

Firetube Giant FTG 2000-2400

NATURAL GAS TO LP CONVERSION INSTRUCTIONS:



Version Date: 2024-02-13

Kit Number: 99985758-1

WARNING

This conversion shall be performed by a qualified installer, service agency, or the gas supplier in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, an explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified installer, service agency, or the gas supplier is responsible for the proper application of these instructions. The conversion 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, which necessitates the use of a calibrated CO₂/O₂ and CO combustion analyzer.

NTI boilers are factory equipped to operate with Natural Gas. **BEFORE OPERATING WITH PROPANE** the boiler's gas valve must be adjusted according to these instructions. Use the procedures outlined in these instructions to fully complete the Natural Gas to LP conversion.

Kit Contents:

- Natural Gas to LP Conversion Instructions (p/n 99985759)
- Natural Gas to LP Conversion Decal (p/n 99986947)

WARNING

These instructions **CANNOT** be used to convert NTI appliance models not referenced in these instructions. Contact NTI for the Natural Gas to LP conversion kit and instructions for other models.

WARNING

Failure to apply these instructions properly may result in dangerous Carbon Monoxide levels, fire or explosion leading to property damage, personal injury or death.

ATTENTION: LIQUEFIED PETROLEUM (LP) PROPANE

Liquefied Petroleum (LP) propane gas is heavier than air; therefore, it is imperative that your boiler is not installed in a pit or similar location that will permit heavier than air gas to collect. Local Codes may require appliances fueled with LP gas be provided with an approved means of removing unburned gases from the room. Check your local codes for this requirement.



