Tankless Water Heater

MODEL (LIPPERT PN)
GSWH-2 (2022107534)

TROUBLESHOOTING AND SERVICE MANUAL

* Picture shown here is for reference only.
* L'image présentée ici n'est qu'une référence.

This manual contains the product's basic information, operation instructions, fault diagnosis and basic troubleshooting methods. In order to better understand and use this product, please take good care of this manual, and read it carefully.

TABLE OF CONTENTS

Introduction

This document provides an overview on replaceable parts for Girard Tankless Water Heater, as well as basic troubleshooting and service information.

NOTE: Images used in this document are for reference only when assembling, installing and/or operating this product. Actual appearance of provided and/or purchased parts and assemblies may differ. For more detailed operation, including general safety instructions, warnings and cautions, see Instruction Manual at: https://support.lci1.com/documents/ccd-0006120 or scan QR Code.

Safety

Read and understand all instructions before installing or operating this product. Adhere to all safety labels.

This manual provides general instructions. Many variables can change the circumstances of the instructions, i.e., the degree of difficulty, operation and ability of the individual performing the instructions. This manual cannot begin to plot out instructions for every possibility, but provides the general instructions, as necessary, for effectively interfacing with the device, product or system. Failure to correctly follow the provided instructions may result in death, serious personal injury, severe product and/or property damage, including voiding of the Lippert limited warranty.

⚠WARNING

The "WARNING" symbol above is a sign that a procedure has a safety risk involved and may cause death or serious personal injury if not performed safely and within the parameters set forth in this manual.

⚠WARNING

Failure to follow instructions provided in this manual may result in death, serious personal injury and/or severe product and property damage, including voiding of the component warranty.

⚠CAUTION

The “CAUTION” symbol above is a sign that a safety risk is involved and may cause personal injury and/or product or property damage if not safely adhered to and within the parameters set forth in this manual.

⚠CAUTION

Always wear eye protection when performing service, maintenance or installation procedures. Other safety equipment to consider would be hearing protection, gloves and possibly a full face shield, depending on the nature of the task.

Important Safety Instructions

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

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

-WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch.**
- **Do not use any phone in your recreational vehicle.**
- **Clear the recreational vehicle of all occupants.**
- **Turn off the gas supply tank valve(s) or main gas supply.**
- **Immediately call your gas supplier for instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

-Have the gas system checked and leakage source corrected by a qualified installer, service agency, manufacturer or dealer or the gas supplier.

WARNINGS

1. Use with Universal LPG ONLY.
2. Shut off gas appliances and their pilot lights (if any) when refueling.
3. Turn gas OFF at the LP tank when vehicle is in motion. This disables all gas appliances and pilot lights. Gas appliances must never be operated while vehicle is in motion.
4. LP tanks must be filled by a qualified gas supplier only.
5. Should overheating occur, turn gas OFF at the LP tank and turn the operation switch to the OFF position.
6. Install ONLY in recreational vehicles (RVs). RVs are recreational vehicles designed as temporary living quarters for use as recreational, camping, or travel having their own power or towed by another vehicle. This water heater is NOT designed for marine or space heating applications.
7. All combustion air must be supplied from the outside of the RV. All products of combustion must be vented to the outside of the RV.
8. DO NOT vent water heater with a venting system serving another appliance or to an outside enclosed porch area.
9. DO NOT modify water heater in any way. This is dangerous and will void the warranty.
10. DO NOT alter water heater for a positive grounding system.
11. DO NOT HI-POT water heater unless the electronic ignition control (circuit board) has been turned OFF (power switch is in the OFF position).
12. Protect building materials from flue gas exhaust.
13. Install the water heater on an exterior wall with access door opening to the outdoors.
14. DO NOT lift the water heater or carry it by holding the exhaust tube.
15. DO NOT over tighten cold or hot water inlets. Excessive torque will cause damage. Use two wrenches to tighten the LP gas compression fitting to avoid damaging the unit.
16. DO NOT connect UCP wires to the power wires (black or red) on rear of water heater.
17. DO NOT use matches, candles or other sources of ignition when checking for gas leaks.
18. It is necessary to use only an applicable GSWH-2 Girard Water Heater Door Kit with a Girard GSWH-2 Water Heater. Use of any other brand of water heater door will affect the operation and performance of the Girard Water Heater and may cause a hazardous condition.
19. The appliance and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psi.
20. The appliance and its gas connection must be leak tested before placing the appliance in operation.
21. It is dangerous to operate a tank-less water heater unattended. This may occur accidentally if a

sufficient leak develops in the water system or if a faucet is left open. For this reason, the GSWH-2 will automatically turn off after operating for 20 minutes and display error "En" on the Display.

22. Label all wires prior to disconnection when servicing the controls.
23. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Codes

- Follow all applicable state and local codes. In the absence of local codes, adhere to the National Fuel Gas Code, ANSIZ223.1, NFPA 54, and/or CSAB149.1, Natural Gas and Propane Installation Code, as well as the Recreational Vehicles, NFPA 1192 and/or CAN/CSA-Z240 RV Series.
- If an external electrical source is utilized, the appliance, when installed, must be electrically grounded in accordance with local codes. In the absence of local codes, adhere to the National Electrical Code, ANSI/NFPA 70 and/or the CSA C22.1, Canadian Electrical Code.

Proper Installation of the Water Heater

In a conventional installation, the Girard Tankless Water Heater is dependent on and connected to:

1. Input water flow
2. Output water flow
3. LP gas system
4. 12V DC Power

1. Input Water Flow

The RV's cold water system derives its water input from a pressurized (45 PSI or greater) source such as a shore connection or an RV water pump connected to the RV's freshwater storage tank.

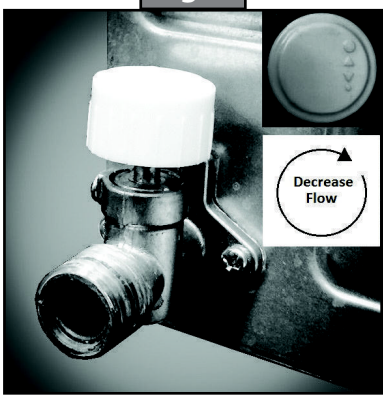
- A steady water flow (not pulsating) will ensure a consistent temperature and performance.
- Water pressure regulators are commonly recommended, but they can decrease water flow to unacceptable levels.
- Water filters are highly recommended to keep sediment out of the plumbing system, but they need to be well-maintained, otherwise they can restrict water flow.
- Winterization bypass kits are not recommended in a tank-less water heater system because they can cause a number of plumbing issues that will affect the operation of the water heater.
- City water connections at RV parks can have low or varying water pressure. If this condition occurs and cannot be resolved, it is recommended to fill up the freshwater tank and use the on-board water pump.

2. Output Water Flow

The RV's hot water system (i.e., faucet and shower).

- Purge all air from the plumbing system using both the water pump and city water source. Air in the plumbing can cause intermittent heating operation errors.
- Pressure is important, but water flow rate is critical to the operation of a tank-less water heater. The longer the water stays in the water heater, the hotter it will become. The water flow rate is dependent on the length of plumbing, number of elbows present and other restrictions in the faucets and shower heads in the RV. Typically, the average RV water flow is between 1 and 1.4 gallons per minute. This water flow provides the optimal operation of the water heater.
- The water heater is equipped with a water control valve (Fig. 1) to help maintain the optimal water flow, especially in winter conditions where input water temperatures can dip below 45°F (7°C). The water heater is shipped with the water control in the maximum flow setting.

Fig. 1



3. LP Gas System

The RV's LP gas system is capable of supplying its rated 42,000 BTU requirement.

- The Girard Products model GSWH-2 introduces a new generation of smart tank-less water heater designed specifically for Recreational Vehicles (RV). Its configuration and size are consistent with the tank-based RV water heaters currently in use and is designed for OEMs and aftermarket use by the RV Industry.
- LP system issues that can adversely affect the operation of the water heater can occur, so it is important to maintain the LP system.
- Gas pressure drop test requirements vary from state to state but RVIA regulations state that gas systems should maintain 8" WC for 3 minutes.
- LP tank and bottles must be purged correctly when filled, especially upon the first fill, to ensure that all the air has been eliminated from the LP cylinder. If a purge is not done correctly, gas appliances will not work or perform as required. Insufficient temperature rises from the water heater can occur if the cylinders are not filled properly.
- Gas pressure of 11" WC is the recommended minimum pressure for the proper operation of the water heater. This test must be performed with a minimum of half of the gas appliances operating at one time.
- Freezing weather conditions will affect the output BTUs of the LP cylinder. The smaller the cylinder, the less output can occur.
- Debris and oil build-up in the LP plumbing can restrict gas flow to appliances.

4. 12V DC Power

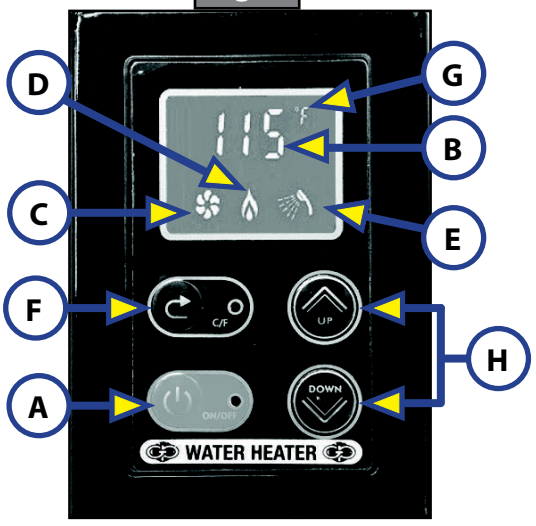
The RV's 12V DC electrical power system. Proper 12V DC and ground is required for proper operation of the water heater. Low voltage or bad voltage will cause non-operation or failure of the water heater.

- The water heater will not function when input voltage drops below 10V DC. When this happens, a red LED will illuminate on the water heater control board.
- Over the years, drastic improvements have been made to power converters and inverters. The poor power output of an older linear style converter can cause issues with modern electronics. If using this water heater with older converters, it is recommended to wire the water heater either through the battery or on the filtered side of the converter so the battery can act like a capacitor and filter the voltage.

How the Girard Tankless Water System Works

- The water heater's microprocessor-based controller (control board) receives data from electronic sensors in order to decide each step of the model GSWH-2 operation. The User Control Panel (UCP) displays each phase of the water heater's operation:
- To activate the UCP, press the ON/OFF button (Fig. 2A). The current set temperature will display (Fig. 2B).
- Verify that all components are in working order and that it is safe to start the unit upon sensing the minimum amount of water flow required (0.70 gallons per minute (GPM) +/- 10%). Later, the start flow rate will change to 0.60 GPM.
- The water heater will continue operation if:
    - The water flow is above the minimum required.
    - The presence of flame is verified.
    - No unsafe conditions develop.
- The UCP will provide the user with a visual indication of the operating conditions illuminating the appropriate icon and displaying the current outlet temperature:
    - **Fan icon (Fig. 2C):** Blower is operating.
    - **Flame icon (Fig. 2D):** Burner is lit and flame is detected.
    - **Shower head icon (Fig. 2E):** Water is flowing.
- The C/F button (Fig. 2F) determines if the temperature is displayed in °F or °C (Fig. 2G).
- When the UP or "DOWN" arrows (Fig. 2H) are pressed, the display will change the set temperature (Fig. 2B).
- In the event the unit shuts off due to unsafe conditions, the display will show an error code.

Fig. 2



Operating the Water Heater

The water heater can be operated in one of two ways:

1. Turn on the hot water and add cold water to achieve desired temperature, similar to a tank water heater.

NOTE: There must be sufficient flow in the RV water system to operate both cold and hot water simultaneously.

2. Select the desired temperature by adjusting the temperature setting up (^) or down (v). The UCP can set a temperature between 95°F ~ 124°F (35°C ~ 51°C). The unit will maintain the set temperature.

NOTE: The water heater factory setting is 115°F (46°C). This is the recommended temperature setting.

For normal operation:

1. Turn on the power. The panel will light up and display the current temperature at the inlet of the unit.
2. Press a temperature selection arrow (up or down) to see the current set temperature and make adjustments as needed.
3. Turn on the faucet.

Water Heater Performance Factors

Factors affecting overall water heater performance include water flow rate, inlet water temperature and water pressure. It may not be possible for the water heater to successfully heat to the set temperature depending on the incoming water temperature and flow rate. To resolve this issue, change the incoming water temperature and/or water flow rate.

- If water flow rate and/or pressure are too high and/or incoming water temperature is too low, the water heater will have trouble achieving the set temperature.
    - Example: if water enters the water heater at a flow rate of 1.0 GPM and a temperature of 35°F (2°C), the maximum temperature rise will be about 70°F (21°C). Approximately 105°F (41°C) is the maximum temperature that the water heater will be able to output. This means the water heater will not be able to heat incoming water above 105°F (41°C), even if the UCP is set to a higher temperature.
- If water flow rate and pressure are too low and/or the incoming water temperature is too high, the water heater may overshoot the set temperature.
    - Example: if water enters the water heater at a flow rate of 1.0 GPM and a temperature of 80°F (27°C), the minimum temperature rise is going to be about 25°F (-4°C). Approximately 105°F (41°C) is the minimum temperature that the water heater will be able to output. This means the water heater will not be able to heat incoming water to any temperature below 105°F (41°C), even if the UCP is set to a lower temperature.

The table below illustrates the water heater temperature rise at 42,000 BTUs.

