



Flammable Vapor Ignition Resistant Water Heaters

SERVICE MANUAL

Troubleshooting Guide
and Instructions for Service

(To be performed ONLY by
qualified service providers)

DEFENDER
SAFETY SYSTEM®

Models Covered by This Manual:

RG130T*(N,X)	RG230S*(N,X)
RG140T*(N,X)	RG230T*(N,X)
RG150T(N,X)	RG240S*(N,X)
RG140S*(N,X)	RG240T*(N,X)
RG150L*(N,X)	RG250H*(N,X)
RG150S*(N,X)	RG250L*(N,X)
LG255H*(N,X)	RG250S*(N,X)
LG275H*(N,X)	RG250T*(N,X)
LG250H65*(N,X)	RG250H*(N,X)
RG2100H*(N,X)	RG255H*(N,X)
	RG275H*(N,X)

(*) Denotes Warranty Years



As required by the state of California Proposition 65.



The Bradford White
DEFENDER
Safety System®

Flammable Vapor Ignition Resistant Water Heaters

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WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result in property damage, personal injury, or death.

For Your Safety

Do not store or use gasoline or other flammable, combustible, or corrosive vapors and liquids in the vicinity of this or any other appliance.

– WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

– Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

DANGER

DO NOT store or use gasoline or other flammable, combustible, or corrosive vapors and liquids in the vicinity of this or any other appliance.

IMPORTANT

Before proceeding, please inspect the water heater and its components for possible damage. **DO NOT** install any water heater with damaged components. If damage is evident then please contact the supplier where the water heater was purchased or the manufacturer listed on the rating plate for replacement parts.

WARNING

Water heaters are heat producing appliances. To avoid damage or injury, do not store materials against the water heater or vent-air intake system. Use proper care to avoid unnecessary contact (especially by children) with the water heater and vent-air intake components. **UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT-AIR INTAKE SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT-AIR INTAKE SYSTEM.**

WARNING

Hydrogen gas can be produced in an operating water heater that has not had water drawn from the tank for a long period of time (generally two weeks or more). **HYDROGEN GAS IS EXTREMELY FLAMMABLE.** To prevent the possibility of injury under these conditions, we recommend the hot water faucet to be open for several minutes at the kitchen sink before you use any electrical appliance which is connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipes as hot water begins to flow. **DO NOT** smoke or have open flame near the faucet at the time it is open.

WARNING

DO NOT ATTEMPT TO LIGHT ANY GAS APPLIANCE IF YOU ARE NOT CERTAIN OF THE FOLLOWING:

- Liquefied petroleum gases/propane gas and natural gas have an odorant added by the gas supplier that aids in the detection of the gas.
- Most people recognize this odor as a "sulfur" or "rotten egg" smell.
- Other conditions, such as "odorant fade" can cause the odorant to diminish in intensity, or "fade", and not be as readily detectable.
- If you have a diminished sense of smell or are in any way unsure of the presence of gas, immediately contact your gas supplier from a neighbor's telephone.

Gas detectors are available. Contact your gas supplier, or plumbing professional, for more information.

WARNING

FAILURE TO INSTALL AND MAINTAIN A NEW, LISTED 3/4" X 3/4" TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIM THAT MIGHT RESULT FROM EXCESSIVE TEMPERATURE AND PRESSURES.

CAUTION

If sweat fittings are to be used **DO NOT** apply heat to the nipples on top of the water heater. Sweat the tubing to the adapter before fitting the adapter to the water connections. It is imperative that heat is not applied to the nipples containing a plastic liner.

INTRODUCTION

The Bradford White DEFENDER Safety System®

The Bradford White DEFENDER Safety System® was designed to resist the ignition of flammable vapors that can occur outside of the water heater. Use and installation are nearly identical to previous versions of atmospherically fired and vented water heaters. A number of exclusive design features are incorporated in the system that will require additional knowledge on the part of the qualified service provider. The following information will instruct service professionals on the function, proper diagnosis and repair of water heaters employing the Bradford White DEFENDER Safety System.

How the Safety System Works

During normal operation, air for combustion is drawn into the water heater through the opening in the jacket. This air travels down and around the combustion chamber and enters through holes in the very bottom of the corrosion-resistant combustion chamber. The air then travels up through the oriented flame arrestor plate louvers, where the velocity of the air is increased, and its direction altered. The air then mixes in a normal manner with the supplied gas and is efficiently combusted, producing very low NOx emissions.

In the case where trace amounts of flammable vapors are present in the air flowing into the combustion chamber, the vapors are harmlessly ignited by the burner/pilot flame. If flammable vapors are in sufficient quantity to prevent normal combustion, the burner/pilot flame is shut down.

Should the flammable vapors continue to the burner, the flame arrestor plate prevents the flames from traveling backwards and igniting vapors outside of the combustion chamber. The calibrated, multipurpose thermal switch recognizes this and shuts down the pilot and main burner. This switch also deactivates the burner and pilot in the unlikely event of restricted airflow caused by severe lint, dust, or oil accumulation on the arrestor plate.

It is intended for this manual to be used by qualified service personnel for the primary purpose of troubleshooting and repair of the Bradford White DV Series water heaters.

The Honeywell Icon Gas Control will display status codes in the event of abnormal operation. Status codes are listed in the troubleshooting charts found in this service manual. The troubleshooting charts will also indicate the probable cause for the status code and direct the service professional to a service procedure to properly diagnose the abnormal operation.

In some difficult to diagnose conditions, it may be necessary to isolate the heater from the vent system to determine the problem.

Contact the Bradford White technical support group immediately if diagnosis cannot be made using the methods described in this service manual.

Tools Required for Service

Manometer:	A liquid "U" tube type or a digital (magnahelic) type can be used. This device is used to measure gas and/or air pressure and vacuum.
Multi-Meter:	A digital type is strongly recommended. This device is used to measure electrical values. The meter you select must have the capability to measure volts AC, volts DC, amps, micro-amps, and ohms.
Electronic Probes:	In some cases, standard multi-meter probes will damage or simply not be effective to obtain certain voltage and ohm readings. It will be necessary to have special electronic "pin" type multi-meter probes. These probes are available at most electronic wholesale outlets.
Thermometer:	Used to measure water temperature. An accurate thermometer is recommended.
Water Pressure Gage:	Used to measure water supply pressure. Also used to determine tank pressure by adapting to the drain valve of the heater.
Various Hand Tools:	Pipe wrench, channel locks, open end wrenches (3/8", 7/16", 1/2"), 12" crescent wrench, allen wrench set, screw drivers (common & Phillips), 1/4" nut driver, pliers (common & needle nose), socket set, side cutters, wire cutters, wire strippers, wire crimpers, torpedo level, small shop vacuum, step ladder, flashlight, and 5-gallon pail.

White Rodgers Mechanical Gas Control Troubleshooting Chart

Flammable Vapor Ignition Resistant Water Heaters

Symptom	Probable Cause	Corrective Action	Service Procedure
Pilot will not light	<ol style="list-style-type: none"> 1.No incoming gas or too low gas pressure. 2.Gas control knob set to wrong position. 3.Gas control knob not being fully depressed when attempting to light pilot. 4.Pilot orifice or pilot tube is obstructed or kinked. 5.Pilot electrode not sparking to pilot. 6.Piezo igniter not functioning. 	<ol style="list-style-type: none"> 1. Turn on gas supply and/or check line pressure. 2. Review lighting instruction. Set gas control knob to correct position. 3. Review lighting instruction. Fully depress gas control knob. 4. Clean, repair or replace. 5. Verify correct electrode position. Replace pilot assembly. 6. Replace piezo igniter. 	<ol style="list-style-type: none"> 1. See Service Procedure RG-V 2. See Service Procedure RG-III 3. See Service Procedure RG-III 4. See Service Procedure RG-IV
Pilot will not stay lit when button is released	<ol style="list-style-type: none"> 1. Poor thermocouple connection at combination thermostat/gas valve. 2. Thermocouple not fully engaged in pilot assembly bracket. 3. Pilot flame is not fully enveloping the thermocouple bulb. 4. Weak or defective thermocouple. 5. Open ECO in combination thermostat/gas valve. 6. Defective magnet in combination thermostat/gas valve. 7. Resettable thermal switch has opened. 	<ol style="list-style-type: none"> 1. Check connection at combination thermostat/gas valve. Proper tightness should be finger tight + a 1/4 turn. 2. Inspect thermocouple to ensure that it is fully engaged into pilot bracket. 3. Clean pilot orifice and verify pilot tube is clear; check gas supply and line pressure. 4. Check thermocouple and replace if necessary. 5. Check ECO continuity and replace combination thermostat/gas valve if necessary. 6. Check magnet operation and replace combination thermostat/gas valve if necessary. 7. Determine cause of switch activation. To reset, depress button on resettable thermal switch located on inner door. 	<ol style="list-style-type: none"> 1. See Service Procedure RG-II 2. See Service Procedure RG-V 3. See Service Procedure RG-V
Pilot will light but the main burner will not come on	<ol style="list-style-type: none"> 1. Combination thermostat/gas valve set too low for desired water temperature. 2. Combination thermostat/gas valve temperature is satisfied. 3. Insufficient gas supply or low gas pressure. 4. Combination thermostat/gas valve has wide differential or is out of calibration. 	<ol style="list-style-type: none"> 1. Adjust temperature dial on combination thermostat/gas valve. 2. Check temperature dial setting on combination thermostat/gas valve. 3. Check gas supply and line pressure. 4. Check combination thermostat/gas valve for proper operation, replace if necessary. 	<ol style="list-style-type: none"> 1. See Installation and Operation Manual. 2. See Service Procedure RG-V 3. See Service Procedure RG-V

White Rodgers Mechanical Gas Control Troubleshooting Chart

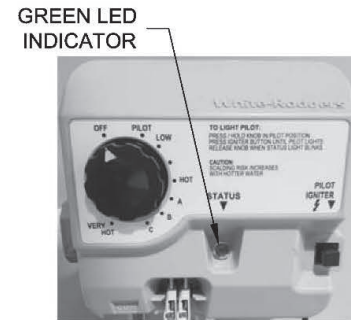
Flammable Vapor Ignition Resistant Water Heaters

Symptom	Probable Cause	Corrective Action	Service Procedure
Pilot goes out periodically (after heating cycles, once a day, once a week etc.)	<ol style="list-style-type: none"> 1. Insufficient combustion air supply. 2. Incorrect or clogged vent system/vent terminal, or incorrect location. 3. Inconsistent gas supply or gas pressure. 	<ol style="list-style-type: none"> 1. Verify adequate combustion air is available to the unit. Check and clear jacket slot openings of any dirt, dust, restrictions or other obstructions. Inspect flame arrestor plate and clean with stiff bristled brush and compressed air to remove any debris accumulation. 2. Check venting for proper sizing and proper operation. 3. Check gas supply and line pressure. 	<ol style="list-style-type: none"> 1. See Service Procedure RG-VIII 2. See Service Procedure RG-V
Not enough hot water	<ol style="list-style-type: none"> 1. Combination thermostat/gas valve set too low for desired water temperature. 2. Cold inlet water temperature is very cold. 3. High demand periods. 4. Incorrectly sized water heater for application. 5. Combination thermostat/gas valve is out of calibration/not functioning. 6. Out of spec dip tube is diluting hot water with cold water. 	<ol style="list-style-type: none"> 1. Check dial on combination thermostat/gas valve. 2. Extremely cold water going into the heater will decrease the amount of hot water produced. It may be necessary to temper incoming water supply. 3. Adjust high demand usage. 4. Contact plumbing professional. 5. Check combination thermostat/gas valve for proper operation, replace if necessary. 6. Inspect dip tube and replace if necessary. 	<ol style="list-style-type: none"> 1. See Service Procedure RG-V 2. See Service Procedure RG-IX

White Rodgers Electronic Gas Control Troubleshooting Chart

Flammable Vapor Ignition Resistant Water Heaters

Observe green LED indicator on gas control. Status flash codes are displayed with a three second pause before repeating. Check and repair the system as noted in the troubleshooting table below.



LED Status	Control Status	Probable Cause
None (LED not on or flashing)	Indicates control is off. Main and pilot burner are off.	Gas valve is functioning normally. Gas valve is not powered. Light pilot.
One flash every four seconds	Not an error. Indicates pilot is lit and main burner is off.	Gas valve is powered and waiting for the set point knob to be turned to a water temperature setting. If the set point knob is at desired setting, the thermostat is satisfied.
One flash every second	Not an error. Indicates main valve is open and main burner is lit.	Thermostat is calling for heat. Water heater operating normally and is in heat cycle.
Solid ON	Not an error. Indicates that the control is in shutdown mode.	Set point knob was recently turned to "OFF" position. Wait until LED goes out before attempting to relight.
Two flashes and three second pause	Low thermopile voltage; main burner not lit.	Loose thermopile connections or weak pilot flame.
Four flashes and three second pause	Temperature cut-out limit reached causing shutdown.	Excessive temperatures may have been reached. Shut off the control and reduce the water temperature. Thoroughly verify control operation, replace if exceeding setpoint.
Five flashes and three second pause	Electronics, sensor, or gas valve fault detected.	Control may be wet or damaged. Verify all connections are tight; if problem persists replace the control.

Honeywell V1 Gas Control Troubleshooting Chart

Flammable Vapor Ignition Resistant Water Heaters

Observe green LED indicator on gas control. Status flash codes are displayed with a three second pause before repeating. Check and repair the system as noted in the troubleshooting table below.



LED Status	Control Status	Probable Cause	Service Procedure
None (LED not on or flashing)	Pilot assembly is not lit.	Gas control is not powered. Light pilot.	If the pilot will not stay lit replace pilot assembly. If problem persists replace gas control.
One flash and three second pause	<ol style="list-style-type: none"> 1. If setpoint knob is in "PILOT" position then pilot flame is detected. Turn setpoint knob to desired setting. 2. If the setpoint knob is already at the desired setting, the water heater is satisfied. 	<ol style="list-style-type: none"> 1. Gas control is powered and waiting for setpoint knob to be turned to a water temperature setting. 2. Water heater is satisfied and operating normally. 	Normal operation.
LED on continuously (solid)	Setpoint knob has been recently turned to the "OFF" position. Wait until LED goes out before attempting to relight.	Setpoint knob was turned to "OFF" position.	LED will go out and the control will function normally once the pilot is lit.
Two flashes and three second pause	Weak pilot signal detected. System will reset when pilot flame is sufficient.	<ol style="list-style-type: none"> 1. Thermopile failure. 2. Unstable pilot. 3. Pilot tube blocked or restricted. 	<ol style="list-style-type: none"> 1. See Service Procedure IV 2. See Service Procedure II 3. See Service Procedure II
Three flashes and three second pause	Insufficient water heating. System will reset.	<ol style="list-style-type: none"> 1. Thermal sensor out of calibration. 2. Faulty gas control. 	Replace gas control.

Honeywell V1 Gas Control Troubleshooting Chart

Flammable Vapor Ignition Resistant Water Heaters

Observe green LED indicator on gas control. Status flash codes are displayed with a three second pause before repeating. Check and repair the system as noted in the troubleshooting table below.



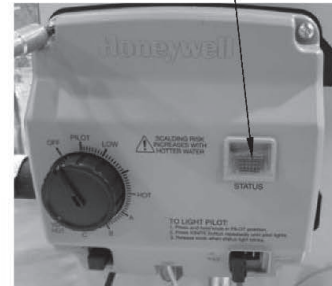
LED Status	Control Status	Probable Cause	Service Procedure
Four flashes and three second pause	Excessive tank temperature. System must be reset.	1. Temperature sensor out of calibration. 2. Faulty gas control.	Replace gas control.
Five flashes and three second pause	Temperature sensor fault.	1. Damage to the temperature sensor, resistance is out of range, or sensor is unplugged. 2. Faulty gas control.	1. See Service Procedure VI 2. Replace gas control.
Six flashes and three second pause	Water leak detected by accessory module.	Excessive amount of water in drain pan/water dam.	1. Check T&P valve. 2. Check all water fittings. 3. Pressurize and leak test tank.
Seven flashes and three second pause	Gas control electronic fault detected.	1. Control needs to be reset. 2. Control is wet or physically damaged.	1. Reset gas control 2. Replace gas control.
Eight flashes and three second pause	Standing pilot remains on while setpoint knob is in "OFF" position.	Pilot valve stuck in open position.	Replace gas control.

Honeywell V2 Gas Control Troubleshooting Chart

Flammable Vapor Ignition Resistant Water Heaters

Observe colored LED indicator on gas control. Status flash codes are displayed with a three second pause before repeating. Check and repair the system as noted in the troubleshooting table below.

LED colors:
Green-Normal operation
Yellow-Low thermopile voltage
Red-Valve fault



LED Status	Control Status	Probable Cause	Service Procedure
None (LED not on or flashing)	Millivolt power is not present. Light pilot.	Gas valve is functioning normally. Gas valve is not powered. Light pilot.	If the pilot will not stay lit replace pilot assembly. If problem persists, replace gas control.
One flash every four seconds (LED green)	Not an error. Indicates pilot is lit and main burner is off.	The knob can be turned to a desired setpoint temperature.	Normal operation.
One flash every second (LED green)	Not an error. Indicates main valve is open and main burner is lit.	None. Control will automatically shut main burner off when water temperature reaches the setpoint temperature.	Normal operation.
Two flashes and three second pause (LED yellow)	Low thermopile voltage; main valve not turned on.	Check thermopile and its connections. Check pilot flame.	1. See Service Procedure IV 2. See Service Procedure II 3. See Service Procedure II
Four flashes and three second pause (LED red)	Temperature cut-out limit reached, causing shutdown.	Check the valves and the water temperature sensor. Reduce the water temperature setpoint. Verify control operation, replace if exceeding setpoint.	Replace gas control.
Five flashes and three second pause (LED red)	Electronics, sensor, or gas valve fault detected.	Check water temperature sensor and its connection for open circuits, shorts, or differences in resistance between the two sensor elements.	Replace gas control.
Solid ON (LED red)	Not an error—indicates that the control is in OFF position.	None; wait until LED turns off if you want to restart system.	LED will go out and the control will function normally once the pilot is lit.

Inner Door Removal Procedure

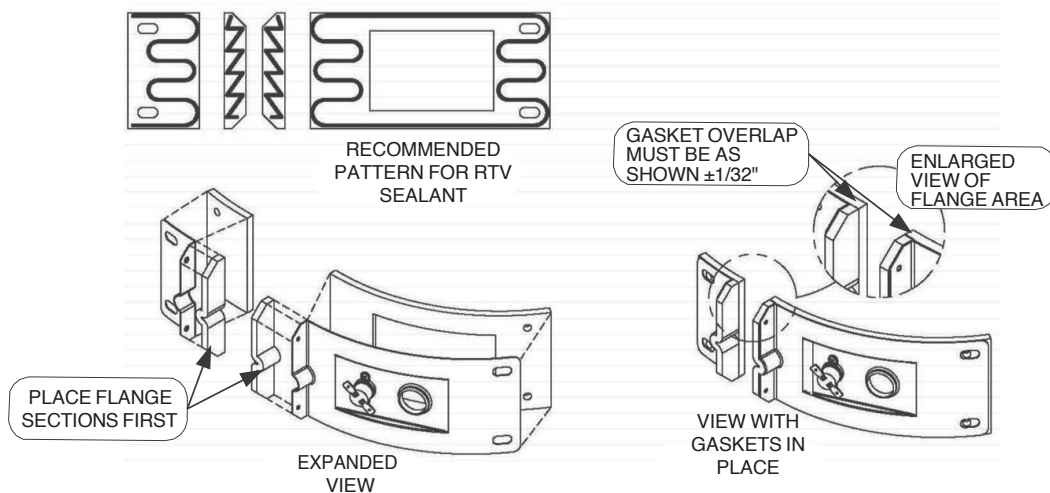
- Step 1. Rotate knob of the combination thermostat/gas valve to the "OFF" position.
- Step 2. Remove the outer jacket burner access door.
- Step 3. Inner Door Removal:
- Disconnect resettable thermal switch wire leads (leading from gas control/gas valve).
 - Remove two (2) 1/4" hex drive screws from right side inner door.
 - Remove two (2) 1/4" hex drive screws from flange section of inner door.
 - Remove two (2) 1/4" hex drive screws from left side inner door.
 - Remove inner door and inspect per Step 4.

- Step 4. Fully inspect inner door gaskets for the following:

- Tears
- Missing material
- Cracks
- Dirt or debris
- Gasket adhesion to inner door
- Material left on combustion chamber (around opening)
- Other imperfections that will inhibit proper seal

If the gasket is not affected by any of the above, gasket replacement is not required. If replacement is required, proceed to **Inner Door Gasket Replacement Procedure**.

Inner Door Gasket Replacement Procedure



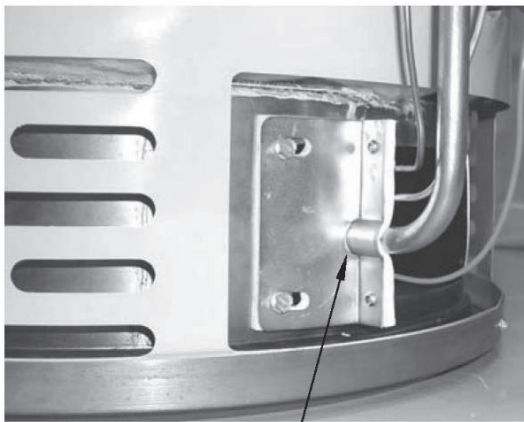
Installation of Inner Door with Gasket

- Step 1. Clean any residual gasket residue or other debris from combustion chamber surface before installing the inner door/gasket assembly.
- Step 2. Place the left side inner door into position first. Firmly position the radiused channel of the inner door around the feedline. Using the two (2) hex drive screws from Step 3d, secure left side inner door in place. **DO NOT OVERTIGHTEN SCREWS.**
- Step 3. Position thermocouple, pilot tube and piezo wire against left side inner door flange gasket. **DO NOT ROUTE THROUGH RADIUSED CHANNEL WITH FEEDLINE.**

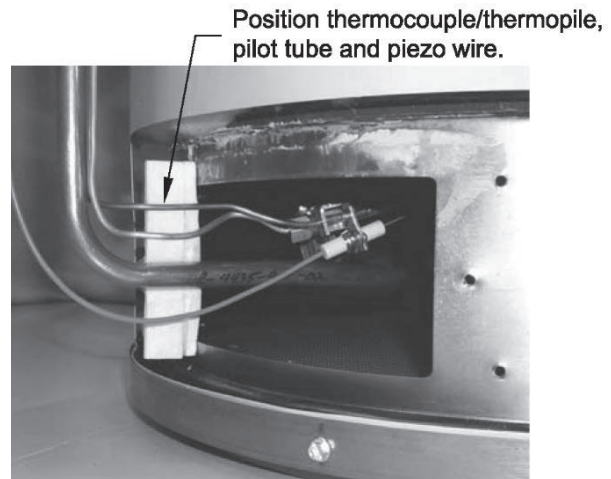
⚠ WARNING

Stripped fastener connections may allow for seal breach of inner door. A seal breach may result in a fire or explosion causing property damage, personal injury or death. DO NOT overtighten screws in Steps 2, 4, and 5.

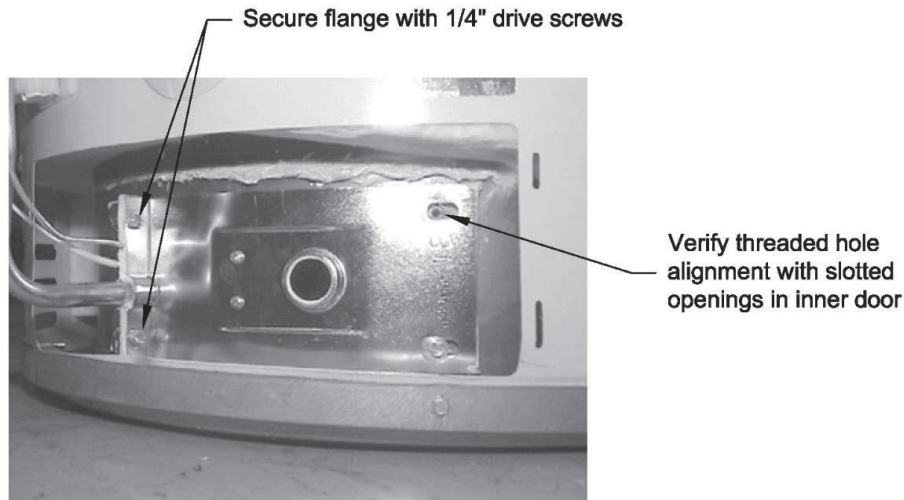
If a fastener connection is stripped, contact the manufacturer listed on the water heater rating plate.



Radiused channel for
feedline



- Step 4. Firmly place right side inner door flange against the left side inner door flange and secure with two (2) 1 / 4 " hex drive screws from Step 3c. **DO NOT OVER TIGHTEN SCREWS.**
- Step 5. Align the right side inner door to combustion chamber and verify that the fastener holes of the combustion chamber are aligned with the right side inner door slotted opening. Verify seal integrity around the combustion opening. Secure right side inner door using two (2) 1/4" hex drive screws from Step 3b. **DO NOT OVER TIGHTEN SCREWS.** Verify both left and right sides of the inner door are properly positioned and sealed against the combustion chamber.

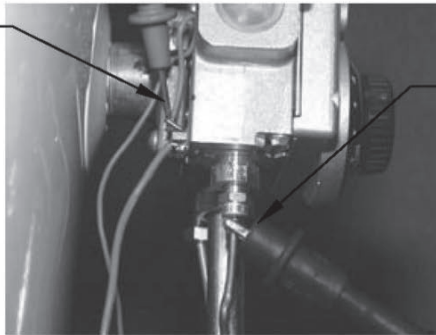


- Step 6. Reconnect the lead wires from combination thermostat/gas valve to resettable thermal switch (see photo in Step 3).
NOTE: Wire terminations are interchangeable with either resettable thermal switch connections.
- Step 7. Replace the outer jacket burner access door.
- Step 8. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

CLOSED CIRCUIT THERMOCOUPLE TESTING (White Rodgers Mechanical)

- Step 1. Closed circuit testing is the preferred method for testing the thermocouple. Following the lighting instruction label on the heater, proceed to light the pilot and allow to operate for three minutes. If the pilot will not stay lit, hold the pilot button (located on the combination thermostat/gas valve) down during this test.
- Step 2. Using a multimeter capable of measuring millivolts, connect one lead using an alligator clip to the copper sheath of the thermocouple. Use the second lead of the multimeter to probe the top terminal located at the back of the combination thermostat/gas valve.
- Step 3. If meter reads 10 millivolts or higher, the thermocouple is O.K.. If reading is below 10 millivolts, replace the thermocouple.

Probe top terminal on
back of combination
thermostat/gas valve

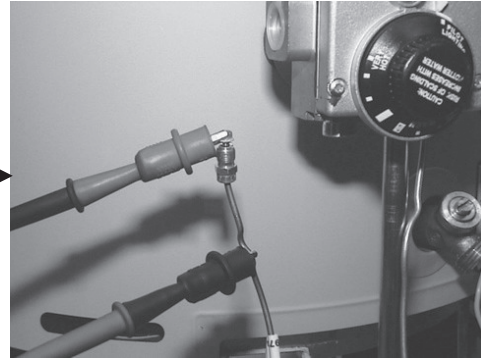


Alligator clip to copper
sheath of thermocouple

OPEN CIRCUIT THERMOCOUPLE TESTING (White Rodgers Mechanical)

Step 1. Disconnect the thermocouple from the combination thermostat/gas valve.

Step 2. Using a multimeter capable of measuring millivolts, connect one alligator clip to the end ball or contact portion of the thermocouple and the other alligator clip to copper portion of the thermocouple.

