



Thermal Leverage

COMMERCIAL & INDUSTRIAL
WATER HEATERS



*When you have
Leverage
use it!*



www.thermalleverage.com
info@thermalleverage.com

DEVELOPED WITH OVER 20 YEARS OF ENGINEERING WORKING KNOWLEDGE

Thermal Leverage a new company having deep roots in Heat Exchanger design with forward looking Engineering and Innovation. The Thermal Leverage TL advantage is just that, superior engineering design paired with the highest grade materials manufactured, tested and stamped to ASME code standards is your answer to satisfying today's most demanding domestic hot water supply applications.



MEP Engineers, Plumbing Contractors and Building Owners who require High Capacity and accurate domestic hot water heating in a reduced area will benefit from this upgraded long lasting TL design. The solid all 316 Stainless Steel shell paired with the welded flanged Stainless Steel interconnecting recirculation pump assembly minimizes threaded connections along with the chances of leaks.

Single or double wall tube construction Copper or 90/10 Cupronickel and 316 Stainless Steel tubing. The PI control panel is securely wired with reliable electronic thermocouples that modulate the motorized fail closed (spring return) control valve to insure tight water temperature control.

Perfect for new or retrofit installs, Thermal Leverage uses a controllable 4:1 ratio water to steam U tube heat exchanger in conjunction with a feed forward inlet temperature sensing thermocouple and a feedback sensing thermocouple to solve for the optimal control valve position based upon actual hot water demand conditions.

Features:

Compatible with the Following:

Single Phase 110V/60Hz

5-50 PSIG Building Steam Supply

160°F-390°F Boiler Water

Low Flow up to 250 GPM

150 PSIG Design Pressure STD

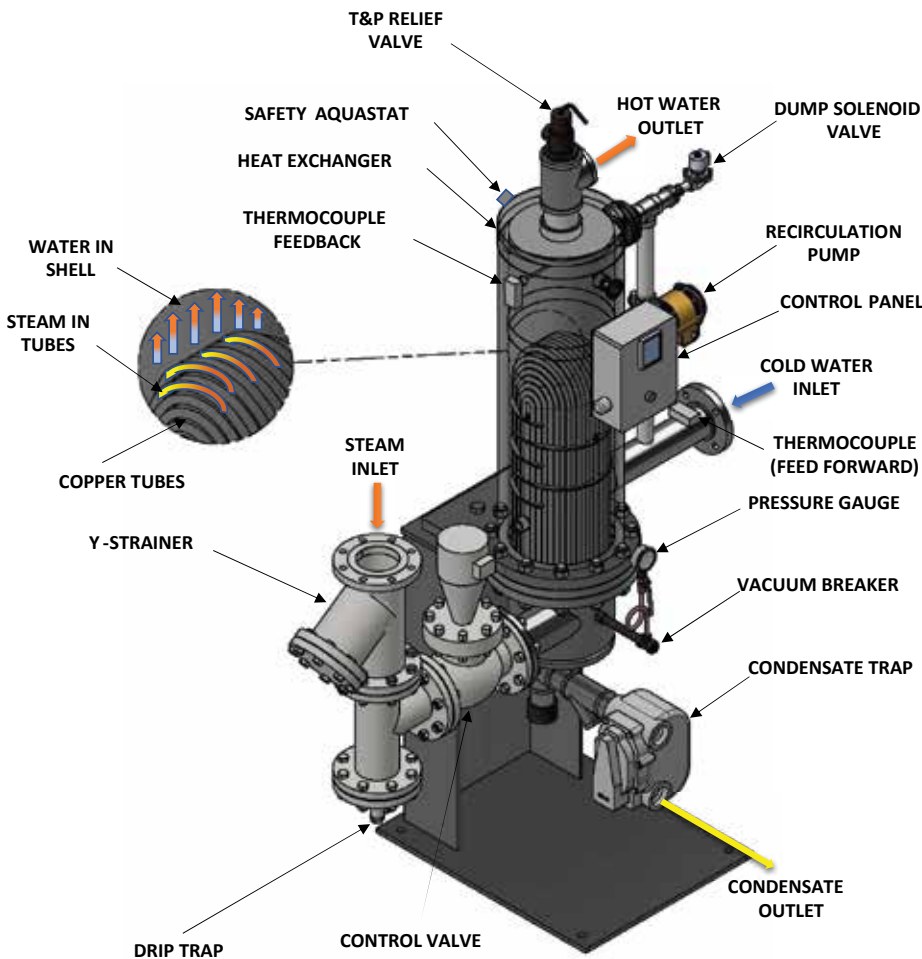
300 PSIG Design Pressure Optional

Single and Duplex Installations

A DEEPER DIVE INTO HOW THE DESIGN OPERATES

The Fulcrum semi-instantaneous steam or boiler water fired design has the domestic water flowing through the large spaces of the shell side minimizing the incidence of fouling. The factory assembled steam or boiler water fired water heater utilizes fast acting modulating electronically actuated valves to achieve close outlet temperature control through varied demand cycles.

