



LESLIE
CONTROLS, INC.

A subsidiary of CIRCOR International, Inc.

12501 Telecom Drive, Tampa Florida 33637

**Installation, Operating and
Maintenance Instructions
Supplement**

**90/0.5.0
Rev. 5**

DOUBLE SHELL & TUBE HEAT EXCHANGER

TABLE OF CONTENTS

INTRODUCTION	6
GENERAL NOTES AND WARNINGS	6
INSTALLATION AND OPERATION.....	6
A. INSTALLATION	7
B. PIPE CONNECTIONS	7
C. ELECTRICAL CONNECTIONS	7
D. OPERATION OF NORMAL RECIRCULATION PUMP	8
E. OPERATION OF SECOND RECIRCULATION PUMP	8
F. OPERATION OF SWITCH PANEL.....	9
G. OPERATION DUE TO OVER TEMPERATURE CONDITIONS	9
H. GENERAL SETUP AND OPERATION OF BLEND VALVE	10
I. GENERAL OPERATION OF HEAT EXCHANGERS.....	11
J. GENERAL OPERATING PRINCIPLE.....	11
<i>STORAGE AND TRANSPORTATION.....</i>	<i>12</i>
<i>STARTUP</i>	<i>13</i>
<i>CLEANING.....</i>	<i>13</i>
<i>CERTIFICATION.....</i>	<i>14</i>
1. GENERAL OPERATION OF RELIEF VALVE	14
REPLACEMENT PARTS	14
A. RECIRCULATION PUMP.....	14
D. BLEND VALVE.....	14
MAINTENANCE.....	15
TROUBLESHOOTING	17
UNIT SEPARATION FOR INSTALLATION.....	18
UNIT STARTUP AFTER INSTALLATION	20

LIST OF ILLUSTRATION

FIGURE 1 - TYPICAL HEATER ILLUSTRATION	3
FIGURE 2 – CONTROL BOX	4
FIGURE 3 - SWITCH BOX	5
FIGURE 4 – LESLIE ELECTRICAL SCHEMATIC.....	7
FIGURE 5 - MOTOR CONDUIT BOX WIRING DETAIL.....	8
FIGURE 6 - PUMP SECTIONAL DRAWING	8
FIGURE 7 - CROSS SECTION	11
FIGURE 8 – FLOW DISTRIBUTION IN HEAT EXCHANGERS	11
FIGURE 9 - FLOW DISTRIBUTION IN HEAT EXCHANGERS	12
FIGURE 10 - THREADED AND FLANGED (COMPATIBLE WITH CL 300) CONNECTIONS.....	12
FIGURE 11 - COMPLETE INSTALLATION DIAGRAM.....	13
FIGURE 12 - INSULATION TIED WITH STRAPS.....	13
FIGURE 13 - MODEL B	15
FIGURE 14 - MODEL C	15

Leslie Controls Inc IOM Manual (With the 130F Element)

For All Serial Numbers EXCEPT:

S#-0712-3
S#-0712-1
S#-0711-11
S#-0807-1
S#-0804-1
S#-0712-5
S#-0712-4
S#-0802-2
S#-0712-7
S#-0801-2
S#-0801-6
S#-0712-9
S#-0712-6
S#-0802-6
S#-0802-9
S#-0803-6
S#-0802-8
S#-0801-5
S#-0802-4
S#-0801-3
S#-0802-1
S#-0801-8
S#-0802-7

