STERILIZERS

Technical Manual

Version 2.16
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Presented by:
WBCS

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1. General Information

1.1. Introduction

Chosen sterilizers come in a variety of types and sizes and are modified AMSCO sterilizers. They are basic sterilizers with reduced parts and electronic components to make them easier to use and maintain. The key component to these sterilizers is the AMSCO Medallion Multi-port Valve. This manually operated five position steam valve controls the operation of the sterilizer.

The actual components and placement of parts will vary from unit to unit. Piping materials (plastic, galvanized, iron, copper, flexible hose, etc.) and piping sizes (½ or ¾ inch) also vary from unit to unit.

No model or serial numbers are assigned to most of the sterilizers. Identification is usually accomplished using the chamber size and purchasing information (who purchased, for where, and when). For inventory management purposes, it is recommended that the serial number on the steam boiler be used or an equipment ID number that is created by the customer. Some more recently built sterilizers have been serialized by Chosen.

Reimers boilers are the typical steam generators used. However, models will vary from sterilizer to sterilizer based on age and sterilizer size. Sussman boilers have also been used on some installations. The names “boiler” and “generator” are interchangeable throughout this manual.

Portions of this manual were created/written by CHOSEN Mission Project and other portions were created/written or revised by Worldwide Biomedical Charitable Services (WBCS). All portions are subject to change.

Every effort is made to provide accurate and complete information within this CHOSEN STERILIZERS TECHNICAL MANUAL. However, with the number of documents available and varied maintenance and operating opinions, we cannot guarantee there will be no errors. WBCS makes no claims, promises or guarantees about the accuracy, completeness, or adequacy of the contents of this manual and expressly disclaims liability for errors and omissions in the contents of this manual.

Typical Sterilizer Sizes

Chamber	Boiler
16 X 16 X 26	20 kw
20 X 20 X 38	20 kw
24 X 36 X 48	30 kw

1.2. Safety Hazards

EXPLOSION HAZARD: Steam sterilizers are pressure vessels, designed to withstand steam pressures at various levels. The vessels are designed with the pressure requirement for sterilization in mind and are tested and approved for a specific safe maximum pressure. On units made in the United States, these maximum pressures are recorded on a boiler plate tag, which is attached to each unit. Pressures are stated in "pounds per square inch", which means that every square inch of exposed area can withstand this pressure. A door, with dimensions of 20" wide and 20" high, has a square inch area of 400". Exceeding the recommended pressure for the specific vessel could result in structure failure of the vessel and could result in damage to the equipment and cause injury to personnel, and potential death. Doors or covers on the sterilizers are generally the most suspect to fail under pressure. This does not mean that other areas of the vessel should be ignored. Routine inspection and maintenance of the vessels, with particular attention to the doors, can go a long way in preventing a disaster. The goods themselves can also be an explosion hazard, particularly in vessels containing liquid, which are commonly made of glass. Exposure to rapid temperature changes and shock can cause these glass vessels to explode.

BURN HAZARD: As steam with temperatures above the boiling point of 212F is used in the sterilizing process, the potential of receiving burns is always present. Although steam is the source for the heat, it should be remembered that the sterilizer itself and the goods being sterilized become hot and can cause burns. Care should be taken to ensure proper equipment is worn and goods are cool enough to handle. Particular attention should be given to metal objects, such as loading equipment and instruments. Steam supply lines, drain lines and exhaust outlets from safety valves are also sources of heat and should be avoided.

PHYSICAL HAZARD: Both of the above, explosions and burns, are considered physical hazards. Although most sterilizers are equipped with devices to prevent the doors from being opened while pressure is in the vessel, care should be taking when attempting to open the vessel, as devices can fail, causing injury. The force of a door opening under pressure can propel the door and anything or anyone in its path at a high rate of speed. Caution should be observed when opening the sterilizer door. DO NOT open the door when the chamber pressure gauge indicates pressure in the chamber. Door with radial arms should be opened slowly, which will allow any pressure to escape prior to the complete disengagement of the radial arms from their anchor points.

ELECTRICAL SHOCK: Disconnect all electrical utilities to sterilizer before servicing. The steam generators typically utilize two separate power sources (one for the heaters and one for the control circuit), so verify ALL power sources are disconnected or turned off.

2. Installation Instructions

2.1. Installation

The pressure steam sterilizer is necessary to assist in the control of infection. To function as intended and for safety, the unit must be installed properly. Read all warnings and installation instructions prior to attempting installation.

If possible, the sterilizer(s) should be installed through a partitioned wall with only the front protruding into the Central Sterilizing Department. The remainder should be in a well-ventilated area with sufficient room to conduct maintenance on the unit(s). Do not build a wall tight against the sterilizer(s), but leave space for expansion. This arrangement provides several advantages; maintenance can be performed outside the sterile supply area and less heat will be released into the area of Central Sterilizing. If an electric steam generator (boiler) is used in conjunction with the sterilizer(s), it should be located as close as possible to the sterilizer(s) while still maintaining room to perform maintenance. Refer to boiler manufacturer's installation instructions for further details.

WARNING – Sterilizer must be properly secured. Some sterilizers are top heavy and when the heavy door is opened, the redistribution of weight may cause the unit to tip. The potential movement of the sterilizer and rupturing of the steam lines could cause personnel injuries.

2.2. Installation Guidelines

1. Provide adequate space around the sterilizer for proper operation, maintenance, and component replacement when necessary. Remember to allow sufficient room in front to permit opening the door with additional room for loading and transfer carriages and safety of personnel. Allow additional room if an electric steam boiler is used as replacement of heaters requires additional space.
2. The chamber floor must slope slightly toward the front to allow condensation to flow out of the chamber drain. Condensation allowed to remain in the chamber will hamper proper operation. CAUTION – Do not elevate the back of the chamber more than necessary. If loading carriages are used, they may drift to the front and roll out when the door is opened.
3. Horizontal steam supply lines must slant toward the sterilizer and any vertical runs should have steam traps at the bottom to permit the removal of condensation. Long steam line runs and lines where people could come in contact with them should be insulated to reduce heat loss and injuries.
4. The sterilizer chamber and jacket drain lines must be provided with air gap between them and the waste drain. Sterilizers may create internal vacuums which could draw waste water into the chamber and contaminate the load. These air gaps also provide an easy way to visually inspect the proper operation of the steam traps (observing the amount of steam escaping). The drain lines should slope away from the sterilizer. Steam traps and check valves must be installed in the following manner: Steam traps are mounted with the cap in the up position. Check valves are installed with the hinge pin in the up position. Strainers are placed in the drain lines prior to the traps to keep foreign matter out of the traps.
5. To prevent excess heat in the sterilizer area and personal injuries, the sterilizer exhaust line should be piped out to the atmosphere in a safe area. The exhaust line may be run horizontal to the outside, but if there is a vertical rise in the line, it must have a drip line to prevent condensation from running toward the sterilizer.
6. The safety relief valve should have, at a minimum, a line running down towards the floor to prevent the accidental release of steam in the direction of personnel. DO NOT connect the exhaust line and safety relief lines together as the steam pressure from the exhaust can potentially damage the relief valve.

7. Provide proper electrical disconnects and circuit breakers/fuses as required. Most steam generators will require 415 volt / 3 phase input power for the heating elements and 110 or 220 volt for the control input power. The control input power can NOT come from the heating element power.
8. Water supply feeding the steam generator (boiler) should first go through a water filter rated at 50 microns or better.
9. Water input pressure can be normal gravity feed pressure. Most boilers require four (4) gallons of feed water per hour for each 10 kW of electric heating capacity of the boiler.
10. For installation details on the electric steam generator, refer to the manufacturer's instructions.
11. New shipment sterilizers may have a vacuum on the chamber and door won't open. To open the chamber door, cycle the multiport valve to vent. New sterilizers may or may not have been set to the proper operating temperature, so this adjustment may need to be made during the initial installation process.
12. After the sterilizer is fully installed, go through the "Troubleshooting and Installation" procedure found in section 5.1. and verify there are no leaks and all components are functioning properly.

Recommended Air Gaps

These air gaps (back flow preventers) are NOT installed or supplied by CHOSEN and are the responsibility of the end user. They allow the user to observe the amount and source of any condensation coming from the unit.

The air gap drain fitting is designed to attach to the relief port on a Reduced Pressure Zone (RPZ) backflow device and pipe to a drain to direct any discharge to a safe place. Bottom features a 1/2" Female NPT Connection. Costs are approximately $35 to $45.

0881576 - Watts 919-AGC and 0881399 - Watts 909-AGA Air Gap Drain Fittings

Newer CHOSEN sterilizers come with the two steam traps connected to one drain line. It has a ¾" threaded fitting. This means only one air gap can be installed and troubleshooting a steam leak could not be narrowed down to the specific steam trap.

3. Operating Instructions

NOTE: The Basic Operating Instructions (3.1.) are modified instructions from the original Chosen Instructions for Sterilizer Operation (3.2.) and are for sterilizers with the Operation Valve label with "OFF" at the top of the label. The Operating Instructions for Autoclave (3.3.) are for sterilizers with the Operation Valve label with "Start" at the top of the label. See Control Panels (3.4.)

3.1. Basic Operating Instructions

1. Make sure the sterilizer Steam Supply valve is closed and the Operation Valve is in the "off" position.
2. Make sure the steam supply valve on the boiler is open. Turn on the boiler and allow it to reach operating temperature (normally set for approximately 80 PSI).
3. Open the Steam Supply valve on the sterilizer and allow jacket pressure gauge to reach 18 – 22 PSI and the boiler pressure to be at normal operating pressure (80 PSI).
4. Load the sterilizer chamber and close the door tight by turning the hand wheel clockwise.
5. Turn the Operation Valve clockwise to "Sterilize". Allow both the jacket and chamber pressure gauges to reach operating pressure of 18 – 22.
6. The Temperature gauge on the sterilizer must reach at least 250^{o}F degrees. After the sterilizer temp reaches 250^{o}F, turn timer clockwise to 30 minutes.
7. At the end of the 30 minute sterilization period, turn the Operation Valve to "Slow Exh" if liquids were sterilized or "Fast Exh" for all other loads.
8. When the chamber pressure reaches zero, turn the Operation Valve to "Dry" and reset the timer to 15 minutes. At the end of the 15 minute dry cycle, turn the Operation Valve to "Off". Open the chamber door slightly to relieve any remaining pressure or steam.
9. If another load is to be run, repeat steps 4 – 8. When finished, close the Steam Supply valve and turn off the boiler.

3.2. Instructions for Sterilizer Operation

1. CONDUCT PRELIMINARY CHECKS
    a. Insure that previous loads have been removed and the chamber is empty
    b. Determine that all safety and maintenance checks have been performed
    c. Steam supply valve is closed
    d. Operating valve is in the "OFF" position
2. STEAM SUPPLY – A suitable steam supply must be available at the sterilizer "Steam Supply Valve". When an electric steam boiler is used to provide steam, it must be started first and allowed to come up to operating pressure before applying steam to the sterilizer. Failure to do this could flood the sterilizer jacket with water and cause other problems. Follow steam boiler operating procedures as specified in the manufacturers operating manual.
3. OPEN STEAM VALVE – Partially open the supply valve and allow the sterilizer jacket to purge and begin to warm up before fully opening the valve. Failure to do this could cause boiler pressure to drop too rapidly and allow water to enter the sterilizer. If the sterilizer is provided with a "Hi-Lo" steam control valve, ensure that the valve is properly adjusted for the desired pressure. When operating at the sterilizing temperature of 250^{o} -252^{o}F (121^{o}C), the jacket pressure should be approximately 18 -22 psi. When operating at 270^{o}-272^{o}F (132^{o}C) the jacket pressure will be approximately 30 – 32 psi. If these pressures cannot be obtained, contact CHOSEN or qualified service personal.
4. STERILIZER WARM UP – Allow the sterilizer to warm up before loading the chamber. This warm-up will help reduce the amount of condensation in the chamber, which could contaminate or cause wet loads.

