User Manual

& Installation Instruction

S.S. LB-100 thru LB-240

High Pressure Double Stack w/ Mercoid

IMPORTANT – READ ALL INSTRUCTIONS BEFORE OPERATING

All steam boilers are built in accordance with ASME miniature boiler code.

NOTE: It is the responsibility of the installer to conform to any state or local codes. If further inspection, following modification by installer, is required under state or local codes, that is the responsibility of the local installer.

Electro-Steam ESTABLISHED 1952

www.electrosteam.com

rev. 07022009

WARNING - The following labels have been placed on this boiler for **YOUR SAFETY**. Failure to observe these instructions could lead to **PROPERTY DAMAGE**, **SEVERE INJURY,** or even **DEATH**

CAUTION
HOT

CAUTION

THROW OFF MAIN POWER SWITCH BEFORE WORKING ON ELECTRICAL CABINET

A MANUAL WAS SHIPPED WITH THIS BOILER. IT IS IMPORTANT THAT YOU READ, UNDERSTAND, AND OPERATE THIS STEAM GENERATOR IN ACCORDANCE WITH THE OPERATING INSTRUCTIONS CONTAINED IN THE MANUAL. IF FOR ANY REASON YOU DO NOT HAVE A MANUAL, CALL ELECRTO-STEAM AT 800-634-8177

REPLACE GLASS EVERY SIX MONTHS

RETIGHTEN SIGHT GLASS BEFORE USE

CAUTION USE ELECTRICAL SUPPLY CONDUCTORS RATED FOR A MINIMUM OF 90°C

TERMINALS ARE SUITABLE FOR COPPER WIRE ONLY

U.L. 834 PAR. 4416

AMBIENT TEMPERATURE AROUND UNIT NOT TO EXCEED 105° F

TABLE OF CONTENTS

1.) INSTALLATION INSTRUCTIONS

LB-SERIES – STAINLESS STEEL HIGH PRESSURE PACKAGE (0-100 LBS. PSI)

The Electro-Steam Generator design consists essentially of a high pressure chamber filled with water that is heated by one or more submerged resistance type electric heating elements. Automatic controls are provided to maintain the pre-set operating pressure and water level. Safety features include: automatic low-water cutoff (manual low-water reset optional), dual pressure controls, safety valve, and visible water level gauge. All of our generators are built in accordance with A.S.M.E. Miniature Boiler Code and are individually inspected and stamped by an Authorized National Board Insurance Inspector.

IMPORTANT – READ ALL INSTRUCTIONS BEFORE OPERATING

Important – Set unit perfectly level, and as close as possible to the steam vessel or appliance it will operate. For generator measurements, refer to Installation Data Drawing attached. For interpretation of numbered items, refer to Parts Legend Drawing attached. NOTE: Ambient temperature around this unit must not exceed 104°F or 40°C.

CONNECTIONS:

Periodically check all plumbing and electrical connections for tightness; this should also be done before initial start-up.

ELECTRICAL:

This generator must be connected to FOUR disconnect switches (one per Louvered Electrical Cabinet #1) by a licensed electrician in accordance with N.E.C. and your local codes with the proper size wire, protected by fuses or circuit breakers – Voltage, KW, and Phase requirement are marked on the nameplate.

WATER SUPPLY:

Connect D.I. or R.O. purity water line to **Water Inlet #6**.
Purity Range: AT LEAST 1 MEG/OHM per CM
Temperature Range: 32°F – 140°F or 0°C – 60°C.
Pressure Range: 20PSI – 150PSI.

STEAM OUTLET:

Connect **Steam Outlet Flange (#22)** to piece of equipment, vessel, room, or area to be operated by Electro Steam Generator(s).

SAFETY VALVE:

Route the **Safety Valve (#18)** separately than the **Drain (#19)** to a high temperature drain ***NO PVC**. Discharging pipe should never be smaller than the valve outlet and should be rigidly supported, placing no weight on the safety valve itself.

DRAIN:

Route **Drain (#23)** separately than **Safety Valves (#18)** to a high temperature drain ***NO PVC**.

STEAM TRAP:

Route **Steam Trap (#24)** separately than **Safety Valves (#18)** to a high temperature drain ***NO PVC**.

2.) OPERATION & SEQUENCE OF EVENTS

IMPORTANT – READ INSTALLATION INSTRUCTIONS BEFORE OPERATING

1. Turn on water supply from the source to the Generator.
2. **OPEN** Steam Outlet for venting purposes.
3. Place main disconnect box in **ON** position.
4. Place **ON/OFF Switch (#2)** in **ON** position.
   - The **Water Solenoid (#7)** and **Pump (#8)** will engage and the chamber will begin to fill with water. As the water level rises, so will the **MERCIOD FLOAT SWITCH**. When the heaters are safely submerged, the **MERCIOD FLOAT SWITCH** will engage the contactors, supplying power to the heaters, causing steam pressure to accumulate.
   - The chamber will continue to fill with water until the **MERCIOD FLOAT SWITCH** disengages the **Water Solenoid (#7)** and **Pump (#8)**.
   - If the contactors still have not engaged at this time, you may need to press the **Safety Reset (#13)** on the "**Safety" Pressure Control (#12).**
5. **CLOSE** Steam Outlet to build pressure.
   - Steam pressure will continue to rise until is reaches **80PSI**. This may take up to 25 minutes. At this time, the "**Control" Pressure Control (#12)** will cause the contactors to disengage. The pressure will drop to approximately **75PSI,** at which time the "**Control" Pressure Control (#12)** will cause the contactors to reengage, causing the pressure to rise again. The contactors will continue to cycle on and off during operation.
6. **OPEN** Steam Outlet when you are ready to use steam. The Generator is now fully operational and will produce steam until it is turned off.
   - As steam is exhausted, the water level will drop until the **MERCIOD FLOAT SWITCH** reengages the **Water Solenoid (#7)** and **Pump (#8)**, again filling the chamber with water. The **Water Solenoid (#7)** and **Pump (#8)** will continue to cycle on and off during operation.
7. To shut off the Generator, place **ON/OFF Switch (#2)** in **OFF** position. Pressure will drop naturally as the chamber cools, or the Generator may be drained manually through **Manual Drain (#19)**. (See Manual Blow Down 3.1)

WARNING – HOT WATER and **STEAM** under **HIGH PRESSURE** can lift drain pipes right off the ground and cause **SERIOUS INJURY**. Make sure drain pipe is **SECURE** and **CANNOT** move. The drain must be directed into a **HIGH TEMPERATURE** drain (**NO PVC**) or outside.

3.) CLEANING & MAINTENANCE

The following cleaning procedures are **HIGHLY RECOMMENDED** in order to keep your Steam Generator in the best operating condition at all times.

3.1) MANUAL "BLOW DOWN"

A Manual "Blow Down" is an easy way to **GREATLY** extend the life of your Steam Generator. Blow Downs should be done **AT LEAST TWICE A MONTH.**

NOTE: The best time to Blow Down your generator is after it has been running for some time, while it is still hot.

1. Place **Toggle Switch (#2)** in **OFF** position.
2. Allow pressure to drop between 10 and 20 PSI.
3. Open **Manual Drain (#19)** slowly, allowing **HOT WATER** and **STEAM** to blow out into the drain, cleaning out the generator.

NOTE: Blow Down your generator at any pressure you feel comfortable with. 10 to 20 PSI is only a recommendation. You may go higher or lower, but higher is always better.

WARNING – HOT WATER and **STEAM** under **HIGH PRESSURE** can lift drain pipes right off the ground and cause **SERIOUS INJURY**. Make sure drain pipe is **SECURELY STRAPPED** and **CANNOT** move. The drain must be directed into a **HIGH TEMPERATURE** drain (**NO PVC**).

3.2) CLEANING OR REPLACING HEATERS

Heaters are located inside the **Control Panel (#1)** below the controls, bolted into the chamber. If (3.4) Chamber Chemical/Acid Treatments are not regularly done, heaters must be taken out and inspected **AT LEAST ONCE A YEAR**, cleaned with wire brush, if needed, and reinstalled using a new gasket. If you are replacing or cleaning your heater elements:

1. Place main disconnect boxes and the **Toggle Switch (#2)** in the OFF position.
2. Make sure generator is cool and the **Pressure Gauge (#15)** reads 0 PSI.
3. Remove heater wires from heaters, using a 3/8" Socket.
4. Unbolt and remove heaters using a 1 1/16" Socket.
   NOTE: Heaters may be difficult to get out; you may need to use some sort of pry bar to get them loose.
5. Clean heaters with wire brush. If replacing, dispose of old heater(s).
6. Reinstall heaters with new gaskets.
7. Attach heater wires assuring proper wiring. *Refer to Heater Wiring Schematics attached*

NOTE: If you are replacing a heater because of a heater failure, there may be a problem with your **MERCIOD FLOAT SWITCH (#4)** and you may have another heater failure, if not corrected.

