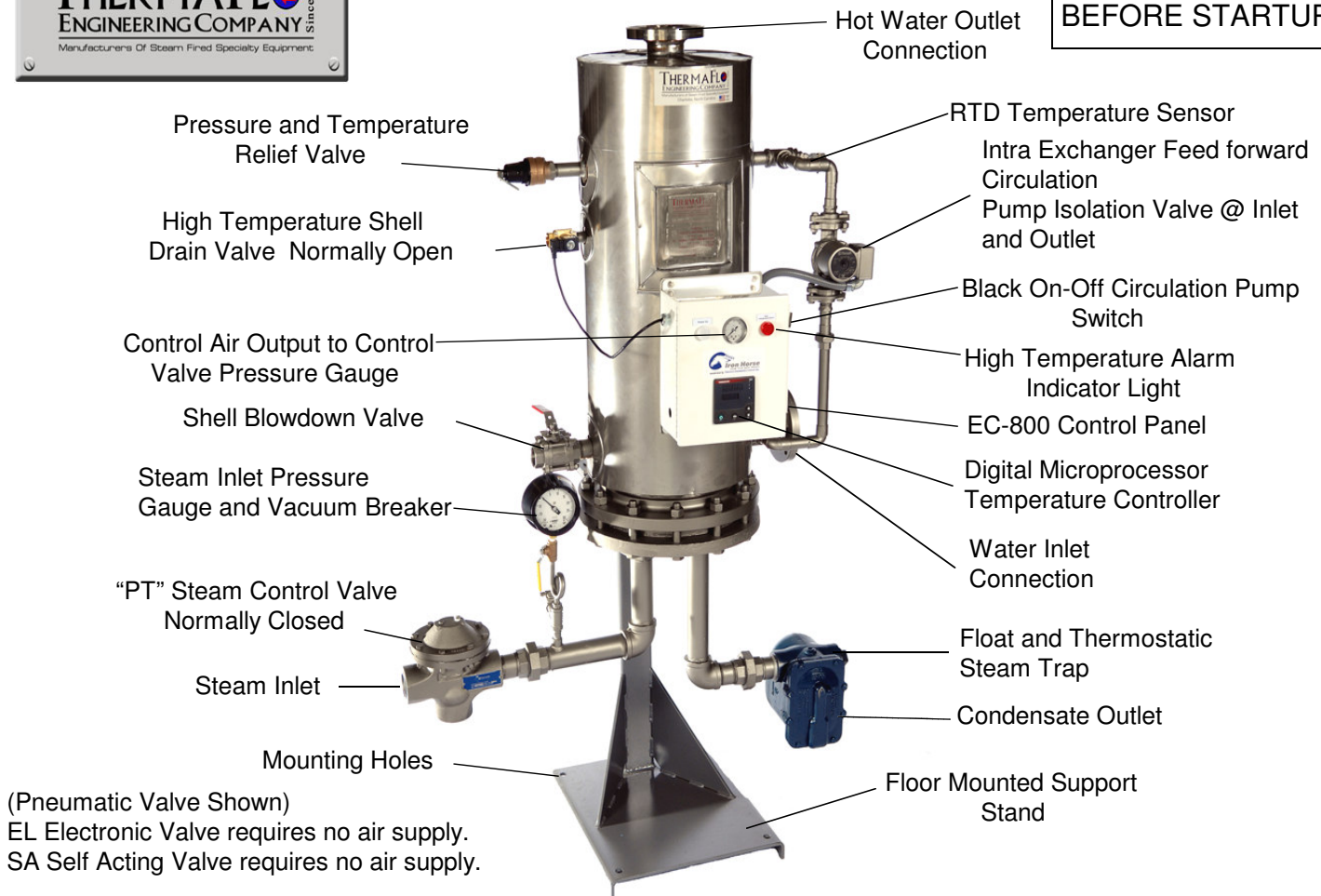


# OPERATION AND STARTUP MANUAL



“STEAM FIRED”

READ COMPLETELY  
BEFORE STARTUP



## SECTION 1 HOOKUP AND INSTALL

## TH-750 Steam Fired Vertical or Horizontal Heater

1. The TH-750 should be located in an area so that it will be easily accessible for any inspection and repairs. Secure to the floor using the 4 (four) mounting holes in the base floor stand.
2. Pipe clean water or fluid to be heated to the inlet on the lower side making provision for the loop recirculation. Install a check valve and suitable wye strainer on the inlet. Pipe the heated water from the top of the TH-750 to the users. A recirculation loop for the heated water is recommended. Service valves should be located at all inlets and outlets. Always open the cold side first and check for any leaks.
3. Pipe steam (**125 psig Max**) to the control valve inlet. If a wye strainer and drip steam trap are not furnished with the heater they should always be installed with the isolation valve. **If a wye strainer and drip trap are not installed the warranty on the unit will be void due to dirt, and condensate buildup on no load or low load conditions. Be sure your supply is sized correctly. Consult Thermaflo Inc. or your Local Representative if you are unsure of the size. Never open the hot side “STEAM” first. Always introduce steam to the unit slowly.**
4. Pipe condensate to a gravity return. **Never elevate or lift the outlet condensate piping** as this will cause water hammer, erratic control, tube failure and will void the warranty.
5. Pipe the Pressure and Temperature Relief Valve full outlet size to a suitable drain.
6. Pipe the high temperature shell drain valve to suitable drain. Note: This valve will discharge a considerable amount of hot water when it opens. Never allow this valve to be piped to a drain that will not carry full flow discharge. Pipe down into a drain not simply to a cover or overflow can cause damage. Installer has the responsibility to select adequate drains for both valves.