5. STERILIZER LOADING – Load the sterilizer using the prescribed method for the goods being sterilized. Do not pack the items too tightly, as steam must circulate through the fabrics and must come in surface contact with all the goods to be sterilized.
6. CLOSE THE CHAMBER DOOR – Close the chamber door and turn the hand wheel in a clockwise direction to allow the door radial arms to tighten until the chamber is sealed tightly.
7. APPLY STEAM TO THE CHAMBER – Turn the operating valve clockwise to the "STERILIZE" position. This allows the steam to enter the chamber. Observe the chamber pressure gauge, which should indicate the same pressure reading as the jacket after the air has been replaced with steam and the chamber steam trap has closed. If steam is observed leaking from around the door, try tightening the door. DO NOT open the door! Should steam continue to leak around the door after attempting to tighten, the door gasket may need to be replaced.
8. TIMING THE STERILIZING PERIOD – Timing of the sterilization period does not begin until the chamber temperature has reached the prescribed sterilizing temperature of 250^{o} -252^{o}F (121^{o}C) for routine sterilization and 270^{o}-272^{o}F (132^{o}C) for flash sterilizing. The chamber temperature is indicated on the chamber temperature gauge.
9. COMPLETION OF STERILIZING PERIOD – At the end of the prescribed sterilization period, turn the operating valve to the "SLOW" or "FAST" exhaust, depending on the type of materials in the sterilizer load ("SLOW" exhaust for fabrics and liquids and "FAST" exhaust for hard goods).
10. DRYING THE LOAD – When processing fabric or hard goods and after the chamber pressure has dropped to zero (0), turn the operating valve to the "DRY" position. Allow a minimum of 20 minutes of time to allow goods to dry. Drying times may vary depending on the quantity, types of goods, and the equipment condition.
    When you put the sterilizer on Dry Cycle you are pulling steam from the boiler and also pulling air in through the filter. The air is being pulled through the drain and out the chamber exhaust. When that air meets the steam being pulled from the boiler it creates a vacuum. You allow this cycle to run at least 20 minutes and sometimes as much as 45 minutes. This makes sure that your packs are dry before removing them from the sterilizer.
11. COMPLETION OF STERILIZING CYCLE – Upon the completion of the prescribed drying time, turn the operating valve to the "OFF" position. It is important that this be done prior to attempting to open the door.
12. OPENING THE STERILIZER DOOR – For the protection of personnel, the operator should stand on the hinge side of the door while attempting to open the door. The door handle should be turned slowly until the door disengages from the seal, allowing any pressure or steam to escape before the door arms disengage from the end ring. The sterilizer doors are equipped with a locking device which should prevent the door from being opened while the chamber is under pressure. If the door handle will open the door, first determine that the chamber pressure is at zero (0). If the chamber pressure has been determined to be at zero and the door won't open, press the button or the shaft located in the center of the door handle.
13. UNLOADING THE STERILIZER – Use caution when unloading the sterilizer. Remember that the sterilizer, loading equipment and the processed goods have been heated to high temperatures and could cause a burn hazard to personnel.
14. RUNNING CONTINUOUS/ADDITIONAL LOADS – If additional loads are to be processed, re-load the sterilizer and repeat the above procedure from step number 4.
15. SHUT DOWN PROCEDURE – Close the "Steam Supply Valve" on the sterilizer and shut down the electric boiler in accordance with the Manufacturer's instructions.

3.3. Operating Instructions for Autoclave

1. Make sure the autoclave steam supply valve is closed (turn the knob to the right until it stops) and the autoclave operation valve is in the "Start" position.
2. Open the steam supply valve on the steam generator. Turn on the steam generator and allow it to come up to operating pressure of 80 – 85 psi.
3. Open the steam supply valve on the autoclave (turn knob to the left until it stops). Steam will then enter the jacket of the autoclave. Allow the jacket pressure gauge to reach 18 – 22 psi. Wait for that pressure is reached, then allow the steam generator to come up to the original operating pressure of 80 – 85 psi.
4. Load the autoclave. Close the door and turn the hand wheel to the right until the door is tightly sealed. The door MUST be tightly sealed to prevent leaking.
5. Turn the operation valve right to the "Sterilize" position to allow the steam to enter the chamber.
6. Wait until the temperature gauge reaches 250 – 254 degrees. Be patient as this make take a while. When the proper temperature is reached, set the timer for 30 minutes.
7. At the end of the required 30 minute sterilization period, turn the operation valve to "Dry". It is necessary to dry fabric wrapped hard goods. This is done by allowing the fabric wrapped goods to remain in the autoclave for a minimum of 20 minutes. Dry time may be as long as 45 minutes, depending upon the pack size. *If liquids are being sterilized, turn the operation valve to "Slow exhaust" after the required sterilization period.* Once drying times are complete make certain that the chamber pressure gauge is at 0 psi. The door may now be opened and the items removed.
8. If running another load, turn the operation valve to "Start" and repeat steps 4 – 7.
9. When you are done using the autoclave, close the steam supply valve on the autoclave. Turn the operating valve on the autoclave to the "Empty" position. When both the jacket and chamber gauges read 0, turn the operating valve on the autoclave to the "Start" position. You may then shut down the steam generator. Follow manufacturers recommendations for blowing own the steam generator.

Important: The sterilization time begins only when the sterilization temperature (121°C) is reached.

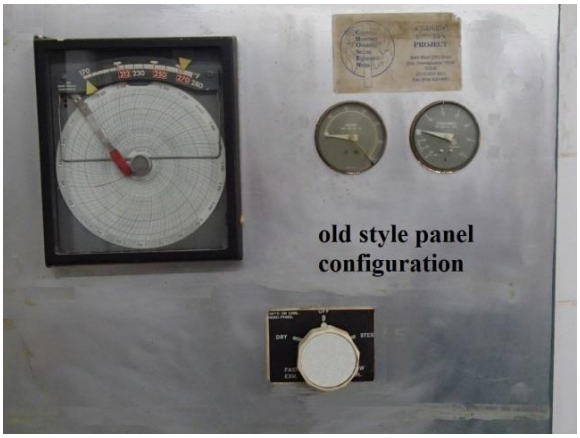
Additional operating instructions may be found in Chosen's sterilizing techniques manual.

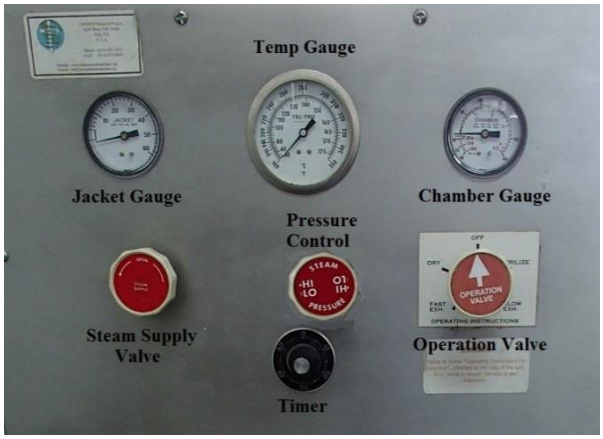
3.3.1. Pressure changes at higher altitudes

The boiling point of water is affected by both pressure and altitude. Water reaches the boiling point at a lower temperature at higher elevations. Also, pressure in an autoclave results in water boiling at a temperature higher than its normal boiling point. Therefore, as altitude increases, the pressure must also increase. At higher elevations, pressure controlled sterilizers have to increase the pressure limit in order to reach the needed sterilization temperature of 250^{o} -252^{o}F (121^{o}C). For example, at Kijabe Kenya, the elevation is 2050 meters and the approximate chamber pressure required to operate at 250^{o} -252^{o}F (121^{o}C) is 27 psi, not 20 psi as stated elsewhere in this manual.

3.4. Control Panels

Control panels vary from unit to unit, depending upon age and size. Older sterilizers may have a temperature chart instead of a temperature gauge and may not have a timer, pressure control, or steam shut off valve. Newer control panels have digital timers and include a boiler pressure gauge.





New style control panel

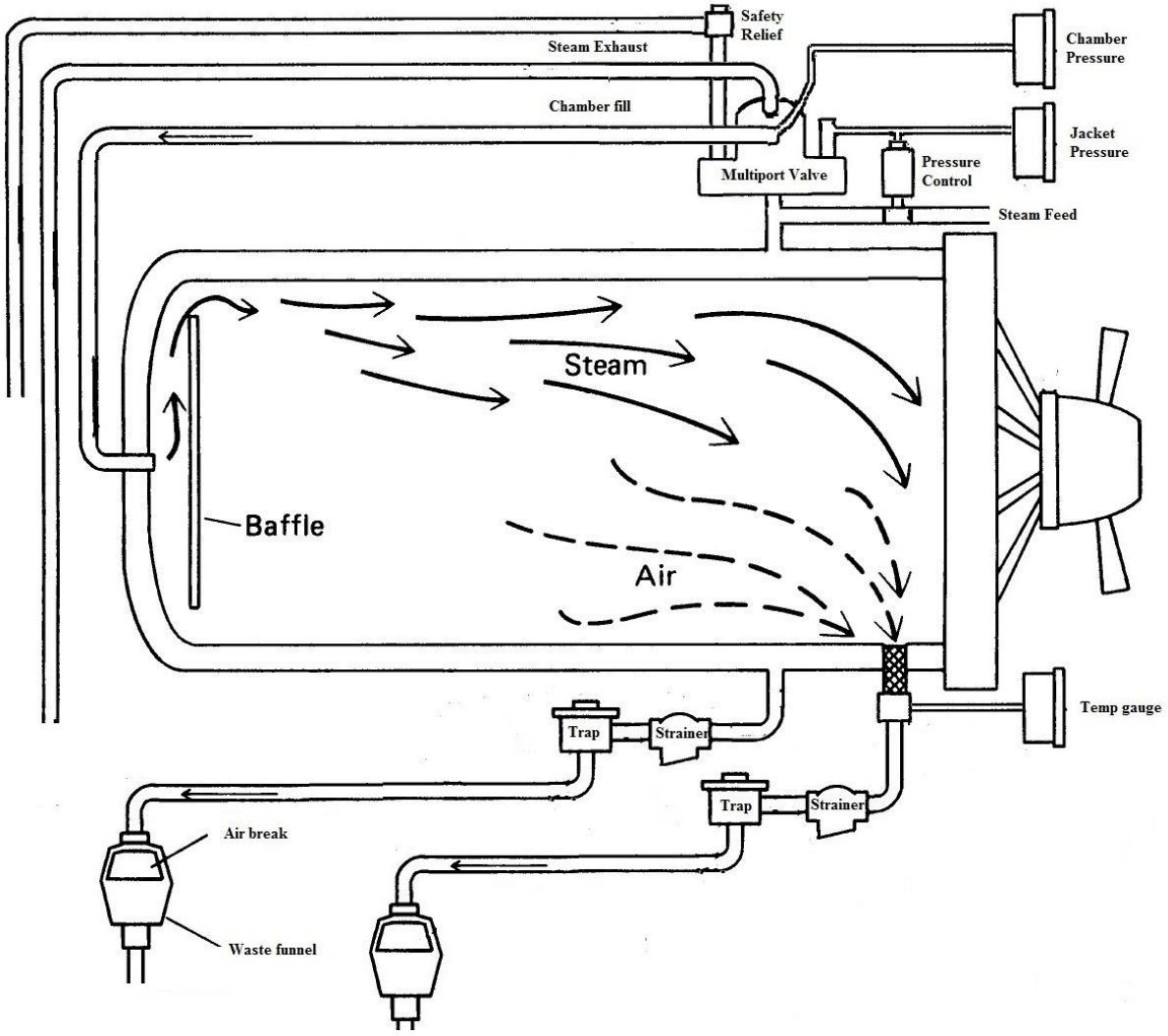
OPERATING VALVE VARIATIONS - Some sterilizers were sent out with an incorrect OPERATION VALVE label. The wrong label has the five positions listed as START, STERILIZE, SLOW EXH, DRY, and EMPTY. According to Chosen, some sterilizers with these labels were also shipped without a dryer vent. If your sterilizer does not have a dryer vent / vacuum filter (see picture on page 20), notify Chosen and request a new vent assembly and replacement label.