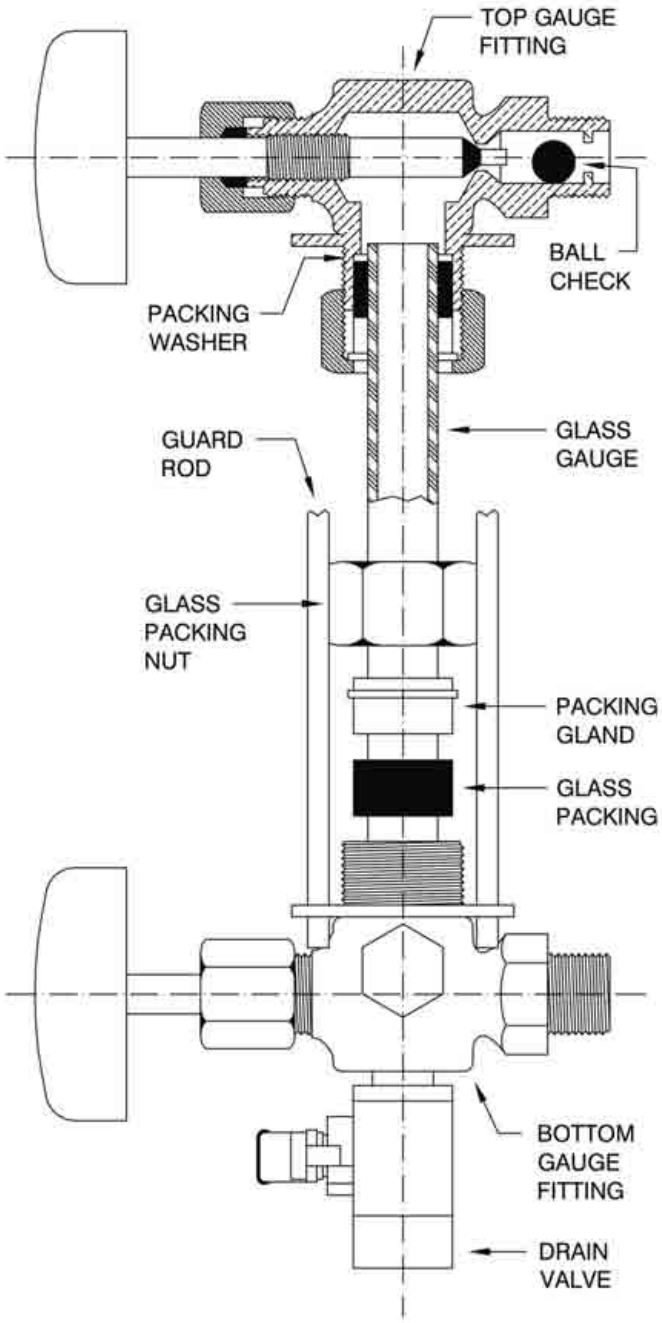
3.3) REPLACING GLASS GAUGE & GLASS PACKINGS

The **Sight Glass (#10)** gives the operator the ability to easily monitor the actual water level inside the chamber. If the **Sight Glass (#10)** gets clogged or is no longer functional, it can be very difficult to troubleshoot a problem.

S.S. SIGHT GLASS (SEISMIC)

GLASS GAUGE and **GLASS PACKINGS MUST** be replaced **EVERY SIX MONTHS**

The Seismic Sight Glass is equipped with **BALL CHECKS** in each **GAUGE FITTING**



INSTALLATION:

Only properly trained personnel should install and maintain water gauge glass and connections. Remember to wear safety gloves and glasses during installation. Before installing, make sure all parts are free of chips and debris.

1. Uninstall **GUARD RODS, GLASS GAUGE,** and **GLASS PACKINGS**. (you may need to rotate one of the **GAUGE FITTINGS** to remove **GLASS GAUGE**)
2. Slip a new **GLASS PACKINGS** on the new **GLASS GAUGE** about an inch from the bottom.
3. Now slip the following items through the top of **GLASS GAUGE** in the following order:
   - **PACKING GLAND** (facing down)
   - **GLASS PACKING NUT** (facing down)
   - **GLASS PACKING NUT** (facing up)
   - **PACKING GLAND** (facing up)
   - **GLASS PACKINGS** (inch down from top)
   - **PACKING WASHER**
4. Gently insert **GLASS GAUGE** into **GAUGE FITTINGS**. You may need to rotate **GAUGE FITTINGS** until vertically aligned, after **GLASS GAUGE** is in.
5. Carefully raise **GLASS GAUGE** about 1/16" from bottom and slide lower **GLASS PACKINGS** down until it makes contact with the **BOTTOM GAUGE FITTING**. (**DO NOT** allow **GLASS GAUGE** to remain in contact with any metal)
6. Carefully slide upper **GLASS PACKINGS** up as far as possible.
7. Hand tighten both **GLASS PACKING NUTS**, then tighten 1/2 turn more by wrench. Tighten only enough to prevent leakage. **DO NOT OVER TIGHTEN!** If any leakage should occur, tighten slightly, a quarter turn at a time, checking for leakage after each turn.
8. Reinstall **GUARD RODS.**

3.4) CHAMBER CHEMICAL/ACID TREATMENT

All Electric Steam Generator should be cleaned regularly. The chamber should be cleaned **AT LEAST ONCE A YEAR.**

Chamber Treatment Instructions:

1. Turn on generator, allowing pressure to climb to **10** to **20 PSI** on **Pressure Gauge (#15)**, and then shut off.

2. **"Blow Down"** Open **Manual Drain (#19)** slowly, allowing **HOT WATER** and **STEAM** to blow out into the drain.

   NOTE: You may Blow Down your generator at any pressure you feel comfortable with. **10 to 20 PSI** is only a recommendation. You may go higher or lower, but higher is always better.

   WARNING – HOT WATER and **STEAM** under **HIGH PRESSURE** can lift drain pipes right off the ground and cause **SERIOUS INJURY**. Make sure drain pipe is **SECURE** and **CANNOT** move. The drain must be directed into a **HIGH TEMPERATURE** drain **(NO PVC).**

3. Remove **Safety Valve (#18)**.

   WARNING – There **MUST** be **NO PRESSURE** in the chamber when removing the Safety Valve, make sure the steam out and drain are open to assure chamber will remain depressurized. Be cautious of escaping steam from chamber while Safety Valve is removed.

4. Close **Manual Drain (#19)** and **Steam Out (#16)**; turn generator on until **Sight Glass (#10)** shows that it is 1/2 full, and then shut off.

5. Insert funnel into coupling, where **Safety Valve (#18)** used to be.

6. Pour a **1 Gallon** of **Sulfamic Acid** into funnel very slowly, being careful of fumes and venting while pouring.

   NOTE: Solution can be obtained from any industrial chemical dealer.
   FOR FOOD APPLICATIONS: Use FDA approved chemicals.

7. Remove funnel, reinstall **Safety Valve (#18)**, and verify **Steam Out (#16)** is closed; let solution set in generator for **1 HOUR.**

8. Turn on generator, allowing pressure to climb to **5 PSI** on **Pressure Gauge (#15)**, and then shut off.

9. Allow the pressure to drop to 0 PSI on **Pressure Gauge (#15)** naturally. **DO NOT** open **Steam Out (#16)** or **Manual Drain (#19)** until pressure is down.

10. Remove **Safety Valve (#18)**.

3.4) CHAMBER CHEMICAL/ACID TREATMENT (Continued)

11. Reinsert funnel, and fill generator completely to the top with clean water; let stand for an additional **1/2 HOUR**.

NOTE: Turning on the generator will not completely fill it to the top. Filling must be done manually through the safety valve coupling.

12. Open **Manual Drain (#19)** to drain generator.

13. Close **Manual Drain (#19)**; refill generator completely to the top with clean water and open **Manual Drain (#19)** to flush out generator completely.

14. Reinstall Safety Valve (#18) and close **Manual Drain (#19)**.

15. Turn on generator, allowing pressure to climb to **10 to 20 PSI** on **Pressure Gauge (#15)**, and then shut off.

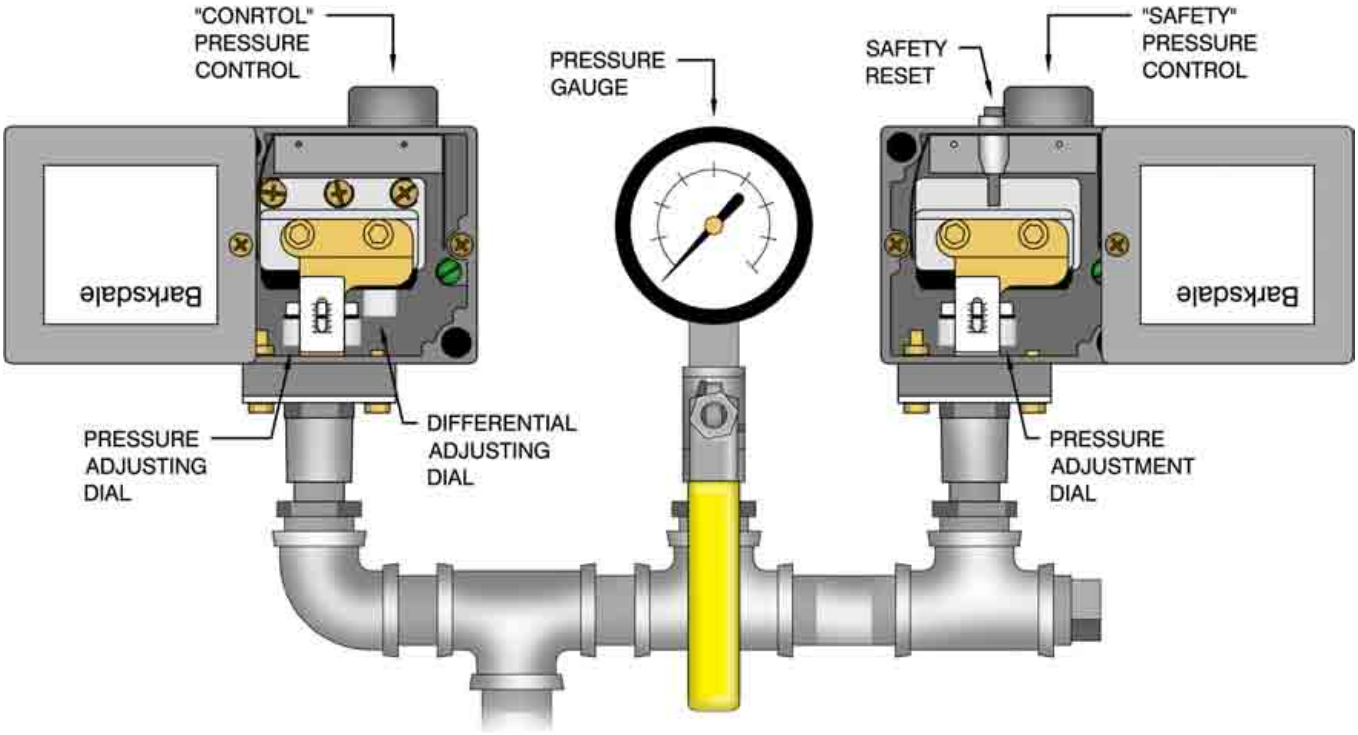
16. **"Blow Down"** Open **Manual Drain (#19)** slowly, allowing **HOT WATER** and **STEAM** to blow out into the drain.

