

BRADFORD WHITE®
W A T E R H E A T E R S

UPV Series

Through-The-Wall (TTW®) Gas Water Heaters

SERVICE MANUAL

Troubleshooting Guide
and Instructions for Service

(To be performed ONLY by
qualified service providers)

Models Covered by This Manual:

URG1PV40S*N
URG1PV50S*N
URG2PV40T*N
URG2PV50T*N
URG2PV50H*N
ULG2PV50H56*N
(*) Denotes Warranty Years



WARNING
CANCER AND REPRODUCTIVE HARM
WWW.P65WARNINGS.CA.GOV

As required by the state of California Proposition 65.



The Bradford White UPV Series

Through-The-Wall Gas Water Heaters

Table of Contents

	<u>Page</u>	<u>PV Service Procedure</u>
Introduction.....	4	---
How to Use This Manual.....	5	---
Tools Required for Service	5	---
Specifications	6	---
Control Timings.....	9	---
Sequence of Operation	10	---
Troubleshooting	14	---
Burner Inspection, Cleaning & Replacement	16	I
Pilot Testing, Cleaning & Replacement	18	II
Pressure Switch Testing & Replacement.....	19	III
Blower Testing & Replacement.....	21	IV
Blower Temperature Switch Testing & Replacement.....	23	V
Gas Control Testing & Replacement	25	VI
Flammable Vapor Device Testing and Replacement.....	28	VII
Safety Circuit Voltage Trace	29	VIII
115 VAC Circuit Trace.....	30	IX
Diptube Inspection & Replacement.....	31	X
Anode Inspection & Replacement.....	32	XI
Flue Baffle Inspection & Replacement.....	33	XII
Inner Door Removal, Inspection & Replacement	34	XIII
Resettable Thermal Switch, Inspection & Replacement	37	XIV
ScreenLok® Flame Arrestor Cleaning	39	---
Glossary of Terms	40	---
Parts List.....	41	---

UPV Series

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing 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 MUST 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**

⚠ 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

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 ¾" X ¾" TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIM THAT MIGHT RESULT FROM EXCESSIVE TEMPERATURE AND PRESSURES.

⚠ CAUTION

Turn off or disconnect the electrical power supply to the water heater before servicing. Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Introduction

The new Bradford White URG1PV & URG2PV water heaters are designed to provide reliable performance with enhanced standard features. New design features include reliable spark to pilot ignition system, enhanced diagnostics, simplified servicing, significantly quieter operation, additional vent lengths, and Bradford White Defender Safety System® (not available on all models).

Spark to Pilot Ignition System - employing the spark to pilot ignition system promotes reliable and consistent pilot and main burner ignitions to provide hot water on demand.

Integrated Immersion Thermostat/Gas Control Valve with LED - was developed for ease of troubleshooting by providing simple diagnostic codes to pinpoint an installation or component performance issue.

Powerful Blower - will eliminate problems with difficult venting situations.

Quieter and Cooler Blower Operation - blower noise is significantly reduced for both interior and exterior environments. Cooler operation increases blower life by reducing bearing wear and noise.

Rugged Wiring Connections - receptacle type connections promote free wiring.

Increased Vent Lengths - increased venting performance is achieved while maintaining Energy Factor & FHR (not applicable on all models) performance.

The URG1PV & URG2PV water heaters use a combustion system where flue gases are combined with dilution air to reduce the flue gas temperature in the blower. The diluted flue gases are evacuated to the exterior through low temperature vent materials. The gas control maintains water temperature, ignition sequence and regulates gas flow. A safety circuit consisting of a pressure switch and blower temperature switch verifies proper conditions exist for safe and reliable operation. If a situation outside of normal operating parameters exists, the gas control diagnostic LED will flash a code to positively identify an operational issue.

This service manual is designed to facilitate problem diagnosis and enhance service efficiency. Please read the service manual completely before attempting service on this new series of power vent models.

How the Safety System Works

During normal operation, most air for combustion is drawn into the water heater through the openings in the jacket door. This air travels into the burner venturi, mixing with the gas jet. This air is then mixed with gas inside the burner and drawn to the burner screen and is efficiently combusted producing Ultra Low NOx emissions. Additional air is drawn through the openings in the jacket. This air travels down and around the combustion chamber and enters through holes in the bottom of the corrosion-resistant combustion chamber. The air then travels up through the oriented flame arrestor plate louvers, where they velocity of the air is increased, and its direction altered. The air then mixes in a normal manner with the combustion products from the burner.

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

Should the flammable vapors continue to the burner, the flame arrestor plate and burner screen prevent the flames from traveling backwards and igniting vapors outside of the combustion chamber. The gas control utilizes a flammable vapor sensor to detect the presence of flammable vapors and shut down if the vapors achieve a certain level.

How to Use This Manual

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 UPV Series water heaters. Understanding the sequence of operation section of this manual will contribute greatly to troubleshooting the water heater.

The Resideo WV4462A Electronic Gas Control will display status codes in the event of abnormal operation. Status codes are listed in the troubleshooting chart beginning on page 14 of this service manual. The troubleshooting chart 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, screwdrivers (common & Phillips), 1/4" nut driver, pliers (common & needle nose), socket set, side cutters, wire cutters, wire strippers, wire crimpers, torpedo level, small shop vac, step ladder, flashlight, and 5 gallon pail.

UPV Series

Specifications

Power Supply	Dedicated 115 VAC, 60 Hz, 15A.
Gas Supply Pipe	Minimum 1/2" NPT (schedule 40 black iron pipe recommended).
Approved Gas Type	Natural Gas, unit must match gas type supplied.
Gas Pressure	6.0" W.C. min. for Natural Gas, 14.0" W.C. maximum.
Venting System	Power vent through the wall or vertical through the roof.
Approved Vent Materials	PVC, CPVC or ABS.
Minimum Clearance for Servicing	18" from top, 24" from front, 4" sides and rear.
Water Supply Pressure	150 PSI maximum allowable working pressure. Check local codes for supply pressure.
Gas Control ECO Limit	Residential 188°F (87°C), Commercial 199°F (93°C).
Residential Temperature Set Point Range	60°F (16°C) to 160°F (71°C) (approximate temperatures).
Commercial Temperature Set Point Range	80°F (27°C) to 180°F (82°C) (approximate temperatures).
Blower Temperature Switch	Normally closed, opens @ 155°F (68°C), auto reset @ approximately 135°F (57°C).
Pressure Switch	URG1PV(40,50)S Models: Normally open, closes on vacuum increase @ -.75" W.C.; Opens on vacuum decrease @ -.72" W.C. RG2PV(40,50)T: Normally open, closes on vacuum increase @ -.80" W.C.; Opens on vacuum decrease @ -.77" W.C. URG2PV50H Models: Normally open, closes on vacuum increase @ -1.40" W.C.; Opens on vacuum decrease @ -1.37" W.C.
Blower	115 VAC, 60 Hz, 3.1 amps, 3000 RPM.

Vent Tables

Venting Specifications for:

URG1PV40S, URG2PV40T
URG1PV50S, URG2PV50T

2" Diameter (5.1 cm) Vent Connector Lengths			
Terminating	# of Elbows	Maximum Straight Length ft. (m)	Minimum Straight Length ft. (m)
Through the Wall	1	45 (13.7)	2 (.6)
Through the Wall	2	40 (12.2)	2 (.6)
Through the Wall	3	35 (10.7)	2 (.6)
Through the Wall	4	30 (9.1)	2 (.6)
Through the Roof	0	50 (15.2)	7 (2.1)
Through the Roof	1	45 (13.7)	7 (2.1)
Through the Roof	2	40 (12.2)	7 (2.1)
Through the Roof	3	35 (10.7)	7 (2.1)
Through the Roof	4	30 (9.2)	7 (2.1)

3" Diameter (7.6 cm) Vent Connector Lengths			
Terminating	# of Elbows	Maximum Straight Length ft. (m)	Minimum Straight Length ft. (m)
Through the Wall	1	115 (35)	10 (3.1)
Through the Wall	2	110 (33.5)	10 (3.1)
Through the Wall	3	105 (32.0)	10 (3.1)
Through the Wall	4	100 (30.5)	10 (3.1)
Through the Wall	5	95 (29.0)	10 (3.1)
Through the Roof	0	120 (36.6)	15 (4.6)
Through the Roof	1	115 (35)	15 (4.6)
Through the Roof	2	110 (33.5)	15 (4.6)
Through the Roof	3	105 (32.0)	15 (4.6)
Through the Roof	4	100 (30.5)	15 (4.6)

Vent Tables

Venting Specifications for:

URG2PV50H
ULG2PV50H

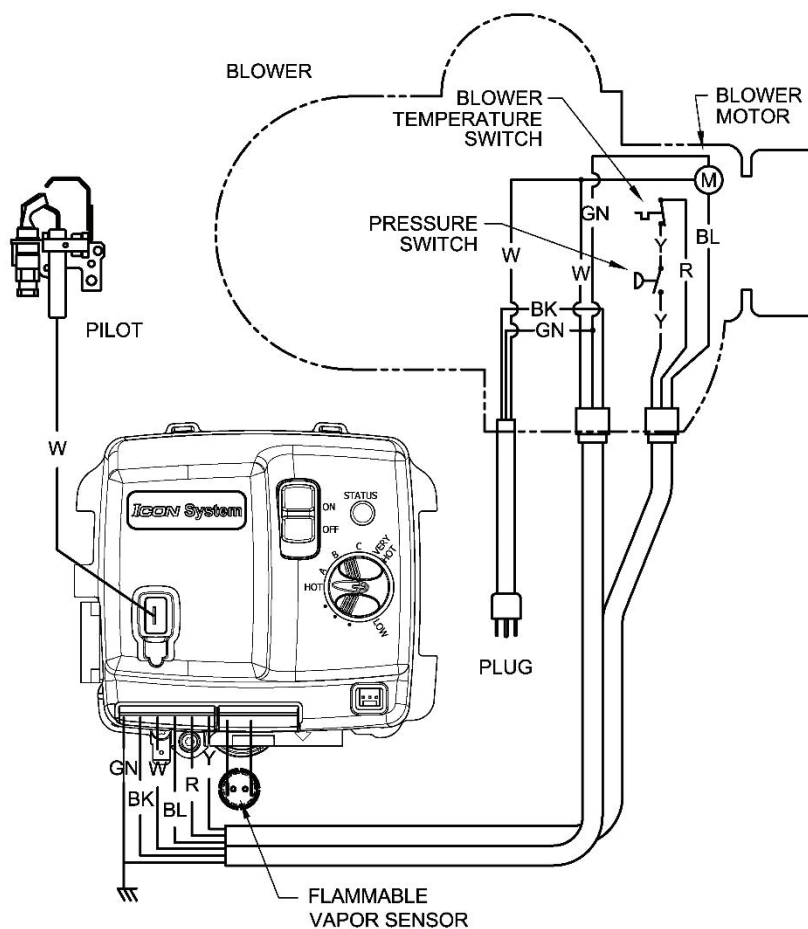
3" Diameter (7.6 cm) Vent Connector Lengths			
Terminating	# of Elbows	Maximum Straight Length ft. (m)	Minimum Straight Length ft. (m)
Through the Wall	1	55 (16.8)	2 (.6)
Through the Wall	2	50 (15.2)	2 (.6)
Through the Wall	3	45 (13.7)	2 (.6)
Through the Wall	4	40 (12.2)	2 (.6)
Through the Roof	0	60 (18.3)	7 (2.1)
Through the Roof	1	55 (16.8)	7 (2.1)
Through the Roof	2	50 (15.2)	7 (2.1)
Through the Roof	3	45 (13.7)	7 (2.1)

