Trinity & Matrix
Version Date: 2013-03-05
Kit Number: 82650-1

NATURAL TO LP CONVERSION INSTRUCTIONS:

⚠️ WARNING
These instructions are to be read in conjunction with the Installation and Operating Instructions included with the appliance. Failure to follow these and other instructions included with the boiler may result in property damage, personal injury or death.

NTI Trinity and Matrix boilers are factory equipped to operate with Natural Gas. These instructions must be followed and the applicable LP-orifice installed, when converting the following NTI boiler models to operate with Propane Gas.

**Trinity and Matrix Boiler Models:**
- Tft60, Tft85, Tft110, Tft155, Tft175, Tft200, Tft250
- Ts80
- Ti100, Ti150, Ti200
- Lx150, Lx150E, Lx200, Lx300
- M100
- M100V

Upon completion of the Natural to LP Conversion a flue gas analysis must be performed to ensure proper combustion, please read these instructions for details.

⚠️ WARNING
This conversion kit **CANNOT** be used to convert NTI-Trinity boiler models Ti400, Lx400, Tft300 or Tft399 from Natural to Propane Gas. Contact NTI for the Natural to LP conversion kit and instructions for these other models.

**ATTENTION: LIQUEFIED PETROLEUM (LP) PROPANE**
The Trinity and Matrix are factory set to operate with Natural Gas. BEFORE OPERATING WITH PROPANE, the specified LP Conversion Orifice must be installed to convert the appliance so it will operate safely with LP Propane. Listed below are the applicable NTI models and corresponding conversion orifice.

Each NG to LP Conversion kit contains:
- Conversion Instructions
- LP orifice for each size listed below
- Conversion Decal (82782)
- T25 Torx Wrench (82253)

Liquefied Petroleum (LP) propane gas is heavier than air; therefore, it is imperative that your Trinity or Matrix appliance 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.

### Natural to LP Propane Conversion Kit

<table>
<thead>
<tr>
<th>Series</th>
<th>Model Number</th>
<th>Kit No.</th>
<th>LP Orifice</th>
<th>Part No.</th>
</tr>
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<tbody>
<tr>
<td>Trinity Ts</td>
<td>80</td>
<td>82650-1</td>
<td>34</td>
<td>83216</td>
</tr>
<tr>
<td>Trinity Ti</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Trinity Tft</td>
<td>60, 85</td>
<td>82650-1</td>
<td>415</td>
<td>84434</td>
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<tr>
<td>Trinity Ti</td>
<td>150, 200</td>
<td>82650-1</td>
<td>52</td>
<td>82650</td>
</tr>
<tr>
<td>Trinity Lx</td>
<td>150, 150E, 200</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trinity Tft</td>
<td>110</td>
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<td></td>
<td></td>
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<tr>
<td>Matrix</td>
<td>100, 100V</td>
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<td></td>
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<tr>
<td>Trinity Lx</td>
<td>300</td>
<td>82650-1</td>
<td>62</td>
<td>84157</td>
</tr>
<tr>
<td>Trinity Tft</td>
<td>155, 175, 200, 250</td>
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</table>

⚠️ CAUTION
**Tft60-110 models** - When converted to LP, increase the minimum modulation RPM as per Section 9.0 in the Tft Installation and Operation Instructions. Failure to increase the minimum modulation rate for these models may result in erratic burner operation.

⚠️ WARNING
This conversion kit must be installed by a qualified service agency in accordance with these instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury, or death. The qualified service agency is responsible for the proper installation of this kit. The installation is not properly complete until the operation of the converted appliance is checked as specified in these instructions.
The boiler is factory configured to operate with Natural Gas; the following procedures describe how to modify the boiler to operate with LP (Propane) Gas. Modifying the unit to operate with LP (Propane) involves the insertion of an orifice between the Venturi and the Gas Valve. The Ts80 and Ti100 take a 34 (3.4mm diameter) orifice; the Tft60-85 take a 415 (4.15mm diameter) orifice; the Ti/Lx150-200, M100(V) and Tft110 take a 52 (5.2 mm diameter) orifice; and the Lx300 and Tft155-250 take a 62 (6.2mm diameter) orifice. The procedure of altering gas type is as follows:

1.0 Changing the Orifice

1. Turn the 120VAC power supply off to the boiler.
2. Turn gas supply “shut off valve” off.
3. Remove the front cover from the unit (for Lx models also remove the plastic display molding as well as the front-top cover).
4. Remove air-inlet piping from the boiler (only the removal of the internal air-inlet piping is necessary on Ts, Lx and Tft models).
5. Disconnect gas line at union (union is internal for Tft models). Remove the gas line from the Gas Valve – non Tft models only.
6. Disconnect Gas Valve Harness and tubing (label tubing to ensure it can be reconnected properly).
7. Pay close attention to the orientation of the Venturi in relation to the Gas Valve and Combustion Blower. It is recommended to mark the components so they are reassembled in the correct orientation.
8. Using the T25 Torx wrench provided, remove the 2 screws connecting the Gas Valve/Venturi Assembly to the Combustion Blower.
9. With the Gas Valve/Venturi assembly removed from the unit, locate and remove the three screws attaching the Venturi to the Gas Valve.
10. Locate the correct Orifice; see table on Page 1 of these instructions.
11. Insert this orifice into the Rubber Gasket of the Gas Valve. The Orifice should seat securely within the gasket.
12. Re-attach the Venturi to the Gas Valve, and securely tighten the three screws, ensure the gasket is properly seated.
13. Re-attach the Gas Valve/Venturi Assembly to the Combustion Blower and securely tighten the two screws, ensure the cork gasket is properly aligned.
14. Reconnect gas line, air-inlet piping, harness and tubing (ensure the tubing is reconnected properly). Turn gas on and check for leaks.