Gallons Per Minute (GPM)	Low Heat Temperature Rise	High Heat Temperature Rise
1.4	15	50
1.2	20	60
1.0	25	70
0.8	30	80
0.6	35	90

Maintenance

It is recommended that the GSWH-2 water heater is inspected monthly by the user and at least once a year by a Girard Products, LLC recommended service technician. Before an inspection, make sure that the electrical power, LP gas and water systems are turned on. Purge air out of ALL hot and cold water lines. **Verify that there are no combustible materials, gasoline, or other flammable vapors and liquids in proximity to the unit.**

A routine inspection must include the following items:

1. Inspect the integrity of the sealing (caulking or tape) between the side wall and the door of the water heater and ensure that the unit is solidly mounted to the vehicle.
2. Verify that the air inlet openings (louvers) are completely open and clear of any debris including mud, leaves, twigs, insects, etc. Remove all obstructions to allow full air flow.
3. Insects, including mud wasps and spiders, can build nests in the exhaust tube outlet which will affect the performance of the unit. Inspect the flue outlet tube to make sure that it is unobstructed and the screen is clean. If debris or insects are present, clean and vacuum the unit to remove any remaining debris. The use of any type of aftermarket screen to cover the vent is not permitted and will void the warranty.
4. Open the door and verify that no debris or extraneous combustible materials are present any where (especially in the area of the burner and the gas controls). Remove any item present and wipe clean the bottom of the housing.
5. Inspect the interior surface of the housing for any cracks or corroded areas that could allow for the penetration of gases into or out of the interior of the vehicle. Check especially around the hot water, cold water, gas and electrical connections.
6. There is a filter screen on the water heater inlet water line connection. Unscrew the water line connection from water inlet and check the screen to ensure there is no debris.
7. Check that all wire connections are firmly in place and there are no signs of chafing or cracks on the insulation. Verify that the spark ignition cable between the control board and the igniter is securely in place and not shorted to any metal components.
8. Check the relief valve to ensure it has not been leaking (i.e., no water residue present).
9. Turn ON the power to the water heater and open a hot water faucet to inspect the flame of the burner. The flame should be normal and bluish in appearance, indicating proper combustion. This can be accomplished by opening the water heater door and observing the flames by looking at the burner under the edge of the heat exchanger.
10. If the unit overheats (limits) often and the relief valve discharges periodically, contact a qualified installer, service agency, manufacturer or dealer.

Winterization

Freezing the water heater and its plumbing components with water still in the plumbing will result in severe damage that is not covered by warranty. For this reason, the water heater contains a winter use device that will keep the water heater from freezing when using the RV in freezing conditions. See the **Winter Use Device** section below for proper use.

At the start of the winter season or before traveling to a location where freezing conditions are likely, the unit must be winterized. There is a very small amount of water present in the heat exchanger so it does not require a bypass. In fact, it is not recommended.

Freezing water inside of the heat exchanger will expand and cause a bulging crack on one of the copper tubes of the heat exchanger (Fig. 3). You will also see that the copper has an orange peel texture (Fig. 4).

Winterization can be accomplished using one of the two common methods of winterization for RV systems. For best results, it is highly recommend to use RV antifreeze in the water heater heat exchanger and the plumbing system.

Fig. 3

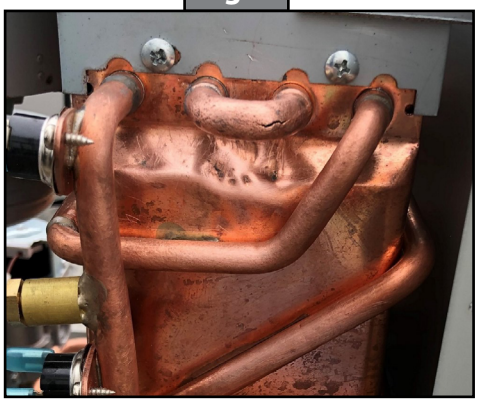
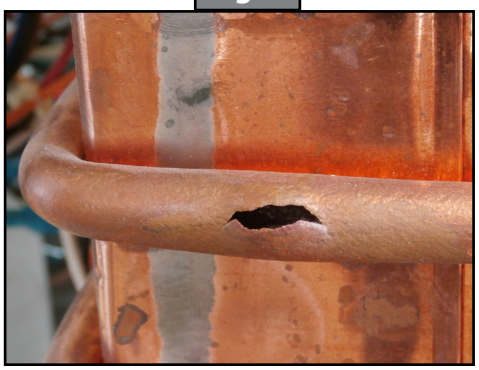


Fig. 4



Compressed Air Method

Drain all the water from the system opening one tap at a time and using compressed air to purge all remaining water.

RV Antifreeze Method

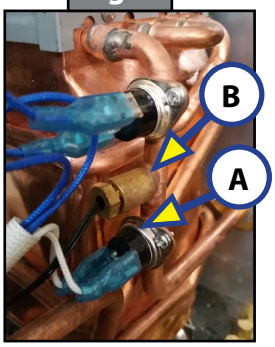
Follow the recommendations of the recreational vehicle manufacturer and fill the system with a nontoxic antifreeze. Make sure that the antifreeze flows from each tap to complete the process.

Winter Use Device

This water heater is equipped with an antifreeze or winter use system. The purpose of this system is to keep the water heater from freezing when the RV is used in freezing conditions.

There is a bimetallic thermostat located on the hot water line called the winter use device (WUD) (Fig. 5A). This WUD thermostat is designed to turn on at 38°F (3°C) and turn off at 58°F (14°C). When the WUD thermostat turns on, the water heater will begin to operate and heat. The board will keep the fire on until the thermostat turns off at 58°F (14°C). At this point, the flame should turn off immediately and the fan should turn off 30 seconds later. When the system operates with the winter use device, an Fd code will display on the UCP.

Fig. 5



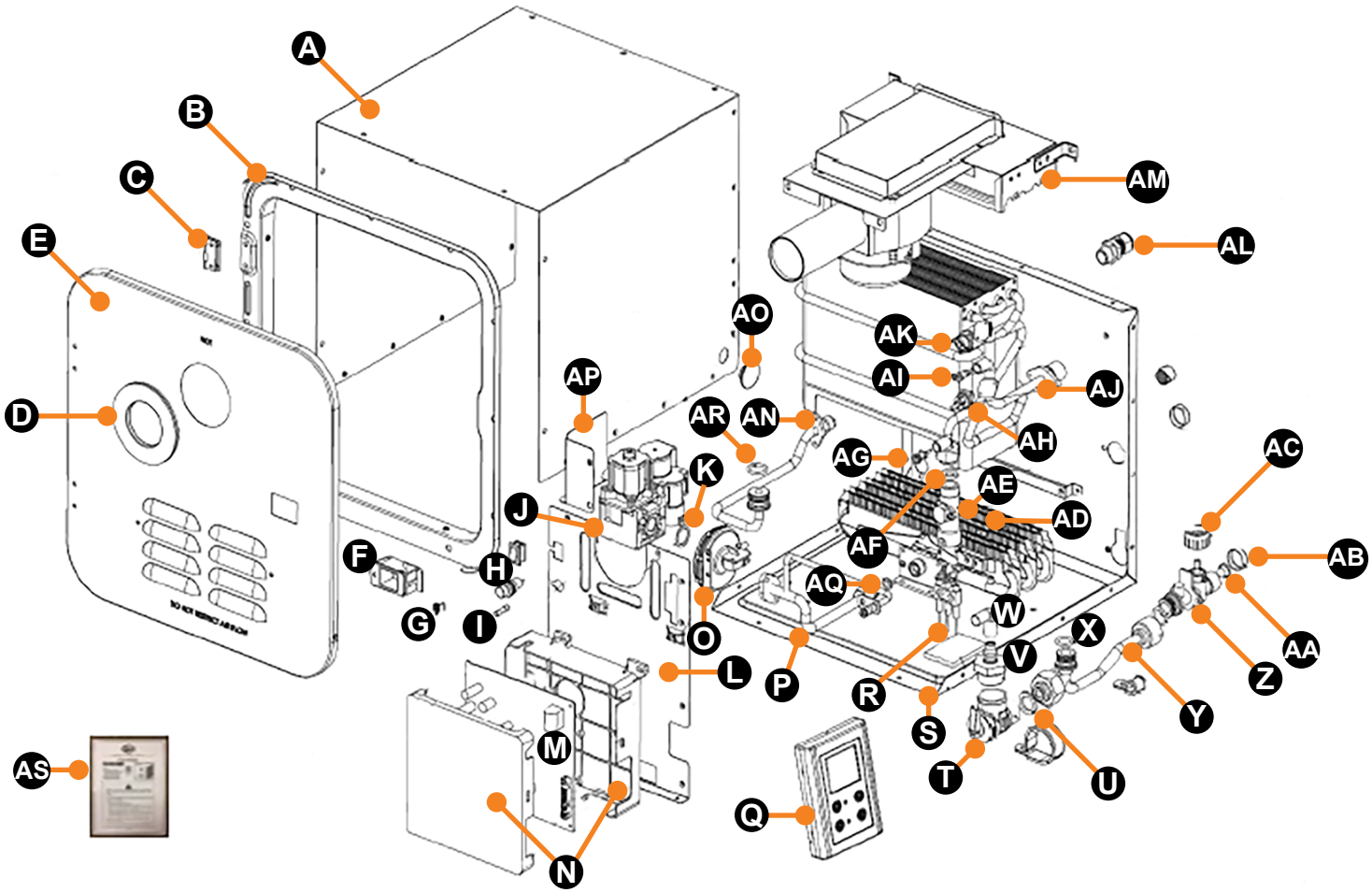
The output thermistor (Fig. 5B) will automatically engage the winter use system at 38°F (3°C). To test the system, remove water pressure and the output thermistor and submerge the thermistor in a cup of ice water. The thermistor should engage.

Fd: Winter Use Device thermostat has engaged turning on the water heater.

NOTE: To allow the antifreeze device to operate, sufficient LP gas must be present in the tank and 12V DC power must be available to leave the unit power switch in the ON position. The power switch must remain ON during all times that freezing may occur. This will NOT protect the entire RV's plumbing system. The RV must be designed for winter use/freezing conditions.

For more information regarding freeze damage identification, review QR-181 - Tankless Water Heater Freeze Damage Identification or visit https://support.lci1.com/documents/ccd-0008320.

Replaceable Parts List



Callout	Part #	Description	Model
A	2022107553	Shell Top	All
B	2022107548	Door Trim Ring - Silver (Thor Motor Coach) (Small Door Kit)	All
	2022107547	Door Trim Ring - White (Small Door Kit)	
	2022107546	Door Trim Ring - Black (Small Door Kit)	
C	2022107593	Door Hinge	All
D	2022107594	Vent silicone - White	All
	2022107595	Vent silicone - Black	
E	2022107535	Door Kit - Small - White	All
	2022107536	Girard Water Heater Door Kit - Small - Black	
	2022107544	Door Kit - Small - Gray - (Airstream)	
	2022107545	Door Kit - Small - Silver - (Thor Motor Coach)	
	2022107537	Door Kit - Medium - White	
	2022107538	Door Kit - Medium - Large	
	2022107539	Door Kit - Medium - Gray	
	2022107540	Door Kit - Large - White	
	2022107541	Door Kit - Large - Black	
F	2022107596	Plastic Latch - White	All
	2022107597	Plastic Latch - Black	

Callout	Part #	Description	Model
G	2022107598	Latch Spring	All
H	2022107557	Power switch Wiring & Fuse Holder Assembly	All
I	2022107558	External Fuse 10A	All
J	2022107554	Gas Valve	All
K	2022107555	O-Ring for Gas Valve	All
L	2022107559	Control Box Bracket	All
M	2022107561	Control Board/Micro- Processor	All
N	2022107562	Control Box with Cover	All
O	2022107560	Air Pressure Switch	All
P	2022107567	Valve Burner Gas Train	All
Q	2022107563	Girard User Control Panel (UCP)	All
R	2022107569	Igniter Pin	All
S	2022107571	Shell Bottom	All
T	2022107573	Pressure Relief Valve	All
	2022107574	New Pressure Relief Valve	
U	2022107576	Gasket/O-Ring for New Pressure Relief Valve	All
V	2022107575	Pressure Relief Direct Connection	All
W	2022107572	Pressure Relief Direction Tube	All
X	2022107578	O-Ring for Water Pipe	All
Y	2022107577	Water Pipe Assembly	All
	2022107579	New Water Pipe Assembly	
Z	2022107580	Flow Switch Inlet	All
AA	2022107581	Filter Screen	All
AB	2022107582	Dust Cap for Inlet/Outlet x 2	All
AC	2022107583	Flow Switch Inlet - Knob	All
AD	2022107570	Burner	All
AE	2022107584	Water Flow Sensor	All
AF	2022107585	Rubber Gasket	All
AG	2022107586	Temperature Probe for Water Inlet	All
AH	2022107587	Inlet Thermostat (Anti-freeze)	All
AI	2022107588	Temperature Probe for Water Outlet	All
AJ	2022107589	Heat Exchanger	All
AK	2022107590	Anti-dry Combustion (ECO) T-switch	All
AL	2022107591	Wire Positioning	All
AM	2022107592	Blower Motor Assembly	All
AN	2022107565	Inlet Valve Gas Train	All
AO	2022107564	Water Pipe Screw Cover	All
AP	2022107556	Valve Bracket	All
AQ	2022107568	Small O-Ring for Gas Train	All
AR	2022107566	O-Ring for Gas Inlet	All
AS	2022107543	GSWH-2 Owner's Manual	All

General Troubleshooting

This following list includes common experiences that are not the result of defective workmanship or material in the appliance. If none of the below rectifies the situation, contact a qualified technician. Do NOT try to adjust or repair the unit yourself.

