



Double-Stack

# DS-150 thru DS-480 (150-480kW)

USER, INSTALLATION, & MAINTENANCE MANUAL

MODELS - DS-150, DS-200, DS-240, DS-300, DS-360, & DS-480  
(LB-75x2) (LB-100x2) (LB-120x2) (LB-150x2) (LB-180x2) (LB-240x2)



**IMPORTANT – READ ALL INSTRUCTIONS BEFORE OPERATING**

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

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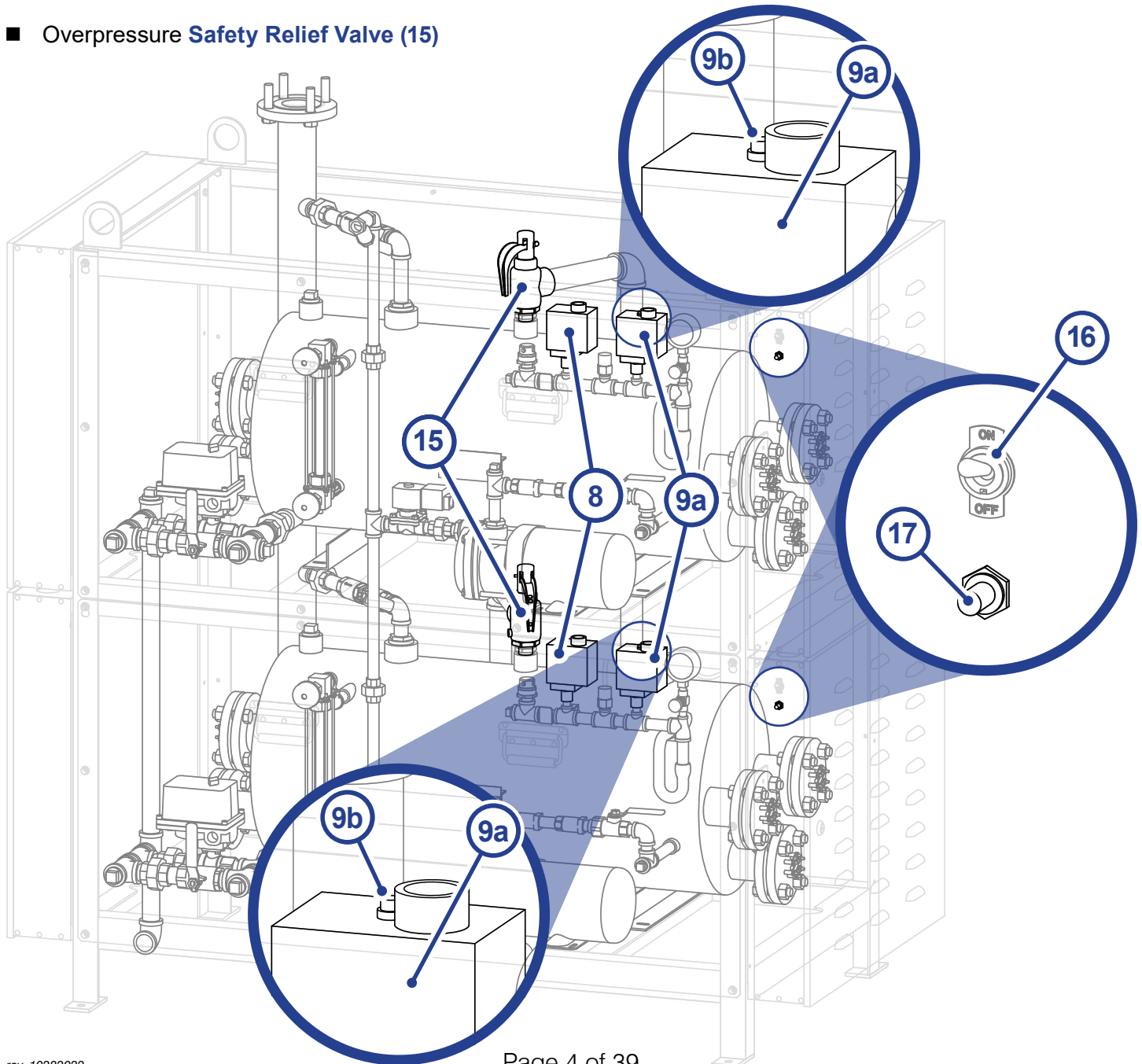
## BOILER DESCRIPTION & SAFETY FEATURES

### DOUBLE-STACK “DS-Series” is two “LB-Series” Boilers in one cabinet

The Electro-Steam Generator design is essentially 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. Boilers in a Double-Stack cabinet are only plumbed together; they are not wired together and operate independent of one another.

### BOILER SAFETY FEATURES INCLUDE:

- Dual (UL-353) Pressure Switches (8,9a) with High Pressure Safety Reset (9b).
- Automatic (UL-353) Low Water Cut-Off (LLCO) with **Optional** Manual Low-Water Reset (MLWR)(17)
- Overpressure Safety Relief Valve (15)



# BOILER DESCRIPTION & SAFETY FEATURES

- All LB Series steam generators are built by an ASME Certificate holder in accordance with the ASME Boiler and Pressure Vessel Code Section I – Rules for Construction of Power Boilers (“ASME BPVC Section I”). They also comply with the requirements outlined in The National Board Synopsis of Boiler and Pressure Vessel Laws, Rules and Regulations (NB-370) RULES FOR CONSTRUCTION AND STAMPING section, which for many jurisdictions include but are not limited to ASME BPVC Section I, ASME CSD-1, ASME B31.1, and REGISTRATION WITH THE NATIONAL BOARD.

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

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

**DANGER**

HIGH VOLTAGE  
AUTHORIZED  
PERSONNEL  
ONLY

**PELIGRO**

ALTO VOLTAJE  
SOLAMENTE  
PERSONAL  
AUTORIZADO

**CAUTION**

**THROW OFF MAIN  
POWER SWITCH  
BEFORE WORKING ON  
ELECTRICAL CABINET**

**CAUTION**

**HOT**

**REPLACE GLASS  
EVERY SIX MONTHS**

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

**TERMINALS ARE SUITABLE  
FOR COPPER WIRE ONLY**

U.L. 834 PAR. 4416

**RETIGHTEN SIGHT GLASS  
BEFORE USE**

**AMBIENT TEMPERATURE  
AROUND UNIT NOT TO  
EXCEED 105° F**

# 1.) INSTALLATION INSTRUCTIONS

## 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 Drawings; for interpretation of numbered or lettered items, refer to Parts Legend Drawings.

### WATER SUPPLY:

Connect city water line to **Water Inlet (1)**

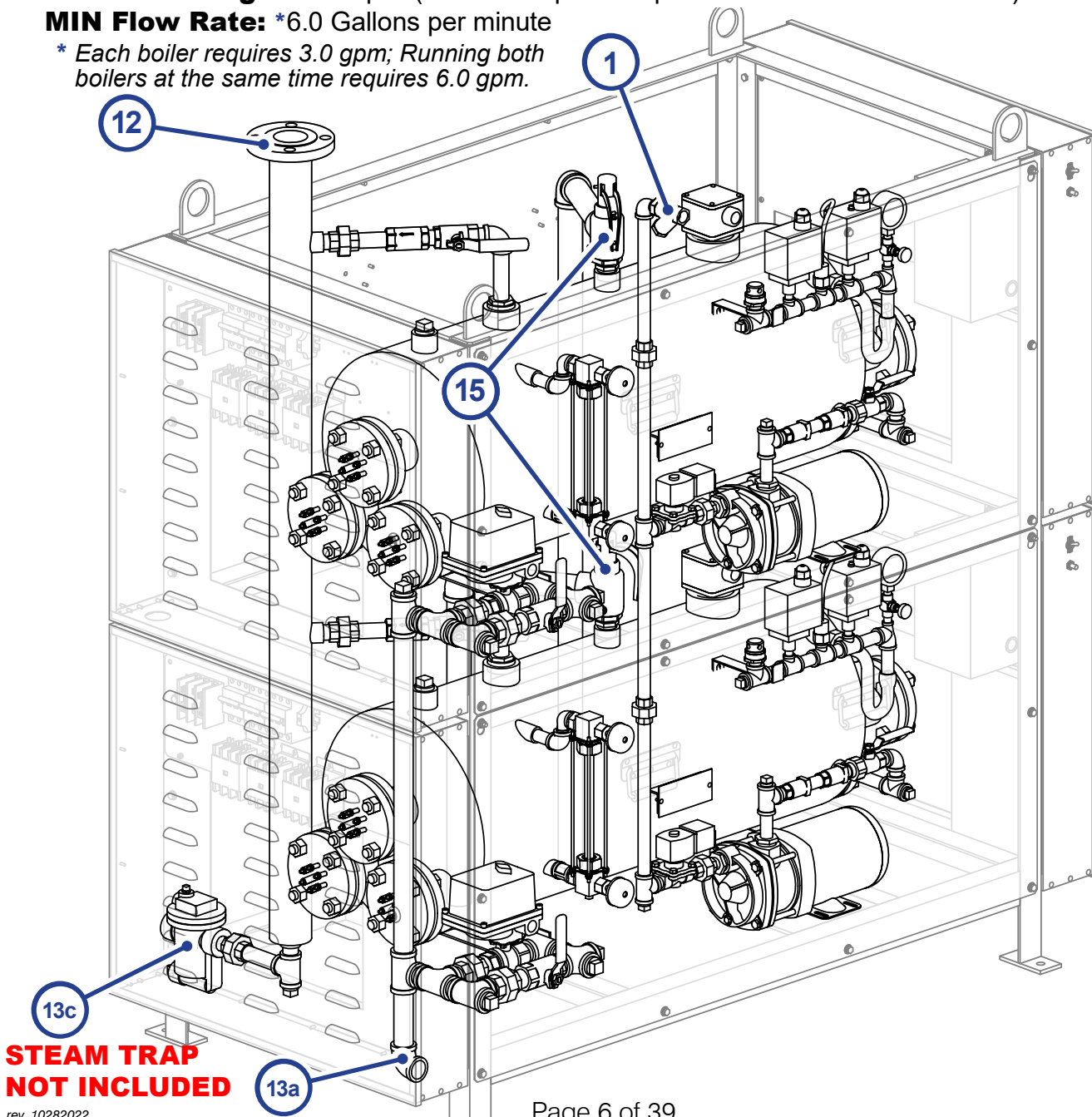
**Purity: Resistivity:** Less than 26kΩ-cm (**Conductivity:** Greater than 38.5µS per cm)

**MAX Temperature:** 160°F (71°C)

**Pressure Range:** 5-150 psi. (At least 35 psi is required for Low Pressure Boilers)

**MIN Flow Rate:** \*6.0 Gallons per minute

\* Each boiler requires 3.0 gpm; Running both boilers at the same time requires 6.0 gpm.



**STEAM TRAP  
NOT INCLUDED**

# 1.) INSTALLATION INSTRUCTIONS

## CONNECTIONS:

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

**NOTE:** Ambient temperature around this unit must not exceed **105°F (40°C)**.

## STEAM OUTLET:

Connect **Steam Outlet (12)** to piece of equipment, vessel, room, or area to be operated by the Electro Steam Generator.

## SAFETY VALVE & DRAIN:

Separately route the **Safety Valves (15) & Drains (13)** to a high temperature drain \*NO PVC. Discharging pipe of the **Safety Valves (15)** should never be smaller than the valve outlet and should be rigidly supported, placing no weight on the safety valve itself.

## ELECTRICAL:

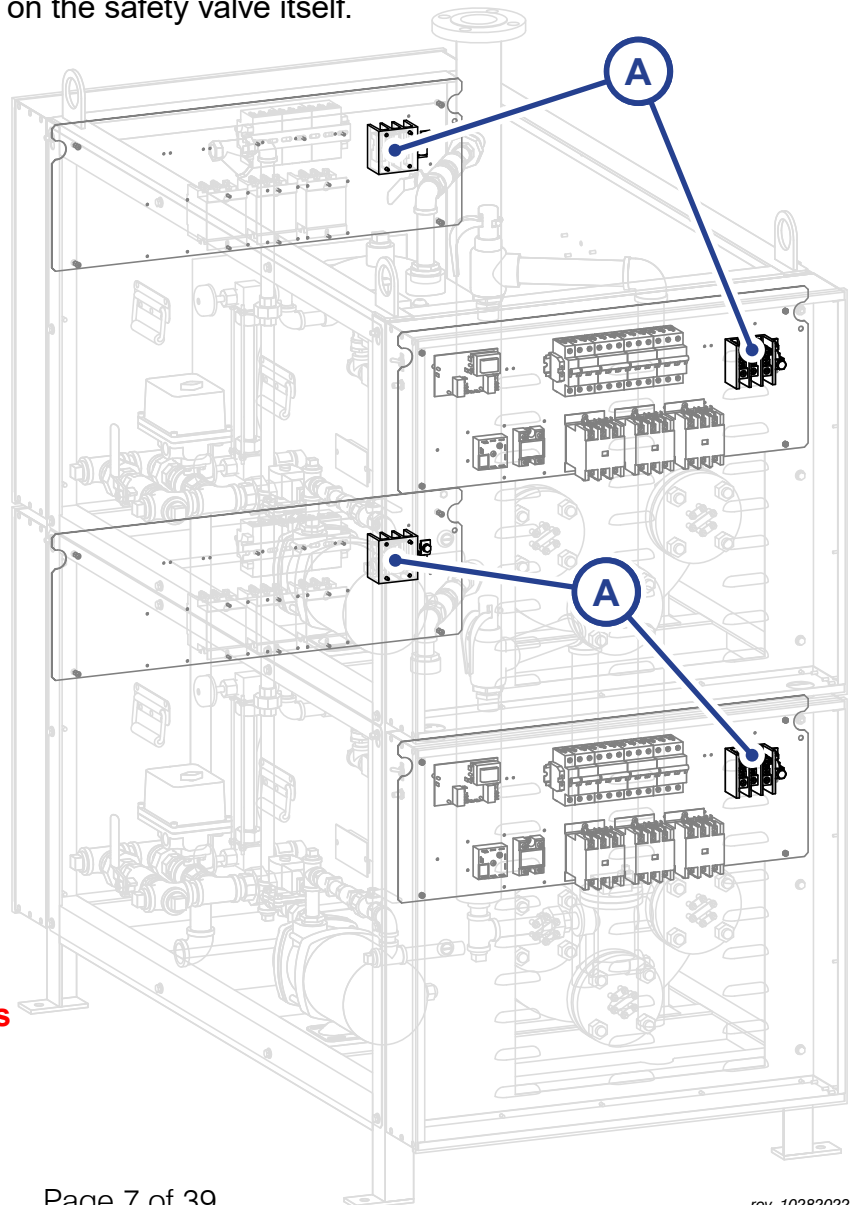
**This Boiler must be installed by a licensed electrician with Branch Circuit Protection, using properly sized wire, in accordance with N.E.C. and any applicable local codes. – Voltage, KW, and Phase requirement are marked on the nameplates. There are 2 Name Plates; 1 per Boiler.**

Double-Stack Boilers require four (4) High Voltage Power Feeds for the Heating Element (23). The two internally wired Single Service Transformers will provide 120VAC for the controls.

### **(A) Three Phase (3Ø) Voltage Input Connections (x4):**

The Heater load is split evenly between four (4) Electrical Boxes.

**Supply Power to all 4 Electrical Boxes**



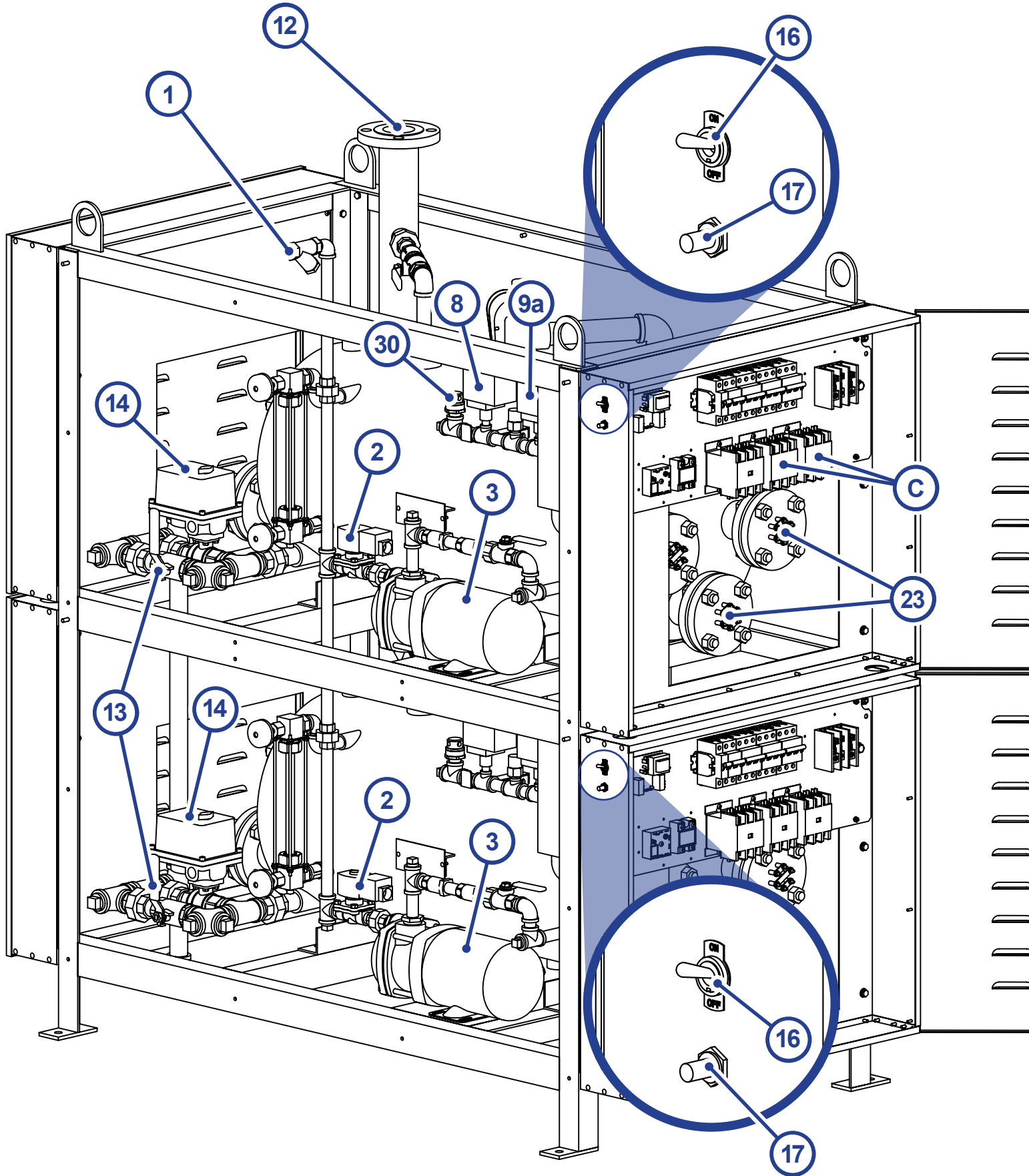
## 2.) OPERATION & SEQUENCE OF EVENTS

### IMPORTANT – READ INSTALLATION INSTRUCTIONS BEFORE OPERATING

1. Turn on water supply from the source to the **Water Inlet (1)**.
  2. **OPEN** all valves except for the **Drain Valves (13)**.
  3. Place the main disconnect switch(es) in the **ON** position.
  4. Place the **Toggle Switch (16)** of the boiler you wish to run in the **ON** position.
    - The **Motorized Auto-Flush & Drain (MAFD) (14)**, will open and begin draining the boiler for approximately 3 minutes. During this 3 minute flush cycle, the contactors will remain **OFF** and the boiler will be unable to heat. The **Vacuum Breaker (30)** will allow air into the chamber as it drains without pressure. If at least 5psi is present in the boiler when it is first turned on, the **(MAFD) (14)** will not open, but the boiler will still be unable to heat for approximately 3 minutes.
    - If the water level is not connecting the **(C & G) Probes (22)** for 1 full second, the **Water Solenoid (2)** and **Pump/Motor (3)** will turn **ON** and the chamber will begin to fill with water. As the water level rises, it will connect the **(A & G) Probes (22)**, indicating the Heaters are safely submerged. If the **(MAFD) (14)** is finished flushing, the contactors will turn **ON** to supply the heaters with power, causing steam pressure to accumulate.
- NOTE:** If an **Optional Manual Low-Water Reset (MLWR) (17)** is installed and operational, it must be pressed before the contactors will turn **ON**.
- The chamber will continue to fill with water until it connects the **(C & G) Probes (22)** for 1 full second; this will cause the **Water Solenoid (2)** and **Pump/Motor (3)** to turn **OFF**.
  - If the contactors have still not turned **ON** after the chamber finished filling with water, the **High Pressure Reset (9b)** on top of the “**Safety**” **Pressure Switch (9a)** may be tripped.
  - Steam pressure will continue to accumulate until the “**Control**” **Pressure Switch (8)** turns the contactors **OFF**. This may take **10-25 minutes**. After the pressure drops low enough, the “**Control**” **Pressure Switch (8)** will turn the contactors **ON** again. The pressure will continue to cycle during operation. **Approximate Operating Pressures: High = 74-80 psi, Low = 10-11 psi**
5. The Generator is now fully operational and will produce steam until it is turned off.
    - As steam is exhausted, the water level will drop. If the water breaks contact between the **(C & G) Probes (22)** for 1 full second, the **Water Solenoid (2)** and **Pump/Motor (3)** will turn **ON** and the chamber will begin to refill with water. It will continue to fill with water until it connects the **(C & G) Probes (22)** for another full second. The water will continue to cycle during operation.
  6. To shut off a boiler, place the **Toggle Switch (16)** of the boiler you wish to stop in the **OFF** position. The pressure will drop naturally as the boiler(s) cools, or it may be drained manually through **Drain Valve (13)**. (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 pipes are **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. Using a **Motorized Auto-Flush & Drain (MAFD) (14)** of course helps, but is not a “Cure all”. The following is the **LEAST** amount of times recommended to blow down your generator:

**NORMAL WATER AREAS** – Should be done **ONCE A DAY**.

**BAD WATER AREAS** – Should be done **TWICE A DAY**.

**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 (16)** and Main Disconnect Switch in **OFF** position.
2. Allow pressure to drop to **10 PSI** on the **Pressure Gauge (11)**.
3. Slowly open the **Drain Valve (13) (1/4 Turn at a time)**, allowing **HOT WATER** and **STEAM** to blow out into the drain, cleaning out the generator.

**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.

### 3.2) CLEANING THE WATER LEVEL PROBES

**CLEANING** the **Probe Rods (22)** is by far the **MOST IMPORTANT** maintenance step; almost all steam generator malfunctions are caused by dirty water level probes. The following is the **LEAST** amount of times recommended to clean your probes:

**NORMAL WATER AREAS** – Should be done **2-3 TIMES PER YEAR**.

**BAD WATER AREAS** – Should be done **4-6 TIMES PER YEAR**.

**NOTE:** The best time to clean the **Probe Rods (22)** is before the generator is turned on, while it is still cool.

**WARNING!** There **MUST** be **NO PRESSURE** in the **Boiler Chamber (25)**. If the probes must be removed while the boiler is **HOT**, perform a **(3.1) Blow-Down** and keep the **Steam Outlet Valve (12)** and **Drain Valve (13) OPEN** to assure that the **Boiler Chamber (25)** remains depressurized. **DO NOT** touch the probes with your bare hands, and be cautious of escaping steam from the **Probe Holder (20)** while the **Probe Rods (22)** are removed.

