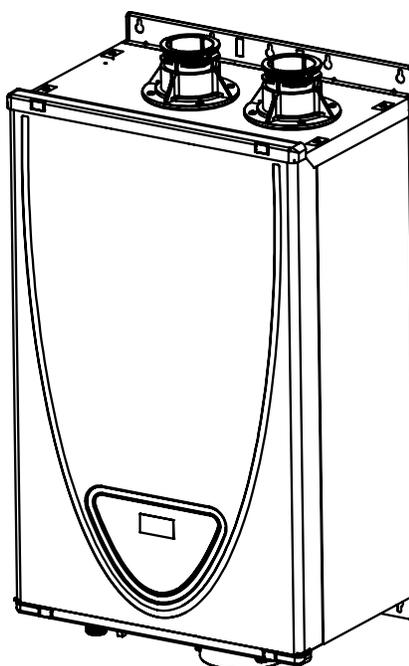


Condensing Models

On-Demand Water Heater Service Handbook



MODELS:		
160X3P	180X3P	199X3P
(Indoor/Outdoor)	(Indoor/Outdoor)	(Indoor/Outdoor)
Series 100	Series 100	Series 100

**THIS SERVICE HANDBOOK IS FOR USE BY QUALIFIED SERVICE PROFESSIONALS ONLY.
IF YOU NEED ASSISTANCE, CALL TECHNICAL SUPPORT.**

IN USA, CALL AT 877-737-2840. IN CANADA, CALL 888-479-8324.

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SPECIFICATIONS

Model			160X3P Indoor	160X3P Outdoor	180X3P Indoor	180X3P Outdoor	199X3P Indoor	199X3P Outdoor	
Natural Gas Input (Operating Range)	BTU/h	MIN:	9,000		9,000		9,000		
		MAX:	160,000		180,000		199,000		
Propane Input (Operating Range)	BTU/h	MIN:	9,000		9,000		9,000		
		MAX:	160,000		180,000		199,000		
Gas Connection			1/2" NPT						
Water Connections			3/4" NPT						
Water Pressure*	psi (MPa)		15 - 150 (0.1 - 1)						
Max. water flow rate	GPM (L/min)		6.5 (25)		8.0 (30)		10.0 (38)		
Natural gas Inlet Pressure	inch W.C. (kPa)		Min. 3.5 (0.87) Max. 10.5 (2.62)						
Propane Inlet Pressure	inch W.C. (kPa)		Min. 8.0 (1.99) Max. 13.0 (3.24)						
Manifold Pressure**	NG	inch W.C. (Pa)	MIN:	0.05 (12.5)		0.05 (12.5)		0.05 (12.5)	
			MAX:	-0.4 (-99.6)		-1.12 (-279)		-1.12 (-279)	
	LP	inch W.C. (Pa)	MIN:	-0.06 (-14.9)		-0.06 (-14.9)		-0.06 (-14.9)	
			MAX:	-0.5 (-124.5)		-1.26 (-313.8)		-1.26 (-313.8)	
Weight	lbs. (kg)		68.8 (31.0)						
Dimension	inches		H 27.4 x W 17.7 x D 11.2						
	mm		H 696 x W 450 x D 285						
Ignition			Electric Ignition						
Electric Consumption	Supply		VAC/Hz	120/60					
	Operation	W/Pump	W/A	126.7/1.55					
		W/O Pump	W/A	113.8/1.41	107.0/1.30	113.8/1.41	107.0/1.30	113.8/1.41	107.0/1.30
	Standby		W/A	1.2/0.04					
	Freeze-Protection		W/A	129.5/1.10					
Water Heater Vent Category***			Category IV	N/A	Category IV	N/A	Category IV	N/A	
Maximum Pipe Length**** (Hot Water supply line and Dedicated Return line)		Pipe Diameter	3/4"	500 ft (152.4 m)					
			1/2"	200 ft (61 m)					
<p>* 40 psi (0.27 MPa) or above is recommended for maximum flow.</p> <p>** The Manifold Pressure is the factory setting and should not need adjustment. NOTE: Manifold Pressure readings are taken with the front cover removed.</p> <p>*** Water Heater Vent Category - Does not apply to Outdoor or Direct Vent Installations. Category IV - a water heater that operates with a positive vent static pressure and with a vent gas temperature that may cause excessive condensate production in the vent.</p> <p>**** Refer to page 36 in the Installation Manual for additional information on pipe lengths.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Check the rating plate to ensure this product matches your specifications. • The manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligation. 									

INTRODUCTION

Read and follow all safety messages and instructions in this handbook and on the product labeling.



This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible property damage, serious injury or death. Do not remove any permanent instructions, labels, or the rating plate from either the outside of the water heater or the inside of the access panels.

⚠ DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

⚠ NOTICE indicates practices not related to physical injury.

⚠ WARNING

- Installation and service must be performed by a qualified installer (such as a licensed plumber or gas fitter).
- The installer/service agent (licensed professional) is responsible for correctly installing or servicing your water heater and for compliance with all national, state/provincial, and local codes.
- Failure to comply with these warnings could result in death, explosion, fire, or carbon monoxide poisoning.

⚠ CAUTION

Wear eye protection during water heater assembly or disassembly. Failure to do so could lead to personal injury.

This handbook provides the necessary information for troubleshooting the 160X3P, 180X3P and 199X3P tankless water heaters. It will be effective in helping your troubleshooting needs as long as the instructions are followed in the intended order. Here is how to use this manual:

- First, refer to the Installation Manual as the primary source of information. Refer to it along side this manual throughout the troubleshooting process.
- Before troubleshooting, if you are unfamiliar with how a tankless unit operates, read “Normal Operation” on page 6.
- Before troubleshooting a new installation, use the installation manual.
- Before troubleshooting, first go through the “Preliminary Checklist” on page 6. It will identify the most common and frequent problems and provide you with general knowledge to help narrow down the information you need.
- If the water heater is in fault and is displaying an error code, refer to “Error Codes” on page 11. If you have not received an error code, refer to “General Issues” on page 8.

If you have any problems or questions regarding this equipment, consult the technical service department or the local service agent.

General Installation Guidelines

1. Follow all local codes, or in the absence of local codes, follow the current edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or B149.1 (Natural Gas and Propane Installation Code) in Canada.
2. Properly ground the unit in accordance with all local codes or, in the absence of local codes, with the National Electrical Codes: ANSI/NFPA 70 in the USA or CSA standard C22.1, Canada Electrical Code, Part 1 in Canada.
3. Carefully plan where you intend to install your water heater.
4. Check the rating plate located on the right side of the water heater for the correct GAS PRESSURE, WATER PRESSURE, ELECTRIC RATING and GAS TYPE. **NOTE:** This water heater’s gas type is field convertible, confirm the orifice installed matches the gas type supplied. See Removing, Replacing, and Verifying the Gas Orifice Assembly on page 47.
NOTE: If this unit does not match your requirements, do not install.

If any problem occurs, turn off all hot water taps and turn off the gas. Then call a trained technician or the gas company.

NORMAL OPERATION

Becoming familiar with how a tankless water heater normally operates may help to troubleshoot it. Assuming it is properly installed with appropriate gas, water, and electrical connections, it should operate as follows:

Activation

1. A hot water fixture is opened. The flow sensor must detect a flow rate through the heater that is greater than the 0.4 GPM before the heater will begin operation. The temperature rise must be great enough to meet the minimum input requirement which is 9,000 Btu/h for NG and LP. Otherwise, the heater will remain in standby.
2. The fan activates to purge the system.
3. The Igniter generates a spark to ignite the gas.
4. The gas valve will open. You will hear a deep “clunk clunk” noise.
5. Once a flame is detected, the green “In Use” LED will activate. (This green LED is located on the temperature controller or remote controller.)

Operation

6. The fan will modulate and the gas solenoid valve assembly will adjust based on the amount of energy input required to meet the demand.
7. If the water flow exceeds the water heater’s capabilities to heat to the desired temperature, the flow control valve will restrict the flow to ensure

delivery of water at the desired temperature. This will result in a loss of pressure at hot water fixtures whenever flow is restricted through the water heater.

NOTICE: The bypass component acts like a mixing valve. It helps to maintain the desired outlet temperature and reduce damage to the heat exchangers due to corrosion and erosion. The bypass valve is also used when multiple water heaters are linked together.

Shutdown

8. The heater will stop heating when the water flow rate drops below the deactivation point of 0.26 GPM.
9. The heater will close the main gas valve and solenoid gas valves, extinguishing the flame.

10. When the flame sensor no longer detects a flame, the green “In Use” LED will turn off.
11. The fan will increase in speed to purge any remaining exhaust gases. The length of post-purge can last up to 1-½ minutes.
12. The heater will enter standby mode.

Preliminary Checklist

To get started, review the following topics. You may also refer to “General Issues,” if necessary.

Gas/Water/Electric:

- Verify that the correct gas type is being used. Check the supply gas, the gas type DIP switch, and the gas type shown on the

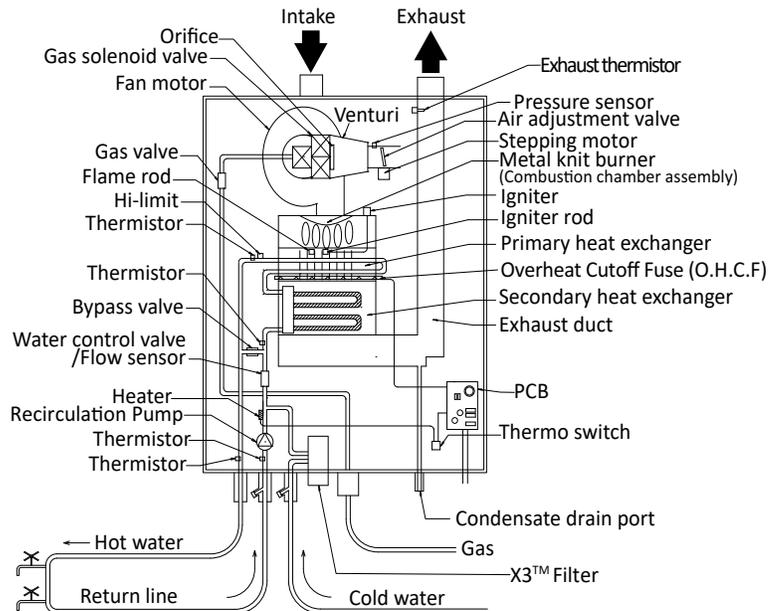


Figure 1: The purpose of this diagram is to illustrate tankless water heater design concepts, and may not be accurate to the unit’s physical description.

NORMAL OPERATION / TROUBLESHOOTING

rating plate. All four must be the same in terms of gas type, and your water heater model must be converted for use with that type of gas (natural gas or LP). **NOTE:** This water heater's gas type is field convertible, confirm the orifice installed matches the gas type supplied. See Removing, Replacing, and Verifying the Gas Orifice Assembly on page 47.

- The gas supply valve should be fully open and the gas line purged of air and debris.
- The water supply valve should be fully open and purged of air and debris.
- The unit must be connected to a 120 VAC 60 Hz power supply.
- There is a power switch inside the heater, located to the left of the control board, that must be turned on before the heater can operate.

Remote Controller:

If you are using a remote controller, the remote's ON/OFF button must be turned on. Press the ON/OFF button on the remote until the amber Stand-By LED is lit.

High Altitude:

If the heater is installed at an altitude of over 2,000 feet, it may cause a lack of air and incomplete combustion. See "DIP Switch Settings" on page 25.

Vent Length

The length of your vent run may require changes to your DIP switch settings. See "DIP Switch Settings" on

page 25. Also, see the installation manual for venting requirements.

Incorrect vent length settings may result in the reduced output from the water heater.

X3™ Technology:

This water heater is equipped with X3™ Scale Reduction Technology to inhibit scale formation within the heat exchanger tubing of this unit. Part of the X3™ Technology's anti-scale protection comes from the special X3™ cartridge. The X3™ cartridge must be installed into the manifold located on the underside of the heater cabinet prior to operation of the unit). The X3™ system is designed to be hassle-free; eliminating the need to drain the heater for installation, removal, or replacement of the cartridge. X3™ Scale Reduction Technology reduces the formation of scale in the heat exchanger, extending the operating life of the unit in typical potable water installations. Specific water conditions may impact the efficacy of X3™, such as excessive iron or manganese levels. Refer to the guidelines below and consult a water quality expert to determine if your water is within acceptable X3™ and EPA guidelines.

New Installations:

If a newly installed water heater won't operate at all or operates erratically, check for the following:

- Reversed hot and cold plumbing connections. The water heater must sense water flow to initialize operations. Water flowing through the heater backwards will not activate the flow sensor.
- Cross-connections may be related to a recirculation pump, a defective mixing valve, a bad check valve, a

missing check valve, or a cartridge in a single-handle faucet that needs to be replaced.

- A dirty inlet filter. A dirty inlet filter can either prevent water from flowing through the water heater entirely, or create turbulence that can prevent the flow sensor from measuring the water flow.
- Misconfiguration of the Easy-Link system (if applicable).
- Gas line that has not been purged of air correctly.

Test to determine if the problem is related to plumbing or the water heater:

1. Test whether the problem is within the unit or external to the unit (i.e., in the plumbing system) by attempting to run hot water locally through the isolation valve (if installed). Ensure that the hot water shutoff is closed on the hot and return lines while running water through the pressure relief valve or hot isolation valve drain port. See Figure 2 on page 8.
2. Does the heater ignite and continue to run properly? If it runs properly, the plumbing system is at fault. If the heater shuts down with an error code or no operation occurs, the problem is with the water heater. **NOTICE:** If no error code is displayed, you can use Diagnostic Mode to review stored error codes. See "ERROR CODES" on page 11

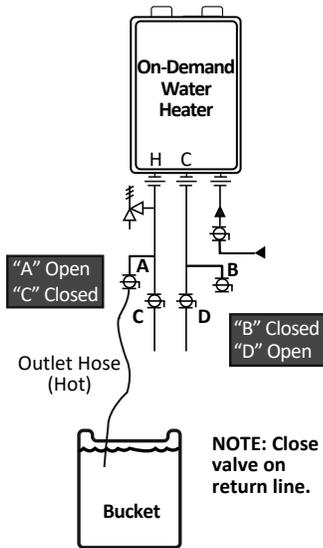


Figure 2: Water flow test.

Next Step:

Finally, check to see if the unit has an error code. The error code will be displayed on the temperature controller (or remote controller) and by flash codes on the green LED on the computer board. See Figure 3, page 11. See also the error code chart in Table 2 starting on page 11.

- If it is displaying an error code, proceed to “ERROR CODES” on page 11.
- If there is no error code, proceed to “General Issues.”

General Issues

Proceed to the “Error Codes” section if an error code is identified. For other common problems that do not involve error codes, see if the following items help:

Water is too hot or not hot enough.

- What is the set temperature of the water heater? The temperature setting may be set

too high or low. The temperature can be adjusted using the temperature or remote controller. Solar installation can have higher inlet water temperatures. NOTE: To reduce the risk of scalding, install Thermostatic Mixing Valves (temperature limiting valves) at each point-of-use.

- If a mixing valve is installed, verify proper installation and check temperature setting at the valve. The mixing valve may need to be adjusted or cleaned. Refer to the mixing valve manufacturer’s instructions.
- The output thermistor could be malfunctioning or debris may be present on the thermistor. This could cause it to read incorrectly. Clean the thermistor and recheck.
- Cross plumbing between cold water lines and hot water lines.
- Incorrect gas supply line and/or regulator sizing.
- Easy-Link misconfiguration in multi unit system.

Temperature fluctuates when a fixture is opened.

- Check DIP switches for correct setting. Incorrect settings for altitude and vent length can result in fluctuating outlet temperature.
- Test whether the problem is within the unit or external to the unit (i.e., plumbing system).
- If the unit is installed in a multi-unit system, verify that the Easy-Link system is set up correctly. Refer to the installation manual.

- The filter on the cold water inlet should be clean. See “Filter/Drain Plugs Cleaning” on page 29.
- Fluctuations in pressure of the supply water system will result in outlet temperature fluctuations. On well systems, the heater’s operation will fluctuate when the well pump is charging the bladder tank. Check the pressure settings to see if an adjustment can reduce the pressure difference and/or consider a constant pressure pump.

Unit does not operate when water goes through it.

- Check to see if the water heater is in standby. This can be verified by observing the amber LED on the temperature/remote controller.

If is not lit, press the ON/OFF button on the controller to see if it will turn on. If not, then check to see if the ON/OFF button to the right of the temperature controller is set to the on position, or if the fuse in the fuse box assembly is blown.

- Is the flow rate over 0.4 GPM? See if the unit initiates when you increase demand of water being drawn through the unit (e.g., opening up more hot fixtures). You can verify the flow rate by pressing the info button on the front of the unit until the arrow lights up beside “flow.” See “Filter/Drain Plugs Cleaning” on page 29.

- Make sure that a check valve is installed on the return line. A malfunctioning or missing check valve will cause a cross connection, allowing cold water to back-feed into the system.
- Check that the filters on the cold and return lines are clean.
- Is the inlet water temperature too close to the set point temperature. Verify by opening multiple faucets and check to see if the water heater operates. If the water heater operates this may indicate a seasonal/geographic condition causing warmer inlet water that is too close to the water heater's set point. The minimum input is 9,000 btu/h which means the heater will not activate if the energy input is below this. For recirculation systems, review and adjust the temperature differential setting as necessary.
- New installations only: Are the hot and cold water connections to the water heater reversed (hooked up backwards)? Water flowing in reverse through the heater will not be detected by the flow sensor and the water heater will not operate. See "Checking for a Reversed Connection" on page 30 for details on checking for a reversed connection.
- If the fan does not initiate at all and it is verified that there is power to the unit, the flow sensor may not be working properly. Check the flow sensor for proper impeller functionality. See "Checking the Flow Sensor," page 32.

Abnormal sounds come from the unit.

- Check the fan for debris.
- Check for blockages in the exhaust vent and intake air line.
- Check terminations for proper clearances to ensure flue gases are not being drawn into the combustion air intake.
- Check for proper gas supply pressure and allowable pressure drop.
- Check the rating plate to ensure that the correct gas type is applied to the unit. **NOTE:** This water heater's gas type is field convertible, confirm the orifice installed matches the gas type supplied. See Removing, Replacing, and Verifying the Gas Orifice Assembly on page 47.
- Check the DIP switch settings for vent length, altitude and gas type.
- If you cannot identify the source of this issue, contact the technical service department.

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ERROR CODES

All units have self-diagnostics. If there is a problem with the unit, a numerical error code will display on the temperature controller of indoor models or on the TM-RE43 Remote Controller (if installed). Installation related problems can also produce an error code(s). If the remote/temperature controllers are not working, the green LED on the computer board will flash a code pattern. (The green LED is located beside the DIP switches as shown in Figure 3).

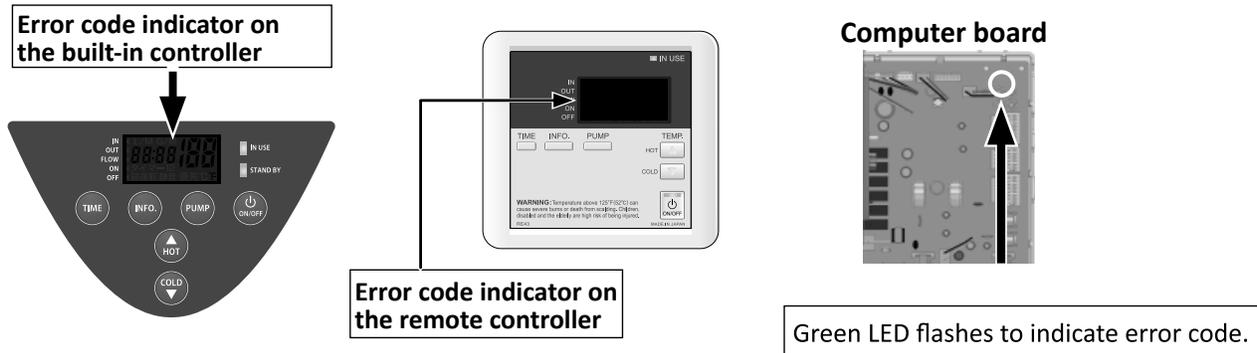


Figure 3: Error Code Indicators.

If you are working with a water heater that is part of an Easy-Link system, we recommend that you troubleshoot the unit as an individual unit and not as part of the system. Follow these steps prior to troubleshooting a child unit:

1. Disconnect power to all the water heaters in the Easy-Link system. The ON/OFF button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
2. Close isolation valves to the water heater.
3. Disconnect both linking wires from the bottom of the heater.
4. If the unit is not an end unit, take the ends of both linking wires which you unplugged and connect them together. One end is male and the other is female; they will connect together.
5. Turn power to the water heaters back on, then troubleshoot as necessary.

Table 2: Error and Flash Codes

ERROR CODE	GREEN LED ON COMPUTER BOARD	SYMPTOM OR ISSUE	TROUBLESHOOTING PROCEDURE
031	One Flash	Incorrect DIP switch setting	Check the DIP switch settings on the PCB (Part #701).
051	Three Flashes	Combustion Air and/or Exhaust Gas Blockage	See Error Code 991
101	Five Flashes	Combustion Air and/or Exhaust Gas Blockage	See Error Code 991

ERROR CODE	GREEN LED ON COMPUTER BOARD	SYMPTOM OR ISSUE	TROUBLESHOOTING PROCEDURE
111 or 121	Three Flashes	Ignition failure / Loss of flame	<ul style="list-style-type: none"> • Check for connection/breakage of wires, burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). • A “buzzing” ignition sound should be coming from the burner (Part #101) when the water heater prepares for combustion, if not heard then the igniter (Part #710) maybe the issue. • Listen for the “clunk” sound coming from gas solenoid valve assembly (Part #130) when water heater goes into combustion. If nothing is heard, then check the hi-limit switch (Part #412), overheat-cut-off fuse (Part #413) and connections to the gas valve Part #102). • Check if the Hi-limit switch (Part #412) is functioning properly. The switch has a button in its center, pressing the button will reset the switch. If tripped, you will hear and feel it click when resetting. If the high limit switch continues to trip contact a qualified service technician.
201	One Flash	Combustion air and gas line failure	<ul style="list-style-type: none"> • Check if the pressure sensor (Part # 123) is functioning properly. • Check if the fan motor (Part #103) is functioning properly. • Check for connection/breakage of wires, burn marks on the computer board (Part #701).
211	Three Flashes	Air pressure sensor failure	Check for connection/breakage of wires (Part #123, 715), burn marks on the computer board (Part #701).
311	Two Flashes	Heat Exchanger Thermistor Failure	<ul style="list-style-type: none"> • Check for connection/breakage of wires and/or debris on thermistor (Part #407, 408, 411, 715, 718, 731). • Verify thermistor resistances, see page 18 for thermistor troubleshooting.
321	Two Flashes	Inlet thermistor failure	
331	Two Flashes	Outlet thermistor failure	
341	Two Flashes	Exhaust thermistor failure	
351	Two Flashes	Return thermistor failure	

ERROR CODE	GREEN LED ON COMPUTER BOARD	SYMPTOM OR ISSUE	TROUBLESHOOTING PROCEDURE
391	Two Flashes	Flame Rod Failure	Check for connection/breakage of wires (Part #709) and/or soot on the Flame rod (Part #108).
441	Two Flashes	Flow Sensor Failure	<ul style="list-style-type: none"> • Check for connection/breakage of wires (Part #402, 715). • Check for debris on the flow sensor impeller (Part #402). • If a check valve(s) is installed in the water lines, verify that they are operating properly. • The circulation lines may have more pressure drop than the pump is designed to push through. A Qualified Service Technician will need to perform a pressure drop calculation. • If a cross over valve is installed, check if the DIP switch setting is correct. (Refer to p. 25.)
511	Six Flashes	Abnormal main gas valve (MV)	Check for connection/breakage of blue and brown wires going to gas valve assembly and/or burn marks on the computer board (Part #701).
521	Six Flashes	Air damper failure	<ul style="list-style-type: none"> • Check if the air damper assembly (Part #122) is functioning properly. • Check for connection/breakage of wires (Part #122, 715), burn marks on the computer board (Part #701).
551	Six Flashes	Abnormal gas solenoid valve (SV1, SV2, and/or SV3)	Check for connection/breakage of the blue and green, light blue, and red wires going to gas valve assembly and/or burn marks on the computer board (Part #701).
611	Four Flashes	Fan motor fault	<ul style="list-style-type: none"> • Check for connection/breakage of wires, dust buildup in the fan motor (Part #103) and/or burn marks on the computer board (Part #701). • Check for corrosion/damage of the wire connectors (Part #103). • Inspect your exhaust air intake for any blockages, clear if any are found.
631	Four Flashes	Pump fault	<ul style="list-style-type: none"> • Check for connection/breakage of wires in the pump (Part #726, 738). • Check for the reverse water flow through the pump. Install a check valve on the return line to the water heater. Verify proper operation.

