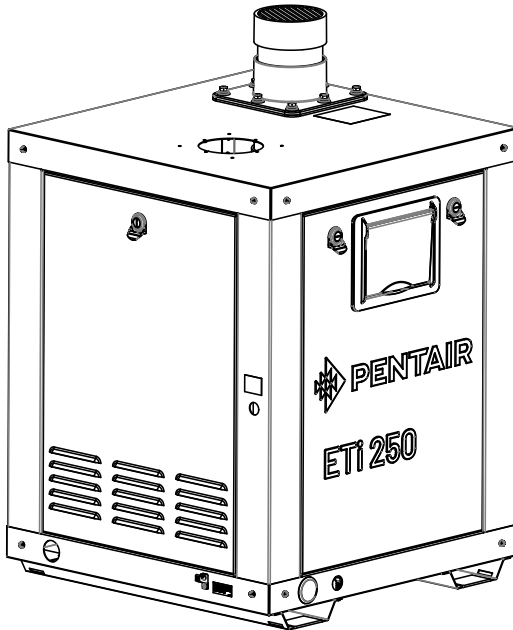




ETi[®] 250 POOL HEATER
PROPANE CONVERSION KIT
NATURAL GAS TO PROPANE (LPG)
[ETi 250 Heater Kit P/N 476370]

INSTALLATION INSTRUCTIONS



IMPORTANT!
WARNING! FOR YOUR SAFETY: THIS PRODUCT
MUST BE INSTALLED AND SERVICED BY
AUTHORIZED SERVICE PERSONNEL
QUALIFIED IN POOL/SPA INSTALLATION

Customer Service and Technical Support

8 AM to 7:30 PM Eastern Time/Pacific Time

Phone: (800) 831-7133

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IMPORTANT WARNING AND SAFETY INSTRUCTIONS



SERIOUS BODILY INJURY OR DEATH CAN RESULT IF THIS PRODUCT IS NOT INSTALLED AND USED CORRECTLY.



INSTALLERS, POOL OPERATORS AND POOL OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS BEFORE USING THE ETI® 250 HEATER.



Most states and local codes regulate the construction, installation, and operation of public pools and spas, and the construction of residential pools and spas. It is important to comply with these codes, many of which directly regulate the installation and use of this product. Consult your local building and health codes for more information.



IMPORTANT NOTICE - Attention Installer: This Installation Guide (“Guide”) contains important information about the installation, operation and safe use of this product. This Guide should be given to the owner and/or operator of this heater.



Before installing this product, read and follow all warning notices and instructions in this Guide. Failure to follow warnings and instructions can result in severe injury, death, or property damage. Call (800) 831-7133 for additional free copies of these instructions. Please refer to www.pentair.com for more information related to this products.

IN CANADA: THE CONVERSION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROVINCIAL AUTHORITIES HAVING JURISDICTION AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATURAL GAS AND PROPANE INSTALLATION CODE CSA B149.1.



Failure to follow instructions could result in fire or explosion with serious injury or property damage. This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer’s instructions and all applicable codes and requirements of the authority having jurisdiction. The information in these instructions must be followed to minimize the risk of fire or explosion or to prevent property damage, personal injury, or death. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer’s instructions supplied with the kit.

READ AND FOLLOW ALL INSTRUCTIONS IN THIS MANUAL

IMPORTANT WARNING AND SAFETY INSTRUCTIONS

WARNING

Risk of fire or explosion from incorrect fuel use or faulty fuel conversion. Do not try to run a heater set up for natural gas on propane gas or vice versa. Only qualified service technicians should attempt to convert heater from one fuel to the other.

Serious malfunction of the burner can occur which may result in loss of life. Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a Pentair dealer or other qualified agency using factory specified and approved parts.


WARNING

Risk of explosion if a unit converted to propane gas is installed in a pit or other low spot. Propane is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult your local building code officials to determine installation requirements of heater relative to propane storage tanks and filling equipment. In Canada, Installation must meet the requirements of the Standard for the Storage and Handling of Liquid Petroleum Gases, CAN/CSA B149.1 (latest edition). In the U.S. installation must meet the requirements of the Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58 (latest edition). Consult local codes and fire protection authorities about specific installation restrictions. Propane (LPG) fired heaters must not be installed in garages in Massachusetts, by order of the Massachusetts State Fire Marshall. For more information, call the Fire Marshall's office.