Error Code	Probable Cause	Corrective Action
E0	Unit does not attempt to light when water is turned on. Water outlet sensor failure.	Verify connections to the sensor. Verify with a voltmeter that the resistance of the outlet sensor is not an open circuit or a short. Refer to **Thermistor Removal and Replacement** section.
E1	Ignition failure or accidental flame off during ignition. If the established flame signal is lost while the burner is operating, the controller will respond within 0.8 seconds, the gas valve is de-energized and a new inter-purge and ignition routine will begin. If the burner does not light, the controller will de-energize the gas valve and will make two attempts to relight the burner. If the burner does not relight after the three trials, the controller will go into lockout and the unit will need to be turned off before it can operate again.	**Inspect major components for issues:** 1. ECO is not open. If it is, run cold water through the unit to cool off the ECO. 2. Lack of gas in tank. 3. Faulty igniter (no spark). 4. Faulty igniter connections. 5. Improper distance between the igniter and the burner. 6. Igniter and burner. 7. Accumulated dirt or obstruction between igniter and burner. 8. Low gas inlet pressure. Correct any improper condition. Refer to **Gas Valve Diagnostics** or **Flame Sense** sections.
E2	Flame sensing interrupted during normal operation. Buzzer will sound.	
E3	Unit does not attempt to light when water is turned on. ECO open before ignition or during normal operation. Temperature exceeds 140°F (60°C).	Verify with a voltmeter that the resistance of the ECO is not an open circuit. Let water flow through the unit to cool it off. Replace the ECO if needed. Refer to **Emergency Cut Off (ECO)** section.
E4	Unit does not attempt to light when water is turned on. Water inlet temperature sensor failure.	Verify with a voltmeter that resistance of the inlet sensor is not an open circuit or a short. Refer to **Thermistor Removal and Replacement** section.
E5	Unit does not attempt to light when water is turned on. Blower motor failure.	Verify motor power connection. Refer to **Blower Motor Operation** section.
E6	Outlet water temperature has exceeded 140°F (60°C) for 3 seconds.	Reduce temperature setting. Refer to **Emergency Cut Off (ECO)** section.
E7	Unit does not attempt to light when water is turned on. Linear valve failure.	Inspect linear valve for open circuit. Refer to **Linear Valve** section.
E8	Unit does not attempt to light when water is turned on. Pressure switch or motor failure.	Inspect exhaust pressure switch for blockage in tube. Inspect for faulty motor and blockage in exhaust system. Refer to **Blower Motor Operation** section.
E9	Unit does not attempt to light when water is turned on. Flame sensor failure.	Verify that there is a short in the flame sensor (Sensor touching burner or wires shorted). Refer to **Flame Sense** section.

Specifications

Technical Specifications	
BTU/HR	42,000 BTU
Fuel	Propane
Inlet Pressure	11" WC min to 14" WC max
Manifold Pressure	1.5" - 7.8" WC
Power Input	12V DC < 3A
Water Operating Pressure	125 PSI max
Dimensions - W x H x D	12 ½" x 12 ½" x 15 ½" (318 mm x 318 mm x 394 mm)
Weight - Shipping	22 lb. (10 kg)
ECO	Max temperature 140°F (60°C)

Troubleshooting and Repair Guide

Tools Required

- Multimeter
- Gas pressure manometer
- Phillips head and slot screwdrivers
- Thermocouple readout or thermometer
- Wrenches (23mm, 19mm, 15mm)
- Regular and needle nose pliers

Proper Installation Verification

Before troubleshooting, complete the following installation verification steps:

1. Open the water heater door and verify that there are no obstructions to the air flow within the housing (i.e., objects, dirt or other).
2. Check that the exhaust tube is free and clear of any obstructions (i.e., leaves, insect nests, or other).
3. Verify that the water inlet valve is wide open.
4. Remove the fuse located below the ON/OFF switch and verify that it is not blown.
5. Open the lid to the control box by pulling on the left edge.
6. Verify that the control board is clean. Check for signs of burns or overheating around any components.
7. Verify that all connections are in place and solid (refer to the **Wiring Diagram Section**).
8. Turn ON the power switch.
9. Verify that the indicator light comes ON.
10. Verify that the unit is connected to a 12V DC power supply using the multimeter or a voltmeter.
11. Verify that there is gas available (e.g., the gas tank is not empty and the gas lines are full).
12. Once all verification steps are complete, open a faucet to operate the unit.

NOTE: If a malfunction occurs during operation, proceed to the troubleshooting procedures. Unit cannot be operated without a firewall in place. Make sure to determine a probable cause before gaining access to the major components. Maintenance must be performed by a qualified installer, service agency, manufacturer or dealer.

NOTE: Due to limitations of space and tools on hand, some troubleshooting and/or repairs may require the partial or even full removal of the water heater.

⚠WARNING

Shut off gas valve and power to unit prior to servicing. Failure to do so may result in death, serious personal injury and/or severe product and property damage, including voiding of the component warranty.

Static Operation: No Water Flow

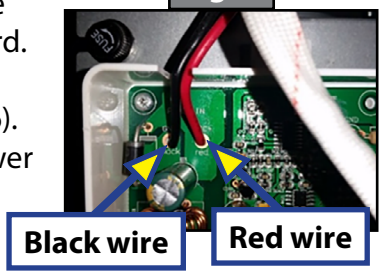
Input 12V DC Power

Confirm that you have a good power source with filtered voltage. Older linear type converters can cause issues with the operation of this more advanced control board.

Check the water heater connections:

1. Red wire (positive) and black wire (ground) to back of the water heater (Fig. 6).
2. 12V DC ground (black wire) should run directly to the board through the power connector.

Fig. 6



Remove and Replace Fuse Holder and Power Switch

1. Check connections:
   - 12V DC (red wire) positive to the power switch.
   - 12V DC (red wire) from the switch to the fuse.
   - 12V DC (red wire) from the fuse to the power connector.
   - 12V DC (red wire) from the power connector to the board.
2. Locate the power switch (Fig. 7A) and the fuse holder (Fig. 7B).
3. Push down on the top tab and up on the bottom tab of the power switch (Fig. 8).

NOTE: Pliers may be needed for this step.

Fig. 7

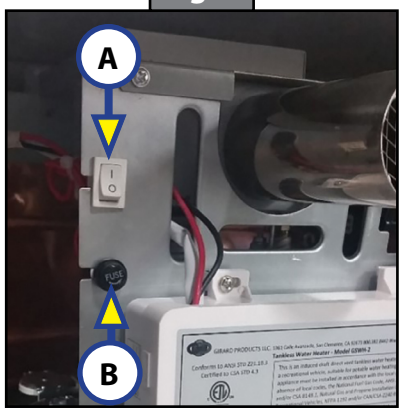
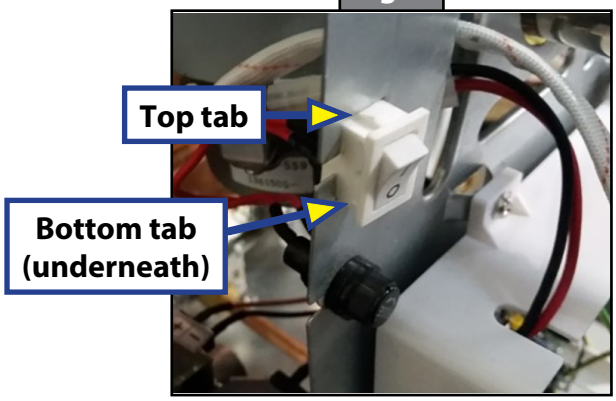
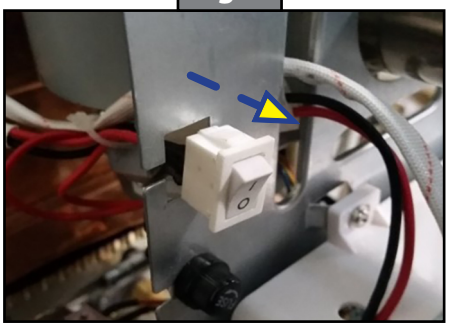


Fig. 8



4. Pull the switch forward to remove (Fig. 9).

Fig. 9



5. Pull the wires through the cut out (Figs. 10 & 11).

NOTE: The wires are soldered to the switch.

Fig. 10

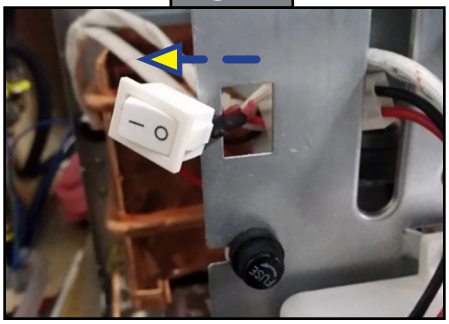
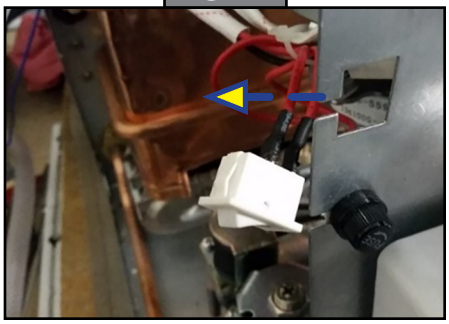
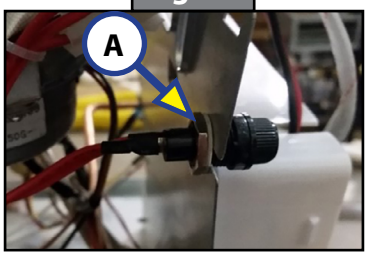


Fig. 11



6. Loosen the 15 mm nut on the fuse holder (Fig. 12A).

Fig. 12



7. Pull the fuse holder forward to remove and pull it through the cut out (Fig. 13).
8. Remove the power wire connector for incoming 12V DC to the board (Fig. 14).

Fig. 13

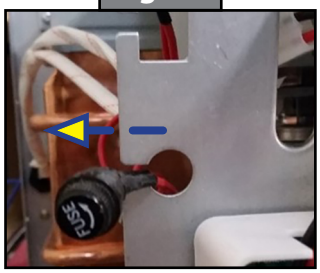
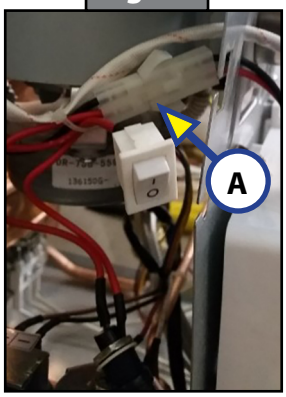


Fig. 14



9. Note the location of the zip ties routing the wire harnesses alongside the exchanger and remove them.
10. Loosen the compression nut securing the incoming power wires on the rear of the water heater and remove the switch and fuse holder harness from the water heater.
11. Feed the new harness wires through the rear of the water heater and secure them in place with the compression nut.
12. Place and secure the new power switch and fuse holder into their respective cut outs.

NOTE: Use zip ties to secure the wires in place away from the burner.

Operational Indicator LEDs

These LEDs are located on the control board and indicate proper voltage and operation of the water heater.

- **Green LED (Fig. 15A):** Illuminates at 10V DC up to 17V DC.
- **Red LED (Fig. 16A):** If the voltage drops below 10V DC or there is a bad ground, the red light will illuminate. When this occurs, there is no power going from the control board to the UCP and the water heater will not operate.
- **Amber LED (Fig. 17A):** Illuminates during operation.

Fig. 15

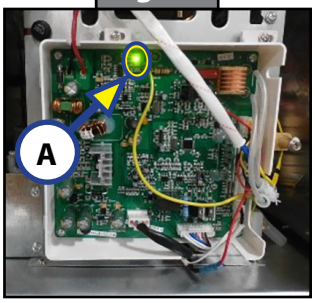


Fig. 16

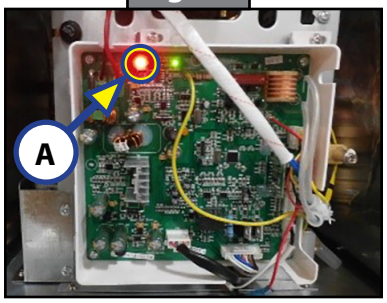
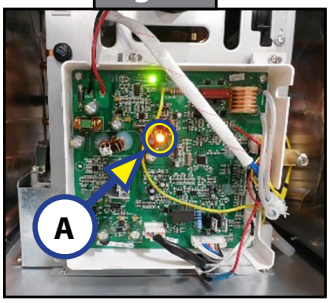


Fig. 17



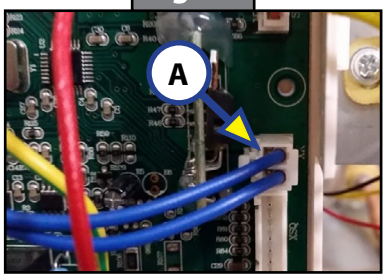
User Control Panel

Damage to the control board may occur if the blue wires between the control board and the UCP are connected to the ground or 12V DC, or if wires are crossed.

If there is no operation of the UCP:

1. Turn on the power switch and verify the back light comes on and the temperature setting can be changed. The recommended setting is 115°F (46°C), or desired temperature.
2. Confirm the control board green LED light is on, indicating it is receiving good power and ground.
3. Check the wire connection at the XK terminal (Fig. 18A).
4. Check voltage between the two wires at the connection of the UCP. Voltage should fluctuate between 9V to 11V DC.
5. Check voltage between the two blue wires at the XK Connector. Voltage should fluctuate between 9V to 11V DC.

Fig. 18



- **If there is no power to the UCP, but power is present at the control board:** There is a wiring issue between the UCP and the control board.
- **If the UCP has good power but does not activate:** The UCP is bad and needs to be replaced.
- **If there is no power at the UCP and no power at the control board:** The control board is bad and needs to be replaced.

NOTE: Before replacing the board, inspect it for damage. Wiring issues can cause the board to fail. If the wires between the board and the UCP are shorted to ground, each other or 12V DC, the wires will get hot, resulting in discoloration of the control board.

Hot Water Flow On - Pre-Test for Ignition

Water Flow Sensor

- The water flow sensor (Fig. 19A) or water flow rate meter gives the actual water flow measurement to the control board. As water passes through the flow meter, the stationary white deflector fins in the flow meter (Fig. 20A) will spin the water through the flow sensor. Once the water spins through the flow sensor, the magnetic impeller (Fig. 21A) will start to spin. The reed switch on the side of the water flow sensor turns on and off quickly as the magnetic impeller turns past it. If the water is flowing the wrong way through the water heater, the impeller will not turn since it is not passing through the white deflector fins.

