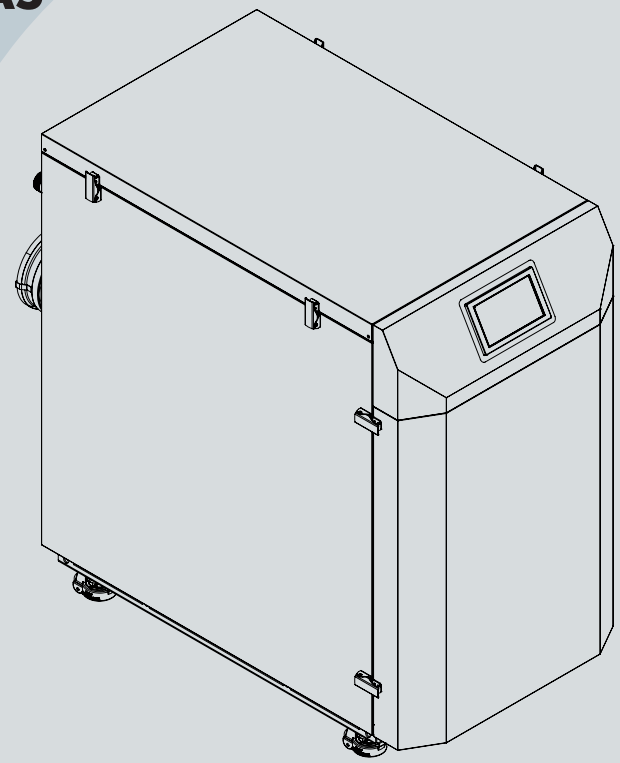
NCW

Commercial Condensing Gas Boiler / Water Heater

NATURAL GAS TO PROPANE GAS CONVERSION INSTRUCTIONS



For models:

NCW-400(WH)
NCW-500(WH)
NCW-650(WH)
NCW-800(WH)
NCW-1000(WH)

NOTICE

The manufacturer reserves the right to make product changes or updates without notice and will not be held liable for typographical errors in literature.

⚠ WARNING

This conversion kit shall be installed 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 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_2 /O_2 AND CO COMBUSTION ANALYZER.

Part 0. General Safety Information

NTI boilers and water heaters are factory set to operate with Natural Gas.
BEFORE OPERATING WITH PROPANE the appliance 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: NCW-400(WH), NCW-500(WH), NCW-650(WH), NCW-800(WH), NCW-1000(WH).

Note: NTI recommends installing the LP Conversion Kit before installing the appliance or connecting the gas line.

Kit Contents:

- Natural Gas to Propane Gas Conversion Instructions (this document)
- Foil tape (2½" width)
- LP Conversion Label
- LP Mixer (see Table 1)

Model Size	Polidoro Code (mixer data plate)	Kit Part No.
NCW-400(WH)	350_1431_02	560001002500
NCW-500(WH)		
NCW-650(WH)	350_1432_02	560001002600
NCW-800(WH)	350_1433_02	560001002700
NCW-1000(WH)	350_1433_04	560001002800

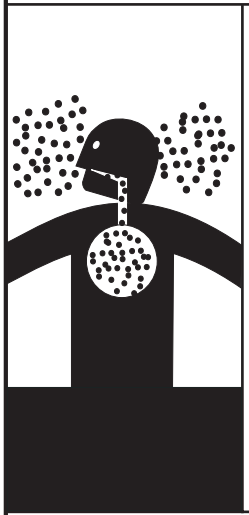
Table 1 - LP Mixer Identification

⚠ WARNING

If the Kit contents do not match those specified for your appliance model (see Table 1), DO NOT proceed with installing the LP Conversion Kit, and DO NOT operate the unit – contact NTI for assistance.

⚠ 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.

⚠ 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 gas is heavier than air; therefore, it is imperative that your 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.