1. Turn **OFF** the Steam Generator.
2. Make sure the **Pressure Gauge (11)** reads **0 PSI**.
3. Remove the **Rubber Boots (19)**, exposing the **Probe Plugs (21)**.
4. Use a **5/16"** **Nut Wrench/Socket** to remove the high temperature colored wires from the **Probe Plugs (21)**.
5. Use a **13/16"** **Deep Socket** to remove the **Probe Plugs (21)** from the **Probe Holder (20)**.
6. Clean the **Probe Rods (22)** to remove rust and scaling.

**NOTE:** To clean the probes you may use emery cloth, wire wheel, wire brush, steel wool, or Scotch-Brite. (Wire wheel works the best) You may also want to try some sort of chemical like CLR remover or LIME-A-WAY.

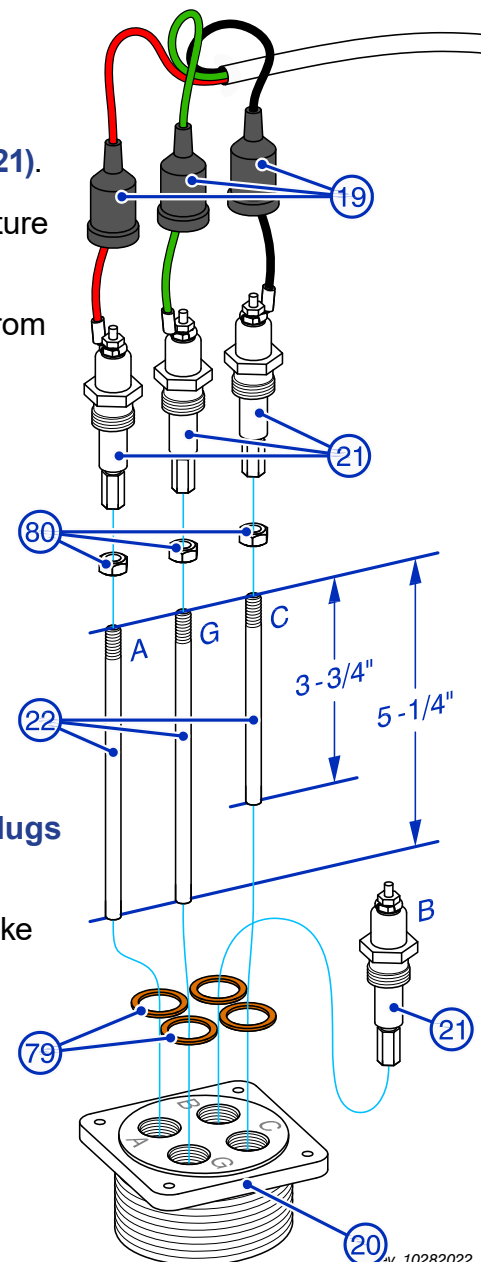
7. Reinstall the **Probe Plugs (21)**, assuring each **Probe's (22)** length is assigned to its proper letter.

**NOTE:** Letters are engraved into the **Probe Holder (20)**

8. Reconnect the high temperature colored wires to the **Probe Plugs (21)**, assuring each color is also assigned to its proper letter.

**NOTE: DO NOT** make wires too tight. Tighten just enough to make contact. Over tightening may damage **Probe Plugs (21)** over time.

9. Reinstall Probe cover



### 3.3) CLEANING OR REPLACING HEATING ELEMENTS

Two or Three **Heating Elements (23)** are located inside each Control Box bolted into the **Boiler Chamber (25)**. If the **(3.5) Chamber Cleaning** is not regularly done, the **Heating Elements (23)** must be taken out at least **ONCE A YEAR**, inspected, and cleaned; then reinstalled using a new **Heater Gasket (24)**.

**NOTE:** The best time to clean or replace a **Heating Element (23)** is several hours after a **(3.1) Blow-Down**, while the **Boiler Chamber (25)** is cool and completely drained.

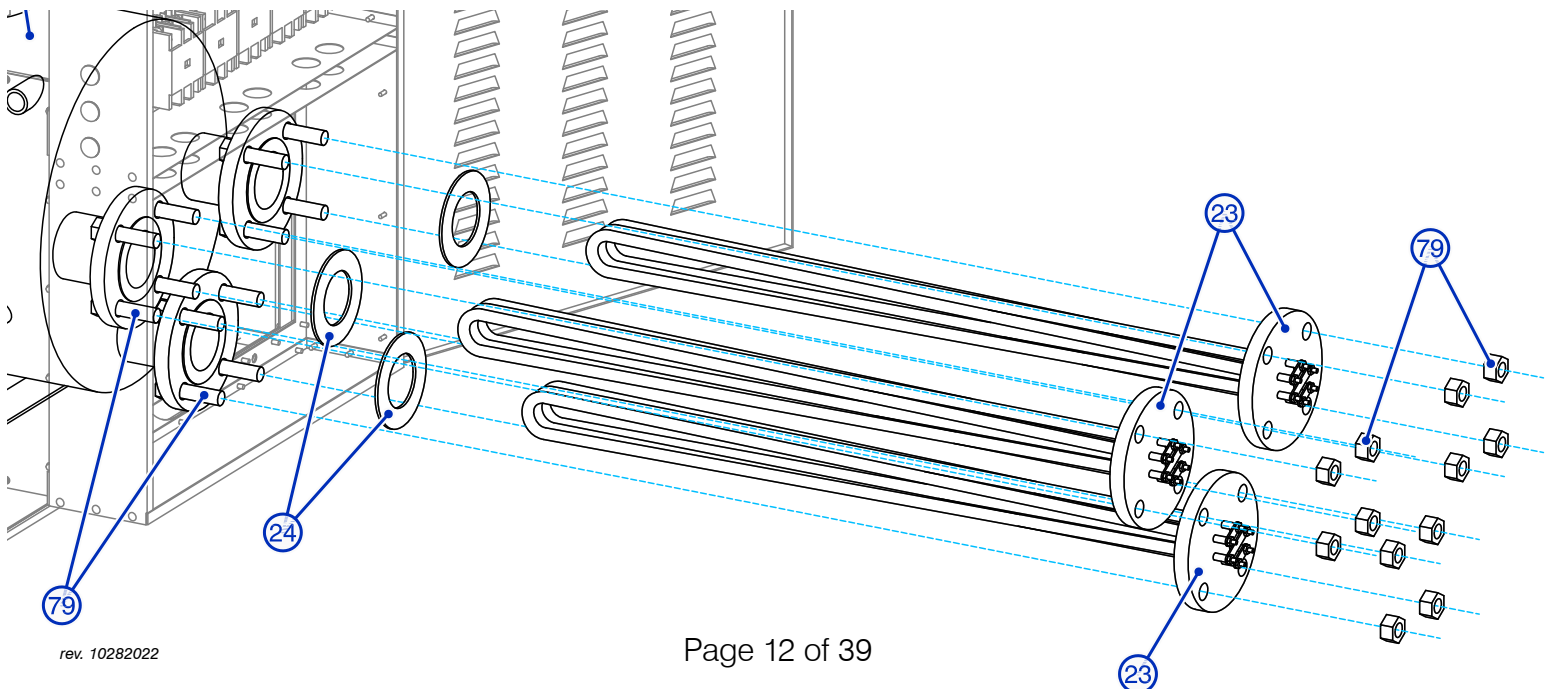
**WARNING** – There **MUST** be **NO WATER** or **PRESSURE** in the **Boiler Chamber (25)**. If the **Heating Elements (23)** must be removed while the generator is **HOT**, perform a **(3.1) Blow-Down** and keep the **Steam Outlet Valve (12)** and **Drain Valve (13)** **OPEN** to assure that the **Boiler Chamber (25)** remains depressurized. **DO NOT** touch any parts with your bare hands, and be cautious of escaping steam from the heater flanges while the **Heating Elements (23)** are removed.

1. Place **Toggle Switch (16)** and Main Disconnect Switch in **OFF** position.
2. Make sure the generator is cool and the **Pressure Gauge (11)** reads **0 PSI**.
3. Remove the heater wires from the **Heating Elements (23)**, using a **3/8" Nut Wrench**.
4. Unbolt and remove the **Heating Elements (23)** using a **1-1/16" Socket**.

**NOTE:** The **Heating Elements (23)** may be difficult to get out; some sort of pry bar may be required to get them loose.

5. Dispose of or clean the **Heating Elements (23)** with a wire brush. If replacing, dispose of old **Heating Elements (23)**.
6. Reinstall the **Heating Elements (23)** with a new **Heater Gaskets (24)**.
7. Re-attach the heater wires assuring proper wiring. \*Refer to Heater Wiring Schematics attached\*

**NOTE:** If replacing a **Heating Elements (23)** because of a heater failure, also clean the **Probe Rods (22)** and break away any debris/scale in the **Boiler Chamber (25)** that may make contact with the new **Heating Elements (23)**, or there may be another heater failure almost immediately



### 3.4) REPLACING GLASS GAUGE & TEFLON WASHERS

The **Sight Glass (5)** gives the operator the ability to monitor the boiler's water level, which can aid in troubleshooting boiler malfunctions. The **Sight Glass (5)** and **Teflon Beveled Washers (6)** must be replaced **EVERY SIX MONTHS**.

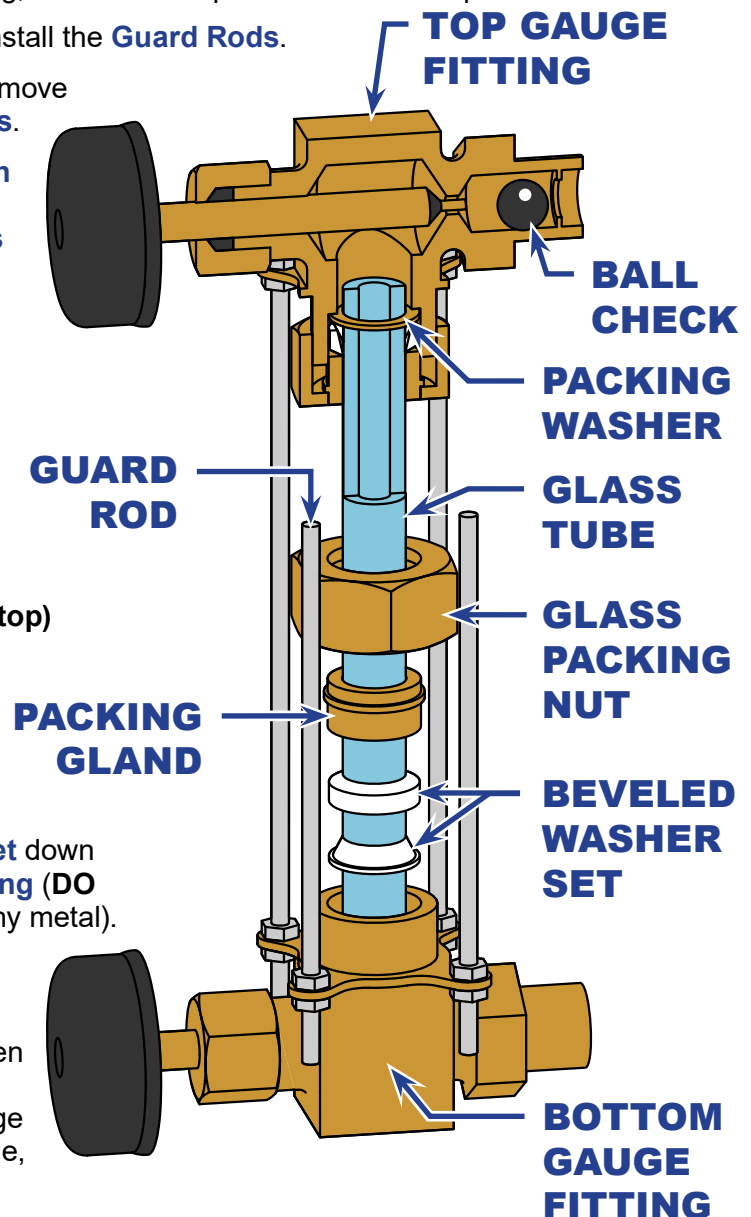
**NOTE:** The best time to replace the **Sight Glass (5)** and **Teflon Beveled Washers (6)** is several hours after a **(3.1) Blow-Down**, while the **Boiler Chamber (25)** is cool and empty.

**WARNING!** There **MUST** be **NO WATER** or **PRESSURE** in the **Boiler Chamber (25)**. If the **Sight Glass (5b)** must be removed while the generator is **HOT**, perform a **(3.1) Blow-Down** and keep the **Steam Outlet Valve (12)** and **Drain Valve (13)** **OPEN** to assure that the **Boiler Chamber (25)** remains depressurized. **DO NOT** touch any parts with your bare hands, and be cautious of steam venting from the **Gauge Fittings (7)** while the **Sight Glass (5)** is removed.

#### INSTALLATION INSTRUCTIONS:

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

1. With a **3/8" Crescent** or **Adjustable Wrench**, uninstall the **Guard Rods**.
2. With a **1-1/2" Crescent** or **Adjustable Wrench**, remove the **Glass Packing Nuts** from both **Gauge Fittings**.
3. Remove and dispose of old **Glass Tube** and **Teflon Beveled Washers** (You may need to use a pipe wrench to rotate one or both of the **Gauge Fittings** for the **Glass Tube** to clear).
4. Slip a new **Teflon Beveled Washer Set** on the new **Glass Tube** about an inch from the bottom.
5. Now slip the following items on the top of **Glass Tube** in the following order:
  - **Packing Gland (facing down)**
  - **Glass Packing Nut (facing down)**
  - **Glass Packing Nut (facing up)**
  - **Packing Gland (facing up)**
  - **Teflon Beveled Washer Set (inch down from top)**
  - **Packing Washer**
6. Gently insert **Glass Tube** into **Gauge Fittings**. If needed, rotate **Gauge Fittings** until vertically aligned after **Glass Tube** is in place.
7. Carefully raise **Glass Tube** about 1/16-inch from bottom and slide lower **Teflon Beveled Washer Set** down until it makes contact with the **Bottom Gauge Fitting (DO NOT** allow **Glass Tube** to remain in contact with any metal).
8. Carefully slide upper **Teflon Beveled Washer Set** up as far as possible.
9. 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.
10. Reinstall **Guard Rods**.



**3.5) CHAMBER CLEANING (CHEMICAL/ACID TREATMENT)**

Every Electro-Steam™ Double-Stack boiler is made up of two(2) a **27 Gallon** High Pressure Boiler Chambers that must be cleaned regularly for continuous operation. Every Boiler is available in Carbon Steel or Stainless Steel. The simplest way to verify what material the Boilers are made from would be to look at the exposed plumbing; Carbon Steel Boilers are constructed with Brass Plumbing and Stainless Steel Boilers are constructed with Stainless Steel Plumbing. If you can't be certain of the Boiler's construction material, contact Electro-Steam™ Generator Corp. with the serial number(s).

**Electro-Steam™ DOES NOT make recommendations** for titration levels nor which chemical solution will best fit your application. Hydrochloric Acid Solution (Inhibited) is commonly used for Carbon Steel Generators, but further specifications and recommendations should be obtained from an industrial chemical dealer. **FOR FOOD APPLICATIONS**, use **FDA** approved chemicals as specified by the chemical supplier.

The **LEAST** amount of times recommended to clean out a Carbon Steel Boiler Chambers:

**NORMAL WATER AREAS** – Should be done **ONCE A YEAR**.

**BAD WATER AREAS** – Should be done **TWICE A YEAR**.

**WARNING!** Before opening the control box, **TO AVOID ELECTRICAL SHOCK**, place Main Disconnect Switch and the **Toggle Switch (16)** in the **OFF** position.

**BEFORE CHAMBER CLEANING:**

- A.** Adjust the **Time Adjustment Dial (h)** on the **MAFD Timer/Relay (T)** all the way down to **2 seconds**.
- B.** Make sure the **Motorized Auto-Flush & Drain (MAFD) (14)** is in the closed position. (*Flat sides of shaft are perpendicular to valve flow when closed*)
- C.** Disconnect the **ORANGE WIRE** from the **#8 (NO) Terminal** of the **MAFD Timer/Relay (T)**.

**AFTER CHAMBER CLEANING:**

- D.** Reconnect the **ORANGE WIRE** to **#8 (NO) Terminal**.
- E.** Adjust the **Time Adjustment Dial (h)** on the **MAFD Timer/Relay (T)** back to the desired flush time. (*Most commonly 3 minutes*)



**CHAMBER CLEANING (CHEMICAL/ACID TREATMENT) INSTRUCTIONS:**

- 1.** Turn ON or turn OFF the generator to reach **10 PSI** of steam pressure.
- 2.** Wait for the steam pressure to climb or fall to at least **10 PSI** on the **Pressure Gauge (11)** and then perform a **(3.1) Blow-Down**.

**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.

**3.5) CHAMBER CLEANING (CHEMICAL/ACID TREATMENT) (CONT.)**

- 3. OPEN** the **Steam Outlet (12)** and **Drain Valve (13)** and then remove the **Safety Valve (15)**, or the **Water Level Probe Plugs (21)** depending on which is easier and the size of your funnel.

**WARNING!** There **MUST** be **NO PRESSURE** in the Boiler when removing plumbing parts; keep the **Steam Outlet Valve (12)** and **Drain Valve (13)** **OPEN** to assure that the Boiler Chamber remains depressurized. **DO NOT** touch any parts with your bare hands, and be cautious of venting steam.

- 4.** Close the **Drain Valve (13)** and turn **ON** the generator.
- 5.** Wait for the **Sight Glass (5)** to show **1/2 full** and then turn **OFF** the generator.
- 6.** Insert a funnel where the **Safety Valve (15)** or **Water Level Probe Plugs (21)** were removed.
- 7.** Pour acid solution into the funnel very slowly, being careful of fumes and venting while pouring.

**NOTE:** In **Step 10**, the chamber will fill to approximately 25 gallons. Add enough acid solution to reach the desired concentration or titration level for 25 gallons, minus the volume you add.

**NOTE: Electro-Steam™ DOES NOT make recommendations** for titration levels nor which chemical solution will best fit your application. Hydrochloric Acid Solution (Inhibited) is commonly used for Carbon Steel Generators, but further specifications and recommendations should be obtained from an industrial chemical dealer. **FOR FOOD APPLICATIONS**, use **FDA** approved chemicals as specified by the chemical supplier.

- 8.** Remove the funnel and reinstall the **Safety Valve (15)** or **Water Level Probe Plugs (21)**.
- 9.** Close the **Steam Outlet Valve (12)** and let the acid solution stand for **1 HOUR**.
- 10.** Turn **ON** the generator; the boiler will finish filling to around 25 gallons and then begin heating. Wait for the steam pressure to climb to **5 PSI** on the **Pressure Gauge (11)** and then turn **OFF**.
- 11.** Wait for the pressure to drop to **0 PSI** as the boiler cools. **5-6 HOURS or OVERNIGHT**
- 12. OPEN** the **Steam Outlet Valve (12)**, and remove the **Safety Valve (15)** or **Probe Plugs (21)**.
- 13.** Reinsert the funnel, fill the **Boiler Chamber (25)** completely to the top with clean water, and let stand for an additional **1/2 HOUR**.
- 14.** Open the **Drain Valve (13)** to completely drain the boiler.

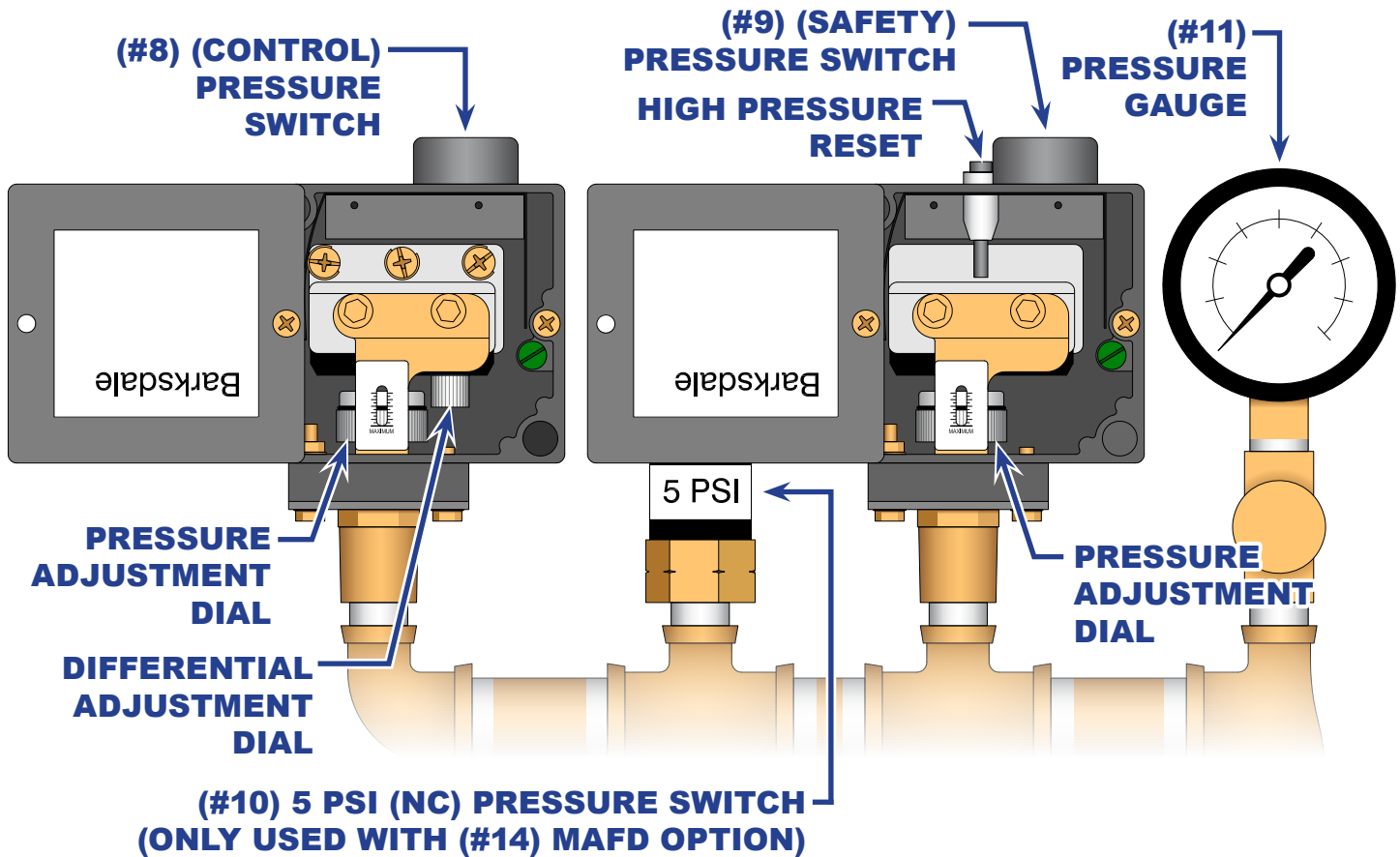
**NOTE: Treat drained acid solution, as required by local codes, before disposal.**

- 15.** Close the **Drain Valve (13)**, refill the boiler completely to the top with clean water, and repeat **Step 14** one more time.
- 16.** Reinstall the **Safety Valve (15)** or **Probe Plugs (21)** and close the **Drain Valve (13)**.
- 17.** Turn **ON** the generator, wait for the steam pressure to climb to at least **10 PSI**, and then perform a **(3.1) Blow-Down**.

**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.

- 18.** The generator is now ready for normal use and operation.

