

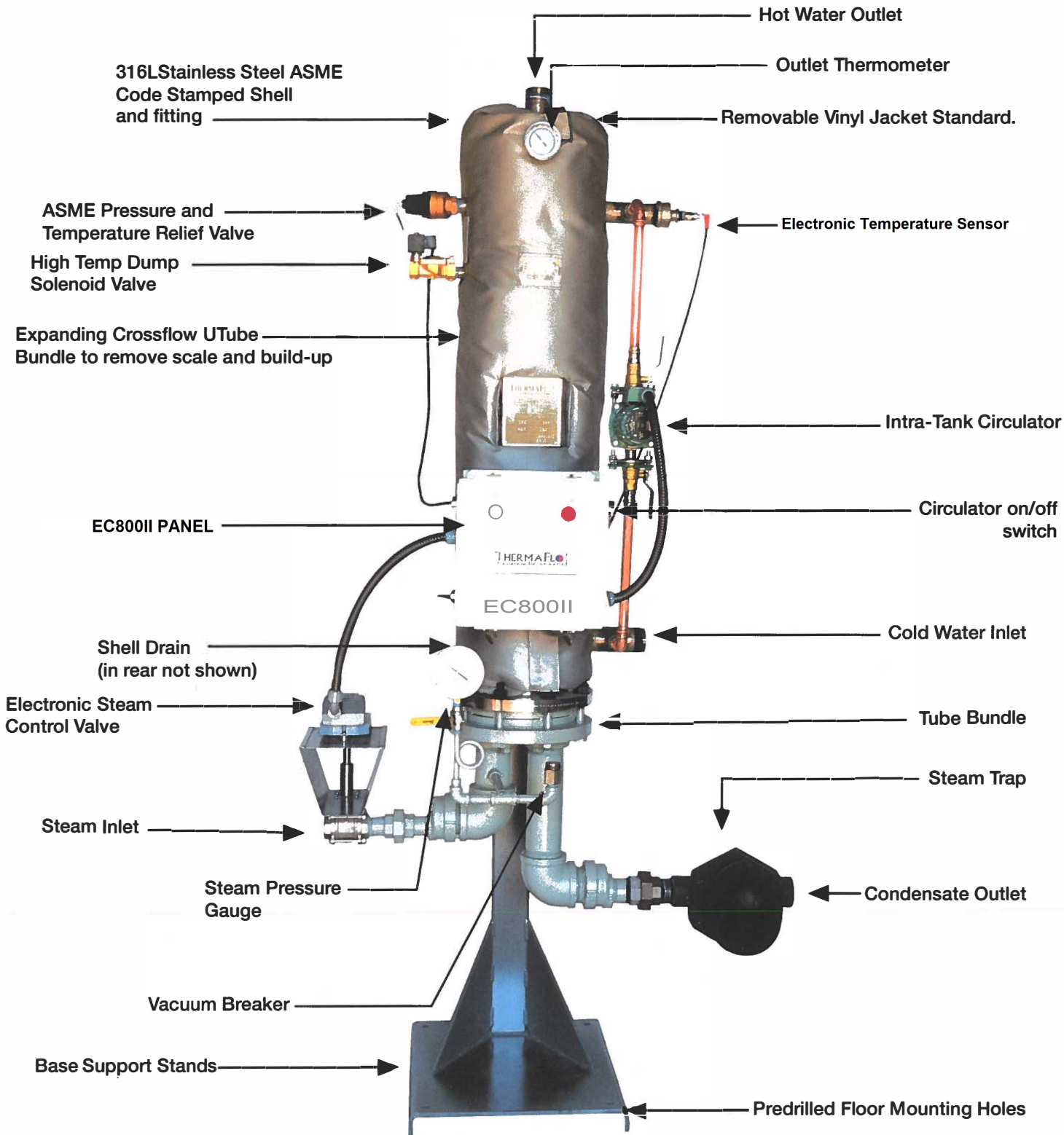


**TH-750/250 Series Steam or
Boiler Water Fired Water
Heaters, Plate and VSH and
HSH Storage Type Heaters
Startup Operation &
Maintenance Manual
EC800II Panel Only**

**READ THIS MANUAL COMPLETELY BEFORE ATTEMPTING START UP
THIS IS GENERAL INFORMATION PLEASE REVIEW FINAL DRAWING
OR CONSULT YOUR LOCAL REPRESENTATIVE OR THERMAFLO**

TH750 CONNECTIONS AND ACCESSORIES IDENTIFICATION

TH-750 Vertical Steam Fired Water Heater



Electronic Version Shown

Section 1 – Hookup and Installation

1. The TH-750/250 should be located in an area so that it will be easily accessible for any inspection and repairs Min 24". Secure to the floor using the four mounting holes in the base floor stand. 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 "Y" strainer on the inlet. Check Local Codes.
2. Pipe the heater outlet from the top of the TH-750/250 to the users. A recirculation loop for the hot circuit is always recommended. Size flow loop at 20-25% of max demand on the system.
3. Service (isolation) valves should be located at all inlets and outlets. Steam Supply Line should NEVER be the same size as the control valve. Size the steam supply at 9000FPM full load. The steam supply line will always be larger than the control valve.
4. Always open the cold water side first and check for any leaks. Leaks occur due to transit and install.
5. Pipe steam (150 psig Max) to the control inlet valve. If a "Y" strainer and drip steam trap were not supplied with the TH-750/250 heater, they should be installed with the isolation valve.
6. If a "Y" strainer and drip trap are not installed, dirt and condensate will build up on zero or low load conditions. **Failure to install a "Y" strainer and drip trap on the steam supply line voids the warranty.**
7. Be sure the steam supply is sized correctly – consult Thermaflo Engineering if you are unsure of the size. The steam supply line is NOT the same size as the control valve!
8. Always open the cold (WATER) side first very slowly so as not to wave shock the shell before opening the hot (STEAM) side and always introduce steam to the unit very slowly over time. A flow of recirculated water of 25% min flow of max flow should be maintained at all times thru the heaters. Example 100 GPM Max - 25 GPM recirculation. It is recommended not to totally isolate the water flow side of any heater to dead head or no usage or over heating will occur.
9. For gravity return systems, the TH-750/250 will be supplied with a factory sized Float & Thermostatic steam trap. **Never substitute with another manufacturer's steam trap or a different trap other than that supplied with the TH-750V unit as this could effect operation and will void the warranty.** If the steam trap cannot be located at the time of installation, contact your local Thermaflo Engineering representative.
10. **For TH-750/250 units installed where the condensate drains into a gravity return system, the condensate piping must not be elevated or lifted as this will cause water hammer, erratic control, flooding of the tube steam space, premature tube failure and will void the warranty.**
11. For pressurized condensate return systems or where a lift is required, the TH-750 should be supplied and fitted with a Thermaflo Engineering POP pump trap on pressure powered pump in place of the F & T trap. Consult your Thermaflo Representative.
12. Pipe the high temperature dump valve shell drain valve, any drain, and P&T Valve to suitable drain. These valves will discharge a considerable amount of water when it opens. Never allow this valve to be piped to drain that will not carry full flow discharge. Installer is responsible for selecting adequate drain size. If the drain pipe is PVC install a cooler to quench the drain to 140F Max.
13. Always leave the vacuum breaker, located below the inlet steam pressure gauge, open to atmosphere. Pipe all air vents and drain valves to a proper drain never to open atmosphere.
14. As a general rule all TH750/250 Heaters after 2017 come equipped with the JVV steam control valve. These valves are shipped loose and required reinstall by union or flg plus control wires reattached. Control wires are a 6 pin black connector factory wired in the EC800II Panel.