Install the LP Mixer

1. Check that the code of the LP Mixer is the one indicated for the model to be converted – see Table 1.
2. Turn OFF the 120 V AC power and gas supply to the unit.
3. Remove the front cover from the unit.
4. Remove the Natural Gas Mixer and Air Intake assembly:

   400-500 models:
   i. Loosen the swivel nut connecting the gas line to the Natural Gas Mixer.
   ii. Remove the six (6) screws securing the Mixer to the Fan.
   iii. Remove the Mixer-Air Intake assembly from the cabinet (retain gaskets and fasteners for re-assembly).
   iv. Remove the Natural Gas Mixer from the assembly.

   650-1000 models:
   i. Remove the four (4) hex key head bolts and nuts securing the Gas Inlet Flange to the Natural Gas Mixer.
   ii. Remove the six (6) 5 mm hex key head screws securing the Natural Gas Mixer to the Fan.
   iii. Remove the Mixer-Air Intake assembly from the cabinet (retain gaskets/O-rings and fasteners for re-assembly).
   iv. Remove the four (4) screws securing the Natural Gas Mixer to the Air Intake.
   v. Remove the Natural Gas Mixer from the assembly (keep gaskets and hardware for reassembly):
5. Re-assemble the assembly using the LP Mixer (see Table 1), reusing the original hardware. Verify that all gaskets are correctly positioned and in good condition.
6. Re-install the assembly into the appliance reusing the original hardware, taking care to ensure that the gaskets and/or O-rings between the LP Mixer and both the Gas Inlet Flange and the Fan are correctly positioned and in good condition
7. Turn the gas valve Throttle Screw clockwise (in) one (1) turn – see Figures 1 & 3 (400-500 models) or Figures 2 & 4 (650-1000 models).
8. Turn the gas supply on and check for leaks in all gas piping, including the inlet connection to the gas valve, using a soap and water mixture.
9. Proceed to Part 2: Gas Valve and Burner Setup.

