

# FTVN NATURAL TO PROPANE CONVERSION INSTRUCTIONS

**Applicable Models:  
FTVN085, FTVN110, FTVN150, FTVN199,  
FTVN110C, FTVN150C, and FTVN199C**

## **WARNING**

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. 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 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, WHICH NECESSITATES THE USE OF A CALIBRATED CO<sub>2</sub>/O<sub>2</sub> AND CO COMBUSTION ANALYZER.



## Part 0. General Safety information

**NTI boilers** are factory set to operate with Natural Gas.

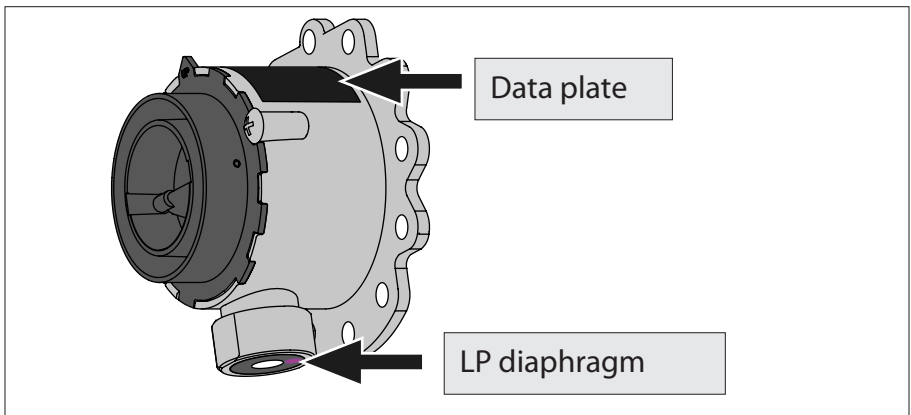
**BEFORE OPERATING WITH PROPANE** the boiler must be converted to Propane using this kit.

Use the procedures outlined in these instructions to fully complete the Natural Gas to LP conversion for models **085, 110, 150, 199, 110C, 150C** and **199C**.

IF THE KIT CONTENTS DO NOT MATCH THOSE SPECIFIED FOR YOUR BOILER MODEL (SEE TABLE 1), DO NOT PROCEED WITH INSTALLING THE LP-CONVERSION KIT, AND DO NOT OPERATE THE BOILER - CONTACT NTI FOR ASSISTANCE.

### Kit Contents:

- Natural to LP Conversion Instructions      nr. 1
- LP Conversion Label                              nr. 1
- LP-Mixer w. Diaphragm (Table 1)           nr. 1
- Gasket for gas pipe                              nr. 2



Model	Polidoro code (MIXER data plate)	LP diaphragm Ø in (mm)
<b>085, 110, and 110C</b>	350_0944_02 or 350_0944_03	6.4 mm
<b>150 and 150C</b>	350_0921_02 or 350_0921_03	
<b>199 and 199C</b>	350_0922_02 or 350_0922_03	6.9 mm

Table 1 - LP Mixer and Gas diaphragm



## 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.

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.

## ⚠ WARNING

### Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

**Breathing carbon monoxide can cause brain damage or death.  
Always read and understand instruction manual.**

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## Part 1 Propane Conversion Procedure

### 1. Install LP-Mixer with LP-Diaphragm

- a. Check that the code of the air / gas mixer and the diameter of the gas diaphragm are those indicated for the model of boiler to be converted – see Table 1.
- b. Turn the 120VAC power supply OFF to the boiler.
- c. Turn the gas supply OFF.
- d. Remove the front cover from the unit.
- e. Remove the silencer.

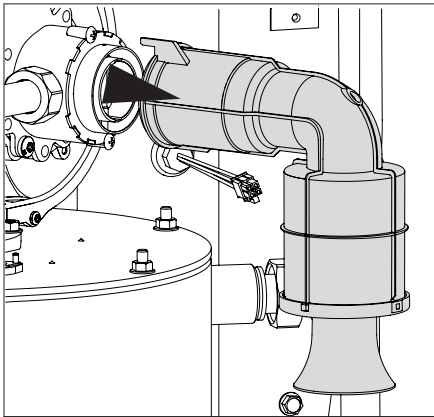


Figure 1 - Remove the Silencer

- f. Unscrew the two nuts and remove the gas pipe.