## 3.6) PRESSURE SWITCH DATA SHEET



## DEFINITIONS:

- (CONTROL) PRESSURE SWITCH (8)** – This pressure switch is set lower than the **(Safety) Pressure Switch (9)**, making it the first line of defence. It controls the boiler's operating pressure.
- (SAFETY) PRESSURE SWITCH (9)** – This pressure switch is set higher than the **(Control) Pressure Switch (8)**, making it the second line of defence. If the set point of this switch is reached, the **Safety Reset** will trip to alert the operator that the operating pressure has been exceeded.
- SAFETY RESET** – This reset button will trip if the set point of the **(Safety) Pressure Switch (9)** is reached. The **Heating Elements (23)** will remain **OFF** until this button is manually pressed.
- PRESSURE ADJUSTING DIAL** – This dial adjusts the pressure set points of each **Pressure Switch (8,9)**; the **ON** and **OFF** points of each switch can be moved **UP** or **DOWN** with this dial.
- DIFFERENTIAL ADJUSTING DIAL** – This dial, only present in some **(Control) Pressure Switches (8)**, adjusts span between the **ON** and **OFF** set points of the switch. This dial should never need adjustment, unless desired by the operator.
- PRESSURE GAUGE (11)** – This gauge reads the pressure inside of the **Boiler Chamber (25)**. The pressure set points of both **Pressure Switches (8,9)** are set to this gauge.
- 5 PSI (NC) PRESSURE SWITCH (10)** – This normally closed (NC) pressure switch is factory set at **5 PSI** and is not adjustable. It is only used with the **(2.4) Motorized Auto-Flush & Drain (MAFD) (14) Option** and prevents the **MAFD (14)** from being able to open, if there is more than **5 PSI** present in the **Boiler Chamber (25)**.



3.7) SETTING THE PRESSURE SWITCHES

**WARNING! DO NOT ALTER** the **ORIGINAL FACTORY PRESSURE SETTINGS** of the **Pressure Switches (8,9)** without contacting Electro-Steam Generator Corp. Every boiler is designed to produce a specific flow rate of steam at a set pressure. Altering the factory pressure settings will affect the performance of the machine, which may Hinder your process, **CAUSE DAMAGE**, and potentially **VOID ANY WARRANTIES**.

**WARNING!** Setting the **Pressure Switches (8,9)** should only need to be done if one has been replaced, or if a set point has drifted from the original factory setting, according to **Table 3.2**.

**WARNING!** The **Pressure Switches (8,9)** can only be set while **ALL CIRCUITS ARE LIVE; TO AVOID ELECTRICAL SHOCK, DO NOT TOUCH** any **WIRE CONNECTIONS**.

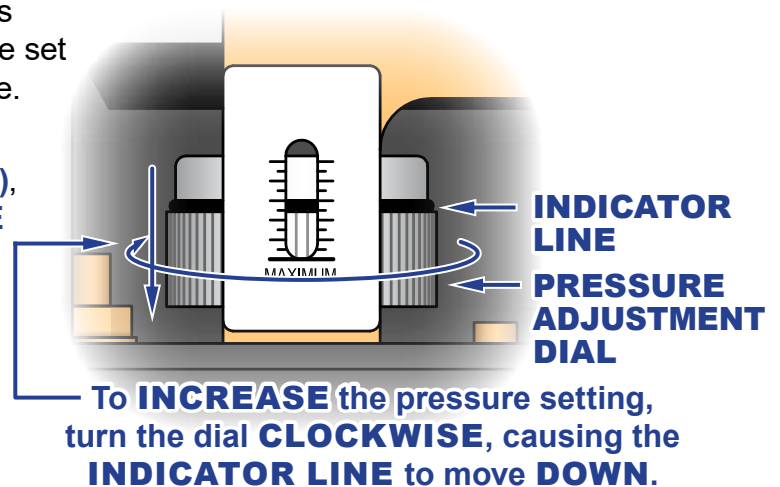
TABLE 3.2 - STANDARD FACTORY PRESSURE SETTINGS

	Control Pressure Switch (8) "Operating Pressure"	Safety Pressure Switch (9) "High Pressure Reset"	Safety Relief Valve (15) "Pop-OFF Pressure"
Low Pressure (0-15 psi)	11 psi	13.5 psi	15 psi
High Pressure (0-100 psi)	80 psi	85 psi	100 psi

The Operating Pressure must never exceed 80% of the Safety Relief Valve's Pressure Rating. Pressures higher than 80% will cause the Safety Valve to leak.

**NOTES:**

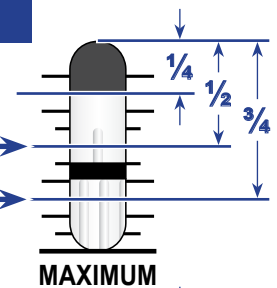
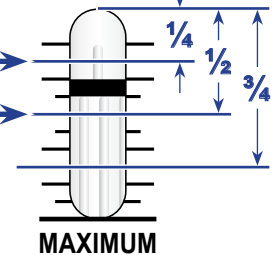
- When setting the **Pressure Switches (8,9)**, it's important to be able to hear the **Contactor (C)** click **ON** and/or **OFF**; possibly by the tone of the click, being able to distinguish an **ON** click from an **OFF** click is essential. If in doubt, look at the **Contactor (C)** and/or watch the **Pressure Gauge (11)**; after an **ON** click, the center square hole in the face of the **Contactor (C)** will be pulled in (no longer flush), and steam pressure will begin slowly increasing.
- In order to set the **(Safety) Pressure Switch (9)**, the **(Control) Pressure Switch (8)** must be **TEMPORARILY** disabled, or set higher than the **(Safety) Pressure Switch (9)**; this temporarily permits steam pressure to reach to the required set point of the **(Safety) Pressure Switch (9)**.
- Only after the **(Safety) Pressure Switch (9)** is set, can the **(Control) Pressure Switch (8)** be set lower to the boiler's correct operating pressure.
- To **INCREASE** the pressure setting, when looking down on the **Pressure Switches (8,9)**, using both 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 line to move **UP** the scale.



## 3.7) SETTING THE PRESSURE SWITCHES (CONTINUED)

## PRESSURE SETTING INSTRUCTIONS:

1. Remove the covers of the **Pressure Switches (8,9)**, as shown on **(3.6) Pressure Switch Data Sheet**.
2. **TEMPORARILY** adjust the **PRESSURE ADJUSTMENT DIAL** on the **(Control) Pressure Switch (8)** so that the **BLACK INDICATOR LINE** is **Somewhere Between  $\frac{1}{2}$  and  $\frac{3}{4}$**  down from the top.
3. **TEMPORARILY** adjust the **PRESSURE ADJUSTMENT DIAL** on the **(Safety) Pressure Switch (9)** so that the **BLACK INDICATOR LINE** is **Somewhere Between  $\frac{1}{4}$  and  $\frac{1}{2}$**  down from the top.

**TEMPORARILY**Adjust the  
(Control)  
Somewhere  
Between**TEMPORARILY**Adjust the  
(Safety)  
Somewhere  
Between

**WARNING!** Never let the pressure reach the rating of the **Safety Valve (15)**, shown on **Table 3.2 (15 or 100 psi)** and also marked on the valve itself; if at any point the pressure exceeds **90%** of this rating (**13.5 or 90 psi**), **(2.2) Shut-Down** the generator, **OPEN** the **Steam Outlet Valve (12)**, **DECREASE** the pressure setting on the **(Safety) Pressure Switch (9)**, and go to **Step 4:**

4. **OPEN** the **Steam Outlet Valve (12)**, and turn **ON** the generator.
  - As the boiler fills with water, listen to or watch the **Contactor (C)** and wait for it to click **ON**. If the **(2.4) Motorized Auto-Flush & Drain (MAFD) (14) Option** is included, the **Contactor (C)** will be unable to click **ON** until the flush cycle time is complete.
5. Wait for the boiler to stop filling with water, and then **CLOSE** the **Steam Outlet Valve (12)**.
6. After the **Contactor (C)** clicks **ON**, watch the pressure rise on the **Pressure Gauge (11)**.  
*(This may take 10-30 minutes from a cold start)*

**NOTE:** If the **Contactor (C)** did not click **ON**, even after the boiler stopped filling with water, press the **SAFETY RESET**, located on the **(Safety) Pressure Switch (9)**.

7. Continue watching the **Pressure Gauge (11)** until you hear the **Contactor (C)** click **OFF**.

**WARNING!** Never let the pressure reach the rating of the **Safety Valve (15)**, shown on **Table 3.2 (15 or 100 psi)** and also marked on the valve itself; if at any point the pressure exceeds **90%** of this rating (**13.5 or 90 psi**), turn **OFF** the generator, **OPEN** the **Steam Outlet Valve (12)**, **DECREASE** the pressure setting on the **(Safety) Pressure Switch (9)**, and go back to **Step 4**.

8. As soon as the **Contactor (C)** clicks **OFF**, press the **SAFETY RESET**, located on the **(Safety) Pressure Switch (9)**; this should cause the **Contactor (C)** to click **ON** and **OFF**.

**NOTE:** This is a way to test which **Pressure Switch (8,9)** reached its set point and caused the **Contactor (C)** to click **OFF**. If pressing the **SAFETY RESET** causes the **Contactor (C)** to click **ON** and **OFF**, that means the current set point of the **(Safety) Pressure Switch (9)** was reached; if **Contactor (C)** to click **OFF** and the **SAFETY RESET** does nothing, the current set point of the **(Control) Pressure Switch (8)** was most likely reached.

9. If pressing the **SAFETY RESET** did nothing, **INCREASE** the pressure setting of the **(Control) Pressure Switch (8)** until the **Contactor (C)** clicks back **ON**, and then go back to **Step 7**.

**3.7) SETTING THE PRESSURE SWITCHES (CONTINUED)****SETTING THE (SAFETY) PRESSURE SWITCH (9) (STEPS 10-15):**

**After Steps 1-9** the **Contactor (C)** should be clicked **OFF**; pressing the **SAFETY RESET** should cause the **Contactor (C)** to click **ON** and **OFF**.

- 10. OPEN** the **Steam Outlet Valve (12)** to exhaust some pressure.
- 11.** As the pressure drops, keep pressing the **SAFETY RESET** until the **Contactor (C)** remains **ON**.  
**NOTE:** After the **Contactor (C)** is **ON**, the pressure should eventually begin to rise. With the **Steam Outlet Valve (12)** fully **OPEN**, this may take some time. To speed things up, you may want to **CLOSE** this valve **SLIGHTLY**. Not too far though; the pressure **MUST RISE SLOWLY**.
- 12.** Continue watching the **Pressure Gauge (11)** until you hear the **Contactor (C)** click **OFF**; take note of the **EXACT PRESSURE** that caused the **Contactor (C)** to click **OFF**.
- 13.** Press the **SAFETY RESET**; if it causes the **Contactor (C)** to click **ON** and **OFF**, continue to **Step 14**; If does nothing; go back to **Step 9**.
- 14.** If the pressure stopped **BELOW** the correct **(Safety) Pressure Switch (9)** setting, according to **Table 3.2 (13.5 or 85 psi)**, **INCREASE** the pressure setting on the **(Safety) Pressure Switch (9)**. If the pressure stopped **ABOVE**, **DECREASE** the pressure setting.
- 15. Repeat Steps 10-13** until the pressure stops at the **EXACT** correct **(Safety) Pressure Switch (9)** setting, according to **Table 3.2 (13.5 or 85 psi)**.

**SETTING THE (CONTROL) PRESSURE SWITCH (8) (STEPS 16-20):**

**After Steps 1-15** the **(Safety) Pressure Switch (9)** should be set and the **(Control) Pressure Switch (8)** should be set somewhere above. The **Contactor (C)** should be clicked **OFF**; **DO NOT** press the **SAFETY RESET** to click **ON** the **Contactor (C)**; if already **ON**, jump to **Step 18**.

- 16.** Fully **OPEN** the **Steam Outlet Valve (12)** to exhaust pressure.
- 17.** Let the pressure drop below the **(Control) Pressure Switch (8)** setting, according to **Table 3.2 (11 or 80 psi)**, and then press the **SAFETY RESET** to click **ON** the **Contactor (C)**.
- 18.** With the **Contactor (C)** clicked **ON** and the pressure rising, **DECREASE** the pressure setting on the **(Control) Pressure Switch (8)** until the **Contactor (C)** clicks **OFF**.
- 19.** Repeat **Step 17-18** until the **SAFETY RESET** does nothing.
  - With the **Steam Outlet Valve (12) OPEN**, the **Contactor (C)** should click **ON** an **OFF** on it's own now between two pressures on the **Pressure Gauge (11)**, as it cycles up and down.
- 20.** Watch the **Pressure Gauge (11)** and take note of the **EXACT PRESSURE** that caused the **Contactor (C)** to click **OFF**; then adjusts the **(Control) Pressure Switch (8)** accordingly to get it closer to the correct pressure setting, according to **Table 3.2 (11 or 80 psi)**. **Repeat this Step** until the pressure stops at the **EXACT** correct **(Control) Pressure Switch (8)** setting.
- 21.** The **Pressure Switches (8,9)** are now set.

**NOTE:** If the **SAFETY RESET** ever needs to be pressed during operation, after **(3.7) Setting the Pressure Switches**, either one of the switches went bad, the **(Safety) Pressure Switch (9)** is set **TOO LOW**, or the **(Control) Pressure Switch (8)** is set **TOO HIGH**.

## 4.) CALCULATIONS & DATA SHEETS

### 4.1) ELECTRIC BOILER STANDARD RATINGS

The following performance calculations are based on 100% efficiency with a **212°F boiler feed-water**. However, the boiler feed-water must not exceed 140°F. All installation parts and paths (ex. Water supply, Pipes, Safety Valves, Steam Traps, etc.) should be sized according to **Table 4.1**, since it shows the generator's MAX potential under perfect circumstances. For more realistic performance calculations, used to size equipment to be supplied steam, see **Table 4.2**.

Model	BHP	Full Tank Capacity (Gallons)	Usable Capacity (Gallons)	Minimum Flow Rate (gal/min)	Average Water Consumption		Average Steam Production		BTU/hr
					(gal/hr)	(L/hr)	(lb/hr)	(kg/hr)	
DS-150	15.0	54 (27 × 2)	46 (23 × 2)	*6.0 (3.0 × 2)	62.0	234.7	517.5	234.7	511,821
DS-200	20.0				82.7	313.0	690.0	313.0	682,428
DS-240	24.0				99.2	375.6	828.0	375.6	818,914
DS-300	30.0				124.0	469.5	1,035	469.5	1,023,643
DS-360	36.0				148.8	563.4	1,242	563.4	1,228,371
DS-480	48.0				198.4	751.2	1,656	751.2	1,637,828

\*A minimum of 6.0 GPM is required when running both boilers at the same time.

### 4.2) ADJUSTED ELECTRIC BOILER CALCULATIONS

The following adjusted performance calculations are based on **more realistic boiler feed-water temperatures**. Equipment to be supplied steam should be sized according to **Table 4.2**, but de-rated even further, depending on the distance the steam will travel. To size installation parts and paths (ex. Water supply, Pipes, Safety Valves, Steam Traps, etc.), see **Table 4.1**.

Model	Water Feed Temperature		Adjusted Water Consumption		Adjusted Steam Production		Adjusted BTU/hr
	°F	°C	(gal/hr)	(L/hr)	(lb/hr)	(kg/hr)	
DS-150 (LB-80 × 2)	59	15	46.5	176.1	388.1	176.1	383,866
	104	40	49.6	187.8	414.0	187.8	409,457
	140	60	55.8	211.3	465.8	211.3	460,639
DS-200 (LB-100 × 2)	59	15	62.0	234.7	517.5	234.7	511,821
	104	40	66.1	250.4	552.0	250.4	545,943
	140	60	74.4	281.7	621.0	281.7	614,186
DS-240 (LB-120 × 2)	59	15	74.4	281.7	621.0	281.7	614,186
	104	40	79.4	300.5	662.4	300.5	655,131
	140	60	89.3	338.0	745.2	338.0	737,023
DS-300 (LB-150 × 2)	59	15	93.0	352.1	776.3	352.1	767,732
	104	40	99.2	375.6	828.0	375.6	818,914
	140	60	111.6	422.5	931.5	422.5	921,278
DS-360 (LB-180 × 2)	59	15	111.6	422.5	931.5	422.5	921,278
	104	40	119.1	450.7	993.6	450.7	982,697
	140	60	133.9	507.0	1,118	507.0	1,105,534
DS-480 (LB-240 × 2)	59	15	148.8	563.4	1,242	563.4	1,228,371
	104	40	158.8	600.9	1,325	600.9	1,310,263
	140	60	178.6	676.0	1,490	676.0	1,474,046

### 4.3) HEATER POWER & VOLTAGE RATINGS

DS-150 to DS-480 Models use two (2) LB-80 to LB-240 Models with **three (3), four (4), or six (6) Heating Elements (23)**, each available in three (3) different **POWER RATINGS (KW)** and four (4) different **VOLTAGE RATINGS**.

Model	Boiler kW	Heater Qty.	Heater kW	Available Voltage Ratings			
DS-150	150	6	25	208	230	480	600
DS-200	200	8	25				
DS-240	240		30				
DS-300	300	12	25				
DS-360	360		30				
DS-480	480		40				

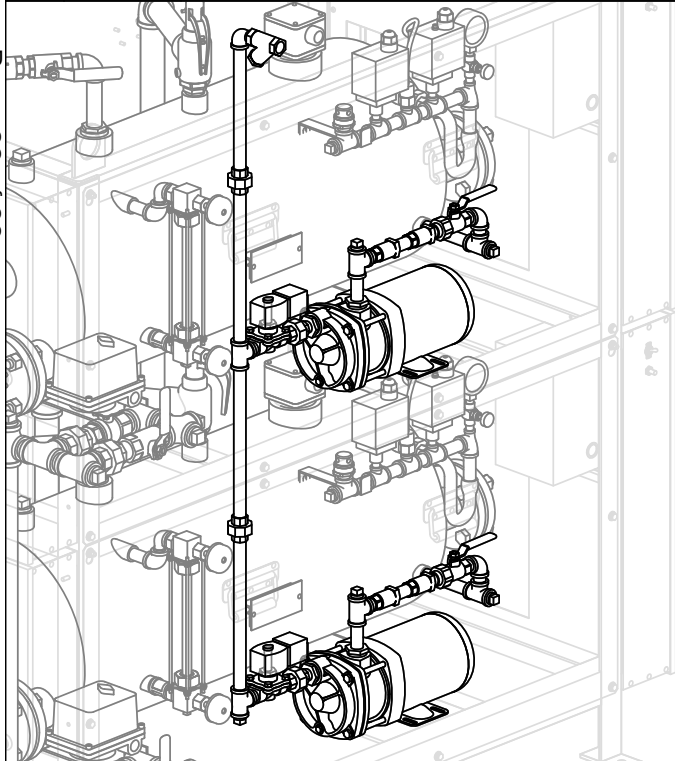
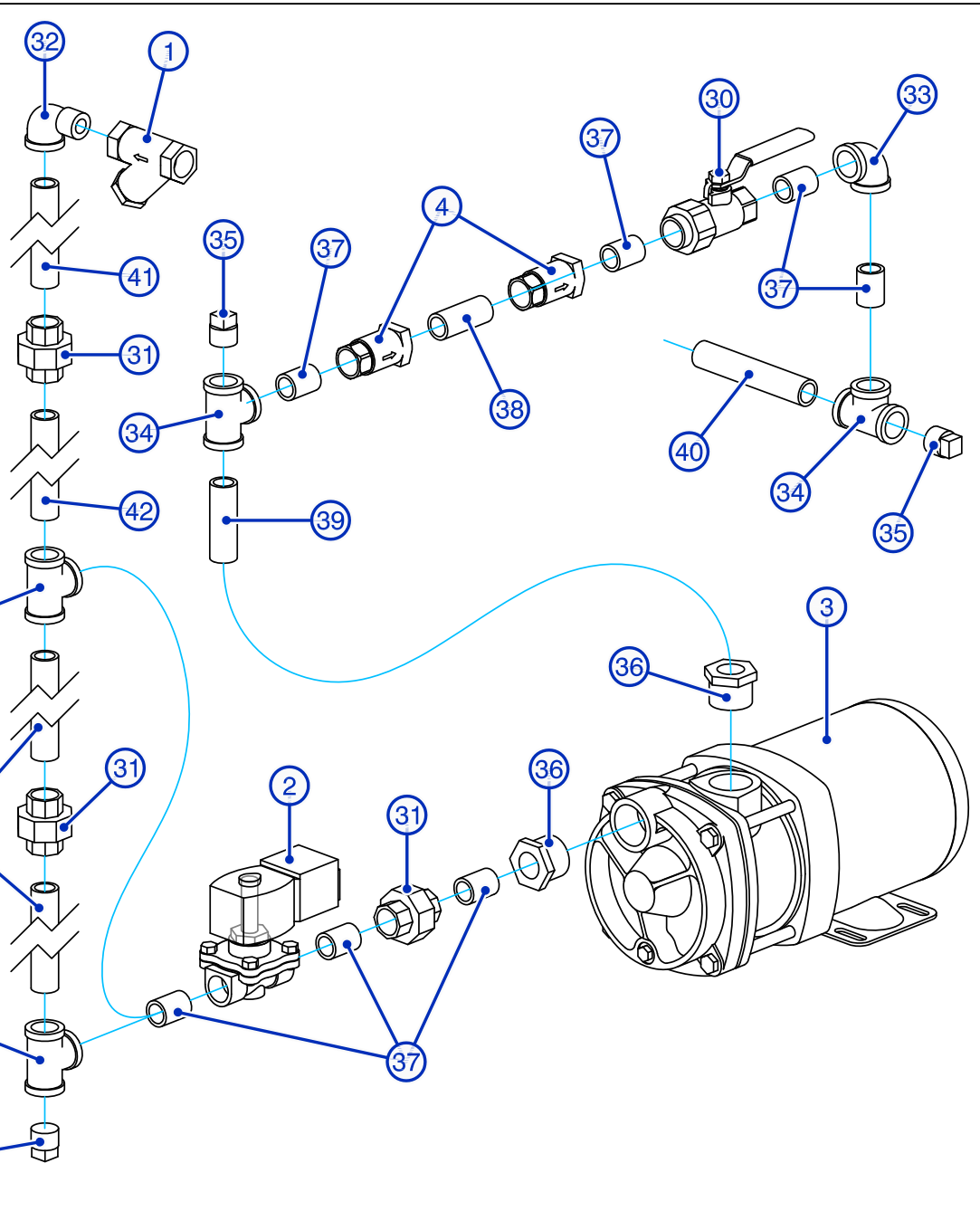
### 4.4) ACTUAL POWER & AMPERAGE CALCULATIONS

Double Stack Boilers have two (2) or four (4) Electrical Boxes that each require a High Voltage Power Feed. Actual Power and Amperage Calculations are based off of the Boiler Ratings and Supply Voltage.