7. Always leave to vacuum breaker open to atmosphere. The vacuum breaker is located below the inlet steam pressure gauge.
8. The EC800 Control Panel requires a single 120 volt/1phase/60hz power supply for operation. Supply wiring connections are furnished so that only one simple connection is required. The wiring should come from a minimum 10 amp breaker with fused disconnect and comply with the local codes. **NOTE: The EC800 Panel powers the intra shell circulation pump and all of the controls on the SVH-125. No additional wiring is required. Each TH-750 Digital Temperature Controller is "Factory Setup and Tested" NO ADJUSTMENTS should be required" unless the operating actual conditions change. After wiring the unit make sure the intratank switch on side of the EC800 control panel shown above is turned OFF! before turning on electrical power to the panel. If this is not done the pump will run dry and the seals will fail on startup and VOID THE WARRANTY on the pump.**
9. If the TH-750 you are installing is a pneumatic unit a clean 20 psig min (120 Max) air supply to the bottom supply port tubing connection should be piped. The outlet tubing to the control valve is furnished with the unit but will have to be reconnected during installation. Simple slide fittings are used for use with poly air tubing. Self acting or electronic units require no outside air source.
10. All Thermaflo TH-750 Steam Fired Heaters are furnished with a factory sized float and thermostatic stem trap for the heaters application. Never substitute another manufacturers steam trap or a different trap than the one that is furnished with your heater. If the steam trap can not be located at the time of installation call you local Thermaflo representative.  
If you encounter a lift or have to pipe the condensate to a return that does not have gravity flow a Thermaflo pressure powered condensate pump or another type of condensate return system will need to be installed to prevent flooding of the tube steam space. Contact your Spirax Sarco representative for advice and a recommendation in this area. This is very important to the systems operation.
11. Prior to startup of the unit all head flange bolts should be retightened due to shipment and the piping stress at installation. **SEE TORQUE SPECIFICATIONS AND PROCEDURE SHEET LISTED BELOW. THIS IS VERY IMPORTANT.**  
This is important and failure to comply can cause head gasket leaks. Warranty will not cover any head gasket leaks for failure to completely comply with this section. These bolts should also be checked after startup (SEE OPERATION SECTION).
12. Attached in this manual you will find hookup drawings for these units that cover many different scenarios. You should always find your application and review it before any startup is attempted to make sure you have all of the piping components in place correctly. If you have a question on this you should contact your Thermaflo Representative or the factory.
13. Since water expands as it is heated, installation of a properly sized thermal expansion tank will be required if the TH-750 does not have continuous usage. Failure to install an expansion tank may cause excessive popping of the relief valve and or high pressure, which could cause damage to the tube bundle or shell.

**NOW YOU ARE READY FOR STARTUP!**

**SAFETY NOTE:** It is **highly recommended** that when hot water is used for any domestic use that a secondary blending valve system be installed as to prevent any chance of a scalding situation. Consult your engineering firm or local Thermaflo representative if this is not in place. The TH-750 heater is manufactured standard with a double safety shutdown system. However all nessary precautions should be taken so that no one has a chance of injury.