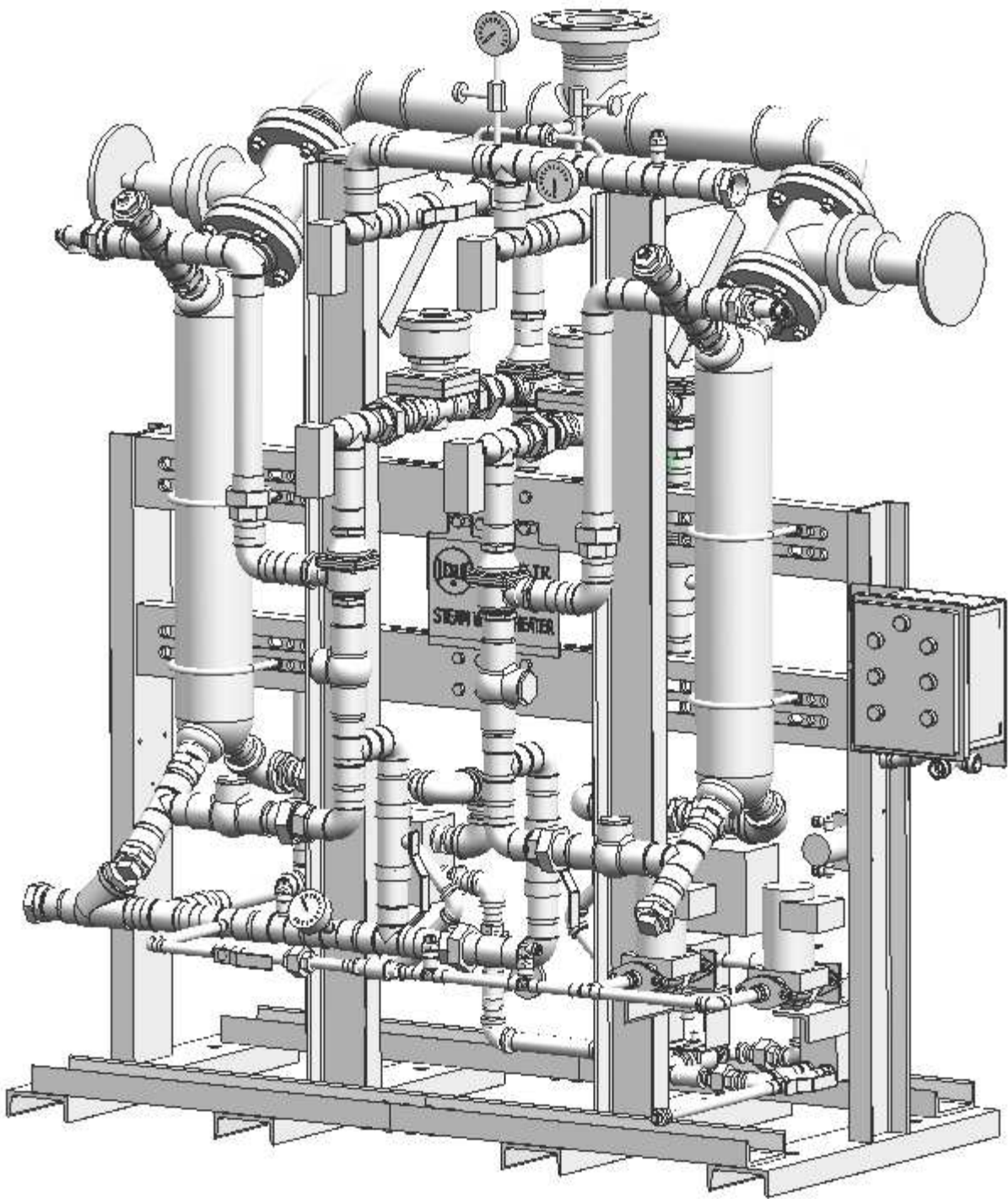


Figure 1 - Typical Heater Illustration

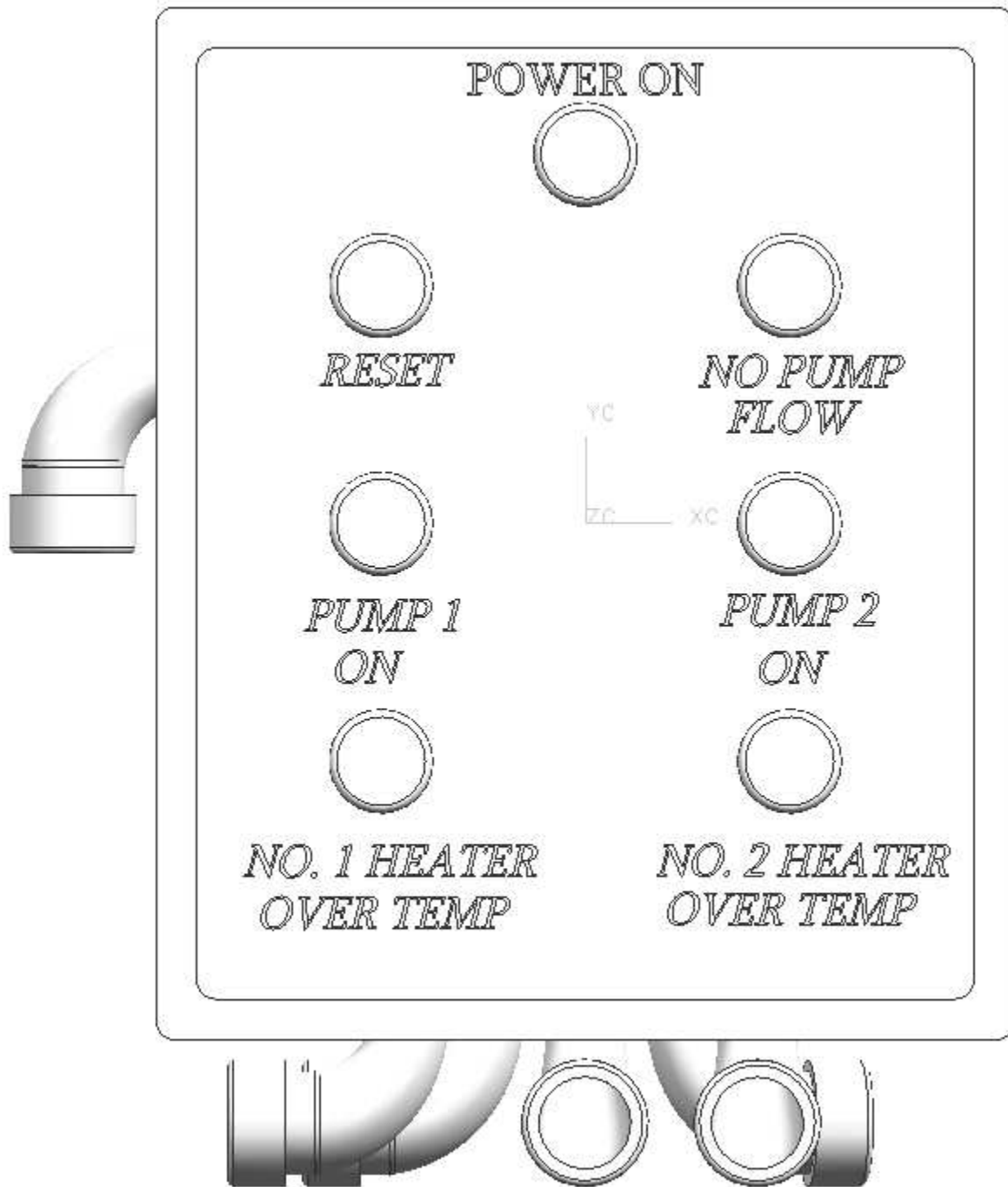


Figure 2 – Control Box

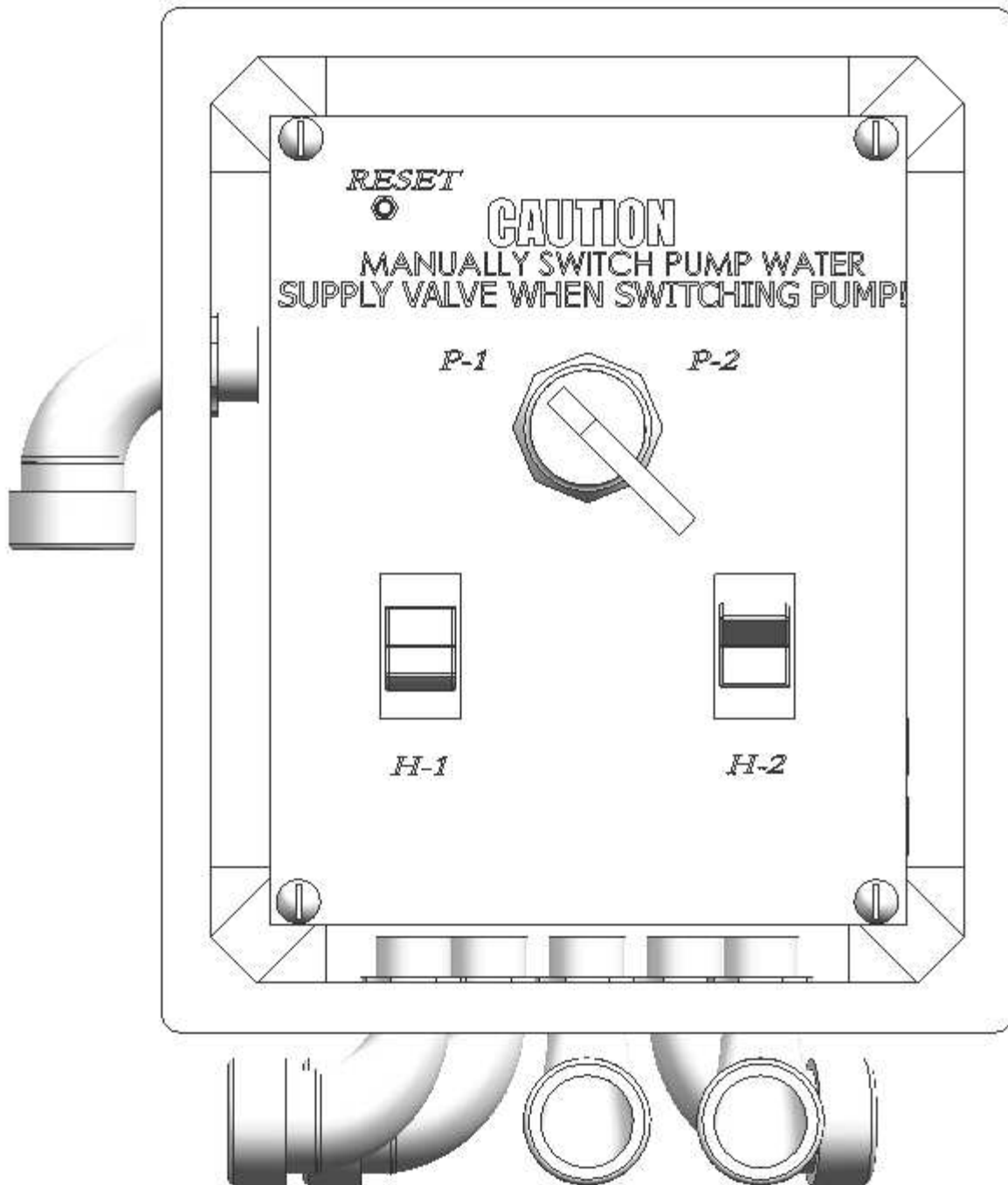


Figure 3 - Switch Box

WARNING!

Injury or death can occur due to failure to completely isolate component from all sources of pressure before beginning disassembly. Do not proceed until component has been completely isolated from process stream and vented to atmosphere.

WARNING!

Injury can occur due to adjusting secondary temperature switches higher than 130 degrees F. Check this setting before supplying steam to the unit.

INTRODUCTION

This Installation, Operation, and Maintenance Manual is intended to be as complete and up to date as possible. It covers installation, operation, and maintenance procedures for Leslie Controls, Inc. Double Shell Tube. Leslie reserves right to update this manual and/or product information concerning installation, operation, and/or maintenance, at any time and without obligation to notify product owners of such changes.

Leslie is not responsible for inaccuracies in specifications, procedures and/or content of product literature supplied by manufacturers of components used in Leslie Controls, Inc. Double Shell Tube, Leslie strives to use only highest quality components; however, Leslie has no direct control over manufacture or its consistent quality.