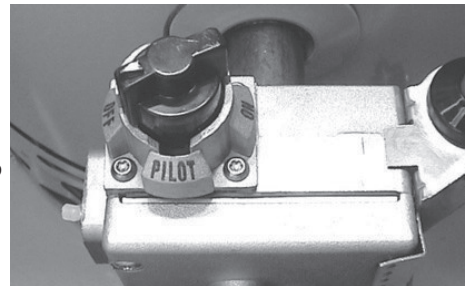


Step 3. Following the lighting instruction label on the heater, proceed to light the pilot and allow to operate for three minutes. **It will be necessary to hold the pilot button down continuously throughout this test.** A reading of 20 to 30 millivolts indicates good thermocouple output.

THERMOCOUPLE REPLACEMENT (White Rodgers Mechanical)

Step 1. Turn off gas supply to the water heater. Rotate the knob of the combination thermostat/gas valve to "OFF" position.

Depress knob slightly and rotate clockwise to the "OFF" position.



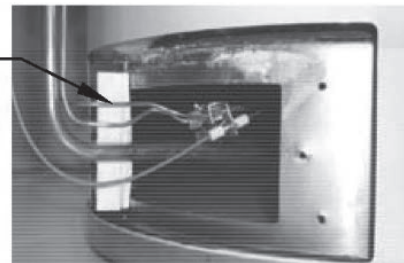
Step 2. Remove the outer jacket door.

Step 3. Remove the right side of inner door per Service Procedure RG-I, Steps 3a through 3c.

Step 4. Disconnect the thermocouple from the combination thermostat/gas valve. Locate other end of the thermocouple inside of the combustion chamber and remove from the pilot bracket. Pull firmly, pulling away from the pilot assembly.

Step 5. Install a new thermocouple into the pilot bracket making certain the thermocouple is fully engaged into the pilot bracket. Position the thermocouple against the left side inner door flange at its original position. Connect the other end of thermocouple to the combination thermostat/gas valve (finger tight + a 1/4 turn).

Thermocouple position



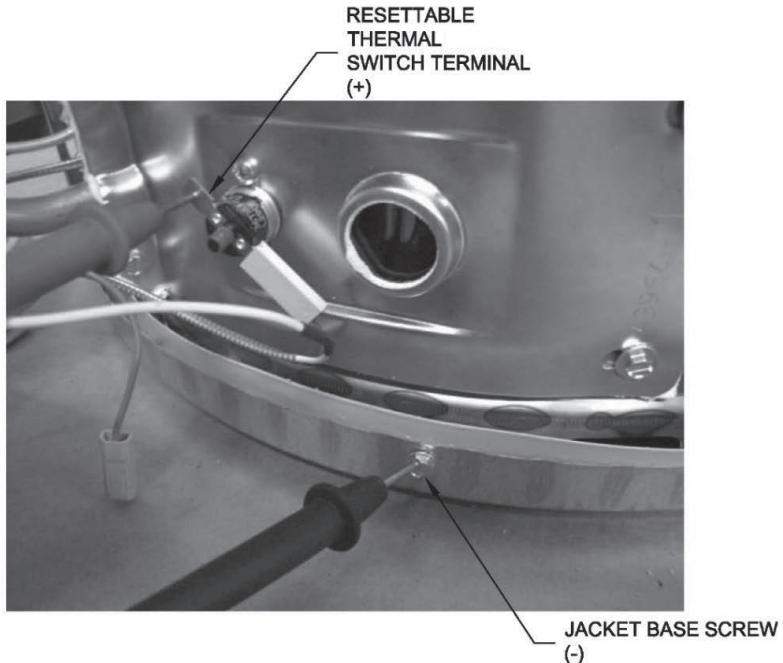
Step 6. Inspect the inner door gasket per Service Procedure RG-I, Step 4.

Step 7. Install right side inner door per Service Procedure RG-I, "Installation of Inner Door with Gasket," Step 6 through Step 8.

Step 8. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

OPEN CIRCUIT THERMOPILE TESTING **(Honeywell & White Rodgers Electronic)**

- Step 1. Turn knob to pilot position and depress.
- Step 2. Continue pressing knob and remove the red (+) wire from resettable thermal door switch.
- Step 3. Using a multimeter capable of measuring millivolts, connect the positive side of the multimeter to the terminal of the resettable thermal switch. Connect the negative side of the multimeter to any earth ground location (jacket base, screw, etc.). Normal thermopile operation will be between 350mV - 850mV.



- Step 4. If reading is less than 350mV, resettable thermal switch must be tested. Refer to Service Process RG-III. If resettable thermal switch is closed, replacement of pilot assembly is recommended following Service Procedure RG-III.
- Step 5. If thermopile reading is between 350mV - 850mV, reconnect red wire to positive (+) terminal of the gas control.
- Step 6. Release the gas control knob and turn to desired setting to resume normal operation.

PILOT/ELECTRODE ASSEMBLY INSPECTION, CLEANING, AND REPLACEMENT

Step 1. Turn off gas supply to water heater. Rotate the knob of gas control/gas valve to the "OFF" position.

Step 2. Remove the outer jacket door.

Step 3. Remove right side of inner door per Service Procedure RG-I, Steps 3a through 3c.

Step 4. Disconnect thermocouple/thermopile, pilot tube, and feedline from gas control/gas valve.

NOTE: Feedline nut for natural gas control uses right hand threads, L.P. control uses left hand thread.

Step 5. Disconnect piezo ignition wire from piezo igniter.

Step 6. Remove burner assembly from the combustion chamber.

Step 7. Remove the pilot/electrode assembly from the feedline.

Step 8. Inspect pilot for the following:

- Primary air openings for blockage. Must be free from any debris (dirt, lint, etc.).
- Kinks or cracks in the pilot tube. If found, the pilot must be replaced.

Step 9. Inspect pilot orifice (**Honeywell ONLY**):

- Remove 7/16" nut from bottom of pilot assembly.
- Remove pilot tube and pilot orifice.
- Inspect pilot orifice for blockage, must be cleaned or replaced. (Honeywell & White Rodgers Electronic pilot orifice not replaceable, replace pilot assembly).

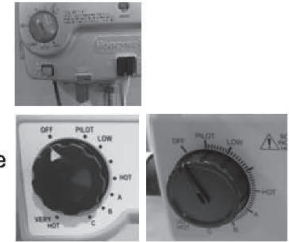
Step 10. Install pilot/electrode assembly to feedline, secure with screw from Step 7.

Step 11. Re-install burner assembly into combustion chamber, connect feedline, pilot tube and thermocouple/thermopile to gas control/gas valve.

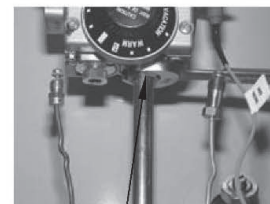
Step 12. Install inner door per Service Procedure RG-I, "Installation of Inner Door with Gasket."

Step 13. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

For Honeywell & White Rodgers electronic control, rotate knob counter-clockwise to the "OFF" position.



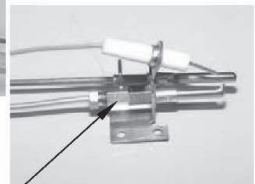
For White Rodgers mechanical control, depress knob slightly and rotate clockwise to the "OFF" position.



Feedline nut



Primary air opening
White Rodgers pilot



Primary air opening
Honeywell pilot

PILOT ORIFICE

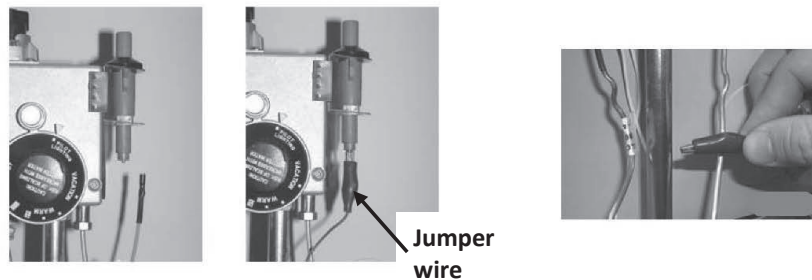


Removal of thermopile from Honeywell & White Rodgers Electronic pilot assembly is **NOT** recommended but can be achieved by viewing the pilot assembly from the top and pressing the thermopile towards the right while pulling to remove.

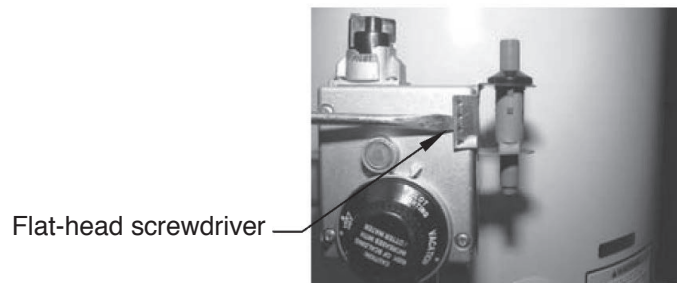
PIEZO IGNITER, ELECTRODE TESTING AND REPLACEMENT

With the pilot not in operation (no pilot flame) you can check the piezo and electrode circuit by viewing pilot through the sight glass located on the inner door and observing the spark action.

- Step 1. Remove the outer jacket door.
- Step 2. Repeatedly depress the piezo igniter while viewing the pilot through the sight glass. If a spark is present, the circuit is O.K.. If there is no spark, proceed to Step 3.
- Step 3. Remove orange (or white) wire from piezo igniter and install a jumper wire in its place. Hold the other end of the jumper by the wire insulation or using an insulated tool, next to an unpainted surface such as the feedline or gas valve and depress the piezo igniter. If there is a spark, the igniter is O.K., the pilot is not functioning and must be replaced (see Service Procedure RG-III for pilot replacement). If no spark is present the igniter is not functioning and must be replaced.



- Step 4a. **For White Rodgers Mechanical gas valves:** To replace the igniter, disconnect orange wire from piezo igniter. Use a flat-head screwdriver under piezo bracket and gently pry bracket from the front of the gas valve and unhook the bracket from rear of the gas valve.



- Step 4b. **For Honeywell gas controls:** To replace the igniter, see the Honeywell ONLY information in Service Procedure RG-VI.

GAS VALVE TESTING AND REPLACEMENT (White Rodgers Mechanical)

The gas valve is a non-repairable device. If troubleshooting has determined a problem with the gas valve, it must be replaced.

If the burner and/or pilot do not function, service checks for gas pressure, thermocouple output, magnet assembly, and ECO are to be performed. If these check O.K., the gas valve may be faulty.

LINE PRESSURE

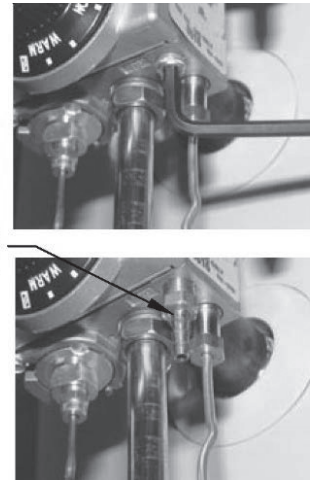
The gas valve is designed for a maximum line pressure of 14.0" W.C., and a minimum line pressure based on the manifold pressure plus 1.0" W.C. (check rating plate for rated manifold pressure). Line pressure must be checked with burner on and burner off to assure proper readings.

MANIFOLD PRESSURE TESTING

(This procedure assumes a maximum line pressure of 14.0" W.C.)

- Step 1. Set gas valve to "OFF" position.
- Step 2. Remove the pressure tap plug (3/16" Allen wrench) and install pressure tap.
- Step 3. Connect the manometer to pressure tap.
- Step 4. Follow the lighting instructions and proceed to light main burner and observe manometer reading.
- Step 5. Proper operating range for natural gas is 4.0 ± 0.5 " W.C.
Proper operating range for L.P. gas is 10.0 ± 0.5 " W.C.
 - a. If pressure is O.K., set gas valve to "OFF" remove manometer and pressure tap and replace pressure tap plug. Check for gas leaks before placing water heater back in operation.
 - b. If pressure is out of the specification noted above, proceed to Step 6 for proper service procedure.
- Step 6. The manifold pressure is **NOT** adjustable. If manifold pressure is outside of the range in Step 5, the control must be replaced.

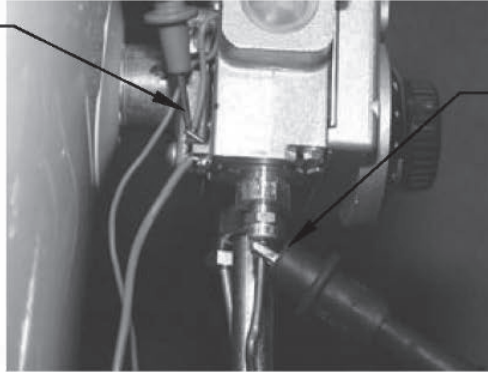
Pressure tap
shown installed



MAGNET ASSEMBLY TESTING (White Rodgers Mechanical Control)

- Step 1. Following the lighting instruction label on the heater, proceed to light the pilot and allow to operate for three minutes. If the pilot will not stay lit, hold the pilot button (located on the gas valve) down during this test.
- Step 2. Using a multimeter capable of measuring millivolts, connect one lead using an alligator clip to the copper sheath of the thermocouple. Use the second lead of the multimeter to probe the top terminal located at the back of the gas valve.

Probe top terminal on
back of combination
thermostat/gas valve

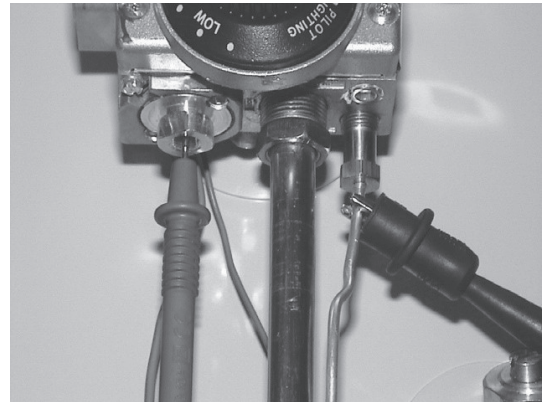


Alligator clip to copper
sheath of thermocouple

- Step 3. With a meter reading of 13 millivolts or greater, rotate the knob of the combination thermostat/gas valve to the "OFF" position.
- Step 4. The magnet should remain closed for a drop of at least 6 millivolts. You will hear a "snap" or "click" sound when the magnet opens; if you hear this sound prior to a drop of 6 millivolts, the magnet is out of specification and the gas valve should be replaced.

ECO (ENERGY CUT OFF) TESTING

- Step 1. Disconnect the thermocouple from the gas valve.
- Step 2. Using a multimeter capable of measuring ohms (or continuity), attach one lead using an alligator clip to the pilot tube. Insert the other lead fully into the magnet opening, be sure the lead makes contact only at the top center of the magnet opening. **DO NOT** allow the lead to make contact with the threaded sides of the opening.

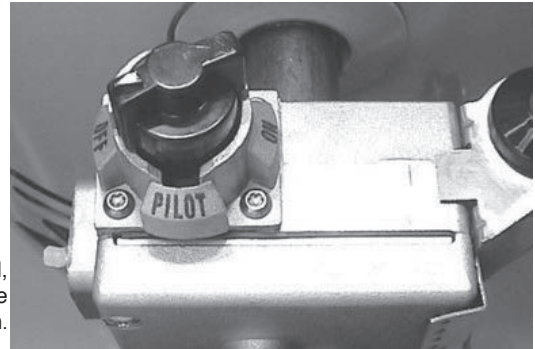


- Step 3. If continuity is indicated, the ECO is O.K.. If continuity is not indicated, the ECO has opened, and the gas valve must be replaced.

COMBINATION THERMOSTAT/GAS VALVE REPLACEMENT

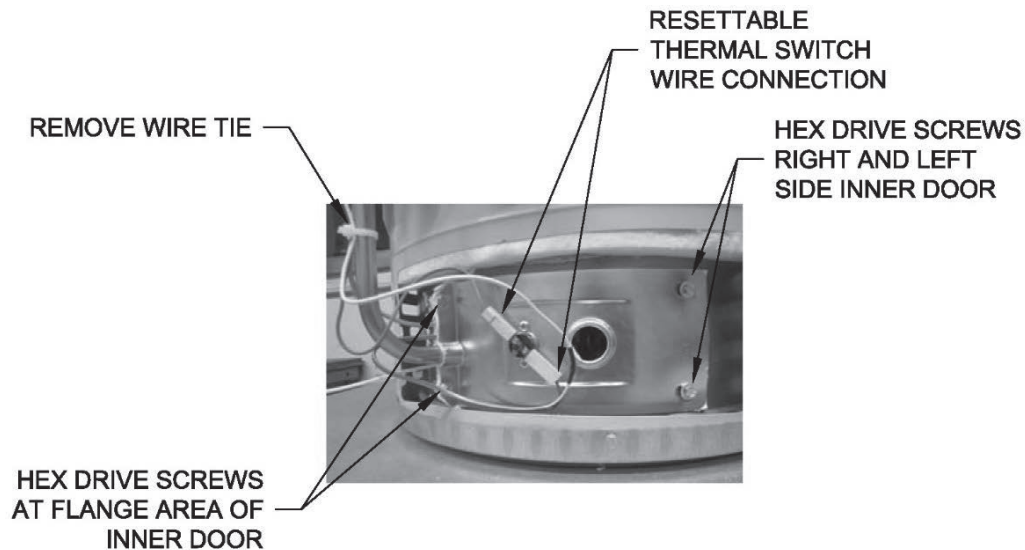
- Step 1. Rotate the knob of the gas valve to the "OFF" position.
- Step 2. Turn off gas supply to the water heater.
- Step 3. Disconnect the gas supply line from the gas valve.
- Step 4. Turn off water supply and drain the water heater completely.
- Step 5. Remove the outer jacket burner access door.

For White Rodgers Control,
depress knob slightly and rotate
clockwise to the "OFF" position.



Step 6. Right side inner door removal:

- a) Disconnect resettable thermal switch wire leads (leading from gas valve) and remove the wire tie from the feedline.
- b) Remove two (2) 1/4" hex drive screws from the right side inner door.
- c) Remove two (2) 1/4" hex drive screws from the flange section of inner door.
- d) Remove the right side inner door and set aside. Be careful to not damage the gasket material on the inner door.



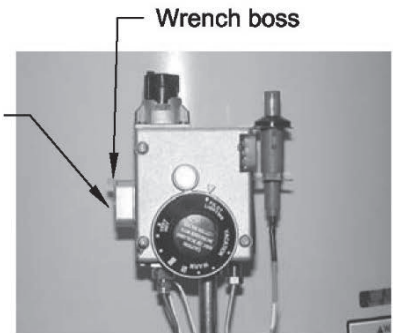
Step 7. Removal of gas valve:

- a) Disconnect the main burner feedline, pilot tube and thermocouple from the gas valve. Remove the burner from combustion chamber.

NOTE: Feed line nut for natural gas control uses right hand threads; L.P. control uses left hand thread.

- b) Remove piezo bracket with piezo igniter (refer to Service Procedure RG-IV) from gas valve.
- c) Remove gas valve from water heater, rotating counter clockwise using a control body wrench or a length of 1/2" NPT pipe threaded into inlet of control.

To remove or install control, insert only 1/2" NPT threaded pipe into inlet and use to loosen or tighten control



Step 8. Installation of gas valve:

- a) Install new gas valve using a control body wrench or a length of 1/2" NPT pipe threaded into inlet of control. **DO NOT OVER TIGHTEN.** Use caution not to damage cast aluminum body of gas valve. Be certain not to damage the bundled wire leads.

NOTE: Gas valve must be installed in proper upright position to assure the feedline will align properly at the inner door flange. **DO NOT OVER TIGHTEN.** If control is turned past proper alignment, **DO NOT** reverse direction to align.

- b) Reattach piezo bracket with piezo igniter to gas valve.
- c) Reattach main burner feedline, pilot tube and thermocouple to gas valve.

NOTE: Feedline nut for natural gas control uses right hand threads; L.P. control uses left hand thread.

- d) Gather wire leads of gas valve and piezo igniter and secure alongside of feedline using new wire tie provided.
- e) Connect gas supply piping to inlet of control. Use back up wrench on wrench boss of control, **NEVER** use back up wrench on body of control.

Step 9. Reinstallation of inner door assembly:

- a) Prior to reinstallation of inner door, fully inspect inner door gasket for the following:

- Tears
- Missing material
- Cracks
- Dirt or debris
- Gasket adhesion to inner door
- Other imperfections that will inhibit proper seal
- Material left on combustion chamber

If the gasket is not affected by any of the above, gasket replacement will not be required.

If replacement is required, replace using new gasket kit following the provided instructions.

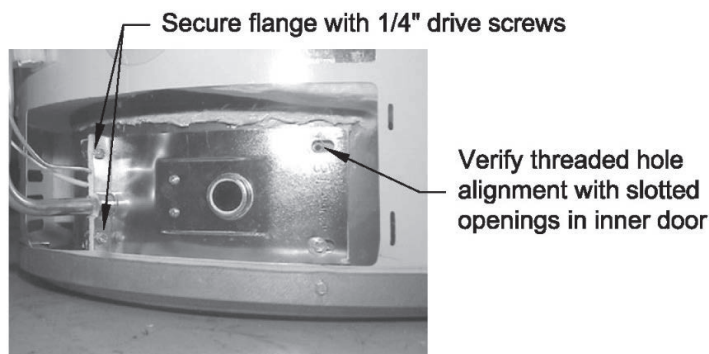
Step 9. Reinstallation of inner door assembly (cont.):

- b) Clean any gasket residue or other debris from combustion chamber surface before installing the inner door/gasket assembly.
- c) Position thermocouple, pilot tube and piezo wire against left side inner door flange gasket. **DO NOT ROUTE THROUGH RADIUSED CHANNEL WITH FEEDLINE.** Be sure that thermocouple and pilot tube are not in position to interfere with outer jacket burner access door when reinstalled.

⚠ WARNING

A seal breach may result in a fire or explosion causing property damage, personal injury or death.

- d) Firmly place the right side inner door flange against the left side inner door flange and secure with two (2) hex drive screws from Step 6c. **DO NOT OVER TIGHTEN SCREWS.**
- e) Align the right side inner door to combustion chamber and verify the fastener holes of the combustion chamber are aligned with the right-side inner door slotted openings. Verify seal integrity around the combustion opening. Secure right-side inner door using two (2) hex drive screws from Step 6b. **DO NOT OVER TIGHTEN SCREWS.** Verify both left and right sides of the inner door are properly positioned and sealed against the combustions chamber.



- Step 10. Reconnect wire leads from gas valve to resettable thermal switch (see photo in Step 6).
NOTE: Wire terminations are interchangeable with either resettable thermal switch connection.
- Step 11. Replace the outer jacket burner access door.
- Step 12. Reconnect the gas supply to the gas valve.
- Step 13. Resume water supply to the water heater. Be sure the tank is full of water.
- Step 14. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

LINE PRESSURE

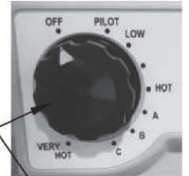
The gas valve is designed for a maximum line pressure of 14.0" W.C., and a minimum line pressure based on the manifold pressure plus 1.0" W.C. (check rating plate for rated manifold pressure). Line pressure must be checked with burner on and burner off to assure proper readings.

MANIFOLD PRESSURE TESTING

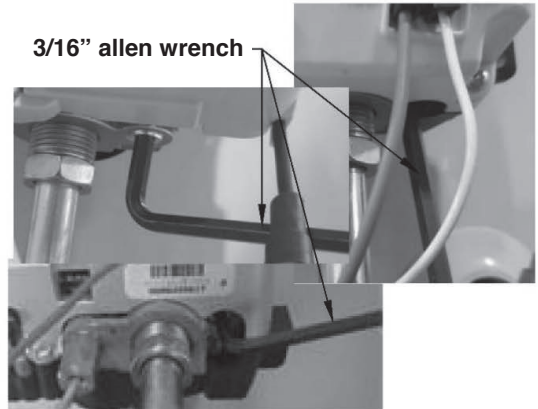
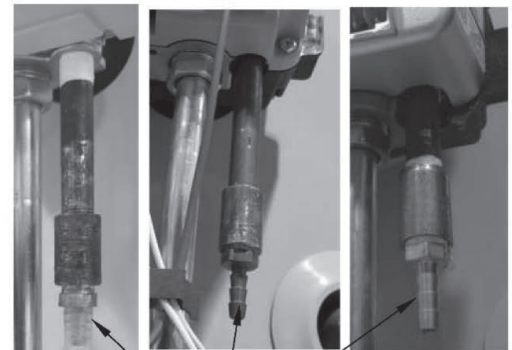
(This procedure presumes a maximum line pressure of 14.0" W.C.)

- Step 1. Set the gas control to the "OFF" position.
- Step 2. Remove pressure tap plug (3/16" allen wrench) and install 1/8" NPT pipe, coupling, and pressure tap.
- Step 3. Connect manometer to pressure tap.
- Step 4. Follow instructions located on the lighting instructions label and proceed to light the main burner and observe manometer reading.
- Step 5. Proper operating range for natural gas is:
4.0" $\pm$ 0.5" W.C.
Proper operating range for L.P. gas is:
10.0" $\pm$ 0.5" W.C.
 - a) If pressure is within the range specified in the previous step, set gas control knob to the "OFF" position, remove manometer and pressure tap, and replace pressure tap plug. Check for gas leaks prior to placing water heater back into operation by following the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.
 - b) If gas pressure is outside the specification noted above, refer to the following Honeywell ONLY information, or "Gas Control Replacement" to replace gas control or valve body.
- Step 6. The manifold pressure is NOT adjustable. If manifold pressure is outside of the range in Step 5, the control must be replaced.

Gas controls shown in the "OFF" position



3/16" allen wrench



Pressure tap shown installed

ECO (ENERGY CUT OFF) TESTING

The Honeywell and White Rodgers Electronic gas control is designed with an ECO device that will reset.

To reset the gas control after a status code 4, turn the gas control knob to the "OFF" position and wait a minimum of five (5) minutes before relighting following the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

NOTE: The following procedure applies to the Honeywell gas control ONLY.

SERVICE PROCEDURE RG-VI
Gas Control Testing, Disassembly, & Replacement
(Honeywell ONLY)

HONEYWELL COVER REMOVAL

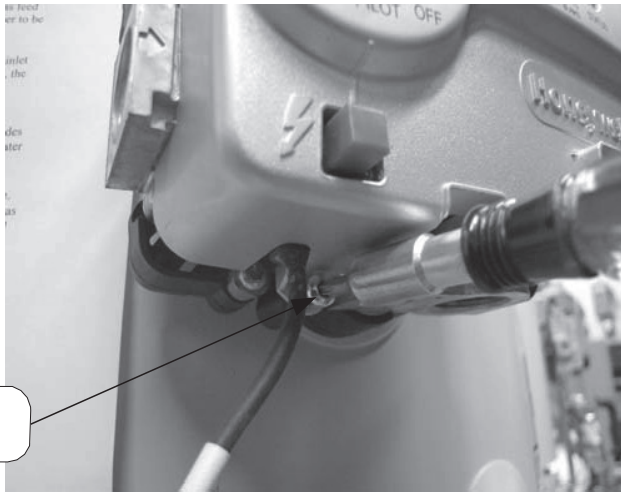
- Step 1. Rotate the knob of the gas control to the "OFF" position.
- Step 2. Turn off gas supply to the water heater.
- Step 3. Disconnect the gas supply line from the gas control.
- Step 4. Disconnect the piezo igniter wire.
- Step 5. Remove the gas control cover screw using flat-head screwdriver.