Fig. 19

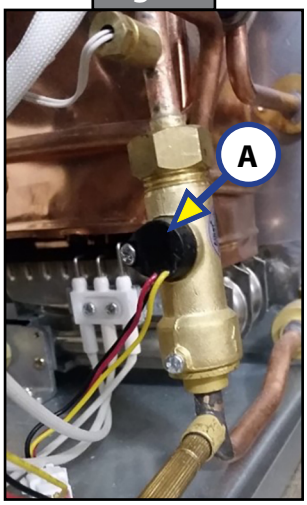


Fig. 20

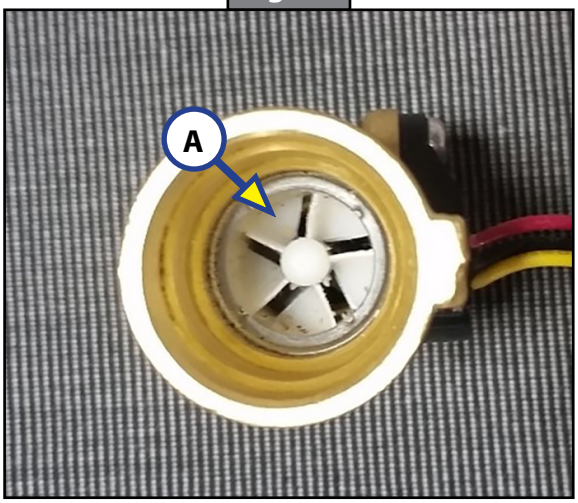
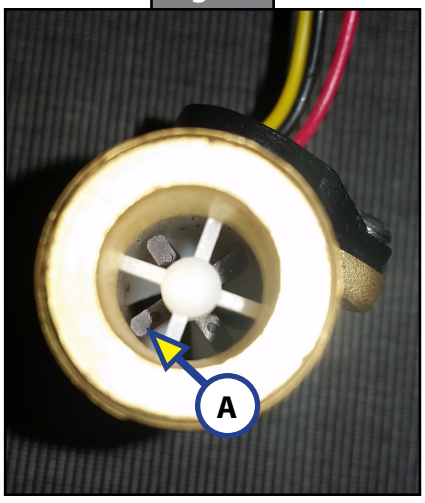


Fig. 21

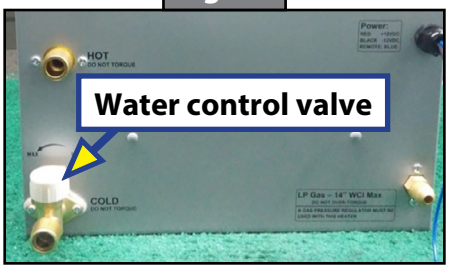


- As the water flow rate increases, the board will increase the BTUs to compensate for the lower temperature rise. As the water flow rate decreases, the board will decrease the BTUs to compensate for the higher temperature rise.
- If the water flow icon (a shower head symbol) is active on the User Control Panel when the hot water faucet is turned on, then the water flow sensor can be eliminated as an issue.
- The control board initiates operation of the water heater when the water flow exceeds .70 GPM (+/- 10%). Later, that was changed to .60 GPM (+/- 10%). Water pressure is important, but the water heater only measures the GPM.

If there is no operation of the water heater when the hot water faucet is on:

1. Examine the UCP.
2. If the shower head icon is not on, but the set temperature can be changed, there is either a water flow rate issue or a water flow sensor issue.
3. Eliminate plumbing issues such as winterization bypass kits, outside shower valves, and single-handle shower fixtures that can cause a mixing of hot and cold water. When hot and cold water are mixed, the flow rate through the water heater will decrease.
   - **Winterization bypass kits:** May be set incorrectly causing a mixing of hot and cold water or no water through the water heater.
   - **Outside shower valves:** Can cause a mixing of hot and cold water. If the valves are turned on and the shower head is turned off, you will mix hot and cold water through the plumbing system.
   - **Single-handle shower fixtures:** Often have anti-scald devices that mix hot and cold water.
4. Another plumbing issue is the polarity of the water flow through the water heater. If the plumbing lines are reversed, the impeller in the flow sensor will not activate. If water is going the wrong way through the water heater, the impeller will not spin and the flow meter will not operate.
5. Confirm the actual water flow by timing how long it takes to fill a gallon container. Divide 60 seconds by the seconds measured to produce the GPM. Less than 1 minute and 25 seconds is sufficient flow for the water heater to start.
6. If the water flow rate is too low, then you will need to inspect the water control valve adjustment on the water heater (Fig. 22). Ensure that the water control valve is opened all the way up.
7. Other causes of reduced water flow are plumbing restrictions, pressure regulators, water filters, plugged aerators in sinks, diffusers in shower heads and insufficient shore or pump water pressure.

Fig. 22



Improper Winterization

The expansion of ice inside the pipes (Fig. 23) can separate plumbing fittings. Sometimes damage will occur (Fig. 24) and either the parts will need to be replaced or the connections will need to be repositioned and reattached.

Fig. 23

Fig. 24

For more information regarding freeze damage identification, review QR-181 - Tankless Water Heater Freeze Damage Identification or visit https://support.lci1.com/documents/ccd-0008320.

Remove and Replace Water Flow Sensor

1. Remove the set screw on the front of the flow meter (Fig. 25A).
2. Loosen the compression fitting on the top of the flow meter using a 15⁄16" or a 23 mm wrench (Fig. 26A).
3. Twist the flow meter plumbing and pull the flow meter upward. Ensure the top o-ring is not damaged or discarded.

Fig. 25

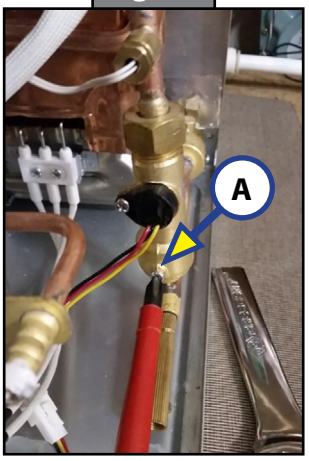
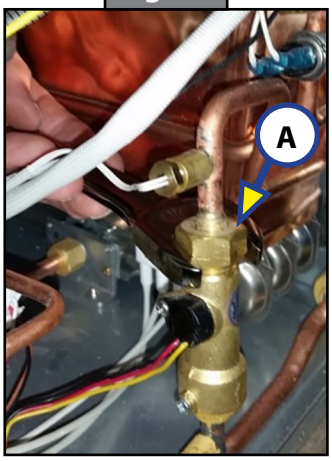
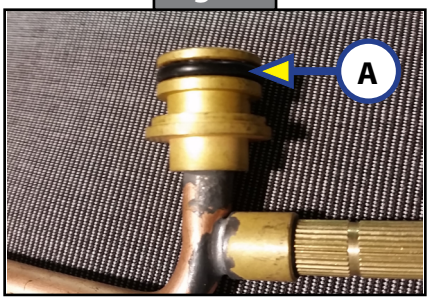


Fig. 26



4. After removing the flow meter, check the integrity of the bottom o-ring (Fig. 27A).

Fig. 27

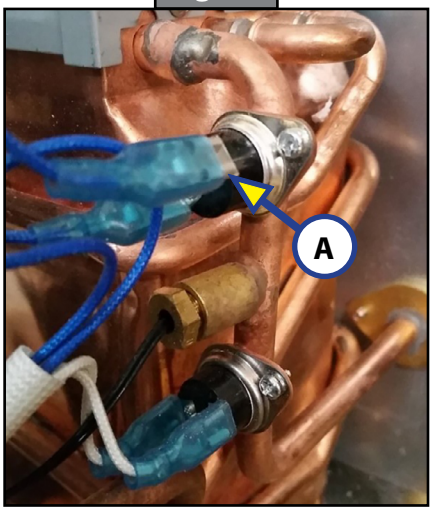


5. When reinstalling the flow meter, ensure it is fully seated to avoid water leaks. Reinstall the 23 mm compression fitting. Do not over tighten.
6. Reinstall the set screw.
7. Check for leaks.

Emergency Cut Off (ECO)

- The emergency cut off, energy cut off and high temperature limit switch (also referred to as the ECO switch) will turn off at 140°F (60°C).
- Although purging out of the plumbing is less crucial with this model, it is still important to prevent intermittent overheating or erroneous heating issues.
- Once the board sense the water flow rate is sufficient, the board will read the ECO to ensure it is not open.
  1. The wire connections on the ECO are clip-type spade connections (Fig. 28A). Pull back insulation over the spade connection. Push the clip down and pull simultaneously.
  2. If the ECO circuit is open by the control board when the hot water faucet is turned on, the control panel will show the water flow symbol and an E3 fault. The fan will not turn on.
  3. If the water temperature reaches approximately 140°F (60°C) during operation, the E3 code will show on the control panel and the burner will turn off immediately. The fan will turn off after approximately 15

Fig. 28



seconds. The E3 fault code will stay on the control panel display until the ECO resets and the hot water faucet is turned off and turned back on again.

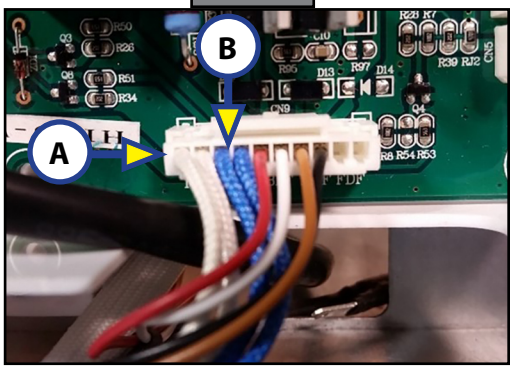
E3: ECO open before ignition or during normal operation

This occurs if the ECO thermostat opens. Under normal circumstances, this is due to the temperature of the water at the outlet exceeding 140°F (60°C). The cause must be identified and removed before restarting the unit. If the water heater goes straight into an E3 code it can only be the ECO, wire connections or the control board.

1. Remove the 8-wire plug from the CN9 connection on the control board (Fig. 29A).
2. Check to ensure the wire connections are good.
3. Perform a continuity check between the blue wires on the plug (Fig. 29B).
   - **No continuity:** the ECO is bad and needs to be replaced.
   - **Continuity:** the control board is bad and needs to be replaced.

E6: Over Temperature

Fig. 29



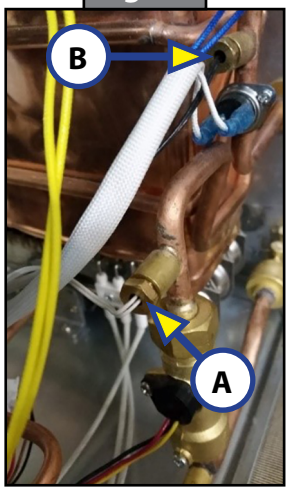
This error code occurs if the outlet water temperature (the output thermistor) exceeds 140°F (60°C) for 3 seconds.

1. Check the temperature shown on the control panel display and the water temperature at the faucet to ensure that the water is not overheating.
2. If the thermistor is out of calibration, the UCP will show a much higher temperature than what is coming out of the faucet.
3. Incoming high temperature water will force the water heater to its lowest BTUs. When this occurs, mixing cold water at the faucet will decrease the temperature of the water at the faucet, but it will also decrease the water flow through the water heater causing the temperature at the water heater to rise. This higher temperature will show on the UCP.

Input and Output Thermistors

- The water heater is equipped with an input or cold water thermistor (Fig. 30A) and an output or hot water thermistor (Fig. 30B).
- These thermistors will give the control board the actual temperature of the incoming cold water and the outgoing hot water temperatures. The board will adjust the BTUs at the linear side of the gas valve to meet the requirements of the temperature set on the UCP.
- The operating temperature shown on the UCP display is the temperature of the output (hot) thermistor.
- If the output thermistor is open when the board senses that the flow sensor is on, an E0 fault code will display.

Fig. 30



E0: Water Outlet Temperature Probe Failure

- An open circuit or short circuit condition is detected, which could be due to an internal failure in the temperature probe or to a faulty connection of the wires.
- Verify wire connections are good before condemning the thermistor.

E4: Water Inlet Temperature Probe Failure

- If the input thermistor is open when the board senses that the flow sensor is on, then an E4 fault code will display.
- An open circuit or short circuit condition is detected, which could be due to an internal failure in the temperature probe or to a faulty connection of the wires.

Remove and Replace the Thermistor

1. Turn off the water supply.
2. Identify input and output thermistors (Fig. 30). Remove the compression nut using an 11 mm crow foot wrench (Fig. 31A).
3. The thermistors are sealed into the water systems with an o-ring. Reach in with needle nose pliers and firmly pull the thermistor out of the fitting (Fig. 32 & Fig. 33).

NOTE: Do not damage or discard the o-ring.

Fig. 31

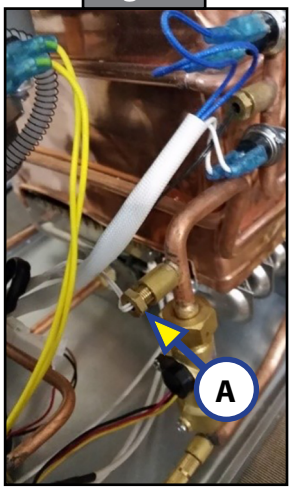


Fig. 32

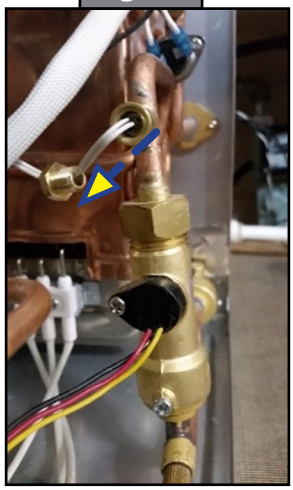
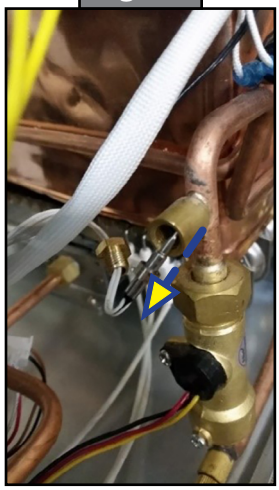


Fig. 33



4. Remove the wire from the control board.
5. To install the replacement thermistor, reverse these steps.
6. Check for water leaks.