15. The EC800II control panel requires a single-phase 120V/1/60Hz power supply. Supply wiring connections are furnished so that only one simple connection is required. **Supply circuit should be fitted with a minimum 10 amp breaker with fused disconnect and should comply with local codes. The internal controller has been factory programmed for your conditions. Do not attempt to reprogram the PID controller without proper supervision by your Thermaflo representative. Factory setpoint is 90F outlet water so the heater can be slowly brought up to temperature maximum of 140F for domestic water.**
16. **VERY IMPORTANT** - Prior to connecting power to the unit, ensure that the re-circulation pump ON-OFF switch (black in color and located on the right side of the EC800 control panel) is in the **OFF** position to prevent the pump from running dry and damaging the seals which will consequently fail on start up. Evidence of the pump being run dry will void the warranty.
17. The EC800II panel powers the shell re-circulation pump and all of the controls on the TH-750 unit. No additional wiring is required to operate the intera shell feed forward circulator. This pump operation is crucial to the overall operation of the system and temperature accuracy.
18. Before starting any thermal heating unit a certified Thermaflo Representative or Thermaflo factory Service Tech should be onsite or contacted so that the installation can be reviewed and authorized. Thermaflo Inc. 704-940-1228 Plan Ahead!
19. **Prior to and after startup, all head flange bolts on all shell and tube type heaters should be retightened as these may have loosened during shipping or due to piping stress during installation. Bolts should be torqued incrementally and in the sequential order shown in the tables and drawings in Appendix A.** This does NOT apply to plate type heaters.
20. **Retightening of head flange bolts is important and failure to complete this procedure can lead to head gasket leaks.** The bolts should also be checked and adjusted as necessary after startup and annually to stop future leaks. Heat exchangers expand and contract requiring this.
21. Included in Appendix B of this manual are drawings showing typical hookups for various applications. It is recommended that the drawing outlining the relevant application is carefully reviewed before startup is attempted. If you are uncertain about correct hookup contact your local Thermaflo Engineering representative or the factory.
22. As water expands when heat is applied, installation of a properly sized thermal expansion tank is recommended 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.
23. **SAFETY NOTE:** The TH-750 is supplied as standard with a double safety shutdown system. However it is strongly recommended that when the TH-750 heater supplies hot water for domestic use, a secondary blending valve system be installed to prevent any chance of a scalding situation. Consult your engineering consultant or local Thermaflo Engineering representative if this is not in place. TH250 Units have a single shutdown. All TH750/250 and 500 Series heaters used on steam service with a supply pressure above 30 psig should have a secondary shutdown valve on the inlet of the modulating control valve. This also applies to boiler water above 180F. If this is not installed contact your area representative or Thermaflo immediately before startup to eliminate risk of burn or scalding.

ALL HIGH TEMP SHUTDOWN ALARMS LATCH AND MUST BE MANUALLY RESET AT 160F

24. Temperature and Pressure Relief Valve and Safety Drain Solenoid Valves require a proper working drain point as these will relieve water from the shell on operation. Make sure!

**BEFORE YOU STARTUP READ THIS AND FOLLOW THIS PROCEDURE:
IF YOU ARE NOT A FACTORY TRAINED THERMAFLO SERVICE TECH
CONTACT 704-940-1228 BEFORE ATTEMPTING TO STARTUP**

1. Turn off the steam or boiler water supply until you are familiar with the controller and its functions. This is **IMPORTANT**. Later in the procedure you will be notified when to turn on the steam or boiler water if you are not using steam as the heating media.
2. With all supply valves closed turn on power to the panel. During the 4-5 second power up phase the shell drain solenoid will open then close. So it is advisable to close water supply off during this initial phase and then back on after the boot up phase has finished to prevent water from going to drain. If you do not have suitable floor drains in the area water from safetys will discharge to floor and can causing temporary flooding in the area.
3. When the system powers up you will see the actual water temperature in the system as indicated below and the **TARGET** setpoint. Thermaflo has put the setpoint for Startup at 100F initial set point. **DO NOT ATTEMPT TO CHANGE THIS** until indicated to do so. This allows for a slow controlled warm up of the system. It is **NEVER** recommended to set the outlet **TARGET** temperature above 120F for any **DOMESTIC SYSTEM** or scalding can occur. In order to set this higher the discharge **MUST** be piped into a Blending system period.
4. After the system powers up check to make sure you have power to the JVV steam or Boiler water control valve. See Date sheet Page 8 of this manual. **LOOK AT THIS SHEET NOW** and make sure that the power is on and the valve is responsive. Initially with the **ACTUAL** water temperature below the **DEFAULT 100F** set point the JVV should be 50% open, This can be determined also by the **RED** and **YELLOW** Visual indicator on top of the valve showing 50% approx of each color. As the valve modulates this indicator color will change Red is Closed.

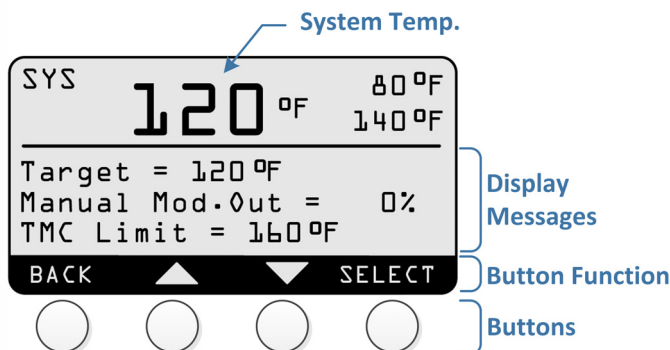
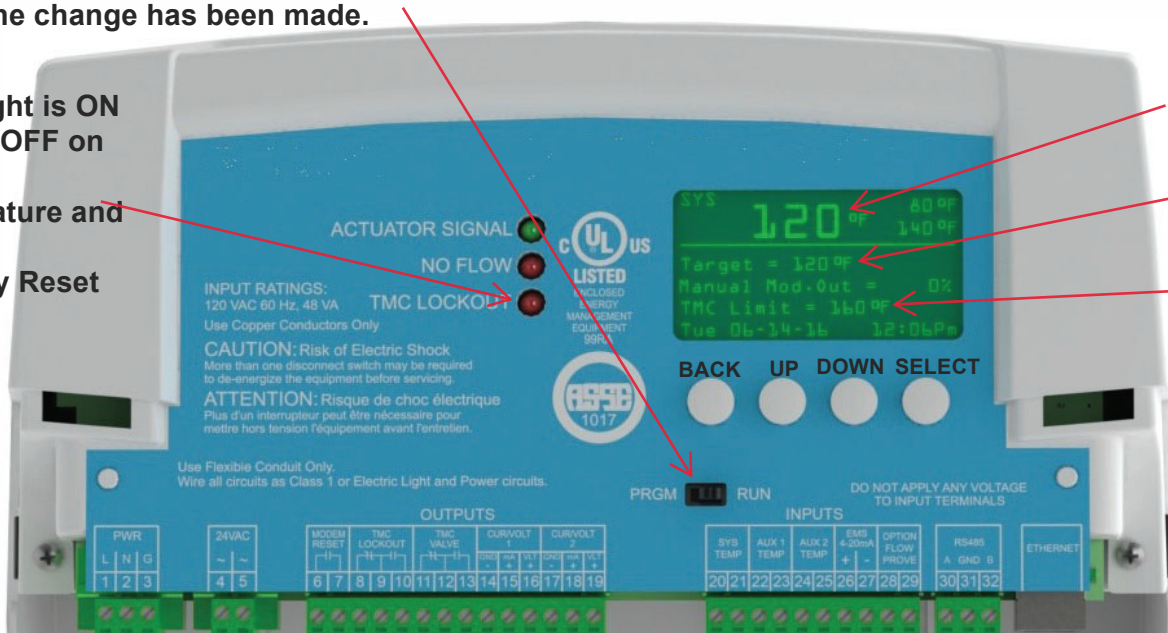
To make any change the Program/Run switch must be in the Program position then moved back to RUN after the change has been made.