⚠ CAUTION

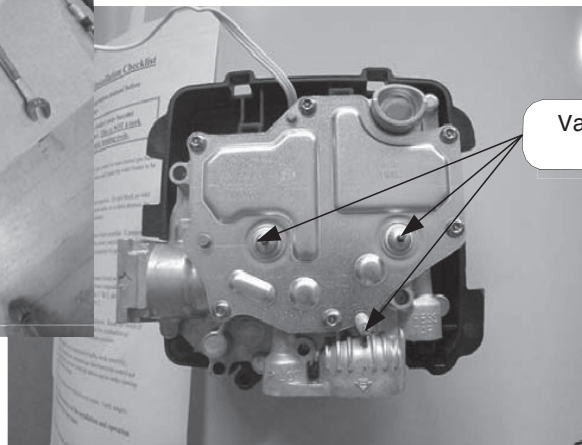
Use caution to not bend or damage valve body pins when removing or installing the gas control cover.



Rotate knob counter-clockwise to the "OFF" position

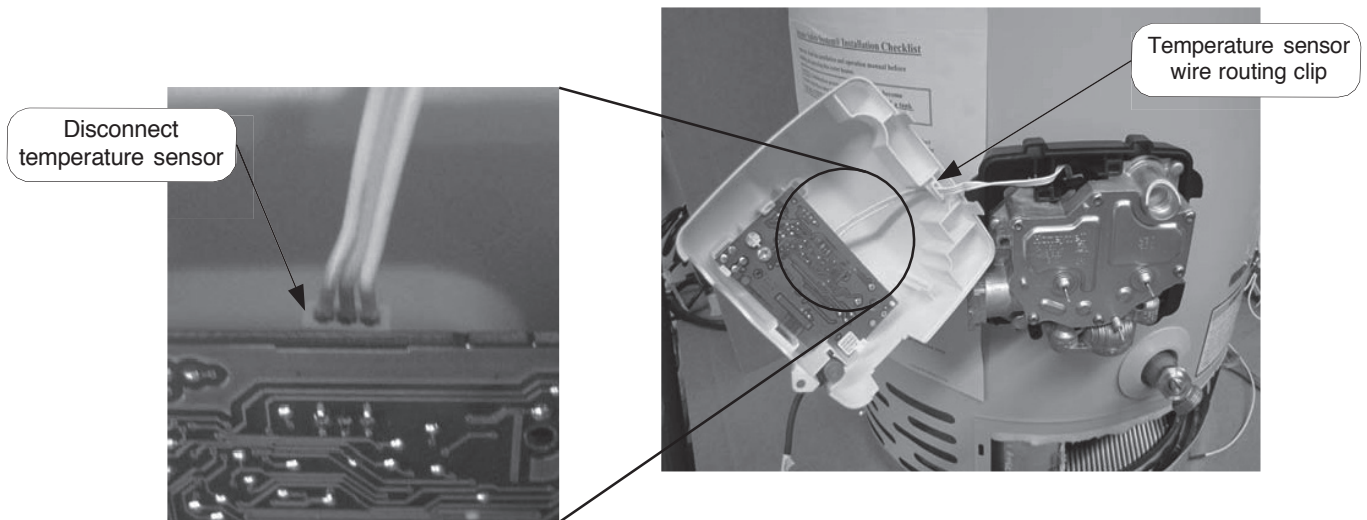


- Step 6. Depress both tabs on the top of the gas control cover and pull straight out to remove.

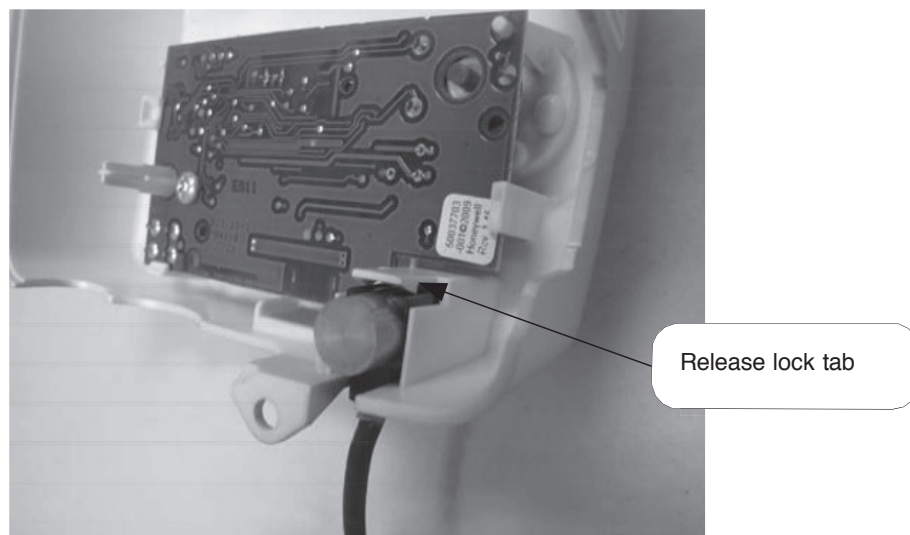


HONEYWELL COVER REMOVAL (cont.)

Step 7. Disconnect the temperature sensor from the control board and remove the wire from the temperature sensor wire routing clip.



Step 8. Remove the piezo igniter from the control cover by releasing the lock tab on the control cover.

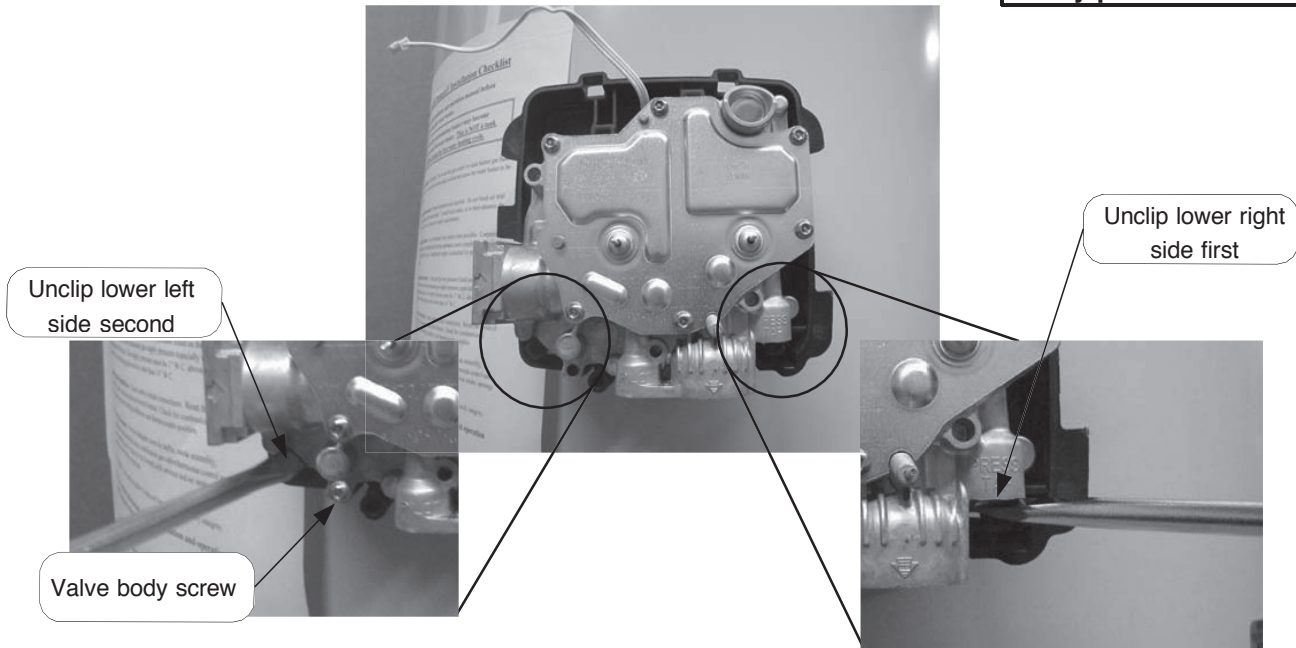


HONEYWELL VALVE BODY REMOVAL AND TEMPERATURE SENSOR REMOVAL

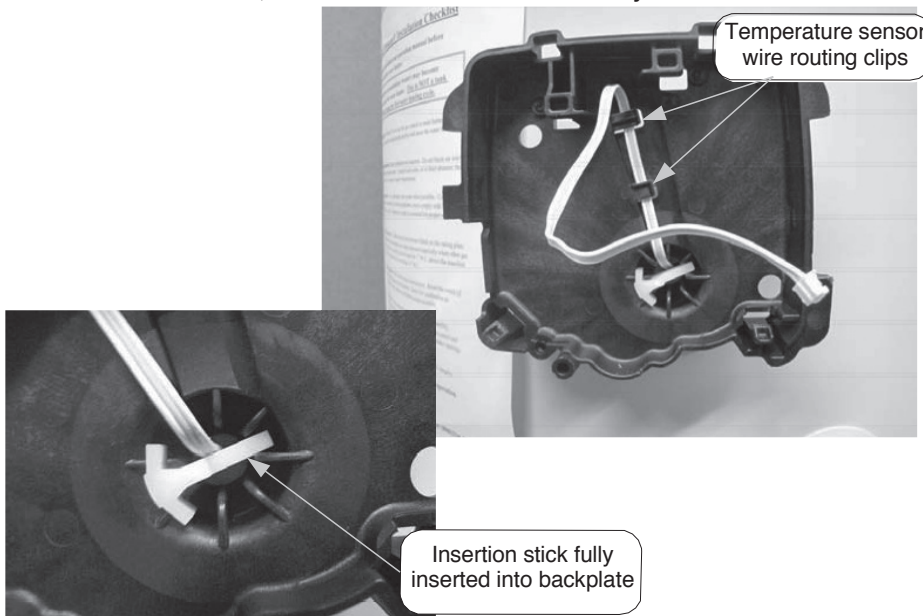
- Step 1. Disconnect the burner and pilot tubes per Service Procedure RG-II.
Step 2. Remove the valve body by removing the screw located at the lower left corner. Unclip the lower right side from the backplate first, followed by the lower left side, using a flat-head screwdriver.

⚠ CAUTION

Use caution to not bend or damage valve body pins.



- Step 3. Remove the temperature sensor and insertion stick from the backplate by first removing the wire from the temperature sensor wire routing clips. Make note of the insertion stick's orientation, as the insertion stick can only be installed in one way.

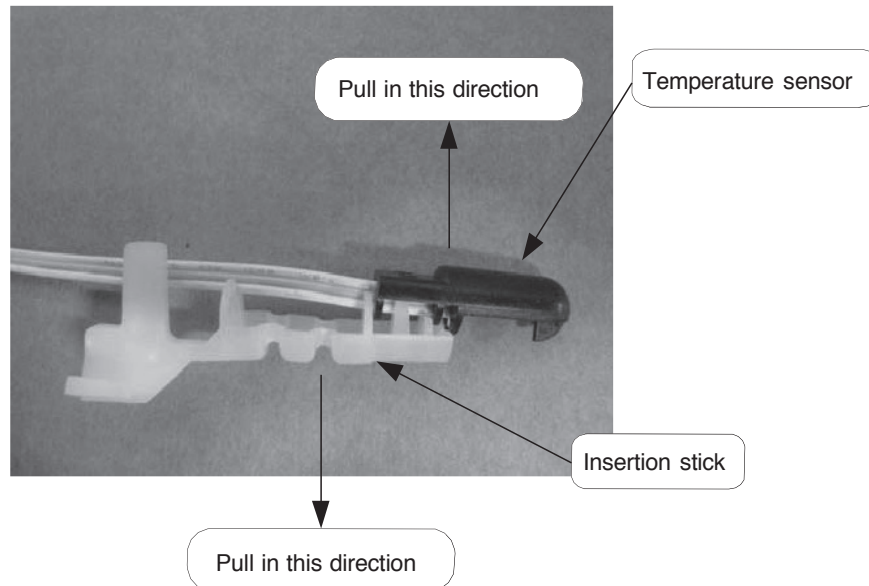


⚠ CAUTION

When reinstalling temperature sensor and insertion stick, make sure the assembly is inserted **FULLY** into the backplate and the wires are routed through the wire routing clips. Failure to do so will not allow the valve body to be reinstalled properly and may damage temperature sensor wires.

HONEYWELL VALVE BODY REMOVAL AND TEMPERATURE SENSOR REMOVAL (cont.)

Step 4. Remove the temperature sensor from the insertion stick by pulling apart as illustrated below.



Step 5. To reassemble the gas control, follow the previous steps in reverse order. Once the gas control is reassembled, the burner assembly is reinstalled, and the gas supply line is reconnected, resume water supply to the water heater. Be sure the tank is full of water before relighting.

Step 6. To resume operation, follow the instructions located on the lighting instruction label, or the lighting instructions located in the Installation and Operation Manual.

TEMPERATURE SENSOR TESTING (Honeywell)

Step 1. If control has gone into lockout due to excessive tank temperature (four flashes, three second pause), reset control by rotating gas control knob to "OFF" position and wait a minimum of five (5) minutes. Then follow lighting instructions and return the gas control knob to a desired setpoint.

Step 2. Observe green light indicator. Does status code 4 (four flashes, three second pause) appear?

- a) If no, resume normal operation.
- b) If yes, continue with Step 3.

Step 3. Following "Honeywell Cover Removal," "Honeywell Valve Body Removal and Temperature Sensor Removal" instructions, disassemble gas control to access the temperature sensor.

Step 4. With the temperature sensor still in the back plate, use a multimeter set to the ohms setting, determine the resistance of the temperature sensor (see photo).

Step 5. See next page to obtain water temperature. Are temperature sensor resistance values correct?

- a) If no, replace the temperature sensor.
- b) If yes, replace the gas control.

⚠ CAUTION

DO NOT use standard multimeter probes for this test. Doing so will damage connector. Use special pin type electronic probes or small diameter wire pins inserted into connector.

NOTE: Using a multi-meter set to the ohms setting, insert one-meter probe into center wire position of thermal well connector, insert the second probe into either of the outside wire positions (see photo).

Alternate the probe on the outside position to the opposite outside wire position (see photo).

⚠ WARNING

Stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

DETERMINE WATER TEMPERATURE

NOTE: It is important to understand once the resistance for the temperature sensor is determined from the previous page, water flow through the water heater should not occur. Prior to drawing water from drain valve, turn off the cold-water supply to the water heater. This will prevent cold water flow into the tank, affecting the resistance value of the temperature sensor.

- Step 1. Set the gas control knob to the "OFF" position. Turn off inlet water supply to water heater.
- Step 2. Draw approximately 4 gallons of water from drain valve into a container, or suitable drain, and discard. Draw an additional gallon and immediately measure water temperature using an accurate thermometer. It may be necessary to open a hot water faucet to allow water heater to drain.
- Step 3. Using the chart below, determine correct resistance value for the water temperature from Step 2.

Example: If temperature of water is 84°F, then the resistance through the sensor would be 8449 (see shaded area).

NOTE: Sensor resistance increases as the temperature decreases.

Sensor Resistance at Various Temperatures

In Degrees F										
°F	0	1	2	3	4	5	6	7	8	9
40	26109	25400	24712	24045	23399	22771	22163	21573	21000	20445
50	19906	19383	18876	18383	17905	17440	16990	16553	16128	15715
60	15314	14925	14548	14180	13823	13477	13140	12812	12494	12185
70	11884	11592	11308	11032	10763	10502	10248	10000	9760	9526
80	9299	9078	8862	8653	8449	8250	8057	7869	7685	7507
90	7333	7165	7000	6839	6683	6531	6383	6238	6098	5961
100	5827	5697	5570	5446	5326	5208	5094	4982	4873	4767
110	4663	4562	4464	4368	4274	4183	4094	4006	3922	3839
120	3758	3679	3602	3527	3453	3382	3312	3244	3177	3112
130	3048	2986	2925	2866	2808	2752	2697	2643	2590	2538
140	2488	2439	2391	2344	2298	2253	2209	2166	2124	2083
150	2043	2004	1966	1928	1891	1856	1820	1786	1753	1720
160	1688	1656	1625	1595	1566	1537	1509	1481	1454	1427
170	1402	1376	1351	1327	1303	1280	1257	1235	1213	1191
180	1170	1150	1129	1110	1090	1071	1053	1035	1017	999
190	982	965	949	933	917	901	886	871	857	842
200	828	814	801	788	775	762	749	737	725	713

GAS CONTROL REPLACEMENT

Step 1. Rotate knob of the gas control to the "OFF" position.

Step 2. Turn off gas supply to the water heater.

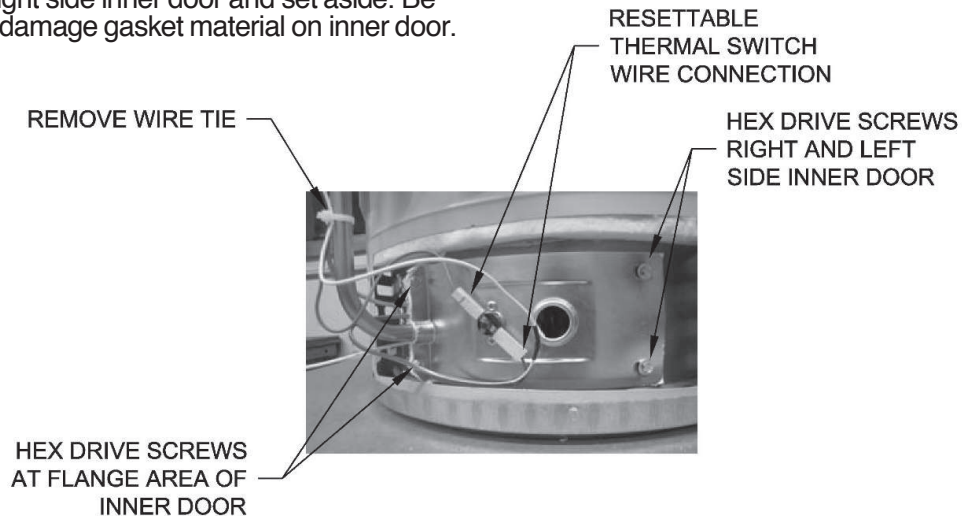
Step 3. Disconnect the gas supply line from gas control.

Step 4. Turn off the water supply and drain the water heater completely.

Step 5. Remove the outer jacket burner access door.

Step 6. Right side inner door removal:

- a) Disconnect the red wire leads from the resettable thermal switch.
- b) Remove two (2) 1/4" hex drive screws from RIGHT side inner door.
- c) Remove two (2) 1/4" hex drive screws from FLANGE SECTION of inner door.
- d) Remove the right side inner door and set aside. Be careful to not damage gasket material on inner door.



Step 7. Removal of gas control:

- a) Disconnect main burner feedline, pilot tube, piezo igniter wire, inner door wire (red), and thermopile wire (white) from gas control.
- b) Remove gas control from water heater by rotating counter clockwise. **DO NOT** use a wrench on the gas control body, damage to the gas control may occur. If necessary, use a length of 1/2" NPT pipe threaded into gas inlet of gas control.

Step 8. Install new gas control into water heater:

- a) Install a new gas control into water heater by rotating clockwise. **DO NOT** use a wrench on the gas control body, as damage to the gas control may occur. If necessary, use a length of 1/2" NPT pipe threaded into gas inlet of gas control.

GAS CONTROL REPLACEMENT (cont.)

Step 8. Install new gas control into water heater (cont.):

- b) Reattach the main burner feedline, pilot tube, piezo igniter wire, inner door wire (red), and thermopile wire (white) to the gas control. Attach the inner door wire (red) to the positive (+) terminal and the thermopile wire (white) to the negative (-) terminal.

⚠ CAUTION

Use back up wrench on wrench boss of gas control,
NEVER use back up wrench on body of gas control.

- c) Gather piezo igniter wire, thermopile wire (white), inner door wire (red), and pilot alongside of feedline using new wire tie provided.
d) Reconnect gas supply piping to inlet of gas control.

Step 9. Reinstallation of inner door assembly:

- a) Prior to reinstallation of inner door, fully inspect inner door gasket for the following:

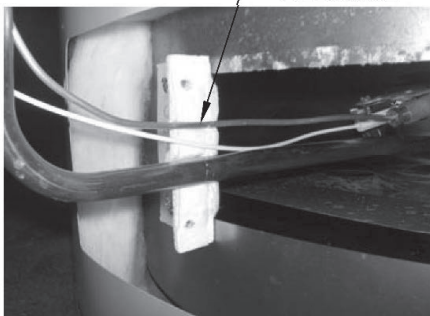
- Tears
- Missing material
- Cracks
- Dirt or debris
- Gasket adhesion to inner door
- Material left on combustion chamber
- Other imperfections that will inhibit proper seal

If the gasket is not affected by any of the above, gasket replacement will not be required. If replacement is required, replace using new gasket kit following the instructions provided with kit.

- b) Clean any gasket residue or other debris from combustion chamber surface before installing the inner door/gasket assembly.

- c) Position thermopile wire, pilot tube, and piezo wire against left side inner door flange gasket. **DO NOT ROUTE THROUGH RADIUSED CHANNEL WITH FEEDLINE.** Be sure that the thermopile and pilot tube are not in position to interfere with outer jacket burner access door when reinstalled.

POSITION
THERMOCOUPLE/THERMOPILE,
PILOT TUBE AND
PIEZO WIRE



⚠ WARNING

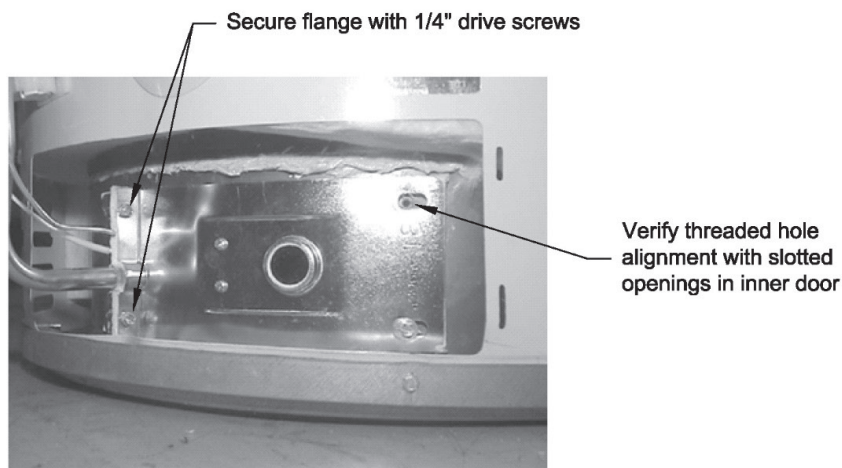
A seal breach may result in a fire or explosion causing property damage, personal injury or death.

GAS CONTROL REPLACEMENT (cont.)

Step 9. Reinstallation of inner door assembly (cont.):

- d) Firmly place right side inner door flange against the left side inner door flange and secure with two (2) 1/4" hex drive screws from Step 6c. **DO NOT OVER TIGHTEN SCREWS.**
- e) Align the right side inner door to combustion chamber and verify the fastener holes of the combustion chamber are aligned with the right side inner door slotted openings. Verify seal integrity around the combustion opening. Secure right side inner door using two (2) 1/4" hex drive screws from Step 6b. **DO NOT OVER TIGHTEN SCREWS.** Verify both left and right sides of the inner door are properly positioned and sealed against the combustion chamber.

⚠ CAUTION
Use back up wrench on wrench boss of gas control, **NEVER** use back up wrench on body of gas control.



Step 10. Reconnect two (2) red wire leads from pilot assembly and gas control to resettable thermal switch.

NOTE: wire terminations are interchangeable with either resettable thermal switch connection.

Step 11. Replace the outer jacket burner access door.

Step 12. Reconnect the gas supply to gas control.

Step 13. Resume water supply to the water heater. Be sure the tank is full of water before resuming operation.

Step 14. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

MAIN BURNER: Inspection, Adjustment, Cleaning and Replacement

At periodic intervals (not more than 6 months) a visual inspection should be made of the main burner for proper operation and to ensure no debris accumulation.

Main burner should light smoothly from pilot and burn with a blue flame with a minimum of yellow tips.

Steel burner models have a self-adjusting air mixture and do not have an adjustable air shutter.

Main burner must be free from any debris accumulation that may affect burner operation (see burner cleaning procedure on page 36).

⚠ DANGER

Under **NO** circumstances should flammable materials be used or stored in the vicinity of the water heater. With the inner door removed the Bradford White Defender Safety System will be deactivated. If flammable vapors are present, a fire or explosion may result causing property damage, personal injury, or death.

⚠ WARNING

Inner door and burner components may be **HOT** when performing this operation. Take necessary precaution to prevent personal injury.

BURNER REMOVAL

Step 1. Remove inner door assembly per Service Procedure RG-I, Steps 1 through 3c.

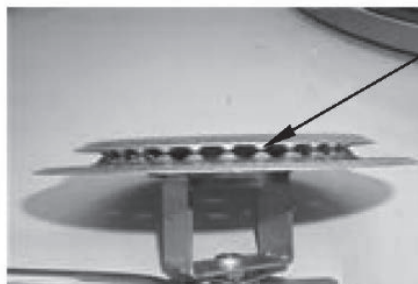
Step 2. Disconnect the main burner feed line, pilot tube and thermocouple/thermopile from combination thermostat gas valve and remove burner assembly from combustion chamber.

NOTE: Feedline nut for natural gas control uses right hand threads;
L.P. control uses left hand thread.

Step 3. Thoroughly inspect burner surface area and burner ports and remove any loose debris accumulation.



**BURNER SURFACE
AREA**



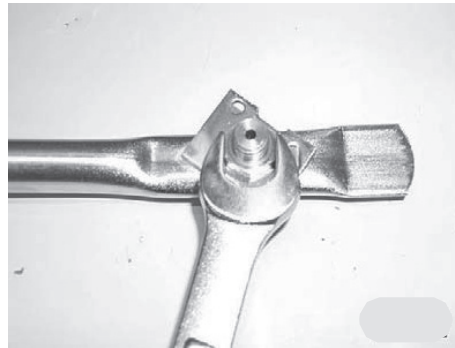
BURNER PORT AREA

BURNER CLEANING

- Step 4. Disconnect the burner plate from main burner orifice and disconnect feedline from burner.



- Step 5. Remove main burner orifice from feed line. Inspect and clean if necessary.



- Step 6. Remove pilot assembly, refer to Service Procedure RG-III for cleaning and inspection.
- Step 7. Using a stiff brush and compressed air, clean the burner plate and feedline, then reassemble all components.
- Step 8. Inspect combustion chamber area of heater prior to reinstallation of burner assembly. If cleaning is required, refer to Service Procedure RG-VIII.
- Step 9. Reinstall burner assembly into combustion chamber, reconnect feedline, thermocouple and pilot tube to the combination thermostat/gas valve.
- Step 10. Reinstall inner door per Service Procedure RG-I.
- Step 11. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the installation and operation manual.

RESETTABLE THERMAL SWITCH CONTINUITY TESTING

- Step 1. Remove the outer jacket door.
- Step 2. Disconnect the wire leads from the resettable thermal switch.
- Step 3. Using a multimeter capable of measuring continuity (ohms), place one probe of meter on one of the brass connection tabs of the resettable thermal switch, and the remaining probe on the other connection tab.
- Step 4. If continuity is indicated, the switch is closed, allowing millivolt current to pass.
- Step 5. If continuity is not indicated, the switch is open, possibly due to an overheating condition. The switch is designed to open at predetermined temperatures depending on model. An open switch can be reset by depressing the red colored button located at the center of the switch. The overheating condition must be determined prior to putting the heater back in service.