NOTE: You may Blow Down your generator at any pressure you feel comfortable with. **10** to **20 PSI** is only a recommendation. You may go higher or lower, but higher is always better.

WARNING – **HOT WATER** and **STEAM** under **HIGH PRESSURE** can lift drain pipes right off the ground and cause **SERIOUS INJURY**. Make sure drain pipe is **SECURE** and **CANNOT** move. The drain must be directed into a **HIGH TEMPERATURE** drain **(NO PVC)**.

17. Your generator is now ready for normal use and operation.

3.5) PRESSURE CONTROL DATA SHEET



DEFINITIONS:

"CONROL" PRESSURE CONTROL – This pressure control should be the only one controlling the operating pressure of the generator.

"SAFETY" PRESSURE CONTROL – This pressure control is only used if the "Control" fails. It is always set higher than the "Control"; if the operating pressure is passed, The "Safety" will turn the heaters off.

SAFETY RESET – This reset is tripped when the "Safety" turns the heaters off. It must be manually pushed to turn the heaters back on. This lets the user know there was a problem. If it is tripped, the "Control" most likely failed.

PRESSURE ADJUSTING DIAL – These dials adjust the set pressure at which each pressure control will turn the heaters off.

DIFFERENTIAL ADJUSTING DIAL – This dial is only on the "Control". When the "Control" turns the heaters off, the amount of pressure that is dropped before it turns the heaters back on (the differential) can be adjusted by this dial**.** This dial should never have to be adjusted, unless desired.

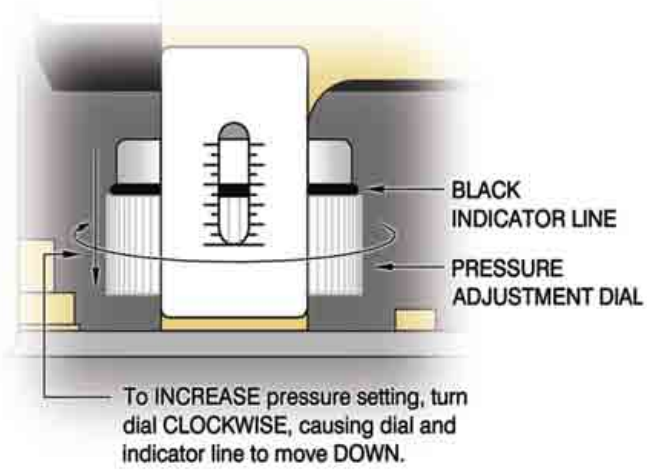
PRESSURE GAUGE – This tells the user what pressure is in the chamber. The pressure controls are set to this gauge.

3.6) SETTING THE PRESSURE CONTROLS

WARNING – The pressure controls must be set while all circuits are live. **TO AVOID ELECTRICAL SHOCK**, **DO NOT TOUCH** the wires or the terminals in which they connect while setting the pressure controls.

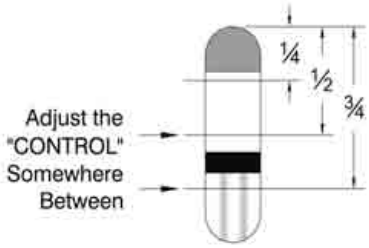
NOTES:

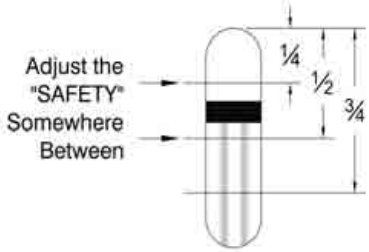
- Setting the pressure controls greatly relies on your ability to tell whether the contactors are turning the heaters on or off. You should be able to hear the contactors, located inside the **Electrical Boxes (#1)**, click on and off. Familiarize yourself with this sound.
- The order in which the pressure controls must be set is the "Safety" and then the "Control".
- In order to set the "Safety" you must keep the "Control" at a higher pressure setting than the "Safety"
- Once the "Safety" is set, then you can lower the "Control" to its correct setting.
- To **INCREASE** the pressure setting, when looking down on pressure control, using your two index fingers, turn the **PRESSURE ADJUSTMENT DIAL CLOCKWISE**, causing the **BLACK INDICATOR LINE** to move **DOWN** the scale.
- To **DECREASE** the pressure setting, turn the dial **COUNTER CLOCKWISE**, causing the indicator line to move **UP** the scale.



SETTING INSTRUCTIONS:

1. Open the pressure control covers, as shown on previous page.
2. Adjust the **PRESSURE ADJUSTMENT DIAL** on the "**CONTROL**" so that the **BLACK INDICATOR LINE** is somewhere between ½ and ¾ of the way down from the top.
3. Adjust the **PRESSURE ADJUSTMENT DIAL** on the "**SAFETY**" so that the **BLACK INDICATOR LINE** is somewhere between ¼ and ½ of the way down from the top.
4. Close the **Steam Out (#16)** and turn on generator. When the contactors click on, the pressure will rise. If contactor(s) do not click on right away, you may need to press **SAFETY RESET**. Continue to watch the **Pressure Gauge (#15)** until you hear the contactors click off. This may take up to 20 minutes.





WARNING – **DO NOT** allow the pressure to exceed **100 PSI**, the rating on the **Safety Valve (#18)**. If contactors do not turn off before **100 PSI**, manually shut off generator, open the **Steam Outlet Valve (#16)**, and **DECREASE** the pressure setting on the "**SAFETY**" pressure control. Repeat step #4.

3.6) SETTING THE PRESSURE CONTROLS (Continued)

5. At this point the contactors should be clicked off and you should be able to click them on and then off again by pressing the **SAFETY RESET**. This is a way to test if the "**SAFETY**" is still controlling the pressure, and not the **"CONTROL"**. While setting the "**SAFETY**" and the contactors are off, if the **SAFETY RESET** does not cause the contactors to click on and off again, **INCREASE** the setting on the "**CONTROL**"

WARNING – DO NOT allow the pressure to exceed **100 PSI**, the rating on the **Safety Valve (#18)**. If contactors do not turn off before **100 PSI**, manually shut off generator, open the **Steam Outlet Valve (#16)**, and **DECREASE** the pressure setting on the "**SAFETY**" pressure control. If you cannot get the "**SAFETY**" to control the pressure, it may need to be replaced.

6. Open the **Steam Out (#16)** to exhaust some pressure. Continue pressing the **SAFETY RESET** until the contactors click on and remain on. The pressure should eventually begin to rise. If it doesn't, throttle the **Steam Out (#16)** somewhere between closed and open until it does.

7. Pay attention to what the pressure reads when the contactors click off. If the pressure stopped **BELOW 85 PSI**, then **INCREASE** the pressure setting on the "**SAFETY"**. If the pressure stopped **ABOVE 85 PSI**, then **DECREASE** the pressure setting.

8. Continue to watch the pressure go up and down, while adjusting the "**SAFETY**" and pressing the **SAFETY RESET**, until the pressure stops at **85 PSI**.

9. At this point the "**SAFETY**" should be set to **85 PSI**, and the "**CONTROL**" should be set somewhere above the **85 PSI**.

10. Let the pressure drop below the **80 PSI** and then press the **SAFETY RESET**, so that the contactors click on. **DECREASE** the pressure setting on the "**CONTROL**" until the contactors click off.

11. Repeat Step 10 until you no longer need to press the **SAFETY RESET** for the contactors to click on.

12. Continue to watch the pressure go up and down, while adjusting the "**CONTROL**", until the pressure stops at **80 PSI**.

13. The Pressure Controls are now set.

NOTE: If at anytime the **SAFETY RESET** needs to be pressed after the pressure controls are set, either one of the controls are bad, the "**SAFETY**" is set too low, or the "**CONTROL**" is set too high.

4.) CALCULATIONS AND DATA SHEETS

4.1) HEATER POWER & VOLTAGE RATINGS

LB 100 thru 240 Model units use 4 or 6 heaters to meet the required **(KW) POWER** from the customer's specified **INPUT VOLTAGE**. Each heater comes in 3 different **(KW) POWER RATINGS** and 4 different **VOLTAGE RATINGS**

HEATER VOLTAGE RATINGS per INPUT VOLTAGE (VOLTS)														
Input Voltage	**208**	**220**	**230**	**240**	**380**	**400**	**415**	**425**	**440**	**460**	**480**	**550**	**575**	**600**
LB 100-180	208	230	230	230	208	230	230	230	480	480	480	600	600	600
LB 240	NA	NA	NA	NA	380	380	NA	NA	480	480	480	600	600	600

NOTE: 380-425V heaters are not usually rated for 380-425V. They are usually 208-240V heaters that have been re-stamped 380-425V and jumpered in series.

AVAILABLE HEATER RATINGS				
KW	**VOLTAGES**			
25	208	230	480	600
30	208	230	480	600
40		380	480	600

POWER RATINGS per MODEL		
MODEL UNIT	**QUAN.**	**KW**
LB-100	4	25
LB-120	4	30
LB-150	6	25
LB-180	6	30
LB-240	6	40

4.2) AMPERAGE CALCULATIONS

The **INPUT VOLTAGE, PHASE, TOTAL POWER RATING,** and **HEATER VOLTAGE RATING** are used to calculate the amperage.