Leslie is not responsible for injury to personnel or product damage due to improper installation, operation, and/or maintenance of Leslie Controls, Inc. Double Shell Tube. Trained/certified personnel should only perform all installation, operation, and maintenance procedures. Personnel should be trained in and familiar with correct piping and electrical procedures and methods, and should be experienced in working with hot/boiler water systems and steam systems. All personnel performing procedures should completely and carefully read and understand all supplied materials before attempting procedures. All personnel should pay strict attention to all Notes, Cautions, and Warnings that appear within procedures detailed in this manual.

Leslie welcomes user's input as to suggestions for product or manual improvement.

Contact Information

For information concerning warranties, or for questions pertaining to installation, operation or maintenance of Leslie products, contact:

Leslie Controls Inc.
12501 Telecom Drive
Tampa, FL 33637
USA Phone: (813) 978-1000
USA Fax: (813) 978-0984
www.LeslieControls.com

To order replacement parts, contact Leslie Controls at address listed above, or call toll free:

USA/Canada/Caribbean Phone: (800) 323-8366

Note: Please include model and serial number of unit for which parts are being ordered. If ordering by phone, please have this information readily available.

GENERAL NOTES AND WARNINGS

Notes:

- If questions are not answered by this manual, or if specific installation, operation, and/or maintenance procedures are not clearly understood, contact Leslie Controls, Inc. for clarification before proceeding.
- If unit is damaged during installation, operation, or maintenance, complete following steps:
 1. Turn off and lock out electric power supply to unit in an approved manner.
 2. Turn off all incoming valves.
 3. Contact in-house maintenance personnel or Leslie Controls, Inc. for instructions.

Note: Throughout this manual, BOXES will denote warnings and cautions

CAUTION!

Piping system must be adequately designed and supported to prevent extraordinary loads to pressure equipment.

INSTALLATION AND OPERATION

A. INSTALLATION

After connecting inlet cold water, outlet hot water, Steam inlet, re-circulation inlet, safety relief valve drains and condensate piping, lag unit to concrete floor.

CAUTION!

Safety Relief valves and condensate drain must be connected properly to drainage, to insure no hot water can contact people.

IMPORTANT!

1. Shut off cold water valves to secondary blend valves.
2. Insure that cold water supply to primary blend valves is turned on.
3. Slowly supply water pressure to primary blend valves after full water pressure is reached then open up cold water supply to secondary blend valves slowly.
4. Slowly supply steam to unit, up to 8 psig.

CAUTION!

Water pressure must be supplied slowly to the inlet of the unit so that the solenoid valves are pressurized correctly. If not, then correct temperature adjustment may not be possible.

B. PIPE CONNECTIONS

Connection	Drawing symbol
Inlet water	M
Outlet Hot water	N
Inlet Steam	L
Re-circulation Inlet	P
Condensate Outlet	R

Model	Connection	Conn. Size
NYCHA60	Inlet water	2" F NPT
	Outlet Hot water	2" F NPT
	Inlet Steam	4" RF
	Outlet Condensate	3/4" F NPT
NYCHA90	Inlet water	2" F NPT
	Outlet Hot water	2" F NPT
	Inlet Steam	4" RF
	Outlet Condensate	3/4" F NPT
NYCHA120	Inlet water	2" F NPT
	Outlet Hot water	2" F NPT

NYCHA150	Inlet Steam	4" RF
	Outlet Condensate	3/4" F NPT
	Inlet water	2" F NPT
	Outlet Hot water	2" F NPT
	Inlet Steam	4" RF
	Outlet Condensate	3/4" F NPT

C. ELECTRICAL CONNECTIONS

WARNING!

ELECTRICAL SHOCK HAZARD

Be certain that all connections are secure and the conduit box cover is closed before electrical power is connected. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

See drawing for latest revision of wiring.

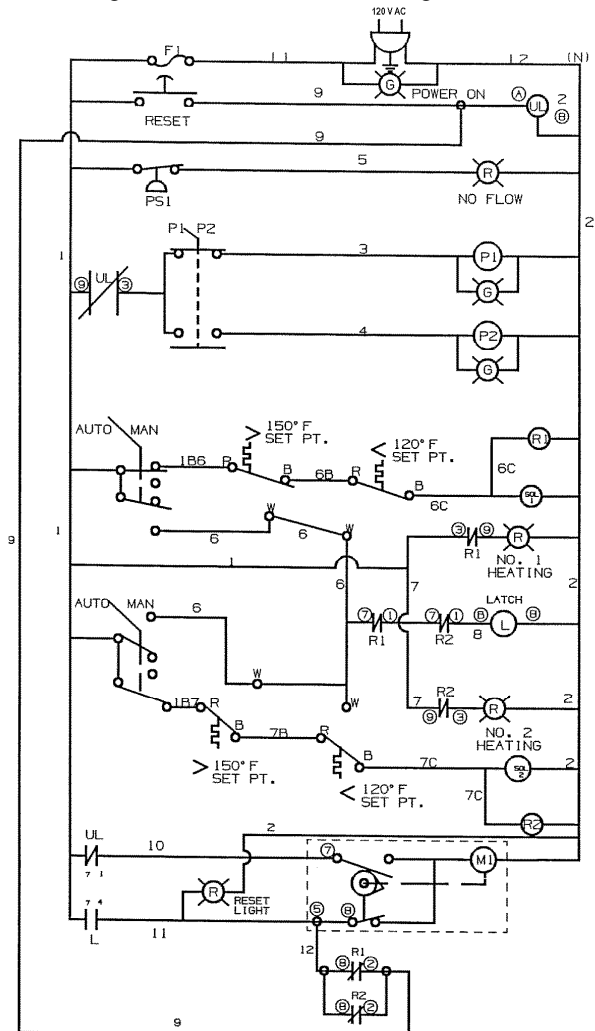


Figure 4 – Leslie Electrical Schematic

Schematic Component Descriptions

1. Power on Light:
 - Indicates that power is being supplied to system.
 - Fuse F1 blown, burnt out light or disconnection of power will cause light to go out.
2. No flow light:
 - Will light red when pressure switch (PS1) senses no pressure across pumps.
3. Reset Switch:
 - This switch is only used if unit was set up so that it will not automatically reset. It is a manual switch that will unlatch latched relay and set all switches back to start position after an over temperature condition was seen by unit .
 - Note, this switch is not required if unit is setup for automatic restart.
4. P1/P2 Switch:
 - Turns first pump on and second pump off or vice versa.
 - Front panel light will identify active pump.
5. Primary and secondary over temperature switches:
 - If either primary or secondary switch sees an over temperature condition, then:
 1. Solenoid supplying hot water is de-energized to the shut position.
 2. Latching relay and over temperature light are energized.
 3. Power to re-circulation pump is cut off.
 4. Latching relay supplies power to three way condensate diverting valve and Three way condensate diverting valve diverts hot condensate water away from cooler and sends it directly to condensate return line.
 - Latching relay:
 1. Upon an over temperature condition, latch will hold three way condensate diverting valve in diverting position until over temperature switch has reset and over temperature condition no longer exists. It will then allow diverting valve to go back to sending condensate water to cooler.
6. Auto/Manual Switches:
 - Perform same function as primary and secondary temperature over temperature switches.

CAUTION!

Manufacture's IOM must be referred to. This IOM is FOR GENERAL USE ONLY .

Pump Connections

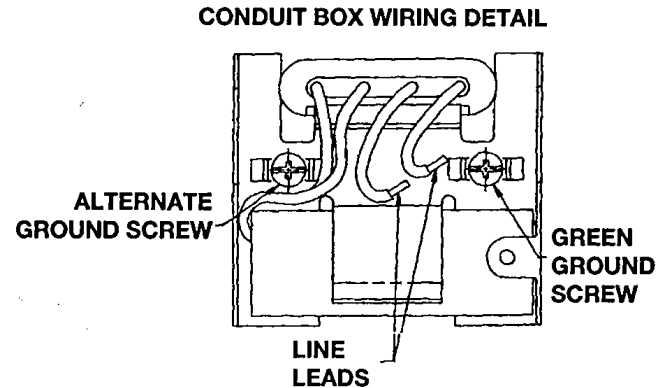


Figure 5 - Motor Conduit Box Wiring Detail

D. OPERATION OF NORMAL RECIRCULATION PUMP

PERIODIC INSPECTION

It is recommended that periodic inspections be made to check for potential problems with pump. If any leakage or evidence of leakage is present, repair or replace unit.