ERROR CODE	GREEN LED ON COMPUTER BOARD	SYMPTOM OR ISSUE	TROUBLESHOOTING PROCEDURE
651	Four Flashes	Flow adjustment valve fault	<ul style="list-style-type: none"> • <i>Inspect the flow adjustment valve (Part #402), for connection/breakage of wires</i> • <i>Inspect the control valve for debris that may be blocking it.</i>
661	Four Flashes	Bypass valve fault	<ul style="list-style-type: none"> • <i>Inspect the bypass valve (Part #403), for connection/breakage of wires.</i> • <i>Inspect the control valve for debris that may be blocking</i>
701	One Flash	Computer board fault	<i>Check for connection/breakage of wires or burn marks (Part #701, 714).</i>
711	One Flash	Gas solenoid valve drive circuit failure	<i>Refer to the 111 and 121 error codes.</i>
721	Six Flashes	False flame detection	<i>Check the flame rod (Part #108) for corrosion/soot buildup.</i>
741	N/A	Communication error between water heater and remote controller	<ul style="list-style-type: none"> • <i>Verify the correct model/type of remote is installed.</i> • <i>Inspect the connections between the water heater and remote controller.</i> • <i>The code will appear if you disconnect the remote from the water heater without first turning off power to the water heater. Turn the water heater OFF then ON to reset.</i>
751	N/A	Communication error between water heater and built-in controller	<ul style="list-style-type: none"> • <i>Inspect the connections between the water heater and built-in controller.</i> • <i>The code will appear if you disconnect the remote from the water heater without first turning off power to the water heater. Turn the water heater OFF then ON to reset.</i>
761	N/A	Communication error in Easy-Link	<ul style="list-style-type: none"> • <i>Check if the connections between the parent unit and the child units are correct. Refer to pp. 34 and 37.</i> • <i>Check the Child units for power. Troubleshoot any Child units without power.</i> • <i>The code will only appear on the Parent water heater if you disconnect an Easy Link wire from a Child water heater without first turning off power to the Easy Link System. Turn the Parent water heater OFF then ON to reset.</i>

ERROR CODE	GREEN LED ON COMPUTER BOARD	SYMPTOM OR ISSUE	TROUBLESHOOTING PROCEDURE
991	Five Flashes	Combustion Air and/or Exhaust Gas Blockage	<ul style="list-style-type: none"> • <i>Verify the gas type supplied to the water heater matches gas type orifice plate installed. DO NOT operate the water heater if they do not match; correct immediately.</i> • <i>Inspect the environment around the water heater.</i> • <i>Check the altitude/elevation of the area where the water heater is installed, and verify the DIP switches are set to the proper elevation.</i> • <i>Verify the vent length DIP switches match the equivalent vent length of the installed venting system. Refer to See Table 5 on page 27.</i> • <i>Inspect your exhaust air intake for any blockages, clear if any are found.</i> • <i>If the water heater is installed as a direct-vent system, check whether there is proper clearance between the intake air terminal and the exhaust terminal. Refer to pp. 26 to 28 of the Installation Instructions and Use & Care Guide.</i> • <i>Check for dust and dirt on the air screen of the rain protection tray (Part #007) and verify air intake is not blocked.</i> • <i>Check for connection/breakage of wires and/or burn marks on the computer board (Part #701)</i>

Code 031: Incorrect DIP Switch Settings

The system displays this code when an incorrect DIP switch setting is detected or DIP switches were changed when the heater power was on.

1. Turn off the power supply.
2. Remove front cover and locate the DIP switches at the side of the computer board.

Refer to “DIP Switch Settings” on page 25. The correct DIP switch positions are illustrated in that section.

For specific DIP switch settings related to vent length or high-altitude installations, refer to the tables that start on page 25. Additional information is provided in the Installation Manual/Owner’s Guide.

3. After setting the DIP switches, turn power to the water heater back on.

Code 051 or 101: Combustion Air and/or Exhaust Gas Blockage

Refer to “Error Code: 991,” page 22.

Code 111 or 121: Ignition Failure / Flame Loss

Either the water heater will not fire after three failed ignition attempts (code 111) or it lost the flame signal during a heating cycle and was not able to establish a flame after three failed ignition attempts (code 121).

These codes can appear due to a component in the heater or due to an external cause, such as no gas supply.

1. Verify that the gas supply pressure is within specifications when the heater is

in standby, and verify the gas pressure does not drop below the minimum specified supply pressure when all gas appliances are in operation. Also, verify that the gas line is cleared of debris.

- It is possible that there is a faulty pressure regulator at the gas meter.
 - If a second stage regulator is installed, verify the following: that it is sized properly for the application; that it is installed per the manufacturer’s instruction (pay close attention if an indoor vent limiter is installed); the vent line (if installed) is sized properly. Note: Some manufacturer’s may recommend that a specific amount of straight pipe is installed on the outlet before any changes in direction. Refer to the regulator’s manufacturer. See “Checking the Inlet Gas Pressure and Pressure Drop” on page 30.
2. Check the High Limit Switch and Overheat Cutoff Fuse (OHCF) as follows:
 - 2.1 Turn off power to the water heater, then turn it back on. (Use the switch above the computer board.) Listen for the “clunking” noises of the gas solenoid valves. If you DO hear them, go directly to step 3. The water heater may show error code 711, if this occurs proceed to the next step.
 - 2.2 Turn off power to the heater by disconnecting the power cord or external switch.
 - 2.3 Locate the high limit switch (item 412, p. 74). See also Figure 21 (p. 40) and Table 8 (p. 41).

- 2.3.1 Push the button in the middle of it. The switch was reset if you heard and felt the button click.

- 2.3.2 Turn the power back on and test the heater. If the burner lights, the cause of the high limit trip must be determined. Continue with the troubleshooting process.

Also, be sure to check the temperature of the incoming water supply. If the unit is supplied with pre-heated water, such as from a solar system, the incoming water temperature may be too high.

- 2.3.3 If the high limit switch is operating properly and you don’t hear the “clunking” noises of the gas valves, then check the overheat cutoff fuse (OHCF) for continuity. If there is no continuity, or for instructions on how to test the OHCF for continuity, refer to “Checking the Overheat Cutoff Fuse (OHCF)” on page 32.
3. Check for blockages in venting, such as bird nests, animals, or trash. A blockage will cause improper operation leading reduced capacity and inability to maintain combustion.
4. Check for a spark inside the burner chamber between the igniter rods. The spark may be viewed through the sight glass located next to the igniter and flame sensor. A strong blue spark will remain steady and in place, while a weak spark will jump around.
 - 4.1 If no spark or a weak spark is observed, check the purple igniter wire connections at

both the igniter and at the computer board. Unplug and reconnect them to clean the electrical connections.

- 4.2 Check the igniter rod to make sure the black wire is properly attached and that the rod doesn't move. If the rod moves, replace the igniter rod. You will also need a rod holder gasket.
- 4.3 When the igniter is sparking, check the voltage across the purple wires coming to the igniter. Normal voltage is 108-132 VAC. If voltage is outside of this range, then replace the computer board. (See item 701 on page 77 for the correct part number.)
- 4.4 If the previous steps still don't result in a spark being generated, replace the igniter.
5. If flame comes on for only 1-2 seconds before going out, verify that the green IN USE LED on the built-in controller or remote controller did not turn on. If the

LED stayed off, then inspect the flame sensor. Clean it if necessary. Replace it if any damage (chips or cracks in the ceramic) is seen or if the metal rod can move freely in the ceramic insulator. See "Cleaning the Flame Sensor and Igniter Rod)" on page 33.

Unplug both ends of the wiring harness from the igniter assembly and control board, then reconnect them to ensure good connection. Also, verify that the green wire that is part of the circuit is attached to one of the screw connections around the manifold.

6. Verify proper operation of the main gas valve (MV). To do so, turn the power off, then check the resistance of the MV. A normal resistance is 1.15-1.65 k Ω . If the resistance is out of range, replace the gas valve.
7. Verify proper operation of the gas solenoid valves. To do so, turn the power off, then check the resistance of the valves. A normal resistance reading for SV1 is 1.35-

1.65 k Ω . Normal resistance for SV2 and SV3 is 2.07-2.53 k Ω . If the resistance is out of range, replace the gas valve.

Code 201: Combustion Air and Gas Line Failure

- Check if the pressure sensor is functioning properly.
- Check if the fan motor is functioning properly.
- Check for connection /breakage of wires, burn marks on the PCB.

Code 211: Air Pressure Sensor Failure

- Check the voltage between the black and red wires. Normal: 4 to 6 VDC between black & red (during operation)
- Replace the pressure sensor if the voltage is outside of the range. Replace the PCB if the voltage is within the normal voltage range.

**Code 311, 321, 331, 341 or 351:
Thermistor Failure**

The system displays this code when it detects a thermistor failure.

1. Turn off power to the water heater.
2. Identify the row in Table 3 that applies to you, then follow its instructions.
3. After you have located the correct thermistor, verify that the wire connections are secure and free of burns or cuts.
4. Check the thermistor’s resistance value. See Figure 4 for a list of normal resistance values. Run water through the heater for several minutes to get all the thermistors in approximately the same temperature range.
5. Clean the thermistor as follows:

- a. Drain the unit of water. (See “Unit Draining and Filter Cleaning” on p. 29.)
 - b. Remove the screw or clip that secures the thermistor, then pull the sensor probe out by grabbing the metal base. Do not pull the wire as you may cause the wire to separate from the probe.
 - c. Clean the probe to a silver finish. Do not lose the red rubber o-ring that wraps around this sensor.
 - d. Reinstall the thermistor.
6. Return the water heater to service.
 7. If the error code persists, replace the thermistor.

Temperature vs Resistance

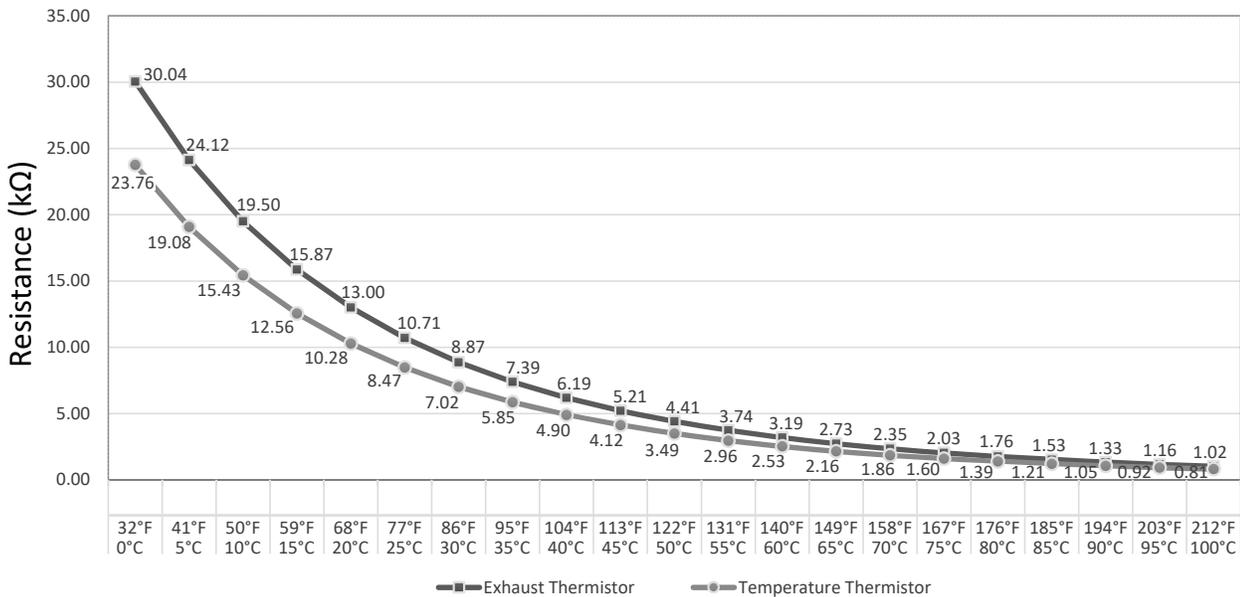


Figure 4: Temperature vs Resistance Graph

Code 391: Flame Rod Failure

1. Ensure that the unit is plugged into a socket that is properly grounded. A floating ground can cause this error.
2. Check that the wire connections are secure and free of burns or cuts. Verify that the green ground wire is installed properly and is making an electrical connection. This ground wire is part of the connector to the PCB. The green wire is secured to the metal plate to the right of the surge box.
3. Clean the flame rod. See "Cleaning the Rod Assembly (Flame Sensor and Igniter Rod)" on page 33.

Code 441: Flow Sensor Failure

This code is displayed when the computer doesn't detect a signal from the flow sensor when the pump is running or when a heater in the Easy-Link System is running.

1. If the code appears when the pump should be operating, then:
 - Inspect the filter on the return connection and clean as necessary.
 - Inspect the pump for any debris in the pump connections and clean as needed.
 - If using a crossover valve, check to make sure the crossover valve DIP switch setting is in the ON position (DIP switch #5, top bank).
2. Disconnect the water heater from the linked system before you advance to step 2. The water heater must be tested as an individual unit.
3. Ensure that the water supply is turned on.

4. Check the flow sensor/control valve wires to see if they are broken or disconnected.
5. Verify the flow rate using the water heater's controller. To do so, select Flow Rate by pushing the INFO button until the arrow on the left side of the display points toward "Flow." Ensure that the controller displays a flow rate during operation. If a flow rate is not indicated, proceed to the next step.
6. Check the inline water filter for debris.
7. Turn off the gas supply and electrical power to the heater, then remove the flow sensor/control valve (p. 61). Check the flow sensor as described in "Checking the Flow Sensor," page 32. Clean or replace as necessary.

Code 511: Abnormal Main Gas Valve (MV)

This code indicates a fault in the main gas valve (MV) circuit.

1. If the hot water is shut off, but flames are still visible through the burner sight window, immediately shut off gas and power to the unit and contact the technical service department.
2. Check the wire connections to the main gas valve for burns or cuts.
3. If the unit was serviced recently and the gas valve had to be removed, make sure that each gas valve wire is fully plugged into the connector.
4. Verify that the gas supply pressure is within the specified limits. An inlet gas pressure that is too high can jam or damage the main gas valve.
5. With the power off, check the

resistance of the valve. Normal resistance reading is 1.15-1.65 kΩ. If the resistance is out of range, replace the gas valve.

6. Check the voltage across the main gas valve wires (blue - light blue #3) during operation. The voltage reading should be 93-120 VDC. If the voltage is not within normal range, replace the computer board.

Code 521: Air Damper Failure

1. Verify the DIP switches are set for the proper installation altitude. If adjustment is needed, turn off power to the heater and adjust. Then go to step 4 for the error code reset and test heater. If this doesn't fix it, go to steps 2-4.
2. Visual inspection of the air damper for blockage and/or loose fit. Remove any debris or blockage that would keep the damper from rotating.
3. Normal: 3 to 11 VDC between COM (white) & brown (during operation) Visual inspection of PCB: connection/breakage of wires and/or burn marks on the computer board.
4. To reset this error code, go to Reset Procedure, step 10 of 991 error code on page 24.

Code 551: Abnormal Solenoid Gas Valve (SV1, SV2, and/or SV3)

This code indicates a driving circuit fault for one or more of the solenoid gas valves (SV1, SV2, or SV3).

1. Check the wire connections to the gas solenoid valves for burns or cuts.
2. If the unit was serviced recently

and the gas valve had to be removed, make sure that each gas valve wire is plugged into the proper place. (For each connector, the number stamped on the metal must match the number that is printed on the wire's label.)

3. Verify that the supply gas pressure is within the specified limits. Too high of an inlet gas pressure may cause the main gas valve to jam or could be damaged.
4. With the power off, check the resistance of each valve. Normal resistance reading for SV1 is 1.35-1.65 kΩ. Normal resistance reading for SV2 and SV3 is 2.07-2.53 kΩ. If the resistance is out of range, replace the gas valve.

5. Check the voltage across these solenoid gas valve wires during operation. (The dark blue wire is common.)

- SV1: Green (#9) & Blue
- SV2: Orange (#53) & Blue
- SV3: Red (#73) & Blue

In each case, the voltage reading should be 93-120 VDC. If the voltage is not within normal range, replace the computer board.

Code 611: Abnormal Fan Motor

This code indicates a fan motor fault.

1. Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker.
2. Check venting for blockages or for the presence of contaminants in the water heater area (e.g., lint, dust). Make sure that there are no contaminants inside the water heater cabinet. Correct any issues

that are found.

3. Visually check for breakages in the fan motor wiring or burn marks on the computer board (PCB). Repair/replace as needed.
4. Check for leaks at the heat exchanger.
5. Check the fan housing for water.
6. Turn on power to the water heater, then test the heater.
7. Complete this step only if the previous steps did not solve the issue.

During operation, check the voltage between the fan motor wires listed below. The blue wire is common. (See "FM" in the wiring diagram, page 28.)

- Red & Blue
Normal: 132 to 192 VDC (during operation)
- Yellow & Blue
Normal: 13 to 17 VDC (during operation)
- Orange & Blue
Normal: 2 to 6.5 VDC (during operation)

If the voltage readings fall within the normal range, replace the fan motor. If the voltage readings are not within normal range, replace the computer board.

Code 631: Pump Fault

1. Verify the check valve is operating properly. This code appears when water moves backwards through the pump.
2. Check the filter on the return connection and clean as necessary.
3. Inspect the pump for buildup or debris

in the connections that can reduce the speed of the pump impeller. Clean out the debris. Once re-installed make sure the pump is not air locked.

4. Inspect the wires to the pump for any cuts or breakage. Replace the wires if they are compromised.
5. Complete this step only if the previous steps did not solve the issue.

During operation, check the voltage between the pump wires listed below. The blue wire is common. (See "PUMP" in the wiring diagram, page 28.)

- Red & Blue
Normal: 132 to 192 VDC (during operation)
- Yellow & Blue
Normal: 13 to 17 VDC (during operation)
- Orange & Blue
Normal: 1.0 to 6.5 VDC (during operation)

If the voltage readings fall within the normal range, replace the pump. If the voltage readings are not within normal range, replace the computer board.

Code 651: Flow Adjustment Valve Fault

This code indicates a flow adjustment valve fault.

1. Inspect the flow adjustment valve (item number 402, p. 73) for the following:
 - Broken or disconnected wires
 - Debris or scale buildup inside the valve assembly that would prevent the valve from opening or closing
 - Water leakage at the flow adjustment valve (Replace the seals/component.)

2. Check the resistance of the flow adjustment valve. To check it,
 - 2.1 Turn off electrical power to the water heater, then.
 - 2.2 Unplug the flow adjustment valve's connector from the computer board. (See Wiring Diagram on page 28.)
 - 2.3 Check the resistance between the red and black wires. Normal resistance (black-red): 90 to 200 Ω . If the resistance is out of range, replace the flow adjustment valve.
3. Check the voltage of the flow adjustment valve where its connector plugs into the PCB. Measure between the black and red wires. (See page 20 or 20.) Normal voltage range (black-red): 7 VDC - 16 VDC. If the voltage is out of range, replace the computer board. (See page 28.)

Code 661: Bypass valve fault

This code indicates a bypass valve fault.

1. Inspect the bypass valve (item number 403) for the following:
 - Broken or disconnected wires (Be sure to look behind the fuse box and check the wire assembly from the bypass valve. Wire colors: red, yellow, white, blue, brown.)
 - Locked motor drive due to debris or scale build up inside the valve assembly
 - Water leakage at the bypass valve
2. Check the resistance of the bypass valve. To check it,
 - 2.1 Turn off electrical power to the water heater, then.

- 2.2 Unplug the bypass valve's harness. There is a connector in the middle of the harness which you can access by removing the computer board. The harness' wire colors are red, yellow, white, blue, brown). See connector #715 on page 73.
- 2.3 Check the resistance between the brown and red wires. (You can use the pins in the female connector.) Normal resistance (brown-red): 50 to 85 Ω . If the resistance is out of range, replace the bypass valve.
3. Check the voltage of the bypass valve. To check it, measure between the brown and red wires. (Connector #715 on page 73.) Normal voltage range (brown-red): 3 VDC - 11 VDC. If the voltage is out of range, replace the computer board. (See page 73.)

Code 701: Computer Board Fault

This code indicates a computer board or outlet thermistor fault.

1. Inspect the computer board (PCB) for connection/breakage of wires and/or burn marks.
2. Check the operation of the outlet thermistor as follows:
 - 2.1 Push the on/off button on the temperature controller or remote controller so the orange STAND BY LED turns off.
 - 2.2 Run water through the heater.
 - 2.3 Check the reading of the outlet thermistor by pushing the INFO button on the temperature/remote controller two times. Compare it to the inlet

thermistor. The readings should be similar and it should be reading the temperature of the supply water. If there is a difference of more than five degrees, refer to Code 311, 321, 331, 341 or 351: Thermistor Failure, p. 18.

When you are finished, retest the water heater.

Code 711: High Limit Switch / Overheat Cutoff Fuse Circuit is Compromised

When power is turned on to the heater, the computer performs a diagnostic check of the gas valve, high limit, and Overheat Cutoff Fuse (OHCF) circuits. If any of these are compromised, this code will appear.

1. Inspect the dark blue common wire to the high limit switch, the OHCF, and the gas valves for any breaks or cuts.
2. Verify proper wiring harness connections to the main gas valve located next to the PCB and the gas solenoid valve assembly located above the heat exchangers. (For each connector, the number stamped on the metal must match the number that is printed on the wire's label. See page 28)
3. Check the High Limit switch. Refer to "Code 111 or 121: Ignition Failure / Flame Loss," See on page 16.
4. The Overheat Cutoff switch may be compromised. Refer to "Checking the Overheat Cutoff Fuse (OHCF)," page 32.
5. There may be a computer board (PCB) and/or gas valve fault. Refer error codes 510 and 551.

Code 721: False Flame Detection

A false flame was detected by the system during start up. No flames should have been present, so the system stopped the ignition process.

1. **WARNING! Shut off all gas and power to the unit. Failure to do so could lead to fire, explosion, personal injury or death.**
2. Inspect the flame sensor to see if it is dirty. Also, check the ceramic housing for cracks. Clean the assembly, if necessary. See *Cleaning the Flame Sensor and Igniter Rod*, p. 33. Contact the technical service department for further assistance.

Code 741: Remote Control Problem

This code indicates a miscommunication between the temperature remote controller and the water heater. This code is **not** associated with the built-in controller for indoor models.

NOTICE:

If you disconnect the remote from the heater with the power supply on, this error code will result. Turn off power before disconnecting the remote from the heater.

1. Verify that the remote is compatible with the water heater. Refer to the remote's instruction sheet and the heater's installation manual.
2. Verify that only a single remote is installed. Only one remote may be used in addition to the built-in temperature controller. An incorrect remote or multiple remotes will result in this error code.

3. Make sure that all wiring is connected to the remote controller properly.
4. Power surges can cause this fault. If frequent power surges occur, install adequate surge protection to prevent nuisance faults.
5. Check the voltage across the wires coming to the remote. Normal voltage should be 11-17 VDC. If within normal range, replace the remote. If the voltage is out of range, replace the computer board (PCB).

Code 751: Temperature Controller Problem

This code indicates a miscommunication between the water heater and the **built-in** temperature controller. **NOTE:** This code is **not** associated with the remote controller.

1. Check that all wiring is properly connected to the built-in temperature controller.
2. Power surges can cause this fault. If frequent power surges occur, install adequate surge protection to prevent nuisance faults.
3. Check the voltage across the wires that are connected to the remote. Normal voltage should be 11 VDC and 17 VDC. If within normal range, replace the built-in temperature controller. If the voltage is out of range, replace the computer board (PCB).

Code 761: Communication Error in Easy-Link System

A 761 error code means that the parent unit in the Easy-Link system has lost communication with at least one heater.

This code will display on the parent heater in an Easy-Link system.

To reset the code, either reconnect the easy-link wires or cycle the parent heater's power off and then back on.

To address this error, do the following:

1. Inspect the wiring between the Parent heater and the heater identified by the code.
2. Verify that the heater in question has power to the computer board.
 - Make sure the switch above the computer board is on.
 - Make sure that a fuse or surge absorber in the fuse box has not blown.
 - Verify proper supply power to the water heater in question.

If the error appeared when you disconnected the easy-link wire to a heater to troubleshoot, then cycle the parent heater's power off and then on to remove this heater from the easy-link system.

Code 991: Combustion Air and/or Exhaust Gas Blockage (also Code 051 and 101)

These codes are related and appear during different phases of operation.

- Code 051: This error code will appear if there are combustion air and/or exhaust vent issues during the post purge sequence. This check occurs once in a 24-hour time period.
- Code 101: This error code will

appear if there are combustion air and/or exhaust vent issues during the pre-purge sequence.

- Code 991: This error code will appear if there are combustion air and/or exhaust vent issues during heater operation.

WARNING! Familiarize yourself with the components before attempting these procedures. Use the Installation Manual and reference the component schematic on the last few pages of the manual.

Safety first! These procedures must be performed by licensed, qualified service professionals only. Failure to observe this warning could lead to personal injury or death.

The manufacturer is not liable for the actions of the technician if he/she fails to adhere to any or all safety procedures, specifically in regards to electrical and gas safety.

1. Check the rating plate to verify that the gas type of the water heater matches the gas type applied to the unit. **NOTE:** This water heater's gas type is field convertible, confirm the orifice installed matches the gas type supplied. See Removing, Replacing, and Verifying the Gas Orifice Assembly on page 47. Next, make sure that the gas-type DIP switch setting is correct. (See Table 5 on page 27.)
2. Verify that the venting meets the requirements specified in the installation manual (e.g., vent diameter and length).
3. Verify the DIP switch settings.
 - 3.1 Are the DIP switches set for the correct vent size and length? Refer to DIP Switch Settings, p. 25 for the correct

settings. Each 90-degree elbow is equal to 5 feet of straight pipe. Refer to the installation manual for vent requirements.

- 3.2 Is the heater set to the correct elevation? The default setting for your water heater is 2,000 ft. above sea level or less. A DIP switch change is required for installations that are higher than 2,000 feet above sea level. Refer to "DIP Switch Settings" on page 26.
4. Check for wiring connections for any breakage and/or burn marks on the PCB.
5. Check for obstructions in the vent or intake air lines. Clear them if any are found. Check the following:
 - Air intake and exhaust
 - Rain protection tray screen
 - Fan motor intake
6. Verify that the terminations meet the minimum clearances that are outlined in the installation manual and local codes. (Doing so will minimize the risk of flue gas recirculation.) Also, ensure that no other appliance's exhaust gasses can be pulled into the intake.
7. Check for signs of contaminated air inside the water heater's cabinet and inside the fan on the fan blades. Clean the fan and cabinet if any debris is present. It may also be necessary to inspect for debris or a partial blockage of the burners that could affect the flame quality.