Model	Boiler Rating		Supply Voltage	Amperage (3Ø) per Box	Number of Boxes	Amperage (3Ø) Total	Actual Power (kW)
	(kW)	(VAC)					
DS-150 (LB-80 × 2)	150	208	200 - 220	200.2 - 220.2	2	400.3 - 440.4	138.7 - 167.8
		230	220 - 240	180.1 - 196.5		360.2 - 392.9	137.2 - 163.3
		<b>360</b>	360 - 380	120.1 - 126.8		240.2 - 253.6	149.8 - 166.9
		<b>400</b>	380 - 415	103.7 - 113.2		207.4 - 226.5	136.5 - 162.8
		480	440 - 480	82.7 - 90.2		165.4 - 180.4	126.0 - 150.0
		600	550 - 600	66.2 - 72.2		132.3 - 144.3	
DS-200 (LB-100 × 2)	200	208	200 - 220	133.4 - 146.8	4	533.8 - 587.2	184.9 - 223.7
		230	220 - 240	120.1 - 131.0		480.2 - 523.9	183.0 - 217.8
		<b>360</b>	360 - 380	80.1 - 84.5		320.3 - 338.1	199.7 - 222.5
		<b>400</b>	380 - 415	69.1 - 75.5		276.5 - 302.0	182.0 - 217.0
		480	440 - 480	55.1 - 60.1		220.5 - 240.6	168.1 - 200.0
		600	550 - 600	44.1 - 48.1		176.4 - 192.5	
DS-240 (LB-120 × 2)	240	208	200 - 220	160.1 - 176.2	4	640.6 - 704.6	221.9 - 268.5
		230	220 - 240	144.1 - 157.2		576.3 - 628.6	219.6 - 261.3
		<b>360</b>	360 - 380	96.1 - 101.4		384.3 - 405.7	239.6 - 267.0
		<b>400</b>	380 - 415	82.9 - 90.6		331.8 - 362.3	218.4 - 260.5
		480	440 - 480	66.2 - 72.2		264.6 - 288.7	201.7 - 240.0
		600	550 - 600	52.9 - 57.7		211.7 - 230.9	
DS-300 (LB-150 × 2)	300	208	200 - 220	200.2 - 220.2	4	800.7 - 880.8	277.4 - 335.6
		230	220 - 240	180.1 - 196.5		720.3 - 785.8	274.5 - 326.7
		<b>360</b>	360 - 380	120.1 - 126.8		480.4 - 507.1	299.6 - 333.8
		<b>400</b>	380 - 415	103.7 - 113.2		414.7 - 452.9	273.0 - 325.6
		480	440 - 480	82.7 - 90.2		330.8 - 360.8	252.1 - 300.0
		600	550 - 600	66.2 - 72.2		264.6 - 288.7	
DS-360 (LB-180 × 2)	360	208	200 - 220	240.2 - 264.2	4	960.8 - 1,057	332.8 - 402.7
		230	220 - 240	216.1 - 235.7		864.4 - 943.0	329.4 - 392.0
		<b>360</b>	360 - 380	144.1 - 152.1		576.5 - 608.5	359.5 - 400.5
		<b>400</b>	380 - 415	124.4 - 135.9		497.7 - 543.5	327.6 - 390.7
		480	440 - 480	99.2 - 108.3		396.9 - 433.0	302.5 - 360.0
		600	550 - 600	79.4 - 86.6		317.5 - 346.4	
DS-480 (LB-240 × 2)	480	380	360 - 380	172.7 - 182.3	4	690.9 - 729.3	430.8 - 480.0
		415	380 - 415	152.9 - 166.9		611.5 - 667.8	402.5 - 480.0
		480	440 - 480	132.3 - 144.3		529.2 - 577.4	403.3 - 480.0
		600	550 - 600	105.8 - 115.5		423.4 - 461.9	

\*208 & 230VAC Heating Elements (23), in a star configuration, are used for 360 & 400VAC 3Ø Boilers.

PART #	Description	QTY.
1	0012051 BOILER WATER INLET - 1/2" Y-STRAINER	1
2	0013998 1/2" WATER SOLENOID - BRASS	2
3	0013104 1/3 HP PUMP & MOTOR	2
4	0027136 1/2" CHECK VALVE - BRASS	4
30	0012031 1/2" UNION BALL VALVE - BRASS	2
31	0018060 1/2" UNION - BRASS SCH 40	4
32	0018064 1/2" STREET ELBOW - BRASS SCH 40	1
33	0018048 1/2" ELBOW - BRASS SCH 40	2
34	0018052 1/2" TEE - BRASS SCH 40	6
35	0018074 1/2" PLUG - BRASS SCH 40	5
36	0018071 1" X 1/2" HEX REDUCER BUSHING - BRASS	4
37	0018023 1/2" CLOSE NIPPLE - BRASS SCH 40	14
38	0018025 1/2" X 2" NIPPLE - BRASS SCH 40	2
39	0018026 1/2" X 2-1/2" NIPPLE - BRASS SCH 40	2
40	0018030 1/2" X 4-1/2" NIPPLE - BRASS SCH 40	2
41	0018140A 1/2" X 10" NIPPLE - BRASS SCH 40	1
42	0018141 1/2" X 12" NIPPLE - BRASS SCH 40	3



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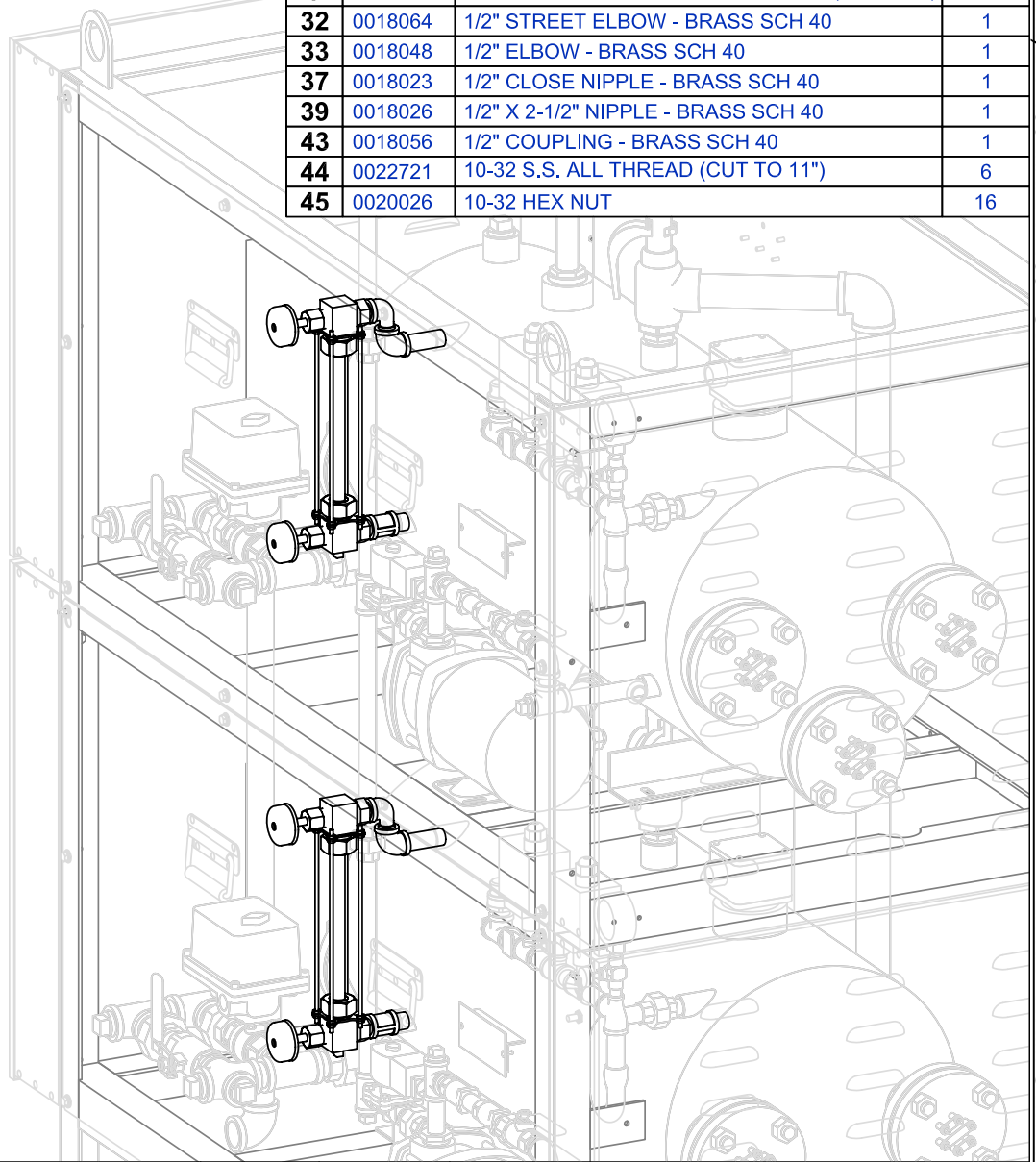
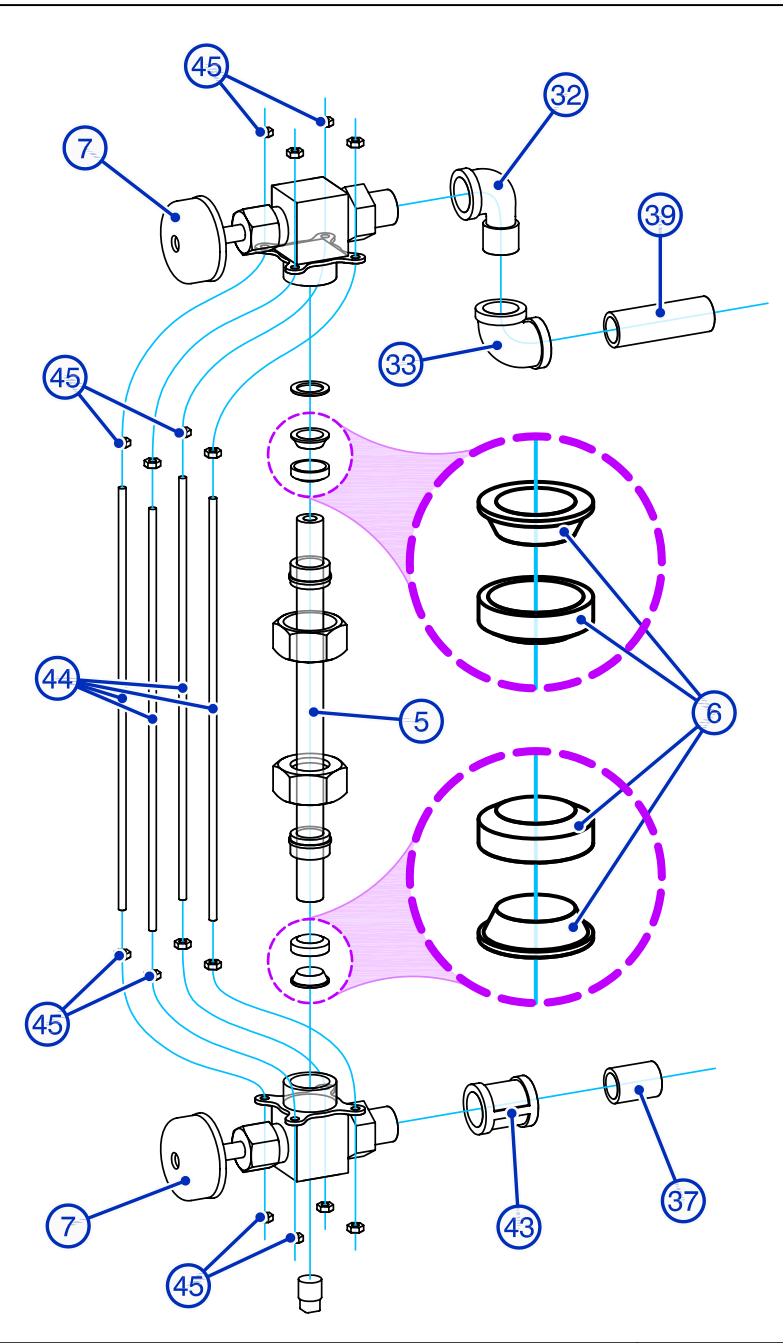
DWG. TITLE:  
**DOUBLE STACK PLUMBING ASSEMBLY - WATER INLET**

ENGINEER:	C.FERRARA	08-24-22
DRAWN BY:	C.FERRARA	08-24-22
APPROVED:	B.WEIGLE	08-24-22
DWG NO: -		REV: A

**Electro-*Steam*™ Generator Corp.**  
**50 Indel Ave, Rancocas, NJ. 08073**

MODEL UNIT: DS 200-480	SCALE: 1.0 : 4.9	SHEET: 01 of 07
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	PART #	Description	QTY.
5	0012008	9-1/2" RED LINE GLASS GAUGE TUBE	1
6	0016017B	BEVELED SIGHT GLASS SEAL KIT (4 PIECES)	1
7	0012012	1/2" SEISMIC SIGHT GLASS FIXTURE (SET OF 2)	1
32	0018064	1/2" STREET ELBOW - BRASS SCH 40	1
33	0018048	1/2" ELBOW - BRASS SCH 40	1
37	0018023	1/2" CLOSE NIPPLE - BRASS SCH 40	1
39	0018026	1/2" X 2-1/2" NIPPLE - BRASS SCH 40	1
43	0018056	1/2" COUPLING - BRASS SCH 40	1
44	0022721	10-32 S.S. ALL THREAD (CUT TO 11")	6
45	0020026	10-32 HEX NUT	16



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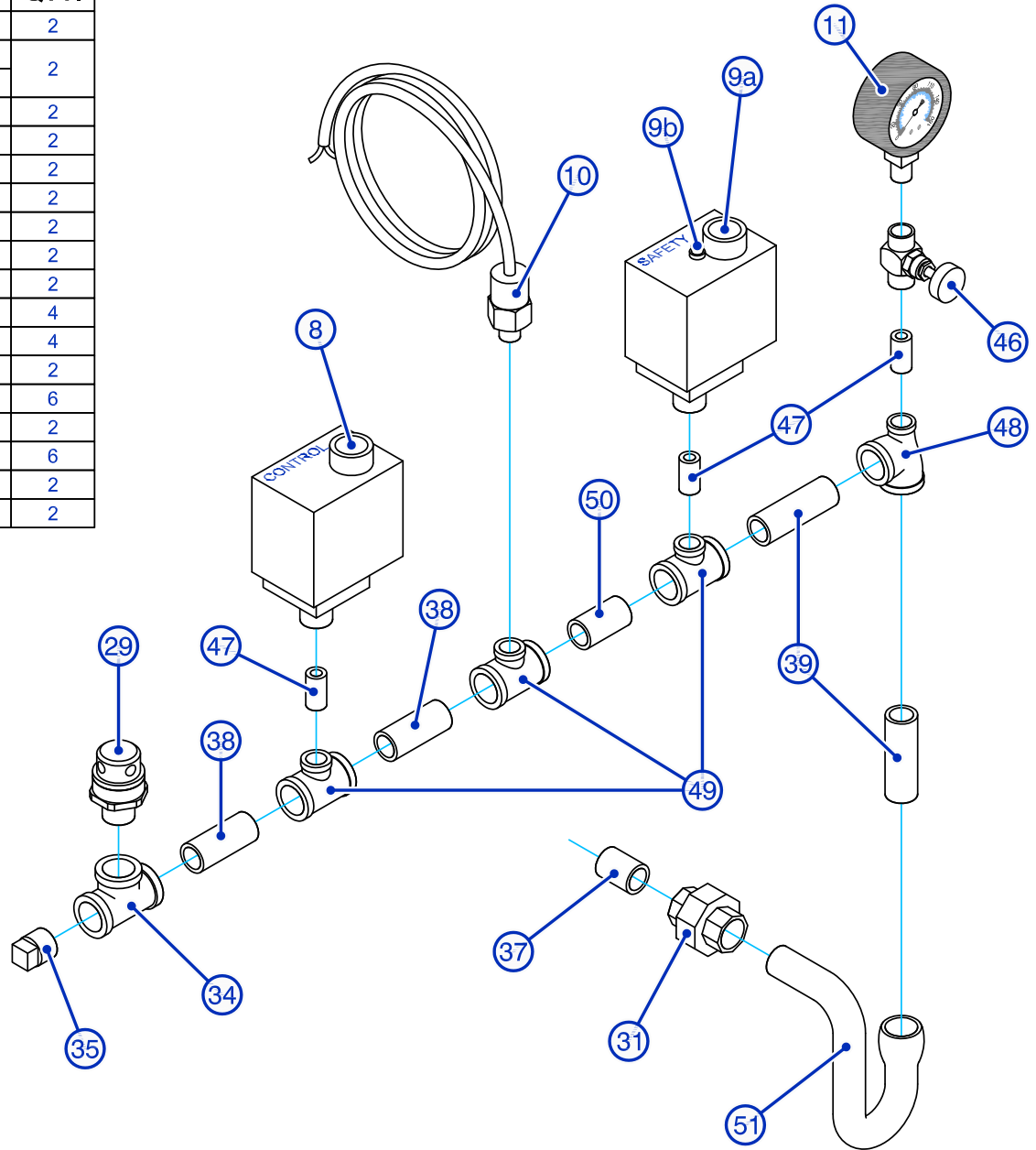
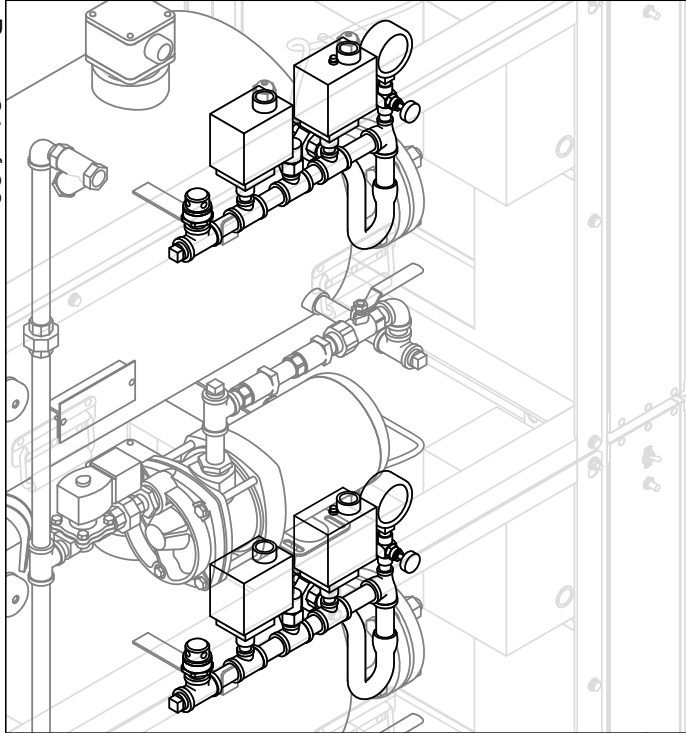
DWG. TITLE:  
**DOUBLE STACK PLUMBING ASSEMBLY - SIGHT GLASS**

ENGINEER: C.FERRARA 09-08-22  
 DRAWN BY: C.FERRARA 09-08-22  
 APPROVED: B.WEIGLE 09-08-22  
 DWG NO: - REV: A

**Electro-Steam™ Generator Corp.**  
**50 Indel Ave, Rancocas, NJ. 08073**

MODEL UNIT: DS 200-480 SCALE: 1.0 : 4.1 SHEET: 02 of 07

	PART #	Description	QTY.
8	0013076B	0-90 PSI "CONTROL" PRESSURE SWITCH	2
9a	0013075A	0-90 PSI "SAFETY" PRESSURE SWITCH W/ RESET	2
9b		HIGH PRESSURE RESET (PART OF "SAFETY")	
10	0013078	5 PSI (NC) PRESS. SWITCH (FOR MAFD)	2
11	0012023	0-160 PSI PRESSURE GAUGE	2
29	0012030	VACUUM RELIEF VALVE (FOR MAFD)	2
31	0018060	1/2" UNION - BRASS SCH 40	2
34	0018052	1/2" TEE - BRASS SCH 40	2
35	0018074	1/2" PLUG - BRASS SCH 40	2
37	0018023	1/2" CLOSE NIPPLE - BRASS SCH 40	2
38	0018025	1/2" X 2" NIPPLE - BRASS SCH 40	4
39	0018026	1/2" X 2-1/2" NIPPLE - BRASS SCH 40	4
46	0012037	1/4" NEEDLE VALVE - BRASS	2
47	0018005	1/4" CLOSE NIPPLE - BRASS SCH 40	6
48	0018182	1/2" X 1/4" X 1/2" TEE - BRASS SCH 40	2
49	0018107A	1/2" X 1/2" X 1/4" TEE - BRASS SCH 40	6
50	0018024	1/2" X 1-1/2" NIPPLE - BRASS SCH 40	2
51	0018170	1/2" U-TUBE 90° NIPPLE - BRASS SCH 40	2



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DWG. TITLE: DOUBLE STACK  
PLUMBING ASSEMBLY -  
PRESSURE CONTROLS

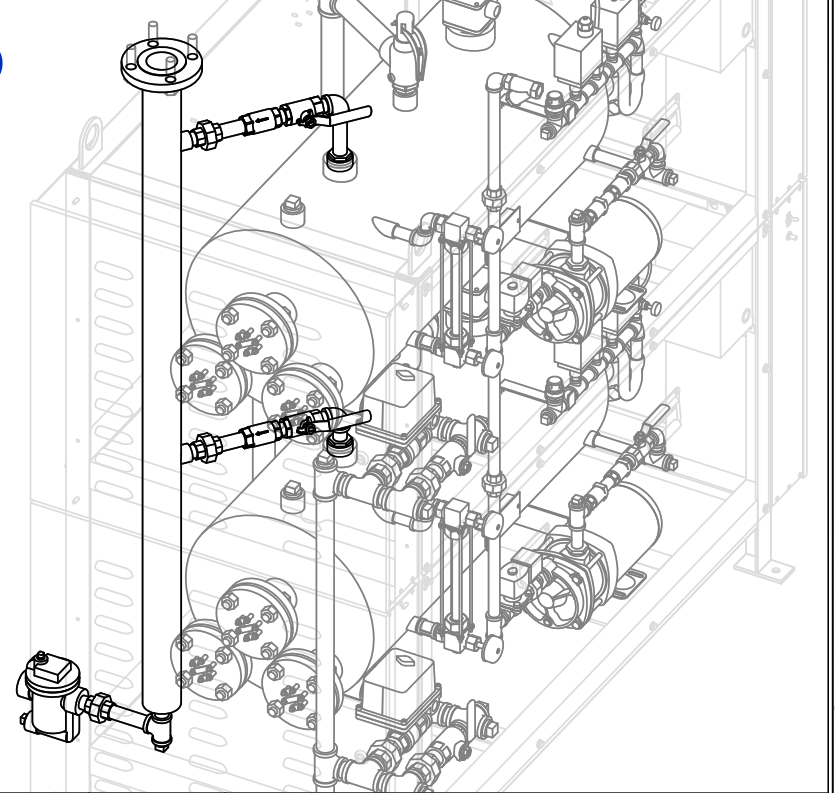
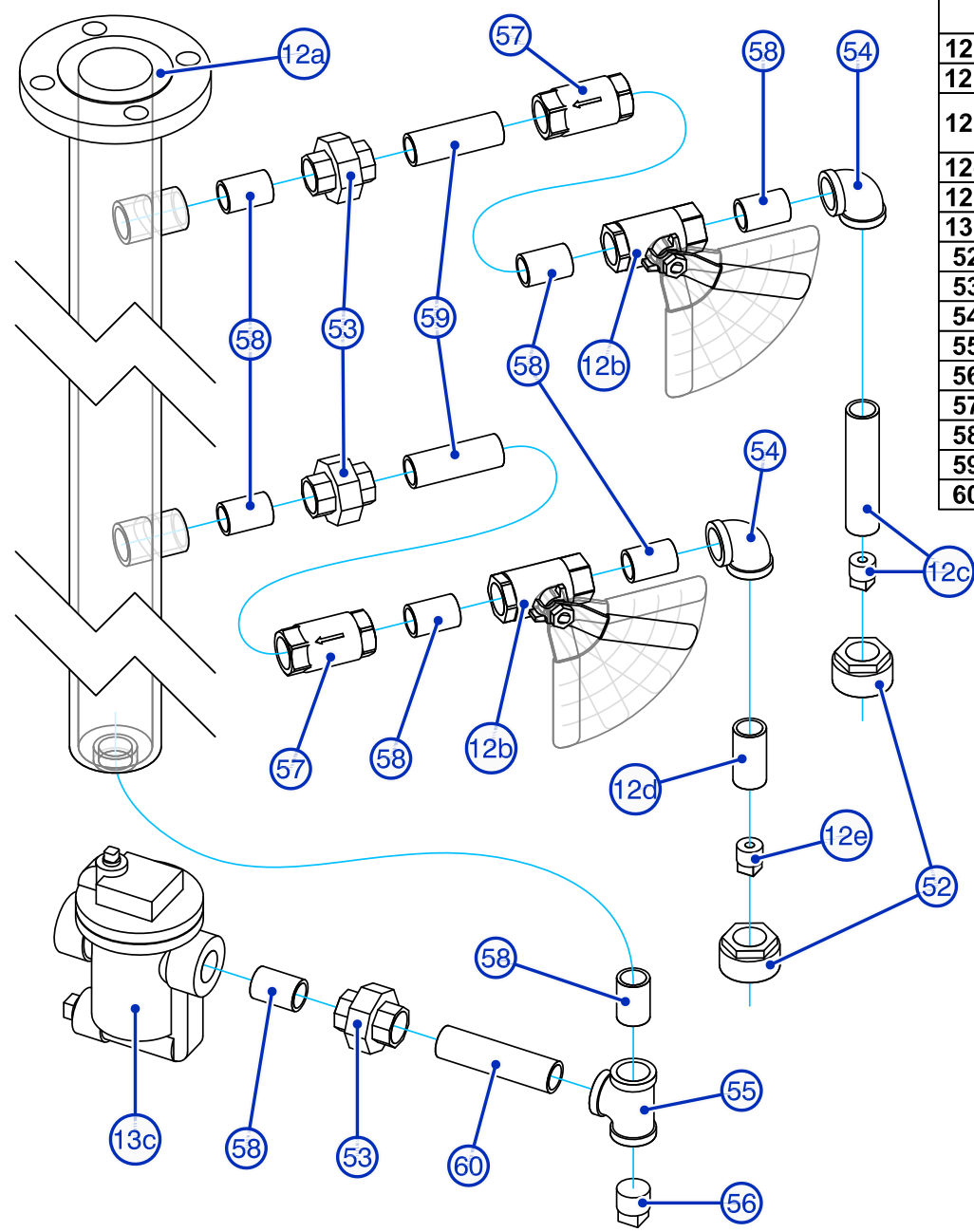
ENGINEER:	C.FERRARA	08-24-22
DRAWN BY:	C.FERRARA	08-24-22
APPROVED:	B.WEIGLE	08-24-22
DWG NO: -	REV: A	MODEL UNIT: DS 200-480