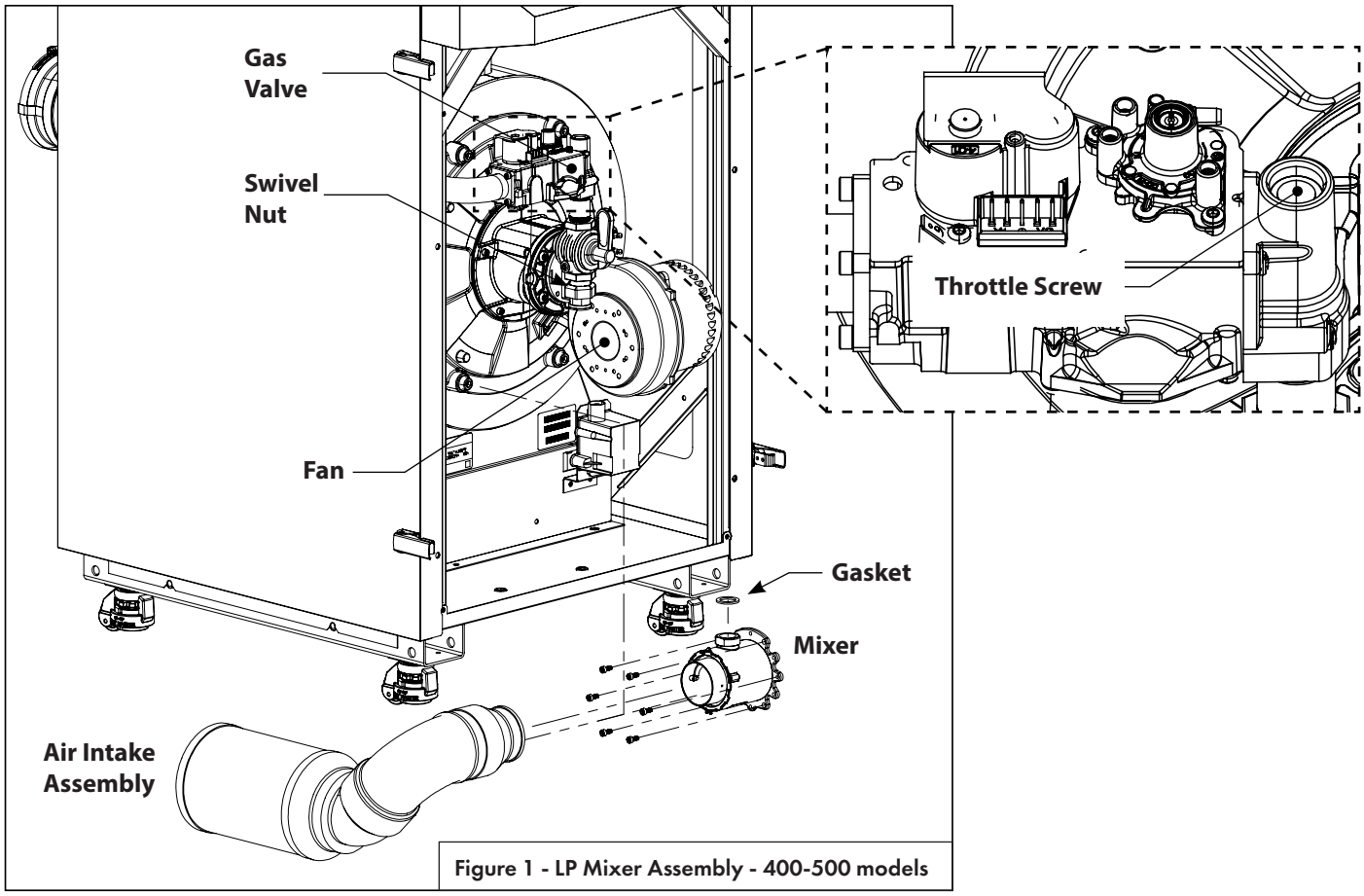


Figure 1 - LP Mixer Assembly - 400-500 models

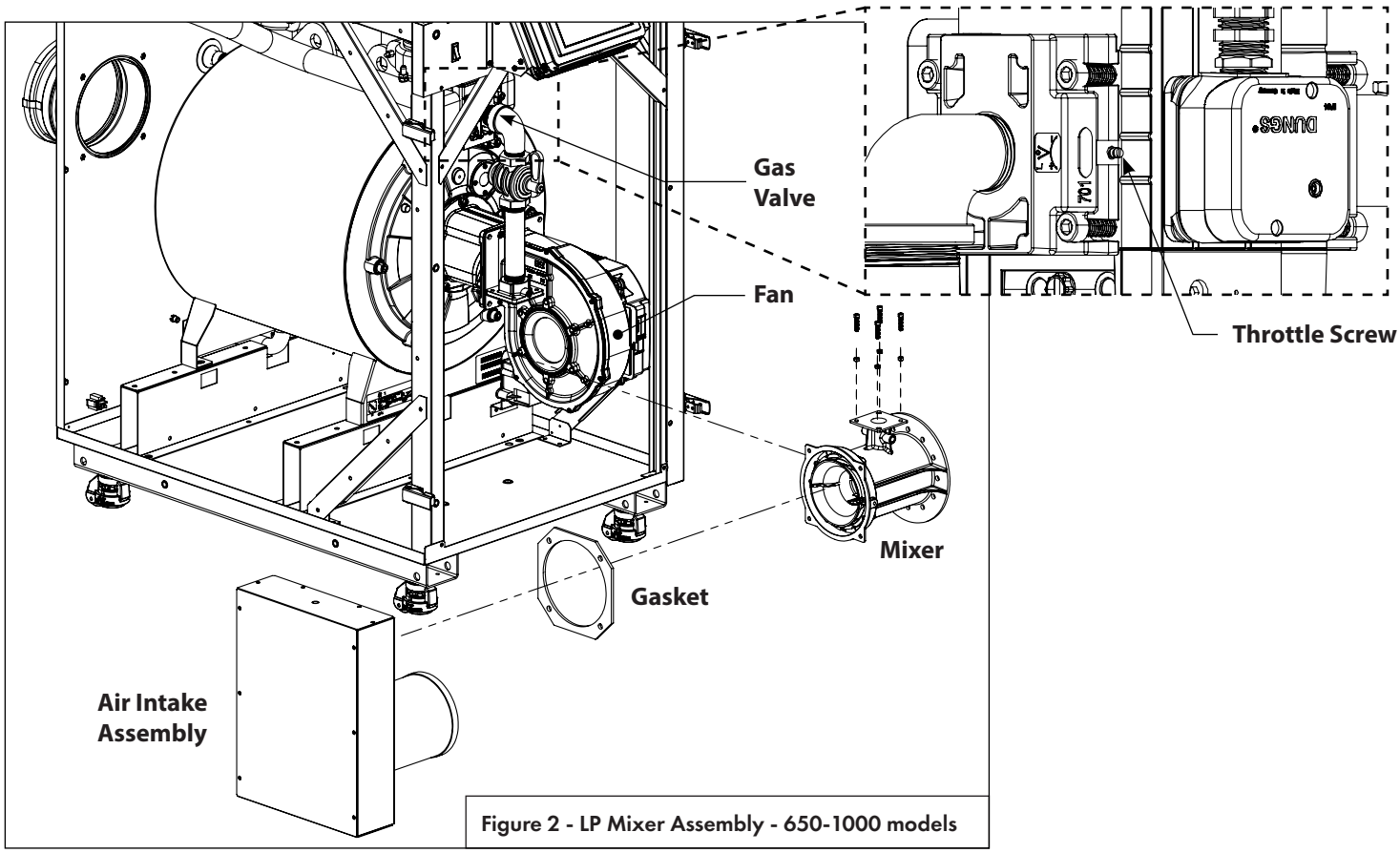


Figure 2 - LP Mixer Assembly - 650-1000 models

Part 2 - Gas Valve and Burner Setup

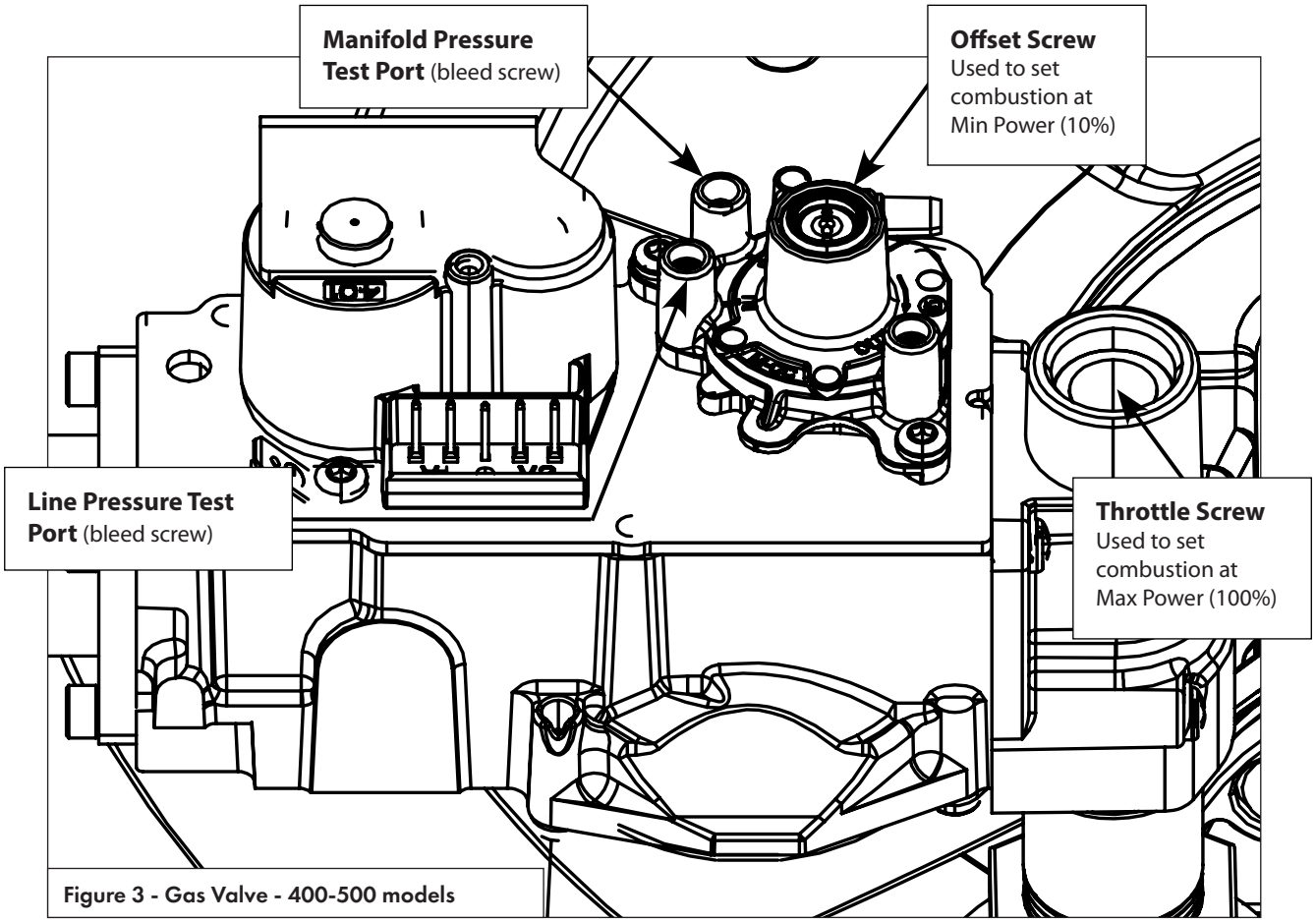


Figure 3 - Gas Valve - 400-500 models

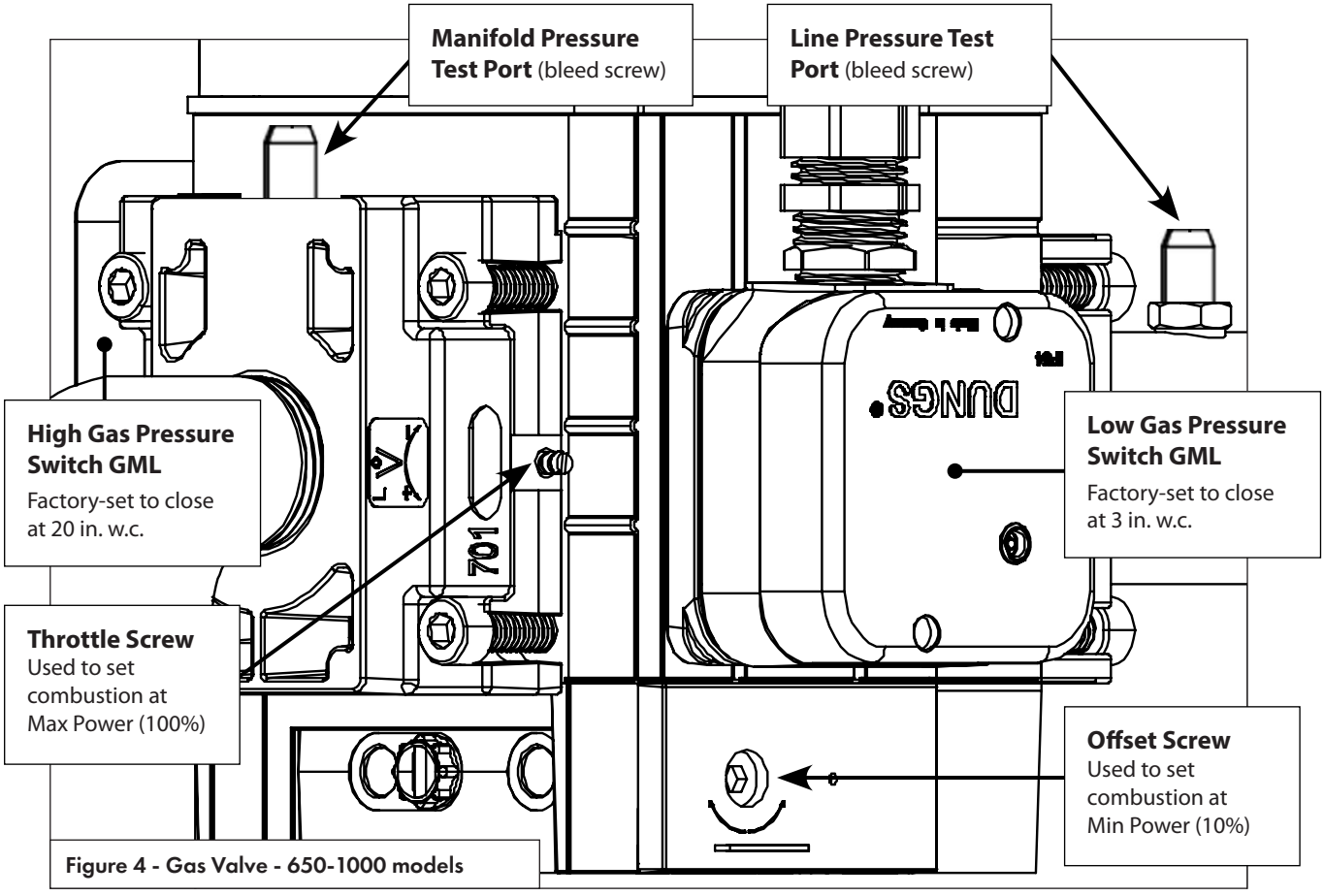


Figure 4 - Gas Valve - 650-1000 models

⚠ WARNING

Set-up of the 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.

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 appliance OFF.
2. Set the thermostat to the highest setting.
3. Ensure the combustion fan pre-purges for a short time prior to activating the igniter.
