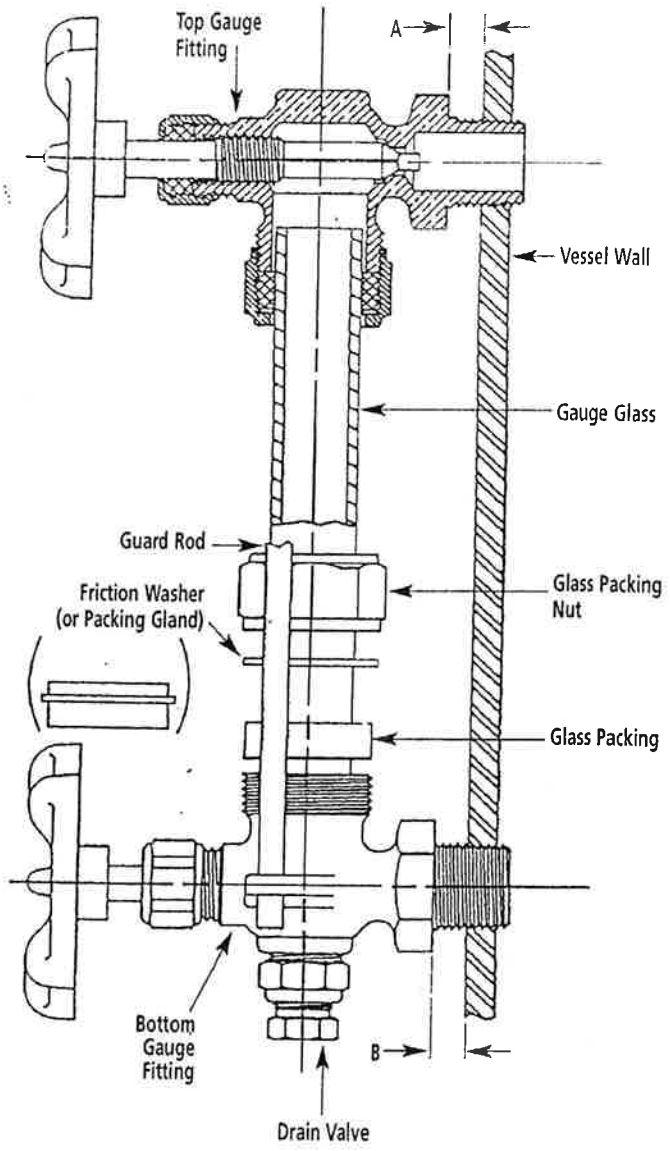
Avoid use of chemical cleaning compounds. Follow maintenance instructions.

— NOTES —

SUSSMAN ELECTRIC BOILERS, a division of SUSSMAN-AUTOMATIC CORPORATION • 43-20 34TH STREET, LONG ISLAND CITY, NEW YORK 11101 • (718) 937-4500
TOLL FREE 800-238-3535 FAX 718-937-4676

Gauge Glass Installation

IMPORTANT NOTE: *Read all warnings and instructions before performing installation or maintenance. Safety glasses and gloves should be worn at all times when working with or examining water gauge glass and connections. Pressure in generator to be at zero before proceeding. Improper installation or maintenance of gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.*



1. Apply Teflon tape or pipe dope to pipe threads. Install top gauge fitting (fitting without a drain valve) into the uppermost tapping. Wrench tighten the fitting until it is snug and the glass outlet is pointing at five o'clock (about 1/8 turn from its final downward vertical position).
2. Install the bottom gauge fitting (the fitting with a drain valve) until it is snug and the glass outlet is pointing directly upward. Verify top and bottom fittings are threaded into the tappings the same number of turns (distance A= distance B).
3. Remove glass packing nut, friction washer (or packing gland, depending upon the model), and glass packing from the fittings, and place them, in the same order, on to both ends of the gauge glass. Push both packings about an inch up the gauge glass.
4. Gently insert one end of the glass into the top gauge fitting. Keeping the glass inside the top fitting, gently rotate the top gauge fitting clockwise until vertically aligned with the bottom gauge, then insert glass into bottom fitting until glass bottoms out on the shoulder inside the bottom fitting.
5. Carefully raise glass about 1/16" and slide lower glass packing down until the glass packing contacts the lower gauge fitting. DO NOT allow the glass to remain in contact with any metal!
6. Carefully slide upper glass packing up as far as possible.
7. Hand tighten both glass packing nuts, then tighten 1/2 turn more by wrench. Tighten only enough to prevent leakage. DO NOT OVER TIGHTEN!
   If any leakage should occur, tighten lightly, a quarter turn at a time, checking for leakage after each turn.