THERMAL LEVERAGE FULCRUM WATER HEATER



The unit can fit through most building doorway's while taking up minimal floor space. This highly efficient thermally accurate water heater will provide years of safe service.

Developed over years of theoretical design improvements backed up with empirical real world operational testing.

Fulcrum heaters are offered in four different sizes. (6", 8", 10" & 12")

Precise temperature control maintains unit outlet at +/-4 degrees F even under varied demand conditions.

State of the art PI controls integrates feed forward and feedback signals.

Low residence time U tube heat exchanger design which allows for sensible heat transfer.

Economic rigging into existing facilities with no storage in most cases and conditions.

Easy to service tube bundle which can be easily tested or removed without disturbing building connections.

Hardened design using solid Stainless Steel ERW dual certified pipe coupled with heavy duty 3000LB ANSI fittings which will provide years of service.

Independently wired over temperature cut off switch senses temperatures above normal controller settings immediately closing the spring return control valve.

HOW IT WORKS



The water heater incorporates a high surface area U tube design. The cold-water flows to the inlet from the bottom of the unit through the tube bundle up to the top of the unit and is heated as it passes over the tubes guided by Teflon baffles in counter current heat transfer. While the steam travels in the tubes it begins to condense as it flows up and over the return bend section giving up its sensible heat at an even higher rate before it falls down the outlet side of the bundle giving up its latent heat and draining out of the return head of the heat exchanger. In the boiler water fired design, the boiler water travels on the tube side in turbulent flow transferring heat through the tube wall.

Most heaters use a feedback signal that relies heavily on the changes that have already occurred not giving the controls the heads-up feed forward signal to anticipate the cold water that is entering the system cooling the return water which is already reduced in volume due to the increased draw on the system.

The fast-acting equal percentage control valve is closely modulated by the PI control which calculates the optimal setting after receiving both the feed forward and feedback thermocouple signals. The mixing zone is located in the volume of water above the tube bundle just before the water exits the top connection providing a buffer to absorb and dissipate the excess heat released by any residual heat energy inside the tubes.

Control System- Automated Control with Electromechanical Actuation

Due to the inherent high capacity of steam water heating in a compact heat exchanger the process is very sensitive. Relying heavily on the precise release of steam into the tube bundle is best through a control valve that is provided by a company whose only business is designing and fabricating the highest quality valves available. The compact actuator the valve body, seat materials coupled with the worldwide service and parts availability is our philosophy for a solid control system.

Heat Exchanger

The Thermal Leverage heat exchanger has increased surface area due to triangular tube pitch along with a smaller tube diameter to fit more tubes. The drilled and reamed tube hole through a solid stainless steel tube sheet provides a simple long lasting mechanical sealed joint after tube expansion with no internal connections that can leak. The Teflon baffles insure proper support and water flow direction for the U tube heat exchanger. The solid 316 Stainless Steel corrosion resistant heat exchanger shell and fittings are back welded to ensure any crevasses or discontinuities are welded and sealed smoothly. The U tube design precludes the formation of scaling due to the large spaces and turbulent flow around the tube passages.



Temperature Accuracy

Accurate temperature performance allows the unit to operate without the use of temperature mixing valves which lowers the total installed system cost.

State of the Art Controls

Latest PI controller wired into a solid factory assembled panel connected to feed forward and feedback thermocouples insure accurate temperature control. The temperature can be maintained +/-2 degree F under constant load and +/- 4 degree F under load variations. No storage tanks required in most cases. The standard inlet strainer and impingement tee piped with a drip trap to eliminate any entrained liquid from entering the modulating control valve insures the longevity of the tube bundle. The system also utilizes a double safety control that cuts power to the control valve which fails closed when the first alarm level is reached and secondary dump valve that opens if the second alarm level is reached. The system also has an independent thermostat switch that will cut power to the valve if it is malfunctioning.



Features:

Economic Installation and Maintenance

Small Footprint Under 4 FT2

No Storage Tanks in Most Scenarios

No Blending Valves Needed

No Pneumatic Components

Easy Tube Bundle Removal

All Solid 316 Stainless Steel Shell

Bacnet Ready, No Gateway Needed



TLSW STEAM TO WATER SINGLE WALL PERFORMANCE TABLE

40°F to 140°F		LINE PRESSURE PSIG						
		2	5	10	15	25	40	50
		BUNDLE PRESSURE PSIG						
GPM	Steam lb/hr	0	2	5	10	15	25	30
10	500	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW
20	1000	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW	TL06SW
30	1500	TL08SW	TL08SW	TL08SW	TL06SW	TL06SW	TL06SW	TL06SW
40	2000	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW	TL06SW
50	2500	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW
60	3000	TL10SW	TL10SW	TL08SW	TL08SW	TL08SW	TL08SW	TL08SW
70	3500	TL10SW	TL10SW	TL10SW	TL08SW	TL08SW	TL08SW	TL08SW
80	4000	TL10SW	TL10SW	TL10SW	TL10SW	TL08SW	TL08SW	TL08SW
90	4500	TL10SW	TL10SW	TL10SW	TL10SW	TL10SW	TL08SW	TL08SW
100	5000	TL12SW	TL10SW	TL10SW	TL10SW	TL10SW	TL08SW	TL08SW
125	6250	TL12SW	TL12SW	TL12SW	TL10SW	TL10SW	TL10SW	TL10SW
150	7500	-	TL12SW	TL12SW	TL10SW	TL10SW	TL10SW	TL10SW
175	8750	-	-	TL12SW	TL12SW	TL12SW	TL10SW	TL10SW
200	10000	-	-	-	TL12SW	TL12SW	TL12SW	TL10SW

TLSDW STEAM TO WATER DOUBLE WALL PERFORMANCE TABLE

40°F to 140°F		LINE PRESSURE PSIG						
		2	5	10	15	25	40	50
		BUNDLE PRESSURE PSIG						
GPM	Steam lb/hr	0	2	5	10	15	25	30
6	300	TL06SWD	TL06SWD	TL06SWD	TL06SWD	TL06SWD	TL06SWD	TL06SWD
12	600	TL08SWD	TL08SWD	TL08SWD	TL06SWD	TL06SWD	TL06SWD	TL06SWD
18	900	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL06SWD
24	1200	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD
30	1500	TL10SWD	TL10SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD
36	1800	TL10SWD	TL10SWD	TL10SWD	TL08SWD	TL08SWD	TL08SWD	TL08SWD
42	2100	TL10SWD	TL10SWD	TL10SWD	TL10SWD	TL08SWD	TL08SWD	TL08SWD
48	2400	TL10SWD	TL10SWD	TL10SWD	TL10SWD	TL10SWD	TL08SWD	TL08SWD
54	2700	TL12SWD	TL10SWD	TL10SWD	TL10SWD	TL10SWD	TL08SWD	TL08SWD
60	3000	TL12SWD	TL12SWD	TL12SWD	TL10SWD	TL10SWD	TL10SWD	TL10SWD
75	3750	TL12SWD	TL12SWD	TL12SWD	TL10SWD	TL10SWD	TL10SWD	TL10SWD
90	4500	-	TL12SWD	TL12SWD	TL12SWD	TL12SWD	TL10SWD	TL10SWD
105	5250	-	-	TL12SWD	TL12SWD	TL12SWD	TL12SWD	TL10SWD
120	6000	-	-	-	TL12SWD	TL12SWD	TL12SWD	TL12SWD

TLWW BOILER WATER TO WATER SINGLE WALL PERFORMANCE TABLE

BOILER WATER TEMPERATURE													
		180°F to 160°F				190°F to 170°F				200°F to 180°F			
Temp	Heater	Dom	Blr		P	Dom	Blr		P	Dom	Blr		P
		Wtr	Wtr		a	Wtr	Wtr		a	Wtr	Wtr		a
Range	Size	Flow	Flow	PD psi	s	Flow	Flow	PD psi	s	Flow	Flow	PD psi	s
		gpm	gpm		s	gpm	gpm		s	gpm	gpm		s
40°	TL06WW	6	27	4.7	6	8	41	2.6	4	14	63	6.1	4
to	TL08WW	26	130	2.6	4	35	177	6.8	4	37	179	0.9	2
140°	TL10WW	47	238	6.9	4	53	260	1.3	2	56	400	3.2	2
	TL12WW	77	400	1.6	2	82	415	3.6	2	88	418	3.6	2

TLWWD BOILER WATER TO WATER DOUBLE WALL PERFORMANCE TABLE

BOILER WATER TEMPERATURE													
		180°F to 160°F				190°F to 170°F				200°F to 180°F			
Temp	Heater	Dom	Blr		P	Dom	Blr		P	Dom	Blr		P
		Wtr	Wtr		a	Wtr	Wtr		a	Wtr	Wtr		a
Range	Size	Flow	Flow	PD psi	s	Flow	Flow	PD psi	s	Flow	Flow	PD psi	s
		gpm	gpm		s	gpm	gpm		s	gpm	gpm		s
40°	TL06WWD	5	20	4.3	6	7	40	4.2	6	13	66	5.6	4
to	TL08WWD	8	36	2.4	4	13	66	6.4	4	19	92	0.8	2
140°	TL10WWD	25	126	6.3	4	41	200	1.2	2	42	205	2.9	2
	TL12WWD	57	288	1.4	2	64	320	3.2	2	66	308	3.2	2