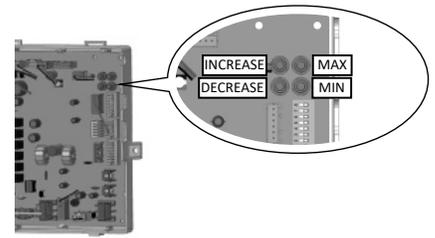


Figure 5: Checking Combustion Status.

8. Check the following:

- 8.1 Is the gas supply pressure within specified limits when the heater is in standby and when it is running with multiple taps open and MAX pressed on the computer board?
- 8.2 If the pressure difference between standby and maximum firing is greater than 1 inch W.C., the supply line, gas meter, and/or regulator may be undersized. **NOTE:** In Canada, do not exceed the maximum allowable pressure drop permitted by B149.1.
- 8.3 Verify that the gas lines are sized for the correct volume of gas. **NOTE:** Gas line capacity will vary based on type of gas line material used. Refer to the installation manual or the current edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 (U.S.) or Natural Gas and Propane Code, B149.1 (Canada).

NOTE: Do not proceed to the next step until this one has been completed and these causes have been ruled out. Improperly installed venting, incorrect DIP switch settings,

and obstructions in the venting or heater *will* affect manifold pressure readings.

9. Contact Technical Support regarding the manifold pressure. (See Table 1 on page 4.) With approval from Technical Support, adjust the manifold pressure to the correct values, if necessary.

Reset Procedure

10. Complete the following procedure to clear the 101/521/991 error code:
 - 10.1 Make sure that the water heater is powered on.
 - 10.2 Press the on/off button on the remote/temperature controller so the amber standby light is off.
 - 10.3 On the computer board, simultaneously press and hold the INCREASE and DECREASE buttons for five seconds. (See Figure 11 on page 30.)
 - 10.4 Release the buttons when the green LED on the computer board turns on.

The green LED will then turn back off.
 - 10.5 Shut off power to the heater using the on/off switch above the computer board.
 - 10.6 After 5 seconds, turn the power on. Press the On/Off button on the controller to place the water heater in standby and ready for operation.

DIP SWITCH SETTINGS

The computer board layout for all models is identical. See “Wiring Diagrams,” page 28. The DIP switches have certain special functions as shown on the following tables and generally should not need adjustment.

Verify the functions of each DIP switch carefully before changing any settings. Only adjust DIP switches with the supply power to the heater off.

If you have questions, contact the technical service department. NOTE: Dark squares represent DIP switch position.

Figure 6: DIP switch location.

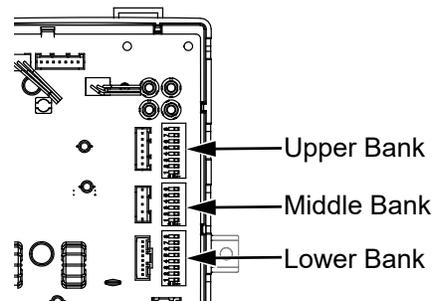


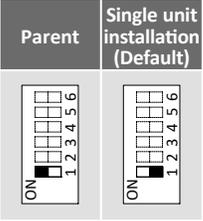
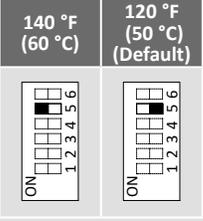
Table 3: Upper Bank of DIP Switches

No.	Functions	ON position	OFF position
1	N/A		OFF
2			(Default)
3	Interval pump operation <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>10 min.</p> </div> <div style="text-align: center;"> <p>20 min. (Default)</p> </div> </div>	Ten minutes	Twenty minutes (Default)
4	Pump operation for freeze protection <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Inactive (Default)</p> </div> <div style="text-align: center;"> <p>Active</p> </div> </div>	Inactive (Default)	Active
5	Cross over valve installation <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>Installed</p> </div> <div style="text-align: center;"> <p>Not installed (Default)</p> </div> </div>	Installed	Not installed (Default)
6	N/A		OFF
7			(Default)
8			

DIP SWITCH SETTINGS (CONTINUED)

TROUBLESHOOTING

Table 4: Middle Bank of DIP Switches

No.	Functions	ON position	OFF position										
1	Parent setting for Easy-Link System 	Parent	Single unit (Default)										
2 3 4	Altitude adjustment settings <table border="1" data-bbox="305 693 868 945"> <thead> <tr> <th>0 to 2,000 ft (0 to 610 m) (Default)</th> <th>2,001 to 3,000 ft (611 to 914 m)</th> <th>3,001 to 5,000 ft (915 to 1,524 m)</th> <th>5,001 to 7,500 ft (1,525 to 2,286 m)</th> <th>7,501 to 10,100 ft (2,287 to 3,078 m)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	0 to 2,000 ft (0 to 610 m) (Default)	2,001 to 3,000 ft (611 to 914 m)	3,001 to 5,000 ft (915 to 1,524 m)	5,001 to 7,500 ft (1,525 to 2,286 m)	7,501 to 10,100 ft (2,287 to 3,078 m)							
0 to 2,000 ft (0 to 610 m) (Default)	2,001 to 3,000 ft (611 to 914 m)	3,001 to 5,000 ft (915 to 1,524 m)	5,001 to 7,500 ft (1,525 to 2,286 m)	7,501 to 10,100 ft (2,287 to 3,078 m)									
5	Output temperature settings 	140 °F (60 °C)	120 °F (50 °C) (Default)										
6	N/A		OFF (Default)										

DIP SWITCH SETTINGS (CONTINUED)

Table 5: Lower Bank of DIP Switches

No.	Functions	ON position	OFF position																																																						
1 2	Gas type <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LP</th> <th>Natural (Default)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	LP	Natural (Default)																																																						
LP	Natural (Default)																																																								
3 4	Vent settings <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Vent style</th> <th>Vent type</th> <th>Vent length</th> <th>DIP switches (Default)</th> <th>Vent style</th> <th>Vent type</th> <th>Vent length</th> <th>DIP switches</th> </tr> </thead> <tbody> <tr> <td rowspan="2">2" DV</td> <td>Intake</td> <td rowspan="2">10 to 60 ft (3.1 to 18.3 m)</td> <td rowspan="8"></td> <td rowspan="2">2" DV</td> <td>Intake</td> <td rowspan="2">5 to 9.9 ft (1.5 to 3.0 m)</td> <td rowspan="8"></td> </tr> <tr> <td>Exhaust</td> <td>Exhaust</td> </tr> <tr> <td rowspan="2">2" PV</td> <td>Intake</td> <td>2" elbow: 5 ft (1.5 m)</td> <td rowspan="2">2" PV</td> <td>Intake</td> <td>2" elbow: 5 ft (1.5 m)</td> </tr> <tr> <td>Exhaust</td> <td>15 to 60 ft (4.6 to 18.3 m)</td> <td>Exhaust</td> <td>5 to 14.9 ft (1.5 to 4.5 m)</td> </tr> <tr> <td rowspan="2">3" DV</td> <td>Intake</td> <td rowspan="2">60 to 150 ft (18.3 to 45.7 m)</td> <td rowspan="2">3" DV</td> <td>Intake</td> <td rowspan="2">5 to 59.9 ft (1.5 to 18.3 m)</td> </tr> <tr> <td>Exhaust</td> <td>Exhaust</td> </tr> <tr> <td rowspan="2">3" PV</td> <td>Intake</td> <td>2" elbow: 5 ft (1.5 m)</td> <td rowspan="2">3" PV</td> <td>Intake</td> <td>2" elbow: 5 ft (1.5 m)</td> </tr> <tr> <td>Exhaust</td> <td>60 to 150 ft (18.3 to 45.7 m)</td> <td>Exhaust</td> <td>5 to 59.9 ft (1.5 to 18.3 m)</td> </tr> <tr> <td colspan="8" style="text-align: center;">Outdoor installation</td> </tr> </tbody> </table>	Vent style	Vent type	Vent length	DIP switches (Default)	Vent style	Vent type	Vent length	DIP switches	2" DV	Intake	10 to 60 ft (3.1 to 18.3 m)		2" DV	Intake	5 to 9.9 ft (1.5 to 3.0 m)		Exhaust	Exhaust	2" PV	Intake	2" elbow: 5 ft (1.5 m)	2" PV	Intake	2" elbow: 5 ft (1.5 m)	Exhaust	15 to 60 ft (4.6 to 18.3 m)	Exhaust	5 to 14.9 ft (1.5 to 4.5 m)	3" DV	Intake	60 to 150 ft (18.3 to 45.7 m)	3" DV	Intake	5 to 59.9 ft (1.5 to 18.3 m)	Exhaust	Exhaust	3" PV	Intake	2" elbow: 5 ft (1.5 m)	3" PV	Intake	2" elbow: 5 ft (1.5 m)	Exhaust	60 to 150 ft (18.3 to 45.7 m)	Exhaust	5 to 59.9 ft (1.5 to 18.3 m)	Outdoor installation									
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Outdoor installation																																																									
5	On demand pump operation <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Active</th> <th>Inactive (Default)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Active	Inactive (Default)			Active	Inactive (Default)																																																		
Active	Inactive (Default)																																																								
6 7	N/A		OFF (Default)																																																						
8	Freeze protection firing system <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Inactive</th> <th>Active (Default)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Inactive	Active (Default)			Inactive (off)	Active (on) (Default)																																																		
Inactive	Active (Default)																																																								

WIRING DIAGRAM

TROUBLESHOOTING

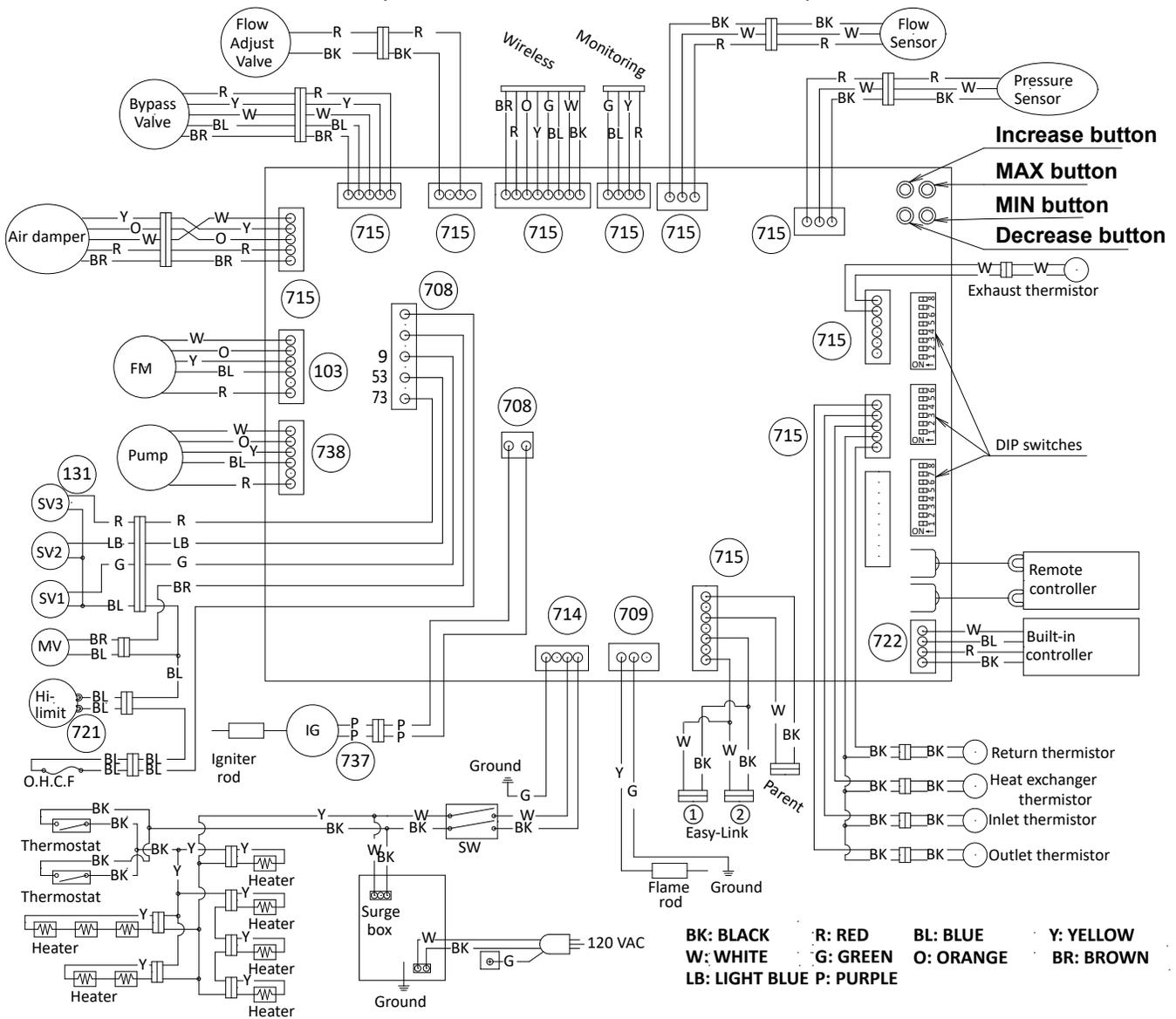


Figure 7: Wiring Schematic for 160X3P, 180X3P, and 199X3P Models

For instructions on how to use checkpoints during troubleshooting, refer to the water heater’s maintenance sheet. The maintenance sheet is stored in a pouch on the inside of the water heater’s front cover.

SERVICE PROCEDURES

Filter/Drain Plugs Cleaning

⚠ WARNING

Water drained from the water heater may be hot and could cause severe burns. Failure to observe proper safety practices could lead to serious personal injury.

1. Close the manual gas shut off valve.
2. Wait 30 seconds, then turn OFF power to the unit again.
3. Close the cold water shutoff valve.
4. Open nearby hot water faucets. When the water flow stops, close all hot water faucets.
5. Place a bucket or pan under the water filter/drain plug to catch the water when it drains. You may also drain the water to the outdoors.
6. Remove the water filter drain plugs and the water filter.

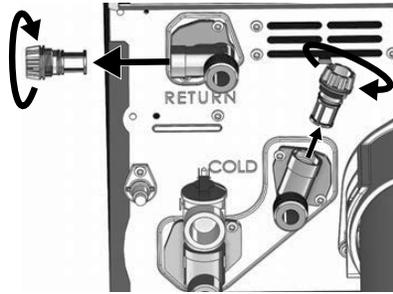


Figure 8: Drain plug removal.

7. **Clean the filter.** With a small brush, clean the water filter of any debris which may have accumulated. (See Figure 9). When the filter is clean, reinstall it.

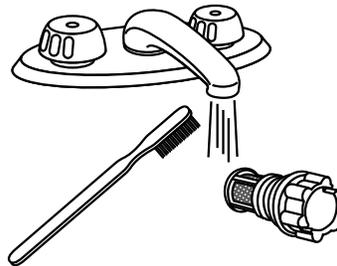


Figure 9: Cleaning the filters.

NOTICE: The filter strainer basket can be separated from the filter threads. When separated, be sure that the O-ring is not lost and is in place before you reinstall the filter.

8. Replace all plugs and close all drain valves.

NOTICE: Drain plugs must be hand tightened only.

Checking for a Crossed Connection

1. Turn off cold water supply valve to the water heater. If there are pumps installed in the system for recirculation, ensure that they are turned off.
2. Turn on hot water at **one** fixture in the structure. If possible, use the hot side of a two-handle fixture. If you must use a single-handle fixture, make sure that it is open to the hot side only.
 - After a brief time, the water should drain completely.
 - If water continues to run, the fixtures and plumbing system need to be checked.
 - Cold water cross-connections may be related to a recirculation pump application, a defective mixing valve, a bad check valve, a missing check valve in the application, or a cartridge in a single-handle faucet that needs to be replaced.

Checking for a Reversed Connection

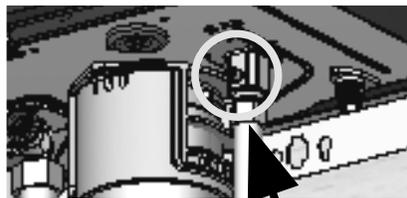
1. Close cold water supply at the inlet and pump return connections.
2. Open the pressure-relief valve or the hot water tap of a two handle faucet.
3. If water continues to run through the pressure-relief valve or hot

water faucet, the system has a reversed connection.

Checking the Inlet Gas Pressure and Pressure Drop

This test is most effective when all gas appliances on the supply line are operating.

1. Close the manual shut off valve at the gas supply line inlet.
2. Open a hot water fixture. The unit should turn on and the remaining gas in the pipe line should purge out. Close the water fixture when the flame in the heater extinguishes.
3. Turn power to the heater off by unplugging it or closing the external shutoff switch.
4. Remove the screw from the pressure port located on the gas inlet. See Figure 10.



Pressure port

Figure 10: Pressure port location.

5. Connect a manometer to the pressure port and zero the manometer.
6. Slowly re-open the manual gas valve. Confirm that there are no gas leaks.
7. Turn power to the water heater on.
8. Open some of the hot water fixtures that use the highest flow rate to turn on the unit. Once the heater has reached a steady firing

rate, **press and hold the “MAX” button on the computer board.** (See Figure 11).

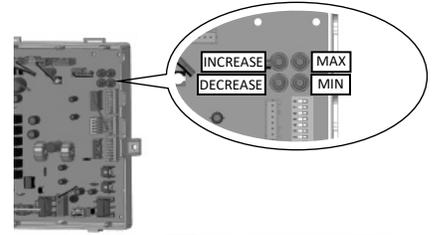


Figure 11: Max button on computer board.

9. Record your gas supply pressure (dynamic).
10. Release the “MAX” button and close all of the water fixtures.
11. Record your gas supply pressure (static).
12. The gas supply pressures should be within the following ranges:
 - Natural Gas: 3.5 to 10.5 inches W.C.
 - Propane: 8 to 13.0 inches W.C.
13. Subtract your dynamic supply gas pressure (step 9) from your static supply gas pressure (step 11). This will be your pressure drop.
14. If the pressure drop is more than 1.5 inch W.C., there may be insufficient gas supply, incorrectly sized gas line, or incorrectly sized gas regulator. **NOTICE:** In Canada, do not exceed the maximum allowable pressure drop permitted by B149.1.
15. Remove the manometer.
16. Install the screw into the gas pressure port on the gas inlet (hand tight).

WARNING! Ensure that there are no gas leaks. Failure to prevent gas leaks can result in an explosion, severe injury, or death.
17. Turn power to the water heater on.

Adjusting the Manifold Gas Pressure and Firing Rate

⚠ WARNING

Complete the following procedures **ONLY** if you have been instructed to do so by the Technical Service Department. Incorrect adjustment may result in carbon monoxide poisoning.

NOTICE:

Incorrect adjustment may damage the water heater and/or shorten its lifespan. Therefore, changing the manifold pressure is not recommended unless there are very strong reasons to do so (e.g., high elevation installations).

Checking the Manifold Gas Pressure

1. You must verify proper gas supply pressure and pressure drop, before proceeding with this procedure. Manifold pressures will not be properly set if supply pressure and pressure drop are outside allowable tolerance.
2. Verify proper DIP switch settings for vent length and altitude. Incorrect DIP switch settings will cause improper readings. **NOTE:** This water heater's gas type is field convertible, confirm the orifice installed matches the gas type supplied. See Removing, Replacing, and Verifying the Gas Orifice Assembly on page 47.
3. Turn power to the water heater off by unplugging it or closing the external shutoff switch.

4. Shut off the gas supply to the water heater at the manual gas shutoff valve.

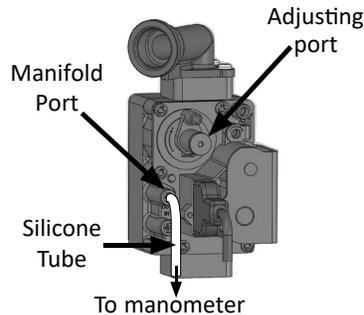


Figure 12: Manifold port location.

5. Remove the screw from the manifold port (See Figure 12).
6. Connect a manometer to the manifold port using a tube. Ensure that this connection is secure enough to prevent a gas leak.
7. Turn power to the water heater on, then turn on the gas supply to the water heater at the manual gas shutoff valve.
8. Run water (preferably 3.5 GPM or more) to activate operation. It is suggested that you draw a large amount of flow to prevent overheating during maximum burn. If presence of a gas leak is detected, immediately shut off the unit and inspect the tube/manifold connection. Otherwise, proceed to the next step.
9. Check the manifold gas pressures:
 - Check the manifold pressure during minimum combustion, press and hold the "MIN" button on the computer board (See Figure 13).
 - The desired pressures are listed in the "Specifications" section. (See Table 1 on page 4.)

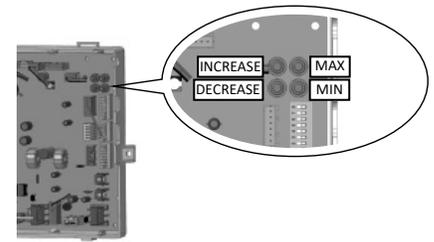


Figure 13: Max button on computer board.

10. When you are finished, turn off water flow and then turn off power to the water heater.
11. Shut off the gas supply to the water heater at the manual gas shutoff valve, before removing the manometer tube. Then replace the port screw.

Complete the next step ONLY if you have been instructed to do so by the Technical Service Department.

12. **IF** the manifold pressures do not match up with those listed in Table 1 on page 4, adjust the manifold pressure. To do so, refer to the following procedures.

Adjusting Manifold Pressure

WARNING! Complete the following procedure **ONLY** if you have been instructed to do so by the Technical Service Department. See WARNING text at the beginning of this section.

1. Follow steps 1 - 6 in the previous section before proceeding to step 2.
2. Use a T15 Torx™ to remove the adjusting port cover. See Figure 12.
3. Turn power to the water heater on, then turn on the gas supply to the water heater at the manual gas shutoff valve.
4. Run water (preferably 3.5 GPM or more) to activate operation. It is suggested that you draw a large amount of flow to prevent

overheating during maximum burn. If presence of a gas leak is detected, immediately shut off the unit and inspect the tube/manifold connection. Otherwise, proceed to the next step

5. Press and hold down the “MIN” button on the computer board. See Figure 13.

Use the T15 Torx™ driver to adjust the manifold pressure. Turning clockwise increases pressure and counter-clockwise decreases the pressure. Use the manometer to verify that pressure has been set to the desired value.

6. When you are finished, turn off water flow and then turn off power to the water heater.
7. Shut off the gas supply to the water heater at the manual gas shutoff valve, before removing the manometer tube.
8. After the gas pressure has been set, remove the manometer tube, and re-install the manifold port screw and adjusting port cover. See Figure 12.
9. Turn power to the water heater on, then turn on the gas supply to the water heater at the manual gas shutoff valve.
10. Verify proper operation.

Checking the Overheat Cutoff Fuse (OHCF)

1. **⚠ WARNING**

Disconnect electrical power from the water heater before servicing. Failure to do so can result in electrical shock.

2. Locate the white OHCF which wraps around the heat exchanger (See Figure 14).

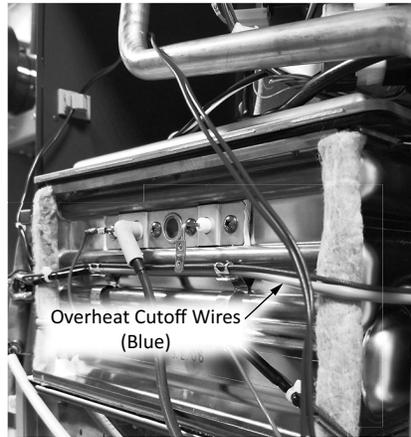


Figure 14: Overheat cutoff.

3. Find the white clip at the end of the two blue braided wires coming from the OHCF.
4. Unplug the connection.
5. Test resistance at the end of the OHCF with a digital volt/ohm meter. Resistance should measure 1 ohm or less. Reconnect the plug.

If the resistance exceeds 1 ohm, replace the OHCF. Replacing this part will require you to remove the heat exchanger. Follow the “Replacing the Heat Exchanger” instructions which are found in the “Service Procedures” section. Inspect the heat exchanger for any burn marks, hot spots, cracks, etc.
6. Restore power and test the unit.

Checking the Flow Sensor

Tools and Materials:

- Flashlight
- Towels

The flow sensor (item 402, p. 73) is part of the flow control valve and located above the X3 Manifold. Its flow rate is determined by an impeller that spins as water runs through it.

To check the flow sensor,

1. You can check the flow rate by turning on power to the water heater. Push the “Info” button on the built-in controller three times. This will display flow if the flow sensor is working properly.
2. Turn off cold water supply valve to the water heater.
3. Remove the flow sensor #402 as described in “Removing and Replacing the Water Piping System Components”, page 61.
4. Blow into the inlet of the flow sensor. Watch to see if the impeller spins. It should spin freely for a few seconds. If it comes to rest abruptly or doesn’t spin at all, it should be inspected for blockage.

NOTICE: Do not try to disassemble the flow sensor. If there is debris that cannot be removed, or if the impeller does not move freely, replace the flow sensor/flow control valve.
5. Reinstall the flow sensor as described in “Removing and Replacing the Water Piping System Components”, page 61.

Cleaning the Flame Sensor and Igniter Rod

Tools:

- Fine steel wool or other suitable abrasive
- #2 Philips Screw Driver
- Replacement gasket

1. Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. Verify that power is off using a volt meter or similar device.
2. Remove the front cover. It is held on by two screws on the top and two screws on the bottom.

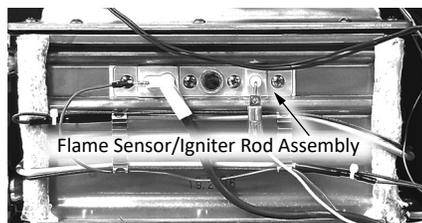


Figure 15: Igniter Rod/Flame Sensor Cleaning

3. Remove the rod assembly as described below.
 - 3.1 Locate the yellow, grey and green wires located in the center of the unit (beside the sight glass).
 - 3.2 Disconnect these wires.