4. Principles of Operation

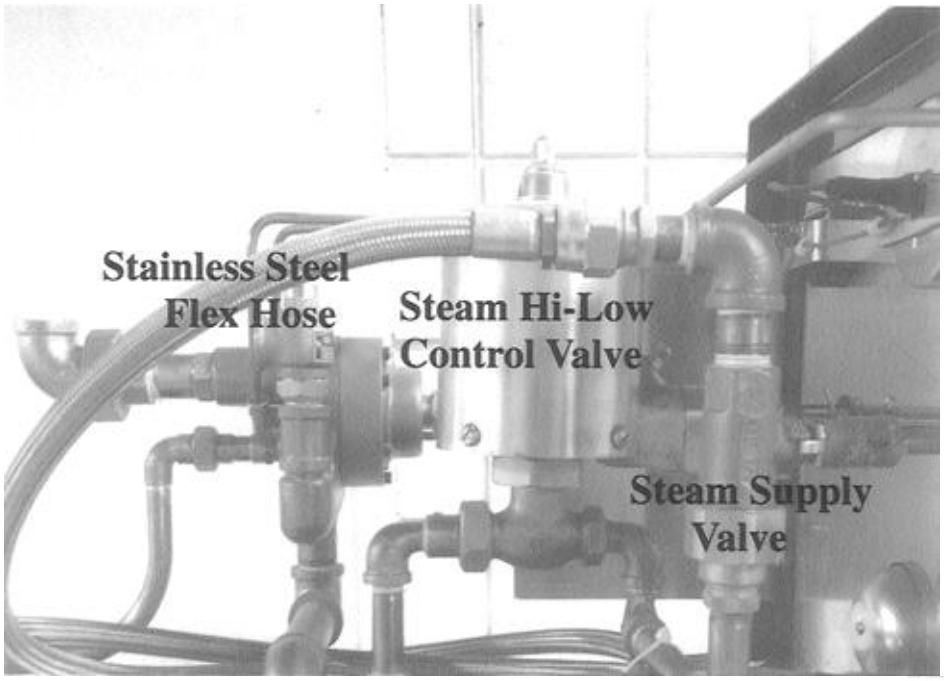
4.1. Theory of operation

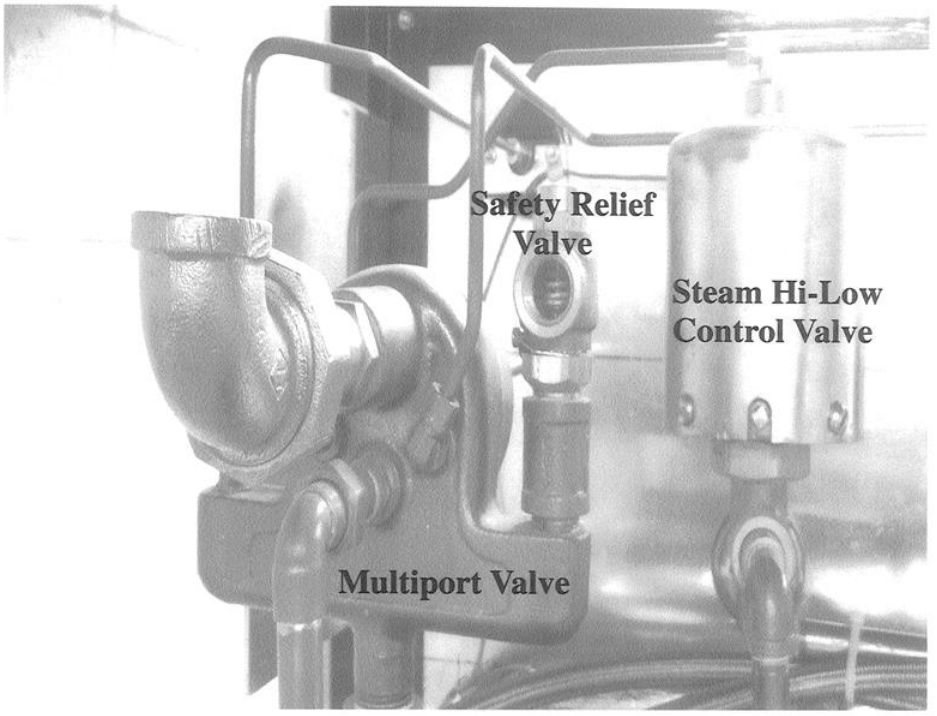
This diagram of a typical Chosen sterilizer depicts the simplicity of its operation. Steam enters the chamber jacket, passes through the operating valve and enters the rear of the chamber behind a baffle plate. It flows forward and down through the chamber and the load, exiting at the front bottom. A pressure regulator maintains jacket and chamber pressure at a minimum of 15 psi, the pressure required for steam to reach 250F.

Overpressure protection is provided by a safety valve. The conditions inside are thermostatically controlled so that heat (more steam) is applied until 250F is achieved, at which time the timer can be started and the temperature maintained for the selected time.



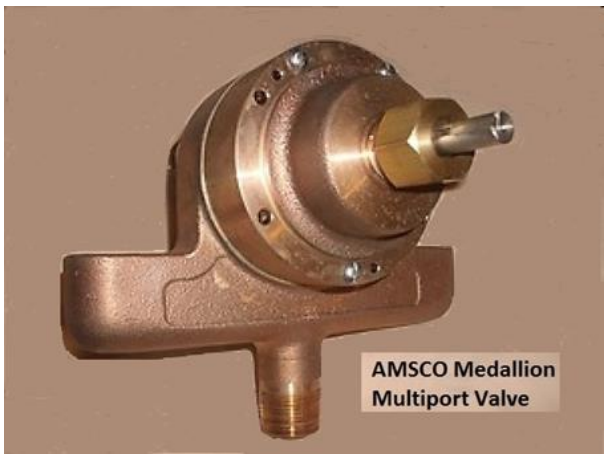
4.2. Major components



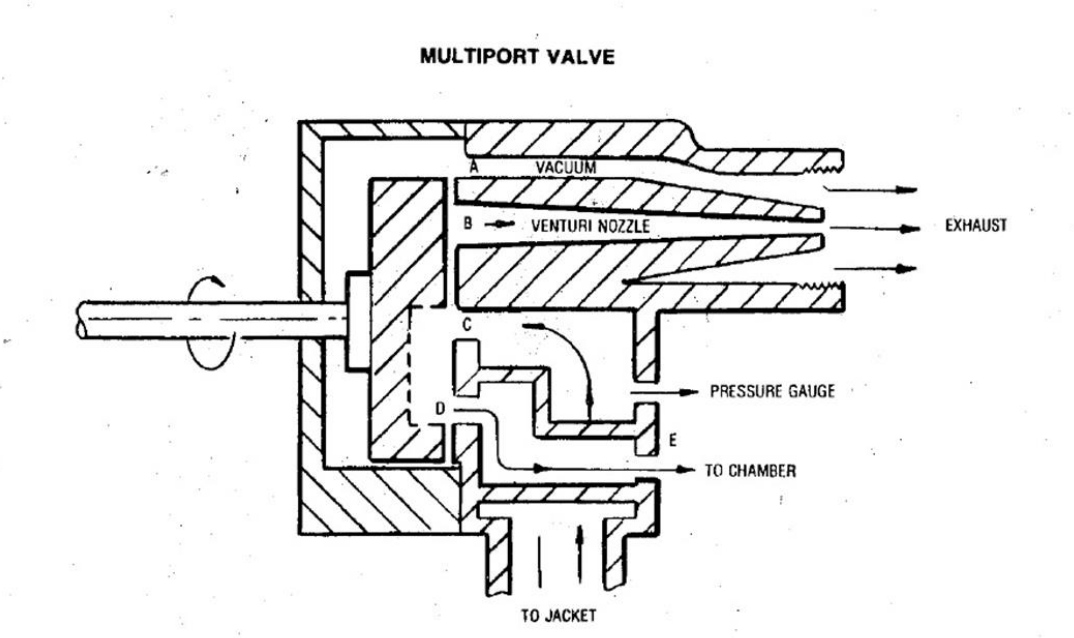


4.2.1. Multiport valve

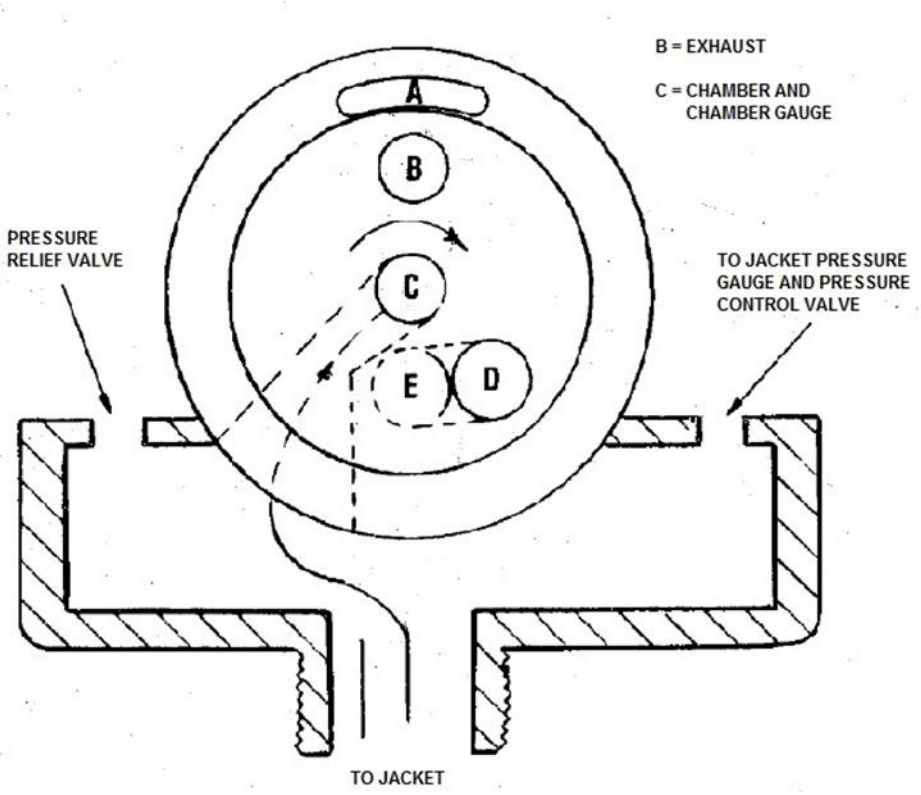
The key component to the sterilizer is the five position operating multiport valve and is ONLY available from Chosen. However, rebuild kits are available from Chosen and other sources such as Replacement Parts Industry (RPI).



