# GAS UNITS
# KITS & ACCESSORIES

**506656-01**
**01/ 2019**
**Supersedes 02/2013**

**HIGH ALTIUDE KIT**

**INSTALLATION INSTRUCTIONS FOR HIGH ALTITUDE NATURAL GAS KIT (73W37) USED WITH ML180, EL180, EL280, SL280, ML193, ML195, EL195, ML296, EL296 & 80AF1, 92AF1, 95AF1, 95AF2 SERIES UNITS**

## ⚠ WARNING

**This conversion kit is to be installed by a licensed professional service technician (or equivalent) or other qualified agency in accordance with the manufacturer's instructions, all codes and requirements of the authority having jurisdiction in the USA, and the requirements of the CSA-B149 installation codes in Canada. If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life. The qualified agency performing this work assumes responsibility for this conversion.**

## Shipping and Packing List

**Package 1 of 1 contains:**

12 - Burner orifices (0.055)

1 - Gas converter sticker

1 - Nameplate conversion sticker

## Application

When installed at altitudes 7501 ft to 10,000 ft, ML180, EL180, EL280, SL280, ML193, ML195, EL195, ML296, EL296, 80AF1, 92AF1, 95AF1 and 95AF2 units require a gas orifice change. Some units may require a pressure switch change which is ordered separately. See unit installation instructions.

## Installation

## ⚠ CAUTION

**As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing**.

1 - Set the thermostat to the lowest setting. If the gas supply line has been connected, shut off the gas supply to the furnace, then turn off the electrical power.

2 - Remove the heating compartment access panel. Move the automatic gas valve switch to the OFF position. See figures 5, 6 and 7.

3 - Disconnect the gas supply and wiring at the gas valve.

4 - If necessary remove the wires from the ignitor and sensor (mark wires). Remove the burner box cover (if equipped) and set aside. Remove the four manifold securing screws. Slide the manifold/gas valve assembly out of the burner box. See figures 1, 2, 3 and 4.

5 - Replace the burner orifices with the provided gas orifices. Torque to approximately 35 in-lbs. **Do not** use sealant on orifices. Figures 1, 2, 3 and 4 show manifold/gas valve assemblies.

## ⚠ IMPORTANT

**DO NOT use pipe dope or any pipe sealant on gas orifice threads.**

6 - Re-install the manifold/valve assembly. Re-install the burner box cover (if removed). Re-install the ignitor wire and sensor wire (if removed). Re-connect the wiring to the gas valve.

7 - Re-connect the gas supply to the gas valve and turn on gas supply to unit.

## ⚠ IMPORTANT

**Carefully check all piping connection for gas leaks. DO NOT use matches, candles, open flames or other means of ignition to check for gas leaks. Use a soap solution or other preferred means.**

## ⚠ CAUTION

**Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.**

8 - Restore the electrical power to the unit.

9 - Affix nameplate conversion sticker next to unit nameplate.

10 - Complete the information required on the gas converter sticker: date, name, and address. Affix sticker to the exterior of the unit in a visible area.

11 - Follow the steps given in the start-up and adjustment section.

12 - Energize the thermostat several times to ensure the ignition control is operating and that the ignitor glows.

13 - Replace the heating compartment access panel.