## SECTION II

### STARTUP OPERATION:

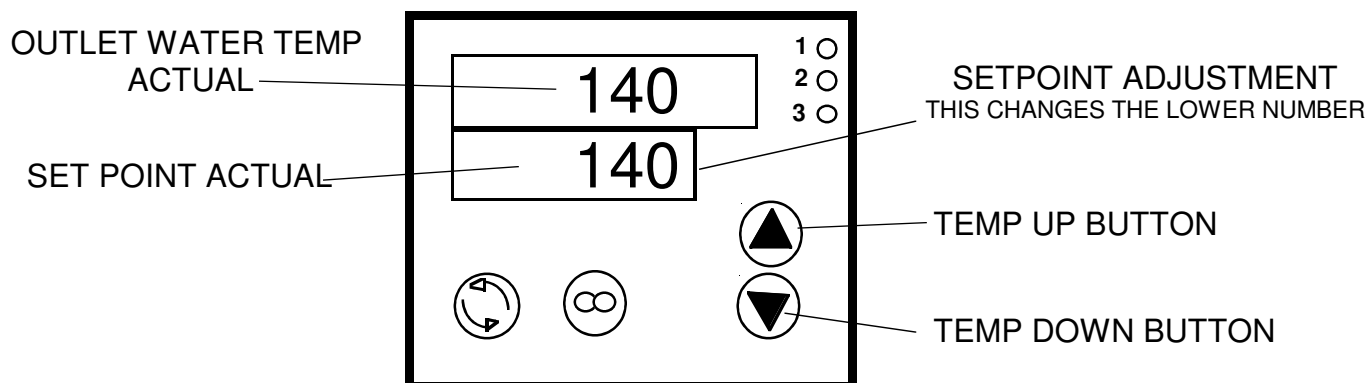
1. Verify that all manual valves are closed on the water and heat sources. On the side of the EC800 panel locate the black circulation pump on-off switch, and make sure it is in the off position! With this switch off power up the panel. This will close the high temp drain solenoid valve and activate the temperature controller. **Failure to turn the pump off will run the circulator dry. If you fill the unit with water first the safety drain solenoid valve will send water to drain due to the fact that it is normally open. Power to the panel will close this valve.**
2. Slowly open the water supply valve to shell of the TH-750 heater and check for leaks. Repair any leaks before proceeding with startup. Allow the shell to fill with water. Open the valves on the circulator pump. **When the shell is full of water turn the circulator on!**
3. Open the outlet water supply valve to the system slowly with a small user on. (A sink hot water side and a shower for example). This will allow the shell to fill completely with water and remove air from the shell. Never **use the P&T relief valve to remove air!**
4. The digital controller will sequence for a few minutes when you first power it up and return to its operation mode. **The controller has been preset at the factory before shipment and should require no adjustment.** Two numbers will appear on the front of the controller. The lower number is the outlet water set point. The upper number is the actual water temperature in the shell. If you have a pneumatic type control valve unit make sure the air supply is open to the panel. On the front of the EC800 pneumatic panel you will see a pressure gauge. This gauge will indicate the outlet air control pressure to modulate the control valve. When the system is first turned on the water temperature will be cold and the controller will be sending out its maximum air signal to the control valve. The pressure gauge will indicate a pressure of 15 to 30 psig. As the system reaches set point the pressure gauge will began to drop in pressure and finally read zero. As the system functions normally this pressure will move up and down modulating the steam control valve. See Fig 1EC800 below which illustrates the EC800 panel layout.
5. Open the condensate isolation valve fully to allow condensate to drain from the steam trap. Make sure the condensate is gravity flow or that a condensate pump is installed to lift the condensate.
6. Very slowly open the inlet steam isolation valve about 10% and allow steam to flow into the heater. The steam control valve will be 100% open at this point as the water in the heater is cold. You will have to slowly introduce steam through the inlet valve at a controlled rate manually for warmup. The upper number on the controller will began to increase as the steam is being introduced to the heating coil.
7. After about 10 minutes of warm up time slowly open the inlet steam isolation valve fully and allow the heater to come up to full operation temperature. This may take several minutes. This will allow the water in the shell to fully reach set point and the control valve will began to take over and fully control.
8. Gradually close the hot water users in the facility used for setup and allow the TH-750 to function in the automatic normal mode. It will take several minutes for a new system to settled down into a normal operating mode. Many times new systems have no users on line so after the system comes up to operating set point it operates in a hold mode. It is advisable for the owner to open several users and let the heater operate for about 30 minutes to an hour if this is the case before shutting down all hot water users.
9. Recheck the head bolt torque and repair any system leaks as required. See Torque Chart below Fig 1

10. It is IMPORTANT to note that Thermaflo uses several different types of steam control valves. This manual illustrates a pneumatic version as an example. If your unit has the EN electronic version no air will be required. The EN valve is a spring to close electronic valve. These valves on startup will open fully as the water in the shell is below set point. As the water in the shell comes up to set point the valve will begin to modulate closed, controlling temperature. The electronic EN valve is a ball type with a soft teflon seat that closes tight on shutdown. The self acting SA version will utilize the Thermaflo PT series valve. A control valve O&M manual will be attached that matches the valve utilized with this heater.
11. The controller illustration below is a quick reference for startup use. A complete manual is also attached to the O&M for your information. This manual contains more detailed information on the controller. It has been noted many times that the controllers are setup at the factory so that the installer will not have to do this in the field. Each controller is setup so that only the outlet temperature set point can be changed. All of the other critical control settings have been locked out so that they can not be tampered with in the field by unauthorized personnel.

THIS CONTROLLER HAS BEEN SETUP SO THAT ONLY THE  
SETPOINT CAN BE CHANGED.

