BRADFORD WHITE®
WATER HEATERS

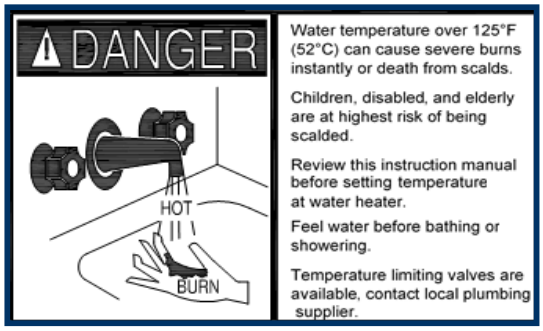
120 Gallon Commercial Water Heater

SERVICE MANUAL

Troubleshooting Guide and Instructions for Service (To be performed ONLY by qualified service providers)

Models covered By this manual:
120-400
120-500

Serial Numbers BK- and After



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

WARNING
CANCER AND REPRODUCTIVE HARM
WWW.P65WARNINGS.CA.GOV
As required by the state of California Proposition 65.

Built to be the Best®

238-56734-00A REV 05/26

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 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.

Table of Contents

Safety Information

This manual contains information regarding the safe installation and use of your water heater. It is very important that the information below and throughout the manual is understood for the health and safety of both the installer and the user.

Read and obey all safety instructions detailed in this manual.

This is the safety alert symbol. It is used to bring attention to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
Indicates an immediately hazardous situation which, if not avoided, WILL result in death or injury.
⚠ WARNING
Indicates a potentially hazardous situation which, if not avoided, COULD result in death or injury.
⚠ CAUTION
Indicates a potentially hazardous situation which, if not avoided, COULD result in moderate to minor injury.
IMPORTANT
Indicates a potentially hazardous situation which, if not avoided, COULD result in damage to property.

All safety messages in this manual will define the type of hazard, what can happen if the safety message is not followed, and how to avoid or mitigate the hazard and risk of injury.

	**⚠ 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. Failure to do so can lead to an explosion or fire that may result in death or severe injury.
	**⚠ WARNING** Turn OFF the electrical supply to the unit before installation and before removing any access panels to service the heater. Failure to do so can result in death, severe injury, and/or property damage.
	**⚠ WARNING** High temperatures and pressures in the water heater tank can cause an explosion resulting in property damage, serious injury or death. This unit is 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.
	**⚠ CAUTION** Increasing the thermostat setting above the preset temperature may cause severe burns and consume excessive energy. Hotter water increases the risk of scald injury. Scalding may occur within five (5) seconds at a temperature setting of 140°F *(60°C)*. It is advised to test the temperature of the water before exposing oneself to it.

Determining the Age of Your Water Heater

The first two characters of the serial number represent the year and month of manufacture. The remainder of the serial is a sequential production number, seven digits in length before December 2007 (DM), and eight digits in length after.

For example:

Production Year			
A=	2004 or 2024	L=	2014 or 2034
B=	2005 or 2025	M=	2015 or 2035
C=	2006 or 2026	N=	2016 or 2036
D=	2007 or 2027	P=	2017 or 2037
E=	2008 or 2028	S=	2018 or 2038
F=	2009 or 2029	T=	2019 or 2039
G=	2010 or 2030	W=	2020 or 2040
H=	2011 or 2031	X=	2021 or 2041
J=	2012 or 2032	Y=	2022 or 2042
K=	2013 or 2033	Z=	2023 or 2043

Production Month			
A=	January	G=	July
B=	February	H=	August
C=	March	J=	September
D=	April	K=	October
E=	May	L=	November
F=	June	M=	December

For the year column, we do not use the letters: I, O, Q, R U, V

For the month column we do not use the letters: I & N – Z

IMPORTANT

This Service Manual is ONLY for Serial Numbers BK- and AFTER. Please make sure that your water heater falls within this range.

How To Use This Manual

It is intended for this manual to be used by qualified service personnel for troubleshooting analysis and repair of the 120T400/500 models. Understanding the sequence of operation section of this manual will contribute greatly to troubleshooting this product.

A Service Report is shown on **page 67**. Completing this form will assist in the troubleshooting efforts. Should you need to call for technical support, please provide the information shown on this form to the support technician to ensure accurate troubleshooting.

Troubleshooting begins with System Observation to determine failure mode as indicated by error codes on the system display. Troubleshooting continues with Failure Modes and Probable Cause, directing the service provider to a series of test procedures to determine the root cause of failure. Component replacement procedures directly follow the test procedures for a given component.

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

Contact Technical Support immediately if diagnosis is not determined using the methods described in this service manual.

Tools Required for Service

Manometer: Two types available, a liquid "U" tube type or a digital type. This device is used to measure gas and/or air pressures and vacuum.

Multi-Meter: A digital type is strongly recommended. This device is used to measure electrical values. The meter must have the capability to measure volts AC, volts DC, amps, micro-amps, and ohms.

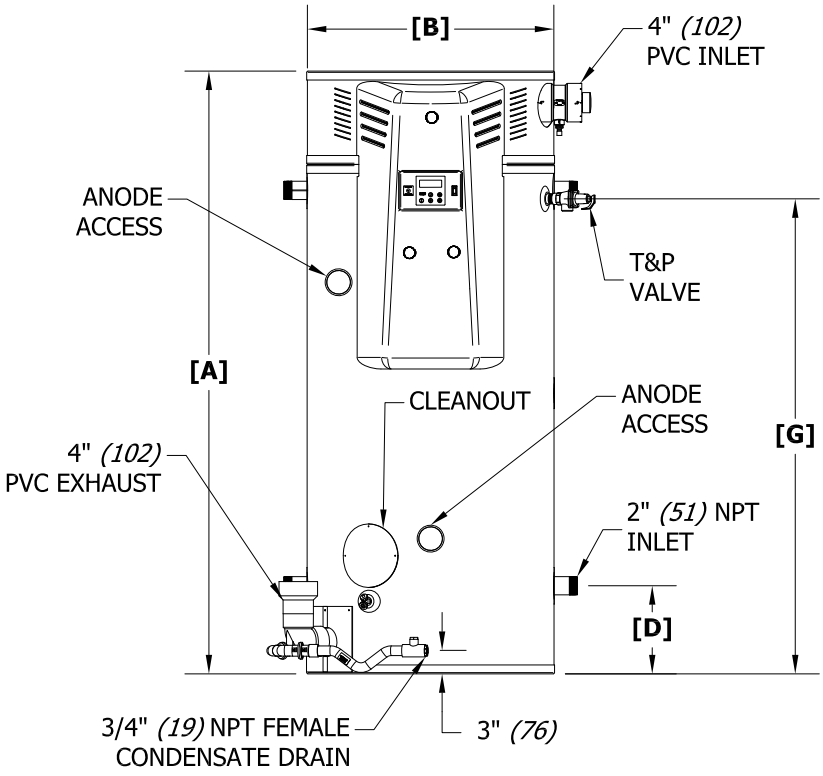
Thermometer: Used to measure water temperature. An accurate thermometer is recommended.

Water Pressure Gauge: Used to measure water supply pressure, and to determine tank pressure by adapting to the drain valve of the heater.

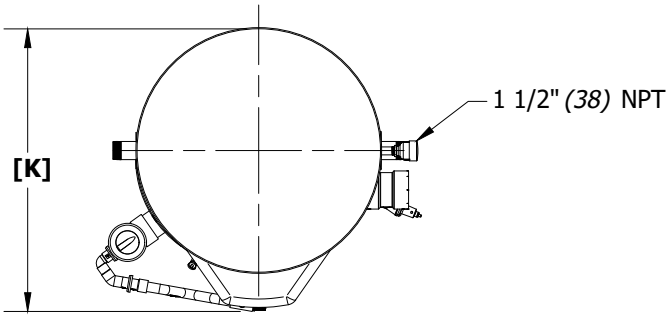
Jumper Leads: A length of wire (12 in. minimum) with an alligator clip at both ends.

Various Hand Tools: Pipe wrench, slip joint pliers, open end wrench set, 12 in. adjustable wrench, hex wrench set, Torx bit set, screwdrivers (common & Phillips), long reach (12 in.) magnetic tip Phillips head screw driver #2 tip, 1/4 in. nut driver, pliers (common & needle nose), socket set including a 1-1/16 deep well socket, wire cutters, wire strippers, wire crimpers, torpedo level, small shop vacuum cleaner, step ladder, and flashlight.

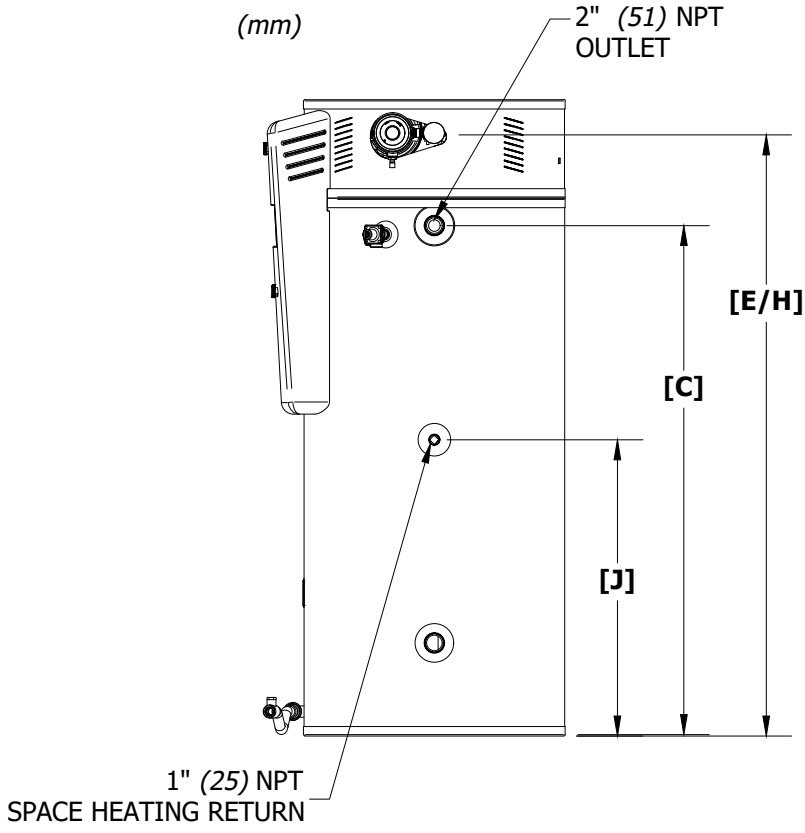
Specifications



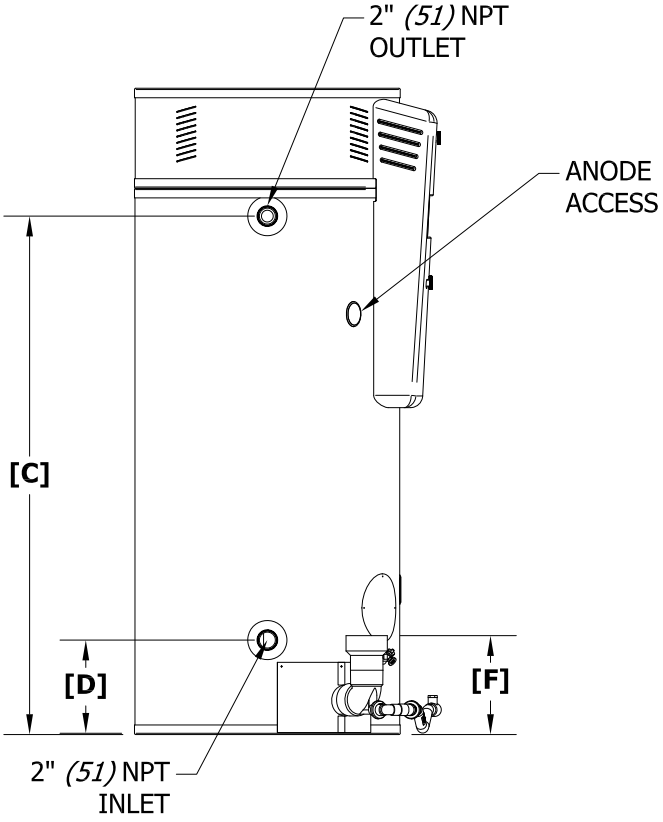
Front View



Top View



Right Side View



Left Side View

Fig. 1

Table 1: Dimensions

Model	A	B	C	D	E	F	G	H	J	K
120-400 **120-500**	78 1/2" (199 cm)	32" (81 cm)	62 3/4" (159 cm)	11 7/16" (29 cm)	74 1/8" (188 cm)	12" (31 cm)	61 11/16" (156 cm)	74 3/16" (188 cm)	36 5/16" (92 cm)	37" (94 cm)

Model	Hot & Cold (NPT)	Recir-culation Return (NPT)	Gas (NPT)	Air Intake (PVC)	Exhaust Vent (PVC)	Shipping Weight LBS/ (kg)
120-400 **120-500**	2"	1"	1 1/2"	4"	4"	1100 (500)

Model	Rated Storage Capacity GAL (L)	Rated Max. Input, Btu/hr (kW)	Rated Min. Input, Btu/hr (kW)	Thermal Efficiency (%) @Max Input	Thermal Efficiency (%) @ Min Input	Recovery @100°F rise, GAL/hr (L/hr)	1st Hr. Delivery @ 100°F rise, GAL (L)
120-400	Code 125 (473) Non-Code 119 (150)	Non-Code 399,999 (117.2) Code 400,000 (117.2)	80,000 (23.4)	97	99	466 (1,764)	587 (2,222)
120-500	Code 125 (473) Non-Code 119 (450)	Non-Code 499,999 (146.5) Code 500,000 (146.5)	80,000 (23.4)	96	99	576 (2,180)	696 (2,635)

For natural gas:
MINIMUM GAS SUPPLY PRESSURE (at gas control) = 3.5" W.C. (dynamic)
MAXIMUM GAS SUPPLY PRESSURE (at gas control) = 14" W.C. (static or dynamic)

For LP gas:
MINIMUM GAS SUPPLY PRESSURE (at gas control) = 8" W.C. (dynamic)
MAXIMUM GAS SUPPLY PRESSURE (at gas control) = 14" W.C. (static or dynamic)
Note: Dynamic pressure is measured while gas is flowing and static pressure is measured while gas is not flowing.

All products meet or exceed current ASHRAE standards.
These products are design certified by UL (Underwriters Laboratories) and meet ANSI Z21.10.3/CSA 4.3 requirements for operation up to 181°F (82°C) as a Category IV water heater.
Approved for use as a direct vent automatic storage water heater.

Specifications

Power Supply	Dedicated 120 VAC, 60 Hz, 15A
Gas Supply Line	120-400 is 1.25” 120-500 is 1.5” NPT. (Schedule 40 black iron pipe, or equivalent, recommended)
Approved Gas Type	Natural and LP Gas
Gas Pressure/Combustion Levels Natural Gas	1. 14” W.C. maximum. 2. 3.5” W.C. minimum dynamic (running) at maximum input. 3. Recommend 7” W.C. minimum dynamic (running). 4. CO: less than 25 PPM air free.
Gas Pressure/Combustion Levels LP Gas	1. 14” W.C. maximum. 2. 8.0” W.C. minimum dynamic (running) at maximum input. 3. CO: less than 25 PPM air free.
Venting System	Power vent or direct vent. See vent tables on **page 10.**
Approved Venting Materials	See **page 11.**
Recommended Clearance for Servicing	24 in. from top, 24 in. from front, 0 in rear, 12” Left side, 24” right side.
Maximum Water Supply Pressure	Maximum recommended water supply pressure 80 PSI Maximum vessel working pressure 150 PSI
Water Sensor	12,000 Ohms @ 77°F, Max 181°F setpoint, ECO opens at 190°F maximum.
Flue Gas Sensor	10,000 Ohms @77F
Collector Sensor	10,000 Ohms @77F
Control Display	Digital display, 20-30 VDC. Temperature setpoint range: 99 to 181°F. Used to set tank temperature (°F or °C), show operating status, display error codes, and error code history.
Control Board	120 VAC. Controls tank temperature, ignition functions, blower. See ignition timings in sequence of operation for control.
Transformer	120 VAC primary, 24 VAC secondary, 40 VA.
Igniter	Hot surface ignition (38 ohms at room temperature, 38-80 ohms after heating cycle).
Flame Sensor Output	Typical range 5 to 7 micro amps. Minimum 1.25 micro amp.
Gas Valve	Negative regulation, 24 VAC, 1/2 in. PSI max.
Vent Temperature Sensor	12,000 Ohms @ 77°F. Flue gas heat blocking fault when sensor reads 158°F
Blocked Exhaust Vent Pressure	Normally closed, opens when pressure increases to +1.70” W.C.
Blocked Intake Vent Pressure	Normally closed, opens when vacuum pressure increases to 2.10” W.C.
Blower	120 VAC, 60 Hz, 2.5 amps.
Combustion Levels	CO: less than 0.0025% (25 PPM) air free
Gas Pressure Switch	Normally Open, closes at 3.5” WC.

Sequence of Operations

Burner operation is controlled using an electronic ignition control board. The control board monitors the status of the electronic water temperature sensor, vent temperature sensor, vent system intake and exhaust pressure switch, collector temperature sensor, flame sensor, spark rod, blower speed, and gas valve. The control board contains programming which determines the sequence of operation and timings for purge periods, trial for ignition, flame sensing, and lockouts. The control board modulates burner firing rate to account for varying hot water demands. The control board provides information to the display to determine the cause of a system lockout.

1. Thermostat calls for heat.
2. Blower is energized to pre-purge speed of 2640 RPM for 5 seconds.
3. Hot surface igniter is energized for warm up period of 8 second while fan continues to pre-purge.
4. The gas valve opens on trial for ignition while the igniter remains energized for 3 seconds.
5. Once the flame signal is verified, the blower will remain on and will modulate based on the temperature sensor value vs. setpoint.
6. The burner continues to operate and will modulate based on the temperature sensor value vs. the setpoint until the call for heat is satisfied.
7. The thermostat circuit opens, the gas valve closes, and the blower continues to operate at 2640 RPM for 25 seconds during post purge period.
8. After the post purge time of 25 seconds has been completed, the fan will shut down and the burner remains in standby until the next call for heat.

Venting Specifications

Minimum and Maximum Vent and Air Intake Pipe Lengths (4” Pipe)

Model(s)	Fuel Type	Vent Arrangement	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake[1] (ft)	Vent[2] (ft)	Air Intake[1] (ft)	Vent[2] (ft)
120-400 120-500	NAT or LP	Direct Vent	20	20	50†	50†
		Power Vent	0	20	0	100

[1] Equivalent length is measured between the 4” pipe connection on the water heater and the required 90° elbow termination fitting.
[2] Equivalent length is measured after the point of connection to the condensate assembly and includes the termination fitting (if used).
† Shown as a balanced system. Vent length may exceed air intake length if total combined length does not exceed 100 ft. Intake length cannot exceed exhaust length.

Minimum and Maximum Vent and Air Intake Pipe Lengths (6” Pipe)

Model(s)	Fuel Type	Vent Arrangement	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake[3] (ft)	Vent[4] (ft)	Air Intake[3] (ft)	Vent[4] (ft)
120-400 120-500	NAT or LP	Direct Vent	50	50	120‡	120‡
		Power Vent	0	100	0	240

[3] Equivalent length is measured between the 4” pipe connection on the water heater and the required 90° elbow termination fitting.
[4] Equivalent length is measured after the point of connection to the condensate assembly and includes the termination fitting (if used).
‡ Shown as a balanced system. Vent length may exceed air intake length if total combined length does not exceed 240 ft. Intake length cannot exceed exhaust length.

Common Vent - Minimum and Maximum Vent and Air Intake Pipe Lengths (8” Pipe)

Model(s)	Fuel Type	Vent Arrangement	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake[5] (ft)	Vent[6] (ft)	Air Intake[5] (ft)	Vent[6] (ft)
120-400 120-500	NAT or LP	Common Vent	20	20	60*	60*

[5] Equivalent length is measured between the last branch tee in the Common Intake Vent manifold and the required 90° elbow termination fitting.
[6] Equivalent length is measured after the last branch tee in the Common Exhaust Vent manifold and includes the termination fitting (if used).
* Shown as a balanced system. Vent length may exceed air intake length if total combined length does not exceed 120 ft. Intake length cannot exceed exhaust length.

The vent and combustion air intake systems must be sufficiently supported along vertical and horizontal sections. At minimum, it is recommended that a support is placed along the vent or air intake piping every 3 ft horizontally, and every 5 ft vertically. For horizontal systems, the first support shall be located immediately adjacent to the first 90-deg. elbow following the vertical section connected to the water heater. The support method should act to isolate the vent and combustion air intake piping from floor joists or other structural members to reduce transmission of noise and vibration.

NOTE: Do not support, pin, or secure the vent and combustion air intake pipe in a way that restricts the normal thermal expansion and contraction of the venting material.
For replacement installations, thoroughly inspect the existing vent and combustion air intake systems prior to installing the new water heater. The following steps shall be taken to properly inspect the existing vent system:

- Verify that the materials as specified in this manual have been used.
- Verify the maximum and minimum vent and combustion air intake equivalent lengths and terminal clearances meet the specifications in this manual.
- Inspect the vent and combustion air intake systems for cracking. Pay close attention to joints between elbows and straight pipe.
- Inspect the system for misalignment of components. This may lead to sagging and unwanted stresses in the joints.

If any corrections are required they must be computed before installing the replacement water heater.

Notes:

1. Multiply the total number of 90° elbows (intake and exhaust) by 5 ft. **DO NOT** include the 4 in. termination fittings or 4 in. condensate elbow.
2. Multiply the total number of 45° elbows (intake and exhaust) by 2 1/2 ft.
3. Add this to the total length of straight pipe - intake and exhaust.
4. The total of all elbows and straight pipe: intake and exhaust must not exceed maximum lengths from tables above.

Example:

A 4 in. balanced direct vent system has 10 ft. of straight exhaust pipe and 10 ft. of straight intake pipe. It has 1- 90° elbow in the exhaust and 1- 90° elbow in the intake. It has 1- 45° elbow in the exhaust and 1- 45° elbow in the intake.

Therefore:

2- 90° elbows x 5 ft.= 10 ft.
2- 45° elbows x 2 1/2 ft. = 5 ft.
20 ft. of straight pipe + 10 ft. + 5 ft. = 35 ft.
System is within "Maximum Combined Length" from table above.

⚠WARNING

Ensure that the elbows are counted when determining total vent length. See below and the Installation and Operation Manual for more information.