NOTICE: The yellow wire is locked onto the rod's conductive spade. To release the flame sensor connector, follow the instructions in Figure 16.

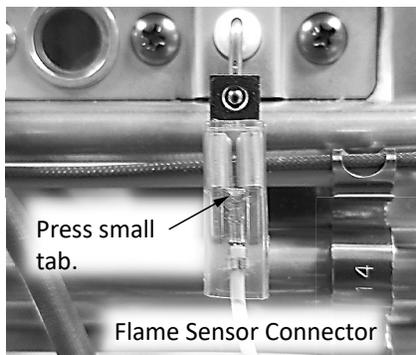


Figure 16: Removing flame sensor connector.

- 3.3 Remove the four Phillips-head screws holding the panel in place.
 - 3.4 Pull the assembly out.
- NOTICE:**
- The flame sensor is separate from the rest of the assembly.
 - Be careful to not drop or lose the sight glass.
4. Inspect the ceramic insulators for chips or cracks. (These ceramic insulators holds the flame sensor and igniter rods in place.) Replace it if any chips or cracks are visible or if either rod moves freely inside the ceramic.
 5. Clean the flame sensor and igniter rod as described.
 - 5.1 Clean the portion of the **flame sensor and igniter rod** that extends to the inside of the burner. Use fine steel wool or other suitable abrasive. Be sure to remove any oxidation or contaminates.
 - 5.2 **Do not** clean the external flame sensor rod or igniter rod connection points. Clean only the metal extensions on the **inside** of the burner.
 6. Reassemble the unit in reverse order: gasket, rods, and metal

cover. Be sure to connect all 3 wires on the front of the burner. Also, inspect all gaskets to make sure that they are free of debris and are not ripped or torn. If the gaskets are ripped or torn, replace them **BEFORE** reassembly.

7. Verify proper operation.

Easy-Link Connections with Previous Models

DIP Switch Setting Easy-Link on the Computer Board

The Easy Link system manages multiple water heaters to provide a set water temperature based on demand/flow rate. The water heater can be connected to the same or a specified model in an Easy-Link System as shown in Table 6: on page 35. One heater must be designated the PARENT unit by turning ON DIP switch 1 of the middle bank as shown in figures 17 & 18. The CHILD units should leave this DIP switch in the default OFF position. Refer to the Easy-Link System section in the heater's installation manual for more detailed installation instructions.

Note: The 199X3P may be installed in with an easy-link system of 540H heaters. The 180X3P and 160X3P are not compatible with any other model as noted in Table 6 and the installation manual.

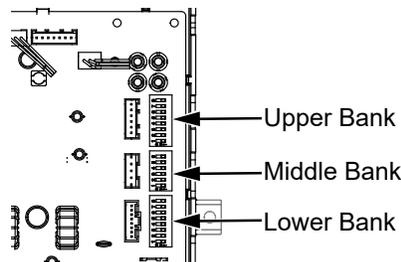


Figure 17: DIP switch location

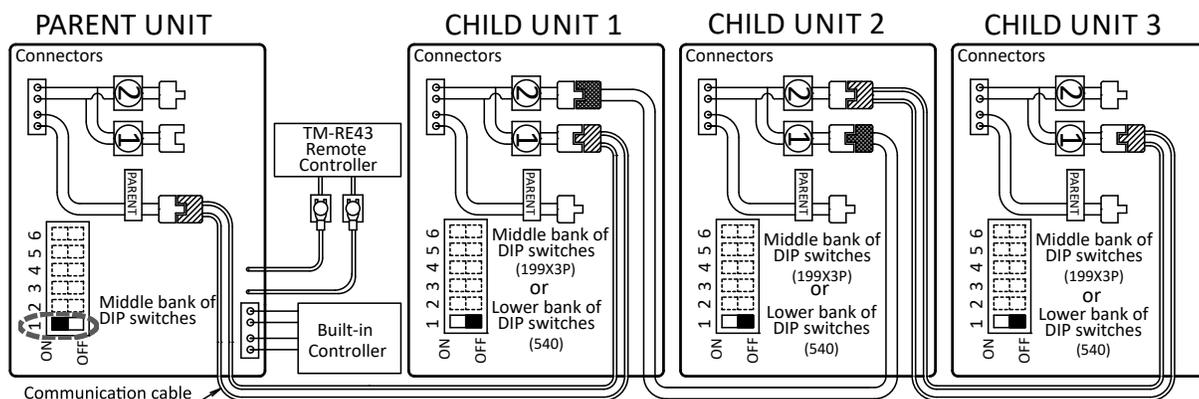


Figure 18: Multiple child unit configuration.

Table 6:

Parent Unit	Child Unit (Acceptable Combinations)		
199X3P	199X3P	199X3P	199X3P
199X3P	540H	540H	540H
540H	540H	540H	540H
540P	540H	540H	540H

Parent Unit	Child Unit (Unacceptable Combinations)		
199X3P	199X3P	199X3P	540H
199X3P	199X3P	540H	540H
199X3P	199X3P	540H	n/a
540H	199X3P	540H	540H
540H	199X3P	199X3P	540H

Easy-Link Unit Number Display and Renumbering Procedure (for 199X3P Models Only)

A. How to display the unit number

Press the “Increase” button on the PCB of a Child unit. The controller of the Child unit will display the assigned number for 10 second. The number can also be accessed through the Diagnostic Mode under Information Mode 32. See Table 7 on page 39.

NOTE:

- The Parent unit is assigned automatically No. 1 in the system and the number isn’t displayed on the controller.
- Child units are randomly assigned 2 to 4.
- The system can only link 4 units. Any additional units connected via the Easy-Link wire will be ignored and act independently of the Easy-Link System.

B. How to reset and reconfigure the numbering of units

Unit #'s can be reset and reassigned manually:

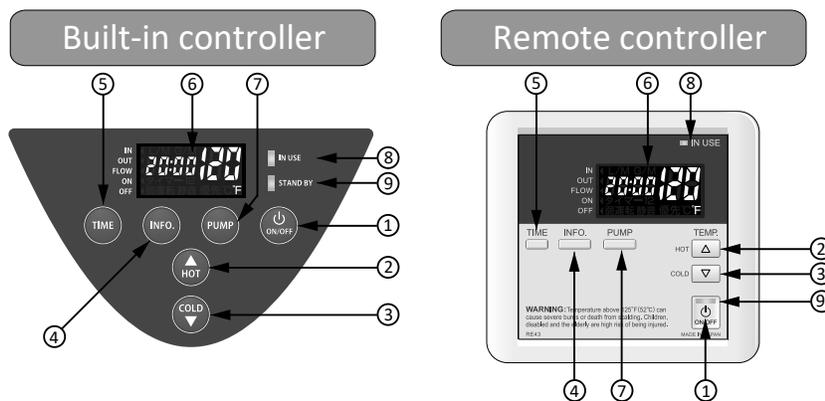
1. Push the ON/OFF button on the controller of the parent unit so the Standby LED turns off.
2. Press and hold the “Increase” button on the PCB of the Parent unit for at least 5 seconds.
3. The green LED on the PCB of the Parent unit will blink for 10 seconds. At the same time the controller of the Child unit will display “000” for 10 seconds to signify that the computer memory of the previously assigned unit # has been erased.
4. During the 10 second period press and release the “Increase” button on each Child unit in the new order of your choice. The new unit numbers will be assigned in this order.

Diagnostic Mode

Diagnostic mode allows you to discover various pieces of information about one or more water heaters, even if they are linked together through an Easy-Link system.

Individual Unit

- To enter diagnostic mode, press the HOT button and the COLD button simultaneously for at least five seconds. Figure 19.
- Use the HOT or COLD buttons to scroll through the mode numbers. Continue until you reach the desired mode number. See Table 7 on page 38. for a list of mode numbers and their meanings.
- Press the INFO button to select the mode number. The information will display on the controller.
- To exit diagnostic mode, press and hold the HOT and COLD buttons simultaneously for at least five seconds.



No.	Description	Note	No.	Description	Note
1	"ON/OFF" Button	Press this button to start or stop operation.	5	"TIME" Button	Press this button to set the current time.
2	"HOT" Button	Press the "HOT" button or the "COLD" button to set the outlet water temperature, the current time, and PUMP TIMER.	6	LCD	The current time, set temperature, error code and other information are displayed.
3	"COLD" Button		7	"PUMP" Button	Press this button to set and control the pump operation.
4	"INFO." Button	Press the "INFO" button to display: -Inlet/Outlet Water Temperature -Water Flow Rate -Pump Status/Settings	8	IN USE LED	The LED lights during combustion.
			9	STAND BY LED	The LED lights when power is on.

NOTICE

- When the remote controller is installed it will take priority over the built-in controller.
- The controller has an energy saving mode. Five minutes after the water heater stops operating, the backlight of the controller turns off.
- The backlight of the remote will turn back on once the water heater begins firing again.

NOTE: You may exit diagnostic mode by pressing the ON/OFF button. Also, if left alone, the display will exit diagnostic mode automatically after 30 minutes.

Figure 19: Built-in and Remote controller settings.

Multiple Units in a Linked System

1. To enter diagnostic mode, complete this step on the parent heater or on the remote that is attached to the parent unit:

Press the HOT button and the COLD button simultaneously for at least five seconds. See Figure 19.

2. "0" will display on the controller. (See Figure 20.)
3. Scroll to the desired unit number in the linked system by pressing the HOT or COLD button to scroll up or down. (Figure 20 shows that unit no. 2 is selected.)

NOTE: "0" will yield information about the linked system as a whole. "1" will yield information about the parent unit in a Easy-Link system. "2", "3", & "4" will yield information about each of the water heaters

that are installed in the Easy-Link system. See Table 6 for allowable combinations that can be linked together in an Easy-Link System.

4. Press the INFO button to select the desired unit number.
5. When the desired unit number is selected, press the HOT or COLD button to scroll to the desired information (mode number). Figure 20 shows that mode number 6 is selected. See Table 7, page 38 for a list of mode numbers and their meanings.
6. Press the INFO button to select the mode number. The data will be displayed on the controller. (Figure 21 shows that the outlet water temperature of this heater is 120 degrees.)
7. To exit diagnostic mode, press and hold the HOT and COLD buttons

simultaneously for at least five seconds.

NOTE: You may exit diagnostic mode by pressing the ON/OFF button. Also, if left alone, the display will exit diagnostic mode automatically after 30 minutes.

This example shows the steps for displaying the outlet temperature for unit 2 in a linked system.

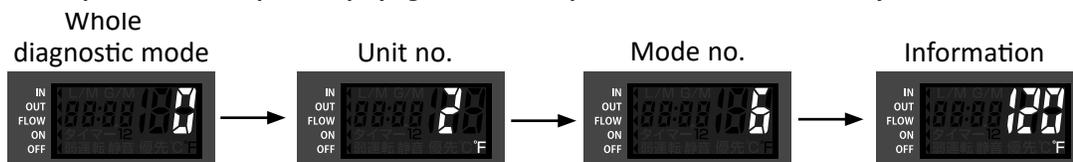


Figure 20: Multiple unit temperature display.

- This example shows the steps for displaying the outlet temperature for unit 2 in a linked system.

NOTE:

- Although the controller of the parent unit will display the set temperature in an Easy-Link System, the controller of the child unit will not display the set temperature.
- In an Easy-Link system, the parent heater will always be heater number 1.

Table 7: Diagnostic Modes

Mode #	Whole Easy-Link System information (#0)		Unit information (#1 to #4)	
1	Total system flow rate	0 to 999 (GPM)	Total operation time	0 to 999 (x 100 hours)
2	BTU requirement for the Multi-System	0 to 999 (xkBTU/h)	ON/OFF cycles	0 to 999 (x 1,000 cycles)
3	Quantity of connected water heaters	160/180X3P: 1 to 2 199X3P: 1 to 4	Fan motor speed	0 to 999 (x 10 rpm)
4	Priority water heater unit number	160/180X3P: 1 to 2 199X3P: 1 to 4	Inlet temperature	32 to 212 (°F) Over 212 °F = E5, Under 32 °F = E0
5	Quantity of operational water heaters	160/180X3P: 1 to 2 199X3P: 1 to 4	Heat exchanger temperature	
6	Set temperature	100 to 140 °F	Outlet temperature	
7	Operation time during current rotation	0 to 720 (minutes) After 720, the next rotation occurs	Flame rod current	0 to 999 (µA)
8	ON/OFF cycles during current rotation	0 to 100 (cycles) After 100, the next rotation occurs	Flow rate	0 to 999 (x 0.1 GPM)
9	N/A		Time unit has Power	0 to 999 (x 100 hours)
10			Total water flow through the heater	0 to 999 (x 10,000 gallons)
11			Error code history: displays the most recent error code	
12	Inlet temperature of the priority unit	32 to 212 (°F) Over 212 °F = E5, Under 32 °F = E0	Error code history: displays the 2nd most recent error code	
13	Outlet temperature of the priority unit		Error code history: displays the 3rd most recent error code	
14	N/A		Clears the memory in error code history*	
15			Total energy output of the heater	0 to 999 MBTU/h
16			N/A	
17			Exhaust temperature	32 to 212 (°F) Over 212 °F = E5, Under 32 °F = E0
18			Current air pressure value	(x 10 mV)

***EEPROM Initialization of water heater's computer:**

Press the "INFO" button on the controller while in mode# 14 and mode# 25 for at least 3 seconds to completely clear the memory in the error code history.

Mode #	Whole Easy-Link System information (#0)	Unit information (#1 to #4)		
19	N/A	Bypass valve position	0 to 999 (x 10 steps) Closed position = 10 Full open = 164	
20		Flow rate through bypass valve	0 to 999 (%)	
21		Return temperature	32 to 212 (°F) Over 212 °F = E5, Under 32 °F = E0	
22		Pump speed	0 to 999 (x 10 rpm)	
23		N/A	N/A	
24		Pump operation time	0 to 999 (x 100 hours)	
25		EEPROM Initialization Reset X3 flow volume (mode 31)*		
26		Position of inlet air damper	0 to 283 (steps)	
27		Current combustion stage in operation	"1" means 1st stage "2" means 2nd stage "3" means 3rd stage "4" means 4th stage "0" means No burning	
28		N/A		
29		Estimated output $500 \times \text{GPM} \times (T_{\text{set}} - T_{\text{in}})$	0 to 999 (kBTU/h)	
30		Actual output $500 \times \text{GPM} \times (T_{\text{out}} - T_{\text{in}})$	0 to 999 (kBTU/h)	
31		Total flow through X3	0 to 999 (x 10,000 gallons)	
32		Unit Number in Easy-Link	160/180X3P: 1 to 2 199X3P: 1 to 4	

***EEPROM Initialization of water heater's computer:**

Press the "INFO" button on the controller while in mode# 14 and mode# 25 for at least 3 seconds to completely clear the memory in the error code history.

MAINTENANCE

SERVICE PROCEDURES

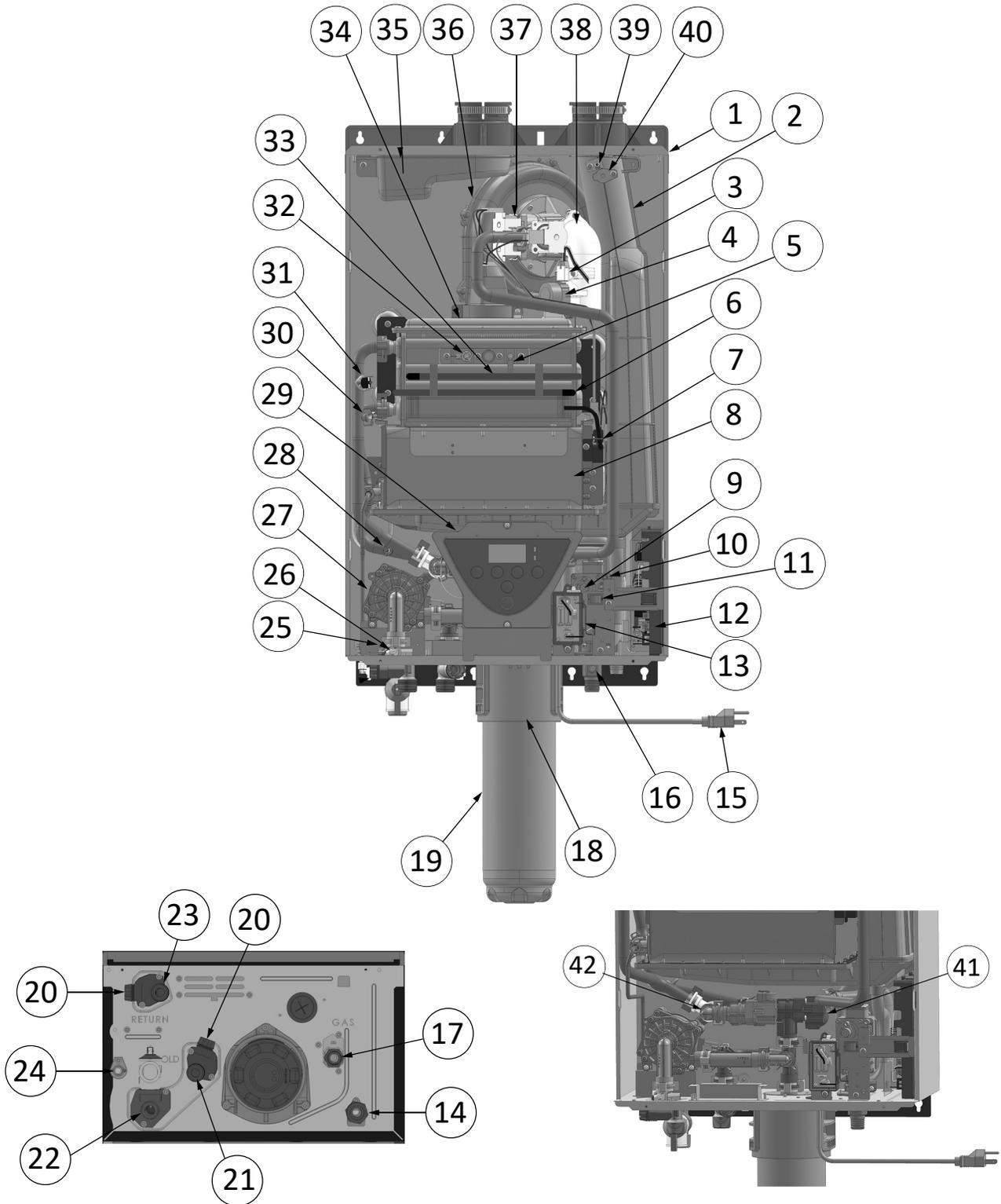


Figure 21: System component locations

Table 8: LIST OF MAIN COMPONENT IN THE INTERIOR VIEW

No.	Description	Item # in components diagram
1.	Case assembly	001
2.	Exhaust duct	431
3.	Pressure sensor	123
4.	Air damper assembly	122
5.	Flame Sensor	108
6.	Primary heat exchanger assembly	401
7.	Igniter assembly	710
8.	Secondary heat exchanger assembly	418
9.	Main Gas Valve	102
10.	Gas valve assembly	102
11.	120 VAC Power ON-OFF switch	706
12.	Computer board	701
13.	Surge box	703
14.	Condensate drain port	009
15.	120 VAC wire	704
16.	Gas inlet port (Gas inlet)	(118)
17.	Gas inlet	118
18.	X3™ manifold assembly	489
19.	X3™ Cartridge	739
20.	Inlet filter plug	405
21.	Water inlet	404
22.	Water outlet (with PRV)	409
23.	Return water inlet	404
24.	Drain port	469
25.	Return thermistor	731
26.	Inlet heater	417
27.	Recirculation pump	726
28.	Inlet thermistor	407
29.	Built-in controller	722
30.	Heat exchanger thermistor	411
31.	Hi-limit switch	412
32.	Igniter rod	109
33.	Overheat-cut-off fuse	413
34.	Mixing chamber assembly	112
35.	Rain protection tray	007
36.	Fan motor	103
37.	Gas solenoid valve assembly	130
38.	Air inlet tube	124
39.	Exhaust thermistor	718
40.	Exhaust port cap (Outlet venting port)	434
41.	Flow adjustment valve/Flow sensor	402
42.	Bypass valve	403

Removing and Replacing the Exhaust Port Cap

⚠ WARNING

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools:

#2 Phillips Screw Driver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

Removing and replacing the Exhaust Port Cap:

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the

cover to the water heater. See Figure 22. Set the front cover and screws aside for re-installation.

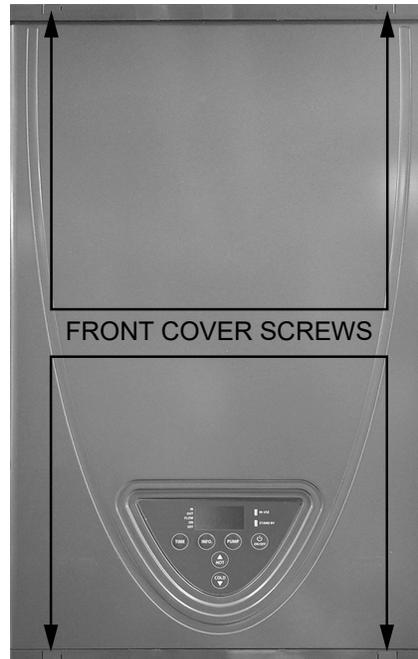


Figure 22: Front cover removal.

- 4 Reference Figure 23 for the location of the exhaust port cap. Use a Phillips-head screwdriver to remove and keep the screw securing the plastic exhaust port cap to the exhaust port.



Figure 23: Exhaust port cap removal.

- 5 Carefully pull the old plastic exhaust port cap from the water heater. Inspect the gasket on the new

exhaust port cap, ensure that it is good condition.

⚠ WARNING! The exhaust port cap must be properly seated to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

- 7 Place the new exhaust port cap on the exhaust vent and secure it with the screw removed earlier. See Figure 23. Check the new exhaust port cap to ensure that it is properly seated.
- 8 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built in controller when setting the front cover in place to ensure proper alignment.
- 9 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 10 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 11 Verify proper operation of the water heater.

Removing and Replacing the Fan Assembly

⚠ WARNING

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.

- If you do not have the skills necessary complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools:

#2 Phillip’s Head Screwdriver (8” or longer with magnetic tip), Pliers.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

Removing the Fan Assembly

1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

2 Shut off the gas supply to the water heater at the manual gas shutoff valve.

3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.

4 Remove the screw securing the left side of the rain protection tray. Remove and keep the front right screw in the intake port assembly. Slide the rain protection plate from the water heater. Keep the screws with the rain protection tray for re-installation.

5 Remove the white plastic cable clips securing the various cables to the copper gas pipe.

6 Locate the plastic computer board housing on the bottom right side of the water heater. Remove the screw and bracket securing the plastic housing for the computer board. Keep the screw and bracket for re-installation. Slide the computer board and plastic housing out from the water heater to access the cable connections. See Figure 24.



Figure 24: Computer Board Bracket.

7 Locate the wire on the built in controller and follow it to the computer board. Carefully disconnect the built in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.

8 Disconnect the fan motor cable from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Slide the computer board and plastic housing back into the water heater to prevent unnecessary tension on the cables.

9 Locate and follow the three cables on the fan motor assembly to their plastic connectors. Disconnect and move them aside. Reference Figure 25 to identify cables.

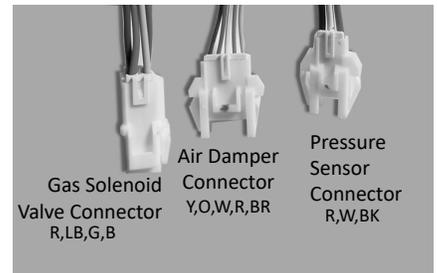


Figure 25: Fan Motor Assembly Wire Connections

10 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (#104) and set them aside for re-installation. Remove the two screws securing the fan motor to the mixing chamber assembly.

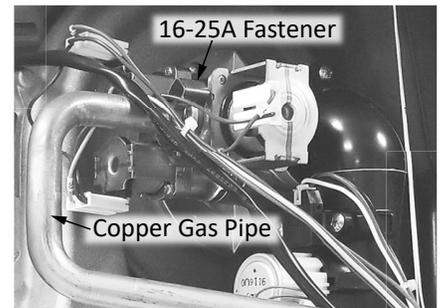


Figure 26: Gas Pipe and Fan Motor Assembly removal.

11 Remove the complete Fan Motor assembly from the water heater.

12 Remove the four screws securing the venturi body to the fan assembly. See Figure 27.

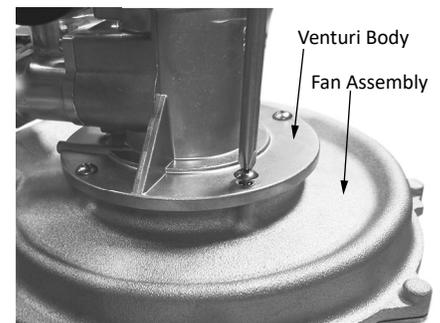


Figure 27: Remove screws securing the fan assembly.

