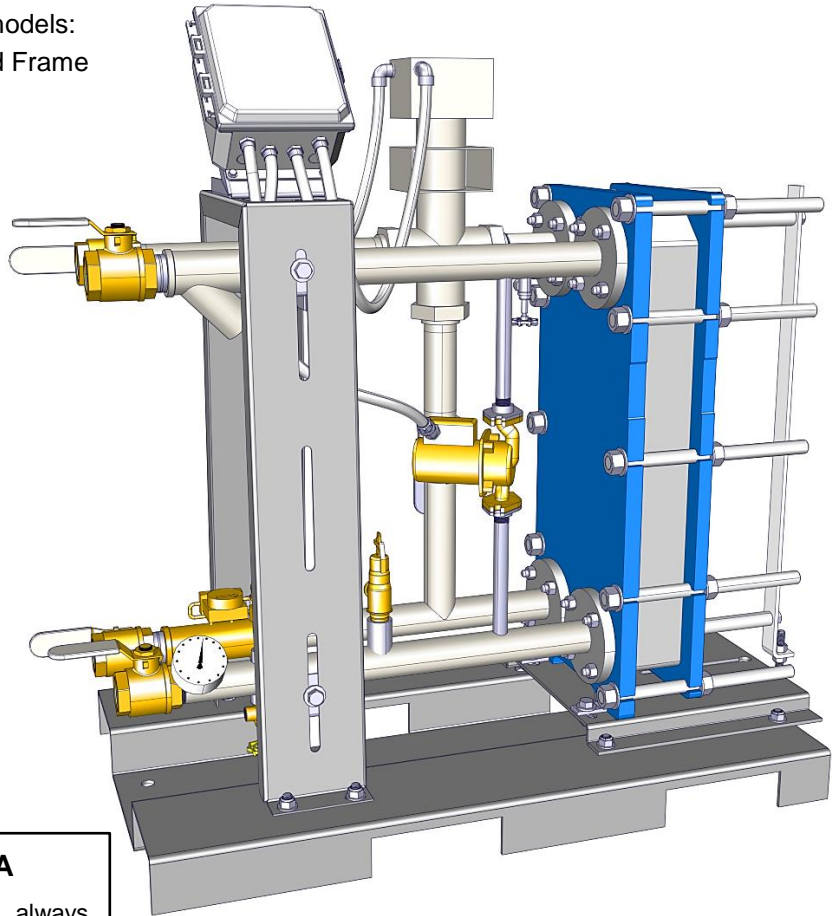


# SuperPlate

## Indirect Fired, Semi-Instantaneous, Boiler/HTHW Water Heater (Plate & Frame units)

This manual applies to the following models:

- SuperPlate Double Wall Plate and Frame units



**DHT SUPERPLATE WATER HEATER  
(Frame & Plate Version Shown)**

### CONTRACTOR / FACILITY DATA

**NOTE:** This user manual must always accompany the specific unit as recorded below:

Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

Install Date: \_\_\_\_\_

**Latest Update: 01/02/2019**

### DISCLAIMER

The information contained in this document is subject to change without notice from Diversified Heat Transfer, Inc. (DHT). DHT makes no warranty of any kind in respect to this material, including, but not limited to, implied warranties of merchantability and fitness for a particular application. DHT is not liable for errors appearing in this document, nor for incidental or consequential damages occurring in connection with the furnishing, performance, or use of these materials.



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## SECTION 1: GENERAL INFORMATION

### 1.1 INTRODUCTION

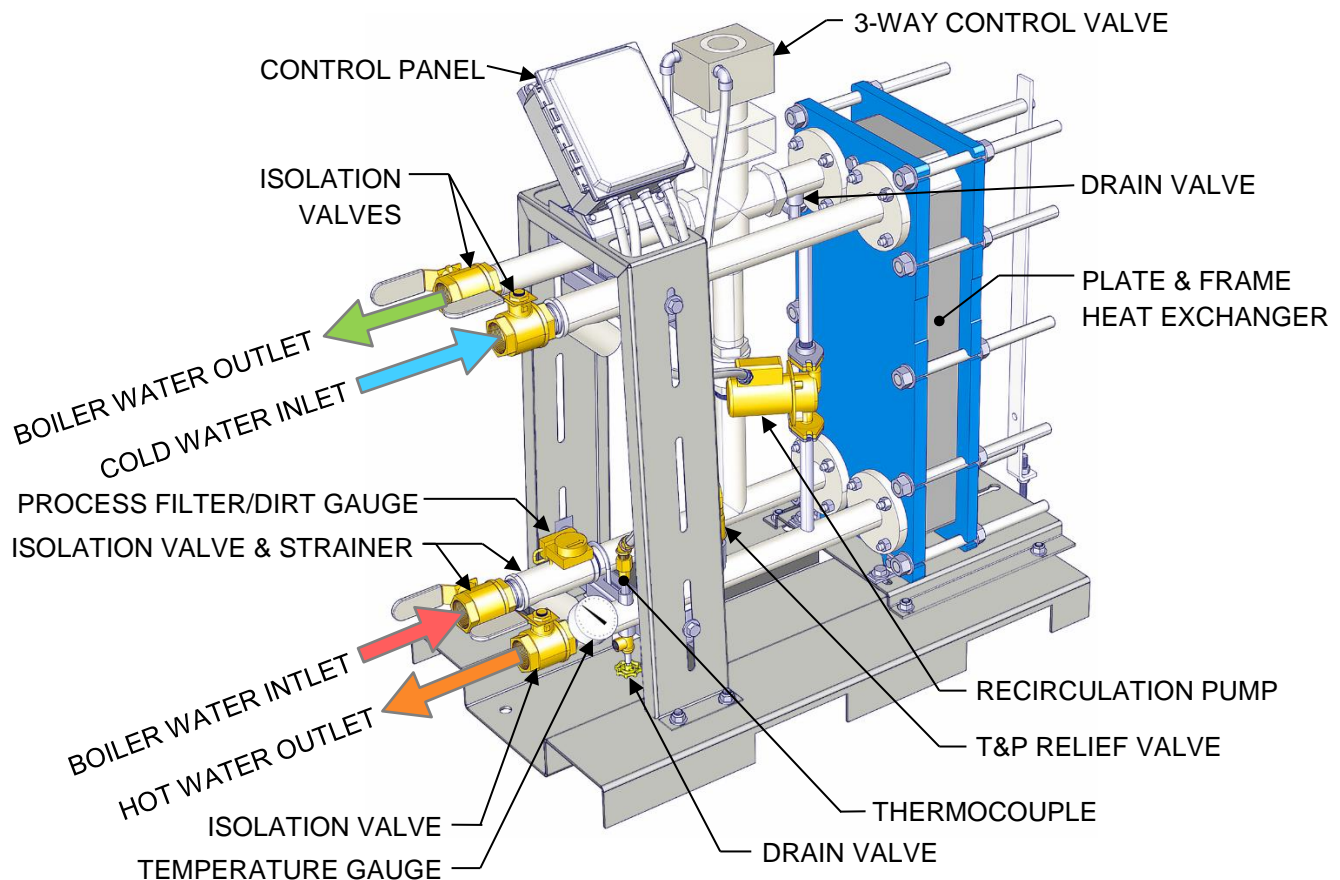
The purpose of this manual is to provide an installation, operation and maintenance procedural guide for the SuperPlate water heaters, which includes the following four models:

- SuperPlate Single Wall Plate and Frame
- SuperPlate Single Wall Braze Plate
- SuperPlate Double Wall Plate and Frame
- SuperPlate Double Wall Braze Plate

These are boiler water or HTHW to domestic water units.

### 1.2 DESCRIPTION

The Diversified Heat Transfer SuperPlate series of water heaters are the engineered solutions for facility owners/managers who need Water-to-Water heat solutions in a small space. They are constructed of stainless steel domestic water piping and carbon steel boiler water piping to ensure long leak-free operation. Water heater is equipped with a Control Panel, 3-way Control Valve and fittings etc. which makes it ideal for new and retrofit installations.



**FIG 1.2: SuperPlate Component and Function Diagram  
(Plate and Frame Heat Exchanger Shown)**

Units are engineered using boiler water or HTHW as the heating medium. Piping assembly components are similar between single/double wall and Plate & Frame and Braze plate heat exchangers. Perfect for mechanical rooms where space is limited, the water heating systems feature compact plate heat exchanger so they require less floor space.



## SECTION 1: GENERAL INFORMATION

### 1.3 FEATURES

- Compact design to fit in small mechanical rooms and standard doorways
- Complete packaged system with components engineered to specific application requirements
- Energy efficient
- High recovery
- Stainless steel plates
- Single/Double Wall Plate and Frame or Brazed Plate construction heat exchanger
- ASME compliance heat exchanger

### 1.4 APPLICATIONS

SuperPlate units are used in wide range of domestic water heating applications including either new construction or replacement of existing units. Most common application examples include:

- Apartment complexes
- Prisons/Correctional facilities
- Hospitals/medical centers/nursing homes
- Hotels/casinos/entertainment
- Schools/colleges/universities/dormitories
- Government buildings
- Commercial office buildings
- Factories/industrial facilities
- Fitness centers/health clubs etc.

#### **NOTE:**

Contact your DHT sales representative or DHT factory in case any applications related information is required.

### 1.5 ENERGY SOURCES

DHT SuperPlate Hot Water Heaters are engineered and manufactured to use one the following energy sources to produce domestic hot water:

- Boiler Water
- High Temperature Hot Water (HTHW)

### 1.6 DESIGN CONDITIONS

DHT has design, engineering and manufacturing capabilities to produce products to satisfy wide range of our customer requirements. DHT standard design conditions for SuperPlate units are:

	Shell Side
Design Pressure, PSIG	150
Design Temperature, °F	250

#### **NOTE:**

Consult the design specifications for the unit or the name plate attached to the unit and a tag on T & P Relief valve for maximum pressure for the unit.



### 1.7 CONSTRUCTION

All DHT SuperPlate units are designed and manufactured from superior materials of highest quality. Each unit meets or exceeds requirements of ASME Section VIII, Div.1 Code.

**Heat exchangers:** Heat exchangers are available in both gasket plate & frame and brazed plate constructions. Plates are stainless steel construction and available in both single or double wall plates configurations depending upon customer requirement.

**Controls and trim:** DHT SuperPlate units are equipped with electronically activated fully modulating 3-way control valves. DHT SuperPlate units are equipped with a control panel with graphical LCD display, easy adjustable set points, and set points for safety alarm system, if it is required a data port for a communication with Building Management System. SuperPlate units are equipped with double safety alarm system.

Standard package also includes ASME Temperature and Pressure Relief valve in domestic water piping and recirculating water line with circulator.

Fabricated skid package with single point inlet and outlet piping connections to produce domestic hot water using heating hot water. Stainless steel construction domestic water piping manifolds and carbon steel boiler water piping manifolds including fittings and accessories.



### 1.8 SAFETY

#### 1.8.1 Operating Precautions

In order to achieve maximum performance from the unit, the precautions and procedures described below must be strictly followed:

- The unit should be installed, operated, and serviced in accordance with the information only in this manual.
- The unit should be installed according to designs prepared by qualified facility engineers, including those of a structural, mechanical, electrical, or other applicable disciplines.
- The unit should not be operated or serviced until a safety training program has been established by the customer.
- The unit should only be operated and serviced by qualified technical personnel in accordance with all applicable codes, laws, and regulations.
- The unit must be used according to the specification given to DHT.
- Pressure and temperatures should not exceed limits indicated on DHT name plate attached to the unit.
- For initial startup refer to all instructions in **Section 3.4: Startup Procedures**.
- The heating and heated fluids should be free from any debris.
- The unit should operate only with fluid that it was designed for.
- The system should be designed to prevent the unit from encountering pressure shocks.
- All strainers installed on the unit should be periodically cleaned as per DHT maintenance schedule. (See Recommended Inspections Time Interval).
- Refer to **Section 2.6: Electrical Connections** for proper grounding of the unit.

#### 1.8.2 Storage and Transportation

The units should be stored in a clean place away from corrosive environment or weather elements (e.g. rain, snow) preferably indoors and maintained between 32°F to 110°F ambient operating temperature. During transportation, ensure that they are not exposed to mechanical damage. Units should not be exposed to too cold or hot temperature limits specified by DHT.

#### 1.8.3 Safety Features

The customer is responsible for maintenance of the safety features of the SuperPlate water heater such as guards, safety labels, safety controls, interlocks and lockout devices.



## SECTION 1: GENERAL INFORMATION

### 1.8.4 Safety Notation

In this manual there will be four levels of important note types as regards those accompanying the text of this document. Note headers will appear as shown and described below:

**NOTE:**

Important information, but not associated with safety practices.

**CAUTION!**

Indicates potential safety concerns, possible material damage, and unsafe practices that may lead to damage to property, injury or death.

**WARNING!**

Indicates a potential health hazard that *MAY* lead to injury or death.

**DANGER!**

Indicates an immediate health hazard that *WILL* lead to injury or death.

### 1.8.5 Proper Training

Proper training is the best protection against accidents. Operating and service personnel must be thoroughly familiar with the basic construction and operation of the SuperPlate semi-instantaneous water heater, and all applicable safety precautions. If any of the provisions of this manual are not fully and completely understood, contact DHT technical service for advice and information. Please have the serial number of the unit available. The serial number is located on the name plate attached to the front of the unit below the control panel.

### 1.8.6 Safety Precautions

**DANGER!**

- ***WATER TEMPERATURES OVER 125°F CAN CAUSE SEVERE BURNS INSTANTLY, OR DEATH FROM SCALDS.***



- Children, disabled, and elderly are at the highest risk of being scalded.
- See instruction manual before setting temperature at water heater.
- Feel water before bathing or showering.
- Contact DHT technical support at 800-221-1522 for more information.





## SECTION 1: GENERAL INFORMATION

### **WARNING!**

- Fluids under pressure may cause injury to personnel or damage to equipment when released. Be sure to shut off all incoming and outgoing water shutoff valves. Carefully decrease all trapped pressures to zero before performing maintenance.
- Before attempting to perform any maintenance on the unit, shut off all electrical power to the unit from an exterior switch.
- Electrical voltages up to 120 VAC may be used in this equipment, therefore the front panel door on the unit's power box must be closed at all times, except during maintenance and servicing.
- A three-pole switch must be installed on the electrical supply line of the unit. The switch must be installed in an easily accessible position to quickly and safely disconnect electrical service. Do not affix switch to any part of the water heater itself.

### **CAUTION!**

DO NOT use this water heater if any part has been under water. Call a qualified technician to inspect and replace any part that has been under water.

## SECTION 2: INSTALLATION INSTRUCTIONS

### CAUTION!

In order to maintain the warranty on the SuperPlate water heater, the startup must be completed within six (6) months of shipment, and the start-up report must be furnished to DHT within thirty (30) days of the startup. The warranty may be found in Section 7, and the Startup and Installation forms can be found in Section 6.5.

### WARNING!

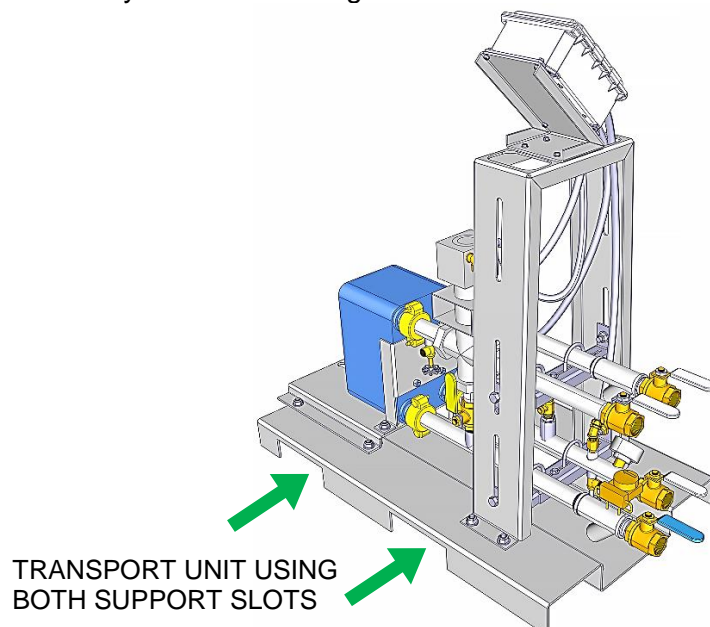
- INSTALLER MUST COMPLY WITH STARTUP AND INSTALLATION INSTRUCTIONS TO AVOID A DANGEROUS SITUATION.
- Startup and installation forms MUST be submitted to a DHT representative or risk loss of coverage under warranty.
- The inspection log must be maintained and up-to-date and kept in close proximity to the SuperPlate unit for inspection of DHT personnel.

### NOTE:

The startup must be performed by DHT factory personnel or a factory authorized representative.

## 2.1 RECEIVING, HANDLING, AND STORAGE

SuperPlate water heater base frame is designed in such a way that they can be carried from all four directions using forklifts or pallet jacks provided unit must be properly supported over the forks, as indicated by the arrows in Figure 2-1.



**FIGURE 2-1: Support Slots for Transport**



## SECTION 2: INSTALLATION INSTRUCTIONS

### 2.1.1 Examining the Unit

SuperPlate water heaters are thoroughly inspected and tested prior to shipment. Upon receipt of the SuperPlate water heater, please carefully inspect the entire unit and its components for any damages during shipping. If any evidence of damage is detected that could affect the safe operation of the unit, contact DHT or the authorized sales representative to report the damage and to receive instructions on how to proceed.

After the inspection has been done, we advise that all pressure and control components be checked to assure that they meet design specifications, the name plate and the specification tags. In case of any discrepancy, contact DHT or an authorized sales representative, before proceeding with the installation.

### 2.1.2 Compliance with Codes

The SuperPlate water heater is constructed and stamped in accordance with ASME Boiler and Pressure Vessel Code, Section VIII – Division 1. Other codes or approvals which apply will be labeled on the SuperPlate water heater.

The SuperPlate water heater installation must only be performed by technically qualified persons. The installation must conform to all national, state or provincial and local code requirements established by the authorities having jurisdiction as well as specific instructions in this manual. Authorities having jurisdiction should be consulted before installations are made.

## 2.2 SITE PREPARATION

- A firm and level foundation is required (a six to eight inch thick concrete pad is preferable).
- Secure the SuperPlate water heater to the building floor or mounting pad. For attachment to the foundation, use the four holes in the base.

**NOTE:**

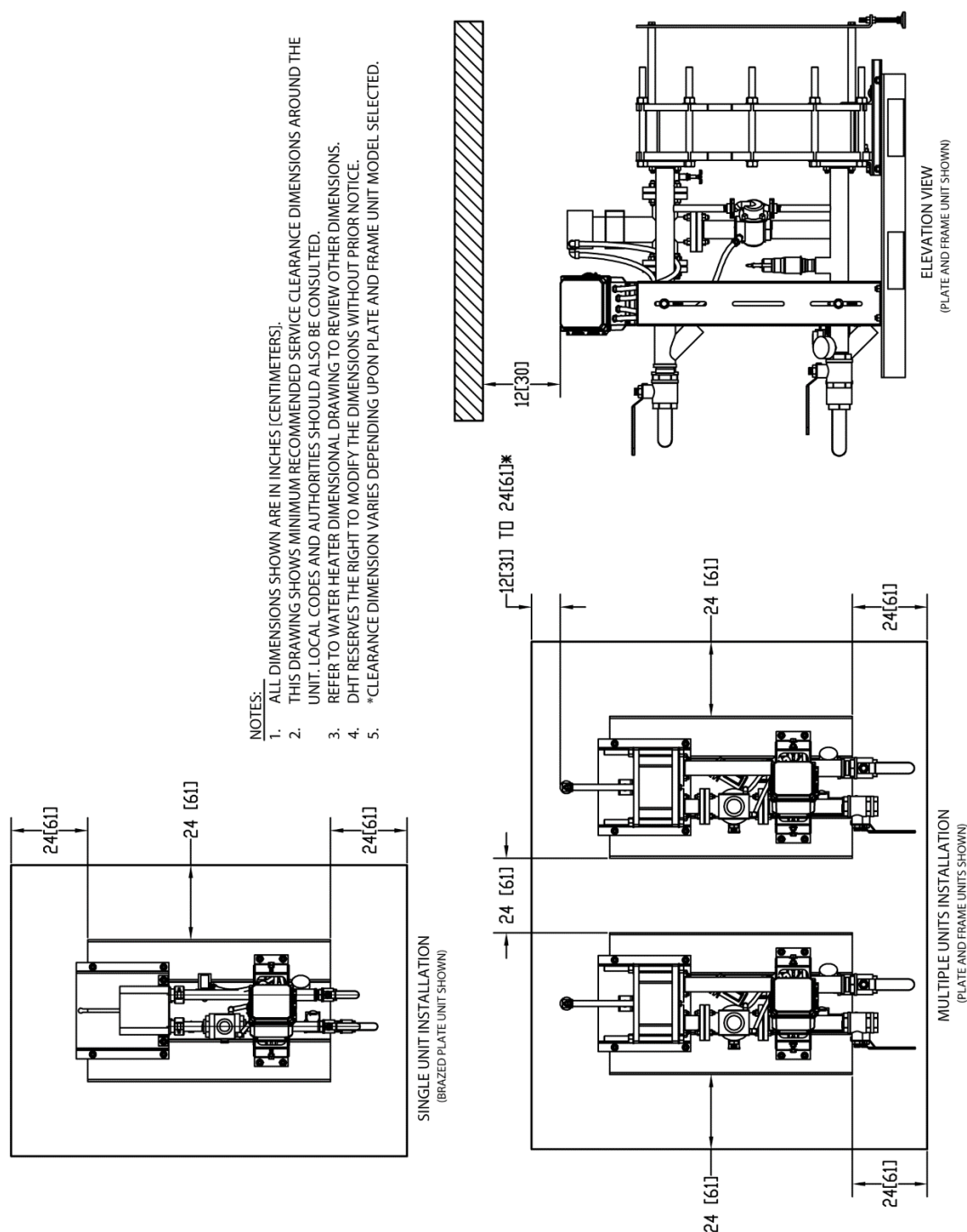
Seismic anchorage information is available upon request. Contact your DHT sales representative for more information.

- The SuperPlate water heater is top-heavy and proper rigging techniques should be followed while moving heavy equipment to avoid injury.
- The SuperPlate water heater must be plumb and level to function properly.
- The SuperPlate water heater should be placed with at least 12" headroom clearance.