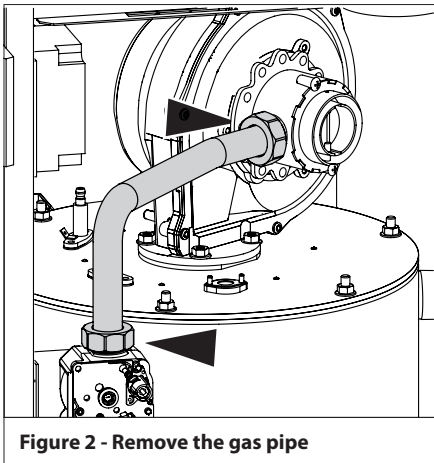


Figure 2 - Remove the gas pipe

- g. Remove the three bolts securing the NG-mixer to the blower and remove the NG-Mixer.

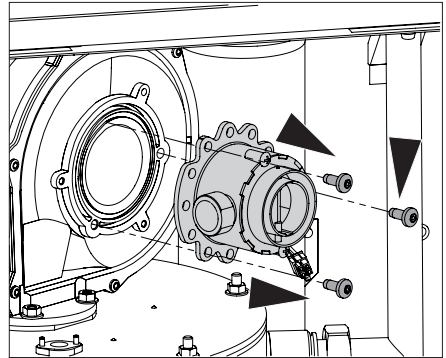


Figure 3 - Remove the NG-mixer

**NOTICE:** 150/150C NG-MIXERS ARE EQUIPPED WITH AN NG DIAPHRAGM LOCATED ON THE MIXER GAS LINE INLET (SEE FIGURE 4 FOR GENERAL DIAPHRAGM LOCATION).

**NOTICE:** SAVE THE NG-MIXER (AND NG DIAPHRAGM FOR 150/150C) IN-CASE THE BOILER NEEDS TO BE CONVERTED BACK TO NATURAL GAS AT A LATER DATE.

- h. Secure the LP-Mixer (with LP Diaphragm) to the blower in the same position as the removed NG-Mixer, reusing the bolts from the previous step.

**NOTICE:** VERIFY THE O-RING SEAL BETWEEN THE MIXER AND BLOWER IS CORRECTLY POSITIONED AND IN GOOD CONDITION BEFORE ASSEMBLING.

### LP - Gas diaphragm

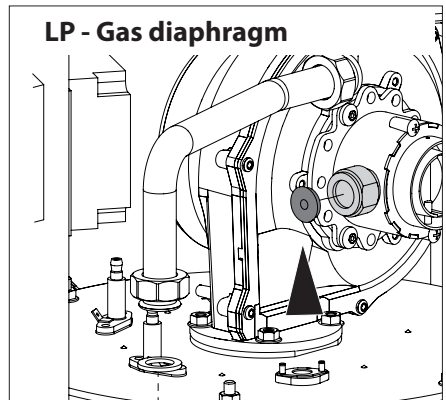


Figure 4 - Insert the LP-diaphragm

## Part 1 Propane Conversion Procedure

- i. Reassemble the gas pipe to the gas valve and mixer.

**ATTENTION!! USE THE NEW RUBBER GASKETS PROVIDED WITH THE KIT.**

- j. Install the silencer.

### 2. Perform preliminary adjustment on gas valve throttle screw 4.

- a. **085, 110, and 110C:** Adjust throttle screw 4 - counter-clockwise **0.5 turns**.
- b. **150, 199, 150C, and 199C:** Adjust throttle screw 4 - counter-clockwise **2 turns**.
- c. Turn the gas supply on and test for gas leaks in all piping.

- d. Perform gas line pressure test and combustion calibration in accordance with Parts 2 and 3.