Blower Motor Operation

- This water heater is equipped with a 4-wire variable speed brush-less motor (Fig. 34 & 35).
- The motor operates with a 24V DC pulse width modulation system, which means there is voltage at all four wires on the CN1 plug with or without the motor running.

Fig. 34

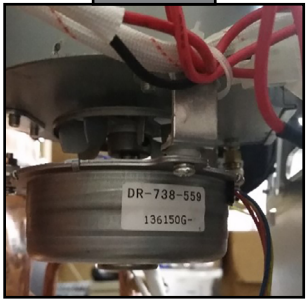
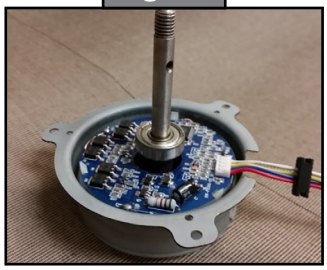


Fig. 35



- When the hot water faucet is turned on, the water flow symbol (shower head) will display on the UCP. The control board will then check the thermal sensors and thermistors for proper operation. If operation is good, the control board will turn on the motor and create 24V DC pulse width modulation power to the motor.
- Although voltage can be measure at the connector, it is not possible to determine the proper voltage with a volt meter.

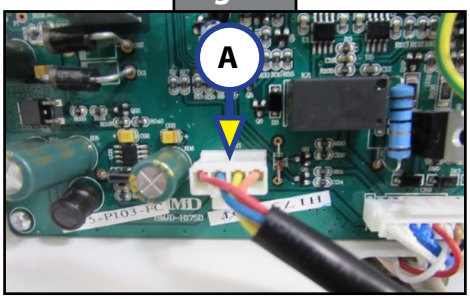
E5: Blower Motor Failure

No motor signal was detected before ignition or during normal operation. This could be caused by a wiring fault in the motor connections.

If an E5 fault code shows on the UCP:

1. Check the CN1 connection at the control board (Fig. 36A).
2. Check for debris in the blower assembly.
3. Ensure that you have good power and ground. Older linear converters can make it difficult for the board to put out the proper power to the motor.
4. If connections are solid, the blower assembly is clean, and there is good ground, then the motor is bad and either the motor or the water heater will need to be replaced.

Fig. 36



If the motor does not turn on and there is no E5:

1. Check the CN1 wire connection at the control board (Fig. 36A).
2. Check the UCP for the water flow icon.
3. Check for debris in the blower assembly.
4. If the connection is good and the water flow icon is on, but the blower motor is not operating, the control board will need to be replaced.

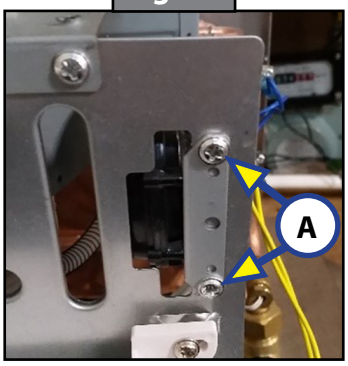
Pressure Switch

- The pressure switch is the air providing device on the water heater. It is vital that the fan is operating before the board goes into ignition mode.
- The pressure switch contacts close as the air from the fan passes over the petit tube inside the blower housing. This creates a suction on the hose that connects the fan housing to the pressure switch. This will pull the contacts of the pressure switch closed.

E8: Pressure Switch

- Air pressure switch not detected for 7 sec. before ignition or is cut off for 2 seconds during normal operation. This failure may be caused by a faulty motor or a blockage in the air supply or in the exhaust system.
- An E8 fault is read when the control board does not see the pressure switch close. Remove the mounting screws of the pressure switch (Fig. 37A) to get better access to the components.

Fig. 37



- **Before replacing the pressure switch:**
  1. Check for integrity and connections of the pressure switch hose (Fig. 38A).
  2. Check the wire connections on the board and the pressure switch.
  3. Check the integrity of the petit tube in the blower housing (Fig.39).

Fig. 38

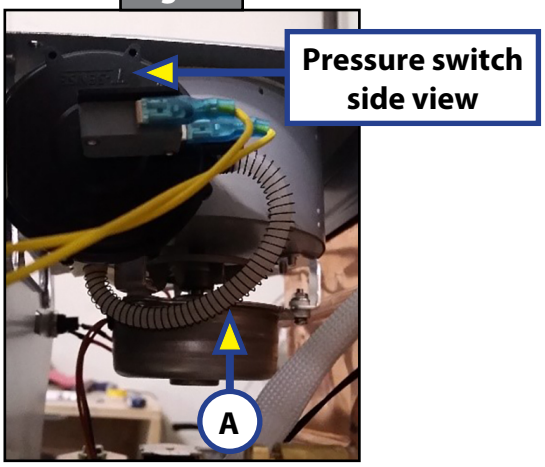
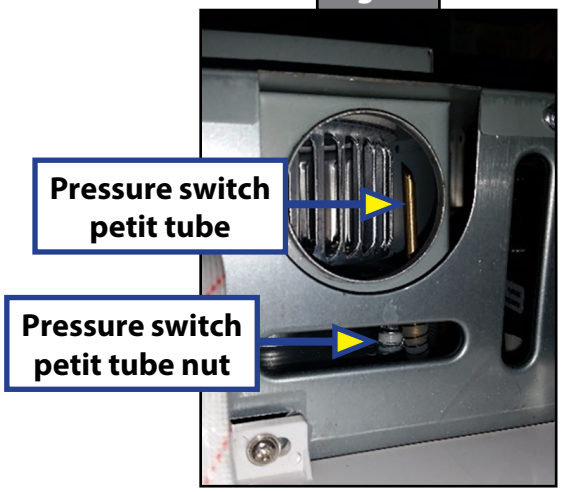


Fig. 39



4. Ensure the mounting nut is not loose and the standpipe is not twisted out of position. The petit tube should be facing away from the blower wheel to ensure it works with suction.
5. Check for debris in the hose and open pipe of the pressure switch.
6. Once the above conditions have been eliminated, remove the pressure switch completely. With the pressure switch removed, apply suction to the port the hose is attached to and confirm with a continuity test if the switch is not actuating.

Trial for Ignition

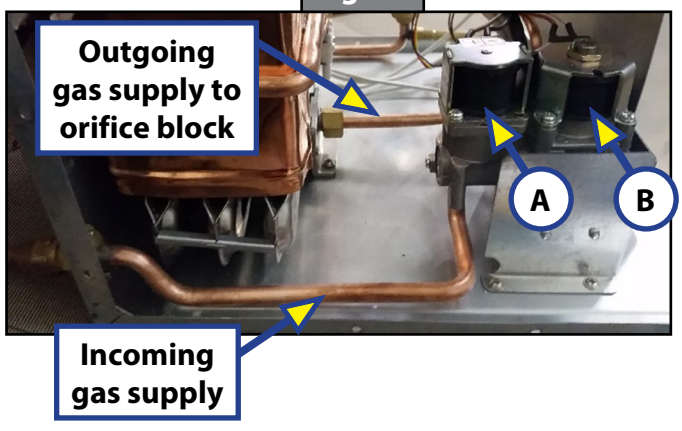
Control Board

- Once the board senses the water flow meter, ECO, thermistor, motor operation and pressure switch are activated, the board will power the gas valve and send high voltage for the spark.
- This is a two-try board.
- If there is no ignition, an E1 fault code will display and a soft reset will need to be performed by turning the water flow off and back on again.

Proportional Gas Valve

The proportional gas valve has two gas valves in one. One side of the gas valve is the on/off solenoid (Fig. 40A). The other side is the linear valve (Fig. 40B) which adjusts the amount of gas and gas pressure to the burner orifice.

Fig. 40



Gas Solenoid

The gas solenoid valve is powered from the brown (+) and black (-) wires at the 8-wire connector at the bottom of the board (Fig. 42A). There are also wire connectors behind the firewall (Fig. 41).

Fig. 41

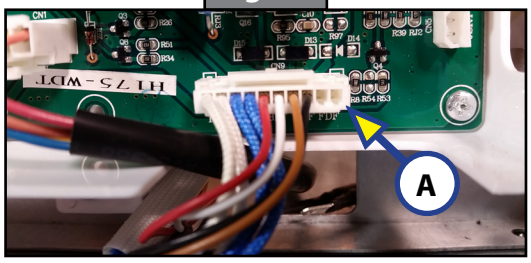
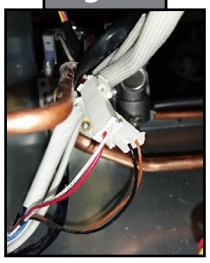


Fig. 42



The control board supplies an approximate 50-percent duty cycle of 24V DC to the gas solenoid side of the valve. Because the voltage is turning on and off many times per second, the voltage can be measured with a voltmeter. The voltmeter should read approximately 12V DC. If the voltage is not around 12V DC, there is a problem with the wire connections or the power output of the board.
If the solenoid gas valve fails to open, no gas will be supplied to the burner and an E1 fault code will occur.

Gas Valve Diagnostics

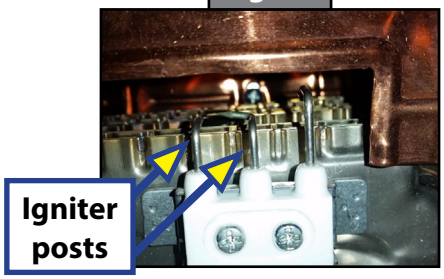
E1: Ignition Failure or Accidental Flame Off During Ignition

- The E1 fault code indicates that the water heater tried to ignite twice, but failed. An E1 fault code is not always caused by a failure of the gas valve to open. Additional diagnosis needs to be performed since this fault code may be caused by a number of issues. The other causes are listed below and in the owner's manual.
- If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds, the gas valve will de-energize, and a new inter-purge and ignition routine will begin. If the burner does not light, the control panel will de-energize the gas valve and make one more attempt to relight the burner. If the burner does not relight after the two trials, the control will go into LOCKOUT and the unit will need to be turned off before it can operate again. Turn hot water faucet OFF and back ON to reset (this cycle should be tried three times).
- No ignition could occur for a number of reasons. The most common are:
  - Lack of gas in the tank
  - Faulty igniter
  - Faulty igniter connections
  - Improper distance between the Igniter and the burner
  - Accumulated dirt or obstruction between
  - Igniter and burner
  - Low gas inlet pressure

Diagnosis of an E1 Fault Code

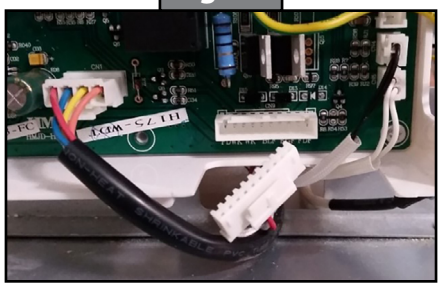
1. Confirm that gas has purged through the entire gas plumbing system by lighting the range and resetting the water heater a minimum of three times.
2. Confirm that the spark is occurring at the tips of the igniter (Fig. 43). Visually inspect the igniter for obstructions or debris.

Fig. 43



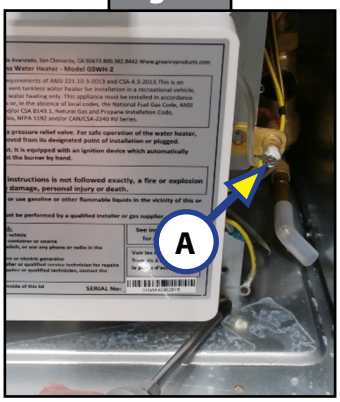
3. Smell for the scent of gas from the exhaust during the two trials for ignition.
4. Check the brown and black wires on the 8-pin wire connector at the bottom right side of the board to ensure integrity. Unplug the connector (Fig. 44), gently pull on the brown and black wires. Visually inspect the connector and plug it back in.

Fig. 44



5. Check voltage between the brown and the black wires during the trial for ignition. You should have 12V DC. The resistance on the coil should be approximately 110 ohms.
6. The output gas pressure of the gas valve can be measured at the test port on the right side of the board (Fig. 45A). There should be at least 1.5" WC on low heat and up to 7.8" WC on high heat. If there is no pressure, then the solenoid side of the gas valve is not opening.

Fig. 45



7. Restrictions in the gas system can prevent gas from getting to the water heater. Just because there is gas everywhere else does not mean you have good gas flow to the water heater.

Linear Valve

The board also sends voltage to the linear (modulator) side of the gas valve on the red (+) and white (-) wires at the 8-wire connector at the bottom of the board. Using a voltmeter, verify voltage ranges from 11.24V DC to 20V DC. The board sends a variable 24V DC duty cycle to adjust gas flow to the burner.

The output function of the linear valve can be tested by attaching a manometer to the gas test port (Fig. 45A). When the diaphragm inside the linear portion of the gas valve moves, the gas pressure will change. The gas reading on the manometer should read 1.5" WC to 7.8" WC depending on the gas flow needed to regulate the set temperature. The pressure will change when increasing or decreasing the water flow or changing the temperature on the UCP.