NTI # 99985759

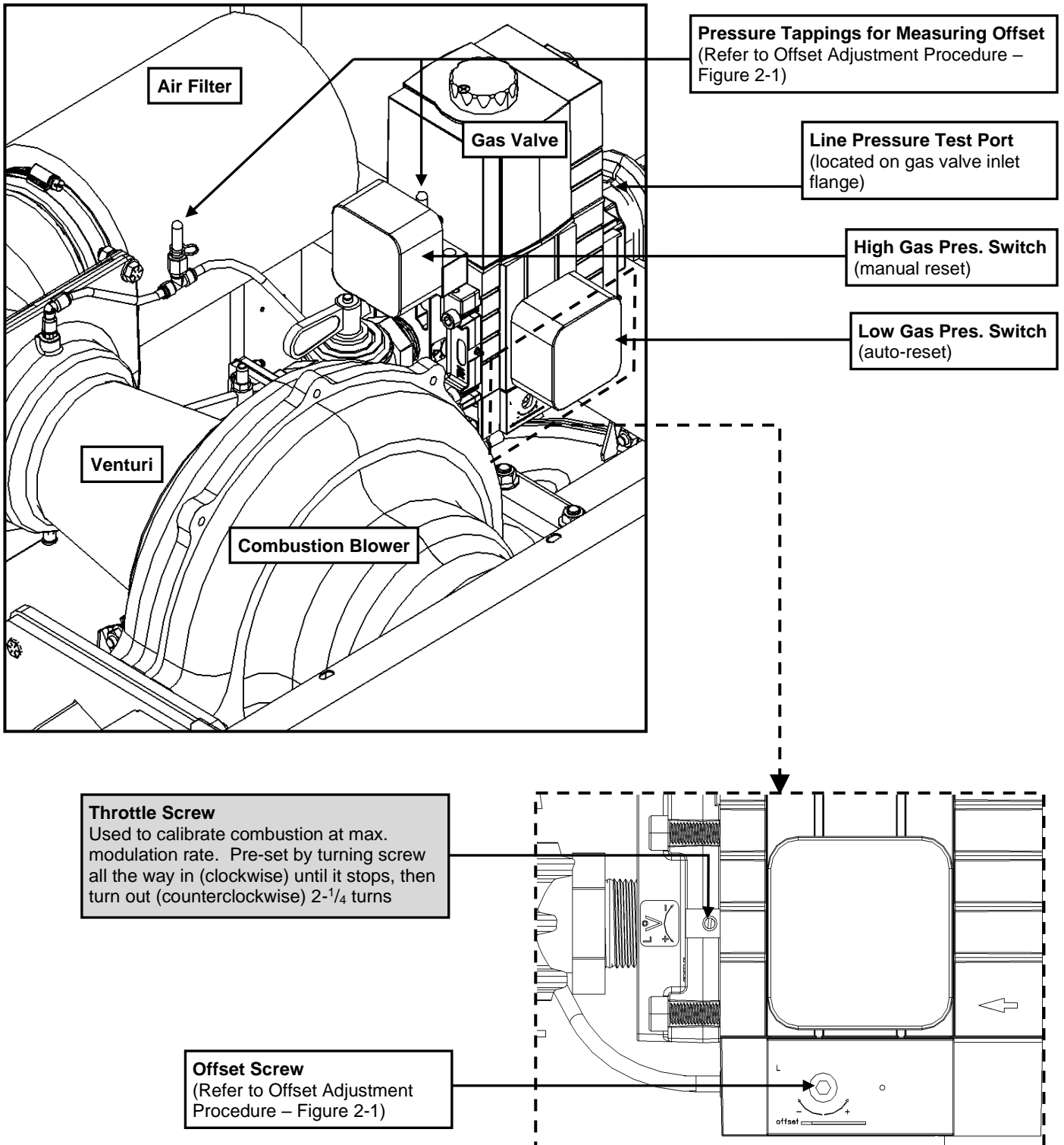
1.0 Adjusting the Gas Valve

NOTICE

The FTG 2000, FTG 2200 & FTG 2400 are converted from Natural to LP Gas by adjusting the Throttle Screw located on the gas valve; unlike most LP conversions an LP orifice is **NOT** used.

1. Locate the Throttle Adjustment Screw on the gas valve, see Figure 1-1.
2. Turn the Throttle Screw all the way in (clockwise until it stops).
3. Turn the Throttle Screw counterclockwise (out) 2-1/4 turns.
4. Proceed to Section 2.0, *Gas Valve and Burner Setup*, for instructions on how to test the Gas Line Pressure, perform the Combustion Calibration, and test the Gas Valve Offset Pressure.

Figure 1-1 Gas Valve Assembly



2.0 Gas Valve and Burner Setup



WARNING

Failure to perform the Gas Valve and Burner Setup correctly may result in incorrect operation, component failure, property damage, serious injury or death.

Operating Sequence

Prior to commencing the Gas Valve and Burner Setup, perform the following operating sequence check:

1. Turn the supply of gas to the boiler off.
2. Set the thermostat to the highest setting.
3. Ensure the combustion fan pre-purges for at least 30 seconds prior to activating the igniter.
4. Ensure the combustion fan post-purges for at least 60 seconds prior to reactivating the igniter.
5. Set the thermostat to the lowest setting and continue with the Gas Valve and Burner Setup procedure outlined below.

Combustion Calibration Procedure

To calibrate burner combustion, perform the following procedure using a calibrated combustion analyzer capable of measuring CO₂ and CO from a Natural Gas or Propane burning appliance:

1. **Set analyzer** to the appropriate fuel (Propane).
2. **Gas Line Pressure Test** – monitor gas line pressure throughout all combustion tests and verify it is maintained within tolerance. See *Gas Line Pressure Test* below.
3. **Set Throttle Screw** – operate burner to the maximum modulation rate (see Table 2-2); set combustion according to Table 2-1 using the Throttle Screw; allow time for the analyzer readings to stabilize between adjustments – record CO₂ value. See *Throttle Screw Adjustment* below.
4. **Set Offset Screw** – operate burner to the minimum modulation rate (see Table 2-2); using the Offset Screw, set the CO₂ to 0.5-1.0% lower than the value obtained during the maximum modulation rate test (e.g. if CO₂ at Max = 10%, then CO₂ at Min must = 9.0-9.5%). Perform the Gas Valve Offset Check/Adjustment procedure detailed in Figure 2-1. See *Offset Screw Adjustment* below.



WARNING

Combustion Calibration is mandatory upon installation and during each annual service. Failure to perform the Combustion Calibration in accordance with these instructions may result in incorrect combustion leading to burner damage or excessive Carbon Monoxide concentrations causing property damage, personal injury or death.



WARNING

Carbon Monoxide - Never leave the unit operating while producing Carbon Monoxide (CO) concentrations in excess of 175 ppm. Failure to follow this warning may result in serious injury or death.