2.0 Gas Valve and Burner Setup

⚠️ WARNING ⚠️ Set-up of the Trinity gas valve must be performed by a licensed Gas Technician. Failure to perform the set-up correctly may result in incorrect operation, component failure, property damage, serious injury or death.

Gas Line Pressure

The boiler gas valve is equipped with a line pressure test port; see Figure 2-1. 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. Open the bleed screw of the line pressure test port approximately 1-1/2 turns. This port is directly connected to the gas line feeding the boiler. See Figure 2-1.
3. Force 1/4” ID tubing over the housing of the line pressure test port; install the other end of the tubing to an appropriate line pressure test gauge or manometer. Ensure both ends of the tubing make a tight connection.
4. Turn the gas supply to the boiler on 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 I/O manual) 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. 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.
8. Continue observing the gas line pressure until the completion of a combustion analyses in case adjustments need to be made.
9. Complete pressure testing, remove the ¼”tube from the test port and then return the bleed screw of the Line Pressure Test Port to the closed position.

**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.

**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.

**Table 2-1 Line Pressure and Combustion Parameters**

<table>
<thead>
<tr>
<th>Series</th>
<th>Gas</th>
<th>Line Pressure (inches wc)</th>
<th>CO₂ (%)*</th>
<th>CO (ppm) Max.*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal/Desired</td>
<td>Min.</td>
<td>Max.</td>
<td>Min.</td>
</tr>
<tr>
<td>Trinity Ti/Lx Matrix</td>
<td>Natural</td>
<td>7</td>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Propane</td>
<td>11</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Trinity Tft/Ts</td>
<td>Natural</td>
<td>7</td>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Propane</td>
<td>11</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

*Note: Observe the combustion products with the burner operating at the maximum modulation rate.

**WARNING**
Carbon Monoxide – DO NOT leave the unit operating if producing Carbon Monoxide (CO) concentrations in excess of 175ppm. Failure to comply may result in serious injury or death.

**WARNING**
Manifold Pressure - DO NOT adjust or measure the Manifold Pressure of the boiler. Correct manifold pressure is factory set. Field adjustment could result in improper burner operation resulting in fire, explosion, property damage or death.

**WARNING**
Adjustments to the Throttle/Input-Screw may only be made by a qualified gas technician while 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.

**Throttle/Input Adjustment Screw**

- **Decrease gas**
  - Turn Clockwise

- **Increase gas**
  - Turn Counter Clockwise

**Adjustment**

**Throttle / Input Screw Adjustments** - The boiler is equipped with a Throttle/Input Adjustment Screw, located on the Gas Valve/Venturi Assembly. It is used to adjust the flow of gas leaving the gas valve, entering the Venturi, and then the combustion air stream. Turn the adjustment screw in (clockwise) to reduce gas flow, make combustion leaner, and reduce CO₂ concentration in the flue gases. To increase the CO₂ level and gas flow in the combustion air stream, adjust the Throttle screw out (counterclockwise). Typical adjustment is 0-3 full turns in / out from the factory setting upon inserting the LP orifice as per these conversion instructions. See Figure 2-1 for throttle screw location.

**NOTICE**
Ts80 models require an initial adjustment of two (2) full turns counterclockwise of the Throttle Screw prior to performing the Combustion Calibration.

**Combustion Calibration** - To calibrate burner operation, perform the following procedure using a calibrated combustion analyzer capable of measuring CO₂ and CO from Natural and Propane Gas burning appliances (ensure the meter is set to measure combustion products from the applicable fuel):
1. Operate the unit at the maximum modulation rate, see I/O Manual.
2. Ensure the gas line pressure is maintained within tolerance, see Table 2-1.
3. While at the maximum modulation rate, measure the CO\textsubscript{2} and CO; adjust as necessary, using the Throttle Screw, to be within the limits listed in Table 2-1.
4. Operate the unit at the minimum modulation rate. Ensure the combustion remains smooth and CO\textsubscript{2} and CO remain within the limits (Table 2-1). If not, do not adjust further, contact NTI for assistance.

**WARNING** Failure to perform the flue gas analysis and adjustment 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 and Venturi Assembly**
(model Tft60-110 shown)

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. 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**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Pressure, Line</td>
<td>7&quot; wc [1.74 kPa]</td>
<td>11&quot; wc [2.74 kPa]</td>
<td>Pression du Gaz, Condutt</td>
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<tr>
<td>Min/Max Gas Pressure, Line</td>
<td>9/12&quot; wc [2.24/3 kPa]</td>
<td>0&quot; wc [0 kPa]</td>
<td>Min/Max Pression du Gaz, Collecteur</td>
</tr>
<tr>
<td>Gas Pressure, Manifold</td>
<td>0&quot; wc [0 kPa]</td>
<td>0&quot; wc [0 kPa]</td>
<td>Pression du Gaz, Collecteur</td>
</tr>
</tbody>
</table>

**Figure 3-2 Conversion Decal**

This appliance was modified with kit #82650-1, by
John Smith, which accepts responsibility that this conversion was made properly.

THIS CONTROL WAS CONVERTED FOR USE WITH LP GAS.