4. Ensure the combustion fan post-purges for at least 5 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 gas valve is equipped with a Line Pressure Test Port; see Figures 3 & 4. Use the following procedure to measure the gas line pressure to the unit to ensure it falls within the range given in Table 2.

1. Turn the supply of gas to the unit OFF.
2. Open the bleed screw of the Line Pressure Test Port approx. 1-1/2 turns. This port is directly connected to the gas line feeding the unit (see Figures 3 & 4).
3. Connect a gas pressure gauge to the line pressure test port using applicable tubing (e.g. 1/4" ID). Ensure both ends of the tubing make a tight connection.
4. Turn the gas supply to the unit on and check for gas leaks.
5. Observe the line pressure under static conditions and compare it to Table 2. The pressure will be greatest under static conditions.
6. Observe the line pressure with the unit running, while checking/adjusting the CO_2 at Max Power (100%) and compare it to Table 2. The pressure will be lowest during the maximum flow of gas.
7. 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 Max Power (100%). Continue observing gas line pressure until the completion of the Checking/Adjusting of the CO_2 (see Part 3), in case adjustments need to be made.
8. 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.

⚠ 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 appliance gas valve influence or be used to adjust the gas line pressure.

	Line Pressure (in. w.c.)	
	Min – Max	Nominal
NG	3.5 – 10.5	7
LP	8.0 – 13.0	11

Table 2 - Gas Line Pressure Parameters

Part 3 - Checking/Adjusting the CO_2 at Max and Min Power

WARNING

Adjustments to the Gas valve may only be performed by a qualified gas technician, while using a calibrated combustion analyzer capable of measuring CO_2 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.