The multiport valve has been plumbed differently from sterilizer to sterilizer. The safety relief valve may be located on either side of the main body and the gauges may be connected to a variety of different points. A complete understanding of how this valve works is necessary in understanding the variety of connections found from installation to installation.



4.2.1. Multiport valve (continued)



4.2.2. Pressure control valve

Source (Amsco)
Basic description
16” and 20” sterilizers use a 3/8” steam control valve
48” and 60” sterilizers use a 3/4” steam control valve

The steam pressure control valve, also known as the HI-LO valve is typically preset by Chosen and is not adjustable by the user. Some sterilizers come with an adjustment knob for the HI-LO Steam Pressure on the front panel, but it may be locked in the preset position. Only qualified personal should attempt to adjust the pressure if the operating pressure and temperature is not running at the desired level.

Water may inadvertently build up inside of the bellows and result in an operational failure. If this occurs, a temporary fix may be performed by removing the bellows and shaking out the water.

4.2.3. Steam traps

Typical Specification Thermostatic steam trap repair units shall be Tunstall Steam Trap Capsule® (1-800-423-5578) or approved equal. Capsules to be rated for Vac to 125 psig working pressure. Due to the extended life of high pressure bellows units on low pressure applications, only high pressure bellows units will be acceptable. Capsule to be made entirely of corrosion resistant stainless steel with TIG welded construction. The actuator shall be a ten plate stainless steel bellows, with heat treated hardened ball bearing close off mechanism. Bellows shall be entirely enclosed in a protective stainless steel capsule to prevent damage from water hammer and debris build-up. The replacement capsule shall include integral welded stainless steel seat able to fit directly into the condensate portion of the steam trap body. Diaphragm, Nozzle, Orifice, Venturi, Quick Fix, Wafer, Nugget or low pressure units are not acceptable. The replacement Tunstall unit must be of universal design, able to retrofit the existing thermostatic steam traps. New covers may be necessary and shall be provided as required.

TF (Class 1) Post & Spring Style

TC (Class 2) Post & Spring Style

TC (Class 2) Thread Style Cut Away Class 1 & Class

Top View

A steam trap has two major functions, to remove condensate as quickly as it forms, and to prevent steam discharge. There are certain installation faults, which negatively affect the ability for traps to perform these functions efficiently. A high percentage of steam trap failures are simply due to incorrect installation. Proper installation should provide six years of maintenance-free operation. Install a visual indication of the steam trap performance on all process applications. The visual indication can be a sight glass, air vent, or test valve.

4.2.4. Water filter

The supply water to the boiler should be clean in order to protect both the parts of the boiler and ensure that clean steam is provided to the sterilizer. Never assume the water quality is adequate. A filter should always be used, inspected and cleaned regularly. There are a variety of filter options and they may need to be purchased outside of the country where the sterilizer is located. However, good quality filter systems are also available locally in many areas.

In areas where the water has a high level of calcium carbonate ("Hard Water") consider installing a water softener between the filter and the boiler or using distilled water. This will prevent the buildup of lime scale on the boiler components and extend the life of the water heater elements.

Filters with a clear canister are preferred as this allows inspection of the filter without having to turn off the water and remove the filter. A dual water filter system has the advantage of having a first stage reusable (cleanable) filter which will add life to the second disposable filter.

5. Service

5.1. Troubleshooting and Installation

Follow these steps to isolate the parts of the sterilizer making sure everything is working properly including the gauges.

1. Boiler: Start the boiler with the valve to the sterilizer closed. Make sure the boiler heats and maintains proper pressure. You will know it is up to operating temperature when you hear the heater contactor start to cycle on/off.
2. Sterilizer Jacket: Keeping the sterilizer in the off position, open the steam supply valve from the boiler to sterilizer and observe the Jacket pressure increasing. Wait until the jacket is pressurized and verify the pressure gauge and proper set pressure of 18 - 22 PSI.
   After it reaches pressure, check for leaks, especially on the jacket steam trap below. It may leak a very small amount which is normal. If it leaks a lot, it could be dirty and can be cleaned or replaced after it cools and all the steam has been exhausted.
3. Chamber: Go into the cycles of the sterilization process. In Sterilization, you will see the jacket gauge drop some and eventually both gauges will climb together and will stop climbing when it reaches the pressure that you noticed before on the Jacket 18 - 22 PSI = +/- 250F. When it stabilizes you can time the sterilization. During the sterilization cycle make sure the chamber steam trap is not leaking too much (some steam with water is acceptable). If too much steam is escaping, repair or replace the steam trap.
   Verify no steam leaks around the door gasket or any component and piping areas.
4. FAST EXHAUST is the normal step unless there is water product inside the chamber.
   When you go into the vent cycle (FAST EXH) and dry modes you leave the boiler on. The chamber pressure and temperature will drop and the Jacket should stay at the set pressure of 18 -22 PSI. Be careful when opening the door as some steam may be still in the chamber. Make sure the Chamber gauge shows 0.

5.2. Performance Testing and Preventive Maintenance

Maintenance and performance inspections must be performed regularly using the indicated intervals below as a guide. A schedule based upon the sterilizer components is found in Table 5.1. A schedule based upon the frequency in which the components are inspected/serviced is found in Table 5.2.

Local conditions (water quality, usage, etc.) may require more frequent maintenance than indicated. Customer should maintain a record of all maintenance performed on the sterilizer. Refer to the maintenance procedure (5.2.1.) section of the manual for detailed service instructions and performance expectations.

Table 5.1 Service schedule based upon sterilizer parts

Service Required	Frequency
1.0 **Door and Chamber**	
1.1 Check condition of door gasket and replace as needed	Quarterly
1.2 Clean chamber with clean water	Weekly
1.3 Grease door mechanism and lubricate hinges	Annually
1.4 Clean chamber drain	Weekly
2.0 **Controls**	
2.1 Verify that the timer is functioning	Daily
2.2 Verify that the jacket and chamber gauges are functioning	Daily
2.3 Verify that the sterilizer operates at the proper temperature	Daily
3.0 **Piping**	
3.1 Inspect for steam or water leaks (including steam traps)	Weekly
3.2 Clean or rebuild jacket and chamber steam traps	Annually
3.3 Inspect jacket and chamber strainers for debris, clean as needed	Annually
3.4 Replace safety relief valve	Annually
4.0 **Steam Generator (Boiler)**	
4.1 Conduct blow down procedure	Weekly
4.2 Inspect water filter and replace filter as needed	Weekly
4.3 Verify that the gauge(s) and indicator lights are functioning	Daily
4.4 Verify that the boiler operates at the proper pressure	Daily
4.5 Inspect and clean water level probes	Quarterly
4.6 Function test the safety relief valve (per OEM instructions)	Annually

Table 5.2 Service schedule based upon frequency

Service Required	Who Performs
Daily	
Verify that the boiler operates at the proper pressure	Sterilizing Staff
Verify that the gauge(s) and indicator lights are functioning	Sterilizing Staff
Verify that the timer is functioning	Sterilizing Staff
Verify that the jacket and chamber gauges are functioning	Sterilizing Staff
Verify that the sterilizer operates at the proper temperature	Sterilizing Staff
Weekly or Monthly	
Inspect for steam or water leaks (including steam traps)	Biomed
Clean chamber with clean water or proper cleaning solution	Sterilizing Staff
Clean chamber drain	Sterilizing Staff
Inspect input water filter and replace filter as needed	Biomed
Conduct blow down procedure (depending upon water condition)	Sterilizing Staff
Quarterly	
Check condition of door gasket and replace as needed	Biomed
Inspect and clean water level probes	Biomed
Annually or as needed	
Grease door mechanism and lubricate hinges	Biomed
Clean or rebuild jacket and chamber steam traps	Biomed
Inspect jacket and chamber strainers for debris, clean as needed	Biomed
Replace safety relief valves	Biomed
Function test the safety relief valves (per OEM instructions)	Biomed

5.2.1. Maintenance procedures

STERILIZER CHAMBER: Inspect the sterilizer chamber interior. Be sure the chamber is cool before attempting to clean. Remove all racks, trays, instruments, etc. Wash the chamber interior using a calgonite solution. CAUTION: Abrasives, steel wool, picks, scrapers or sharp instruments should never be used to remove film or deposits. Use only mild detergents and hot water. Soak heavy deposits to loosen. Wipe the chamber dry with a lint free cloth to remove film.

Remove the chamber drain strainer at the bottom of the chamber and clean the screen of any lint or debris. Flush the drain with a hot solution of trisodium phosphate in one (1) quart of hot water. Pour in the chamber drain and allow soaking. After five (5) minutes, flush thoroughly with hot water.

LOADING CARTS AND EQUIPMENT: Wash the loading carts, racks and trays in a calgonite solution. Do not use abrasives (see above instructions for chamber cleaning). Wipe dry with a lint free cloth. Lubricate all metal to metal bearing surfaces after drying. Do not oil or grease nylon or other synthetic bearings.

CHAMBER DOOR MECHANISMS: Place a few drops of oil on the hinge pins and work in by opening and closing the door several times. Wipe off any excess oil. Remove the old grease completely from the door before applying new lubricant. Grease the door mechanism with Jet-Lube AP-1W or equivalent high temperature white grease. Jet-Lube AP-1W is insoluble in water, insensitive to temperatures from subzero to 300 degrees F, and conforms to NLG1 No. 2 grade (ASTM 265-295). The blue button on some models at the center of hand wheel can be removed by unscrewing and will reveal a grease fitting for this purpose. See figure 5.1

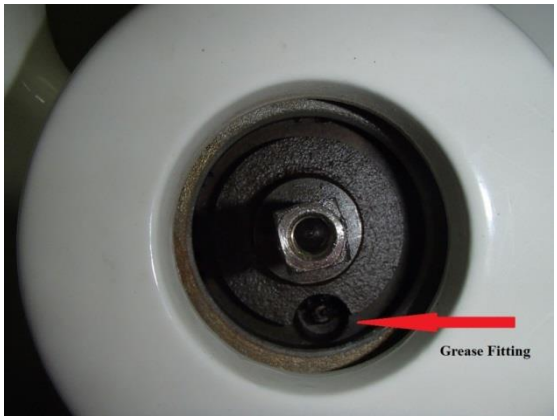


Figure 5.1

DOOR GASKET: Check the door to make sure it closes easily and centers properly. Inspect the door gasket, looking for conditions which would allow the steam to leak (cracks, cuts, irregularities, or dryness and inflexibility). Clean with hot water and mild detergent. It is recommended that the gasket be replaced annually or as needed.

When installing a new door gasket, start at all four corners first and ensure the gasket is equally spaced between each corner before pushing in the gasket on the two sides, top and bottom.

VACUUM FILTER: Some sterilizer models utilize a replaceable vacuum filter. Inspect filter for visible dirt and replace as needed. Old style vacuum dryer components should be replaced with the new check valve and filter assembly. See figure 5.2 and 5.3

The vacuum filter assembly may be connected directly to the chamber or to the drain assembly.

5.2.1. Maintenance procedures (continued)

Old style filter

Figure 5.2

New style filter

Figure 5.3

DRAIN COMPONENTS: The jacket and chamber drain components consist of check valves, strainers and steam traps (see photo on Major Components page). Inspect the strainers and clean out any sediment or debris collected in them.