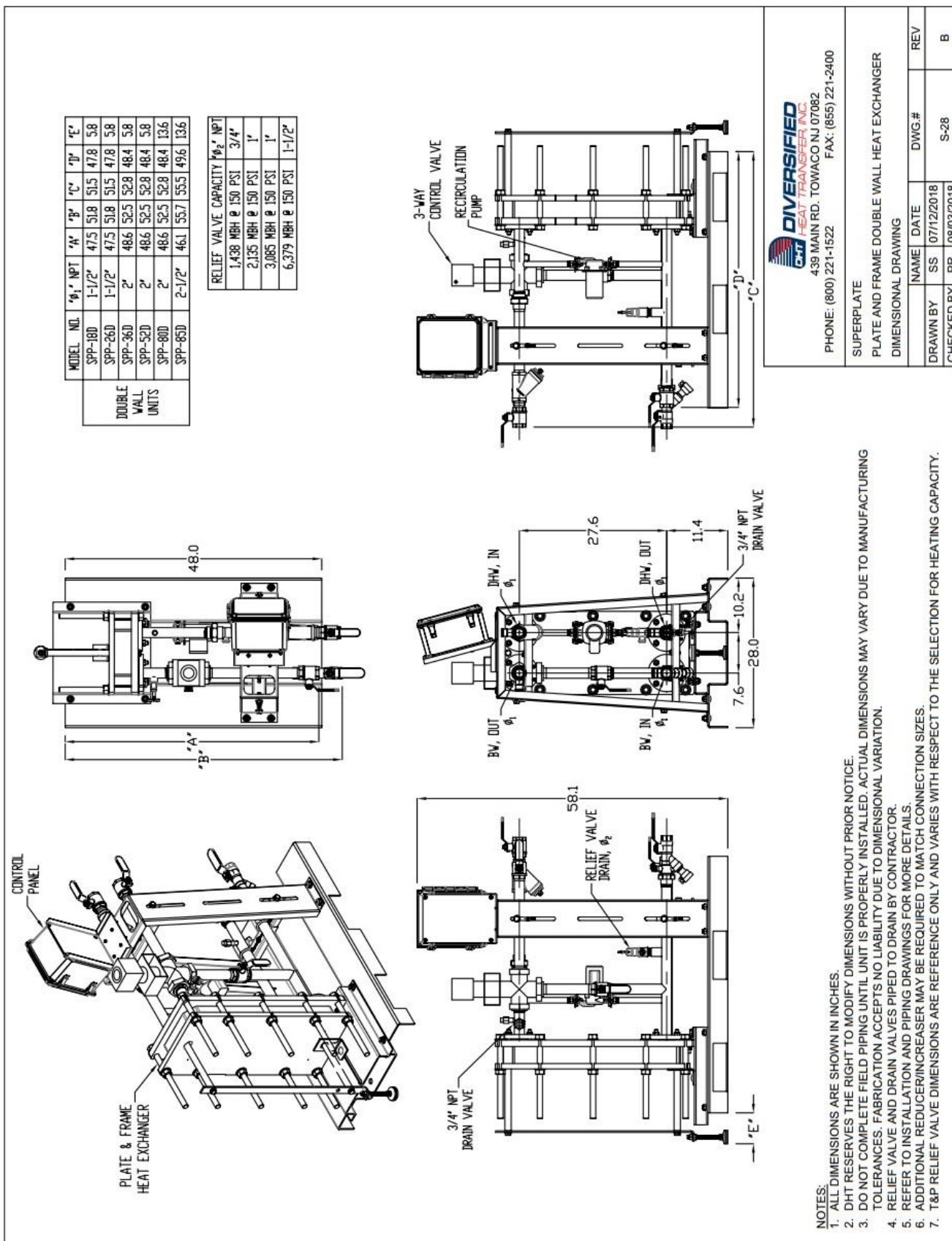
## 2.3 INSTALLATION CLEARANCES AND UNIT DIMENSIONS

The SuperPlate minimum acceptable clearances are shown in Figure 2-1 and dimensions are shown in Figure 2-2. The minimum clearance dimensions are indicated in the drawings. However, if Local Building Codes require additional clearances, these codes shall supersede these requirements.

All water piping and electrical conduit or cable must be arranged so that they do not interfere with the removal of any panels, or inhibit service or maintenance of the unit.



**FIGURE 2-1: SuperPlate Installation Clearance Drawing**



**FIGURE 2-2a: SuperPlate Plate & Frame Dimensional Drawing**



### 2.4 UNIT PLACEMENT

The unit should be mounted to the suitable floor, concrete pads or structural construction, following DHT guidelines, applicable architectural and local code requirements to assure the safe operation of the unit.

#### NOTES:

1. Proper rigging techniques should be followed while moving heavy equipment.
2. Maintain proper levels in order for the unit to function properly and follow clearance, dimensional and applicable piping drawings.

#### CAUTION!

Refer to **Section 2.5 Piping Installation and Unit Connections** for piping and installation instructions. SuperPlate units must be installed to permit relief valve drain per local codes.





## 2.5 PIPING INSTALLATION AND UNIT CONNECTIONS

SuperPlate units can be installed in various domestic water applications within the rated temperature and pressure conditions. Refer to Appendix/Section 6.3 for appropriate Piping and Installation drawings per your application requirements before making piping connections. CAD drawings are also available on DHT website for layout specification. If any special application help is needed, please call your local DHT representative or DHT factory for specific application information.

**NOTE:**

Also consult local codes and authorities in addition to DHT typical Piping and Installation drawings.

- **Domestic water piping:** the exact location of domestic water inlet and outlet ports of the unit, as well as pipe diameters and thread/flange size, can be determined for the drawing supplied with the unit. Properly sized water lines should be connected to the unit. All piping and fittings should be clean and free of debris. It is important that the piping systems are balanced when two or more units are in parallel in order to achieve the combined capacity and proper temperature control. Refer to typical Piping and Installation Drawings in Section 6.3. Most up to date drawings are available at [www.dhtnet.com](http://www.dhtnet.com).

**NOTE:**

Building recirculation piping shall be properly sized to provide sufficient capacity to dissipate residual heat within the tube bundle of the water heaters during the periods of low demand.

- **Boiler water piping:** Boiler water inlet and return piping to be sized per given flow rates to the control valve.

**CAUTION!**

High temperature water can present a very dangerous situation because of the high pressures and temperatures. Follow all mandatory and recommended procedures and safety rules to avoid any hazardous situation.

All valves on the source line should be closed during the installation process. Connect the energy source to the piping leading to the control valve. Determine the exact location of the inlet connections and piping size using the drawing of the unit. Refer to typical Piping and Installation Drawings in Section 6.3.

- **Drain discharge piping:** All DHT SuperPlate units are equipped with pressure and temperature relief valves and drain connections on both boiler and domestic water side connections. They should be piped directly to a safe drain according to appropriate plumbing codes as explained in Piping and Installation drawings in Section 6.3.

**WARNING!**

Make sure that the pressure & temperature relief valve is piped to a proper drain per instructions and codes. Scalding injury and/or water damage can occur from either the manual lifting of the lever or the normal operation of the valve if it is not piped to a proper drain. Ensure that the piping is of the proper material and rating for the temperature and pressure of the system and that it is secured to prevent possible injury. If the valve fails to flow water or reseal, consult the factory.





## SECTION 2: INSTALLATION INSTRUCTIONS

## 2.6 ELECTRICAL CONNECTIONS

All field wiring connections for power and controls are inside the control panel at the front of the SuperPlate water heater. The wiring label is attached to the inside front door of the control box. An external electrical disconnect (not supplied with the water heater) with adequate overload protection is required. The water heater must be grounded in accordance with national, state or provincial, and local codes.

Connect the system to the correct voltage. The SuperPlate water heater requires 120V AC, 15Amp service with ground (H, N, G) supplied from a suitable circuit breaker or fused disconnect. The circulation pump has a 120V constant speed fractional HP motor that operates continuously when the power to the unit is on.

Refer to Appendix 6.4 for standard electrical wiring drawings/schematics.

**CAUTION!**

All electrical wiring must be in accordance with all local, state and national codes that apply. Do not exceed the rated current of the D.C. power supply (100MA) or the form 'C' relay outputs (5A/240VAC resistive).

**WARNING!**

Hazardous voltages are present within the enclosure. Installation or service should only be carried out by trained personnel.

**CAUTION!**

Do not operate the pump without water in the unit! Do not turn on power before filling with water! Failure to do so can cause damage to the pump.

**SECTION 2: INSTALLATION INSTRUCTIONS****2.7 WATER QUALITY**

- Before piping the unit into the system, the system must be thoroughly flushed to remove sediment, flux, filings and other foreign matter. The heat exchanger can be damaged by build-up of corrosion due to sediment.
- The manufacturer cannot be held responsible for any damage caused by incorrect use of additives in the system.
- Mineral buildup in the heat exchanger reduces heat transfer, overheats the heat exchanger, and causes failure. Leaks in the heater or piping must be repaired at once. Leakage of boiler water or HTHW into domestic water side is unsafe and needs to be repaired immediately.
- Air elimination is extremely important from the domestic hot water system. Ensure proper air vents are installed in the piping systems that are prone to trap air pockets.
- Consider using water hammer arrestors or an expansion tank to dampen the spikes in water pressure since water hammering can lead to premature failure of the unit.
- Water hardness contributes to the formation of scaling, which impacts the performance of the heater exchanger and may lead to premature heat exchanger failures. Water softening may be required if it is high.
- Do NOT use artificially softened water since artificial softening agents generally use salt, which causes corrosion of the heat exchanger and piping components. Do NOT use deionized water.
- Elevated chloride levels in water accelerate corrosion of the heat exchanger and piping system materials.
- The pH must always be within the acceptable limits of the heat exchanger.

**NOTES:**

1. Consult DHT factory before using SuperPlate units for any other non-standard applications.



## SECTION 3: OPERATION AND CONTROLS

### 3.1 INTRODUCTION

This chapter provides information and instructions for following topics:

- SuperPlate functional description
- Preparation of unit for operation
- Unit startup procedure instructions
- Unit shutdown procedure instructions
- Controller startup settings

### 3.2 SUPERPLATE FUNCTIONAL DESCRIPTION

DHT's SuperPlate units are engineered using boiler water or HTHW as the heating medium. Heat exchanger is either available in both brazed plate and plate and frame construction with single or double wall configuration depending upon customer requirement. SuperPlate incorporates the proven DHT PID controller coupled with the high efficiency plate and frame or brazed plate heat exchangers. The DHT SuperPlate water heater is designed to satisfy potable water heating needs in commercial and institutional environments. The packaged system utilizes simple, easy to understand, real-time load tracking and responsive controls to maintain accurate hot water temperatures under various load patterns. DHT SuperPlate can be coupled with both condensing and non-condensing type boilers with wide range of operating temperature ranges to achieve high efficiency within an optimized space. The control system features a temperature sensor transmitting a 4-20 MA signal through quality twisted shielded wiring. The signal transmits directly into the DHT designed PID controller which in turn sends a 4-20 MA signal to the electrically activated three way control valve to achieve accurate temperature control over various demand situations.

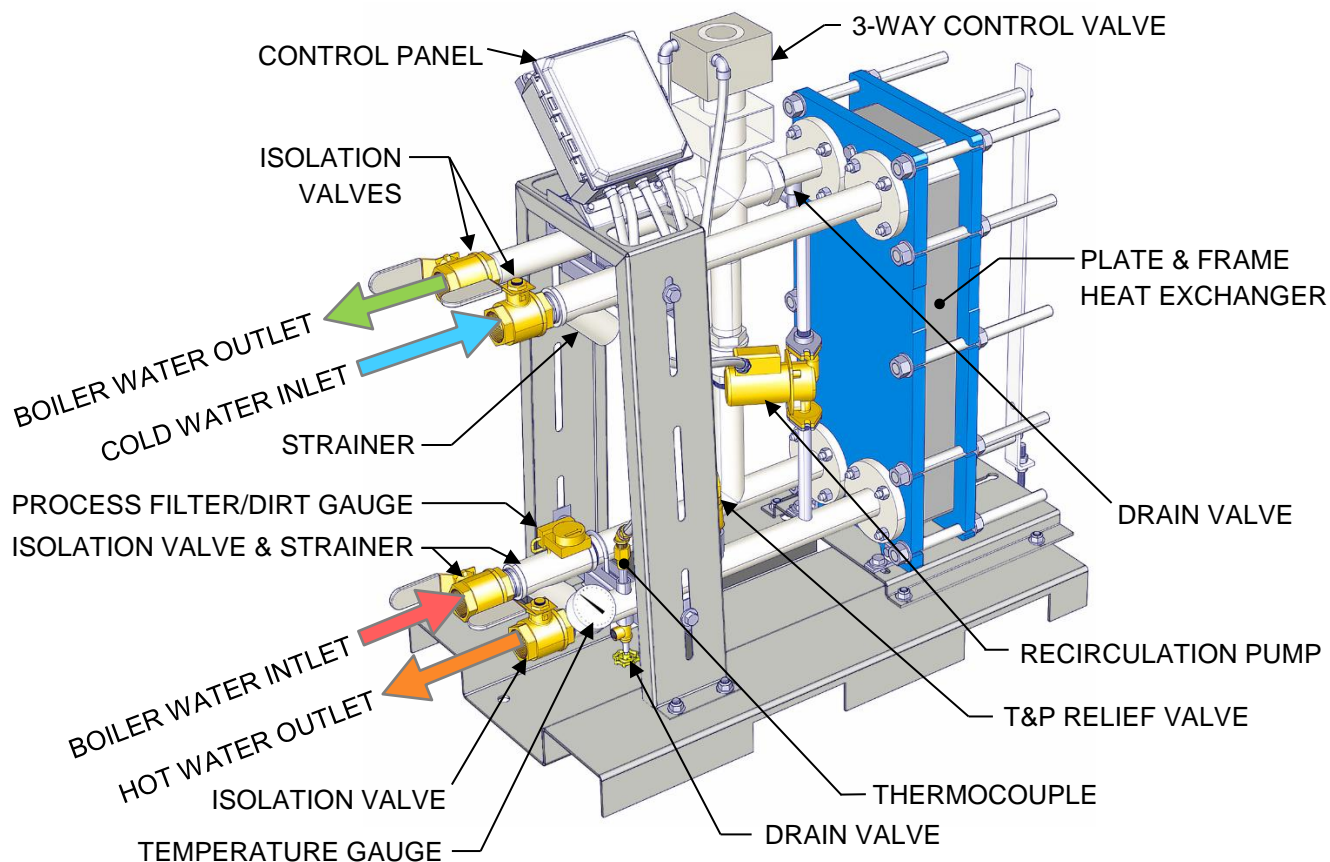
The SuperPlate can efficiently produce higher flow domestic hot water depending upon the temperature rise and available boiler water temperature and flow rate. Skid mounted with a state of the art PID control panel, brazed plate, plate and frame heat exchanger, electric three way control valve and non-ferrous circulator pump.

Easy removal of heat exchanger via flanged or victaulic connections allow the complete removal of the heat exchanger without disturbing the water heater piping. Isolation valves, inlet strainers and backflush connections provided for scheduled maintenance.

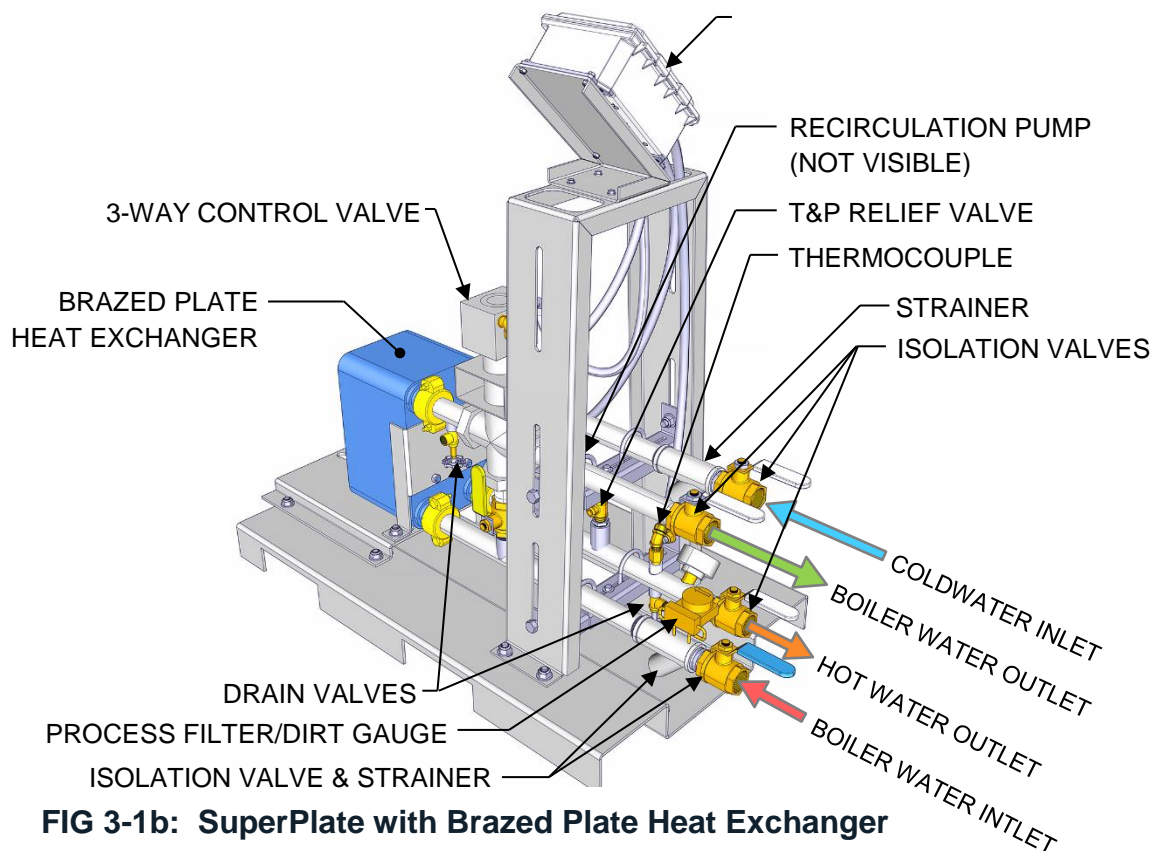
Cold domestic water enters the heat exchanger through the cold water inlet connection (as shown in Figures 3-1a and 3.1b). It is distributed over the plates in the heat exchanger and flows downwards. Heated domestic water then exits the heat exchanger from the hot water outlet connection on bottom of the unit. Unit also includes a constant speed recirculation pump which continuously circulates the heated domestic water through the heat exchanger to ensure there is always hot water present in case of demand. Domestic hot water supply temperature is maintained by either electronic operated 3-way control valve.

Boiler water or HTHW enters the heat exchanger through the inlet connection located on the bottom and flows upwards to have counter flow arrangement for effective heat transfer. Control valve which is modulated by the 4-20 mA output from the controller depending upon the reading from the temperature sensor on the domestic hot water outlet of the heat exchanger. Unit employs closed loop feedback control system to maintain target temperature set point in tight range. Boiler or HTHW exits through the outlet connection on the top of the heat exchanger as shown. Flow rate of heating medium is modulated to maintain the desired set point in varying load conditions.

The control panel can be rotated 180 degrees to orient the control surface in the desired direction. SuperPlate units can be used with both condensing and non-condensing boilers for combination space and domestic water heating.



**FIG 3-1a: SuperPlate with Plate and Frame Heat Exchanger**



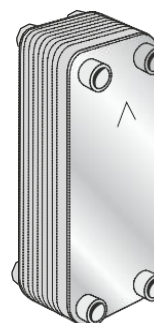
**FIG 3-1b: SuperPlate with Brazed Plate Heat Exchanger**

### 3.2.1 Brazed Plate Heat Exchanger Construction

Although there is no disassembly possible for brazed plate heat exchangers, it should be understood that they do essentially work the same way as plate & frame heat exchangers, and can come configured in a number of ways.

Brazed plate heat exchangers are constructed as modules in the configuration desired. They can be cleaned with cleaning agents and Clean-In-Place procedures, but are not disassembled for maintenance or plate replacement. They are replaced at the effective end of service life.

See below for instructions for replacing the brazed plate heat exchanger module in the SuperPlate water heaters.



### 3.2.2 Plate & Frame Heat Exchanger Construction

**Frame:** The heat exchanger consists of a frame plate (Head), a pressure plate (Follower), a carrying bar, a lower bar and a column. Tightening bolts are used to press the plates together. This is depending on the type of heat exchanger and can be different in some applications.

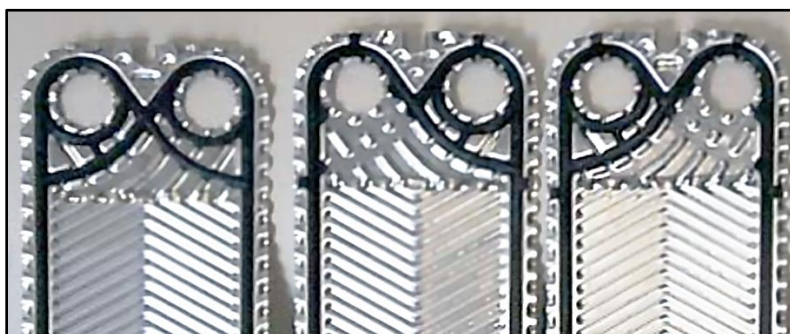
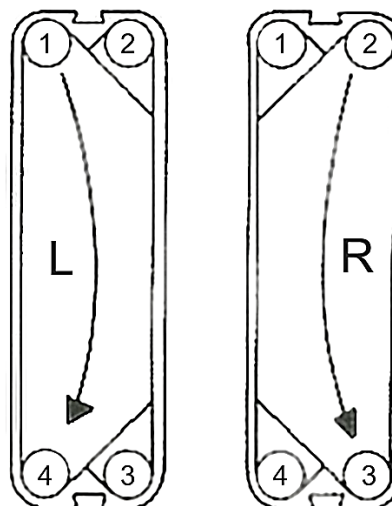
**Plates:** The plate package consists of plates with a groove along the rim of the plate and around the ports. The number of plates is, as well as size and dimension, dependent on the thermal output required.

The DHT plates are designed in such a way that they can be used both as right and as left plates. The plates just have to be turned 180°.

Right and left plates:

- On a right plate the flow runs from hole #2 to hole #3 or reverse from hole #3 to hole #2.
- On a left plate the flow runs from hole #1 to hole #4 or reverse from hole #4 to hole #1.
- The opening of the corner holes are described in a "plate code index". For instance 1234 mean that all corner holes are open.

Every plate can be identified by the packing configuration, the plate code index and thermal short or thermal long execution.



START PLATE    LEFT HAND FLOW    RIGHT HAND FLOW OR  
WITH GASKET    PLATE WITH GASKET    END PLATE WITH GASKET



## SECTION 3: OPERATION AND CONTROLS



THERMAL LONG PLATE



THERMAL SHORT PLATE

**Gaskets:** The groove provided in the plates holds the special gasket. The purpose of this gasket is to prevent intermixing of the media and leakage to the outside. The gaskets are selected to suit the actual combination of temperature, chemical environment and possible other conditions to be considered. They can be supplied in Viton, Nitrile or EPDM.

The following types of packings are being used in our plate type heat exchangers:

- Clip-on gaskets
- Glue gaskets
- "Sonder Lock" gaskets (new generation Clip-on gasket)

**Clip-on gaskets:** This type of gasket (Sonder Snap) and "Sonder Lock" (new generation glue free gasket) require no adhesive. They are located by pushing the gasket fully down into the gasket groove. The gaskets are held in place by the interference fit – narrowed portions of the gasket groove are pressed to ensure a secure fit. Make sure groove and gasket are clean!



CLIP-ON GASKET DETAIL



SONDER LOCK GASKET DETAIL

**Glue type gaskets:** The surfaces need to be clean and free of oil. Only use chloride free glues like Pliobond 20 or 30, Bostic 1782, 3M EC 1099 and Bond Spray 77. Follow the instructions of the manufacturer; these will be printed on the cover of the glue.

**CAUTION!**

When using commercial solvents and adhesives, follow the manufacturers recommendations carefully, as many of these materials are hazardous.

**O-rings:** Make sure that the flat side of the O-ring fits into the special packing groove of the plate. If the O-ring is not provided with a flat side the thinnest side of the O-ring needs to be fitted into the groove. It can be necessary to use a little glue for positioning the O-ring during assembly of the heat exchanger.

**Rubber liners:** On some model types, the rubber frame plate nozzle liners have an O-ring molded into the liner itself. This molded O-ring fits into the gasket groove in the first plate. Therefore, if new gaskets have been fitted, the O-ring portion of the gasket around the nozzle hole will have to be cut off prior to assembly back into the frame.

### 3.3 Plate Options

SuperPlate units are available in either single or double wall plate construction depending upon customer requirement. Double wall construction features boiler and domestic water separated by an air gap between two walls, rather than just being separated by a single wall. This greatly enhances protection against leakage of the boiler water into the domestic water. If there is leakage in a wall, the water is collected within the air gap which is vented to atmosphere for leak detection. Similarly, if the domestic water leaks through a wall, it is collected within the air gap and is vented to atmosphere for leak detection.