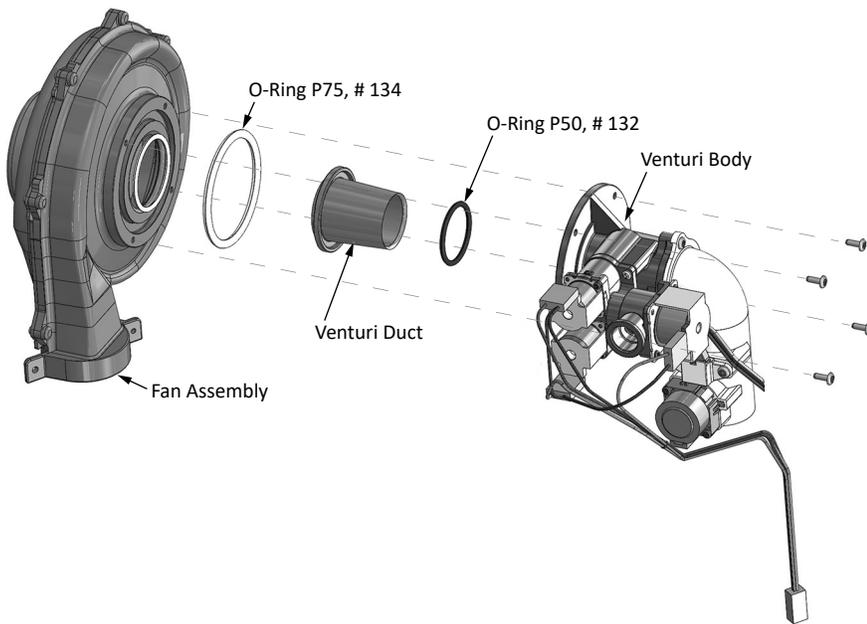


Figure 28: Removing the screws securing the fan assembly.

13 Separate the fan assembly from the venturi body. Remove the plastic venturi duct from the venturi body and set aside for re-installation. See Figure 28.

Replacing the fan assembly:

▲ WARNING! The fan assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

14 Before attaching the venturi body to the new fan assembly, replace the o-rings with the ones provided in the kit. See Figure 28.

15 Make sure o-ring P50 (#132) is seated properly in the venturi body, then insert the venturi duct into the venturi body as shown in See Figure 28.

16 Insert the venturi duct into the venturi body as shown in See Figure 28.

17 Make sure o-ring P75 (#134) is seated properly in the new fan assembly, as shown in Figure 28.

18 Reattach the venturi body to the new fan assembly and secure with the four screws removed earlier. Reference Figure 28 for correct orientation of the venturi body to the new fan assembly. It is essential that the connection between the fan motor and the venturi body not have any gaps or leaks. Check this union for any issues, correct them immediately.

19 Reattach the fan assembly to the mixing chamber assembly (# 112). Secure it with the two screws removed earlier.

20 Reconnect the copper gas pipe (# 104). Attach the 16-25A metal fasteners on both ends of copper gas pipe. Inspect the o-rings, if any cuts or nicks are present replace them immediately. See Figure 28.

21 Reconnect the three cables on the fan motor assembly to their plastic connectors. Reference Figure 25 to identify cables.

22 Reconnect the fan motor cable to the computer board. Reference the wiring diagram on page 28. Once

connected, slide the computer board and plastic housing back into the water heater.

23 Attach the built in controller to the front of the water heater. Reconnect the wire from the built in controller to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for plug location.

24 Slide the plastic housing with the computer board back into the water heater. Secure it in place with the bracket and screw removed earlier. See Figure 24.

25 Re-install the rain protection tray and secure it with the screw removed earlier. Re-attach and tighten the front right screw in the intake port assembly.

26 Use the white plastic cable clips removed earlier to organize the series of vertical cables along the right side of the water heater.

27 Reconnect the copper pipe (# 468) to the primary heat exchanger outlet and the water outlet tee. Inspect the o-rings, if any cuts or nicks are present replace them immediately. Use the 16-25A metal fasteners removed earlier. See Figure 26.

28 Use the white plastic cable clips removed earlier to organize the series of vertical cables along the right side of the water heater.

29 Before proceeding, take a moment to check all wiring connections and pipe connections. Make sure all are mated correctly and seated securely.

30 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built in controller when setting the front cover in place to ensure proper alignment.

- 31 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 32 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 33 Verify proper operation of the water heater.

Removing and Replacing the Copper Gas Pipe

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing the copper gas pipe:

Tools Needed: #2 Phillip's Head Screwdriver.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.

- 5 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (# 104) and set them aside for re-installation. See Figure 29.

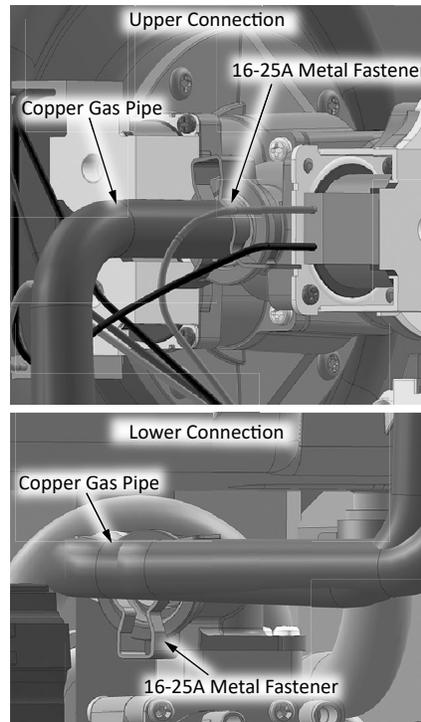


Figure 29: Gas pipe connection.

- 6 Carefully remove the old copper gas pipe from the water heater. See Figure 30.

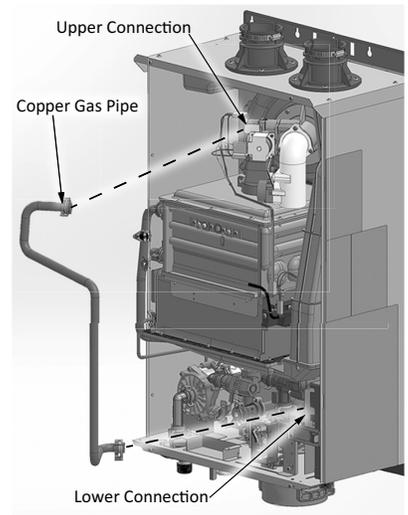


Figure 30: Copper gas pipe removal

Replacing the copper gas pipe:

▲ WARNING! The copper gas pipe must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

- 7 Install the new copper gas piping. Inspect the o-rings, if any cuts or nicks are present replace them immediately. Reference Figure 29 for correct part placement and orientation.
- 8 Re-install the 16-25A metal fasteners on both ends of the copper gas pipe (# 104). See Figure 29.
- 9 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for plug location.
- 10 Before proceeding, take a moment to check all wiring connections and pipe connections. Make sure all are mated correctly and seated securely.

- 11 Turn on the gas supply to the water heater at the manual gas shutoff valve and check for leaks. If any leaks are detected, re-seat the appropriate connection(s) and re-check.
- 12 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 13 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 14 Verify proper operation of the water heater.

Removing and Replacing the Venturi Assembly

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing the venturi assembly:

Tools Needed: #2 Phillip's Head Screwdriver.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

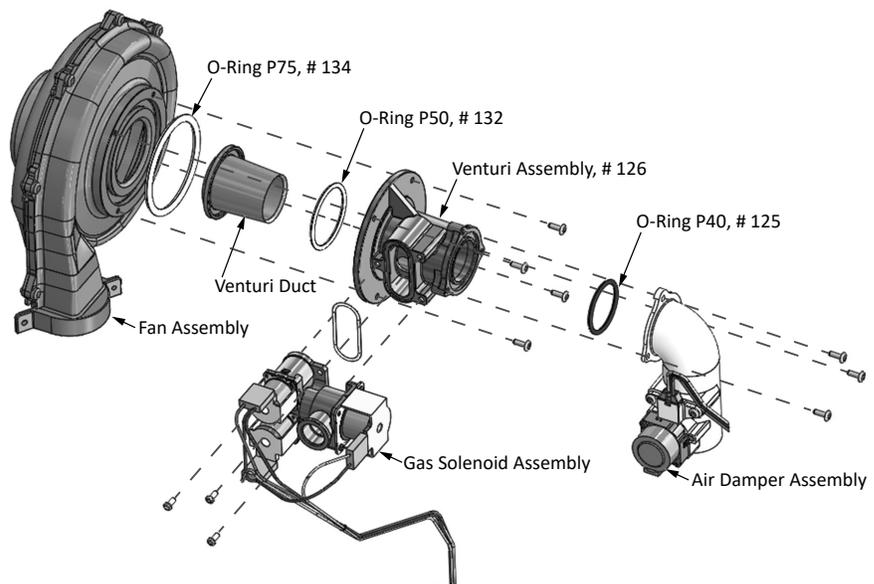


Figure 31: Fan Assembly

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 4 Remove the white plastic cable clips securing the various cables to the copper gas pipe.
- 5 Locate and follow the three cables on the fan motor assembly to their plastic connectors. Disconnect and move

them aside. Reference Figure 33 to identify cables.

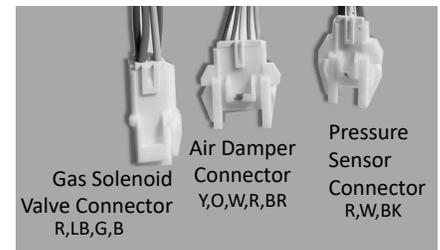


Figure 32: Fan Motor Assembly Wire Connections

- 6 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (# 104) and set them aside for re-installation. Remove the two screws securing the fan motor to the mixing chamber assembly. See Figure 34.

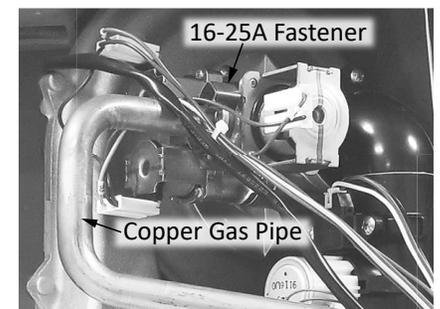


Figure 33: Gas Pipe removal.

7 Unscrew and keep the 4 screws securing the venturi body to fan assembly. See Figure 31 on page 46.

8 Remove and set aside the old P75 O-ring, venturi duct, and P50 O-ring. See Figure 31 on page 46.

9 Remove and set aside the three screws securing the gas valve solenoid assembly to the venturi assembly. Set aside the assembly and gasket for re-installation. Keep the gasket safe from damage.

10 Remove and set aside the three screws securing the air damper assembly to the venturi assembly. Set aside the old P40 O-ring. See Figure 31 on page 46.

Replacing the venturi assembly:

▲ WARNING! The venturi assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

11 Place the new P40 O-ring on the new venturi assembly and secure the air damper assembly to the new venturi assembly. Inspect the O-ring, if any cuts or nicks are present replace it immediately. Reference See Figure 31 on page 46. for correct part placement and orientation.

12 Place the O-ring removed earlier from the gas valve solenoid assembly on the new venturi assembly. Inspect the O-ring, if any cuts or nicks are present replace it immediately. Secure the gas valve solenoid to the new venturi assembly with the three screws removed earlier. Reference See Figure 31 on page 46. for correct part placement and orientation.

13 Insert the new venturi duct and O-ring P50 into the new venturi assembly. Inspect the O-ring, if any cuts or nicks are present replace it

immediately. Reference See Figure 31 on page 46. for correct part placement and orientation.

14 Install the new P75 O-ring on the fan assembly. Inspect the O-ring, if any cuts or nicks are present replace it immediately. Reference See Figure 31 on page 46. for correct part placement and orientation.

15 Reattach the venturi body to the new fan assembly and secure with the four screws removed earlier. See Figure 31 on page 46. for correct part placement and orientation.

16 Reconnect the copper gas pipe (# 104). Attach the 16-25A metal fasteners on both ends of copper gas pipe. Inspect the O-rings, if any cuts or nicks are present replace them immediately.

17 Reconnect the three cables on the fan motor assembly to their plastic connectors. Reference Figure 32 to identify cables.

18 Use the white plastic cable clips removed earlier to organize the series of vertical cables along the right side of the water heater.

19 Before proceeding, take a moment to check all wiring connections and pipe connections. Make sure all are mated correctly and seated securely.

20 Turn on the gas supply to the water heater at the manual gas shutoff valve. Turn the gas supply on and check for leaks. If any leaks are detected, tighten the appropriate connection(s) and re-check.

21 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.

22 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.

23 Verify proper operation of the water heater.

Removing, Replacing, and Verifying the Gas Orifice Assembly

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing the gas orifice assembly:

Tools Needed: #2 Phillip’s Head Screwdriver, #2 Phillip’s Head Screwdriver (8” or longer with magnetic tip)

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Shut off water to the water heater and drain the system. Place a bucket under the water heater and open the drain port. Allow the system to completely drain before proceeding.
- 4 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (# 104) and set them aside for re-installation. See Figure 34.

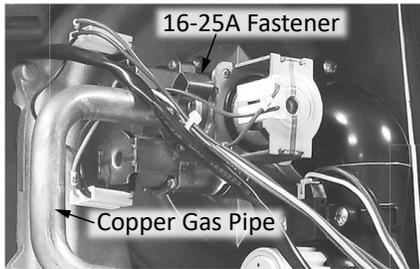


Figure 34: Gas Pipe and Fan Motor Assembly removal.

- 5 Remove and set aside the three screws securing the gas solenoid valve assembly to the fan assembly. Figure 35.
- 6 Separate the gas solenoid valve assembly from the fan assembly. This can be done without disconnecting the various wiring connections. See Figure 35.
- 7 Remove and set aside the two screws securing the orifice and orifice gasket to the gas solenoid valve assembly. Set the screws aside for re-installation. See Figure 35.
- 8 Remove the oval O-ring ① from the gas solenoid valve assembly. See Figure 35.

Replacing the gas orifice assembly:

▲ WARNING! The gas orifice assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

- 9 Before proceeding, confirm the new orifice is correct for the type of gas you are using. Assemble the new orifice components in the following order. See Figure 35 for assembly order and gas orifice plate identification.

- ① Oval O-ring.
- ② Orifice
- ③ Orifice Gasket

Note the orientation of the components. All holes will line up if it is correctly oriented. Secure the orifice components with the two screws removed earlier. See Figure 35.

- 10 Reattach the gas solenoid valve assembly to the fan motor assembly. Secure it with the three screws removed earlier. Make sure the new oval O-ring ① is properly seated and not pinched.

- 11 Connect the Fan Blower motor wire to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for placement.

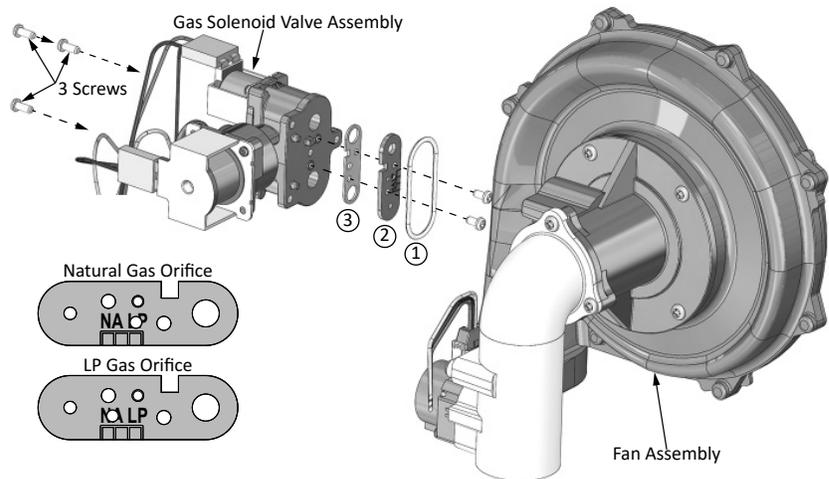


Figure 35: Fan Assembly

- 12 Reinstall the copper gas pipe using the 16-25A metal fasteners removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figure 34.
- 14 Before proceeding, take a moment to check all wiring connection and pipe connections. Make sure all are mated correctly and seated securely.
- 15 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 16 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 17 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 18 Verify proper operation of the water heater.

Removing and Replacing the Main Gas Valve (MV) Assembly

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing the gas valve assembly:

Tools Needed: #2 Phillip's Head Screwdriver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.

- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 in the manual or maintenance sheet. Set the built-in controller aside for re-installation.

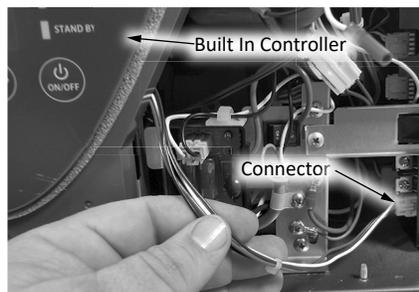


Figure 36: Built-in controller removal.

- 5 Remove the screw securing the surge box fixing plate to the base of the water heater housing. See Figure 37.

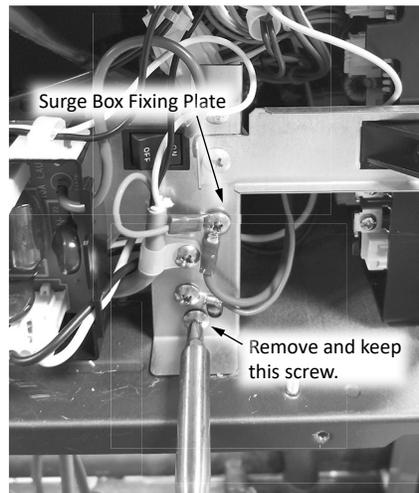


Figure 37: Surge box fixing plate removal.

- 6 Carefully reposition the surge box fixing plate, computer

board, and wiring so that you have clear access to the gas valve assembly.

- 7
 - 1 Remove the 16-25A metal fastener securing the copper gas pipe to the gas valve assembly. Carefully reposition the pipe for clear access to the gas valve assembly.
 - 2 Remove the screw securing the wiring harness to the gas valve assembly.
 - 3 Remove the screw securing the gas valve assembly to the gas inlet mount. See Figure 38.

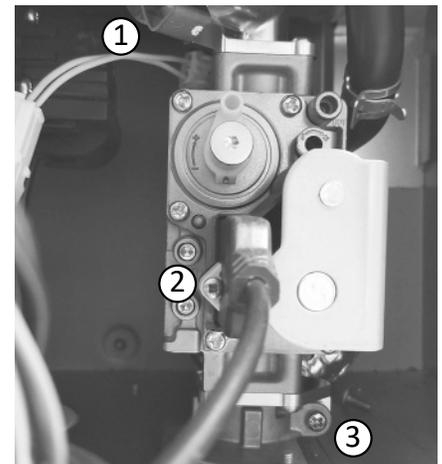


Figure 38: Gas valve assembly removal.

- 8 Lift the gas valve assembly from the water heater. Check the gas valve assembly to ensure the old o-ring and plastic bushing were not left in the gas inlet mount.

Replacing the gas valve assembly:

▲ WARNING! The gas valve assembly must be properly installed to prevent gas leaks. Failure to follow these instructions can result in serious injury or death from explosion, fire or carbon monoxide poisoning.

- 9 Install the new gas valve assembly. Inspect the o-ring on the new gas valve assembly, if any cuts or nicks are present replace the o-ring immediately.

- 10 Secure the gas valve assembly to the gas inlet mount at ③ using the screw removed earlier. See Figure 38 on page 49.
- 11 Reattach the wiring harness and secure it at ② with the screw removed earlier. See Figure 38 on page 49.
- 12 Reconnect the copper gas pipe to the new gas valve assembly at ①. Inspect the o-ring on the copper gas pipe, if any cuts or nicks are present replace the o-ring immediately. Secure the copper gas pipe using the 16-25A metal fastener removed earlier. See Figure 38 on page 49.
- 13 Return the computer board to its original location in the water heater housing. Reinstall and secure the surge box fixing plate with the screw removed earlier. Restore the wiring to its original location. See See Figure 37 on page 49.
- 14 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. See See Figure 36 on page 49.
- 15 Before proceeding, take a moment to check the wiring connection and pipe connection. Make sure all are mated correctly and seated securely.
- 16 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 17 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 18 Reconnect power to the water

heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.

- 19 Verify proper operation of the water heater.

Removing and Replacing the Primary Heat Exchanger

▲ WARNING!

- **To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.**
- **If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.**

Removing the primary heat exchanger:

Tools Needed: #2 Phillip's Head Screwdriver, #2 Phillip's Head Screwdriver (16" or longer with magnetic tip), Pliers.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must

physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Shut off water to the water heater and drain the system. Place a bucket under the water heater and open the plastic drain port located on the bottom left side of the water heater. Allow the system to completely drain before proceeding.
- 4 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 5 Remove the screw securing the left side of the rain protection tray. Slide the rain protection plate from the water heater. Keep the screw with the rain protection tray for re-installation.
- 6 Remove the white plastic cable clips securing the various cables to the copper gas pipe.
- 7 Locate the plastic computer board housing on the bottom right side of the water heater. Remove the screw and bracket securing the plastic housing for the computer board. Keep the screw and bracket for re-installation. Slide the computer board and plastic housing out from the water heater to access the cable connections.



Figure 39: Computer Board Bracket.

8 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.

9 Disconnect the black fan motor cable from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Slide the computer board and plastic housing back into the water heater to prevent unnecessary tension on the cables.

10 Locate and follow the three cables on the fan motor assembly to their plastic connectors. Disconnect and move them aside. Reference Figure 40 to identify

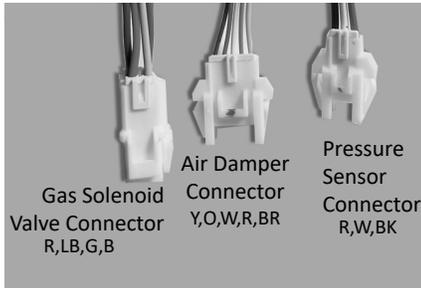


Figure 40: Fan Motor Assembly Wire Connections

11 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (# 104) and set them aside for re-installation. Remove the two screws securing the fan motor to the

mixing chamber assembly. See Figure 41.

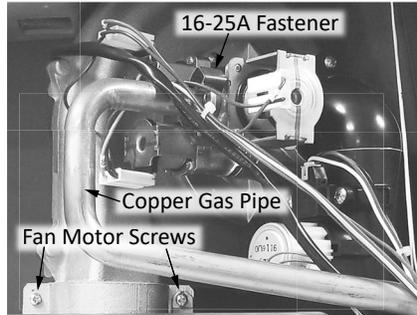


Figure 41: Gas Pipe and Fan Motor Assembly removal.

12 Remove the complete fan motor assembly from the water heater and set it aside for re-installation.

13 Disconnect the heat exchanger thermistor cable (# 411). Figure 42.

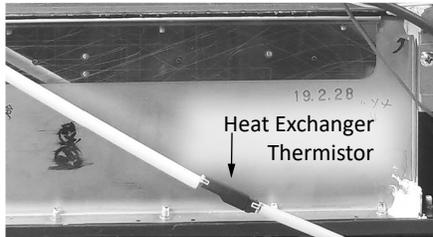


Figure 42: Disconnect for Heat Exchanger Thermistor.

14 Disconnect the plastic connector joining the purple igniter rod wires.

15 Disconnect the flame rod connector (Yellow wire). Notice: the flame rod connector uses a special connection. Press the small tab in the center of the connector to release it. See Figure 43.

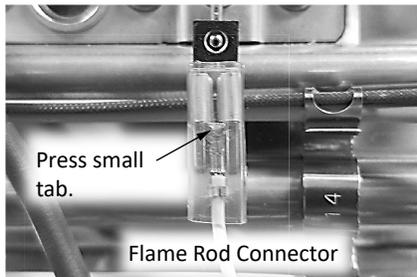


Figure 43: Flame Rod Connector.

16 Disconnect the Over Heat Cutoff Fuse (O.H.C.F.) # 413 wires at the plastic connector and the Hi Limit Switch (# 721) wires at the plastic connector. Both connectors are located on the same blue cable. They are located at the right side of the Primary Heat Exchanger.

17 Disconnect the inlet thermistor (# 407). It is located under the secondary heat exchanger. See Figure 44.



Figure 44: Inlet Thermistor Connector.

18 Disconnect the 16-25A metal fasteners connecting the copper pipe to the primary heat exchanger outlet (# 468) and the water outlet tee (Reference Joint C in maintenance instructions). Move the pipe aside and keep the metal fasteners for re-installation. See Figure 45 on page 51.

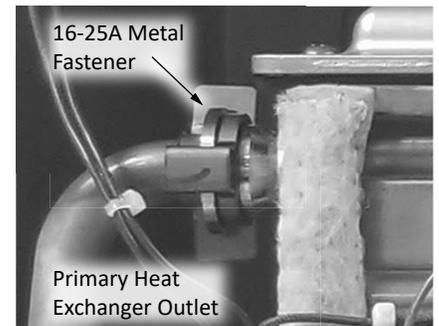


Figure 45: Primary Heat Exchanger Outlet.

- 19 Disconnect the 6-15 metal fastener from the small copper drain pipe (# 465). Set the fastener aside for re-installation. Figure 46.

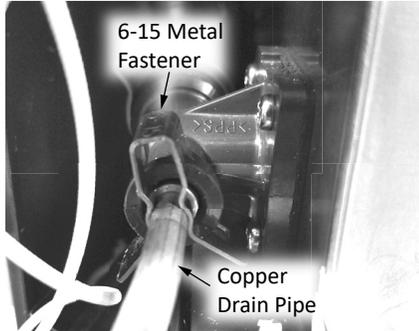


Figure 46: Copper Drain Pipe.

- 20 On the left-back side of the secondary heat exchanger, locate the copper pipe connected to the secondary heat exchanger inlet (# 466). Remove the 16-25A metal fastener and disconnect the copper pipe from the secondary heat exchanger. Space is restricted so you will need to have the pipes disconnected in steps 17 and 18 moved aside to allow access. Set the metal fastener aside for re-installation. See Figure 47.

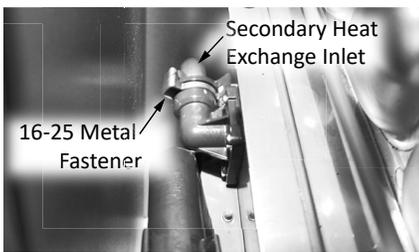


Figure 47: Secondary Heat Exchanger Inlet Connection.

- 21 Disconnect the rubber drain tube (# 416) from the bottom right of the secondary heat exchanger. The connection uses a compression clamp and will require pliers to move the clamp. See Figure 48.