**NOTICE: 199 and 199C Models ONLY:** ADJUST HIGH AND LOW FAN SPEEDS WHEN CONVERTED TO LP, THE 199 AND 199C MODELS MUST HAVE THE HIGH AND LOW FAN SPEEDS ADJUSTED FROM THE NATURAL GAS DEFAULT VALUES. ACCESS THE TECHNICAL MENU AND ADJUST PARAMETERS 232, 233, AND 234 IN ACCORDANCE WITH **TABLE 4** - MINIMUM AND MAXIMUM GAS FLOW, IN THIS DOCUMENT.

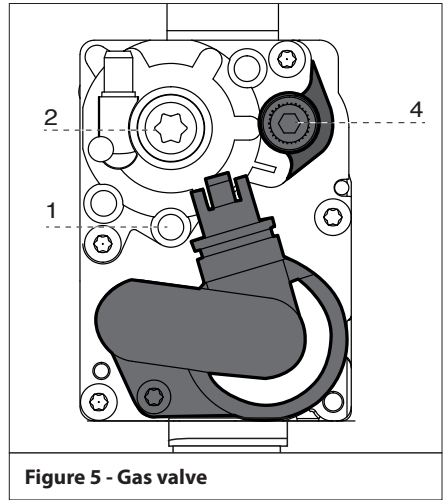


Figure 5 - Gas valve

## Part 2. 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.**

#### 1. Operating Sequence

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

- a. Turn the supply of gas to the boiler off.
- b. Set the thermostat to the highest setting.
- c. Ensure the combustion fan prepurges for a short time prior to activating the igniter.
- d. Ensure the combustion fan postpurges for at least 5 seconds prior to reactivating the igniter.
- e. Set the thermostat to the lowest setting and continue with the Gas Valve and Burner Setup procedure outlined below.

#### 2. Gas Line pressure

The boiler gas valve is equipped with a Line Pressure Test Port; see screw 1, Figure 5. Use the following procedure to measure the gas line pressure to the boiler to ensure it falls within the range given in Table 2:

- a. Turn the supply of gas to the boiler off.
- b. Loosen screw **1 (Torx 10 - Line Pressure Test Port)**. This port is directly connected to the gas line feeding the boiler. See screw 1, Figure 5.
- c. Connect a gas pressure gauge to the line pressure test port using applicable tubing. Ensure both ends of the tubing make a tight connection.
- d. Turn the gas supply to the boiler on and check for gas leaks.
- e. Observe the line pressure under static conditions and compare it to Table 2. The pressure will be greatest under static conditions.
- f. Observe the line pressure with the boiler running, while checking/adjusting the CO<sub>2</sub> at maximum and minimum gas flow rate (see Part. 3). Compare it to Table 2. The pressure will be lowest during the maximum flow of gas.

- g. Adjust the gas line pressure to ensure the parameters in Table 2 are attained under all conditions.

If possible, adjust the line pressure to the "Nominal/Desired" value listed in Table 2 while the unit is operating at the maximum power.

Continue observing gas line pressure until completing of necessary Checking/ Adjusting of the CO<sub>2</sub> (see Part 3), in case adjustments need to be made.

- h. Complete pressure testing. Remove the tubing from the test port and then return the bleed screw of the Line Pressure Test Port to the closed position. Check for gas leaks.

	Line Pressure (inches w.c.)		
	Nominal	Min.	Max.
<b>Natural</b>	7	3.5	10.5
<b>Propane</b>	11	8	13

**Table 2 - Line Pressure Parameters**



### DANGER

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

### NOTICE

**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.**

**! WARNING**

Adjustments to the Gas valve 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 3. Failure to follow these instructions may result in serious injury or death.

**! WARNING**

FAILURE TO PERFORM THE FLUE GAS ANALYSIS AND ADJUSTMENT AS 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.

**1. Preparing the measuring equipment**

Remove the flue test port plug as illustrated, and insert a calibrated combustion analyzer.

**NOTICE**

Make sure the analyzer is set to the appropriate fuel.