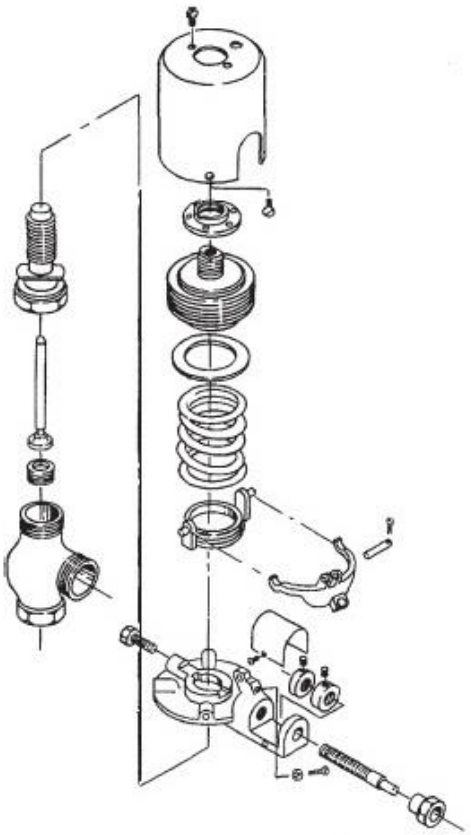
Steam traps are regular replacement items and vary from sterilizer to sterilizer, depending upon size and model. Steam traps can be rebuilt but certain ones require special tooling to open and reseal. The steam trap caps may be difficult or impossible to remove when seized because of time and heat. Therefore, replacement may be the only option. Also there are two sizes - 3/8" pipe and ½" pipe threads. Verify correct trap when ordering parts or replacements. An excessive amount of steam escaping through the drains is an indication the traps need service or replacement.

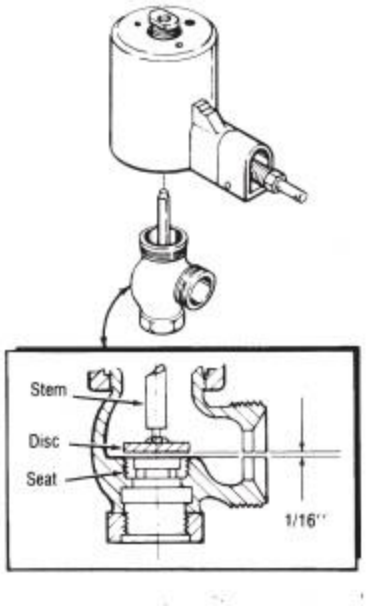
PRESSURE/SAFETY RELIEF VALVE: The safety relief valve may be located on either side of the multiport valve (see photo on Major Components page). The safety valve styles vary from unit to unit. The safety relief valves that have TIE WIRE on the mechanism cannot be actuated manually without breaking the TIE WIRE. Once opened, they need to be replaced because they will never be able to reseat and close off the steam pressure. It is recommended that the valves be replaced on a regular basis (see Preventive Maintenance Schedule).

Some installations have no piping connected to the pressure relief valve. Some installations connect the pressure relief valve output to the multiport exhaust output. It is recommended that the output of the relief valve is at least piped to direct the possible release of steam to the floor and away from the potential presence of staff. It is NOT recommended that it is connected back to the multiport valve exhaust output which potentially can damage the relief valve.

TIMERS: Most older sterilizers come with disposable type mechanical timers which are replaced when they fail. Some newer sterilizers come with digital timers (Taylor – model 5820) that are also disposable with the exception of the two "LR44" batteries which can be replaced as needed.

STEAM HI-LOW CONTROL VALVE: This pressure/temperature control valve can be difficult to service and may need to be replaced every few years. There are locking mechanisms to prevent the operators from adjusting the pressure. If adjustment is required, only turn about a quarter of a turn and allow the sterilizer to stabilize in pressure before adjusting again.





WATER FILTER: Although many installations do not incorporate an incoming water filter on the steam generator/boiler feed line, it is recommended that one is installed. There are a variety of filter types that can be used (see photos under major components section, 4.2.4.). A clear canister type filter will allow you to visually inspect the condition of the filter without disassembly. These can often be purchased locally if you are in a major metropolitan area. Filter replacement should be done as needed and according to the local water conditions.

5.3. Blow Down Procedure

5.3.1. Blow down Frequency

The following recommendations come from the Riemers instruction manual. Opinions vary, so it is important to understand the water conditions at each site and how this affects the boiler parts (heaters, valves, etc.)

In areas where water is soft or has been softened chemically: Blow down once per week

In areas where hard water exists or the water is not adequately filtered: Blow down once a day

5.3.2. Manual Blow down

Turn the electrical power to the boiler off. Allow the pressure to drop to approximately 10 psig. When the pressure reaches 10 psig, open the blow down valve for approximately 10 seconds. The blow down pressure and time may vary according to the need (frequency of blow downs, condition of the water, age of the boiler, etc.).

Per Riemers instruction manual: Turn power off and allow pressure to drop to 5 psig. Then open blow down valve for approximately 20 seconds.

CAUTION! Stand clear of scalding water or steam. Ensure that the blow down valve is safely piped.

5.3.3. Auto Blow down

Newer Chosen sterilizers come with an auto blow down system installed. The blow down is automatically actuated by a low pressure sensor after the boiler power switch is turned off and the pressure drops to 15 PSI.

See pages 34 and 35 for more details

Safety Valve Test (for the boiler, NOT the sterilizer)

The following is the Riemers instruction manual recommendation. However, it is not recommended that the safety valve test be conducted unless there is a spare safety valve on site. If the safety valve should fail to reseat after the test, it will need to be replaced.

CAUTION! Stand clear of safety valve and scalding steam.

Frequency: Minimum once per month. Safety valve should be tested at maximum operating pressure:

- Hold trip lever open for five seconds in order to flush off valve seat

- Permit valve to "slap" shut. If leak occurs, repeat test or replace valve.

6. Parts

NEW CHOSEN PARTS LIST

All prices are ESTIMATES only and subject to change

RPI or Other	Chosen	Description	Cost
	CH1001	Boiler Steam Pressure Gauge	$42.00
4661		Boiler Pressure Gauge, External	$25.00
2299		Boiler Pressure Gauge, Internal	
	CH1002 -	Not available	
	CH1009	1/4 Tube to Female 1/8 Pipe Conn. (Flare)	$1.00
	CH1010	1/4 TUBE TO FEM. 1/4 PIPE CONN. (FLARE)	$1.00
	CH1011	1/4 TUBE TO MALE 1/8 PIPE CONN. (FLARE)	$1.00
	CH1012	1/4 TUBE TO MALE 1/4 PIPE CONN. (FLARE)	$1.00
	CH1013	Not available	
	CH1014	5/8 TUBE TO MALE 3/8 PIPE CONN. (FLARE)	$2.00
	CH1015	5/8 TUBE TO MALE 1/2 PIPE CONN. (FLARE)	$2.00
	CH1016	90 ELBOW 1/4 TUBE TO MALE 1/4 PIPE (FL)	$2.00
	CH1017 -	Not available	
	CH1025	45 ELBOW 1/2 PIPE	$4.00
	CH1027	45 STREET ELBOW 1/2 PIPE	$5.00
	CH1028	TIMER, DIGITAL	$12.00
MDT012		TIMER, 60 MINUTE MANUAL WITH BELL	$40.00
	CH1029	GROMET	$2.00
	CH1030 -	Not available	
	CH1037	SNAP ACTION DIAPHRAGM	$29.00
AMG009	CH1041	16" DOOR GASKET	$38.00
AMG010	CH1042	20" DOOR GASKET	$40.00
		36" DOOR GASKET	$75.00
	CH1047	PRESSURE GAUGE	$27.00
AMG135	CH1048	PRESSURE GAUGE, JACKET	$27.00
AMG134		PRESSURE GAUGE, CHAMBER	$27.00
AMK111	CH1053	3/8" PRV KIT	$224.00
	CH1054	Not available	
AMK155	CH1055	MULTIPORT VALVE KIT	$134.00
	CH1058	DUAL OFFSET SHAFT	$78.00
	CH1059	SPRING	$5.00
	CH1060	Not available	
	CH1064	SAFETY RELIEF VALVE	$47.00
CSF052	CH1068	AIR IN FILTER	$94.00
CSV057	CH1069	1/2" CHECK VALVE	$32.00
	CH1073	1/4 SS FLEX HOSE, 10"	$17.00
	CH1076	1/4 SS FLEX HOSE, 42"	$25.00
	CH1080	5/8 SS FLEX HOSE, 17" (MEDALLION)	$23.00
	CH1081	5/8 SS FLEX HOSE, 26"	$27.00
	CH1082	5/8 SS FLEX HOSE, 46"	$36.00

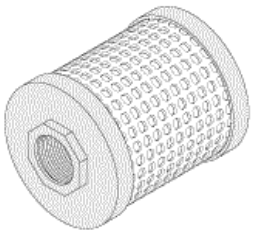
	CH1084	5/8 SS FLEX HOSE, 72"	$47.00
		5/8 SS FLEX HOSE, 96"	$60.00
		5/8 SS FLEX HOSE, 120"	$60.00
	CH1089	MALE SPUD	$12.00
	CH1109	BONNET	$78.00
	CH1110	FOOT PADS	$60.00
	CH1120	SMALL HANDWHEEL	$61.00
	CH1121	BODY CONTROL VALVE	$221.00
	CH1124	NOZZLE	$18.00
	CH1125	EJECTOR TUBE	$26.00
	CH1129	WATER FLEX HOSE	$20.00
	CH1132	ANGLE THERMOSTATIC TRAP	$65.00
	CH1134	STEAM TRAP CAPSULE	$43.00
TCTA-2901		STEAM TRAP CAPSULE, TUNSTALL TA-1/2-A	$43.00
	CH1135	STEAM TRAP CAPSULE REMOVAL TOOL	$12.00
	CH1136	TEL-TRU VAPOR THERMOMETER	$128.00
	CH1137	5/8 TUBE TO MALE 3/4 PIPE CONN. (FLARE)	$3.00
	CH1138	1/4 SS FLEX HOSE, 24"	$19.00
	CH1141	3/4" M 1/2" M FILTER ADAPTER	$8.00
	CH1142	BALL VALVE 3/8	$20.00
	CH1143	BALL VALVE 3/8 GASKET	$1.00
CH1206 ?	CH1144	OPERATION VALVE LABEL	$3.00
	CH1145	FRONT ALUMINUM PANEL TOP	$75.00
	CH1146	FRONT ALUMINUM PANEL BOTTOM	$50.00
	CH1147	3/4" X 1 1/2" BRASS PIPE NIPPLE	$1.00
	CH1148	3/4" BRASS CROSS	$1.50
	CH1149	3/4" X 1/2" REDUCER	$0.25
	CH1150	1/2" BRASS STREET 45 DEGREE ELBOW	$0.50
	CH1151	1/2" BRASS STREET 90 DEGREE ELBOW	$0.50
	CH1152	1/2" X 1 1/2" BRASS PIPE NIPPLE	$1.00
	CH1153	1/2" X 4 1/2" BRASS PIPE NIPPLE	$1.00
	CH1154	1/2" BRASS 45 DEGREE ELBOW	$0.50
	CH1155	1/2" BRASS STRAINER	$4.00
	CH1156	1/2" BRASS CHECK VALVE	$5.00
	CH1157	1/2" X 6" BRASS PIPE NIPPLE	$2.00
	CH1158	3/4" X 3 1/4" BRASS PIPE NIPPLE	$0.50
	CH1159	3/4" X 1/2" BRASS 90 DEGREE ELBOW	$0.50
	CH1160	1/2" X 7 1/2" BRASS PIPE NIPPLE	$3.00
	CH1161	1/2" X 1 3/4" BRASS PIPE NIPPLE	$1.00
	CH1162	MAIN DRAIN COPPER ADAPTER	$18.00
	CH1163	1/2" BRASS ELBOW 90 DEGREE	$0.75
	CH1164	3/8" BRASS STREET 90 DEGREE ELBOW	$0.50
	CH1165	3/8" X 4" BRASS PIPE NIPPLE	$3.00
	CH1166	3/8" BRASS 90 DEGREE ELBOW	$0.50
	CH1167	3/8" X 2 1/2" BRASS PIPE NIPPLE	$2.00
	CH1168	3/8" X 6" BRASS PIPE NIPPLE	$4.00