**MANIFOLD/GAS VALVE ASSEMBLY**
**(SINGLE-STAGE 80% FURNACE SHOWN)**

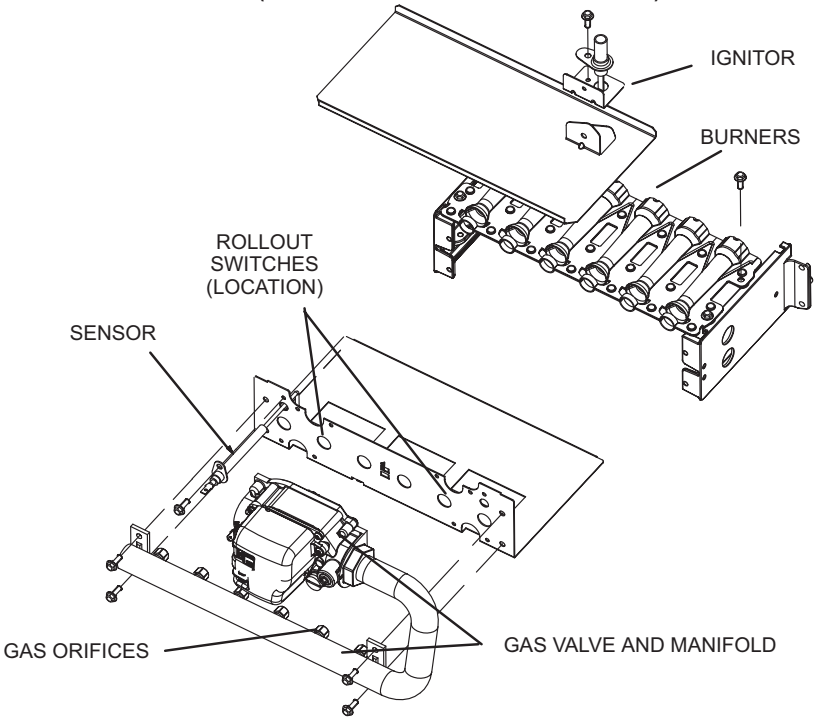


**FIGURE 1**

**MANIFOLD/GAS VALVE ASSEMBLY**
**(TWO-STAGE 80% FURNACE SHOWN)**

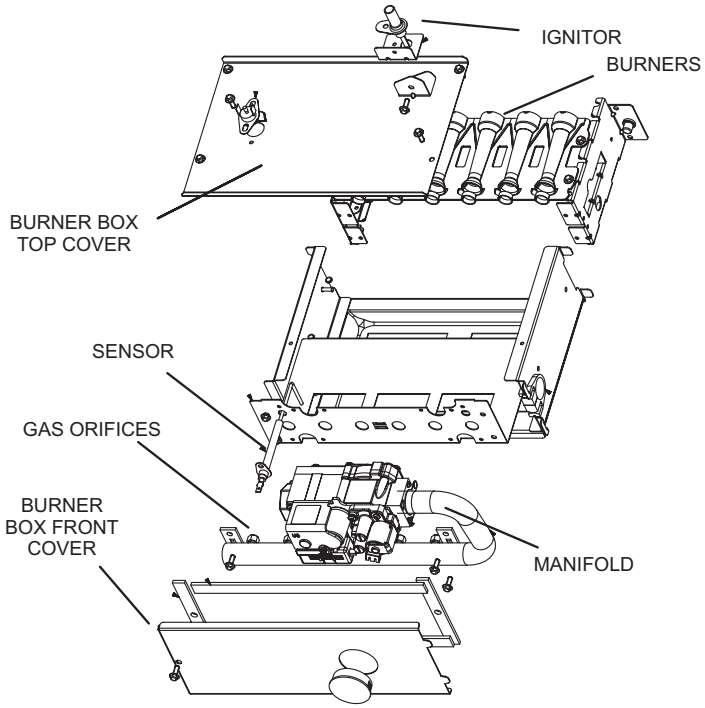


**FIGURE 2**

**MANIFOLD/GAS VALVE ASSEMBLY**
**(SINGLE-STAGE 90% FURNACE SHOWN)**

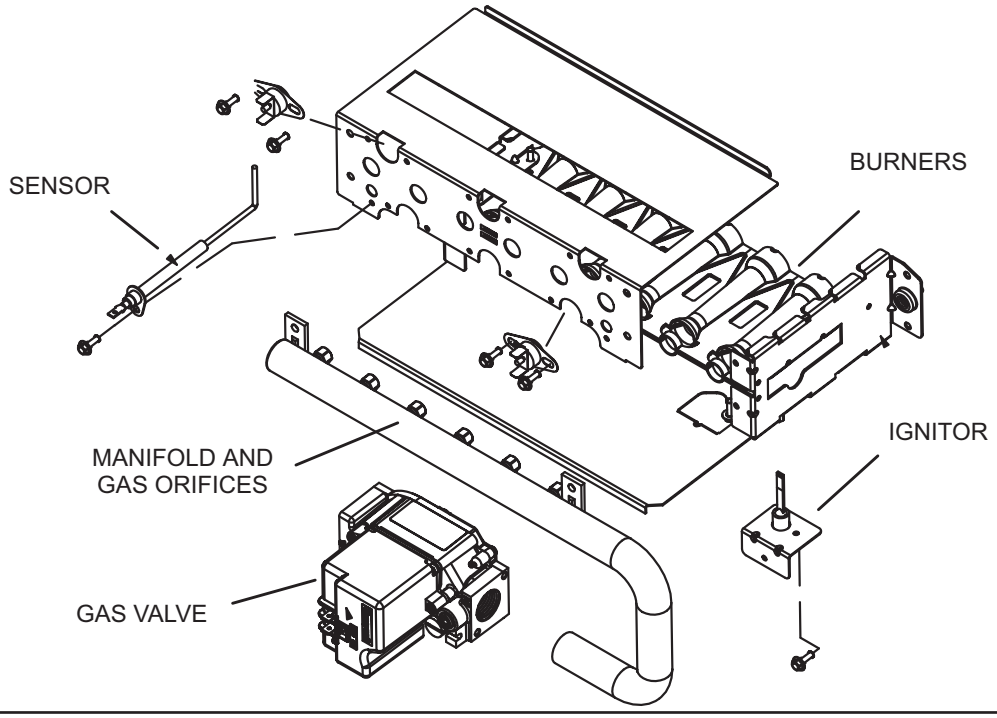


**FIGURE 3**

**MANIFOLD/GAS VALVE ASSEMBLY**
**(TWO-STAGE 90% FURNACE SHOWN)**

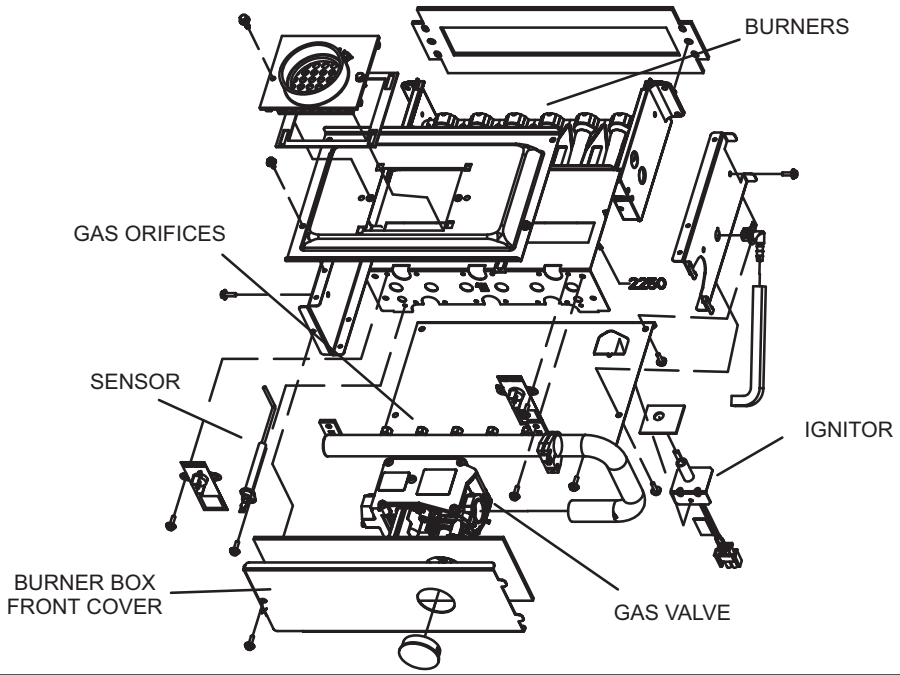


**FIGURE 4**

## Start-Up & Adjustment

**BEFORE LIGHTING -** Smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. Use only your hand to move the gas control switch. Never use tools. If the switch will not move by hand, do not try to repair it. Force or attempted repair may result in a fire or explosion.

**A - Placing the Unit into Operation**

# ⚠ IMPORTANT

**Follow the lighting instructions provided on the unit. If lighting instructions are not available, refer to the following section.**

Units are equipped with a hot surface ignition system. The ignition system automatically lights the burners each time the thermostat calls for heat.

1 - **STOP!** Read the safety information at the beginning of this section.

2 - Set the thermostat to its lowest setting.

3 - Turn off all electrical power to the furnace.

4 - Do not try to light the burners by hand.