REVIEW WATLOW MANUAL IF REQUIRED  
CONTACT THE FACTORY BEFORE CHANGING SETTINGS

### TH-750 CONTROLLER REVIEW AND SETTINGS



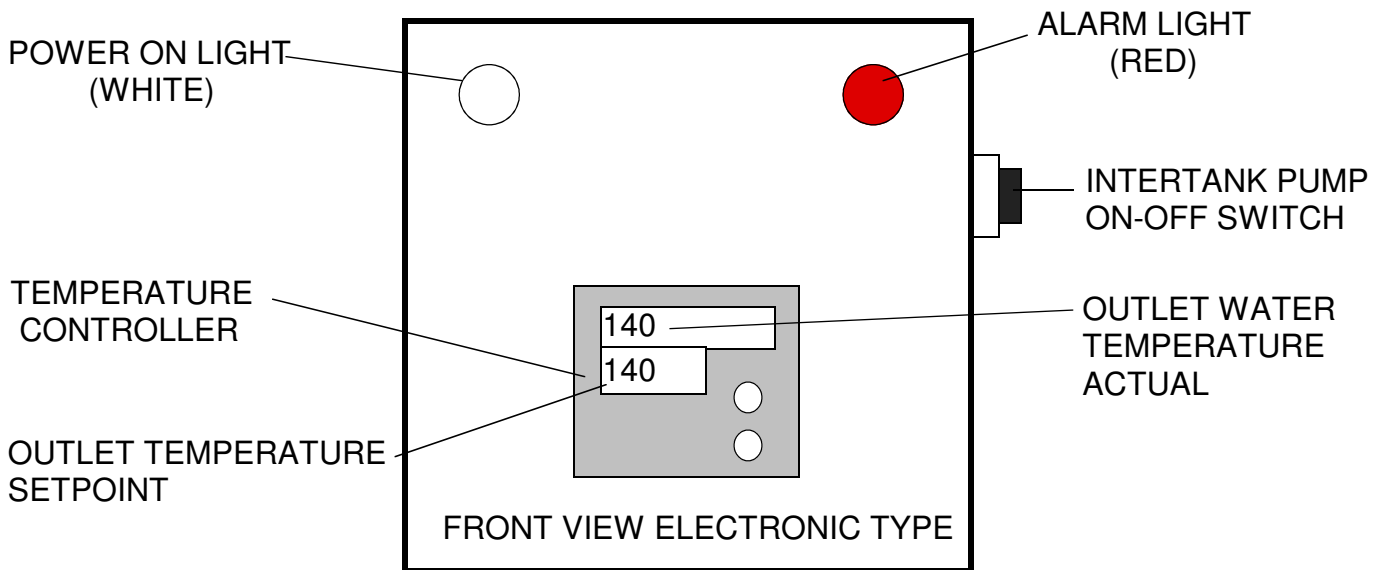
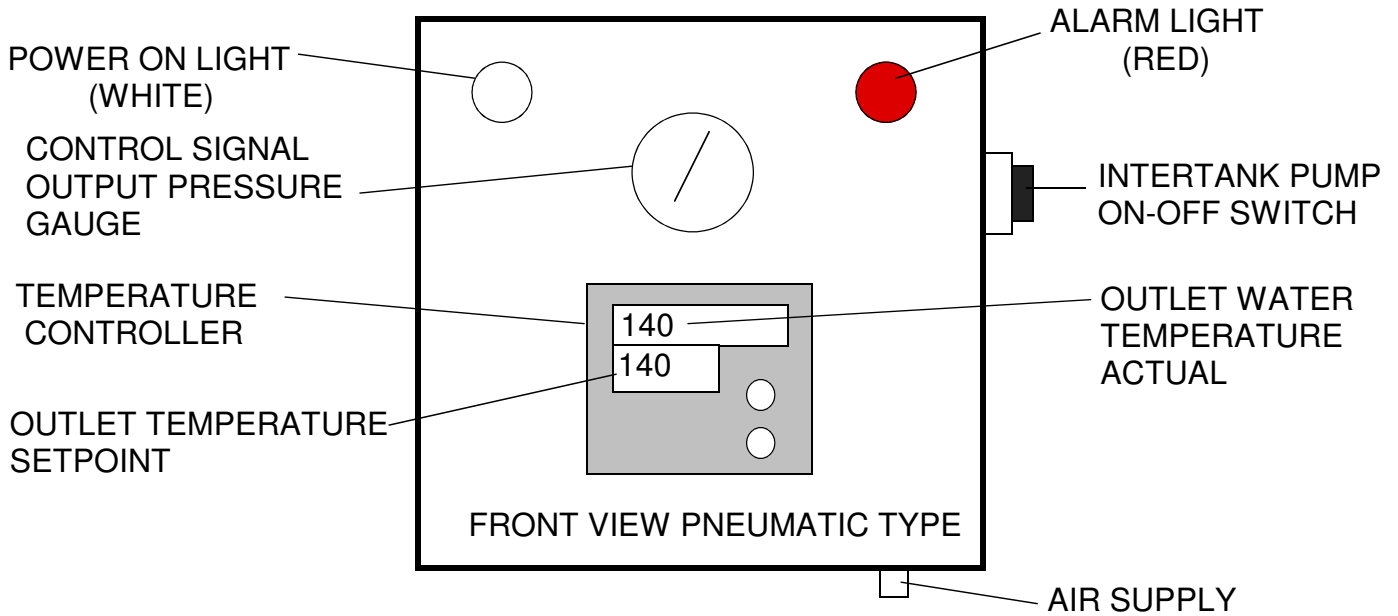
### SECTION III MAINTENANCE