	CH1169	3/8" BRASS STREET 90 DEGREE ELBOW	$0.50
	CH1170	3/8" X 3" BRASS PIPE NIPPLE	$2.00
	CH1171	3/8" X 3 1/4" BRASS PIPE NIPPLE	$2.00
	CH1172	3/4" X 1" BRASS PIPE NIPPLE	$0.50
	CH1173	3/4" BRASS COUPLER	$2.00
	CH1174	3/4" BRASS SHOULDER UNION	$5.00
	CH1175	1/2" X 5" BRASS PIPE NIPPLE	$3.00
	CH1176	20KW ELECTRIC BOILER, REIMERS	$3,900.00
	CH1177	30KW ELECTRIC BOILER, REIMERS	$4,300.00
		60KW ELECTRIC BOILER, REIMERS	$7,500.00
	CH1178	AUTO BLOWDOWN OPTION	$895.00
	CH1179	DRYER VENT SUPPORT	$2.00
R # 02006	CH1193	GAUGE RUBBER WASHER .625"	$1.30
R # 02448	CH1194	GAUGE BRASS WASHER .625"	$1.20
	CH1196	RETRO FIT DRYER VENT HOLDER ASSY	$10.00
	CH1206	OPERATION VALVE LABEL	$4.00
R # 02396	CH1215	WATER GAUGE VALVE SET	$106.00
R # 04180	CH1216	GAUGE GLASS .625" X 3.375"	$29.00
R # 02530	CH1217	50 AMP CONTACTOR	$116.00
R # 04296	CH1218	HI-LIMIT PRESSURE SWITCH	$106.00
R # 02490	CH1219	1/2" BOILER BALL VALVE	$45.60
R # MBJ135	CH1220	WATER LEVEL PROBE (MIDDLE)	$79.50
R # 04213	CH1221	ON/OFF ILLUMINATED ROCKER SWITCH	$13.80
R # 20592	CH1222	RESET SPRING RETURN SWITCH	$28.60
R # 20838	CH1223	GENERATION 3 CONTROL BOARD	$879.80
R # 03693	CH1224	WATER PUMP FOR BOILER 120VOLT	$339.20
R # 04178		WATER PUMP FOR BOILER 120VOLT	
R # 03774		WATER PUMP FOR BOILER 240VOLT	
		NO PARTS ARE AVAILABLE FOR THE ABOVE PUMPS !	
R # 04264	CH1225	BLACK PLASTIC ELBOW CONNECTOR	$17.00
R # 03760	CH1226	COPPER TUBING (PER FOOT)	$9.00
R# 03763	CH1227	BRASS ELBOW CONNECTOR	$12.70
R # 03949	CH1228	1/2" CLOSE NIPPLE	$3.50
R # 02693	CH1229	1/2" BOILER CHECK VALVE	$45.60
R # 04523	CH1230	1/2" BOILER TEE	$30.70
R # 03346	CH1231	1/2" BOILER BALL VALVE W/LATCH	$45.60
AMA045		SYPHON BONNET ASSY 3/8”	
AMA055		VALVE STEM ASSEMBLY	
AMB042		BELLOWS	
AMS122		VALVE SEAT (MULTI-VALVE)	

FILTER, AIR-IN

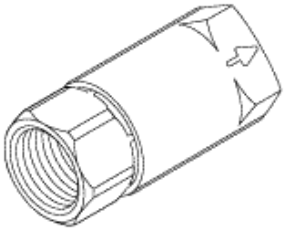
- 2.84" OD x 3.10" Long
- 3/4" FPT
- 0.03 micron HEPA media

RPI Part #CSF052
OEM Part #61301600303
Fits: air Supply Line



CHECK VALVE

RPI Part #CSV057
OEM Part #19114
1/2" FPT
Material: bronze body; RPTFE® seal
0.5 PSI opening pressure
(CSV058 - 3/4" FPT)



RPI Part #AMG010
OEM Part #P078767-091
DOOR GASKET

- OD: 24.530"
- C/S: .375" Sq.

Fits: 20" x 20" Square Door
Model(s) This Part Fits: Eagle 2000 (16" Small-Gravity), Eagle 2000 (16" Small-Vacumatic), Eagle 2000 (20" Small-Gravity)

RPI Part #AMG009
OEM Part #P074367-091
DOOR GASKET

- OD: 19.800"
- C/S: .375" Sq.

Fits: 16" x 16" Square Door
Model(s) This Part Fits: Eagle 2000 (16" Small-Gravity Stage II), Eagle 2000 (16" Small-Gravity Stage III), Eagle 2000 (16" Small-Gravity), Eagle 2000 (16" Small-Vacumatic Stage II), Eagle 2000

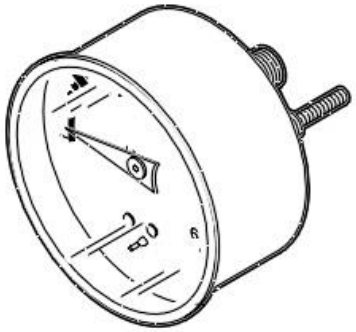
RPI Part #AMG134
OEM Part #P090525-091

PRESSURE/VACUUM GAUGE (CHAMBER)

- Center back mount, 1/8 MPT; 2-1/2" dia.
- Gauge has zero adjust pointer
- Reads Chamber Pressure/Vacuum
- Dual scale: 0-60 PSIG/10-30 PSIG & 0-4.2 kgs. sq. cm/254-760mm Hg.
- Includes gauge, mounting bracket, and hardware

Fits: Front Control Panel 2-5/8" dia. panel cut-out

RPI Part #AMG135
OEM Part #P090730-091

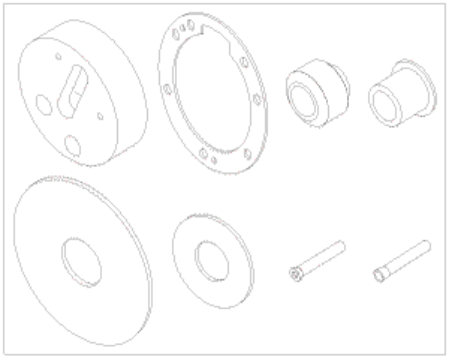


PRESSURE GAUGE (JACKET)

- 0-60 PSIG
- Center back mount, 1/8 MPT, 2-1/2" dia. dial
- Gauge has zero adjust pointer
- Reads jacket pressure
- Includes gauge, mounting bracket, and hardware

Fits: Front Control Panel 2-5/8" dia. panel cut-out

RPI Part #AMK155
OEM Part # Not Available
Chosen Part # CH1055
MULTIPORT VALVE KIT



OLD CHOSEN PARTS LIST

All prices are ESTIMATES only and subject to change

Item	Vendor	Model / Part	Cost Each	Notes
Timer	Chosen - RPI	MDT012	$40	60 minute timer w/ bell for front panel
Filter, air-in	Chosen - RPI	CSF052	$70	replaces old style dryer
Check valve	Chosen - RPI	CSV057	$25	goes with CSF052 air-in filter
Steam trap	Chosen	TCTA-2901	$40	steam capsule for Tunstall TA-1/2-A
Steam trap	Chosen	SPFLD MA	$205	Tunstall assembly (complete trap)
Temperature gauge	Chosen			
Door Gasket	Chosen	16"	$35	RPI part - AMG009
Door Gasket	Chosen	20"	$40	RPI part - AMG010
Door Gasket	Chosen	36"	$75	
Pressure gauge	Reimers	04661	$25	external mount 2.0" ¼" NPT, 0-160 psi
Pressure gauge	Reimers	02299		for Riemers boiler - internal (with mount)
Pressure gauge	Chosen - RPI	AMG135	$25	for jacket pressure
Pressure gauge	Chosen - RPI	AMG134		for chamber pressure
Safety relief valve	Chosen		$75	
Flex hose	Chosen			Boiler water supply hose
Flex hose	Chosen		$60	Steam supply hose - 8 foot
Flex hose	Chosen		$60	Steam supply hose - 10 foot
Sterilizer	Chosen	16" x 16" x 26"	$2,200	manual sterilizer
Steam Boiler	Reimers	20kw boiler	$4,500	brand new electric boiler
Sterilizer	Chosen	20" x 20" x 38"	$2,200	manual sterilizer
Steam Boiler	Reimers	20kw boiler	$4,500	brand new electric boiler
Sterilizer	Chosen	24" X 36" X 48"	$3,200	manual sterilizer w/ loading transfer cart
Steam Boiler	Reimers	30kw boiler	$5,000	brand new electric boiler
Sterilizer	Chosen	24" x 36" x60"	$3,200	manual sterilizer w/ loading/transfer cart
Steam Boiler	Reimers	30kw boiler	$5,000	brand new electric boiler
Steam Boiler	Reimers	60kw boiler	$7,300	brand new electric boiler
Valve repair kit	RPI	AMK155	$550	for P-136807-139 Amsco multiport valve
Multiport valve	Chosen		$475	
Steam regulator	Chosen		$375	
Water filter			$150	purchase locally when possible
Steam valve	Chosen		$380	
Filter cartridge			$20	purchase locally when possible

7. Steam Generators

7.1. Reimers Electra Steam, Inc. has been a manufacturer of commercial and industrial electric steam boilers since 1908. Reimers steam boilers are utilized for high and low pressure steam applications. They offer a variety of models from 1.5 to 750kW with carbon steel pressure vessels and 1.5 to 120kW in all stainless steel design to match any steam application. The typical models used with CHOSEN sterilizers are the R, RH and RHC (RB series).