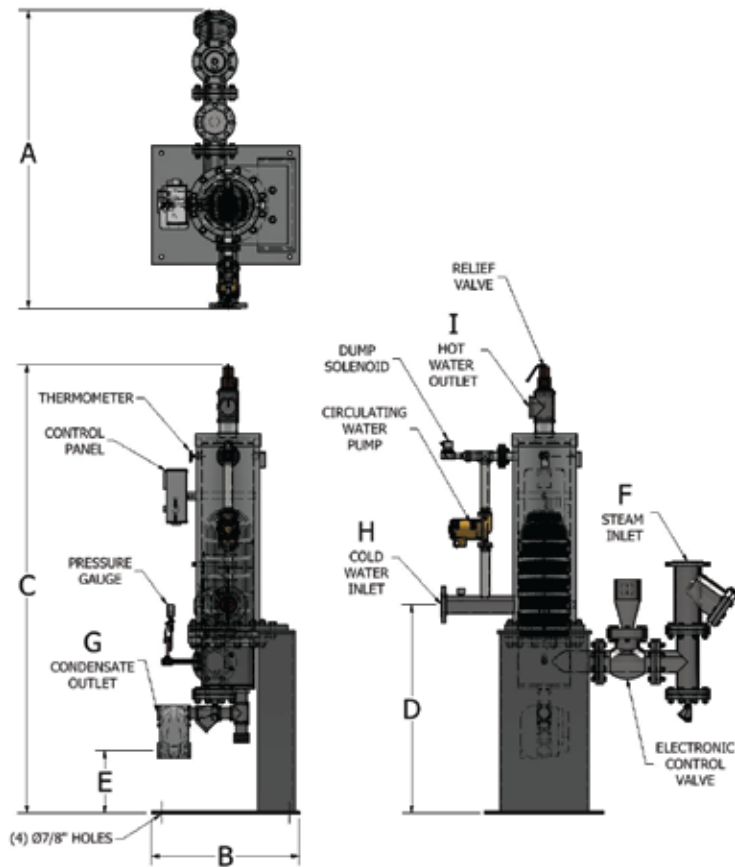
TLSW STEAM TO WATER UNIT

UNIT DETAILS									
MODEL #	DIMENSIONS					CONNECTIONS			
	A	B	C	D	E	F	G	H	I
TL-06SW	51-15/16"	19"	89-7/8"	42-3/8"	19-5/8"	2-1/2" FLG	1-1/4" CPLG	1-1/2" FLG	1-1/2" CPLG
TL-08SW	56-1/16"	19"	89-15/16"	42-3/8"	19-1/2"	3" FLG	1-1/2" FLG	2" FLG	2" CPLG
TL-10SW	60-9/16"	24"	90-1/16"	42-5/16"	20-3/8"	4" FLG	2" FLG	3" FLG	3" CPLG
TL-12SW	64-7/8"	24"	90-1/8"	42-3/8"	18-3/16"	4"/5" FLG	2" CPLG	4" FLG	4" CPLG

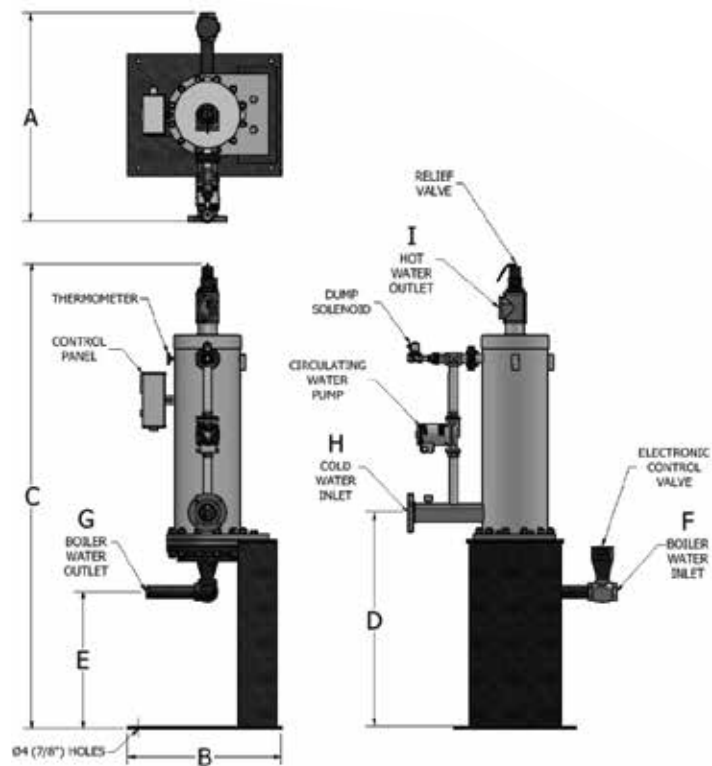
TLWW WATER TO WATER UNIT

UNIT DETAILS									
MODEL #	DIMENSIONS					CONNECTIONS			
	A	B	C	D	E	F	G	H	I
TL-06WW	40-3/4"	19"	89-7/8"	40-3/4"	26-7/8"	1-1/4" FLG	1-1/4" CPLG	1-1/2" FLG	1-1/2" CPLG
TL-08WW	40-7/8"	19"	89-15/16"	40-7/8"	26-7/8"	2" FLG	2" FLG	2" FLG	2" CPLG
TL-10WW	41"	24"	90-1/16"	41"	26-7/8"	3" FLG	3" FLG	3" FLG	3" CPLG
TL-12WW	41-1/8"	24"	90-1/8"	41-1/8"	26-7/8"	4" FLG	4" FLG	4" FLG	4" CPLG