Install Altitude Limit

THIS KIT IS ONLY INTENDED FOR HEATERS INSTALLED **BELOW 2,000 FT (610 M)** ELEVATION.

HEATERS INSTALLED ABOVE THE 2,000 FT (610 M) LIMIT SHOULD NEVER BE CONVERTED TO PROPANE GAS.

 DANGER **DO NOT INSTALL** propane fueled heaters above 2,000 ft. (610 m). Improper installation can cause damage to the heater, property damage and personal injury (including brain damage), or death. The release of carbon monoxide is colorless and odorless and potentially fatal if received in high doses.

INSTALL ALTITUDE	FUEL TYPE	
	PROPANE	NATURAL GAS
0 – 2,000 ft. [0 – 610 m]	P/N 476370 Propane Conversion Kit	No Kit Required
2,000 – 10,000 ft. [610 – 3,048 m]	DO NOT INSTALL	P/N 462057 High Altitude Conversion Kit
> 10,000 ft. [> 3,048 m]	DO NOT INSTALL	

Required Tools

You will need the following tools and components for this conversion:

- 1 Air orifice (Blue) (P/N 476355)
- 1 Gas orifice with O-ring attached
(Letters "FL" stamped on the Gas Orifice).
- 1 5/16" socket wrench or nut driver
- 1 Channel lock pliers
- 1 Adjustable wrench, 2-1/2" Capacity
- 1 Adjustable wrench, 1-1/2" Capacity
- 1 Flat Blade Screwdriver
- 1 3/16" Hex key (Allen wrench)
- 1 Pipe Sealant approved for use with natural gas or Propane
- 1 Pressure gauge or manometer with range to 14" W.C. (High Pressure Gauge)
- 1 Differential pressure gauge or slope gauge (inclined manometer) capable of reading to a resolution of 0.05" W.C. (Low Pressure Gauge)
- 1 Flue-gas analyzer reading CO2 (optional)

Note: Do not attempt the heater conversion without all the listed tools shown above.

Gas Connection

The heater requires a gas supply of not less than 4" (10.2 cm) wc and not more than 12" (35.6 cm) wc. Gas supply pressures outside of this range may result in improper burner operation. A minimum flowing or dynamic inlet pressure (while the heater is running) of 4" (10.2 cm) wc is required to maintain input rating with no more than 2" wc pressure drop between static and dynamic. The gas supply must be installed in accordance with standard CSA B149.1 or ANSI/NFPA 58 (as applicable), and all applicable local codes. Install a manual shut-off valve and a sediment trap and union located outside the heater jacket. Do not use a restrictive gas cock. The following gas pipe sizes are recommended for propane gas supply piping, with a minimum pipe size of 3/4" (1.9 cm). Check for compliance with local codes.

NOTICE: DO NOT use a corrugated flexible gas line to supply the heater. It will not deliver enough gas (at nominal diameter) to supply heater.

Table 1: Gas Pipe Sizing - STAGE TWO LOW PRESSURE GAS PIPE SIZING

Maximum Equivalent Pipe Length (ft)											
Natural Gas 1000 BTU/FT ³ 0.60 Specific Gravity at 0.5 in. WC Pressure Drop											
Propane Gas 2500 BTU/FT ³ 1.50 Specific Gravity at 0.5 in. WC Pressure Drop											
	Input	1/2"		3/4"		1"		1-1/4"		1-1/2"	
Model	(KBTU)	N	P	N	P	N	P	N	P	N	P
ETi 250	250	*	10	20	50	60	200	200	550	600	*

Table 1: Note (*) A 3/4" (1.9 cm) gas line can be used for up to 2 ft (61 cm) maximum length from the gas valve in addition to the sediment trap.

WARNING

INSTRUCTIONS FOR CHECKING THE GAS PRESSURE THROUGH THE COMBINATION GAS CONTROL VALVE.