IMPORTANT NOTE: *Read all warnings and instructions before performing installation or maintenance.*

WARNING *Safety glasses and gloves should be worn at all times when working with or examining water gauge glass and connections.*

Pressure in generator to be at zero before proceeding.

Improper installation or maintenance of gauge glass and connections can cause immediate or delayed breakage resulting in bodily injury and/or property damage.

Sussman® ELECTRIC BOILERS

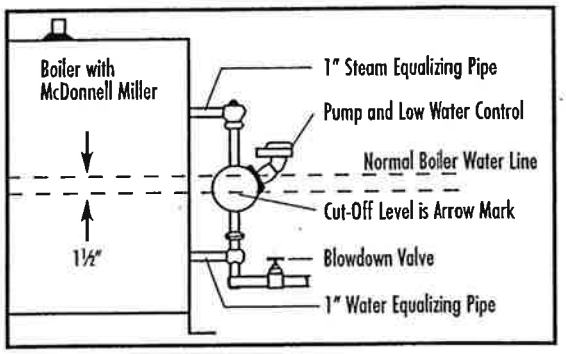
Instructions for Element Replacement

READ INSTRUCTIONS COMPLETELY BEFORE STARTING WORK

CAUTION Before Installing your new elements be sure the McDonnell Miller low water cut-off and aux. low water cutoff (if supplied) is operating properly. The float chamber and lower equalizer column of the MM control must be completely clear of sludge or other foreign matter. Failure to do this may cause the immediate burn-out of the new elements. If the unit is probe equipped, check condition of the probes and isolator.

All elements are thoroughly checked before shipment. The manufacturer cannot be responsible for burn-outs caused by a faulty low water cut-off.

The lower equalizer column can best be examined by breaking the unions on either side and then visually and manually examining the piping with your finger or probes to see if it is clear and clean.



1. Disconnect boiler from electric power supply at main safety switch or fuse panel. Then turn boiler switch to "OFF" position.
2. Close water supply valve on incoming water supply line. Drain boiler completely of water.
3. Open boiler door to access heating element.
4. Disconnect wire (electric) leads connecting element to main power system of boiler. Again, note wire connections to facilitate re-assembly. Proceed to remove and discard (6) bolts from flange.

IMPORTANT: Note the wire connections to facilitate re-assembly (see wiring schematic). Remove and discard six (5/16"-18) bolts from flange. Do not reuse these bolts.

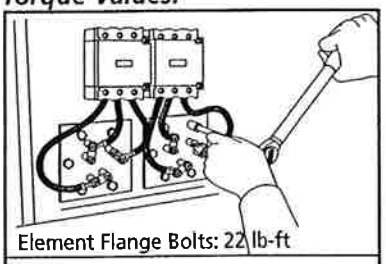
5. Thoroughly clean boiler flange of all foreign material. Be certain no part of old gasket remains on flange.
6. Apply "Slic-Tite" Gasket Compound (or equal) to both surfaces of new gasket supplied with replacement element. Proceed to install element flange assembly with gasket between boiler flange and element flange. In doing this, be careful to align flange holes so element wire connection terminals on element assembly are in line with previously disconnected wire leads to facilitate easy connections.

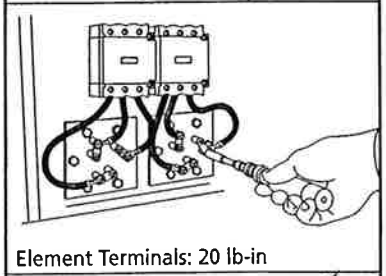
NOTE: Observe markings on element flange. Install element marking "TOP" on top.