If this light is ON
You are OFF on High
Temperature and
Must be
Manually Reset

Actual System
Water Temperature

TARGET is the
current setpoint

High(HTLV)
Temperatur
e Shutdown
Setpoint



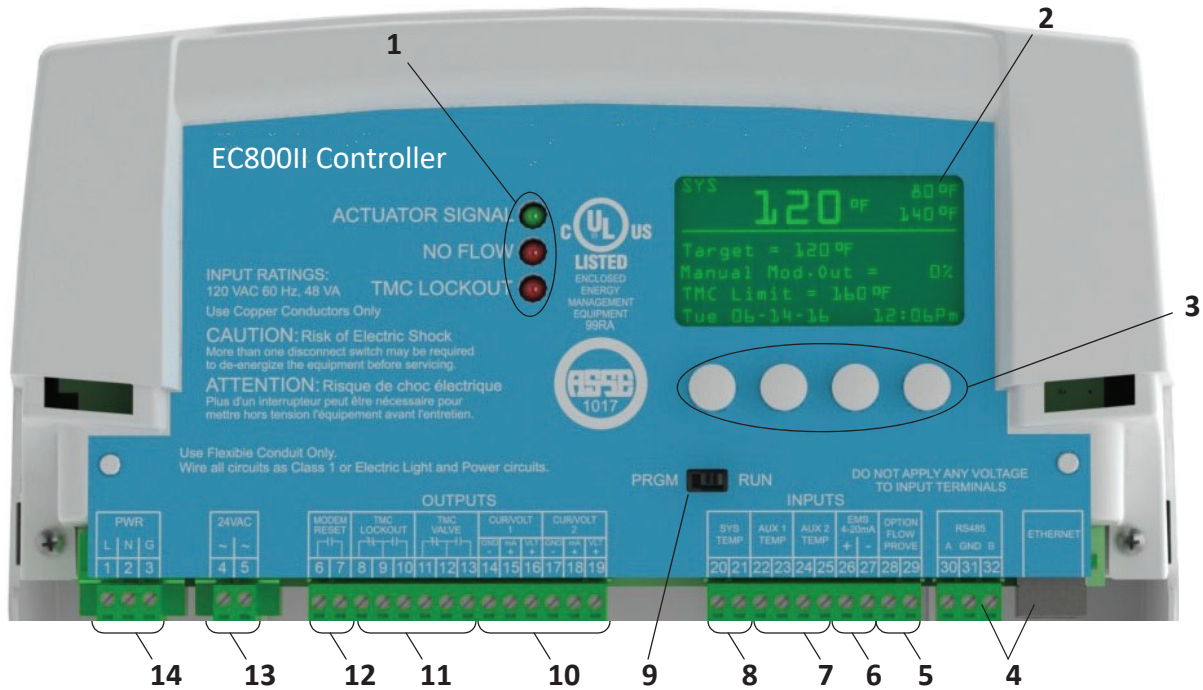
Display and Variable-Function Buttons

The display shows the system sensor temperature and operation messages. By default, the display shows the current Setpoint, Alarm Limit, or the Modulation Output percentage.

TMC is the High Limit Controller/System Shutdown
If the outlet water reaches this point the system will close the inlet steam valve and open the shell drain valve and latch. Manual reset is required.

EC800II Electronic Temperature Controller System

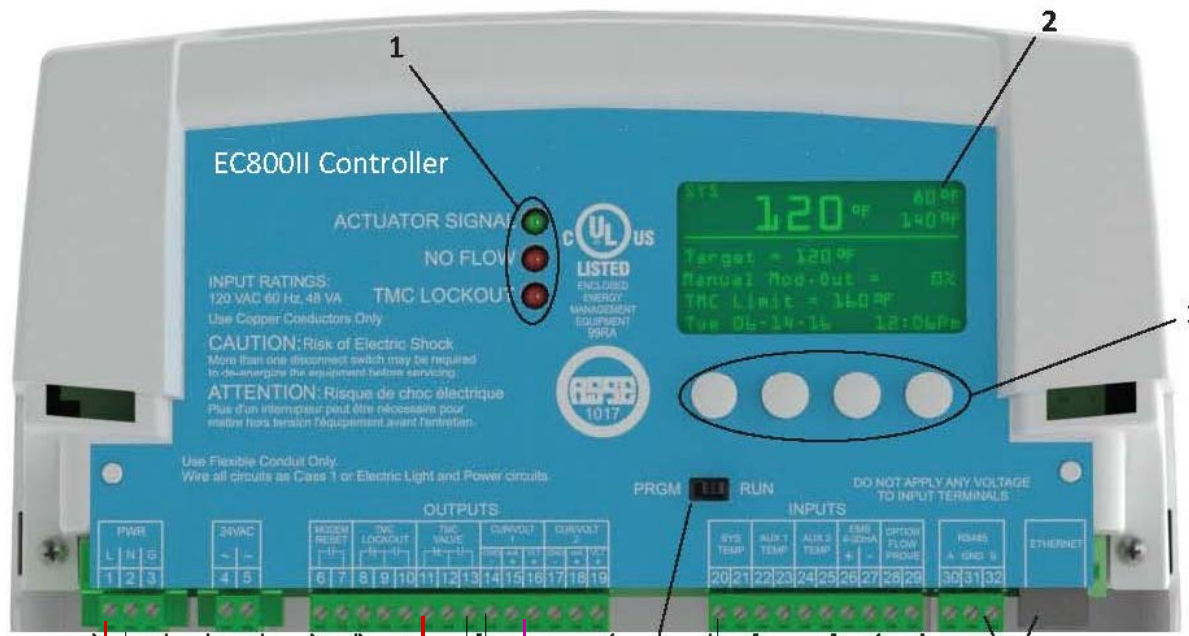
Figure 1: EC800II Temperature Controls, Indicators, and Connections



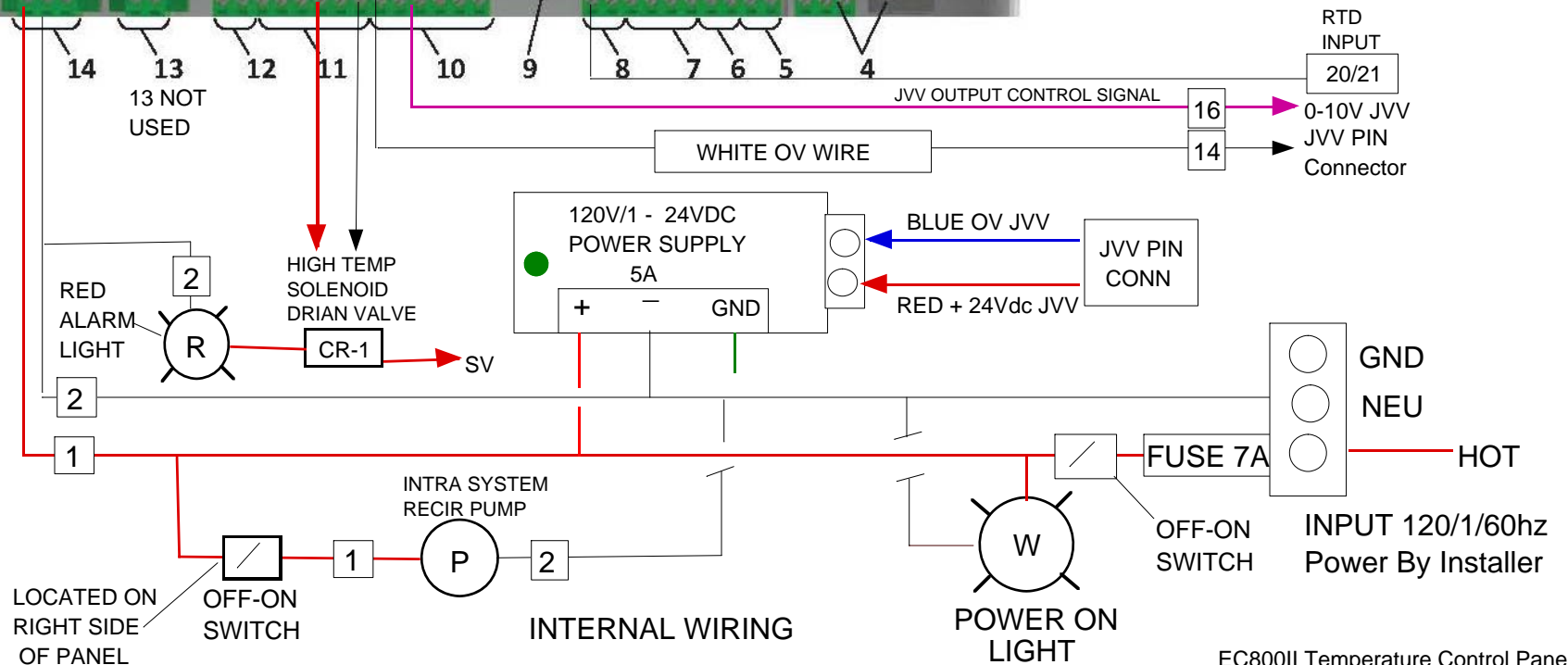
Item	Description	Item	Description
1	Output Status LEDs	8	System Temperature Sensor Input Connection RTD Sensor
2	Digital Temperature Display RTD Sensor Input	9	Program/Run Switch Places the EC800II in programming mode or run (normal operation) mode. NOTE: Programming mode may be password protected.
3	Variable-Function Buttons Temperature Setpoint, High Temperature Setpoint, Bacnet Output	10	JVV Temperature Valve Modulating Signal Connections for Valve 1 and Valve 2. 0-10V Output Signal
4	Internet/BACnet/Modbus Connection Communications interface	11	Safety Shutdown and Alarm Output Connections
5	Prove Input Connection Hot Water Flow Proving Switch Input When Used	12	Communication Modem Reset NOTE: Used if internet communication is lost for more than one hour.
6	Remote Setpoint Connection	13	Actuator 24Vac Power Source Connection
7	Additional RTD Sensor Inputs (2)	14	120Vac Power Input Connection