Risk of fire and explosion. Improper installation, adjustment, alteration, service, or maintenance of the Combination Gas Control Valve can lead to fire or explosion, causing loss of life, personal injury, or property damage.

These instructions are for the use of qualified service technicians only!

Do not attempt this procedure unless you have been trained and certified in the care and repair of gas-fired appliances!

Do not attempt this procedure if you are not confident about following instructions!

This appliance is equipped with an unconventional gas control valve that is factory set with a manifold pressure of +1.4" wc (POSITIVE not negative). Installation or service must be performed by a qualified service technician or the gas supplier. If this control valve is replaced, it must be replaced with an identical control.

NOTICE: Before converting the heater, make the necessary gas connections to the new gas supply, following the instructions in the ETi® 250 Heater Installation and User's Guide. Verify the maximum and minimum regulated gas pressures from the gas supply. These pressures must be within the range listed on the conversion plate.

Heater Propane Conversion Kit Installation Instructions

1. **IMPORTANT!** Turn off the electrical supply to the heater and turn off the pump.
2. Remove the side panel from the heater to access the Gas Control Valve. Using a flat-blade screwdriver, insert press and turn the screwdriver to unlock the panel. See Figure 1.
3. Close the gas supply SHUT OFF valve to the heater.
4. Turn the heater Gas Toggle switch to the off position.
5. Remove the water manifold and side service panel from the heater.
*Note: After completing the **Gas Supply Pressure Verification Instructions** on page 12, reinstall both heater Service Panels.*

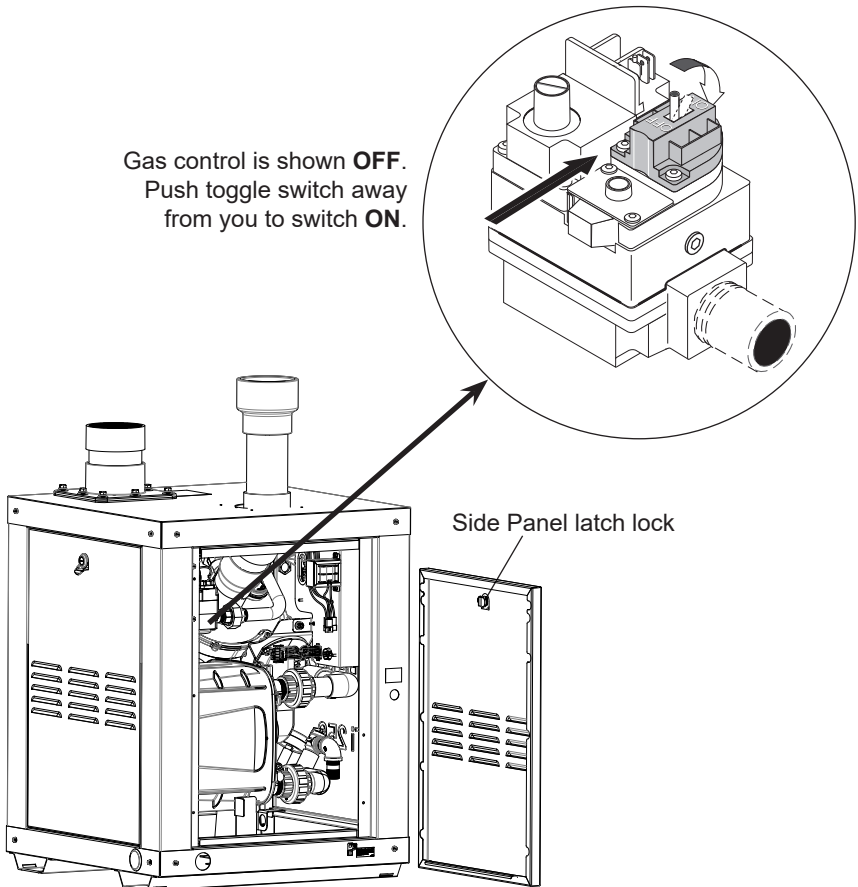


Figure 1.

Propane Conversion Kit Installation Instructions (Continued)

6. Loosen the screw that retains the lower gas train to the enclosure and the union outside the heater to remove the lower gas train. See Figure 2 and 3.