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.

1. Preparing the measuring equipment

Make sure that the combustion test probe is well-sealed at its point of entry into the flue pipe. The presence of fresh air can alter the measurement, invalidating the combustion adjustment process.

NOTICE

Make sure the analyzer is set to the appropriate fuel.

WARNING

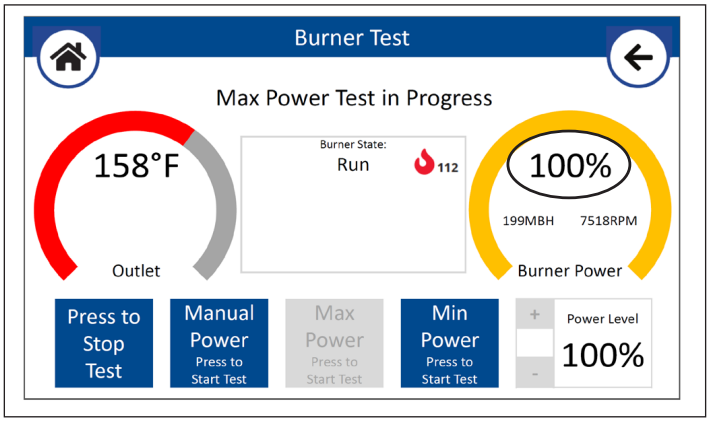
It is very important that the combustion system be set within the recommended CO_2 & CO measurements listed in Table 3.

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_2 & CO measurements could result in property damage, severe personal injury, or death.

2. Checking/Adjusting the CO_2 at Max Power

Set the thermostat at the highest possible setting to create a demand for heat. Select Max Power from the Test Mode – Burner Test screen, then wait for the Burner Power gauge to reach 100%.



Wait 1 minute for the system to stabilize before carrying out the combustion analyses. Read the CO_2 value (%) and compare it with the values given in the Table 3 below:

	CO_2 (%)		CO (ppm)	Line Pressure (in. w.c.)	
	MAX Power (100%)	MIN Power (10%)		Min – Max	Nominal
NG	8.3 – 9.3	7.9 – 8.9	< 175	3.5 – 10.5	7
LP	9.3 – 10.3	8.9 – 9.9	< 175	8.0 – 13.0	11

Table 3 - Combustion Parameters

Note: the CO_2 at MIN. Power (10%) must be set lower than the CO_2 at MAX. Power (100%) by 0.4 – 0.8%.

(e.g. if, using LP, the CO_2 at Max Power = 9.9%, the CO_2 at Min Power must be between 9.1 – 9.5%).

IMPORTANT! Values must be obtained with the front cover installed.

If the CO_2 reading differs from the values given in Table 3, adjust the gas valve following the instructions below. Otherwise move directly to the next operation.

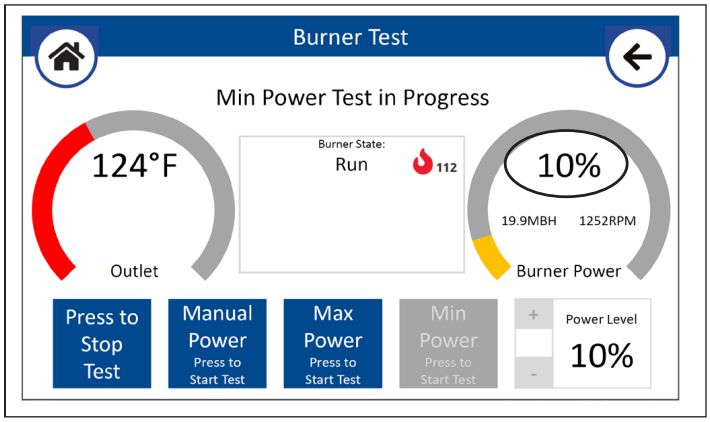
Adjusting the Gas Valve at Max Power

Adjust the gas valve by turning throttle screw counterclockwise to increase the CO_2 level; clockwise to reduce the CO_2 level.
Adjust in increments of 1/16th of a turn, waiting 1 minute after each adjustment. When the measured value corresponds to the value given in Table 3, Max Power adjustment is complete.