<u>PROBABLE CAUSE FOR RESETTABLE THERMAL SWITCH ACTIVATION</u>	
<u>PROBABLE CAUSE</u>	<u>PROBABLE CAUSE</u>
Insufficient combustion air	<ol style="list-style-type: none"> 1. Verify adequate combustion air supply is available. 2. Clear jacket slot openings of any dirt, dust, restrictions or other obstructions. 3. Inspect flame arrestor plate and clean with a stiff brush, compressed air to remove scale deposits and debris.
<ol style="list-style-type: none"> 1. Weak switch or switch out of calibration. 2. Incorrect switch. 	<ol style="list-style-type: none"> 1. Replace resettable thermal switch. 2. Verify switch color code and approximate temperature.
Flammable vapor incident	<ol style="list-style-type: none"> 1. Replace water heater.

Resettable thermal switch color code reference	
Color code	Approximate switch activation temperature (open)
Blue	240°
Yellow	270°
Red	290°

RESETTABLE THERMAL SWITCH REPLACEMENT

Step 1. Rotate the knob of combination thermostat/gas valve to the "OFF" position.

Step 2. Remove the outer jacket door.

Step 3. Disconnect the wire leads from the resettable thermal switch.

Step 4. Remove the resettable thermal switch from the inner door (Phillips screwdriver).



Step 5. Put new resettable thermal switch in place. Be sure contact surface of resettable thermal switch and inner door are free of any debris. Secure resettable thermal switch into place using screws from Step 4. **DO NOT OVER TIGHTEN SCREWS.**

Step 6. Reconnect wire leads from combination thermostat/gas valve to resettable thermal switch.

NOTE: Wire terminations are interchangeable with either resettable thermal switch connection.

Step 7. Replace the outer jacket door.

Step 8. To resume operation, follow the instructions located on the lighting instruction label or the lighting instruction located in the Installation and Operation Manual.

ScreenLok® Flame Arrestor Cleaning

Step 1. Rotate knob of combination thermostat gas valve to the off position.

Step 2. Remove the outer jacket door.

Step 3. Remove inner door per Service Procedure RG-I, Steps 3a through 3e.

Step 4. Disconnect the main burner feed line, pilot tube, and thermocouple/thermopile from combination thermostat gas valve and remove burner assembly from the combustion chamber.

NOTE: Feedline nut for natural gas control uses right hand threads;
L.P. control uses left hand thread.

Step 5. Clean ScreenLok® Flame Arrestor using stiff brush and compressed air to remove any scale or other debris accumulation. Using a soft brush, clear jacket openings of any dirt, dust, restrictions, or other obstructions.

Step 6. Remove any debris from burner assembly per Service Procedure RG-V and reinstall burner assembly into combustion chamber.

Step 7. Reconnect feedline, thermocouple, and pilot tube to the combination thermostat/gas valve.

Step 8. Reinstall inner door per Service Procedure RG-I.

Step 9. To resume operation, follow the instructions located on the lighting instruction label or the lighting instruction located in the Installation and Operation Manual.

DIPTUBE INSPECTION AND REPLACEMENT

⚠ WARNING

Heater components and stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

- Step 1. Rotate the knob of combination thermostat/gas valve to “OFF” position.
- Step 2. Turn off cold water supply to the water heater. Connect a hose to the drain spigot of the water heater and route to an open drain. Open a nearby hot water faucet to vent the heater for draining. Open drain spigot of the water heater and allow the heater to drain to a point below the inlet connection nipple.
- Step 3. Disconnect the inlet nipple from plumbing system.
- Step 4. With an appropriate wrench, remove the inlet nipple/dip tube from the water heater. Use caution to not damage pipe threads.
- Step 5. Visually inspect inlet nipple/dip tube. Inlet nipple/dip tube should be free of cracks and any blockage. Hydro-jets located near the bottom of the dip tube should be open and free of any blockage. The anti-siphon hole, located approximately 6 in from the bottom of nipple, should be free of any blockage.
- Any damage such as cracks, restriction due to deformation or unintentional holes are not field repairable and the inlet nipple/dip tube must be replaced.
- Step 6. Upon completion of inspection or subsequent replacement, reinstall the inlet nipple/dip tube into the heater. Ensure pipe dope is used on the nipple's threads. Connect the nipple to the plumbing system, resume the water supply, and refill the heater with water.
- Step 7. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

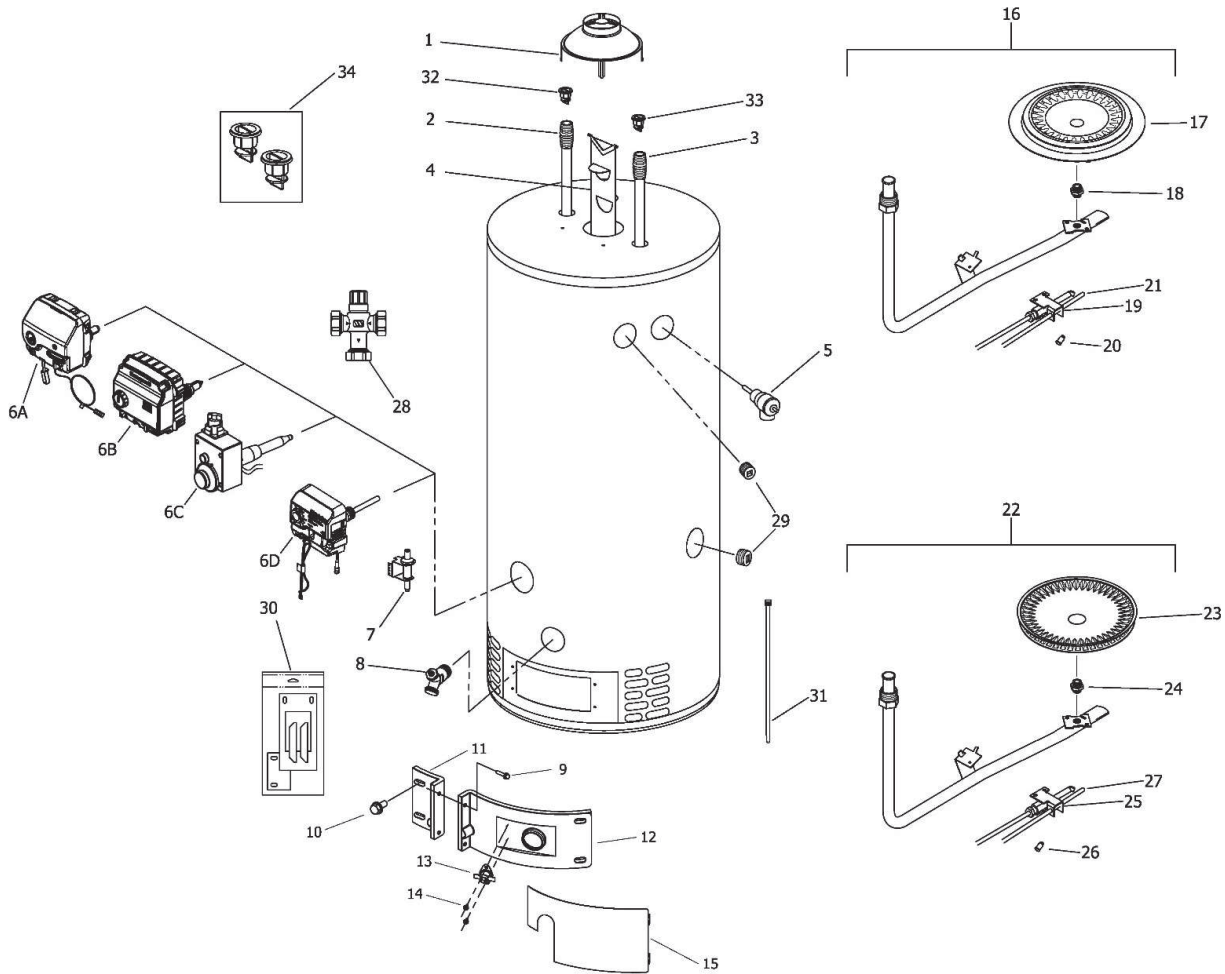
ANODE INSPECTION AND REPLACEMENT

⚠ WARNING

Heater components and stored water may be HOT when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

- Step 1. Turn off water supply to water heater. Rotate knob of combination thermostat/gas valve to "OFF" position.
- Step 2. Turn off cold water supply to the water heater. Connect a hose to the drain spigot of the water heater and route to an open drain. Open a nearby hot water faucet to vent the heater for draining. Open the drain spigot of the water heater and allow the heater to drain to a point below the outlet connection nipple.
- Step 3. Disconnect the outlet nipple from the plumbing system.
- Step 4. With an appropriate wrench, remove the outlet nipple/anode from the water heater. Use caution to not damage pipe threads.
- Step 5. Visually inspect outlet nipple/anode. Outlet nipple/anode should show signs of depletion; this is normal. If depletion is 1/2 of the original anode diameter (approximately 5/8" diameter), replacement is recommended. If any of the steel core of the anode is exposed, replacement is recommended.
- Step 6. Upon completion of inspection or subsequent replacement, reinstall the outlet nipple/anode into the heater. Ensure pipe dope is used on the nipple's threads. Connect the nipple to the plumbing system, resume water supply, and refill the heater with water.
- Step 7. To resume operation, follow the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

Parts Diagram



1	Draft Hood	17	Burner Only
2	Hot Water Outlet/Anode	18	Main Burner Orifice
3	Cold Water Inlet Tube	19	Pilot Assembly
4	Flue Baffle	20	Pilot Orifice
5	T&P Relief Valve	21	Thermocouple/Thermopile
6A	Gas Control (Honeywell V1)	22	Complete Burner Assembly (LP)
6B	Gas Control (Honeywell V2)	23	Burner Only (LP)
6C	Gas Control (White Rodgers Mechanical)	24	Main Burner Orifice (LP)
6D	Gas Control (White Rodgers Electronic)	25	Pilot Assembly (LP)
7	Piezo Igniter (White Rodgers Mechanical)	26	Pilot Orifice(LP)
8	Brass Drain Valve	27	Thermocouple/Thermopile (LP)
9	Screw-#8-18 x 3/4 Hex Washer Head	28	ASSE Approved Mixing Valve (Optional)
10	Screw-#10-12 x 3/4 Hex Washer Head	29	3/4 NPT Tank Plug (H Models)
11	Left Side Inner Door with Gasket	30	Inner Door Gasket Kit
12	Complete Right Side Inner Door	31	Wire Tie
13	Resettable Thermal Switch	32	Heat Trap (Outlet)
14	Screw-#6-20 x 3/8 PHCR	33	Heat Trap (Inlet)
15	Outer Door	34	Heat Trap Kit
16	Complete Burner Assembly (Natural)		

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For U.S. and Canada field service,
contact your professional installer or
local Bradford White sales representative.

Sales/800-523-2931

Technical Support/800-334-3393
Email/techserv@bradfordwhite.com

Warranty/800-531-2111
Email/warranty@bradfordwhite.com

Service Parts/800-538-2020
Email/Parts@bradfordwhite.com

International:
international@bradfordwhite.com



Halton Hills, Ontario, Canada

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Parts/orders@bradfordwhitecanada.com
Orders/ca.orders@bradfordwhite.com

www.bradfordwhite.com

GAS-FIRED WATER HEATER

A Spanish language version of these instructions is available by contacting the company listed on the rating plate.

La versión española de estas instrucciones se puede obtener al escribirle a la fábrica cuyo nombre aparece en la placa de especificaciones.

Installation & Operation Instruction Manual For Flammable Vapor Ignition Resistant System Equipped Water Heater

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result in property damage, personal injury, or death.

For Your Safety

Do NOT store or use gasoline or other flammable, combustible, or corrosive vapors and liquids in the vicinity of this or any other appliance.

– WHAT TO DO IF YOU SMELL GAS

- DO NOT try to light any appliance.
- DO NOT touch any electrical switch; DO NOT use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

– Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

For your family's comfort, safety and convenience, we recommend this water heater be installed and serviced by a plumbing professional.



As required by the state of California Proposition 65.

CONGRATULATIONS!

You have purchased one of the finest water heaters on the market today!

This installation, operation and instruction manual will explain in detail the installation and maintenance of your new Flammable Vapor Ignition Resistant Gas Water Heater. We strongly recommend that you contact a plumbing professional for the installation of this water heater.

We require that you carefully read this manual, as well as the enclosed warranty, and refer to it when questions arise. If you have any specific questions concerning your warranty, please consult the plumbing professional from whom your water heater was purchased. For your records we recommend that you write the model, serial number and installation date of your water heater in the maintenance section in the back of this manual.

This manual should be kept with the water heater.

Special Flammable Vapor Ignition Resistant System

This water heater is equipped with a Flammable Vapor Ignition Resistant System. In the event of improper usage or storage of gasoline or other flammable materials in the location where the water heater is installed, the technology will resist ignition of the flammable vapors outside the confines of the water heater.

The Flammable Vapor Ignition Resistant System features:

- Advanced Flame Arrestor Design
- Re-settable Thermal Switch to prevent burner/pilot operation with restricted airflow
- Piezo Igniter
- Sight Window to observe operation of pilot and burner

FOR YOUR SAFETY: Activation of the Flammable Vapor Ignition Resistant System occurs when flammable vapors are drawn into the water heater and are combusted. If flammable vapors are detected:

- **Do not** try to light any appliance.
- **Do not** touch any electrical switch.
- **Do not** use any phone in your building.
- Leave the premises and immediately call the fire department from a neighbor's phone. Follow the fire department's instructions.

Once the flammable vapor has been evacuated, contact your plumbing professional or the manufacturer for further instructions. Replacement of a Flammable Vapor Ignition Resistant System equipped water heater due to a flammable vapor shutdown is not covered under the terms of the limited warranty.



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GENERAL INFORMATION

This gas-fired water heater is design certified by CSA International under the applicable American National Standard, Z21.10.1 or CSA 4.1-(as indicated on the rating plate), available from CSA International, 8501 East Pleasant Valley Road, Cleveland, OH U.S.A. 44131-5575.

This water heater must be installed in accordance with local codes. In the absence of local codes, it must be installed in compliance with the National Fuel Gas Code (ANSI Z223.1-Latest Edition), or in Canada CAN/CGA B149.1 Natural Gas Installation Code (Latest Edition) or CAN/CGA B149.2 Propane Installation Code (Latest Edition). The warranty for this water heater is in effect only when the water heater is installed, adjusted, and operated in accordance with these Installation and Operating Instructions. The manufacturer will not be liable for any damage resulting from alteration and/or failure to comply with these instructions.

This water heater is not design certified for installation in a mobile home. Such an installation may create a hazardous condition and will nullify the warranty.

This water heater has been designed and certified for the purpose of heating potable water. The installation and use of this water heater for any purpose other than the heating of potable water may cause damage to the water heater, create a hazardous condition, and nullify the warranty.

CAUTION

Incorrect operation of this appliance may create a hazard to life and property and will nullify the warranty.

WARNING

Prior to connecting the gas supply line to a gas fired water heater, ensure that the gas supply line does not have moisture/water or dirt/scale inside the gas line. Commonly this check is done at the lowest point in the gas distribution system prior to gas burning appliances.

Do **NOT** use this appliance if any external part to the tank has been submerged in water. You should contact a qualified service technician to inspect the appliance and to replace any part of the control system including the combination gas control which has been submerged in water. See the Gas Connections section of this manual before servicing or replacing a water heater that has had any external part to the tank submerged in water.

DANGER

DO NOT store or use gasoline or other flammable, combustible, or corrosive vapors and liquids in the vicinity of this or any other appliance.

IMPORTANT

Before proceeding, please inspect the water heater and components for possible damage. **DO NOT** install any damaged components. If damage is evident then please contact the supplier where the water heater was purchased, or the manufacturer listed on the rating plate for replacement parts.

General Information cont.-

This water heater has been manufactured for operation at altitudes from sea level to 2000 ft (610 m) (unless otherwise specified on the water heater rating plate). For use of this appliance at an elevation greater than 2000 ft (610 m), contact the dealer or manufacturer listed on the rating plate for information on any necessary modification. Incorrect operation of this appliance may create a hazard to life and property.

Make sure that you check the rating plate and combination gas control on the water heater to be certain that the type of gas being supplied corresponds with the marking on the rating plate and combination gas control.

A sacrificial anode is used to extend tank life. Removal of any anode, except for inspection and/or replacement, will nullify the warranty. In areas where water is unusually active, an odor may occur at the hot water faucet due to a reaction between the sacrificial anode and impurities in the water. If this should happen, an alternative anode(s) may be purchased from the supplier that installed this water heater. This will minimize the odor while protecting the tank. Additionally, the water heater should be flushed with appropriate dissolvers to eliminate any bacteria.

INSTALLATION

Locating The Water Heater

⚠ WARNING

Water heaters are heat producing appliances. To avoid damage or injury there shall be no materials stored against the water heater or vent-air intake system and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater and vent-air intake components. **UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT-AIR INTAKE SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT-AIR INTAKE SYSTEM.**

This water heater MUST NOT be installed in any location where gasoline or flammable vapors are likely to be present, unless the installation is such to eliminate the probable ignition of gasoline or flammable vapors.

Water heaters in residential garages must be installed and located, or protected, to avoid physical damage. For other installations refer to local codes. In the absence of local codes, the water heater must be installed in compliance with the National Fuel Gas Code, (ANSI Z223.1- Latest Edition), or in Canada CAN/CGA B149.1 Natural Gas Installation Code (Latest Edition) or CAN/CGA B149.2 Propane Installation Code (Latest Edition).

The location of this water heater is of the utmost importance. Before installing this water heater, read the installation section of these instructions. After reading these Installation and Operation Instructions, select a location for the water heater where the floor is level and is easily accessible to gas and water supply lines. **Do NOT locate the water heater where water lines could be subjected to freezing temperatures. Make sure the cold water pipes are NOT located directly above the gas control so that condensate during humid weather does NOT drip on the controls.**

Installation (Locating the Water Heater) cont.-

This water heater MUST be installed indoors out of the wind and weather.

To comply with NSF requirements this water heater is to be:

- a) Sealed to the floor with sealant, in a smooth and easily cleanable way, or
- b) Installed with an optional leg kit that includes legs and/or extensions that provide a minimum clearance of 6" beneath the water heater.

Note: For California installation, this water heater must be braced, anchored, or strapped to avoid falling or moving during an earthquake. See instructions for correct installation procedures. Instructions may be obtained from DSA Headquarters Office, 1102 Q Street, Suite 5100, Sacramento, CA 95811.

Water heater corrosion and component failure can be caused by the heating and breakdown of airborne chemical vapors. Examples of some typical compounds that are potentially corrosive are: spray can propellants, cleaning solvents, refrigerator and air conditioning refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes and process chemicals. These materials are corrosive at very low concentration levels with little or no odor to reveal their presence.

NOTE: Damage to the water heater caused by exposure to corrosive vapors is NOT covered by the warranty. Do NOT operate the water heater if exposure has or will occur. Do NOT store any potentially corrosive compounds in the vicinity of the water heater.

⚠ WARNING

Liquefied petroleum gases/propane gases are heavier than air and will remain at floor level if there is a leak. Basements, crawl spaces, closets and areas below ground level will serve as pockets for accumulation of leaking gas. Before lighting, smell all around the appliance area for gas. Be sure to smell next to the floor.

IF YOU SMELL GAS:

- **DO NOT** try to light any appliance.
- **DO NOT** touch any electric switch; **DO NOT** use any telephone in your building.
- Immediately call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

DO NOT OPERATE APPLIANCE UNTIL LEAKAGE IS CORRECTED!

⚠ WARNING

DO NOT ATTEMPT TO LIGHT ANY GAS APPLIANCE IF YOU ARE NOT CERTAIN OF THE FOLLOWING:

- Liquefied petroleum gases/propane gas and natural gas have an odorant added by the gas supplier that aids in detection of the gas.
- Most people recognize this odor as a "sulfur" or "rotten egg" smell.
- Other conditions, such as "odorant fade" can cause the odorant to diminish in intensity, or "fade", and not be as readily detectable.
- If you have a diminished sense of smell or are in any way unsure of the presence of gas, immediately contact your gas supplier from a neighbor's telephone.
- Gas detectors are available. Contact your gas supplier or plumbing professional for more information.

Installation (Locating the Water Heater) cont.-

Proper venting practices must be considered when selecting a location for this water heater. For exact venting specifications, please consult the Venting section of these Installation and Operation Instructions.

This water heater must be located in an area where leakage of the tank, water line connections, or the combination temperature and pressure relief valve will not result in damage to the area adjacent to the water heater or to lower floors of the structure. When such locations cannot be avoided, a suitable drain pan must be installed under the water heater. The drain pan must have a minimum length and width of at least 4 in (10.2 cm) greater than the diameter of the water heater and must not restrict proper combustion air flow to the water heater. The drain pan, as described above, can be purchased from your plumbing professional. The drain pan must be piped to an adequate drain. The piping must be at least 3/4 in (1.9 cm) in diameter and pitched for proper drainage.

It is recommended that a minimum clearance of 4 in (10.2 cm) be provided on the side of the water heater for servicing and maintenance of the combination temperature and pressure relief valve.

Minimum Clearances

⚠ WARNING

Failure to adhere to these installation and operating instructions may create a hazard to life and property and will nullify the warranty.

This installation shall allow access to the front of the water heater and adequate clearance shall be provided for servicing and operating this water heater. The water heater may be installed on either a combustible or non-combustible floor. If the water heater is to be installed directly on carpeting, it shall be installed on top of a metal or wood panel (or equivalent) extending beyond the full width and depth of the appliance by at least 3 in (7.6 cm) in any direction or, if the appliance is to be installed in an alcove or closet, the entire floor shall be covered by the panel.

If the rating plate or the label on the front of the heater specifies minimum clearances less than those listed in the below table, the water heater may be installed in accordance with the minimum clearances listed on the rating plate or the label on the front of the heater.

If it is necessary to install this water heater in an alcove, use the clearances listed in Figure 1.

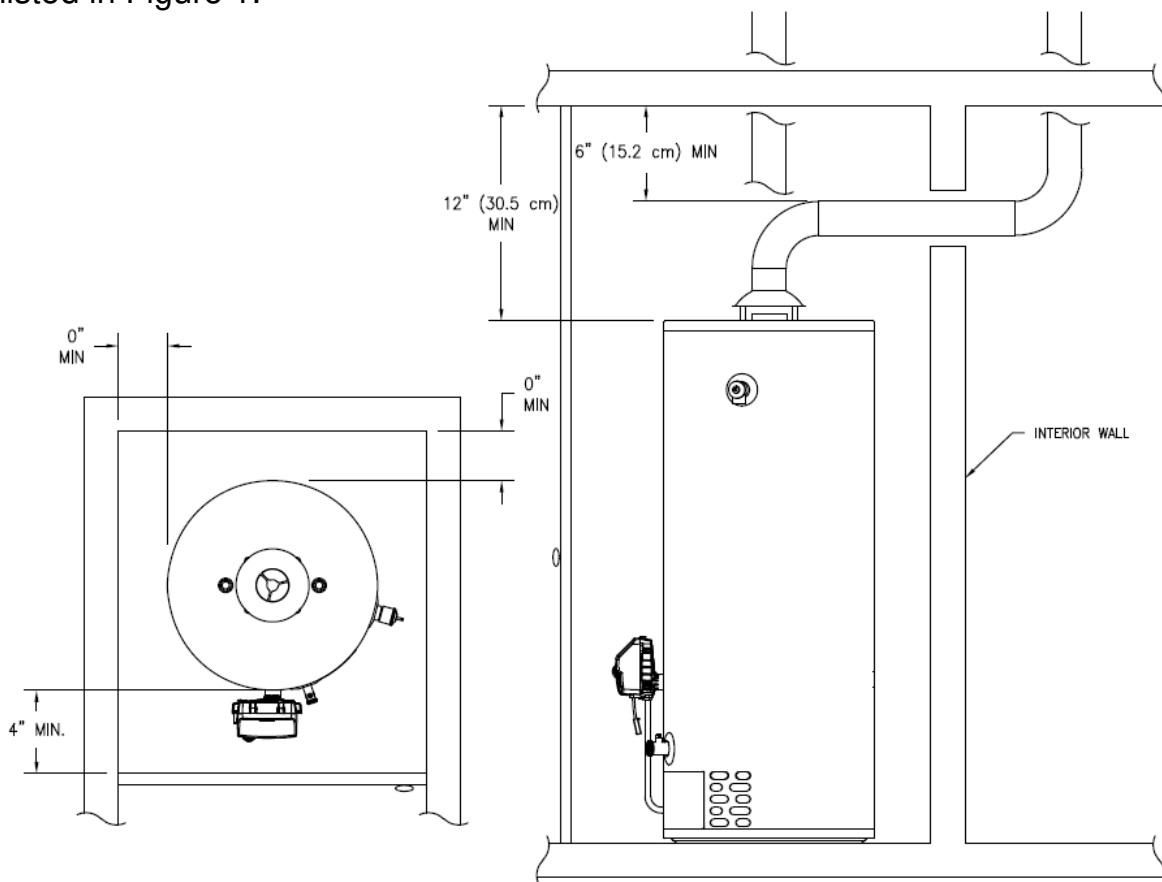


Figure 1

Venting

WARNING

The venting system must be installed properly following all local codes or in the absence of local codes, the latest edition of the National Fuel Gas Code (ANSI Z223.1- latest edition), or in Canada, The Natural Gas and Propane Installation Code (B149.1-00 latest edition). Failure to properly install the venting system could result in property damage, personal injury, or death.

WARNING

Carefully inspect the venting system of a replacement water heater installation before connecting to the venting system. All joints in the vent connector must be securely fastened with screws and fit tightly together. Inspect the venting system for signs of deterioration (rust and perforation) and replace any sections that are not in good condition.

The chimney must be lined and in good condition. Check to make sure the venting system is properly sized for the water heater. If the venting system was previously sized for another gas appliance that has been removed, the venting system may now be too large. Refer to the latest edition of the National Fuel Gas Code (ANSI Z223.1-latest edition), or in Canada, the Natural Gas and Propane Installation Code (B149.1-00 latest edition) for the correct sizing of venting systems and common venting with another gas appliance.

DO NOT vent this water heater into the venting system of another gas appliance designed to vent under positive pressure.

The water heater should be installed as close as practical to the venting system to minimize the vent connector length required. Refer to local codes for the distance limitations on vent connector lengths.

At the completion of the water heater installation, the burner and venting system must be checked for proper operation with all other commonly vented appliances in operation. Check for spillage of flue products around the outside relief opening of the draft hood after several minutes of operation. The flame from a match should be drawn into the draft hood. **DO NOT** use the water heater or connected equipment if spillage is detected until the problem is corrected.

Refer to the latest edition of the National Fuel Gas Code, or in Canada, the Natural Gas and Propane Installation Code for complete details on the "Procedure to Be Followed to Place Equipment in Operation".

This water heater has been shipped with a draft diverter for which it was designed with reference to the horizontal and vertical planes. If removed, the draft diverter must be replaced in the same position and secured to the jacket top by which it was installed.

This water heater must be connected to a lined masonry chimney or venting system approved by local codes or ordinances. The vent connector used to attach the draft diverter outlet to the chimney or approved vent must be of the same diameter as the draft diverter outlet or larger.

For proper venting in certain installations, a larger vent connector may be needed. Consult venting tables in ANSI standard (Z223.1-or latest edition), National Fuel Gas Code and CAN/CGA (B149.1 or B149.2-latest editions) Natural Gas and Propane Installation Code, or local code officials for proper application for your area.

Combustion Air Supply

WARNING

Liquefied petroleum gases/propane gas are heavier than air and will remain at floor level if there is a leak. Basements, crawl spaces, closets and areas below ground level will serve as pockets for accumulation of leaking gas. Before lighting, smell all around the appliance area for gas. Be sure to smell next to the floor.