Throttle Screw Adjustment

The gas valve Throttle Screw (see Figures 1-1) is used to calibrate the CO₂ concentration with the burner operating at or near the maximum modulation rate (see Table 2-2). Turning the Throttle Screw in (clockwise) decreases the CO₂ concentration. Turning the Throttle Screw out (counterclockwise) increases the CO₂ concentration. Typical adjustment required is 0 - 1/8th of a turn in or out from the position established in Section 1.0 above.

NOTE:

Calibration of the Throttle Screw should only be performed with the burner operating at or near the maximum modulation rate (see Table 2-2).



WARNING

Adjustments to the **Throttle Screw** may only be made by a qualified gas technician using a calibrated combustion analyzer capable of measuring CO₂ and CO. Adjustments may only be performed if the gas line pressure is maintained above minimum levels throughout the duration of the test (see Table 2-1). Failure to follow these instructions may result in serious injury or death.

Offset Screw Adjustment

The gas valve Offset Screw (see Figures 1-1 & 2-1) is used to calibrate the CO₂ offset at minimum modulation vs. maximum modulation. Making the offset more positive (+) increases the CO₂ concentration at minimum modulation rate; making the offset more negative (-) decreases the CO₂ concentration at minimum modulation rate.

NOTE: Calibration of the Offset Screw must only be performed with the burner operating at the minimum modulation rate (see Table 2-2).

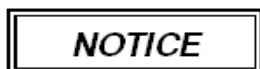


Adjustments to the **Offset Screw** may only be made by a qualified gas technician using a calibrated combustion analyzer capable of measuring CO₂ and CO, and only with the burner at the minimum modulation rate (see Table 2-2). Attempting to set the Offset Screw while the burner is operating at a modulation rate other than the minimum will result in incorrect combustion and may lead to burner damage or excessive CO.

Gas Line Pressure

The boiler gas valve is equipped with a line pressure test port; see Figure 1-1. Use the following procedure to measure the gas line pressure to the boiler to ensure it falls within the range given in Table 2-1:

1. Turn the supply of gas to the boiler off.
2. A bleed screw is located on the inlet flange of the gas valve; open it approximately 1-1/2 turns. See **Line Pressure Test Port** in Figure 1-1.
3. Slide the gas pressure manometer tubing over the bleed screw fitting located on the inlet flange of the gas valve; connect the other end of the tubing to the gas pressure manometer. Ensure both ends of the tubing make a tight connection.
4. Open the supply of gas to the boiler and check for gas leaks.
5. Observe the line pressure under static conditions and compare it to Table 2-1. The pressure will be greatest under static conditions.
6. With all other gas appliances in the application running, operate the burner to the maximum firing rate (see Table 2-2) and compare the observed line pressure with Table 2-1. The pressure will be lowest during the maximum flow of gas.
7. Adjust the gas line pressure to ensure the parameters in Table 2-1 are attained under all conditions (see NOTICE below). If possible, adjust the line pressure to the "Nominal/Desired" value listed in Table 2-1, while the unit is operating at the maximum modulation rate, see Table 2-2.
8. Continue observing the gas line pressure until the completion of the combustion analyses, in case adjustments need to be made.
9. Upon completion of the line pressure testing, turn the gas supply off and close the bleed screw. Turn gas on and check for leaks.



The line pressure is a function of the gas supply and is affected solely by field provided parameters such as line size and regulator settings. Under no circumstances can the boiler gas valve influence or be used to adjust the gas line pressure.



Failure to properly close the **Line Pressure Test Port** bleed screw will cause severe leakage of gas, resulting in a fire or explosion causing property damage, serious injury or death.

Table 2-1 Line Pressure and Combustion Parameters

| Gas | Line Pressure (inches w.c.) | | | Offset Pressure (inches w.c. / [Pa]) ² | CO ₂ (%) ¹ | | Max. CO (ppm) |
|---------|-----------------------------|------|------|--|----------------------------------|------|------------------|
| | Nominal/ Desired | Min. | Max. | | Min. | Max. | |
| Natural | 7 | 4 | 10.5 | -0.01 to 0 / [-3 to -1] | 8.3 | 9.3 | 175 |
| Propane | 11 | 8 | 13 | -0.04 to -0.03 / [-10 to -8] | 9.6 | 10.6 | 175 |

Notes:

¹ Combustion values listed are for burner operation at maximum modulation rate; when tested at minimum modulation rate the CO₂ must be 0.5-1.0% lower than CO₂ at maximum modulation rate.