This unit is approved to be used with the following venting materials:

Item	Material	United States	Canada
Vent or Air Intake Pipe and Fitting	Polypropylene (PP)	UL 1738	ULC S636
	PVC	DWW ASTM-D2665 or CSA B181.2	
	PVC - Schedule 40	ASTM-D1785 or CSA B137.3	
	CPVC	ASTM-F442	
	CPVC - Schedule 40	ASTM-F441 or CSA B137.3	
	AL29-4C Stainless Steel	UL 1738	
	ABS - Schedule 40	ASTM-D2661 or CSA B181.1	
Pipe Cement / Primer	PVC	ASTM D2564	
	CPVC	ASTM F493	
	IPEX	UL 1738	
	ABS	ASTM D-2235	

The use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic vent pipe and systems is prohibited. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

IMPORTANT

Installations in Canada must conform to the requirements of CSA B149 code. Plastic vent systems must be assembled with pipe, fittings, cements, and primers listed to ULC S636. Components of this listed system shall not be interchanged with other vent systems or unlisted pipe/fittings. In Canada, the primer and cement must be of the same manufacturer as the vent system; do not mix primers and cements from one manufacturer with a vent system from a different manufacturer. The supplied plastic pipe/fittings are certified as part of the water heater.

Control Layout

⚠WARNING

The following procedure is for service and installation personnel only. Resetting lockout conditions without correcting the malfunction can result in a hazardous condition.

Water Heater Display and Control Buttons

Menu/Back Button

Fault List Cycling and Lockout Reset

Up and down arrows used to change the setpoint and scroll through parameters

OK Button - used to save new settings

Fig. 2

Fig. 3

Display Home Screen: The home screen displays the status of the water heater and will say one of the following:

- "Hot Water Demand" is displayed when there is a call for heat.
- "Standby: No Demand" is displayed when there is not a call for heat.
- The temperature displayed in lower right hand corner of the screen is the actual water temperature.

The upper left hand corner shows when components are energized or when sequence of operations actions are detected.

- "F" is displayed when FLAME is present.
- "B: is displayed when the BLOWER is running.
- "I" is displayed when the IGNITER is energized.
- "G" is displayed when the GAS VALVE is open.

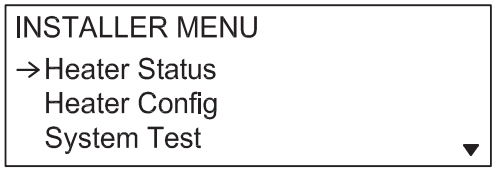
The lower left-hand corner displays the percentage value of the factory set burner power range. 100% indicates highest burner power and 1% indicates the lowest burner power.

⚠WARNING

The following procedure is for **service and installation personnel ONLY.** Resetting lockout conditions without correcting the malfunction can result in a hazardous condition.

The display has a “Installer Menu” for accessing information in aiding servicing of the water heater. System and troubleshooting information such as fan speeds, flame signal, ignition attempts, and error history are available in the Installer Menu. This procedure is for service and installation personnel only. To enter the Installer Menu, follow the steps illustrated below:

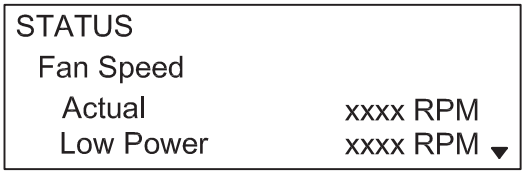
Step 1: To access the Installer Menu, hold down the “OK”, then “M” buttons together for 5 seconds. The display must be on the home screen before pressing these buttons.



The Heater Config menu can be used to set a service reminder.

System Test can be used to maintain a constant input rate at low, ignition, or high input fan speed. This can be useful when troubleshooting the heater or performing combustion tests. The default setting is “OFF”. Use the default setting to resume normal operation.

Step 2: Heater Status

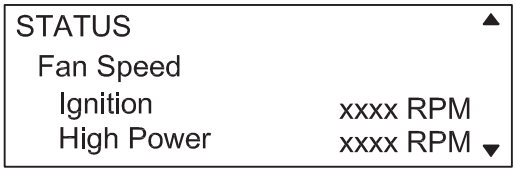


Press the “OK” button to select Heater Status.

The first screen in the STATUS menu displays actual fan speed and the low power fan speed (factory setting). As a reference point, when the fan speed is displayed as “1 %” at the home screen the actual speed will match the low power speed.

Use the down arrow (“-”) to advance to the next screen.

Step 3: Ignition and High-Power Fan Speed



The second screen in the STATUS menu shows the ignition speed and high power fan speed (both are factory settings). As a reference, when the fan speed is displayed as “100%” at the home screen the actual speed will match the high power speed.

Use the down arrow (“-”) to advance to the next screen.

Step 4: Flame Current and Flame Failures

The third screen displays the present flame current measurement. When a flame is present this value will vary based on fan speed, but it will be in the range of 5 -7 microamps most of the time.

A running total of the number of flame failures is also displayed. A flame failure is defined as a loss in flame signal after the flame has been proven during the trial for ignition period.

Use the down arrow (“-”) to advance to the next screen.

Step 5: Total Ignition Attempts, Successful Ignitions and Failures

The fourth screen displays the history of ignition attempts. A running total of successful and failed attempts is given.

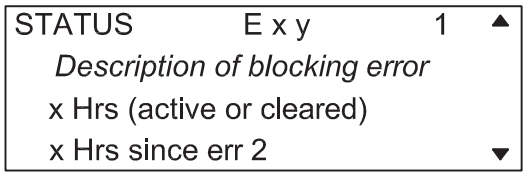
Use the down arrow (“-”) to advance to the next screen.

Step 6: Total Run Hours

The fifth screen displays the total hours of heating time for the water heater.

Use the down arrow ("-") to advance to the next screen.

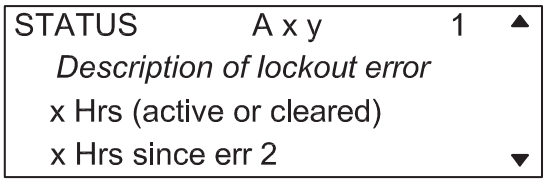
Step 7: Heat Blocking Fault Code List (Non-Lock Out Faults)



The sixth screen displays the history of blocking errors ("E" codes). The most recent error is shown first (indicated by #1 in top right comer). Cycle through the error history by pressing the "i" button. The most recent error shows the time since the error occurred and if the error is active or cleared. The time interval between the displayed error and previous error is also given.

Use the down arrow ("-") to advance to the next screen.

Step 8: Lock Out Fault Code List



The final screen displays the history of lockout errors ("A" codes). The most recent error is shown first (indicated by #1 in top right comer). Cycle through the error history by pressing the "i" button. The most recent error shows the time since the error occurred and if the error is active or cleared. The time interval between the displayed error and previous error is also given.

Step 9: Press the "M" button to exit the STATUS menus.

Heater Configuration: Service Reminders, Condensation Prevention, Burner Release

Step 1: Enter the Installer Menu.

Step 2: Use the down arrow so the arrow points at Heater Config then press OK.

Fig. 4

Service Reminder:

Press OK to enter service reminder. Next, press OK to access status, then press the up/down buttons to toggle the status on or off. Press OK to select on or off for the status. If the status is turned on, the reminder period in days can be selected. To change the reminder period, scroll to reminder, press ok, then use the up/down button to change the reminder days interval. Press OK to change the number of days interval between service reminders. The service reminder can be from 1 to 740 days. The display will show a service reminder when the set time has elapsed.

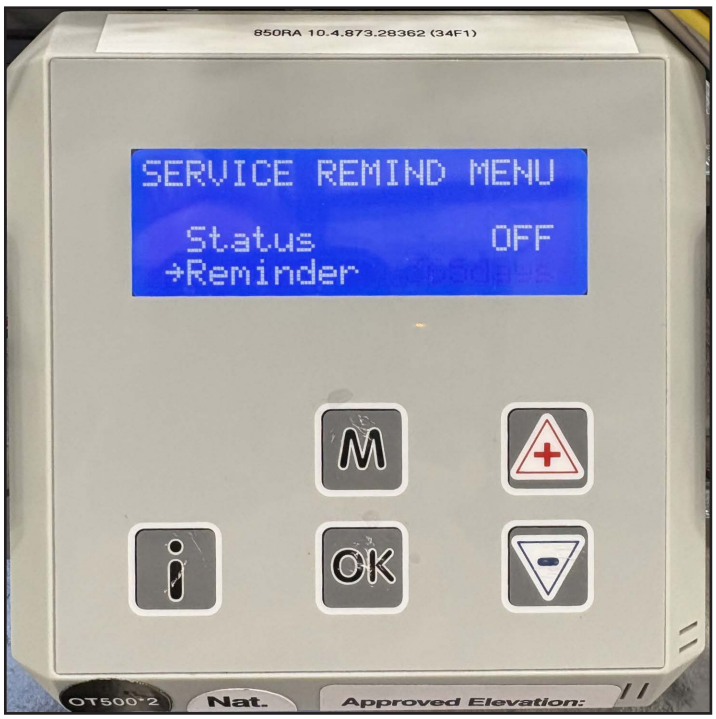


Fig. 5

Condensation Prevention:
Use the up and down arrows to scroll to “Cond. Prevention” and then press OK to enter. Press OK again, then use the up/down buttons to toggle condensation prevention on or off. Press OK to save the desired selection.

⚠WARNING

This feature should only be used under the supervision of technical support. **DO NOT LEAVE CONDENSATION PREVENTION IN AN OFF STATE**. Leaving Condensation Prevention off could cause damage to the heat exchanger and result in lack of hot water.

Fig. 6

Burner Release:
DO NOT CHANGE ANY SETTINGS in the burner release menu. In case an accidental mistake was made, the following settings should be used.

1. Automatic should be set to ON for normal operation. If Automatic is set to off, the calls for heat will be blocked and the system will not proceed to any pre-purge.
2. MB Control stands for Modbus Control. MB Control should always be set ON, but if it were set to OFF there will not be any noticeable changes to the system functionality.

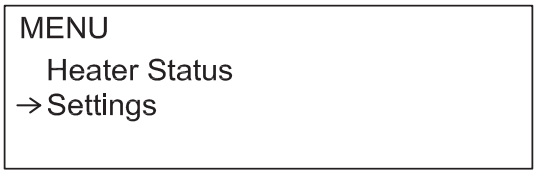
Fig. 7

System Test:
Scroll to system test and press OK. Press OK again so that the options Off, Low Power, Ignit (Ignition) Power, or High Power can be scrolled through using the UP/DOWN buttons. Press OK to select one of the options. The system will lock the firing rate at the selected power level. When the test is completed, turn this option back OFF.

Fig. 8

To Increase or Decrease Setpoint Temperature

Step 1:



In the MENU screen, use the down arrow ("-") button to move the cursor to SETTINGS.

Press the "OK" button to select SETTINGS. Press "OK" button a second time (temperature will flash) to change setpoint.

Step 2:

Use the up arrow ("+") button or down arrow ("-") button to adjust the setpoint temperature.

For the purposes of this section of the manual, raise the setpoint temperature to 135°F. Press the "OK" button to save the new setting.

To exit from the SETTINGS menu, press the "M" button.

Change Temperature Format in Display from ˚F to ˚C or ˚C to ˚F

Step 1: Press the menu button to enter the menu.
Step 2: Use the down button to scroll to settings, then press OK. The setpoint option will appear.

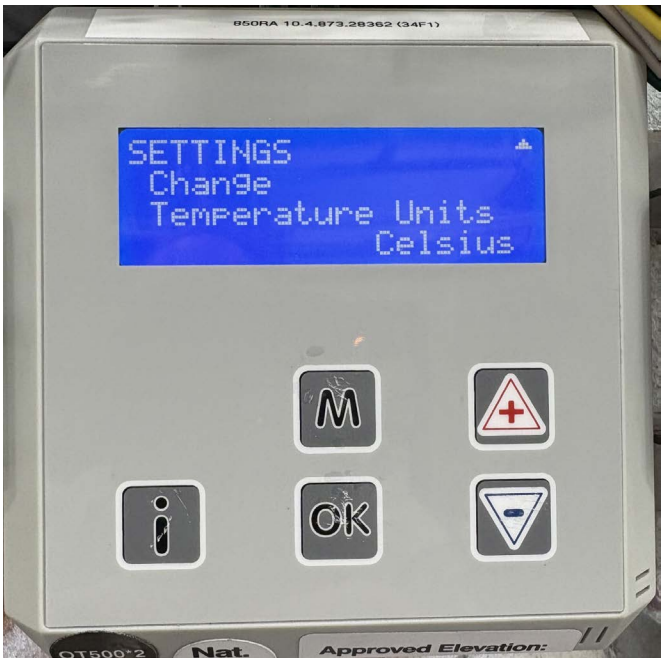


Fig. 9

Step 3: Press the down button to the preferred temperature units, then press OK.
Step 4: Press the up button so that the preferred temperature units change, then press OK to select the new units.

Wiring Diagram

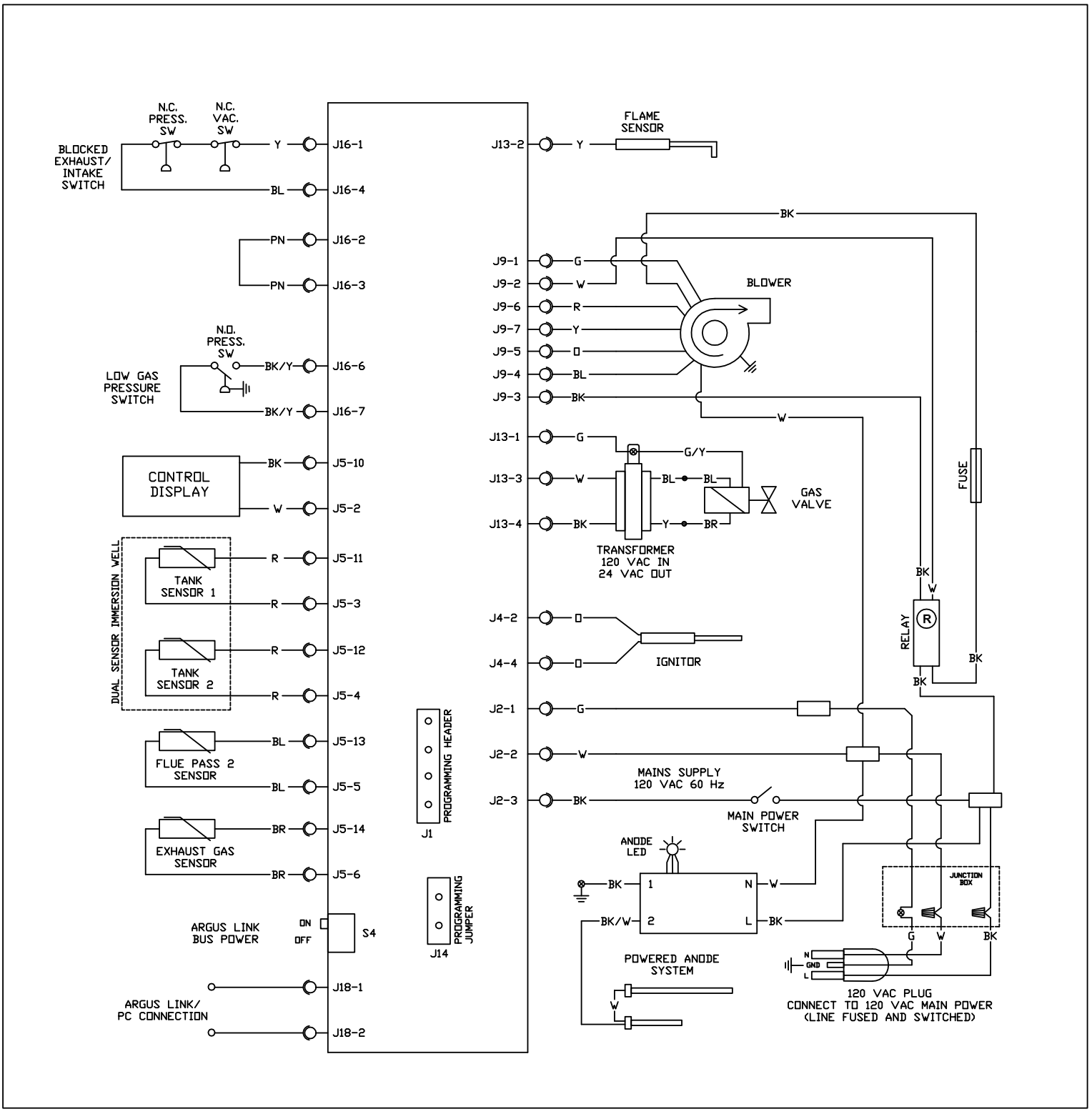


Fig. 10 **Component Wiring Diagram**

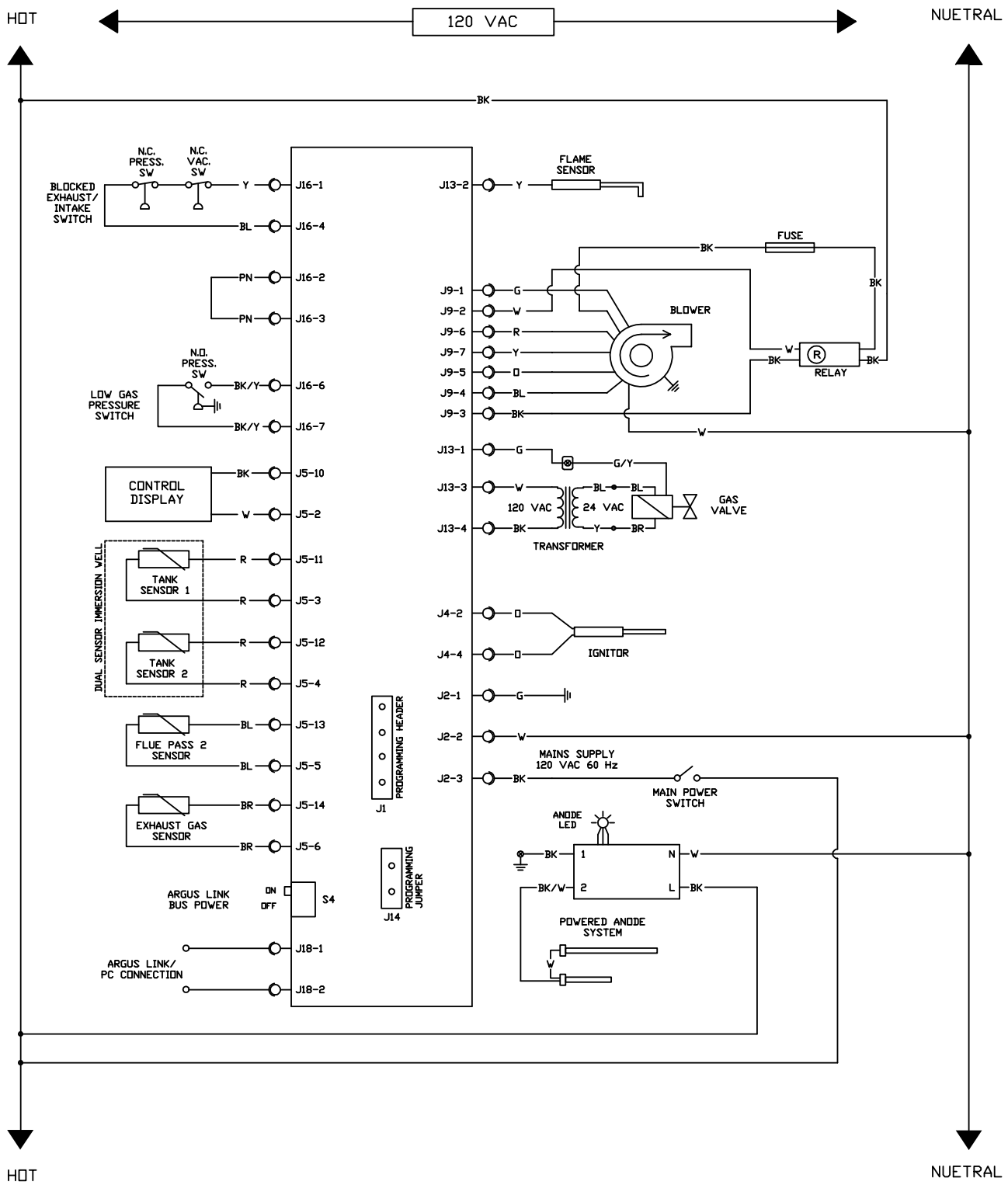


Fig. 11 **Schematic Wiring Diagram**

Service Error Codes And Troubleshooting Procedures

IMPORTANT

The control system can produce blocking and hard lockouts faults. Blocking faults are displayed if active and are stored in Diagnostic Mode history. Blocking faults automatically reset once error is corrected. Hard lockouts will display if active and require manual reset. Press the "i" button to clear lockouts. The display can store the last 16 blocking faults and 16 hard lockout faults.

Non-Blocking Error Codes

Code	Error Message	Description & Possible Causes/Actions	
A00	EXTND BLOCKING ERROR	**Description:**	A blocking error has been present for more than 20 hours in a row.
		Causes & Actions:	Investigate the blocking error that caused the lockout.
A01	IGNITION LOCKOUT	**Description:**	There have been three unsuccessful ignition attempts in a row.
		Causes & Actions:	Dirty or faulty flame sensor - see manual.
			Damaged or worn hot surface igniter· see manual.
			Faulty or loose wiring - check wiring and connections to flame sensor, hot surface igniter, gas valve and blower.
A05	GV RELAY ERROR	**Description:**	A failure was detected in the GV Relay in the main operating control.
		Causes & Actions:	Contact a qualified agency to inspect the control.
A06	SAFETY RELAY ERROR	**Description:**	A failure was detected in the Safety Relay in the main operating control.
		Causes & Actions:	Contact a qualified agency to inspect the control.
A08	FAN ERROR	**Description:**	The actual fan speed differs more than 300 RPM from the target fan speed.
		Causes & Actions:	Contact a qualified agency to inspect the control and wiring to blower.
A09,A11, A13, A14	RAM, X·RAM, STATE, OR ROM ERRORS	**Description:**	Various internal software errors.
		Causes & Actions:	Contact a qualified agency to inspect the control.
A10, A12	E2PROM ERRORS	**Description:**	Various errors caused by E2PROM file.
		Causes & Actions:	Contact a Qualified agency to inspect the control.
A16	ISMS XRL ERROR	**Description:**	Internal software error.
		Causes & Actions:	Contact a qualified agency to inspect the control.
A18	HIGH LIMIT LOCKOUT	**Description:**	Water temperature higher than 190 degrees F detected when the burner is on.
		Causes & Actions:	Faulty temperature regulation - contact qualified service technician to inspect the control.
A19, A22, A23, A27, A28, A29, A30	VARIOUS SOFTWARE ERRORS	**Description:**	Internal software error.
		Causes & Actions:	Contact a qualified agency to inspect the control.
A20	FLAME ERROR 2	**Description:**	The flame is still present 10 seconds after closing the gas valve.
		Causes & Actions:	The gas valve is not closing properly - contact a qualified service technician.
A21	FLAME ERROR 1	**Description:**	A flame is detected before ignition.
		Causes & Actions:	Contact a qualified agency to inspect the controls.
A24	FLAME FAIL LOCKOUT	**Description:**	Flame signal has been lost ten times during one demand.
		Causes & Actions:	Dirty or faulty flame sensor - see manual.
			Faulty or loose wiring to gas valve - check wiring and connections.
A36	BLOCKED VENT	**Description:**	Blocked vent error occurs 3 times in a 10 minute period.
		Causes & Actions:	See blocking error E36.
A38	LOW GAS PRESSURE	**Description:**	Low gas pressure error occurs 3 times in a 10 minute period.
		Causes & Actions:	See blocking error E38.