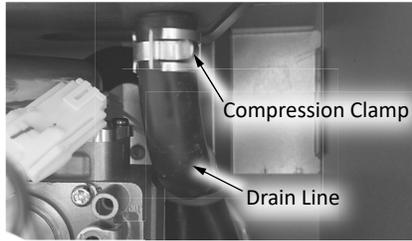


Figure 48: Drain line.

- 22 Disconnect the ceramic block heater from the Primary Heat Exchanger inlet pipe. Move the block heater and wires aside to prevent it catching on the heat exchanger assembly when it is being removed. See Figure 49.

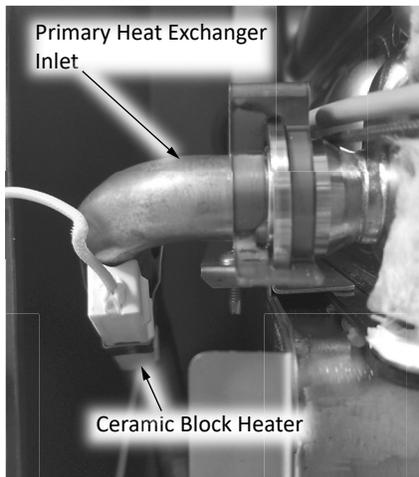


Figure 49: Ceramic block heater on Primary Heat Exchanger Inlet Pipe.

- 23 Disconnect the exhaust thermistor (# 718) and move the wires aside. Remove and set aside the screw securing the exhaust duct to the top of the water heater enclosure. See Figure 50.

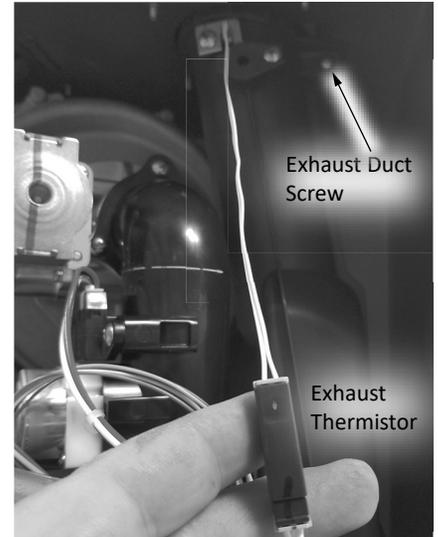


Figure 50: Exhaust Thermistor.

- 24 **NOTICE: Read this step carefully before performing any actions.**

Cover electronics and anything directly under the water heater as some water will drain from the heat exchanger assembly during its removal. Remove and set aside the 4 screws securing the support bracket to the back of the water heater enclosure. The heat exchanger assembly must then be supported by hand, when removing the two screws securing it to the enclosure. To reach the screws, a magnetized tip Phillips-head screwdriver with a length of at least 8 inches or more must be used. See Figure 51. Once both screws are removed and set aside, begin the removal of the heat exchanger assembly. While supporting the heat exchanger base, tilt it outward from the bottom. Use care not to damage the water piping and other components under the heat exchanger. Once the heat exchanger assembly base is clear of the front of the water heater slowly lower it to disconnect the plastic exhaust duct from its fitting at the top of the water heater. The heat exchanger assembly should be placed on a secure surface, take note not

to damage the various piping and wiring connections that are still attached.

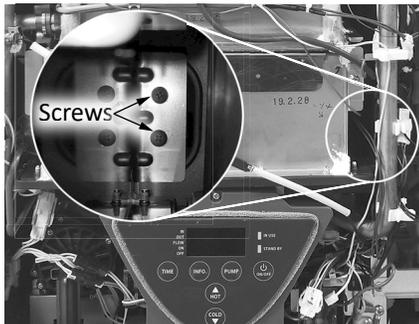


Figure 51: Heat Exchanger Screws

- 25 Remove the 16-25A metal fastener securing the copper pipe to the primary heat exchanger (# 467). See Figure 53.

Removing the burner plate (Steps 25 - 28):

- 25 Remove and set aside the twelve bolts and nuts securing the top of the burner plate to the primary heat exchanger. See Figure 4.

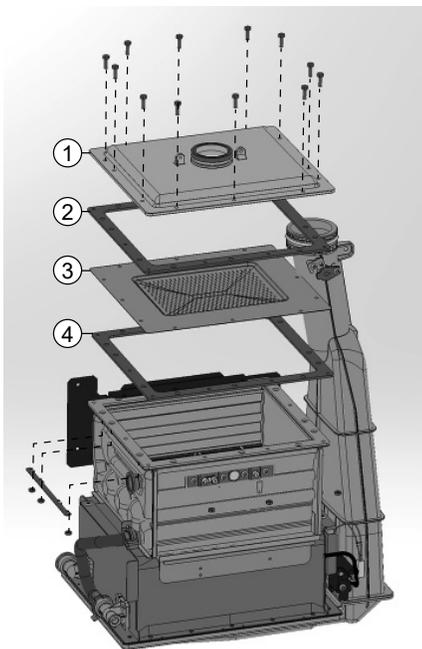


Figure 52: Burner and gasket assembly order.

- 26 Once the burner plate has been removed. Turn it over to view the burner assembly and gaskets. Use a plastic scraper to remove the old burner assembly and gaskets. Clean any gasket material that may remain on the burner mixing chamber. **NOTICE:** The hole pattern on the primary heat exchanger will only line up with burner assembly and burner mixing chamber if it is oriented properly. Note this orientation for reassembly.

⚠ WARNING! The burner assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

- 27 Assemble the new burner elements in the following order, reference Figure 14.

- ① Burner Mixing Chamber.
- ② Mixing Chamber Gasket
- ③ Burner (Mesh Metal)
- ④ Burner Gasket

Note the orientation of the elements. All holes will line up if it is correctly oriented.

- 28 Carefully place the burner assembly and burner mixing chamber onto the primary heat exchanger. Secure with the twelve bolts and nuts removed earlier. Note: Tighten bolt and nut connections to a torque specification of 31 in-lbf (3.5 Nm). Check the gaskets to make sure no gaps are present.

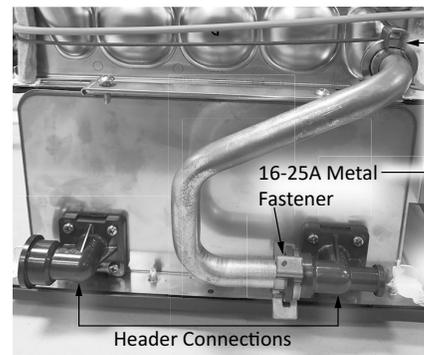


Figure 53: Header Connection Removal

- 29 Disconnect the green and gray wires from the igniter rod. Unbundle the green wire from the metal cable guides. See Figure 54.



Figure 54: Igniter Rod Connections.

- 30 Remove the three screws securing the support bracket and set them aside for re-installation. Remove the remaining nine screws securing the primary heat exchanger (# 401) to the secondary heat exchanger (# 418). Note the location and orientation of the two metal compression brackets (# 421 & #422).

Replacing the primary heat exchanger:

⚠ WARNING! The heat exchanger assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

- 31 Place new the gasket on the bottom of the Primary Heat Exchanger (# 401). If any cuts or any other

issues are present do not use the gasket, a new gasket must be used. Contact the Service Center to order a new one. Attach the new Primary Heat Exchanger to the top of the Secondary Heat Exchanger. Check alignment of the screw holes. Using the nine screws and two metal compression brackets (#421 & #422) secure the Primary Heat Exchanger to the Secondary Heat Exchanger. **NOTICE:** Hand tighten all screw connections, do not use an electric screwdriver or drill. Re-attach the support bracket to the primary heat exchanger with the three screws removed earlier.

32 Reconnect the copper pipe (# 467) using the 16-25A metal fastener. Use the provided O-ring. Inspect the O-rings if any cuts or nicks are present replace it immediately. See Figure 53.

33 Reattach the green and gray wires to the igniter rod. Route the green wire through the cable guides on the front of the primary heat exchanger. See Figure 54.

34 **NOTICE: Read this step carefully before performing any actions.** To assist with installation have one of the screws that secures the side connection of the heat exchanger assembly affixed to the long magnetic tip screwdriver and within easy reach. Lift the heat exchanger assembly and tilt the top back and slide it in and up. The top of the plastic exhaust duct will mate with the exhaust port on the top of the water heater enclosure. The heat exchanger assembly must then be supported by hand, while installing the screws securing it to the enclosure. See Figure 51. Use the magnetic screwdriver with the screw already affixed to it to secure the assembly. Install the remaining screw to the side bracket. Next install the four screws that secure the mounting bracket to the back of the water heater

enclosure.

35 Reconnect the copper pipe (# 466) to the secondary heat exchanger inlet. See Figure 53. Use the 16-25A metal fastener. When placing the fastener, position the top (flat section) of the fastener to the ten o' clock position. See Figure 47.

36 Reconnect the rubber drain line to the bottom of the secondary heat exchanger. See Figure 48.

37 Reconnect the small copper drain pipe (# 465). Use the provided O-ring. Inspect the O-ring, if any cuts or nicks are present replace it immediately. Use the 6-15 metal fastener removed earlier. See Figure 46 on page 52.

38 Reconnect the copper pipe (# 468) to the primary heat exchanger outlet and the water outlet tee. Inspect the O-rings, if any cuts or nicks are present replace them immediately. Use the 16-25A metal fasteners removed earlier. See Figure 46 on page 52.

39 Reconnect the ceramic block heater from the Primary Heat Exchanger inlet pipe. See Figure 49 on page 52.

40 Reattach the fan blower assembly to the mixing chamber assembly (# 112). Secure it with the two screws removed earlier. See Figure 41 on page 51.

41 Connect the Fan Blower motor wire to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for placement.

42 Reconnect the flame rod connector (Yellow wire). When connecting the special tab must be facing outward. Reference See Figure 43 on page 51. for correct orientation.

43 Reconnect the heat exchanger thermistor connector. See Figure 42

on page 51.

44 Reconnect the igniter rod connector (purple wires).

45 Reconnect the Over Heat Cutoff Fuse (O.H.C.F.) and the Hi Limit Switch. Both connectors are located on the same blue cable.

46 Reconnect the inlet thermistor. It is located under the secondary heat exchanger. See Figure 44 on page 51.

47 Reconnect the three cables on the fan motor assembly to their plastic connectors. See Figure 40 on page 51. to identify cables.

48 Reinstall the copper gas pipe using the 16-25A metal fasteners removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figure 41 on page 51.

49 Slide the plastic housing with the computer board back into the water heater. Secure it in place with the bracket and screw removed earlier. See Figure 39 on page 51.

50 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for plug location.

51 Use the white plastic cable clips removed earlier to organize the series of vertical cables along the right side of the water heater.

52 Re-install the rain protection tray using the screw removed earlier.

53 Secure the exhaust duct to the top of the water heater enclosure using the screw removed earlier and reconnect the exhaust thermistor.

54 Before proceeding, take a moment to check all wiring connection and pipe connections. Make sure all are mated

correctly and seated securely.

- 55 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream.
- 56 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 57 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 58 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 59 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 60 Verify proper operation of the water heater.

Removing and Replacing Secondary Heat Exchanger

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills

necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools Needed: #2 Phillip's Head Screwdriver, #2 Phillip's Head Screwdriver (16" or longer with magnetic tip), Pliers.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Shut off water to the water heater and drain the system. Place a bucket under the water heater and open the plastic drain port located on the bottom left side of the water heater. Allow the system to completely drain before proceeding.
- 4 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 5 Remove the screw securing the left side of the rain protection tray. Slide the rain protection plate from the water heater. Keep the screw with the rain protection tray for re-

installation.

- 6 Remove the white plastic cable clips securing the various cables to the copper gas pipe.
- 7 Locate the plastic computer board housing on the bottom right side of the water heater. Remove the screw and bracket securing the plastic housing for the computer board. Keep the screw and bracket for re-installation. Slide the computer board and plastic housing out from the water heater to access the cable connections.



Figure 55: Computer Board Bracket.

- 8 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.
- 9 Disconnect the black fan motor cable from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Slide the computer board and plastic housing back into the water heater to prevent unnecessary tension on the cables.
- 9 Locate and follow the three cables coming from the fan motor assembly to their plastic connectors. Disconnect and move them aside.

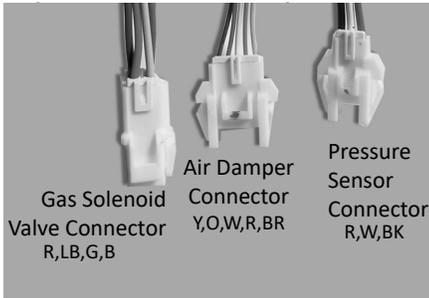


Figure 56: Fan Motor Assembly Wire Connections

- 10 Remove the 16-25A metal fasteners on both ends of the copper gas pipe (# 104) and set them aside for re-installation. Remove the two screws securing the fan motor to the mixing chamber assembly. See Figure 57.

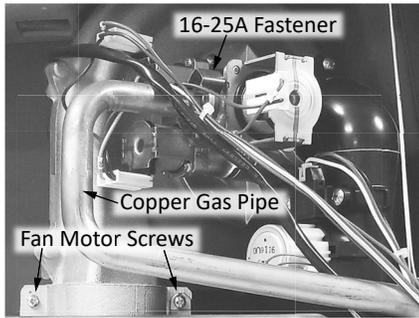


Figure 57: Gas Pipe and Fan Motor Assembly removal.

- 11 Remove the complete fan motor assembly from the water heater and set it aside for re-installation.
- 12 Disconnect the heat exchanger thermistor cable (# 411). See Figure 58.

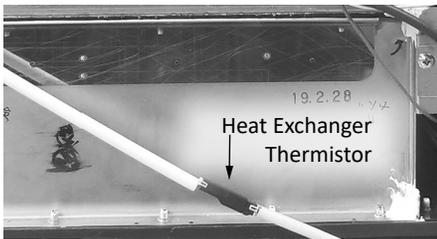


Figure 58: Disconnect for Heat Exchanger Thermistor.

- 13 Disconnect the plastic connector joining the purple igniter rod wires.
- 14 Disconnect the flame rod connector (Yellow wire). Notice: the flame rod connector uses a special connection. Press the small tab in the center of the connector to release it. See Figure 59 on page 56.

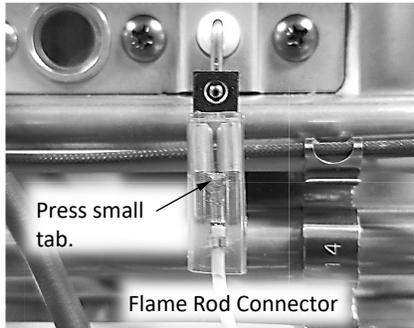


Figure 59: Flame Rod Connector.

- 15 Disconnect the Over Heat Cutoff Fuse (O.H.C.F.) # 413 wires at the plastic connector and the Hi Limit Switch (# 721) wires at the plastic connector. Both connectors are located on the same blue cable. They are located at the right side of the Primary Heat Exchanger.
- 16 Disconnect the inlet thermistor (# 407). It is located under the secondary heat exchanger. See Figure 60.



Figure 60: Inlet Thermistor Connector.

- 17 Disconnect the 16-25A metal fasteners connecting the copper pipe to the primary heat exchanger outlet (# 468) and the water outlet tee. Move the pipe aside and keep the metal fasteners for re-installation. See Figure 61.

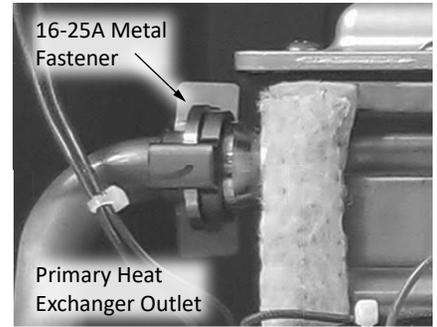


Figure 61: Primary Heat Exchanger Outlet.

- 18 Disconnect the 6-15 metal fastener from the small copper drain pipe(# 465). Set the fastener aside for re-installation. See Figure 62.

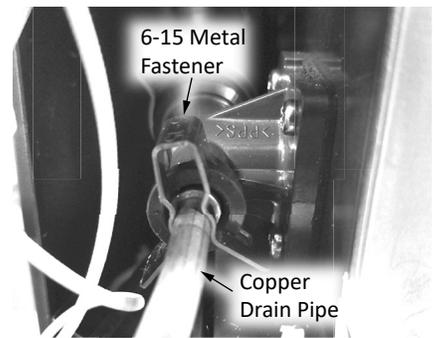


Figure 62: Copper Drain Pipe.

- 19 On the left-back side of the secondary heat exchanger, locate the copper pipe connected to the secondary heat exchanger inlet (# 466). Remove the 16-25A metal fastener and disconnect the copper pipe from the secondary heat exchanger. Space is restricted so you will need to have the pipes disconnected in steps 17 and 18 moved aside to allow access. Set the metal fastener aside for re-installation. See Figure 63.

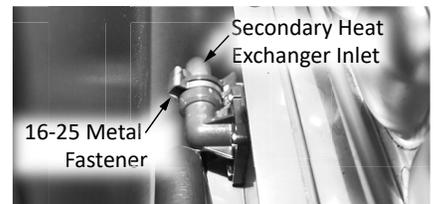


Figure 63: Secondary Heat Exchanger Inlet Connection.

- 20 Disconnect the rubber drain tube (# 416) from the bottom right of the secondary heat exchanger. The connection uses a compression clamp and will require pliers to move the clamp. See Figure 64.

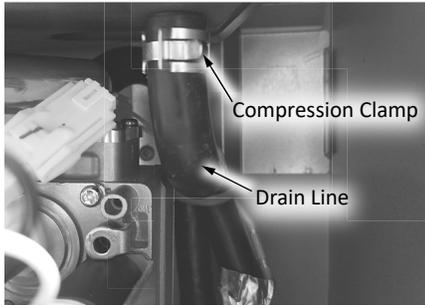


Figure 64: Drain line.

- 21 Disconnect the ceramic block heater from the Primary Heat Exchanger inlet pipe (# 467). Move the block heater and wires aside to prevent it catching on the heat exchanger assembly when it is being removed. See Figure 65.

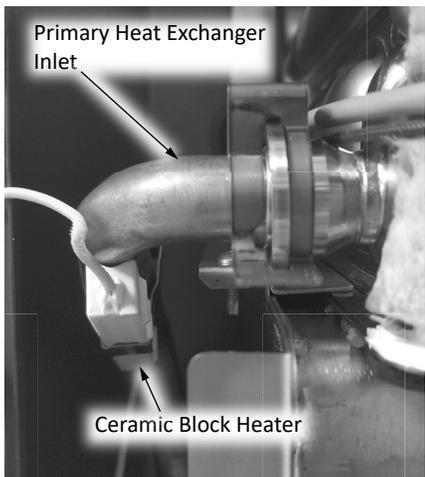


Figure 65: Ceramic block heater on Primary Heat Exchanger Inlet Pipe.

- 22 Disconnect the exhaust thermistor (# 718) and move the wires aside. Remove and set aside the screw securing the exhaust duct to the top of the water heater enclosure. See Figure 66.

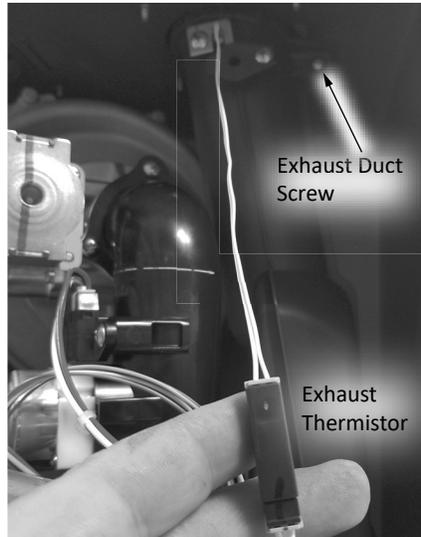


Figure 66: Exhaust Thermistor.

- 23 **NOTICE: Read this step carefully before performing any actions.** Cover electronics and anything directly under the water heater as some water will drain from the heat exchanger assembly during its removal. Remove and set aside the 4 screws securing the support bracket to the back of the water heater enclosure. The heat exchanger assembly must then be supported by hand, when removing the two screws securing it to the enclosure. To reach the screws, a magnetized tip Phillips-head screwdriver with a length of at least 8 inches or more must be used. See Figure 67. Once both screws are removed and set aside, begin the removal of the heat exchanger assembly. While supporting the heat exchanger base, tilt it outward from the bottom. Use care not to damage the water piping and other components under the heat exchanger. Once the heat exchanger assembly base is clear of the front of the water heater slowly lower it to disconnect the plastic exhaust duct from its fitting at the top of the water heater. The heat exchanger assembly should be placed on a secure surface, taking note not damage the various piping and wiring connections that are still attached.

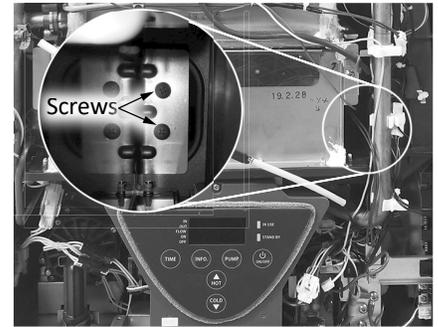


Figure 67: Heat Exchanger Screws

- 24 Remove the 16-25A metal fasteners securing the copper inlet tube (#467) to the heat exchangers. See Figure 68. If you are replacing only the inlet tube, proceed to step 32. Otherwise, proceed to the next step.

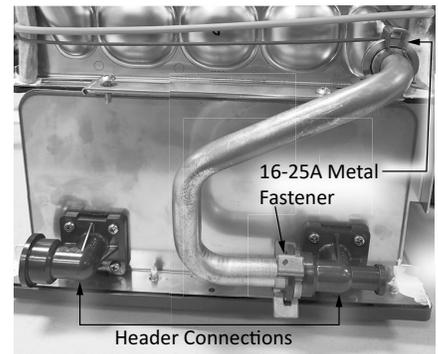


Figure 68: Header Connection Removal

- 25 Disconnect the green and gray wires from the igniter rod. Unbundle the green wire from the metal cable guides. See Figure 69.



Figure 69: Igniter Rod Connections.

- 26 Remove the three screws securing the support bracket and set them aside for re-installation. Remove the ten screws securing the

primary heat exchanger (# 401) to the secondary heat exchanger (# 418). Note the location and orientation of the two metal compression brackets (# 421 & #422).

27 Remove the screw securing the igniter fixing plate (#711). Carefully set the igniter fixing plate assembly and screw aside for re-installation.

28 Remove the eighteen screws securing the plastic exhaust duct (# 431) to the secondary heat exchanger.

Replacing the secondary heat exchanger:

▲ WARNING! The heat exchanger assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

29 With the new secondary heat exchanger (# 418) resting upside down on a solid surface. Check the gasket for any cuts or imperfections. Place the new gasket (# 432) on the bottom of the new secondary heat exchanger and verify the screw hole alignment. Secure the plastic exhaust duct to the secondary heat exchanger with the eighteen screws removed earlier. Hand tighten all screws and check to make sure all screws are fully seated.

30 Reinstall the igniter fixing plate (# 711) to the secondary heat exchanger using the screw removed earlier.

31 Reinstall both header connections (# 472 & # 473) to the secondary heat exchanger using the screws removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figure 68 for correct orientation of the fittings.

32 Inspect the gasket (# 420)

attached to the bottom of the primary heat exchanger (# 401). Replace it if any cuts or any other issues are present. This gasket is 2 pieces. Take care to make sure there isn't a gap between the gaskets where they line up. Attach the Primary Heat Exchanger to the top of the Secondary Heat Exchanger. Check alignment of the screw holes. Using the ten screws and two metal compression brackets (# 421 & # 422) secure the Primary Heat Exchanger to the Secondary Heat Exchanger. **NOTICE:** Hand tighten all screw connections, do not use an electric screwdriver or drill. Re-attach the support bracket to the primary heat exchanger with the three screws removed earlier.

33 Reconnect the copper pipe (# 467) using the 16-25A metal fastener. Use the provided O-ring. Inspect the O-rings if any cuts or nicks are present replace it immediately. See Figure 68 on page 57.

34 Reattach the green and gray wires to the igniter rod. Route the green wire through the cable guides on the front of the primary heat exchanger. See Figure 69 on page 57.

35 **NOTICE: Read this step carefully before performing any actions.** To assist with installation have one of the screws that secures the side connection of the heat exchanger assembly affixed to the long magnetic tip screwdriver and within easy reach. Lift the heat exchanger assembly and tilt the top back and slide it in and up. The top of the plastic exhaust duct will mate with the exhaust port on the top of the water heater enclosure. The heat exchanger assembly must then be supported by hand, while installing the screws securing it to the enclosure. See See Figure 67 on page 57. Use the magnetic screwdriver with the screw

already affixed to it to secure the assembly. Install the remaining screw to the side bracket. Next install the four screws that secure the mounting bracket to the back of the water heater enclosure.

36 Reconnect the copper pipe (#466) to the secondary heat exchanger inlet. See See Figure 63 on page 56. Use the 16-25A metal fastener. When placing the fastener, position the top (flat section) of the fastener to the ten o' clock position.

37 Reconnect the rubber drain line to the bottom of the secondary heat exchanger.

38 Reconnect the small copper drain pipe (# 465). Use the provided O-ring. Inspect the O-ring, if any cuts or nicks are present replace it immediately. Use the 6-15 metal fastener removed earlier. See Figure 62 on page 56.

39 Reconnect the copper pipe (# 468) to the primary heat exchanger outlet and the water outlet tee. Inspect the O-rings, if any cuts or nicks are present replace them immediately. Use the 16-25A metal fasteners removed earlier. See Figure 61 on page 56.