4" Diameter (10.2 cm) Vent Connector Lengths			
Terminating	# of Elbows	Maximum Straight Length ft. (m)	Minimum Straight Length ft. (m)
Through the Wall	1	175 (53.3)	10 (3.1)
Through the Wall	2	170 (51.8)	10 (3.1)
Through the Wall	3	165 (50.3)	10 (3.1)
Through the Wall	4	160 (48.8)	10 (3.1)
Through the Wall	5	155 (47.2)	10 (3.1)
Through the Roof	0	180 (54.9)	15 (4.6)
Through the Roof	1	175 (53.3)	15 (4.6)
Through the Roof	2	170 (51.8)	15 (4.6)
Through the Roof	3	165 (50.3)	15 (4.6)
Through the Roof	4	160 (48.8)	15 (4.6)

Control Timings

Ignition State	Timing
Pre-purge	15 Seconds
Trial for Ignition	90 Seconds
Flame Stabilization Period	3 Seconds
Inter-purge	15 Seconds
Flame Failure Response Time	1.5 Seconds (2 second maximum; 1 second minimum)
Post-purge	15 Seconds
PS Fault Delay (failed open/close)	Retry after 2 minutes
Soft Lockout	Retry after 5 minutes
ECO Limit Lockout	Indefinite (see page 26)
Verify Resistive Delay	Retry after 2 minutes (repeats 5 times)
Flammable Vapor Sensor/Simulated Resistive Load Lockout	Indefinite (cycle power to restart)
Hardware Status Lockout	Indefinite (self clears if fault clears for at least 15 seconds)

WIRING DIAGRAM ALL MODELS



Power Up Sequence

1. Start Up.
Upon power up, the control runs a safe-start check with a typical start-up delay of 5 seconds.
2. Flammable Vapor.
To assure no outputs are energized if the “Flammable Vapor Sensor” is out of range, the control will test the “Flammable Vapor Sensor” or “Simulated Resistive Device” for proper operating range. If the “Flammable Vapor Sensor” or “Simulative Resistive Device” is out of range, the control LED immediately flashes 7 times with 3 second pause.

Normal Heating Sequence

1. Thermostat calls for heat.
Prior to energizing blower, gas control checks safety circuit to ensure the circuit is open. Normal switch positions in the safety circuit are as follows:
 - a) Pressure switch normally open.
 - b) Blower temperature switch normally closed.

If the safety circuit is closed, the control waits 4 seconds, gas control LED flashes 2 times with 3 second pause. Gas control waits 2 minutes then, blower runs for 30 seconds. This cycle repeats until safety circuit opens.
2. Blower energizes.
3. Pressure switch proves blower/vent system operation.
If the pressure switch does not close within 30 seconds, the control LED flashes 3 times with 3 second pause. The blower runs for 30 seconds every 2 minutes trying to get the pressure switch or blower temperature switch to close. This cycle repeats as long as there is a call for heat.
4. Blower pre-purge period (2 seconds).
5. Trial for pilot ignition (90 seconds).
 - a. The gas control lights the pilot by activating spark igniter and gas flow to pilot burner.
 - b. If flame is not sensed within 90 seconds, igniter and gas flow are deactivated, blower will post purge and control LED flashes 6 times with 3 second pause.
6. Main burner ignition.
After pilot flame is sensed, gas control activates main valve for main burner ignition. The gas control will ignore flame and pressure switch signals for 3 seconds allowing for main burner to stabilize.

Normal Heating Sequence (cont.)

7. Steady state operation.

During steady state operation, the control monitors:

Thermostat temperature sensor-when set point temperature is satisfied, gas valve is shut down and blower will post purge for 15 seconds. Control LED flashes a short flash once every 4 seconds (idle) status code.

Pressure switch / blower temperature switch-if either switch opens, pilot valve and main valve shut down. The blower continues to run for 30 seconds attempting to close the circuit. The control LED flashes 3 times with 3 second pause.

Flame sensor-if flame is lost, pilot & main valves are shut down, blower runs for 15 seconds. Control attempts to re-light pilot 4 times. If unsuccessful, blower is shut down and control proceeds to 5 minute lockout. Control re-attempts to light pilot starting at normal heating sequence #2.

8. Thermostat satisfies. (Control LED flashing once every 4 seconds).

9. Burner off.

10. Blower post purges (15 seconds).

Abnormal Operation

1. Flammable Vapor Sensor or Simulated Resistive Device Fault:

- a. **If the resistance is greater than 70,000 Ohms**-the gas control immediately turns off all outputs. Control waits and monitors resistance for 30 seconds. If the resistance is greater than 65,000 ohms after 30 seconds, the gas control proceeds to verify resistive delay for 2 minutes and flashes 7 times then once with a three second pause. This process is repeated 5 times until the control either returns to normal operation or proceeds to flammable vapor lockout.
- b. **If the resistance is below 3000 Ohms**-The gas control immediately turns off all outputs and proceeds to flash 8 times then once with three second pause. The status self clears if the resistance returns to normal range for at least 15 seconds.

2. Temperature Sensor Fault:

- a. **Temperature sensor detected open circuit**-The gas control immediately turns off all outputs and proceeds to flash 8 times then, 3 times with 3 second pause. The status self clears if the fault clears for at least 15 seconds.
- b. **Thermal well sensor not reading the same temperature within $\pm 5.5^{\circ}\text{F}$** – The gas control immediately turns off all outputs and proceeds to flash 8 times, then 3 times twice with 3 second pause. The status self clears if the fault clears for at least 15 seconds.

Abnormal Operation (cont.)

- c. **Water temperature in excess of ECO (energy cut out) limit** -The gas control immediately turns off pilot & main valves and proceeds to flash 4 times with 3 second pause. Blower continues to run until gas control is reset. To reset control, rotate knob of temperature control to the minimum setting for at least 6 seconds before returning to desired temperature setting.
3. Pressure Switch/Blower Temperature Fault:
- a. **Pressure switch closed at start of call for heat**-the gas control waits 4 seconds then, proceeds to flash 2 times with 3 second pause. The control waits 2 minutes and then turns on blower for 30 seconds. The blower turns off after 30 seconds and the control waits for pressure switch to open. Any time the pressure switch opens, the blower turns on (or stays on) and the control proceeds to wait for pressure switch to close.
 - b. **Pressure switch or blower temperature switch failed to close**-the gas control runs the blower for 30 seconds waiting for the pressure switch and/or blower temperature switch to close. If either switch does not close in 30 seconds, the blower turns off and the control flashes 3 times with 3 second pause. The gas control waits 2 minutes before turning on the blower for another 30 seconds to see the circuit close. This cycle repeats as long as there is a call for heat or until the circuit closes.
 - c. **Pressure switch or blower temperature switch opens during burner operation**-the gas control turns off the pilot and main valve, runs blower for 15 seconds (inter-purge) waiting for pressure switch and/or blower temperature switch to close. If either switch fails to close, the control proceeds as described in 3b above, if the circuit closes again by the end of the inter-purge, the recycle counter is incremented, if the recycle count has not reached its limit (4), another trial for ignition begins. If the recycle count has been reached, the gas control turns off the blower and flashes 6 times then, 2 times with 3 second pause. The gas control waits 5 minutes before repeating ignition sequence.
4. Trial for Ignition Fault:
- a. **Pressure switch opens during trial**-the gas control turns off igniter and pilot valve. The gas control proceeds as described in 3b above. If the pressure switch closes within 30 seconds the gas control will continue with trial for ignition starting at blower pre-purge.
 - b. **Flame not sensed**-the gas control energizes the spark igniter attempting to light the pilot and prove flame. If flame is not sensed within 90 seconds, the igniter turns off, the pilot valve is closed and the gas control runs the blower through post purge and flashes 6 times then, once with 3 second pause. The control waits 5 minutes before repeating the ignition sequence.

Abnormal Operation (cont.)

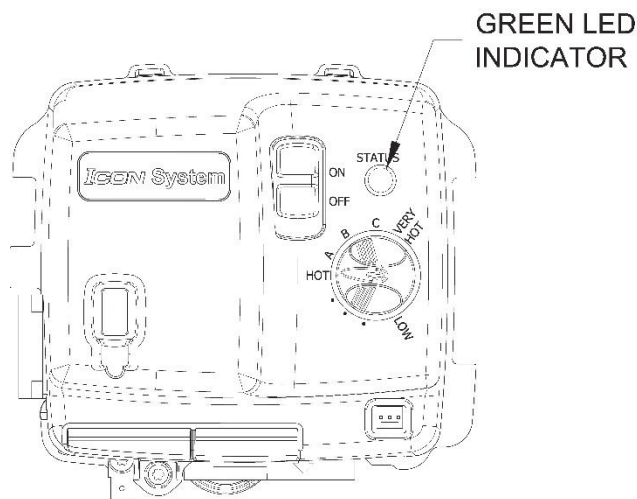
5. Flame sensing fault:

- a. **Flame lost during run**-the gas control turns off pilot and main valves, runs blower for 15 seconds (inter-purge). The gas control increments the recycle count, if the recycle count has not reached its limit (4), another trial for ignition begins. If the recycle count has been reached, the gas control turns off the blower and flashes 6 times then, 3 times with 3 second pause. The gas control waits 5 minutes before repeating the ignition sequence.
- b. **Flame sensed out of sequence**-the gas control only looks for pilot flame when the blower is running. If flame is present when the pilot valve is not open, the gas control proceeds to wait for flame loss and flashes 5 times with 3 second pause. This continues until flame is lost. Once the flame signal is lost, the control flashes 6 times then, 4 times with 3 second pause. The control waits 5 minutes before repeating the ignition sequence.

UPV Series

Troubleshooting

Observe green LED indicator on electronic 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.



<u>LED Status</u>	<u>Control Status</u>	<u>Probable Cause</u>	<u>Service Procedure</u>
None, control LED not on or flashing	No electrical power	Control power switch in "OFF" position. Supply voltage interrupted.	Turn power on.
Short flash, once every four seconds	Stand-by mode, waiting for call for heat (no fault).	Temperature demand is satisfied.	Normal operation. Adjust thermostat to temp level.
"Heartbeat" alternates bright/dim	Thermostat calling for heat (no fault).	Tank temperature below set point of thermostat.	Normal operation. Adjust thermostat to temp level.
Short flash once per second	Weak pilot signal on last call for heat.	1. Unstable pilot. 2. Pilot tube block or restricted. 3. Oxidation build up on pilot electrode. 4. Wire damage to pilot assembly or bad connection at gas valve.	Page 18.
Two flash, three second pause	Pressure switch not working-closed position.	1. Pressure switch tubing kinked or blocked. 2. Blocked pressure tap on switch or blower. 3. Faulty pressure switch.	Page 20.
Three flash, three second pause	Pressure switch or blower temp. switch not working -open position.	1. Vent blockage or improper vent configuration. 2. Pressure switch tubing kinked or blocked. 3. Faulty pressure switch. 4. Blower not spinning up to speed. 5. Blower temp or exhaust temp too high. 6. Faulty blower temperature switch.	1. Check vent or vent tables. 2 & 3. Page 19. 4. Page 21. 5 & 6. Page 24.
Four flash, three second pause	Excessive tank temperature. System must be reset.	1. Temperature sensor out of calibration. 2. Faulty gas control. 3. Plumbing leak.	1 & 2. Replace gas control, page 27.
Five flash, three second pause	Undesired-false pilot flame present.	1. Pilot valve stuck in open position.	Replace gas control, page 27.