Blocking Error Codes

Code	Error Message	Description & Possible Causes/Actions	
E34 - E38	WD INTERNAL ERROR	**Description:**	Internal software error.
		Causes & Actions:	Contact a qualified agency to inspect the control.
E31 - E34	REF HI/LO TOO HI/LO	**Description:**	Internal hardware error.
		Causes & Actions:	Contact a qualified agency to inspect the control.
E35	FALSE FLAME	**Description:**	A flame is detected when no flame is allowed.
		Causes & Actions:	The control and/or gas valve is not working properly - contact a qualified agency.
E36	BLOCKED VENT	**Description:**	The blocked vent circuit is open.
		Causes & Actions:	Intake or exhaust vent is blocked - inspect and clean.
			Faulty or loose wiring to switches - check blue and yellow wires.
			Excessive wind or room draft is creating high pressures.
E38	LOW GAS PRESSURE	**Description:**	The gas supply pressure is too low.
		Causes & Actions:	Low supply pressure or undersized piping - see manual.
			Gas supply is turned off.
			Pressure drop due to other appliances on the same supply line.
			Faulty or loose wiring to switch - check black/yellow wires.
E39	FLUE GAS LIMIT	**Description:**	The flue gas temperature has exceeded the high limit.
		Causes & Actions:	Exhaust pipe is blocked - inspect and clean.
E43, E47	Various WD ERRORS	**Description:**	Various WD communication errors.
		Causes & Actions:	Contact a qualified agency to inspect the control.
E44	PHASE ERROR	**Description:**	The polarity at the main power supply is reversed.
		Causes & Actions:	The hot and neutral wires are reversed - Contact a qualified agency to inspect the installation.
E46	EARTH GROUND ERROR	**Description:**	A faulty earth ground connection is detected.
		Causes & Actions:	Improper wiring - check all green wires.
E51 or E52	WATER T SENSOR OPEN	**Description:**	The water temperature sensor is open.
		Causes & Actions:	Faulty or loose wiring - check sensor, wires and connections.
E59 or E60	WATER T SENSOR SHORT	**Description:**	The water temperature sensor is shorted.
		Causes & Actions:	Short in circuit - check sensor, wires and connections.
E65	FLUE SENSOR SHORT	**Description:**	The flue sensor is shorted.
		Causes & Actions:	Short in circuit - check sensor, wires and connections.
E66	RESET BUTTON ERROR	**Description:**	An error has occurred with the reset button (“i” button).
		Causes & Actions:	Contact a qualified agency to inspect the control display.
E72	APPLIANCE SEL ERROR	**Description:**	An error has occurred due to incorrect appliance selection.
		Causes & Actions:	Contact a qualified agency to inspect the controls.
E76, E77, E79 OR E81	VARIOUS FAN ERRORS	**Description:**	A communication error has occurred with the fan.
		Causes & Actions:	Contact a qualified agency to inspect the control.

Control Troubleshooting

System Observation for 120-400/500 Models

Water Heater Fault: Water heater does **NOT** operate.
Display Error Code: Water heater digital display does **NOT** operate - blank display.

⚠ WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

⚠ CAUTION

Use caution to NOT damage connectors when making voltage measurements or jumping terminals.

Check main power supply to water heater. Check control board fuse, circuit breaker, plug receptacle, line cord, and wiring to water heater.

↓

Check to make sure switch on front of control panel is in the ON position.

↓

Does the water heater digital display operate? Increase thermostat setting if tank is warm.

Y → Digital display operates– see next page.

↓ N

Is 24-28 VDC present between white and black wire pin connections on the back of display? (Fig. 12)

Y → Replace digital display.

↓ N

Check wires for proper termination to control board. Are wire terminations connected properly to digital display?

↓ Y

Check wire harness for proper continuity.

↓ Y

Replace control board.

Back of Control Display

Check pin connections for voltage

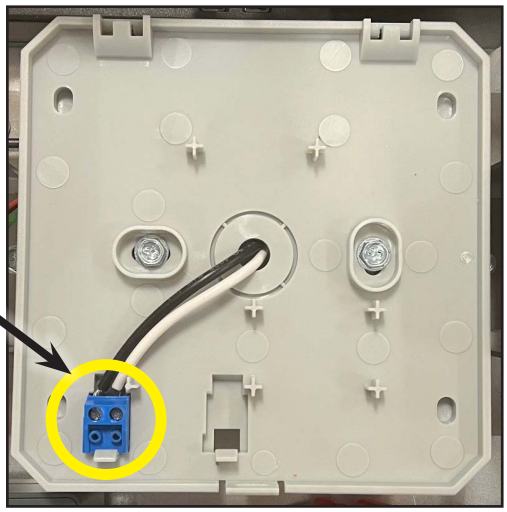
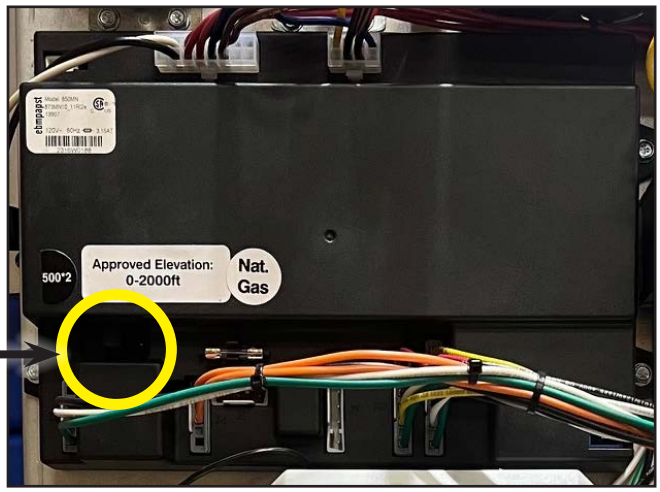


Fig. 12

Wire Harnesses on Control Board

Location of Control Board Fuse



Control Troubleshooting (cont.)

⚠ CAUTION

Use caution to **NOT** damage connectors when making voltage measurements or jumping terminals.

⚠ WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

Continued from previous page.

Y

Does blower operate?

N

Error code A08, E77, E79, E81 on display. Measure voltage between black and white wires, 3 wire harness, at the blower (make sure the display shows “hot water demand” on the home screen, if not increase the setpoint). Is there 110-120 VAC?

N

Verify 120V from power switch. Replace blower harness if digital display shows “heating” and no voltage is present to the blower.

Check the blower fuse for continuity. If fuse is OK, check blower relay contacts are closed. If NO, check the relay coil for continuity. Check the voltage from the control to the coil. If there is no voltage (ADD voltage), replace the board.

Y

Check that the 4 wire blower modulation harness is plugged in to the blower.

Y

Measure voltage between red and blue wires. Is there 13-30 VDC?

Y

Replace blower.

N

Replace control board.

N

Plug in the wire harness (If this harness is unplugged blower will run constantly).

Y

Does the igniter glow orange when looking in the sight glass?

N

Disconnect the igniter Molex and test the resistance across the wires. Is the resistance approximately 38 (+/- 4) ohms at room temperature?

Y

Check continuity of the orange wires to the igniter connector on the board (J4). Replace harness if there is no continuity. If wires are good, confirm 120V at connector during call for heat. If no voltage is present, replace control board.

N

Replace the Igniter.

Y

Does main burner light?

N

Error code A01 or A24 on display. See main burner lights, no flame signal in section Flame Sensor testing and replacement

Y

Does burner continue until thermostat set point is reached?

N

See Combustion System Testing and Replacement **(pg 38)**.

Y

Does blower post-purge for 25 seconds?

N

Check to see if digital display shows any other error codes (A36 or E36 blocked vent pressure switch, E39–Flue Gas Limit, A38 or E38 low gas pressure or A18–high limit). If so, refer to the appropriate section(s) for testing and replacement.

Y

System O.K.

Fig. 13

Service Procedure 1:
Water Temperature Sensor Circuit Testing and Replacement

IMPORTANT

This procedure assumes a cool tank.

⚠WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

⚠CAUTION

Use caution to NOT damage connectors when making voltage measurements or jumping terminals.

Condition: Water heater not operating. Digital display shows error code E51, E52 Water Sensor Open, or E59, E60 Water Sensor Short.

↓

Unplug or disconnect electrical power to the water heater.

↓

Check continuity of wire harness to sensor. Resistance of harness should be close to 0 ohms. Replace wire harness if high resistance is measured (over .5 ohms). Check wires for intermittent connections, shorts, and/or frayed insulation. Replace if necessary.

↓

If wire harness is O.K., check sensor resistance detailed in Appendix A: Sensor Resistance at Various Temperatures, **pg 30.** Replace sensor if needed.

↓

Fill the unit completely with water before turning the power ON. Turn power ON to water heater. Run water heater through heating cycle and verify proper operation. Sensor temperature can be viewed in the lower right-hand corner of the display while burner runs and when set point is satisfied.

↓

Condition: Water heater not operating. Digital display shows error code A18 high water temperature (over 190°F).

↓

⚠WARNING

DO NOT reset the digital display from the hard lockout state without correcting the cause of the overheating condition.

↓

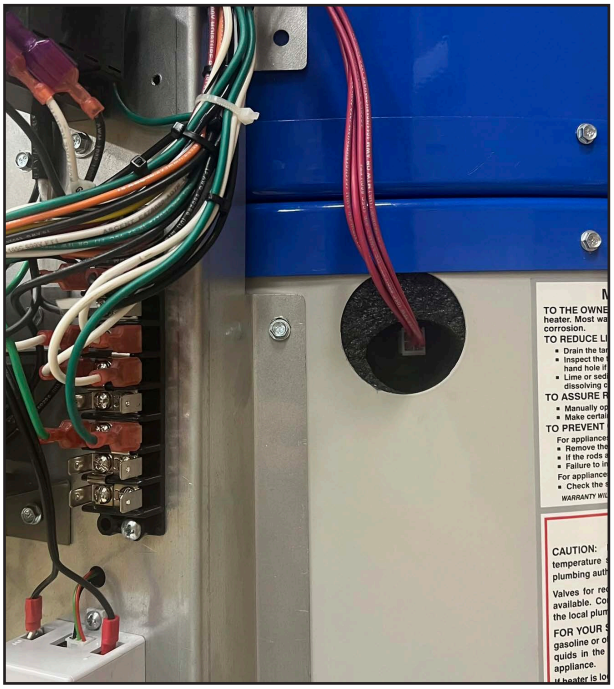
Draw water to cool tank below setpoint.

↓

Check sensor. Check sensor wire for potential damage or breaks in the wire insulation.

→ Continued on next page.

→ Check sensor resistance (see Appendix-A: Sensor Resistance at Various Temperatures, **pg 30).**



The water sensor is located on the right of the control panel.

Fig. 14

Continued from previous page

Condition: Water heater not operating. Digital display shows error code A18 high water temperature (over 190°F) (continued from previous page).

Once cause of overheating condition has been diagnosed and corrected, the control board may be reset.

- Press the “I” button to reset the control (Fig. 15).
- Set thermostat to the desired setting.
- Water heater will start.
- Monitor temperatures for one complete heating cycle making sure the setpoint is achieved.

⚠WARNING

DO NOT operate the water heater without verifying that the overheating condition has been corrected.

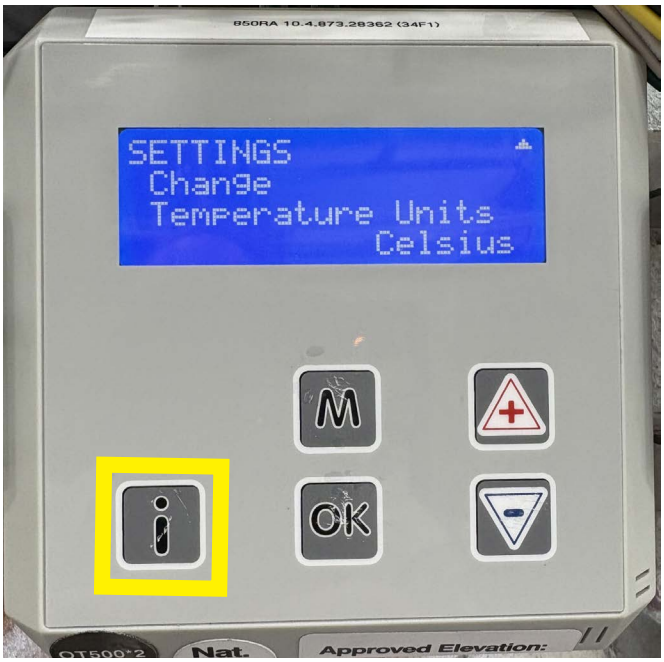


Fig. 15

APPENDIX-A
Water and Flue Gas Sensor Resistance at Various Temperatures

IMPORTANT

Be careful when making voltage measurements or jumping terminals not to damage or deform connectors or connector pins.

Draw water from the temperature and pressure relief valve. Compare temperature with temperature ohms chart below.

Example: If the temperature is 84°F, then the resistance through the sensor would be 10,292 (see shaded area).
Note: Sensor resistance increases as the temperature falls.

In Degrees F										
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
40	29291	28590	27814	27103	26409	25732	25071	24427	23798	23184
50	22790	22290	21790	21290	20790	20290	19790	19290	18790	18290
60	17899	17508	17117	16726	16335	15944	15553	15162	14770	14462
70	14154	13847	13539	13231	12923	12616	12308	12000	11756	11512
80	11268	11024	10780	10536	10292	10048	9805	9611	9416	9222
90	9027	8833	8639	8444	8250	8055	7899	7743	7588	7432
100	7276	7120	6964	6809	6653	6528	6402	6277	6151	6026
110	5901	5775	5650	5524	5422	5320	5218	5117	5015	4913
120	4812	4710	4609	4526	4443	4360	4277	4194	4111	4028
130	3945	3863	3795	3728	3660	3592	3524	3456	3389	3321
140	3253	3197	3141	3086	3030	2974	2919	2863	2807	2752
150	2706	2660	2614	2568	2522	2475	2429	2383	2337	2299
160	2261	2223	2185	2147	2108	2070	2032	1994	1962	1930
170	1898	1866	1834	1803	1771	1739	1707	1680	1654	1627
180	1600	1574	1547	1520	1494	1467	1445	1422	1400	1378
190	1355	1333	1311	1288	1266	1247	1228	1209	1190	1171
200	1153	1134	1115	1096	1080	1064	1048	1032	1016	1000

In Degrees C										
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	36100	34389	32898	31467	30098	28590	27336	26113	24951	23845
10	22790	21795	20845	19943	19084	18290	17493	16755	16054	15387
20	14770	14147	13572	13023	12500	12000	11526	11071	10636	10221
30	9805	9442	9077	8727	8392	8055	7760	7463	7178	6904
40	6653	6390	6149	5919	5699	5524	5291	5104	4927	4763
50	4609	4470	4343	4184	4045	3863	3758	3632	3510	3393
60	3253	3171	3065	2964	2867	2752	2683	2596	2513	2433
70	2337	2282	2211	2143	2077	1994	1954	1896	1841	1788
80	1707	1687	1640	1595	1551	1467	1400	1357	1316	1277
90	1266	1231	1200	1170	1125	1096	1070	1045	1020	975

Water Temperature Sensor Harness Replacement Procedure

Note: Also covers flue gas sensor, collector and display harness.

⚠ WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

1. Position main power switch to “OFF.”
2. Disconnect (unplug) water heater from 120 volt power source.
3. Remove top surround cover from top of the water heater.
4. Remove the front control assembly cover.
5. Disconnect the temperature sensor connector from control board (see images below). Note that the display (black and white wires), collector sensor (blue wires), and flue gas temperature sensor (brown wires) are also on this connector.
   a. Disconnect the blue wires from the second pass collector sensor connector, and disconnect the second pass sensor.
   b. Disconnect the brown wires from the lower flue gas sensor ¼” quick connects.
   c. Disconnect the black and white display harness from the back of the display.
   d. Disconnect the 4 wire red harness connector to the water temperature sensor.
6. Install the new harness and re-connect the harness connectors to the temperature sensors and display in part 5a-5d.
7. Restore 120-volt power supply and water supply to water heater, check and repair any leaks found. Confirm proper operation following the lighting instructions on the lighting instruction label, or in the Installation and Operating Manual.
8. Replace the surround cover on the top of the water heater and the control assembly cover on the front of the water heater.

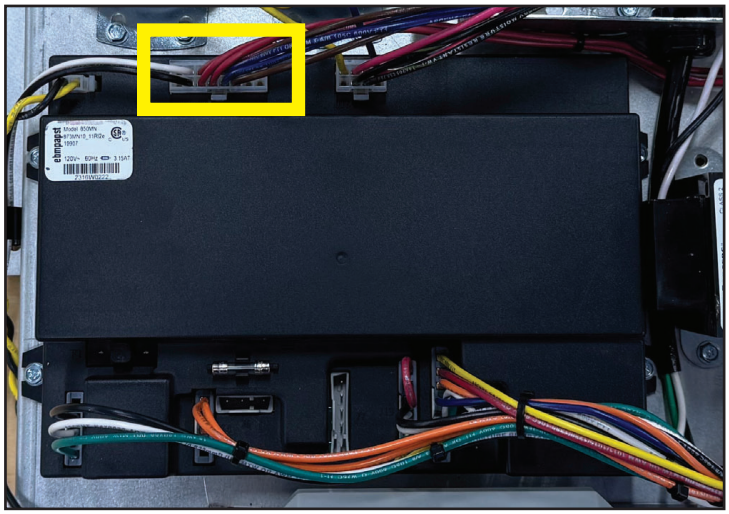


Fig. 16

Fig. 17

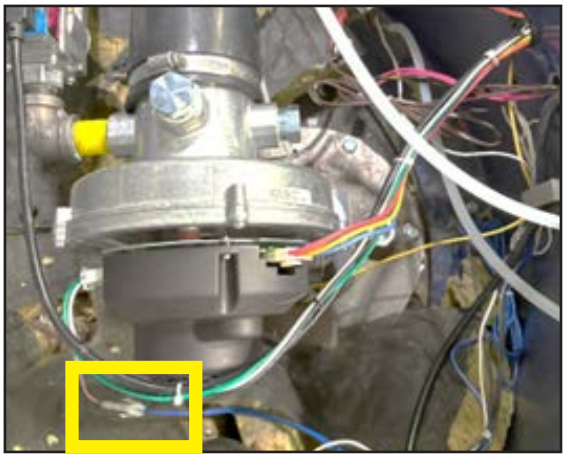


Fig. 18

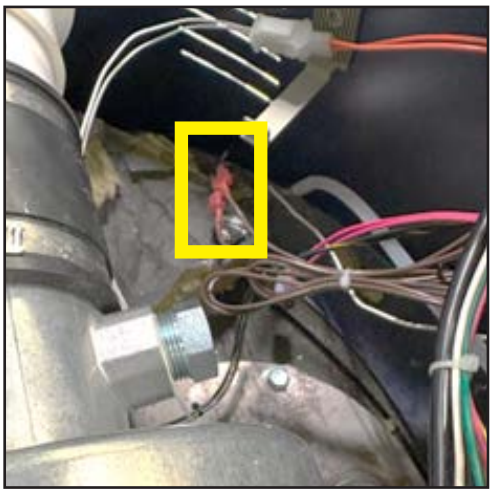


Fig. 19

Testing the Water Temperature Sensor

1. Unplug or disconnect electrical power to the water heater.
2. Check continuity of the wire harness to the sensor. Resistance of harness should be close to 0 Ohms. Replace the harness if high resistance is measured (over 0.5 Ohms). Check wires for intermittent connections, shorts, and/or frayed insulation. Replace the harness if necessary.
3. If the harness is functional, check the sensor resistance at various temperatures detailed in Appendix A on **pg 30**. Replace sensor if needed.

Water Temperature Sensor Replacement Procedure

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

1. Position main power switch to "OFF."
2. Disconnect (unplug) water heater from 120-volt power source.
3. Remove the front control assembly cover.
4. Disconnect the temperature sensor connector from the sensor shown below.
5. Drain the water heater so that the water level is below the temperature sensor.
6. Remove the sensor with a deep well 14mm socket.
7. Apply thread sealant to the new sensor. Install the new sensor with a deep well 14mm socket.
8. Re-connect the sensor connector to the sensor.
9. Restore 120-volt power supply and water supply to water heater, check and repair any leaks found. Confirm proper operation following the lighting instructions on the lighting instruction label, or the lighting instructions located in the Installation and Operating Manual.
10. Replace the front control cover assembly.

Fig. 20

Service Procedure 2:
Second Pass Collector Temperature Sensor Circuit Testing and Replacement

⚠ WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

Testing the Second Pass Collector Temperature Sensor

1. Unplug or disconnect electrical power to the water heater.
2. Check continuity of the wire harness to the sensor. Resistance of harness should be close to 0 Ohms. Replace the harness if high resistance is measured (over 0.5 Ohms). Check wires for intermittent connections, shorts, and/or frayed insulation. Replace the harness if necessary.
3. If the harness is functional, check the sensor resistance at various temperatures detailed in Appendix B on **pg 36.**
4. Replace sensor if needed.

Second Pass Flue Temperature Sensor Replacement Procedure

1. Turn OFF power to water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Disconnect wiring terminal.
5. Remove old second pass flue sensor by using a 14 mm wrench.