**Electro-*Steam*™ Generator Corp.**  
50 Indel Ave, Rancocas, NJ. 08073

SCALE: 1.0 : 4.1 | SHEET: 03 of 07



	PART #	Description	QTY.
12a	-	STEAM OUTLET - 6" 150PSI 4-HOLE FLANGE	1
12b	0012019	3/4" BALL VALVE - BRASS (STEAM OUTLET VALVE)	2
12c	0018000B	3/4" X 4-1/2" SCH 80 BRASS NIPPLE TAPPED 1/2" NPT & 1/2" PLUG (ORIFICE HOLE DRILLED THROUGH)	1
12d	0018532	3/4" X 2" SCH 80 BRASS NIPPLE TAPPED 1/2" NPT	1
12e	0018074	1/2" PLUG (ORIFICE HOLE DRILLED THROUGH)	1
13c	-	3/4" STEAM TRAP - INVERTED BUCKET (NOT INCLUDED)	1
52	0018099	1-1/2" X 3/4" HEX REDUCER BUSHING - BRASS	2
53	0018061	3/4" UNION - BRASS SCH 40	3
54	0018126	3/4" ELBOW - BRASS SCH 40	2
55	0018053	3/4" TEE - BRASS SCH 40	1
56	0018119	3/4" PLUG - BRASS SCH 40	1
57	0012047	3/4" CHECK VALVE - BRASS	2
58	0018034	3/4" CLOSE NIPPLE - BRASS SCH 40	8
59	0018038	3/4" X 3" NIPPLE - BRASS SCH 40	2
60	0018040	3/4" X 4" NIPPLE - BRASS SCH 40	1

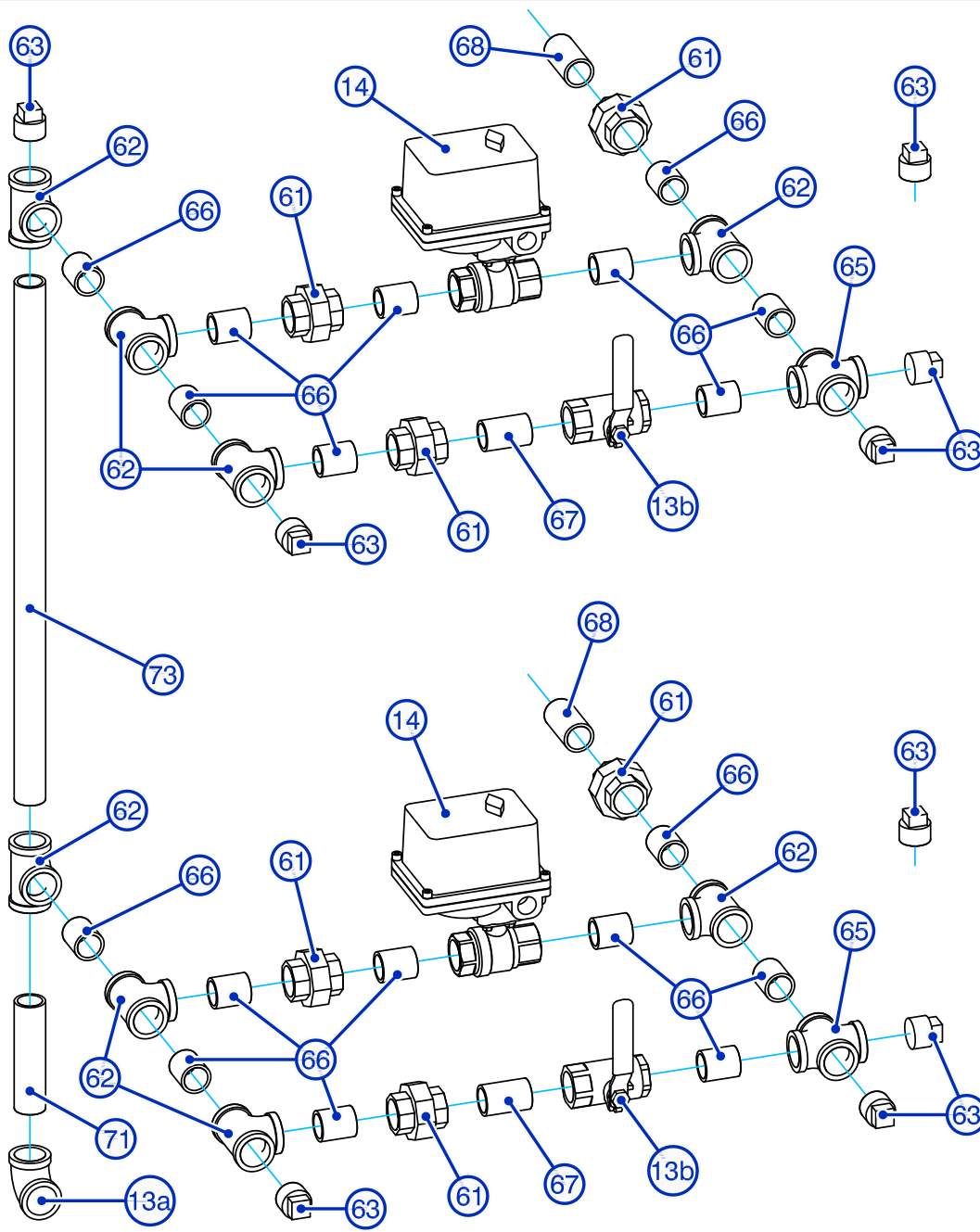


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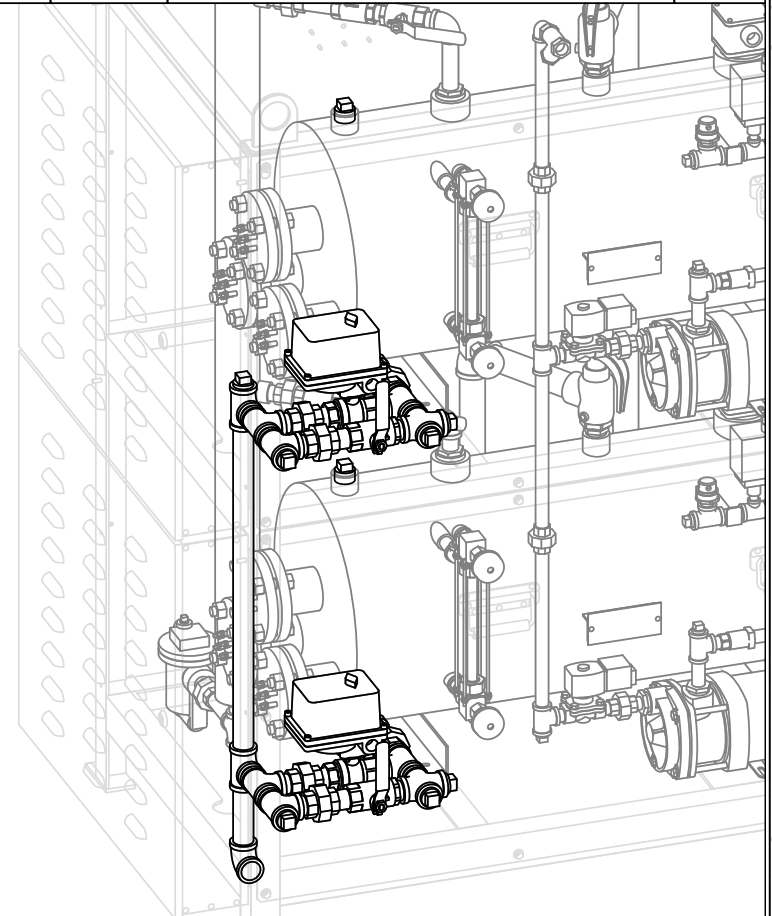
DWG. TITLE:  
**DOUBLE STACK PLUMBING ASSEMBLY - STEAM OUTLET**

ENGINEER: C.FERRARA 09-12-22  
 DRAWN BY: C.FERRARA 09-12-22  
 APPROVED: B.WEIGLE 09-12-22  
 DWG NO: - REV: B

**Electro-Steam™ Generator Corp.**  
 50 Indel Ave, Rancocas, NJ. 08073  
 MODEL UNIT: DS 200-480 SCALE: 1.0 : 5.2 SHEET: 04 of 07



	PART #	Description	QTY.
13a	0012088	1" BALL VALVE - BRASS (DRAIN VALVE)	2
13b	0018180	1" ELBOW - BRASS SCH 40	1
14	0013997	MOTORIZED AUTO-FLUSH & DRAIN - 1" NPT	2
61	0018116	1" UNION - BRASS SCH 40	6
62	0018054	1" TEE - BRASS SCH 40	8
63	0018607	1" PLUG - BRASS SCH 40	9
65	0018610	1" CROSS - BRASS SCH 40	2
66	0018085	1" CLOSE NIPPLE - BRASS SCH 40	18
67	0018086A	1" X 2" NIPPLE - BRASS SCH 40	2
68	0018086	1" X 2-1/2" NIPPLE - BRASS SCH 40	2
71	0018614	1" X 5" NIPPLE - BRASS SCH 40	1
73	0018171A	1" BRASS PIPE SCH 40 (CUT TO 24")	1 (24")



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DWG. TITLE:  
**DOUBLE STACK PLUMBING ASSEMBLY - DRAIN**

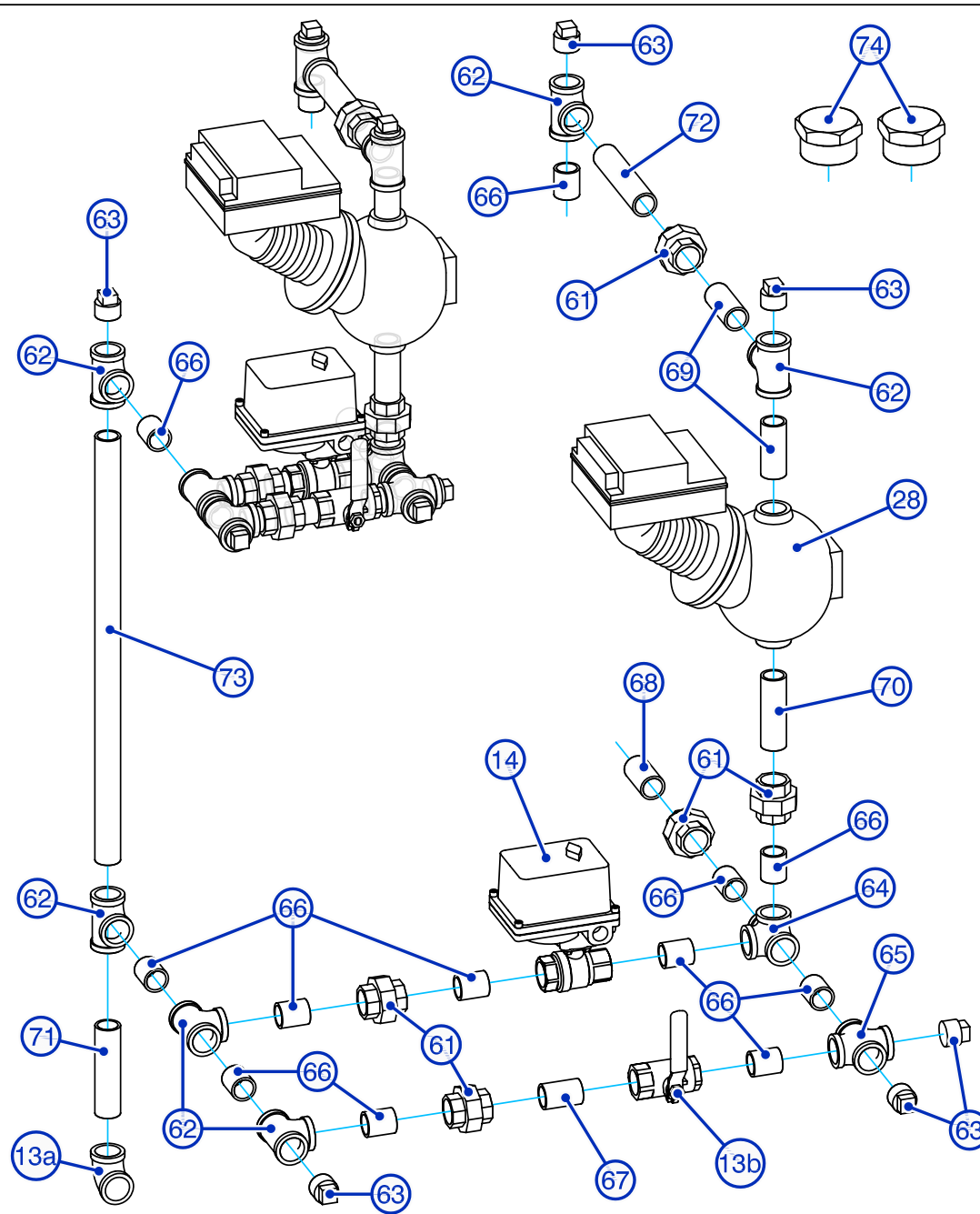
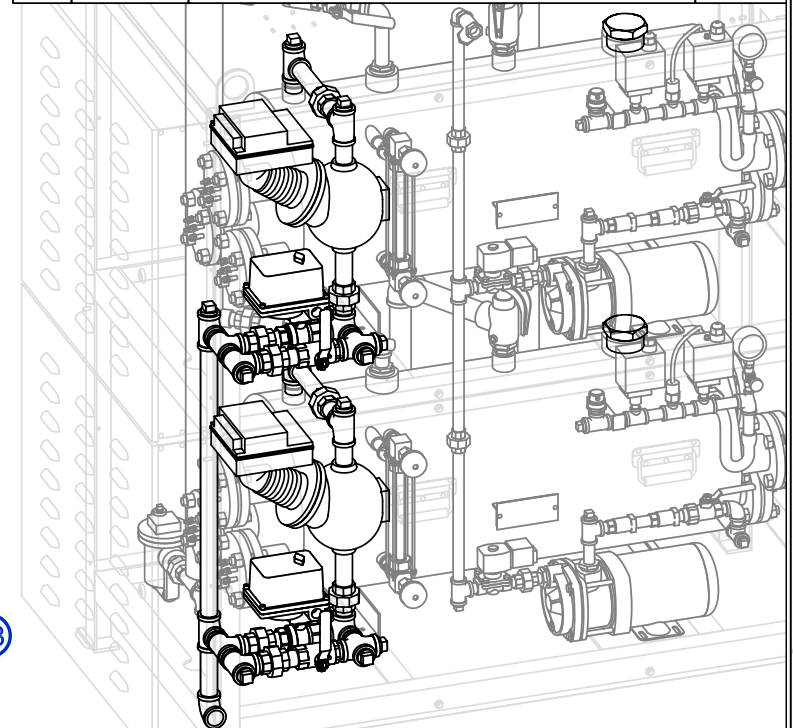
ENGINEER: C.FERRARA 09-12-22  
 DRAWN BY: C.FERRARA 09-12-22  
 APPROVED: B.WEIGLE 09-12-22  
 DWG NO: -



**Electro-Steam™ Generator Corp.**  
 50 Indel Ave, Rancocas, NJ. 08073

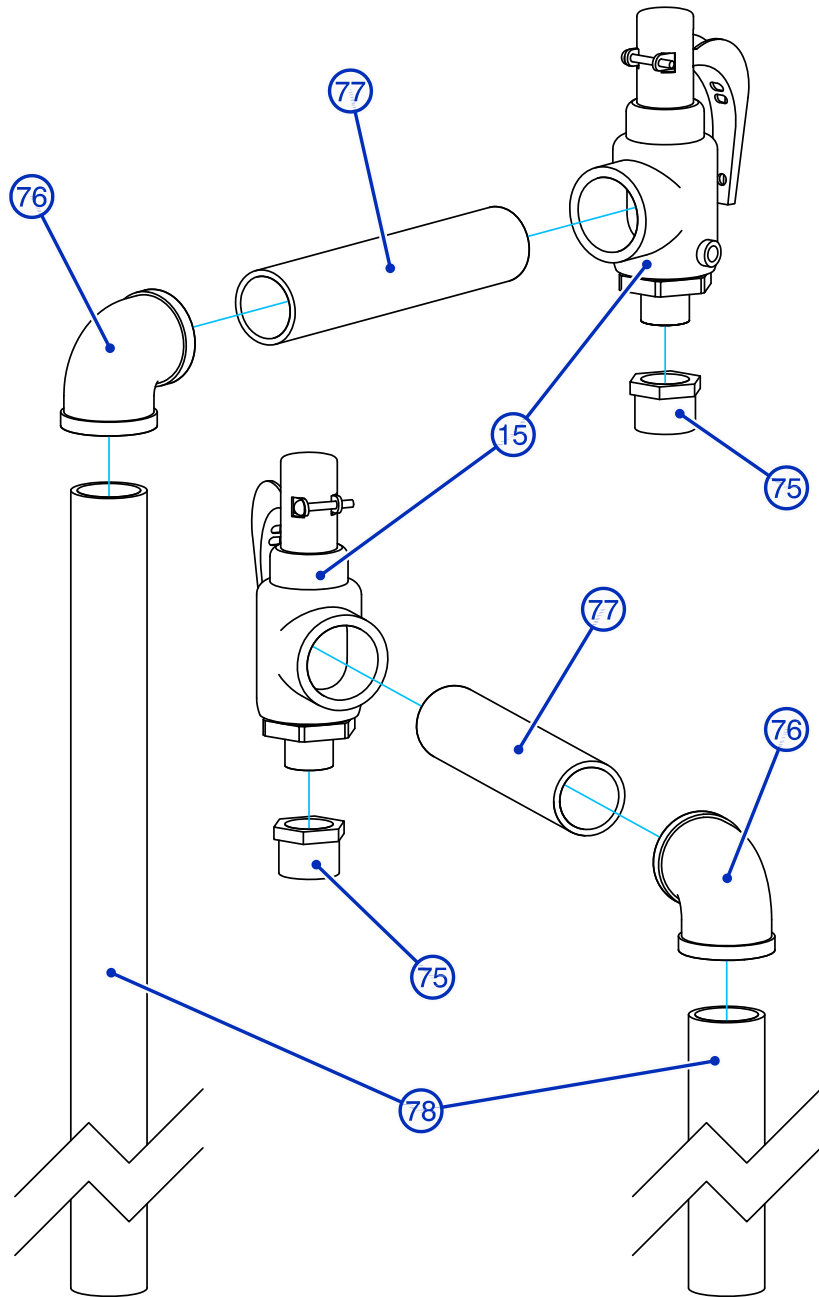
MODEL UNIT: DS 200-480 | SCALE: 1.0 : 6.8 | SHEET: 05 of 07

	PART #	Description	QTY.
13a	0018180	1" ELBOW - BRASS SCH 40	1
13b	0012088	1" BALL VALVE - BRASS (DRAIN VALVE)	2
14	0013997	MOTORIZED AUTO-FLUSH & DRAIN - 1" NPT	2
28	0016001A	MCDONNELL MILLER FLOAT	2
61	0018116	1" UNION - BRASS SCH 40	10
62	0018054	1" TEE - BRASS SCH 40	10
63	0018607	1" PLUG - BRASS SCH 40	11
64	0018567	1" SIDE-OUT TEE - BLACK SCH 40	2
65	0018610	1" CROSS - BRASS SCH 40	2
66	0018085	1" CLOSE NIPPLE - BRASS SCH 40	22
67	0018086A	1" X 2" NIPPLE - BRASS SCH 40	2
68	0018086	1" X 2-1/2" NIPPLE - BRASS SCH 40	2
69	0018083	1" X 3" NIPPLE - BRASS SCH 40	4
70	0018084	1" X 4" NIPPLE - BRASS SCH 40	2
71	0018614	1" X 5" NIPPLE - BRASS SCH 40	1
72	0018615	1" X 6" NIPPLE - BRASS SCH 40	2
73	0018171A	1" BRASS PIPE SCH 40 (CUT TO 24")	1 (24")
74	0015207	2-1/2" PLUG - HEX HEAD SOLID BLACK STEEL	2

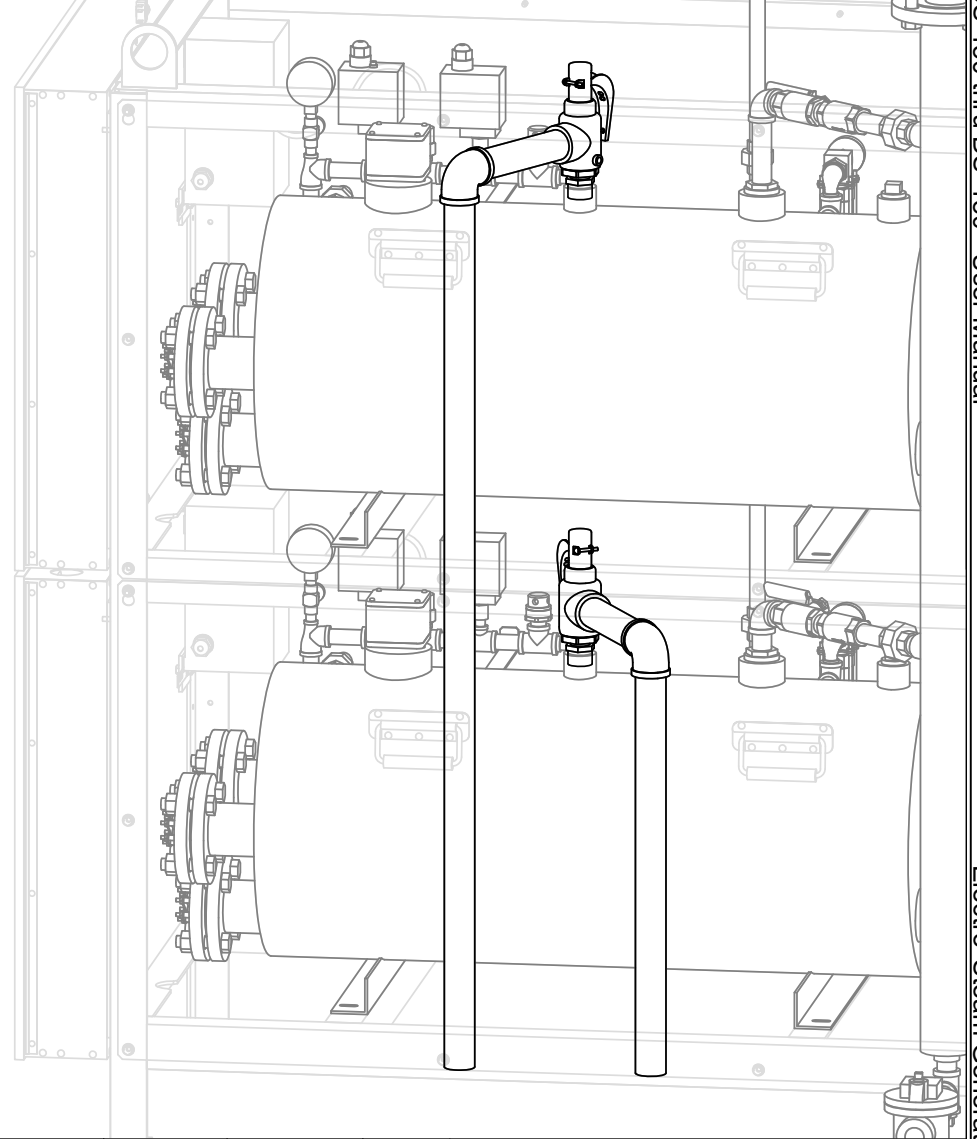


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	DOUBLE STACK PLUMBING ASSEMBLY - DRAIN & FLOAT		DRAWN BY:	C.FERRARA	09-12-22
			APPROVED:	B.WEIGLE	09-12-22
			DWG NO: -	REV: A	MODEL UNIT: DS 200-480
					SHEET: 06 of 07