IF YOU SMELL GAS:

- **DO NOT** try to light any appliance.
- **DO NOT** touch any electric switch; **DO NOT** use any telephone in your building.
- Immediately call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

DO NOT OPERATE APPLIANCE UNTIL LEAKAGE IS CORRECTED!

IMPORTANT

The flow of combustion and ventilating air **must NOT** be obstructed. **DO NOT** block or in any way restrict jacket air inlet slots located at the bottom front of the water heater.

Provide adequate air for combustion and ventilation. An insufficient supply of air will cause recirculation of combustion products resulting in air contamination that may be hazardous to life. Such a condition often will result in a yellow, luminous burner flame, causing carboning or sooting of the combustion chamber, burners and flue tubes with possible damage to the water heater.

When an exhaust fan is installed in the same room with a heater, sufficient openings for air must be provided in the walls. Undersized openings will cause air to be drawn into the room through the chimney, causing recirculation of combustion products.

Unconfined Spaces

In unconfined spaces in buildings, infiltration may be adequate to provide air for combustion, ventilation, and dilution of flue gases. However, in buildings of tight construction (heavily insulated, weather stripping, caulked, vapor barrier, etc.) additional air may need to be provided using the methods described below.

Confined Spaces

Confined spaces are spaces defined as having less than 50 ft³/1,000 BTU/hr (4.8 m³/kW) of input.

All Air from Inside the Building: The confined space must be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume, so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space must be considered in making this determination. Each opening must have a minimum free area of 1 in²/1000 BTU/hr (2200 mm²/kW) of the total input rating of all gas utilization equipment in the confined space, but not less than 100 in² (0.06 m²). One opening must be within 12 in (31 cm) of the top and one within 12 in (31 cm) of the bottom of the enclosure.

Combustion Air Supply cont.-

All Air from Outdoors: Provide two permanent openings, one commencing within 12 in (30 cm) of the top and one commencing within 12 in (30 cm) from the bottom of the enclosure. The openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

1. When communicating with the outdoors through vertical ducts, each opening must have a minimum free area of 1 in²/4000 BTU/hr (550 mm²/kW) of total input rating of all equipment in the enclosure.
2. When communicating with the outdoors through horizontal ducts, each opening must have a minimum free area of 1 in²/2000 BTU/hr (1100 mm²/kW) of total input rating of all equipment in the enclosure.
3. When ducts are used, they must be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts cannot be less than 3 in (8 cm).

Provide one permanent opening, commencing within 12 in (30 cm) of the top of the enclosure. The appliance must have clearance of at least 1 in (3 cm) from the sides and back and 6 in (16 cm) from the front of the appliance. The opening must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors and has a minimum free area of the following:

1. 1 in²/3000 BTU/hr (700 mm²/kW) of the total input rating of all appliances located in the enclosure.
2. Not less than the sum of the areas of all vent connectors in the space.

Specialty Engineered Installations

The requirements noted under CONFINED SPACES above will not necessarily govern when special engineering, approved by the authority having jurisdiction, provides an adequate supply of air for combustion, ventilation, and dilution of flue gases.

Water Connections

Note: BEFORE PROCEEDING WITH THE INSTALLATION, CLOSE THE MAIN WATER SUPPLY VALVE.

After shutting off the main water supply, open a faucet to relieve the water line pressure to prevent any water from leaking out of the pipes while making the water connections to the water heater. After the pressure has been relieved, close the faucet. The cold-water inlet and hot-water outlet are identified on the top of the water heater. The fittings at the cold-water inlet and hot-water outlet are dielectric waterway fittings with 3/4 in NPT male thread. Make the proper plumbing connections between the water heater and the plumbing system to the house. Install a shut-off valve in the cold-water supply line.

⚠ CAUTION

If sweat fittings are to be used, **DO NOT** apply heat to the nipples on top of the water heater. Sweat the tubing to the adapter before fitting the adapter to the water connections. It is imperative that heat is not applied to the nipples containing a plastic liner.

⚠ WARNING

FAILURE TO INSTALL AND MAINTAIN A NEW, LISTED 3/4 IN X 3/4 IN TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIM, WHICH MIGHT RESULT FROM EXCESSIVE TEMPERATURE AND PRESSURES.

Installation (Water Connections) continued-

If this water heater is installed in a closed water supply system, such as the one having a back-flow preventer in the cold-water supply, provisions shall be made to control thermal expansion. **DO NOT** operate this water heater in a closed system without provisions for controlling thermal expansion. Your water supplier or local plumbing inspector should be contacted on how to control this situation.

After installation of the water lines, open the main water supply valve and fill the water heater. While the water heater is filling, open several hot water faucets to allow air to escape from the water system. When a steady stream of water flows through the faucets, close them and check all water connections for possible leaks.

NEVER OPERATE THE WATER HEATER WITHOUT FIRST BEING CERTAIN IT IS FILLED WITH WATER.

WARNING

For protection against excessive temperatures and pressure, install temperature and pressure protective equipment required by local codes, but not less than a combination temperature and pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials as meeting the requirements of the Standard for *Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22 or the Standard CAN1-4.4. Temperature and Pressure* and the Standard *CAN1-4.4, Temperature, Pressure, Temperature and Pressure Relief Valves and Vacuum Relief Valves*. The combination temperature and pressure relief valve shall be marked with a maximum set pressure not to exceed the maximum working pressure of the water heater. The combination temperature and pressure relief valve shall also have an hourly rated temperature steam BTU discharge capacity not less than the hourly rating of the water heater.

Install the combination temperature and pressure relief valve into the opening provided and marked for this purpose on the water heater.

Note: Some models may already be equipped or supplied with a combination temperature and pressure relief valve. Verify that the combination temperature and pressure relief valve complies with local codes. If the combination temperature and pressure relief valve does not comply with local codes, replace it with one that does. Follow the installation instructions above on this page.

Install a discharge line so that water discharged from the combination temperature and pressure relief valve will exit within 6 in (15.2 cm) above, or any distance below the structural floor and cannot contact any live electrical part. The discharge line is to be installed to allow for complete drainage of both the combination temperature and pressure relief valve and the discharge line. The discharge opening must not be subjected to blockage or freezing. **DO NOT** thread, plug or cap the discharge line. It is recommended that a minimum clearance of 4 in (10.2 cm) be provided on the side of the water heater for servicing and maintenance of the combination temperature and pressure relief valve.

DO NOT place a valve between the combination temperature and pressure relief valve and the tank.

⚠ WARNING

Hydrogen gas can be produced in an operating water heater that has not had water drawn from the tank for a long period of time (generally two weeks or more). **HYDROGEN GAS IS EXTREMELY FLAMMABLE.** To prevent the possibility of injury under these conditions, we recommend the hot water faucet to be open for several minutes at the kitchen sink before you use any electrical appliance, which is connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipes as hot water begins to flow. **DO NOT** smoke or have open flame near the faucet at the time it is open.

This water heater can deliver scalding temperature water at any faucet in the system. Be careful whenever using hot water to avoid scalding injury. Certain appliances such as dishwashers and automatic clothes washers may require increased temperature water. By setting the thermostat on this water heater to obtain the increased temperature water required by these appliances, the potential for scald injury increases. To protect against injury, you should install an ASSE approved mixing valve in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from the manufacturer of this water heater or a local plumbing supplier. Please consult with a plumbing professional.

APPROXIMATE TIME/TEMPERATURE RELATIONSHIPS IN SCALDS	
120°F (49°C)	More than 5 minutes
125°F (52°C)	1½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1½ seconds
155°F (68°C)	About 1 second



Gas Connections

The gas supply lines must meet all requirements of the National Fuel Gas Code (ANSI Z223.1-Latest Edition), or in Canada CAN/CGA B149.1 Natural Gas Installation Code (Latest Edition) or CAN/CGA B149.2 Propane Installation Code (Latest Edition).

The minimum permissible gas supply pressure for the purpose of input adjustment is 1 in (0.25 kPa) water column above the operating manifold pressure. See the rating plate and gas supply valve for the manifold pressure and gas type. The maximum permissible gas supply pressure is 14 in (3.5 kPa) water column for natural gas and liquefied petroleum gases/propane gas.

Gas Connections cont.-

1. Connect this water heater only to the type of gas (Natural or Propane) as shown on the rating plate. Use clean black iron pipe or equivalent material approved by local codes and ordinances (dirt and scale from the pipe can enter the gas valve and cause it to malfunction). The inlet gas line must have a minimum length of 3 in (7.6 cm) drip leg (*sediment trap*) installed as close to the water heater's gas valve as possible. A ground joint union must be installed as close to the water heater as possible in the gas supply line feeding the water heater to permit servicing of the water heater. Compounds used on the threaded joints of the gas piping must be resistant to the action of liquefied petroleum gases/propane gas. **DO NOT** apply pipe dope to the gas valve inlet and make certain that no pipe dope has become lodged in the inlet screen of the gas valve. Extreme care must be taken to ensure no pipe dope enters the gas valve. Avoid excessive torque when tightening the gas supply line to the gas valve. Excessive torque may result in cracking of the gas valve housing and could create a gas leak. When tightening gas supply line to L.P. control, it is recommended to hold the inlet body of the control securely with an adequate wrench. The suggested maximum torque is 31.5 ft. lbs. (4.4 kg-m).

WARNING

The manufacturer of this water heater will not be liable for any damage or injury caused as a result of a cracked gas inlet as a result of excessive torque.

2. This water heater and its gas connection must be leak tested before placing the water heater in operation. Check for gas leaks with a soap and water solution and a brush or a commercial leak detector fluid. **NEVER USE A MATCH OR OPEN FLAME FOR TESTING!**
3. While checking for leaks care must be taken to prevent solution from contacting the electrical connections at the control. If electrical connections at the control become wet, they must be thoroughly dried before attempting to operate the water heater.

CAUTION

The water heater and individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures in excess of ½ psi (3.5 kPa). The water heater must be isolated from the gas supply piping system by closing its manual shutoff valve during any pressure testing of the gas supply system at test pressures equal to or less than ½ psi (3.5 kPa). The supply line must be capped when not connected to the water heater.

WARNING

The gas inlet pressure to the gas control must never exceed 14 in of water column (½ psi) (3.5 kPa). The gas supply system and any pressure regulating device in the gas line must be specified, inspected and adjusted to assure a gas supply pressure of ½ psi (3.5 kPa) or less. Failure to do so may result in severe injury or death.

GENERAL OPERATION



! WARNING

Water heaters are heat producing appliances. To avoid damage or injury there shall be no materials stored against the water heater or vent-air intake system, and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater and vent-air intake system. **UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT-AIR INTAKE SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT-AIR INTAKE SYSTEM.**

To Fill The Water Heater

1. Close the water heater drain valve by turning the knob clockwise .
2. Open the cold-water supply shut-off valve.
3. Open several hot water faucets to allow air to escape from the system.
4. When a steady stream of water flows from the faucets, the water heater is filled. Close the faucets and check for water leaks at the water heater drain valve, combination temperature and pressure relief valve and the hot and cold-water connections.

To Drain The Water Heater

Should it become necessary to completely drain the water heater, make sure you follow the steps below:

1. For the White Rodgers mechanical control, rotate the thermostat dial clockwise  to the lowest possible position, OR for the Honeywell and the White Rodgers electronic controls, rotate the thermostat dial counter-clockwise  to the lowest possible position.
2. For the White Rodgers mechanical control, partially depress and rotate the gas control knob clockwise  to the "OFF" position.
3. Shut OFF the gas supply to the water heater.
4. Close the cold-water supply shut-off valve.
5. Open the drain valve on the water heater by turning the knob counter-clockwise . The drain valve has threads on the end that will allow the connection of a standard hose coupling.
6. Open a hot water faucet to allow air to enter the system.

To refill the water heater, refer to "To Fill the Water Heater."

! WARNING

Wait at least 2 minutes after this control is pressurized with gas before attempting to light pilot and/or push igniter button. Failure to do so may result in severe injury.

Lighting & Shutdown Instructions- White Rodgers Mechanical Gas Control

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance has a pilot which is lit by a piezo-electric spark gas ignition system. Do not open the inner door and attempt to light the pilot by hand.
- B. **BEFORE LIGHTING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS.
 - * Do not try to light any appliance.
 - * Do not touch any electric switch; do not use any phone in your building.
 - * Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - * If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Rotate and if applicable partially depress gas control knob clockwise  to "OFF" position.

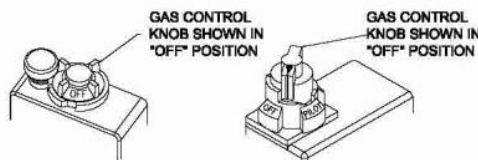


EXHIBIT A

EXHIBIT B

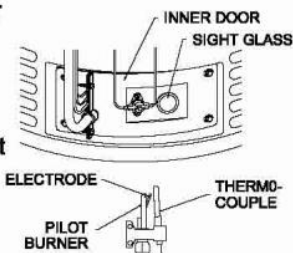
NOTE: On exhibit B, knob cannot be turned from "PILOT" to "OFF" unless knob is depressed slightly. Do not force.

4. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.

5. Remove outer door.

6. Locate piezo igniter button.

7. Look into sight glass window on inner door to view pilot.



8. Turn the gas control knob counterclockwise  to "PILOT" position.

- 9a. **FOR EXHIBIT A GAS CONTROLS-** Depress and hold down red pilot set button. Immediately depress piezo igniter button until you hear a "click" sound, then release. Continue to hold down the pilot set button for about one (1) minute after the pilot is lit. Release the pilot set button and it should pop back up. Pilot should remain lit. If it goes out, repeat steps 3 through 9.

- 9b. **FOR EXHIBIT B GAS CONTROLS-** Depress and hold down gas control knob. Immediately depress piezo igniter button until you hear a "click" sound, then release. Continue to hold down the knob for about one (1) minute after the pilot is lit. Release the knob and it should pop back up. Pilot should remain lit. If it goes out, repeat steps 3 through 9.

FOR EXHIBIT A & B GAS CONTROLS-

- If button or knob does not pop up when released, stop and immediately call your service technician or gas supplier.
- If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your technician or gas supplier.

10. Replace outer door.
11. Turn gas control knob counterclockwise  to "ON" position.
12. Set thermostat to desired setting.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat dial to lowest possible setting.
2. Rotate and if applicable partially depress gas control knob clockwise  to "OFF" position.

Lighting & Shutdown- White Rodgers Electronic Gas Control

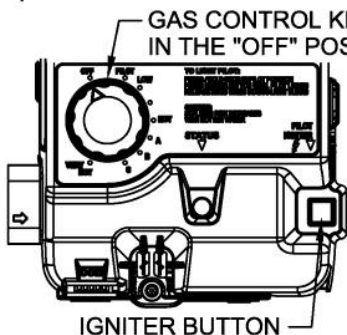
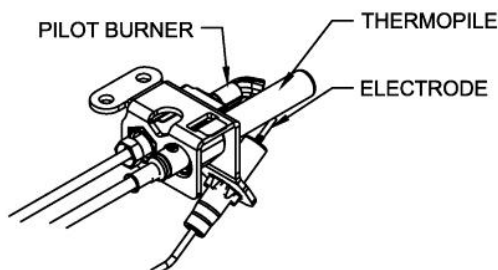
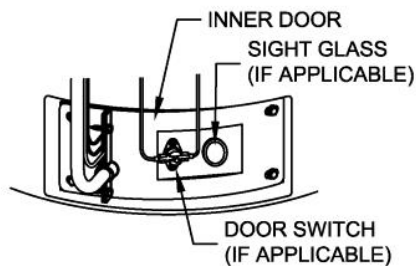
FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance has a pilot which is lit by a piezo-electric spark gas ignition system. Do not open the inner door and attempt to light the pilot by hand.
- B. **BEFORE LIGHTING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS.**
- * Do not try to light any appliance.
 - * Do not touch any electric switch; do not use any phone in your building.
 - * Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - * If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the gas control knob to the "OFF" position.
3. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow "B" in the safety information above this label. If you don't smell gas, go to the next step.
4. Remove outer door.
5. Locate igniter button.
6. Look through sight glass window on inner door to view pilot.
7. Turn the gas control knob clockwise to "PILOT" position. 
8. Depress and hold in gas control knob. Immediately press igniter button until you hear a "click" sound, then release. Continue to hold down the gas control knob until the status light blinks. Release the gas control knob. It should pop back out. Check to see if the pilot is still lit. If the pilot goes out, repeat steps 2 through 8.
 - If gas control knob does not pop out when released, stop and immediately call your service technician or gas supplier.
 - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your technician or gas supplier.
9. Replace outer door.
10. Turn gas control knob to desired setting.



TO TURN OFF GAS TO APPLIANCE

1. Turn the gas control knob counterclockwise  to the "OFF" position.

Lighting & Shutdown- Honeywell Gas Control

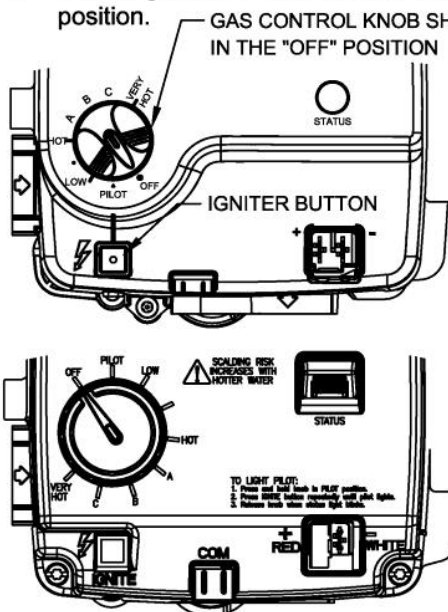
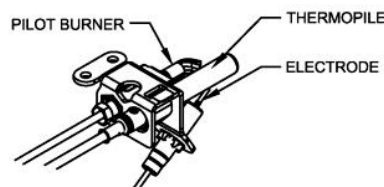
FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance has a pilot which is lit by a piezo-electric spark gas ignition system. Do not open the inner door and attempt to light the pilot by hand.
- B. **BEFORE LIGHTING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS.**
- * Do not try to light any appliance.
 - * Do not touch any electric switch; do not use any phone in your building.
 - * Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - * If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the gas control knob to the "OFF" position.
3. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow "B" in the safety information above this label. If you don't smell gas, go to the next step.
4. Remove outer door. Remove inner door or slide it open.
5. Locate igniter button.
6. Turn the gas control knob clockwise to "PILOT" position.
7. Depress and hold in gas control knob. Immediately press igniter button until you hear a "click" sound, then release. Continue to hold down the gas control knob until the status light blinks. Release the gas control knob. It should pop back out. Check to see if the pilot is still lit. If the pilot goes out, repeat steps 2 through 7.
8. Replace inner door or slide it closed. Replace outer door.
9. Turn gas control knob to desired setting.



TO TURN OFF GAS TO APPLIANCE

1. Turn the gas control knob counterclockwise to the "OFF" position.

Thermostat Adjustment - White Rodgers Mechanical Gas Control

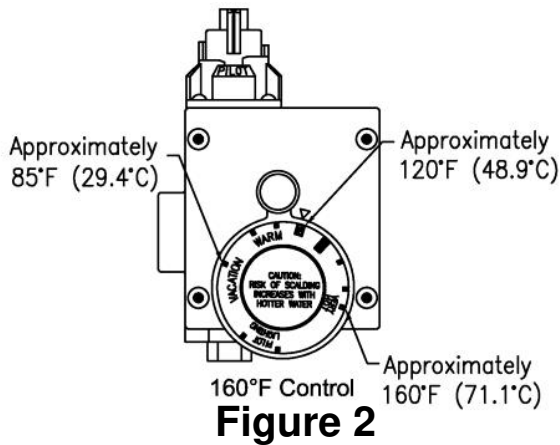


Figure 2

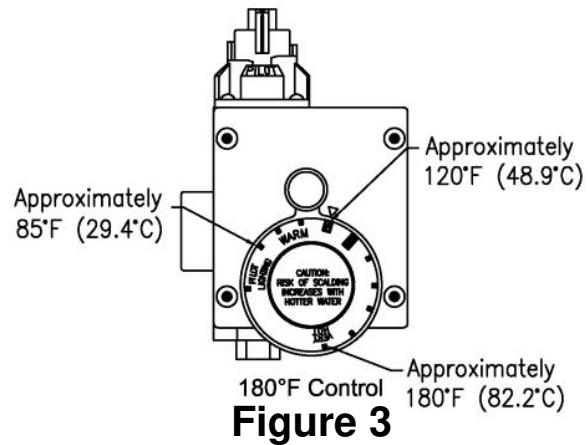


Figure 3

The thermostat dial is set to its lowest temperature setting when shipped from the factory. **Remember that lower temperature settings are more energy efficient.** Adjust the temperature by turning the thermostat dial. It is suggested that the starting point setting not be greater than the "▲" or "▼" mark on the thermostat dial (approximately 120°F [48.9°C]) as indicated above. Rotate the thermostat dial **clockwise** ↻ to decrease the temperature setting. Rotate the thermostat dial **counter-clockwise** ↻ to increase the temperature setting. Adjust the dial until the minimum acceptable temperature is achieved (See figure 2 and 3) above for approximate temperature settings).

Thermostat Adjustment – White Rodgers Electronic Gas Control

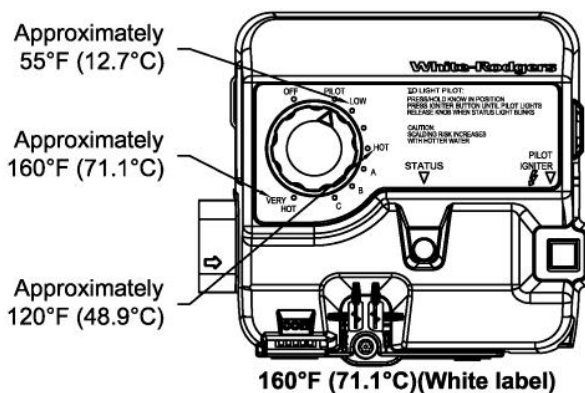


Figure 4

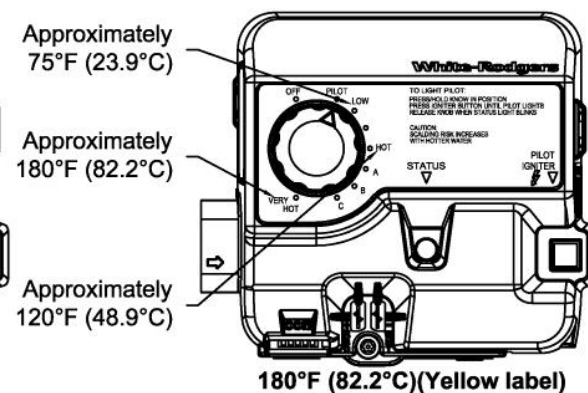


Figure 5

The thermostat dial is set to its lowest temperature setting when shipped from the factory. **Remember that lower temperature settings are more energy efficient.** Adjust the temperature by turning the thermostat dial. It is suggested that the starting point setting not be greater than the "HOT" mark on the thermostat dial (approximately 120°F [48.9°C]) as indicated above. Rotate the thermostat dial **counter-clockwise** ↻ to decrease the temperature setting. Rotate the thermostat dial **clockwise** ↻ to increase the temperature setting. Adjust the dial until the minimum acceptable temperature is achieved (See figure 4 and 5) above for approximate temperature settings).

Thermostat Adjustment- Honeywell V1 Gas Control

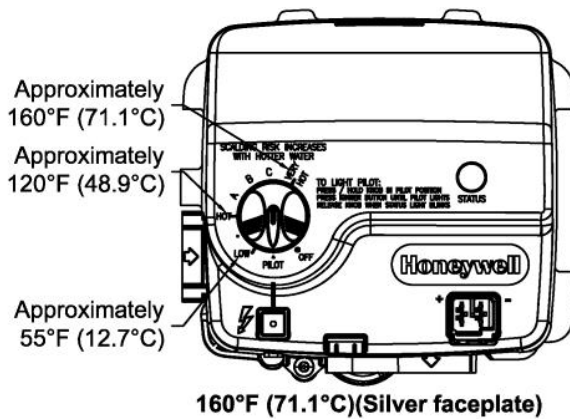


Figure 6

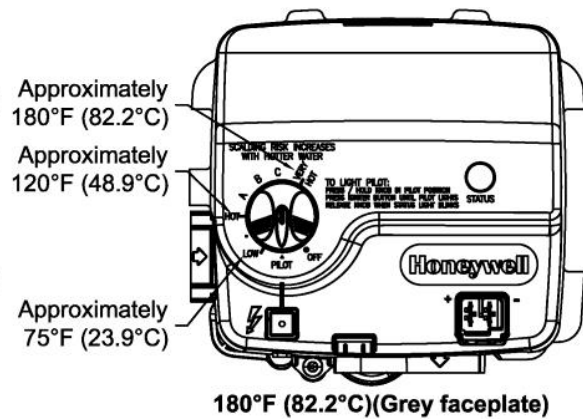


Figure 7

The thermostat dial is set to its lowest temperature setting when shipped from the factory. **Remember that lower temperature settings are more energy efficient.** Adjust the temperature by turning the thermostat dial. It is suggested that the starting point setting not be greater than the "HOT" mark on the thermostat dial (approximately 120°F [48.9°C]) as indicated above. Rotate the thermostat dial **counter-clockwise**  to decrease the temperature setting. Rotate the thermostat dial **clockwise**  to increase the temperature setting. Adjust the dial until the minimum acceptable temperature is achieved (See figure 6 and 7 above for approximate temperature settings).

Thermostat Adjustment- Honeywell V2 Gas Control

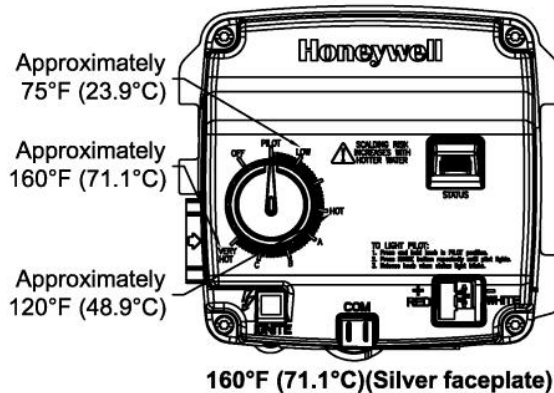


Figure 8

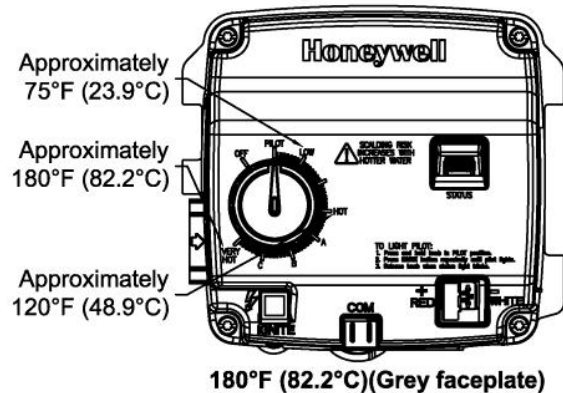


Figure 9

The thermostat dial is set to its lowest temperature setting when shipped from the factory. **Remember that lower temperature settings are more energy efficient.** Adjust the temperature by turning the thermostat dial. It is suggested that the starting point setting not be greater than the "HOT" mark on the thermostat dial (approximately 120°F [48.9°C]) as indicated above. Rotate the thermostat dial **counter-clockwise**  to decrease the temperature setting. Rotate the thermostat dial **clockwise**  to increase the temperature setting. Adjust the dial until the minimum acceptable temperature is achieved (See figure 8 and 9 above for approximate temperature settings).