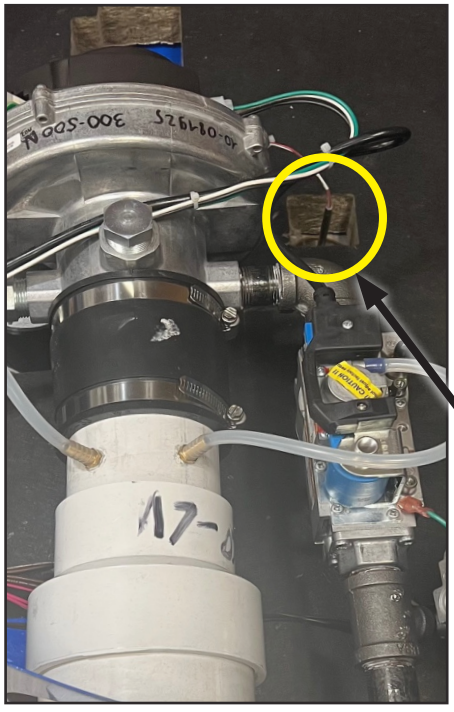


Fig. 21

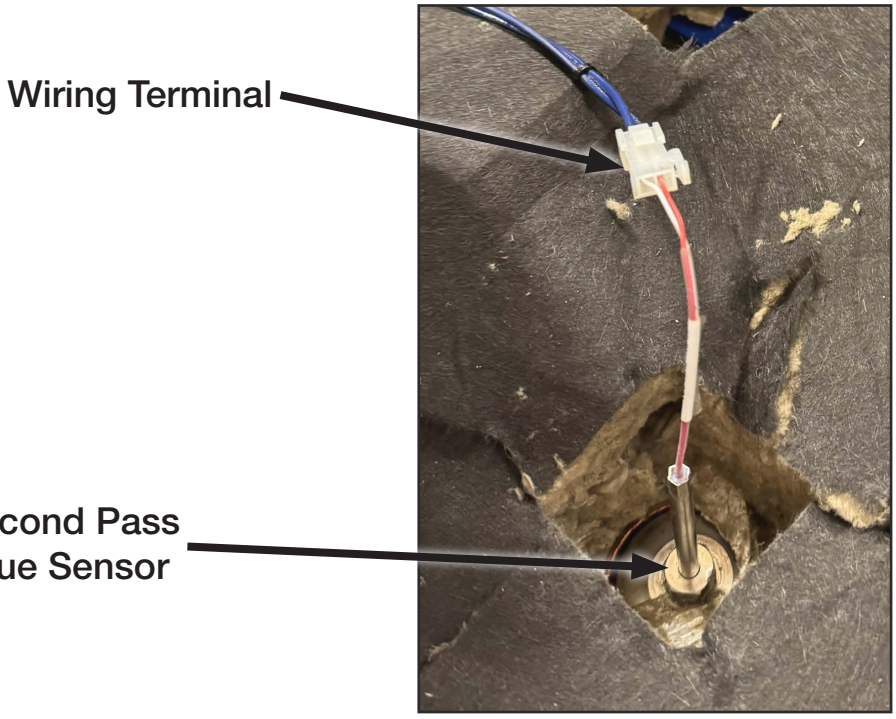


Fig. 22

6. Seal the threads of the new second pass flue sensor using an appropriate thread sealant and install.
7. Reconnect wiring terminal.
8. Replace surround cover on the surround enclosure.
9. Turn ON gas supply to the heater.
10. Turn ON power to the water heater.

Service Procedure 3:
Flue Gas Temperature Sensor Circuit Testing and Replacement

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

Flue Gas Temperature Sensor Testing Procedure

Condition: Water heater not operating. Digital display shows error code E39 or E65.

1. Turn OFF power to water heater.
2. Disconnect (unplug) water heater from 120-volt power source.
3. Remove the 6 jacket screws on the access door located at the bottom of the water heater.
4. Remove the access door to gain access to the flue gas temperature sensor (Fig 23).
5. Check continuity of wire harness to sensor (Fig. 24). Resistance of harness should be close to 0 ohms.
6. If wire harness is functional, check sensor resistance detailed in Appendix A: Water and Flue Gas Sensor Resistance at Various Temperatures on **pg 30**. Replace sensor if needed.

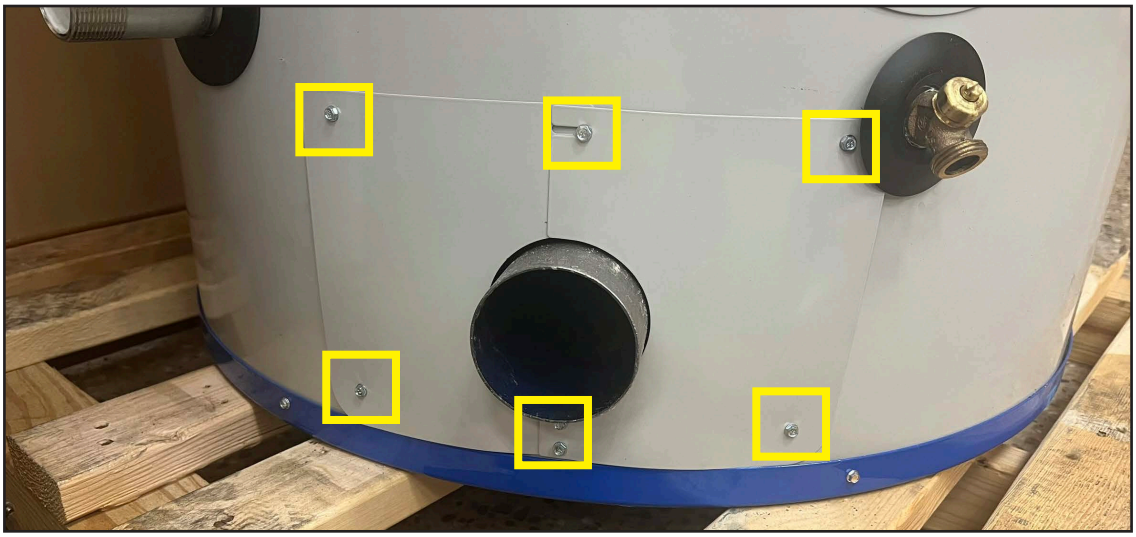


Fig. 23

Fig. 24

Flue Gas Temperature Sensor Replacement Procedure

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

1. Position the main power switch to “OFF.”
2. Disconnect (unplug) water heater from 120-volt power source.
3. Remove the 6 jacket screws on the access door located at the bottom of the water heater.
4. Remove the access door to gain access to the flue gas temperature sensor (Fig. 25).
5. Remove both ¼” flag terminal quick connects from the sensor (Fig. 26).
6. Remove the sensor with a deep well 14mm socket.
7. Apply thread sealant to the threads of the new temperature sensor.
8. Replace the new sensor and tighten with a deep well 14mm socket. Do not overtighten.
9. Re-connect the flag terminal connectors on the sensor.
10. Restore 120-volt power supply and water supply to water heater, check and repair any leaks found. Confirm proper operation following the lighting instructions on the lighting instruction label, or in the Installation and Operating Manual.
11. Reinstall the access door.

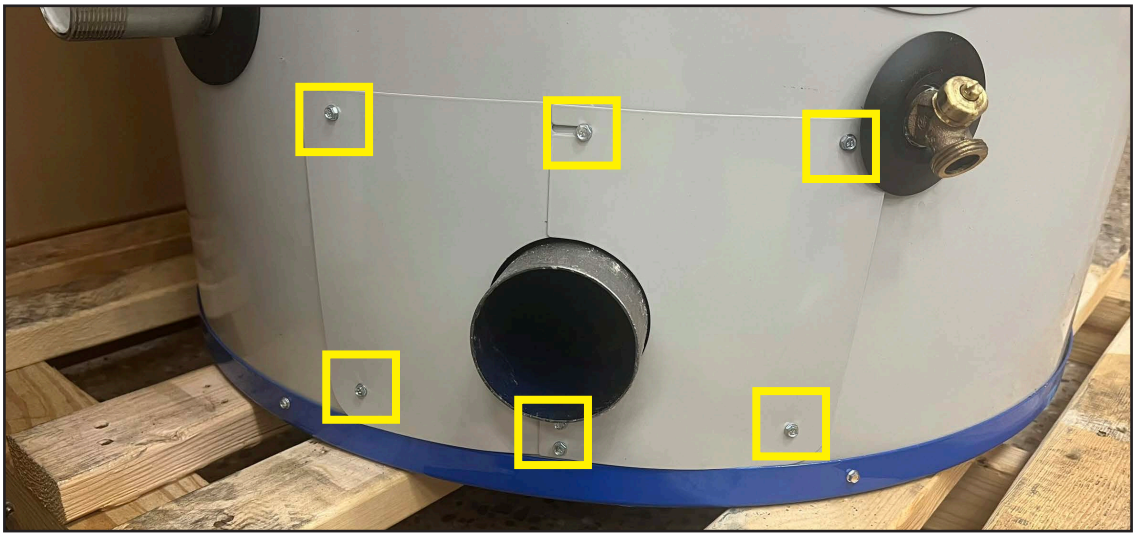


Fig. 25

Fig. 26

APPENDIX-B
Collector Sensor Resistance at Various Temperatures

IMPORTANT

Be careful when making voltage measurements or jumping terminals not to damage or deform connectors or connector pins.

Example: If the temperature is 84°F, then the resistance through the sensor would be 8491 (see shaded area).
Note: Sensor resistance increases as the temperature falls.

In Degrees F										
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
40	26916	26211	25506	24801	24096	23392	22687	21982	21277	20572
50	19867	19457	19047	18637	18227	17817	17407	16997	16587	16176
60	15766	15356	14946	14536	14126	13716	13306	12896	12486	12210
70	11934	11657	11381	11105	10829	10553	10276	10000	9784	9569
80	9353	9138	8922	8707	8491	8275	8060	7908	7757	7605
90	7454	7302	7150	6999	6847	6696	6544	6393	6241	6090
100	5938	5786	5635	5483	5332	5237	5141	5045	4949	4853
110	4757	4662	4566	4470	4374	4278	4182	4087	3991	3895
120	3799	3703	3607	3545	3483	3421	3359	3297	3235	3173
130	3111	3049	2987	2925	2863	2801	2739	2677	2615	2553
140	2491	2450	2409	2368	2327	2286	2245	2204	2163	2122
150	2081	2040	1999	1958	1917	1876	1835	1794	1753	1725
160	1698	1670	1643	1615	1587	1560	1532	1505	1477	1449
170	1422	1394	1367	1339	1311	1284	1256	1237	1218	1199
180	1180	1161	1142	1123	1105	1086	1067	1048	1029	1010
190	991	972	953	934	915	902	889	875	862	849
200	836	822	809	796	783	770	756	743	730	717
210	703	690	677	668	658	649	639	630	621	611
220	602	592	583	574	564	555	546	536	527	517
230	508	502	495	489	483	476	470	464	458	451
240	445	439	432	426	420	414	407	401	395	388
250	382	376	369	363	357	351	344	338	335	331
260	328	324	321	317	314	310	307	304	300	297
270	293	290	286	283	279	276	273	269	266	262
280	259	255	252	248	245	242	238	235	231	228
290	224	221	217	214	211	207	204	200	197	193
300	190	186	183	181	180	178	176	174	173	171
310	169	167	166	164	162	160	159	157	155	154
320	152	150	148	147	145	143	141	140	138	136
330	134	133	131	129	128	126	124	122	121	119
340	117	115	114	112	110	108	107	105	104	103
350	102	101	101	100	99	98	97	96	95	94

In Degrees C										
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	32554	31144	29735	29030	27620	26211	24801	23391	21982	21277
10	19867	19047	18227	17407	16997	16177	15356	14536	13716	13306
20	12486	11934	11381	10829	10276	10000	9569	9138	8707	8491
30	8060	7757	7454	7151	6999	6696	6393	6090	5787	5635
40	5332	5140	4949	4757	4661	4470	4278	4086	3895	3799
50	3607	3483	3359	3235	3173	3049	2925	2801	2677	2615
60	2491	2409	2327	2245	2204	2122	2040	1958	1876	1835
70	1753	1698	1643	1587	1560	1505	1449	1394	1339	1311
80	1256	1218	1180	1142	1123	1086	1048	1010	991	953
90	915	889	862	836	822	796	770	743	730	703
100	677	658	639	630	611	593	574	555	536	527
110	508	495	483	470	464	451	439	426	414	407
120	395	382	370	357	351	338	331	324	317	314
130	307	300	293	286	283	276	269	262	255	252
140	245	238	231	224	221	214	207	200	193	190
150	183	180	176	173	171	167	164	160	157	155
160	152	148	145	141	140	136	133	129	126	124
170	121	117	114	110	108	105	103	101	100	99
180	97	95	93	92	91	89	87	85	84	83
190	81	79	77	76	75	73	71	69	68	67
200	65	64	63	62	61	60	59	58	57	57
210	56	55	54	53	52	51	50	49	48	48
220	47	46	45	44	43	42	41	41	40	40
230	39	39	38	37	37	36	36	35	35	34
240	34	33	32	32	31	31	30	30	29	29
250	28	28	27	27	27	26	26	26	25	25
260	25	24	24	24	24	23	23	22	22	22
270	22	21	21	21	20	20	20	20	19	19
280	19	19	19	18	18	18	18	18	17	17
290	17	17	17	16	16	16	16	16	15	15

Service Procedure 4:
Combustion System Testing Procedure

Observe burner operation through the sight glass located on the combustion insert mounting flange. Normal burner operation should ignite smoothly, without evidence of coughing or huffing upon ignition. The burner flame should be a blue flame near the burner surface in a uniform flame pattern. Occasional yellow or white streaks are normal.

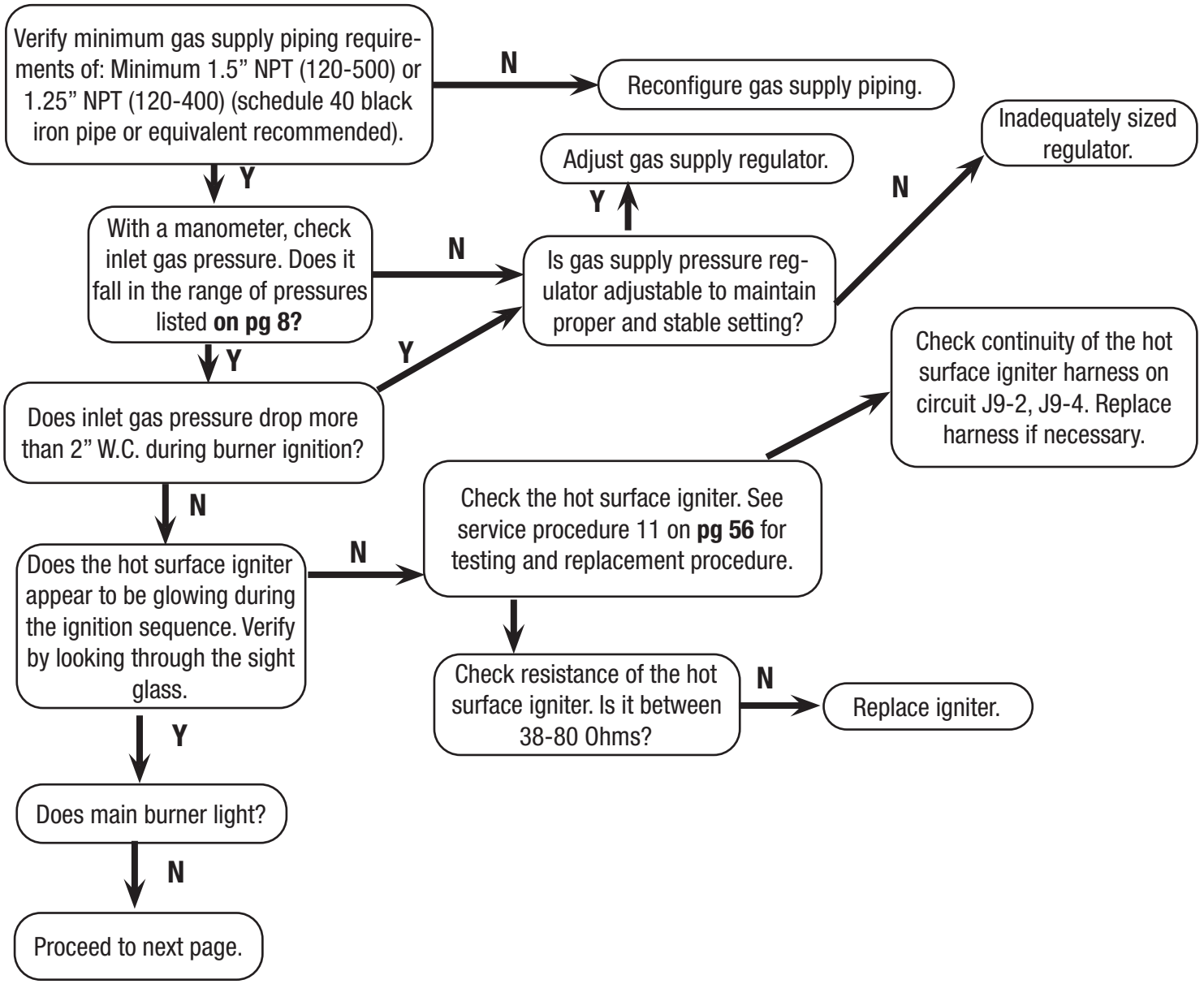
Note: On this high input model that uses metal fiber mesh burner a red glow from the burner surface is normal.

⚠WARNING

Removing screw from inlet gas pressure tap will immediately allow gas to flow from the pressure tap.

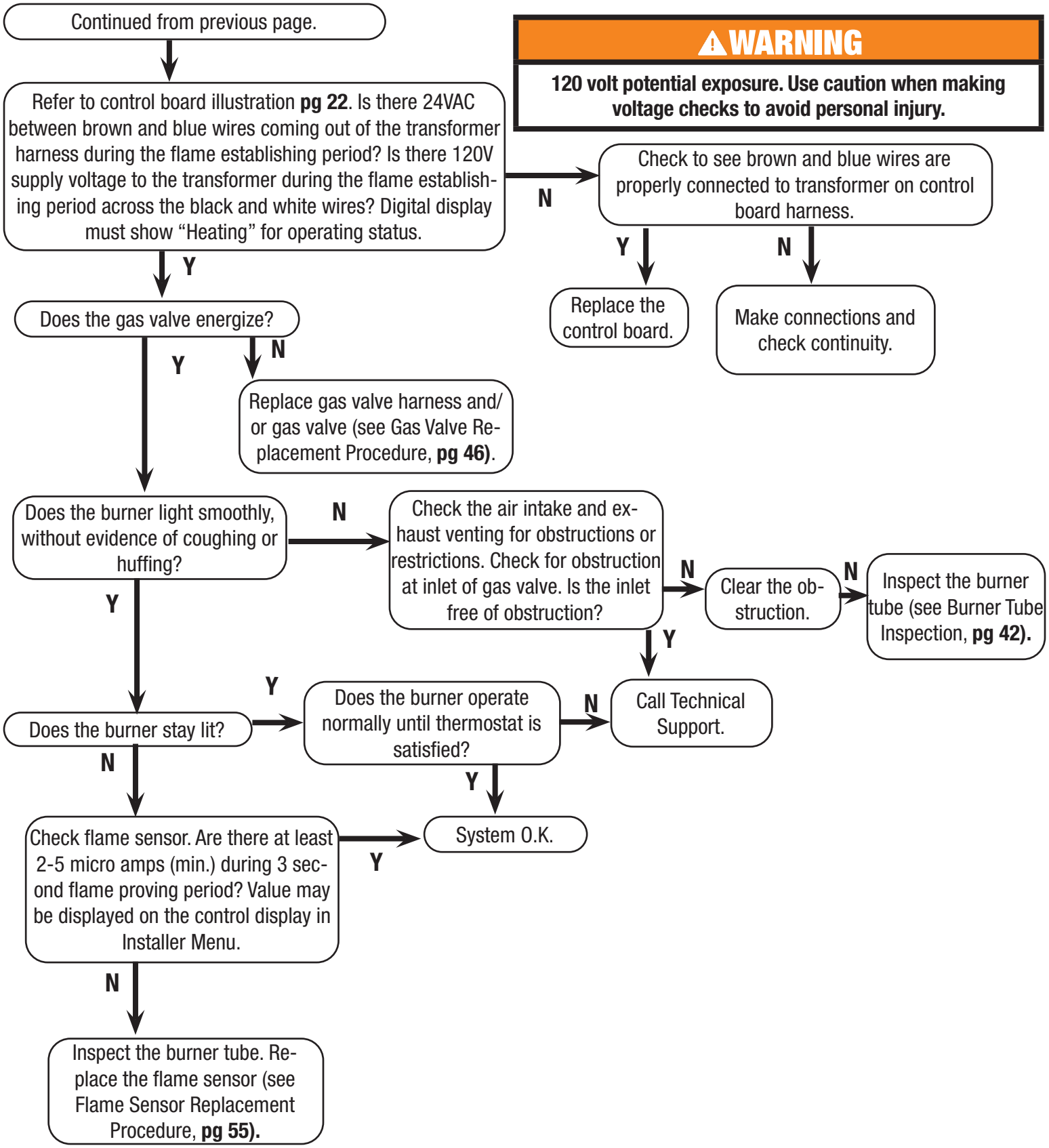
⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.



Observe burner operation through the sight glass located on the combustion insert mounting flange. Normal burner operation should ignite smoothly, without evidence of coughing or huffing upon ignition. The burner flame should be a blue flame near the burner surface in a uniform flame pattern. Occasional yellow or white streaks are normal.

Note: On this high input model that uses metal fiber mesh burner a red glow from the burner surface is normal.



Service Procedure 5:
Complete Combustion Assembly Replacement Procedure

⚠WARNING

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

⚠WARNING

120 volt potential exposure. Make sure power is OFF when servicing and use caution when making voltage checks to avoid personal injury.

Removal

1. Turn OFF power to the water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover.
4. Disconnect the following connections (all are numbered in the reference figures below):

1	Gas valve reference hose
2	Gas pressure switch harness
3	Gas valve harness
4	PWM harness to the fan
5	Fan power harness

6	Hot surface igniter (HSI) harness
7	Flame sensor harness
8	Gas piping
9	Blower intake pipe assembly

5. Save all removed pieces for re-installation.
6. Remove 6 bolts using a ½" socket. Save the bolts for reassembly.
7. Remove the complete combustion assembly.
8. Remove the mounting flange gasket and clean the excess off the mounting surface thoroughly.