#### 3.3.1 Double Wall Construction and Protection Performance

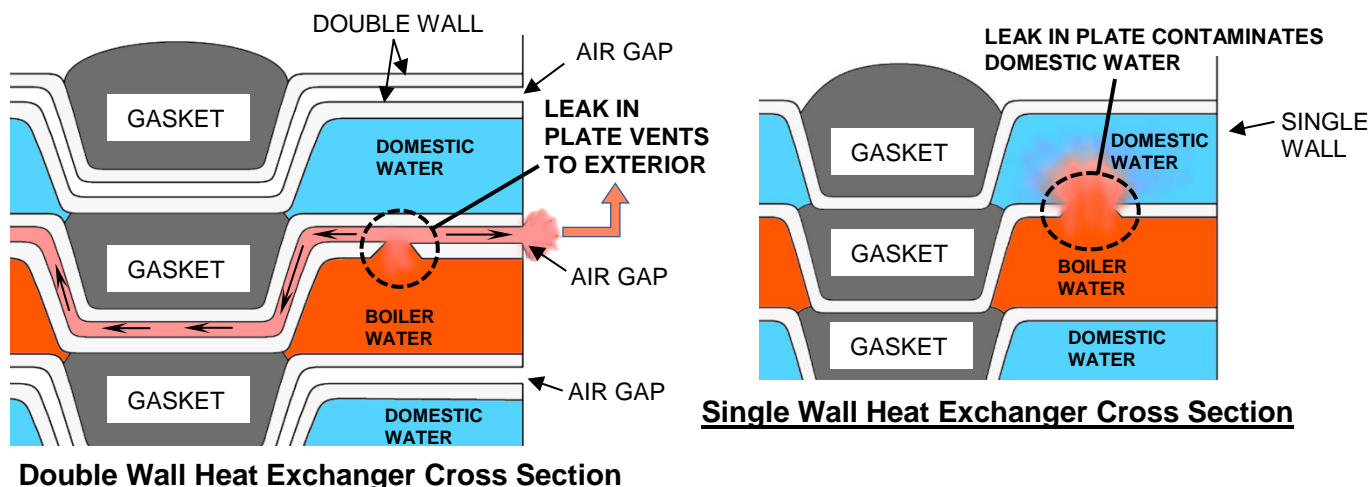
The advantages of double construction include:

- Prevention of cross-contamination
- Easy inspections and low maintenance
- Fully visible and vented leak detection between plates
- Potable water and heating medium are completely separated

Leakage can be caused by corrosion, erosion, and vibration, and can result in the contamination of the domestic water system to be contaminated by a heating medium such as hydronic water, glycol solution, etc.

There is no practical way to have the heating medium sterile or free from harmful treatment compounds or corrosion by-products. A low pressure/temperature heating medium circuit does not ensure contamination protection of indirect, single-wall water heaters. Whether they are shell and tube, shell and coil, plate and frame, or any other type, all consist of relatively thin wall heat transfer surfaces separating the heating medium from the domestic water system. Therefore, the potential for cross contamination is real and in some instances contamination has occurred.

Several states and cities are now insisting on double-wall vented construction in all indirect type domestic water heaters. Plumbing codes have also been re-written to include double-wall protection. See Figure 3-2 for an illustration of how a single wall and double wall differ in construction, and how both function in the event of a hole allowing fluid to leak through a plate.



**FIGURE 3-2: Double Wall and Single Wall Heat Exchanger Leakage Comparison**



**SECTION 3: OPERATION AND CONTROLS**

**NOTE:** Optional heat exchanger insulation is available.

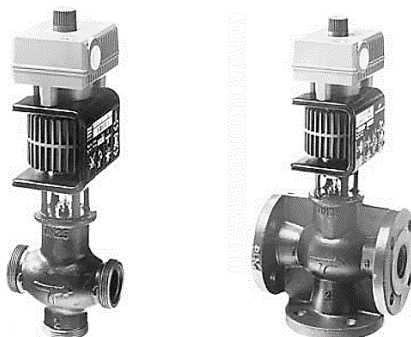
### 3.4 Safety Controls

Automatic over-temperature limit function is included which will cut off electricity supply to the fail-close control valve during over temperature condition. Power supply is restored to the control valve when unit goes back to normal operating temperature conditions.

Unit includes primary and secondary alarms functionality in the safety controls. Red light turns on when the hot water temperature reaches the primary alarm setting and then alarm starts sounding. In the next step, power supply to the control valve is interrupted causing it to close. If the water temperature continues to rise, it turns the secondary alarm on. Hot water outlet piping includes pressure and temperature relief valve to release high temperature hot water to safe drain in order to protect the unit. When the unit goes back to normal operating temperature conditions, green light turns on but the siren continues until owner manually presses the switch to turn it off. Power to the control valve is restored and unit goes back into normal operation.

### 3.5 3-Way Control Valve

Two types of 3-way control valve are available; one with NPT connections of up to two inches (2") in size, and one with larger sized flanged connections. Both are shown in Figure 3-3.



**FIGURE 3-3: 3-Way Control Valves with NPT (L) and Flange Connections (R)**

#### 3.5.1 Performance Data (3-Way Control Valve)

- SuperPlate water heaters include MXG-461 3-way control valve actuators.
- Control valve modulates the flow of boiler/HTHW through the heat exchanger based upon the signal from controller to maintain DHW supply temperature to target setpoint.
- Valve is fast positioning < 2 seconds
- High rangeability (1000:1)
- Low leakage rates: Leakage at  $\Delta P_v = 14.5 \text{ psi (0.1 Mpa) (1bar)}$ .
  - A  $\rightarrow$  AB Max. 0.02 % Cv (to IEC534-4).
  - B  $\rightarrow$  AB Depends on operating conditions (<0.2% Cv).
- Temperature of medium = 34°F to 266°F (1°C to 130°C)
- UL listed
- Before shipment, every unit is inspected to make sure the valve is opening and closing with respect to signal from the controller.
- 3-way control valve is factory set to Automatic mode of operation.

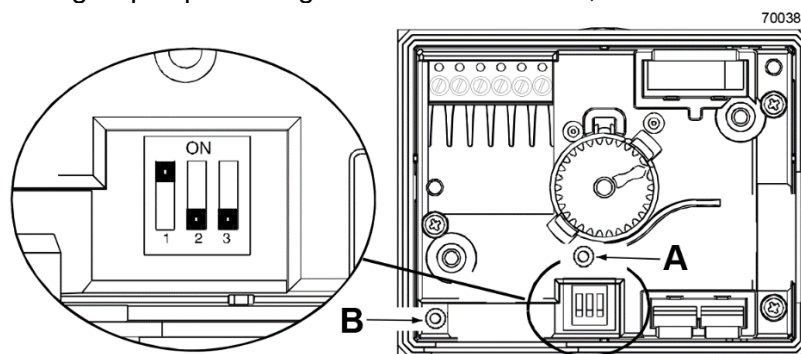
**SECTION 3: OPERATION AND CONTROLS**

- 3-way control valve is powered by 24VAC electricity.
- 3-way control valve is actuated by 4 to 20 mA signal from controller.
  - 4mA means valve is in fully bypass position (flow direction from port B to AB). Flow path from A to AB is closed when valve is de-energized (fail safe feature).
  - 20mA means valve is in full open position (flow direction from port A to AB)

**3.5.2 Calibration Instructions (3-Way Control Valve)**

3-WAY CONTROL VALVE DIPSWITCH FUNCTIONS			
Switch #	Switch Function	OFF (down)	ON (up)
1	Characteristic	Linear	Equal percentage*
2	Control signal	0 to 10 Vdc*	2 to 10 Vdc or 4 to 20 mA
3	Volts or mA	0(2) to 10 Vdc*	4 to 20 mA

\* Factory setting: equal percentage valve characteristic, 4-20 mA control signal.



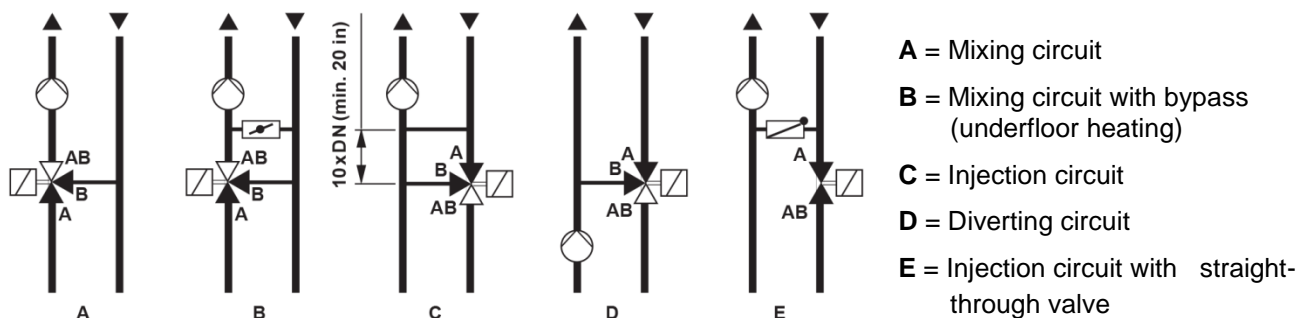
**FIGURE 3-4: 3-Way Control Valve DIP Switch Functions**

The 3-Way Control valves are factory-calibrated at 0% and 100% stroke. When commissioning the valves (especially under extreme usage conditions) there may still be some leakage via control path A → AB with a 0% stroke control signal (4 mA). In this case, the valve can be recalibrated as follows (see Figure 8):

- Use a pin or paper clip to push the button in opening (A) in the terminal housing.
- During calibration, the LED light (B) in the electronics module will flash green for approximately 10 seconds. The valve will be briefly closed and fully opened.

**CAUTION!**

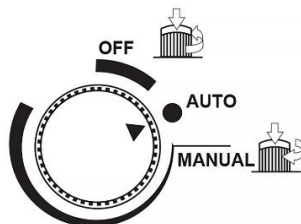
This valve is suitable for straight-through normally closed or three-way applications only, and should only be installed in a mixing arrangement.



**FIGURE 3-5: 3-Way Control Valve Hydraulic Circuits Application Example**

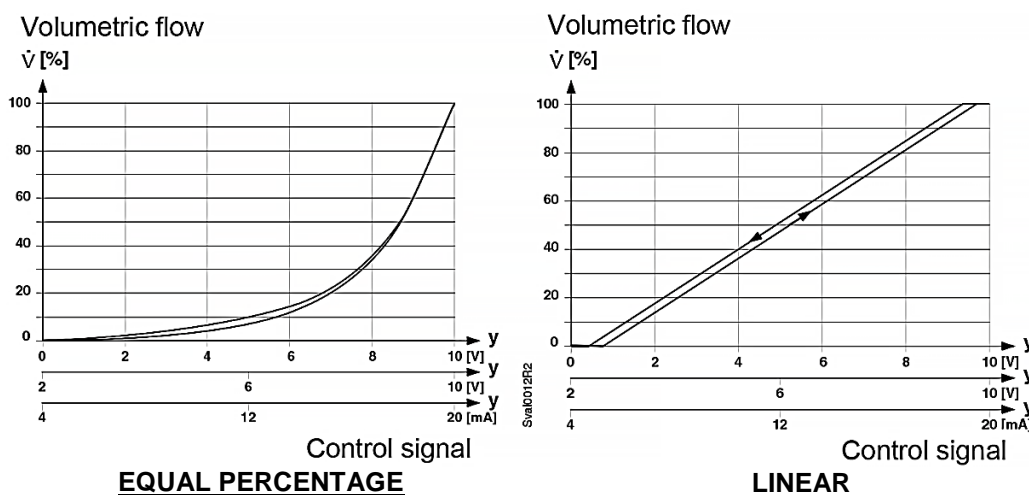
### 3.5.3 Auto and Manual Control (3-Way Control Valve)

The 3-way control valve Automatic and Manual control modes can be selected using the knob shown in Figure 3-6.

**FIGURE 3-6: Selecting AUTO or MANUAL Control**

#### 3.5.3.1 AUTO Control

The control signal is converted by the microprocessor in the electronics module into an output signal that generates a magnetic field in the core. This causes the only moving part, the armature, to change its position in accordance with the interacting forces (magnetic field, counter-spring, hydraulics, and so on). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the control disc, enabling fast changes in load to be corrected quickly and accurately. The valve position is measured continuously. The positioning controller ensures an exactly proportional relationship between the control signal and the valve stroke.

**FIGURE 3-6: Valve Characteristics - Equal Percentage (L) and Linear (R)**

In the event of a power failure, or if the power is switched off, the spring force closes the valve automatically (control path ports A → AB normally closed).

#### 3.5.3.2 Manual Control

The valve control path (ports A → AB) can be opened mechanically up to 95% of the full stroke by pressing the knob inward and turning it clockwise (to the MANUAL position). This disables the control signal from the controller.

To disable automatic control of the valve, press the knob (Figure 3-6) inward and turn it counterclockwise (to the OFF position). The valve will close.

For automatic control, the knob (Fig. 3-6) must be set to the AUTO position (knob will spring out).

**WARNING!**

The valve knob (Figure 3-6) **MUST** be set to AUTO position for operation of the SuperPlate unit.

### 3.5.4 3-Way Controller Status LED Indication

Open the electronics module of the 3-Way Controller Valve to view the two-color LED display, which indicates the operating status of the valve. The table below identifies what the behavior and color of the LEDs indicate.

3-WAY CONTROL VALVE STATUS LEDs		
LED Display	Status	Description
Green LED	On continuously	Automatic mode: Auto (normal, no faults)
	Flashing	<ul style="list-style-type: none"> <li>– Mechanically set to MANUAL</li> <li>– Mechanically set to OFF</li> <li>– Currently in auto-calibration mode</li> </ul>
Red LED	On continuously	<ul style="list-style-type: none"> <li>– General fault</li> <li>– General calibration fault</li> <li>– Microcontroller fault</li> </ul>
	Flashing	– Faulty 24 VAC supply (or low power)
LED Off		<ul style="list-style-type: none"> <li>– No 24 VAC supply</li> <li>– Fault with electronics module</li> </ul>

The LED will typically only assume the conditions in this table (continuously red or green, flashing red or green, or off).

**SECTION 3: OPERATION AND CONTROLS****3.6 PREPARATION OF UNIT FOR OPERATION**

It is important to make sure that the unit is installed and all piping and electrical connections are made per instructions in Chapter 2. Also make sure that the connecting piping has been cleaned out before starting up the unit.

**3.7 UNIT STARTUP PROCEDURES**

Follow the instructions below to start up the SuperPlate unit:

**➤ UNIT STARTUP PROCEDURE INSTRUCTIONS**

- 1) Assure that all manual shutoff valves on boiler water/high temperature hot water and domestic water lines are closed.
- 2) Slowly open the manual shutoff valve on the cold water inlet line, checking to assure that there are no leaks at the valve or any joints.
- 3) Adjust the operating temperature control to the desired temperature. Refer to Section 3.5 for the exact location of the controls and detailed adjusting procedure.
- 4) Adjust the high temperature limit per actual operating conditions. It is normally factory set at 160°F considering 140°F operating supply water temperature.
- 5) Open the boiler water/ HTHW return valve.
- 6) Slowly open the manual shutoff valves on the power source inlet.

**NOTE:**

This procedure is similar for both boiler water and high temperature water energy sources.

**CAUTION!**

Boiler water and high temperature water present situations that can be very dangerous because of the high temperatures and pressures. Use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures, to avoid possible injury or death.

- 7) If no leaks are found, slowly continue to open the manual shutoff valves on the power source inlet.
- 8) As the unit is initially heating the water, carefully re-inspect the water inlet, the water outlet, power source inlet (boiler water or high temperature water), and boiler water return lines and joints for signs of leakage.
- 9) As unit approaches the desired operating temperature, check that the temperature on the unit is within the desired range. If necessary, readjust the temperature control valve. See the Submittal documents and the temperature control valve component manual, included with the unit, for the exact location of the valve and detailed adjusting procedures.
- 10) After the unit has reached operating temperature, re-inspect all joints for signs of leakage. In addition, check all gauges and controls to verify that the energy source pressures are within design specification.
- 11) The unit is now ready for normal operation. Proceed to Section 3.7 for setting the temperature and other initial startup parameters using the controller.

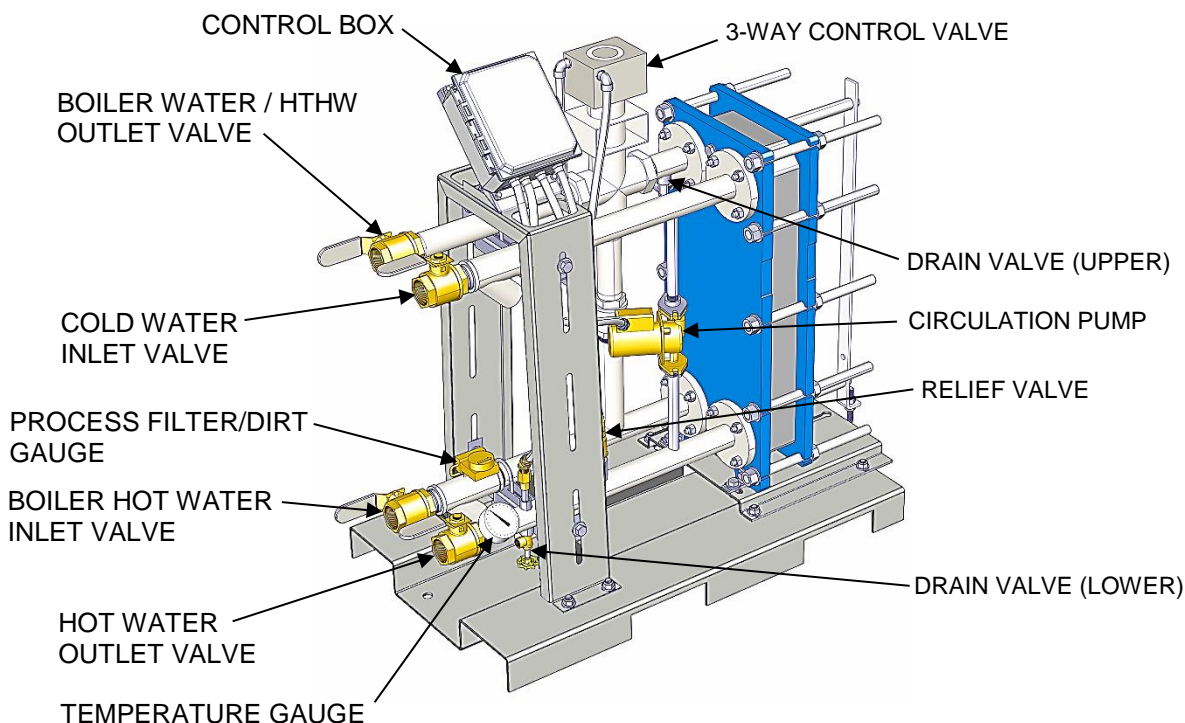


## 3.8 UNIT SHUTDOWN PROCEDURES

All maintenance procedures require the water heater to be properly shutdown. Follow the instructions below in order to shut down the SuperPlate unit:

### ➤ UNIT SHUTDOWN PROCEDURE INSTRUCTIONS

1. Close all valves in the energy source inlet line (boiler water or high temperature water).
2. Turn off all power to the electric control, if so equipped.
3. When possible, relieve the pressure from energy source line (boiler water or high temperature water), between the shutoff valve and the unit.
4. Wait 5 minutes or until dial thermometer starts dropping. Close all remaining valves in the system in this order.
  - a. Hot water outlet line.
  - b. Cold water inlet line; and
  - c. Boiler/high temperature water return line.
5. After the system has cooled, drain the unit by opening the heat exchanger drain valve and holding the relief valve in the open position. This will prevent the formation of a vacuum and increase the drainage flow.
6. Proceed with the required maintenance or repairs.
7. After performing the required maintenance or repairs, return the unit to operation by following the described above startup procedures in Section 3.4.



**SUPERPLATE STARTUP / SHUTDOWN COMPONENTS**





### 3.9 CONTROLLER INTRODUCTION

The DHT Series 700 Water Heater Controller is a microprocessor based, state of the art, device offering unmatched performance and full user configurability for water heating applications.

The 700 Series is used with a type 'K' thermocouple sensor.

Process indication is displayed in alpha/numeric format on the controller's two line, backlit LCD display along with the current status of the unit's relay outputs. Six digital LED indicator lights (3 red and 3 green) provided for alarm and status indication.

All aspects of the unit are user configurable through the 'plain English' menus and combinations of the 3 user data key push buttons.

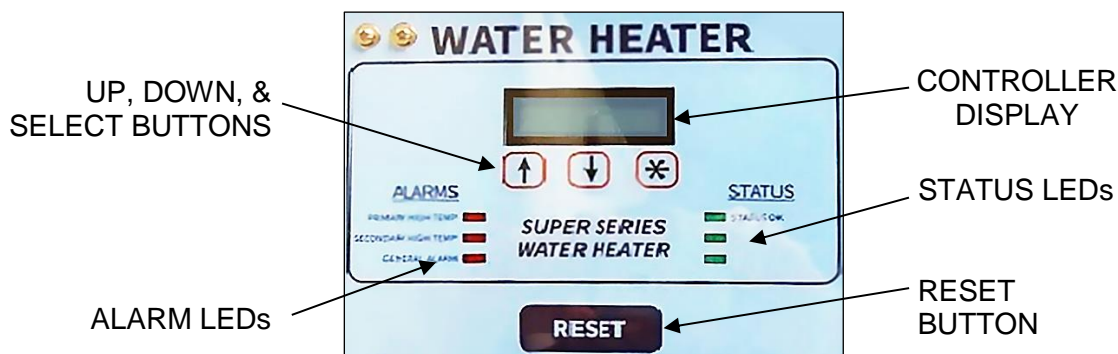
**MODBUS RTU®:** RS485Network allows multiple units to be connected together for distributed applications, remote monitoring SCADA applications (optional).

Optional Building automation communication gateway available for connections with Bacnet MS/TP, or Bacnet/IP

Menu based programming, all parameters and setpoints are user configurable via menu prompts and user keys. The preconfigured screens and 'pull down' sub menus with English prompts assures rapid setup and commissioning.

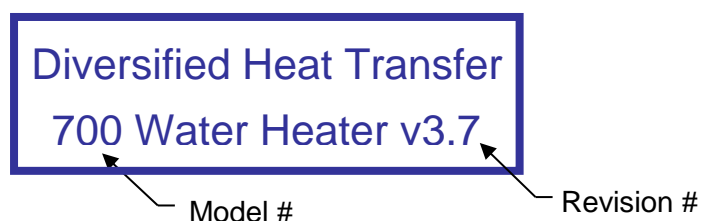


### 3.10 CONTROLLER STARTUP



**FIG 3-5: SUPERPLATE CONTROLLER MODULE PHOTO**

Upon power up, the opening screen shows the model number and the current revision level (Figure 3-6), then defaults to the display shown in Figure 3-7.



**FIG 3-6: OPENING SCREEN DISPLAY**

**NOTE:**

The numbers shown in this section are for information purposes only. User has to manually insert the numbers depending upon required application operating conditions following the programming sequence in Section 3.7.



**FIG 3-7: DEFAULT DISPLAY AFTER STARTUP**

To program the controller for operation, follow the instructions in the following sections.

### 3.11 PROGRAMMING THE SEQUENCE

#### ➤ ENTERING THE PASSWORD

1. To begin the programming sequence, press the \* button and the 'ENTER PASSWORD' screen appears:



FIG 3-8: PASSWORD ENTRY

2. Use the ↑ ↓ buttons to enter the access password, press the \* button to enter the password, and then proceed to step 3.

**NOTE:**

Use default password "0" to move to next steps.

#### ➤ SETPOINTS MENU

3. Use the ↑ ↓ buttons to cycle through the menu choices and navigate to the 'SETPOINTS' menu, as shown:



FIG 3-9: SETPOINTS MENU

4. Press \* to access the 'PRIMARY ALARM ON AT' Menu.
5. Use the ↑ ↓ buttons to change the 'PRIMARY ALARM ON AT' setpoint value. Press \* to save and advance to the 'PRIMARY ALARM OFF AT' setpoint value as shown:



FIG 3-10: PRIMARY ALARM ON SETTING

6. Use the ↑ ↓ buttons to change the 'PRIMARY 'ALARM OFF AT' setpoint value. Press \* to save and advance to the 'SECONDARY ALARM' set points menus.