THREE PHASE AMPERAGE FORMULAS	
208-240V & 440-600V	**380-425V (using 208-240V heaters)**
$I = \frac{P_T V_I}{V_H^2 \sqrt{3}}$	$I = \frac{P_T V_I}{(\sqrt{3} V_H)^2 \sqrt{3}}$

DEFINITIONS:

I = Amperage **V_I = Input Voltage**

P_T = Total Power Rating **V_H = Heater Voltage Rating**

4.2) AMPERAGE CALCULATIONS (Continued)

THREE PHASE AMPERAGE CALCULATIONS (AMPS)														
Input Voltage	**208**	**220**	**230**	**240**	**380**	**400**	**415**	**425**	**440**	**460**	**480**	**550**	**575**	**600**
LB-100	278	240	251	262	169	146	151	155	110	115	120	88	92	96
LB-120	333	288	301	314	203	175	181	186	132	138	144	106	111	115
LB-150	416	360	377	393	254	218	226	232	165	173	180	132	138	144
LB-180	500	432	452	471	304	262	272	278	198	207	217	159	166	173
LB-240	NA	NA	NA	NA	365	384	NA	NA	265	277	289	212	221	231

4.3) ACTUAL POWER RATING CALCULATIONS

Because the **HEATER VOLTAGE RATINGS** only come in 4 different voltages, and there are so many different voltages in the field, the **TOTAL POWER RATING** is only completely accurate if the **VOLTAGE IN** is exactly equal to the **HEATER VOLTAGE RATING**. This means, in most cases, the **TOTAL POWER RATING** is not completely accurate. The **AMERAGE** and **INPUT VOLTAGE** can be used to calculate the **ACTUAL POWER RATING**.

THREE PHASE ACTUAL POWER RATINGS FORMULA

$$P_A = I\, V_I \sqrt{3}$$

DEFINITIONS:

P_A = Actual Power Rating **I = Amperage**

V_I = Input Voltage

ACTUAL POWER RATING CALCULATIONS (KW)														
Input Voltage	**208**	**220**	**230**	**240**	**380**	**400**	**415**	**425**	**440**	**460**	**480**	**550**	**575**	**600**
LB-100	100	91.5	100	109	111	101	109	114	84	91.8	100	84	91.8	100
LB-120	120	110	120	131	134	121	130	137	101	110	120	101	110	120
LB-150	150	137	150	163	167	151	163	171	126	138	150	126	138	150
LB-180	180	165	180	196	200	182	195	205	151	165	180	151	165	180
LB-240	NA	NA	NA	NA	240	266	NA	NA	202	220	240	202	220	240

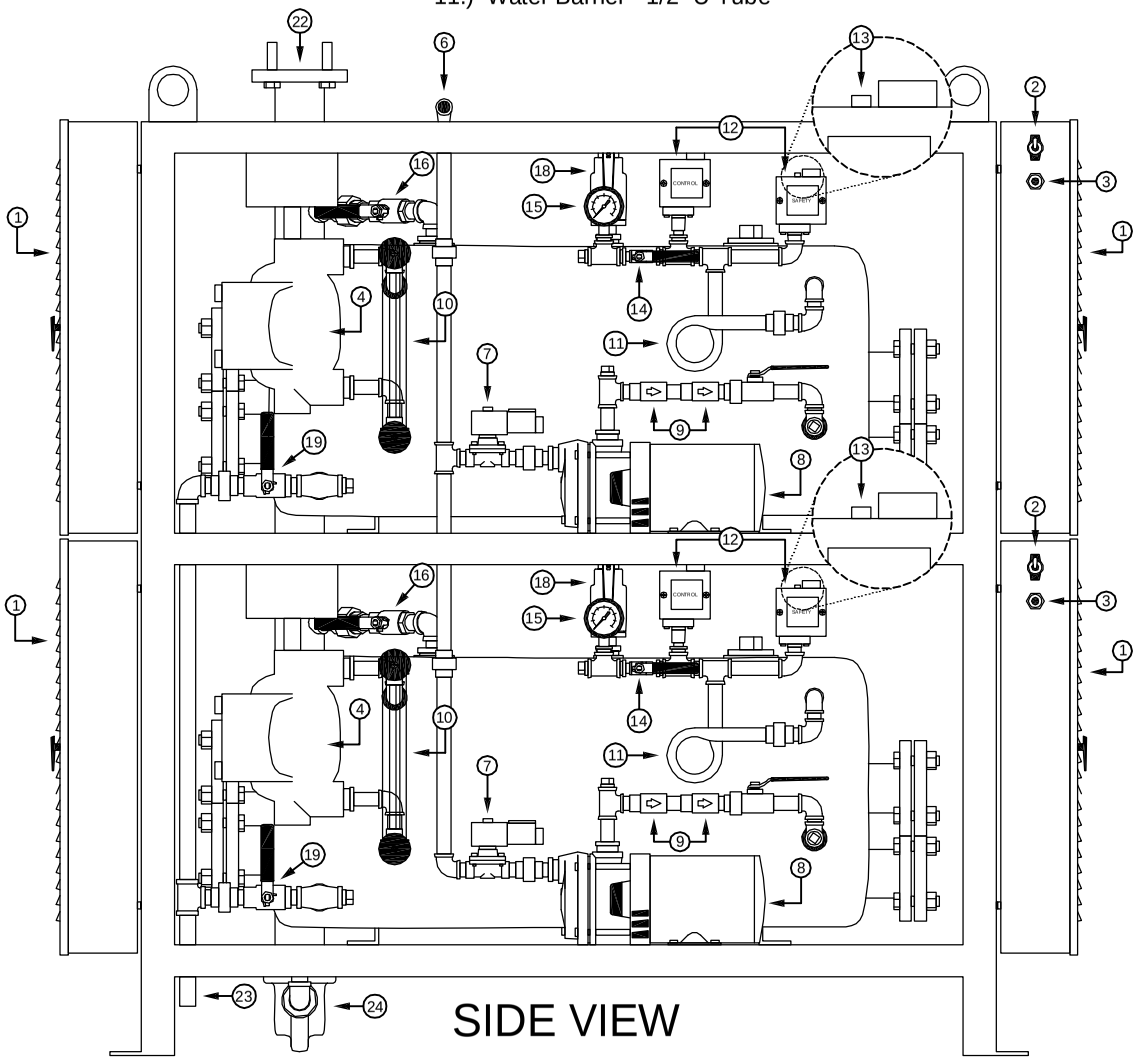
4.4) STEAM CAPACITY CALCULATIONS

Steam Capacity Calculations are based on the impossible feed water temperature of 212°F.
WARNING – Anything above 140°F will cause damage to water solenoid and pump.

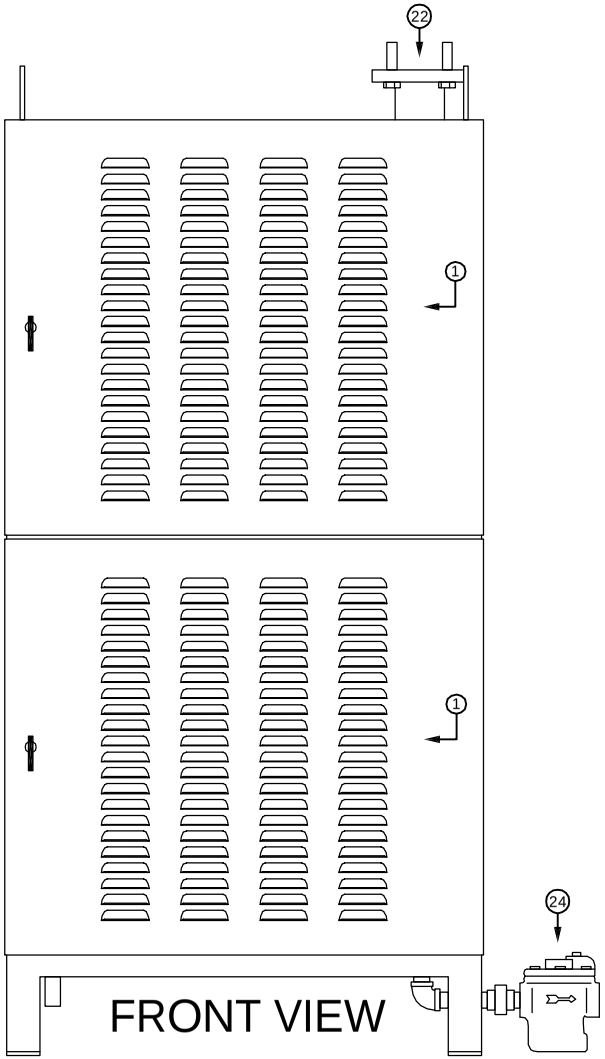
NET STEAM CAPACITY CALCULATIONS				
MODEL UNIT	Feed Water @ **212°F**	Feed Water @ **140°F** **90%** of **212°F**	Feed Water @ **100°F** **80%** of **212°F**	Feed Water @ **60°F** **75%** of **212°F**
LB-100	**345.0** LB/hr **156.5** Kg/hr	**310.5** LB/hr **140.8** Kg/hr	**276.0** LB/hr **125.2** Kg/hr	**258.8** LB/hr **117.4** Kg/hr
LB-120	**414.0** LB/hr **187.8** Kg/hr	**372.6** LB/hr **169.0** Kg/hr	**331.2** LB/hr **150.2** Kg/hr	**310.5** LB/hr **140.8** Kg/hr
LB-150	**518.0** LB/hr **235.0** Kg/hr	**466.2** LB/hr **211.5** Kg/hr	**414.4** LB/hr **188.0** Kg/hr	**388.5** LB/hr **176.2** Kg/hr
LB-180	**621.0** LB/hr **281.7** Kg/hr	**558.9** LB/hr **253.5** Kg/hr	**496.8** LB/hr **225.3** Kg/hr	**465.8** LB/hr **211.3** Kg/hr
LB-240	**828.0** LB/hr **375.6** Kg/hr	**745.2** LB/hr **338.0** Kg/hr	**662.4** LB/hr **300.5** Kg/hr	**621.0** LB/hr **281.7** Kg/hr

PARTS LEGEND - DOUBLE STACK LB 100-240 (H) MERCOID

1.) Louvered Electrical Cabinet
2.) ON/OFF Switch
3.) Manual Low-Water Reset (MLWR) (Optional)
4.) Mercoid Float Switch
6.) Water Inlet - 1/2" Connection
7.) 1/2" Water Solenoid
8.) 1/3 HP Pump & Motor
9.) 1/2" Check Valves
10.) 5/8" x 10 1/2" Sight Glass
11.) Water Barrier - 1/2" U-Tube
12.) 0-100 PSI Pressure Controls
13.) Reset on "Safety" Pressure Switch
14.) 1/4" Ball Valve
15.) 0-160 PSI Pressure Gauge
16.) Steam Out - 3/4" Ball Valve
18.) 100 PSI Safety Relief Valve
19.) Drain - 3/4" Ball Valve
22.) Steam Connection - 6" Flange
23.) Drain Connection - 3/4" Nipple
24.) 3/4" Steam Trap