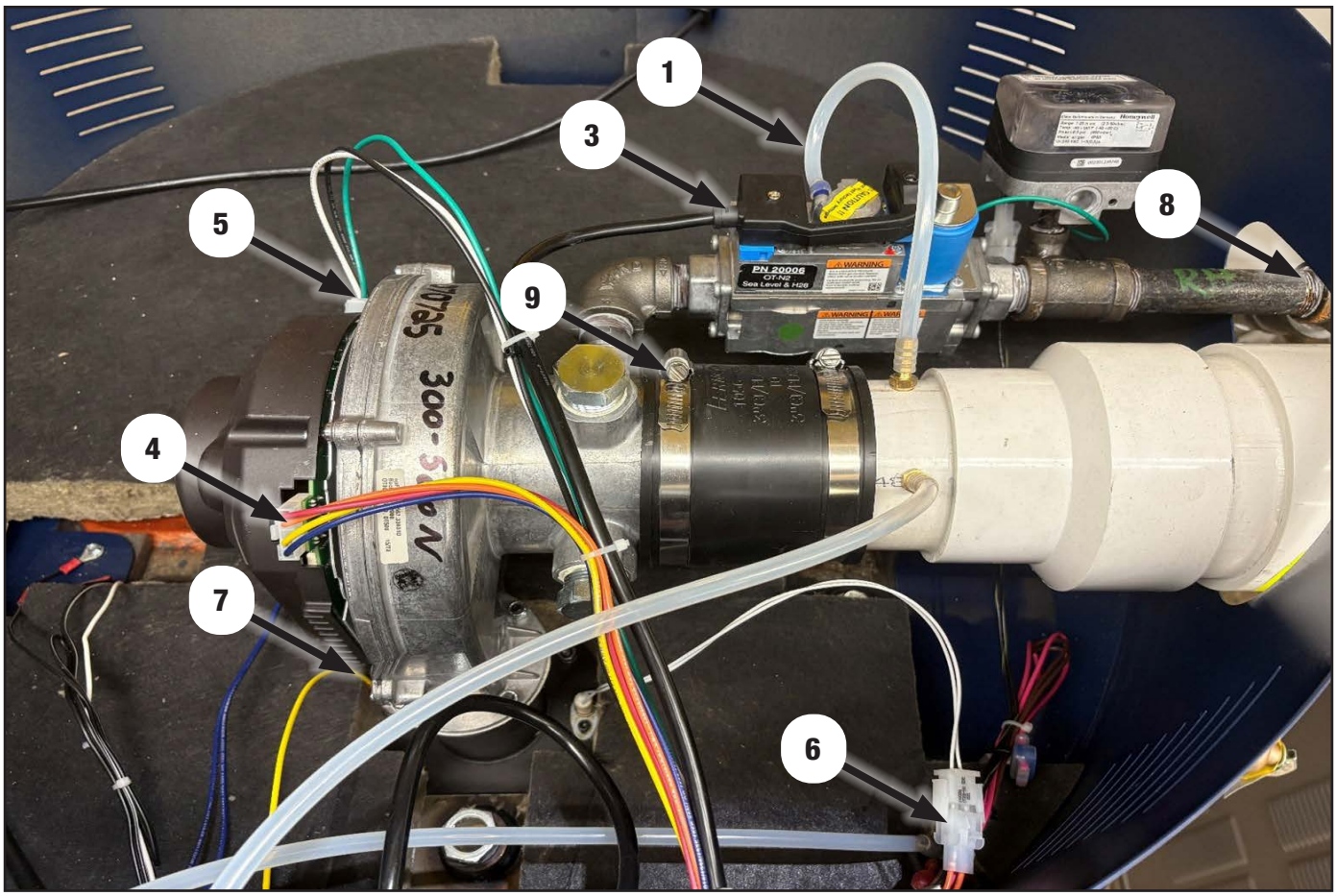


Fig. 27

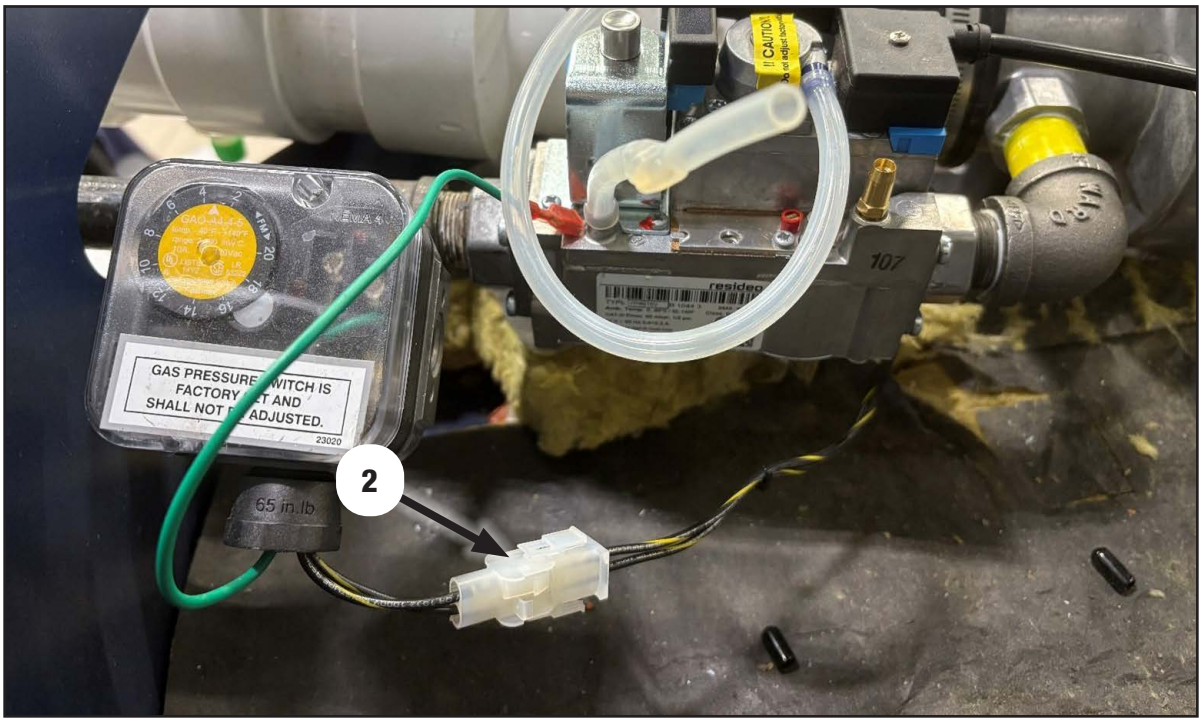


Fig. 28

Replacement

1. Install the new mounting flange bracket gasket.
2. Install the complete combustion assembly on top of the gasket. Line the holes up properly to the mounting flange.
3. Install and tighten the 6 bolts using a ½" socket.
4. If a complete combustion assembly was purchased, the flame sensor and HSI are packed in the kit with the flame sensor and HSI gaskets. Install the flame sensor and igniter with the gaskets if the full kit is purchased. If not, this step can be skipped if the complete combustion assembly already has the flame sensor and HSI installed.
5. Reconnect the following:

1	Gas valve reference hose
2	Gas pressure switch harness
3	Gas valve harness
4	PWM harness to the fan
5	Fan power harness

6	Hot surface igniter (HSI) harness
7	Flame sensor harness
8	Gas piping
9	Blower intake pipe assembly

6. Turn ON gas supply to the water heater and check for leaks. Repair any leaks that are found.
7. Turn ON power to water heater and confirm proper operation following the lighting instructions on the lighting instruction label or in the Installation and Operating Manual.
8. Replace the surround cover on top of water heater

Service Procedure 6:
Burner Tube Inspection and Replacement

⚠WARNING

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

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

Burner Tube Removal Procedure

1. Turn OFF power to the water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Disconnect the air intake from the blower by loosening the band clamp closest to the blower, ensuring the air intake pipes are properly supported (Fig 29).

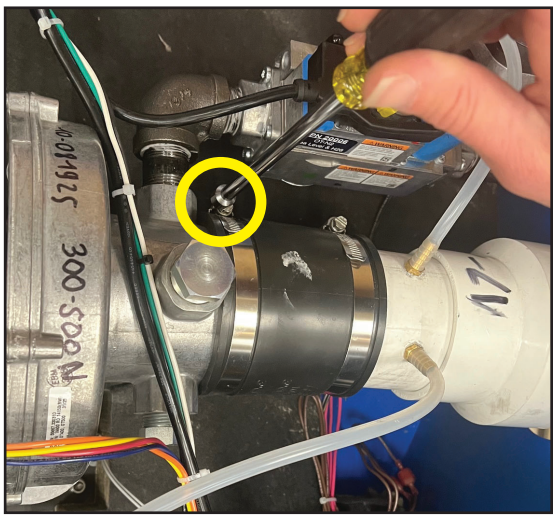


Fig. 29

5. Disconnect the wiring harnesses on the blower (Fig. 30) and connectors on the flame sensor and hot surface igniter (Fig. 31).

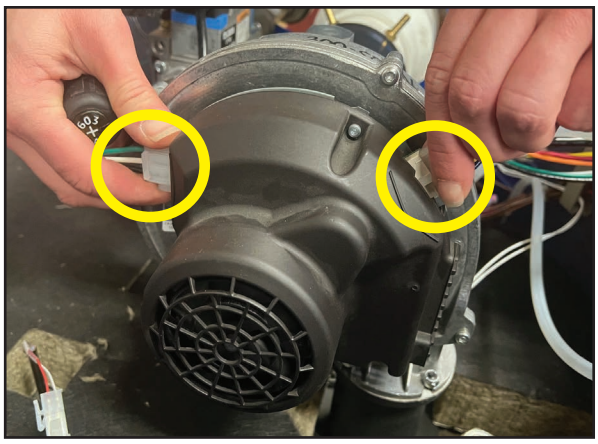


Fig. 30

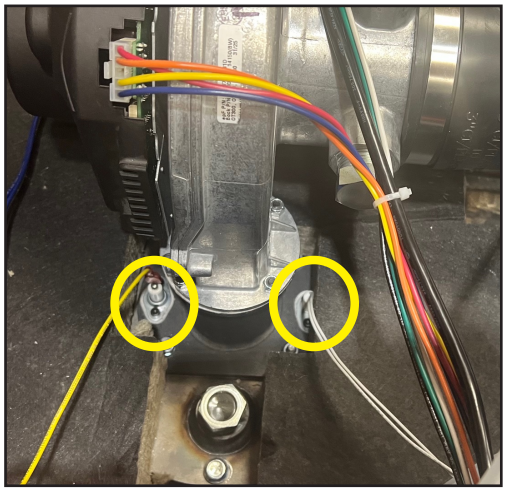


Fig. 31

6. Remove and retain fasteners from gas control flange closest to the blower (Fig. 32). Four additional fasteners are provided in case some are lost or damaged. Remove and retain the O-ring for reinstallation later, inspect for damage. Replace if necessary.

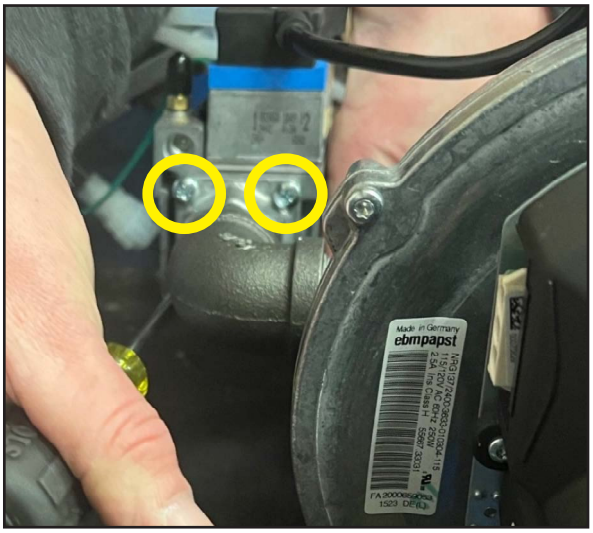


Fig. 32

7. Remove and retain the four nuts with washers from the bottom of the transition tube (Fig. 33). Four additional nuts and lock washers are provided in case some are lost or damaged.

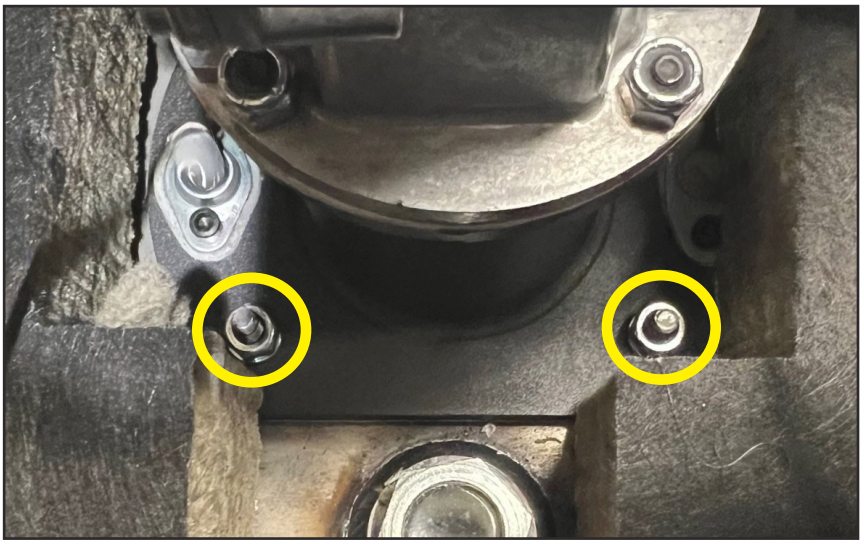


Fig. 33

8. Remove the blower assembly.

Fig. 34

9. Remove gasket on top of burner.
10. Remove burner.

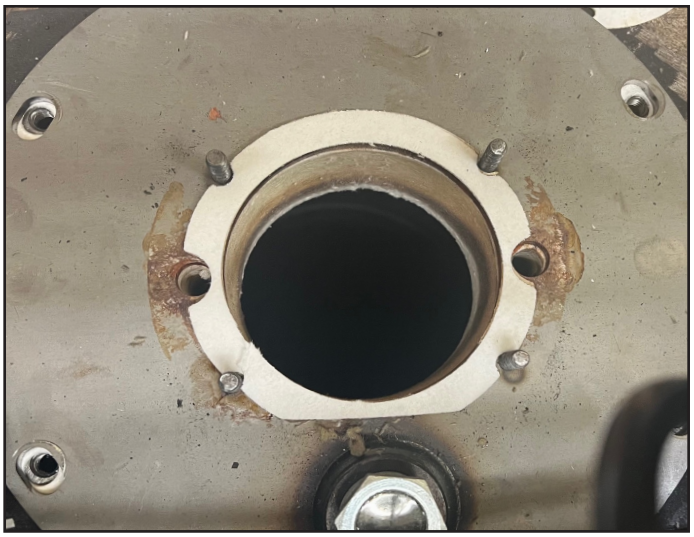


Fig. 35

11. Remove gasket below burner.
12. Clean the mating surfaces where the gasket seals.
13. Place new gasket on top of mounting flange.

Burner Tube Inspection

1. Inspect burner tube (metal fiber mesh burner) for the following:
   a. Outer fiber mesh should be uniform with no tears or deterioration.
   b. Gently squeeze burner tube; burner tube should feel firm without any soft areas around the sides or at the bottom.
   c. Visually inspect inside burner tube, burner tube should be intact with no areas of deterioration. Ports should be free of any debris.
2. Fully inspect burner flange gaskets, HSI and flame sensor gaskets for the following:
   a. Tears
   b. Missing material
   c. Cracks
   d. Dirt or debris
   e. Other imperfections that would inhibit proper seal
3. If burner tube is affected by any of the above, replacement is required. Refer to burner tube replacement procedure below.

Burner Tube Replacement Procedure

Note: Provide the model and serial number for the correct replacement burner.

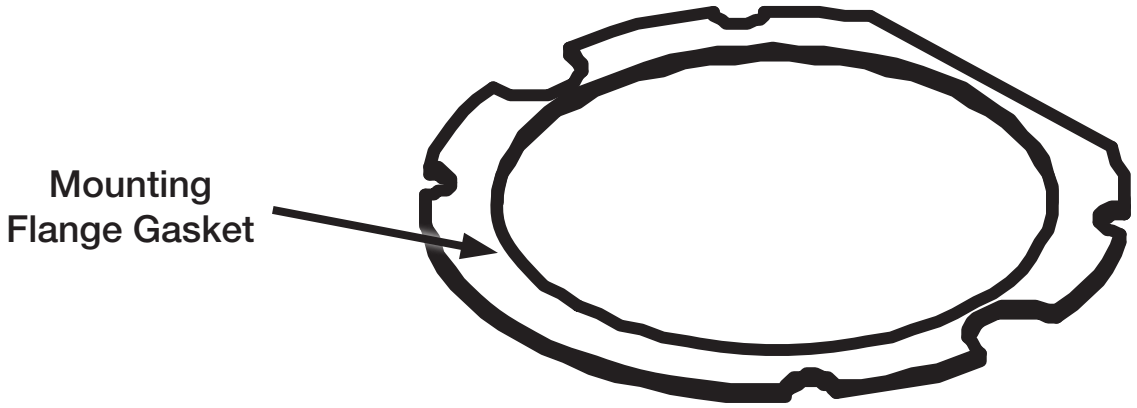


Fig. 36

1. Place new gasket on top of mounting flange.
2. Replace the burner, inserting it into the combustion chamber.

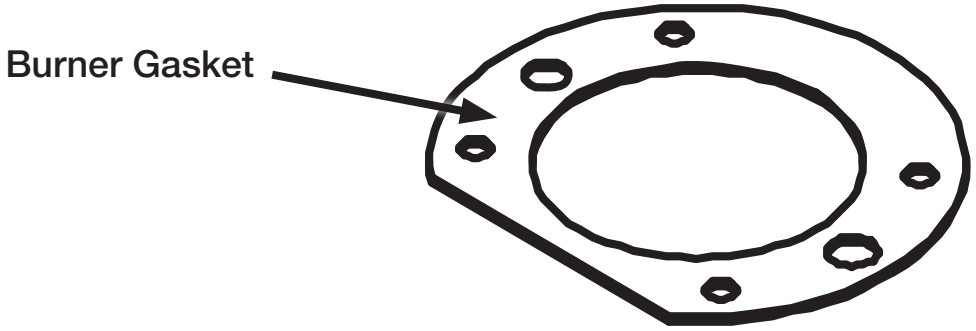


Fig. 37

3. Place new gasket on top of burner.
4. Place blower assembly, aligning the transition tube with bolts in mounting flange.
5. Reinstall washers and nuts on bottom of transition tube.
6. Install new O-ring on gas control flange and reinstall fasteners.
7. Reconnect the wiring harnesses on the blower and connectors on the flame sensor and hot surface igniter.
8. Reconnect the air intake to the blower by tightening the band clamp closest to the blower.
9. Place surround cover on the surround enclosure.
10. Turn ON gas supply to the water heater.
11. Turn ON power to water heater.

Service Procedure 7:
Gas Valve Replacement

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

Gas Valve Removal Procedure

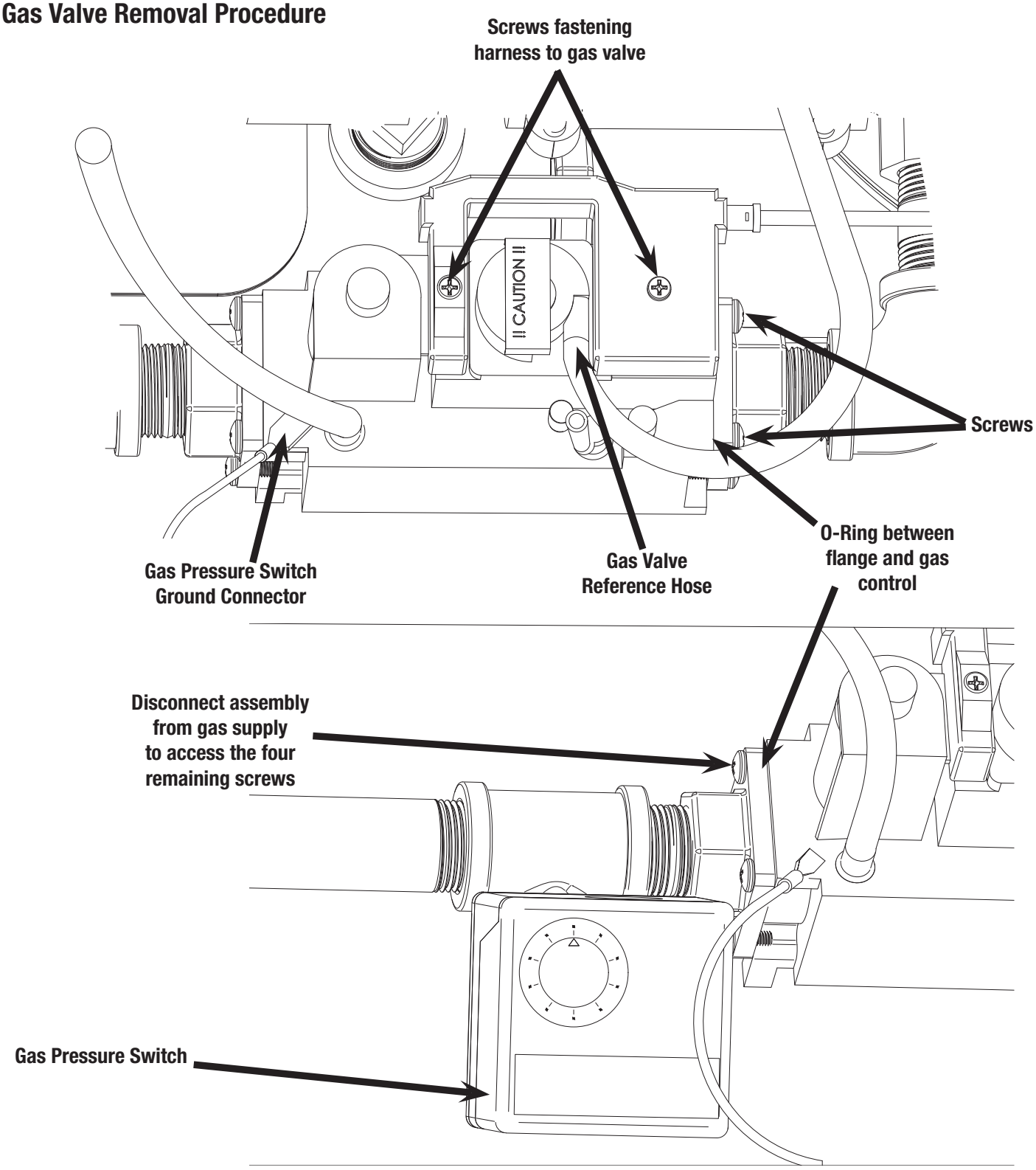


Fig. 38

⚠WARNING

Do NOT rotate gas pressure switch or gas valve during procedure.

