

# Firetube Giant FTG 2000-2400

## NATURAL GAS TO LP CONVERSION INSTRUCTIONS:



Version Date: 2017-08-18

Kit Number: 85758-1



This conversion shall be performed by a qualified service agency 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 service agency 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 CO<sub>2</sub>/O<sub>2</sub> 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 85759)
- Natural Gas to LP Conversion Decal (p/n 85758)



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.



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.

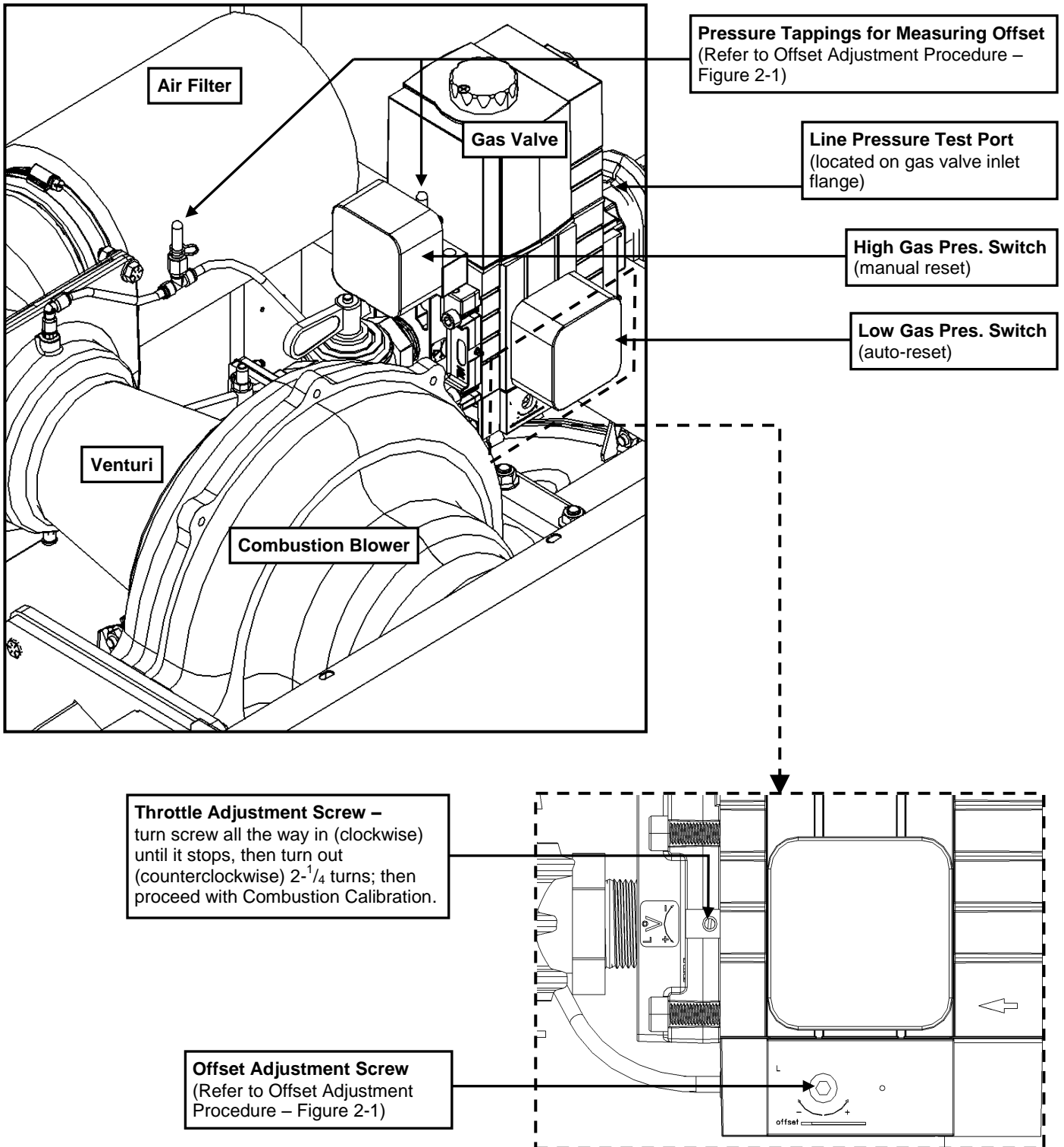
# 1.0 Adjusting the Gas Valve

**NOTICE**

The FTG 2000, FTG 2200 & FTG 2400 are converted from Natural to LP Gas by adjusting the Throttle/Input 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



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

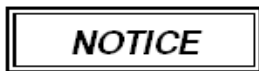
Prior to commencing the Gas Valve and Burner Setup, perform the following operating sequence check:

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.