1. Gasket creep is inherent to most gasket joints, and retorquing is required. The greater the operating temperature and pressure the greater the problem can become. It is imperative that the head bolts be torqued after installation, after initial startup, and inspected several times a year to be sure that there are no leaks and the bolts are torqued properly.  
The bolts should be torqued incrementally to 30%, 60%, and then to 100% of the appropriate value shown in the torque chart in this manual. They should be torqued in the sequential order and the pattern shown in Fig 2 of the torque chart below.
2. The TH-750 has a shell blow down valve located in the lower rear. This valve should be piped to a suitable drain. On a monthly to quarterly frequency this valve should be quickly opened for 2 seconds. This has proven to remove scale buildup, or normal sediment that may collect in the shell.
3. The intratank circulation pump is critical for the accurate operation of the TH-750. This pump circulates the water in the shell across the temperature sensor and into the cold water supply inlet. This action allows the system to detect changes in flow demand but temperature changes as well. The pump is fitted with permanently lubricated bearings and does not require any lubrication. If in the future a control inaccuracy begins suddenly this pump should be checked for operation. On a yearly basis the operation of this pump should be verified. Isolation valves have been located on each side of this pump for service. On the side of the EC800 controller you will find an on/off switch. If this pump is not working make sure this switch is ON. If the pump should need to be replaced turn the pump switch off. Isolate the pump and remove. Install the new pump. Open the isolation valves and turn the pump on. This can be done while the heater is in service so that hot water flow to end users can be maintained.
4. Each TH-750 should be fitted with a steam trap drip station at the steam inlet to the heater. The satisfactory operation of this trap is critical. On at least a quarterly basis this trap should be checked for condition and the strainer should be blown down to clean.
5. Each TH-750 should be fitted with a steam strainer at the inlet of the steam control valve. At least quarterly this strainer should be blown down for cleaning.
6. The internal U type heating coil commonly referred to as the heating bundle is very important to the overall operation of the TH-750. Every two years of operation, this bundle should be removed and cleaned so that effective heat transfer can continue to take place. We recommend a pressure wash or a very mild soaking for several hours in lime away or another product that will not damage copper, cupro nickel, or stainless steel. Before using any chemical be sure to consult their factory.
7. On a yearly basis it is good practice to operate each valve on the heater to make sure they shut off and operate as required.
8. Each TH-750 heater is fitted with a pressure gauge and steam syphon. At least once a year the operation of this gauge should be verified by closing off the steam inlet valve and making sure the gauge moves to clean zero. If it does not the accuracy can be off and it should be replaced.
9. Each TH-750 heater is fitted with a pressure and temperature relief valve. We recommend that this valve be replaced every two years to make sure operation is verified. Hard water and scale can buildup on the element and cause the valve to malfunction. A good record of this replacement schedule should be kept in place. THIS IS VERY IMPORTANT!

**Thermaflo recommends that any application where water hardness is 120 mg/l that a water softener be installed. Thermaflo is not responsible for scale out at or above that range!**

- 10. TH-750 heaters are engineered and constructed to last for many years when the steam is of good quality, and the condensate is removed correctly. Be sure to keep all of the supply steam main drip traps are maintained in good working order. Poor quality steam will erode the overall performance and quality workmanship crafted into every SVH-125 heater.
- 11. Contact the factory if you have any questions about maintenance of this unit.

FIG 1 EC800 Panels

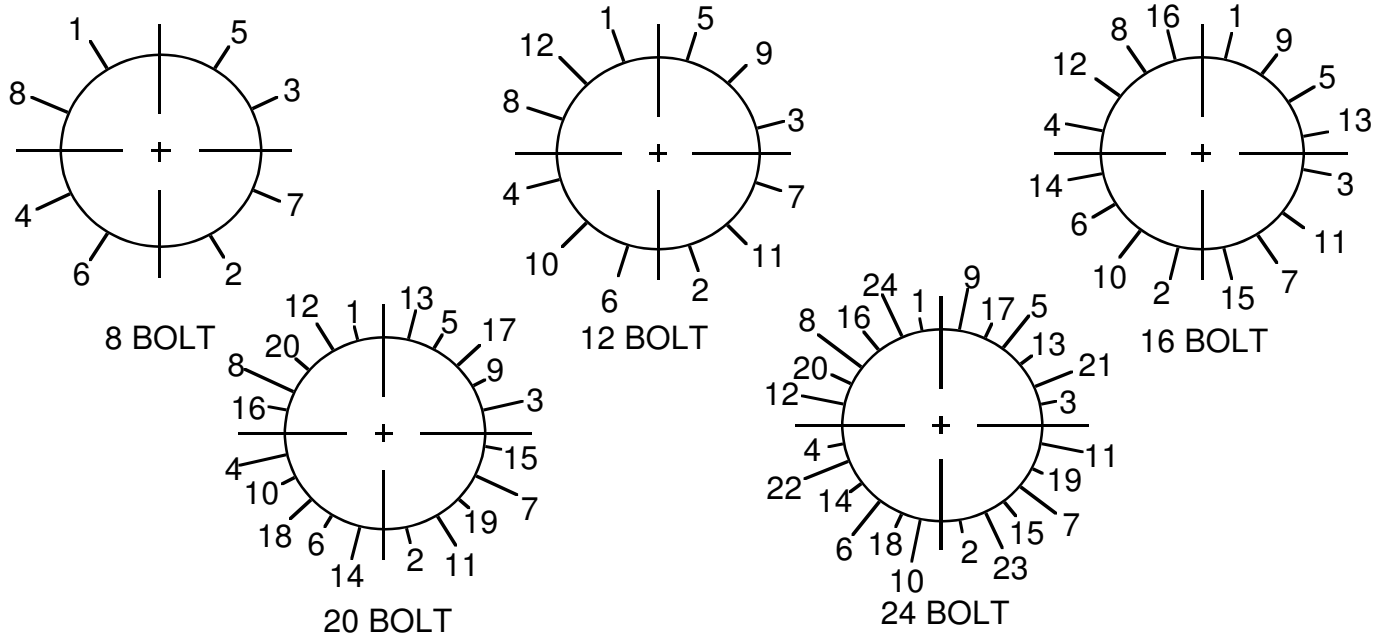


NOTE: The electronic EC800 Panel has no pressure gauge.