<u>LED Status</u>	<u>Control Status</u>	<u>Probable Cause</u>	<u>Service Procedure</u>
Six-one flash, three second pause	Failed to light pilot. System auto resets.	1. Unstable pilot. 2. Pilot tube blocked or restricted. 3. Oxidation build up on pilot electrode. 4. Wire damage to pilot assembly or bad connection at gas valve.	Page 18.
Six-two flash, three second pause	Pressure switch or blower temp switch opened during burner operation. System auto resets.	1. Vent blockage or improper vent configuration. 2. Pressure switch tubing kinked or blocked. 3. Faulty pressure switch. 4. Vent termination being affected by wind. 5. Blower not spinning up to speed. 6. Blower temp or exhaust temp too high. 7. Faulty blower temperature switch.	1. Check vent or vent tables. 2 & 3. Page 19 4. Refer to venting section of installation manual. 5. Page 21 6 & 7. Page 23.
Six-three flash, three second pause	Pilot flame extinguished. System auto resets.	1. Unstable pilot. 2. Pilot tube blocked or restricted. 3. Oxidation build up on pilot electrode. 4. Wire damage to pilot assembly or a bad connection at gas valve. 5. Insufficient combustion air. 6. Gas pressure is out of specification.	1-4. Page 18. 5. Refer to installation manual 6. Page 25.
Six-four flash, three second pause	Undesired-false pilot flame sensed. System auto resets.	Pilot valve stuck in open position.	Replace gas control, page 27.
Seven flash, three second pause	Flammable vapor sensor or resettable thermal switch fault detected.	1. Flammable vapor present 2. Flammable vapor sensor exposed to excessive moisture 3. Flammable vapor sensor exposed to extreme ambient temperature 4. Resettable thermal switch open	1-3. Flammable sensor testing, Page 28. 4. Resettable thermal switch testing, Page 37.
Eight-one flash, three second pause	Flammable vapor sensor out of specification.	Flammable vapor sensor or simulated resistive device out of specification.	Page 28.
Eight-two flash, three second pause	Temperature sensor fault.	1. Damage to temperature sensor wire. 2. Temperature sensor resistance out of range.	Replace gas control, page 27.
Eight-three flash, three second pause	Gas valve electronics fault detected.	1. Control needs to be reset. 2. Control is wet or physically damaged.	1. Interrupt power supply. 2. Replace gas control, page 27.
Eight-four flash, three second pause	Gas valve fault detected.	1. Control needs to be reset. 2. Control is wet or physically damaged.	1. Interrupt power supply. 2. Replace gas control, page 27.

UPV Series

UPV SERVICE PROCEDURE I

Burner Operation Inspection, Cleaning and Replacement

Burner Inspection

At periodic intervals (every 6 months) a visual inspection should be made of the pilot and main burner for proper operation and to assure no debris is accumulating.

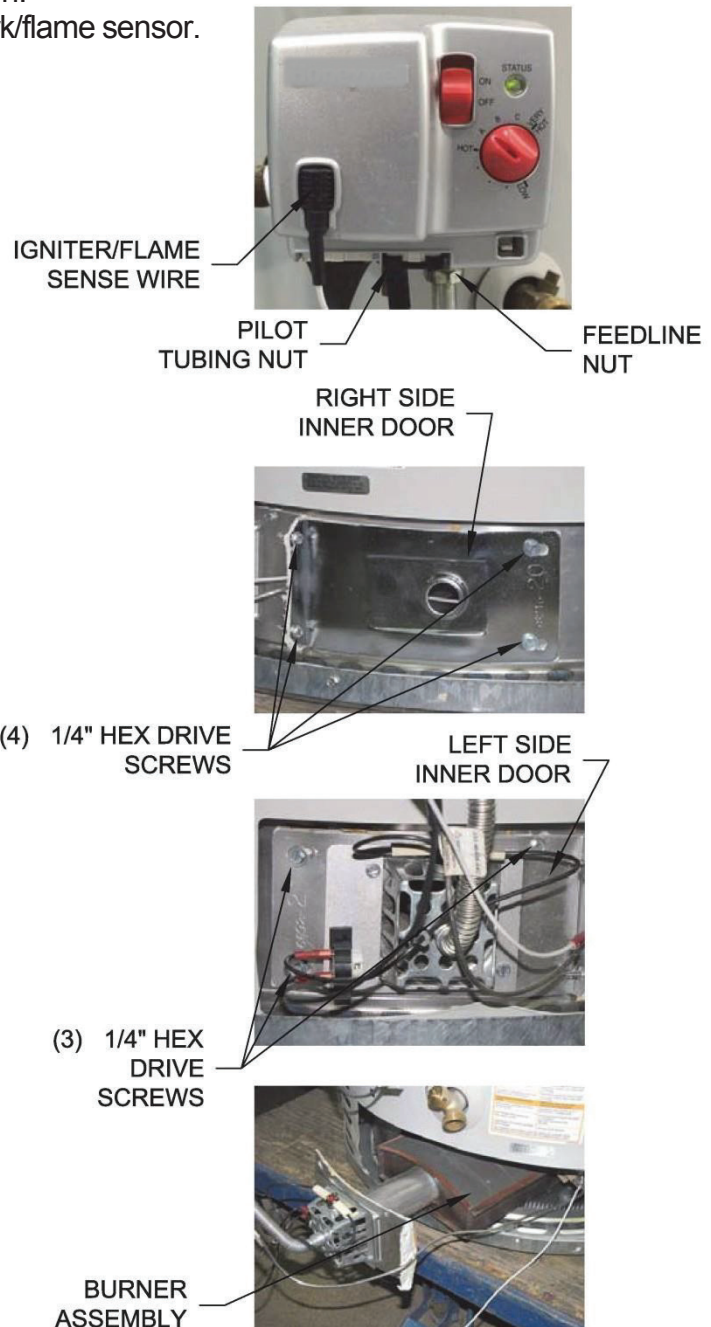
Pilot flame should be stable, some causes for an unstable pilot flame are:

- a) Water heater vent is less than the allowable vent length.
- b) Gas pressure is out of specification.
- c) Pilot flame not fully engulfing spark/flame sensor.

Main burner should light smoothly from pilot and burn with a blue flame with a minimum of yellow tips. Main burner must be free from any debris accumulation that may affect burner operation.

Burner Cleaning

- Step 1. Position the gas control power switch to the "OFF" position and unplug the heater from the wall outlet.
- Step 2. Turn OFF gas supply to the water heater.
- Step 3. Remove outer jacket door.
- Step 4. Disconnect pilot tube ($\frac{7}{16}$ " wrench) and feedline ($\frac{3}{4}$ " wrench) from gas control.
- Step 5. Disconnect igniter/flame sensor wire from gas control.
- Step 6. Remove the (4) $\frac{1}{4}$ " hex drive screws holding the right side inner door in place.
- Step 7. Remove the (3) $\frac{1}{4}$ " hex drive screws holding the left side burner door in place.
- Step 8. Remove burner assembly from combustion chamber.



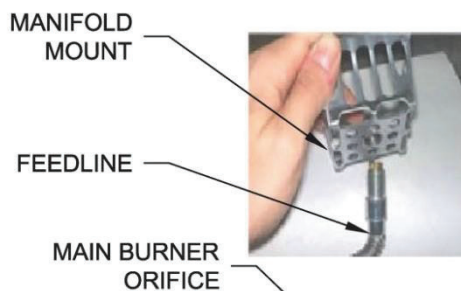
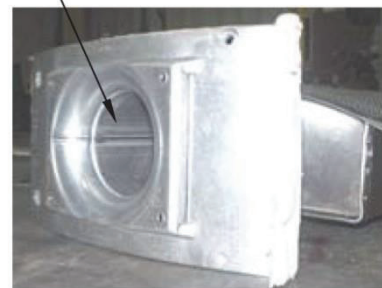
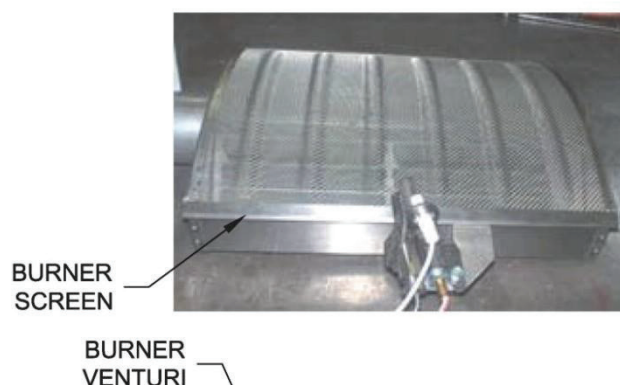
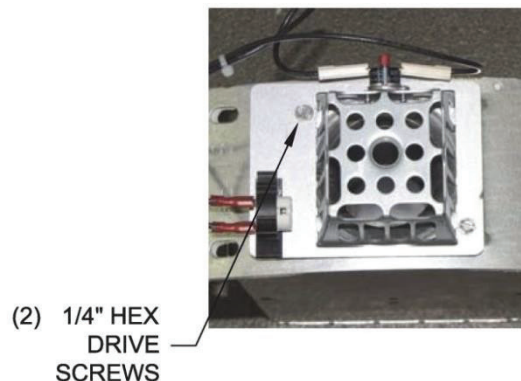
UPV Series

UPV SERVICE PROCEDURE I

Burner Operation Inspection,
Cleaning and Replacement

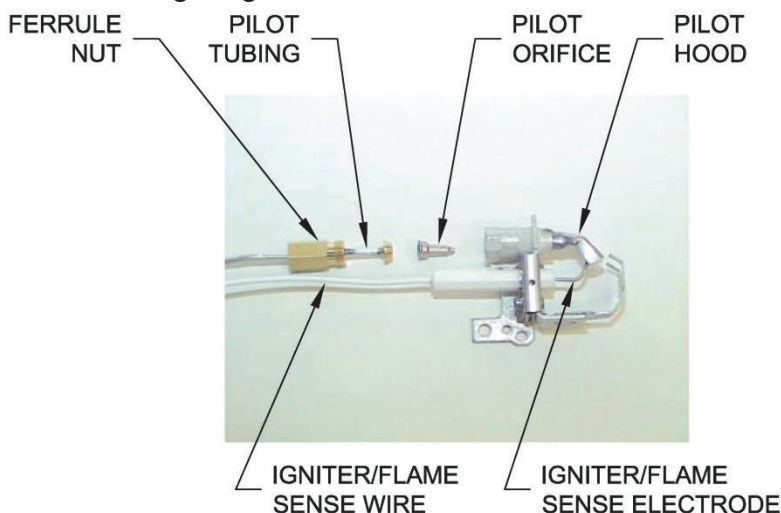
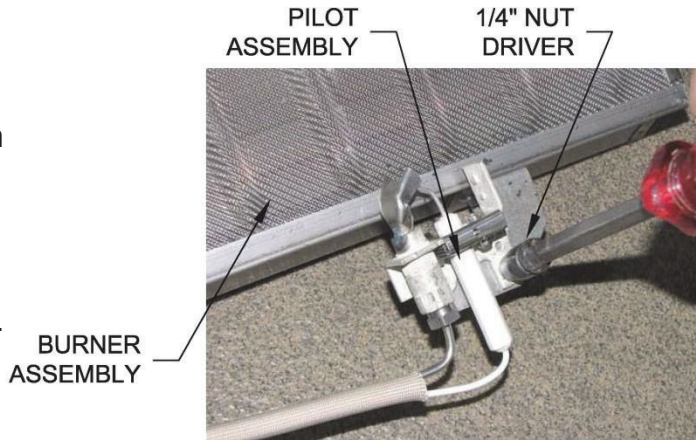
Burner Cleaning (cont.)