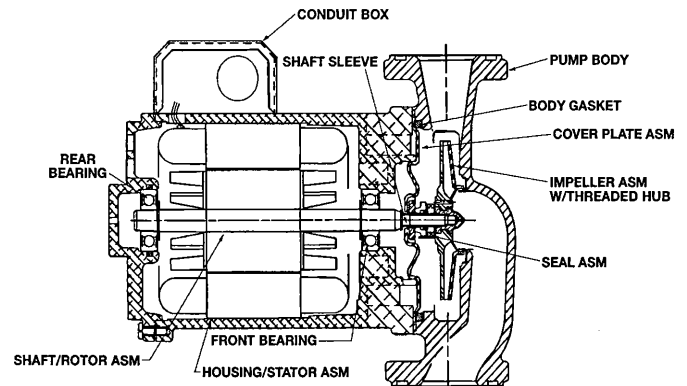


Figure 6 - Pump Sectional Drawing

“P-1” pump is used under normal situations. Green light for “P-1” is lit and red light for “NO-FLOW” is not lit. If this pump should fail then Red light for “NO_FLOW” will light. Follow instructions for isolating this pump and starting secondary pump.

E. OPERATION OF SECOND RECIRCULATION PUMP

This pump is used under maintenance situations. Light for “P-2 is lit and red light for “NO-FLOW” is not lit. If this

pump should fail then Red light for “NO_FLOW” will light. Follow instructions for isolating this pump and starting primary pump or shutting down system.

<p>WARNING!</p> <p>Pressure may be present in the pump body. Loosening flange bolts and shifting pump assembly slightly to allow pressurized water to escape can relieve this pressure. Failure to follow these instructions could result in serious personal injury or death</p>
<p>WARNING!</p> <p>When disassembling a gasketed joint, always use a new gasket upon reassembly. NEVER RE-USE OLD GASKETS. Failure to follow these instructions could result in serious personal injury or death</p>
<p>WARNING!</p> <p>Pressurize the body slowly while checking for leaks at all joint with gaskets. NEVER RE-USE OLD GASKETS. Failure to follow these instructions could result in serious personal injury or death</p>
<p>CAUTION!</p> <p>Do not run pumps dry, seal damage may occur. Failure to follow these instructions could result in serious personal injury or death</p>

F. OPERATION OF SWITCH PANEL

(Ref Figure 2)

Light/Switch	Indication	Notes
Power On	Green	Electrical power is being supplied to unit.
Pump 1 On	Primary pump P1 is on. Green	Pump can have power but not pump fluid
Pump 2 On	Secondary Pump P2 is on. Green	Pump can have power but not pump fluid
No Pump Flow	Re-circulation system flow has stopped. Red	Water pressure before pumps is same as

		after pumps
No. 1 Heater Over Temp	Hot water is off. Red	One or more temp controllers on side one detected an over temp condition.
No. 2 Heater Over Temp	Hot water is off. Red	One or more temp controllers on side two detected an over temp condition.
H-1	Turn hot water to side one on	Turns system on (Both switches need to be on)
H-2	Turn hot water to side two on	Turns system on (Both switches need to be on)
P-1	Select primary pump on, secondary off	Power to primary pump. Off to secondary
P-2	Select secondary pump on, primary off	Power to secondary pump. Off to primary
Reset	Momentary switch to reset from a fail condition	Fail condition latches unit to supply only cold water

<p>CAUTION!</p> <p><u>IF AN OVER TEMPERATURE CONDITION WAS DETECTED:</u></p> <ol style="list-style-type: none"> 1. The hot water supply is shut off and only cold water is supplied to building. 2. Re-circulation pump power is turned off. 3. Condensate bypasses cooler. <p><u>RESET WILL OCCUR AUTOMATICALLY AFTER WATER TEMPERATURE REDUCES AND RECIRCULATION CONTINUES</u></p>
--

G. OPERATION DUE TO OVER TEMPERATURE CONDITIONS

Temperature switch settings:
First switch = 180 degrees F

Second switch = 130 degrees F

Should an over temperature condition occur a temperature switch in first or second stage of one or both sides of the unit will recognize this and switch the relay in the control box. Relay will:

1. Cause solenoid supplying hot water to shut off supply of hot water to output of system.
2. Cause three way valve (101) to rotate and divert condensate water away from condensate cooler and send it directly to drain.
3. Cause "RESET", "NO. 1 HEATER OVER TEMPERATURE" "NO. 2 HEATER OVER TEMPERATURE" light or all three lights to light up.
4. When temperature switch senses the water temperature has cooled down and the three way valve has reached its full rotation, relay in the control box will switch three way valve to rotate back to its original position. Only then will the solenoid valves open up again and normal operation begin.

H. GENERAL SETUP AND OPERATION OF BLEND VALVE

NOTE

Gain adjuster valves, item 39 are used to adjust cold water to final blend valve to insure holding set temperature over flow range of unit. Valves are generally set at 4.5 turns from full open position, however they should be adjusted for each installation since each building has it's own characteristics. Valves should be re-adjusted when season changes from winter to summer.

INITIAL SETTING OF GAIN ADJUSTER VALVES PROCEDURE

1. Ensure all connections are made and unit is running at specified maximum flow.
2. Turn off supply of water to one side. Half of specified maximum flow is now being delivered.
3. Check outlet water temperature and insure it is 120 degrees F.
4. If warmer then turn gain valve handle counterclockwise for ¼ turn.
5. Recheck water temperature and repeat until reaching desired temperature.
6. Note: Temperature will not change quickly and must be left to seek it's normal setting.
7. If the water was colder then turn the gain valve handle clockwise for ¼ turn.
8. Recheck water temperature and repeat until reaching desired temperature.

9. Re-open the supply of water to side turned off. Wait for the system to stabilize.
10. Repeat step 2 through 9 for the second side.

BLEND VALVE OPERATION

Motive force of operation comes from expansion of a special wax material which remains in a semi-solid form and which is highly sensitive to temperature changes.

Upon warming sliding valve moves up to extended position. By-pass closes off as sliding valve seats and water is diverted to outlet (Port C on valve). In actual operation, sliding valve is normally in about mid-position. When wax material expands with rising temperature, rubber plug is forced into a reduced diameter in piston guide, which multiplies movement of piston by and extruding action.

Operating range is determined by chemical composition of wax material. Expanding wax develops a pressure that easily overcomes return spring force of over 100 lb. Construction is simple and rugged, yet unit is very sensitive to changes in temperature. Changes in pressure do not affect element and, due to valve construction, surges in pressure do not tend to upset stability of Thermostatic valve.

Thermostatic valves have Tamper-Proof Temperature Setting, and are Completely Self-Contained.

3-way action of thermostatic valve allows a constant volume of water through system at all times with no restriction to flow when system is cold.

MATERIALS OF CONSTRUCTION

Temperature Element Assemblies are made of brass and bronze. Seals are Buna N. Certain fluids may be damaging to standard valve body and seal materials.

TEMPERATURE SETTINGS

Thermostatic Valves are set to a predetermined temperature at factory, errors due to mistakes of operating personnel are eliminated. After a Thermostatic Valve had been installed, it is impossible for operator to arbitrarily change operating temperature unless element assemblies themselves are changed.

For long life, Thermostatic Valves should not be operated continuously at temperatures more than about 25°F (14°C) above their nominal ratings. If higher continuous over temperatures are expected, contact factory for recommendations.

I. GENERAL OPERATION OF HEAT EXCHANGERS

Heat exchangers are designed to transfer heat between steam and water at various temperatures, fluid flows, and pressures.

WARNING!
FLUSH HEAT EXCHANGERS
WITH FRESH CLEAN WATER EVERY SIX
MONTHS. An inspection and maintenance log must
be maintained.