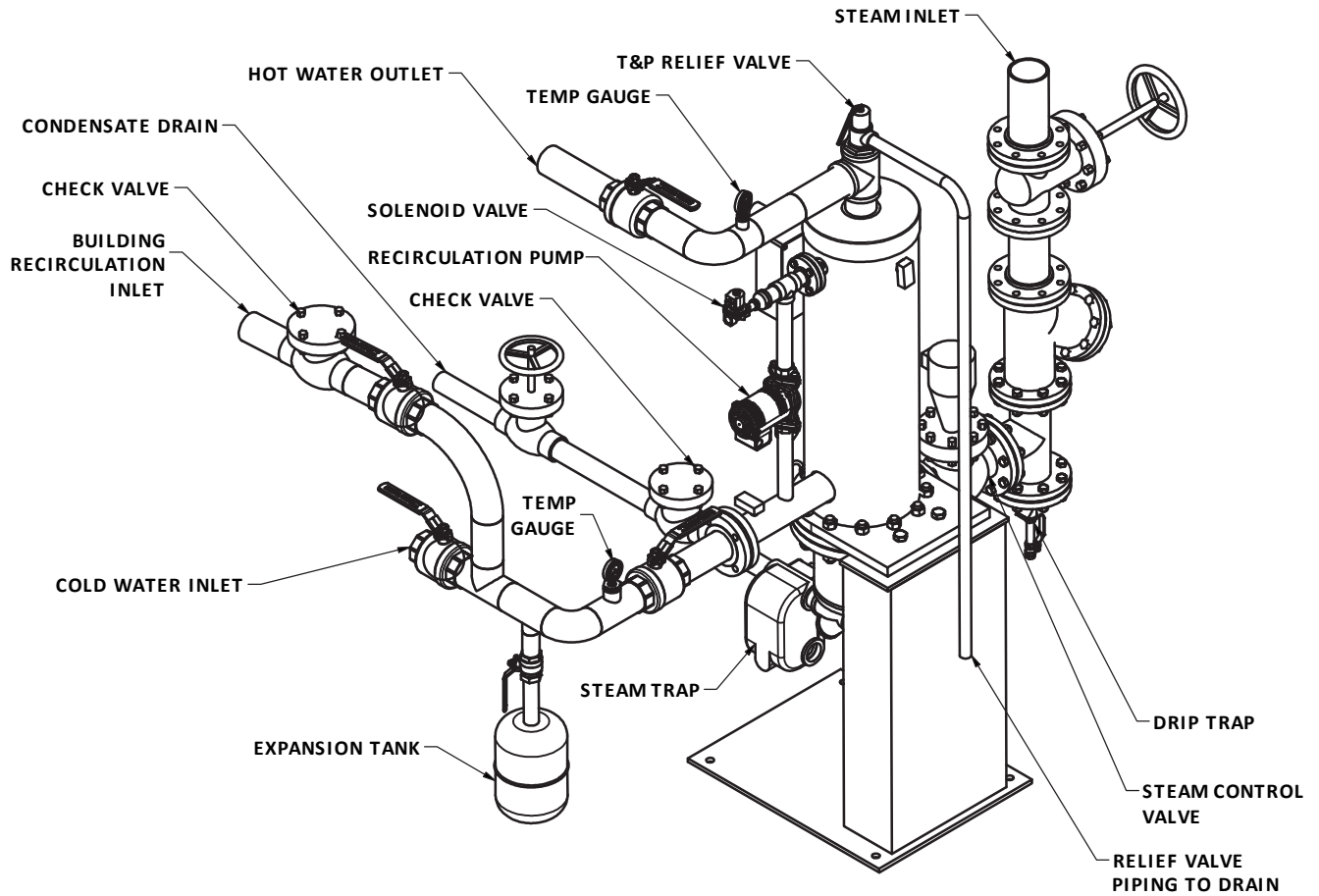
Steam Fired TLSW



Boiler Water Fired TLWW



VERTICAL WATER HEATER INSTALLATION



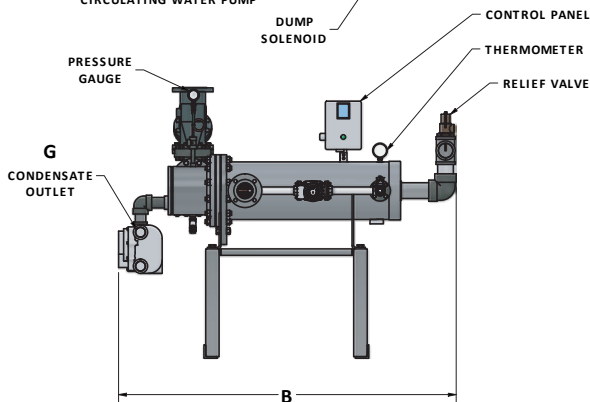
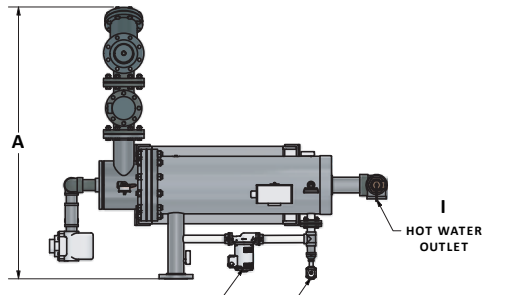
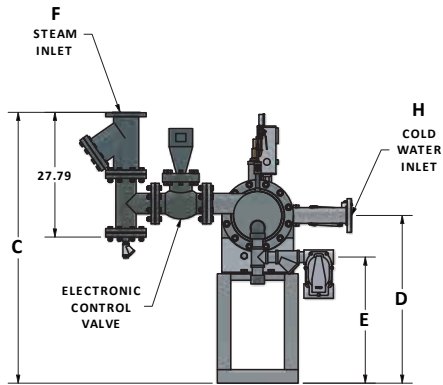
NOTES:

1. THIS IS A TYPICAL SINGLE UNIT INSTALLATION PIPING DRAWING. CONSULT LOCAL CODES AND AUTHORITIES.
2. FOR ACTUAL SIZE AND LOCATION DIMENSIONS OF PIPING AND OTHER CONNECTIONS REFER TO APPROPRIATE DIMENSIONAL DRAWING OF THE UNIT.
3. T&P RELIEF VALVE SHALL BE INSTALLED TO SAFE DRAIN ACCORDING TO PLUMBING CODES.
4. PIPING CONNECTIONS TO THE UNIT SHALL BE PROVIDED WITH UNIONS OR FLANGES LEAVING ENOUGH CLEARANCE FOR SERVICE.