Fig. 46

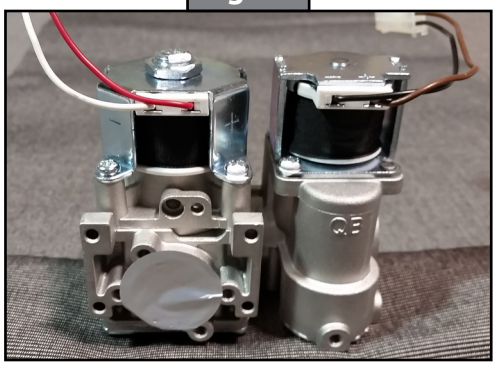
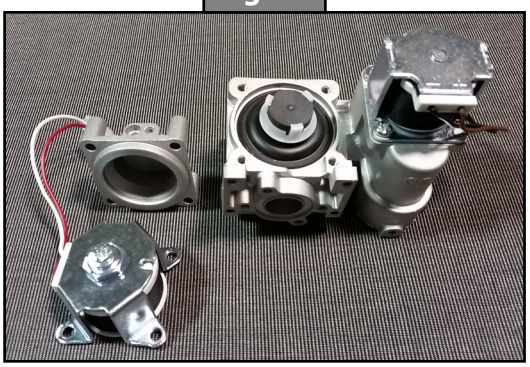


Fig. 47



An E7 fault code appears when the board is not sensing the linear or the solenoid coils of the gas valve. If this occurs, check the connection of the white and red wires for the linear side, the black and brown wires for the solenoid side on the 8-wire plug and the connections behind the firewall. The resistance of the coil of the linear valve can be measured at the white and red wires of the 8-wire connector when it is unplugged. The resistance of the coils should be 80 to 100 ohms.

⚠WARNING

Do not attempt to repair gas valves.

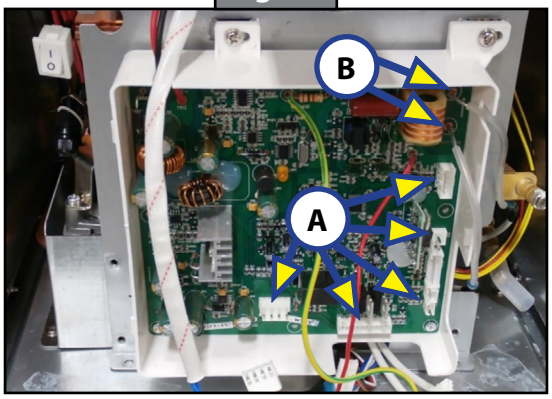
E7: Linear Valve Failure

The controller module detects an open circuit in the linear valve control circuit before ignition or during normal operation indicating a faulty valve.

Remove and Replace Gas Valve

1. First, remove the fuse and power switch from the unit by following the instructions in the "Remove and Replace Fuse and Switch" steps 1 - 7 on page 14.
2. Remove the wire connectors from the main control board (Fig. 48A) leaving the high-tension lead wires connected (Fig. 48B). All wire connectors are unique.

Fig. 48



3. With a Phillips screwdriver, remove the screws securing the firewall to the blower housing (Fig. 49A), the gas valve bracket (Fig. 50A), the ground (Fig. 51A), the gas test port (Fig. 51B) and the bottom case (Fig. 51C).

Fig. 49

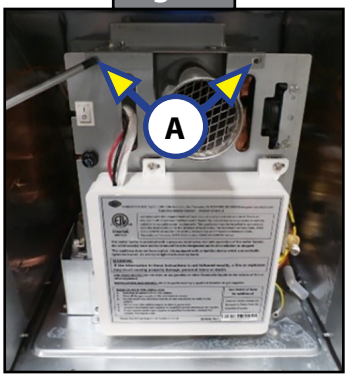


Fig. 50

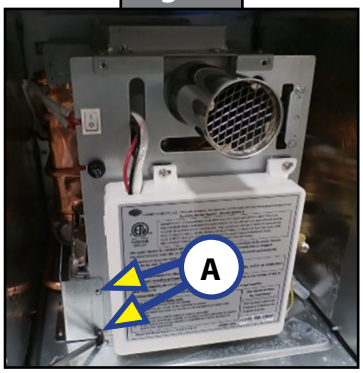
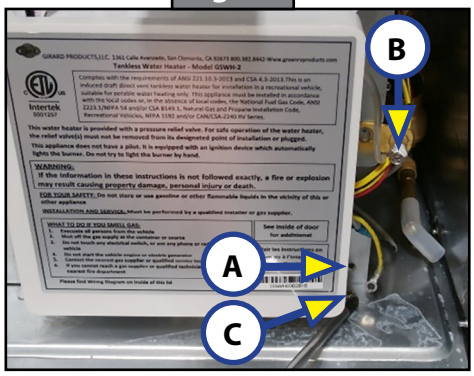


Fig. 51



4. Lift the firewall and shift it to the right, away from the gas valve bracket. Swing the control board and the panel to the right giving access to the internal components (Fig. 52).
5. Remove the gas line from the orifice block using a 19 mm or ¾" wrench (Fig. 53A).

Fig. 52

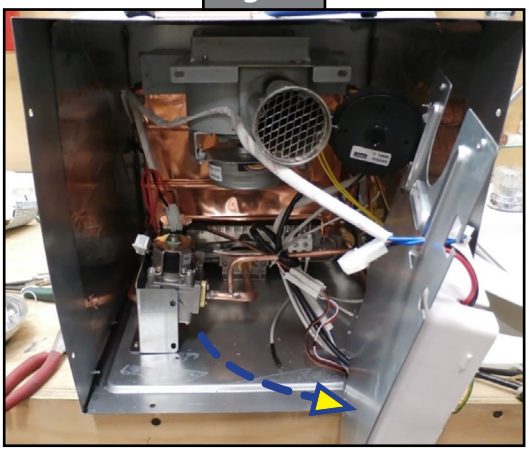
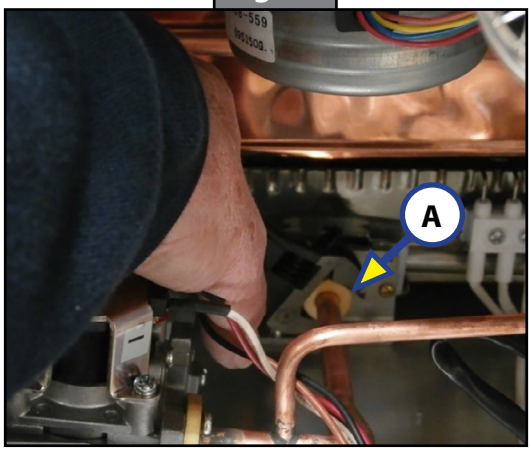
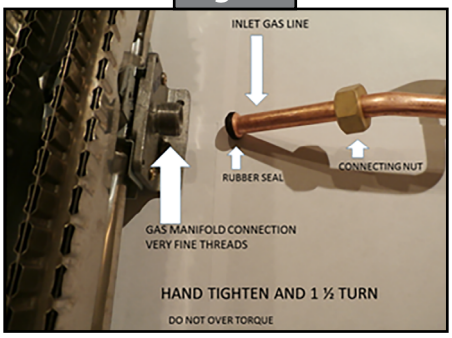


Fig. 53



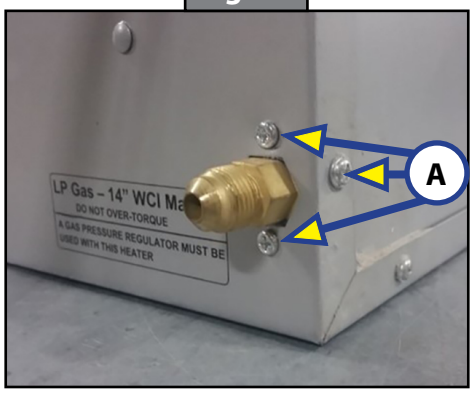
6. Remove the gas line from the water heater and cover to prevent damage (Fig. 54).

Fig. 54



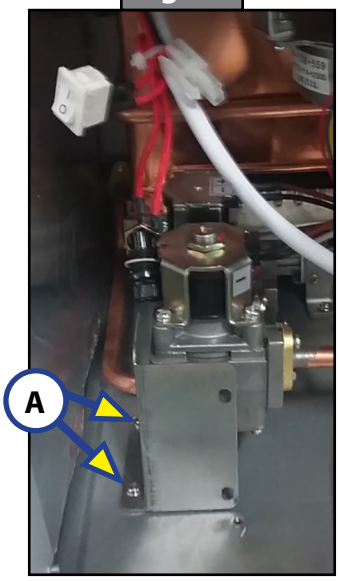
7. Remove three screws from the gas input fitting (Fig. 55A).

Fig. 55



8. Remove the screws from the gas valve bracket (Fig. 56A).

Fig. 56



9. Pull the gas valve out. Be careful to maneuver the gas line past the burner (Fig. 57).

Fig. 57

10. With the gas valve assembly removed (Fig. 58), remove the two screws and disconnect the output gas line from the gas valve (Fig. 59A). Note the position of the o-ring.

Fig. 58

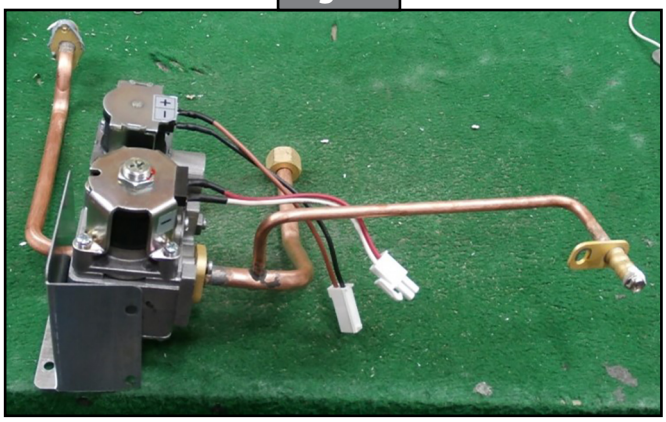
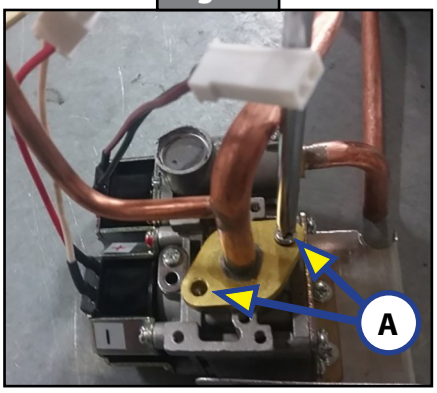
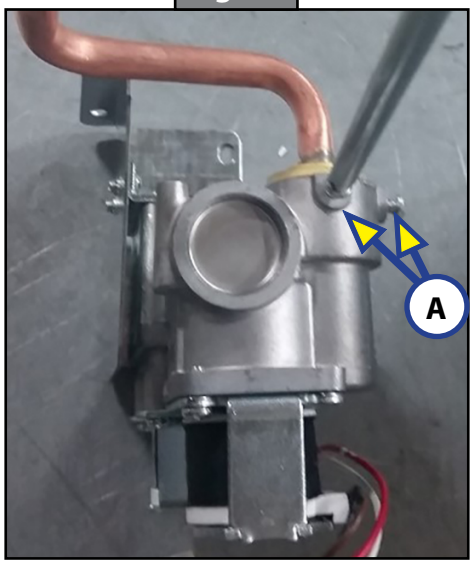


Fig. 59



11. Remove the set screws that hold the input gas line in place (Fig. 60A). Remove the gas line from the valve.

Fig. 60

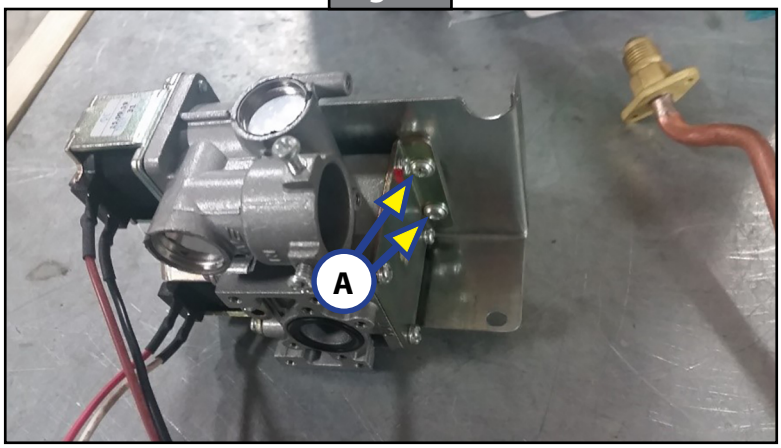


12. Inspect the o-ring on the input gas line (Fig. 61). Ensure there are no cuts or tears.

Fig. 61

13. Remove the bracket from the original gas valve by removing the two screws (Fig. 62A) and place it on the new valve.

Fig. 62



14. Reassemble the gas lines back onto the gas valve and install back into the water heater.

NOTE: Do not over over tighten the gas connection when reattaching it to the orifice block.

Orifice Block

The orifice block is located under the burner. It has six orifices metering gas into the burners, three on the left and three on the right. Debris in the orifices can cause poor flame quality and may cause insufficient temperature rise.

Remove and Replace Orifice Block

1. Remove the output gas line mounting screws (Fig. 63A). Pay close attention to the integrity and mounting of the o-ring (Fig. 64A).