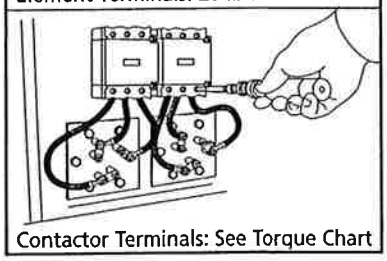
7. Use only new element flange bolts. Tighten all (6) element flange bolts to a torque value of 22 lb-ft each (see illustration).
8. Connect all wires to the terminals. Tighten all element terminals to a torque value of 20 lb-in each (see illustration). Make sure all wires are clean and bright to assure good electrical contact.
9. Check that the wires are correctly connected to the contactor terminals and are tightened to a torque value of 45 lb-in. (see illustration). Make sure all wires are clean and bright to assure good electrical contact.
10. Open water valve to allow water supply to reach boiler feed mechanism.
11. As boiler automatically refills, observe the new flange assembly for possible leaks. If water is noticed, the bolts must be re-tightened. Before doing this, turn the boiler off at the main fuse safety switch.
12. When boiler reaches working pressure, check flange assembly again for leaks.

CAUTION Avoid use of chemical cleaning compounds. Follow maintenance instructions provided with the boiler.

Torque Values:


Element Flange Bolts: 22 lb-ft


Element Terminals: 20 lb-in


Contactor Terminals: See Torque Chart

For Illustrative Purposes Only.
Power wiring shown in approximate factory-installed location

TORQUE VALUES		
Element Flange Bolts		22 lb-ft
Element Terminals		20 lb-in
Contactor Terminals	50 amp	25 lb-in
	60 amp	45 lb-in
	75 amp	75 lb-in

PN 103923 8/07

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A Division of Sussman-Automatic Corporation
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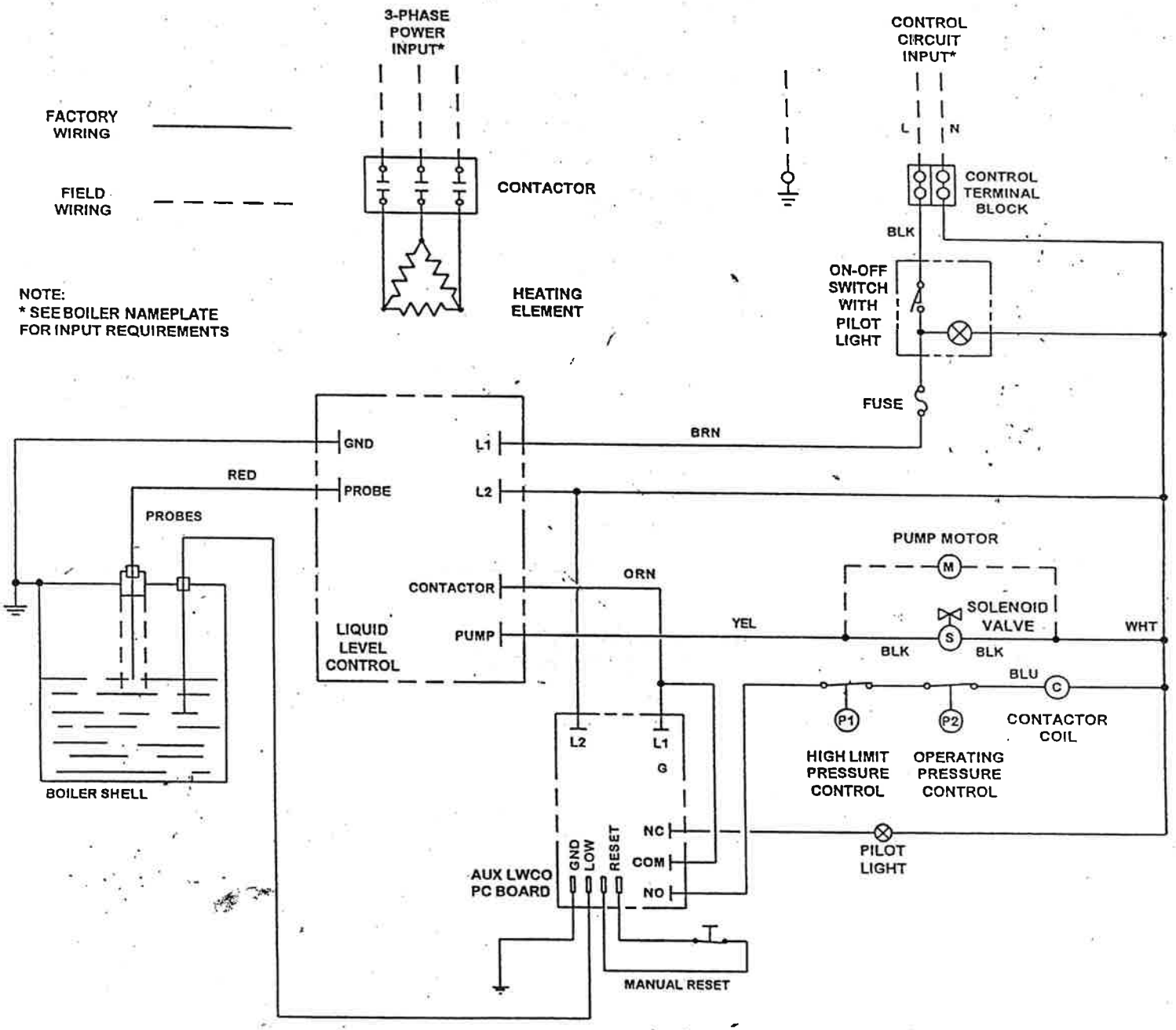