Note: Test Function will automatically deactivate after 30 minutes. Test Function can be turned off manually by pressing the RESET button.

3. Checking/Adjusting the CO_2 at Min Power

Select Min Power from the Test Mode – Burner Test screen, then wait for the Burner Power gauge to reach 10%.



Wait 1 minute for the system to stabilize before carrying out the combustion analyses. If the CO_2 (%) reading at Min Power is not 0.4 – 0.8% lower than the CO_2 (%) reading at Max Power, adjust the gas valve following the instructions below. Otherwise move directly to the next operation.

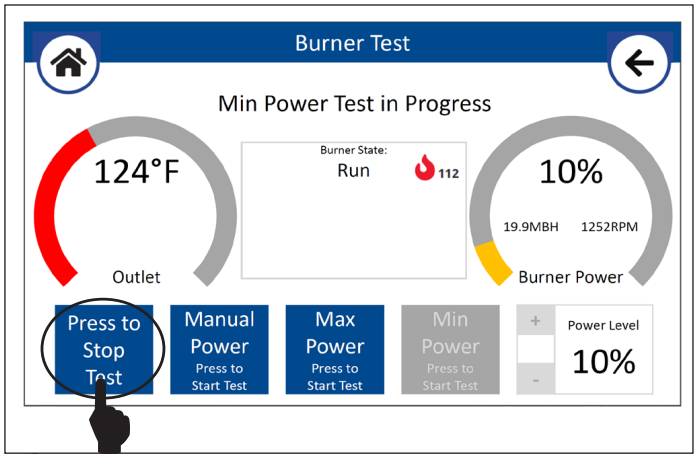
Adjusting the Gas Valve at Min Power

Adjust Offset Screw by turning counter-clockwise to reduce the CO_2 level; clockwise to increase it. Wait 1 minute after each adjustment for the CO_2 value to stabilize.

IMPORTANT! Min Power adjustment is very sensitive.
If the CO_2 value measured corresponds to the value given in Table 3, Min Power adjustment is complete. Continue with the procedure.

4. Ending Adjustment

1. Exit Test Mode by pressing the 'Press to Stop Test' button (located in the lower-left corner of the Burner Test screen).
2. Turn down the thermostat and / or stop the DHW draw.
3. Check for and repair any gas leaks.
4. 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.

5. Apply the Conversion Decal

As the certified installer of the Natural Gas to LP Conversion Kit, you must indicate on the appliance that it has been converted for use with Propane (LP) Gas:
Fill out the required information on the Conversion Decal (included in this Kit; see Figure 5) and affix it to the appliance cabinet adjacent to the rating plate decal, in a location where it can be easily seen.

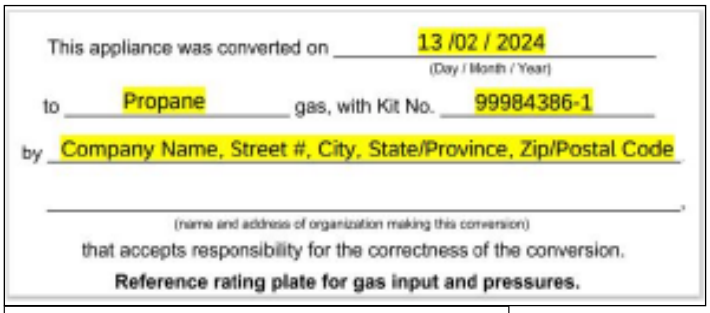


Figure 5 - Gas Conversion Decal

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