FIGURE 1: BOLT SIZE AND TORQUE REQUIREMENTS

HEAT EXCHANGER SIZE	BOLT SIZE	# OF BOLTS	TORQUE FT/LB. 150# FLGS.	HEAT EXCHANGER SIZE	BOLT SIZE	# OF BOLTS	TORQUE FT/LB. 300# FLGS.
4"	.62	8	30	4"	.75	8	100
6"	.75	8	50	6"	.75	12	100
8"	.75	8	50	8"	.87	12	160
10"	.87	12	80	10"	1.00	16	245
12"	.87	12	80	12"	1.12	16	390
14"	1.00	12	123	14"	1.12	20	390
16"	1.00	16	123	16"	1.25	20	545
18"	1.12	16	195	18"	1.25	24	545
20"	1.12	20	195	20"	1.25	24	545
22"	1.25	20	273				
24"	1.25	20	273				
26"	1.25	24	273				

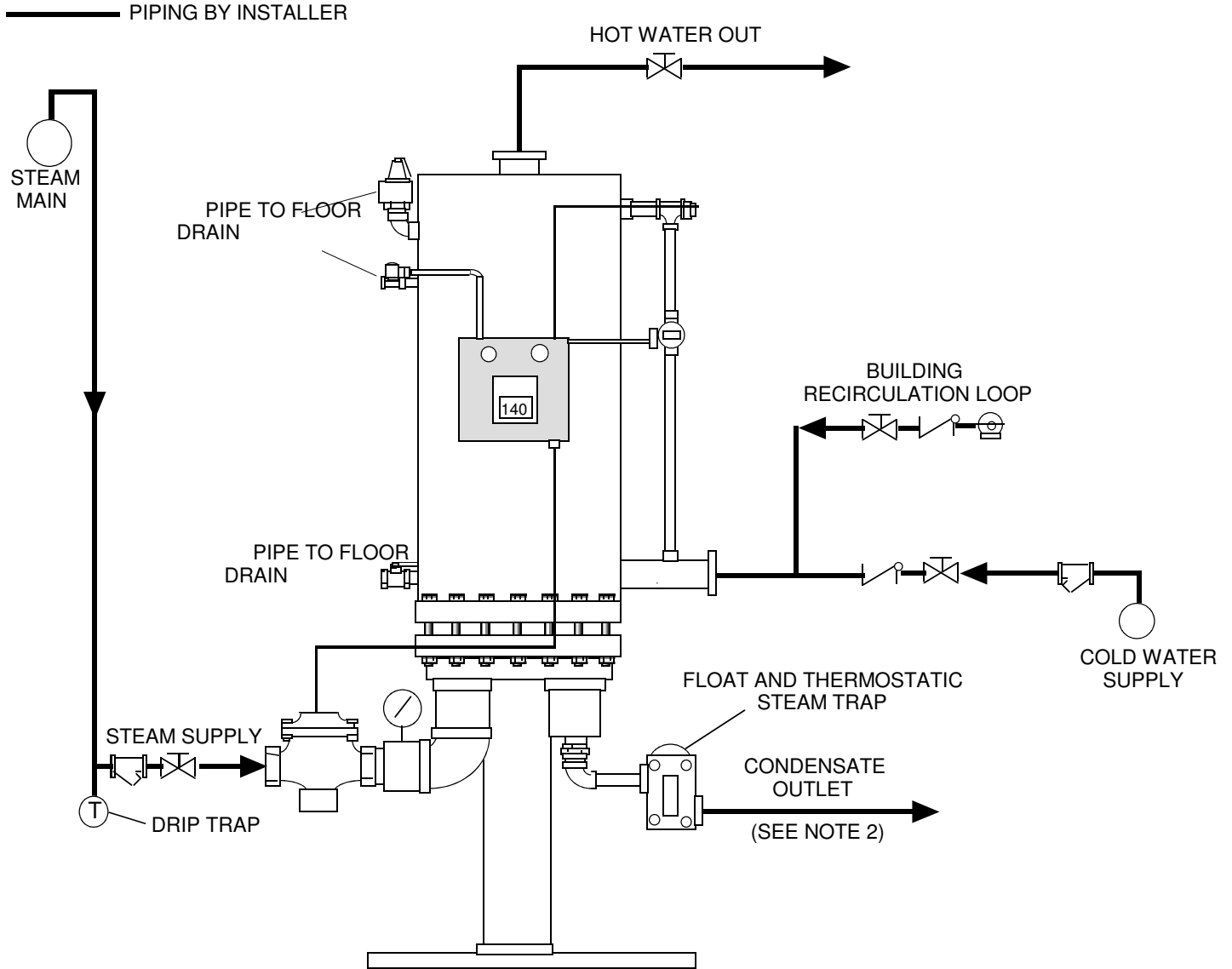
FIGURE 2: SEQUENTIAL ORDER FOR TORQUING FLANGE BOLTS



**PAGE VIII**  
**TYPICAL HEATER PIPING HOOKUPS**

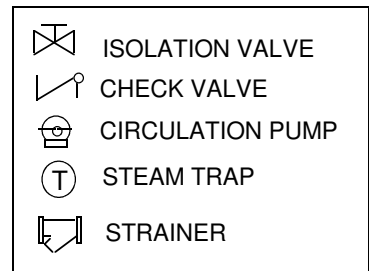
	ISOLATION VALVE