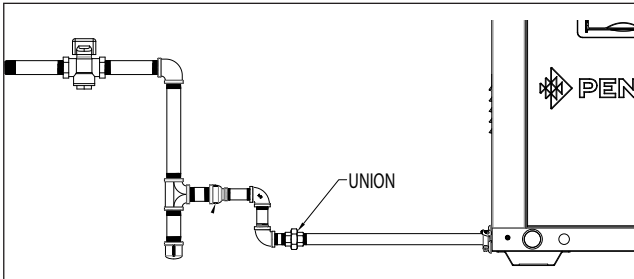
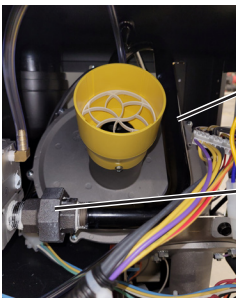


Figure 2.



Figure 3.

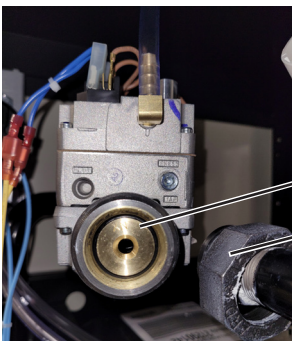
7. **REPLACE GAS ORIFICE:** Use channel lock pliers to loosen the gas train at the gas orifice union (near the gas valve) and replace the GAS ORIFICE with the new one provided. See Figure 5. Discard the old gas orifice. **Be sure that the O-ring is installed around the outside edge of the gas orifice, and the gas orifice is seated flush inside the union.** Tighten the union using channel lock pliers for a good seal. See Figure 4 and 5.



Black pipe
gas train.

ROTATE to loosen the
lower gas train union
as shown in Figure 5.

Figure 4.



Replace the gas orifice inside
the union with the new one. Be
sure the letters "FL" are facing
outward. Tighten the union with
the channel lock pliers.

Union

Figure 5.

Propane Conversion Kit Installation Instructions (Continued)

8. **REPLACE YELLOW AIR ORIFICE WITH NEW BLUE ORIFICE:** Disconnect all the tubing attached to the Yellow air orifice. Use a 5/16" socket wrench or 5/16" ratchet wrench to remove the hex screws from the Yellow air orifice. Discard the Yellow air orifice. See Figure 6.

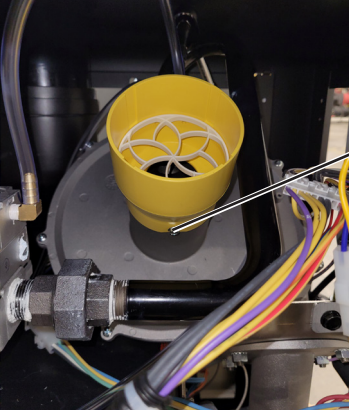


Figure 6.

Remove tubing attached to air orifice. Use a 5/16" socket wrench or nut driver to remove the two air orifice hex screws securing the Yellow air orifice, see Figure 6.

9. **IMPORTANT:** Secure the external lower gas train to the gas pipe located on the exterior of the heater. Tighten the union outside the heater with channel lock pliers and tighten screw to secure lower gas train. See Figure 2 and 3, page 8.
10. **INSTALL NEW BLUE ORIFICE:** Use a 5/16" socket wrench or 5/16" ratchet wrench to secure the Blue air orifice. Reconnect the tubing onto the air orifice, see Figure 7.

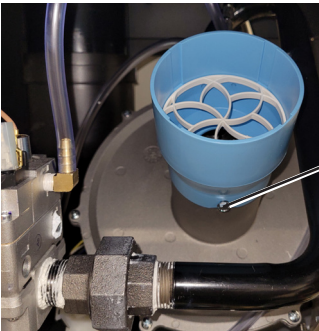


Figure 7.

Use a 5/16" socket wrench or nut driver, to secure the air orifice in place with the two screws

Propane Conversion Kit Installation Instructions (Continued)

11. Remove the Air Flow Switch with the Red line on the label. See Figure 8. Remove the bracket from the Air Flow Switch, attach it to the new Air Flow Switch provided in the kit. Attach the bracket to the heater and secure PVC tubing to Air Flow Switch with the hose clamps included in the kit. See Figure 9.



