

P-1501 Fuel Conversion to Natural Gas - Boiler Model 110



Danger

A combustion test checks that the gas valve is operating properly in the field. To perform a combustion test, you must be a qualified, trained and licensed gas fitter. Making adjustments to the gas valve without a properly calibrated gas combustion analyzer and by people who are not trained and experienced in its use is forbidden. Failure to use an analyzer can result in an immediate hazard.



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.

Note

If converting from natural gas to propane, order the Propane Conversion Parts kit (P-1500) from your authorized distributor.

Use the Natural Gas conversion parts kit if the fuel source at the site is natural gas and the modulating boiler has been set up (factory fire-tested) to operate with propane. Check the rating plate on the boiler to see which fuel source the particular boiler has been set up with.

Using this conversion kit, a qualified technician will need to:

1. Perform a fuel conversion.
2. Perform a combustion test.
3. Fill in the information required on the fuel conversion labels, and affix them to the boiler after the conversion is completed.

Included with the conversion kit:

Fuel Conversion Kit, LP to NG -Boiler Model 110			
	Part #	Description	Quantity
	180-095	Orifice, marked 505	1
	150-175	O-Ring, 2 mm x 19 ID	1
	080-107	Label, fuel conversion fuel select	1
	080-501	Label, fuel conversion installation	1
	080-309	Label, rating plate overlay	1

Combustion Test Target Ranges

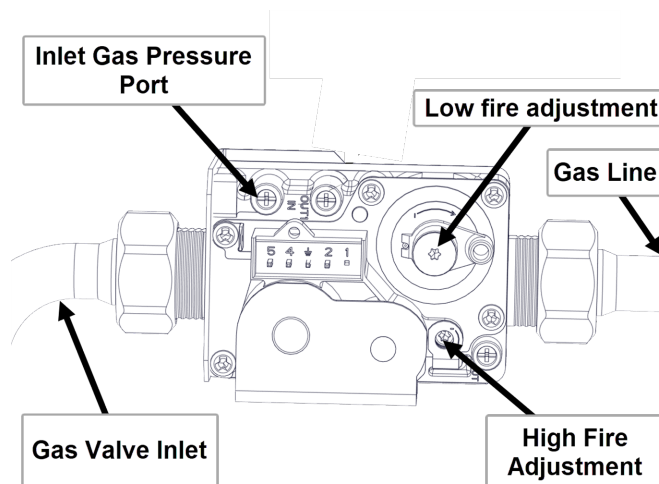


Figure 1 Gas valve and pressure reference system

Note

The Low Fire adjustment screw is a Torx 15 screw underneath the long brass protrusion on the front of the gas valve.

Both the Low-Fire and High-Fire screws may need adjustment to attain optimum combustion results whenever fuel conversion is undertaken; however, no mixture adjustment shall be performed unless done by a qualified technician using properly functioning and calibrated combustion analyzing equipment.

Fuel	High fire CO ₂		Low fire CO ₂		CO max PPM
	Range	Target	Range	Target	
Natural Gas	8.9 % - 10.0 %	9.5 %	8.2 % - 9.2 %	8.7 %	<150
Propane	10.3 % - 11.3 %	10.8 %	9.3 % - 10.3 %	9.8 %	< 250

Table 1 Combustion test target ranges - CO₂ / Maximum CO

Note

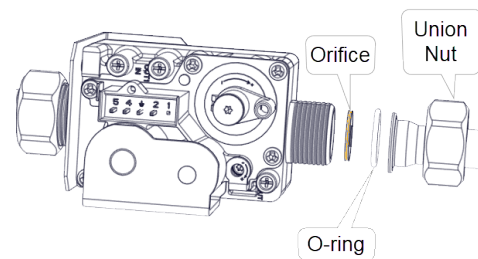
Low Fire CO₂ should be at least 0.5% lower than High Fire CO₂.

Fuel Conversion Instructions

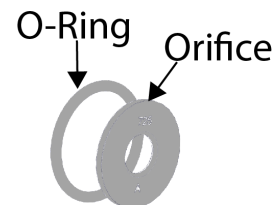
Model Number	Orifice Size
Boiler Model 110	5.05 mm

Table 2 Natural Gas Orifice Chart

1. Confirm that the natural gas source is available.
2. Shut off the gas supply at the gas shut-off valve.
3. Disconnect the electrical power.
4. Remove the front door cover.
5. Remove the top panel of the appliance to access the gas valve.
6. Undo the union nut connecting the gas line to the gas valve (gas valve outlet) (see drawing to right).
7. Remove the O-ring and orifice.