1. Turn OFF power to the water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Remove the gas valve reference hose to the air intake.
5. Disconnect the gas pressure switch ground and 2-wire harness connector.
6. Remove the gas valve harness.
7. Remove 4 screws on the side of the gas valve closest to the blower to remove the flange. Save the screws, flange and o-rings for re-installation.
8. Disconnect the gas valve/pressure switch assembly from the gas supply line to access the remaining four screws on the side of the gas valve closest to the gas pressure switch. Take the gas valve/pressure switch assembly out of the surround enclosure.
9. Remove 4 screws on the side of the gas valve closest to the pressure switch. Save the screws, flange and o-rings for re-installation. Slide the gas valve out of position. Make sure the o-rings stay in place properly on the fittings.

Gas Valve Installation Procedure

1. Attach the gas valve to the pipe assembly containing the gas pressure switch using the screws retained from earlier. **Ensure the O-rings are in place and sit properly.**
2. Connect the assembly to the gas supply line.
3. Install the four remaining screws on the side of the gas valve nearest to the blower using the screws retained from earlier. **Ensure the O-rings are in place and sit properly**.
4. Attach the gas valve harness
5. Attach the gas valve reference hose to the intake.
6. Attach the gas pressure switch ground and 2-wire harness connector.
7. Turn ON gas supply to the water heater and check for leaks. Repair any leaks that are found.
8. Turn ON power to water heater and confirm proper operation.
9. Replace the surround cover on top of surround enclosure.

Service Procedure 8:
Blower Testing and Replacement

Does blower energize? Ensure digital display shows “Hot Water Demand.” Raise temperature setpoint if necessary. “B” should appear in the upper left-hand corner of the display.

Y → Is the normally open vent pressure switch or the normally open intake vent switch closed?

N → Correct exhaust pressure switch or intake pressure switch problems. See **Pg 52.**

N → Is there 120V between the white and black wires on the 3 wire connector located on the fan (Fig. 39)?

Y → Replace blower (see Blower Replacement Procedure, **pg 49).**

N → Refer to ignition control board illustration below. Is there 120V between the black and white wires at location J2 (Fig. 40)?

N → Is there 120V between the black and white wires at the incoming power harness connection?

N → Determine power source problem and correct.

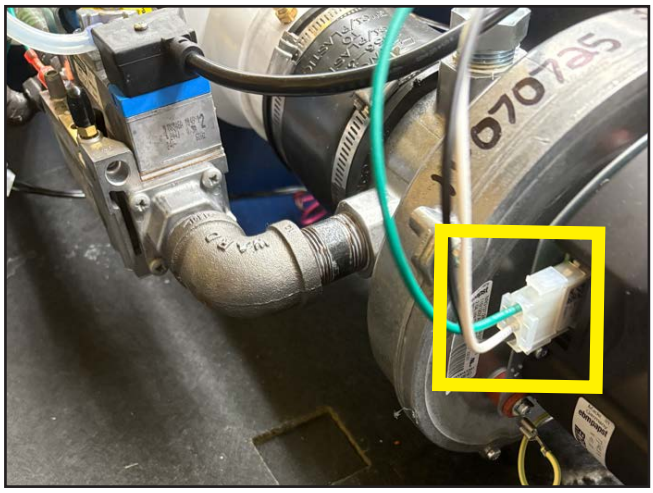


Fig. 39

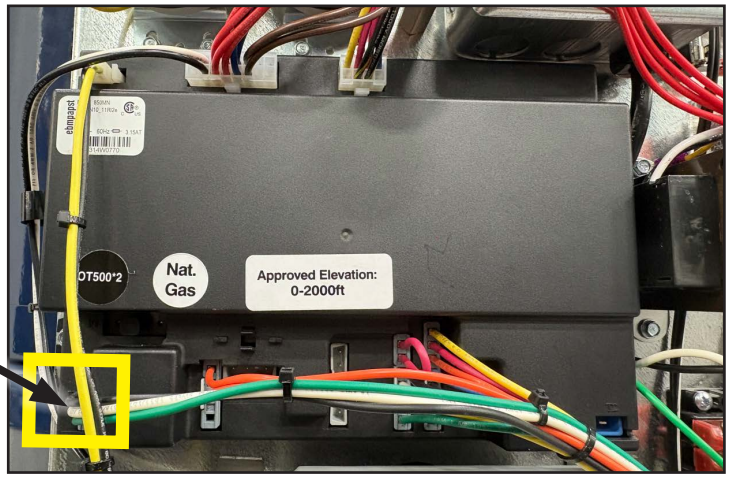


Fig. 40

Blower Replacement Procedure

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.

Blower Removal

1. Turn OFF power to the water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Disconnect the air intake from the blower by loosening the band clamp closest to the blower, ensuring the air intake pipes are properly supported (Fig. 41).

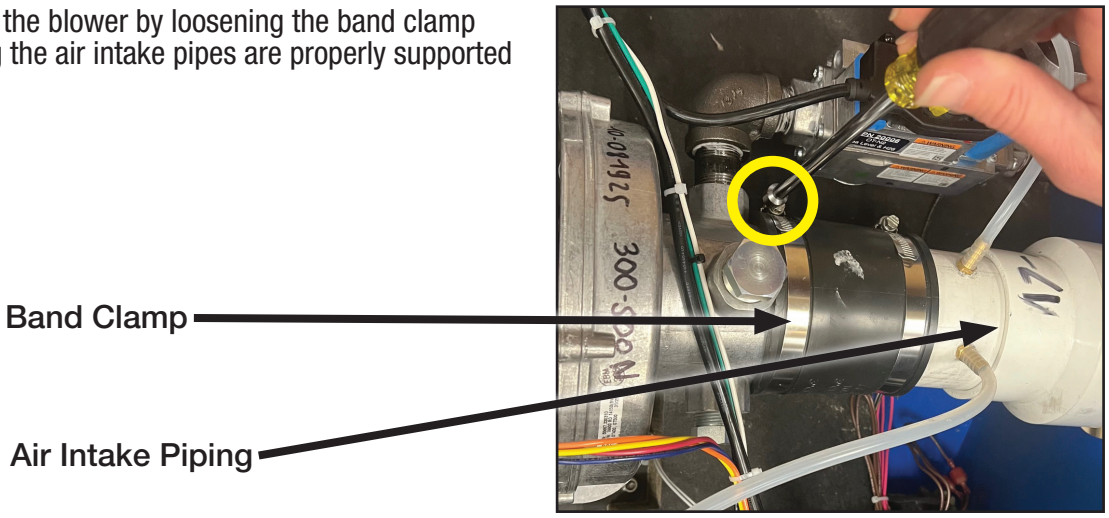


Fig. 41

5. Disconnect the wire harnesses on the blower and connectors on the flame sensor and hot surface igniter (Fig. 42).

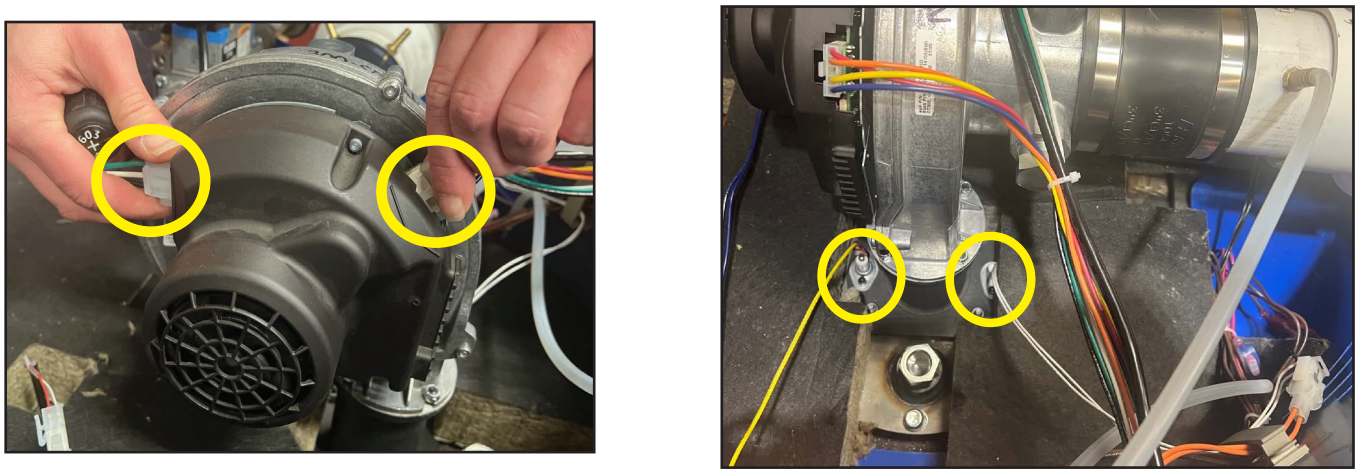


Fig. 42

6. Remove and retain flame sensor fasteners.
7. Remove and retain flame sensor.
8. Remove flame sensor gasket and clean the mating surfaces where the gasket will go in order to ensure a proper seal.
9. Remove and retain hot surface igniter fasteners.
10. Remove and retain hot surface igniter.
11. Remove hot surface igniter gasket and clean the mating surfaces where the gasket will go in order to ensure a proper seal (Fig. 43).

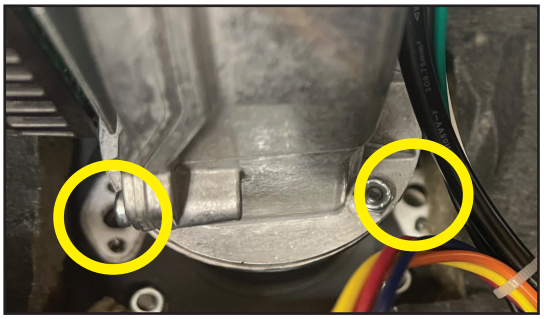
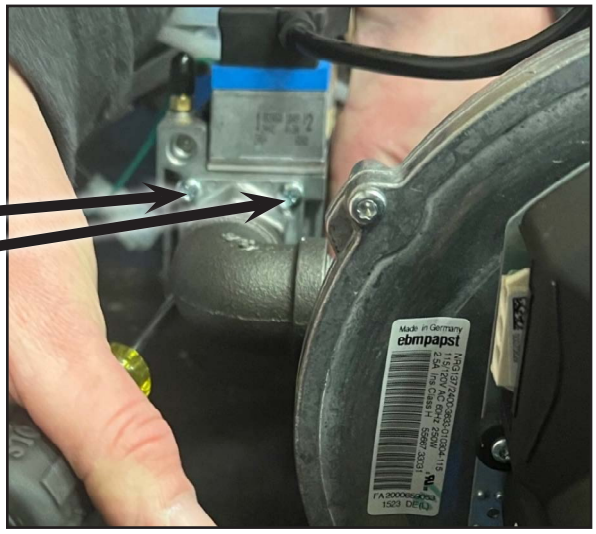


Fig. 43

IMPORTANT

Do NOT touch the surface of the hot surface igniter. Oils on the skin can impair the performance and damage the igniter.



12. Remove and retain fasteners from gas control flange closest to the blower (Fig. 44). Four additional fasteners are provided in case some are lost or damaged.

Fig. 44

13. Remove and retain the four nuts with lock washers from the base of the transition tube with a 7/16” socket (Fig. 45).

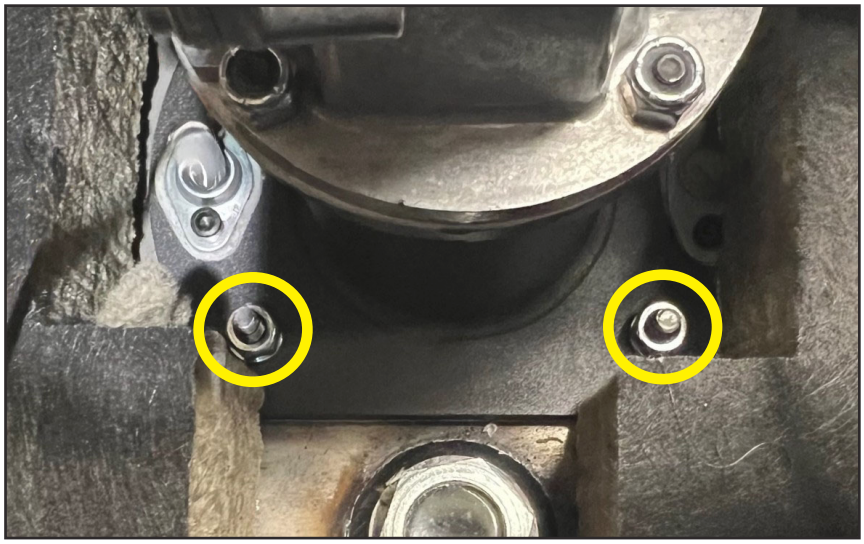


Fig. 45

14. Remove the existing blower assembly.
15. Remove gasket located at the base of the transition tube, on top of the burner.
16. Clean the mating surfaces where the gasket will go in order to ensure a proper seal.

Blower Replacement

1. Place new gasket on top of the burner.

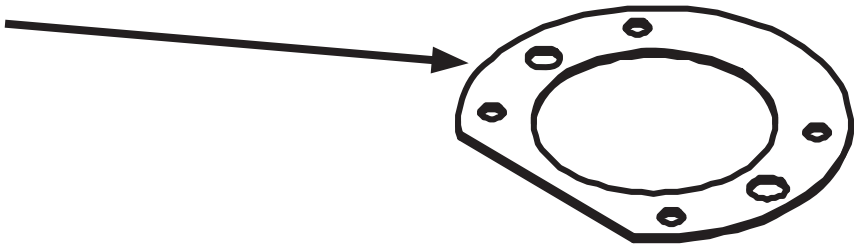


Fig. 46

2. Place new blower assembly, aligning the transition tube with bolts in mounting flange.
3. Reinstall lock washers and nuts on the base of transition tube.
4. Install a new O-ring on the flange to the gas control before reassembly. Reinstall fasteners on gas control flange once the new O-ring is in place.
5. Place new gasket for flame sensor.

Fig. 47

6. Reinstall flame sensor using retained fasteners.
7. Place new gasket for hot surface igniter.

Fig. 48

IMPORTANT

Do NOT touch the surface of the hot surface igniter. Oils on the skin can impair the performance and damage the igniter.

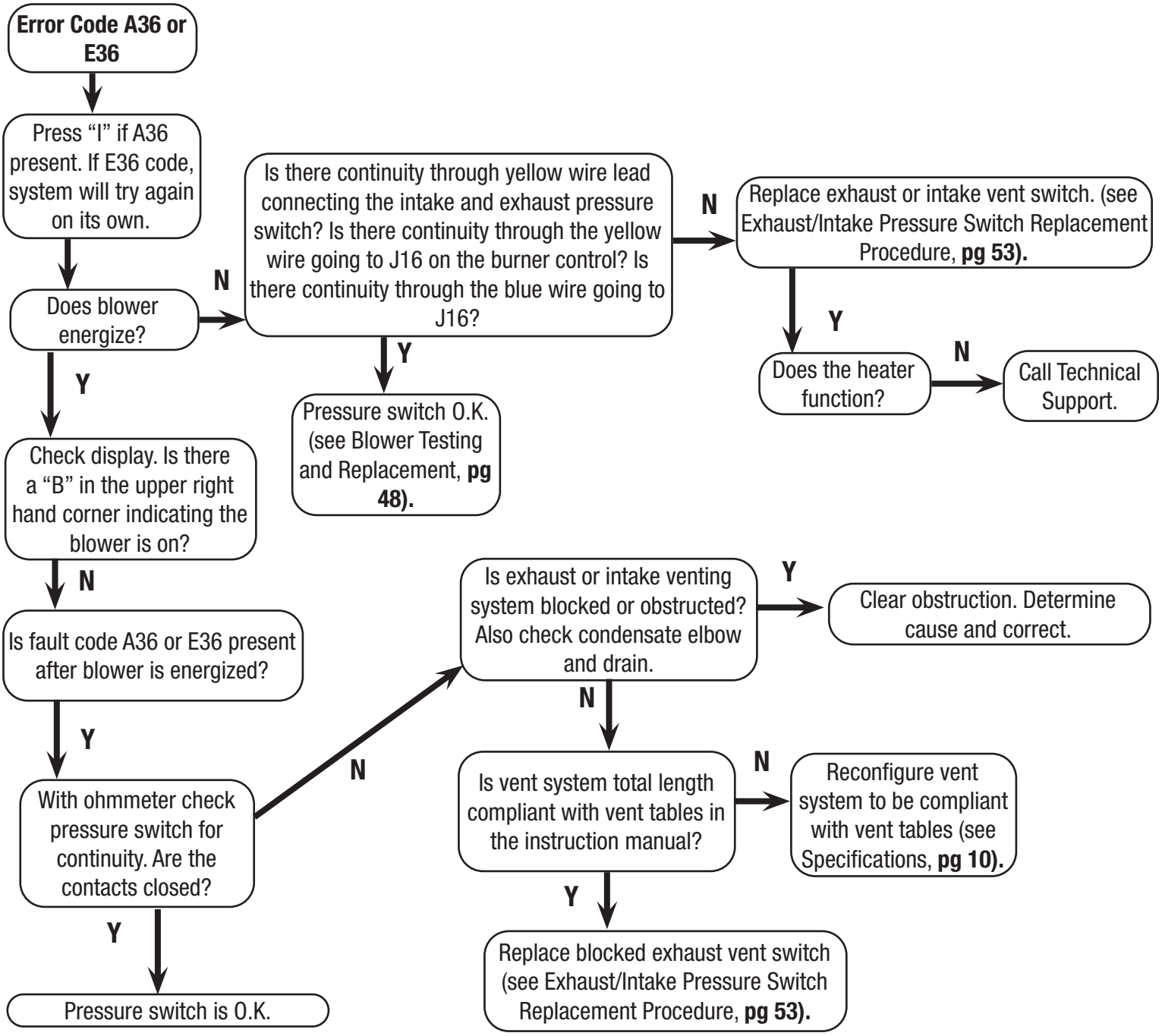
8. Reinstall hot surface igniter using retained fasteners.
9. Reconnect connectors on the flame sensor and hot surface igniter.
10. Reconnect the wiring harnesses on the blower.
11. Reconnect the air intake to the blower by tightening the band clamp closest to the blower.
12. Place surround cover on the surround enclosure.
13. Turn ON gas supply to the water heater.
14. Turn ON power to water heater.

Service Procedure 9:
Blocked Vent and Intake Pressure Switch Testing and Replacement

The blocked vent pressure switch monitors the pressure in the exhaust vent. The intake pressure switch monitors the pressure in the combustion air intake. Both switch contacts are normally closed and will not open unless there is a blockage in the exhaust or intake venting or terminal (snow, ice, debris). If the blocked vent or intake pressure switch contacts open while the burner is in operation, the unit will stop operating. The unit may attempt to cycle and check the safety circuit; however, the unit will not operate until the safety circuit is closed. The display may show error code A36 or E36.

⚠WARNING

120 volt potential exposure. Use caution when making voltage checks to avoid personal injury.



Exhaust/Intake Pressure Switch Replacement Procedure

1. Turn OFF power to water heater.
2. Remove and retain fastener knobs securing the control enclosure cover.
3. Pull forward to remove control enclosure cover.
4. Locate exhaust and/or intake pressure switch on the control panel (Fig. 49).

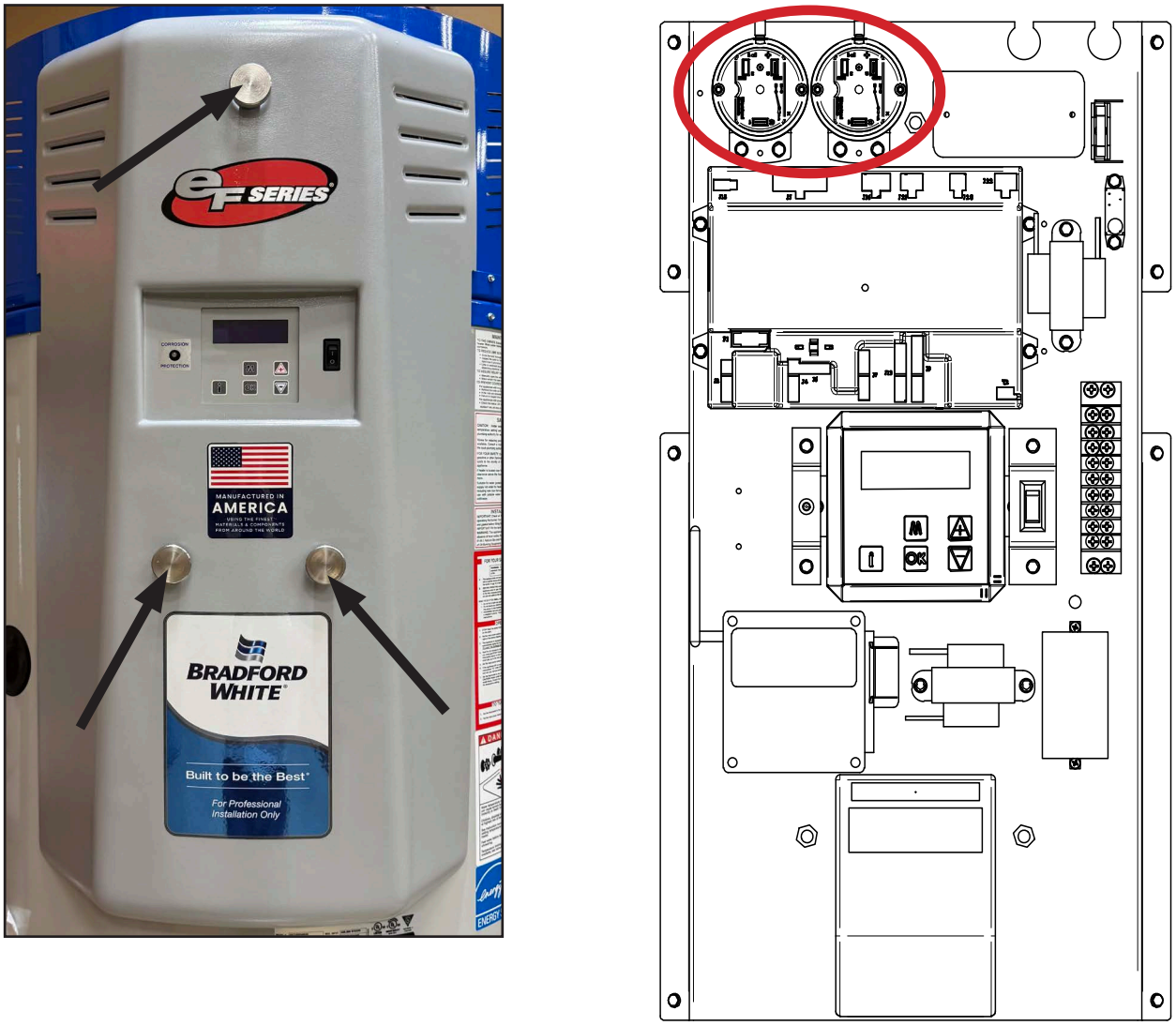


Fig. 49

2. Disconnect tubing from top of intake/exhaust pressure switch (Fig. 50).
3. Disconnect wire terminals.
4. Remove and retain fasteners.
5. Remove and replace the pressure switch.