FIG 3-11: PRIMARY ALARM OFF MENU



**SECTION 3: OPERATION AND CONTROLS**

7. Use the  $\uparrow$   $\downarrow$  buttons to change the 'SECONDARY ALARM **ON** AT' setpoint value. Press  $\ast$  to save and advance to the 'SECONDARY ALARM **OFF** AT' setpoint value.

SECONDARY ALARM ON AT  
170.0

**FIG 3-12: SECONDARY ALARM ON MENU**

8. Use the  $\uparrow$   $\downarrow$  buttons to change the 'SECONDARY ALARM **OFF** AT' setpoint value.

SECONDARY ALARM OFF AT  
165.0

**FIG 3-13: SECONDARY ALARM OFF SETTING**

**HINT:** Holding down the  $\ast$  key for three (3) seconds will display the previous screen.

**➤ VALVE OUTPUT MENU**

9. Press  $\ast$  to save and advance to the 'VALVE OUTPUT' Menu using  $\uparrow$   $\downarrow$  buttons.

\*\*\*MENU SELECTION\*\*\*  
**VALVE OUTPUT**

**FIG 3-14: VALVE OUTPUT MENU**

10. Press  $\ast$  to view or adjust the current 'SETPOINT' using  $\uparrow$   $\downarrow$  buttons.

SETPOINT	140.0	← Current Setpoint
OUT %	80.00	← Current Out Percentage

**FIG 3-15: SETPOINT SETTING**

11. Press  $\ast$  to view or adjust 'GAIN' setting using  $\uparrow$   $\downarrow$  buttons.

GAIN	4.50
OUT %	20.0

**FIG 3-16: GAIN SETTING**

## SECTION 3: OPERATION AND CONTROLS

### NOTE:

- The 'GAIN' setting increases or decreases the speed of response to a load change.
- Factory settings are typically 4.5. If the system is overshooting, lower the gain to 4.4, 4.3 or 4.2.

12. Press \* to view or adjust the 'INTEGRAL' setting using ↑ ↓ buttons.

INTEGRAL	1.00
OUT %	20.0

**FIG 3-17: INTEGRAL SETTING**

### NOTE:

- 'INTEGRAL' mode permits the controller to return to setpoint after a load change. **Make small adjustments, from 1.0 to .9, .8, .7, or .6.** This will make the system calculate its current position at a faster rate.
- The bottom line (OUT %) shows the live output percentage to the valve. This appears on all of the valve output screens.

13. Press \* to view and adjust the 'MAXIMUM' and 'OUTPUT %' using ↑ ↓ buttons.

MAXIMUM %	100.00
OUT %	20.0

**FIG 3-18: MAXIMUM AND OUTPUT % SETTINGS**

### NOTE:

- Maximum output allowed can be limited to limit cycling.
- When starting up, begin with an output setting of 50% to 60%.

14. Press \* to view the 'MANUAL/AUTO' menu items. Press ↑ ↓ to select AUTO (automatic) or MANUAL Operation.

### CAUTION!

Always leave in the AUTO (Automatic) setting.

AUTO
OUT% 20.00

← Automatic Output selected

**FIG 3-19: AUTO SETTING**



FIG 3-20: MANUAL SETTING

15. Use the  $\uparrow\downarrow$  buttons to increase or decrease the 'OUT %' (output).



FIG 3-21: MANUAL OUTPUT % MANUAL SELECT SETTING

**NOTE:**

Not recommended to use manual positioning when unit is in operation.

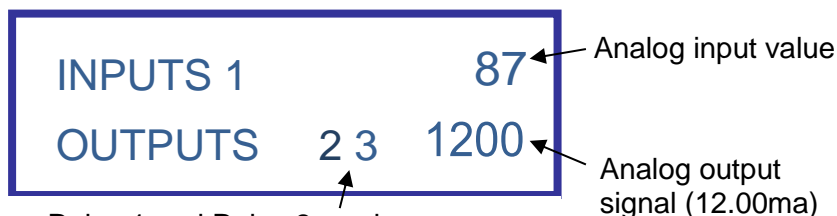
## ➤ DIAGNOSTICS MENU

16. Press  $\uparrow$  or  $\downarrow$  buttons to navigate to the 'DIAGNOSTICS' MENU'.



FIG 3-22: DIAGNOSTICS MENU

17. Press  $\star$  to view the 'DIAGNOSTICS' screen as shown below.



Relays that are active, Relay 1 and Relay 2 as shown.

FIG 3-23: DIAGNOSTIC DISPLAY

**NOTE:**

The bottom line shows the live output (OUT %) to the valve. This appears on all of the valve output screens.



### SECTION 4: MAINTENANCE

#### **CAUTION!**

All service on the SuperPlate water heater must be performed by trained and experienced technicians from appropriate service agencies.

This section covers the service and maintenance for SuperPlate water heaters and provides instructions for the inspection and replacement of critical parts and components.

Any questions concerning maintenance procedures should be directed to DHT support at 1-800-221-1522. Please be prepared with model and serial numbers of the unit and heat exchanger coils prior to contacting DHT.

#### **NOTE:**

Taking the unit offline is required for many of the maintenance procedures in this section, so all technicians performing maintenance should be familiar with the procedures necessary for unit shutdown (Section 3.5) and unit startup (Section 3.4).

Any component(s) directly connected or linked to the component being replaced should carefully be examined before maintenance procedures are started. If any of the related components show signs of wear or improper operation, they should be considered for replacement at the same time.



## SECTION 4: MAINTENANCE

## 4.1 CIRCULATING PUMP MAINTENANCE

DHT SuperPlate water heaters are equipped with a circulating pump to assist in the even heating of the water. If the unit is equipped with a circulating pump, the following procedure should be followed to replace the pump.

### ➤ CIRCULATING PUMP INSPECTION & REPLACE INSTRUCTIONS

- 1) Take the unit offline (Steps: 1 through 5 of the shutdown procedure, Sec. 3.8) before attempting to service the circulating pump.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

- 2) Test the pump according to manufacturer's instructions supplied with the test unit. If found to be defective or worn, replace the pump per the following steps:
  - a) After assuring that the power has been turned off, disconnect the electric leads to the circulating pump.
  - b) Drain the unit by opening the drain valves (See Figures 3-1a and 3-1b).
  - c) Break the flanged joint between the pump and the inlet and outlet piping.
  - d) Remove the pump.
  - e) Reconnect the pump to the inlet and outlet piping. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to the use and/or type of joint compounds or sealer at the connections.
  - f) Reconnect the electric leads to the pump (reference wiring diagram provided with the unit to assure proper wiring).
  - g) Follow the startup procedures (Section 3.1) to put the unit back on-line. Carefully check all connections for any sign of leakage.





## 4.2 POWER CONNECTION REWIRING

If any of the power connections must be rewired at the electrically activated controls or junction boxes, follow the steps listed below.

### ➤ POWER CONNECTION REWIRING INSTRUCTIONS

- 1) Follow Steps: 1 through 5 of the shutdown procedure (Sec. 3.8) to take the unit off-line before attempting any electrical service.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

- 2) After assuring the power has been turned off, disconnect and rewire the electrical connection in question.
- 3) Turn the power on to check that the component that has been rewired is functioning properly.
- 4) Follow the startup procedure instructions in Sec. 3.1 of this manual to return the unit to operation.



### 4.3 PLATE HEAT EXCHANGER MAINTENANCE

This section describes how to clean and maintain the SuperPlate heat exchangers, including disassembly and inspection instructions for the Plate & Frame heat exchangers.

Brazed Plate type of heat exchangers cannot be disassembled for plate replacement and so maintenance is necessarily limited to CIP cleaning or replacement of the entire heat exchanger module when it has reached the end of its lifetime.

#### 4.3.1 General Heat Exchanger Maintenance Procedures

- Every 6 months to a year check temperatures and flows against the commissioning data.
- Check general condition and look for any signs of leakage.
- Wipe clean all painted parts and check surfaces for signs of damage.
- Check bolts and bars for rust and clean.
- Lightly coat threaded parts with molybdenum grease or a corrosion inhibitor (ensure that no grease, etc. falls onto the plate gaskets).

#### 4.3.2 Clean-In-Place (CIP) Cleaning (Frame & Plate and Brazed Plate)

CIP cleaning is preferable when the scaling deposits on the plates are soluble. When CIP cleaning is used routinely, intervals between heavier maintenance is extended and gasket life is improved.

Two suggestions for cleaning solutions appropriate for plate & frame heat exchangers are listed below:

DEPOSIT TYPE	SOLUTION
<b>Organic materials and grease</b>	<b>Sodium Hydroxide (NaOH)</b> <ul style="list-style-type: none"> <li>• Maximum concentration = 1,5%</li> <li>• Max. Temp. = 185 °C.</li> <li>• Mixture for 1.5% concentration = 1.32086 gallon.</li> <li>• 30% NaOH per 26.4 gallon water</li> </ul>
<b>Limestone and other minerals</b>	<b>Nitric Acid (HNO<sub>3</sub>)</b> <ul style="list-style-type: none"> <li>• Maximum concentration = 1.5 %</li> <li>• Max. Temp. = 149 °C.</li> <li>• Mixture for 1.5% concentration = 2.4 ltr.</li> <li>• HNO<sub>3</sub> 62% per 0.63 gallon water</li> <li>• Nitric acid also has an affective build up effect on the passivation film of stainless steel.</li> </ul>

#### CAUTION!

- Nitric acid and Sodium Hydroxide may cause injury to exposed skin, eyes, and mucous membranes. Use of protective eyewear and gloves is strongly recommended.
- Under no circumstances should hydrochloric acid be used to clean stainless steel plates, nor should hydrofluoric acid be used to clean titanium plates.

Instructions for use of a CIP system are on the next page.

**➤ CIP CLEANING INSTRUCTIONS (P&F and BRAZED PLATE)****NOTES:**

- Choose a cleaning product appropriate for the materials used in the system that will come into contact with the cleaner. Follow all manufacturer instructions when using any cleaning agent.
- Contact DHT at 800-221-1522 for suggested cleaning solutions for your system.

- 1) Isolate the heat exchanger from the system and connect the CIP unit to the heat exchanger with the flow direction opposite to normal operation.
- 2) Dilute and mix the cleaning agent with the CIP tank water according to the manufacturer's instructions, and heat to the required temperature.
- 3) The cleaning agent should be circulated through the system at the fastest flow rate available (10% to 20% above normal), but at the least should be at the normal operational flow rate.
- 4) Circulate the cleaning solution for at least 30 minutes and up to 4 to 6 hours. If possible, reverse the flow direction every 30 minutes.
- 5) After the cleaning interval, always rinse the system thoroughly with fresh water. Circulate fresh water through the system for at least 10 minutes after the cleaning operation. A solution of 1-2% sodium hydroxide (NaOH) or sodium bicarbonate (NaHCO<sub>3</sub>) before the final rinse ensures that all acid is neutralized.
- 6) Disconnect the CIP unit from the heat exchanger.
- 7) Check the performance of the water heater against the data provided in the equipment manifest, such as the pressure drop data. Compare to pre-cleaning results. Noted performance differences can be used to trigger future maintenance.
- 8) Responsibly dispose of used cleaning chemicals.

### 4.3.3 Brazed Plate Heat Exchanger Module Replacement

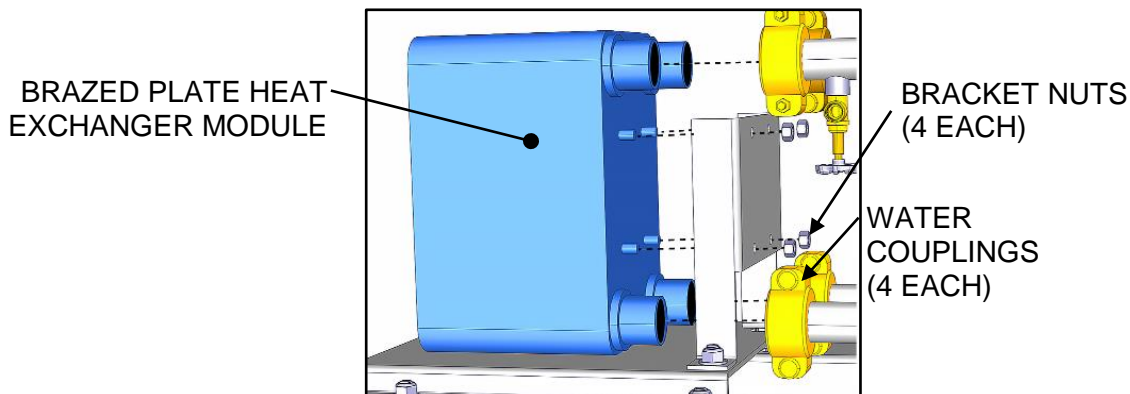
#### ➤ REPLACING THE BRAZED PLATE HX MODULE

1. Shut down the heat exchanger as described in section 3.5.
2. Shut off all water connections and shut off all power to the unit.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

3. Ensure to bleed all pressure from all parts of the unit. Open the drain valves.
4. Make sure the heat exchanger cools down to below 104 °C; with EPDM < 219.2 °C
5. Remove the four bolts that affix the module to the support plate.
6. Decouple the four connections to the heat exchanger module.

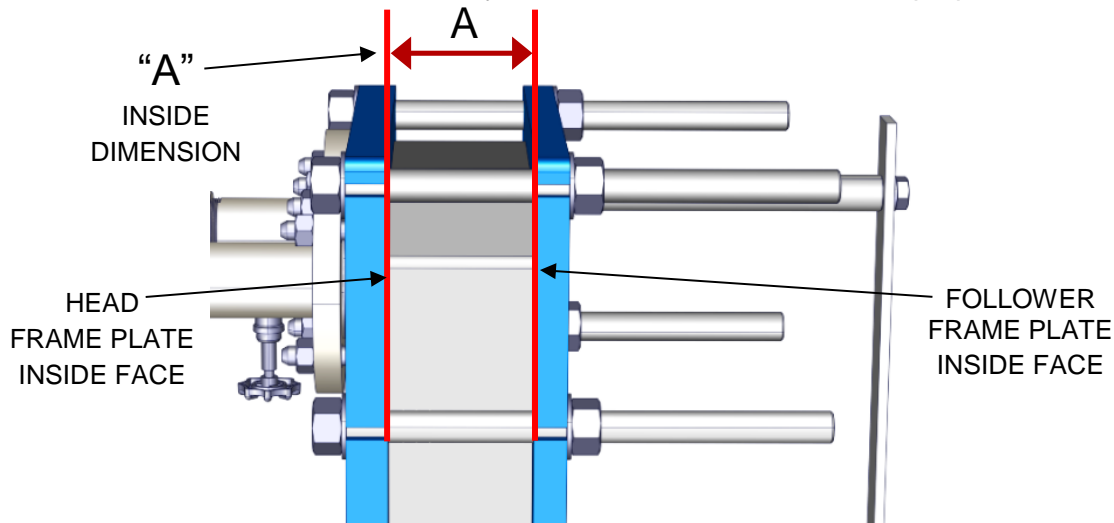


7. Replace the module, recouple to the four water heater connections, and affix the four plate nuts.
8. After all adjustments have been made to satisfaction and all connections and fittings double checked, apply power and refer to **Section 3.4: Unit Startup Procedures** to initiate operation of the unit.
9. Unit should be checked for leaks and correct pressure levels to ensure proper operation.

#### 4.3.4 Plate & Frame Heat Exchanger Disassembly and Cleaning

When CIP cleaning is not appropriate, then it may be necessary to disassemble the plate & frame heat exchanger to access the plates directly for cleaning.

**IMPORTANT!** The distance between the inside faces of the Follower frame plate and the Head frame plate ("A" in Figure 4-1) is listed in the service contract. If unavailable, then carefully measure and record it before disassembly, as this dimension is critical for proper reassembly.



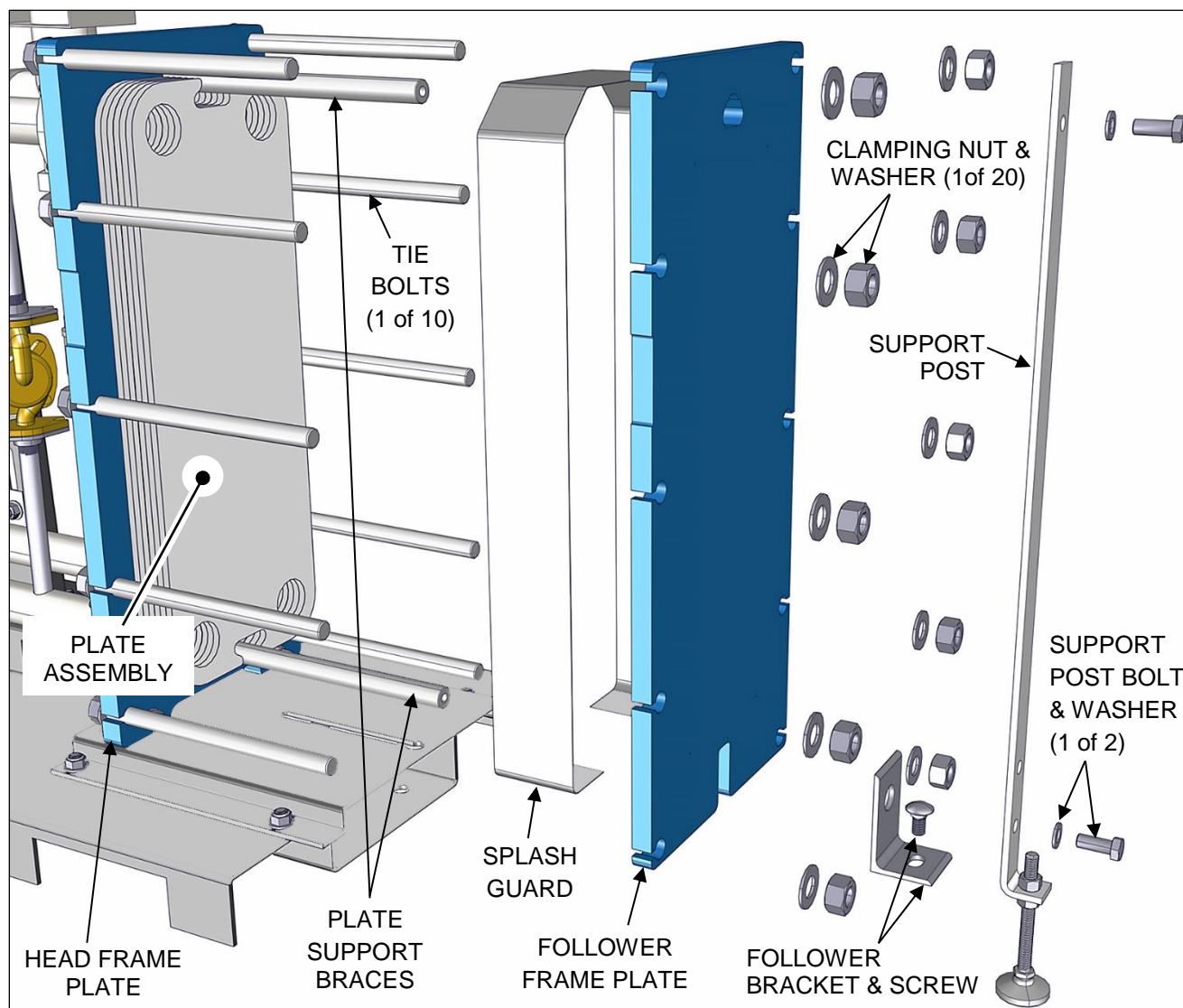
**FIGURE 4-1: Critical Dimension "A"**

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To disassemble the heat exchanger and access the plate assembly for cleaning or replacement, refer to Figure 4-2 and to the instructions that follow. Parts in Figure 4-2 are labeled according to the nomenclature used in the disassembly instructions on the next page.

### NOTE:

Figure 4-2 is for part identification only and is not meant to accurately portray the plate assembly.



**FIGURE 4-2: Plate & Frame Heat Exchanger Parts**

### CAUTION!

Only technically qualified persons are allowed to disassemble and perform maintenance on this heat exchanger.

Below are the instructions for disassembly and inspection of the plate and frame heat exchanger.

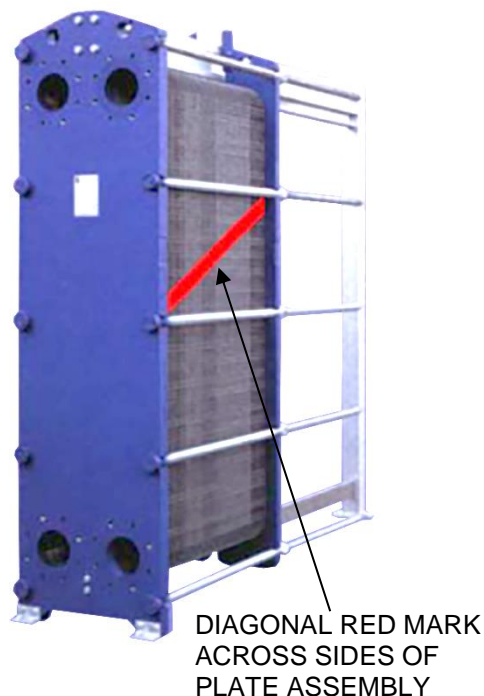
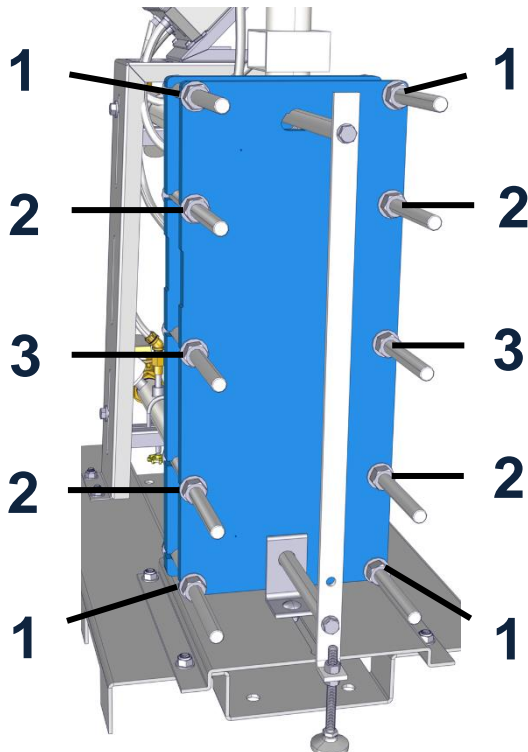
### ➤ PLATE & FRAME HEX DIASSEMBLY and CLEANING

1. Shut down the heat exchanger as described in section 3.5.
2. Shut off all water connections.
3. Shut off all power to the unit.
4. Ensure to bleed all pressure from all parts of the unit. Open drain valves.
5. Make sure the heat exchanger cools down to below 104 °C; with EPDM < 219.2 °C
6. Clean the exposed threads of the ten clamping bolts (Figure 4-1) and grease them.

#### **CAUTION!**

To prevent personal injury, ensure unit is depressurized and drained of all hot fluids before attempting to open the heat exchanger.

7. Loosen the clamping nuts affixing the bolts in the Follower frame plate in the order shown in Figure 4-3a.
8. Unclamp as uniformly as possible by turning alternating bolts based on the bolt opening order, thus keeping the frames and plates parallel throughout the operation. Avoid allowing the frame plates to be skewed by more than 5 mm.



**FIGURE 4-3a: Bolt Loosening Order      FIGURE 4-3b: Marking Plates w/ Red Line**

9. Remove the upper and lower Support Post Bolts, washers, and support post (Figure 4-2)



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and set aside for reassembly.

10. Remove the Follower Bracket and Screw (Fig. 4-2) and set aside for reassembly.
11. Pull the Follower frame plate back far enough to expose the internal Plate Assembly (Fig. 4-2).
12. Remove the Splash Guard (Fig. 4-2), and set aside for reassembly.