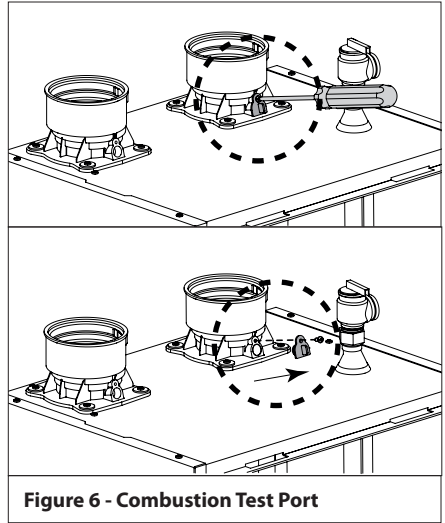


Figure 6 - Combustion Test Port

**! WARNING**

It is required to use a calibrated combustion analyzer to verify final adjustment according to the combustion chart (Table 3). Failure to do so could result in serious personal injury or death.

**! WARNING**

It is very important that the combustion system be set within the recommended CO<sub>2</sub>/ CO measurements listed in Table 3. Visually looking at the burner does not determine combustion quality. Failure to measure combustion with a calibrated combustion analyzer and set the throttle within the recommended CO<sub>2</sub>/CO measurements could result in property damage, severe personal injury, or death.


## Part 3. Checking/Adjusting the CO2



### 2. Checking/Adjusting the CO2 at Maximum Gas Flow Rate (High Fan Speed)

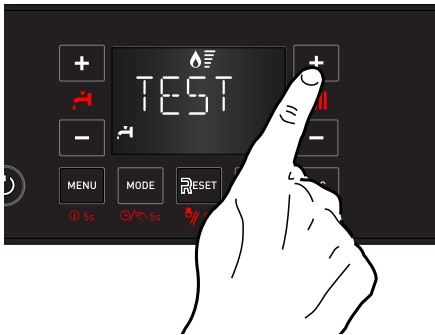
Set the thermostat at the highest possible setting or draw off the domestic hot water at the maximum water flow rate to create a demand for heat.

**NOTE:** For only Heating Boiler Applications, open all thermostatic valves present in the CH circuit. Select the TEST Function by pressing and holding the RESET button for 10 seconds.

**WARNING! WHEN THE TEST FUNCTION IS ACTIVATED THE TEMPERATURE OF THE WATER COMING OUT OF THE BOILER MAY BE MORE THAN 150°F.**

TEST and the  icon will appear on the display when Test Function is active. The boiler will operate at maximum heating power.

Press the  button to operate the boiler at maximum power. The  icon will display.



Wait 1 minute for the boiler to stabilize before carrying out the combustion analyses.

Read the CO2 value (%) and compare it with the values given in the table below:

Gas	CO <sub>2</sub> (%)	CO MAX (ppm)
Natural	8.5 to 10	175
Propane	9.5 to 11	175

Table 3 - CO2 max-min

**ATTENTION: The CO2 at minimum gas flow must not be set higher than the CO2 reading a maximum gas flow; it may be set lower by as much as 1.0%, e.g., if CO2 at Max. = 9.5%, then CO2 at Min. must = 8.5-9.5%.**

**ATTENTION!! VALUES MUST BE OBTAINED WITH THE FRONT COVER INSTALLED.**

If the CO2 reading differs from the values given in the table, then adjust the gas valve following the instructions below. Otherwise move directly to next operation.

#### ADJUSTING THE GAS VALVE AT MAXIMUM GAS FLOW

Adjust the gas valve by turning setting screw **4** clockwise to increase the CO2 level; counterclockwise to reduce the CO2 level (1 turn adjusts the CO2 level by approximately 0.3%). Wait 1 minute after each change in setting for the CO2 value to stabilize.

If the value measured corresponds to the value given in Table 3, max adjustment is complete.

Otherwise continue the setting procedure.

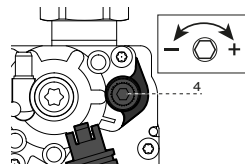


Figure 7 - Max CO2 Adjustment




#### ATTENTION!!

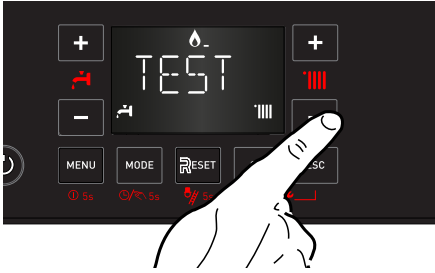
Test Function will automatically deactivate after 30 minutes.