5. DIELECTRIC FITTINGS ARE SUGGESTED TO MAKE CONNECTIONS BETWEEN DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
6. CHECK PACKING SLIP FOR FIELD INSTALLATION ITEMS.
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. MIXING VALVE SHOULD NOT BE INSTALLED WITHIN 20 FEET OF WATER HEATER OUTLET CONNECTION.
10. WHEN STEAM INLET PRESSURE IS HIGHER THAN REQUIRED. A PRESSURE REGULATING VALVE SHALL BE PROVIDED BEFORE STEAM INLET TO CONTROL VALVE.
11. EXPANSION TANK SHALL BE INSTALLED WHEN BUILDING RECIRCULATION PIPING IS EMPLOYED.

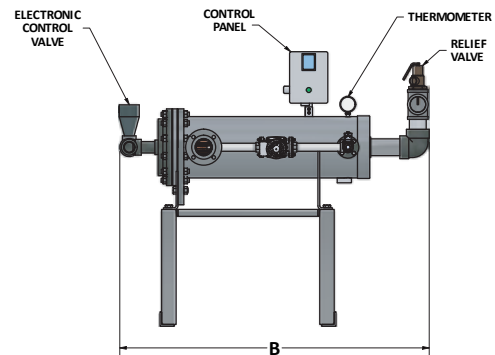
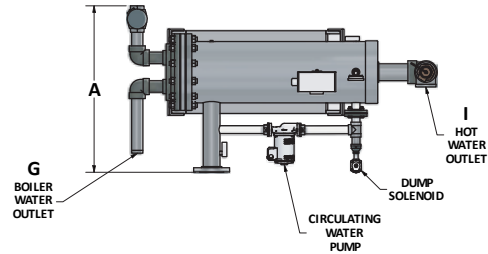
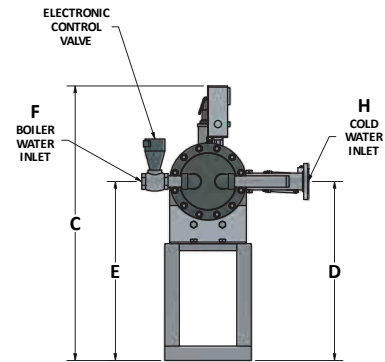
HORIZONTAL CONFIGURATION