EC800II Digital BacNet Temperature Controller Wiring Schematic



ITEM	DESCRIPTION
1	Output Status LEDs Actuator Output Signal, No Flow and High Temp
2	Digital Temperature Display, Actual Temp, Temp Setpoint, High Temp Setpoint
3	Variable Function Calibration Buttons Temp Setpoint, High Temp, BacNet, PID, Valve Output ect
4	BacNet and Ethernet Connections
5	Flow Proving Connection When Used
6	Remote Set Point Connection
7	Additional RTD Inputs
8	Main Control RTD Sensor
9	Program / Run Mode Switch
10	JVV Control Valve Output Control Signal
11	Internal Safety Shutdown Drain Valve
12	Communication Modem Reset



NOTE: WHITE POWER ON AND RED ALARM LIGHTS ARE LOCATED ON THE FRONT OF THE PANEL
 ON OFF POWER SWITCH LOCATED ON FRONT OF PANEL
 HIGH TEMP DRAIN VALVE USED ON TH750 DOMESTIC HEATERS ONLY

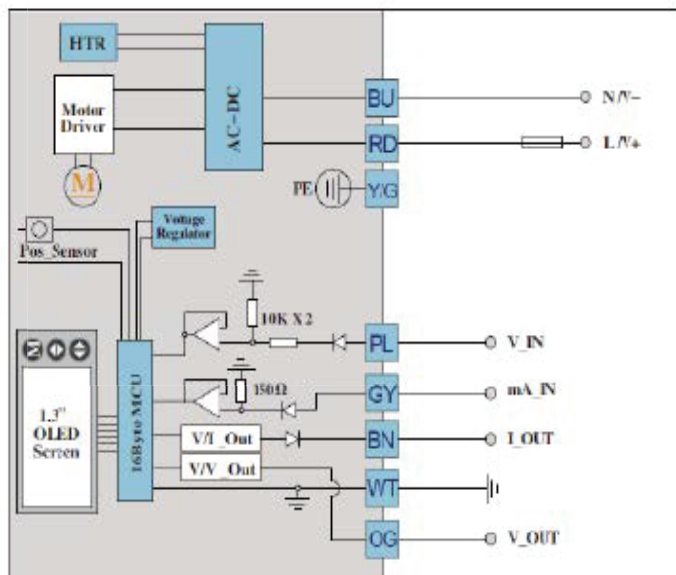
JVV Electronic Fail Closed Control Valve Actuator



INTELLIGENT MODULATING ACTUATOR USAGE INSTRUCTIONS

When the EC800II Panel is powered up the top digital display of the JVV will power up. It takes approx 45 seconds for the inner power pack to fully charge. Make sure Green Light is on and the visual indicator is 50% YELLOW and 50% RED

WIRING DIAGRAM



SET V % open set from the control signal.
ANGLE Actual Valve Position



LED Power Light Valve Indicator

FORMELY 06T

- 1 BLUE
- 2 RED
- 3 YELLOW/GREEN
- 4 PURPLE
- 5 ORANGE
- 6 WHITE

POWER REQUIREMENTS

S80 Series 60W @ 24vdc

S80 (Formely 06T)	Valve Sizes . 5" to 2"
RED	24V DC DC ONLY
BLUE	NEUTRAL - Volt
PURPLE	0-10V Control INPUT SIGNAL
WHITE	COMMON
GREEN /YELLOW	GROUND
ORANGE	SIGNAL FEEDBACK

NOTE: Factory Control Signal is 0-10V Calibrated Input and Output

Troubleshooting Tip: If the actuator does not power up check to make sure from the EC800II panel that you have 24VDC power on the Red wire and Blue wire. This power comes from the transformer in the EC800II panel. Read with a volt meter.

Section 2 – Startup Procedure and Operation HAVE YOU COMPLETED YOUR THERMAFLO CHECKLIST?

1. Verify that all manual valves are **CLOSED** on the heat (steam or HTHW) sources.
2. Verify that the black circulator pump on off switch on the right side of the panel is in the OFF position. Make sure that the water supply and discharge valves are in the OFF or closed position. If you dont do this a high flow of water will discharge to drain from the high temperature solenoid valve for approx 4-6 seconds on panel power up. Pump Circulator switch on the right side of the EC800II panel should be in the OFF position.
3. Now turn on the front panel power switch and Power up the panel. This will close the high temp drain solenoid valve and activate the temperature controller. This will take 4 to 6 seconds. The high temp solenoid valve is normally closed, so it should close off after power up. Turn on Main Power before water! Check to make sure the JVV valve is powered up as discussed in prior pages and the TARGET equals 100F Factory setpoint.
4. Now Slowly open the water discharge valve from the shell of the TH-750, and then slowly open the supply water valve to the shell and allow the shell to fill with water (checking for leaks). Repair any leaks before proceeding with startup. Leaks occur with transit and piping install. After the shell is full of water TURN ON the shell circulation pump switch located on the right side of the EC800II panel.
5. Open valves on the system hot water recirculation loop and when shell is full of water turn the hot water recirculation pumps ON and make sure the hot water loop has flow. The small pump on the side of the TH750 is NOT the loop pump!
6. With a user turned on and calling for hot water (sink hot water faucet or shower). This will allow the shell or tank to completely fill with water flow and remove any air from the shell. **Never use the Pressure & Temperature relief valve to remove air.**
7. **Open the condensate discharge valve so that condensate can flow freely by gravity to a condensate return pump system. If you have a vertical lift or any type check valve on trap discharge other than a swing check STOP and contact the factory, to avoid a waterhammer and thermal shock situation. Proceed to set 8.**
8. Gradually and slowly crack the main steam supply valve to the JVV electronic control valve and introduce the steam and or boiler water to the heater. No steam trap is used with boiler water. Also remember that steam will flow through the JVV valve as its approx 50% open because the actual water temperature is below the startup setpoint (TARGET) of 100F. This gradual opening should continue over a 5-10 minute time span until the actual temperature starts to rise towards target.
9. When the temperature starts to rise allow for a stabilization time of approx 10 minutes then slowly continue to open the main steam or boiler water valve and let the controller take over fully.
10. At this point you will note that the JVV valve will start to cycle proportionally between open and closed. This can be observed on the JVV Valve Yellow/Red indicator and digitally on the SV and % Angle. SV is what the controller is telling the valve to do and % Angle is where the inner V Ball is actually at for position. These numbers should closely match. During this time the unit may cycle back and forth for a while until the full loop warms up and the heater sees the demands. This process takes 15-30 minutes so dont start adjusting anything during this time.
11. Allow the system to operate in this startup mode with 100F output water for approx 45 minutes.