	CHECK VALVE
	CIRCULATION PUMP
	STEAM TRAP
	STRAINER

**TH-750 Steam Fired Single Unit Piping Hookup**

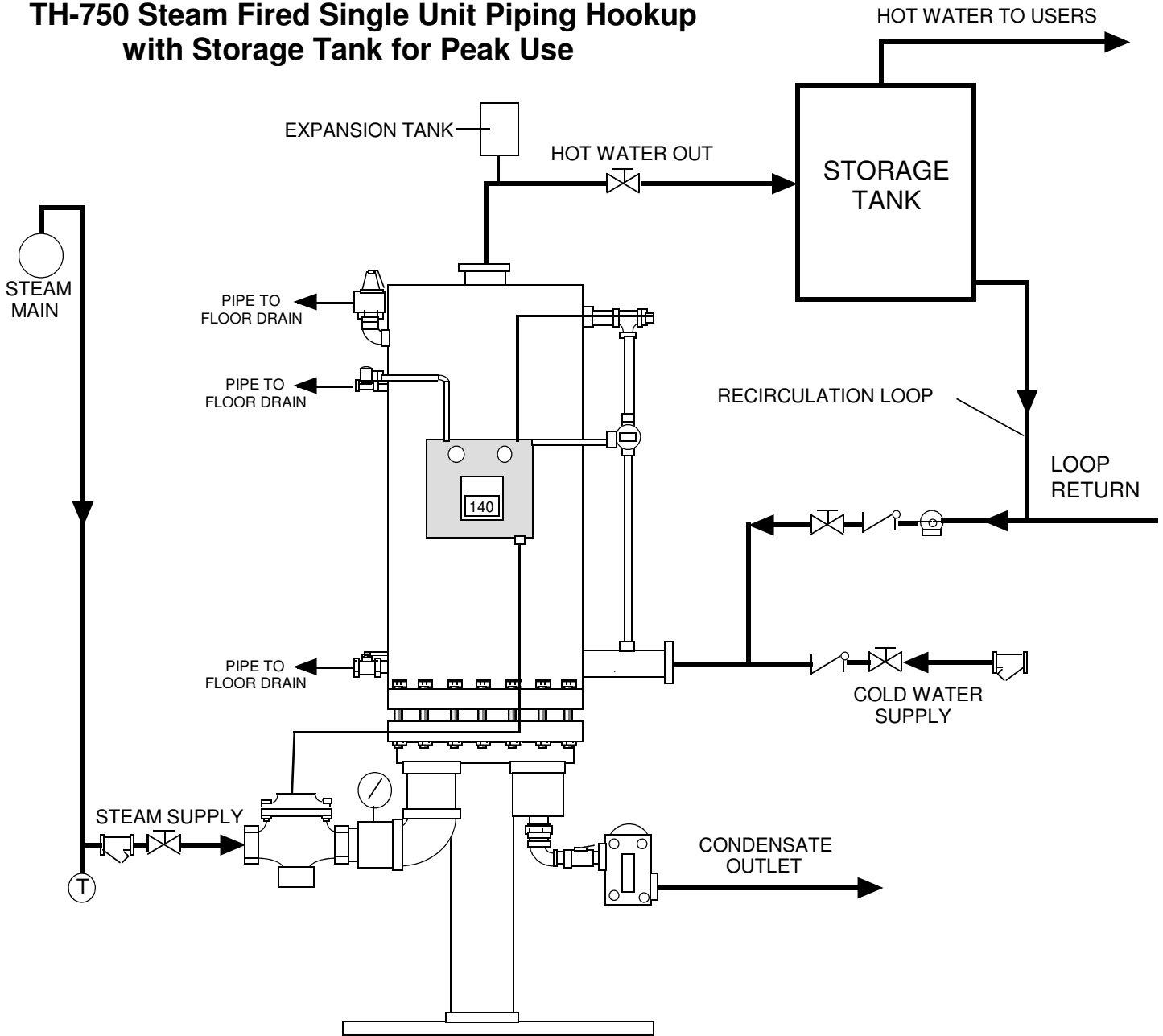


**Notes:**

1. SUGGESTED PIPING DESIGN. DESIGNER SHOULD CONSULT LOCAL CODES TO VERIFY COMPLIANCE.
2. ALWAYS PIPE OUTLET CONDENSATE TO GRAVITY ATMOSPHERIC RETURN LINES, TO AVOID WATER HAMMER AND INTERNAL STEAM SPACE FLOODING. INSTALL A PRESSURE POWERED PUMP TO ELIMINATE THIS. CONSULT THERMAFLO FOR DETAILS AND RECOMMENDATIONS.
3. ALWAYS PIPE SUPPLY STEAM FROM THE TOP OF THE HEADER AS SHOWN, AND INSTALL A MAIN DRIP BEFORE CONTROL VALVE INLET.
4. WHEN USING THE TH-750 FOR DOMESTIC LOOP SUPPLY IT IS HIGHLY RECOMMENDED TO INSTALL A MASTER BLEND VALVE TO PREVENT ANY CHANCE.