CONSTRUCTION FEATURES

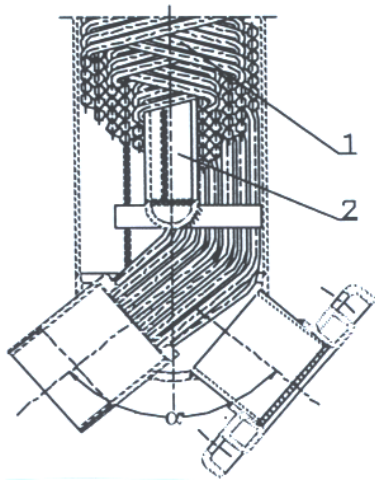


Figure 7 - Cross Section

Heat exchangers are designed and fabricated as a single unit with non-removable parts. Cylindrical shell encloses a tube bundle which consists of circular layers of helically, corrugated tubes. Each layer flows in opposite direction to layers surrounding it in a criss-cross manner. Tube bundle has perforated bottom, which are welded near connections. Both ends of cylindrical shell are enclosed within hemispherical heads.

Each heat exchanger has a total of four (4) symmetrically located connections, two on each hemispherical head. One pair of opposing connections is connected to tube side while other pair is connected to shell side.

J. GENERAL OPERATING PRINCIPLE

A heat exchanger is a device in which heat is transferred from one flowing fluid to another. Shell and Tube heat

exchangers are most common type of heat exchangers. These heat exchangers are counter flow units, which from a thermodynamic point of view extract more heat from a given fluid stream than other common types of heat exchangers.

Heating medium flows through tubes. Thermal energy is transferred through tube walls. Total heat load is dependent on flow parameters of fluid.

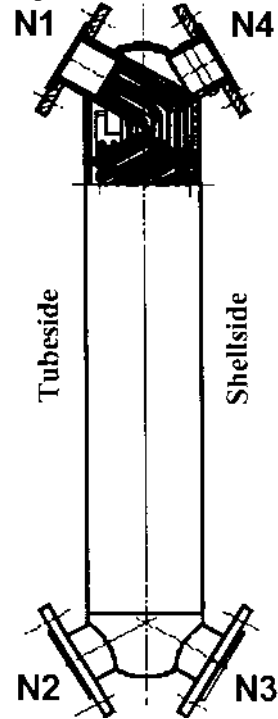


Figure 8 – Flow Distribution in Heat Exchangers

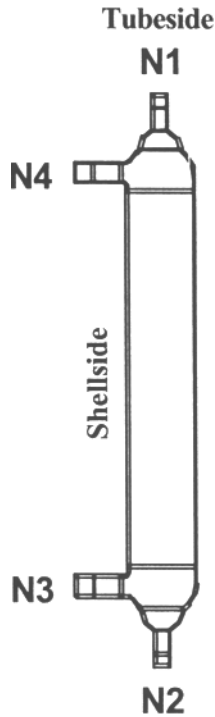


Figure 9 - Flow Distribution in Heat Exchangers

N 1	Heating Fluid In
N 2	Heating Fluid Out
N 3	Cold Fluid In
N 4	Cold Fluid Out

MATERIALS

Heat exchangers are manufactured according to following table.

Standard Materials

Shell	ASTM 316L
Tubes	ASTM 316L
Nozzle	ASTM 316L
Connection flanges	Stainless Steel/ Carbon Steel with Stainless Steel Lining

OPERATING PARAMETERS OF HEAT EXCHANGERS

Standard maximum working parameters of heat exchangers are as follows:

Design Pressure

Shell	300 psig (2.0 Mpa)
Tube	300 psig (2.0 Mpa)

Design temperature

Shell	422°F (217°C)
Tube	422°F (217°C)

OPERATING PRECAUTIONS

In order to achieve maximum performance from heat exchanger, following must be strictly followed:

Heat exchangers should be used according to specification given.

Pressures and temperatures should not exceed limits set forth in *Operating Parameters and Selection of Heat Exchangers Section*.

Initial start up should be done according to *Start up Section*.

Heat exchangers should be free of any debris existing in fluid.

In central heating applications, hot water should not exceed 140 °F (60 °C). Over this limit, lime will form on tube walls.

Prevent evaporation of fluid on shell side. Steam or vapor should only flow through tubes.

Clean heat exchangers according to *Cleaning Section*.

System should be designed to prevent heat exchanger from encountering pressure shocks.

Prevent rapid temperature increases in heat exchangers. This would include installation of expansion tanks and safety valves into system.

Prevent any fluids from dropping below freezing point.

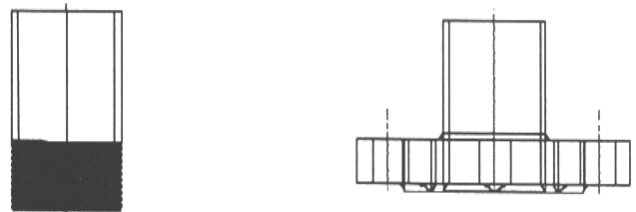


Figure 10 - Threaded and Flanged (compatible with CL 300) connections

A name plate is placed on shell and includes following data:

- Type of heat exchanger
- Serial number
- Production year
- Maximum working pressure and temperature
- ASME stamp of approval
- CRN registration number
- Manufacturer logo

STORAGE AND TRANSPORTATION

Heat exchangers should be stored in a clean place away from corrosive environments or weather elements (e.g.

rain). During transportation, ensure that they are not exposed to mechanical damages.

STARTUP

To prepare heat exchanger for operation, it should initially be:

- Mounted properly
- Filled with working fluids
- Deaerated
- All connections checked for leaks

During startup, first open valves, then start pump of heated medium followed by opening cycle of heating medium. Valves should be opened gradually in order to achieve a steady increase in flow and pressure. Pressure increase/decrease should not exceed 72 psi/min (0.5 Mpa/min).

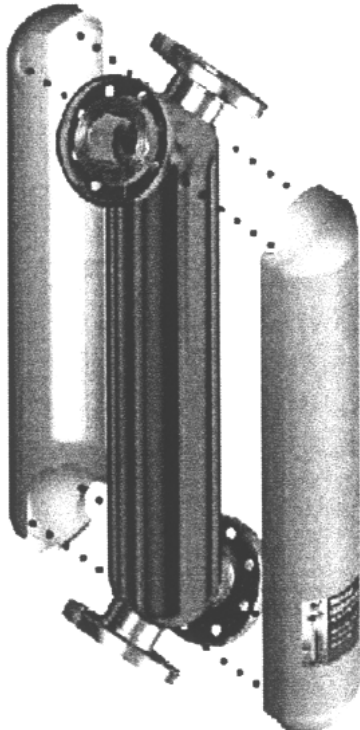


Figure 11 - Complete Installation Diagram

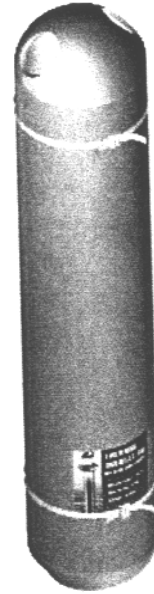


Figure 12 - Insulation tied with straps

Insulation is mainly used to reduce heat loss, and also offers operator some degree of personal protection from hot surface of unit. Insulation should be designed for temperatures up to 130°C.

CLEANING

Heat exchangers are cleansed by flushing units with fluids which do not react with stainless steel.

Dirt deposit in heat exchanger will result in an increase in pressure drop, lower temperature difference in heated medium or a higher exit temperature on heating medium side. Flushing can be done without removal of heat exchanger from system.