	PART #	Description	QTY.
15	0012005	3/4" X 1-1/4" SAFETY VALVE - 100 PSI - 851 LB/HR	2
75	0018099	1-1/2" X 3/4" HEX REDUCER BUSHING - BRASS	2
76	0018172	1-1/4" ELBOW - BRASS SCH 40	2
77	0018171C	1-1/4" BLACK PIPE SCH 40 (CUT TO 8")	2 (16")
78	0018171C	1-1/4" BLACK PIPE SCH 40 (CUT TO 49" & 23")	2 (72")



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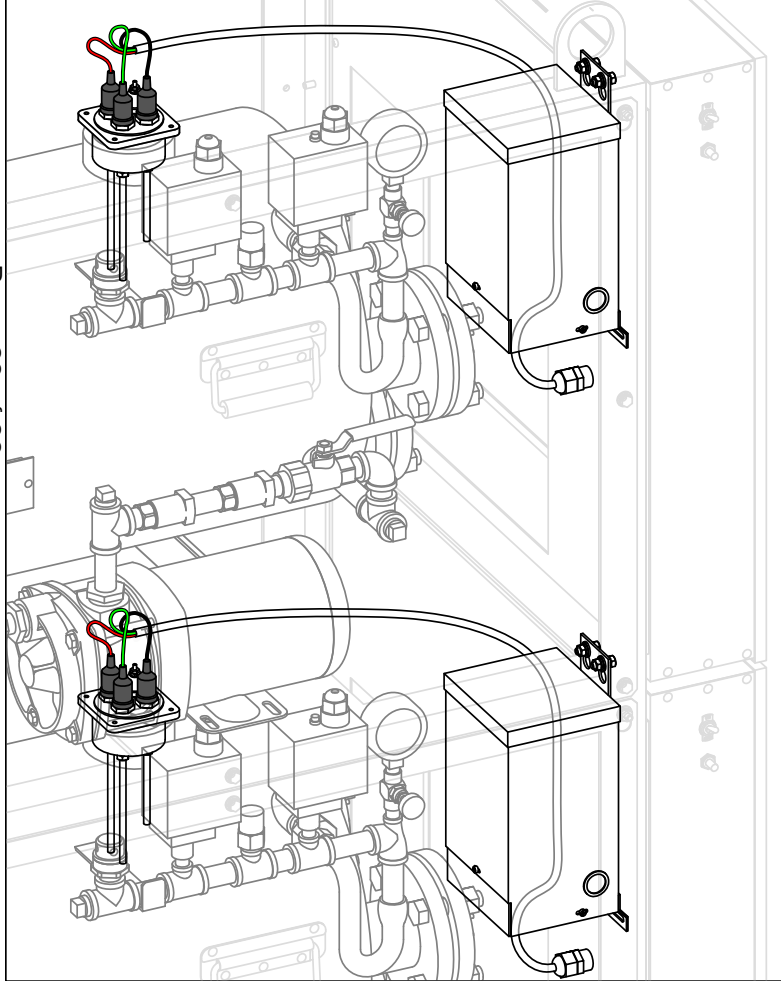
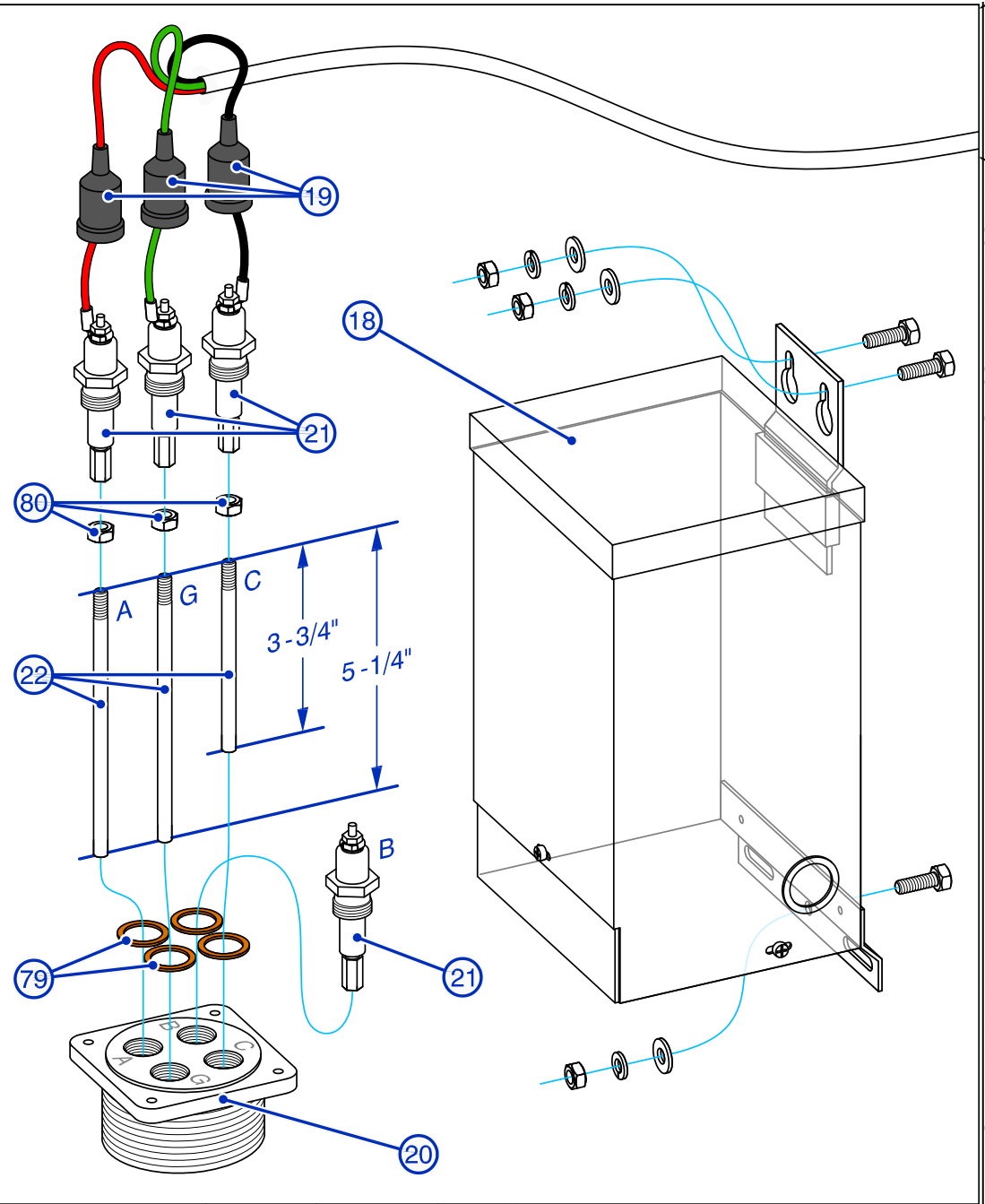
DWG. TITLE:  
**DOUBLE STACK PLUMBING ASSEMBLY - SAFETY VALVE**

DRAWN BY:	C.FERRARA	09-12-22
APPROVED:	B.WEIGLE	09-12-22
DWG NO: -	REV: A	

**Electro-*Steam*™ Generator Corp.**  
**50 Indel Ave, Rancocas, NJ. 08073**

MODEL UNIT: DS 200-480	SCALE: 1.0 : 3.8	SHEET: 07 of 07
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PART #	Description	QTY.
18	0013060 TRANSFORMER FOR 120V CONTROLS (1 KVA 190-480V PRIMARY - 120/240V SEC.)	2
19	0013176 RUBBER BOOT FOR PROBE PLUGS	6
20	0013192 PROBE HOLDER ASSEMBLY (INCLUDES FOUR PROBE PLUGS W/ GASKETS)	2
21	0013087 PROBE PLUG W/ COPPER RING GASKET	8
22	0015070C 5-1/2" S.S. PROBE RODS CUT TO SIZE (A = 5-1/4", C = 3-3/4", & D/G = 5-1/4")	6
79	0013976 COPPER RING GASKET FOR PROBE PLUG	8
80	0020019B 1/4"-20 STAINLESS STEEL NUT	6



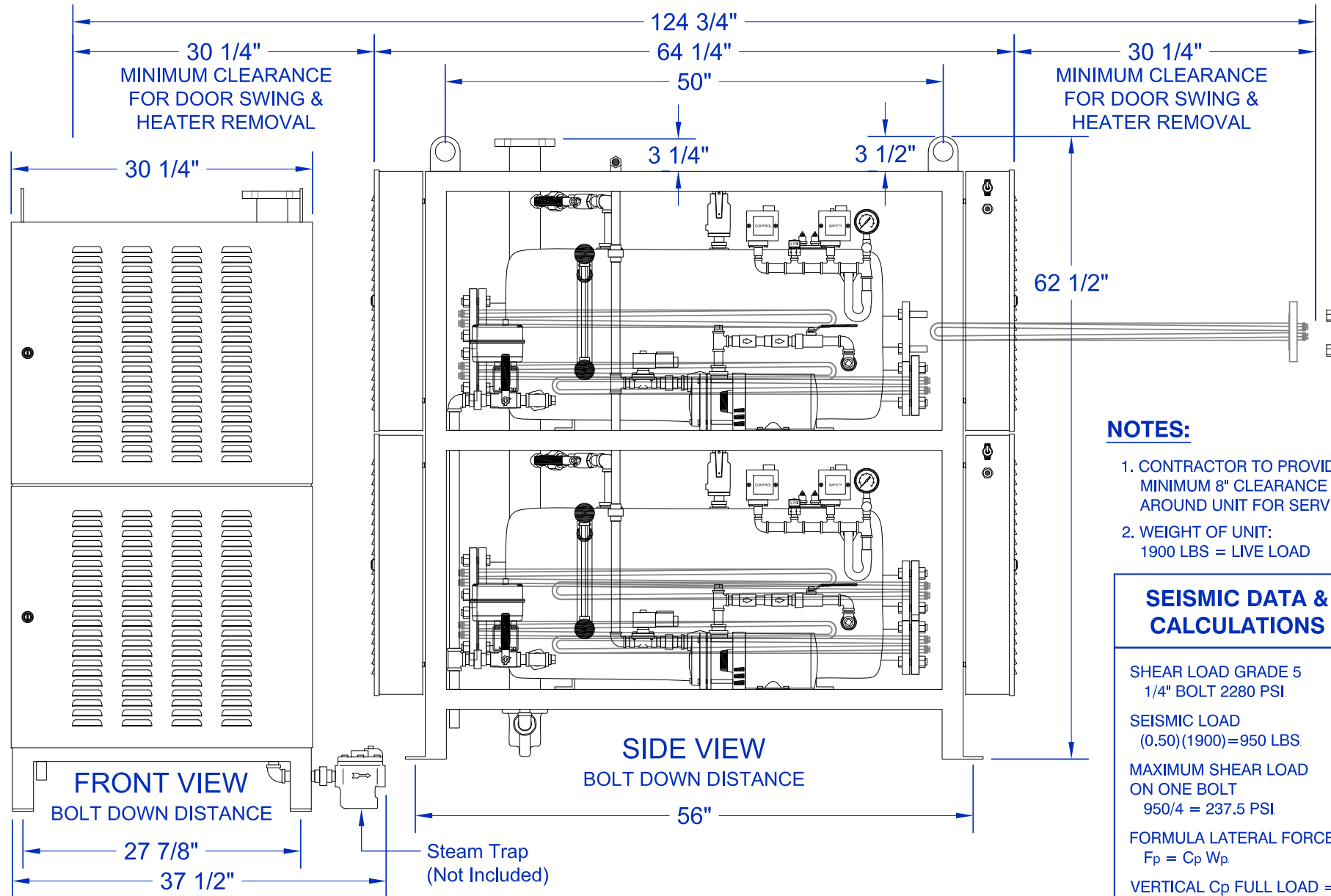
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DWG. TITLE: DOUBLE STACK  
ELECTRICAL ASSEMBLY -  
PROBES & TRANSFORMER

ENGINEER: C.FERRARA 08-24-22  
DRAWN BY: C.FERRARA 08-24-22  
APPROVED: B.WEIGLE 08-24-22  
DWG NO: - REV: A

**Electro-Steam™ Generator Corp.**  
50 Indel Ave, Rancocas, NJ. 08073  
MODEL UNIT: DS 200-480 SCALE: 1.0 : 2.8 SHEET: 01 of 01

# 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  $C_p$  FULL LOAD = 1

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DWG. TITLE:  
LB 80-240 INSTALLATION DATA  
& DIMENSIONAL DRAWINGS

ENGINEER:	C.FERRARA	03-09-22
DRAWN BY:	C.FERRARA	03-09-22
APPROVED:	B.WEIGLE	03-09-22

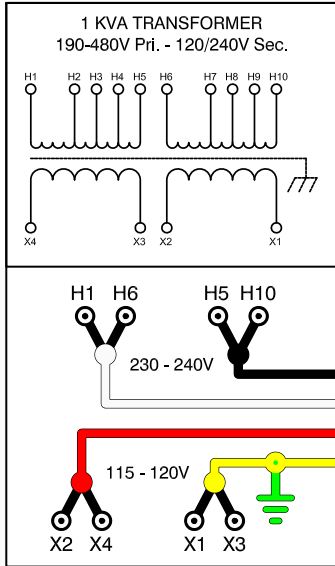
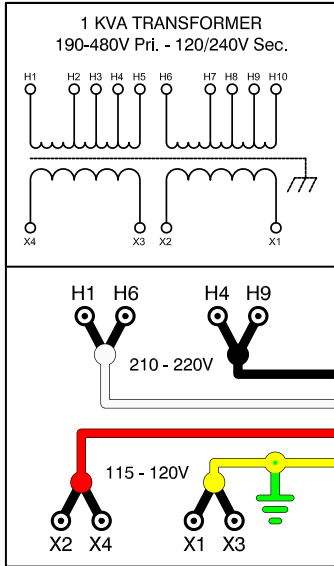
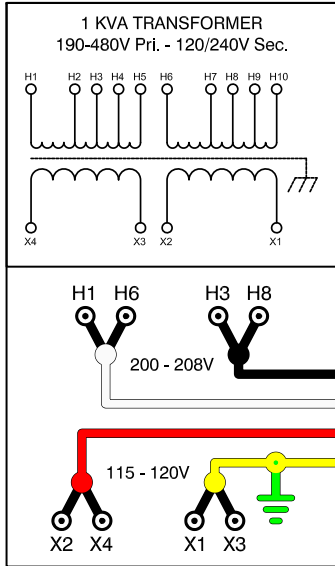


**Electro-Steam™ Generator Corp.**  
50 Indel Ave, Rancocas, NJ. 08073

### 200-208V

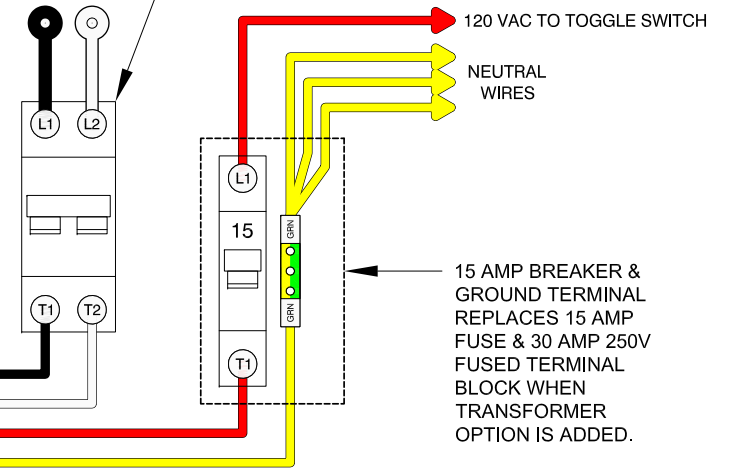
### 210-220V

### 230-240V



HIGH VOLTAGE SUPPLY

- 200-240 VAC - 10 AMP 480 VAC 2-POLE BREAKER
- 360-415 VAC - 8 AMP 480 VAC 2-POLE BREAKER
- 440-480 VAC - 6 AMP 480 VAC 2-POLE BREAKER
- 550-600 VAC - 4 AMP 600 VAC 2-POLE BREAKER



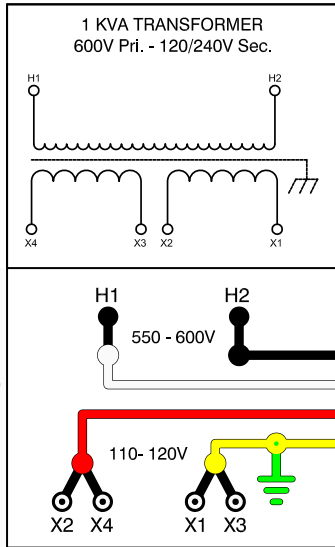
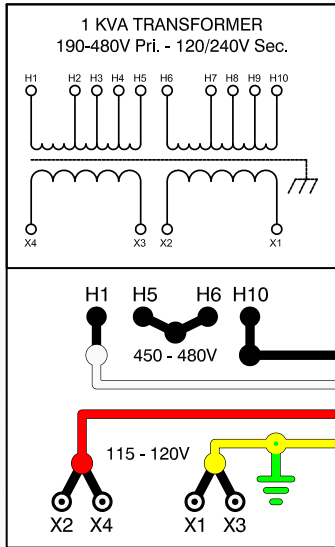
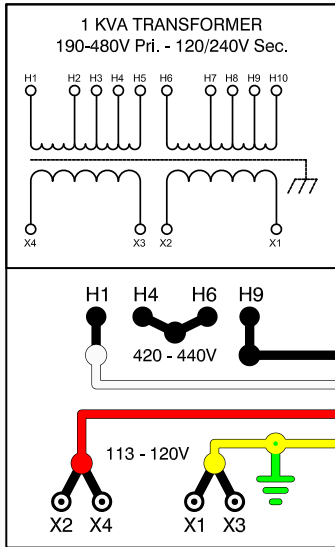
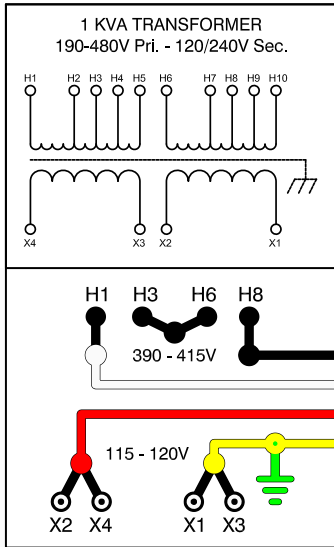
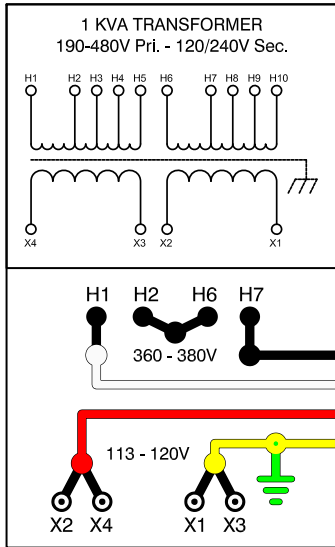
### 360-380V

### 390-415V

### 420-440V

### 450-480V

### 550-600V



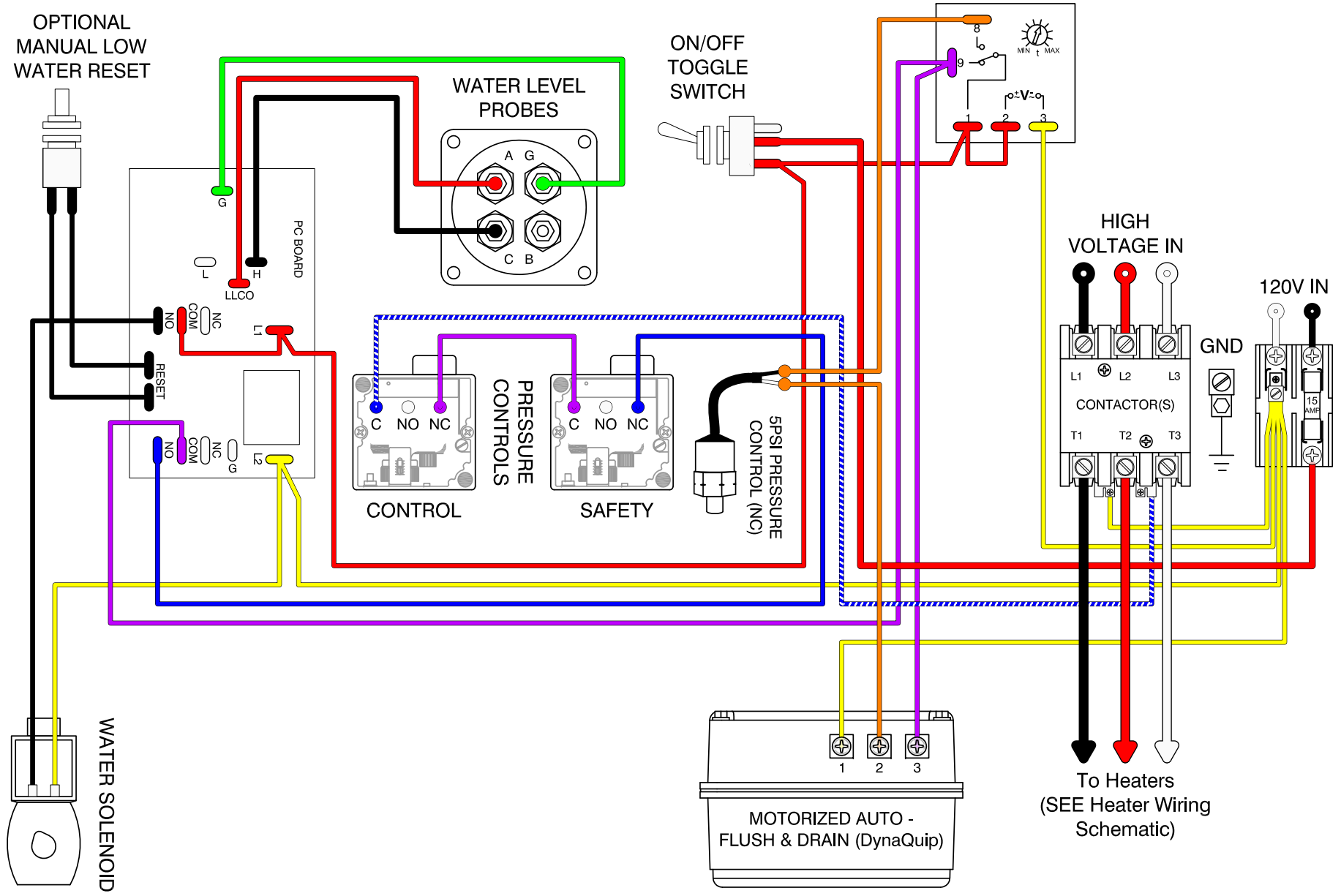
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DWG. TITLE: SCHEMATIC - TRANSFORMER OPTION  
CUSTOMER: -