12. After 30 minutes of operation the TARGET temperature can be raised, This again is a step by step process, Switch the RUN/PROGRAM switch to program. Push the SELECT button until SETPOINT appears, SELECT then the bar graph will appear. Using the up key STEP 1 will be to go to 105F then push the set button, and switch the RUN/PROGRAM switch to run and allow approx 5 minutes at 105F repeating the process up to a maximum setting of 120F.

CAUTION!

IF YOU HAVE A SECONDARY BLENDING VALVE IN PLACE AT MAXIMUM SETTING OF 140F CAN BE MADE. USE CAUTION WHEN SETTING THE UNIT TO 140F. SETTING THE EC800II to A SETTING OF 140F IS NOT ADVISABLE UNDER ANY CIRCUMSTANCES WITHOUT THE USE OF A SECONDARY BLENDING VALVE STATION.

See the picture below of the actual MENU screens.

Section 3 – Shutdown Procedure

1. Turn off all power to the circulating pump and / or electric controls, if so equipped.
2. Close all valves in the water supply inlet and discharge lines and open the lower shell drain.
3. Relieve the pressure from the energy source line (water, boiler water, or high temperature water), where possible. Close the steam or boiler water inlet supply manual valve.
4. Close all remaining valves in the system in this order:
 - a) Hot water outlet line
 - b) Cold water inlet line
 - c) Condensate return line (or boiler / high temperature water return line).
5. After the system has cooled, drain the unit by opening the tank drain valve and holding the pressure relief valve in the open position. This will prevent the formation of a vacuum and increase the drainage flow. Consider any freezing situation.
6. Proceed with required maintenance or repairs. For correct maintenance procedures see pages 9 – 12.
7. After performing the required maintenance or repairs, return the unit to operation by following the start up procedures detailed on pages 4 - 7.

Section 4 – Maintenance

1. Gasket creep is inherent to most gasketed 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 setup, and inspected several times a year to be sure that the bolts are torqued correctly and there are no leaks. See Section 1 paragraph 19 for correct torque procedure.
2. Located at the lower rear of the unit, the TH-750 has a manual, shell blow down valve that should be piped to a suitable drain. On a monthly to quarterly frequency, this valve should be quickly opened for 2 seconds to remove scale buildup and any normal sediment that may collect in the shell.
3. The intra-tank 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 back into the shell through the cold water supply inlet. This action allows the system to not only detect changes in flow demand, but also temperature changes as well. The recirculation pump is fitted with permanently lubricated bearings and therefore does not require any additional lubrication. If however the TH-750 suddenly becomes unable to maintain accurate control, the pump should be checked for operation.
4. On a yearly basis, the operation of the recirculation pump should be verified, and isolation valves have been fitted on each side of the pump for this service. If the pump is not running, make sure the pump ON-OFF switch (black in color and located on the right side of the EC800 control panel) is in the ON position.
5. If the recirculation pump requires replacement, turn the pump ON-OFF switch to the OFF position, isolate pump and remove.
6. Install new pump, open isolation valves and turn pump ON-Off switch to the ON position. This can be done while the TH-750 heater remains in service so that hot water flow to end users is not interrupted.
7. All TH-750 units must be fitted with a steam drip trap station (trap and strainer) at the steam inlet before the control valve. The satisfactory operation of this trap is critical. On at least a quarterly basis, this trap should be checked for condition and operation and the strainer should be blown down to clean.
8. On a yearly basis it is good practice to operate each valve on the TH-750 unit to ensure all valves operate and shut off as required.
9. Each TH-750 heater is fitted with a pressure gauge and steam siphon. 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 registers zero. If it does not, the accuracy may be off and it should be replaced.
10. Each TH-750 heater is fitted with a pressure and temperature relief valve. Scale from hard water can build up on the element and cause the valve to malfunction. We recommend that this valve be replaced every two years to make sure operation is verified. A record of the

replacement schedule should be kept and adhered to by the operator/owner. **THIS IS VERY IMPORTANT.**

11. TH-750 heaters are engineered and constructed to last for many years when the supply steam is of good quality, the feedwater has been softened and the condensate is removed correctly. Poor quality steam will cause buildup on the inner tubes and corrode the tube joints. It is recommended a HSS or VSS Steam Separator be used if this condition exist.
12. 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 2 years of operation, this bundle should be removed and cleaned so that effective heat transfer can continue to take place. Thermaflo now employees teflon baffles to eliminate baffle rubbing due to expansion/contraction.
13. Tube bundle removal procedure is as follows:
14. When removing tube bundle there are two gaskets that will need to be replaced with new. These gaskets are located: one between the tube face of the coil and the flange welded to the tank, and one with a divider to fit between the head and the tube sheet.
15. **SAFETY NOTE:** Water, 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. **Caution!** The combination of electricity and water can pose a **very dangerous situation**. Turn off and disconnect all power before attempting any maintenance procedures.
16. Follow Steps 1 through 7 of the shutdown procedures (page 8) to take the unit offline before attempting to remove and inspect the heat exchanger coil.
17. Assure that the energy source, condensate / water return line, cold water inlet, and hot water outlet have been shut off; that the tank has been completely drained; that the pressure has been bled from both the water and energy source system; and that the water, all components, and surfaces have cooled.
18. Carefully break the joint between the heat exchanger coil head and the small line leading to the energy source pressure gauge.
19. Carefully break the connections between the heat exchanger coil head and the energy source inlet and outlet lines. **Note: It may be necessary to break the lines at a second location, and for the lines to be rotated to allow clearance for the heat exchanger coil to be removed from the tank. If it is necessary, care should be taken to insure that in-line components are not damaged.**
20. Break the bolts loose that secure the heat exchanger coil head to the tank. After all bolts have been broken loose, remove them from the unit.
21. Carefully separate the heat exchanger coil head from the mounting flange and remove the coil assembly from the tank. **Caution!** There may still be residual water condensate (or boiler/high temperature water) in the coil that can run out during removal of the coil from the tank. If sufficient time has not been allowed for cooling, this residual condensate/water could present a **danger of injury**.

22. Examine the heat exchanger coil for scale buildup and signs of leakage. If no leakage is detected, carefully clean any excess scale from the coils and prepare the heat exchanger coil for installation. If leakage is detected between the coils and water in the tank, either repair the leaking coil(s) or replace the heat exchanger coil. Water should be of quality that is compatible with materials of construction.
23. Remove the old gaskets and completely clean the mating surfaces. Install the two (2) new gaskets: one (1) between the tube face of the coil and the flange welded to the tank, and one (1) gasket with a divider to fit between the heat and the tube sheet.
24. Carefully insert the heat exchanger coil into the tank. The coil should be installed so that the divider in the head lines up with the coil, and that the divider is parallel to the horizon.
25. After assuring that the heat exchanger unit is correctly aligned, clamp the flanges together and proceed with the torque procedures detailed below.

Note: Bolts used to secure the heat exchanger unit in the TH-750V Heaters are rated as B7. Grade B7 bolts are designated by B7 on the head OF THE BOLT.

- a. Lubricate the bolt threads and the nut faces with a suitable lubricant such as copper never seize..
- b. Insert the bolts through the flanges, and then start and finger tighten the nuts.
- c. Number all bolts so that torque requirements can be followed.
- d. Apply torque in three steps of 60%, 80% then 100% of required final torque, loading all bolts at each step before proceeding to the next step.

Note: Appendix A contains tables listing ANSI approved target torques for Grade B7 bolts. The correct target torque can be determined by the nominal pipe size, number and grade of bolts used to secure the flange, and the size of the bolt used. Be sure of the bolt grade used in the unit.

When replacing bolts, be sure to use the same type of bolt and corresponding nuts. Grade B7 bolts can be used in all cases.

- e. Tighten bolts in the applicable sequential order (0°- 180°, 90°- 270°, 45°- 225°, 135°-315° etc.) at each step until final target torque is reached (see applicable diagram contained in Appendix A).
- f. Use rotational tightening until all bolts are stable at final torque level. Two (2) complete times around is usually required.

Note: Appendix A contains drawings depicting the typical flange configurations (number of bolts, location, tightening sequence, etc.) for the TH-750 Heater. Reference the applicable drawing for the unit being serviced.