- Step 9. Remove manifold mount from burner inner door by removing (2) 1/4" hex drive screws.
- Step 10. Use a stiff brush, compressed air and/or a vacuum to remove any debris build up from the manifold mount.
- Step 11. Thoroughly inspect burner surface area and burner port area and remove any loose debris using compressed air and/or a vacuum.
- Step 12. Thoroughly inspect burner screen and burner venturi and remove any loose debris accumulation. Inspect burner screen for any openings larger than the normal screen openings.
- Step 13. Remove main burner orifice from feedline (1/2" wrench) inspect orifice, clean or replace if necessary.
- Step 14. Reassemble burner and reinstall inner door with gasket into water heater per Service Procedure XIII on page 35. Restore gas supply and check for gas leaks.
- Step 15. To resume operation, follow the instruction located on the lighting instruction label or the lighting instruction located in the Installation and Operation Manual.



Pilot Inspection, Testing, and Replacement

- Step 1. Visually inspect igniter/flame sense electrode for oxidation build up. Carefully clean any oxidation using very fine emery cloth.
- Step 2. Remove pilot assembly from the burner assembly ($\frac{1}{4}$ " nut driver).
- Step 3. Visually inspect igniter/flame sense wire for damage. Replace pilot if damage is found.
- Step 4. With a multi-meter set to ohms setting, check continuity through igniter/flame sense wire. Replace pilot if no continuity.
- Step 5. Visually inspect igniter/flame sense electrode for deterioration. Replace pilot as necessary. Electrode should not be in contact with pilot hood, if so, carefully adjust electrode to a gap of distance of $\frac{3}{32}$ " (.09) from pilot hood.
- Step 6. Visually inspect pilot tubing for kinks or cracks. If damage is found, replace pilot.
- Step 7. Inspect pilot tubing and pilot orifice for blockage:
 - a. Remove ferrule nut from bottom of pilot assembly ($\frac{7}{16}$ " wrench).
 - b. Remove pilot tube and pilot orifice.
 - c. Inspect pilot tubing and pilot orifice for blockage. Clean or replace as necessary.
- Step 8. Reassemble pilot and install on burner. Reinstall burner assembly to water heater per Service Procedure XIII on page 35.
- Step 9. Restore gas supply and check for gas leaks.
- Step 10. To resume operation, follow the instruction located on the lighting instruction label or the lighting instruction located in the Installation and Operation Manual.



UPV Series

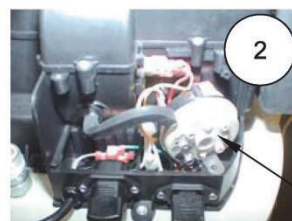
UPV SERVICE PROCEDURE III Pressure Switch Testing and Replacement

Pressure Switch Testing

- Step 1. Position power switch on gas control to the "OFF" position.
- Step 2. Remove the three screws (Phillips screwdriver) from control access cover on blower assembly and remove cover (see photo 1).
- Step 3. Carefully remove pressure switch from blower housing (see photo 2).

⚠ WARNING

**115 volt potential exposure.
Use caution to avoid personal injury.**

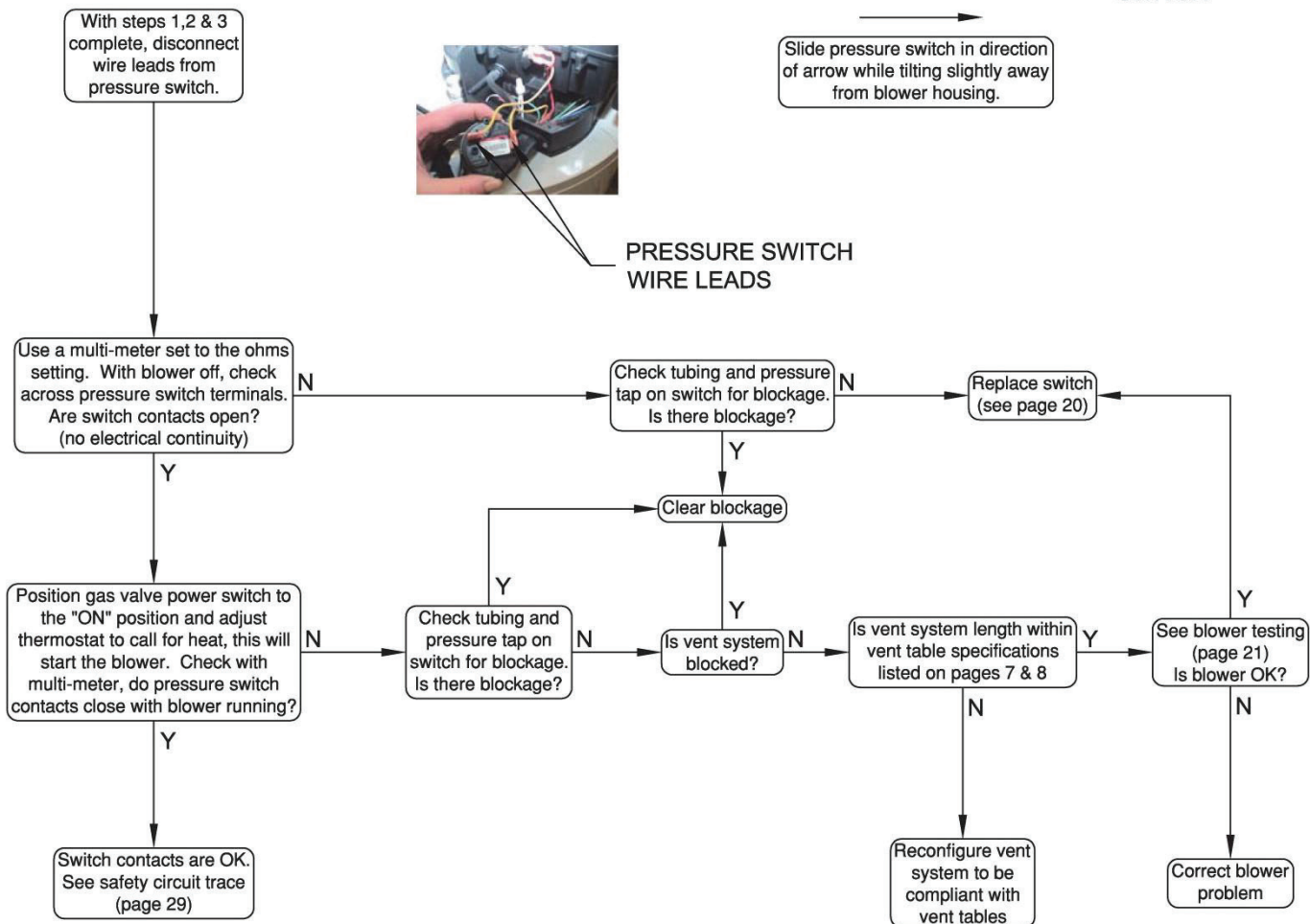


PRESSURE SWITCH

Slide pressure switch in direction of arrow while tilting slightly away from blower housing.



PRESSURE SWITCH WIRE LEADS



UPV Series

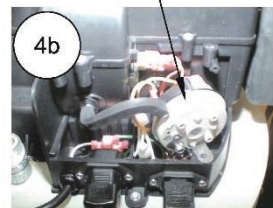
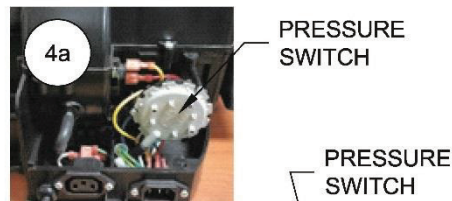
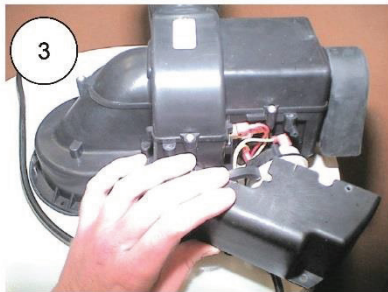
UPV SERVICE PROCEDURE III Pressure Switch Testing and Replacement

Pressure Switch Replacement

⚠ WARNING

115 volt potential exposure. Use caution to avoid personal injury.

- Step 1. Position gas control power switch to "OFF" position.
- Step 2. Remove the three screws (Phillips screwdriver) from control access cover on blower assembly and remove cover (see photo 3).
- Step 3. Remove pressure switch from blower housing by removing the two T10 screws (see photo 4a). If it does not have 2 screws, carefully remove it from the housing (see photo 4b).
- Step 4. Disconnect tubing from pressure switch (see photo 5).
- Step 5. Disconnect yellow wires from pressure switch (see photo 6).
- Step 6. Reconnect yellow wires from step 5 to new pressure switch.
- Step 7. Reconnect tubing to new pressure switch.
- Step 8. Carefully position pressure switch into blower housing (see photo 4b).
- Step 9. Position gas control power switch to "ON" position and verify proper heater operation.
- Step 10. Replace control access cover from step 2.



Slide pressure switch in direction of arrow while tilting slightly away from blower housing.



Blower Testing

Step 1. Position gas control power switch to "ON" position and adjust control to call for heat.