Fig. 63

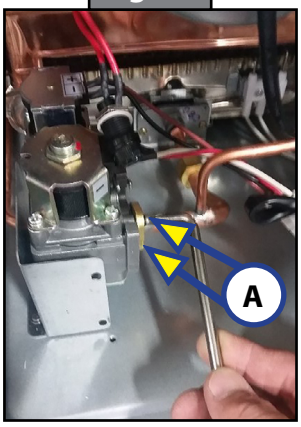
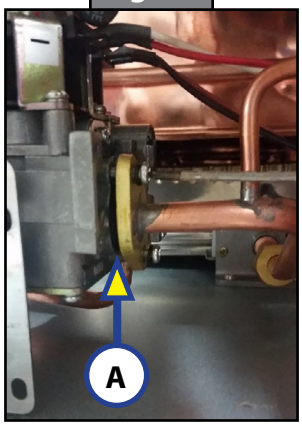
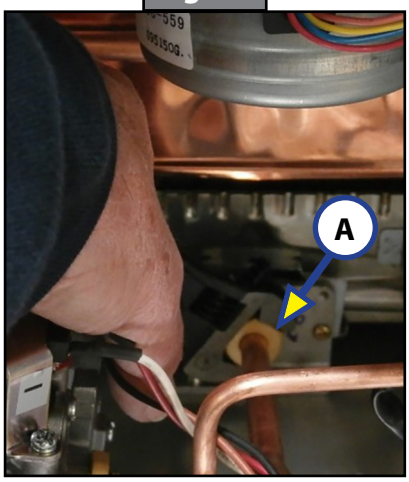


Fig. 64



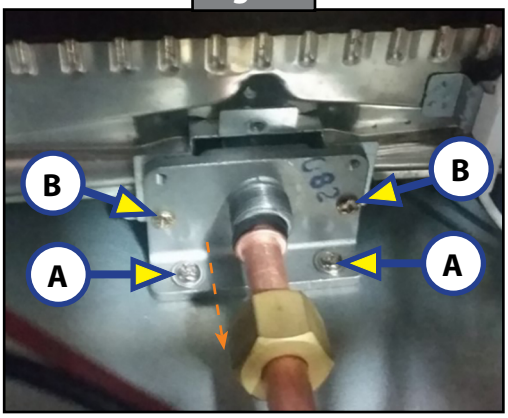
2. Remove the gas line with a 19 mm or ¾" wrench (Fig. 65A). Pay close attention to the integrity and the mounting of the o-ring.

Fig. 65



3. Pull the gas line away from the orifice block (Fig. 66).
4. Remove the two screws mounting the bracket to the case (Fig. 66A). Then, remove the two screws mounting the bracket to the burner (Fig. 66B).

Fig. 66



5. Pull the orifice block mounting tabs (Figs. 67A & 68) out of the notches in the base of the burner (Fig. 67B).

Fig. 67

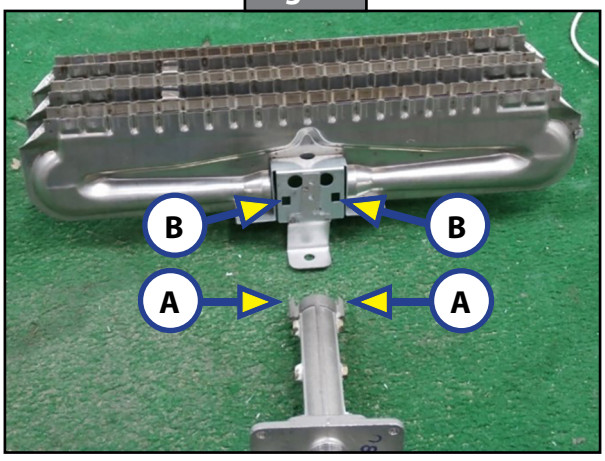
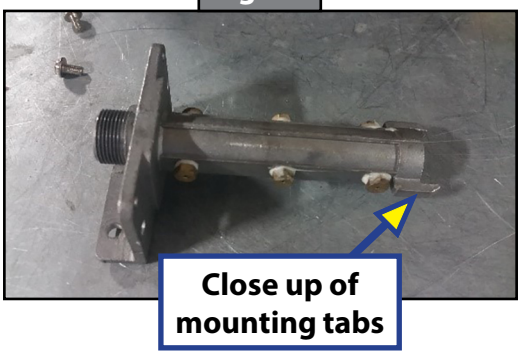


Fig. 68



Remove and Replace Burner Assembly

Once the orifice block is removed, the only thing holding the burner assembly in is the bracket (Fig. 69A) in the catch (Fig. 70A).

Fig. 69

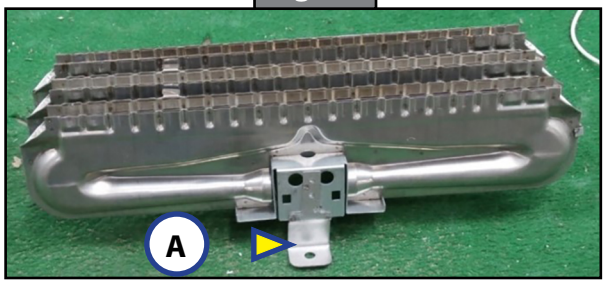
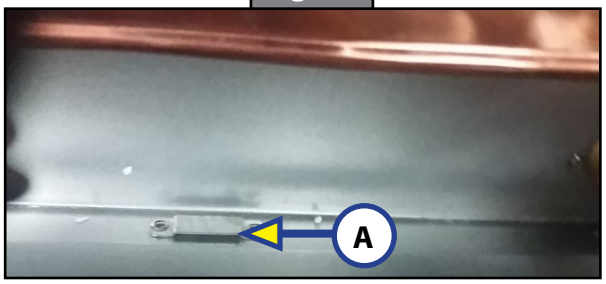
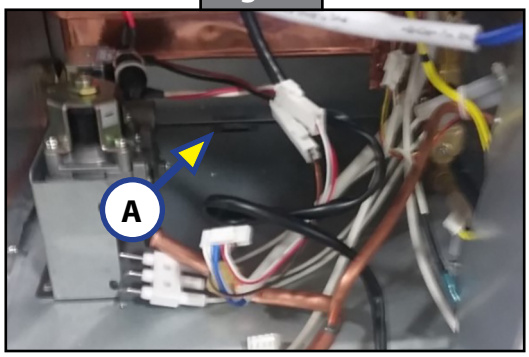


Fig. 70



Reach into the back under the burner (Fig. 71A) and bend the bracket to about a 45° angle to pull the burner bracket out of the catch.

Fig. 71



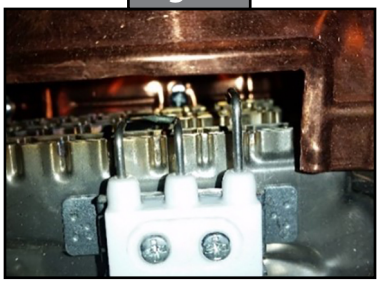
Spark Probe Assembly

This unit has a three post igniter assembly.
High voltage is sent to the igniter from the wires at the top right of the board. One is ground and one is high voltage. There are spade type connectors between the board and the spark probe assembly. Ensure connections are good.

If no spark occurs:

1. Check for cracks on the ceramic of the igniter (Fig. 72).

Fig. 72

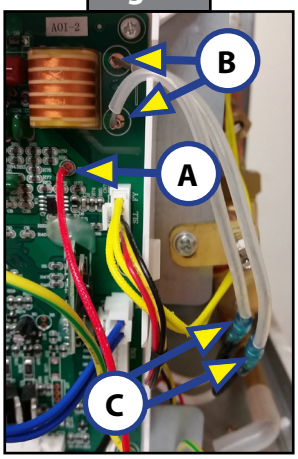


2. Check the flame sensor connections (Fig. 73A) and high voltage output and ground wire connections (Fig. 73B).
3. With insulated pliers, unplug the high voltage wire connector (Fig. 73C) and hold it approximately ⅛" from the case.

NOTE: The clear insulation covers come on newer water heaters.

4. Look for a visible spark. A slow spark is a sign of an igniter problem.

Fig. 73



Flame Sense

- The flame sense probe is the right-hand post of the igniter assembly that wires into the red wire on the control board.
- There is a 7-second trial for ignition. Once the flame is lit and on the flame sense probe, the control board should recognize the flame within one second. The control board then turns off the spark and leaves the gas on. If the flame is not detected, the board continues to spark for the entire 7 second trial. The board then turns off both the gas and the spark. The unit enters a purge cycle for approximately 30 seconds then attempts another trial for ignition. If there is no ignition or the flame is not sensed, the board will go into a lock out fault and E1 will display on the UCP.
- There are two fault codes for flame sense. You will see E2 when you turn off the gas supply to the water heater as it is operating or if you have just enough of a flame during ignition to warm the flame sense probe.

E2: Flame Sensing Interrupted During Normal Operation
Buzzer will sound. Possible causes are the same as indicated by error E1 if any of these conditions occur during normal operation. A lock out will occur also in these conditions.

E9: Flame Sensor Error
This is displayed when a short is detected in the flame sensor. Buzzer will sound. Flame is sensed before ignition.

System Timer

The board turns off the burner and shows an “En” code on the UCP after 20 minutes of operation. Perform a soft reset by turning the hot water faucet off and then back on.

En: System Timer
Water Heater ran longer than 20 min.

FAQs and Troubleshooting

- The new GSWH-2 water heater differs from its predecessors in that it allows the customer to operate the product just as they would a regular tank water heater. Meaning, simply turn on the hot side and add cold water to the desired temperature.
- The tank-less water heater is efficient. When the hot water faucet is turned on, the water heater comes on and immediately begins making hot water at the SET temperature. We recommend 115°F since this is the most efficient temperature in both propane savings and usability. Of course, the temperature setting can be adjusted from 95°F to 124°F (35°C to 51°C).
- One of the advantages of this product is that the UCP will show the customer what it is doing during operation. An added feature is that most faults or defects will be displayed on the UCP's display screen, thus eliminating the time spent to determine what might be wrong when it is not operating properly.

Some of the most common concerns:

Hot water takes too long to get to the shower or another faucet.

- The water heater begins making hot water as soon as the hot water faucet is turned on.
- The time it takes to get to the faucet is determined by the length of piping from the water heater to the faucet. This is determined by the plumbing configuration of the RV. A tank water heater will do the same thing. If a person is primarily a dry camper, there are now devices that can be installed in the RV that will eliminate this problem.

Water heater does not start up when faucet is turned on (no fault code or water flow icon on display).

- Be sure on/off switch is turned on outside.
- Be sure UCP switch is turned on.
- Outside, remove cover on control board. Look for green LED. If the green light is on, power is coming into water heater. If it is not on, check fuse and wiring. Check for separate on/off switch in RV.
- See if there is a red LED illuminated on the board. This indicates that the incoming voltage is too low
- Test water flow. Must have at least .8 GPM. Does flow seem low out of faucet? Open different faucets. Take strainer off one faucet.
- Confirm that water lines are connected properly. Hot to hot, cold to cold.
- Does customer use a flow restricter on the incoming water line? If so, remove.
- Does customer use a water filter? Is filter clean?
- Using a gallon container, check to see how much flow is coming out of the faucet. If the water flow is less than 1 GPM than have customer fill freshwater tank and run off the pump.
- If more than 1 GPM, replace flow sensor.

Water heater come on and then locks out with an E-1 code (ignition failure or accidental flame off).

- Confirm that gas tank is turned on and that they have propane in the tanks.
- If this is the first start up, or a refilled tank, consider that the customer needs to try multiple times for startup. Turn the burners on the range to get the gas moving through the system.
- Tap on the gas valve. If it starts, then replace the gas valve.
- Smell for gas coming out of the exhaust.
- If the weather is cold, do they have enough propane in the tank?
- Is the regulator on the tank working?
- Replace gas valve.

Water heater comes on and immediately gives an E-5 code (motor failure).

- Confirm that motor is not jammed by physically turning the blower under blower housing.
- Check the wire CN1 wire connection at the control board.
- Replace motor or water heater.

Water heater blower motor does not come (no fault code - water flow icon is on).

- Confirm that motor is not jammed by physically turning the blower under blower housing.
- Check the wire CN1 wire connection at the control board.
- Replace the control board.

Water heater comes on and then give E-8 code (air pressure switch).

- Confirm that nothing is blocking the exhaust vent.
- Confirm that the plastic tube is connected to the blower and pressure switch.
- Check the lock nut at the bottom of the blower, where the plastic tube attaches. If it is loose, tighten.
- Look through the exhaust and confirm that the petit tube is facing away from the blower wheel. (Works with suction)
- Confirm wires are attached properly.
- Replace pressure switch.

Water heater comes on and then goes to an E-3 code (ECO tripped).

- Confirm that the customer has enough water pressure.
- Have customer set thermostat to 115 degrees or lower.
- Jump ECO to confirm that the ECO is not defective. If the W/H works properly then replace ECO.
- If customer is in very hot conditions, he may have to replace the current ECO with a higher degree one.

Water heater burner comes on and then shuts off/on and off

- Confirm gas line connection is not kinked.
- Confirm tank regulator is working properly.
- Confirm that electrode wires are properly connected.
- Confirm that electrodes are installed correctly, and not loose.
- Listen for SLOW sparking at the electrodes, if so, replace electrodes.
- Replace board.

Customer cannot control the temperature from set point, get too hot and then too cold.

- Purge water lines.
- Water pressure too low. Some campgrounds have the water pressure very low. Try putting water in the freshwater tank and running off the pump.
- Set temperature lower.
- Partial bypass may be opened.
- Outside shower faucet may be turned on and the shower button is closed. Same for inside shower.
- Outlet temperature probe may be defective.
- Replace water heater.

Malfunction 1: Unit does not attempt to light when water is turned on

Error codes: E0, E3, E4, E5, E7, E8, E9.
If any error codes are displayed, proceed as follows:

Error code E0: Water outlet temperature probe failure
An open circuit or short circuit condition is detected. This could be due to an internal failure in the temperature probe or to a faulty connection in the wires.
1. Verify connections to the probe.
2. Verify with a voltmeter the resistance of the outlet probe.
3. If the outlet probe has an open circuit or a short, install a new probe.

Error code E3: ECO open before ignition or during normal operation
This occurs if the ECO thermostat opens. Under normal circumstances, this is due to the water temperature at the outlet exceeding 140°F (60°C). The cause must be identified and removed before restarting the unit.
1. Verify with a voltmeter that the resistance of the ECO is not an open circuit.
2. Let water flow through the unit to cool it off.
3. If needed, install a new ECO.