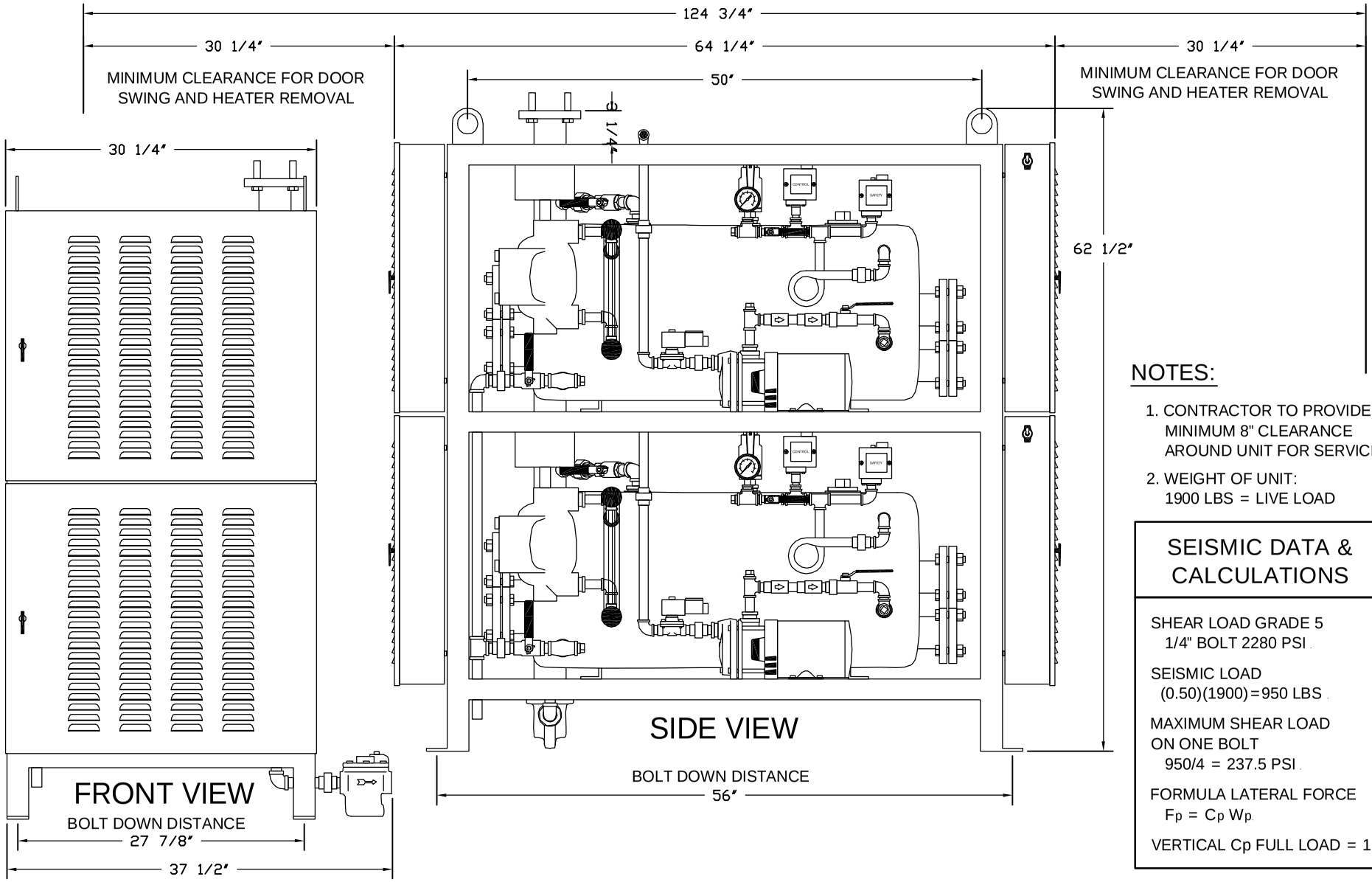
SIDE VIEW



FRONT VIEW

DRAWING TITLE: (PARTS LEGEND) DOUBLE STACK LB 100-240 (H)			MODEL UNIT: LB 100-240	ELECTRO-STEAM GENERATOR CORP.	
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	07-01-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438	
HIGH PRESSURE	CHECKED:	CHRISTOPHER FERRARA	07-01-09		
DOUBLE STACK	ENGINEER:	-	-	DWG NO.: 314-100-240-000217	SCALE: N/A
MERCOID	APPROVED:	SAL NEGRO	07-01-09		SHEET: 1 OF 1

INSTALLATION DATA - DOUBLE STACK LB 100-240



NOTES:

1. CONTRACTOR TO PROVIDE MINIMUM 8" CLEARANCE AROUND UNIT FOR SERVICE
2. WEIGHT OF UNIT: 1900 LBS = LIVE LOAD

SEISMIC DATA & CALCULATIONS

SHEAR LOAD GRADE 5
1/4" BOLT 2280 PSI

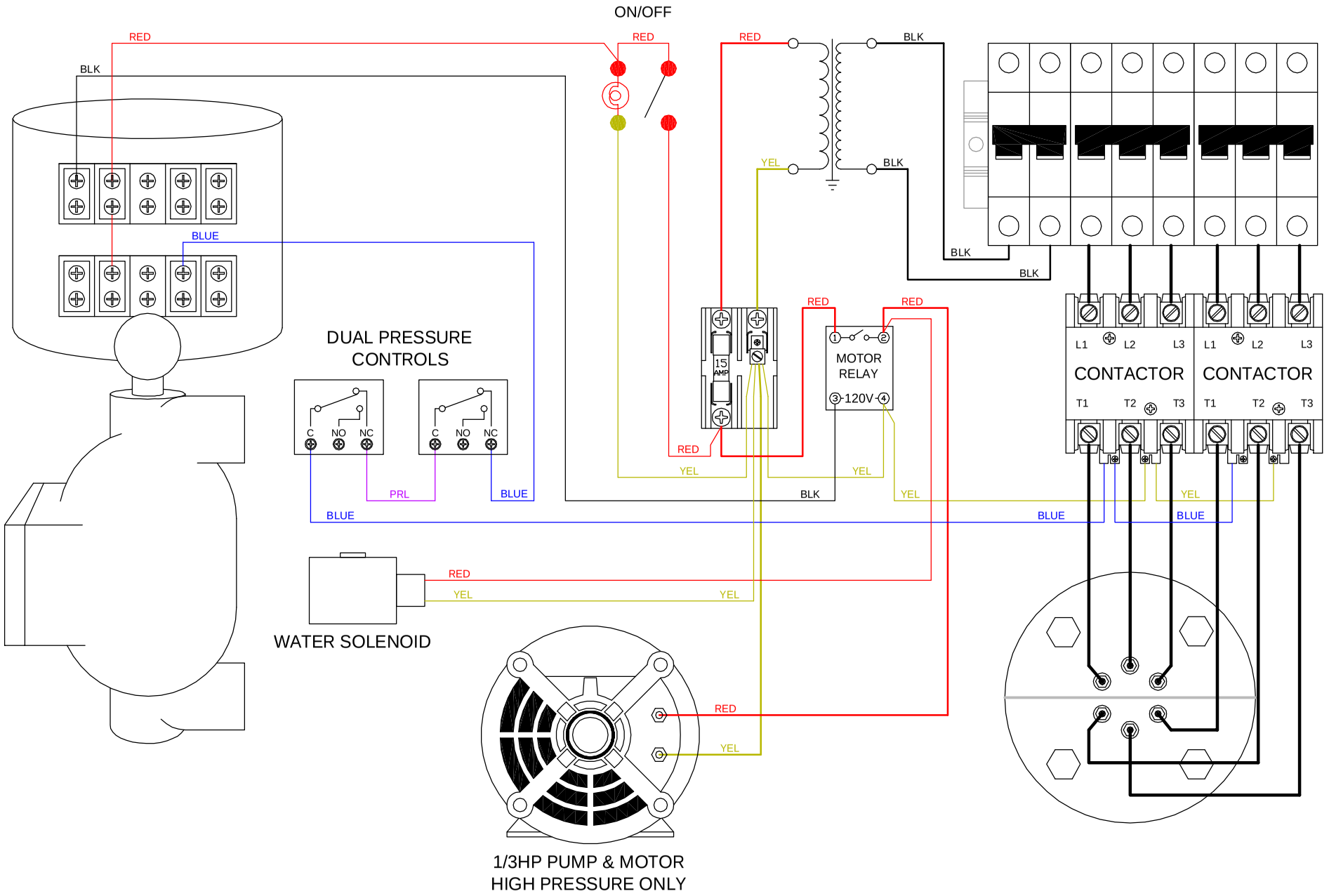
SEISMIC LOAD
(0.50)(1900)=950 LBS

MAXIMUM SHEAR LOAD ON ONE BOLT
950/4 = 237.5 PSI

FORMULA LATERAL FORCE
$F_p = C_p W_p$

VERTICAL Cp FULL LOAD = 1

DRAWING TITLE: (INST-DAT) DOUBLE STACK LB 100-240 MERCOID			MODEL UNIT: LB 100-240	ELECTRO-STEAM GENERATOR CORP.	
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	07-01-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438	
DOUBLE STACK	CHECKED:	CHRISTOPHER FERRARA	07-01-09		
MERCOID	ENGINEER:	-	-	DWG NO.: 414-100-240-000217	SCALE: N/A
-	APPROVED:	SAL NEGRO	07-01-09		SHEET: 1 OF 1



DRAWING TITLE: LB (H)		MODEL UNIT: LB 10-240	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	05-22-09
HIGH PRESSURE	CHECKED:	CHRISTOPHER FERRARA	05-22-09
MERCOID	ENGINEER:	CHRISTOPHER FERRARA	05-22-09
-	APPROVED:	SAL NEGRO	05-22-09