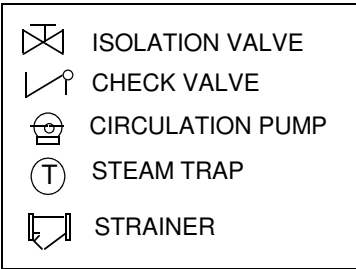


## TH-750 Steam Fired Single Unit Piping Hookup with Storage Tank for Peak Use

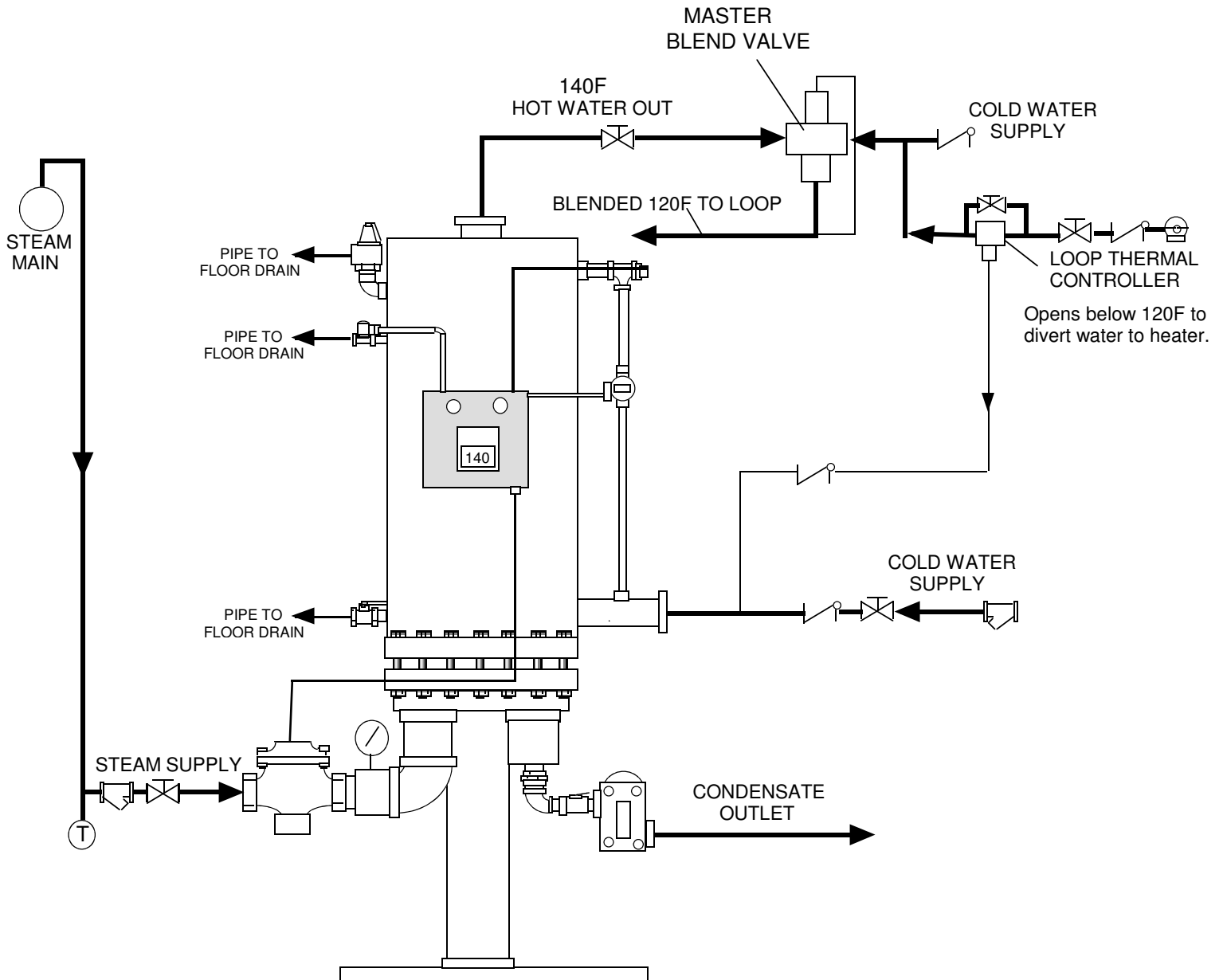


Notes:

1. SUGGESTED PIPING DESIGN. DESIGNER SHOULD CONSULT LOCAL CODES TO VERIFY COMPLIANCE.
2. ALWAYS PIPE OUTLET CONDENSATE TO GRAVITY ATMOSPHERIC RETURN LINES, TO AVOID WATERHAMMER AND INTERNAL STEAM SPACE FLOODING.
3. ALWAYS PIPE SUPPLY STEAM FROM THE TOP OF THE HEADER AS SHOWN, AND INSTALL A MAIN DRIP BEFORE CONTROL VALVE INLET.
4. WHEN HOT WATER IS USED FOR DOMESTIC PURPOSES A MASTER BLEND VALVE IS HIGHLY RECOMMENDED TO PREVENT ANY CHANCE OF SCALDING.



# TH-750 Steam Fired Single Unit Piping Hookup w/ Blend and Thermal Loop Diverter



Notes:

1. SUGGESTED PIPING DESIGN. DESIGNER SHOULD CONSULT LOCAL CODES TO VERIFY COMPLIANCE.
2. ALWAYS PIPE OUTLET CONDENSATE TO GRAVITY ATMOSPHERIC RETURN LINES, TO AVOID WATERHAMMER AND INTERNAL STEAM SPACE FLOODING.
3. ALWAYS PIPE SUPPLY STEAM FROM THE TOP OF THE HEADER AS SHOWN, AND INSTALL A MAIN DRIP BEFORE CONTROL VALVE INLET.
4. BLEND CONTROL VALVE AND THERMAL LOOP PIPING AND VALVES CAN BE FURNISHED BY THERMAFLO.
5. MASTER BLEND VALVES SHOULD ALWAYS BE USED ON DOMESTIC WATER SYSTEMS TO PREVENT ANY CHANCE OF SCALDING.