UNIT DETAILS									
MODEL #	DIMENSIONS					CONNECTIONS			
	A	B	C	D	E	F	G	H	I
TLH-06SW	51-15/16"	74-3/4"	56-3/8"	35-5/16"	28-1/8"	2-1/2" FLG	1-1/4" CPLG	1-1/2" FLG	1-1/2" CPLG
TLH-08SW	56-1/16"	74-7/8"	57-3/8"	36-5/16"	28-1/8"	3" FLG	1-1/2" FLG	2" FLG	2" CPLG
TLH-10SW	60-9/16"	75-1/4"	60-3/8"	37-3/8"	28-1/8"	4" FLG	2" FLG	3" FLG	3" CPLG
TLH-12SW	64-7/8"	75-5/8"	60-5/16"	38-3/8"	28-1/8"	4"/5" FLG	2" CPLG	4" FLG	4" CPLG
TLH-06WW	34-3/4"	64-1/8"	53-3/16"	35-5/16"	20-1/2"	1-1/4" FLG	1-1/4" CPLG	1-1/2" FLG	1-1/2" CPLG
TLH-08WW	34-3/4"	64-1/4"	55-3/16"	36-5/16"	20-1/2"	2" FLG	2" FLG	2" FLG	2" CPLG
TLH-10WW	34-3/4"	64-5/8"	57-5/16"	37-3/8"	20-1/2"	3" FLG	3" FLG	3" FLG	3" CPLG
TLH-12WW	34-3/4"	65"	59-5/16"	38-3/8"	20-1/2"	4" FLG	4" FLG	4" FLG	4" CPLG

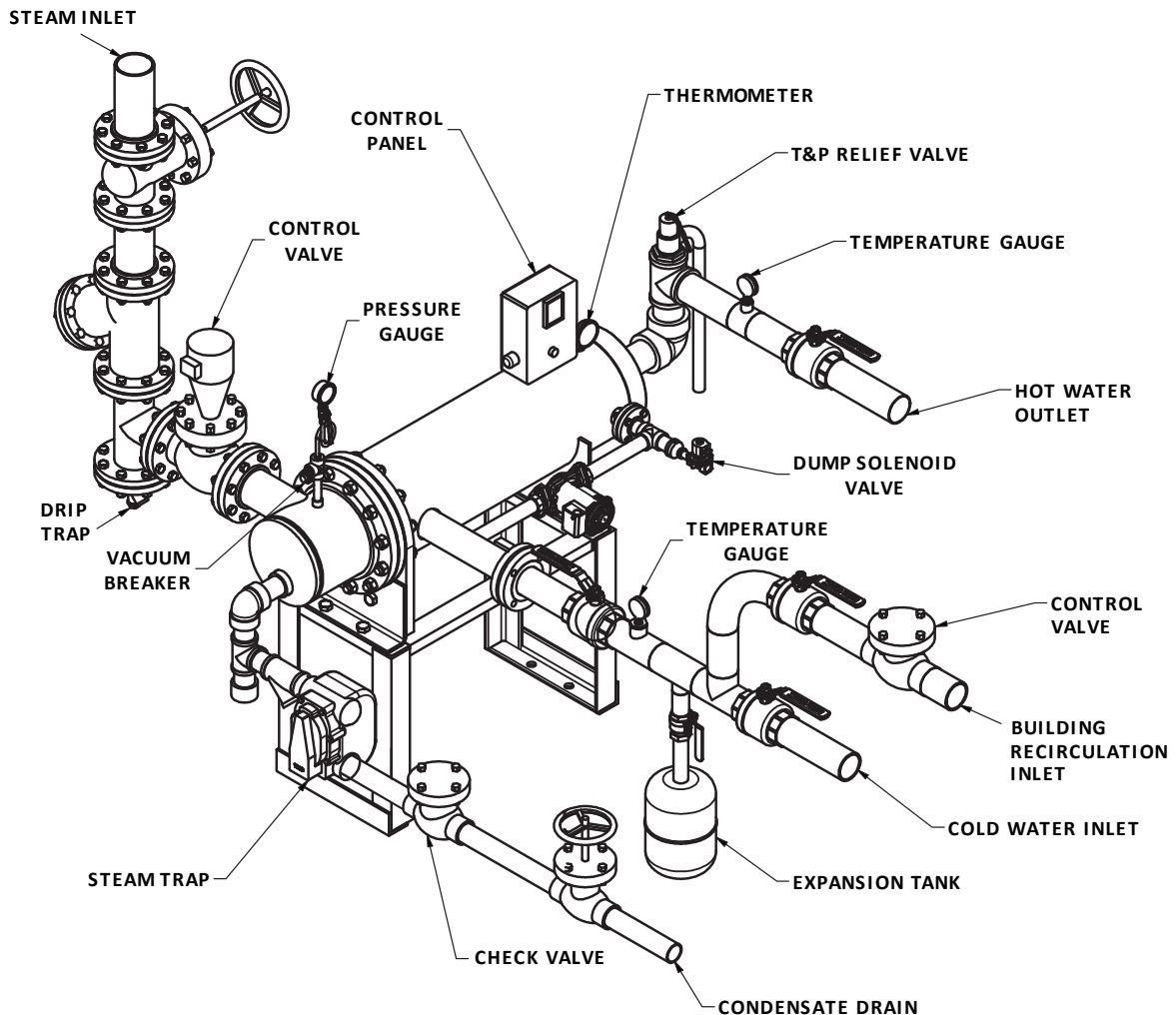
Steam Fired TLHSW



Boiler Water Fired TLHWW



HORIZONTAL WATER HEATER INSTALLATION



NOTES:

1. THIS IS A TYPICAL SINGLE UNIT INSTALLATION PIPING DRAWING. CONSULT LOCAL CODES AND AUTHORITIES.
2. FOR ACTUAL SIZE AND LOCATION DIMENSIONS OF PIPING AND OTHER CONNECTIONS REFER TO APPROPRIATE DIMENSIONAL DRAWING OF THE UNIT.
3. T&P RELIEF VALVE SHALL BE INSTALLED TO SAFE DRAIN ACCORDING TO PLUMBING CODES.
4. PIPING CONNECTIONS TO THE UNIT SHALL BE PROVIDED WITH UNIONS OR FLANGES LEAVING ENOUGH CLEARANCE FOR SERVICE.
5. DIELECTRIC FITTINGS ARE SUGGESTED TO MAKE CONNECTIONS BETWEEN DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
6. CHECK PACKING SLIP FOR FIELD INSTALLATION ITEMS.
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. MIXING VALVE SHOULD NOT BE INSTALLED WITHIN 20 FEET OF WATER HEATER OUTLET CONNECTION.
10. WHEN STEAM INLET PRESSURE IS HIGHER THAN REQUIRED. A PRESSURE REGULATING VALVE SHALL BE PROVIDED BEFORE STEAM INLET TO CONTROL VALVE.
11. EXPANSION TANK SHALL BE INSTALLED WHEN BUILDING RECIRCULATION PIPING IS EMPLOYED.

TL THERMAL LEVERAGE WATER HEATERS

Sample Specifications:

When specifying TL Thermal Leverage Fulcrum Water Heaters Select Model from charts and use specification below. TL has Representation in most Major Cities, contact factory for assistance.

Semi Instantaneous water heater shall be a TL Thermal Leverage Fulcrum Series factory assembled and wired water heater. The heat exchanger shall be designed and fabricated in accordance with ASME Code Section VIII Division 1 for 150 PSIG. The shell shall be 316 Solid Stainless Steel pipe with 3000# FNPT fittings, .500" O.D. Copper tubes, solid 316 Stainless Steel tube sheet and carbon steel head.

Steam Units

Unit should be skid mounted on a steel mounting base. Heater shell shall be insulated with 1" fiberglass insulation and covered in a PVC gray jacket. Water heater shall be factory assembled and piped with incoming strainer, impingement tee, drip and main traps with electronic control valve. The tube bundle shall be baffled with Teflon segmented baffles and shall have an integral bronze circulator pump to flow domestic water over the coil to preclude stacking.

Boiler Water Units

Unit should be skid mounted on a steel mounting base. Heater shell shall be insulated with 1" fiberglass insulation and covered in a PVC gray jacket. Water heater shall be factory assembled and piped with incoming strainer and electronic control valve. The tube bundle shall be baffled with Teflon segmented baffles and shall have an integral bronze circulator pump to flow domestic water over the coil to preclude stacking.

The water heater shall be equipped with a solid-state PI control panel with LCD display, alarm with silence button, ON/OFF switch, primary high limit and secondary high limit. The control module shall be supplied with a field programmable digital PI controller which can be adjusted to set the outlet temperature limit on the display screen. The panel screen shall indicate a red alarm display and horn with silence relay button. The panel shall be supplied with dry contact closure outputs to indicate to BAS the occurrence of power on, primary high temperature and secondary high temperature. The control shall allow the BAS to turn the heater on or off through a remote relay suitable for 24 VAC, 1 amp. The control shall also allow the BAS to remotely set the temperature of the water heater using a 4-20mA input signal. The unit shall have its own separate ON/OFF switch and shall be mounted in a NEMA 4 panel. All solenoids and limits shall be 24 VAC.

The heater shall be equipped with a Steam Pressure, Gauge Vacuum Breaker and a ASME T&P Relief Valve suitable to relieve the BTU input of the unit.

Manufacturer assumes all responsibility for correct sizing of components to guarantee performance.

Heater shall be a Fulcrum TL Model _____ Vertical _____ or Horizontal _____
Steam to Heat _____ GPM from _____ Deg F to _____ Deg F with _____ psig Steam to Valve
Boiler Water to Heat _____ GPM from _____ Deg F to _____ Deg F with _____ GPM of _____ Deg F to Valve