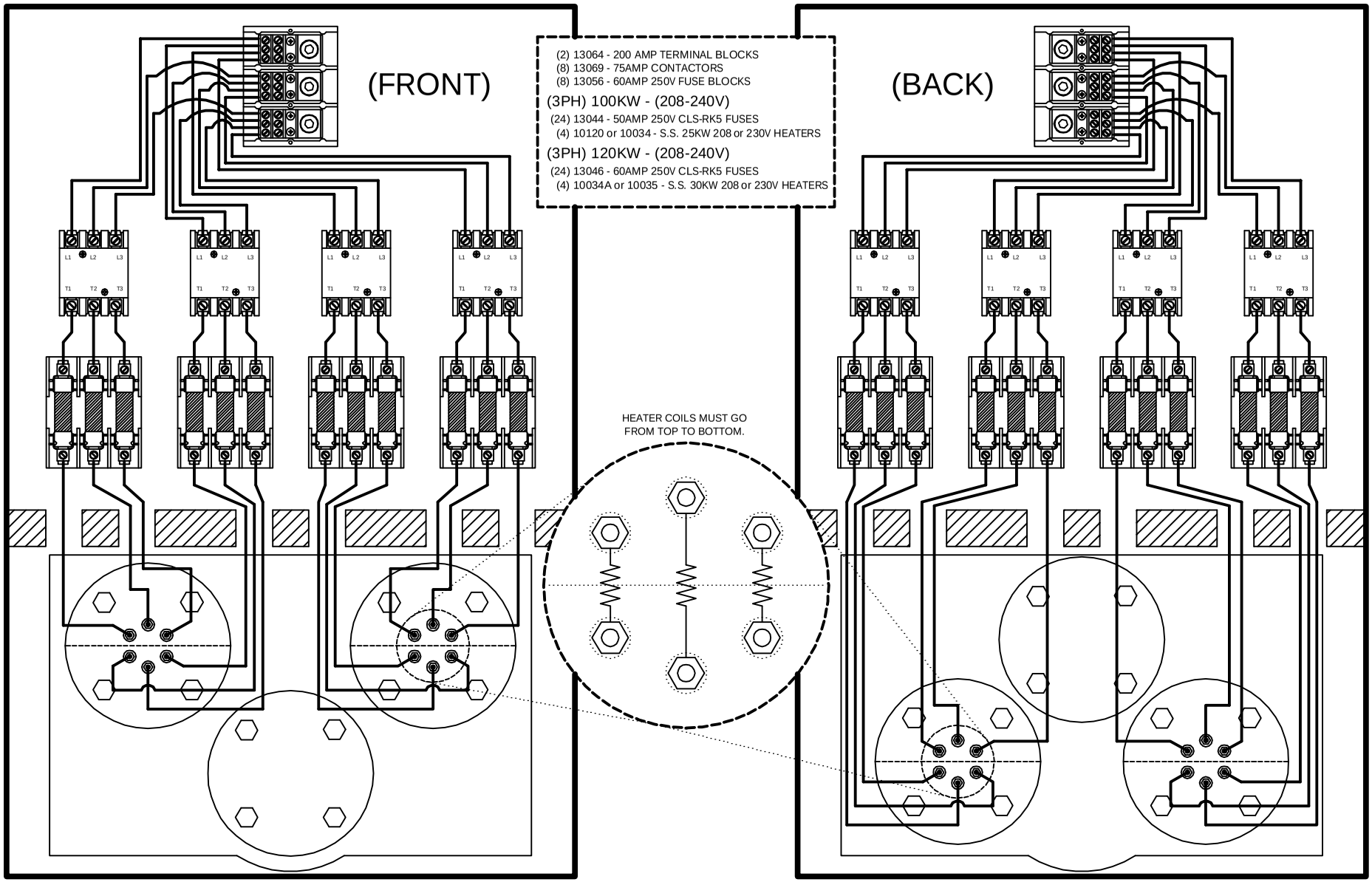
50 Indel Ave. P.O. Rancocas, NJ 08073-0438

DWG NO.: -

SCALE: N/A

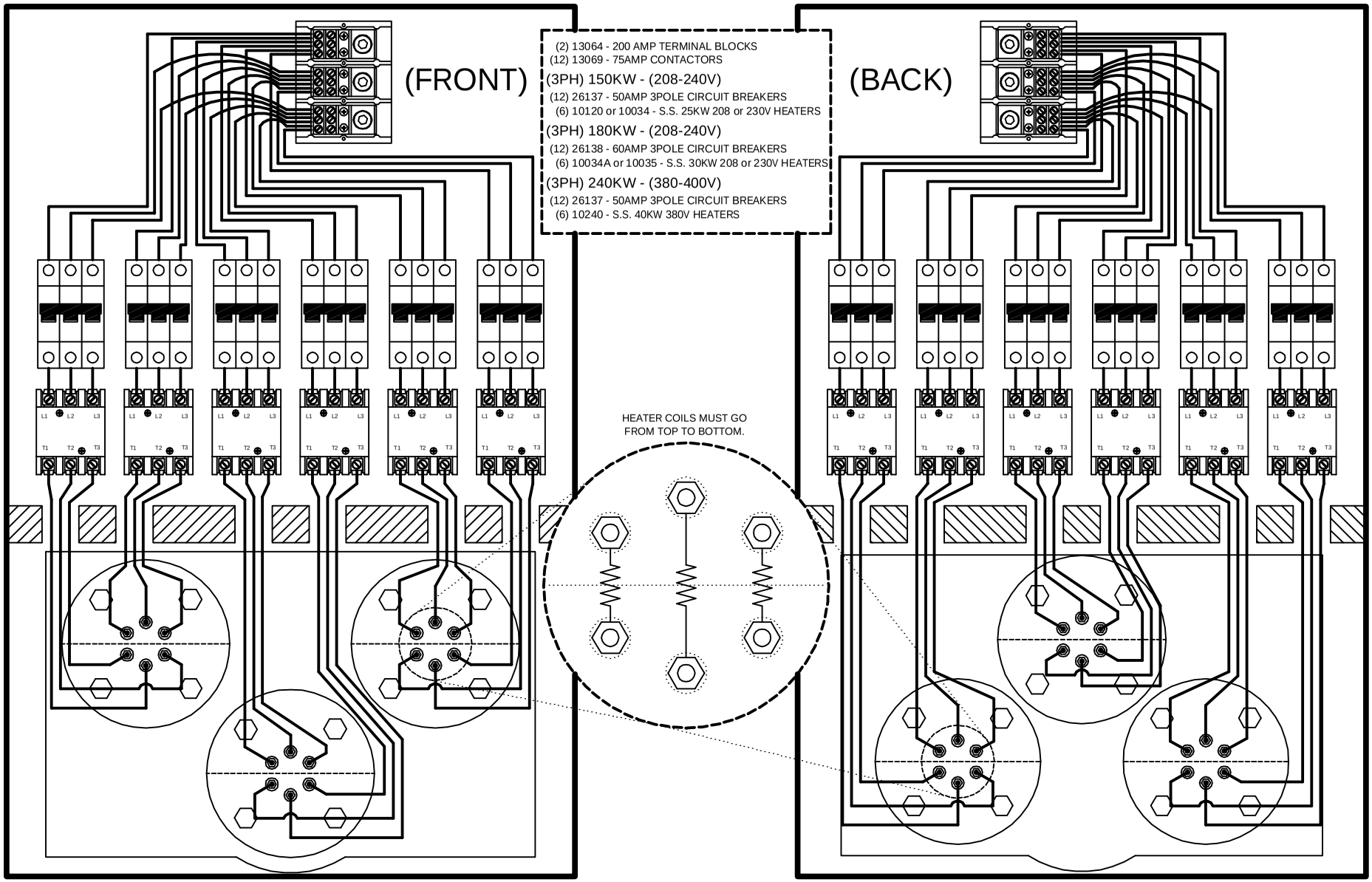
SHEET: 1 OF 1

S.S. (3PH) 100-120KW - (208-240V)



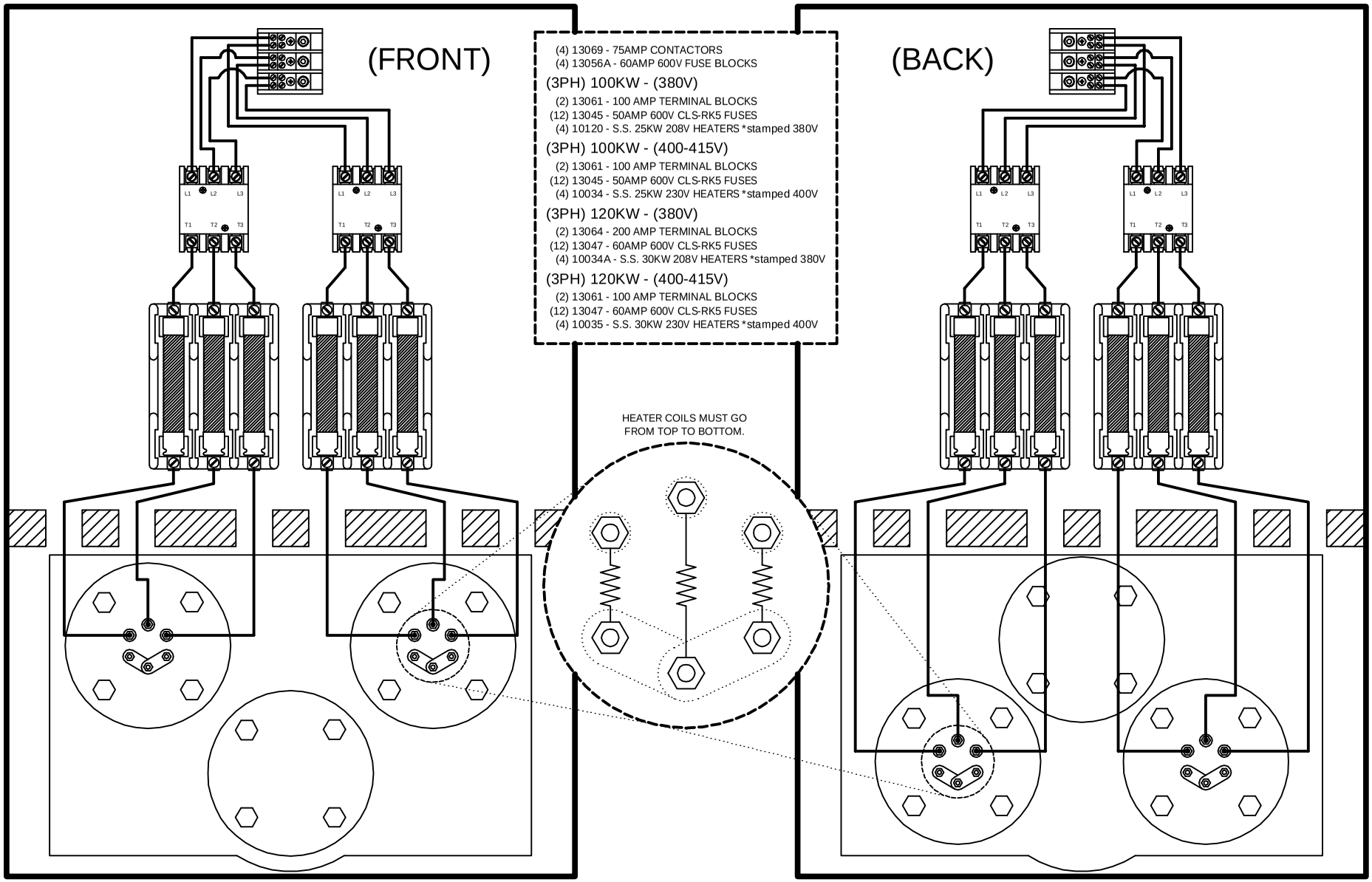
DRAWING TITLE: (HEATERS) S.S. LB 100-120 (3PH)(208-240V)			MODEL UNIT: LB 100-120	ELECTRO-STEAM GENERATOR CORP.	
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438	
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09		
208-240V	ENGINEER:	-	-	DWG NO.: 212-100-120-223000	SCALE: N/A
STAINLES SLEEL	APPROVED:	SAL NEGRO	06-12-09		SHEET: 1 OF 1