⚠ WARNING

Hotter water increases the risk of scald injury. Scalding may occur within 5 seconds at a temperature setting of 140°F (60°C). To protect against hot water injury, install an ASSE approved mixing valve in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch water lines. A licensed plumbing professional or local plumbing authority should be consulted.

Note: This water heater is equipped with an energy cut out device to prevent overheating. Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance and call a qualified service technician.

Note: Whenever the water heater is filled with cold water, condensate will form on the cool tank surface and drops of water will fall on the hot burner and combustion chamber surfaces producing a “sizzling” noise. Condensation is normal and does not indicate a leak. It will disappear when the tank becomes heated.

Burner Flame Checks

Steel Burner: These models are equipped with self adjusting air mixture and do not have an adjustable air shutter (see Figure 10). At periodic intervals, a visual check of the main burner and pilot flames should be made to determine if they are burning properly. The main burner flame should light smoothly from the pilot.

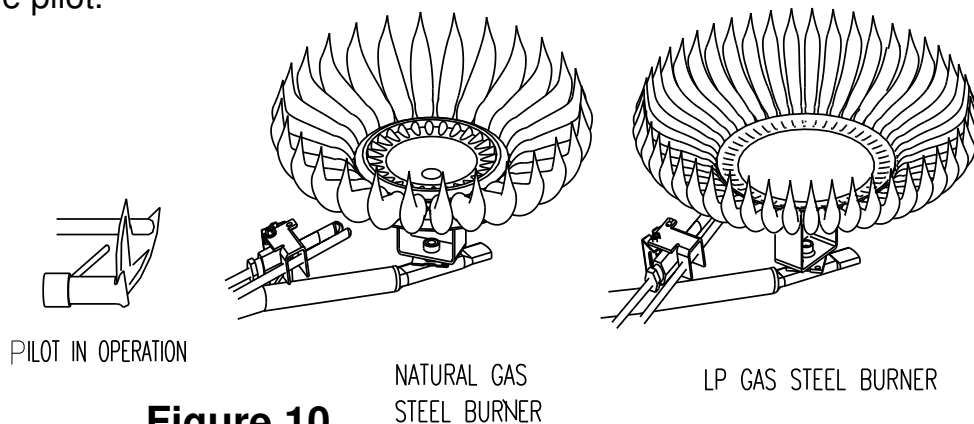


Figure 10

⚠ WARNING

Do not run out of propane gas. Damage to the water heater may occur.



MAINTENANCE

WARNING

Water heaters are heat producing appliances. To avoid damage or injury there shall be no materials stored against the water heater or vent-air intake system, and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater and vent-air intake system.

UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT-AIR INTAKE SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT-AIR INTAKE SYSTEM.

IMPORTANT

The water heater should be inspected at a minimum annually by a qualified service technician for damaged components and/or joints not sealed. DO NOT operate this water heater if any part is found damaged or if any joint is found not sealed.

The following maintenance should be performed by a qualified service technician at the minimum periodic intervals suggested below. In some installations, the maintenance interval may be more frequent depending on the amount of use and the operating conditions of the water heater. Regular inspection and maintenance of the water heater and vent-air intake system will help to insure safe and reliable operation.

1. Annually check the operation of the thermostat.
2. The flow of combustion and ventilation air **must NOT** be restricted. Make sure slots in jacket are open and unobstructed. Clear jacket slot openings of any dirt, dust, or other restrictions.

WARNING

The ventilation air system may be HOT.

3. At all times keep the water heater area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
4. Bi-annually conduct a visual check of the main and pilot burner flames to determine that they are burning properly. See Burner Flame Check section of this installation and operation manual. If sooting or other burner anomalies are evident, shut down the water heater by turning off the gas per the instructions listed in this manual or as listed on the water heater.
5. Annually remove the inner door and main burner assembly to clean orifices and related parts of any dirt or other foreign material. Inspect the burner ports for obstructions or debris and clean with a wire brush as needed. Wire brush and/or vacuum clean the combustion chamber as needed to remove scale deposits and debris. **NOTE:** It is imperative for proper operation of the water heater that the inner door be replaced in the original location, making certain the resettable thermal switch is properly connected to the gas control wire leads provided.

⚠ WARNING

- **DO NOT** operate water heater with jumpered, altered, loosely tightened or absent controls and/or components.
- **DO NOT** operate water heater with replacement controls and/or components, which are not exact duplicates or original equipment.
- Thoroughly inspect and replace, (as needed) burner inner door gasket and/or sight window gasket any time burner inner door is removed or disturbed.
- Replace water heater if involved in flammable vapors incident.

⚠ WARNING

When lifting lever of the combination temperature and pressure relief valve, hot water will be released under pressure. Be careful that any released water does not result in bodily injury or property damage.

6. At least once a year, check the combination temperature and pressure relief valve to ensure that the valve has not become encrusted with lime. Lift the lever at the top of the valve several times until the valve seats properly without leaking and operates freely.

⚠ WARNING

DO NOT run out of propane gas. Damage to the water heater may occur.

⚠ WARNING

THIS WATER MAY BE HOT.

7. Monthly drain off a gallon of water to remove silt and sediment.
8. If the combination temperature and pressure relief valve on the appliance discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. **DO NOT** plug the combination temperature and pressure relief valve outlet.
9. A combination sacrificial anode rod/hot water outlet nipple has been installed to extend tank life. The anode rod should be inspected periodically (every 2 years) and replaced when necessary to prolong tank life. Water conditions in your area will influence the time interval for inspection and replacement of the anode rod. Contact the plumbing professional who installed the water heater, or the manufacturer listed on the rating plate for anode replacement information. The use of a water softener may increase the speed of anode consumption. More frequent inspection of the anode is needed when using softened (or phosphate treated) water.
10. The vent system must be inspected at least once a year to ensure against leakage of exhaust products.

Troubleshooting Chart – Honeywell V1

LED Status	Control Status	Probable Cause
None (LED not on or flashing)	Millivolt power is not present. Light pilot.	1. Gas valve is functioning normally. 2. Gas valve is not powered. Light pilot.
One flash and three second pause	If set point knob is in "PILOT" position, then pilot flame is detected. (no faults).	Gas valve is powered and waiting for the set point knob to be turned to a water temperature setting. If the set point knob is at desired setting the thermostat is satisfied.
LED strobe (two quick flashes) and three second pause	Thermostat calling for heat (no faults).	Water heater operating normally.
LED on continuously	Set point knob has been recently turned to the "OFF" position.	Set point knob was recently turn to "OFF" position. Wait until LED goes out before attempting to relight.
Two flashes and three second pause	Weak pilot flame detected. System will reset when pilot flame is sufficient.	1. Gas valve is functioning normally. 2. Gas valve is not powered. Light pilot.
Three flashes and three second pause	Insufficient water heating. System will reset.	1. Temperature sensor out of calibration. 2. Possible short.
Four flashes and three second pause	Excessive tank temperature. System must be reset.	1. Temperature sensor out of calibration. 2. Faulty gas valve.

Troubleshooting Chart – Honeywell V1 continued-

LED Status	Control Status	Probable Cause
Five flashes and three second pause	Temperature sensor fault.	<ol style="list-style-type: none"> 1. Damage to the temperature wire. 2. Temperature sensor resistance out of range. 3. Replace temperature sensor. 4. If temperature sensor replacement does not correct the problem; verify control is not wet or physically damaged. 5. Turn set point knob to "OFF" position. Turn set point knob to "PILOT" position and light pilot. 6. Replace gas valve if five flash error persists.
Six flashes and three second pause	Water leak detected by accessory module (some models).	Excessive amount of water in drain pan/water dam.
Seven flashes and three second pause	Gas valve electronic fault detected.	<ol style="list-style-type: none"> 1. Verify control is not wet or physically damaged. 2. Turn set point knob to "OFF" position. Turn set point knob to "PILOT" position and light pilot. 3. Replace gas valve if seven flash error persists.
Eight flashes and three second pause	False pilot flame present.	<ol style="list-style-type: none"> 1. Pilot valve stuck in open position. 2. Turn set point knob to "OFF" position. Turn set point knob to "PILOT" position and light pilot. 3. Replace gas valve if eight flash error persists.

Troubleshooting Chart – Honeywell V2

LED Status	Control Status	Probable Cause
None (LED not on or flashing)	Not an error. Indicates control is in OFF mode. Pilot is off.	Gas valve is functioning normally. Gas valve is not powered. Light pilot.
One flash every four seconds (LED green)	Not an error. Indicates pilot is lit and main burner is off.	The knob can be turned to a desired setpoint temperature.
One flash every second (LED green)	Not an error. Indicates main valve is open and main burner is lit.	None. Control will automatically shut main burner off when water temperature reaches the setpoint temperature.
Two flashes and three second pause (LED yellow)	Low thermopile voltage; main valve not turned ON.	Check thermopile and its connections. Check pilot flame.
Four flashes and three second pause (LED red)	Temperature cut-out limit reached, causing shutdown.	Check the valves and the water temperature sensor. Reduce the water temperature setpoint. Verify control operation, replace if exceeding setpoint.
Five flashes and three second pause (LED red)	Electronics, sensor, or gas valve fault detected.	Check water temperature sensor and its connection for open circuits, shorts, or differences in resistance between the two sensor elements.
Solid ON (LED red)	Not an error. Indicates that the control is in shutdown mode. Pilot is off.	None; wait until LED turns off if you want to restart system.

Troubleshooting- White Rodgers Electronic

LED Status	Control Status	Probable Cause
None (LED not on or flashing)	Indicates control is off. Main and pilot burner are off.	Gas valve is functioning normally. Gas valve is not powered. Light pilot.
One flash every four seconds	Not an error. Indicates pilot is lit and main burner is off.	Gas valve is powered and waiting for the set point knob to be turned to a water temperature setting. If the set point knob is at desired setting, the thermostat is satisfied.
One flash every second	Not an error. Indicates main valve is open and main burner is lit.	Thermostat is calling for heat. Water heater operating normally and is in heat cycle.
Solid ON	Not an error. Indicates that the control is in shutdown mode.	Set point knob was recently turned to "OFF" position. Wait until LED goes out before attempting to relight.
Two flashes and three second pause	Low thermopile voltage; main burner not lit.	Loose thermopile connections or weak pilot flame.
Four flashes and three second pause	Temperature cut-out limit reached, causing shutdown.	Excessive temperatures may have been reached. Shut off the control and reduce the water temperature. Thoroughly verify control operation, replace if exceeding setpoint.
Five flashes and three second pause	Electronics, sensor, or gas valve fault detected.	Control may be wet or damaged. Verify all connections are tight; if problem persists replace the control.

Troubleshooting continued-

⚠ CAUTION

FOR YOUR SAFETY, **DO NOT** ATTEMPT REPAIR OF COMBINATION GAS CONTROL, BURNERS OR GAS PIPING. REFER REPAIRS TO A QUALIFIED SERVICE TECHNICIAN.

Contact your supplier or plumbing professional for replacement parts or contact the company at the address given on the rating plate of the water heater.

Provide the part name, model and serial numbers of the water heater when ordering parts.

READ THE WARRANTY FOR A FULL EXPLANATION OF THE LENGTH OF TIME THAT PARTS AND THE WATER HEATER ARE WARRANTED.

Complete the following information and retain for future reference:

Manufactured under one or more of the following U.S. Patents: 5,277,171; 5,341,770; 5,372,185; 5,485,879; 5,574,822; 5,596,952; 5,660,165; 5,682,666; 5,761,379; 5,943,984; 5,954,492; 5,988,117; 6,056,542; 6,142,216; 6,442,178; 6,684,821; 6,935,280; 7,063,132; 7,063,133; 7,007,748; 7,270,087; 7,334,419; 7,337,517; 7,409,925; 7,458,341; 7,559,293; 7,621,238; 7,634,976; 7,650,859; 7,665,210; 7,665,211; 7,699,026; 7,866,168; 7,900,589; 7,971,560; 7,992,526 8,082,888; 8,146,772; Other U.S. and Foreign patent applications pending. Current Canadian Patents: 2,092,105; 2,107,012; 2,108,186; 2,112,515; 2,143,031; 2,239,007; 2,262,174; 2,314,845; 2,409,271; 2,476,685; 2,504,824; 2,548,958

Model No: _____

Serial No: _____

Service Phone

Days: _____ Nights: _____

Address: _____

Supplier: _____

Supplier Phone No: _____

INSTALLATION FOR POTABLE WATER

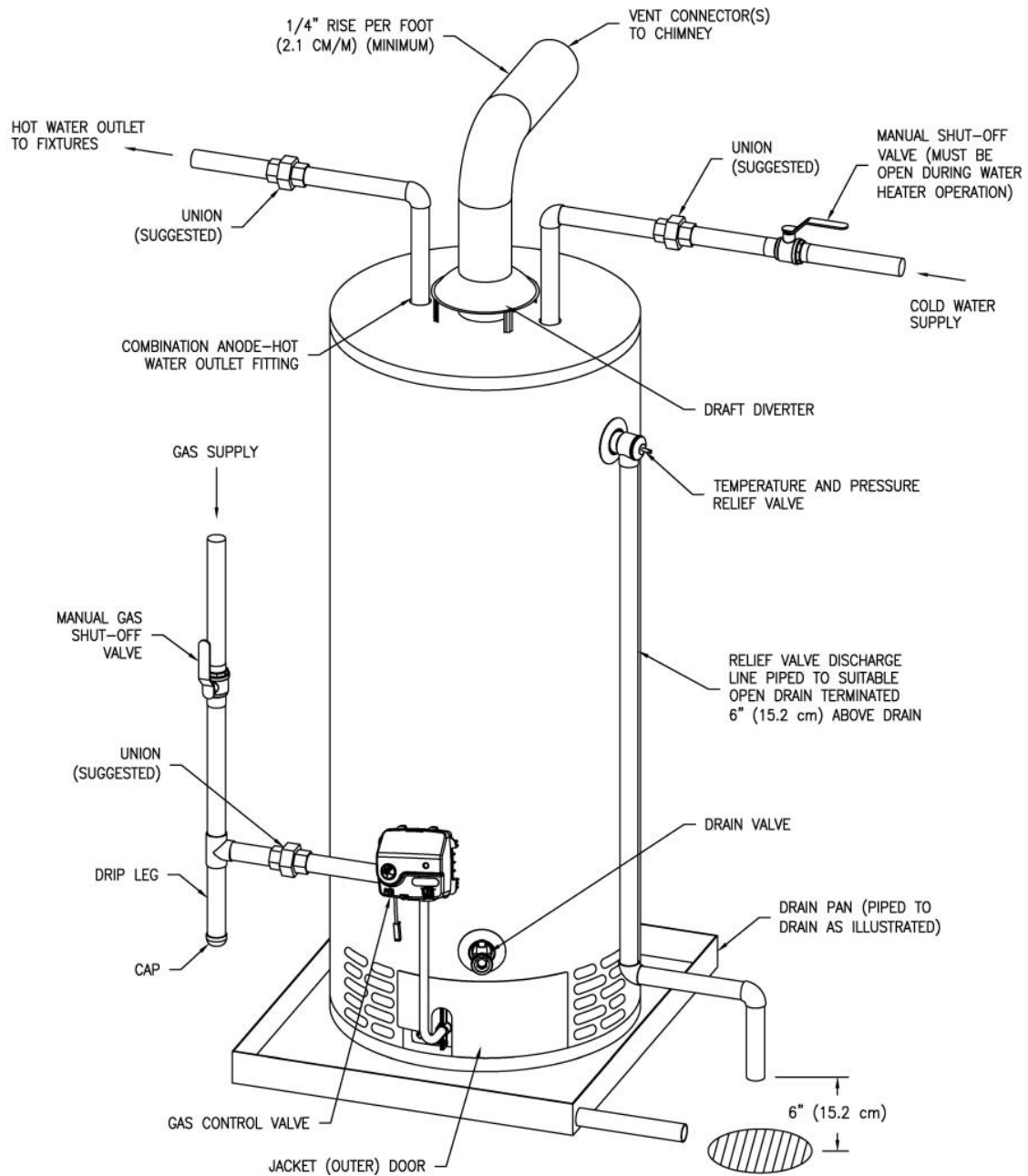
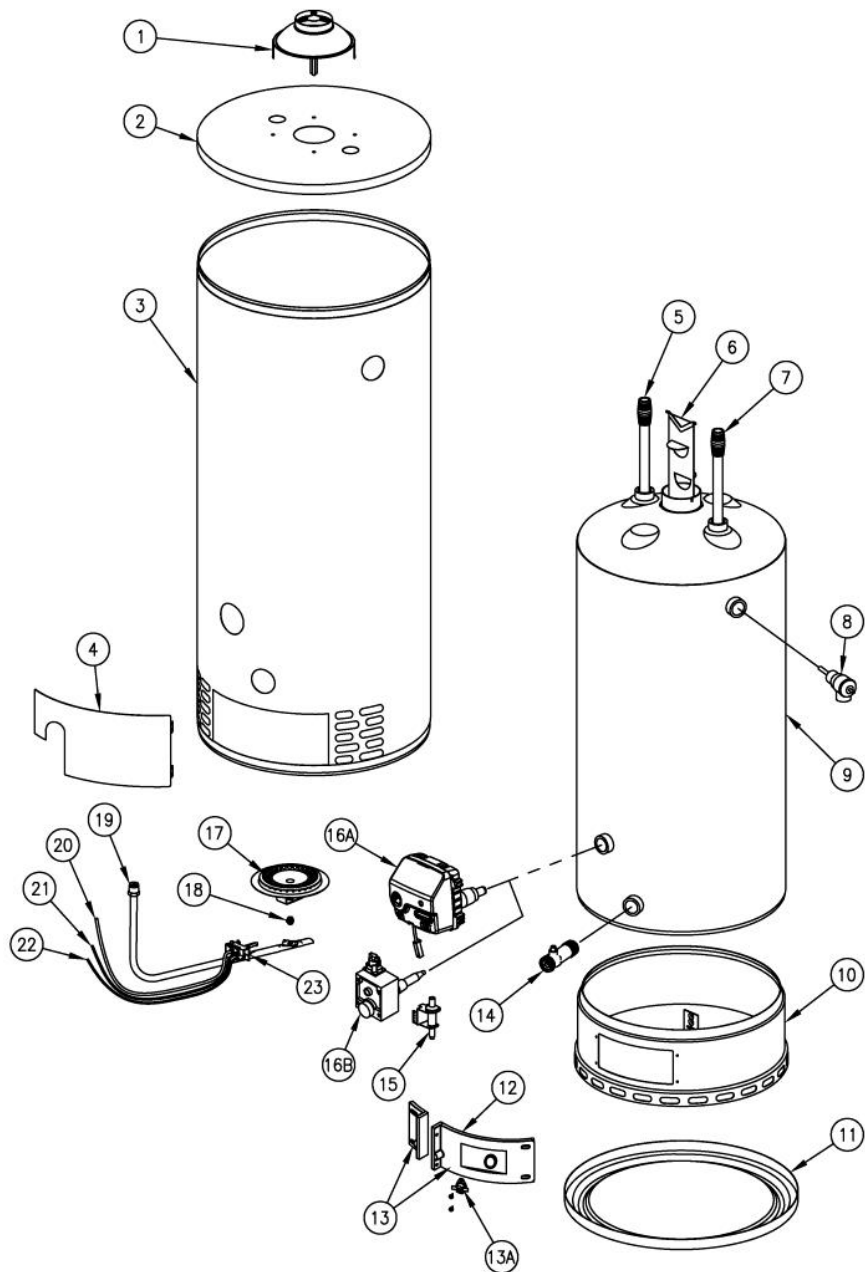


Figure 11

PARTS DIAGRAM

PART NAME AND DESCRIPTION
1. Draft Diverter
2. Jacket Head Pan
3. Jacket
4. Outer Door
5. Magnesium Anode–Hot Water Outlet
6. Flue Baffle Assembly
7. Dip Tube–Cold Water Inlet
8. Temperature and Pressure Relief Valve
9. Glass Lined Tank
10. Combustion Chamber Assembly
11. Jacket Base Pan
12. Inner Door Gasket
13. Inner Door Assembly
13A. High temperature limit switch
14. Drain Valve
15. Piezo Igniter – Use with White Rogers Gas Control
16A. Gas Control Valve – Honeywell
16B. Gas Control Valve – White Rogers
17. Steel Burner
18. Orifice
19. Gas Feedline to Burner
20. Gas Feedline to Pilot
21. Thermocouple/Thermo pile Lead
22. Piezo Igniter Lead
23. Pilot Assembly



THE FOLLOWING INSTRUCTIONS ARE FOR INSTALLATION OF: GAS WATER HEATERS SUITABLE FOR WATER (POTABLE) HEATING AND SPACE HEATING

1. All piping components connected to this water heater for space heating applications must be suitable for use with potable water. In Massachusetts, space heating piping length must **NOT** exceed 50 ft.
2. Toxic chemicals, such as those used for boiler treatment, must **NOT** be introduced into potable water used for space heating.
3. This water heater must **NOT** be connected to an existing heating system or component(s) previously used with a non-potable water heating appliance.
4. When the system requires water for space heating at temperatures higher than required for other uses, an ASSE approved mixing valve shall be installed to temper the water for those uses in order to reduce scald hazard potential.

Please refer to Figure 12 and Figure 13 for suggested piping arrangements.

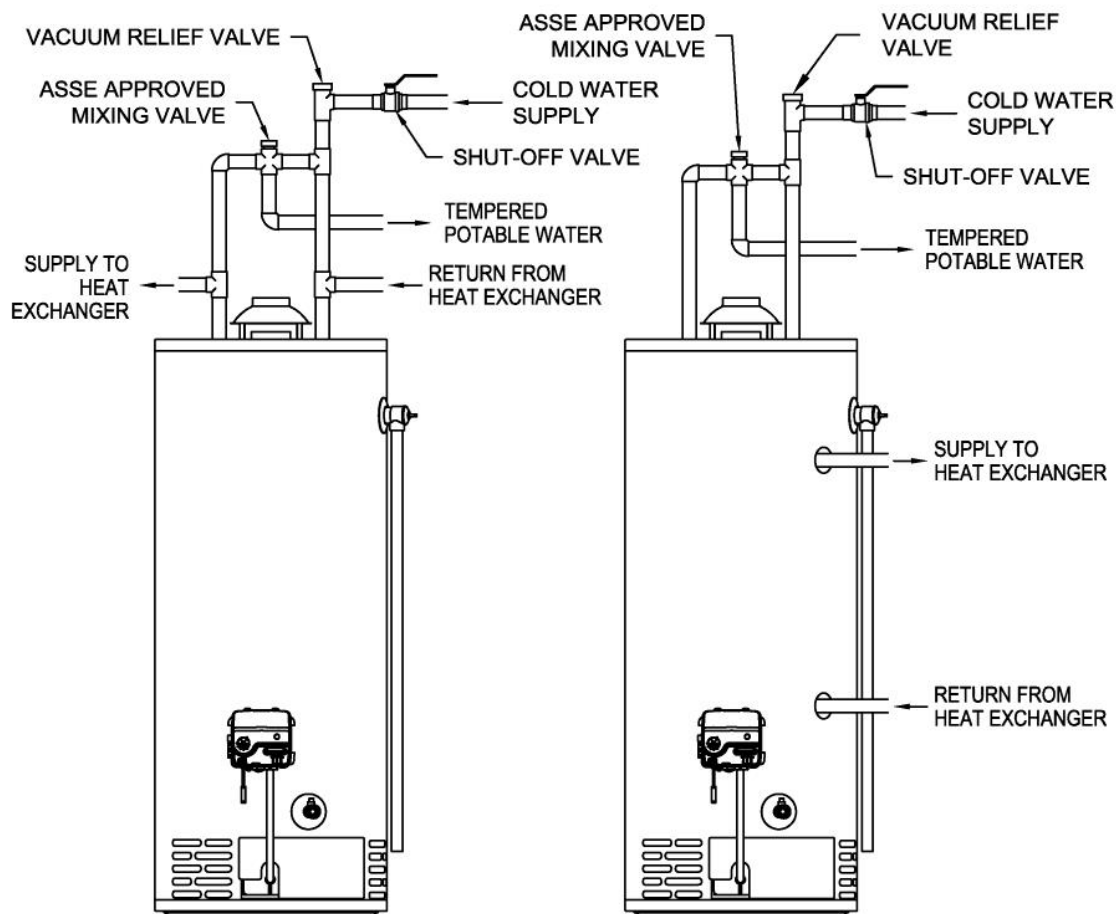


Figure 12

Figure 13

NOTES

SERVICE MANUAL SUPPLEMENT – QUICK SERVICE GUIDE FOR M-SERIES AND RG-SERIES PRODUCTS

ATMOSPHERIC VENT WATER HEATERS - ICON

Error Code	Definition	Service Action	Possible Parts Needed
No LED	No pilot light / Heater not in operation	Follow lighting instructions on the water heater	1) None
One flash & three second pause	Knob in pilot position or thermostat satisfied	None	1) None
LED Strobe (two quick flashes) & three second pause	Thermostat calling for heat	None	1) None
LED on continuously	Control knob turned to the off position	Wait for LED to go off before relighting	1) None
Two flashes & three second pause	Weak pilot signal detected	Verify pilot is lit Check thermopile voltage output Check wire connections at gas valve	1) Pilot assembly 2) Gas valve
Three flashes & three second pause	Gas valve has not seen temp rise in proper amount of time	Check temp probe ohms Verify water is not flowing	1) Gas valve cover w/ temp probe
Four flashes & three second pause	High tank temperature	Check temp probe ohms Check water temperature	1) Gas valve cover w/ temp probe
Five flashes & three second pause	Thermostat sensor fault	Check temp probe ohms Check water temperature	1) Gas valve cover w/ temp probe
Six flashes & three second pause	Water leak detected by the accessory module (if installed)	Refer to troubleshooting for the accessory module	1) Refer to troubleshooting for the accessory module
Seven flashes & three second pause	Gas valve fault	Reset gas valve; if problem persists replace gas valve	1) Gas valve
Eight flashes & three second pause	Pilot remains lit while the control knob is in off position	Check gas pressure Replace gas valve	1) Gas valve

NOTE: Check all wire connections
Check gas inlet and manifold gas pressure
Check for grounding connections



RESIDENTIAL REPLACEMENT PARTS LIST

Residential Atmospheric Vent Gas Models



"RG" Models

DEFENDER
SAFETY SYSTEM®

Includes Hydrojet®
Total Performance System

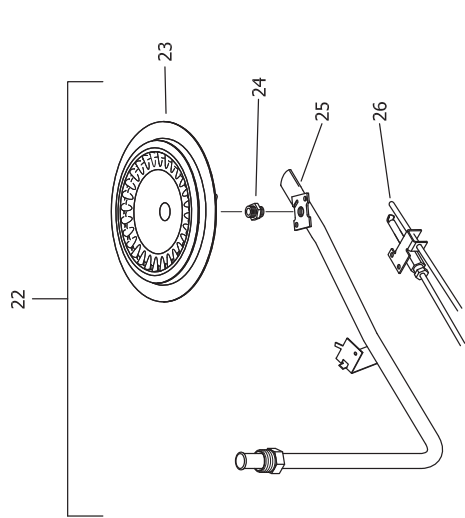
Effective: November, 2019
ECO 8239

NOTE: BOTH MODEL AND SERIAL
NUMBERS ARE REQUIRED FOR
ORDERING REPLACEMENT PARTS

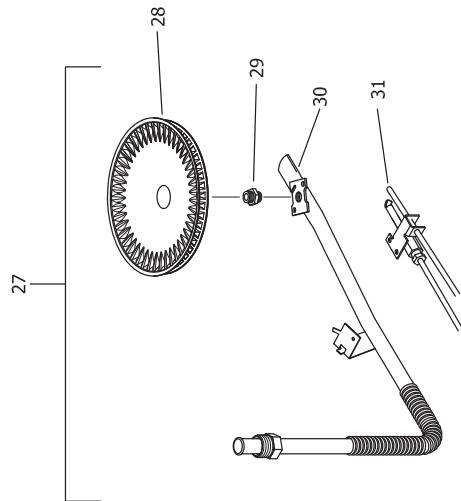
Dimensions and specifications
subject to change without notice.