**NOTE:**

The plates must be reassembled in the exact same order and configuration at reassembly, so the order should be recorded or plates marked to ensure proper configuration during reassembly. It is suggested to mark the plates with a diagonal line, as shown in Figure 4-3b in order to easily record proper order and orientation of the plates.

**4.3.4.1 Cleaning the Plates****CAUTION!**

Always wear gloves and eye goggles when using cleaning detergents.

- Consult a cleaning specialist for a suitable choice of detergent. Ensure that all detergents used are compatible with the plate and gasket material before use.
- If plates are removed for manual cleaning, make sure they are re-fitted in the exact same order and orientation when refitted.
- Use ONLY nylon or other types of “soft” scrubbing brushes when cleaning the plates.
- The plates use gaskets to prevent contamination of the water being heated, and these must be removed in order to clean the plate properly. Use Acetone or other types of solvents which do not contain chlorine to remove old gasket glue. Alternatively use an LP gas flame heating the reverse side of the plate. Do not use any other type of gas which may produce a “harder” flame. Boiling water can be used with some success.
- For thick scaling or organic material, the plates may be submerged in a tank of appropriate cleaning agent in order to dissolve deposits and/or soften organic contamination.

**CAUTION!**

Never use a metal brush, steel wool or sand/glass paper. This will damage the passivation film of the plates.

- A high pressure cleaner may be used, but care should be exercised and abrasives never used.
- Clean thoroughly. Insufficient cleaning may result in reduced water flow, lower thermal output, and shortened heat exchanger life expectancy.

#### 4.3.4.2 Plate Inspection and Replacement

All plates must be clean, dry and free from oil or grease for inspection. If there are any oil deposits on the gaskets, or on the gasket seating area, then there is a strong likelihood that the plates may slip out of place when the unit is being tightened. If the gaskets are contaminated with dirt or grit, then these could cause leakage.

- Make sure that all seating areas are flat, clean and undamaged.
- If one plate is replaced, then each plate on either side must also be replaced.
- Always use new gaskets.
- Fit the plates according to the Plate Sequence Sheet – ensure all gaskets face towards the fixed / head frame plate.
- Alternate between left and right handed plates – if the plate edges form a regular honeycomb pattern, the left / right hand sequence is correct, see Figure 4-3 below.

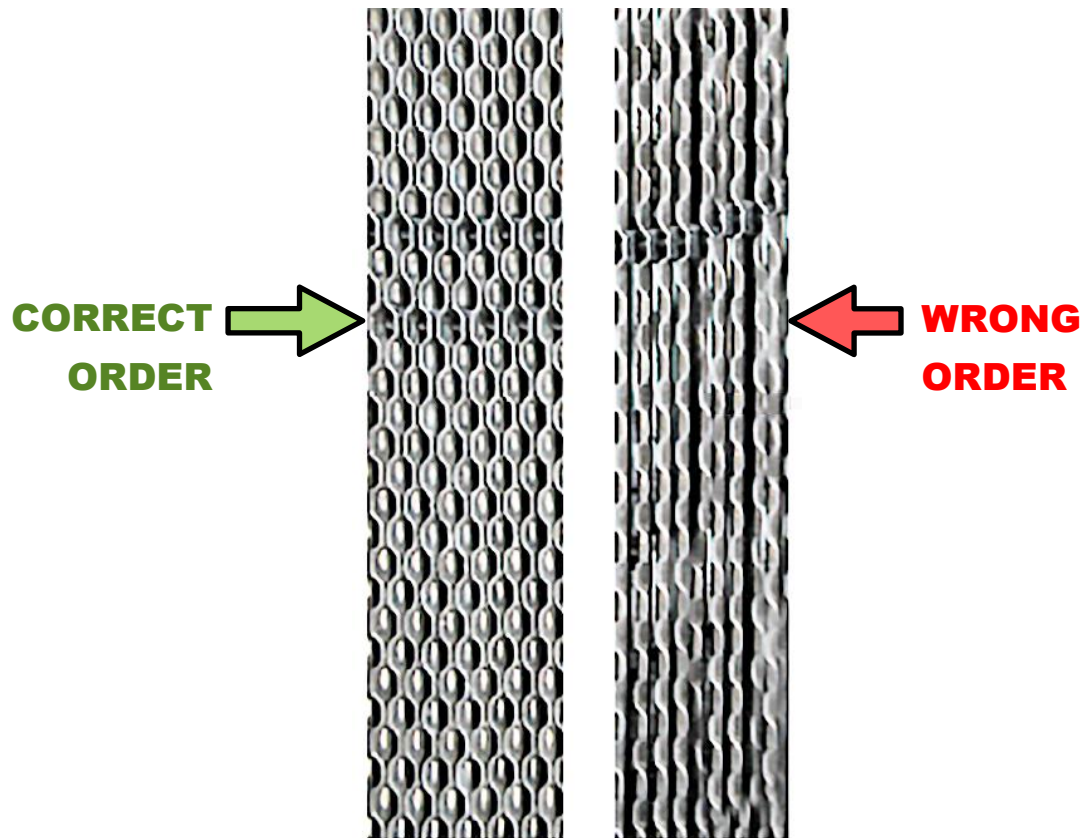


FIGURE 4-3: Determining Proper Alternating Plate Packing



### 4.3.5 Plate & Frame Heat Exchanger Reassembly

To reassemble the plate and frame heat exchanger refer to the instructions below.

#### ➤ PLATE & FRAME HEAT EXCHANGER REASSEMBLY

1. After the plate assembly is in order, refer to Figure 4-2 and instructions in Section 4.3.2 for identification of parts involved in the reassembly.
2. Lightly oil the threads of the tie bolts used for clamping the face plates together. Ensure that oil or grease do not get onto the gaskets or the gasket seating faces on the back of the plates.

Wet or contaminated plates can become misaligned during tightening. In that case, dismantle, clean, and dry all areas in contact with the gaskets.

3. Evenly tighten all bolts in the correct order (refer to Figure 4-2a). A ratchet spanner is advised for this use.

#### CAUTION!

Tightening of the plate package can only be done with a fully depressurized unit.

4. Ensure clamping is as uniform as possible by alternating bolt turns, thus keeping the frames and plates parallel throughout the operation. Avoid skewing the frame plates by more than 5 mm.
5. Tightening is complete when the distance between the inside faces of both Follower and Head frame plates equals the "A" distance as shown in the datasheet or measurement (see Figure 4-1). This tightening distance can also be calculated using the following formula:  $\text{Assembly distance} = \text{No. of plates} \times (\text{plate thickness} + \text{coefficient})$  the coefficients vary depending on the model type. If in doubt, please check with the relevant DHT Sales Office.
6. Finally check that all bolts are in tension and clean any spilt oil off the frame plates.
7. On completion the unit can be pressure tested (test pressure is stated on the name plate).
8. If dimension "A" is not reached with application of maximum tightening torque:
  - a) Check the number of plates and dimension A on the datasheet.
  - b) Check that all the nuts and bearing boxes are running freely. If not, clean and lubricate or replace.
9. If the unit does not fully seal, it may be tightened step by step to give dimension "A" min. This dimension is mentioned on the nameplate. The maximum tightening torque must not, however, be exceeded.

#### CAUTION!

**Under no circumstances distance "A" may be smaller than "A" min.**

10. Replace the Splash Guard, reassemble the Cover Bracket & Screw to the follower cover, and affix the Support Post to the Plate Support Braces at two places (see Figure 4-2).
11. After all adjustments have been made to satisfaction and all connections and fittings double checked, apply power and refer to **Section 3.4: Unit Startup Procedures** to



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initiate operation of the unit.

12. Unit should be checked for leaks and correct pressure levels to ensure proper operation.

#### 4.4 T&P OR PRESSURE ONLY RELIEF VALVE REPLACEMENT

If the water pressure or T&P relief valve mounted on the unit is not functioning correctly and must be replaced, follow the procedures outlined below.

##### ➤ T&P RELIEF VALVE REPLACEMENT INSTRUCTIONS

- 1) Before performing this maintenance procedure, follow the shutdown procedure in Section 3.8 to take the unit off-line.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

- 2) Carefully disconnect the drain line from the relief valve to the drain.
- 3) Unscrew and remove the T&P relief valve from its mounting location (Fig. 4-4).
- 4) Install the new relief valve in place. Tighten until sealed and facing proper orientation for reconnection to the drain line.

**NOTE:** Use and type of joint sealer should be determined from local codes or the specifications of the installing contractor. Reconnect the drain line from the relief valve to the drain per local codes.

- 5) If any were disconnected, reconnect all electric and pneumatic lines and restore power and instrument air to the system.
- 6) Reference the manufacturer's documentation for the T&P relief valve that was supplied with your unit for additional installation / setup instructions.
- 7) Follow the startup procedures to put the unit back on-line. Carefully check all connections for any sign of leakage.

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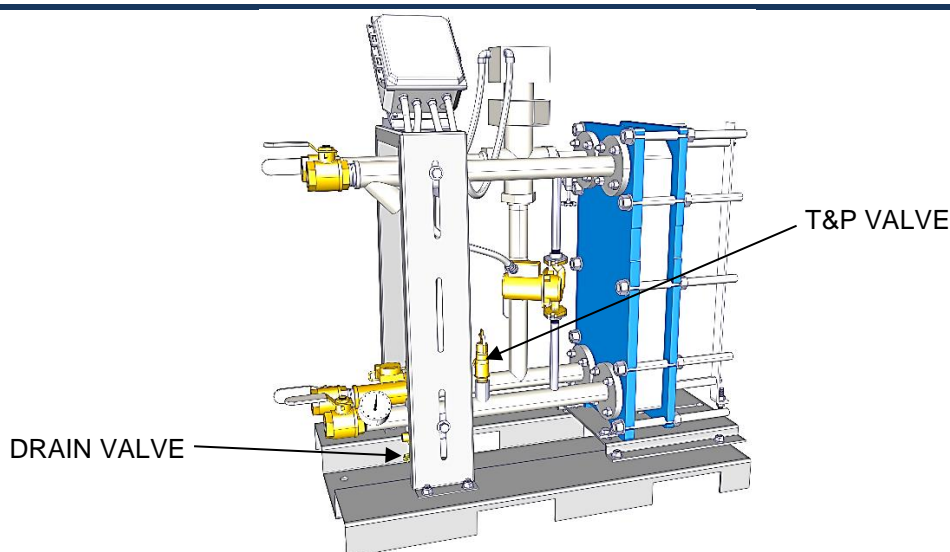


FIGURE 4-4: T&amp;P Relief Valve Replacement Location

## 4.5 STRAINERS INSPECTION AND REPLACEMENT

The strainers are installed upstream of the energy source shutoff valve. The strainers must be flushed periodically (approximately every three (3) to six (6) months) to prevent the buildup of any sediment.

### ➤ STRAINERS INSPECTION AND REPLACEMENT INSTRUCTIONS

- 1) Follow Steps 1 through 7 of the shutdown procedure (Sec. 3.2) to take the unit off-line before attempting this maintenance procedure.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

- 2) The exact location of the strainers can differ between units, but refer to Figure 3-1a and 3-1b for a typical location. Reference the drawing supplied with the Submittal sheet for the unit to identify the exact location of the strainers on the unit.
- 3) Carefully break the line connections on the inlet side of both strainers.
- 4) Carefully break the line connection on the outlet side of the strainers.
- 5) Remove and examine the strainers
- 6) Remove any sediment that is present in the strainers. If they cannot be cleaned satisfactorily, replace with new strainers.
- 7) Place the strainers back-in-line in the system.
- 8) Reconnect the inlet and outlet lines to each strainer. Follow recommendations contained in the manufacturer's documentation, local codes, or accepted contractor practices as to



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the use and/or type of joint compound or sealer at the connections.

- 9) Follow the startup procedures to put the unit back on-line. Carefully check all connections for any sign of leakage.

## 4.6 3-WAY CONTROL VALVE MAINTENANCE

The manufacturer documentation included with the unit gives specifics for operation and maintenance of the control valve. The Submittal sheet and drawing included with the unit will give the exact location, as well as interlocks with other components. This information should be reviewed before removal/ replacement of the temperature control valve.

### 4.6.1 3-Way Control Valve Maintenance

The valves and actuators require no maintenance or service. The valve stem is sealed with a maintenance-free O-ring gland. Open the electronics module of the 3-Way Controller Valve to view the two-color LED display, which indicates the operating status of the valve. See the table below to determine if the valve may possibly be faulty.

3-WAY CONTROL VALVE STATUS LEDs		
LED Display	Status	Description
Green LED	On continuously	Automatic mode: Auto (normal, no faults)
	Flashing	<ul style="list-style-type: none"> <li>– Mechanically set to MANUAL</li> <li>– Mechanically set to OFF</li> <li>– Currently in auto-calibration mode</li> </ul>
Red LED	On continuously	<ul style="list-style-type: none"> <li>– General fault</li> <li>– General calibration fault</li> <li>– Microcontroller fault</li> </ul>
	Flashing	– Faulty 24 VAC supply (or low power)
LED Off		<ul style="list-style-type: none"> <li>– No 24 VAC supply</li> <li>– Fault with electronics module</li> </ul>

Should the valve electronics prove faulty, the electronics module should be replaced with a new one. Contact DHT for part numbers and ordering information. See the replacement information below for mounting and installation.

### 4.6.2 3-Way Control Valve Replacement

Mounting and operating instructions are printed on the actuator and on the electronics module.

The valve is suitable only for straight-through or three-way applications and may be installed only in a mixing arrangement. In the case of the straight-through valve, strict observance of the direction of flow is essential.

To replace a faulty or effective unit, refer to the following instructions.



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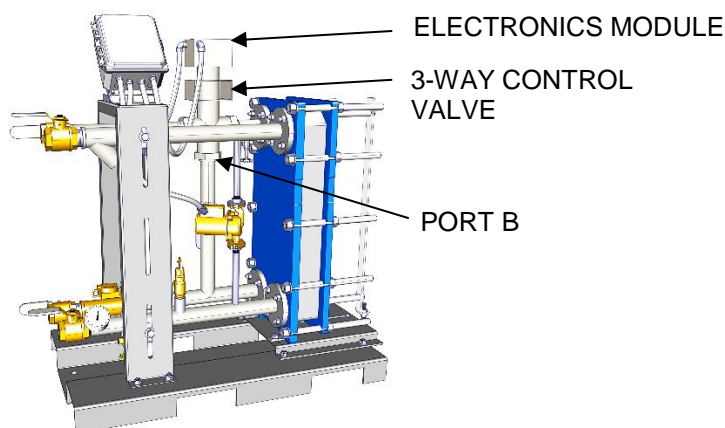


FIGURE 4-5: 3-Way Control Valve Component Locations

### ➤ 3-WAY CONTROL VALVE REPLACEMENT INSTRUCTIONS

- 1) Follow Steps 1 through 7 of the shutdown procedure in Section 3.8 to take the unit off-line before attempting this maintenance procedure.

**WARNING!**

Boiler water or high temperature water present situations that can be **very dangerous** because of the high temperatures and pressures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures.

**WARNING!**

TURN OFF/DISCONNECT ALL ELECTRIC POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.

- 2) Assure that the energy source, water inlets and outlets have been shut off; that the pressure has been bled from both the steam and energy source systems; that the unit has been completely drained; and that all components and surfaces have cooled.
- 3) Turn off the power and disconnect the leads to the valve.
- 4) Carefully break all connections to the control valve and remove the old valve from the unit.

When installing the replacement valve, do not mount with actuator below horizontal position. It is essential to maintain the specified minimum clearance above and to the side of the actuator and/or electronics module for servicing, installing and heat dissipation:

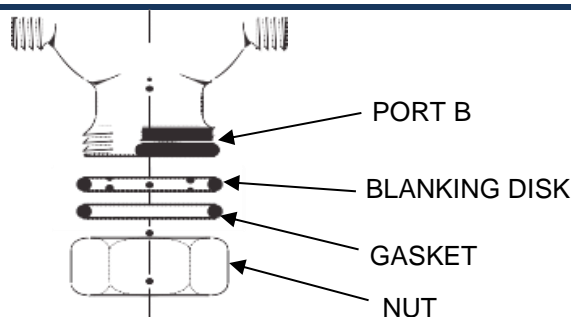
- 1/2-inch to 1-1/4 inches = 4 inches
- 1-1/2 inches to 2-1/2 inches = 6 inches

Port "B" can be sealed with the accessories supplied (blanking disk, gasket, and the nut).

**NOTE:** Blanking disks are not available for the large flange models.



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**FIGURE 4-6: 3-Way Control Valve NPT Connection Components**

**NOTE:** NPT screwed valves are flat-faced to facilitate sealing with the gaskets supplied. Do not use hemp, tape or thread-sealing compound. Do not insulate the actuator.

- 5) Reattach electrical connections. Follow local codes, or accepted contractor practices as to the use and /or type of joint compound or sealer at the connections.
- 6) Follow the startup procedures to put the unit back on-line. Carefully check all connections for any sign of leakage.

## 4.7 TEMPERATURE CONTROLLER

The temperature controller is a digital solid-state device, which requires no periodic maintenance.

Occasional physical checks of the unit should be carried out for physical and mechanical security of mounting, terminal blocks, and electrical wiring.

## 4.8 REPLACEABLE PARTS LIST

The following is a list of parts that are generally replaceable, by trained/certified personnel, on DHT, Inc., Water Heaters. The replaceable parts may vary, depending on the unit and the particular design specifications in which the unit was constructed. If there are questions concerning the replaceable parts for the unit, refer to the original design specifications, or contact DHT, Inc.

**Please have the unit's model and serial number available when contacting DHT, Inc.**

**NOTE:**

Replaceable Parts may vary depending on design specification of the unit.

- 3-Way Control Valve
- Gaskets (Plate & Frame only)
- Heat Exchanger Plates (Plate & Frame only)
- Heat Exchanger Module (Brazed Plate only)
- Thermometer
- T&P Relief Valve
- PID Controller



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- Recirculation Pump
- Thermocouple
- Strainers
- Dirt/Process Filter Gauge
- Isolation Valves

## 4.9 RECOMMENDED SPARE PARTS:

TABLE 4-3: RECOMMENDED SPARE PARTS

REFERENCE	ITEM NO.	QUANTITY PER UNIT	PART NAME
SEC 4.12	1	1	Bi-Metal Thermometer
SEC 4.12	1	1	Control Valve Actuator Module
SEC 4.12	1	1	PID Controller
SEC 4.12	1	1	Recirculation pump
SEC 4.12	1	1	Thermocouple
SEC 4.12	1	1	Dirt or process filter gauge
SEC 4.12	1	1	Strainer screen
SEC 4.12	1	1	Plate and Frame heat exchanger
SEC 4.12	1	1	Plates with gaskets
SEC 4.12	1	1	Gaskets

## 4.10 ORDERING INFORMATION

All replacement parts for DHT SuperPlate units can be ordered directly from your local authorized sales representative/agent. Visit Rep Locator page on DHT website if needed to find your local sales rep contact information.

**NOTE:**

If sales representative is not available, please contact DHT Sales.

Please include the model and serial number of the unit for which the parts are being ordered. If ordering by phone, please have this information readily available. All orders must be submitted via PO and sent to [sales@dhtnet.com](mailto:sales@dhtnet.com).



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**4.11 INSPECTION SCHEDULE**

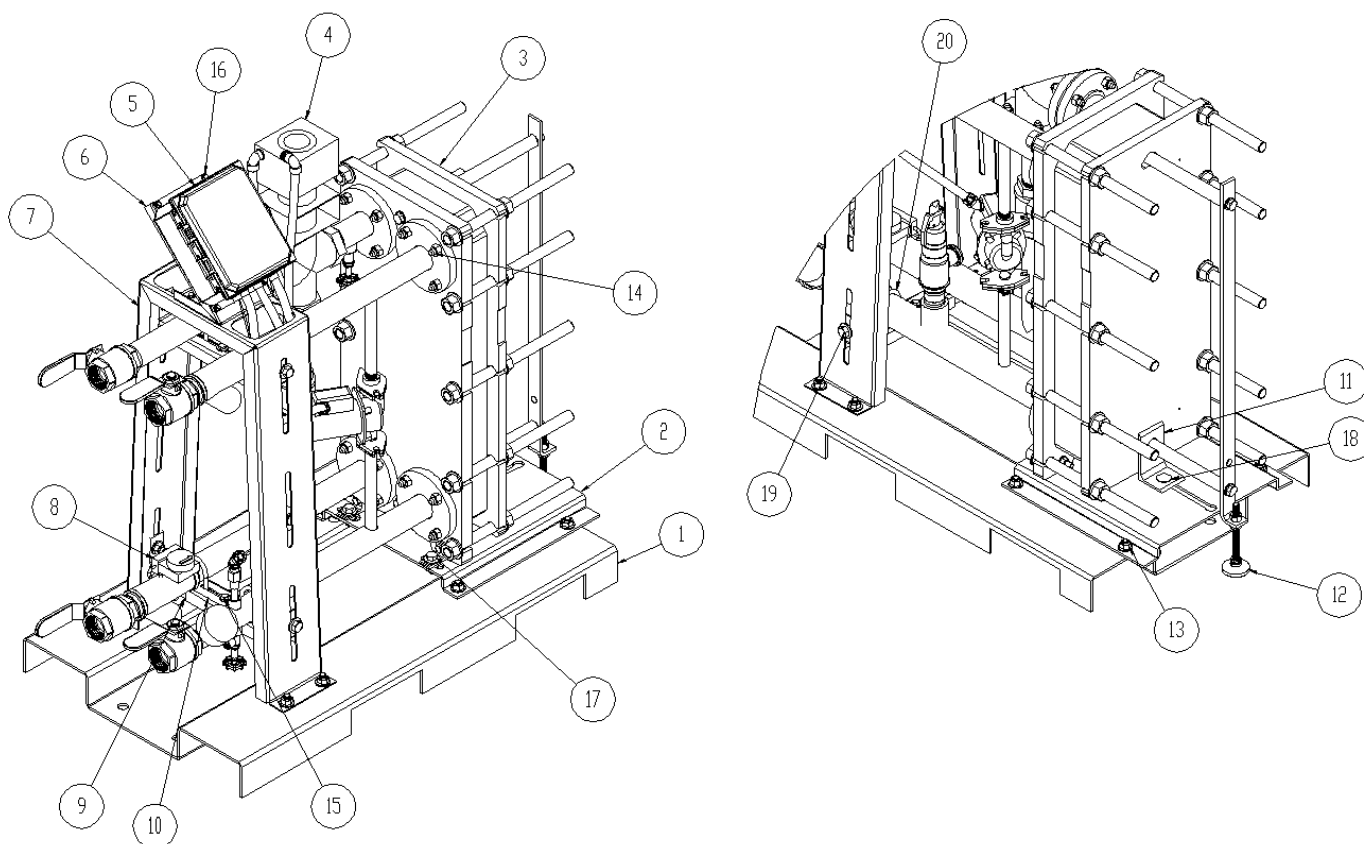
Table 4-4, below, summarizes the recommended time intervals for inspection of the water heater, components, inlet and outlet water and energy source lines (boiler water or high temperature water), and power connections.