8. Place the fuel-appropriate orifice (supplied in the kit) into the O-ring, and re-install.



9. Tighten the union nut at the gas valve outlet.
10. Reinstall the top panel.
11. Restore the gas supply by opening the gas control valve and reconnect the electrical power.
12. Perform a combustion test (see instructions below).
13. When the boiler is running, use an approved leak detection solution to soap test all joints.

Combustion Testing and Adjustment

Model Number	High Fire Input
Boiler Model 110	110 MBH

Table 3 *Rated input of a converted boiler*

Normal ignition system sequence of operation:

The boiler control, upon a call for heat or DHW, turns on the combustion fan for a 20-second pre-purge, then energizes the spark electrode and gas valve for a 4-second trial for ignition.

If the burner does not light, the process is repeated until the burner lights and flame is detected. After 3 trials for ignition, the boiler locks out and will need to be manually reset by clearing the error on the touchscreen controller

( **(Status) > Clear Errors**). The boiler automatically resets after 60 minutes, if no action is taken.

To perform a combustion test and adjustment:

1. Turn on the boiler's external gas shut-off valve.
2. Give the boiler a call for heat.
3. To run the boiler at high fire, you can set the heat-out value in Test Operation mode to the maximum MBH for the boiler. To do this:
 - a. Go to  **> Test Operation**.
 - b. Tap the **Fan Test: Heat Output** box, and using the number pad, enter the maximum MBH (see [Table 3](#)).

4. When the boiler reaches high fire, insert the combustion analyzer test probe into the flue gas test port *Figure 2*.
- » Verify that the CO₂ reading is within the combustion test targets at values.

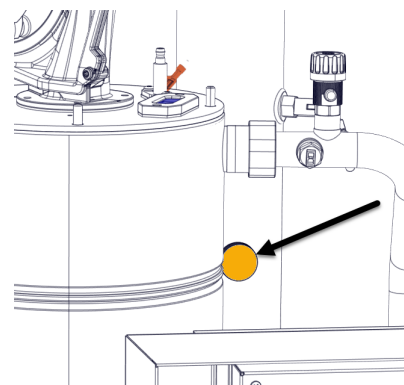


Figure 2 Flue gas test port

5. Refer to and adjust the high fire according to using a Torx 15 screwdriver.
 - » Turn the screwdriver clockwise no more than a maximum of one full rotation at a time to raise the CO₂%.
 - » Turn counter-clockwise no more than a maximum of one full rotation at a time to lower CO₂%.
6. Set the heat-out value in Test Operation mode to the minimum MBH for the boiler. To do this:
 - a. Go to ●●● > **Test Operation**.
 - b. Tap the **Fan Test: Heat Output** box, and using the number pad, enter the minimum MBH.
7. Refer to and adjust the low fire according to using a Torx 15 screwdriver.
 - » Turn the screwdriver clockwise to raise the CO₂% (to richen).
 - » Turn counter-clockwise to lower CO₂%.

Note

Start with 1/8 of a turn until you see the analyzer measure a change then only make 1/16 adjustments. If changing direction on this adjustment you may notice a significant backlash.

8. Check the results and confirm the correct settings when you return the boiler to high fire, and then to low fire.

Note

Clock the gas meter to confirm full maximum rating plate input.

9. To exit the **Test Operation** screen, select **Back**.
10. Remove the call for heat.
11. If a manometer is connected to the gas valve inlet gas pressure port:
 - a. Turn off the gas supply at the external gas shut-off valve.
 - b. Disconnect the manometer.
 - c. Tighten the inlet pressure port screw with a Torx 15 screwdriver.
12. Remove the analyzer probe, and install the test port plug.
13. Turn on the gas supply shut off valve.