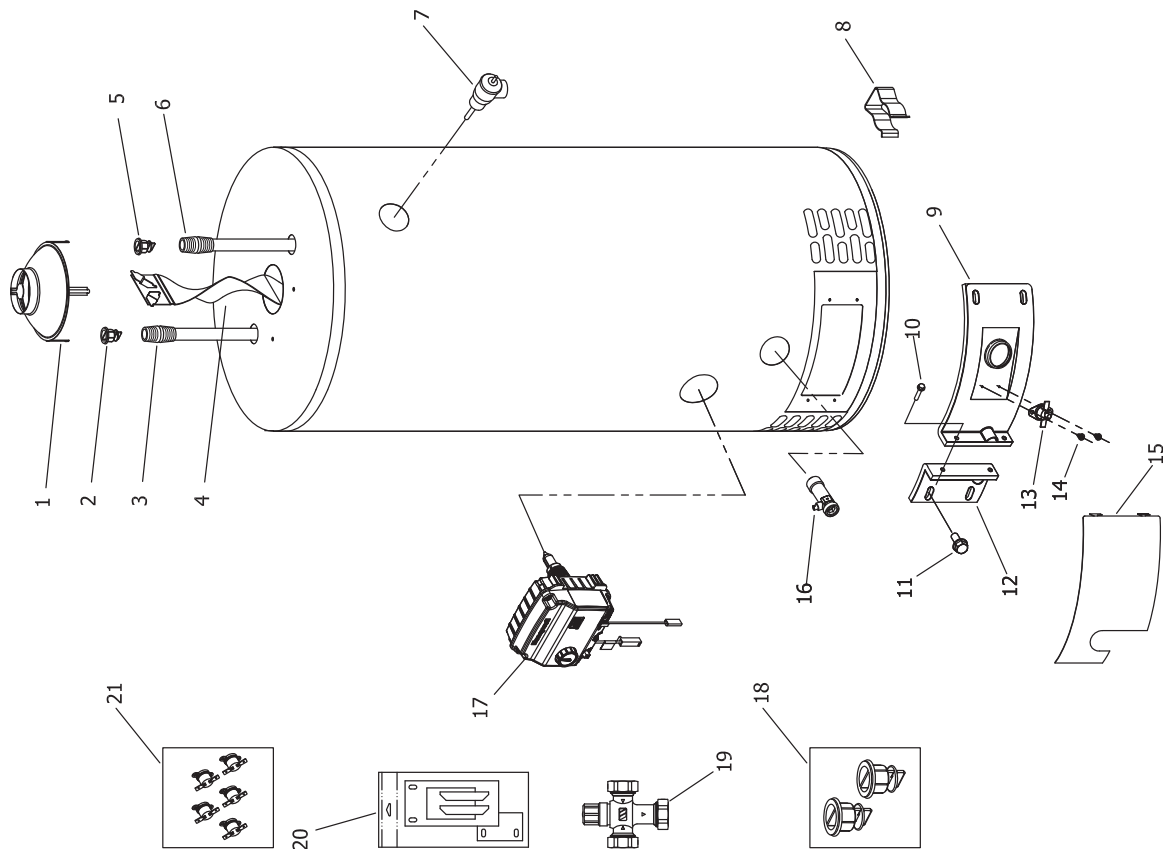
As required by the state of California Proposition 65.



NATURAL GAS BURNER ASSEMBLY



LP GAS BURNER ASSEMBLY

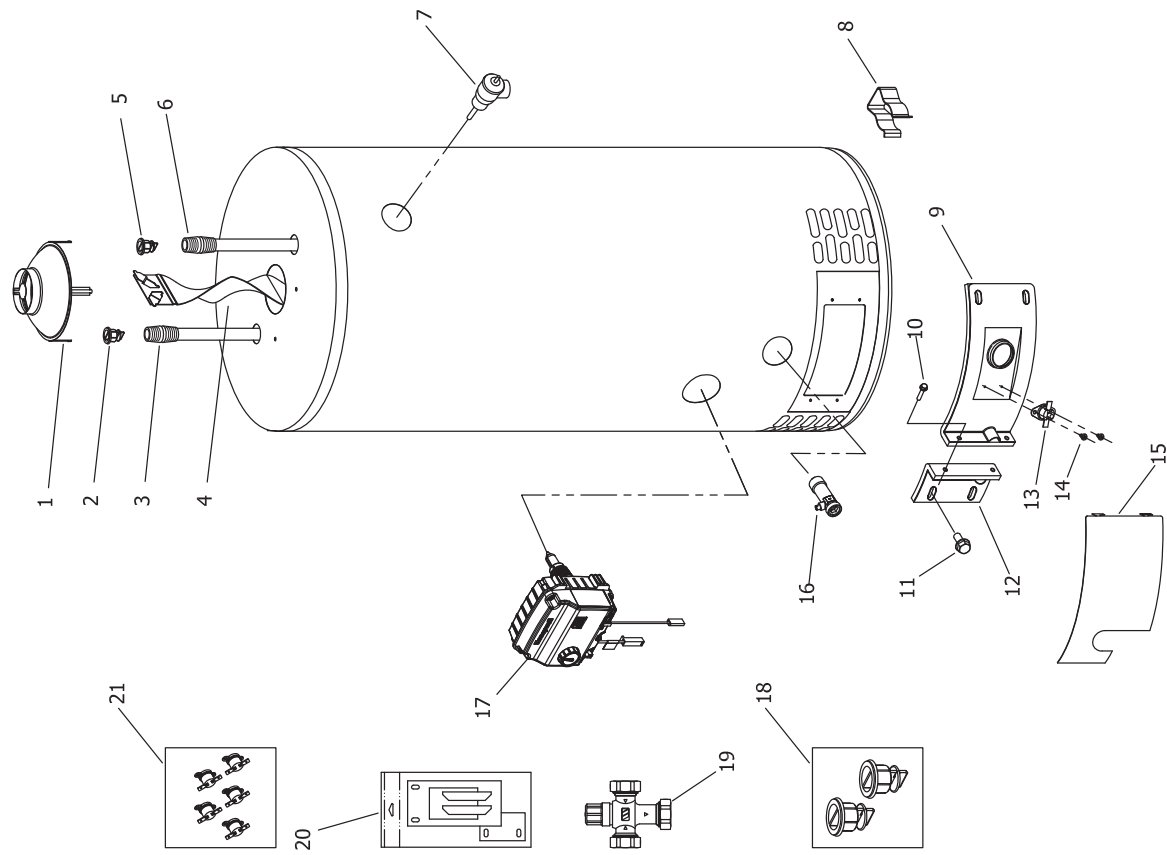
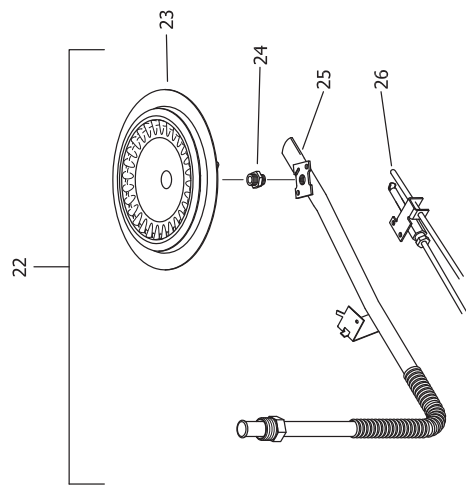


Item	Description	Model RG130T*(N,X)	Model RG140T*(N,X)	Model RG150T*(N,X)
1	Draft Diverter	243-45787-00	243-45787-00	243-45787-00
2	Heat Trap Insert (Outlet)	239-45167-00	239-45167-00	239-45167-00
3	Hot Water Outlet Anode (Magnesium) ▲ #	224-47776-19	224-47776-19	224-47776-19
	Hot Water Outlet (Aluminum) ▲ #	224-32999-42	224-32999-42	224-32999-42
	Hot Water Outlet (A420 Aluminum) ▲ #	224-49560-10	224-49560-10	224-49560-10
4	Flue Baffle	243-51480-00	243-51477-00	243-51477-00
5	Heat Trap Insert (Inlet)	239-51556-00	239-51556-00	239-51556-00
6	Cold Water Inlet Dip Tube (PEX) ▲ ▲	229-51230-19	229-51230-21	229-51230-18
7	T&P Relief Valve	230-40594-02	230-40594-02	230-40594-02
8	Feedline Clip	239-47475-00	239-47475-00	239-47475-00
9	Right Side Inner Door Complete	239-43963-01	239-43963-04	239-43963-06
10	Screw #8-18 x 3/4 HWH	239-44195-00	239-44195-00	239-44195-00
11	Screw #10-12 x 3/4 HWH	239-44113-00	239-44113-00	239-44113-00
12	Left Side Inner Door Complete	239-43968-14	239-43968-16	239-43968-18
13	Resettable Thermal Switch	239-43676-02	239-43676-02	239-43676-01
14	Screw #6-20 x 3/8 PHCR	239-43967-00	239-43967-00	239-43967-00
15	Outer Door	243-43962-00	243-43962-00	243-43962-00
16	Brass Drain Valve	265-42351-02	265-42351-02	265-42351-02
17	Gas Control Direct Replacement (Nat. Gas)**	415-52907-01	415-52907-01	415-52907-01
	Gas Control Direct Replacement (LP Gas)**	415-52909-01	415-52909-01	415-52909-01
	Gas Control Universal Replacement (Nat. Gas)	415-53359-00	415-53359-00	415-53359-00
	Gas Control Universal Replacement (LP Gas)	415-53360-00	415-53360-00	415-53360-00
18	Kit-Heat Trap Insert	265-51572-00	265-51572-00	265-51572-00
19	ASSE Approved Mixing Valve (Optional)	239-51778-00	239-51778-00	239-51778-00
20	Inner Door Gasket Kit	239-44078-00	239-44078-00	239-44078-00
21	Resettable Thermal Switch Kit (5 pcs.)	265-48643-02	265-48643-02	265-48643-01
Natural Gas Burner Assembly				
22	Nat. Gas Burner Assembly Complete*** **	265-51668-01-39	265-51668-02-35	265-47439-03-35
23	Nat. Gas Burner**	228-42506-00	228-42506-00	228-42506-00
24	Nat. Gas Main Burner Orifice** (0 Ft. to 2,000 Ft.)	234-41034-39	234-41034-35	234-41034-35
	Nat. Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-41034-43	234-41034-39	234-41034-39
	Nat. Gas High Altitude Kit 7,001 Ft. to 10,000 Ft.	234-41034-44	234-41034-42	234-41034-42
25	Feedline	233-48094-01	233-48094-02	233-48094-03
26	Nat. Gas Pilot Assembly**	233-51586-02	233-51586-02	233-47845-05
	Nat. Gas Pilot Assembly 0 Ft. to 7,000 Ft. (-475 model suffixes) **	233-47845-05	233-47845-05	233-47845-05
LP Gas Burner Assembly				
27	LP Gas Burner Assembly Complete*** **	265-47440-05-53	265-48038-02-51	265-48038-03-51
28	LP Gas Burner**	228-46964-00	228-46964-00	228-46964-00
29	LP Gas Main Burner Orifice**	234-47064-53	234-47064-51	234-47064-51
	LP Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-47064-54	234-47064-53	234-47064-53
	LP Gas High Altitude Orifice 7,001 Ft. to 10,000 Ft.**	234-47064-55	234-47064-54	234-47064-54
30	Feedline	233-47108-01	233-47108-02	233-47108-03
31	LP Gas Pilot Assembly**	233-47846-05	233-47846-05	233-47846-05
	LP to Nat. Gas Conversion Kit	265-53403-19	265-53403-21	265-45712-84
	LP to Nat. Gas High Altitude Conversion Kit (-475 model suffixes)	265-53403-20	265-53403-22	265-45712-85

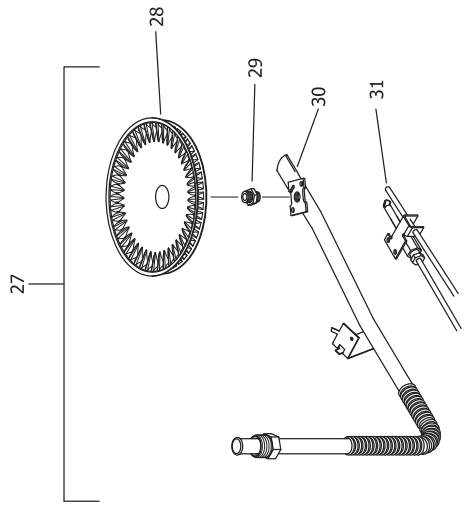
▲ Order with item 2 # Anode may need to be cut to length
 ▲▲ Order with item 5

**Inner door gasket kit recommended

***Ordering a complete burner assembly may increase delivery time. Please order the specific component required for the quickest delivery.



NATURAL GAS BURNER ASSEMBLY



LP GAS BURNER ASSEMBLY

Item	Description	Model RG230S*(N,X)	Model RG240T*(N,X)	Model RG240S*(N,X)	Model RG240T*(N,X)
1	Draft Diverter	243-45787-00	243-45787-00	243-45787-00	243-45787-00
2	Heat Trap Insert (Outlet)	239-45167-00	239-45167-00	239-45167-00	239-45167-00
3	Hot Water Outlet Anode (Magnesium)▲#	224-47776-19	224-47776-19	224-47776-19	224-47776-19
	Hot Water Outlet (Aluminum)▲#	224-32999-42	224-32999-42	224-32999-42	224-32999-42
	Hot Water Outlet (A420 Aluminum)▲#	224-49560-10	224-49560-10	224-49560-10	224-49560-10
4	Flue Baffle	243-45226-00	243-44639-00	243-52980-00	243-52981-00
5	Heat Trap Insert (Inlet)	239-51556-00	239-51556-00	239-51556-00	239-51556-00
6	Cold Water Inlet Dip Tube (PEX)▲▲	229-51230-20	229-51230-19	229-53466-02	229-53466-01
7	T&P Relief Valve	230-40594-02	230-40594-02	230-40594-02	230-40594-02
8	Feedline Clip	239-47475-00	239-47475-00	239-47475-00	239-47475-00
9	Right Side Inner Door Complete (Nat. Gas)	239-43963-03	239-43963-02	239-43963-07	239-43963-05
	Right Side Inner Door Complete (LP Gas)	239-43963-03	239-43963-02	239-43963-07	239-43963-04
10	Screw-#8-18 x 3/4 HWH	239-44195-00	239-44195-00	239-44195-00	239-44195-00
11	Screw-#10-12 x 3/4 HWH	239-44113-00	239-44113-00	239-44113-00	239-44113-00
12	Left Side Inner Door Complete	239-43968-16	239-43968-14	239-43968-18	239-43968-16
13	Resettable Thermal Switch	239-43676-01	239-43676-03	239-43676-02	239-43676-03
14	Screw-#6-20 x 3/8 PHCR	239-43967-00	239-43967-00	239-43967-00	239-43967-00
15	Outer Door	243-43962-00	243-43962-00	243-43962-00	243-43962-00
16	Brass Drain Valve	265-42351-02	265-42351-02	265-42351-02	265-42351-02
17	Gas Control Direct Replacement (Nat. Gas)	415-52907-02	415-52907-02	415-52907-02	415-52907-02
	Gas Control Direct Replacement (LP Gas)	415-52909-02	415-52909-02	415-52909-02	415-52909-02
	Gas Control Universal Replacement (Nat. Gas)	415-53359-00	415-53359-00	415-53359-00	415-53359-00
	Gas Control Universal Replacement (LP Gas)	415-53360-00	415-53360-00	415-53360-00	415-53360-00
18	Kit-Heat Trap Insert	265-51572-00	265-51572-00	265-51572-00	265-51572-00
19	ASSE Approved Mixing Valve (Optional)	239-51778-00	239-51778-00	239-51778-00	239-51778-00
20	Inner Door Gasket Kit	239-44078-00	239-44078-00	239-44078-00	239-44078-00
21	Resettable Thermal Switch Kit (5 pcs.)	265-43676-01	265-43676-03	265-43676-02	265-43676-03
Natural Gas Burner Assembly					
22	Nat. Gas Burner Assembly Complete*** **	265-48037-03-38	265-47439-02-36	265-47439-05-32	265-47439-04-32
23	Nat. Gas Burner**	228-42506-00	228-42506-00	228-42506-00	228-42506-00
24	Nat. Gas Main Burner Orifice** (0 Ft. to 2,000 Ft.)	234-41034-38	234-41034-36	234-41034-32	234-41034-32
	Nat. Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-41034-42	234-41034-41	234-41034-36	234-41034-36
	Nat. Gas High Altitude Kit 7,001 Ft. to 10,000 Ft.	265-51311-02-44	265-51311-02-43	265-51311-02-40	265-51311-02-40
25	Feedline	233-48094-03	233-48094-02	233-48094-04	233-48094-03
26	Nat. Gas Pilot Assembly**	233-47845-05	233-47845-05	233-47845-05	233-47845-05
LP Gas Burner Assembly					
27	LP Gas Burner Assembly Complete*** **	265-47440-05-53	265-47440-01-60	265-47440-09-50	265-48038-03-52
28	LP Gas Burner**	228-46964-00	228-46964-00	228-46964-00	228-46964-00
29	LP Gas Main Burner Orifice**	234-47064-53	234-47064-60	234-47064-50	234-47064-52
	LP Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-47064-54	234-47064-54	234-47064-52	234-47064-53
	LP Gas High Altitude Orifice 7,001 Ft. to 10,000 Ft.**	265-51367-02-56	265-51367-02-54	265-51367-02-53	265-51367-02-54
30	Feedline	233-47108-03	233-47108-02	233-47108-04	233-47108-03
31	LP Gas Pilot Assembly**	233-47846-05	233-47846-05	233-47846-05	233-47846-05
	LP to Nat. Gas Conversion Kit	265-45712-72	265-45712-09	265-45712-75	265-45712-10
	LP to Nat. Gas High Altitude Conversion Kit (-475 model suffixes)	265-45712-73	265-45712-74	265-45712-76	265-45712-77

*Applies to all warranties

**Inner door gasket kit recommended

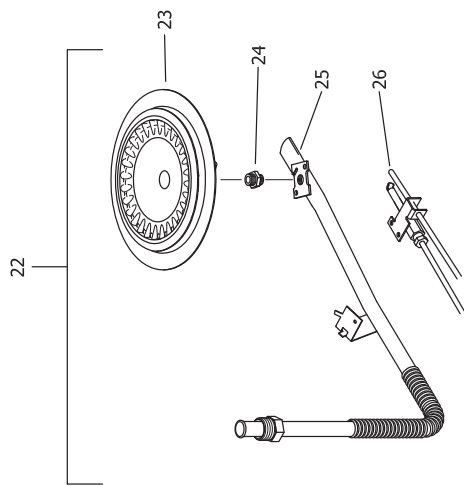
***Ordering a complete burner assembly may increase delivery time.

Please order the specific component required for the quickest delivery.

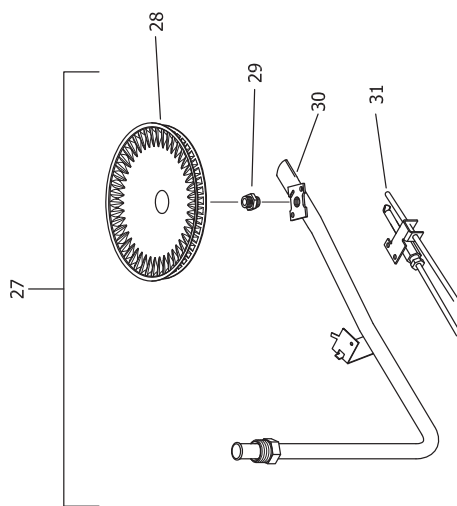
▲Order with item 2

▲▲Order with item 5

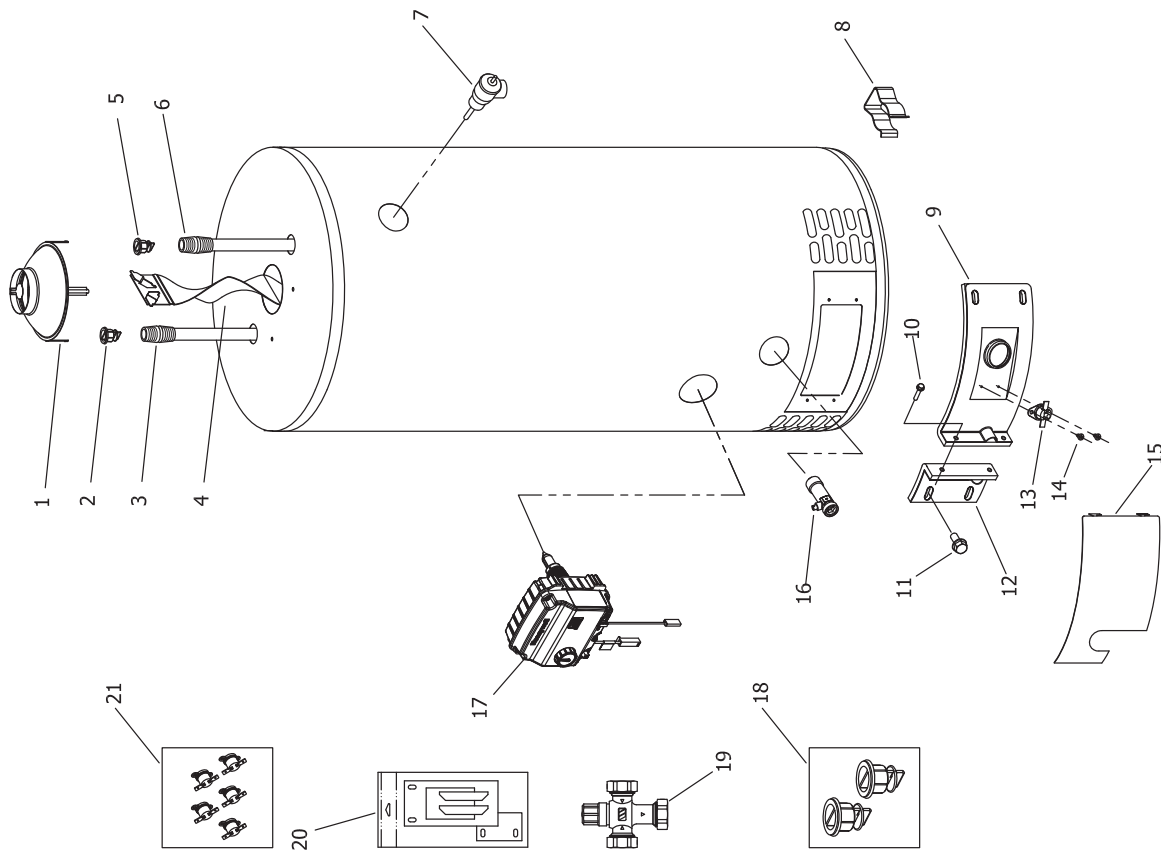
Anode may need to be cut to length



NATURAL GAS BURNER ASSEMBLY



LP GAS BURNER ASSEMBLY



Item	Description	Model RG250L*(N,X)	Model RG250S*(N,X)	Model RG250T*(N,X)
1	Draft Diverter	243-45787-00	239-33081-02-20-15	243-45787-00
2	Heat Trap Insert (Outlet)	239-45167-00	239-45167-00	239-45167-00
3	Hot Water Outlet Anode (Magnesium) ▲ #	224-47776-19	224-47776-19	224-47776-19
	Hot Water Outlet (Aluminum) ▲ #	224-32999-42	224-32999-42	224-32999-42
	Hot Water Outlet (A420 Aluminum) ▲ #	224-49560-10	224-49560-10	224-49560-10
4	Flue Baffle	243-45223-00	243-53148-00	243-44705-00
5	Heat Trap Insert (Inlet)	239-51556-00	239-51556-00	239-51556-00
6	Cold Water Inlet Dip Tube (PEX) ▲ ▲	229-51230-16	229-51230-14	229-51230-18
7	T&P Relief Valve	230-40594-02	230-40594-02	230-40594-02
8	Feedline Clip	239-47475-00	239-47475-00	239-47475-00
9	Right Side Inner Door Complete	239-43963-09	239-43963-06	239-43963-07
10	Screw-#8-18 x 3/4 HWH	239-44195-00	239-44195-00	239-44195-00
11	Screw-#10-12 x 3/4 HWH	239-44113-00	239-44113-00	239-44113-00
12	Left Side Inner Door Complete	239-43968-20	239-43968-18	239-43968-18
13	Resettable Thermal Switch	239-43676-01	239-43676-01	239-43676-02
14	Screw-#6-20 x 3/8 PHCR	239-43967-00	239-43967-00	239-43967-00
15	Outer Door	243-43962-00	243-43962-00	243-43962-00
16	Brass Drain Valve	265-42351-02	265-42351-02	265-42351-02
17	Gas Control Direct Replacement (Nat. Gas)	415-52907-02	415-52907-02	415-52907-02
	Gas Control Direct Replacement (LP Gas)	415-52909-02	415-52909-02	415-52909-02
	Gas Control Universal Replacement (Nat. Gas)	415-53359-00	415-53359-00	415-53359-00
	Gas Control Universal Replacement (LP Gas)	415-53360-00	415-53360-00	415-53360-00
18	Kit-Heat Trap Insert	239-51572-00	239-51572-00	239-51572-00
19	ASSE Approved Mixing Valve (Optional)	239-51778-00	239-51778-00	239-51778-00
20	Inner Door Gasket Kit	239-44078-00	239-44078-00	239-44078-00
21	Resettable Thermal Switch Kit (5 pcs.)	265-43676-01	265-43676-01	265-43676-02
Natural Gas Burner Assembly				
22	Nat. Gas Burner Assembly Complete*** **	265-47439-10-32	265-47439-07-30	265-47439-05-32
23	Nat. Gas Burner**	228-42506-00	228-42506-00	228-42506-00
24	Nat. Gas Main Burner Orifice** (0 Ft. to 2,000 Ft.)	234-41034-32	234-41034-30	234-41034-32
	Nat. Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-41034-36	234-41034-32	234-41034-36
	Nat. Gas High Altitude Kit 7,001 Ft. to 10,000 Ft.	265-51311-02-40	265-51311-02-35	265-51311-02-40
25	Feedline	233-48094-05	233-48094-04	233-48094-04
26	Nat. Gas Pilot Assembly**	233-47845-05	233-47845-05	233-47845-05
LP Gas Burner Assembly				
27	LP Gas Burner Assembly Complete*** **	265-48038-05-50	265-47440-08-47	265-48038-04-51
28	LP Gas Burner**	228-46964-00	228-47000-00	228-46964-00
29	LP Gas Main Burner Orifice**	234-47064-50	234-47064-47	234-47064-51
	LP Gas High Altitude Orifice 0 Ft. to 7,000 Ft. (-475 model suffixes) **	234-47064-52	234-47064-50	234-47064-53
	LP Gas High Altitude Orifice 7,001 Ft. to 10,000 Ft.**	265-51367-02-53	265-51367-02-51	265-51367-02-54
30	Feedline	233-47108-05	243-48039-03	233-47108-04
31	LP Gas Pilot Assembly**	233-47846-05	233-47846-05	233-47846-05
	LP to Nat. Gas Conversion Kit	265-45712-78	265-45712-80	265-45712-75
	LP to Nat. Gas High Altitude Conversion Kit (-475 model suffixes)	265-45712-79	265-45712-81	265-45712-76