26. Reconnect the energy source inlet and outlet lines to the heat exchanger coil. If these lines were broken at an additional location to allow for removal of the coil, be sure to also tighten those connections. Follow recommendations contained in the manufacturer's documentation,

local codes, or accepted contractor practices as to the use and/or type of joint compound or sealer at the connections.

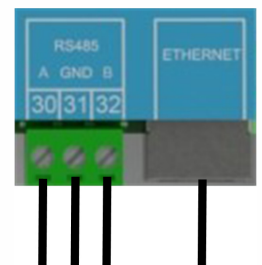
27. Reconnect the small line leading to the energy source pressure gauge.

28. If the unit is equipped with a circulating pump, the pump relay **must be interlocked with the temperature control valve** so that the energy source will shut off if the pump is not operational. Failure to do so could create a **very dangerous situation** if the pump were to fail.

29. Follow the startup procedures (page 5) to put the unit back online. Carefully check all connections for any sign of leakage.

BACnet Communications Wiring To connect the EC800II to BACnet interface

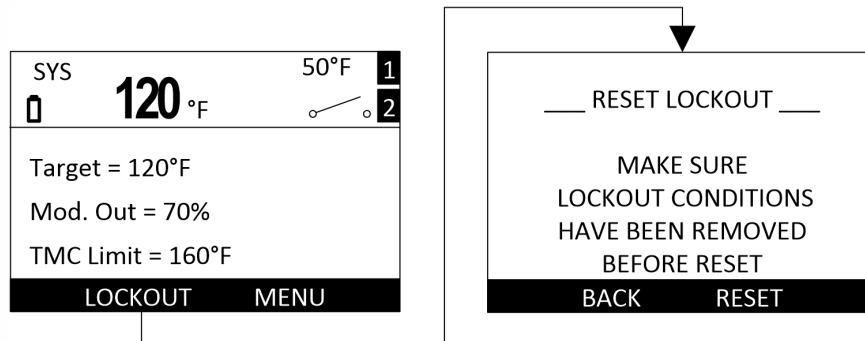
1. Run a CAT5 cable through a knockout located on the bottom of the enclosure.
2. Connect the CAT5 cable to the Ethernet connector on the .
3. Run the BACnet connection wires through a knockout located on the bottom of the enclosure.
4. Connect the positive (+) wire to terminal 30 .
5. Connect the ground wire to terminal 31 .
6. Connect the negative (-) wire to terminal 32 o.
7. BACNET IP or MSTP plus BAUD Rate is programmable.



HIGH TEMPERATURE LOCKOUT RESET SELECT BUTTON TAKES YOU TO THIS MENU OPTION TO RESET

Lockout Menu

The Lockout menu is used to reset system lockouts.



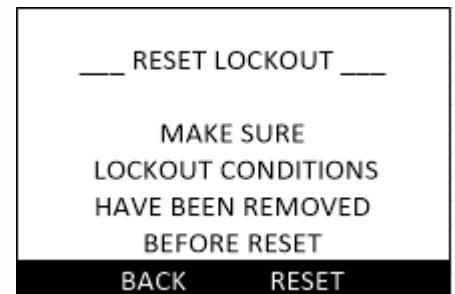
Reset Lockout

Selections: RESET

Available in Control Modes: TMC or ETV + TMC

Menu Path: *Lockout*

Default: N/A



Description:

The TMC Lockout outputs energize whenever the System Temperature rises above the Alarm Limit for the Trigger Delay period.

To reset the lockout, the conditions causing the lockout must be corrected first. Then, the lockout can be reset using the Reset Lockout menu. If the lockout was reset before the conditions are corrected, the lockout output will immediately be re-activated.

Cleaning Procedure Shell and Tube Units:

On an annual basis when using extremely hard water the inner bundle will need cleaning to remove lime and scale deposits. This is simply done by draining the unit and following these steps:

1. Close the outlet isolation valve to the domestic system and turn off recirculation pump.
2. Close the inlet isolation valves to the heater domestic supply and loop recirculation. This will totally isolate the shell.
3. Remove the top thermometer from the shell. The connection will be a $\frac{3}{4}$ " and is located at the very top of the shell.
4. Then using a small flexible funnel completely fill the shell with "DD518" biodegradable descaling fluid (approx. 4 gallons) for a 10" unit, and install the thermometer. Wear protective eye wear and gloves.
5. With the unit full turn on the recirculation pump for 2 hours. Do not operate over 2 hours. Open lower drain valve and drain the shell of the fluid as the fluid is biodegradable and can be sent to the drain.
6. After the shell is drained fill with cold domestic water twice and flush. The system is now ready for use.

APPENDIX A
Garlock Bolt Torque Values
B7 Bolts

.062" Ring Gaskets

ANSI – 150# Flanges

Nominal Pipe Size (IN)	Number of Bolts	Size of Bolts (IN)	Grade A Target Torque (FT - LBS)
2"	4	5/8"	120
2 1/2"	4	5/8"	120
3"	4	5/8"	120
4"	8	5/8"	120
5"	8	3/4"	200
6"	8	3/4"	200
8"	8	3/4"	200
10"	12	7/8"	320
12"	12	7/8"	320
14"	12	1"	490
16"	16	1"	490
18"	16	1 1/8"	710
20"	20	1 1/8"	710
24"	20	1 1/4"	1000

Garlock Bolt Torque Values
B7 Bolts

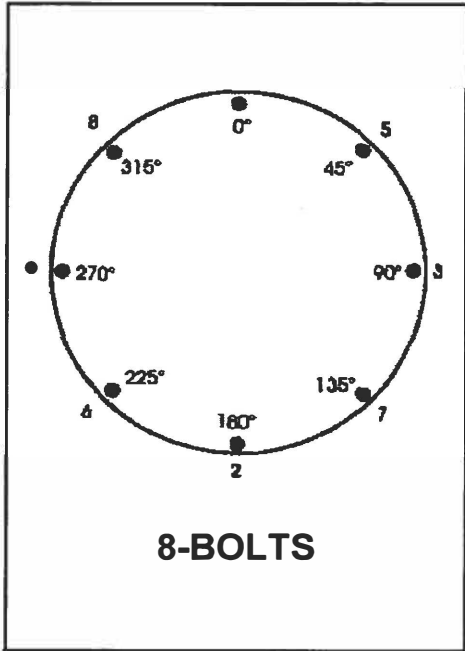
.062" Ring Gaskets

ANSI – 300# Flanges

Nominal Pipe Size (IN)	Number of Bolts	Size of Bolts (IN)	Grade 5 Target Torque (FT - LBS)
2"	8	5/8"	120
2 1/2"	8	3/4"	200
3"	8	3/4"	200
4"	8	3/4"	200
5"	8	3/4"	200
6"	12	3/4"	200
8"	12	7/8"	320
10"	16	1"	490
12"	16	1 1/8"	710
14"	20	1 1/8"	710
16"	20	1 1/4"	1000
18"	24	1 1/4"	1000
20"	24	1 1/4"	1000
24"	24	1 1/2"	1600