MODEL UNIT: 1 KVA TRANS  
ENGINEER: C.FERRARA 10-21-15  
DRAWN BY: C.FERRARA 10-21-15  
APPROVED: B.WEIGLE 10-21-15

ELECTRO-STEAM GENERATOR CORP.  
50 INDEL AVENUE, RANCOCAS, NJ. 08073  
REV: A SCALE: N/A SHEET: 3 OF 4



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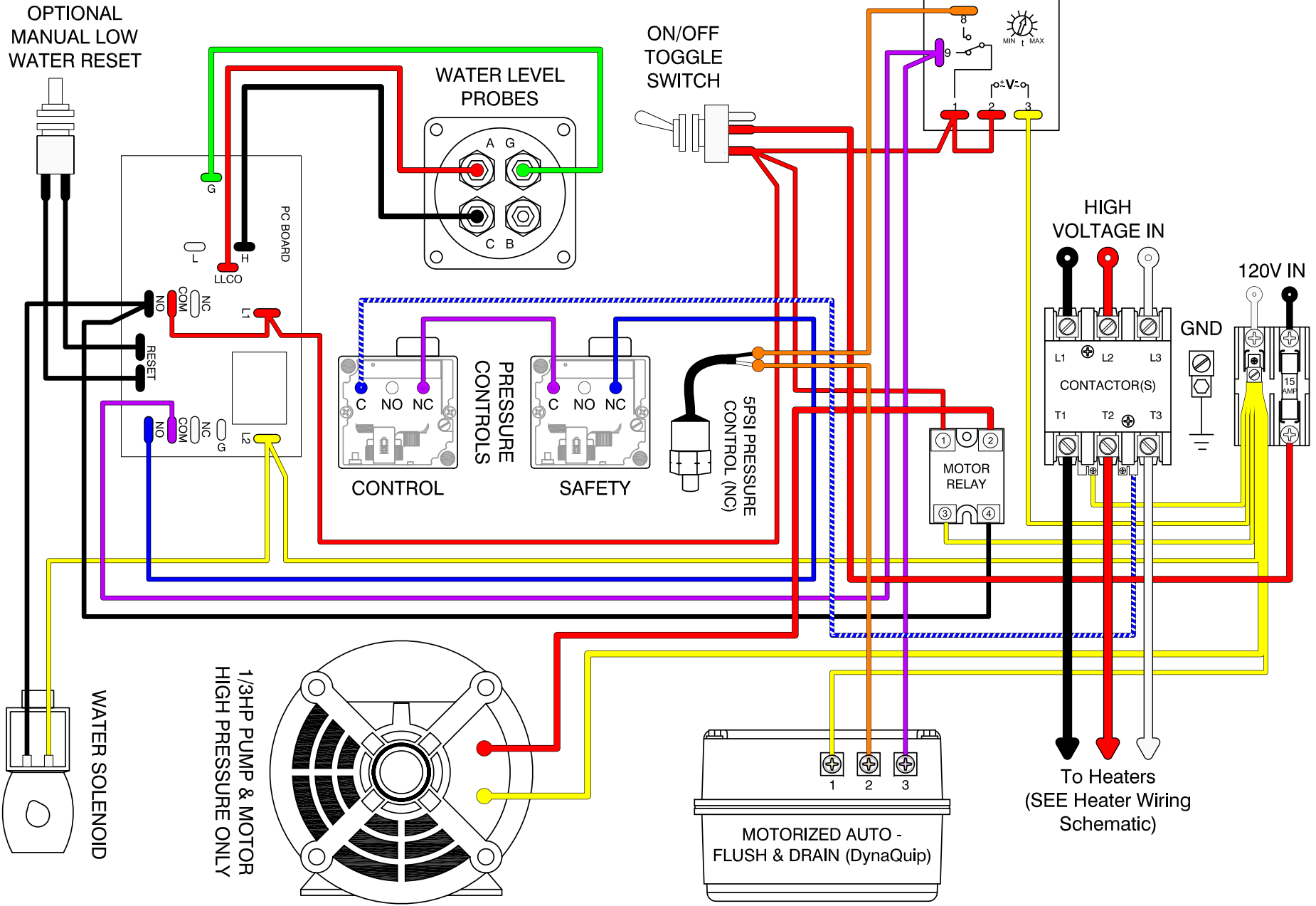
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DWG. TITLE: SCHEMATIC - LB 10-180 (L)(MAFD) CONTROL WIRING  
 CUSTOMER: -

MODEL UNIT: LB 10-180  
 ENGINEER: C.FERRARA 06-19-20  
 DRAWN BY: C.FERRARA 06-19-20  
 APPROVED: B.WEIGLE 06-19-20

ELECTRO-STEAM GENERATOR CORP.  
 50 INDEL AVENUE, RANCOCAS, NJ. 08073  
 DWG NO: -  
 REV: C SCALE: N/A SHEET: 2 OF 4





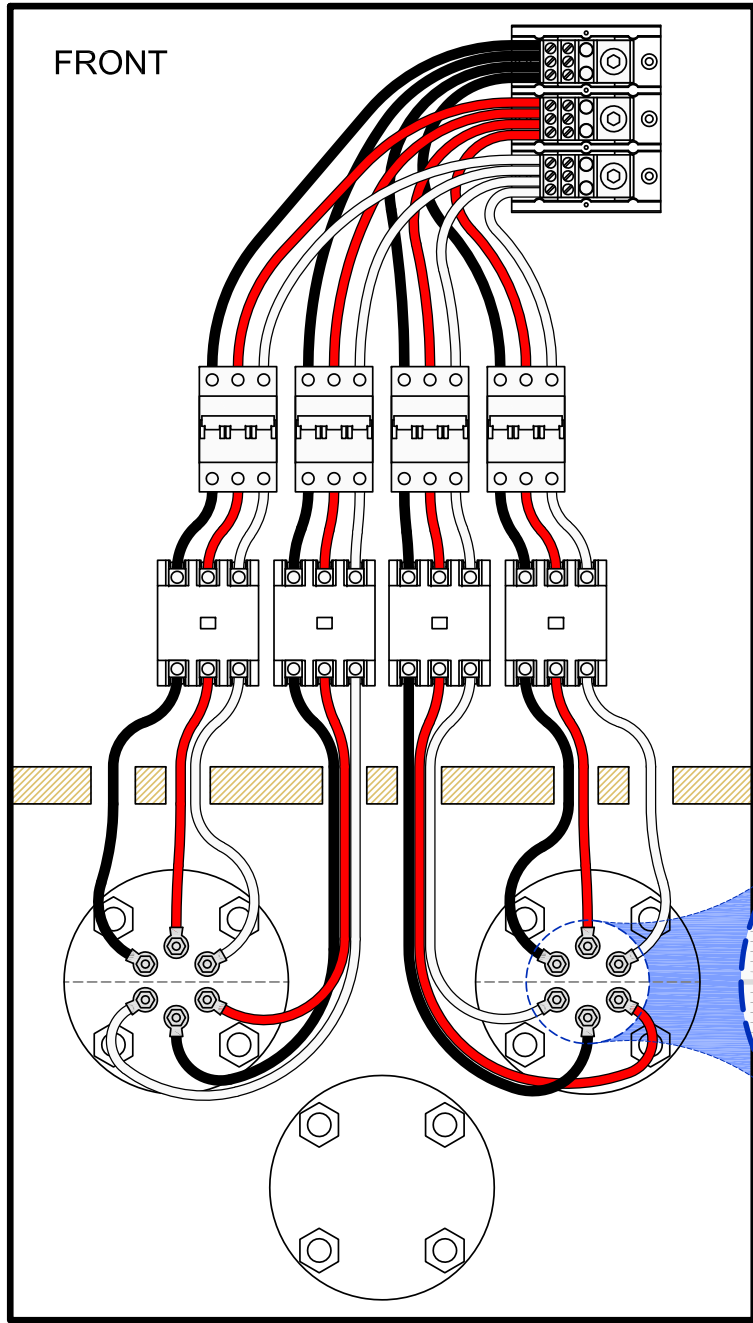
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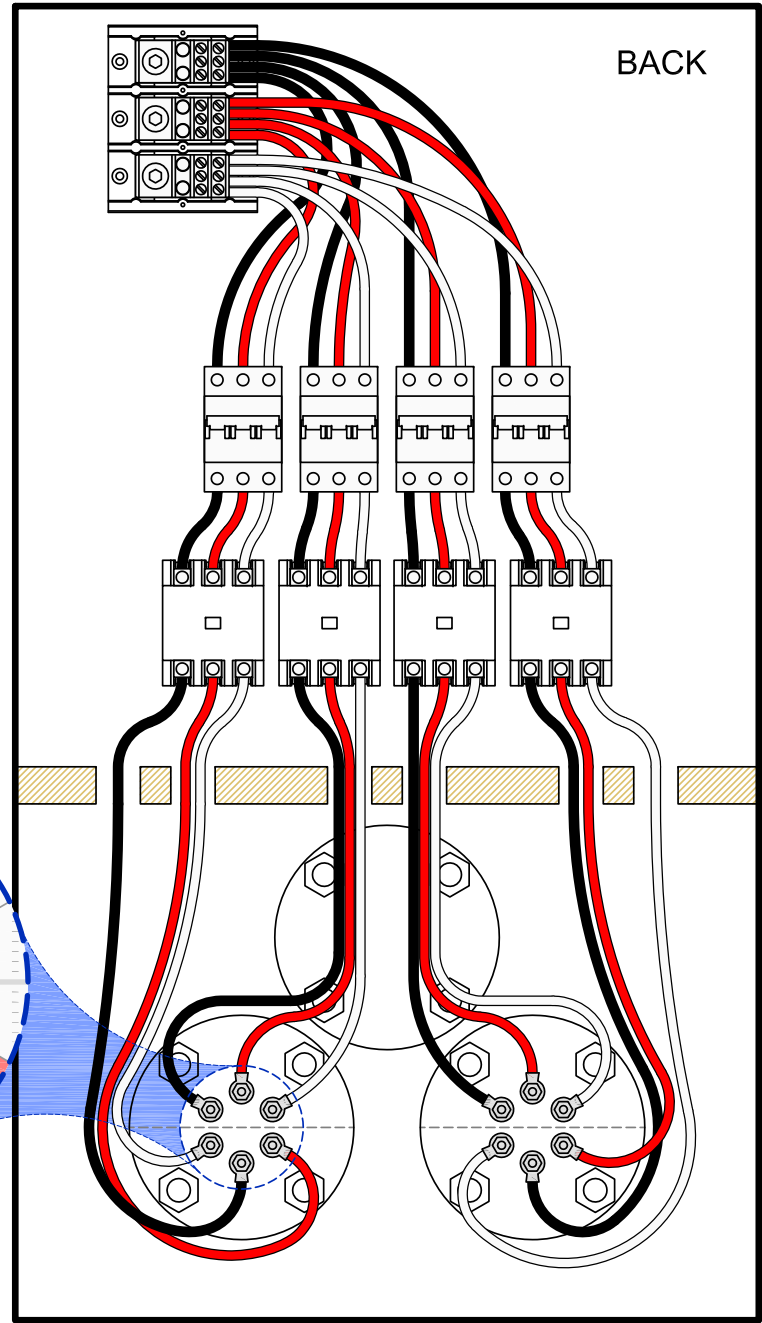
DWG. TITLE:	SCHEMATIC - LB 10-180 (H)(MAFD) CONTROL WIRING	
CUSTOMER:	-	

MODEL UNIT:	LB 10-180	
ENGINEER:	C.FERRARA	06-19-20
DRAWN BY:	C.FERRARA	06-19-20
APPROVED:	B.WEIGLE	06-19-20

	ELECTRO-STEAM GENERATOR CORP.	
	50 INDEL AVENUE, RANCOCAS, NJ. 08073	
DWG NO:	-	REV: C
SCALE:	N/A	SHEET: 4 OF 4



100-120 KW  
208-240 VAC 3Ø



HEATER COILS  
MUST BE ORIENTED  
VERTICALLY FROM  
TOP TO BOTTOM.

THIS DRAWING IS LOANED BY THE ELECTRO-STEAM GENERATOR CORPORATION TO THE CUSTOMER OR USER AS A GENERAL DESCRIPTION OF THE EQUIPMENT AND IS TO BE USED FOR THE PROPER INSTALLATION AND OPERATION OF THIS EQUIPMENT. THIS DRAWING MAY NOT BE COPIED IN WHOLE OR IN PART NOR CAN IT BE USED FOR THE MANUFACTURE OF ANY EQUIPMENT WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE ELECTRO-STEAM GENERATOR CORPORATION.

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DWG. TITLE: SCHEMATIC - HEATER WIRING  
LB 100-120 (208-240 VAC 3Ø)

CUSTOMER: -

MODEL UNIT: LB 100-120

ENGINEER: C.FERRARA 05-13-16

DRAWN BY: C.FERRARA 05-13-16

APPROVED: B.WEIGLE 05-13-16



ELECTRO-STEAM GENERATOR CORP.  
50 INDEL AVENUE, RANCOCAS, NJ. 08073

DWG

NO:

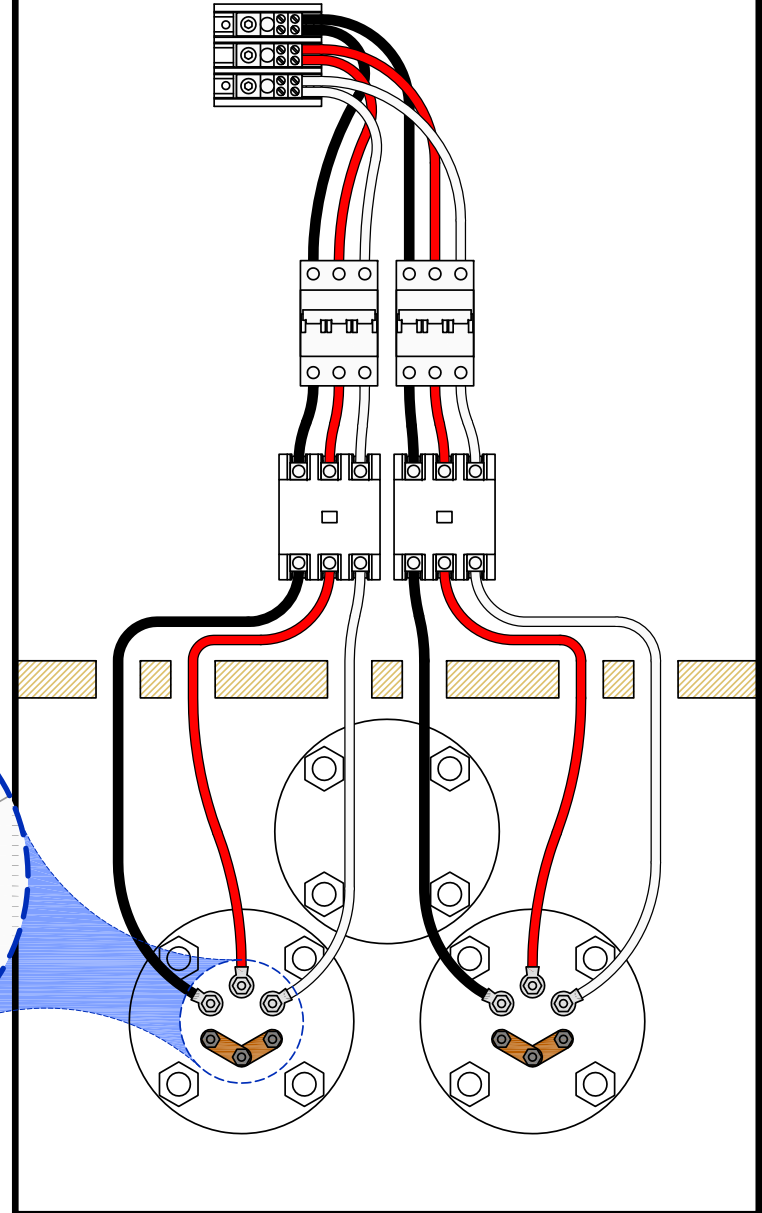
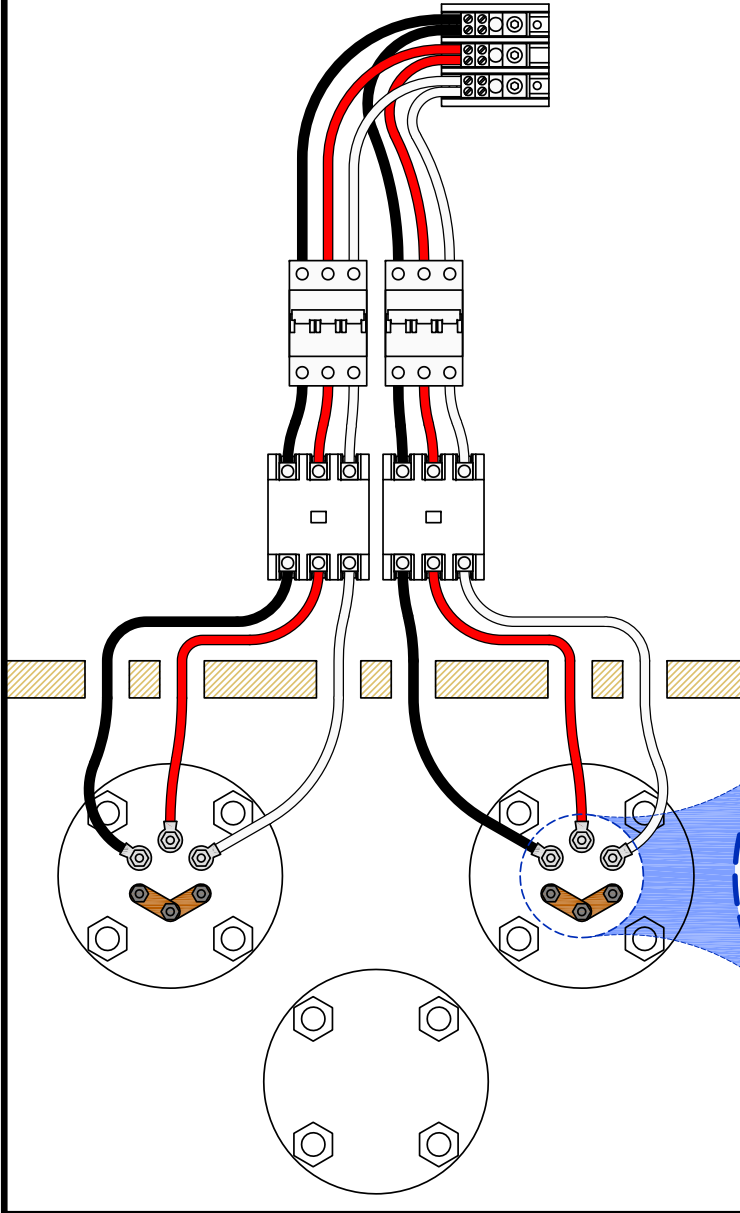
REV: A

SCALE: N/A  
SHEET: 4 OF 4

FRONT

100-120 KW  
360-415 VAC 3Ø

BACK



HEATER COILS  
MUST BE ORIENTED  
VERTICALLY FROM  
TOP TO BOTTOM.

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DWG. TITLE: SCHEMATIC - HEATER WIRING  
LB 100-120 (360-415 VAC 3Ø)