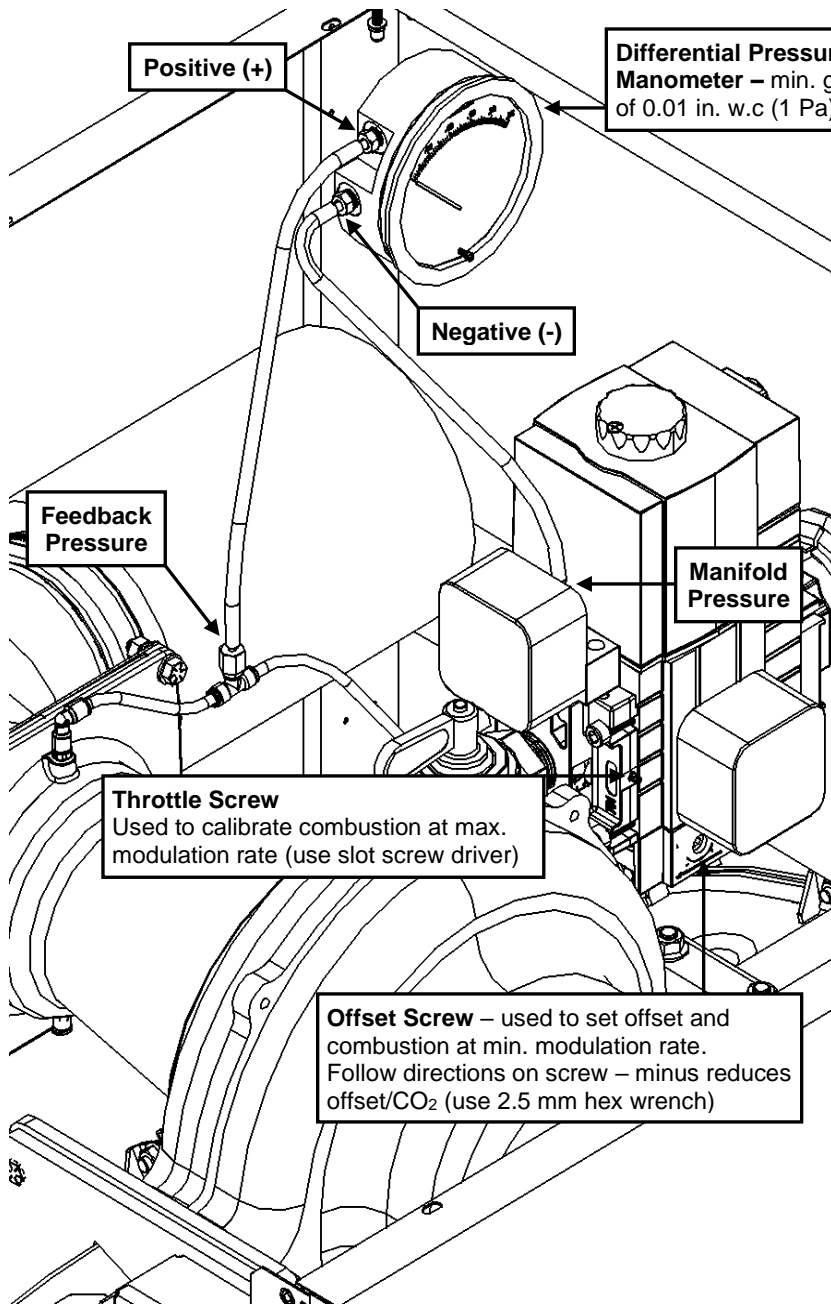
² The Offset Pressure must be checked, and if necessary adjusted, in accordance with the procedure detailed in Figure 2-1.

Table 2-2 Minimum and Maximum Modulation Rates

| Model | Min. Modulation Rate (RPM) | Max. Modulation Rate (RPM) | Input Rate (MBH) | |
|----------|----------------------------|----------------------------|------------------|------------------|
| | | | Min | Max ¹ |
| FTG 2000 | 1050 | 7100 | 235 | 2000 |
| FTG 2200 | 1050 | 7200 | 235 | 2200 |
| FTG 2400 | 1050 | 8000 | 235 | 2350 |

Notes:
¹ Canada: Altitudes between 2000-4500 ft, de-rate by 10%. Consult local authorities for de-rating for altitudes above 4500ft.
² Use *Diagnostic Test*, accessed from the *Diagnostic* menu of the display, to force max. and min. modulation rates; see Appendix A – Controller and Touchscreen Display Instructions, Section 5 DIAGNOSTICS PAGE.