Clocking the Meter (Natural Gas)

1. Turn off all other appliances and pilots
2. Turn on the boiler and set the boiler to high fire.
3. Ensure the boiler has a large load to heat, so that the boiler will not shut off.
4. With a Stop-Watch, record the number of seconds for the smallest dial to make 1 full revolution.
5. $CFH = (3600 \times \text{Dial Size}) / \text{Seconds}$
6. $CFH \times 1000$ (check local Btu content) = Input Btu's.

Note

- » For 2 PSI meters multiply $CFH \times 1.097$
- » For Metric meters multiply $CFH \times 35.3$
- » For 2 PSI metric meters multiply $CFH \times 1.097 \times 35.3$
- » For Altitude above 4,500' deduct 2% per 1,000' of altitude from the Input Btu's.

Completing and Affixing the Conversion Labels

1. Fill in the conversion labels (included in the kit) associated with the new fuel type.
2. Place the conversion labels onto the boiler at the positions indicated in [Figure 3](#).

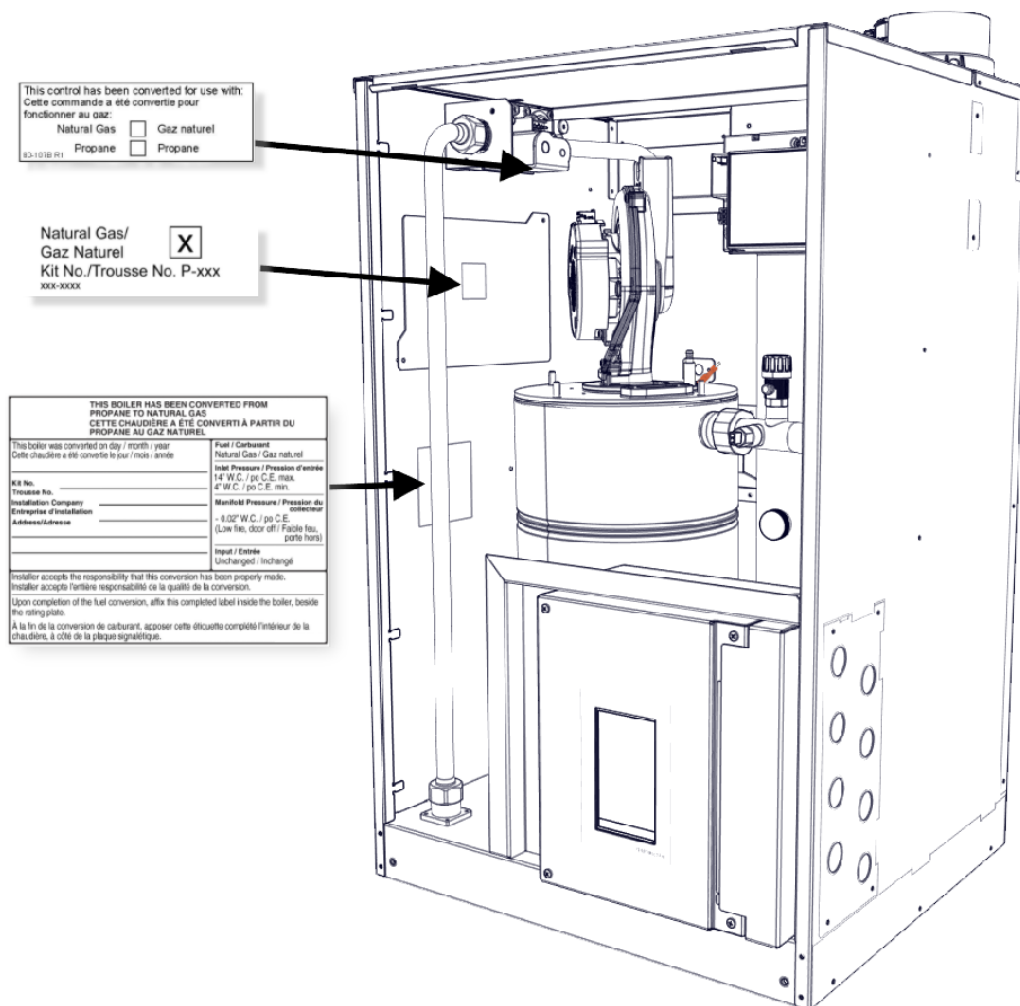


Figure 3 Conversion Label Placement