Following fluids are prohibited for use as a flushing agent:

- Hydrochloric acid up to 0.1% concentration
- Solutions which contain MCI
- Chlorides ($MgCl_2$, $NaCl$ between 0.01 – 1%, $CuCl$ up to 1%, $CaCl_2$ from 5% to saturation, KCl , $MgCl_2$)
- Any fluid which should deposit alkaline residue or phosphorous

Cleaning solutions are easily accessible at businesses carrying chemical cleaning agents for heat exchangers or tubing and piping applications. As a guideline to purchasing cleaning solutions, check for following products data:

- Compatibility with stainless steel

- Accepted for use in food processing industries (if applicable)
- Removes scale, slag, tarnishes, and hard water deposits
- Easily rinsed out of system
- No objectionable or corrosive fumes

CERTIFICATION

Heat exchangers are designed and fabricated in accordance with ASME Code Sec. VIII, Div.1 for symbols “U” and “UM”. Heat exchangers are CSA approved and have obtained CRN in Canadian provinces.

Copies of above certificates are available upon request.

1. GENERAL OPERATION OF RELIEF VALVE

**PRESSURE RELIEF VALVE IS NATIONAL BOARD CERTIFIED. TEMPERATURE STEAM RATED
ANS Z21.22 RELIEF VALVES CONFORMS TO H.U.D./F.H.A. REQUIREMENTS.**

Discharge from relief valve shall be conducted to a suitable place for disposal when relief occurs by installation of a drain line to any open drain. Make sure water in drain cannot freeze and cause a stop-up. Relief line must be such that relief valve outlet and drain line will drain dry.

Do not use reduced couplings or restrictions to install drain line to valve discharge.

This valve protects a water system from over-pressure. It will automatically shut off after providing such protection. If valve fails to shut off, check for excessive pressure and/or heat input control operation.

WARNING!

This product contains a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

REPLACEMENT PARTS

A. RECIRCULATION PUMP

(ref Figure 6)

Pump replacement parts are :

- Impeller
- Impeller seal
- Body Gasket

Do not attempt to replace motor bearings, replace the motor as a whole unit. Refer to manufactures specific IOM for further details.

D. BLEND VALVE

Service Parts For Model BO		
Ref No	Part No	Description
3	9585L001	Seat, Bolted-In
4	1182	Sleeve
5	11132L050	Capscrews
6	11133	Lockwasher
7	1183	Element O-Ring, Buna-N
8	1096X(TEMP)	Element Assembly
9	761	O-Ring

Blend Valve temperature ranges are:

150 degrees F for the first valve

130S degrees F (S = Special 120 degree F unit)

Service Kit No. 9167X(Temp.) Standard Element			
Ref No	Qty	Description	Part No.
3	1	Element	1125X(Temp.)
4	1	O-Ring	1205
5	1	O-Ring	277L145
6	1	O-Ring	11080L001
7	1	O-Ring	11079L001

No adjustments are ever required on thermostatic valves. Once installed a thermostatic valve will provide years of trouble-free service. It is entirely self-contained, and there are no external bulbs or lines to become damaged or broken. There are no packing glands to tighten and no parts to oil. Temperature is permanently set at factory and requires no further adjustment.

Operating temperature can be changed only by changing temperature element assemblies which is easily accomplished by unbolting housing. Element assemblies are all interchangeable within each lettered valve series.

Larger valves in “B” and “H” series contain multiple element assemblies in one housing. This means that a temperature element assembly will fit any size thermostatic valve housing in that series.

MAINTENANCE

WARNING!

Warranty will be void if heat exchanger tubes are not flushed every six months. Reports on this maintenance by Heater Serial number must be provided to Leslie after each flushing. These reports are to be sent to sales@lesliecontrols.com

HEAT EXCHANGERS

(Refer to manufactures specific IOM)

(ref. Valve listing)

Shut down steam and supply water to heat exchanger by turning off valves on the side to be flushed (59), and two (41).

Open plugs (19) on the ends of the water pipes to the heat exchanger.

Flush the heat exchanger per manufactures instructions.

Replace the plugs (19) after Teflon taping the threads to insure no leakage.

Re-turn all valves to there run position.

CAUTION!

Do not torque the U-bolts nuts more than 10 ft-lbs. Over tightening of the nuts can cause the U-bolts to collapse the shell of the heat exchanger.

BLEND VALVES

(Refer to manufactures specific IOM)

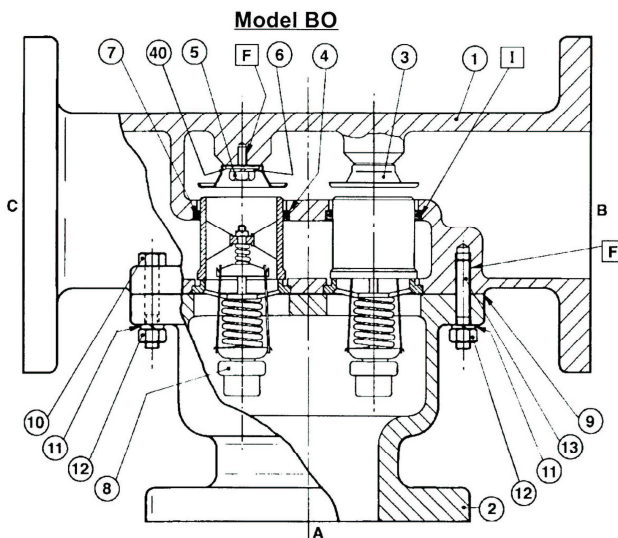


Figure 13 - MODEL B

Service Parts For Model BO		
Ref No	Part No	Description
3	9585L001	Seat, Bolted-In
4	1182	Sleeve
5	11132L050	Capscrew
6	11133	Lockwasher
7	1183	Element O-Ring, Buna-N
8	1096X(TEMP)	Element Assembly
9	761	O-Ring

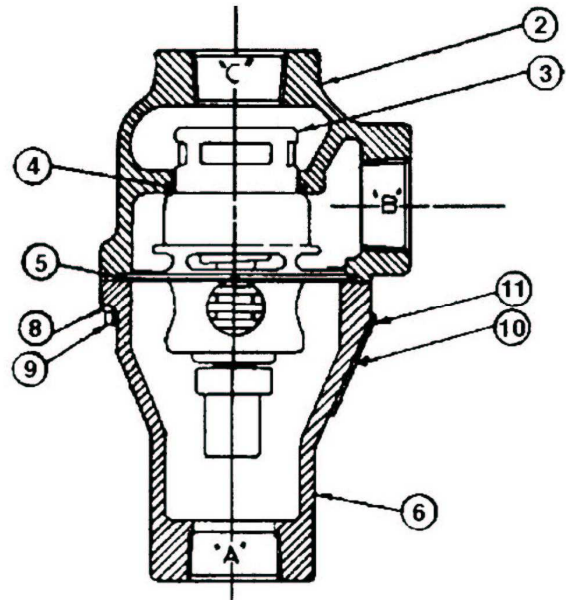


Figure 14 - MODEL C

Service Kit No. 9167X(Temp.) Standard Element			
Ref No	Qty	Description	Part No.
3	1	Element	1125X(A83723)
4	1	O-Ring	1205
5	1	O-Ring	277L145
6	1	O-Ring	11080L001
7	1	O-Ring	11079L001

An element may be quickly checked by immersing it in an agitated bath of water. **Never use oil for checking the element.** Element number and nominal temperature setting (last three numbers of part number) are stamped on flange of element. At 10° F to 13 ° F above nominal setting , bypass port B should be closed.

Order new element by Part No. and Nominal Temperature Setting, which is found on element flange. If these are not known, send complete Model No. and Serial No. on Valve Nameplate.

SOLENOID VALVES

(Ref ASCO Form number V6297R2)

See ASCO solenoid instruction set for Installation, Operation and Maintenance Instructions.

RECIRCULATION PUMPS

(Ref Bell and Gossett manual P81884 Rev C)

WARNING!

Be certain electrical power is not present at motor leads before continuing. Failure to follow these instructions could result in serious personal injury or death

WARNING!