Test Function can be turned off manually by pressing the RESET button.



### 3. Checking/Adjusting the CO2 at Minimum Gas Flow (Low Fan Speed)

With Test Function active, press the  button to operate the boiler at minimum DHW power. The  and  icons will display.



Wait 1 minute for the boiler to stabilize before carrying out the combustion analyses.

If the CO2 (%) reading at min gas flow is greater than the CO2 (%) reading at max flow by more than 1.0%, adjust the gas valve following the instructions below. Otherwise move directly to next operation.

#### ADJUSTING THE GAS VALVE AT MINIMUM GAS FLOW

Remove cap and adjust screw 2 by turning counter - clockwise to reduce the CO2 level; clockwise to increase the CO2 level.

Wait 1 minute after each adjustment for the CO2 value to stabilize.

#### WARNING! MINIMUM GAS FLOW ADJUSTMENT IS VERY SENSITIVE.

If the value measured corresponds to the value given in Table 3 adjustment is complete. Otherwise continue the setting procedure.

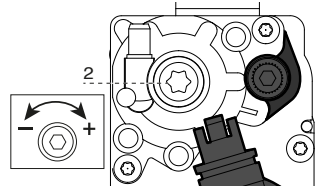


Figure 8 - Min CO2 Adjustment

**ATTENTION!! IF THE VALUE OF THE CO2 AT MINIMUM POWER HAS BEEN CHANGED, IT IS NECESSARY TO REPEAT THE ADJUSTING AT MAXIMUM GAS FLOW.**

Model	Minimum Gas Flow			Maximum Gas Flow		
	P.233 (%)	RPM	MBH	P.234 / P.234 (%)	RPM	MBH
085	7	1504	8.5	78	6616	85
110 / 110C	11	1792	11.0	100	8200	110
150 / 150C	6	1432	15.0	91	7552	150
199 / 199C	NG	4	1288	19.9	91	199
	LP	6	1432		93	

1. Canada: Altitudes between 2000-4500 ft, de-rate by 10%. Consult local authorities for de-rating for altitudes above 4500ft.
2. USA: De-rate capacity by 4% for every 1000 ft above sea level, if altitude is above 2000 ft.

**Table 4 Minimum and Maximum Gas Flow**

## Part 3. Checking/Adjusting the CO2

### 4. Ending Adjustment


1. Exit Test Mode by pressing RESET.
2. Turn down the thermostat and / or stop the DHW draw-off. For Only Heating Boiler applications reset all thermostatic valves.
3. Reinstall the combustion test port. See Figure 6.
4. Check for and repair any leaks of gas.
5. Reinstall the front cover.

**WARNING**

Carbon Monoxide - Never leave the unit operating while producing Carbon Monoxide (CO) concentrations in excess of the values indicated in Table 3. Failure to follow this warning may result in serious injury or death.

**WARNING**

**Breathing Hazard - Carbon Monoxide Gas**



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

**Breathing carbon monoxide can cause brain damage or death.  
Always read and understand instruction manual.**

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### 5. Update rating plate

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

- a. **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. Press hard enough to permanently mark the decal. See Figure 9.

<b>FACTORY SET FOR NATURAL GAS</b> Field converted to Propane Gas <input checked="" type="checkbox"/> Date: <b>October 22, 2018</b>	<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]	3.5" wc [1 kPa]	8" wc [2 kPa]
<b>Manifold Pressure</b> [Pression d'admission]	0" wc [0 kPa]	0" wc [0 kPa]

**Figure 9 - Update the Rating Plate Decal**

- b. **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, in a location where it can be easily seen. See Figure 10.

<b>THIS CONTROL WAS CONVERTED FOR USE WITH PROPANE GAS</b>
This appliance has been converted for use with Propane Gas, in accordance with the instructions provided with the Natural to Propane Conversion Kit by <b>John Smith</b> , which accepts responsibility that the conversion was performed properly.
<b>Reference rating plate for Propane Input and Gas Pressure</b>
<b>420060882600</b>

**Figure 10 - Conversion Decal**



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