Figure 2-1 Gas Valve Offset Check/Adjustment



Offset Adjustment Procedure:

- 1) **Differential Pressure Manometer** – obtain a meter capable of measuring differential pressure (“+” and “-” ports) with a minimum graduation of 0.01 inches w.c. (or 1 Pa).
- 2) **Installation** – with the burner off, remove the caps from the pressure tapplings. Connect the Feedback Pressure Tapping to the Positive (+) port of the manometer; connect the Manifold Pressure Tapping to the Negative (-) port of the manometer. Verify that the manometer is reading zero – zero the meter if necessary.
- 3) **Calibrate Combustion** – operate burner to maximum modulation rate (see Table 2-2), ensuring gas line pressure is maintained above 4 inches w.c.; set combustion according to Table 2-1 using the Throttle Screw – record CO₂ value.
- 4) **Set Offset** – operate burner to minimum modulation rate (see Table 2-2); set offset pressure according to Table 2-1 using the Offset Screw.

NOTICE: Since the Manifold Pressure Tapping is connected to the Negative (-) port of the manometer, a negative Offset Pressure will read positive; e.g., to achieve an offset pressure of -0.03, manometer will read +0.03.

- 5) **Verify Combustion** – with the burner remaining in operation at the minimum modulation rate, measure combustion and compare to readings obtained during maximum modulation – CO₂ must be 0.5 to 1.0% lower at minimum modulation. If readings are out of tolerance – CONTACT NTI FOR ASSISTANCE.
- 6) **Complete Test** – shutdown the burner, remove the manometer tubing and reinstall the factory caps on Offset Pressure Tapplings.

NOTICE

The Gas Valve Offset Pressure is factory set for Natural Gas; units converted to Propane must have the offset pressure field adjusted. Offset pressure must be checked during each annual service for all applications.

WARNING

Improperly adjusted Gas Valve Offset Pressure will result in incorrect combustion leading to burner damage or excessive Carbon Monoxide concentrations causing property damage, personal injury or death.

3.0 Labeling

As the certified installer of the LP Conversion Kit, you must indicate on the boiler that it has been converted for use with Propane (LP) Gas:

1. **Update Rating Plate Decal** – Locate the rating plate decal on the side of the appliance, using a regular ink pen, check the box next to “Field converted to Propane Gas” and fill in the date; depress hard enough to permanently etch the decal (see Figure 3-1).
2. **Conversion Decal** – Fill out the required information on the Conversion Decal (included in this kit) and affix it to the boiler cabinet adjacent to the rating plate decal, and in a location where it can be easily seen (see Figure 3-2).

Figure 3-1 Update the Rating Plate Decal

| | | | |
|--|--------------------------|--|--|
| FACTORY SET FOR NATURAL GAS Field converted to Propane Gas <input checked="" type="checkbox"/> Date: February 13, 2024 | | ADJUSTER A L'USINE POUR GAZ NATURAL Convertie au propane sur place <input type="checkbox"/> Date: _____ | |
| Gas Pressure [Pression du Gaz] | Natural [Naturel] | Propane | |
| Maximum Inlet Gas Pressure [Pression maximale d'entrée du gaz] | 10.5" wc [2.6 kPa] | 13" wc [3.2 kPa] | |
| Minimum Inlet Gas Pressure [Pression minimum d'entrée du gaz] | 4" wc [1 kPa] | 8" wc [2 kPa] | |
| Manifold Pressure [Pression d'admission] | 0" wc [0 kPa] | 0" wc [0 kPa] | |

Figure 3-2 Conversion Decal

This appliance was converted on 13 / 02 / 2024
 (Day / Month / Year)

to Propane gas, with Kit No. 99985758-1

by Company Name, Street #, City, State/Province, Zip/Postal Code

_____,
 (name and address of organization making this conversion)

that accepts responsibility for the correctness of the conversion.

Reference rating plate for gas input and pressures.