S.S. (3PH) 150-180KW - (208-240V) 240KW - (380-400V)



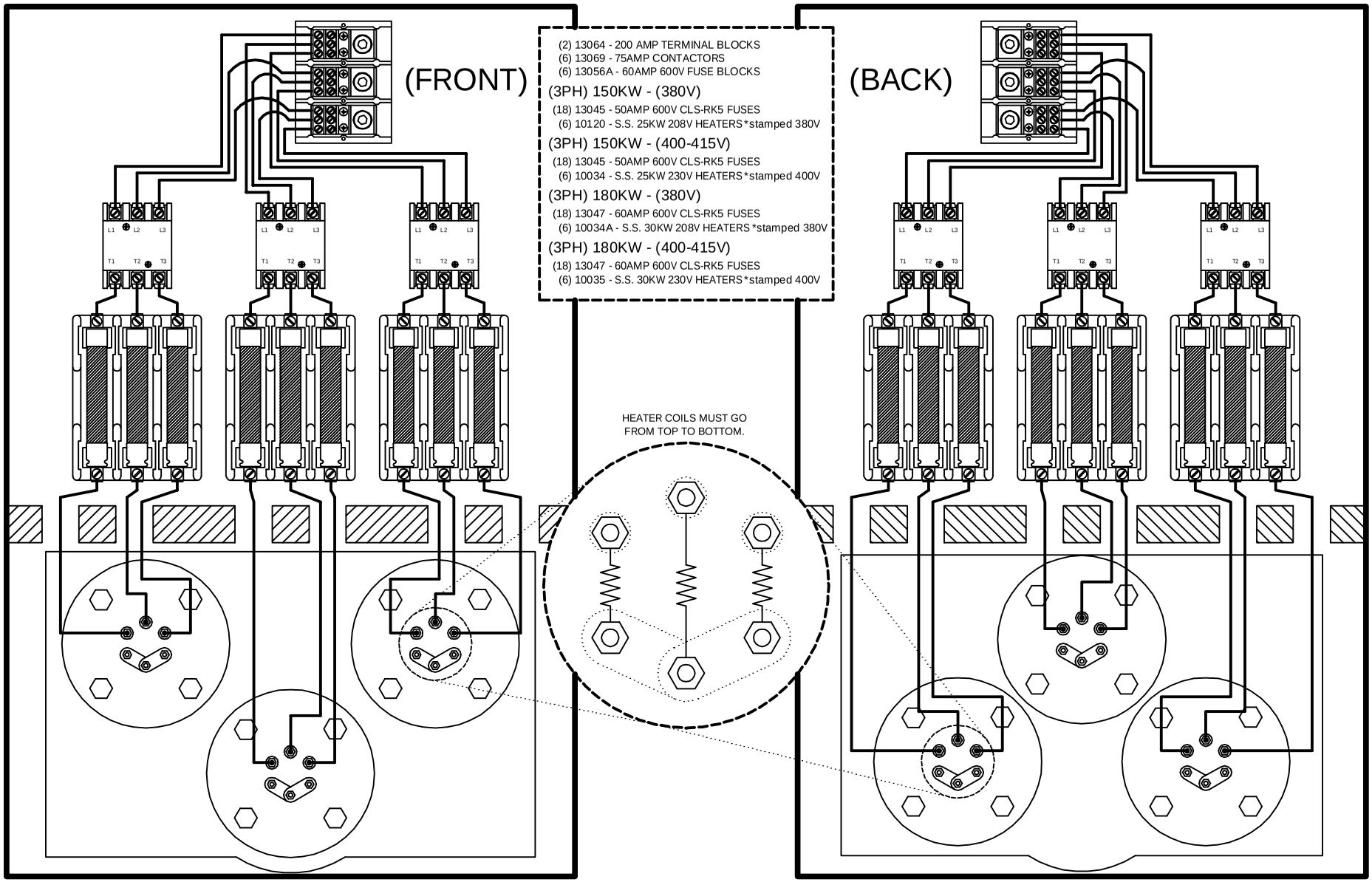
DRAWING TITLE: (HEATERS) S.S. LB 150-180(208-240V), LB 240(380-400V)			MODEL UNIT: LB 150-240	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09	
150-180KW 208-240V	ENGINEER:	-	-	DWG NO.: 212-150-240-233000
240KW 380-400V	APPROVED:	SAL NEGRO	06-12-09	SCALE: N/A
				SHEET: 1 OF 1

S.S. (3PH) 100-120KW - (380-415V)



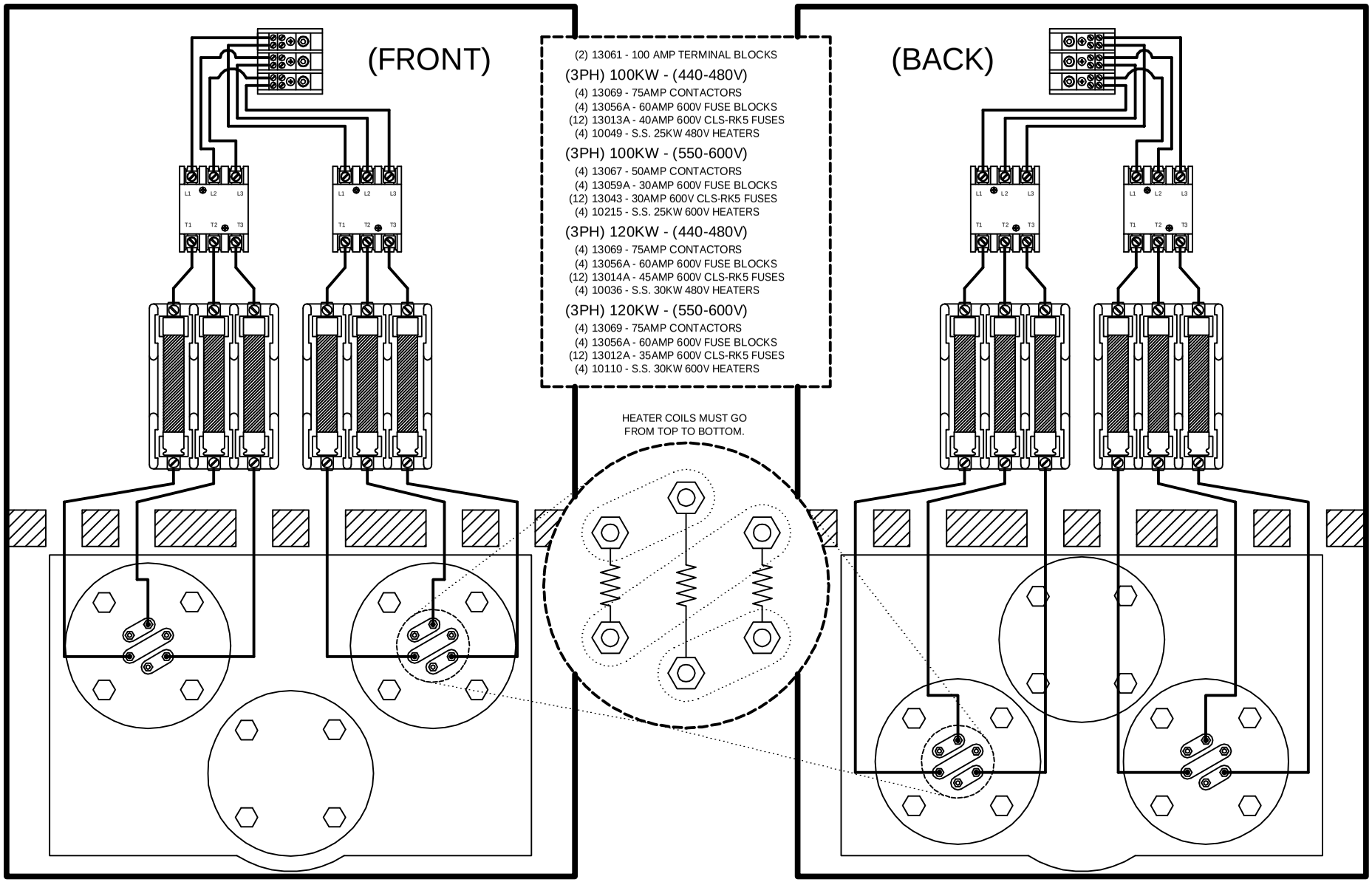
DRAWING TITLE: (HEATERS) S.S. LB 100-120 (3PH)(380-415V)			MODEL UNIT: LB 100-120	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09	
380-415V	ENGINEER:	-	-	DWG NO.: 212-100-120-343000
STAINLES SLEEL	APPROVED:	SAL NEGRO	06-12-09	SCALE: N/A
				SHEET: 1 OF 1