Pressure may be present in the pump body. Loosening flange bolts and shifting pump assembly slightly to allow pressurized water to escape can relieve this pressure. Failure to follow these instructions could result in serious personal injury or death

1. Reference instructions for repairing mechanical seal.
2. Close valves on the suction and discharge sides of pump.
3. Loosen conduit box cover screw and remove cover.
4. Disconnect electrical supply lines.
5. Remove flange bolts and nuts and then remove pump from piping.
6. Loosen four cap screws that hold motor housing to pump body. Remove these screws and remove the housing from pump body.
7. Place pump on a flat work surface and insert a screwdriver into one of endplate ventilation slots until it engages a rotor cooling fin. While holding rotor with screwdriver, turn impeller clockwise. Note that impeller is molded around a metal hub with a left hand thread. Remove impeller from shaft.
8. Remove seal assembly from shaft by sliding it off shaft sleeve.
9. Clean seal seat with a clean rag and inspect for grooving or cracks. If it shows no grooving or cracks, it may be cleaned and reused.
10. If seal seat is to be replaced, face plate must be removed from motor housing. Remove it by gently prying it away from housing.
11. Remove seal seat and cup. Lubricate cup with soapy water and install new parts in face plate

- recess. Reposition face plate on motor housing. Gently tap face plate evenly around its diameter to drive it into recess provided in motor housing.
12. Clean shaft and sleeve before installing new seal.
 13. Slide new carbon seal head onto shaft sleeve until it contacts seal seat. Slide new "O-Ring" and back-up ring along shaft sleeve until they fit inside counter bore in seal head. Place seal spring between back-up ring and seal cage while positioning seal cage flush with end of sleeve. Place small end of spring against back-up ring. Three driving legs of seal cage should engage three slots on seal head. While holding rotor assembly with screwdriver, thread impeller onto shaft in a counter clockwise direction. Tighten impeller with light hand pressure. Take care to avoid bending a rotor cooling fin or damaging shaft sleeve.
 14. Clean recess in pump body and install a new body gasket.
 15. Install pump in body and secure with four capscrews. Apply torque evenly in a criss cross pattern in 40 in-lb to a torque of 80 in-lb.

Valve Listing and Functions (refer to assembly drawing for particular size heater)		
<u>Item No.</u>	<u>ON</u>	<u>OFF</u>
15	Flow diverter, primary flow to Pump 1, no flow to pump 2	No flow to pump 1, flow to pump 2
16	Emergency pressure relief, flow to drain	No flow to drain
37	Hand Op Ball, re-circulation water to Cold inlet water	No re-circulation water to Cold inlet water
39	Gain Adjuster Valves	Adjust cold water flow to insure constant temperature over the range of flow.
41	Hand Op. Ball, Supply cold water to blend valve	Shut off cold water to blend valve
42	Blend Valve, 150 F, Blending Water	No blending of water
43	Blend Valve, 130 F, Blending Water	No blending of water
46	Check Valve, no back flow of hot water from heat exchanger	N/A
47	Solenoid Valve, Hot water to second blend valve	No hot water to second blend valve
59	Gate valve, Supply steam	Shut off steam supply
68	Hand Op Ball, Bypass condensate cooler	Flow through condensate cooler
76	Gate valve, flow of condensate to drain	No flow of condensate to drain
78	Needle valve, Steam to gauge and pressure sensor	Shut of steam for maintenance of gauge
101	Condensate Diverter, Condensate through Cooler	Condensate to drain and bypass Condensate Cooler in fail mode.

TROUBLESHOOTING

Condition	Possible Cause	Fix
No Hot water	No Steam/Low Steam	Adjust steam regulator.
	Blocked tubes in heat exchanger	Flush Heat exchanger.
	Drain valves from steam traps are shut	Open drain valves.
	Condensate drain line is blocked or valves are turned off	Clear line and turn on valves.
	Solenoid is tripped	Turn on Manual switches "H-1" and H-2"
	Blend valve element defective	Test blend valve element and replace if necessary.
	Over temperature condition was reached and Thermo Switches are still engaged.	Find out why over temperature happened and let Thermo Switches reset.
System Tripped	Shut of the Gain adjusters	Cold water main from street is shut off. Reset Gain Valves (39)
	Steam pressure above 15 psi	Steam adjust steam pressure or fix steam regulator.
	Steam Traps broken and steam is being sent to the condensate cooler	Fix Steam traps.
	Blend valve element defective.	Test blend valve element and replace if necessary.

Water temperature fluctuates or is colder than required	Blockage in condensate line causing condensate to back up into heat exchangers. Gain adjusters not adjusted correctly	Check the temperature of heat exchanger outside casing. If top is hot and bottom is warm or cold, shut unit off and check draining of condensate.
Water temperature can not be maintained at 120 F	Solenoid valves were back pressured and solenoid plug is blocking flow.	Shut down unit, disassemble and inspect solenoid units.
Pump 1 or Pump 2 Light is lit and No Flow light is on. Can see Pump is turning and water is re-circulating.	Water was drained from system and tubing to differential pressure switch was not bled of air.	Run pump and then loosen inlet compression fitting and bleed line until all air is out of line. Do same with outlet compression fitting.
	New differential pressure switch installed.	Run pump and then loosen inlet compression fitting and bleed line until all air is out of line. Do same with outlet compression fitting. If light is still on then adjust pressure switch according to manufactures instructions.

UNIT SEPARATION FOR INSTALLATION

To get unit into building may require separating the unit into two parts. The following instructions are to be used as a guide to separating the unit.

1. Remove steam header from the unit and place aside protecting the flange face from damage.



2. Remove Aquastats by removing cover and loosening clamp screw that holds thermostat to well.

Note: Thermostat can be hung off of unit but be careful to not disturb heat conductive compound on thermostat bulb.



3. Undo copper water supply unions.



5. Undo steam side unions and remove condensate drain line between steam traps and condensate cooler.



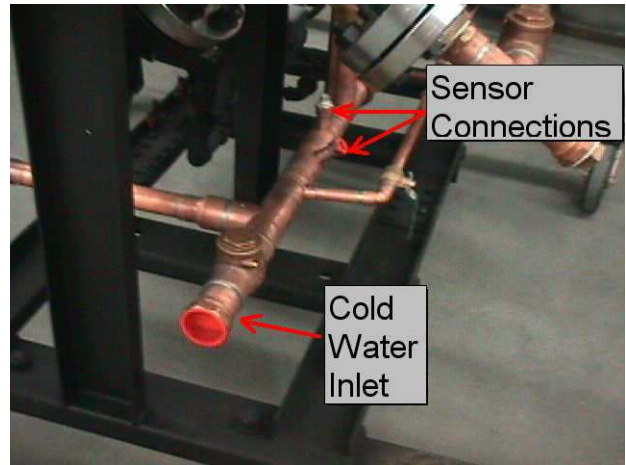
6. Remove bottom rail bolts from frame.



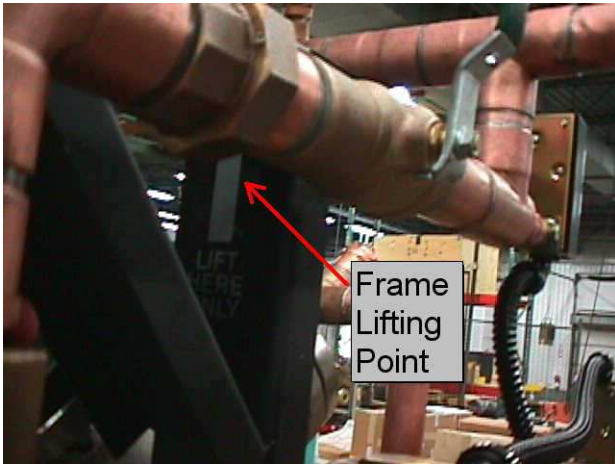
4. Remove output water copper tubing section and put it aside.