CUSTOMER: -

MODEL UNIT:	LB 100-120
ENGINEER:	C.FERRARA 05-13-16
DRAWN BY:	C.FERRARA 05-13-16
APPROVED:	B.WEIGLE 05-13-16

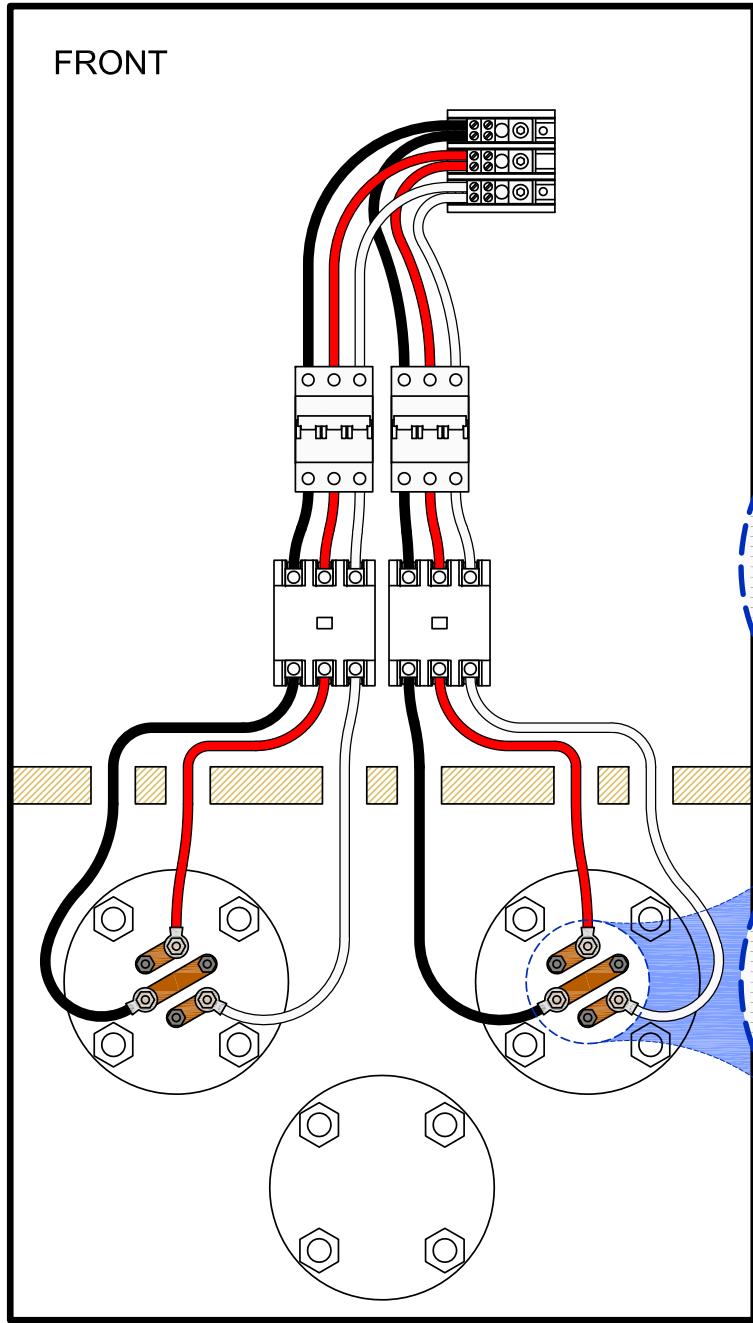


ELECTRO-STEAM GENERATOR CORP.  
50 INDEL AVENUE, RANCOCAS, NJ. 08073

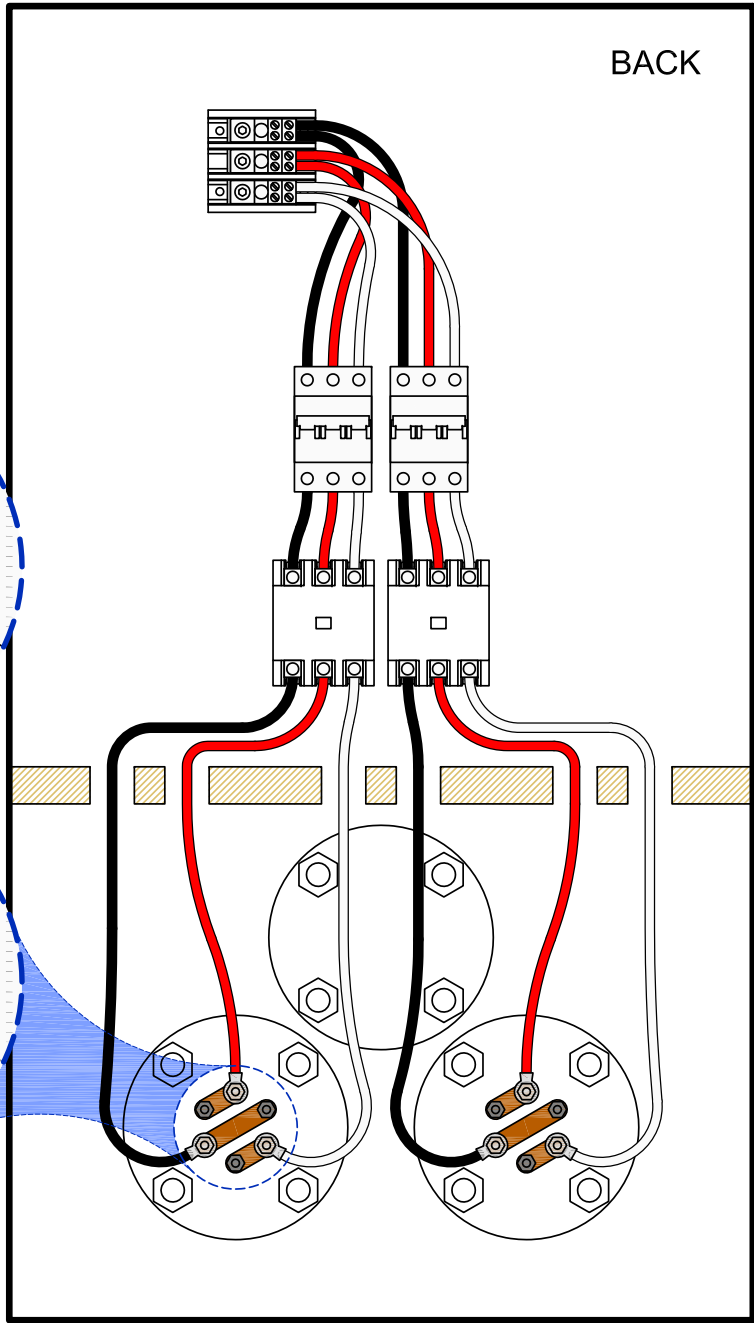
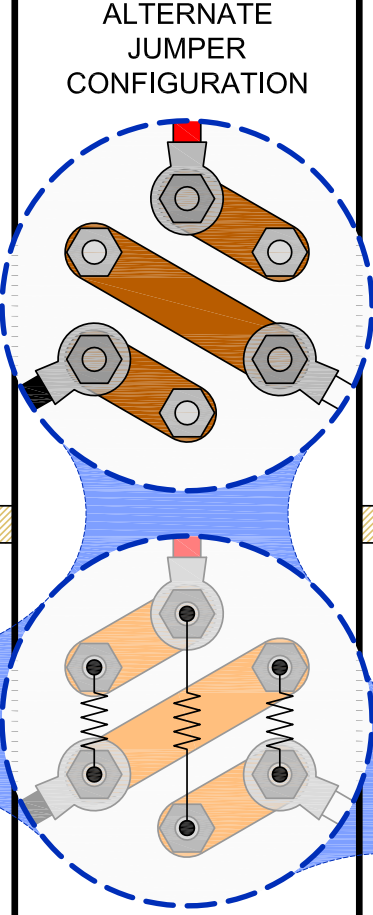
DWG NO:

REV: A

SCALE: N/A  
SHEET: 4 OF 4



100-120 KW  
440-600 VAC 3Ø



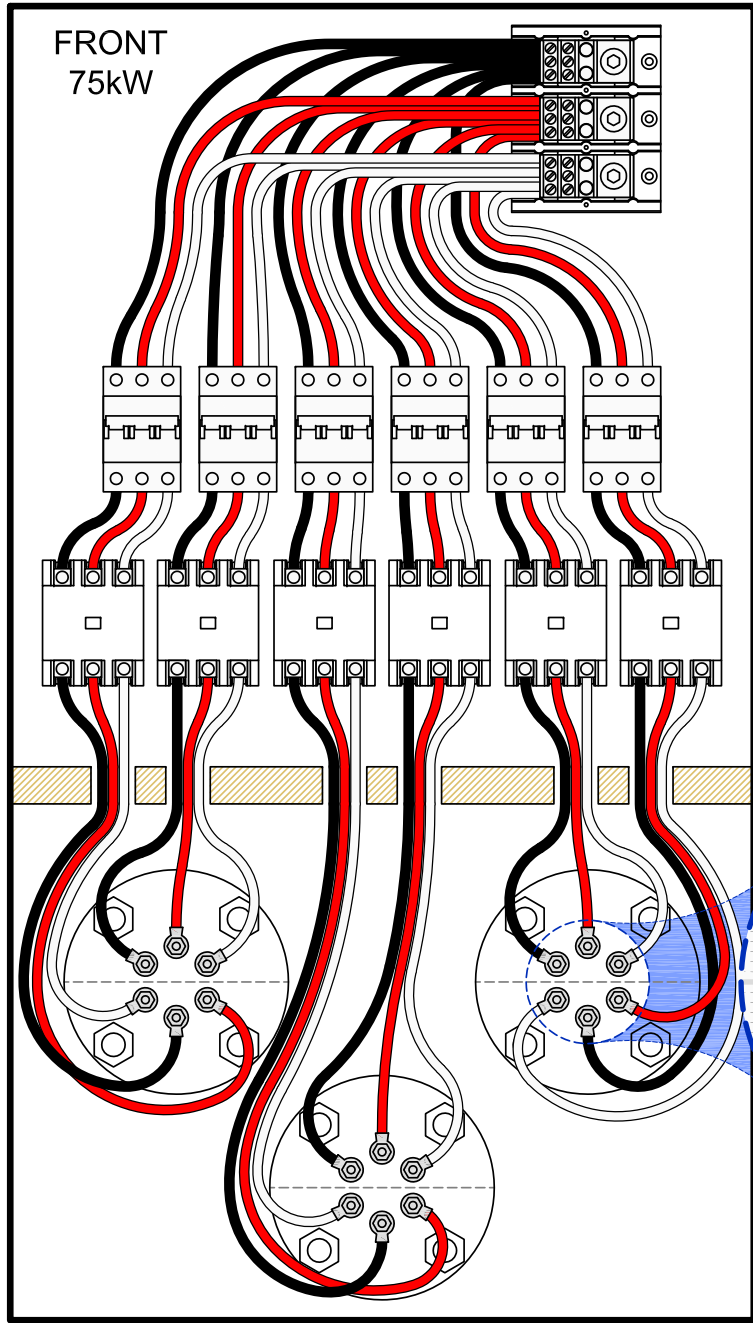
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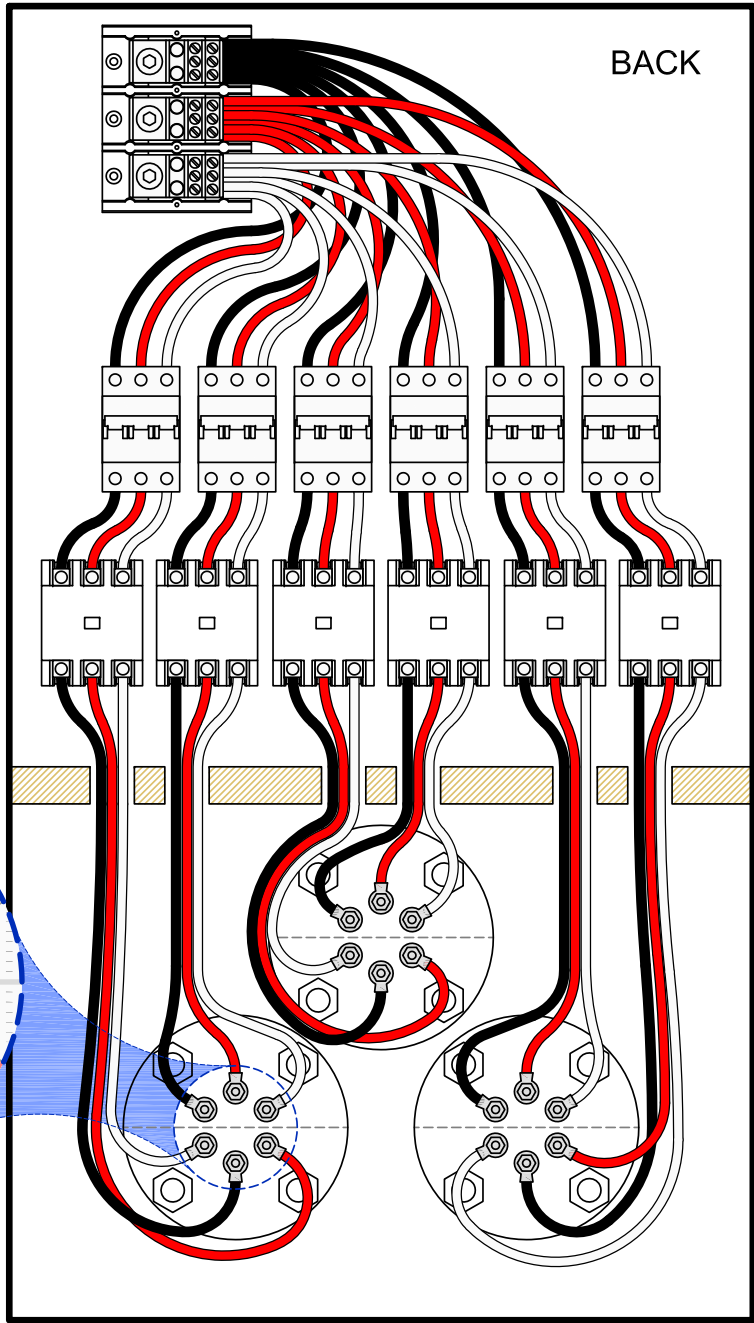
DWG. TITLE: SCHEMATIC - HEATER WIRING  
LB 100-120 (440-600 VAC 3Ø)  
CUSTOMER: -

MODEL UNIT: LB 100-120  
ENGINEER: C.FERRARA 05-13-16  
DRAWN BY: C.FERRARA 05-13-16  
APPROVED: B.WEIGLE 05-13-16

ELECTRO-STEAM GENERATOR CORP.  
50 INDEL AVENUE, RANCOCAS, NJ. 08073  
DWG NO: -  
REV: A SCALE: N/A  
SHEET: 4 OF 4



150-180 KW  
208-240 VAC 3Ø



HEATER COILS  
MUST BE ORIENTED  
VERTICALLY FROM  
TOP TO BOTTOM.

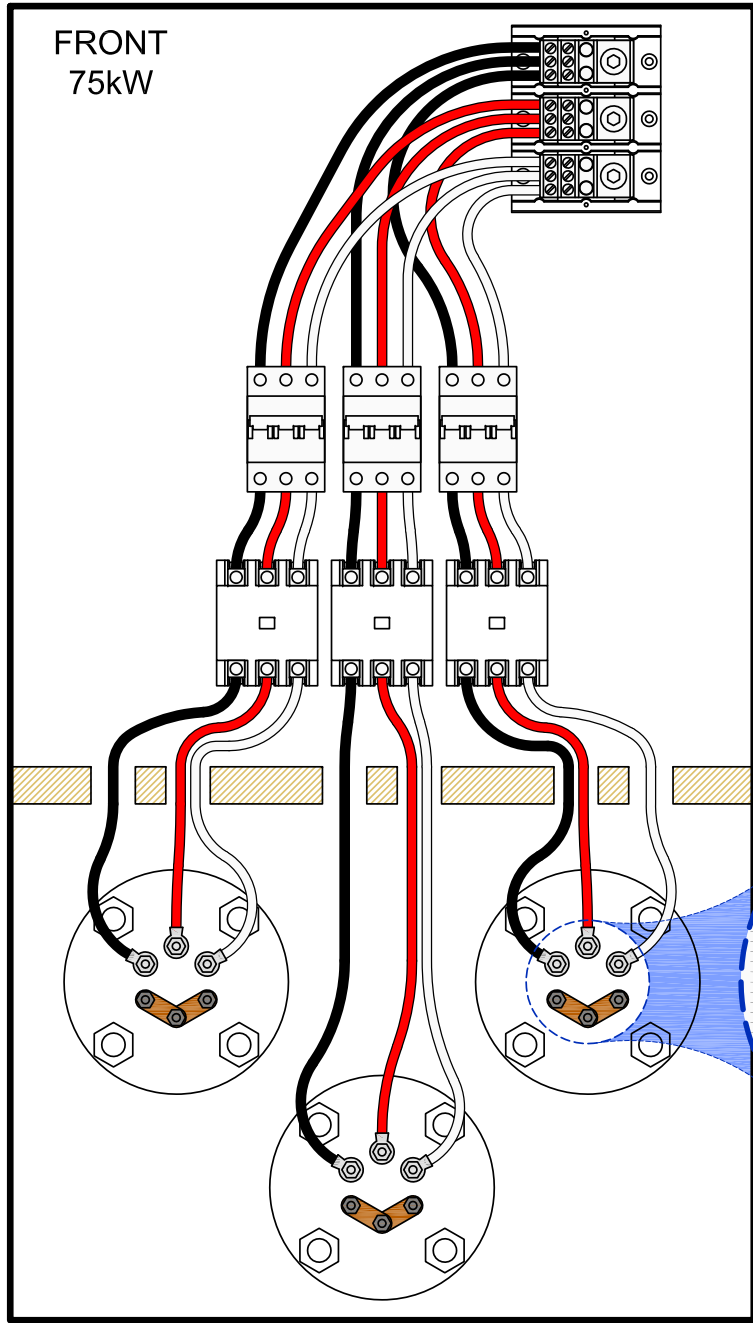
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DWG. TITLE:	SCHEMATIC - HEATER WIRING LB 80, 150-180 (208-240V 3Ø)	
CUSTOMER:	-	

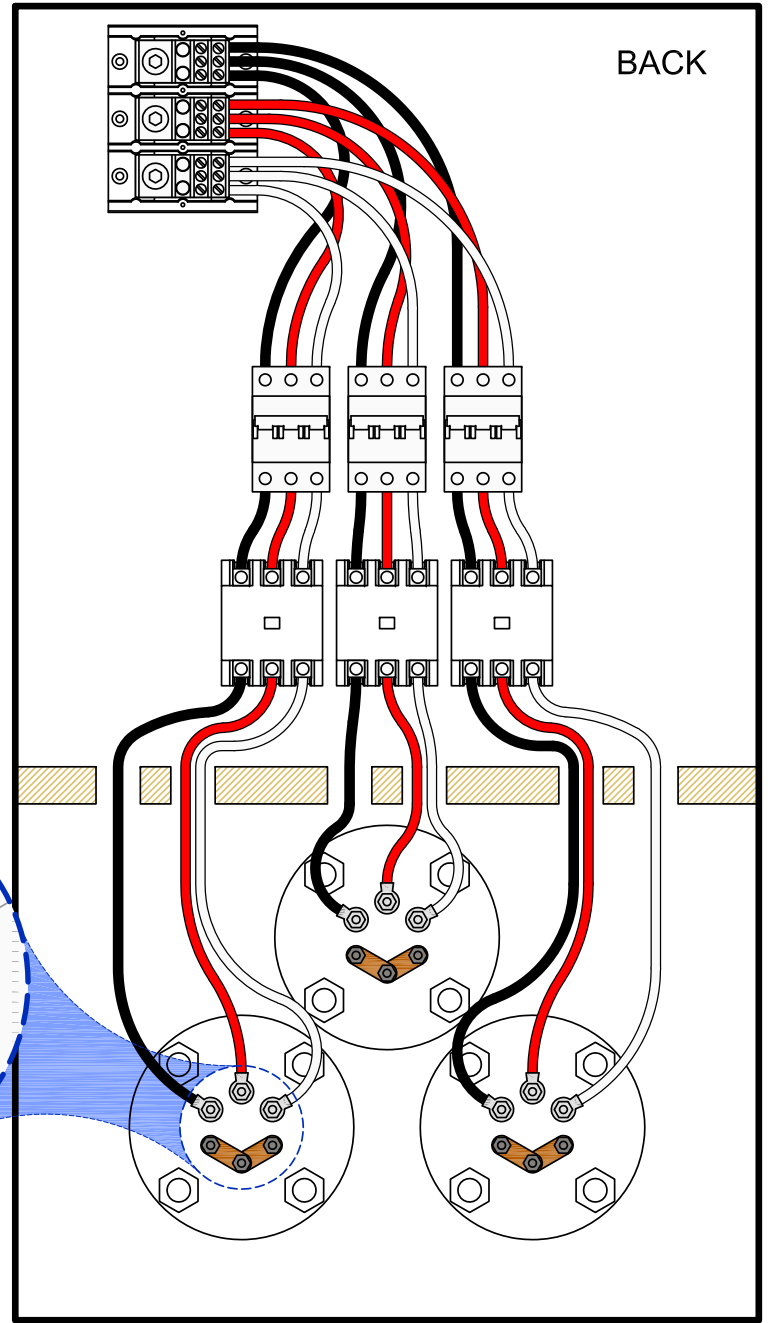
MODEL UNIT:	LB 80-180	
ENGINEER:	C.FERRARA	05-13-16
DRAWN BY:	C.FERRARA	05-13-16
APPROVED:	B.WEIGLE	05-13-16

	ELECTRO-STEAM GENERATOR CORP. 50 INDEL AVENUE, RANCOCAS, NJ. 08073	
	REV: A	SCALE: N/A SHEET: 4 OF 4



FRONT  
75kW

150-180 KW  
360-415 VAC 3Ø



BACK

HEATER COILS  
MUST BE ORIENTED  
VERTICALLY FROM  
TOP TO BOTTOM.

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DWG. TITLE: SCHEMATIC - HEATER WIRING  
LB 80, 150-180 (360-415V 3Ø)

CUSTOMER: -

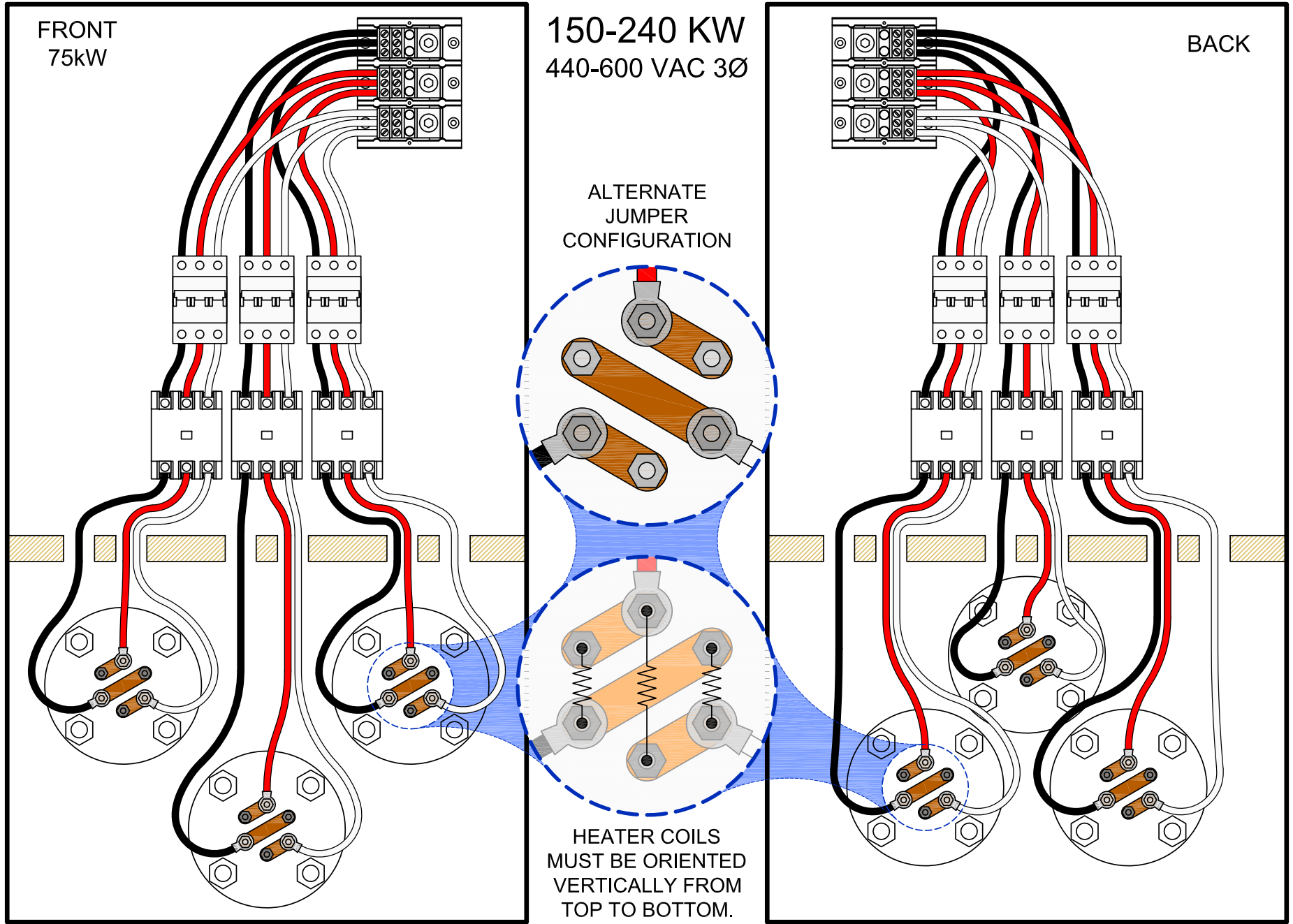
MODEL UNIT:	LB 80-180
ENGINEER:	C.FERRARA 05-13-16
DRAWN BY:	C.FERRARA 05-13-16
APPROVED:	B.WEIGLE 05-13-16

	ELECTRO-STEAM GENERATOR CORP.	
	50 INDEL AVENUE, RANCOCAS, NJ. 08073	
REV:	A	SCALE: N/A
NO:	-	SHEET: 4 OF 4

FRONT  
75kW

150-240 KW  
440-600 VAC 3Ø

BACK



THIS DRAWING IS LOANED BY THE ELECTRO-STEAM GENERATOR CORPORATION TO THE CUSTOMER OR USER AS A GENERAL DESCRIPTION OF THE EQUIPMENT AND IS TO BE USED FOR THE PROPER INSTALLATION AND OPERATION OF THIS EQUIPMENT. THIS DRAWING MAY NOT BE COPIED IN WHOLE OR IN PART NOR CAN IT BE USED FOR THE MANUFACTURE OF ANY EQUIPMENT WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE ELECTRO-STEAM GENERATOR CORPORATION.

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DWG. TITLE: SCHEMATIC - HEATER WIRING  
LB 80, 150-240 (480-600V 3Ø)  
CUSTOMER: -

MODEL UNIT: LB 80-240  
ENGINEER: C.FERRARA 05-13-16  
DRAWN BY: C.FERRARA 05-13-16  
APPROVED: B.WEIGLE 05-13-16

ELECTRO-STEAM GENERATOR CORP.  
50 INDEL AVENUE, RANCOCAS, NJ. 08073  
REV: A SCALE: N/A  
SHEET: 4 OF 4