S.S. (3PH) 150-180KW - (380-415V)



DRAWING TITLE: (HEATERS) S.S. LB 150-180 (3PH)(380-415V)			MODEL UNIT: LB 150-180	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09	
380-415V	ENGINEER:	-	-	DWG NO.: 212-150-240-343000 SCALE: N/A
STAINLES SLEEL	APPROVED:	SAL NEGRO	06-12-09	SHEET: 1 OF 1

S.S. (3PH) 100-120KW - (440-600V)



DRAWING TITLE: (HEATERS) S.S. LB 100-120 (3PH)(440-600V)			MODEL UNIT: LB 100-120	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09	
440-600V	ENGINEER:	-	-	DWG NO.: 212-100-120-563000
STAINLES SLEEL	APPROVED:	SAL NEGRO	06-12-09	SCALE: N/A
				SHEET: 1 OF 1

S.S. (3PH) 150-240KW - (440-600V)

0013061 - 100 AMP TERMINAL BLOCKS
0013064 - 200 AMP TERMINAL BLOCKS
0013067 - 50AMP CONTACTORS
0013069 - 75AMP CONTACTORS
0013059A - 30AMP 600V FUSE BLOCKS
0013056A - 60AMP 600V FUSE BLOCKS
0013043 - 30AMP 600V CLS-RK5 FUSES
0013012A - 35AMP 600V CLS-RK5 FUSES
0013013A - 40AMP 600V CLS-RK5 FUSES
0013014A - 45AMP 600V CLS-RK5 FUSES
0013047 - 60AMP 600V CLS-RK5 FUSES
0010049 - S.S. 25KW 480V HEATERS
0010215 - S.S. 25KW 600V HEATERS
0010036 - S.S. 30KW 480V HEATERS
0010110 - S.S. 30KW 600V HEATERS
0010114 - S.S. 40KW 480V HEATERS
0010111 - S.S. 40KW 600V HEATERS

(FRONT)

(BACK)

(3PH) 150KW - (440-480V)
(2) 0013061, (6) 0013069, (6) 0013056A,
(18) 0013013A, and (6) 0010049

(3PH) 150KW - (550-600V)
(2) 0013061, (6) 0013067, (6) 001359A,
(18) 0013043, and (6) 0010215

(3PH) 180KW - (440-480V)
(2) 0013064, (6) 0013069, (6) 0013056A,
(18) 0013014A, and (6) 0010036

(3PH) 180KW - (550-600V)
(2) 0013061, (6) 0013069, (6) 0013056A,
(18) 0013012A, and (6) 0010110

(3PH) 240KW - (440-480V)
(2) 0013064, (6) 0013069, (6) 0013056A,
(18) 0013047, and (6) 0010114

(3PH) 240KW - (550-600V)
(2) 0013064, (6) 0013069, (6) 0013056A,
(18) 0013014A, and (6) 0010111

HEATER COILS MUST GO
FROM TOP TO BOTTOM.

DRAWING TITLE: (HEATERS) S.S. LB 150-240 (3PH)(440-600V)			MODEL UNIT: LB 150-240	ELECTRO-STEAM GENERATOR CORP.
DECRIPTIONS:	DRAWN BY:	CHRISTOPHER FERRARA	06-12-09	50 Indel Ave. P.O. Rancocas, NJ 08073-0438
THREE PHASE HEATER WIRING	CHECKED:	CHRISTOPHER FERRARA	06-12-09	
440-600V	ENGINEER:	-	-	DWG NO.: 212-150-240-563000
STAINLES SLEEL	APPROVED:	SAL NEGRO	06-12-09	SCALE: N/A
				SHEET: 1 OF 1

Electro-Steam Generator Corporation Terms and Conditions of Sale

These terms and conditions apply to all goods or services Seller provides. Seller recognizes no other terms and conditions unless approved in writing by Seller's authorized representative. Seller rejects any additional terms and conditions that may be contained in any document provided previously or subsequently by your company.

CHANGES: Changes made after fabrication has begun shall be submitted in writing, signed by the purchaser. Purchaser agrees to pay the cost of any changes. The specifications and prices are subject to change without notice.

CLAIMS: Title passes to the buyer upon delivery to the carrier, unless otherwise indicated. Safe delivery is the responsibility of the carrier. Damaged merchandise, if accepted, should be noted on the delivery receipt and on the freight bill before acceptance of shipment. Make claim promptly.

CONTINGENCY: All contracts are contingent upon fire, strikes, accidents, delays in transit, acts of God or other causes beyond our control.

LOCAL CODES: All steam boilers are built in accordance with ASME miniature boiler code. NOTE: It is the responsibility of the installer to conform with any state or local codes. If further inspection following modification by the installer is required under state and local codes that is the responsibility of the local installer

FREIGHT TERMS: F.O.B. FACTORY, NO FREIGHT ALLOWED. All charges for unloading and transportation to job site are at the buyer's expense.

INSTALLATION: No installation or job supervision charges are included.

ORDERS: All orders resulting from this quotation are subject to acceptance by the factory. No production will begin until receipt of purchaser's signed order and credit approval.

PAYMENT TERMS: Within Continental U.S.A., net 30 days, with approved credit from the date of invoice (not date of arrival of goods). Payment in full without retainer and/or any unauthorized sums deducted is expected.

RETURNS OF MATERIAL: No goods will be accepted for return without a return authorization number from the factory. A 25% restocking fee is charged on returns, freight prepaid.

TAXES: No taxes of any kind are included. All prices herein and/or contracts shall be subject to increase without notice by the amount of present or future sales or excise tax levied or charged, either by Federal, State or any other assessing agency.

PATENTS: Seller agrees to indemnify Purchaser against any proven claim and assessed liability for infringement of any United States patent arising from the manufacture or sale of any apparatus furnished by Seller to Purchaser.

THE FOREGOING STATES SELLER'S ENTIRE LIABILITY FOR CLAIMS OR PATENT INFRINGEMENT. Seller shall have no liability whatsoever if the claim of infringement arises out of the Sellers compliance with Purchasers specifications. Seller shall have no liability whatsoever if a claim of infringement is based upon the Purchasers use of the equipment as part of a patented combination where the other elements of the combination are not supplied by Seller, or in the practice of a patented process. Where the specifications, process, design are supplied by Purchaser, then Purchaser agrees to indemnify the Seller in like manner.of the claim or suit; and (c) purchaser provides all information and assistance to Electro-Steam Corporation, at purchaser's expense, as is reasonably necessary for the defense of the claim or suit. Electro-Steam Generator Corporation may, at its option, intervene in any suit or action brought against the purchaser on such claim.

ELECTRO-STEAM GENERATOR CORPORATION LIMITED WARRANTY:
Electro-Steam Generator Corporation fully warrants that all equipment and service supplied shall conform to the description in the quotation and agrees to repair or replace F.O.P. shipping points any parts, excepting expendable items, that fail due to defects in material or workmanship. The pressure vessel; (steam chamber) are warranted to the original Purchaser for a period of five years from the date of shipment from our factory. Mechanical and electrical components, along with accessories and hoses, are warranted for a period of one (1) year from date of shipment from our factory. IN NO EVENT SHALL ELECTRO-STEAM GENERATOR CORPORATION'S WARRANTY BE EXTENDED BEYOND THE WARRANTY LIABILITY PROVIDED BY THE SUPPLIER OR MANUFACTURER OF COMPONENT PARTS INCORPORATED IN THIS EQUIPMENT. THERE ARE NO OTHER WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AND SPECIFICALLY EXCLUDED BUT NO BY WAY OF LIMITATION ARE THE IMPLIED WARRANTIES OF FITNESS FOR PARTICULAR PURPOSE AND MERCHANTABILITY.

All claims for incorrect products or replacement must be made and settled prior to installation. Electro-steam Generator Corporation assumes no liability for the expense of repairs made outside its factory. Any claims for labor and/or parts will be denied unless written authorization is given by Electro-Steam Generator Corporation prior to work being done.

IT IS UNDERSTOOD AND AGREED THAT ELECTRO-STEAM GENERATOR CORPORATION'S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE, SHALL NOT EXCEED THE COST OF REPAIR OR REPLACEMENT, F.O.B. SHIPPING POINTS OF DEFECTIVE PARTS. UNDER NO CIRCUMSTANCES SHALL ELECTRO-STEAM GENERATOR CORPORATION BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE EQUIPMENT IS A CONSIDERATION IN LIMITING ELECTRO-STEAM GENERATOR CORPORATION'S LIABILITY. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS OF THIS AGREEMENT MAY BE BROUGHT BY PURCHASER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED. THE WARRANTY FOR THIS EQUIPMENT
OR SERVICE PROPOSED IN THIS QUOTATION IS AS STATED IN THE AFOREMENTIONED PARAGRAPHS. IT IS NOT RESTATED NOR DOES IT APPEAR IN ANY OTHER FORM.

This warranty supersedes all prior verbal or written warranties.

INSURANCE: Buyer represents that they have a program of Insurance which adequately protects their interest, and that of their employees and agents, including damage to plant, property and equipment, personal injury of any kind, directly or indirectly related in any way to the equipment, service, repair or parts supplied by Seller. Accordingly, Buyer waives any claim against Seller for the foregoing, and on behalf of its Insurance Company, any right of subrogation in connection therewith.

LAW: This Agreement shall be governed by the internal laws of the State of New Jersey, USA, and any claims arising hereunder shall be prosecuted in the United States District Court having jurisdiction of causes of action arising in the District in which Seller is located.

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