Figure 8.

Air Flow Switch
(Natural Gas)

Hose Clamps /
PVC Tubing

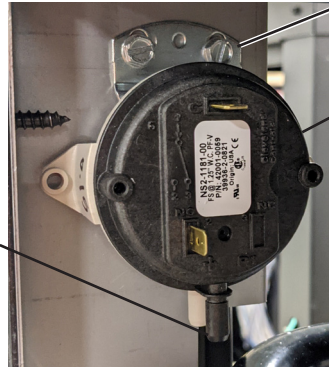


Figure 9.

Bracket

Air Flow Switch
(Propane)

12. **BEFORE PROCEEDING** double check the installation again. Be sure the gas orifice union, and the union outside the heater are tight, and air orifice is seated properly.
13. Switch the gas valve toggle switch back to the on position.
14. Turn on the gas supply valve to the heater.
15. Turn the heater on at the control panel. Be sure it operates properly.
16. Turn on heater. Observe it for smooth ignition and regular combustion without undue noise or pulsation.
17. Run heater for at least 10 minutes. After at least 10 minutes of continuous operation, insert a combustion analyzer probe into the exhaust and measure CO₂. The recommended CO₂ range for Propane combustion is listed below.

Table 3. ETi 250 Heater Flue Gas CO₂ Range

Fuel	Recommended CO ₂ (Dry Basis)
Propane	9.6% – 10.2%

Continue to next page.

Propane Conversion Kit Installation Instructions (Continued)

18. If the combustion is satisfactory and the exhaust analysis is within the range, complete the conversion by attaching the conversion plate and label. See Figure 10.
19. **IMPORTANT:** Using a permanent fine-tip marker, mark on the conversion label the date of conversion and the name and address of the party making the conversion. Attach the conversion label on the area reserved for it on the existing appliance label. Using an alcohol swab, clean the surface before attaching the label. Peel off the backing strip and apply the label with uniform pressure over the entire surface. See Figure 11.

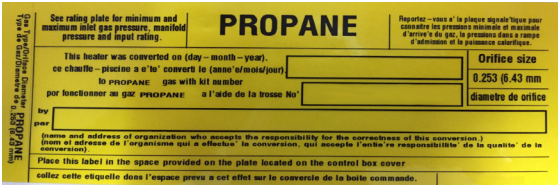


Figure 10.

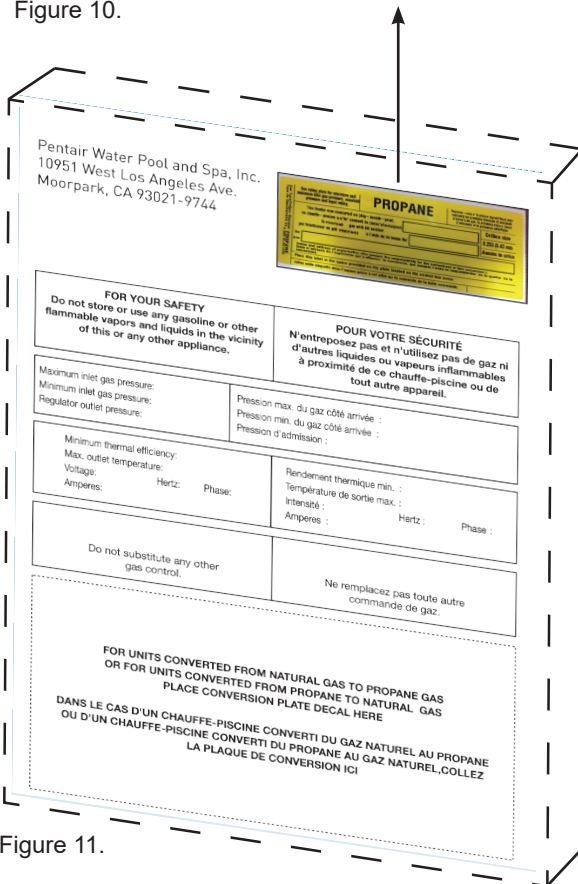


Figure 11.