<b>TABLE 4-4: RECOMMENDED INSPECTIONS TIME INTERVAL TABLE</b>						
<b>TO BE INSPECTED</b>	<b>PER MANUFACTURE SPECS.</b>	<b>WEEKLY</b>	<b>MONTHLY</b>	<b>3 MONTHS</b>	<b>6 MONTHS</b>	<b>1 YEAR</b>
Recirculation Pump	<b>X</b>					
Control Valve	<b>X</b>					
Temperature & Pressure Gauges				<b>X</b>		
Heat Exchanger Plates & Gaskets (measure performance)					<b>X</b>	
Inlet, Outlet & Return Connections				<b>X</b>		
Power & Ground Connections				<b>X</b>		
Relief Valves	<b>X</b>					
Isolation Valves		<b>X</b>				
Strainers				<b>X</b>		
PID Controller & Thermocouple					<b>X</b>	



## 4.12 PARTS AND ACCESSORIES

### Plate and Frame Units:



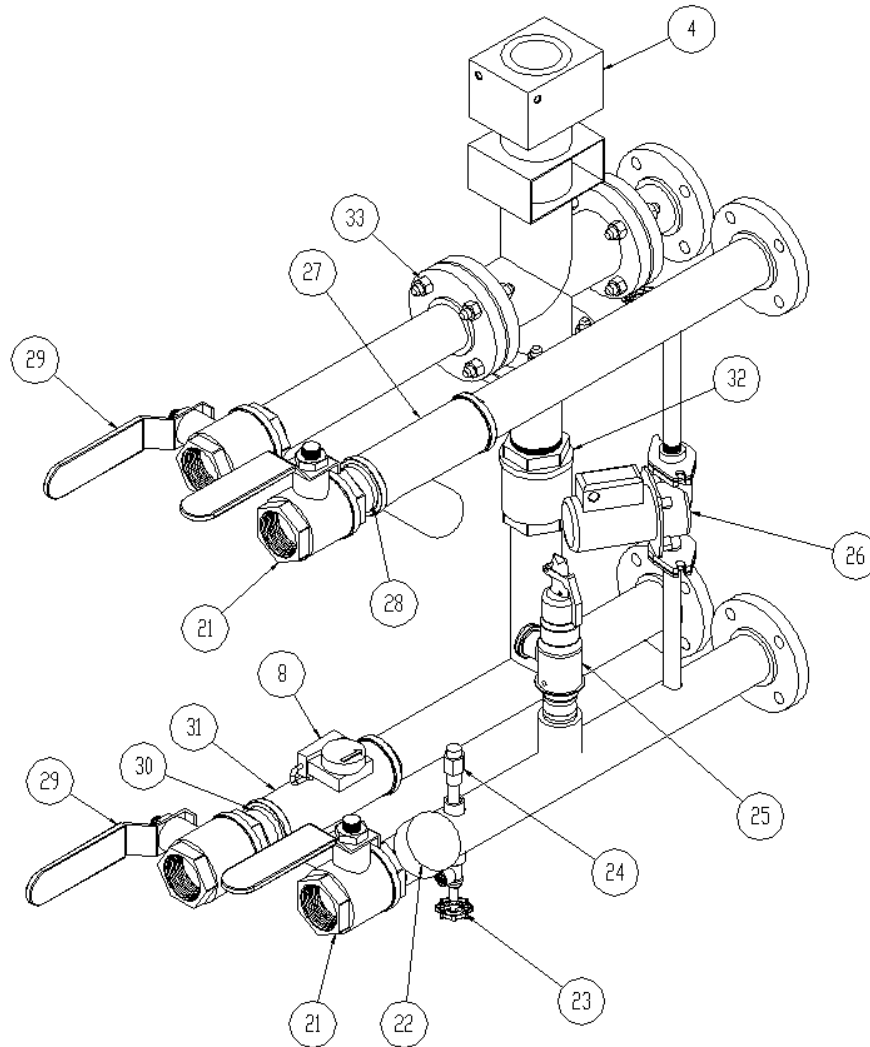
**TABLE 4-5: PLATE AND FRAME UNITS**

ITEM NO.	PART NO.	QUANTITY	PART DESCRIPTION
1	10024	1	BASE SKID - SUPERPLATE
2	10025	1	PLATFORM, HEAT EXCHANGER - SUPERPLATE
3	SEE TABLE 4-8	1	D.W. HEAT EXCHANGER (SEE TABLE 4-8)
4	MPART-A-MXV-0001	1	3-WAY CONTROL VALVE – 1-1/2" NPT
	MPART-A-MXV-0004		3-WAY CONTROL VALVE – 2" NPT
	MPART-A-MXV-0003		3-WAY CONTROL VALVE – 2-1/2 FLG
5	MELE-01-0008	1	CONTROL PANEL W/ GATEWAY
6	10026	1	MOUNT, CONTROL PANEL - SUPERPLATE
7	10027	1	A-FRAME - SUPERPLATE
8	MPART-X-51-0001	1	PROCESS FILTER GAGE - 1/8" NPT
9	10028-1	2	PIPE SUPPORT, LEFT
10	10028-2	2	PIPE SUPPORT, RIGHT



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11	10035	1	L-BRACKET - SUPERPLATE
12	MHRD-19-0001	1	LEVEL FEET - 5/8"-11 X 6"
	MHRD-01A-0003	2	HEX NUT 5/8"-11 - UNC 2B
13	MHRD-03-0015	4	SQUARE NECK CARRIAGE BOLT - 5/8"-11 X 1.25"LG FULL THREAD - UNC 2B - GRADE 5
	MHRD-01B-0008	4	FLANGED LOCK NUT - 5/8"-11 - UNC 2B - GRADE 5
14	MHRD-15-0050	16	STUD - 5/8"-11 X 3 "LG - UNC 2A
	MHRD-01A-0003	16	HEX NUT 5/8"-11 - UNC 2B
15	MHRD-03-0014	2	HEX BOLT - 3/8"-16 X 1.25"LG FULL THREAD - UNC 2B – GRADE 5
	MHRD-05-0009	2	FLAT WASHER (NARROW) – 3/8" – TYPE B
	MHRD-01B-0007	2	FLANGED LOCK NUT - 3/8"-16 - UNC 2B - GRADE 5
16	MHRD-03-0013	8	HEX BOLT - 1/4"-20 X 0.75"LG FULL THREAD - UNC 2B – GRADE 5
	MHRD-05-0010	8	FLAT WASHER (NARROW) – 1/4" – TYPE B
	MHRD-01B-0006	8	FLANGED LOCK NUT - 1/4"-20 - UNC 2B - GRADE 5
17	MHRD-03-0012	2	HEX BOLT - 5/8"-11 X 1.25"LG FULL THREAD - UNC 2B - GRADE 5
	MHRD-05-0008	2	FLAT WASHER (NARROW) – 5/8" – TYPE B
	MHRD-01B-0008	2	FLANGED LOCK NUT - 5/8"-11 - UNC 2B - GRADE 5
18	MHRD-03-0015	1	SQUARE NECK CARRIAGE BOLT - 5/8"-11 X 1.25"LG FULL THREAD - UNC 2B - GRADE 5
	MHRD-01B-0008	1	FLANGED LOCK NUT - 5/8"-11 - UNC 2B - GRADE 5
19	MHRD-03-0015	4	SQUARE NECK CARRIAGE BOLT - 5/8"-11 X 1.25"LG FULL THREAD - UNC 2B - GRADE 5
	MHRD-05-0008	4	FLAT WASHER (NARROW) – 5/8" – TYPE B
	MHRD-01B-0008	4	FLANGED LOCK NUT - 5/8"-11 - UNC 2B - GRADE 5
20	MHRD-03-0016	2+2	U-BOLT - C.S.(ZINC) – 1-1/2" NPS X 3/8-16 - UNC 2A GRADE 5
	MHRD-03-0007		U-BOLT - C.S.(ZINC) - 2" NPS X 3/8-16 - UNC 2A GRADE 5
	MHRD-03-0017		U-BOLT W/ HEX NUTS – 2.5" NPS X 3/8"-16 – UNC 2A



**TABLE 4-6: DOMESTIC HOT WATER ASSEMBLY**

ITEM NO.	PART NO.	QUANTITY	PART DESCRIPTION
21	MPART-E-BV-0023	2	BALL VALVE – 1-1/2" FNPT – LEAD FREE
	MPART-E-BV-0024		BALL VALVE – 2" FNPT – LEAD FREE
	MPART-E-BV-0025		BALL VALVE – 2-1/2" FNPT – LEAD FREE
22	MPART-C-TAG-0001	1	BIMETAL THERMOMETER
23	MPART-E-05-0003	1	3/4" NPT DRAIN VALVE - LEAD FREE
24	MELE-06-0002	1	THERMOCOUPLE – 1-1/2 & 2" NPS PIPE
	MELE-06-0004		THERMOCOUPLE – 2-1/2 & 3" NPS PIPE
25	SEE TABLE 4-9	1	SEE TABLE 4-9
26	MELE-09-0002	1	RECIRCULATION PUMP
27	MPART-E-Y-0002	1	Y-STRAINER – 1-1/2" NPT – 250# - LEAD FREE



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	MPART-E-Y-0003	1	Y-STRAINER – 2" NPT – 250# - LEAD FREE
	MPART-E-Y-0004		Y-STRAINER – 2-1/2" NPT – 250# - LEAD FREE
	MFIT-3A3-S-18-0005-001		NIPPLE – 1-1/2" NPT X CLOSE X (SCH40/STD) – TWO END THREADED
28	MFIT-3A3-S-18-0006-001	1	NIPPLE – 2" NPT X CLOSE X (SCH40/STD) – TWO END THREADED
	MFIT-3A3-S-18-0007-001		NIPPLE – 2-1/2" NPT X CLOSE X (SCH40/STD) – TWO END THREADED

**TABLE 4-7: BOILER HOT WATER ASSEMBLY**

ITEM NO.	PART NO.	QUANTITY	PART DESCRIPTION
29	MPART-E-BV-0023	1	BALL VALVE(FULL PORT) – 1-1/2" FNPT (-40F TO 400F) – 600 CWP – LEAD FREE
	MPART-E-BV-0024		BALL VALVE(FULL PORT) – 2" FNPT (-40F TO 400F) – 600 CWP – LEAD FREE
	MPART-E-BV-0025	2	BALL VALVE(FULL PORT) – 2-1/2" FNPT (-40F TO 400F) – 400 CWP – LEAD FREE
30	MFIT-2A-S-18-0004-001	1	NIPPLE – 2.5" LG X (SCH 40/STD) – TWO END THREADS
31	MPART-E-04-0001	1	COMBINATION VALVE-STRAINER - 1-1/2" NPT
	MPART-X-51-0001		COMBINATION VALVE-STRAINER - 2" NPT
	MPART-A-Y-0006		Y-STRAINER(VERTICAL) – 2-1/2" NPT
32	MPART-E-06-0001	1	CALIBRATED BALANCE VALVE ( CIRCUIT SEETER PLUS) – 1-1/2" NPT – 400 PSIG(250F) – LEAD FREE
	MPART-E-06-0002		CALIBRATED BALANCE VALVE ( CIRCUIT SEETER PLUS) – 2" NPT – 400 PSIG(250F) – LEAD FREE
	MPART-E-06-0003		CALIBRATED BALANCE VALVE ( CIRCUIT SEETER PLUS) – 2-1/2" NPT – 400 PSIG(250F) – LEAD FREE
33	MHRD-15-0051	1	STUD – 5/8"-11 X 4" LG – UNC 2A
	MHRD-01A-0003	1	HEX NUT – 5/8"-11 – UNC 2B

**TABLE 4-8: DOUBLE WALL PLATE AND FRAME HEAT EXCHANGER**

ITEM NO.	PART NO.	QUANTITY	PART DESCRIPTION
3	MPART-3-20-0019	1	HEAT EXCHANGER (D19A-IG10-26-TL)
	MPART-3-20-0020		HEAT EXCHANGER (D19A-IG10-36-TL)
	MPART-3-20-0021		HEAT EXCHANGER (D19A-IG10-60-TL)
	MPART-3-20-0022		HEAT EXCHANGER (D19A-IG10-46-TL)
	MPART-3-20-0023		HEAT EXCHANGER (D19A-IG10-64-TLA)





**SECTION 4: MAINTENANCE**

**TABLE 4-9: TEMPERATURE AND PRESSURE RELIEF VALVE**

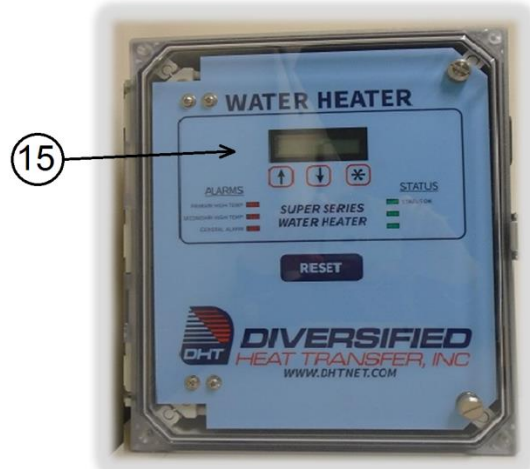
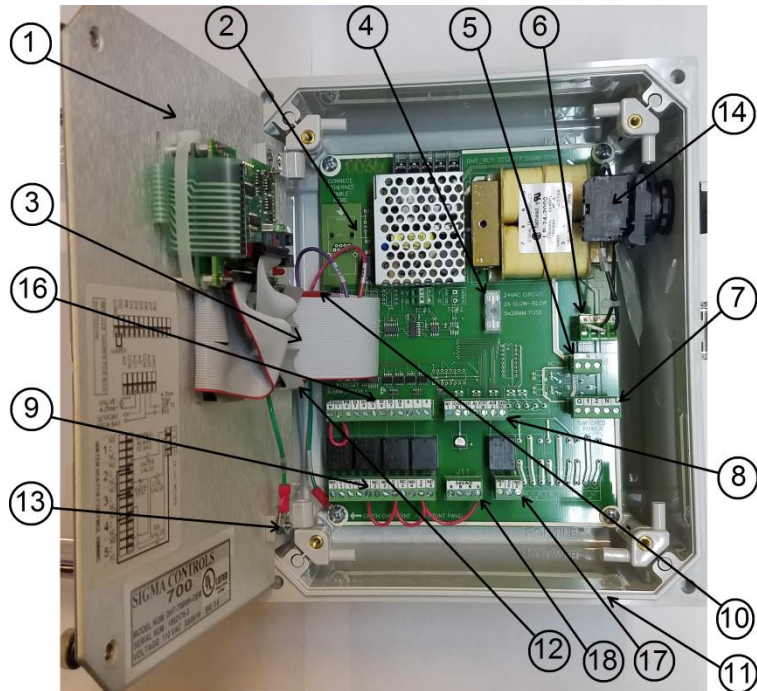
ITEM NO.	PART NO.	QUANTITY	PART DESCRIPTION
25	MPART-E-RV1-0002	1	3/4" NPT T&P RELIEF VALVE – LEAD FREE
	MPART-E-RV1-0003		1" NPT T&P RELIEF VALVE – LEAD FREE
	MPART-E-RV1-0005		1" NPT T&P RELIEF VALVE – LEAD FREE
	MPART-E-RV1-0004		1" NPT T&P RELIEF VALVE – LEAD FREE
	MPART-E-RV1-0001		1-1/2" NPT T&P RELIEF VALVE – LEAD FREE



## 4.13 CONTROL BOX PARTS

**TABLE 4-10: CONTROL PANEL PART NUMBERS**

ITEM	PART NO.	QTY.	DESCRIPTION
1	700-OEM-CPU-SUBASSM	1	ENTIRE CPU, MEMBRANE SW & FRONT DOOR
2	700-OEM-RLY-SUBASSM	1	RELAY PCB WITH TRANSFORMER, ALL HEADERS AND 5 RELAYS
3	700-OEM-CAB44-SUBASSM	1	44 PIN CABLE SUB ASSEMBLY 20 & 14 PIN CONNS AND FOLDS
4	700-OEM-FUSE-2A	1	FUSE CERAMIC 2A 250VAC 5X20MM
5	700-OEM-TB-J8	1	GREEN TERMINAL BLOCK 3 POSITION POWER
6	700-OEM-TB-PS	1	GREEN TERMINAL BLOCK 4 POSITION POWER SWITCH
7	700-OEM-TB-J9	1	GREEN TERMINAL BLOCK 5 POSITION PUMP
8	700-OEM-TB-J4	1	GREEN TERMINAL BLOCK 7 POSITION ANALOGS
9	700-OEM-TB-J5	1	GREEN TERMINAL BLOCK 12 POSITION RELAYS
10	700-OEM-HORN	1	SOUND ALARM
11	700-OEM- DHT-ENC	1	CONTROL BOX ENCLOSURE WITH CLEAR LID AND CUTOUPS
12	700-OEM- CAB-CLIP	1	FLAT GRAY PVC CABLE CLIP
13	700-OEM-DOOR-SCR	4	PHILLIPS ROUND HEAD SCREW 18-8SS, 6-32 THRD, 5/8" LONG
14	700-OEM-22M-SW	1	22MM POWER SWITCH ASSM WITH ROTARY SW & CONTACT BLOCK
15	700-OEM-DHT-MEM	1	FRONT COVER MEMBRANE SWITCH
16	700-OEM-TB-J3	1	GREEN TERMINAL BLOCK 12 POSITION DIGITAL INPUTS
17	700-OEM-TB-J6	1	GREEN TERMINAL BLOCK 3 POSITION RELAY 5
18	700-OEM-TB-J11	1	GREEN TERMINAL BLOCK 4 POSITION 24VAC





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## SECTION 5: TROUBLESHOOTING

The following table summarizes problems that may be encountered over the life of a DHT SuperPlate unit, and the procedures to remedy those problems. The left-hand column lists the symptoms. The remaining columns are suggested procedures or “remedies” that should be followed to identify and correct the problem.

SYMPTOM	PROBABLE CAUSE(S)	REMEDY
Water heater is not able to maintain the required temperature at the rated capacity.	<ol style="list-style-type: none"> <li>1. The water heater temperature controls not set properly.</li> <li>2. Control valve is not opening and closing properly.</li> <li>3. Boiler water supply temperature is low.</li> <li>4. Boiler water flow rate is low.</li> <li>5. Boiler water inlet strainer is clogged.</li> <li>6. The heat exchanger is scaled on boiler water side.</li> <li>7. Water heater and control valve being used at higher than rated design capacity.</li> <li>8. Recirculating pump malfunctions/failed.</li> <li>9. Improper signal to control valve from control panel.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the set point settings on the controller. Readjust the set point settings if it is below the required temperature. Refer to programming sequence in section 3.8 for complete settings information.</li> <li>2. See the adjustment and testing instructions contained in the supplied Installation/Operations Manual. Repair or replace the valve if necessary. Refer to Section 4.19 Control Valve Technical Information if hard copy is not available. Make sure valve is in Automatic mode.</li> <li>3. Check to make sure the boiler water inlet temperature gauge reading is equal to the design conditions. Readjust the boiler supply water temperature if necessary.</li> <li>4. Measure the boiler water supply flowrate using flowmeter and check the pump to make sure the flowrate is not lower than the design conditions.</li> <li>5. Check the differential pressure/dirt gauge and blowdown the strainer until the gauge is in GREEN region.</li> <li>6. Clean the heat exchanger per instructions in Section 4.3. Call DHT or your authorized representative, for instructions on repair or replacement if necessary. Also ensure the water quality levels are within the allowable limits.</li> <li>7. Check to make sure the operating conditions to not exceed the design conditions. Reduce the load or resize the heat exchanger.</li> <li>8. Recirculation piping temperature should be same as the hot water outlet temperature when recirculation pump is operating properly. Check the power supply or repair/ replace the pump if needed.</li> <li>9. Open the valve cover and check 4-20mA control signal is present at valve terminals. Troubleshoot panel to restore proper signal to control valve if it malfunctions.</li> </ol>



DHW supply temperature is too high	<ol style="list-style-type: none"> <li>1. The water heater temperature control system/valve is not operating properly.</li> <li>2. The temperature controller or thermometer indicates wrong value.</li> <li>3. Control Valve is in set in MANUAL mode.</li> <li>4. Control Valve requires calibration.</li> <li>5. Heat Exchanger is scaled on domestic water side.</li> </ol>	<ol style="list-style-type: none"> <li>1. See the adjustment and testing instructions contained in Section 3.6 for the specific temperature control system installed on the unit. Also, check to ensure that the thermocouple is installed and functioning correctly. Repair or replace thermocouple if needed. Replace the control valve and/or actuator if necessary. Refer to Section 4.6 for replacement instructions.</li> <li>2. Inspect and replace the temperature controller, thermocouple and/or thermometer if any of them not functioning properly.</li> <li>3. Make sure the Control Valve is set in AUTO mode.</li> <li>4. Recalibrate the control valve if needed per instructions in Section 4.3.</li> <li>5. Clean the heat exchanger per instructions in Section 4.3. Call DHT or your authorized representative, for instructions on repair or replacement if necessary. Also ensure the water quality levels are within the allowable limits.</li> </ol>
DHW supply outlet temperature fluctuates significantly	<ol style="list-style-type: none"> <li>1. Control Valve does not open/close properly.</li> <li>2. Water heater and control valve being used at higher than rated design capacity.</li> <li>3. Recirculating pump malfunctions/ failed.</li> <li>4. Ground wiring connection is loose or disconnect.</li> <li>5. The water heater temperature control system is not operating properly</li> </ol>	<ol style="list-style-type: none"> <li>1. See the adjustment and testing instructions contained in the supplied manual for the specific temperature control valve installed on the unit. Replace the control valve and/or actuator if necessary. Refer to Section 4.6 for replacement instructions.</li> <li>2. Call DHT or your authorized representative. Refer to the nameplate for the model and serial numbers of the unit and heat exchanger coil. Include these numbers in all correspondence.</li> <li>3. Recirculation piping temperature should be same as the hot water outlet temperature when recirculation pump is operating properly. Check the power supply or repair/ replace the pump if needed. Also check building recirculation pump aquastat settings if being used.</li> <li>4. Check the ground connection to make sure it is not loose which can cause electrical nuisance for temperature control (building stray voltage).</li> <li>5. Refer to the PID settings adjustment and testing instructions contained in Section 3.6 for the specific temperature control system installed on the unit. Also, check to ensure that the thermocouple is installed and functioning correctly. Repair or replace it if needed.</li> </ol>
Excessive or insufficient boiler water	<ol style="list-style-type: none"> <li>1. The water return piping has not been installed properly to allow the water return; boiler water return line is</li> </ol>	<ol style="list-style-type: none"> <li>1. Rearrange the boiler water return piping and inspect the valve for proper drainage. Also check to make sure there is no restriction in the water return line. Replace the check valve if it is leaking or has</li> </ol>