WIRING DIAGRAM - CONTROL CIRCUIT
ES24A-PRI ELECTRIC BOILERS

FE041906

Sussman ES 24A

FORM P-2A MANUFACTURERS' DATA REPORT FOR ALL TYPES OF ELECTRIC BOILERS

As Required by the Provisions of the ASME Code Rules, Section I

17413

PART I ---- To Be Completed by the Manufacturer of the Boiler Pressure Vessel

1. Manufactured by TDC Manufacturing, Inc., 155 Route 61 South, Schuylkill Haven, PA 17972
(Name and address of manufacturer of boiler pressure vessel)

2. Manufactured for Sussman Automatic Corp, 43-20 34th Street, Long Island City, NY 11101
(Name and address of purchaser)

3. Location of Installation Unknown
(Name and address)

4. Type Resistance Element (resistance element, electrode) Boiler No. 73718 (Mfr's Serial No.) N/A (CRN)
991310-1 Rev. A; 991310-2 Rev. B
991310-3 Rev. C; 991310-4 Rev. B (Drawing No.) 73718 (Nat'l Brd. No.) Year Built 2009

5. The chemical and physical properties of all parts meet the requirements of Material Specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to Section I of the ASME Boiler and Pressure Vessel Code 2007 (year)
Addenda to A08 (date), and Code Cases None (Numbers).

Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors are attached for the following items of this report:

N/A
(Name of part, item number, mfr's name and identifying stamp)

6. Shells or drums: 1 (no.) SA-285C (mat'l. spec. gr.) 5/16" (thickness (in)) 6" (dia (ID)) 14" (length, inside) 16-1/8" (dia (ID)) N/A (length, inside)

7. Joints: Welded (long (seamless, welded)) 100% (efficiency (as compared to seamless)) N/A (girth (seamless, welded)) 1 (No. of shell courses)

8. Heads: SA-285C, 1/2" Flat
(Mat'l Spec. No.: thickness---flat, dished, ellipsoidal --- radius of dish)

9. Other Parts. 1. Staybolts (4) 2. Element Flange (1) 3. 1/2" NPT Half Coupling (2)
(Brief Description --- i.e. dome, boiler piping, etc.)

1. SA-36, 1" RD – Welded
2. SA-106B, 4" Double Extra Strong seamless Pipe, 0.674" Thk.
3. SA-105, ½" NPT 3000 PSI Half Coupling.
(Mat'l. Spec., Gr., size, material thickness, MAWP)

10. Openings: (a) Steam (1) 1/2" NPT (See Remarks) (No., size, and type) (b) Safety Valve (1) 3/4" NPT (See Remarks) (No., size, and type)
(c) Blowoff (1) ½" NPT (See Remarks) (d) Feed (1) ½" NPT (See Remarks)
(e) Manholes: No. N/A Size Location
(f) Handholes: No. N/A Size Location 1
(g) Elements/Electrodes: No. (1) 24 KW Size 3-1/8" Location Lower Front Shell

11. Boiler Supports: No. Self Supported Type N/A (saddles, legs, lugs)
Attachment N/A (bolted or welded)

12. MAWP 100 psi Based on PG31, PG46, PG49 (Code, para, and/or formula)

13. Shop Hydrostatic Test 300 psig 14. Maximum Designed Steaming Capacity 84 lb / hr

15. Remarks **TAPPED OPENINGS:**
(1) 3/8" NPT Top Head (2) ¾" NPT Shell
(3) ½" NPT Shell (1) 1" NPT Top Head
1) Product design provided by Sussman-Automatic Corp. 2) Relief valve supplied by Sussman-Automatic Corp.