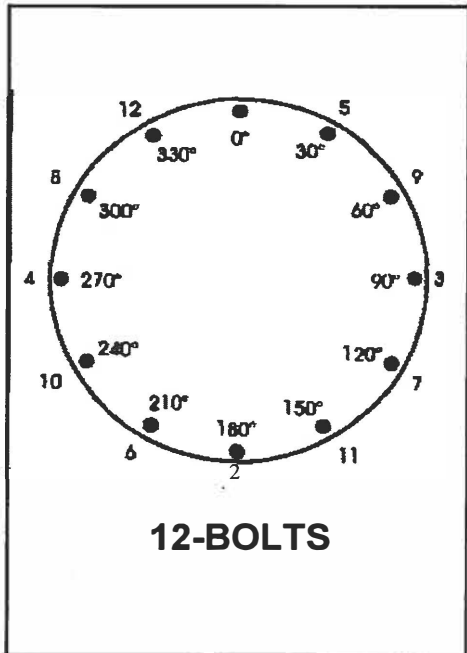
APPENDIX A

Bolt Torque Procedure



SEQUENTIAL ORDER
 1 - 2
 3-4
 5-6
 7-8

ROTATIONAL ORDER
 1
 5
 3
 7
 2
 6
 4
 8

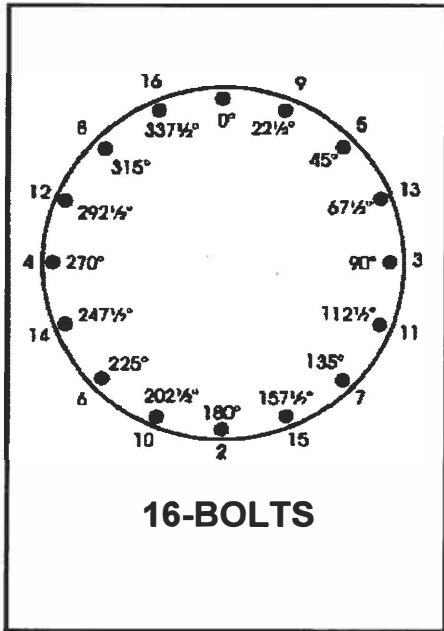


SEQUENTIAL ORDER
 1 - 2
 3-4
 5-6
 7- 8
 9 - 10
 11 - 12

ROTATIONAL ORDER
 1
 5
 9
 3
 7
 11
 2
 6
 10
 4
 8
 12

APPENDIX A

Bolt Torque Procedure

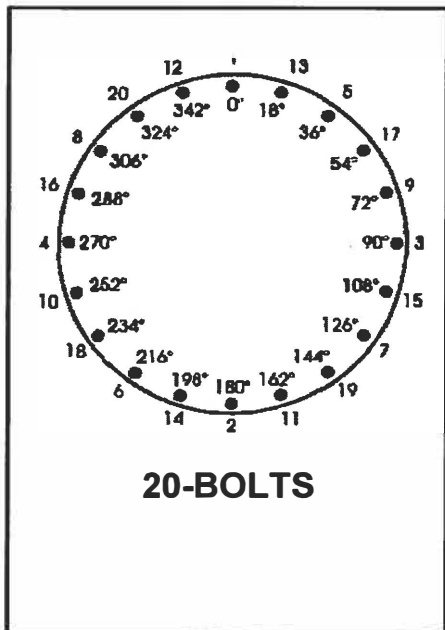


SEQUENTIAL ORDER

- 1 - 2
- 3-4
- 5-6
- 7- 8
- 9 - 10
- 11 - 12
- 13- 14
- 15- 16

ROTATIONAL ORDER

- 1
- 9
- 5
- 13
- 3
- 11
- 7
- 15
- 2
- 10
- 6
- 14
- 4
- 12
- 8
- 16



SEQUENTIAL ORDER

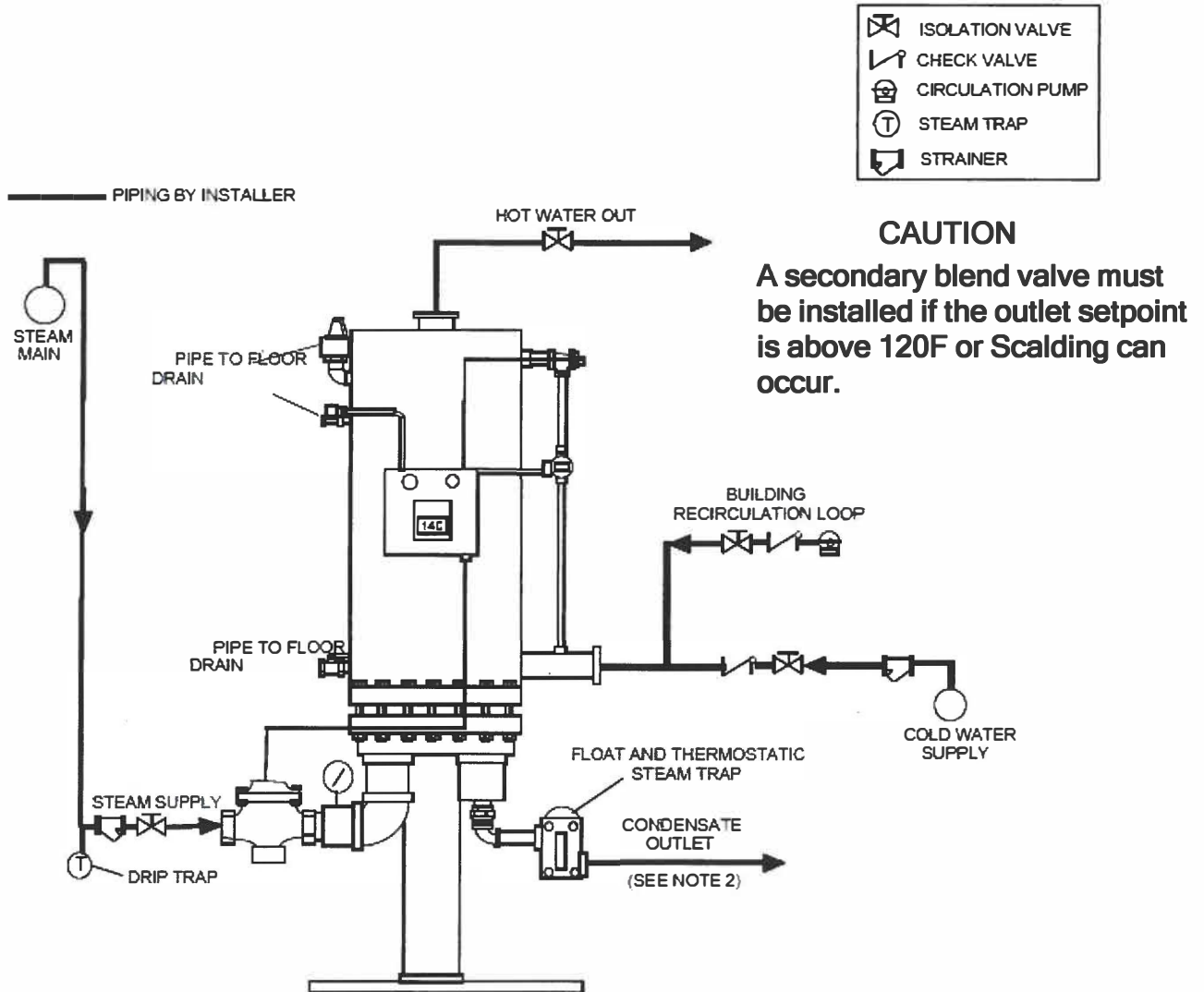
- 1 - 2
- 3-4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 12
- 13- 14
- 15- 16
- 17- 18
- 19- 20

ROTATIONAL ORDER

- 1
- 13
- 5
- 17
- 9
- 3
- 15
- 7
- 19
- 11
- 2
- 14
- 6
- 18
- 10
- 4
- 16
- 8
- 20
- 12