## SECTION 5: TROUBLESHOOTING

being returned from the unit.	<p>restricted; or the return check valve is leaking or has failed.</p> <p>2. There is a water leakage in the heat exchanger.</p>	<p>failed.</p> <p>2. Shut off the isolation valves on inlet and outlet of the unit and check to verify the presence of leakage. Disassemble, inspect, repair (if possible), or replace the heat exchanger and reassemble the unit.</p>
Unit is not heating the domestic water and control valve is closed	<p>1. There is no power supply to control valve.</p> <p>2. There is no signal from controller to valve.</p>	<p>1. Open the valve cover and check to make sure 24VAC power is present at valve terminals. Troubleshoot panel to restore power if it is not present.</p> <p>2. Open the valve cover and check 4-20mA control signal is present at valve terminals. Troubleshoot panel to restore proper signal to control valve if it malfunctions.</p>
Temperature and Pressure or pressure only relief valve "pops".	<p>1. Water 3-way control valve does not close properly.</p> <p>2. Incoming water is preheated too much.</p> <p>3. Improperly sized or disconnected expansion tank in closed loop piping system.</p> <p>4. Inadequate water hammer arrestors.</p> <p>5. System/incoming water pressure is too high.</p> <p>6. Relief valve is faulty.</p> <p>7. Over temperature settings in PID controller not properly set or defective.</p>	<p>1. See the adjustment and testing instructions contained in Section 3.6 for the specific temperature control system installed on the unit. Also, check to ensure that the thermocouple is installed and functioning correctly. Repair or replace it if needed. Replace the control valve and/or actuator if necessary. Refer to Section 4.6 for replacement instructions.</p> <p>2. Maintain incoming cold water at least 10°F below the hot water supply temperature.</p> <p>3. Install the properly sized expansion tank in the closed loop piping system as shown in Installation and Piping drawings in Section 6.3.</p> <p>4. In order to avoid any shock waves, install water hammer arrestors/shock absorbers in the hot and cold water systems as needed.</p> <p>5. Bring the system water pressure below the relief valve setting.</p> <p>6. Inspect and adjust or replace the relief valve if it has failed. Contact DHT representative for replacement.</p> <p>7. Check and readjust as necessary. Replace the defective parts as necessary. Refer to adjustment instructions contained in Section 3.6.</p>
Water heater shuts down at or too close to (above or	<p>1. Over temperature limit settings not properly set or defective.</p>	<p>1. Refer to adjustment instructions contained in Section 3.6. Replace the defective parts as necessary.</p>





below) the design outlet water temperature.		
A loud banging noise in the Water heater or water piping (not to be confused with a normal clicking noise made during operation).	<ol style="list-style-type: none"> <li>1. Water return piping has not been installed properly to allow the water return circulation; the water return line is restricted; or the water return check valve is leaking or has failed.</li> <li>2. Improperly sized or disconnected expansion tank in closed loop piping system.</li> <li>3. Inadequate water hammer arrestors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rearrange the water return piping and inspect the valve for proper drainage. Also check to make sure there is no restriction in the water return line. Replace the check valve if it is leaking or has failed.</li> <li>2. Install the properly sized expansion tank in the closed loop piping system as shown in Installation and Piping drawings in Section 6.3.</li> <li>3. In order to avoid any shock waves, install water hammer arrestors/shock absorbers in the hot and cold water systems as needed. Also check for any trapped air in the domestic water system.</li> </ol>
Over-temperature sound alarm occurs frequently.	<ol style="list-style-type: none"> <li>1. Automatic over temperature settings not properly set or defective parts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and readjust the over-temperature setting as necessary. Refer to adjustment instructions contained in Section 3.6. Replace the defective parts or thermocouple if defective.</li> </ol>
Unable to clear Over-temperature sound alarm condition	<ol style="list-style-type: none"> <li>1. Automatic over temperature settings not properly set or defective parts.</li> <li>2. Defective thermocouple.</li> <li>3. Recirculating pump malfunctions/failed. Flow is stagnant through the heat exchanger.</li> <li>4. Control valve requires calibration.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and readjust the over-temperature setting as necessary. Refer to adjustment instructions contained in Section 3.6. Replace the defective parts.</li> <li>2. Replace the thermocouple if shorted.</li> <li>3. Check to make sure pump is functioning properly. Also, check for any blockage in the piping to ensure proper flow through heat exchanger.</li> <li>4. Recalibrate the Control valve per instructions in Section 3.5.2.</li> </ol>

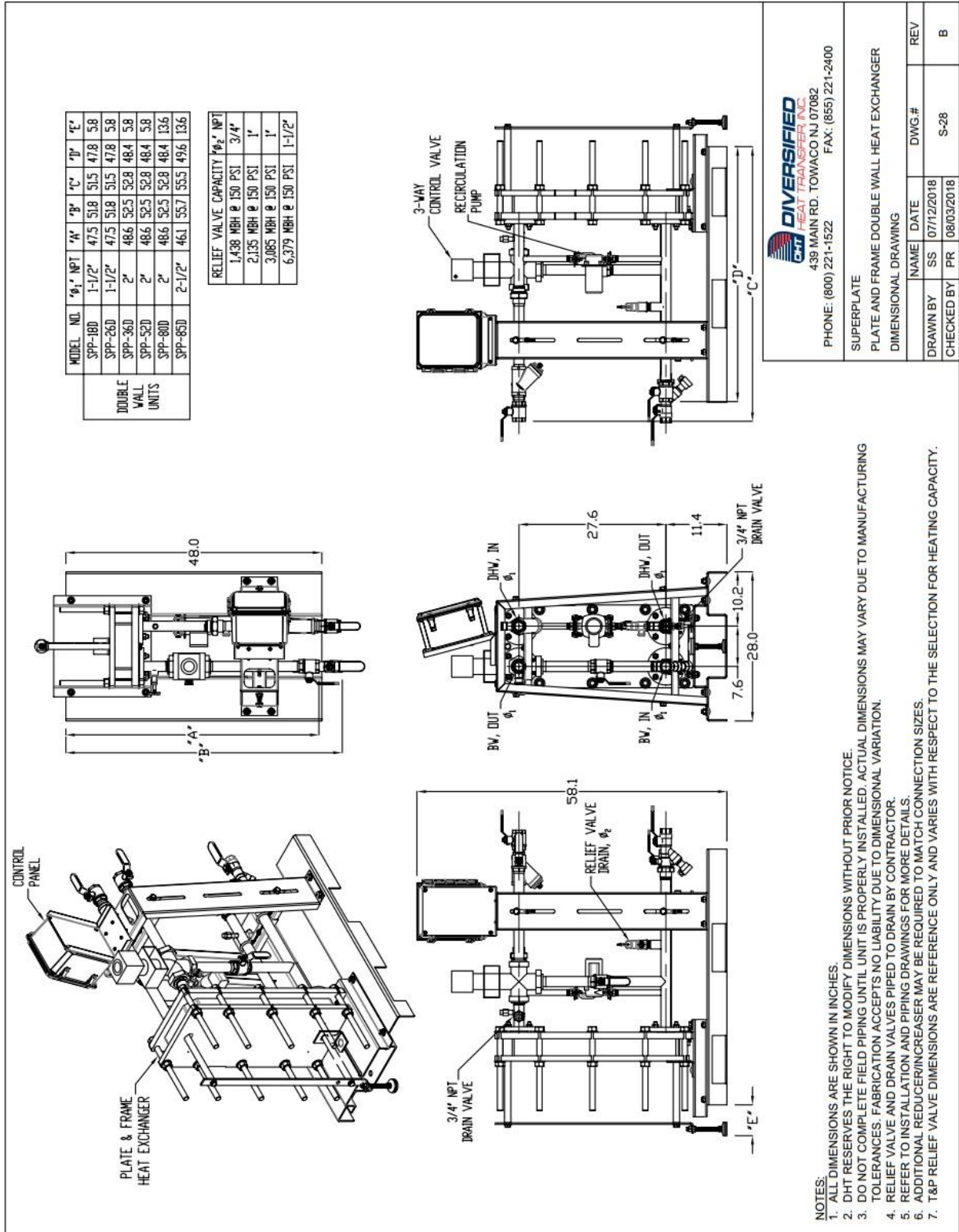


## SECTION 5: TROUBLESHOOTING

Controller unit 'Locks Up'	1. Controller 'Locks Up'	1. Recycle power to the unit by removing AC power, waiting 10 seconds and reconnecting power.  <div style="border: 2px solid black; padding: 5px;"> <p><b>DANGER!</b></p> <p><b>This should be done by using the user provided circuit breaker or fuse, not by removing the power wires at the terminal block. Serious injury or death can occur if contact is made with the incoming AC power.</b></p> </div>
Controller display remains at zero or shows no change	1. Display remains at zero or shows no change but the process is changing.	1. Recycle power to the unit by removing AC power, waiting 10 seconds and reconnecting power. If the problem persists, contact the local DHT representative.
Entire System is OFF	2. External 120V AC power disconnected or ON/OFF switch on control panel failed/OFF.	2. Check to make sure external circuit breaker is ON and there is power supply available. Replace the ON/OFF switch on the control panel if faulty.

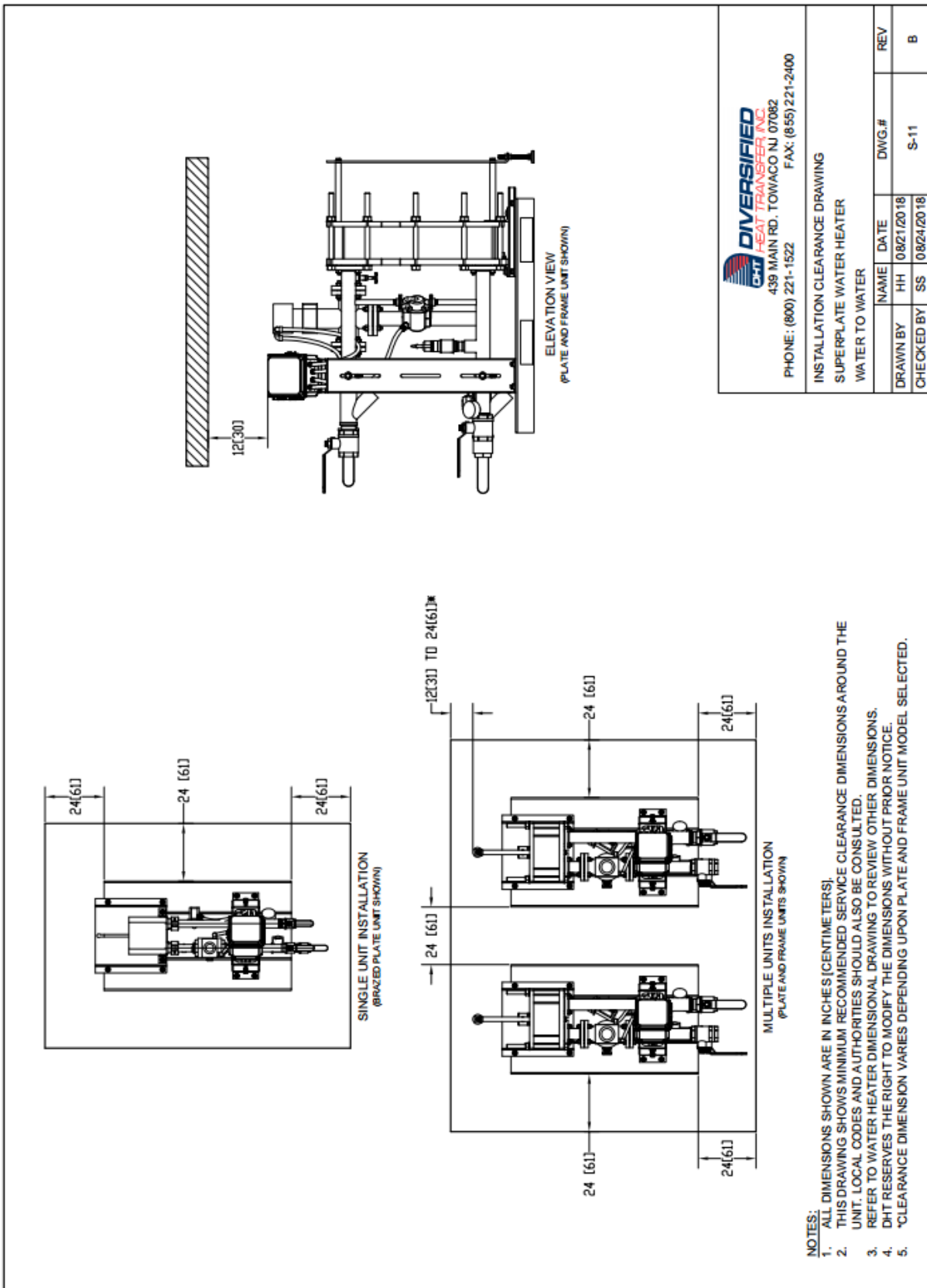
# SECTION 6: TECHNICAL DRAWINGS & FORMS

## 6.1 DIMENSIONAL DRAWINGS

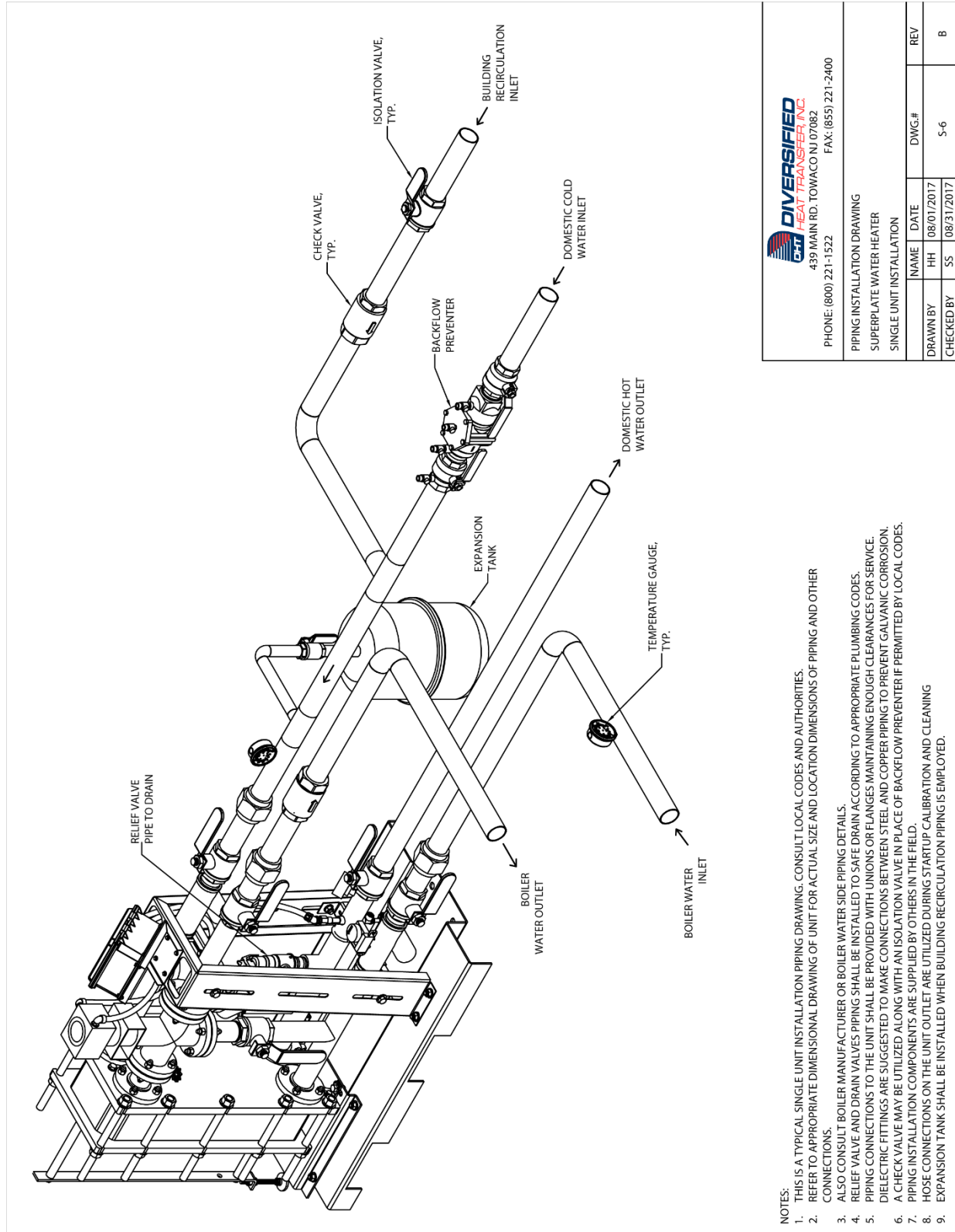


## SECTION 6: TECHNICAL DRAWINGS AND FORMS

### 6.2 CLEARANCE DRAWINGS



### 6.3 PIPING AND INSTALLATION DRAWINGS

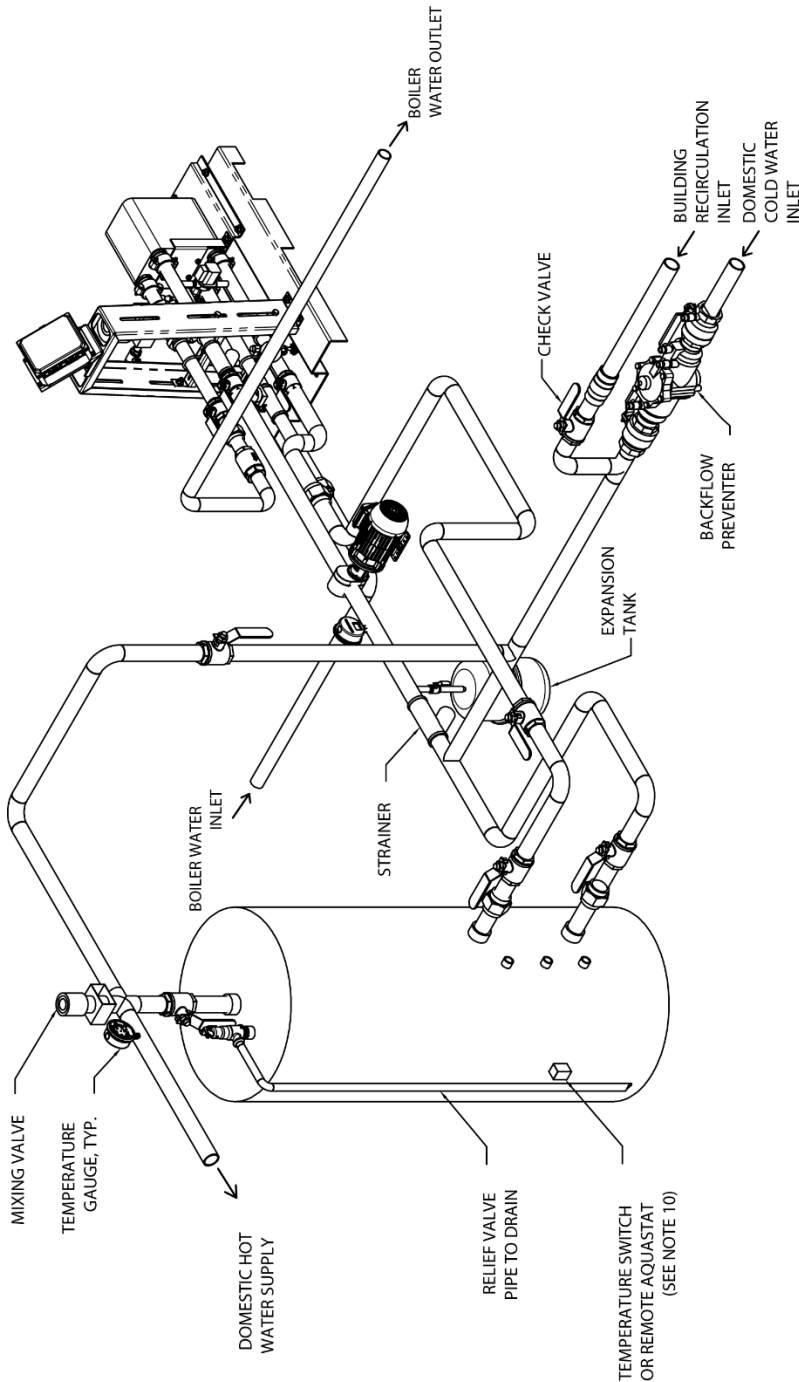


439 MAIN RD. TOWACO NJ 07082  
PHONE: (800) 221-1522 FAX: (855) 221-2400

PIPING INSTALLATION DRAWING  
SUPERPLATE WATER HEATER  
SINGLE UNIT INSTALLATION

NAME	DATE	DWG.#	REV
DRAWN BY HH	08/01/2017		
CHECKED BY SS	08/31/2017	S-6	B

## SECTION 6: TECHNICAL DRAWINGS AND FORMS



### NOTES:

1. THIS IS A TYPICAL INSTALLATION PIPING DRAWING. CONSULT LOCAL CODES AND AUTHORITIES.
2. REFER TO APPROPRIATE DIMENSIONAL DRAWING OF UNIT FOR ACTUAL SIZE AND LOCATION DIMENSIONS OF PIPING AND OTHER CONNECTIONS.
3. RELIEF VALVES AND DRAIN VALVES PIPING SHALL BE INSTALLED TO SAFE DRAIN ACCORDING TO APPROPRIATE PLUMBING CODES.
4. PIPING CONNECTIONS TO THE UNIT SHALL BE PROVIDED WITH UNIONS OR FLANGES MAINTAINING ENOUGH CLEARANCES FOR SERVICE. DIELECTRIC FITTINGS ARE SUGGESTED TO MAKE CONNECTIONS BETWEEN DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
5. ALSO CONSULT BOILER MANUFACTURER FOR BOILER WATER SIDE PIPING DETAILS.
6. HOSE CONNECTIONS ON THE UNIT OUTLET ARE UTILIZED DURING STARTUP CALIBRATION AND CLEANING.
7. A CHECK VALVE MAY BE UTILIZED IN PLACE OF BACKFLOW PREVENTER IF PERMITTED BY LOCAL CODES.
8. PIPING INSTALLATION COMPONENTS ARE SUPPLIED BY OTHERS IN THE FIELD.
9. EXPANSION TANK SHALL BE INSTALLED WHEN BUILDING RECIRCULATION PIPING IS EMPLOYED.
10. INSTALL AQUASTAT/TEMP. SWITCH IN LOWER 1/3 OF THE TANK WHICH IS USED TO ENABLE/DISABLE THE PUMP.
11. PUMP SHALL BE SIZED FOR HEATERS FLOW RATE CAPACITY.
12. USE BALANCING VALVES TO BALANCE THE FLOW BETWEEN UNITS AND TANKS IF THE PIPING ARRANGEMENT IS NOT REVERSE RETURN.