CERTIFICATE OF COMPLIANCE OF BOILER PRESSURE VESSEL

We certify the statements in Part I of this Data Report to be correct
Our Certificate of Authorization No. 18,959 to use the (S) or (M) "M"
Symbol expires September 8, 2009
Date 07/22/2009 Signed (Authorized Representative) Marc Barbe Name TDC Manufacturing, Inc. (Mfr. Or boiler pressure vessel)

FORM P-2A

Boiler No. 73718 (Mfr's Serial No.) — N/A (CRN) — See Part I, Item 4, Drawing No. (Drawing No.) — 73718 (Nat'l Brd. No.)

CERTIFICATE OF SHOP INSPECTION OF BOILER PRESSURE VESSEL

BOILER PRESSURE VESSEL MADE BY TDC Manufacturing, Inc. at 155 Rt. 61 South, Schuylkill Haven, PA 17972
I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and / or the State or Province of PA and employed by OneCIS Insurance Company
have inspected parts of this boiler pressure vessel referred to as data items 1 – 15
and have examined Manufacturer's Partial Data reports for Items N/A
and state that, to the best of my knowledge and belief, the manufacturer has constructed this boiler pressure vessel in accordance with the applicable sections of the ASME BOILER AND PRESSURE VESSEL CODE.
By signing this certificate neither the inspector nor his employer makes any warranty, expressed or implied, concerning the boiler pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the inspector nor this employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 07/22/2009

Charles C. Young, Jr. (Authorized Inspector) — Commissions NB# 9544ANI PA# 2392 (Nat'l. Board (incl. endorsements), State, Province, and No.)

Part II – To Be Completed by the Manufacturer Responsible for the Completed Boiler

16.

Item	Piping				Valves			
	Size	Sch.	Spec,	Bolted, Threaded or Welded	Size	Type	Rating	No.
(a) Steam Pipe	1/2	40	SA53	THD				
(b) Feed Water	1/2	40	SA53	THD	Stop 3/8	BALL	125	1
Feed Water					Check 3/8	SPR	125	2
(c) Blowoff	1/2	40	SA53	THD	1/2	GATE	150	1

17. Safety Valve(s) No. 1 Size 1/2 Set Press 100 Total Capacity lb /hr 423
18. Heating Elements Installed: Quantity 1 kW Total 24
19. Electrodes: Quantity _____ kW Total _____
20. Hydrostatic Test of Completed Boiler 150 psig MAWP of completed boiler 100 psig
21. Serial No. Assigned by Manufacturer responsible for Completed Boiler SS-58092

CERTIFICATE OF COMPLIANCE OF COMPLIANCE OF COMPLETED BOILER

We certify that this completed boiler conforms with the requirements of SECTION I of the ASME BOILER AND PRESSURE VESSEL CODE.
Our Certificate of Authorization No. 14,958 to use the (S) or (M), or (E) _____
Symbol expires JANUARY 15, 2012
Date NOV 18 2009 Signed _____ (Authorized Representative) Name SUSSMAN-AUTOMATIC CORPORATION (Assembler)

CERTIFICATE OF SHOP INSPECTION OF COMPLETED BOILER

BOILER MADE BY _____ at _____
I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and / or the State or Province of _____ and employed by _____
of _____ and have inspected the completed boiler
and have examined Manufacturer's Partial Data reports for _____
and state that, to the best of my knowledge and belief, the manufacturer has constructed this boiler in accordance with the applicable sections of the ASME BOILER AND PRESSURE VESSEL CODE.
By signing this certificate neither the inspector nor his employer makes any warranty, expressed or implied, concerning the boiler pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the inspector nor this employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date _____