*Applies to all warranties

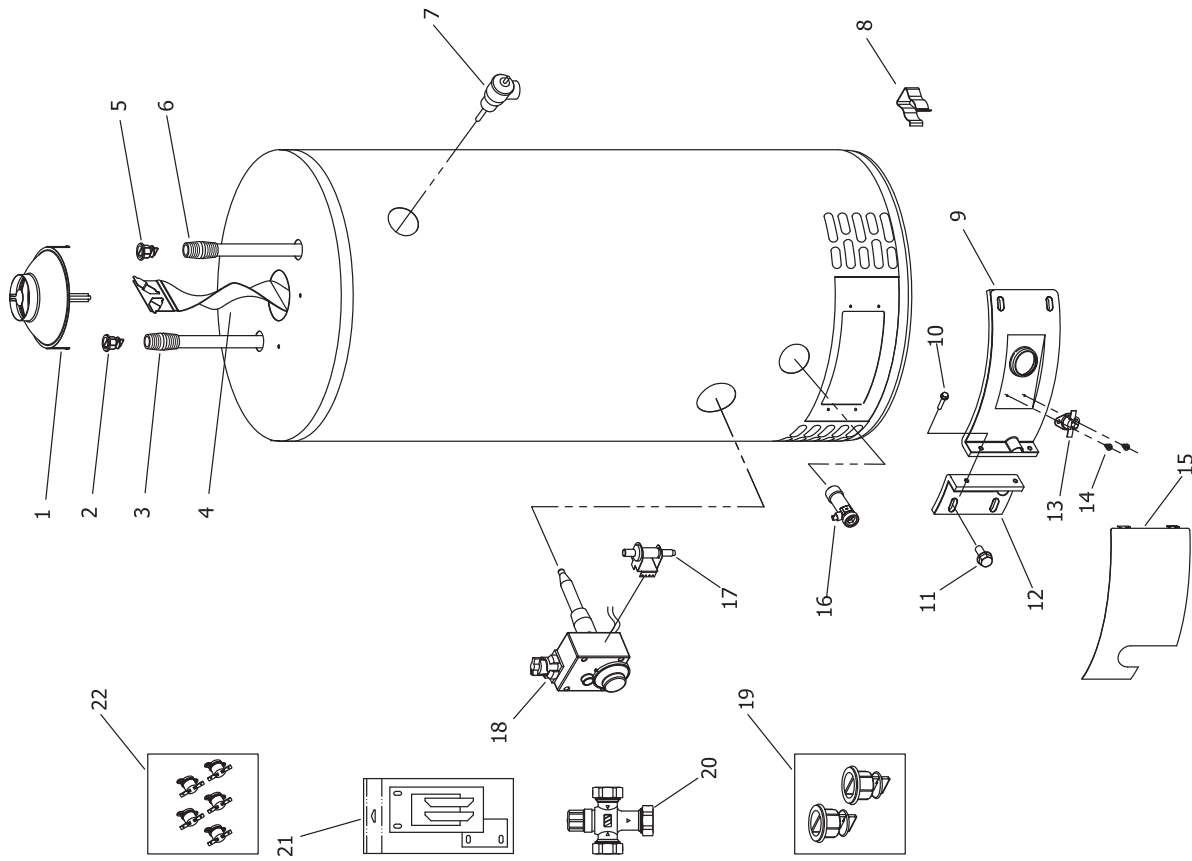
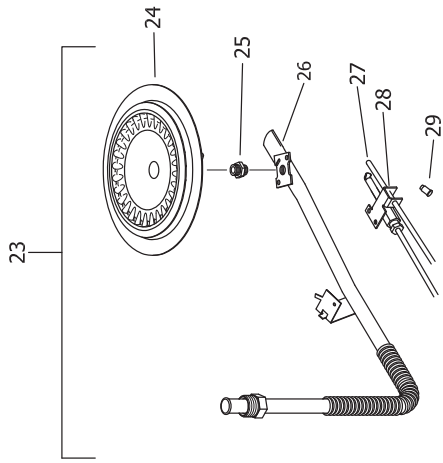
**Inner door gasket kit recommended

▲ Order with item 2

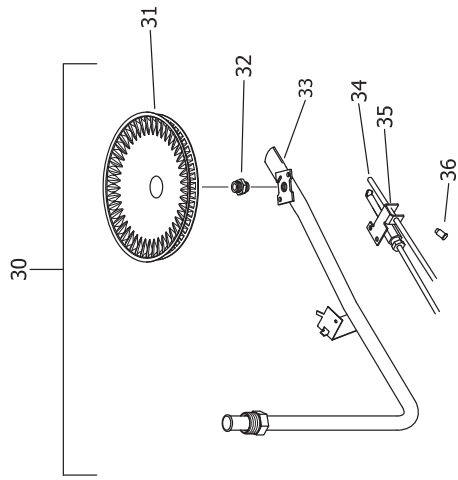
▲▲ Order with item 5

***Ordering a complete burner assembly may increase delivery time.

Please order the specific component required for the quickest delivery.



NATURAL GAS (BN) BURNER ASSEMBLY



LP GAS (SX) BURNER ASSEMBLY

Item	Description	Model RG230S*(N,X)-500	Model RG230T*(N,X)-500	Model RG240S*(N,X)-500	Model RG240T*(N,X)-500
1	Draft Diverter	243-45787-00	243-45787-00	243-45787-00	243-45787-00
2	Heat Trap Insert (Outlet)	239-45167-00	239-45167-00	239-45167-00	239-45167-00
3	Hot Water Outlet Anode (Magnesium)▲#	224-47776-19	224-47776-19	224-47776-19	224-47776-19
	Hot Water Outlet (Aluminum)▲#	224-32999-42	224-32999-42	224-32999-42	224-32999-42
	Hot Water Outlet (A420 Aluminum)▲#	224-49560-10	224-49560-10	224-49560-10	224-49560-10
4	Flue Baffle	243-45226-00	243-44639-00	243-52980-00	243-52981-00
5	Heat Trap Insert (Inlet)	239-51556-00	239-51556-00	239-51556-00	239-51556-00
6	Cold Water Inlet Dip Tube (PEX)▲▲	229-51230-20	229-51230-19	229-53466-02	229-53466-01
7	T&P Relief Valve	230-40594-02	230-40594-02	230-40594-02	230-40594-02
8	Feedline Clip	239-47475-00	239-47475-00	239-47475-00	239-47475-00
9	Right Side Inner Door Complete (Nat. Gas)	239-43963-03	239-43963-02	239-43963-07	239-43963-05
	Right Side Inner Door Complete (LP Gas)	239-43963-03	239-43963-02	239-43963-07	239-43963-04
10	Screw-#8-18 x 3/4 HWH	239-44195-00	239-44195-00	239-44195-00	239-44195-00
11	Screw-#10-12 x 3/4 HWH	239-44113-00	239-44113-00	239-44113-00	239-44113-00
12	Left Side Inner Door Complete	239-43968-16	239-43968-14	239-43968-18	239-43968-16
13	Resettable Thermal Switch (Nat. Gas)	239-43676-01	239-43676-03	239-43676-02	239-43676-03
14	Screw-#6-20 x 3/8 PHCR	239-43967-00	239-43967-00	239-43967-00	239-43967-00
15	Outer Door	243-43962-00	243-43962-00	243-43962-00	243-43962-00
16	Brass Drain Valve	265-42351-02	265-42351-02	265-42351-02	265-42351-02
17	Piezo Igniter Kit	243-43450-00	243-43450-00	243-43450-00	243-43450-00
18	T-Stat Direct Replacement (Natural Gas)	265-46181-02	265-46181-02	265-46181-02	265-46181-02
	T-Stat Direct Replacement (LP Gas)	265-46182-02	265-46182-02	265-46182-02	265-46182-02
19	Kit-Heat Trap Insert	239-51572-00	239-51572-00	239-51572-00	239-51572-00
20	ASSE Approved Mixing Valve (Optional)	239-51778-00	239-51778-00	239-51778-00	239-51778-00
21	Inner Door Gasket Kit	239-44078-00	239-44078-00	239-44078-00	239-44078-00
22	Resettable Thermal Switch Kit (5 pcs.)	265-43676-01	265-43676-03	265-43676-02	265-43676-03
Natural Gas Burner Assembly					
23	Nat Gas Burner Assembly Complete*** **	265-47439-07-38	265-47439-02-36	265-47439-04-32	265-47439-04-32
24	Nat. Gas Burner**	228-42506-00	228-42506-00	228-42506-00	228-42506-00
25	Nat. Gas Main Burner Orifice**	234-41034-38	234-41034-36	234-41034-32	234-41034-32
26	Feedline	233-48094-03	233-48094-02	243-43971-04	233-48094-03
27	Pilot Assembly Thermocouple	233-46501-24	233-46501-24	233-46501-24	233-46501-24
28	Nat. Gas Pilot Assembly**	233-46277-06	233-46277-06	233-46277-06	233-46277-06
29	Nat. Pilot Assembly Orifice	234-46502-05	234-46502-05	234-46502-05	234-46502-05
LP Gas Burner Assembly					
30	LP Gas Burner Assembly Complete*** **	265-47115-03-53	265-47440-01-60	265-47440-09-50	265-47115-03-52
31	LP Gas Burner**	228-46964-00	228-46964-00	228-46964-00	228-46964-00
32	LP Gas Main Burner Orifice**	234-47064-55	234-47064-60	234-47064-50	234-47064-52
33	Feedline	233-47108-03	233-47108-02	233-47108-04	233-47108-03
34	Pilot Assembly Thermocouple	233-46501-24	233-46501-24	233-46501-24	233-46501-24
35	LP Gas Pilot Assembly**	233-46278-04	233-46278-04	233-47846-07	233-46278-04
36	LP Pilot Assembly Orifice	234-46502-02	234-46502-02	234-46502-02	234-46502-02

*Applies to all warranties

**Inner door gasket kit recommended

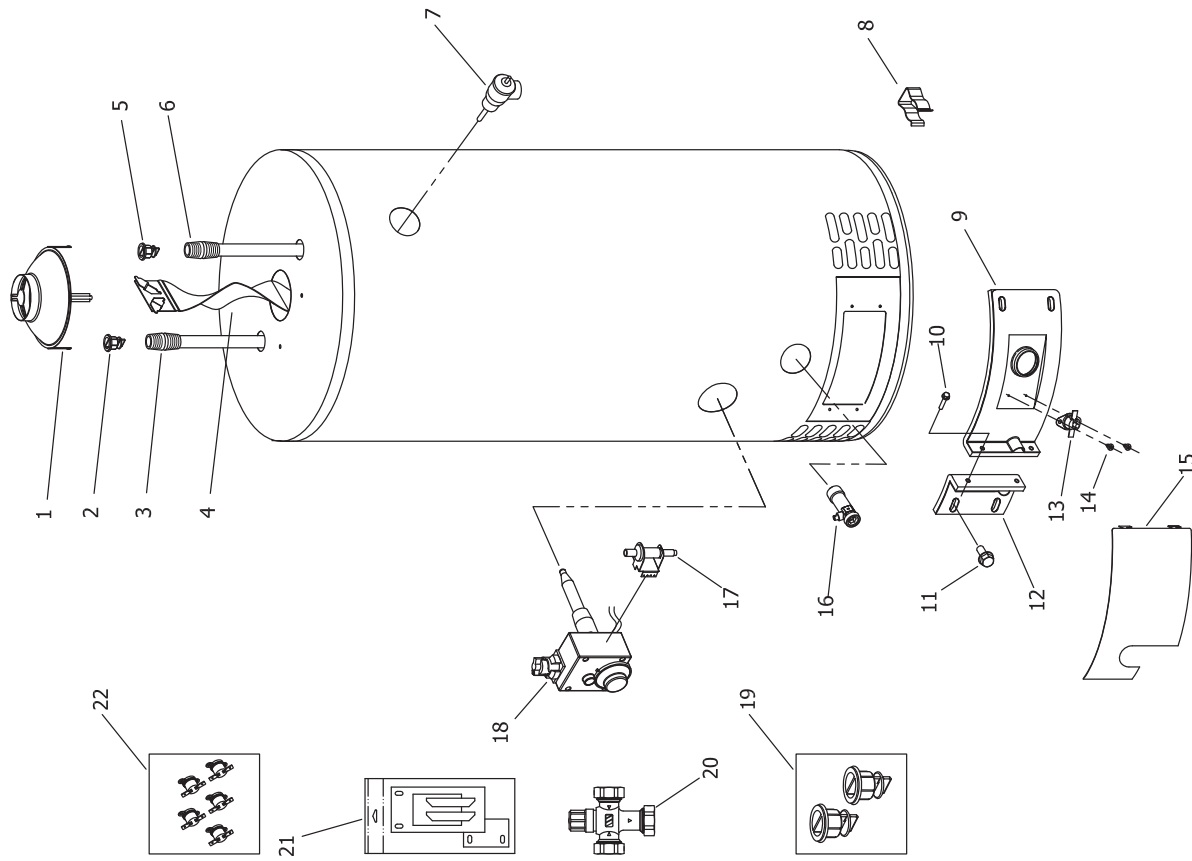
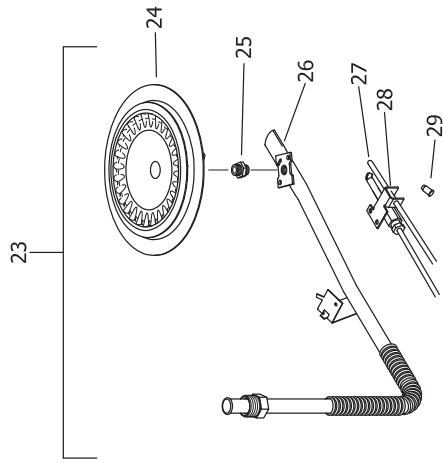
▲▲ Order with item 2

▲▲▲ Order with item 5

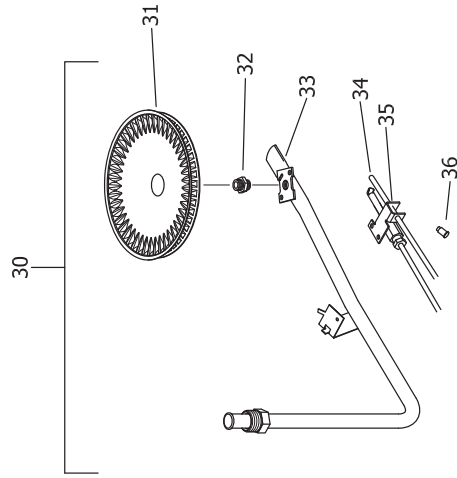
#Anode may need to be cut to length

***Ordering a complete burner assembly may increase delivery time.

Please order the specific component required for the quickest delivery.



NATURAL GAS (BN) BURNER ASSEMBLY



LP GAS (SX) BURNER ASSEMBLY

Item	Description	Model	Model	Model
1	Draft Diverter	RG250L*(N,X)-500	RG250L*(N,X)-500	RG250L*(N,X)-500
2	Heat Trap Insert (Outlet)	243-45787-00	239-33081-02-20-15	243-45787-00
3	Hot Water Outlet Anode (Magnesium)▲#	239-45167-00	239-45167-00	239-45167-00
	Hot Water Outlet (Aluminum)▲#	224-47776-19	224-47776-19	224-47776-19
	Hot Water Outlet (A420 Aluminum)▲#	224-32999-42	224-32999-42	224-32999-42
4	Flue Baffle	224-49560-10	224-49560-10	224-49560-10
5	Heat Trap Insert (Inlet)	243-45223-00	243-53148-00	243-44705-00
6	Cold Water Inlet Dip Tube (PEX)▲▲	239-51556-00	239-51556-00	239-51556-00
7	T&P Relief Valve	229-51230-20	229-51230-14	229-51230-18
8	Feedline Clip	230-40594-02	230-40594-02	230-40594-02
9	Right Side Inner Door Complete	239-47475-00	239-47475-00	239-47475-00
10	Screw-#8-18 x 3/4 HWH	239-43963-09	239-43963-06	239-43963-07
11	Screw-#10-12 x 3/4 HWH	239-44195-00	239-44195-00	239-44195-00
12	Left Side Inner Door Complete	239-44113-00	239-44113-00	239-44113-00
13	Resettable Thermal Switch	239-43968-20	239-43968-18	239-43968-18
14	Screw-#6-20 x 3/8 PHCR	239-43676-01	239-43676-01	239-43676-02
15	Outer Door	239-43967-00	239-43967-00	239-43967-00
16	Brass Drain Valve	243-43962-00	243-43962-00	243-43962-00
17	Piezo Igniter Kit	265-42351-02	265-42351-02	265-42351-02
18	T-Stat Direct Replacement (Natural Gas)	243-43450-00	243-43450-00	243-43450-00
	T-Stat Direct Replacement (LP Gas)	265-46181-02	265-46181-02	265-46181-02
19	Kit-Heat Trap Insert	239-51572-00	239-51572-00	239-51572-00
20	ASSE Approved Mixing Valve (Optional)	239-51778-00	239-51778-00	239-51778-00
21	Inner Door Gasket Kit	239-44078-00	239-44078-00	239-44078-00
22	Resettable Thermal Switch Kit (5 pcs.)	265-43676-01	265-43676-01	265-43676-02
Natural Gas Burner Assembly				
23	Nat Gas Burner Assembly Complete*** **	265-47439-10-32	265-47439-07-30	265-47439-05-32
24	Nat. Gas Burner**	228-42506-00	228-42506-00	228-42506-00
25	Nat. Gas Main Burner Orifice**	234-41034-32	234-41034-30	234-41034-32
26	Feedline	233-48094-05	233-48094-04	233-48094-04
27	Pilot Assembly Thermopile	233-46501-24	233-46501-24	233-46501-24
28	Nat. Gas Pilot Assembly**	233-46277-04	233-46277-04	233-46277-04
29	Pilot Assembly Orifice	234-46502-05	234-46502-05	234-46502-05
LP Gas Burner Assembly				
30	LP Gas Burner Assembly Complete*** **	265-48038-05-50	265-47440-08-47	265-47115-04-51
31	LP Gas Burner**	228-46964-00	228-47000-00	228-46964-00
32	L.P. Gas Main Burner Orifice**	234-47064-50	234-47064-47	234-47064-51
33	Feedline	233-47108-05	233-47108-04	233-47108-04
34	Pilot Assembly Thermopile	233-46501-24	233-46501-24	233-46501-24
35	LP Gas Pilot Assembly**	233-46278-03	233-46278-03	233-46278-03
36	Pilot Assembly Orifice	234-46502-02	234-46502-02	234-46502-02

*Applies to all warranties

**Inner door gasket kit recommended

***Ordering a complete burner assembly may increase delivery time.

Please order the specific component required for the quickest delivery.

▲ Order with item 2

▲▲ Order with item 5

#Anode may need to be cut to length



For U.S. and Canada field service,
contact your professional installer or
local Bradford White sales representative.

Sales/800-523-2931

Technical Support/800-334-3393
Email/techserv@bradfordwhite.com

Warranty/800-531-2111
Email/warranty@bradfordwhite.com

Service Parts/800-538-2020
Email/Parts@bradfordwhite.com

International:
international@bradfordwhite.com



Halton Hills, Ontario, Canada

Sales & Technical Support/866-690-0961
905-203-0600

Fax/905-636-0666

Email
Warranty/bwccwarranty@bradfordwhite.com
Technical Support/BWCCTech@bradfordwhite.com
Parts/orders@bradfordwhitecanada.com
Orders/ca.orders@bradfordwhite.com

www.bradfordwhite.com

BRADFORD WHITE CORPORATION

LIMITED RESIDENTIAL WATER HEATER WARRANTY

WHAT DOES THIS LIMITED WARRANTY COVER?

This limited warranty covers both the glass-lined tank and component parts for leakage or other malfunction caused by defects in materials and/or workmanship. It extends to the first buyer and to any subsequent owner(s) as long as the water heater remains installed at its original place of installation in the USA, CANADA or Puerto Rico. For other countries please see chart on reverse side.

WHAT DOES THIS LIMITED WARRANTY NOT COVER?

1. This limited warranty does not cover leakage or other malfunction caused by:
 - a) Excessive use and specifically, non residential use.
 - b) Defective Installation, and specifically, any installation which is made:
 - i. in violation of applicable state or local plumbing, housing or building codes, or
 - ii. without a certified American Gas Association, ASME, or comparable combination temperature and pressure relief valve, or
 - iii. contrary to the written instructions furnished with the unit.
 - c) Adverse local conditions, and specifically, sediment or lime precipitate in the tank or corrosive elements in the atmosphere.
 - d) Misuse, and specifically, operation, and maintenance contrary to the written instructions furnished with the unit, removal of magnesium anode, disconnection, alteration or addition of non-approved components or apparatus, operation with fuels or at settings other than those set forth on the rating plate or accidental or other exterior damage.
2. This warranty also does not cover:
 - a) Production of noise, taste, odors, discoloration or rusty water.
 - b) Incidental property damage, loss of use, inconvenience or other incidental or consequential costs.
 - c) Costs associated with the replacement and/or repair of the unit, including:
 - i. any freight, shipping or delivery charges
 - ii. any removal, installation or re-installation charges
 - iii. any material, and/or permits required for installation, re-installation or repair
 - iv. charges to return the defective water heater and/or component part to the manufacturer.

WHAT IS THE PERIOD OF COVERAGE?

This limited warranty runs from date of installation (or without proof of installation, from three (3) months after the date of manufacture) for the period specified on the following chart. To determine length of coverage, check model number listed on the rating plate of appliance against this chart.

WHAT IS THE DURATION OF THE IMPLIED WARRANTY?

•Restrictions are not applicable to implied warranties in California. See "Special State Provisions" on reverse side.

USA, CANADA AND PUERTO RICO

MODEL NUMBER PREFIX	LIMITED TANK** WARRANTY	LIMITED PARTS** WARRANTY
JL, MI, M3, MS, (U)DS, MIMH, MIMS, MII, M4, (U)DH1, M1XR, (M,U)2XR, (U)PDX2, M2, M1, AST, (M,U)1TW, (M,U)2TW, GX, CDW, CSW, U1, U2, U4, SSW, SDW, SDC, (U)PDX1, D4, (M,U)4TW, (M,U)4XRTW, HE4, (U)PDX4, WH, (U)RG, RE, RC	1, 2, 3, 5, 6, 8 or 10 YRS	1 or 6 YRS*
M-III, M2HE, RE2H	6 or 10 YRS	6 or 10 YRS*

NOTE: The duration of the tank warranty will be found in the model number.

i.e.; RG240T1N has a 1 Year tank warranty

RG240T2N has a 2 Year tank warranty

RG240T6N has a 6 Year tank warranty

RG240T10N has a 10 Year tank warranty

* All (1) year tank warranted units only have a one year parts warranty. All MIII, M2HE (6) year tank warranted units have a (6) year parts warranty. All MIII, M2HE, RE2H (10) year tank warranted units have a (10) year parts warranty.

** Any (1) to (8) year tank warranted water heater used for other than a single family housing unit will be covered for only one year on tank and parts regardless of any other warranty period specified. Any (10) year warranted water heater used for other than a single family housing unit will be covered for three years on tank and one year on parts regardless of any other warranty period specified. All replacement water heaters and parts carry the balance of the original warranty, i.e. if an original (10) year tank warranted water heater develops a leak due to defects in materials/workmanship after only (9) years, the replacement unit is warranted for only the balance remaining from the original (10) year warranty, or (1) year in this example.

ANY IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY IMPOSED ON THE SALE OF THE WATER HEATER UNDER THE LAWS OF THE STATE OF SALE ARE LIMITED IN DURATION TO ONE YEAR FROM DATE OF ORIGINAL INSTALLATION.

HOW DOES STATE LAW RELATE TO THE WARRANTY?

Some states do not allow:

1. Limitations on how long an implied warranty lasts.
2. Limitations on incidental or consequential damages.

So the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

LIMITED RESIDENTIAL WATER HEATER WARRANTY (CONTINUED)

WHAT WILL WE DO TO CORRECT PROBLEMS?

If a defect occurs within the warranty period, we will:

1. Provide a replacement water heater of our manufacture (or at our option repair) any unit which develops a leak in the steel tank within the tank warranty period. To obtain a replacement, you must forward the rating plate from the defective unit to us. If government regulations require the replacement water heater to have features not found in the defective water heater, you will be required to pay the difference in price represented by those government required features.
2. Provide a replacement part (or at our option repair) any part which fails to function within the parts warranty period. To obtain a replacement, you must forward the defective part to us. If government regulations require the replacement part to have features not found in the defective part, you will be required to pay the difference in price represented by those government required features.

We do reserve the right to verify any claims of defect by inspection.

WHAT WILL WE NOT DO?

We will not:

1. Repair or replace any water heater, or part, subject to conditions outlined in "What Does This Limited Warranty Not Cover?"
2. Reimburse any costs associated with repair and/or replacement.
3. Replace and/or repair any water heater without complete model/serial number.
4. Replace any water heater without prior receipt of actual rating plate from appliance.

HOW DO YOU GET WARRANTY ASSISTANCE?

Upon discovering a defect or problem, you should:

1. Contact either the installer or dealer, or
2. Contact us:
BRADFORD WHITE CORPORATION
WARRANTY SUPPORT GROUP
200 LAFAYETTE
MIDDLEVILLE, MI 49333
(800) 531-2111

WHAT SHOULD YOU DO TO KEEP THE WARRANTY IN EFFECT?

To facilitate warranty assistance, you should:

1. Follow all instructions enclosed with the product.
2. Retain all bills of sale or receipts for proof of installation, etc.
3. Contact your installer, dealer or our Warranty Department as soon as any problem or defect is noticed.
4. When necessary, allow us, or our chosen representative, to inspect the unit.
5. For your reference, fill in the Model and Serial Number found on the unit's Rating Plate:

Model Number _____

Serial Number _____

Date of Installation _____

SPECIAL STATE PROVISIONS

For water heaters installed in California or Oregon, paragraphs 2 (c), (i) and (iv) of the paragraph "WHAT DOES THIS WARRANTY NOT COVER?" do not apply.

All other terms and conditions of this warranty apply as stated.

FOR INSTALLATIONS OUTSIDE THE USA, CANADA OR PUERTO RICO (All other terms and conditions of the Limited Warranties apply)

MODEL NUMBER PREFIX	LIMITED TANK** WARRANTY	LIMITED PARTS** WARRANTY
JL, MI, M3, MS, (U)DS, MIMH, MIMS, MII, MIII, BW, M4, (U)DH1, M1XR, (M,U)2XR, (U)PDX2, M2, M1, M2HE, AST, (M,U)1TW, (M,U)2TW, GX, CDW, CSW, U1, U2, U4, SSW, SDW, SDC, (U)PDX1, D4, PE, (M,U)4TW, (M,U)4XRTW, HE4, (U)PDX4, WH, RE2H, (U)RG, RE, RC	1, 2, 3, 5, 6, 8 or 10 YRS	1 or 2 YRS*

NOTE: The duration of the tank warranty will be found in the model number.

i.e.; RG240T1N has a 1 Year tank warranty

RG240T2N has a 2 Year tank warranty

RG240T6N has a 6 Year tank warranty

RG240T10N has a 10 Year tank warranty

* All (1) year tank warranted units only have a one year parts warranty.

** **Any** water heater used for other than a single family housing unit will be covered for only one year on tank and parts regardless of any other warranty period specified. All replacement water heaters and parts carry the balance of the original warranty, i.e. if an original ten (10) year tank warranted water heater develops a leak due to defects in materials/workmanship after only nine (9) years, the replacement unit is warranted for only the balance remaining from the original ten (10) year warranty, or one (1) year in this example.

PLEASE RETAIN THIS WARRANTY IN A SAFE LOCATION FOR FUTURE REFERENCE.