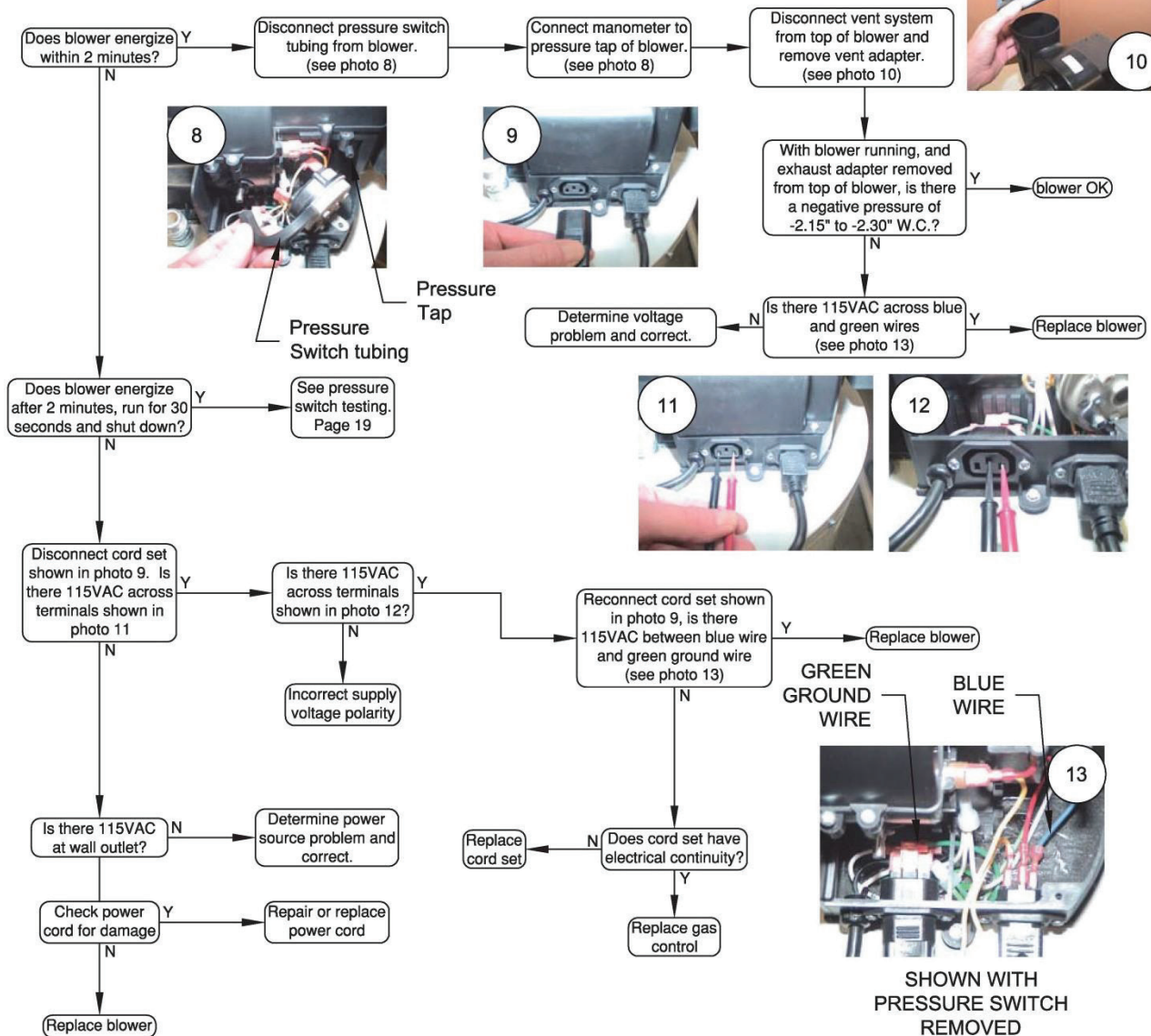
Step 2. Remove the three screws (Phillips screwdriver) from control access cover on blower assembly and remove cover (see photo 7).

⚠ WARNING

115 volt potential exposure. Use caution to avoid personal injury.



REMOVE EXHAUST ADAPTER



Blower Removal

- Step 1. Position gas control power switch to “OFF” position.
- Step 2. Unplug blower power cord from wall outlet.
- Step 3. Disconnect vent system from exhaust adapter on top of blower.
- Step 4. Remove exhaust adapter from blower (blade screwdriver) and retain for use on new blower.
- Step 5. Unplug cord sets from blower.
- Step 6. Remove the three blower mounting screws (1/4” nut driver).
- Step 7. Remove blower with gasket from water heater.

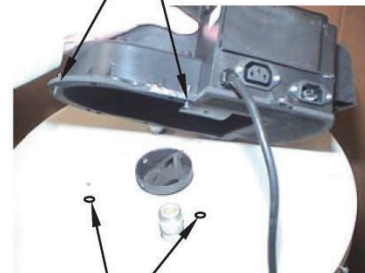
Remove exhaust adapter and retain for use on new blower

Blower Mounting Screws



Blower cord sets

Locating Pins on blower flange



Pin location holes in jacket head

Blower Installation

- Step 8. Clean any debris from jacket head of water heater.
- Step 9. Set new blower with gasket in place using locating pins on blower flange to line up with location holes in jacket head. Be sure not to damage gasket.
- Step 10. Secure blower in place using mounting screws from step 6.
- Step 11. Re-install exhaust adapter from step 4.
- Step 12. Reconnect vent system to exhaust adapter.
- Step 13. Reconnect cord sets from step 5.
- Step 14. Plug blower power cord into wall outlet.
- Step 15. Position gas control power switch to the “ON” position.
- Step 16. Verify proper blower operation.

UPV Series

UPV SERVICE PROCEDURE V Blower Temperature Switch Testing & Replacement

Blower Temperature Switch Testing

- Step 1. Position power switch on gas control to the "OFF" position.
- Step 2. Remove the three screws (Phillips screwdriver) from control access cover on blower and remove cover (see photo 14).
- Step 3. Locate blower temperature switch (see photo 15).

⚠ WARNING

115 volt potential exposure. Use caution to avoid personal injury.



BLOWER TEMPERATURE SWITCH LOCATION

AIR MIXING INLET

Switch Setting
Opens on rise @ approximately 165°F
Auto resets on fall @ approximately 135°F

Cool switch to below 135°F

Disconnect wire leads to switch. Using a multi-meter set to the ohms setting, is there continuity between the switch terminals?

N

Y

Y

N

Y

N

Switch OK

Replace switch (see page 24)

Do switch contacts open?

Y

Replace switch (see page 24)

Exhaust temperature is too hot.

Common causes for high exhaust temperatures

1. Vent length is below minimum allowable.
2. Vent diameter not to specification.
3. Restricted dilution air inlet.
4. Missing or deteriorated flue baffle.
5. Gas pressure is out of specification.

UPV Series

UPV SERVICE PROCEDURE V Blower Temperature Switch Testing and Replacement

Blower Temperature Switch Replacement

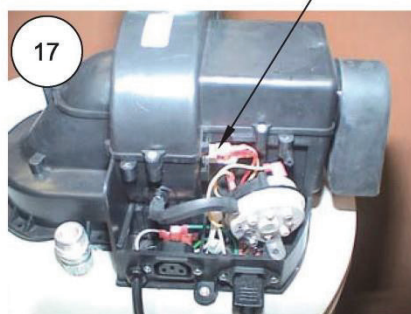
- Step 1. Position gas control power switch to the "OFF" position and unplug heater from wall outlet.
- Step 2. Remove the three screws (Phillips screwdriver) from the control access cover on blower and remove cover (see photo 16).
- Step 3. Locate blower temperature switch (see photo 17).
- Step 4. Disconnect red and yellow wire leads from switch.
- Step 5. With an appropriate tool such as side cutters, snip the retaining lug from the blower housing to allow removal of temperature switch (see photo 18).
- Step 6. Remove switch from blower housing.
- Step 7. Install new switch. Be sure switch is properly seated in mounting area.
- Step 8. Reconnect red and yellow wires to new switch. Wires are interchangeable with either terminal.
- Step 9. Position gas control power switch to the "ON" position and verify proper heater operation.
- Step 10. Replace control access cover from step 2.

⚠ WARNING

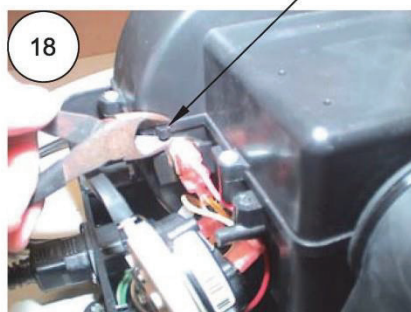
115 volt potential exposure. Use caution to avoid personal injury.



BLOWER
TEMPERATURE
SWITCH LOCATION



SNIP RETAINING LUG
FROM BLOWER
HOUSING



Line Pressure

The gas control is designed for a maximum line pressure of 14.0" W.C. and a minimum line pressure of 1.0" W.C. over the water heater's rated manifold pressure (check rating plate). Line pressure must be checked with the main burner on and off to assure proper readings.

Manifold Pressure Testing

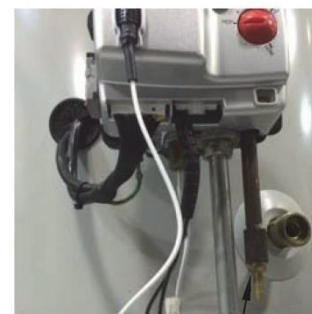
(This procedure presumes a maximum line pressure of 14.0" W.C.)

- 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 5.0" $\pm$ 0.5" W.C.
- Step 6. 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 label, or the lighting instructions located in the Installation and Operation Manual.
- Step 7. If gas pressure is outside the specification noted above, refer to page 27 for gas control replacement.

GAS CONTROL
SHOWN IN THE
"OFF" POSITION



3/16"
ALLEN
WRENCH



PRESSURE TAP
SHOWN INSTALLED

ECO (Energy Cut Out) TESTING

The ICON System 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 (5) minutes before relighting following the instructions located on the lighting instruction label or the lighting instructions located in the Installation and Operation Manual.

Determine Water Temperature Inside Tank

⚠ WARNING

Stored water may be **HOT** WHEN PERFORMING THE FOLLOWING STEPS IN THIS PROCEDURE. Take necessary precaution to prevent personal injury.

- Step 1. Position gas control power switch to “OFF” position.
- Step 2. Draw approximately 4 gallons of water from drain valve into a container 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 heater to drain).
- Step 3. Compare the measured water temperature with the setting on the gas control. In most instances, they should not differ by more than approx. 10°F.

UPV Series

UPV SERVICE PROCEDURE VI Gas Control Testing and Replacement

Gas Control Removal from Water Heater

- Step 1. Position gas control power switch to the "OFF" position and unplug heater from power supply.
- Step 2. Drain heater to a point below the gas control level.
- Step 3. Turn off gas supply to water heater and disconnect gas piping from gas control.
- Step 4. Disconnect wire harnesses from gas control.
- Step 5. Remove outer jacket burner access door.
- Step 6. Disconnect main burner feedline, swing counter-clockwise away from gas control.
- Step 7. Disconnect pilot tube from gas control and move away from gas control
- Step 8. 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 ½" NPT pipe threaded into gas inlet of gas control.

GAS CONTROL
SHOWN IN THE
"OFF" POSITION



MAIN BURNER
FLEXIBLE FEEDLINE

PILOT FEEDLINE

- Step 9. Install a new gas control into the water heater by rotating clockwise. DO NOT use a wrench on the gas control body, damage to the gas control may occur. If necessary, use a length of ½" NPT pipe threaded into gas inlet of gas control.
- Step 10. Reattach main burner feedline, pilot tube and thermopile wire.
- Step 11. Reconnect gas supply piping to inlet of gas control.