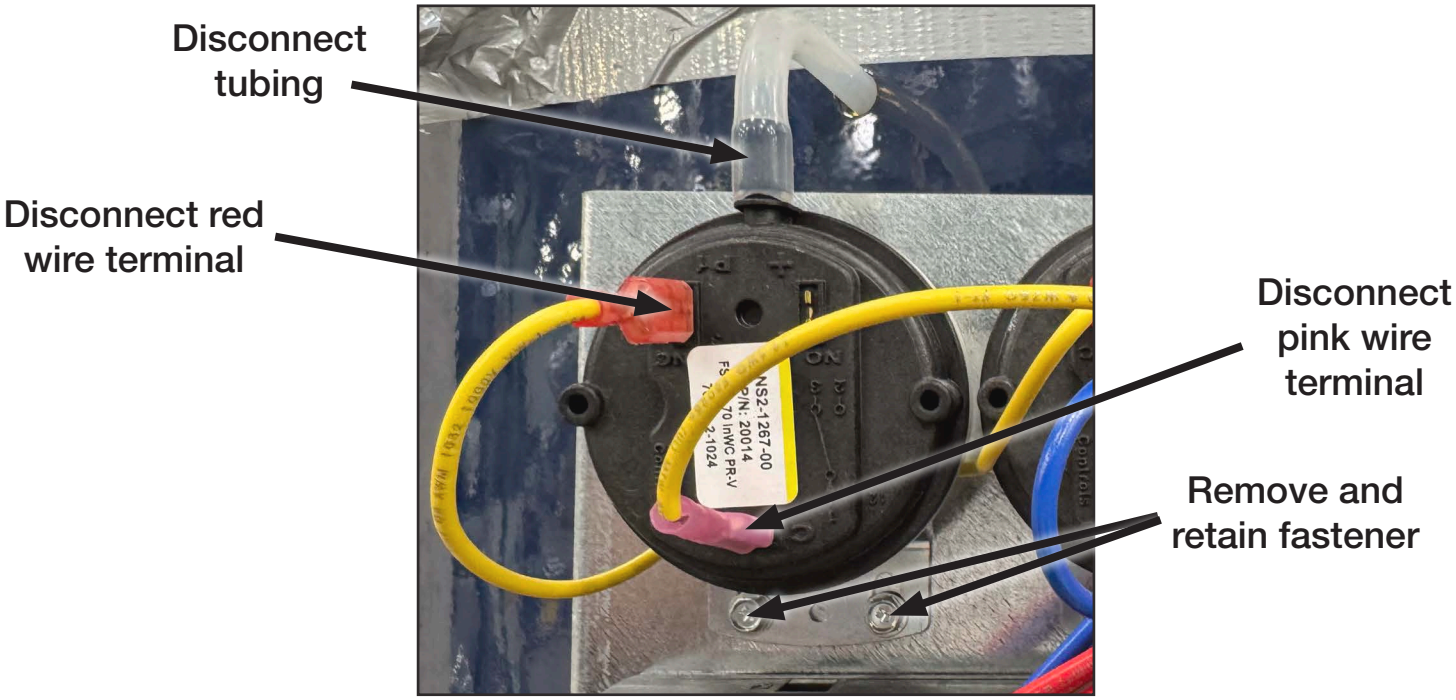


Fig. 50

6. Install retained fasteners on new pressure switch.
7. Connect tubing.
8. Connect wire terminals.
9. Replace control enclosure cover and fastener knobs.
10. Power ON water heater.

Service Procedure 10:
Flame Sensor Inspection Procedure

If an A01 lockout error code is present there has been a problem with lighting the burner. Two possible causes for this error are a dirty or faulty flame sensor or a faulty igniter. Each component can be checked for proper operation.

- If burner ignites but goes out right away, check the flame sensor.
- Start by turning off power to the water heater and remove the flame sensor.
- Inspect the ceramic insulator for cracks (replace if cracked).
- Clean the flame sensor with fine steel wool and reinstall.
- Turn on power to the water heater and enter the Installer Menu on the control display (see next subsection for instructions). Arrow down until the third screen that displays the flame signal.
- During the next ignition attempt, a flame signal (in microamps, "µA") will be displayed. Under normal operation, the flame signal will be between 2 - 5 µA during a successful ignition period.
  - As the fan speed increases the flame signal will become stronger and eventually be in the 5 - 7 µA range.
  - A minimum flame signal of 1.25 µA is required to avoid a flame failure. If the flame signal is 0 µA when a flame is present during the ignition period, the flame sensor needs to be replaced.

Flame Sensor Replacement Procedure

⚠WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

1. Turn OFF power to water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Locate the flame sensor next to the blower.

NOTE: Ensure the flame sensor is removed, NOT the hot surface igniter.

5. Remove the connector leading to the control from the flame sensor.
6. Remove fasteners.
7. Remove existing flame sensor and gasket.
8. Clean mating surfaces where gasket will go in order to ensure a proper seal.
9. Place new gasket.
10. Insert new flame sensor.
11. Install fasteners.
12. Re-install the connector leading to the control.
13. Place surround cover on the surround enclosure.
14. Turn ON gas supply to the water heater.
15. Turn ON power to water heater.

Fig. 51

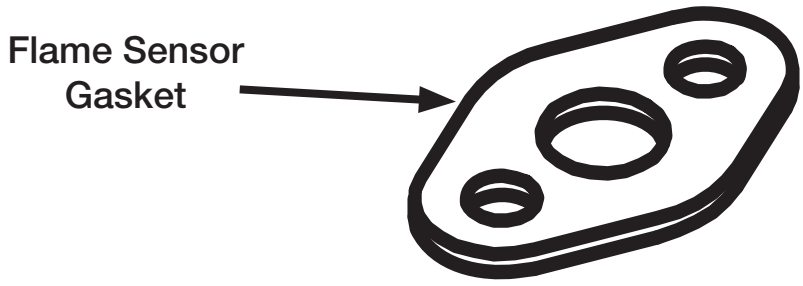


Fig. 52

Service Procedure 11:
Hot Surface Igniter (HSI) Inspection and Replacement

⚠ WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

Hot Surface Igniter Inspection

If an A01 lockout error code is present there has been a problem with lighting the burner. Two possible causes for this error are a dirty or faulty flame sensor or a faulty hot surface igniter. Each component can be checked for proper operation.

- Check the HSI with visual inspection through the burner assembly sight glass. Before the gas valve opens in the ignition sequence, the igniter will warm-up for 8 seconds. During this time, an orange glow will be visible through the sight glass.
- HSI resistance may also be measured at the end of the igniter wiring terminal. Disconnect the HSI terminal, where the 2 white wires connect to the 2 oranges wires going to the control. Check resistance at the wire terminal of the HSI. (2 white wires)
  - At normal room temperature, the igniter resistance will be approximately 38 ohms. After a heating cycle, the resistance will be in the range of 38 - 80 ohms (depending on when the measurement is taken after the cycle). If outside of this range, replace the sensor.
  - Besides resistance, the continuity of the igniter circuit can be checked. With the multimeter probes still in the terminal, switch the meter to check for continuity. If continuity is not indicated, the igniter must be replaced.

Hot Surface Igniter Replacement Procedure

1. Turn OFF power to water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Locate the hot surface igniter next to the blower.

NOTE: Ensure the hot surface igniter is removed, NOT the flame sensor. The igniter has two white wire leads.

6. Remove fastener.
7. Remove existing hot surface igniter and gasket.
8. Clean mating surfaces where gasket will go in order to ensure a proper seal.
9. Place new gasket.
10. Insert new hot surface igniter.
11. Install fasteners.
12. Place surround cover on the surround enclosure.
13. Turn ON gas supply to the water heater.
14. Turn ON power to water heater.

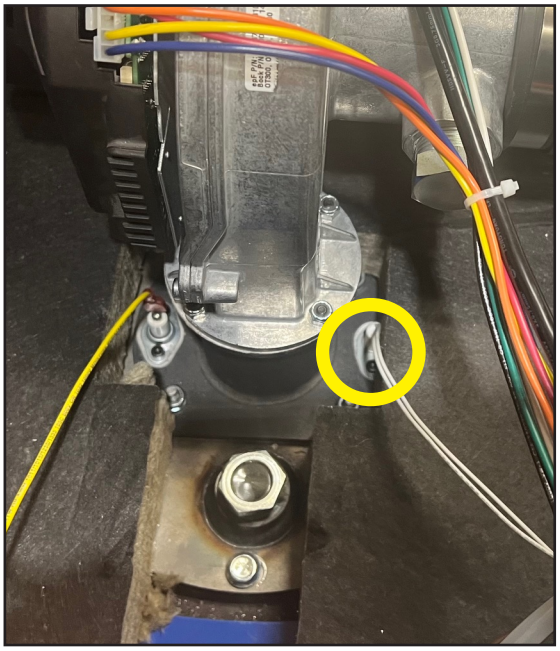


Fig. 53

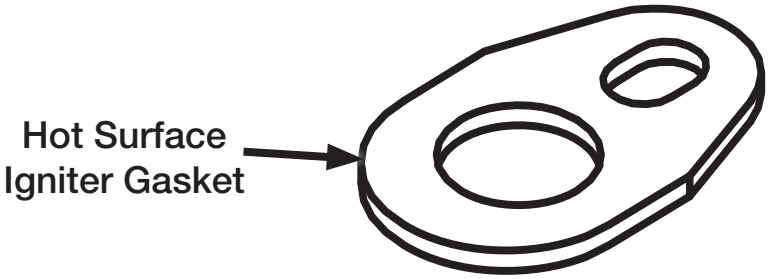


Fig. 54

Service Procedure 12:
Transformer Replacement Procedure

⚠WARNING

120 volt potential exposure. Use caution making voltage checks to avoid personal injury.

1. Turn OFF power to water heater.
2. Remove and retain fastener knobs securing the control enclosure cover.
3. Pull forward to remove control enclosure cover.
4. Locate transformer on the control panel (Fig. 55).

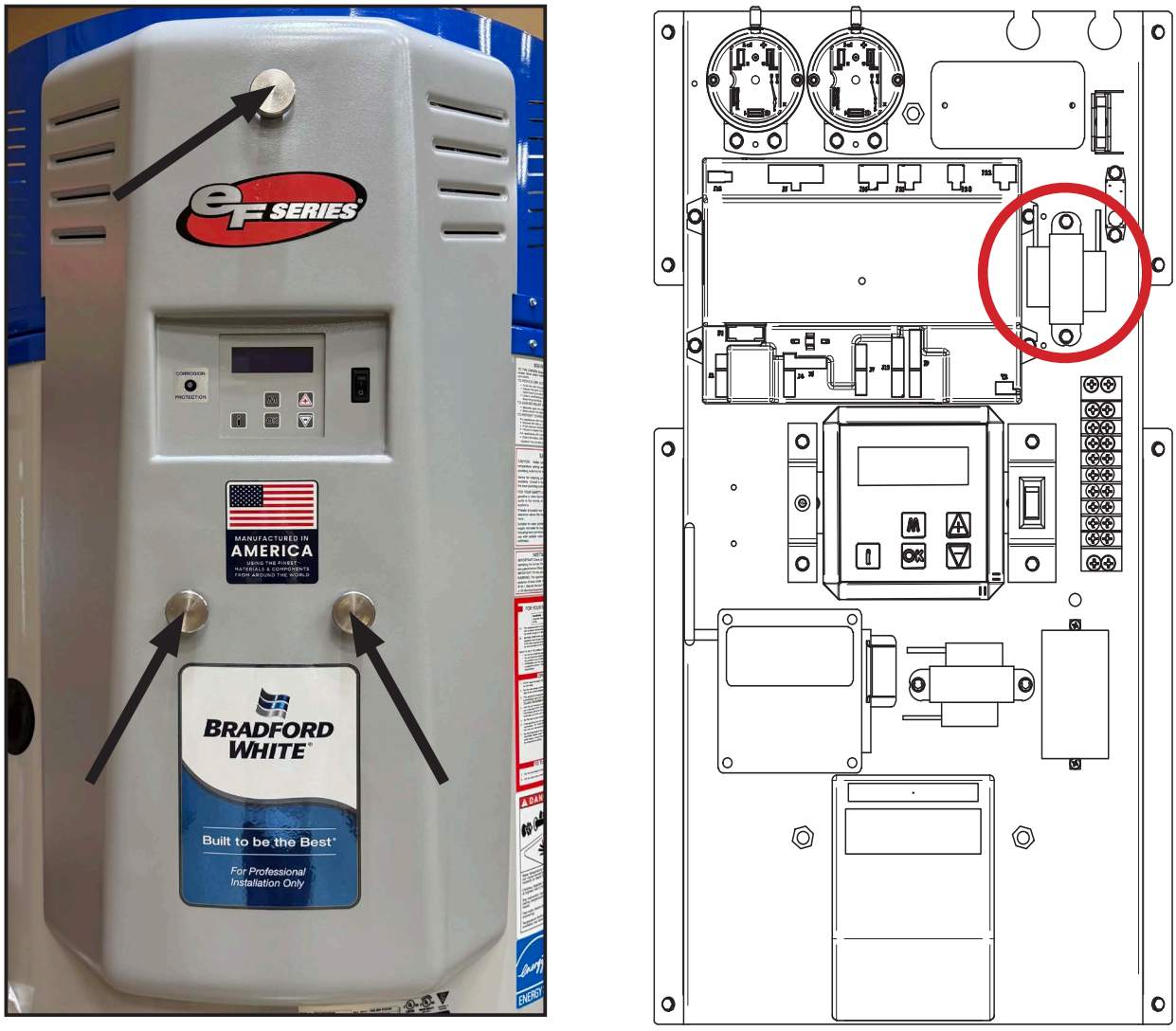


Fig. 55

5. There are (4) wire terminals connected to the transformer (Fig. 56), Black, White, Blue, and Yellow. Take a picture prior to disconnecting for future.
6. Remove and retain fasteners.

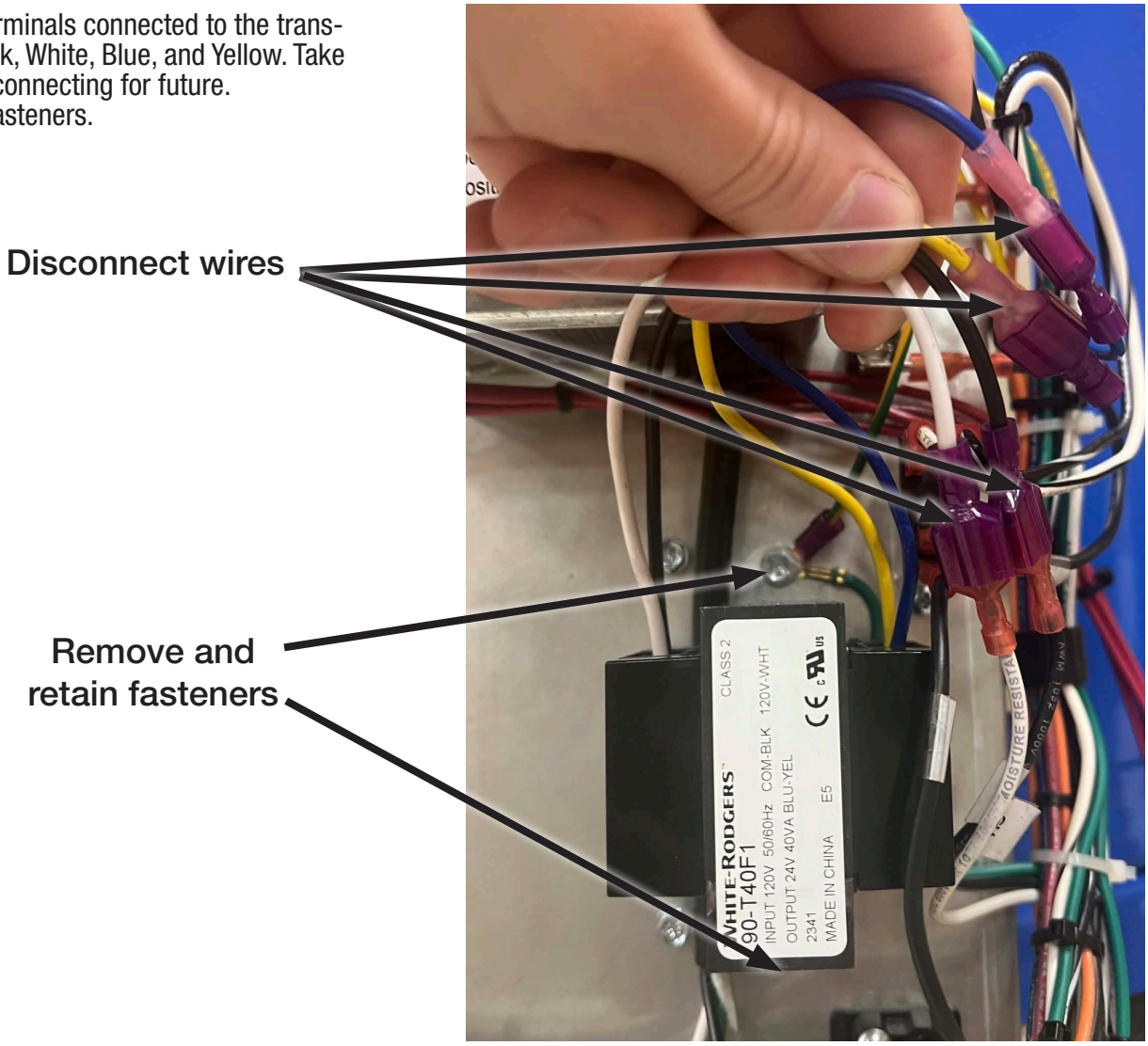


Fig. 56

7. Connect wiring terminals to new transformer.
8. Install retained fasteners.
9. Power ON water heater. Test for proper operation.
10. Replace control enclosure cover and fastener knobs.

Service Procedure 13:
Combustion Chamber Servicing Procedure

⚠WARNING	⚠WARNING
Heater components may be **HOT** when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.	120 volt potential exposure. Make sure power is OFF when servicing and use caution when making voltage checks to avoid personal injury.

Removal of the Chamber Cover

1. Turn OFF power to the water heater.
2. Turn OFF gas supply to the water heater.
3. Lift and remove the surround cover off the surround enclosure.
4. Remove and retain the insulation.
5. Locate the combustion chamber cover behind the blower/burner assembly.
6. Remove and retain the nuts and washers securing the cover to the combustion chamber.
7. Using a crowbar, carefully pry the cover off of the combustion chamber. Be careful NOT to damage any surrounding parts such as the blower and gas valve (Fig. 57).

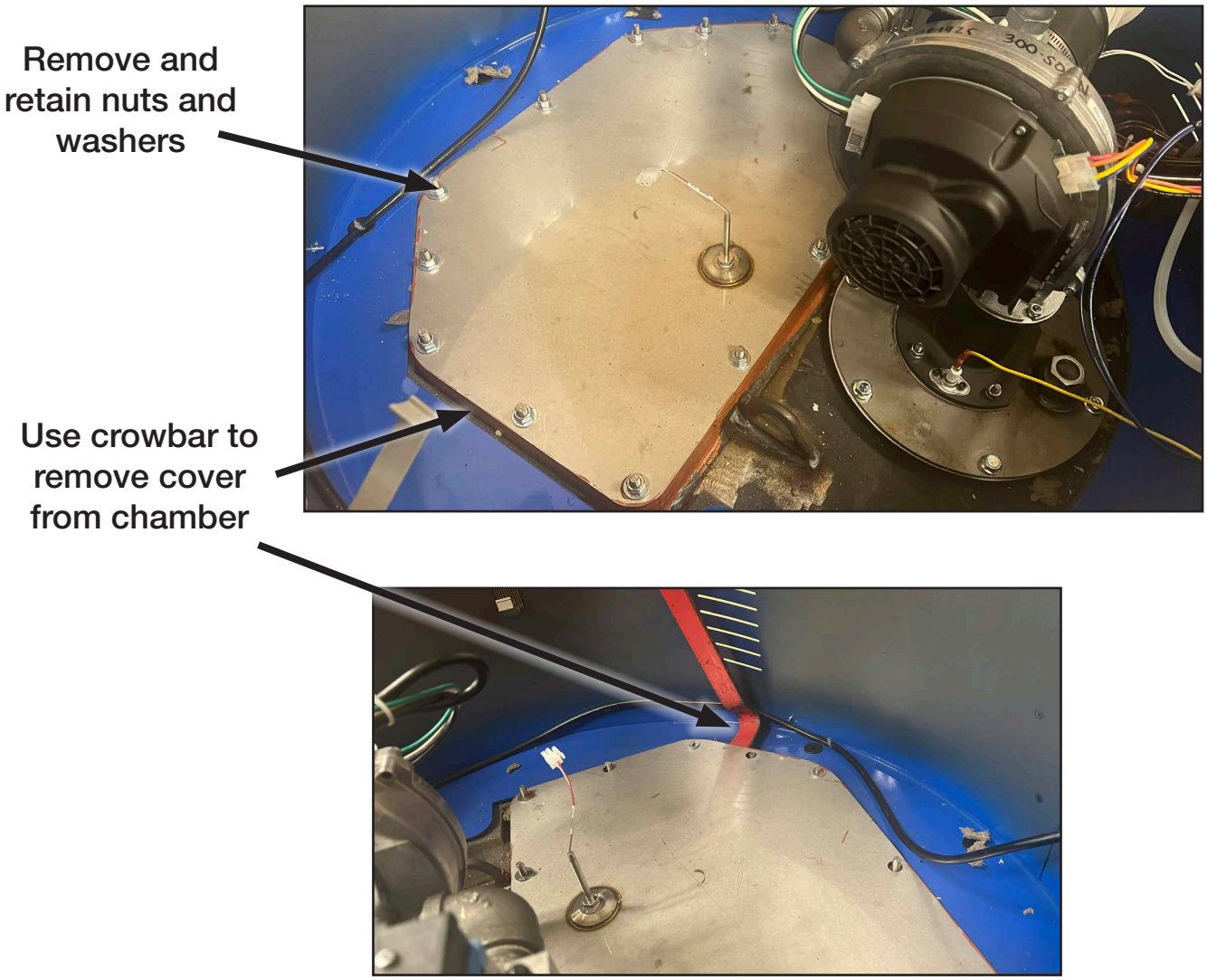


Fig. 57

Inspecting and Cleaning the Baffles

1. Lift and remove the baffles, inspecting and cleaning as needed (Fig. 58).
2. Replace the baffles, making sure they are properly hung on the edge of the flues.