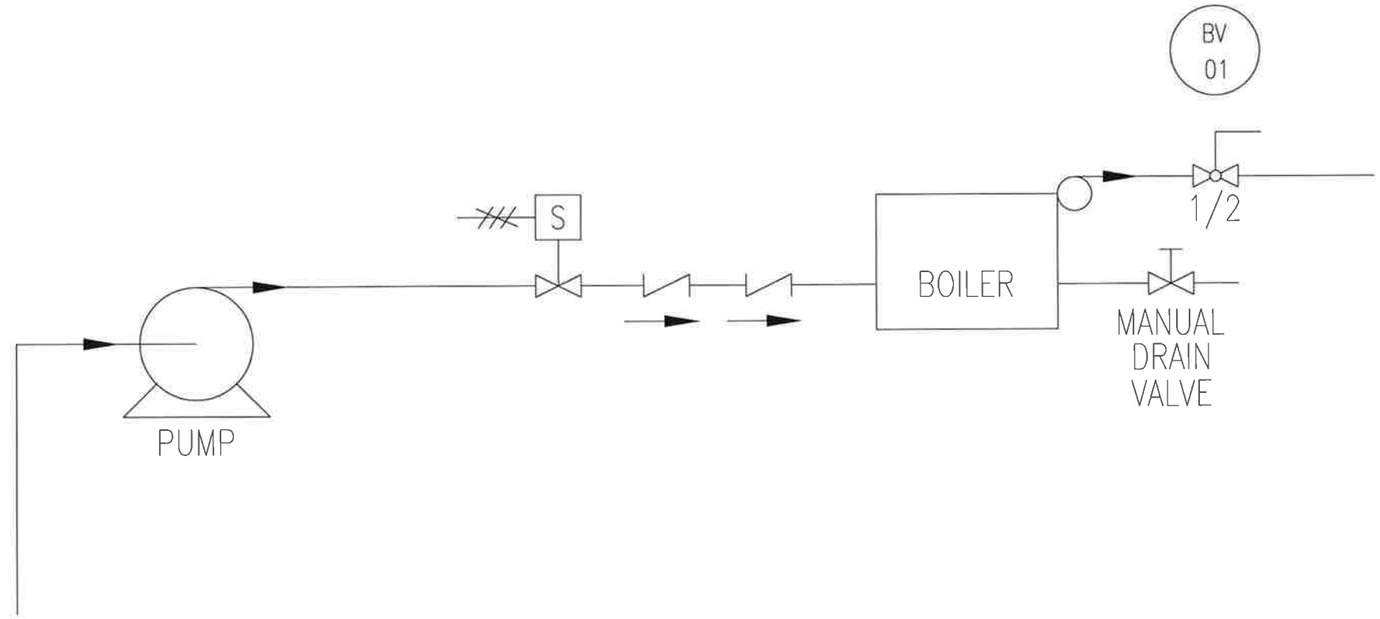
_____ (Authorized Inspector) Commissions _____ (Nat'l. Board (incl. endorsements), State, Province, and No.)

SYMBOL LEGEND

CHECK VALVE

BV 01 — BALL VALVE

SV 01 — S — SOLENOID VALVE



CONNECT TO STEAM SUPPLY IMMEDIATELY BEFORE STEAM SUPPLY PRESSURE REGULATOR.

CONNECT TO COLD WATER SUPPLY IMMEDIATELY DOWNSTREAM FROM STRAINER.

REV	DESCRIPTION	BY	DATE
F	REVISED TITLE BLOCK	N.T.	12-02-09
E	ADDED 2640Y8 TO ELEC DWG: BLOCK	N.T.	04-29-09
D	UPDATED COMPANY NAME IN TITLE BLOCK & ADDED NUMBER 2106Y8 TO TITLE BLOCK	B.S.	04-02-08
C	ADDED NUMBER 1908Y8 TO TITLE BLOCK	B.S.	03-14-05
B	ADD 1331Y8 ELECT.# TO WHERE USED	J.T.B.	08-14-03
A	ADD MANUAL DRAIN VALVE	D.S.	03-16-01

REVISIONS

THESE DRAWINGS ARE:
- ☐ FOR APPROVAL
- ☐ FOR INFORMATION ONLY
- ☒ AS BUILT
- ☐ DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
.X ±.03
.XX ±.010
.XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

DRAWN BY: D.S. DATE: 03-02-99
CHECKED BY: B.S. DATE: 03-02-99
APPROVED BY: DATE:
SCALE: N.T.S.