UPV Series

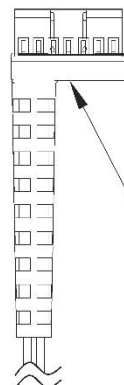
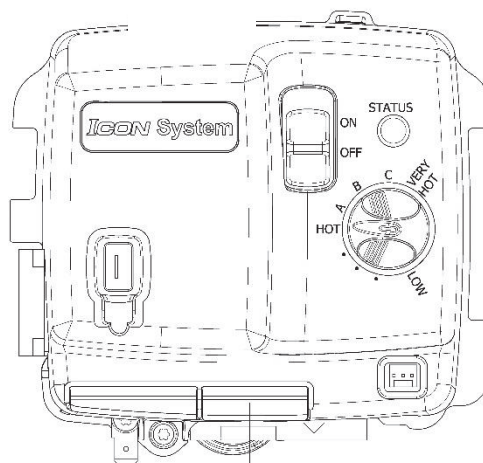
UPV SERVICE PROCEDURE VII Flammable Vapor/Simulative Resistance Device Testing

Flammable Vapor Sensor Testing

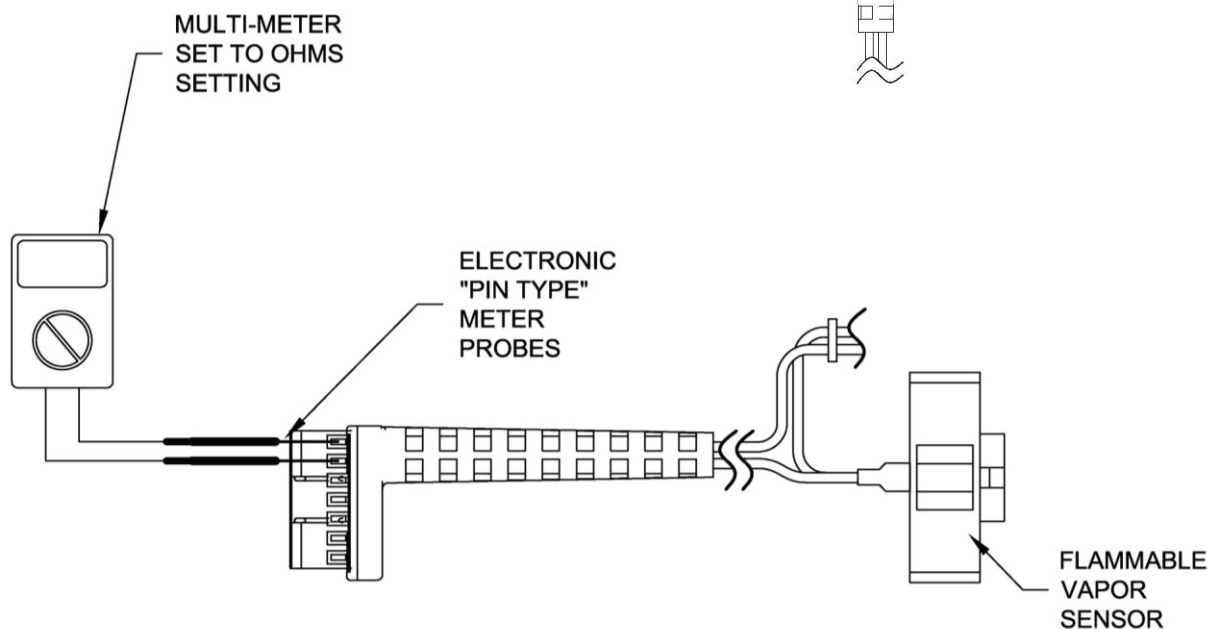
- Step 1. Position power switch on gas control to the "OFF" position.
- Step 2. Disconnect flammable vapor sensor from gas control.
- Step 3. Using a multi-meter set to the ohms setting, check resistance of flammable vapor sensor. Resistance must be within 3,000 ohms and 48,000 ohms. If outside of this range replace Flammable Vapor Sensor.

⚠ CAUTION

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



FLAMMABLE VAPOR
SENSOR HARNESS



UPV Series

UPV SERVICE PROCEDURE VIII Safety Circuit Voltage Trace

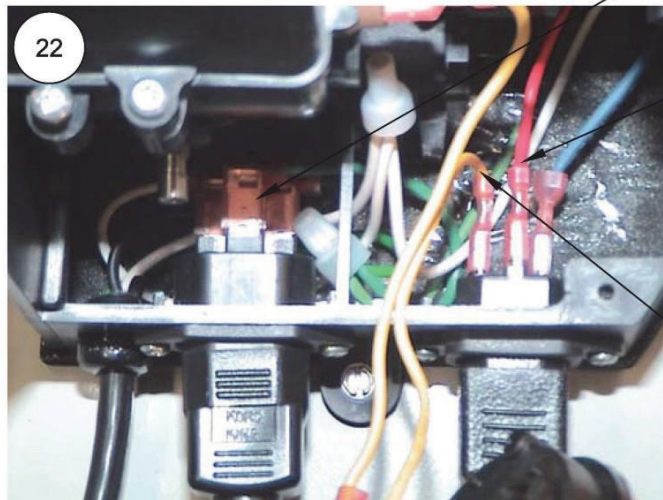
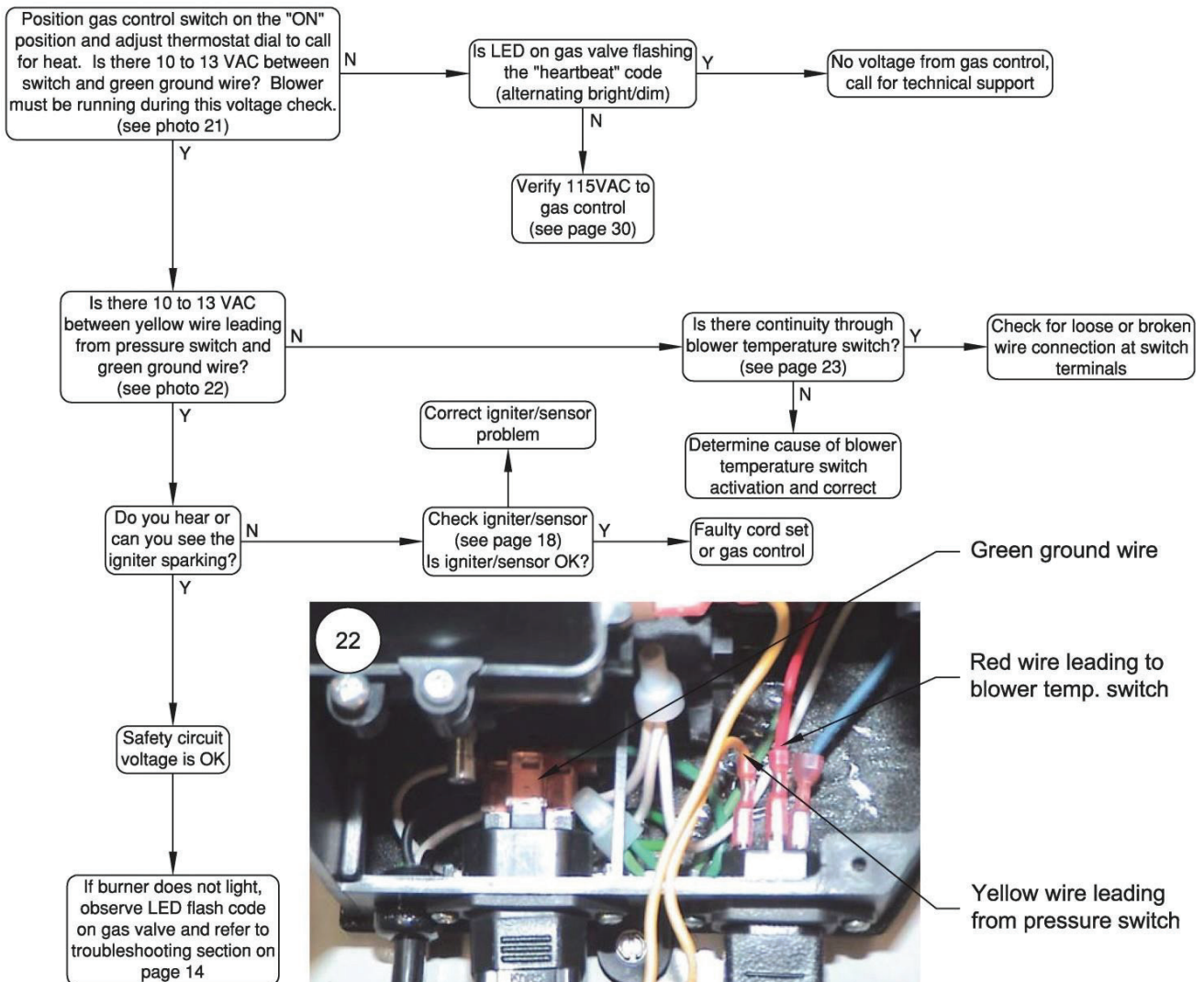
Safety Circuit Voltage Trace

NOTE: This procedure assumes a cool tank.

⚠ WARNING

115 volt potential exposure. Use caution to avoid personal injury.

Remove three screws (Phillips screwdriver) from control access cover on blower and remove cover (see photo 21).



UPV Series

UPV SERVICE PROCEDURE IX 115 VAC Circuit Trace

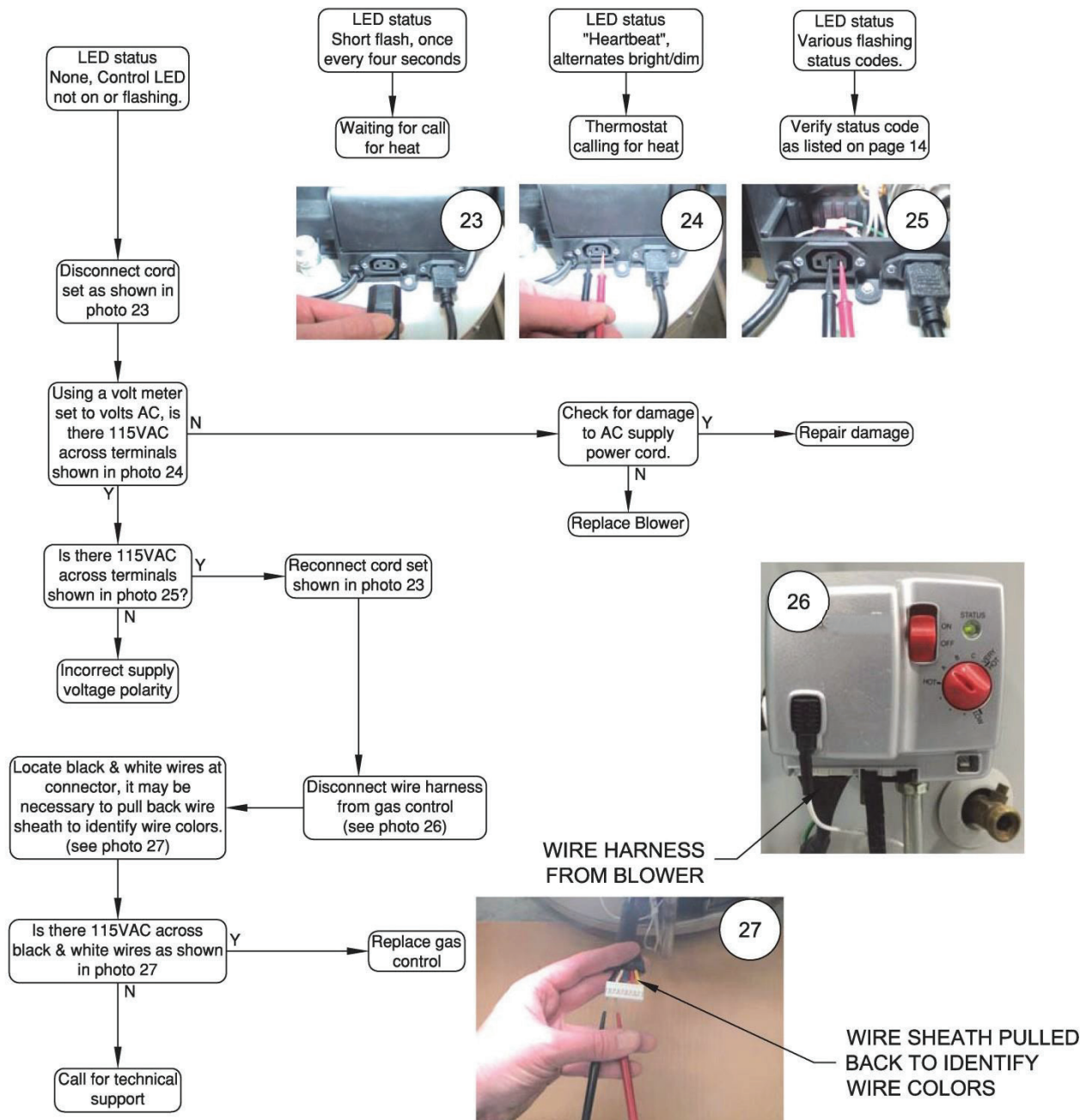
115 VAC Circuit Trace

Step 1. Verify 115 VAC and proper polarity at wall outlet.