7. Remove center rail bolts from frame. Frame is ready to be split in two sections.

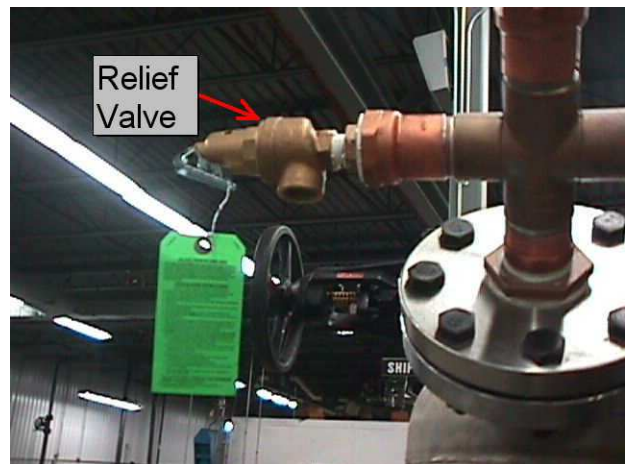


3. Ensure output hot water connection is tight.



4. Connect emergency relief valve to drain.

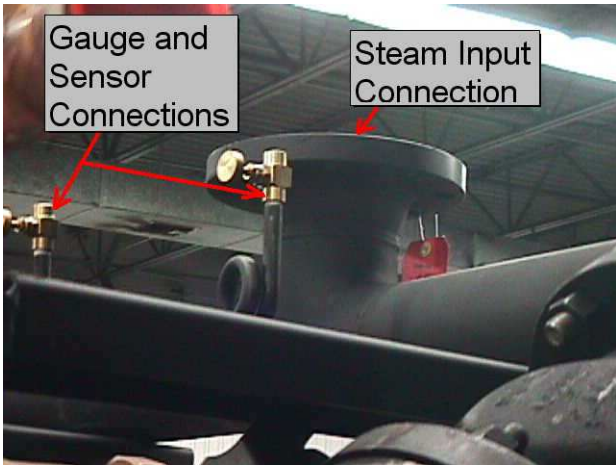
CAUTION!
Never lift or push in any place but frame of unit.
Damage to piping and or components can occur if pressure is applied to them.



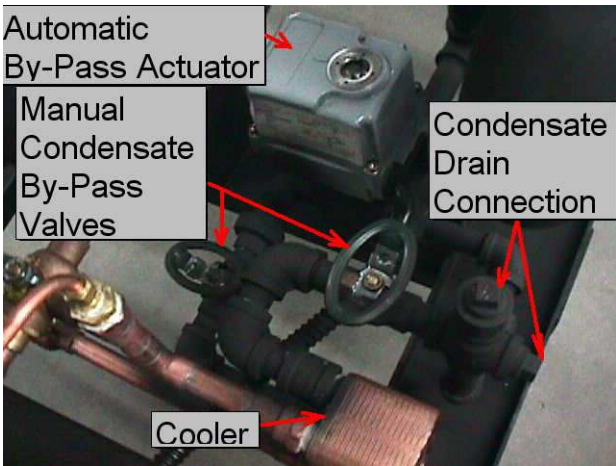
UNIT STARTUP AFTER INSTALLATION

1. Lag the frame to the floor.
2. Insure input cold water connection is tight.

5. Connect steam supply to flange. Check steam pressure gage and sensor connections.



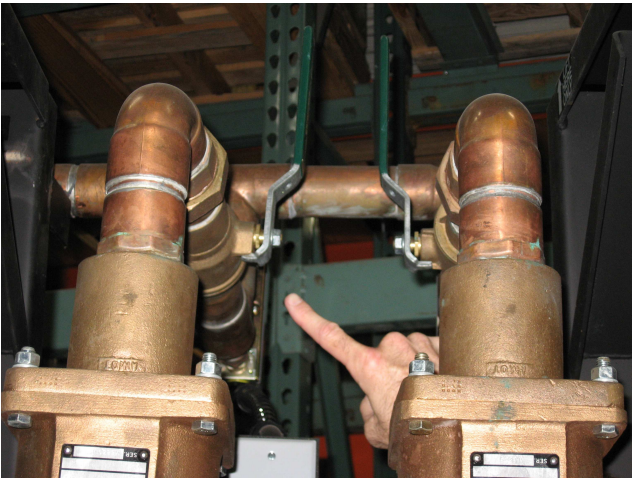
6. Set condensate drain valves such that the condensate flow passes through cooler.



7. Open up both steam gate valves to full open.



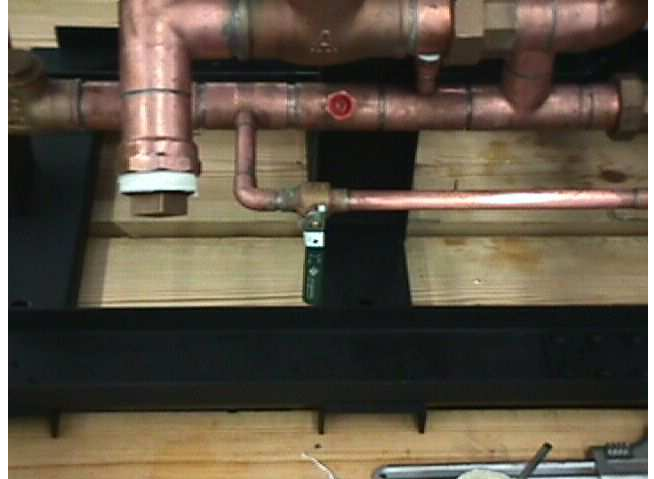
8. Open all other valves. Open cold water supply valves to heat exchangers before opening valves to second blend valves.



(THESE VAVLES FIRST)



(THESE VAVLES LAST)



9. Set three way diverting valve for pump to be used.

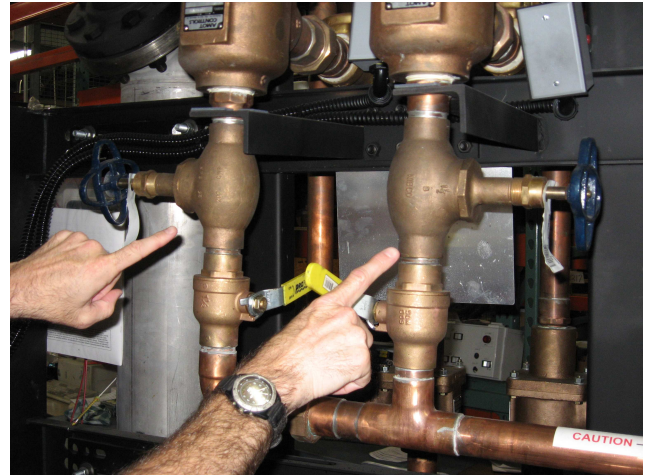


10. Plug in the electronic control box and make sure the correct re-circulation pump is on.
11. Loosen connection to differential pressure switch and make sure the lines are free of air and filled with water.

12. Set the front and back aquastat thermal switches for proper temperature setting.



13. Supply proper steam pressure to the unit.
14. Wait until the system stabilizes and then run procedure to set



GAIN VALVE SETTING PROCEDURE

1. Ensure all connections are made and unit is running at specified maximum flow.
2. Turn off supply of water to one side. Half of specified maximum flow is now being delivered.
3. Check outlet water temperature and ensure it is 120 degrees F.
4. If warmer then turn gain valve handle counterclockwise for $\frac{1}{4}$ turn.
5. Recheck water temperature and repeat until reaching desired temperature.
6. Note: Temperature will not change quickly and must be left to seek its normal setting.
7. If the water was colder then turn the gain valve handle clockwise for $\frac{1}{4}$ turn.
8. Recheck water temperature and repeat until reaching desired temperature.
9. Turn on the supply of water to side turned off. Wait for the system to stabilize.
10. Repeat step 2 through 9 for the second side.

It is solely responsibility of system designer and user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with selection of materials based on technical information supplied to Leslie Controls Inc.; however, system designer and user retain final responsibility. Designer should consider applicable Codes, material compatibility, product ratings and application details in selection and application. Improper selection, application or use of products described herein can cause personal injury or property damage. If designer or user intends to use product for an application or use other than originally specified, he must reconfirm that selection is suitable for new operating conditions. Life expectancy for this product defaults to warranty period of sales contract.



LESLIE
CONTROLS, INC.

A subsidiary of **CIRCOR** International, Inc.