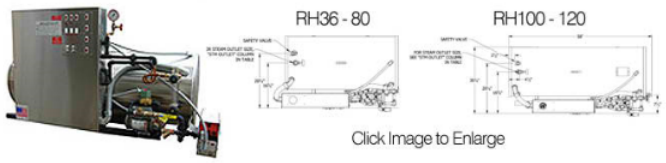
Contact information for Reimers is -

Electra Steam, Inc.
P.O. Box 37
4407 Martinsburg Pike
Clear Brook, VA 22624

Phone: 540-662-3811
Fax: 540-665-8101
Email: Sales@reimersinc.com
Web: www.reimersinc.com

Specifications and Dimensions

Model R-36 thru 80 — Model R-100 thru 120



CLICK ON THE DIAGRAM TO ENLARGE

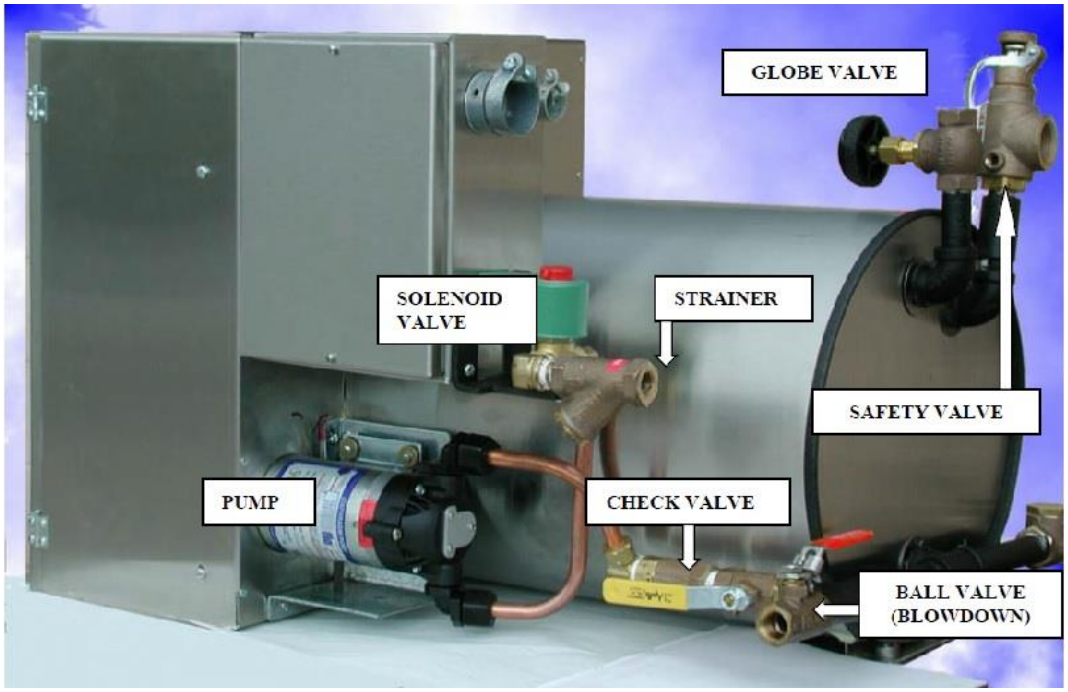
R SERIES LOW & HIGH PRESSURE STEAM BOILERS AVAILABLE WITH PUMP AND CONDENSATE TANK									
								SM OUTLET (NPT)	
KW	**# HR**	**BHP**	**VOLTAGE**	**PHASE**	**SHIP WT.**		**MBTU/HR**	**LP**	**HP**
36 KW	125	3.6	208/240/380/415/480	1-3	500	0-85 PSIG	121	1	3/4
40 KW	139	4.0	208/240/380/415/480	3	500	0-85 PSIG	134	1	3/4
54 KW	187	5.4	208/240/380/415/480	3	535	0-85 PSIG	181	1 1/4	3/4
60 KW	208	6.0	208/240/380/415/480	3	580	0-85 PSIG	202	1 1/4	1
72 KW	250	7.2	208/240/380/415/480	3	580	0-85 PSIG	243	1 1/4	1
80 KW	278	8.0	208/240/380/415/480	3	580	0-85 PSIG	270	1 1/4	1
100 KW	348	10.0	208/240/380/415/480	3	900	0-85 PSIG	337	1 1/4	1 1/4
120 KW	417	12.0	208/240/380/415/480	3	900	0-85 PSIG	405	2	1 1/4
ALL MODELS AVAILABLE WITH PUMP AND CONDENSATE TANKS									

NOTE: The water pumps for Reimers boilers are considered a disposable item and NO parts, such as brushes, are available from Reimers or Chosen.

R-

RH- and RHC-Steam Boiler Models

(RB-Series)



Reimers®
Electra Steam, Inc.

RB-Boiler Series
Essential Boiler Maintenance Work

In order to ensure long term trouble free boiler operation, please perform the maintenance work within the time intervals indicated below:

1. Re-tighten Electrical Terminals (After installation of boiler)

⚠WARNING **Repair must be performed by experienced personnel only. Ensure boiler is cold and drained and has no pressure or electricity.**

Re-tighten the contactor(s) main terminals and *(depending on the boiler model)* the power distribution - and fuse block terminals.
Maximum Torque Ratings:

Component		Maximum Torque
50A-Contactor	-----	25 in*lb
75A-Contactor	-----	45 in*lb
PD-Block	-----	25 in*lb
Fuse Block	-----	45 in*lb

2. Boiler Feed Water Requirements (During installation of boiler at customer's site)

As a minimum, ensure that a water softener is installed. The complete boiler feed water and boiler water properties as recommended by the American Boiler Manufacturer's Association (ABMA) are provided in the Instruction Manual. If significant corrosion is detected during the pressure vessel inspection (see Instruction Manual), contact a water conditioner company located in the area where the boiler is installed.

3. Gauge Glass Replacement (Every Six (6) Months; N/A for Bulls Eye Option #OPT-BULLSEYE)

⚠WARNING

Repair must be performed by experienced personnel only. Ensure boiler is cold and drained and has no pressure or electricity.

Step 1

If installed, remove the gauge glass protector rods

Step 2

Open drain valve on bottom fixture to drain glass

Step 3

Step 4

Step 5

Step 6

Install new glass by performing the above procedure in reverse order. Always install new rubber washers.

4. Probe and Probe Baffle Cleaning (Every Six (6) Months)

WARNING: Repair must be performed by experienced personnel only.
Ensure boiler is cold and drained and has no pressure or electricity.

Step 1:
Remove the water level probe cover, disconnect from each probe the wire and label it. Remove first the Short Probe and inspect the probe rod. If sediment has accumulated, use a stiff wire brush to remove it. Install the probe in its place in the shell. Repeat the above cleaning procedure for the other probes. Don't install the Long Probe yet.

Step 2:
Remove the pipe plug from the boiler blow off line. See Figure 1

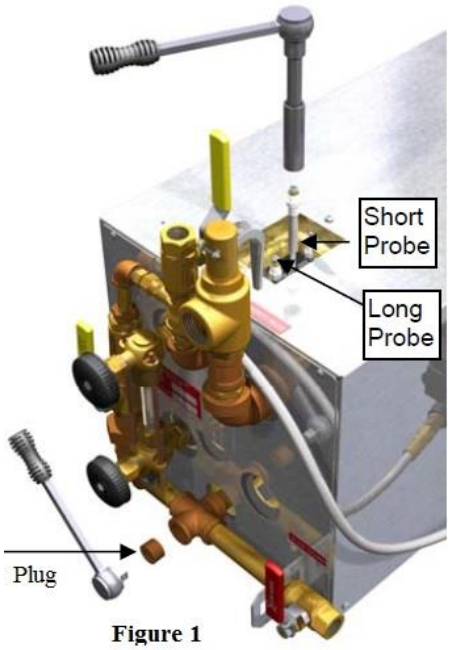


Figure 1

Step 3:
Insert two (2) 1/4in OD copper tubes or any other soft rods through the Long Probe opening and through the boiler blow off opening into the pressure vessel to remove sediments from the bottom of the probe baffle. See Figure 2

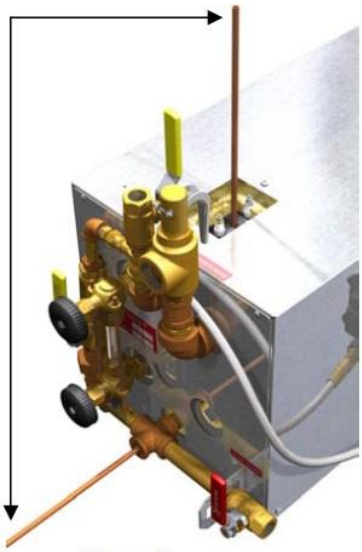
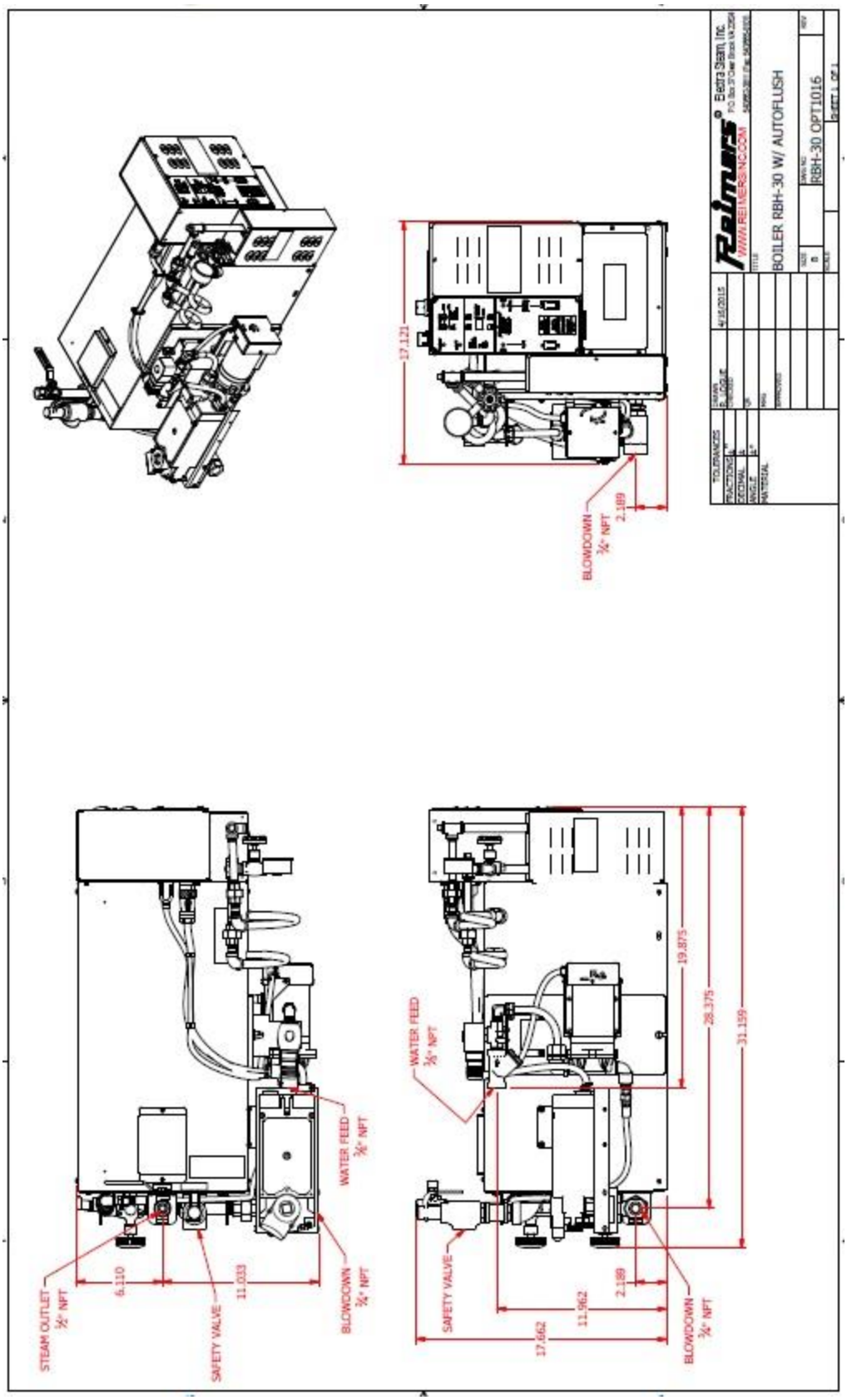


Figure 2

Step 4:
Put a flash light above the Long Probe opening and observe whether light is visible through the boiler blow off opening. If no light is visible, then repeat inserting the copper tube through the Long Probe opening and pushing towards the bottom to remove further sediment from the probe baffle.
If there is a significant amount of sediment visible at the bottom of the pressure vessel, then the heating elements must be removed as shown in chapter 3.4 and the sediments scooped out through the element openings.

Step 5:
Install the Long Probe into the shell and connect all probe wires.