40 Reconnect the ceramic block heater from the Primary Heat Exchanger inlet pipe. See Figure 65 on page 57.

41 Reattach the fan blower assembly to the mixing chamber assembly (# 112). Secure it with the two screws removed earlier. See Figure 57 on page 56.

42 Connect the Fan Blower motor wire to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet for placement.

43 Reconnect the flame rod connector (Yellow wire). When connecting the special tab must be facing outward.

Reference Figure 59 for correct orientation.

- 44 Reconnect the heat exchanger thermistor connector. See Figure 58 on page 56.
- 45 Reconnect the igniter rod connector (purple wires).
- 46 Reconnect the Over Heat Cutoff Fuse (O.H.C.F.) and the Hi Limit Switch. Both connectors are located on the same blue cable.
- 47 Reconnect the inlet thermistor. It is located under the secondary heat exchanger. See Figure 60 on page 56.
- 48 Reconnect the three cables coming from the fan motor assembly to their plastic connectors. See Figure 56 on page 56.
- 49 Reinstall the copper gas pipe using the 16-25A metal fasteners removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See See Figure 57 on page 56.
- 50 Slide the plastic housing with the computer board back into the water heater. Secure it in place with the bracket and screw removed earlier. See Figure 55 on page 55.
- 51 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. for plug location.
- 52 Use the white plastic cable clips removed earlier to organize the series of vertical cables along the right side of the water heater.
- 55 Re-install the rain protection tray using the screw removed earlier.
- 56 Secure the exhaust duct to the top of the water heater enclosure using the screw removed earlier and

reconnect the exhaust thermistor. See Figure 66 on page 57.

- 57 Before proceeding , take a moment to check all wiring connection and pipe connections. Make sure all are mated correctly and seated securely.
- 58 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream.
- 59 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 60 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 61 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 62 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 63 Verify proper operation of the water heater.

Removing and Replacing the Igniter - Flame Rod Assembly

▲ WARNING!

- To ensure your safety and the safety of others, read and follow

each step of these instructions. Failure to do so could result in personal injury or death.

- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools Needed: #2 Phillip's Head Screwdriver.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 4 Disconnect the two wires from the igniter rod connectors. See Figure 70.

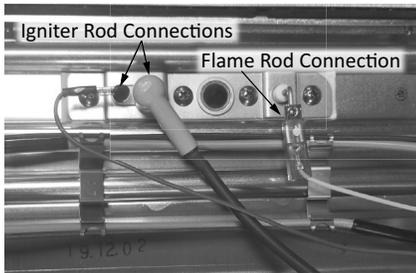


Figure 70: Igniter wires and flame rod wires.

5 Disconnect the flame rod connector (Yellow wire). Notice: the flame rod connector uses a special connection. Press the small tab in the center of the connector to release it. See Figure 71.

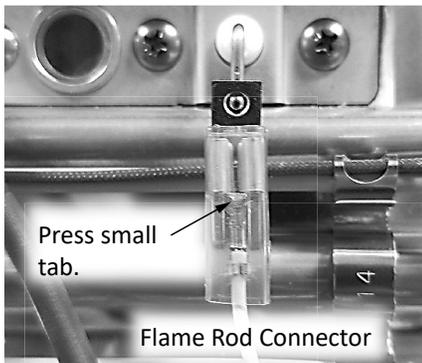


Figure 71: Flame Rod Connector.

6 Remove the 4 screws securing the igniter - flame rod assembly to the primary heat exchanger. Set these screws aside for re-installation. See Figure 70

Removing the Igniter - Flame Rod Assembly:

▲ WARNING! The igniter - flame rod assembly must be properly installed to prevent exhaust gases from leaking. Failure to follow can cause carbon monoxide poisoning or death.

7 Before installing the new igniter - flame rod assembly remove any debris/gasket material from the primary heater exchanger mounting point.

8 Install the new igniter - flame rod assembly, reference Figure 70 for correct orientation. Secure with the four

screws removed earlier. Check to ensure the gasket is not pinched and is fully sealed.

9 Before proceeding, take a moment to check all wiring connections and pipe connections. Make sure all are mated correctly and seated securely.

10 Turn on the gas supply to the water heater at the manual gas shutoff valve and check for leaks. If any leaks are detected, re-seat the appropriate connection(s) and re-check.

11 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.

12 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.

13 Verify proper operation of the water heater.

Removing And Replacing The Thermistors

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools Needed: #2 Phillip's Head Screwdriver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

2 Shut off the gas supply to the water heater at the manual gas shutoff valve.

3 Shut off the water supply to the heater and drain the heater as per "Unit draining and Filter Cleaning" page 29.

4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation. See Figure 72.

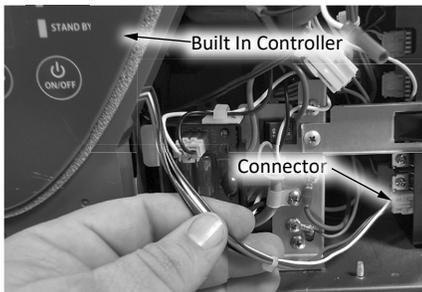


Figure 72: Built-in controller removal.

- 5 Locate the thermistor(s) to be replaced using the figure below.

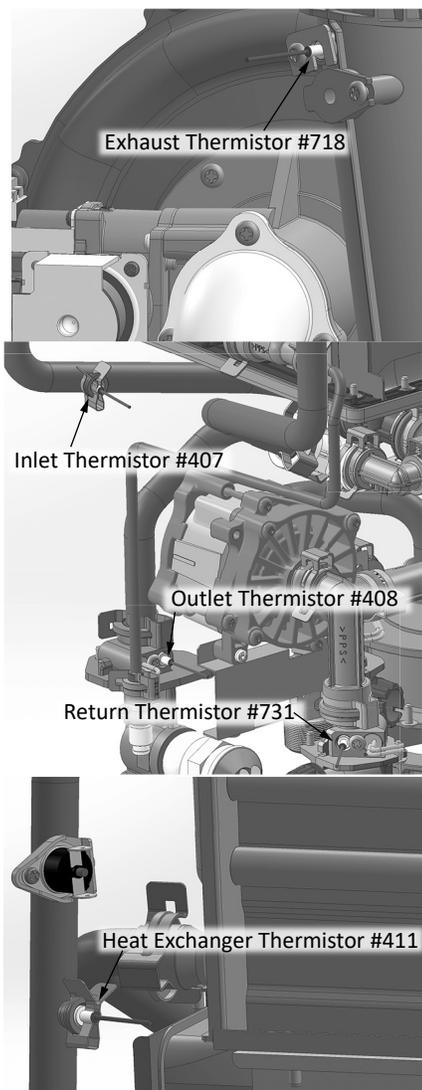


Figure 73: Thermistor locations.

- 6 Remove the metal fastener or screw securing the thermistor. Notice: keep the screw(s) or metal fasteners for re-installation of the thermistors.
- 7 Ensure all wires are routed correctly and not pinched or under tension.
- 8 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. See Figure 72.
- 9 Before proceeding, take a moment to check the wiring connection and pipe connections. Make sure all are mated correctly and seated securely.
- 10 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream. Let the water run full stream for three minutes before closing the faucet.
- 11 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 12 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 13 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.
- 14 Verify proper operation of the water heater.

Removing and Replacing the Water Piping System Components

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing and replacing the water piping system components:

Tools Needed: #2 Phillip's Head Screwdriver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Shut off water to the water heater and drain the system. see "Unit Draining and Filter Cleaning" on p. 29. Place a bucket under the

water heater and open the plastic drain port located on the bottom left side of the water heater. Allow the system to completely drain before proceeding.

- 4 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 5 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.

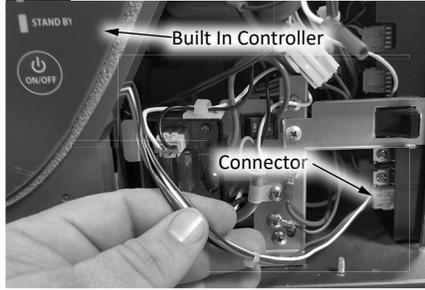


Figure 74: Built-in controller removal.

- 6 Inspect the o-rings when replacing plastic piping joints, if any cuts or nicks are present replace them immediately.
- 7 Note the type of metal fastener when removing and reinstalling

them. Reference Figure 75 & Figure 76 for correct type and placement.

- 8 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board.
- 9 Before proceeding, take a moment to check the wiring connection and pipe connections. Make sure all are mated correctly and seated securely.

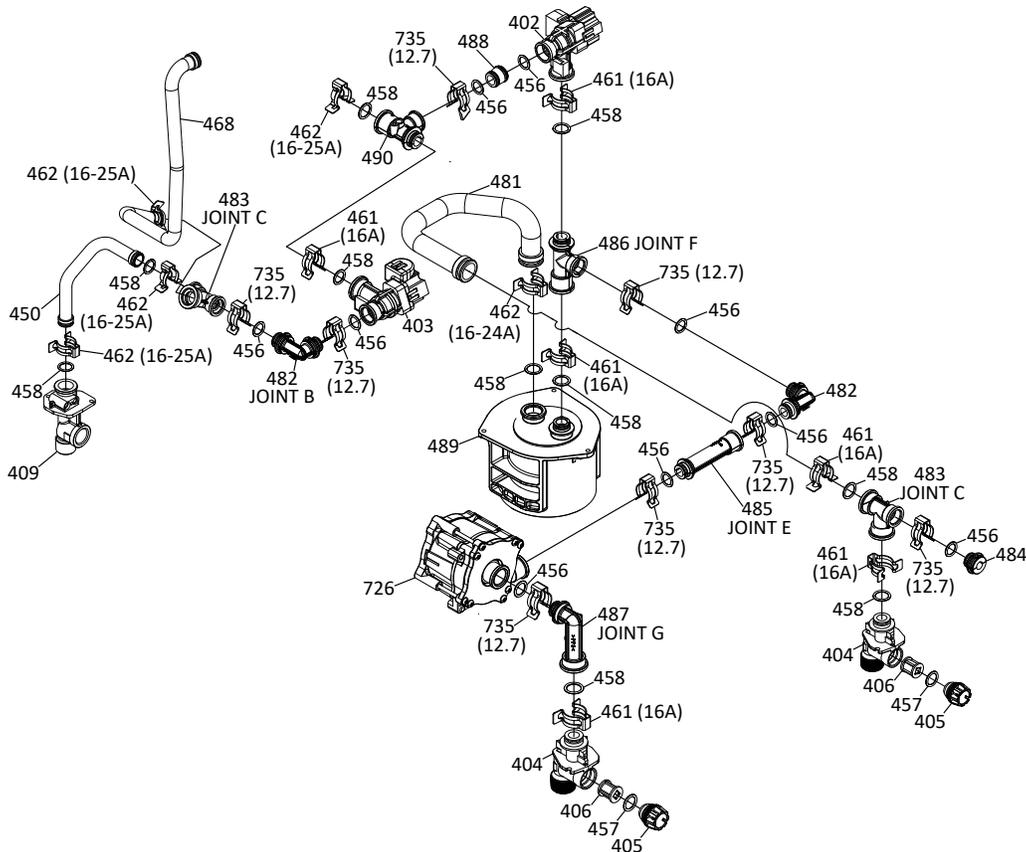


Figure 75: Standard Piping configuration

10 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream. Let the water run full stream for three minutes before closing the faucet.

11 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.

12 Turn on the gas supply to the water heater at the manual gas shutoff valve.

13 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.

14 Verify proper operation of the water heater.

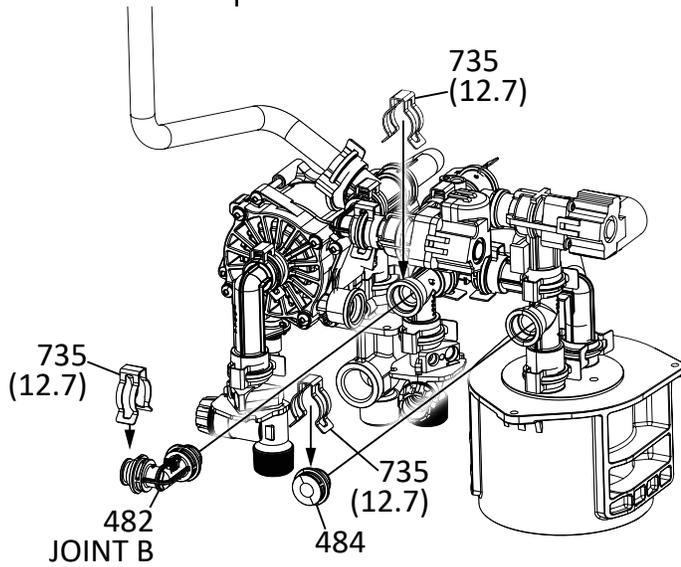


Figure 76: Crossover configuration

Removing and Replacing the Recirculation Pump

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing the recirculation pump:

Tools Needed: #2 Phillip's Head Screwdriver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.
Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the

cover to the water heater. Set the front cover and screws aside for re-installation.

- 4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation. See Figure 77.

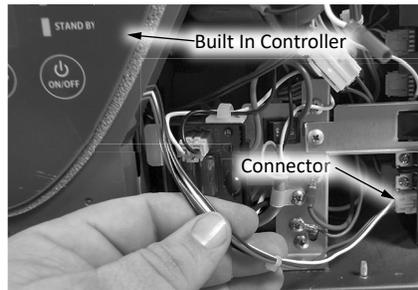


Figure 77: Built-in controller removal.

- 5 Shut off water to the water heater and drain the system. See draining page 29. Place a bucket under the water heater and open the plastic drain port located on the bottom left side of the water heater. Allow the system to completely drain before proceeding.

- 6 Remove the three metal fasteners securing the plastic piping to the recirculation pump. ① uses a 16A metal fastener, Connections ② and ③ use 12.7A metal fasteners. See Figure 78.

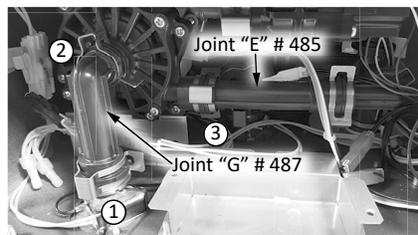


Figure 78: Metal Fastener and Pipe Joint Re-

moval.

- 6 Remove the plastic piping Joint "E" and Joint "G". Set these sections aside for re-installation. See Figure 78.
- 7 Remove the two screws securing the recirculation pump to the base of the water heater. See Figure 79.

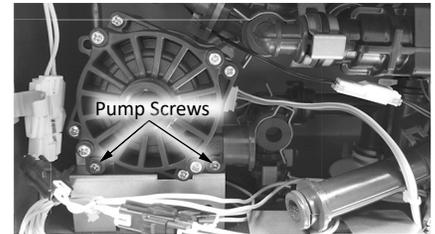


Figure 79: Pump screw removal.

- 8 Unplug the wiring to the recirculation pump and remove it from the water heater. See Figure 80.

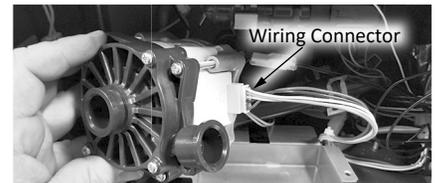


Figure 80: Recirculation pump wiring connector.

Replacing the recirculation pump:

- 9 Connect the wiring removed earlier to the new recirculation pump. See Figure 80.
- 10 Secure the new recirculation pump to the water heater with the two screws removed earlier. See Figure 79.
- 11 Reconnect plastic piping joints. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figure 78.
- 12 Reattach the three metal fasteners securing the plastic piping joints to the recirculation pump. ① uses a 16A metal fastener,

Connections ② and ③ use 12.7A metal fasteners. See Figure 78.

13 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. See Figure 77.

14 Before proceeding, take a moment to check the wiring connection and pipe connections. Make sure all are mated correctly and seated securely.

15 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream. Let the water run full stream for three minutes before closing the faucet.

16 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.

17 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/Off button to turn the water heater back on.

18 Turn on the gas supply to the water heater at the manual gas shutoff valve.

19 Verify proper operation of the water heater.

Removing and Replacing the Drain Port and Drain Tube

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Tools Needed: #2 Phillip's Head Screwdriver

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater.

Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.

2 Shut off the gas supply to the water heater at the manual gas shutoff valve.

3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.

4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation. See Figure 81.

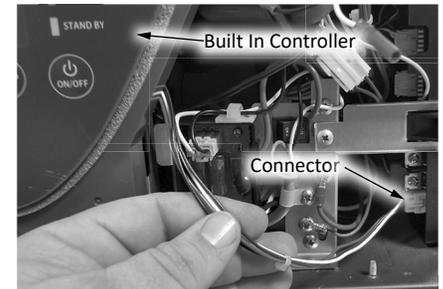


Figure 81: Built-in controller removal.

5 Shut off water to the water heater and drain the system. Place a bucket under the water heater and open the plastic drain port located on the bottom left side of the water heater. Allow the system to completely drain before proceeding.

6 Remove the three metal fasteners securing the plastic piping to the recirculation pump. ① uses a 16A metal fastener, Connections ② and ③ use 12.7A metal fasteners. See Figure 82.

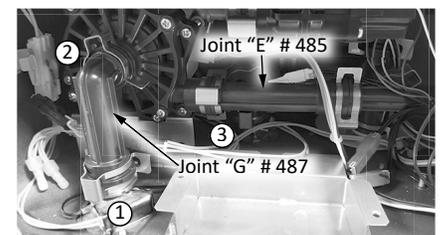


Figure 82: Metal Fastener and Pipe Joint Removal.

7 Remove the plastic piping Joint “E” and Joint “G”. Set these sections aside for re-installation. See Figure 82.

8 Remove the two screws securing the recirculation pump to the base of the water heater. See Figure 83.

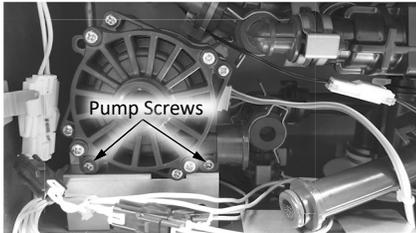


Figure 83: Pump screw removal.

9 Unplug the wiring to the recirculation pump and remove it from the water heater. See Figure 84.

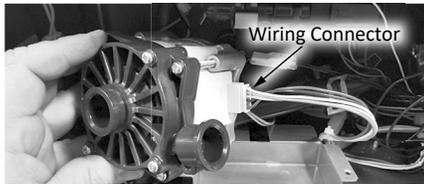


Figure 84: Recirculation pump wiring connector.

For replacing Drain Port go to step 14.
For replacing Drain Tube continue with step 10.

10 Remove the 6-15 metal fastener securing the drain tube to the primary heat exchanger outlet pipe. Keep the fastener for re-installation later. See Figure 85.

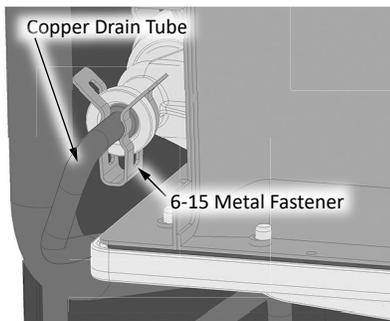


Figure 85: Upper connection point

11 Remove the 6-15 metal fastener securing the drain tube to the base of the water heater enclosure. Keep the fastener for re-installation later. See Figure 86.

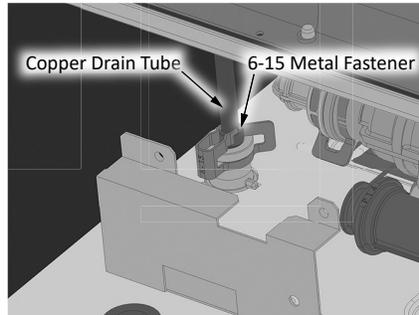


Figure 86: Lower connection point

12 Remove the old drain tube.

13 Install the new copper drain pipe using the 6-15 metal fasteners removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figures 95-96.

Replacing the drain port:

14 Remove the 6-15 metal fastener securing the drain tube to the base of the water heater enclosure. Keep the fastener for re-installation later. See Figure 86.

15 Remove the screw securing the drain port to the bottom of the water heater. See Figure 87.

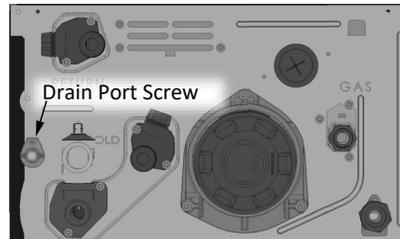


Figure 87: Drain port screw.

16 Install the new drain port using the screw removed earlier. Inspect the O-rings, if any cuts or nicks

are present replace them immediately.

17 Reinstall the copper drain pipe using the 6-15 metal fasteners removed earlier. Inspect the O-rings, if any cuts or nicks are present replace them immediately.

18 Connect the wiring removed earlier to the recirculation pump. See Figure 84.

19 Secure the recirculation pump to the water heater with the two screws removed earlier. See Figure 83.

20 Reconnect plastic piping joints. Inspect the O-rings, if any cuts or nicks are present replace them immediately. See Figures 82 & 83.

21 Reattach the three metal fasteners securing the plastic piping joints to the recirculation pump. ① uses a 16A metal fastener, Connections ② and ③ use 12.7A metal fasteners. See Figure 82.

22 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. See Figure 81.

23 Before proceeding, take a moment to check the wiring connection and pipe connections. Make sure all are mated correctly and seated securely.

24 Before restoring power to the water heater, check the piping connections by restoring water to the system and check for any leaks. Allow a few moments for the system to pressurize. Correct any leaks immediately. Open a hot water faucet and allow the water to run until it flows with a full stream. Let the water run full stream for three minutes before closing the faucet.

- 25 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 26 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 27 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/ Off button to turn the water heater back on.
- 28 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 29 Verify proper operation of the water heater.

Removing and Replacing the Thermistor Inlet Plug

▲ WARNING!

- To ensure your safety and the safety of others, read and follow each step of these instructions. Failure to do so could result in personal injury or death.
- If you do not have the skills necessary to complete this procedure correctly, do not proceed. Seek assistance from a qualified service technician.

Removing and replacing the thermistor inlet plug:

Tools Needed: #2 Phillip's Head Screwdriver and needle nose pliers.

NOTICE: DO NOT USE ELECTRIC SCREWDRIVERS OR DRILLS, HAND TIGHTEN ALL SCREWS TO PREVENT OVER TIGHTENING.

- 1 Disconnect power to the water heater by unplugging it from the wall outlet or turning it off at the circuit breaker, as appropriate. The power button on the water heater and remote does NOT disconnect power to the water heater. You must physically disconnect power to the water heater. Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- 2 Shut off the gas supply to the water heater at the manual gas shutoff valve.
- 3 Use a Phillips-head screwdriver to remove the 4 screws securing the cover to the water heater. Set the front cover and screws aside for re-installation.
- 4 Locate the wire on the built-in controller and follow it to the computer board. Carefully disconnect the built-in controller from the computer board. Reference the wiring diagram on page 28 or in the maintenance sheet. Set the built-in controller aside for re-installation.

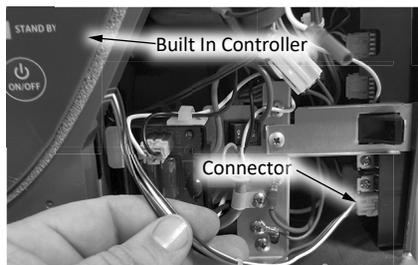


Figure 88: Built-in controller removal.

- 5 Locate the M4 screw as shown in Figure 89. Remove and keep this screw for re-installation.
- 6 Remove and replace the closing plug referenced in Figure 89.

Secure it in place with the M4 screw removed earlier.

- 7 Attach the built-in controller to the front of the water heater. Reconnect the wire from the built-in controller to the computer board. See Figure 88.

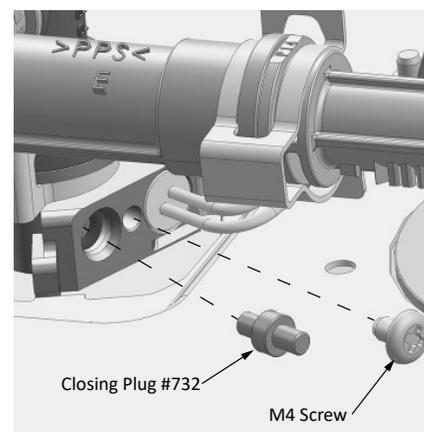
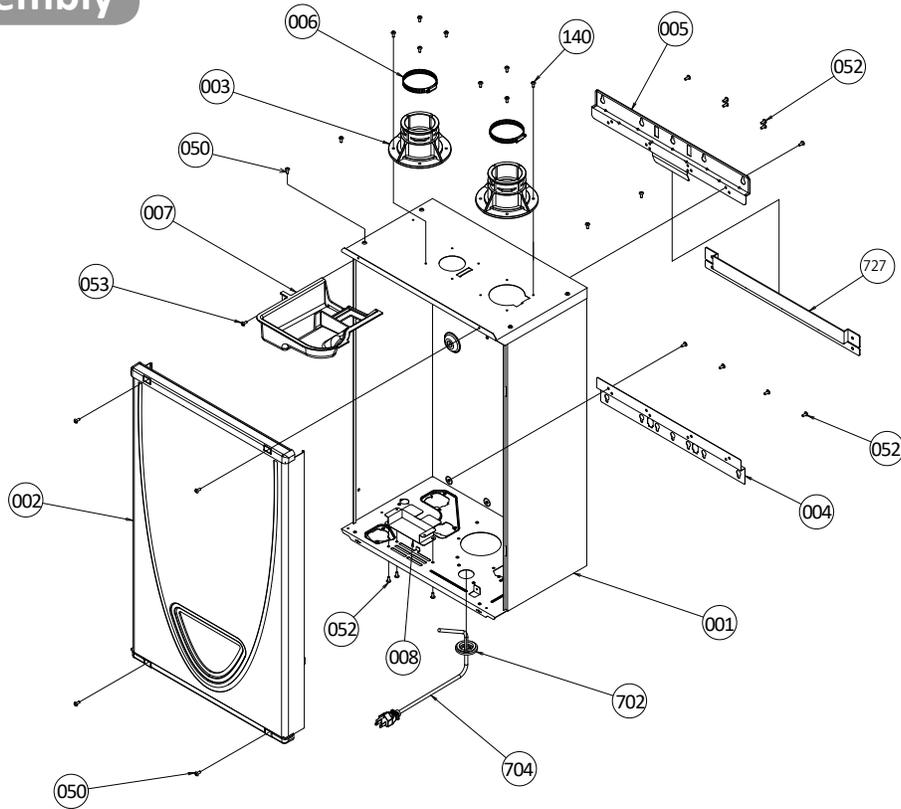


Figure 89: Thermistor Inlet Plug

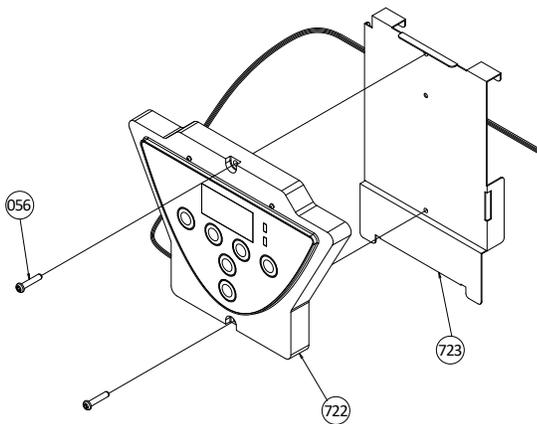
- 8 Before proceeding, take a moment to check the wiring connection and pipe connections. Make sure all are mated correctly and seated securely.
- 9 Replace the front cover and secure with the four screws removed earlier. Note the placement of the built-in controller when setting the front cover in place to ensure proper alignment.
- 10 Turn on the gas supply to the water heater at the manual gas shutoff valve.
- 11 Reconnect power to the water heater by plugging it into the wall outlet or turning it on at the circuit breaker, as appropriate. Press the On/ Off button to turn the water heater back on.
- 12 Verify proper operation of the water heater.