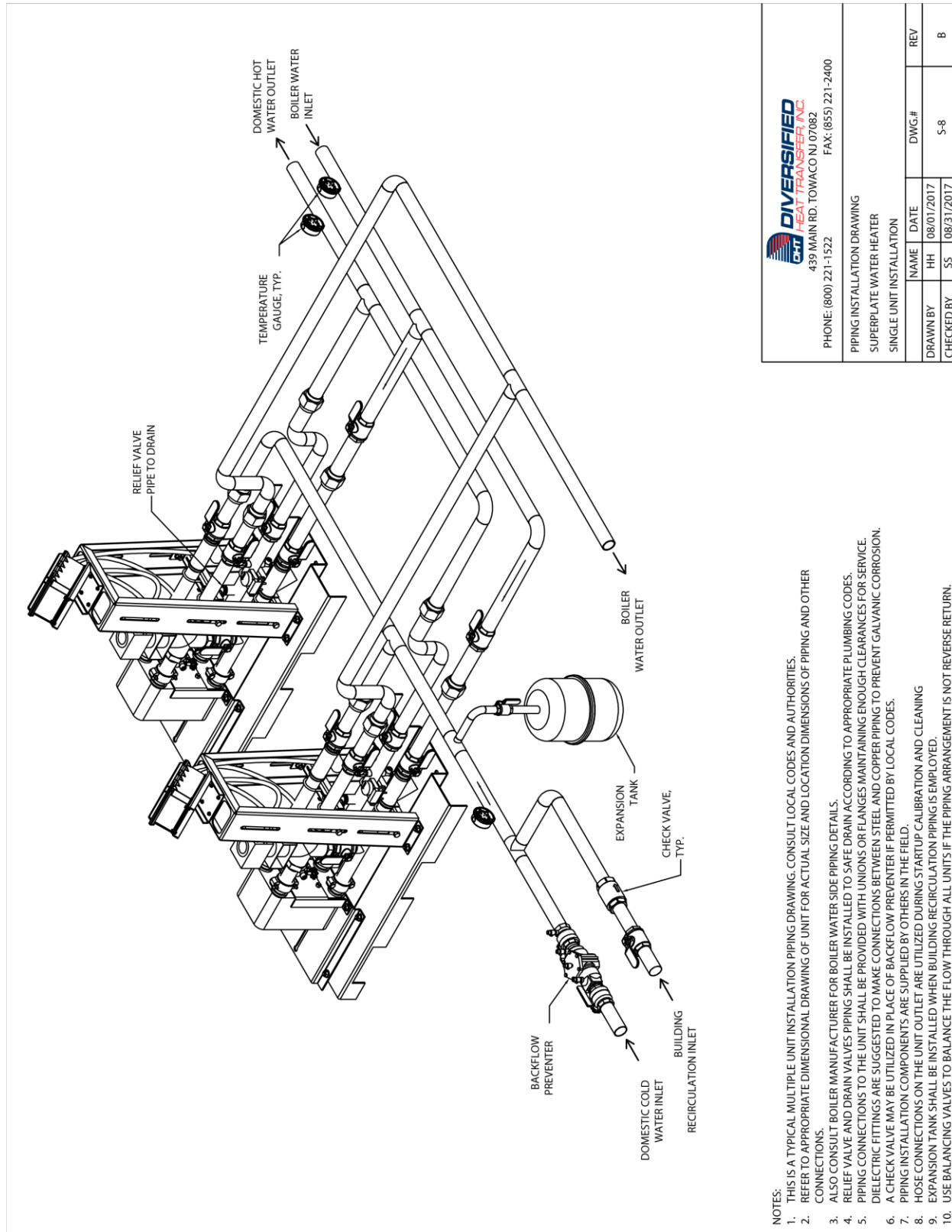
439 MAIN RD. TOWACO NJ 07082  
PHONE: (800) 221-1522 FAX: (855) 221-2400

PIPING INSTALLATION DRAWING  
SUPERPLATE WATER HEATERS  
SINGLE UNIT INSTALLATION WITH STANDARD STORAGE TANK

NAME	DATE	DWG.#	REV
AC	07/27/2018		
SS	08/08/2018	S-32	A



## SECTION 6: TECHNICAL DRAWINGS AND FORMS



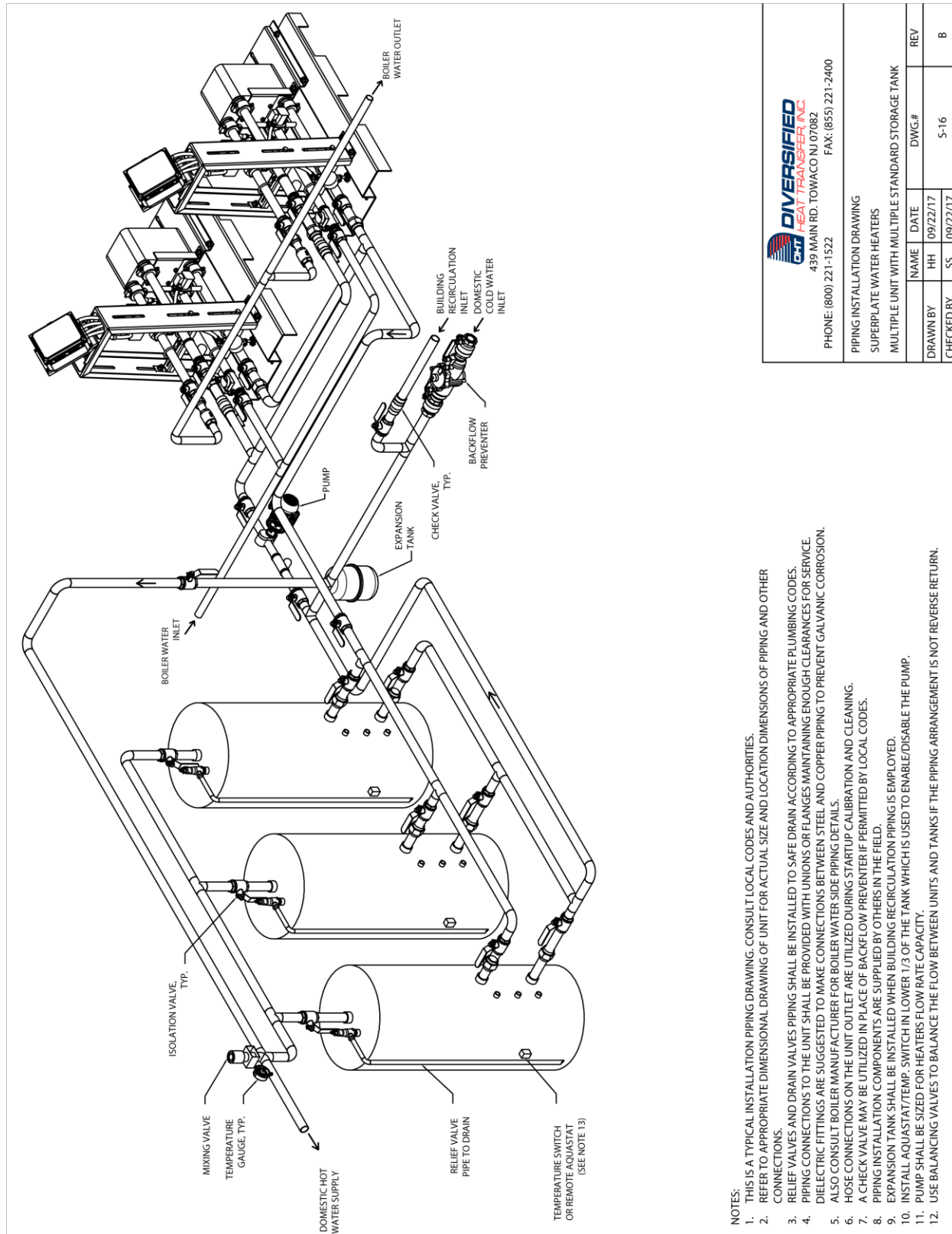
439 MAIN RD. TOWACO NJ 07082  
PHONE: (800) 221-1522 FAX: (855) 221-2400

PIPING INSTALLATION DRAWING  
SUPERPLATE WATER HEATER  
SINGLE UNIT INSTALLATION

NAME	DATE	DWG.#	REV
HH	08/01/2017	S-8	B
CHECKED BY	SS	08/31/2017	



## SECTION 6: TECHNICAL DRAWINGS AND FORMS



439 MAIN RD. TOWACO NJ 07082  
 PHONE: (800) 221-1522 FAX: (855) 221-2400

PIPING INSTALLATION DRAWING  
 SUPERPLATE WATER HEATERS  
 MULTIPLE UNIT WITH MULTIPLE STANDARD STORAGE TANK

NAME	DATE	DWG.#	REV
HH	09/22/17	S-16	B
CHECKED BY	SS	09/22/17	

[illegible]

**6.5 FORMS AND RECORDS**

**6.5.1 DHT Water Heater Controller Programming Record Sheet**

**DHT Water Heater Controller Programming Record Sheet**

MODEL NUMBER: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

VERSION: \_\_\_\_\_

PASSWORD: \_\_\_\_\_

**SETPOINTS**

**SETPOINT**

PRIMARY ALARM ON AT \_\_\_\_\_

PRIMARY ALARM OFF AT \_\_\_\_\_

SECONDARY ALARM ON AT \_\_\_\_\_

SECONDARY ALARM OFF AT \_\_\_\_\_

PASSWORD: \_\_\_\_\_

INPUT FILTER \_\_\_\_\_

UNIT TEXT \_\_\_\_\_

**SCALING**

DECIMAL POINT \_\_\_\_\_

ANALOG INPUT LOW \_\_\_\_\_

ANALOG INPUT HIGH \_\_\_\_\_



### 6.5.2 SuperPlate Installation Form



#### SUPERPLATE INDIRECT FIRED WATER HEATER INSTALLATION FORM

Please complete ONE (1) form for each SITE at which DHT SUPERPLATE units are installed and return it to DHT for warranty validation within 30 days of start-up. After completion, e-mail this form to: WARRANTY@DHTNET.COM or fax to 718-386-7809.

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

#### UNIT AND LOCATION

Installation Name: \_\_\_\_\_ Technician: \_\_\_\_\_  
 Street Address: \_\_\_\_\_ Company: \_\_\_\_\_  
 City, State, Zip: \_\_\_\_\_ Phone #: \_\_\_\_\_  
 DHT Sales Rep: \_\_\_\_\_ Email: \_\_\_\_\_

#### EQUIPMENT CLASSIFICATION

Choose the unit type and enter the serial number for each unit. Add additional in ADDITIONAL NOTES if needed.

☐ Single Wall Brazed Plate    ☐ Double Wall Brazed Plate    ☐ Single Wall Plate & Frame    ☐ Double Wall Plate & Frame  
☐ C46    ☐ C61M    ☐ C76M    ☐ M221EX    ☐ MD221EX    ☐ N7N    ☐ N21C    ☐ N21N    ☐ N7NE    ☐ N21CE    ☐ N26CE

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

☐ Other (please specify): \_\_\_\_\_

#### GENERAL INSTALLATION

1. Is the relief valve piped to drain or within 12" of floor? ☐ YES ☐ NO
2. Is there an electrical service switch at or near the unit? ☐ YES ☐ NO
3. Does any electrical conduit, ductwork or piping impede the serviceability of the unit or the ability to remove the sheet metal covers? ☐ YES ☐ NO
4. Have all electrical components been verified for proper grounding? ☐ YES ☐ NO
5. Has all communication wire been properly shielded? ☐ YES ☐ NO
6. What is the system pressure? \_\_\_\_\_ PSI
7. The system application is: ☐ Potable Water    ☐ Process    ☐ Storage Tank    ☐ Other: \_\_\_\_\_
8. Are all units installed in accordance with the clearances defined in the SUPERPLATE OM? ☐ YES ☐ NO  
 a. If no, why? \_\_\_\_\_
9. If multiple units are installed in parallel, are they piped reversed return as per the SUPERPLATE OM? ☐ NA    ☐ YES    ☐ NO  
 a. If no, why? \_\_\_\_\_



## SECTION 6: TECHNICAL DRAWINGS & FORMS

### FOR HEATERS USING A STORAGE TANK

1. Storage tank is: ☐ Stratified ☐ Accumulator
2. Does the tank have ☐ Baffle ☐ Dispersion Tube
3. What is the storage tanks volume? \_\_\_\_\_ Gallons
4. What is the heater outlet temperature? \_\_\_\_\_ °F
5. Position of aquastat: ☐ Upper 1/3 ☐ Middle 1/3 ☐ Lower 1/3 ☐ No aquastat
6. What is the aquastat temperature setting? \_\_\_\_\_ °F
7. Does the aquastat control the pump between the tank & heater? ☐ YES ☐ NO
8. Is a throttling valve installed between the pump and heater? ☐ YES ☐ NO
9. Is there a bypass loop around the pump? ☐ YES ☐ NO
10. What is the capacity of pump between the tank and heater? \_\_\_\_\_ GPM

### WATER HEATER INSTALLATION

1. Are isolation valves installed in the inlet piping? ☐ YES ☐ NO
2. Are isolation valves installed in the outlet piping? ☐ YES ☐ NO
3. Is a hose bib installed in the outlet piping? ☐ YES ☐ NO
4. Are check valves installed in the cold water inlet? ☐ YES ☐ NO
5. Are check valves installed in the recirculation line? ☐ YES ☐ NO
6. Building recirculation is piped to: ☐ Inlet Side of Heater ☐ None
7. Record distance of building connections (ft) \_\_\_\_\_ & cold water feed \_\_\_\_\_ to the bank of unit (s)
8. What are the maximum/ minimum design flow rates through the unit? Max \_\_\_\_\_ GPM Min \_\_\_\_\_ GPM
  - a. Were the maximum/ minimum flow rates verified? ☐ YES ☐ NO
9. What is the design system flow rate? \_\_\_\_\_ GPM
10. What is the design boiler plant delta T? \_\_\_\_\_ °F
11. Is there a buffer tank used with the SUPERPLATE Heater? ☐ YES ☐ NO
  - a. If yes, is the buffer tank supplied by DHT? ☐ YES ☐ NO
  - b. Number of buffer tank ports? ☐ 2 Ports ☐ 4 ports
  - c. Buffer tank volume: \_\_\_\_\_ Gallons
12. What is the setpoint? \_\_\_\_\_
13. What is the high limit set to? \_\_\_\_\_
14. What boiler water temp is being supplied ? \_\_\_\_\_
15. What is the boiler water pressure? \_\_\_\_\_
16. Does the SuperPlate have a dedicated boiler pump? ☐ YES ☐ NO
17. What is flow rate of the pumo? \_\_\_\_\_ GPM
18. Has the flow been verified? ☐ YES ☐ NO

SUPERPLATE Installation Form Page 2 of 4



## SECTION 6: TECHNICAL DRAWINGS & FORMS

### CONTROL BOX CONFIGURATION

Please indicate if any changes have been made to the Factory Settings.

Factory Settings	Factory Value	Field Value (Changes)	Factory Settings	Factory Value	Field Value (Changes)
Primary Alarm On	160°F		Valve Open	50%	
Primary Alarm Off	155°F		Auto	NA	
Secondary Alarm On	170°F		Filter	1.00	
Secondary Alarm Off	165°F		PID	Reverse	
Setpoint	140°F		Scale	32F-4mA 212F-20mA	
Gain	4.5		Pump	working	
Integral	1		Aqua Stat	180°F	
Derivative	0.00				
Dead Band	0.00				

### WATER QUALITY

DHT recommends that a sample of the unit's input water supply be tested to determine if it will have an adverse effect on the unit. Testing can be via a standard water quality test kit, widely available at retail hardware and home improvement stores. The following questions can be answered by such test kits.

- What is the pH of the water? \_\_\_\_\_ (a pH Between 6.5 to 9.5 is recommended)
- What is the hardness of the water? \_\_\_\_\_ Grains per Gallon (1-10 is recommended)
- Is there a water softening or treatment system installed? ☐ YES ☐ NO
  - If yes, what kind? ☐ Salt ☐ No Salt ☐ Chemical Injection ☐ Other \_\_\_\_\_

### SUMMARY

- Are all the units installed in accordance with DHT guidelines & industry best practices? ☐ YES ☐ NO
  - If no, please describe the issues.

B. Who has been contacted? Please provide name & Number for each person contacted. (Check all that apply)

- |   |  |
|---|--|
| <input type="checkbox"/> DHT Engineer: _____          | <input type="checkbox"/> General Contractor: _____ |
| <input type="checkbox"/> Mechanical Contractor: _____ | <input type="checkbox"/> Building Owner: _____     |
| <input type="checkbox"/> Design Engineer: _____       | <input type="checkbox"/> Plumber: _____            |
| <input type="checkbox"/> Controls Engineer: _____     | <input type="checkbox"/> Electrician: _____        |

SUPERPLATE Installation Form Page 3 of 4



## SECTION 6: TECHNICAL DRAWINGS & FORMS

2. Is there any conflicts between the Installation & the Engineer's Specification or Design Plans?

☐ YES

☐ NO

A. If no, please describe the issues.

B. Who has been contacted? Please provide name & Number for each person contacted. (Check all that apply)

<input type="checkbox"/> DHT Engineer: _____	<input type="checkbox"/> General Contractor: _____
<input type="checkbox"/> Mechanical Contractor: _____	<input type="checkbox"/> Building Owner: _____
<input type="checkbox"/> Design Engineer: _____	<input type="checkbox"/> Plumber: _____
<input type="checkbox"/> Controls Engineer: _____	<input type="checkbox"/> Electrician: _____

3. Are there any conflicts or physical restrictions that will prevent the boiler plant from receiving proper preventative maintenance in the future?

☐ YES

☐ NO

A. If no, please describe the issues.

B. Who has been contacted? Please provide name & Number for each person contacted. (Check all that apply)

<input type="checkbox"/> DHT Engineer: _____	<input type="checkbox"/> General Contractor: _____
<input type="checkbox"/> Mechanical Contractor: _____	<input type="checkbox"/> Building Owner: _____
<input type="checkbox"/> Design Engineer: _____	<input type="checkbox"/> Plumber: _____
<input type="checkbox"/> Controls Engineer: _____	<input type="checkbox"/> Electrician: _____

4. Please outline any exceptions that have granted by a DHT Engineer for this installation if necessary.

OTHER NOTES:

DHT INTERNAL APPROVAL

DHT Engineer Sign-off: \_\_\_\_\_ Date: \_\_\_\_\_

SUPERPLATE Installation Form Page 4 of 4





### 6.5.3 SuperPlate Startup Form



#### SUPERPLATE INDIRECT FIRED WATER HEATER START-UP FORM

Please complete ONE (1) form for each UNIT at the site and return to DHT for warranty validation within 30 days of start-up. After completion, e-mail this form to [WARRANTY@DHTNET.COM](mailto:WARRANTY@DHTNET.COM) or fax to 718-386-7809.

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

#### UNIT AND LOCATION

Installation Name: \_\_\_\_\_ Technician: \_\_\_\_\_  
 Street Address: \_\_\_\_\_ Company: \_\_\_\_\_  
 City, State, Zip: \_\_\_\_\_ Phone #: \_\_\_\_\_  
 DHT Sales Rep: \_\_\_\_\_ Email: \_\_\_\_\_  
 Unit Serial #: \_\_\_\_\_

#### EQUIPMENT CLASSIFICATION

Choose the unit type and enter the serial number for each unit. Add additional in ADDITIONAL NOTES if needed.

- ☐ Single Wall Brazed Plate    ☐ C46    ☐ C61M    ☐ C76M  
☐ Double Wall Brazed Plate    ☐ M221EX    ☐ MD221EX  
☐ Single Wall Plate & Frame    ☐ N7N    ☐ N21C    ☐ N21N  
☐ Double Wall Plate & Frame    ☐ N7NE    ☐ N21CE    ☐ N26CE  
☐ Other (please specify): \_\_\_\_\_

#### TEMPERATURE CALIBRATION

Consult SUPERPLATE OM for temperature calibration procedure.

1. What is the water heater setpoint? \_\_\_\_\_ °F
2. What is the integral setting? \_\_\_\_\_ °F
3. What is the gain setting? \_\_\_\_\_ °F
4. What is the valve maximum percentage? \_\_\_\_\_ %
5. What is the aquastat setting? \_\_\_\_\_ °F  
 (Typically set 20 °F above unit setpoint)



## SECTION 6: TECHNICAL DRAWINGS & FORMS

### CONTROL BOX CONFIGURATION

Please indicate if any changes have been made to the Factory Settings.

Factory Settings	Factory Value	Field Value (Changes)
Primary Alarm On	160°F	
Primary Alarm Off	155°F	
Secondary Alarm On	170°F	
Secondary Alarm Off	165°F	
Setpoint	140°F	
Gain	4.5	
Integral	1	
Derivative	0.00	
Dead Band	0.00	

Factory Settings	Factory Value	Field Value (Changes)
Valve Open	50%	
Auto	NA	
Filter	1.00	
PID	Reverse	
Scale	32F-4mA 212F-20mA	
Pump	working	
Aqua Stat	180°F	

### ADDITIONAL NOTES:

### DHT INTERNAL APPROVAL

DHT Engineer Sign-off: \_\_\_\_\_ Date: \_\_\_\_\_

DHT Notes:

SUPERPLATE Installation Form Page 2 of 2



### SECTION 7: WARRANTY

Subject to the terms and conditions herein and the Terms and Conditions of Sale (as defined herein), Diversified Heat Transfer, Inc. (DHT) ("Seller") provides to the purchaser of the product ("Buyer") a non-prorated warranty for the following components of the SuperPlate Water Heater. The SuperPlate Water Heater must be operated in accordance with the conditions stated herein, against the indicated failures. The SuperPlate Warranty commences on the date of shipment or if a start-up report is furnished to Seller, on the start-up date shown on the report furnished to Seller (the "Warranty Period"). The startup must be completed within six (6) months of shipment, and the start-up report must be furnished to Seller within thirty (30) days of the startup.

- **HEAT EXCHANGER** shall carry non-prorated one year warranty from start-up of the water heater or eighteen (18) months from shipment.
- **ALL OTHER COMPONENTS** shall carry a non-prorated (1) year warranty.

#### CONDITIONS OF WARRANTY:

This Specific Product Limited Warranty is transferrable to the owner that utilizes the product(s) purchased hereunder for its intended use at the original installation site (the "Original Owner"). This Specific Product Limited Warranty is non-transferable to anyone who subsequently receives or purchases products from the Original Owner. If the Original Owner did not purchase the product directly from Seller, the Original Owner should contact the reseller from whom it purchased the product for a copy of the Terms and Conditions of Sale which can be also found on [www.dhtnet.com](http://www.dhtnet.com).

Seller's obligations under this Specific Limited Warranty is limited to modify, repair, or exchange the defective item which after examination shall, to Seller's own satisfaction be determined to have been defective at the time it was shipped. In the event that a replacement is provided by Seller, the defective item will become the property of Seller. Any claims relating to this product shall be limited to the list price of the product at the time of sale. Transportation to Seller's facility or other designated facility for repairs of any products or party alleged defective shall, in all events, be at Buyer's sole risk and cost.

This warranty applies only if the Seller receives, within the Warranty Period, an immediate written notice, providing a detailed description of all claimed defects, upon discovery of such defects together with proof of purchase (invoice or Order Acknowledgment) and a copy of the start-up report for the affected product (Attention: Diversified Heat Transfer, Inc., 439 Main Rd. Rte 202, Towaco, NJ).

Seller may seek reimbursement of any costs incurred by Seller where the product is found to be in good working order, or when it has been determined that this Specific Product Limited Warranty does not apply as per the exclusions set forth below. The remedies available to Buyer set forth herein are exclusive remedies, and all other remedies, statutory or otherwise, including but not limited to the right of legal action, are waived by Buyer. Buyer shall indemnify and hold Seller harmless against, any claim due to any injury or death to any person or damage to any property resulting in whole or in part from any modification or alteration Buyer makes to any product sold hereunder.

#### EXCLUSIONS:

To the full extent permitted by law, Seller shall have no liability for and the warranties do not cover:

- A. Any product which has been altered or repaired by other than Seller's personnel;
- B. Deterioration or failure of any product due to
  - a. abrasion, corrosion, erosion or fouling,
  - b. misuse,
  - c. modification not authorized by Seller in writing
  - d. improper installation, lack of or improper maintenance or operation;
- C. Equipment not furnished by Seller, either mounted or unmounted, or when contracted for by a party or parties other than Seller to be installed or handled;
- D. The suitability of any product for any particular application;
- E. The design or operation of owner's plant or equipment or of any facility or system of which any product may be made a part;



## SECTION 7: WARRANTY

- F. Any damage to the product due to abrasion, erosion, corrosion, deterioration, abnormal temperatures or the influence of foreign matter or energy;
- G. Leakage or other malfunction caused by:
  - a. defective installations in general and specifically, any installation which is made
    - i. in violation of applicable state or local plumbing, housing or building codes or
    - ii. contrary to the written instructions furnished with the product,
  - b. adverse local conditions in general and, specifically, sediment or lime precipitation in the tubes, headers and/or shells or corrosive elements in the water, heating medium or atmosphere, or
  - c. misuse in general and, specifically, operation and maintenance contrary to the written instructions furnished with the unit, disconnection, alteration or addition of components or apparatus, not approved by Seller, operation with heating media, fuels or settings other than those set forth on the rating plate or accidental or exterior damage;
- H. Discoloration or rusty water caused by piping, fittings, valves, pumps or other sources outside of the SuperPlate Water Heater;
- I. Damage to surrounding area or property caused by leakage or malfunction;
- J. INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, SUCH AS LOSS OF THE USE OF PRODUCTS, FACILITIES OR PRODUCTION, INCONVENIENCE, LOSS OF TIME OR LABOR EXPENSE INVOLVED IN REPAIRING OR REPLACING THE ALLEGED DEFECTIVE PRODUCT;
- K. Costs associated with the replacement and/or repair of the unit including: any freight, shipping or delivery charges, any removal, installation or reinstallation charges, any material and/or permits required for installation, reinstallation or repair, charges to return the SuperPlate Water Heater or components;
- L. Any claim due to any injury or death to any person or damage to any property resulting in whole or in part from any modification or alteration Buyer makes to any product sold hereunder; and
- M. Design defects where Seller has complied with Buyer's design specifications.

No salesman or other representative of the seller has any authority to expand warranties beyond the face of the said warranty and purchaser shall not rely on any oral statement except as stated in the said warranty. An Officer of the Seller must do any modifications to this warranty in writing.

### WARRANTY CLAIMS:

Warranty claims should be presented through prompt telephone notification to DHT at toll-free 1-800-221-1522 or email to [warranty@dhtnet.com](mailto:warranty@dhtnet.com). In order to process a warranty claim a formal purchase order number is required prior to shipment of any warranty item. In addition, the returned item must include a Returned Goods Authorization (RGA) label, attached to the shipping carton, which identifies the item's return address, register number and factory authorized RGA number.

This warranty applies only to units sold to customers in North America. All other geographical areas carry a standard warranty of 18 months from date of shipment or 12 months from startup, whichever comes first.

**Change Log:**

Date	Description	Changed By
01/02/2019	Initial release	SS