Step 2. With unit plugged in and control power switch in the "ON" position verify LED status.

⚠ WARNING

115 volt potential exposure. Use caution to avoid personal injury.



Check for 115VAC between black & white wires.

-NOTE-

Electronic meter probes required. Use care not to damage connector during this check.

Diptube Inspection & Replacement

⚠ WARNING

Water 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. Position on/off switch of gas control valve to “OFF” position and unplug water heater from wall outlet.
- Step 2. Turn off cold water supply to water heater. Connect hose to drain valve of water heater and route to an open drain. Open a nearby hot water faucet to vent heater for draining. Open drain valve of water heater and allow heater to drain to a point below the inlet connection nipple.
- Step 3. Disconnect inlet nipple from plumbing system.
- Step 4. With an appropriate tool such as a pipe wrench, remove inlet nipple/diptube from the water heater. Use caution not to damage pipe threads.
- Step 5. Visually inspect inlet nipple/dip tube. Inlet nipple/diptube should be free of cracks and any blockage. Hydrojet slots should be open and 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 inlet nipple/dip tube into water heater. Ensure pipe dope is used on the nipple's threads. Connect nipple to plumbing system, resume water supply and refill 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 & Replacement

⚠ WARNING

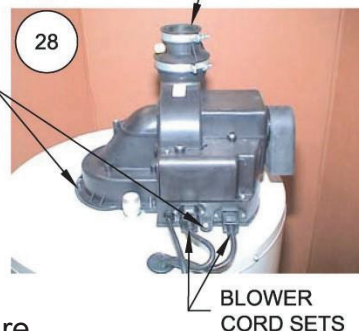
Water heater components and stored water may be **HOT** when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

- Step 1. Position on/off switch of gas control valve to the “OFF” position and unplug water heater from wall outlet.
- Step 2. Turn OFF cold water supply to water heater. Connect hose to drain valve of water heater and route to an open drain. Open a nearby hot water faucet to vent water heater for draining. Open drain valve of water heater and allow water heater to drain to a point below the outlet connection nipple.
- Step 3. Disconnect outlet nipple from plumbing system.
- Step 4. With an appropriate tool such as a pipe wrench, remove outlet nipple/anode from the water heater. Use caution not to damage pipe threads.
- Step 5. Visually inspect outlet nipple/anode. Outlet nipple/anode should show signs of depletion, this is normal. If depletion is $\frac{1}{2}$ of the original anode diameter (approximately $\frac{3}{4}$ ” 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 outlet nipple/anode into water heater. Ensure pipe dope is used on the nipple’s threads. Connect nipple to plumbing system, resume water supply and refill 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.

Flue Baffle Inspection and Replacement

- Step 1. Position gas control power switch to the "OFF" position and unplug blower from wall outlet.
- Step 2. Disconnect vent system from exhaust adapter on top of blower.
- Step 3. Unplug cord sets from blower (see photo 28).
- Step 4. Remove the three blower mounting screws (1/4" nut driver) (see photo 28).
- Step 5. Remove blower with gasket from water heater.
- Step 6. Remove flue baffle from heater (see photo 29).
- Step 7. Inspect baffle for deterioration and any missing restrictors. Clean any scale or debris build up. Replace with new baffle as necessary.
- Step 8. Reinstall baffle into flue tube. Be sure hanger tabs are inserted into notch location at the top of the flue tube (see photos 30 & 31).
- Step 9. Check burner to ensure no scale has accumulated during this operation. See burner cleaning procedure on page 16.
- Step 10. Reinstall blower on water heater. Connect vent system and cords set to blower. Plug water heater into wall outlet.
- Step 11. To resume operation, follow the lighting instruction located on the lighting instruction label or the lighting instructions located in the installation and operation manual.

DISCONNECT VENT
SYSTEM FROM
EXHAUST ADAPTER



FLUE BAFFLE



FLUE TUBE
NOTCH



FLUE
BAFFLE SHOWN
INSTALLED IN
FLUE TUBE
NOTCHES



UPV Series

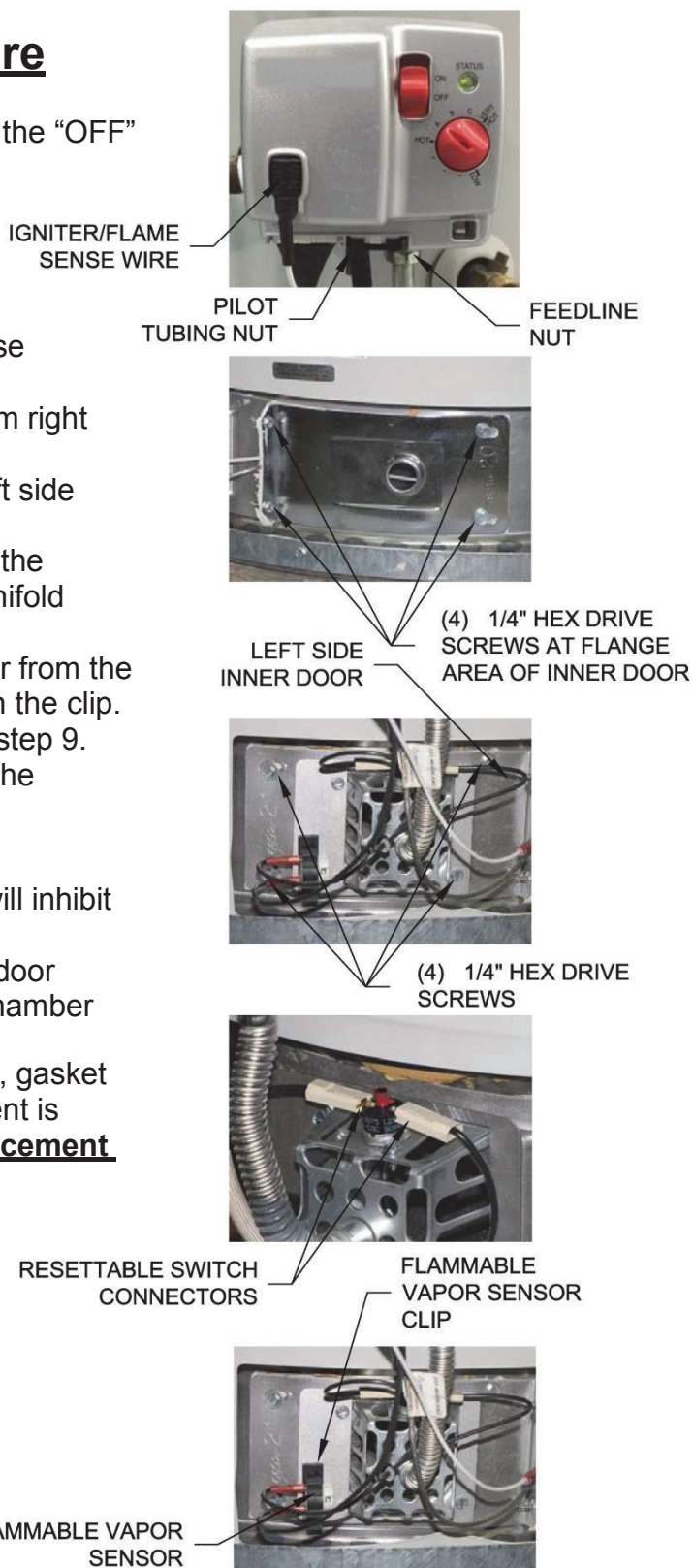
UPV SERVICE PROCEDURE XIII Inner Door/Gasket Removal, Inspection & Replacement

Inner Door Removal Procedure

- Step 1. Position gas control power switch to the "OFF" position.
- Step 2. Remove outer jacket burner access door.
- Step 3. Disconnect main burner feedline (3/4" wrench), pilot tube (7/16" wrench) and white igniter/flame sense wire from the gas valve.
- Step 4. Remove (4) 1/4" hex drive screws from right side inner door.
- Step 5. Remove (3) 1/4" drive screws from left side burner door.
- Step 6. Remove the connectors attached to the resettable thermal switch on the manifold mount.
- Step 7. Remove the flammable vapor sensor from the clip by pushing down the tab to open the clip.
- Step 8. Remove inner door and inspect per step 9.
- Step 9. Fully inspect inner door gaskets for the following:

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

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



Inner Door Gasket Replacement Procedure

⚠ WARNING

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

- Step 10. After inspection of inner door as noted in step 9, completely remove gasket and adhesive residue from right and left side inner doors as needed.
- Step 11. Use RTV sealant (recommended bead size 1/8") to secure the inner door gasket to the inner door sections (right & left). Refer to illustration on next page for proper application. Note the overlap configuration in the flange area of the inner door. Set the flange section first, this will help to achieve the proper overlap position.

Installation of Inner Door with Gasket

⚠ 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 over tighten screws in steps 2, 4 and 5.

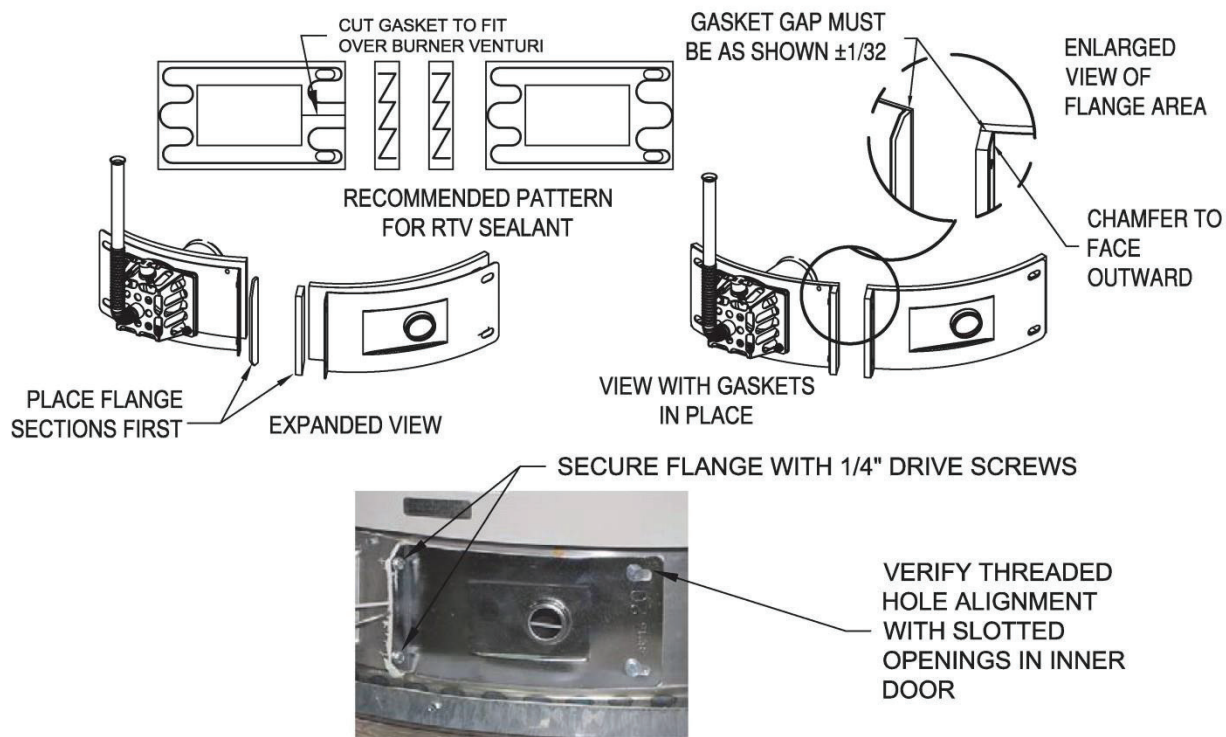
- Step 1. Clean any residual gasket residue or other debris from combustion chamber surface before installing the inner door/gasket assembly.
- Step 2. Place the left side inner door into position first. Using the 1/4" hex drive screws, secure left side inner door in place. **DO NOT OVER TIGHTEN SCREWS.**
- Step 3. Position the pilot tube and spark igniter wire against the left side inner door flange gasket.
- Step 4. Firmly place right side inner door flange against the left side inner door flange and secure with (2) 1/4" hex drive screws. **DO NOT OVER TIGHTEN SCREWS.**

UPV Series

UPV SERVICE PROCEDURE XIII Inner Door/Gasket Removal, Inspection & Replacement

Installation of Inner Door With Gasket (cont.)