### 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]) <sup>4</sup>	CO <sub>2</sub> (%) <sup>1,2,3</sup>		Max. CO (ppm)
	Nominal/ Desired	Min.	Max.		Min.	Max.	
Natural	7	4	10.5	-0.01 to 0 / [-3 to -1]	8.7	9.5	175
Propane	11	8	13	-0.04 to -0.03 / [-10 to -8]	10	10.8	175

**Notes:**

- <sup>1</sup> Combustion calibration must only be performed with the burner operating at maximum modulation rate.
- <sup>2</sup> Combustion values listed are for burner operation at maximum modulation rate; CO<sub>2</sub> and CO values will be lower at minimum modulation rate.
- <sup>3</sup> When tested at minimum modulation rate, the CO<sub>2</sub> must be 0.5-1.0% lower than CO<sub>2</sub> at maximum modulation rate.
- <sup>4</sup> The Offset Pressure for models FTG 2000-2400 converted to Propane, must be checked, and if necessary adjusted, in accordance with the procedure detailed in Figure 2-2.

**Table 2-2 Minimum and Maximum Modulation Rates**

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

\* Canada: Altitudes between 2000-4500 ft, de-rate by 10%. Consult local authorities for de-rating for altitudes above 4500ft.



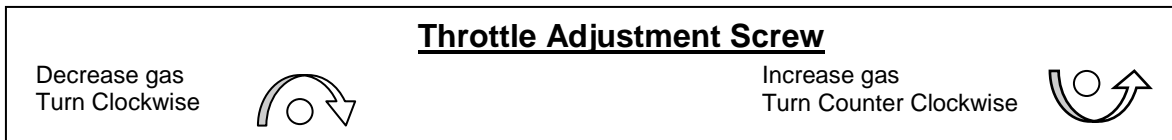
**Carbon Monoxide** - Never leave the unit operating while producing Carbon Monoxide (CO) concentrations in excess of 175ppm. Failure to follow this warning may result in serious injury or death.



Adjustments to the **Throttle Adjustment Screw** may only be made by a qualified gas technician, while using a calibrated combustion analyzer capable of measuring CO<sub>2</sub> 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.

### Flue Gas Analysis and Adjustment

**Throttle Adjustment Screw** – The boiler is equipped with a Throttle Adjustment Screw, located at the Gas Valve; see Figures 1-1 & 2-1; it is used to adjust the flow of gas leaving the Gas Valve entering the Venturi and then the combustion air stream. Turn the Throttle Screw in (clockwise) to reduce the flow of gas, make combustion leaner, and reduce the concentration of CO<sub>2</sub> in the flue gases. Turn the Throttle screw out (counterclockwise) to increase the concentration of CO<sub>2</sub> and flow of gas in the combustion air stream.



**Combustion Calibration** - To calibrate burner operation, perform the following procedure using a calibrated combustion analyzer capable of measuring CO<sub>2</sub> and CO from Natural and Propane Gas burning boilers:

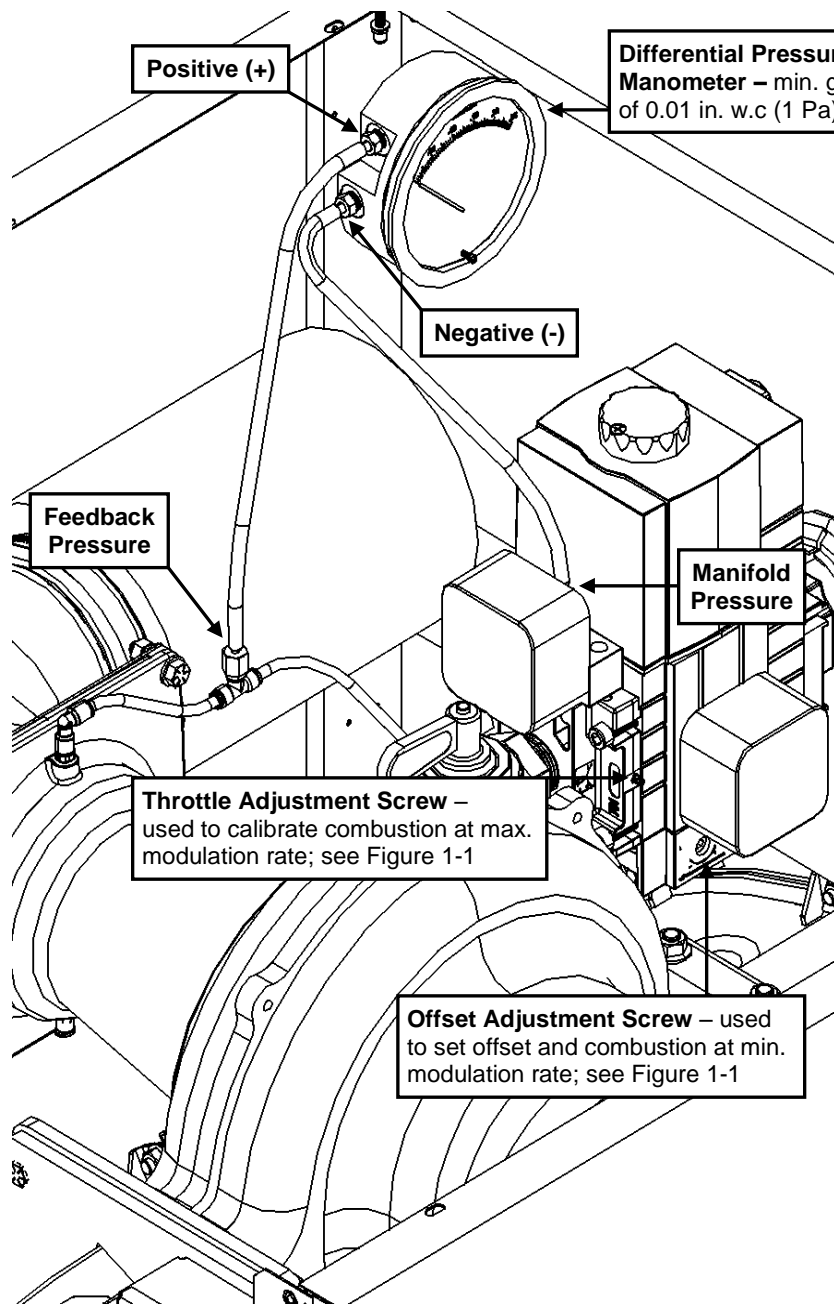
1. Operate the unit at the maximum modulation rate, see Table 2-2.
2. Ensure the gas line pressure is maintained within tolerance, see Table 2-1.
3. While at the maximum modulation rate, measure the CO<sub>2</sub> and CO; adjust as necessary, using the Throttle Screw, to be within the limits listed in Table 2-1.
4. Perform the Gas Valve Offset Check/Adjustment procedure detailed in Figure 2-2.
5. Operate the unit at the minimum modulation rate (see Table 2-2). Ensure the combustion remains smooth and CO<sub>2</sub> and CO values are lower than the values obtained during maximum modulation, as per notes in Table 2-1. If not, do not adjust further, contact NTI for assistance.

Each FTG boiler is factory set to operate with Natural Gas, for boilers field converted to operate with Propane Gas, a **FLUE GAS ANALYSIS AND ADJUSTMENT IS MANDATORY**.



Failure to perform the flue gas analysis and adjustment detailed in this section may result in erratic and unreliable burner operation, leading to reduced efficiency, increased fuel consumption, reduced component life, heat exchanger combustion deposits, and general unsafe operation. Failure to follow these instructions may result in serious injury or death.

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 CO<sub>2</sub> 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 Adjustment 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 – CO<sub>2</sub> 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; only applications operating with Propane need to have the Gas Valve Offset Pressure field adjusted.

**WARNING**

Improperly adjusted Gas Valve Offset Pressure will result in unpredictable burner operating characteristics, which may lead to burner malfunction causing property damage, serious 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**

<b>FACTORY SET FOR NATURAL GAS</b> Field converted to Propane Gas <input checked="" type="checkbox"/> Date: <u>March 29, 2016</u>	<b>ADJUSTER A L'USINE POUR GAZ NATURAL</b> Convertie au propane sur place <input type="checkbox"/> Date: _____	
<b>Gas Pressure</b> [Pression du Gaz]	<b>Natural</b> [Naturel]	<b>Propane</b>
<b>Maximum Inlet Gas Pressure</b> [Pression maximale d'entrée du gaz]	10.5" wc [2.6 kPa]	13" wc [3.2 kPa]
<b>Minimum Inlet Gas Pressure</b> [Pression minimum d'entrée du gaz]	4" wc [1 kPa]	8" wc [2 kPa]
<b>Manifold Pressure</b> [Pression d'admission]	0" wc [0 kPa]	0" wc [0 kPa]

**Figure 3-2 Conversion Decal**

<b>THIS CONTROL WAS CONVERTED FOR USE WITH PROPANE GAS.</b>
This appliance has been adjusted for use with Propane Gas, in accordance with the instructions provided with NTI kit # 85758-1, by <u>John Smith</u> , which accepts responsibility that the conversion was performed properly.
<b>Reference rating plate for Propane Input and Gas Pressure</b>
<div style="display: flex; justify-content: space-between;"> <span>Rev. 2017-04-26</span> <span>NTI Decal # 85758</span> </div>