Gas Supply Pressure Verification and Instructions

After completing the Propane Conversion Kit Installation Instructions (page 2-12) proceed to steps 1-12 to verify the gas supply pressure as follows:

1. Use a 3/16" hex key to remove the plug from the PRESSURE TAP port on the outlet side of the Combination Gas Control Valve.
2. Install a 1/8" NPT barbed fitting into the 'PRESSURE TAP' port on the outlet side of the gas valve. Use a flexible tube to connect it to the HIGH side of a differential pressure gauge or a slope gauge. This gauge will measure low (outlet) pressure, which requires a high degree of resolution.
3. Turn on the manual gas shutoff valve.
4. Before operating the heater, leak-test the heater and all its gas connections with soapy water.

⚠ WARNING! Risk of fire or explosion. Never test for gas leaks with an open flame.

5. Turn on electricity to heater and start the pump.
6. Turn on the heater.

NOTICE: If you are using a slope gauge, close the shutoff valve of the gauge to avoid pulling the liquid out of the gauge when the blower starts.

Table 2.

Replacement Propane Orifice Size Code			
Model ETi 250	P/N	ID Stamp	Diameter in (mm)
	476357	FL	0.255 in (6.48 mm)

7. After the burner lights, verify that the supply pressure is within the range 4" to 12" wc. If the supply pressure drops below this range when the burner ignites, the gas line capacity may be inadequate, and should be increased.
8. With the burner still on, disconnect the plastic hose between the gas valve and "VENT" tap and the blower mixer inlet. The pressure gauge should then read **+1.4" ±0.1" WC** (POSITIVE not negative). If the pressure is outside the range listed, call the factory at **1-800-831-7133**. Do not try to adjust the pressure yourself.

Sequence of Operation

An electronic temperature sensing thermistor in the manifold adapter inlet controls the heater operation. When the inlet water temperature drops below the temperature set on the operator control panel, the control board supplies power to the combustion air blower through a series of safety interlocks. The heater interlocks consist of;

- water pressure switch (PS), which senses that the pump is running,
- the high limit switch (HLS), which opens if the heat exchanger outlet temperature goes above 135° F (57° C), and
- the air flow switch (AFS), sense the pressure drop across the air metering orifices.
- the thermal fuse (TF) open if the flue gas temperature reaches 187° F (86° C).
- the automatic gas shut-off switch, which open if the heat exchanger outlet temperature goes above 150° F (66° C).
- the float switch which opens if the condensate overflows at the float switch due to blockage in the condensate drain hose or neutralizer cartridge.
- the stack flue sensor (SF), which shut down the heater if the flue gas temperature reaches 170° F (77° C).

The Air Flow Switch (AFS) sense the pressure differential the air metering orifice. As soon as there is sufficient air flow, the AFS closes, completing the circuit to the Gas Ignition Control board. The gas ignition control then opens the gas valve and the fuel mixture is ignited by the Direct Spark Ignition (DSI). On a call for heat, the blower is energized the gas valve opens simultaneously as the direct spark igniter are energized, then ignition occurs. The heater is equipped with a digital operating control that enables the user to pre-set the desired pool and spa water temperatures. The control enables the user to select between pool and spa heating, and features a digital display that indicates the water temperature.

Heater Specifications

Inlet Pressure:	
Min./Max:	4" / 12" WC
Manifold Pressure:	
Reference to Blower inlet tap:	+1.4" WC (POSITIVE not negative)
Required Gas Input (BTU/Hr):	250,000 BTU/Hr
Model: ETi250 Heater	

Parts List

Description	Qty.	P/N
Air Flow Switch	1	42001-0059
Air Orifice, ETi250, Propane	1	476355
Gas Orifice (FL)	1	476357
O-ring	1	U9-370
Installation Instructions	1	476454
Propane Conversion Label	1	476448
Hose Clamp 0.38 OD Tubing	2	34116-4031
Screw 10-16 X 0.5" HEX WSHR	2	37336-4104
Grill Air Orifice	1	42001-0114



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P/N 476454 REV. B 8/23/22