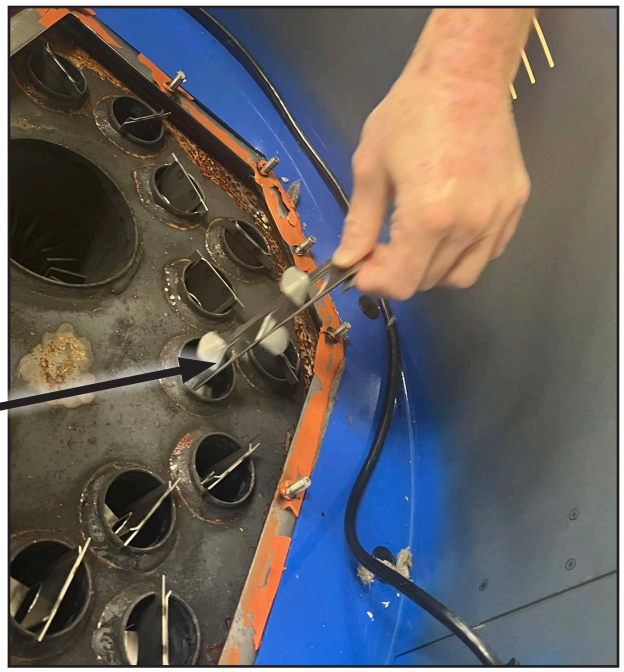


Fig. 58

Replacing the Chamber Cover

1. Scrape off the existing high temperature sealant from the edge of the chamber (Fig. 59).

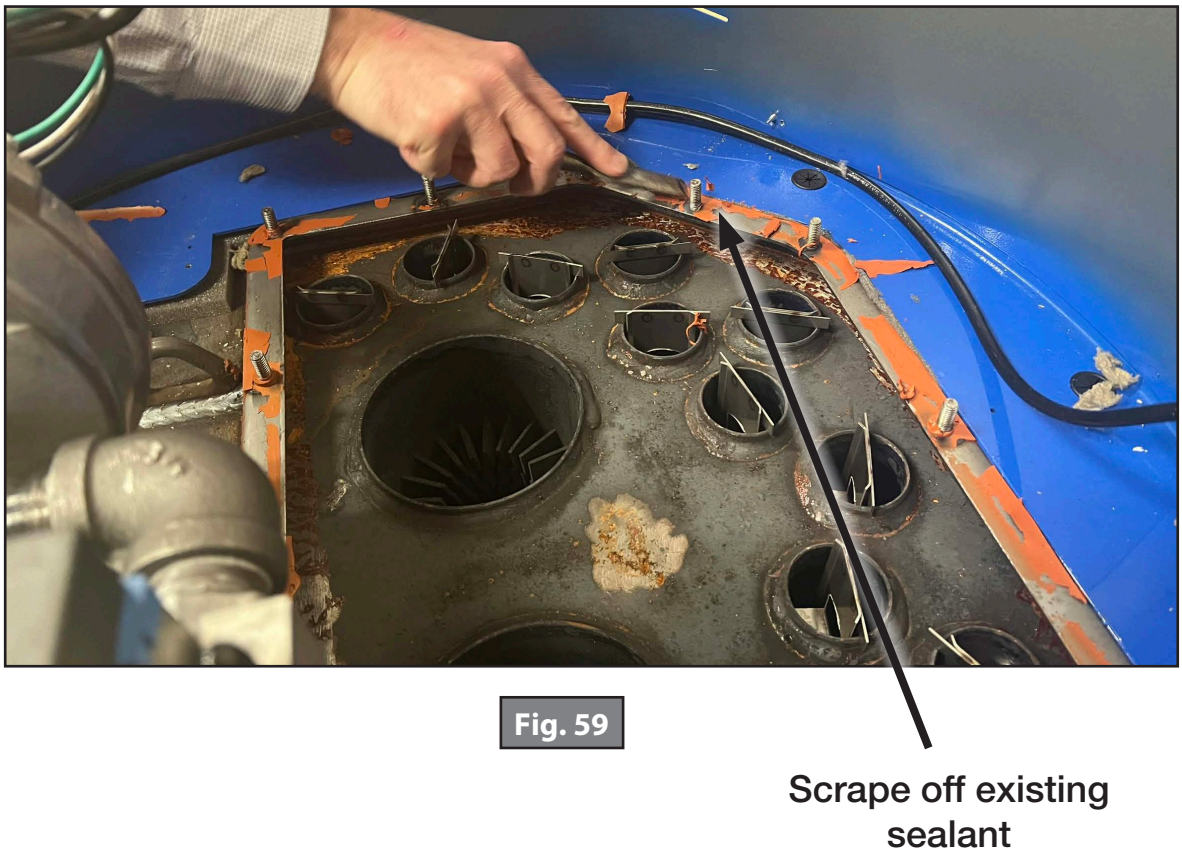


Fig. 59

2. With the edge of the chamber clean, place a thick bead of copper high temperature silicone caulk along the edge of the chamber (Fig. 60).

⚠WARNING

ONLY use a high temperature sealant to seal the chamber. Using the wrong sealant can lead to dangerous combustion gas leaking into the room. This can result in death, serious bodily injury, and/or damage to the water heater and personal property.

Apply high temperature sealant

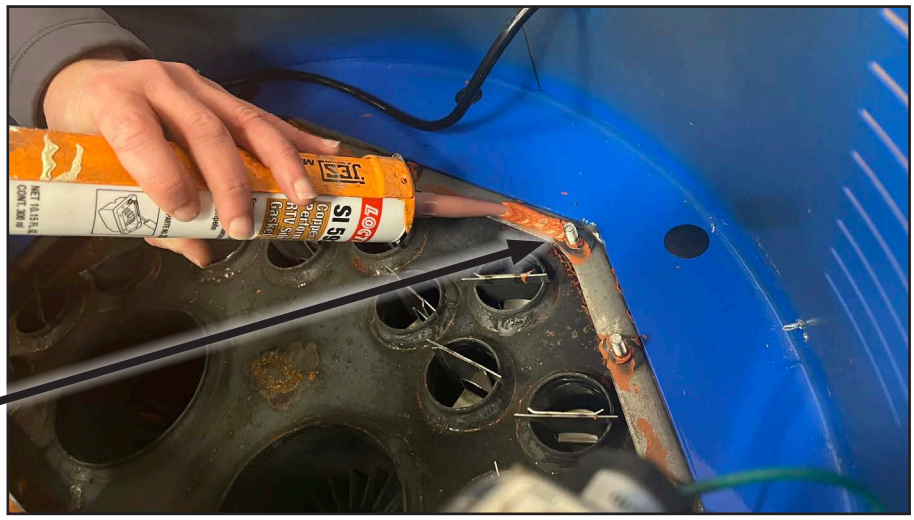


Fig. 60

3. Replace the cover to the chamber and re-install the nuts and washers that were previously removed (Fig. 61).
4. Tighten the nuts in a star pattern around the cover, making sure force is evenly applied.

Fig. 61 Reinstall nuts and washers

Service Procedure 14:
Power Anode Inspection and Replacement

Powered Anode Replacement

If the status LED is off or flashing red, a problem has occurred and service is required. When the LED is a constant green, the system is operating properly. **NOTICE:** The tank must be filled with water prior to connecting the water heater to the power supply. The powered anode system will only work properly if the tank is filled with water.

LED status	Problem	Solution
OFF	The water heater is not connected to the main power supply.	Ensure that the water heater is plugged in.
Flashing Red	Error occurred during start-up.	Reset power to the anode power supply by resetting the mains power supply to the water heater.
	The tank is not filled with water.	Disconnect water heater from mains supply and fill tank with water.
	Poor electrical connection between anode power supply and anode rod.	Check the insulation on all connecting harnesses for bare spots. Check the connections at the power supply and anode terminals.
	Defective seal in adode bushing; anode rod is no longer insulated from tank.	With an ohmmeter, check for electrical continuity between the powered anode terminal and the bushing. If there is continuity, replace the anode rod.

Fig. 62

⚠WARNING

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

Powered Anode Replacement

1. Turn OFF power to the water heater.
2. Drain water from the tank until water level is below the anode that is being replaced.
3. Locate the anode covering cap and remove it by carefully inserting a flat tool behind the cap, moving it around the edge and pulling forward.

NOTE: Ensure the powered anode is being replaced with the correct size anode. See Fig. 64 for the anode sizing and location.

Fig. 63

Anode covering caps

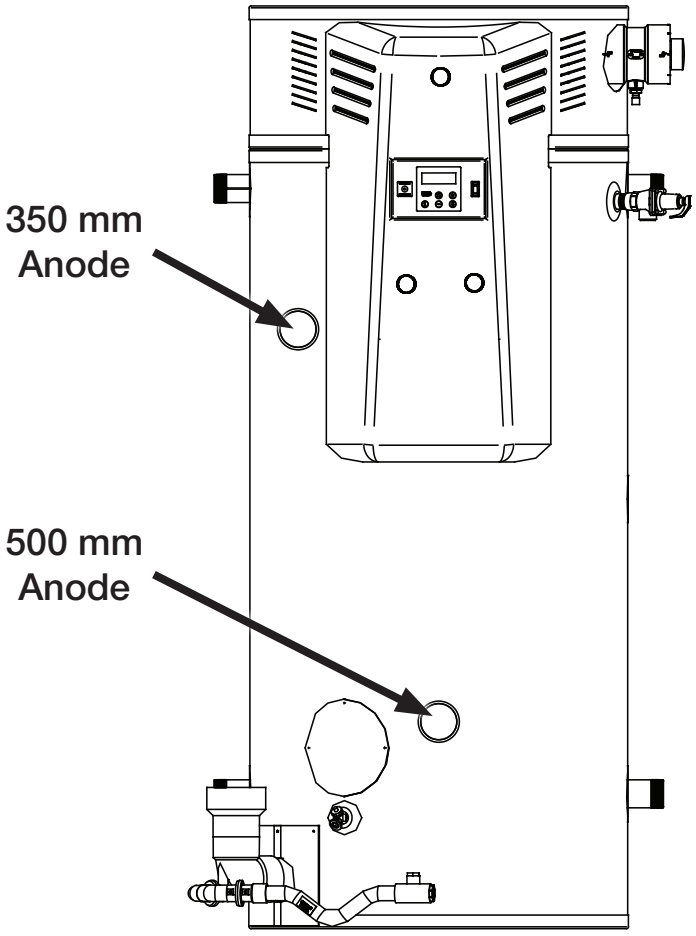


Fig. 64

4. Disconnect the wire terminal (Fig. 65).

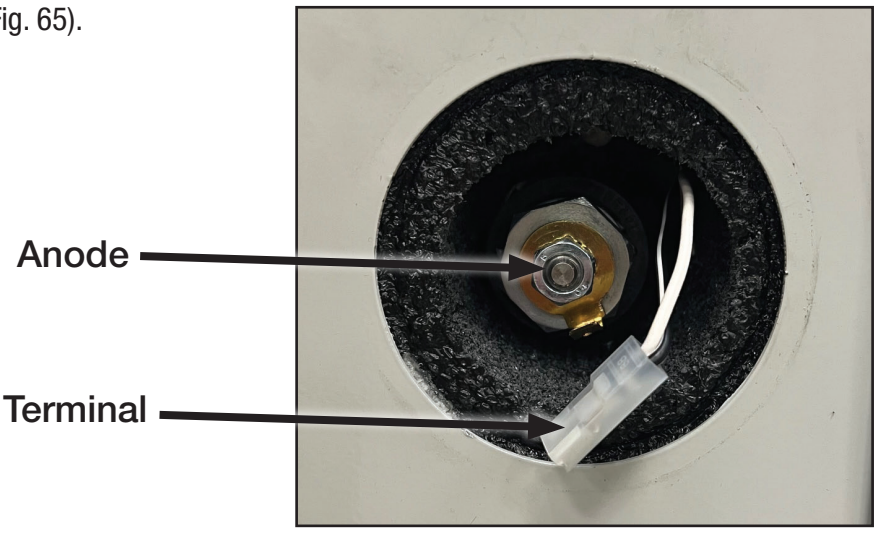


Fig. 65

5. Remove the existing anode with a 1 1/16” deep socket (Fig. 66).

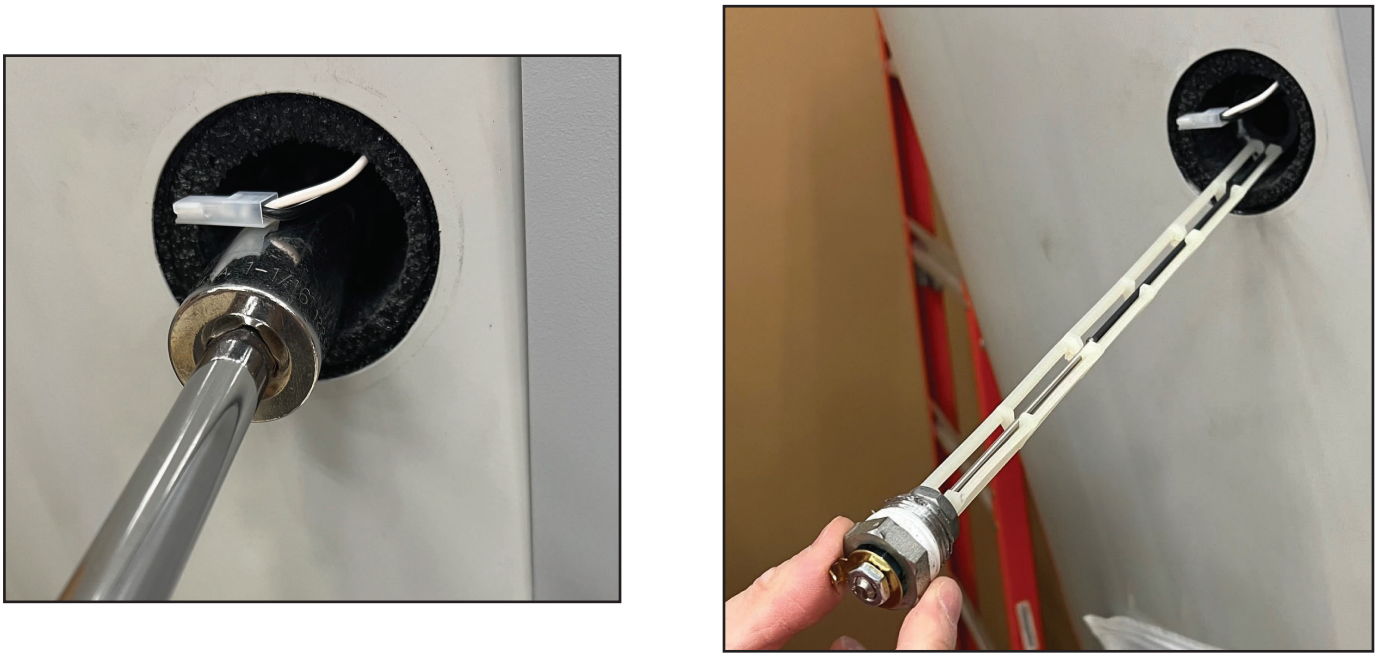
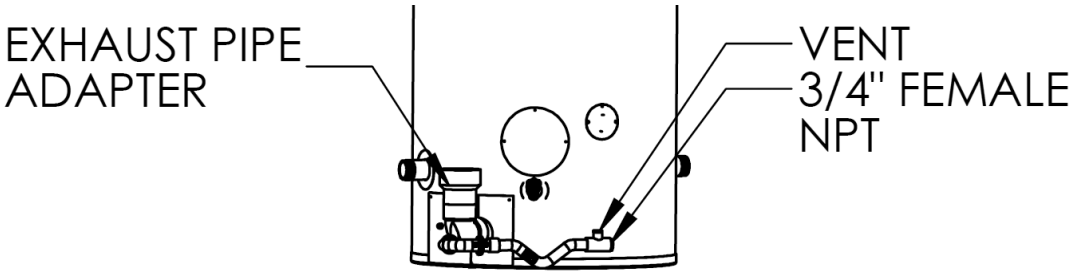


Fig. 66

6. Seal the threads of the new anode using an appropriate thread sealant and install.
7. Connect the wire terminal to the new anode.
8. Refill the tank of the water heater. Verify that there are no leaks.
9. Install the covering cap.
10. Power ON the water heater.
11. Ensure functionality of the water heater.

Water Heater Installation Checklist

Product Handling	Carefully uncrate the heater. Move in place with a hand truck (**DO NOT** use the venting pipes as handles).
Electrical Requirements	Make sure the line voltage is 120volts, properly polarized and adequately grounded.
Venting Requirements	All venting must stay within the required lengths and diameter (see table below). Proper support of the venting pipe is required (every 5 ft. vertical and 3 ft. horizontal). Termination must be located to prevent re-circulation of flue gases. Use factory supplied intake and exhaust terminations.
Gas Requirements	Refer to minimum pressure requirements on **page 8.**
Condensate Requirements	The supplied condensate line must be installed per directions in the I&O manual supplied with the appliance. Condensate line needs to slope to a drain at a minimum of 1/4 in. per ft. Make sure the condensate line does not have the potential to freeze. If using more than one heater and using a common condensate line, make sure the condensate line is properly sized.



Service/Mechanical Room	Provide adequate space for servicing heater.

Scan for a video explanation of the eF Series® Turbo control.

Scan for a video explanation of the eF Series® Turbo installation best practices.

Glossary of Terms

AC	Alternating Current	**LED**	Light Emitting Diode
BTU/H	British Thermal Units per Hour	**NPT**	National Pipe Thread
CO	Carbon Monoxide	**PSI**	Pounds per Square Inch
DC	Direct Current	**RPM**	Revolutions per Minute
ECO	Energy Cut Off	**VAC**	Volts Alternating Current
GFI	Ground Fault Interrupt	**W.C.**	Inches of Water Column
HSI	Hot Surface Igniter	**°C**	Degrees Centigrade
Hz	Hertz	**°F**	Degrees Fahrenheit
		µA	Micro Amp

Refer to the parts list on www.bradfordwhite.com for a complete parts listing and expanded views of the models covered in this manual.

Water Heater Service Report

Date: _____
Service Provider: _____ Model Number: _____
Phone Number: _____Serial Number: _____

Venting (PVC, CPVC):

Vent size 4", 6" _____ Intake 45° Elbows (qty) _____ Length of Straight Pipe (Exhaust) _____

Intake 90° Elbows (qty) _____ Exhaust 45° Elbows (qty) _____
Exhaust 90° Elbows (qty) _____ Length of Straight Pipe (Intake) _____

Gas Line: **Gas Pressure:**

Size & Material _____ Static _____
Distance from Meter to Water Heater _____ Running Inlet _____ Manifold _____

Electrical:

Line Voltage _____ Low Voltage _____ Polarity _____
Igniter Resistance _____ Flame Sense (µA) _____ Spark Gap _____
LED Flashing Y or N Which One(s) _____
Error Codes on Digital Display _____

Condensate Line: **Exhaust Collector Pressure:**

Size & Material _____ Inches W.C. _____
Length _____
Is trap provided Y or N _____

Combustion:

CO _____

Installation Site Contact Name & Number

_____
_____
_____
_____
_____

Installation Site Name & Address

_____
_____
_____
_____
_____

This product is covered under one or more of the following patents and or patent pending applications:

CA2,430,807 CA2,844,271 EP1369647 GB1369647 NL1369647 TWI276761 US7,559,293 US7,900,589 US7,007,748 CA2,476,685 US7,063,132 CA2,409,271 US6,684,821 US7,337,517 US7,665,211 US7,665,210 US7,699,026 CA2,504,824 US6,935,280 AU2007201423 CA2,583,609 EP1840484 GB1840484 NL0840484 US7,634,976 US7,270,087 US7/621,238 US7,334,419 US7,866,168 CA2,491,181 US7,063,133 CA2,677,549 US8,082,888 AU2007201424 CA2,583,108 EP1840481 GB1840481 NL1840481 CA2,659,534 US7,971,560 US7,992,526 US8,146,772 US8,707,558 CA2,548,958 MX243220 US6,422,178 TWI649522 US9,429,337 CA3,001,716 GB2558134 GB2013252.8 US10,866,010 US17/109,618 US10,503,183 US20/42096 CA2,949,830 DE112015002523.5 GB2540513 US9,574,792 US15/436,425 CA3,059,965 EP18784108.5 MX/a/2019/012268 US15/486,816 US17/038,087 US7,007,316 US7,243,381 CA2,784,312 US8,787,742 DE112014002713.8 GB2533862 US9,964,241 US6,644,393 US8,851,022 USD636,857 US8,931,438 CA2,899,271 US10,495,343 CA2,918,211 US10,094,619 US15/621,063 US16/474,833 US16/281,599

BRADFORD WHITE®
WATER HEATERS

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Technical Support	**1-800-334-3393**
Email	***techsupport@bradfordwhite.com***
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Email	***parts@bradfordwhite.com***

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Warranty	**1-800-531-2111**
Email	***warranty@bradfordwhite.com***
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For U.S. and Canada field service, contact your professional installer or local Bradford White sales representative.

International

General Contact	***international@bradfordwhite.com***

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