APPENDIX B

TH-750 Steam Fired Single Unit Piping Hookup

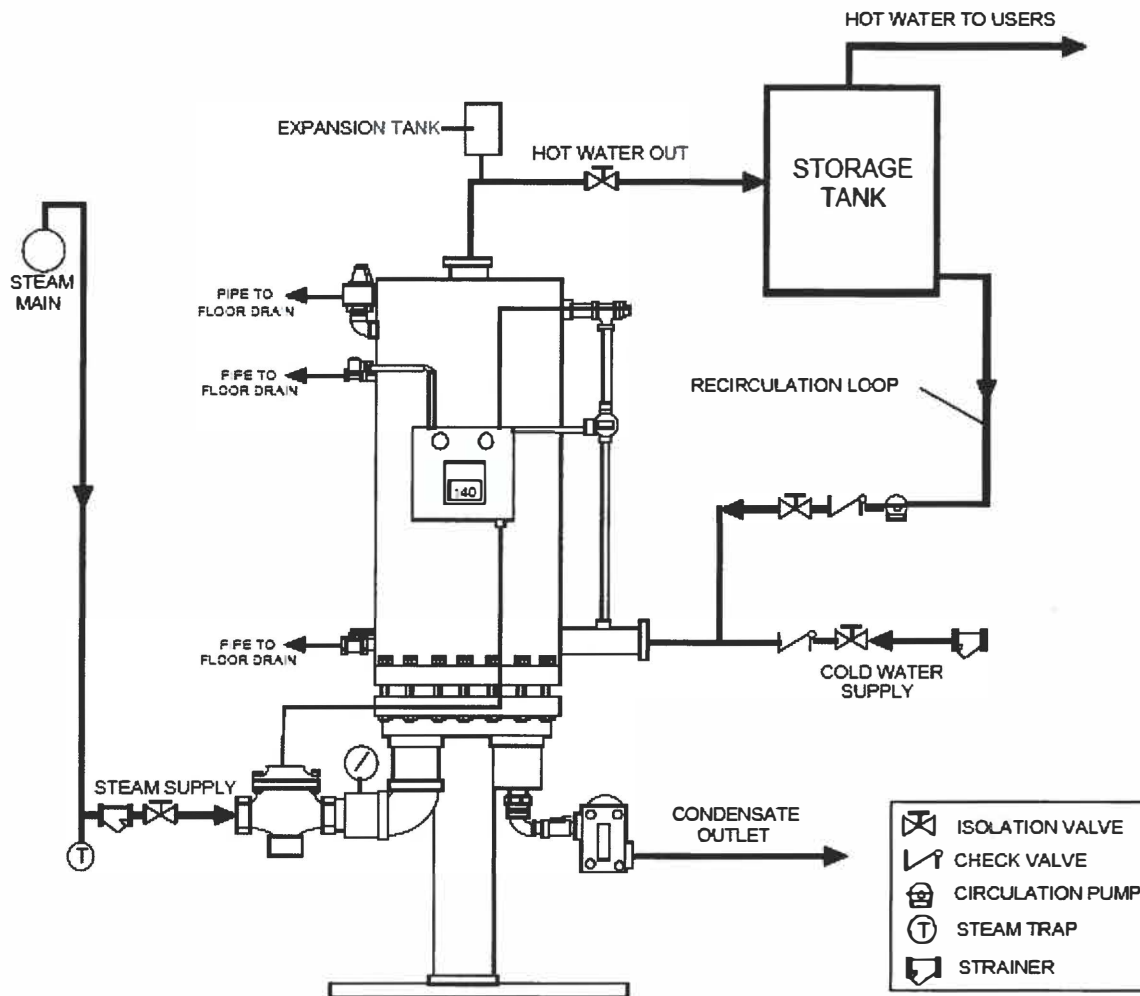


Notes:

1. Suggested piping design. Designer should consult local codes to verify compliance.
2. Hookup shown with Float & Thermostatic steam trap piped to gravity atmospheric condensate return line. For pressurized condensate return systems or where a lift is required, the TH-750 must be fitted with a Thermaflo Engineering pump trap on pressure powered pump in place of the F & T Trap.
3. Always pipe supply steam from the top of the header as shown and install a main drip before the control valve inlet.
4. When using the TH-750 for domestic hot water supply, it is highly recommended to install a master blend valve to prevent any chance of scalding
5. An open suitable drain is required for the PT valve and Shell Drain Valve. If the temperature setting is 140F or above a tempering cooling valve must be installed to quench below 140F.

APPENDIX B

TH-750 Steam Fired Single Unit Piping Hookup With Storage Tank For Peak Use

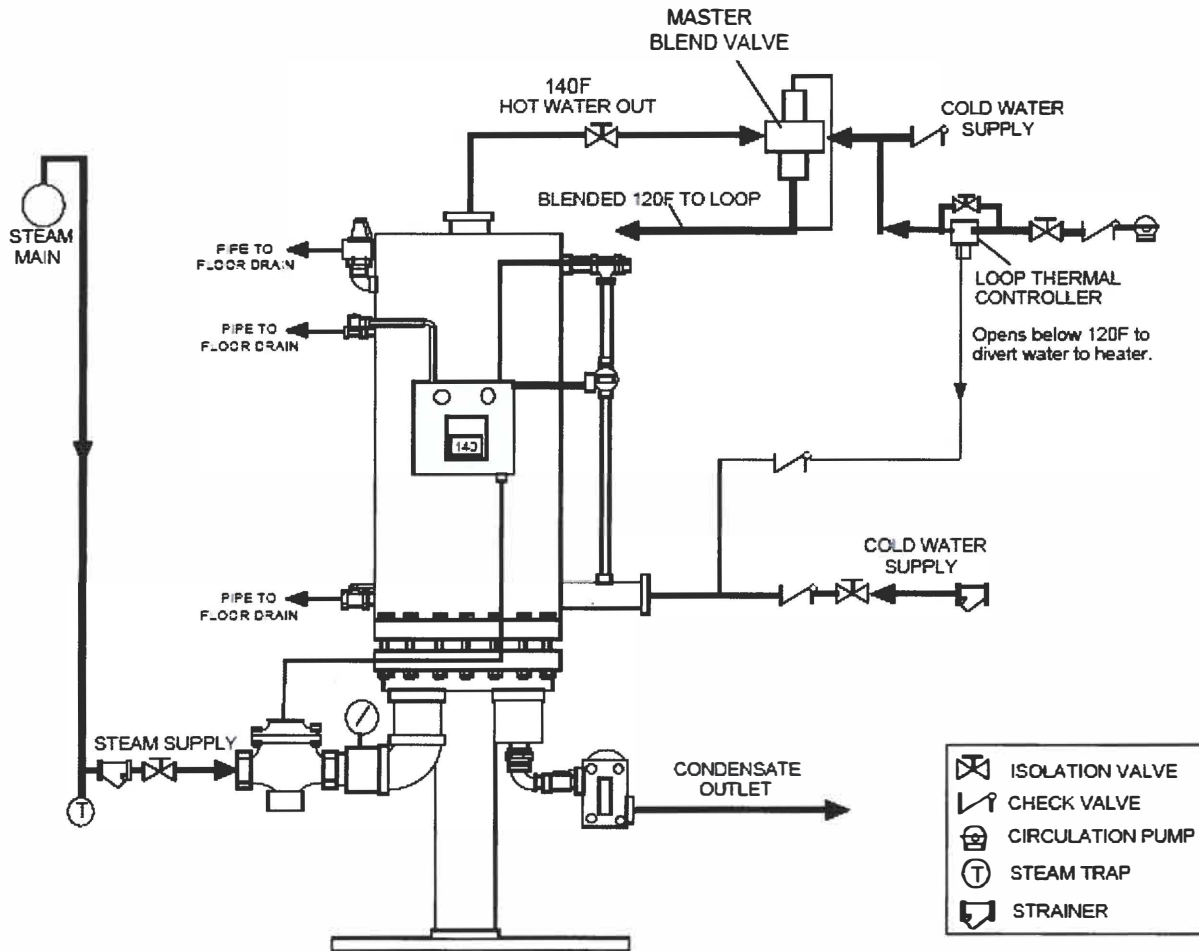


Notes:

1. Suggested piping design. Designer should consult local codes to verify compliance.
2. Hookup shown with Float & Thermostatic steam trap piped to gravity atmospheric condensate return line. For pressurized condensate return systems or where a lift is required, the TH-750 must be fitted with a Thermaflo Engineering pump trap in place of the F & T trap.
3. Always pipe supply steam from the top of the header as shown and install a main drip before the control valve inlet.
4. When using the TH-750 for domestic hot water supply, it is highly recommended to install a master blend valve to prevent any chance of scalding.
5. Not Installing an expansion tank will cause overpressure issues and cause the relief valve to open.

APPENDIX B

TH-750 Steam Fired Single Unit Piping Hookup With Blend Valve & Thermal Loop Diverter



Notes:

1. Suggested piping design. Designer should consult local codes to verify compliance.
2. Hookup shown with Float & Thermostatic steam trap piped to gravity atmospheric condensate return line. For pressurized condensate return systems or where a lift is required, the TH-750 must be fitted with a Thermaflo Engineering pump trap in place of the F & T trap.
3. Always pipe supply steam from the top of the header as shown and install a main drip before the control valve inlet.
4. When using the TH-750 for domestic hot water supply, it is highly recommended to install a master blend valve to prevent any chance of scalding.