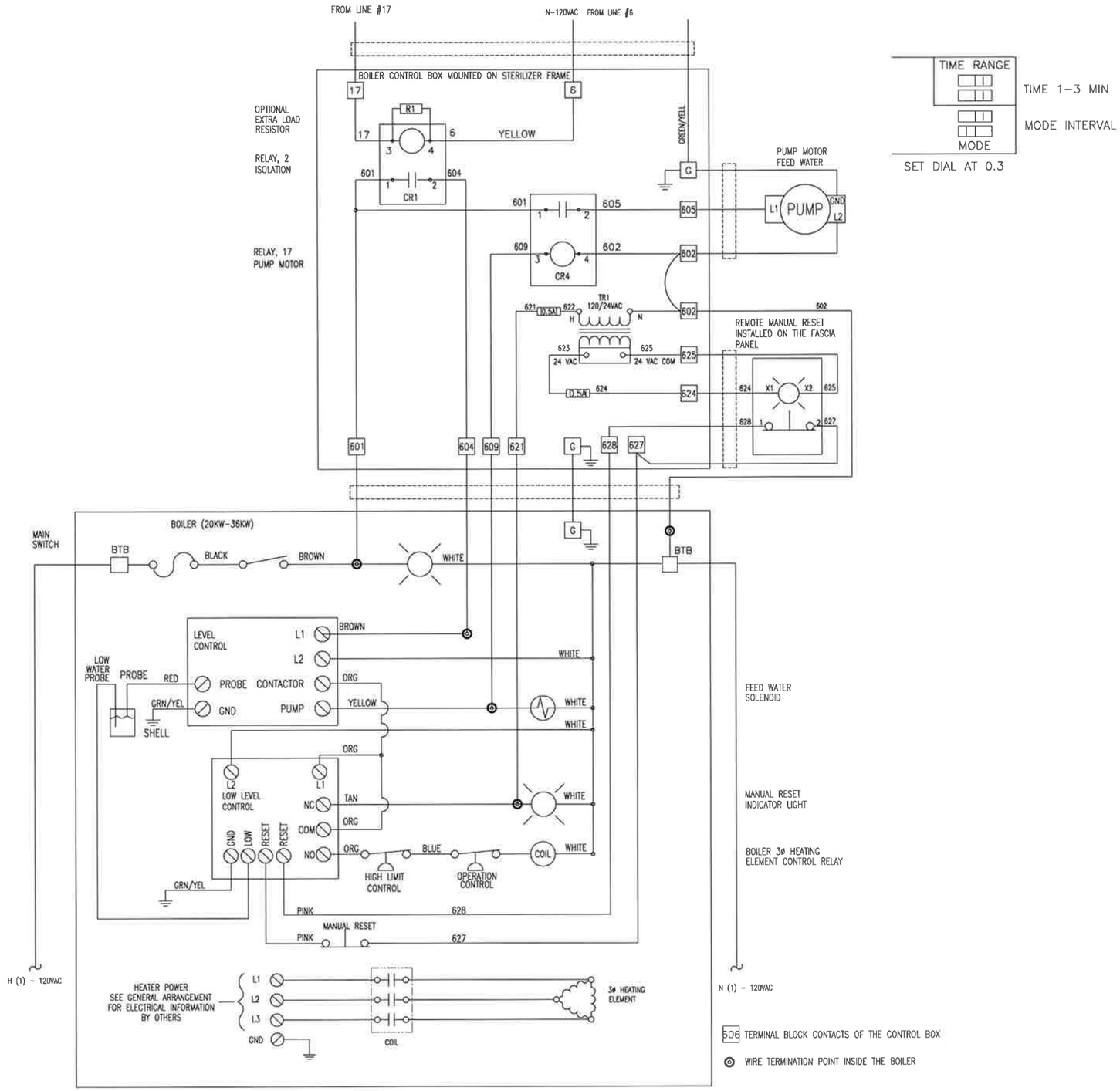
JOB NO:
MODEL:
ELEC DWG: 1331Y8, 1908Y8, 2106Y8, & 2640Y8
SIZE:

TITLE: BOILER, 24KW, 240 VAC, 3Ø, INTEGRAL PIPING DIAGRAM

PRIMUS
STERILIZER COMPANY, LLC
117 SOUTH 25th ST.
OMAHA, NE 68131
PH. (402) 344-4200
FAX (402) 344-4242

DRAWING NO.: 1211Y8 REV: F

Z:\ENGR\ACAD\NEW\MANDWGS\PLUMBING\BOILERS\24KW\INTEGRAL\1211Y8.dwg, 1/5/2010 7:50:36 AM, PLOT ORIGIN: ECLIPSE



REV	DESCRIPTION	BY	DATE
A	UPDATED TITLE BLOCK	NT	12-02-09

REVISIONS

THESE DRAWINGS ARE:

- [ ] FOR APPROVAL
- [ ] FOR INFORMATION ONLY
- [X] AS BUILT
- [ ] DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:

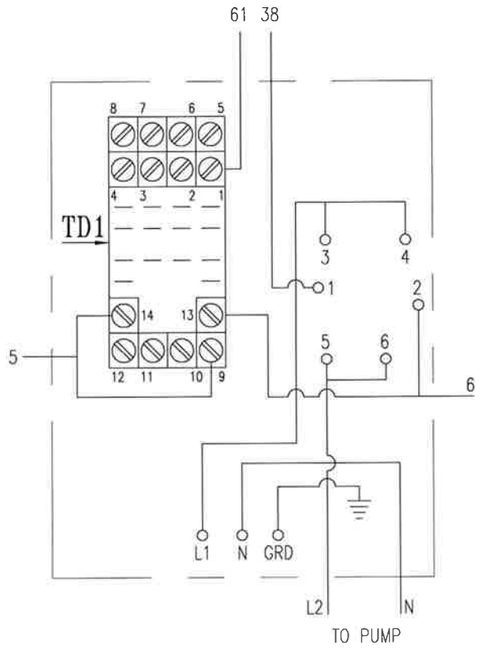
TOLERANCES (UNLESS OTHERWISE SPECIFIED)
.X ±.03
.XX ±.010
.XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

DRAWN BY: N.T.
DATE: 04-29-09
CHECKED BY: B.S.
DATE: 04-29-09
APPROVED BY:
DATE:
SCALE: N.T.S.
JOB NO:
MODEL:
PIPING DWG: 1211Y8
SIZE:

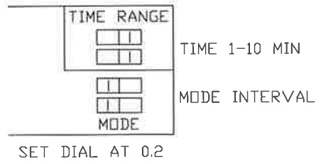
TITLE: INTEGRAL BOILER W/MANUAL RESET AUXILIARY LOW WATER CUT-OFF
24K 240 VAC ELECTRICAL CONNECTION

PRIMUS
STERILIZER COMPANY, LLC
117 SOUTH 25th ST.
OMAHA, NE 68131
PH. (402) 344-4200
FAX (402) 344-4242

DRAWING NO.: 2640Y8
REV: A



TO PUMP



SET DIAL AT 0.2

38 – EJECTOR WIRE L1
5 – L1 CONTROL BOX
61 – L2 CONTROL BOX
GRD – GRD CONTROL BOX

REV	DESCRIPTION	BY	DATE
A	LINE 5 NO LONGER RUNS TO NUETRAL	N.T.	04-02-09

REVISIONS

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- ☐ FOR APPROVAL
- ☐ FOR INFORMATION ONLY
- ☒ AS BUILT
- ☐ DRAFT

EQUIPMENT NO: _____
SPECIFICATION NO: _____
FLOOR NO: _____
ROOM NO: _____

CUSTOMER INFORMATION:

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
X ±.03
XX ±.010
XXX ±.005
FRACTION ±1/16
ANGLES ±0°30'

DRAWN BY: NT
DATE: 10-15-08
CHECKED BY: BS
DATE: 10-15-08
APPROVED BY:
DATE:
SCALE: N.T.S.

JOB NO:
MODEL: ALL
STERILIZER SERIAL NO:
SIZE: ALL

TITLE: WATER RECIRCULATION TANK (ELECTICAL CONNECTION)

PRIMUS
STERILIZER COMPANY, LLC
117 SOUTH 25th ST.
OMAHA, NE 68131
PH. (402) 344-4200
FAX (402) 344-4242

DRAWING NO: 2584Y1
REV: A