Error code E4: Water inlet temperature probe failure
An open circuit or short circuit condition is detected. This could be due to an internal failure in the temperature probe or to a faulty connection in the wires.
1. Verify with a voltmeter the resistance of the inlet probe.
2. If the inlet probe has an open circuit or a short, install a new probe.

Error code E5: Blower motor failure
No motor signal was detected before ignition or during normal operation. This could be also caused by a wiring fault in the motor connections**.**
1. Verify motor power connection.

Error code E7: Linear valve failure
The controller module detects an open circuit in the linear valve control circuit before ignition or during normal operation indicating a faulty valve.
1. Inspect linear valve.

Error code E8: Air pressure switch
Air pressure switch not detected for 7 seconds before ignition is cut off for 2 seconds during normal operation. This failure may be caused by a faulty motor or a blockage in the air supply or in the exhaust system.
1. Inspect air pressure switch.

Error code E9: Flame sensor
Flame is sensed before ignition. Buzzer will sound. This is displayed when a short is detected in the flame sensor.
1. Check to see if there is a short in the flame sensor (i.e., sensor touching burner or wires shorted).

Malfunction 2: Unit attempts to light but does not ignite the gas

Error code E1: Ignition failure or accidental flame off during ignition
If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds, the gas valve is de-energized, and a new inter-purge and ignition routine will begin. If the burner does not light, the control will de-energize the gas valve and will make two attempts to relight the burner. If the burner does not relight after three trials, the control will go into LOCKOUT and the unit will need to be

turned off before it can operate again. This could occur for a number of reasons.

1. Inspect major components and verify that none of the following conditions are present:
   - Lack of gas in the tank
   - Faulty igniter (no spark)
   - Faulty igniter connections
   - Improper distance between the igniter and the burner
   - Accumulated dirt or obstruction between igniter and burner
   - Low gas inlet pressure
2. Correct any improper condition and install a new igniter if needed.

Malfunction 3: Unit ignites the gas but shuts off soon after

Error code E2 Flame sensing interrupted during normal operation. Buzzer will sound.
Possible causes are the same as indicated by error code E1. If any of these conditions occur during normal operation, a LOCKOUT will occur also in these conditions.

1. Check if buzzer sounds to indicate flame sensor failure.
2. Follow the same procedures outlined for **Malfunction 2** above, looking specifically at the igniter electrodes.

Malfunction 4: Unit shuts off while running

Error code E3: ECO open before ignition or during normal operation
This occurs if the ECO thermostat opens. Under normal circumstances, this is due to the water temperature at the outlet exceeding 140°F (60°C). The cause must be identified and removed before restarting the unit.

1. Make sure that the ECO is not open. If it is, run cold water through the unit to cool off the ECO.
2. Follow the same procedures outlined for Malfunction 2 above.

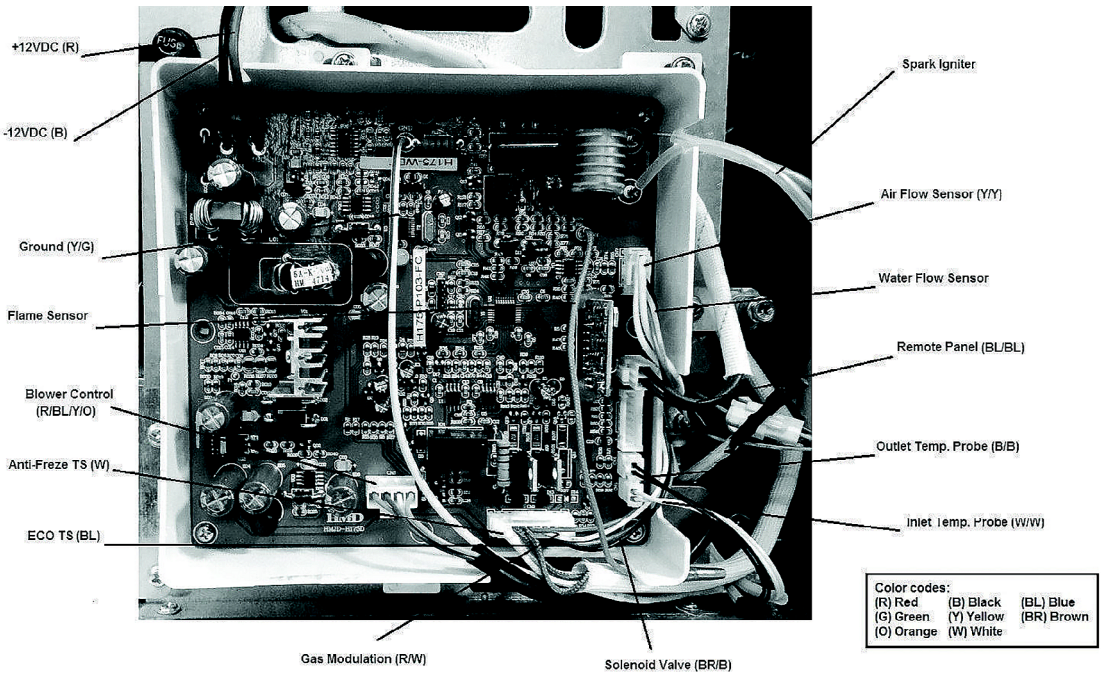
Malfunction 5: Water output temperature is lower than indicated on the UCP

1. Verify the manifold pressure of the gas at the test port using the manometer.
2. Make sure that the voltage applied to the mother board is >11V.
3. Verify accuracy of the outlet temperature probe using a thermocouple or thermometer.

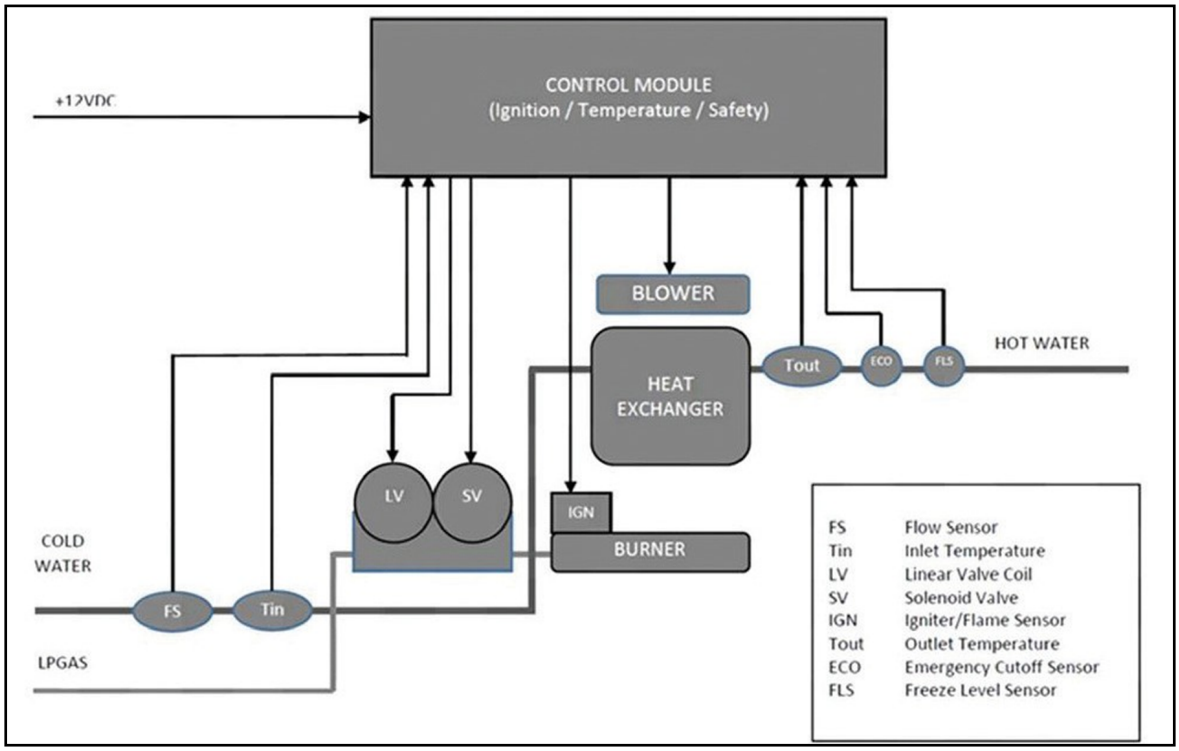
Malfunction 6: Unit is too noisy

1. Inspect motor and blower assembly to determine a cause.

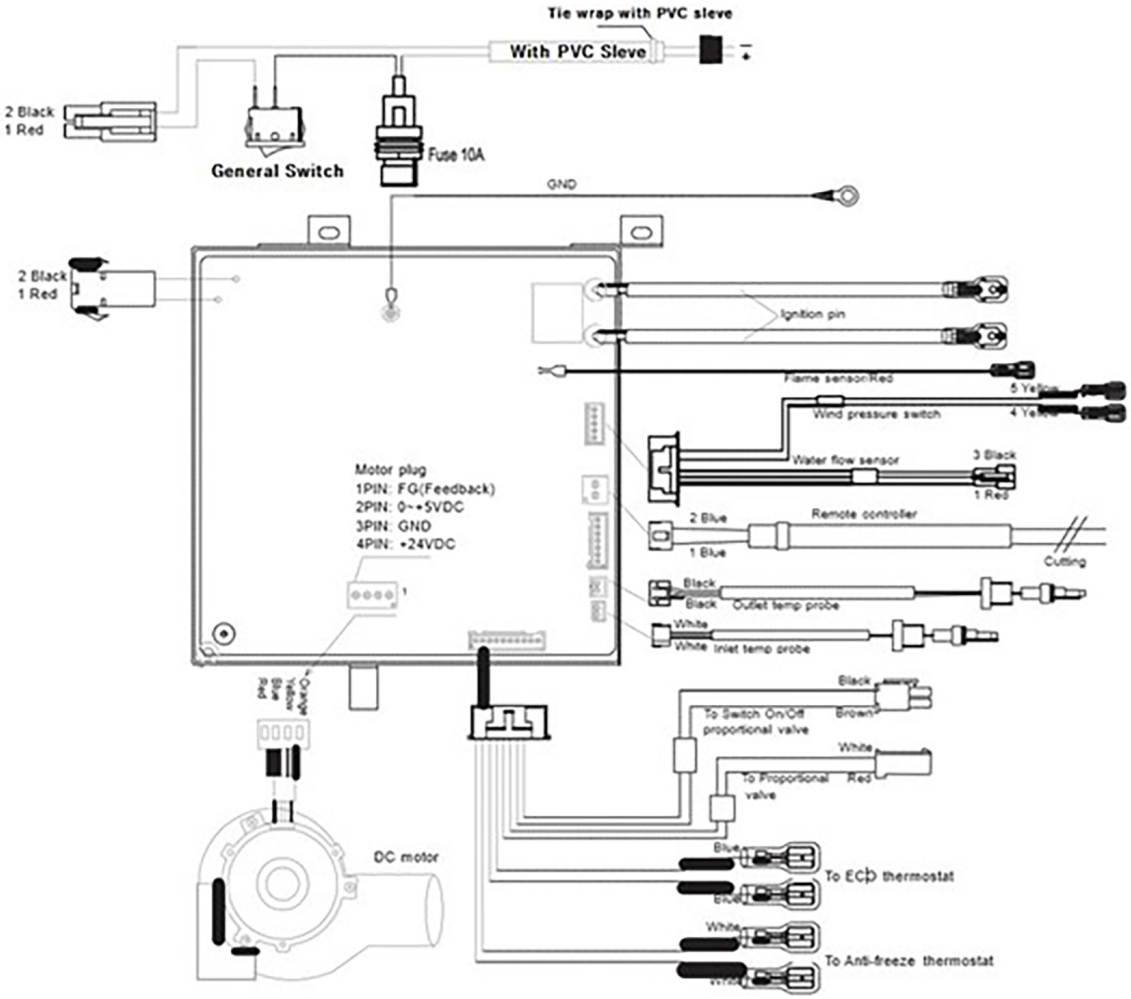
Control Board Diagram



Functional Diagram



Wiring Diagram



This page intentionally blank.

FURRION®

Furrion, LLC (Furrion) are wholly owned subsidiaries of Lippert Components, Inc. (Lippert)
Furrion, LLC (Furrion) sont des filiales en propriété exclusive de Lippert Components, Inc. (Lippert)
Furrion, LLC: 52567 Independence Ct., Elkhart, IN, 46514

Furrion Innovation Center & Institute of Technology
Centre d'innovation et institut de technologie Furrion
22244 Innovation Drive, Elkhart, IN 46514-5514, USA
Toll free/Numéro gratuit/Línea telefónica gratuita:1-800-789-3341
Email/Courriel/Correo electrónico: customerservice@lci1.com

For Patent Info: www.Lippert.com/patents
Pour des informations sur les brevets: www.Lippert.com/patents

SUPPORT.LCI1.COM/FURRION

LIPPERT®

Please recycle all obsolete materials.

Les renseignements contenus dans le présent manuel peuvent seulement être distribués sous forme de document complet, à moins de recevoir l'approbation explicite de Lippert Components pour distribuer desparties individuelles. Tous les renseignements contenus dans le présent manuel peuvent être modifiés sans préavis. Les éditions révisées pourront être téléchargées gratuitement sur le site lci1.com. Ces renseignements sont considérés comme étant factuels jusqu'à ce qu'une version révisée les rende désuets.

Veuillez recycler tout le matériel désuet.

For all concerns or questions, please contact Lippert.
Communiquer avec Lippert Components si vous avez des questions ou des préoccupations.
Ph: 432-LIPPERT (432-547-7378) | Web: lippert.com | Email: customerservice@lci1.com