Reimers
Elstra Steam, Inc.
WWW.REIMERSINC.COM
BOILER RBH-30 W/ AUTOFLUSH
RBH-30 OPT1016
17.121
BLOWDOWN ¾" NPT
2.189
STEAM OUTLET ¾" NPT
6.110
SAFETY VALVE
11.033
WATER FEED ¾" NPT
BLOWDOWN ¾" NPT
WATER FEED ¾" NPT
19.875
28.375
31.159
SAFETY VALVE
2.189
11.962
17.662
BLOWDOWN ¾" NPT

Reimers®

ELECTRA STEAM, INC.

AUTO FLUSH SYSTEM

The auto flush system provides hands off method of draining the boiler daily. A wider range of water conditions makes it necessary to eliminate contaminates on a regular basis.

FEATURES

- LOW PRESSURE OPERATION
- AUTO OR MANUAL
- CLOSES ON POWER LOSS OR SWITCH ON

OPERATION

1. TURN BOILER OFF PM
2. PRESSURE DROPS TO BELOW 15 PSI
3. ACTUATOR OPENS
4. 4 MIN. TIME DELAY FOR FULL DRAINAGE
5. ACTUATOR CLOSES.
6. TURN ON BOILER IN AM

All of our boilers are built to the ASME Boiler Code. Each is U.L. listed and inspected by a commissioned National Board Inspector. These approvals ensure ease of installation and ready acceptance by jurisdictional and insurance inspectors.

Incidentally, we have been building quality steam products for over 100 years. Let our experienced engineering staff assist you in your application. Kindly provide your requirements for our review. Our response will be accurate and prompt.

For specification & pricing please contact us at:
PO Box 37 Clear Brook Va. 22624
Phone 540-662-3811 Fax 800-726-4215
EMAIL: sales@reimersinc.com **WEB ADDRESS** www.reimersinc.com

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AUTOFLUSH VALVE

OPTION 1016

OPT1016 is a fully automatically operating flush and drain valve. In high-pressure steam application (above 15psi) we recommend the operation of this valve in conjunction with a pressure switch, attached to the boiler to allow flush and drains only at low pressures for additional safety.

Principle of operation:
If either, the boiler's power switch is turned on or the Auto-Flush ON/OFF switch is turned off, the valve will close immediately.

If the boiler's power switch is turned off and the Auto-Flush ON/OFF switch turned on:

- If the valve operates in conjunction with the above described pressure switch, then as long as the boiler pressure is higher than the setting of the pressure switch, the valve will remain closed. If the boiler pressure drops below the setting of the pressure switch, the valve opens and the light in the Auto-Flush ON/OFF switch is lit. After 4 minutes, the valve closes and the light in the Auto-Flush ON/OFF switch turns off.
- If the valve operates without the pressure switch, then the valve will open immediately and perform the cycle described above.

The valve can be opened and closed manually by turning the handle located at the top of the actuator (item1).
Before doing this, please read the boilers operating manual carefully for safety instructions.

WARNING

DO NOT ENERGIZE AUTOMATIC BLOWDOWN VALVE UNTIL PROPERLY INSPECTED.

BOILER BLOWDOWN DISCHARGES A LARGE VOLUME OF HOT WATER AND STEAM. ENSURE THAT THIS VALVE IS PROPERLY PIPED FOR THIS DISCHARGE. STATE AND LOCAL CODES MUST BE MET AS APPLICABLE.
BEFORE REPAIRING THIS UNIT, BE SURE THE BOILER IS COLD, HAS NO PRESSURE AND NO ELECTRICITY.

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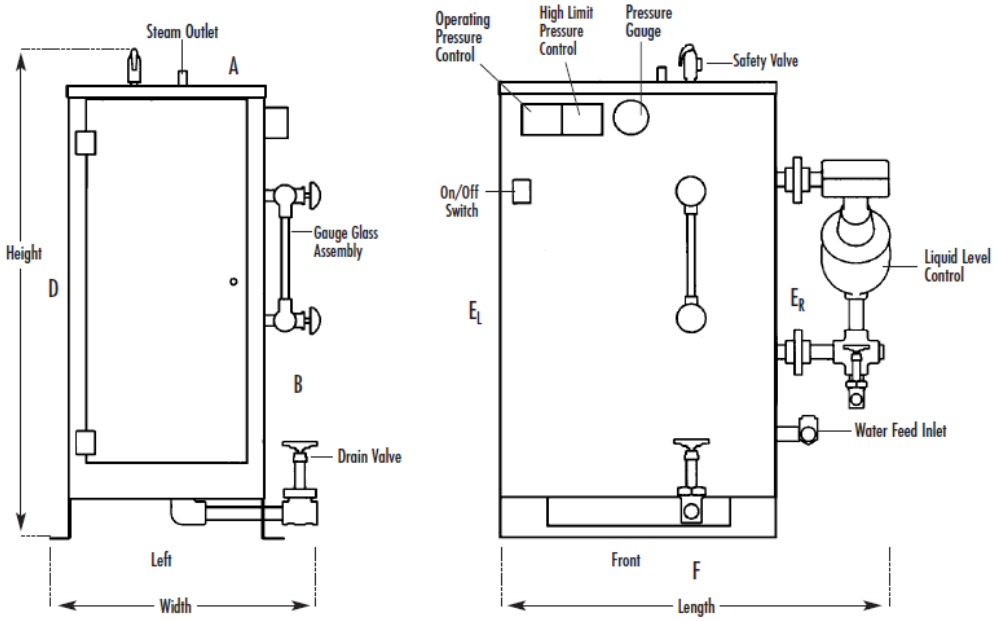
7.2. Sussman Electric Boilers specializes in electric steam and hot water boilers for industrial, commercial, and specialized applications. Sussman's experienced technical capabilities allow us to meet or exceed UL, CSA, and NEC standards. All boilers are built to ASME Boiler Codes for Carbon and Stainless Steel Construction. Each boiler is fully efficient. No onsite products of combustion. Factory tested, ready for immediate use. Capabilities range from Miniature steam generators rated 3KW-9PPH to outputs of 5000PPH steam and 9200MBH hot water.

Contact information for Sussman is –

Sussman Electric Boilers
A Division of SUSSMAN-AUTOMATIC CORP.
800-238-3535 seb@sussmancorp.com
43-20 34th Street • Long Island City, New York 11101
Tel: 718-937-4500 • Fax: 718-937-4676

Dimensions for the ES Model

SYMBOL	ITEM	ES12-18	ES24-72	ES100	ES135-180
Height	Overall Height	36"	44"	59"	61"
Length	Overall Length	28"	33"	34"	38"
Width	Overall Width	20"	22"	26"	30"

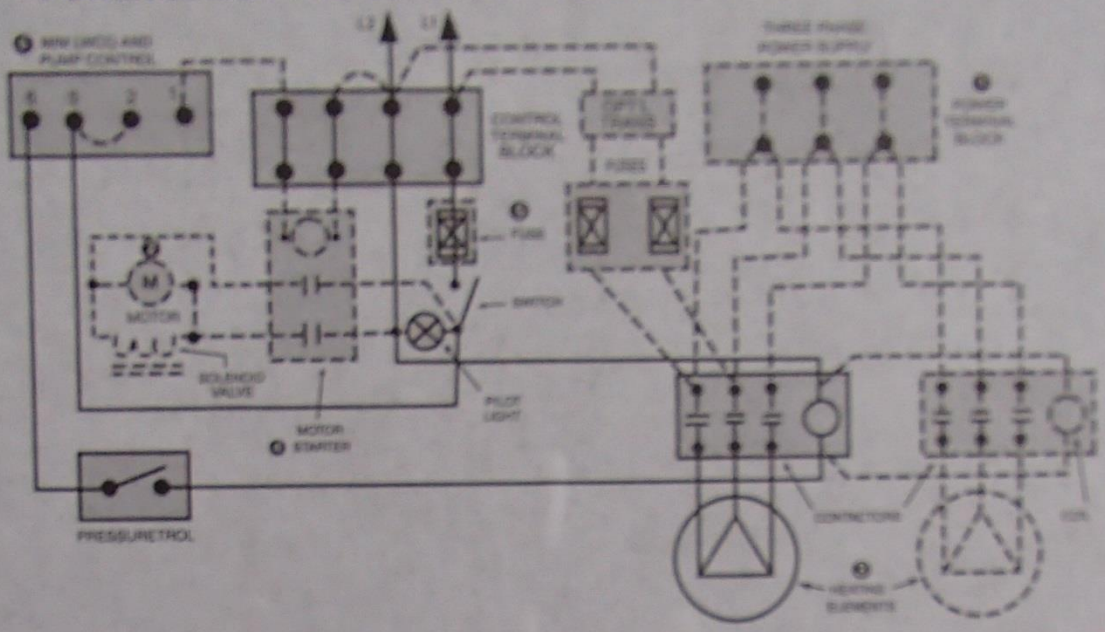


Side Elevation

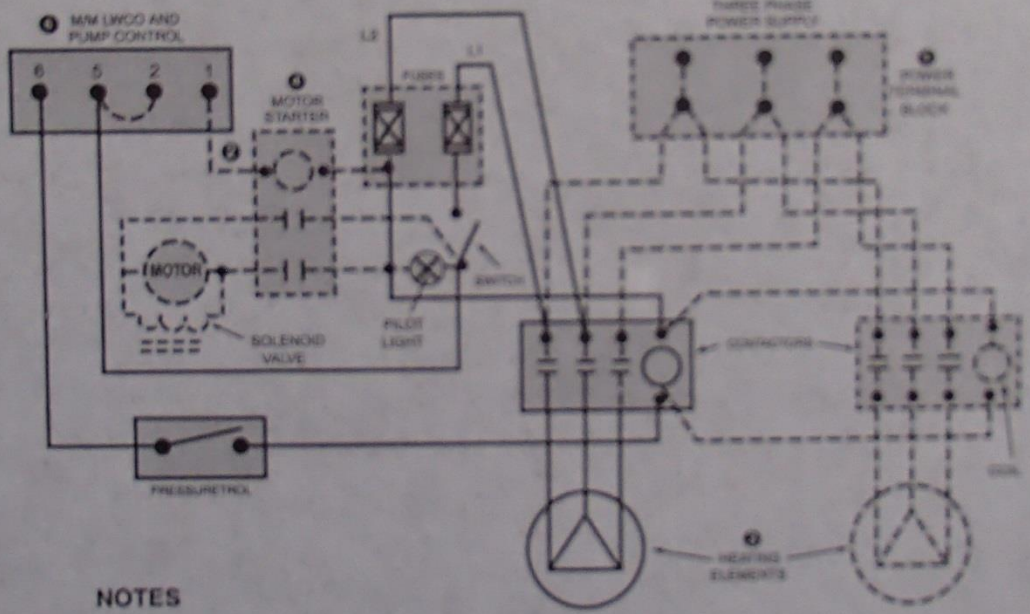
Front Elevation

VERTICAL STEAM BOILER WIRING DIAGRAMS

POWER CIRCUIT AND CONTROL CIRCUIT USE DIFFERENT VOLTAGE



POWER CIRCUIT AND CONTROL CIRCUIT USE SAME VOLTAGE



NOTES

1. On One-Contactor Boilers the Power Terminal Block is not supplied. Three Phase Power connected directly to Single Contactor.
2. Motor, Solenoid Valve and Dotted Control Wiring are included if Motor and Pump package is supplied. Solenoid Valve only is supplied with 99117 Water Feed.
3. 600-v and 480-v Boilers have two Heating Elements in parallel for each contactor.
4. 1/3HP motor is controlled directly without use of Motor Starter.
5. L2 Fuse eliminated on 120-v Control Circuits.
6. On Boilers with Solid State LWCO refer to diagram inside LWCO enclosure.

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