COMPONENT DIAGRAMS

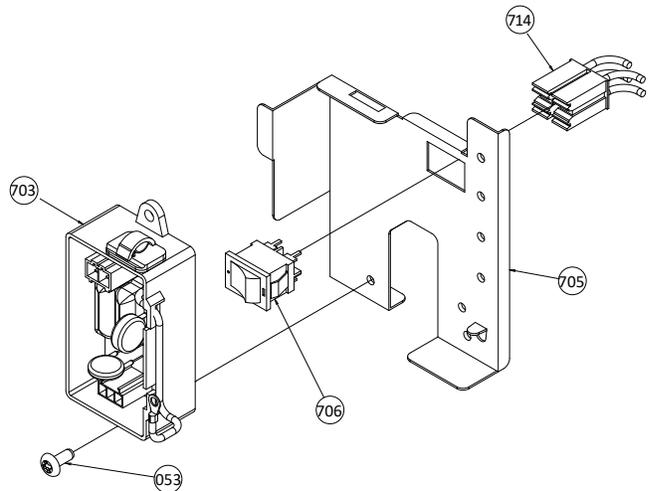
Case assembly



Built-in controller

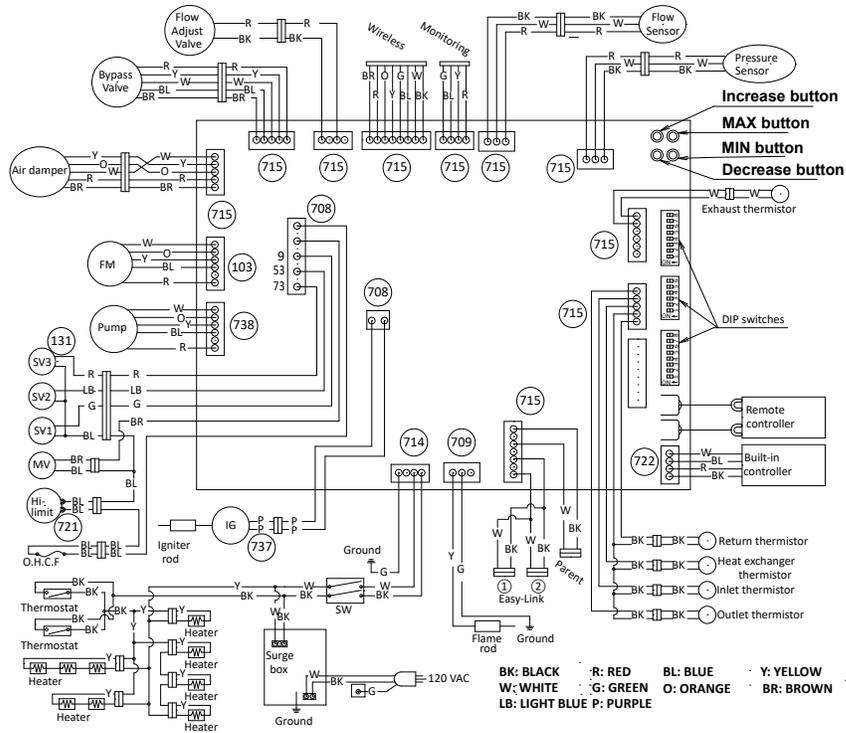
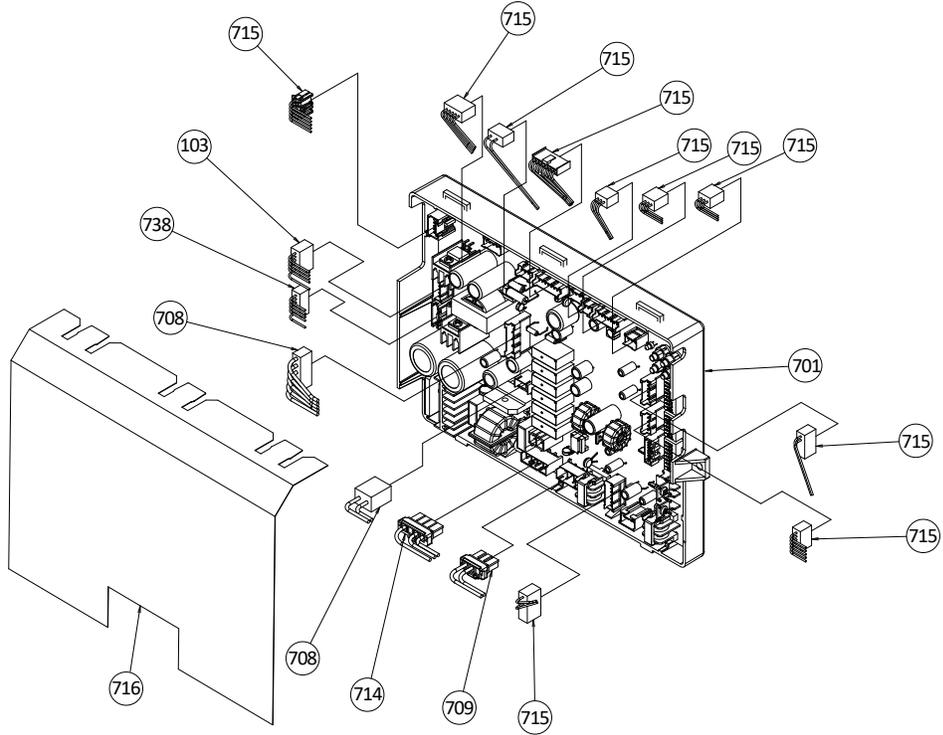


Surge box assembly



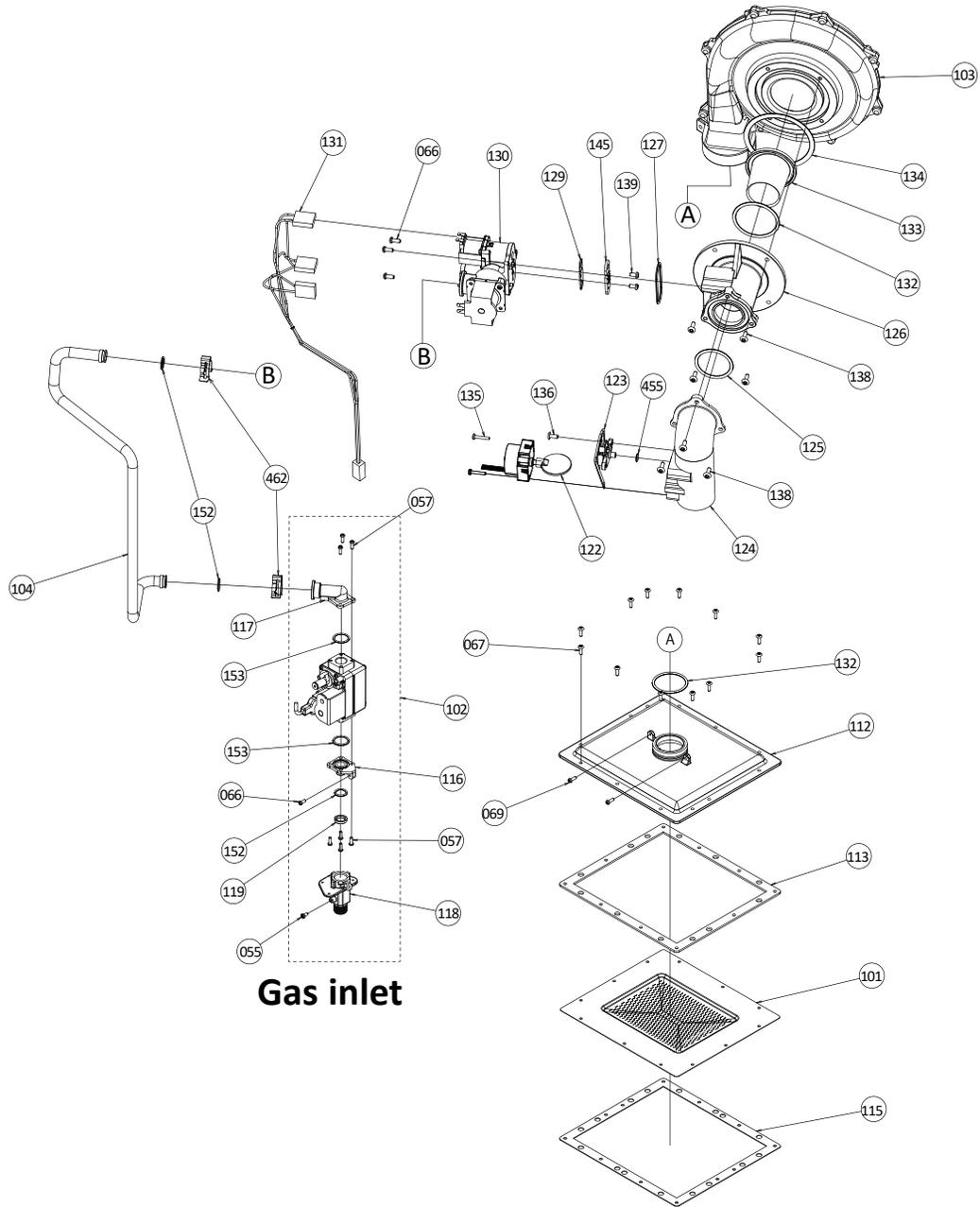
COMPONENTS

Computer board assembly



Gas line

Fan motor assembly



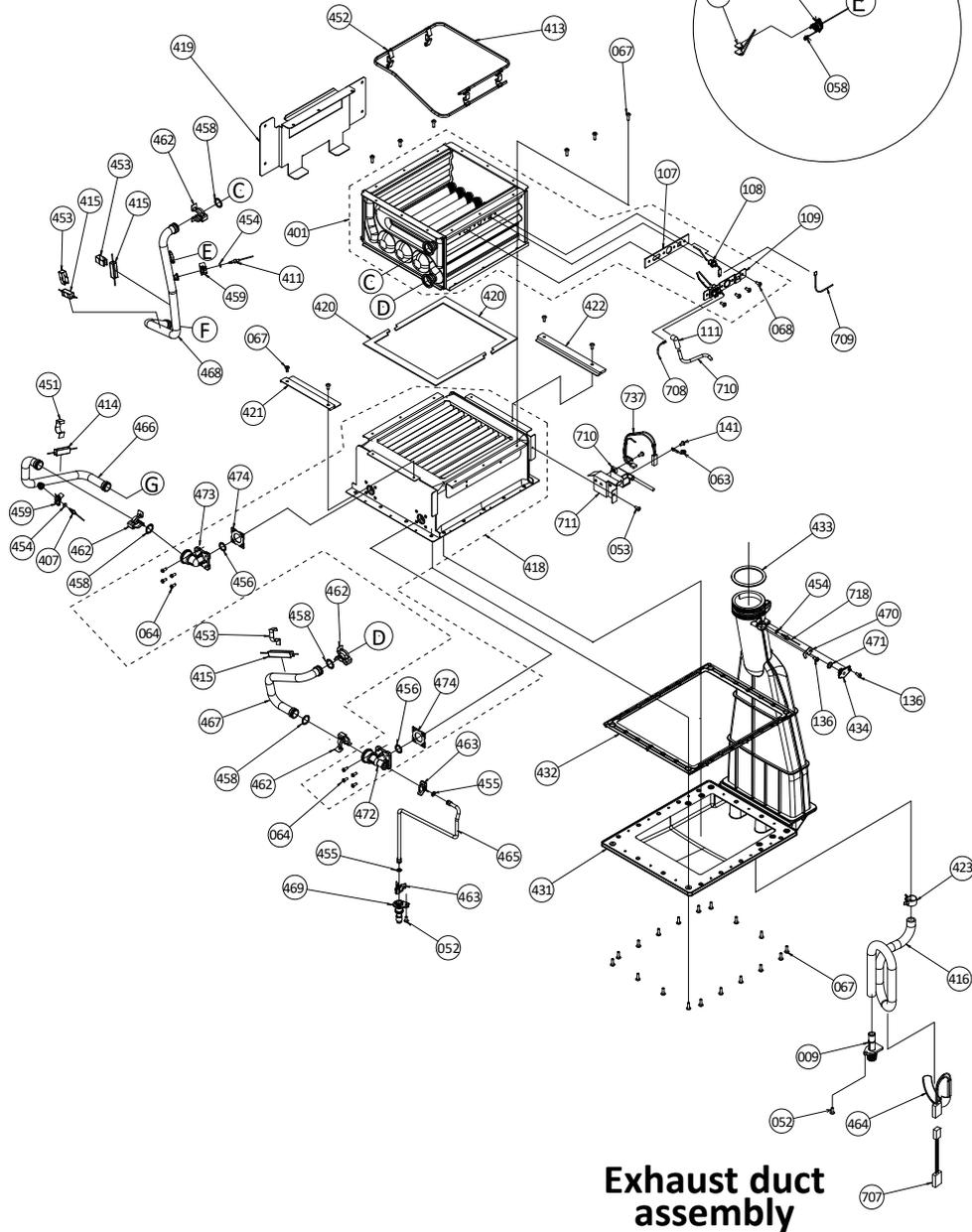
Gas inlet

Burner assembly

Water way 1

Hi-limit switch

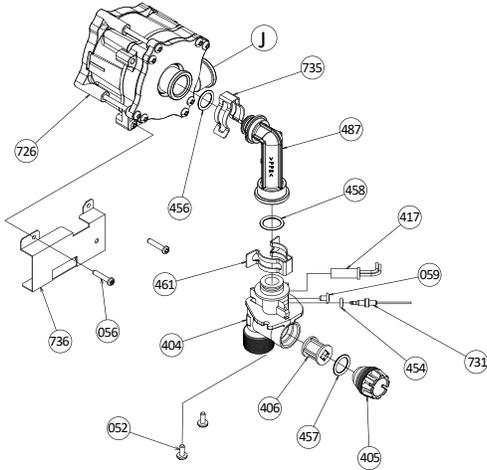
Heat exchangers



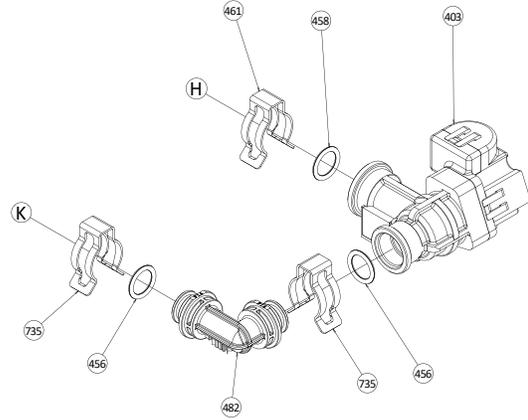
Exhaust duct assembly

Water way 2

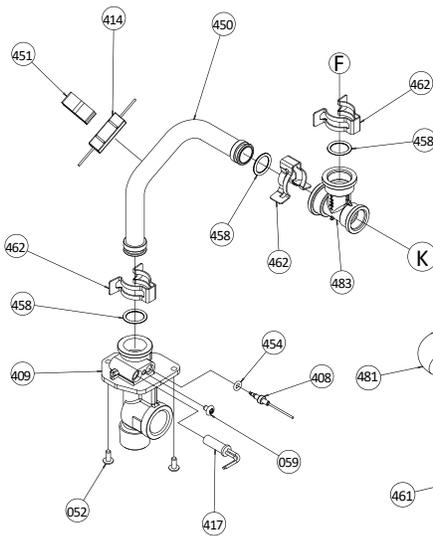
Pump & return inlet



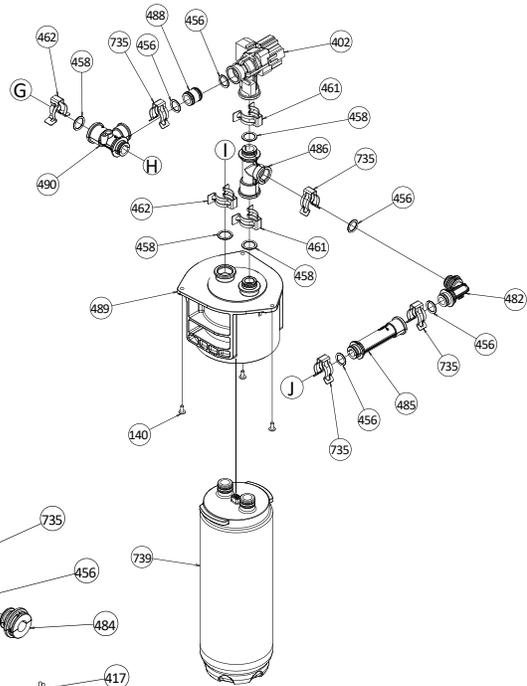
Bypass valve



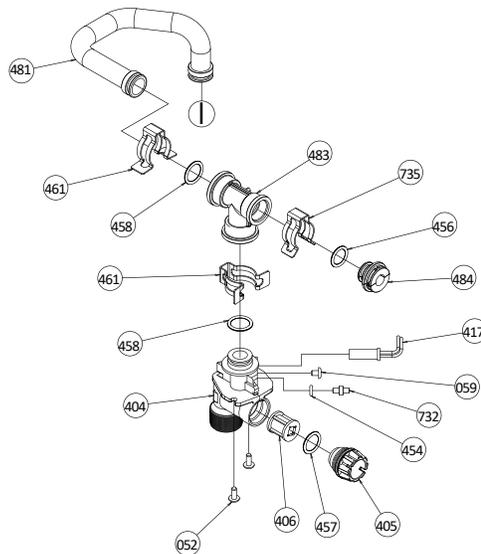
Water outlet



SCM connection



Water inlet



COMPONENT DIAGRAMS/ITEM NUMBERS

No.	Description	Part #
001	Case assembly	N/A
002	Front cover	100320351
003	Intake/Exhaust port assembly	100320352
004	Bracket	N/A
005	Top bracket	N/A
006	Hose clamp	N/A
007	Rain protection tray	100320353
008	Rain protection plate	N/A
009	Condensate drain port	100074203
050	Truss screw M4x12 (W/Washer) SUS410	N/A
052	Truss screw M4x10 (Coated) SUS3	N/A
053	Truss screw M4x10 SUS	N/A
055	Hex head screw M4x8 FEZN	N/A
056	Pan screw M4x20 SUS410	N/A
057	Tap tight screw M4x12 FEZN	N/A
058	Tapping screw M3x6 SUS3 Pan head	N/A
059	Tapping screw M4x6 SUS3 Truss head	N/A
063	Wire clamp 60	100074233
064	Screw M4x10	N/A
066	Pan screw M4x10	N/A
067	Truss screw M4x14 S coated SUS	N/A
068	Truss tapping screw M4x10 S	N/A
069	Pan sems screw M4x12 MFZN	N/A
101	Metal knit burner	100320354
102	Gas valve assembly	100320355
103	Fan motor	100320356
104	Gas pipe	100320357
106	N/A	N/A
107	Rod holder gasket	100320358
108	Flame Sensor	100320359
109	Igniter rod assembly	100320360
110	N/A	N/A
111	Rod cap	N/A
112	Mixing chamber assembly	100320372
113	Mixing chamber gasket	100320373
115	Burner gasket	100320374
116	Gas connection A	100320375
117	Gas connection B	100320376
118	Gas inlet	100320377
119	Gas inlet ring	100320378
122	Air damper assembly	100320319

No.	Description	Part #
123	Pressure sensor	100320320
124	Air Inlet Tube	N/A
125	O-ring P40 EPDM	100320379
126	Venturi body	100320380
127	Oval ring NBR	100320381
129	Orifice gasket	100320382
130	Gas solenoid valve assembly	100320383
131	Gas solenoid valve wire	N/A
132	O-ring P50 FKM	100320384
133	Venturi duct	100320385
134	O-ring P75 FKM	100320386
135	Pan screw M3x18 FEZN	N/A
136	Pan screw M4x12	N/A
138	Tapping screw M4x12 SUS2	N/A
139	Tapping tight screw M3x8	N/A
140	Truss screw M4x12 (Coated) SUS3	N/A
141	Pan screw M4x10	N/A
145	Orifice NA	100320387
145	Orifice LP	100320420
152	O-ring P16 NBR	100320422
153	O-ring P22 NBR	100320423
401	Primary heat exchanger assembly	100320388
402	Flow adjustment valve/Flow sensor	100320486
403	Bypass valve	100320466
404	Water inlet	100320526
405	Inlet filter plug	100074381
406	Inlet water filter	100074382
407	Inlet thermistor	100320523
408	Outlet thermistor	100320524
409	Water outlet	100320527
411	Heat exchanger thermistor	100320522
412	Hi-Limit switch	100320390
413	Overheat-cut-off fuse	100074334
414	Block heater	100074684
415	Block heater	100074683
416	Drain tube	N/A
417	Inlet heater	N/A
418	Secondary heat exchanger assembly	100320391
419	Large heat exchanger fixing plate	N/A
420	Heat exchanger gasket	100320392
421	Small heat exchanger fixing plate L	N/A

COMPONENT DIAGRAMS/ITEM NUMBERS (CONT.)

COMPONENTS

No.	Description	Part #
422	Small heat exchanger fixing plate R	N/A
423	Hose clamp 15	N/A
431	Exhaust duct	N/A
432	Exhaust duct gasket	100320393
433	O-ring P60 FKM	100320394
434	Exhaust port cap	100320395
450	Outlet pipe	100320396
451	Heater fixing plate 16	100074310
452	Fuse fixing plate	N/A
453	Heater fixing plate	N/A
454	O-ring P4 FKM	100076303
455	O-ring P6 FKM	100076305
456	O-ring P14 FKM	100076306
457	O-ring P15 FKM	100076307
458	O-ring P16 FKM	100076308
459	Fastener "4-11"	100074282
461	Fastener "16A"	100074410
462	Fastener "16-25A"	100074389
463	Fastener "6-15"	100074297
464	Flat heater	N/A
465	Drain pipe	N/A
464	Flat heater	N/A
465	Drain pipe	100320397
466	S-heat exchanger in pipe	100320398
467	P-heat exchanger in pipe	100320399
468	P-heat exchanger out pipe	100320400
469	Drain port	100074692
470	Thermistor fixing plate	N/A
471	O-ring P10 FKM	100320401
472	Header connection w/drain port	100320402
473	Header connection	100320403
474	Header connection gasket	100320404
481	Inlet pipe	100320405
482	Joint B - Elbow pump outlet	100320406
483	Joint C - Tee Mixing and inlet	100320407
484	Joint D	100320408
485	Joint E - Pump outlet straight	100320409
486	Joint F - 3 way connection with SCM,return	100320410
487	Joint G - Pump inlet elbow	100320411
488	Brass joint	100320412
489	SCM manifold assembly	100314460
490	3 way connection - Bypass, heat exchanger	100320413

No.	Description	Part #
701	Computer board 160X3P	100320425
701	Computer board 180X3P	100320426
701	Computer board 199X3P	100320427
702	Rubber grommet	100076470
703	Surge box	100076100
704	120 VAC wire	100074601
705	Surge box fixing plate	N/A
706	120 VAC Power ON-OFF switch	100074326
707	Flat heater extension wire	N/A
708	Wiring for Gas valve, Hi-limit, OHCF, Igniter	100320414
709	Flame rod wire	N/A
710	Igniter assembly	100320415
711	Igniter fixing plate	N/A
714	120V cables	N/A
715	24V cables	100320416
716	Computer board cover	N/A
718	Exhaust thermistor	100320417
721	Hi-limit switch wire	N/A
722	Built-in controller	100276680
723	Fixing plate	N/A
726	Recirculation pump	100320418
727	Wall mounting bracket	100320419
731	Return thermistor	100276681
732	Closing plug	100276683
735	Fastener "12.7"	100076400
736	Pump fixing plate	N/A
737	Igniter cord	N/A
738	Recirculation pump wire	N/A
739	X3™ Cartridge	100314491

NOTES