- Step 5. Align right side inner door to combustion chamber and verify the fastener holes of the combustion chamber are aligned with right side inner door slotted opening. Verify seal integrity around combustion opening. Secure right side inner door using $\frac{1}{4}$ " hex drive screws. **DO NOT OVER TIGHTEN SCREWS.** Verify both left and right sides of inner door are properly positioned and sealed against the combustion chamber.
- Step 6. Replace outer jacket burner access door.
- 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.



UPV Series

UPV SERVICE PROCEDURE XIV Resettable Thermal Switch Testing and Replacement

Resettable Thermal Switch Continuity Testing

- Step 1. Remove outer jacket door.
- Step 2. Disconnect black wire leads from the resettable thermal switch.
- Step 3. Using a multimeter capable of measuring continuity (Ohms), place one probe of the 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. 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 water heater back into service.



<u>Probable Cause for Resettable Thermal Switch Activation</u>	
<u>Probable Cause</u>	<u>Corrective Action</u>
Insufficient combustion air	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 and/or vacuum to remove scale deposits and debris.
1. Weak switch or switch is out of calibration. 2. Incorrect switch.	1. Replace resettable thermal switch. 2. Verify switch color code and approximate temperature.
Flammable vapor incident	Replace water heater

Resettable Thermal Switch Color Code Reference	
Color code	Approximate switch activation temperature (open)
Blue	240°
Yellow	270°
Red	290°

UPV Series

UPV SERVICE PROCEDURE XIV Resettable Thermal Switch Testing and Replacement

Resettable Thermal Switch Replacement

- Step 1. Rotate gas control knob to the "OFF" position.
- Step 2. Remove outer jacket door.
- Step 3. Disconnect the black wire leads from resettable thermal switch.
- Step 4. Remove (2) ¼" hex drive screws from the manifold mount.
- Step 5. Remove resettable thermal switch from manifold mount (Phillips screwdriver).
- Step 6. Place new resettable thermal switch in place. Be sure contact surface of resettable thermal switch and manifold mount are free of any debris. Secure resettable thermal switch into place using screws from step 6.
DO NOT OVER TIGHTEN SCREWS.
- Step 7. Reconnect the black wire leads from gas valve and thermopile to resettable thermal switch.
Note: Wire terminations are interchangeable with either resettable thermal switch connection.
- Step 8. Replace outer jacket door.
- 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.

GAS CONTROL
SHOWN IN THE
"OFF" POSITION



MANIFOLD
MOUNT



ScreenLok® Flame Arrestor Cleaning

NOTICE

Some models are not equipped with the ScreenLok® Flame Arrestor.

- Step 1. Position gas control power switch to the “OFF” position.
- Step 2. Remove outer door.
- Step 3. Remove outer jacket door and inner door per service procedure XIII on page 34.
- Step 4. Disconnect main burner feedline (3/4” wrench), pilot tube (7/16” wrench) and igniter/flame sensor wire from gas control and remove burner assembly from combustion chamber.
- Step 5. Clean ScreenLok® Flame Arrestor using stiff brush, compressed air and/or shop vacuum to remove any scale or other debris accumulation. Using a soft brush, clear jacket openings from any dirt, dust, restrictions or other obstructions.
- Step 6. Remove any debris from burner assembly per the burner cleaning procedure on page 16 and reinstall burner assembly into combustion chamber.
- Step 7. Reconnect feedline, pilot tube and igniter/flame sensor wire to the gas control.
- Step 8. Reinstall outer jacket door and inner door per Service Procedure XIII on page 35.
- 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.

Frozen Exhaust Vent Terminal

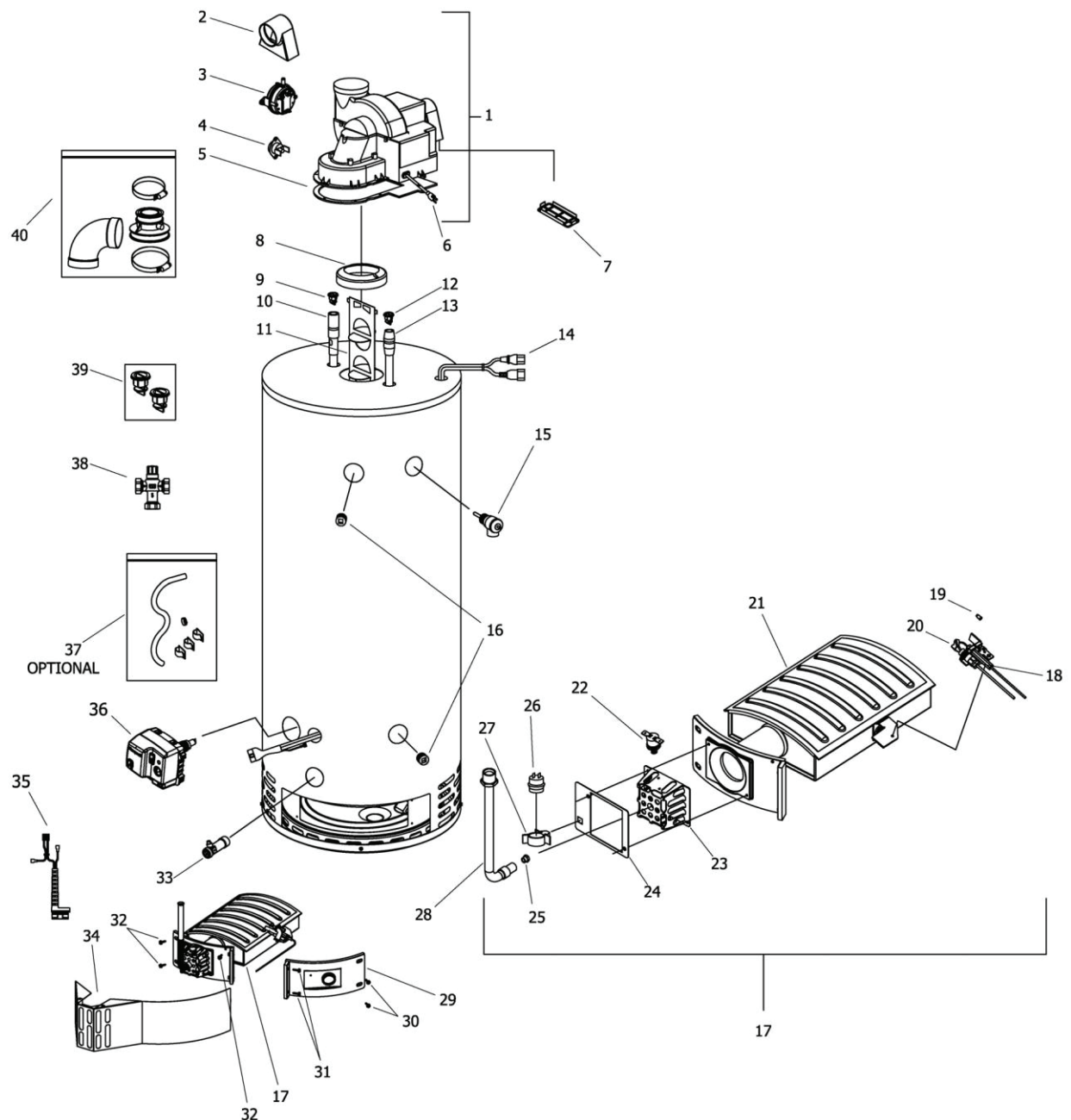
If an exhaust vent terminal is blocked with ice or snow due to severe conditions, the pressure switch and control will not allow the burner to operate. This will result in a three flash status code. Once the blockage is removed (through melting or other means) the controls will let the burner operate. The position of the vent terminals in relation to each other and terminals from other appliances can have an effect on the potential for blockage due to ice or snow. See the installation instructions for recommended positioning of the terminals.

Glossary of Terms

BTU	British Thermal Units
GPM	Gallons per Minute
Hz	Hertz
kWhr	Kilowatt Hour
LED	Light Emitting Diode
NPT	National Pipe Thread
Ohms	Ohms of resistance
PSI	Pounds per Square Inch
RPM	Revolutions per minute
ECO	Energy Cut Out
VAC	Volts Alternating Current
"W.C.	Inches of Water Column
°C	Degrees Centigrade
°F	Degrees Fahrenheit

UPV Series

Parts List



- | | | | |
|----------------------------------|-------------------------------|---------------------------|--------------------------------|
| 1. Blower Complete Air | 13. Inlet Dip Tube | 25. Main Burner Orifice | 38. ASSE Approved Mixing Valve |
| 2. Mixing Inlet Cover | 14. Wire Harness | 26. FV Sensor | 39. Kit-Heat Trap Insert |
| 3. Pressure Switch | 15. T&P Valve | 27. FV Sensor Clip | 40. Vent adapter w/ vent term. |
| 4. Blower Temp. Switch | 16. 1/4 NPT Plug | 28. Feedline | |
| 5. Blower Gasket | 17. Burner Assy. | 29. Right side inner door | |
| 6. Blower Power Cord | 18. Pilot Assembly | 30. Screw #10-12 x 3/4 | |
| 7. Dilution Air Clip | 19. Pilot Orifice | 31. Screw #8-15 x 3/4 | |
| 8. Flue Reducer (URG2PV50H Only) | 20. Pilot Assy. | 32. Screw #10-12 x 3/4 | |
| 9. Heat Trap Outlet | 21. Main Burner | 33. Brass Drain Valve | |
| 10. Hot Water Outlet Anode | 22. Resettable Thermal Switch | 34. Outer door | |
| 11. Flue Baffle | 23. Main Burner Mount | 35. FV Sensor Harness | |
| 12. Heat Trap Inlet | 24. FV sensor mount plate | 36. Polymer Gas Control | |
| | | 37. Condensate hose kit | |

NOTES

[illegible]

NOTES

[illegible]



United States

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

Canada

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

Fax 905-636-0666

Warranty bwccwarranty@bradfordwhite.com

Technical Support bwcctech@bradfordwhite.com

Service Parts orders@bradfordwhitecanada.com

Orders ca.orders@bradfordwhite.com

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

International

General Contact international@bradfordwhite.com