5 - Remove the unit access panel

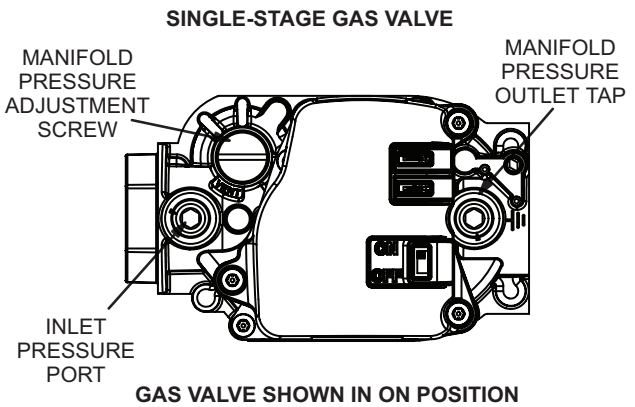


**FIGURE 5**

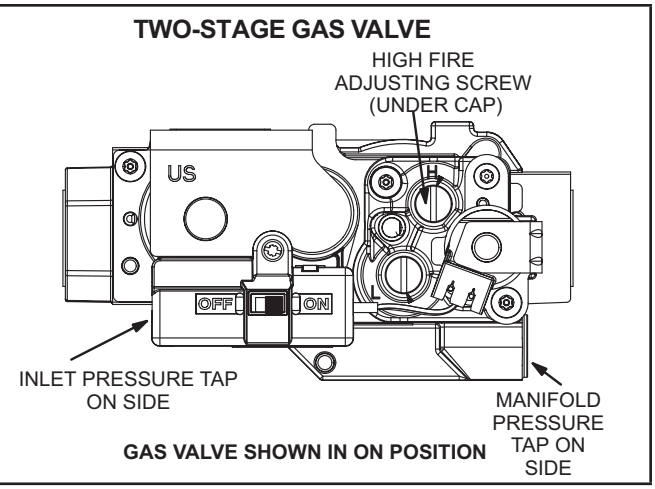


**FIGURE 6**

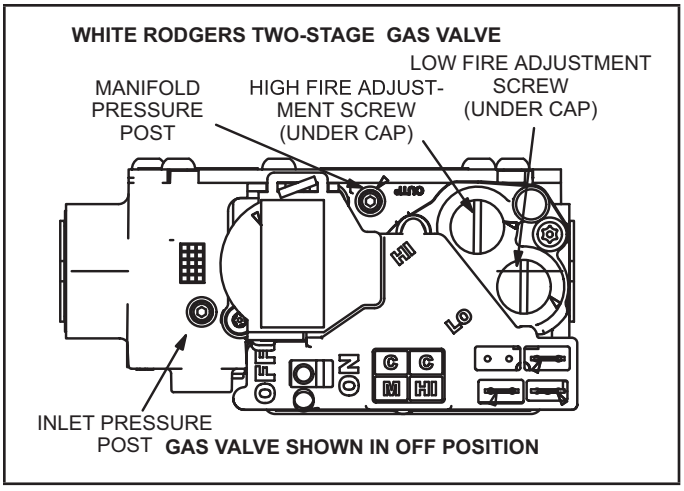


**FIGURE 7**

6 - Move gas valve switch to OFF. See figure 5, 6 and 7.

7 - Wait five (5) minutes for any gas to clear out. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.

8 - Move gas valve switch to ON. See figures 5, 6 and 7.

9 - Replace the unit access panel.

10 - Turn on all electrical power to the unit.

11 - Set the thermostat to desired setting.

12 - If the furnace will not operate, see the section "Turning

**B - Turning Off Gas To the Unit**

1 - Set the thermostat to the lowest setting.

2 - Turn off all electrical power to the unit if service is to be performed.

3 - Remove the unit access panel.

4 - Move gas valve switch to OFF.

5 - Replace the heating compartment access panel.

## Gas Pressure Measurement

**A - Gas Flow (Approximate)**

**TABLE 1**

| GAS METER CLOCKING CHART | | | | |
|---|---|---|---|---|
| Capacity | Seconds for One Revolution | | | |
| | Natural | | LP Propane | |
| | 1 cu ft Dial | 2 cu ft Dial | 1 cu ft Dial | 2 cu ft Dial |
| 045 | 80 | 160 | 200 | 400 |
| 070 | 55 | 110 | 136 | 272 |
| 090 | 41 | 82 | 102 | 204 |
| 110 | 33 | 66 | 82 | 164 |
| 135 | 27 | 54 | 68 | 136 |
| Nat 1000 btu/cu ft | | LP 2500 btu/cu ft | | |

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 1. If manifold pressure matches table 2 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

***NOTE -*** *To obtain accurate reading, shut off all other gas appliances connected to meter.*

**B - Supply Pressure Measurement**

**ML180, EL180, ML193, ML195, EL195, 80AF1, 92AF1, 95AF1 Units**

When testing supply gas pressure, use the 1/8" N.P.T. plugged tap or pressure post located on the gas valve to facilitate test gauge connection. See figure 5 or 6. Check gas line pressure with unit firing at maximum rate. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire.

On multiple unit installations, each unit should be checked separately, with and without units operating. Supply pressure must fall within range listed in table 2 or 3.

**EL280, SL280, ML296, EL296 & 95AF2 With White Rodgers Two-Stage Gas Valve**

An inlet pressure post located on the gas valve provides access to the supply pressure. See figure 7. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure supply pressure. See table 3 for supply line pressure.

**C - Manifold Pressure Measurement**

**ML180, EL180, ML193, ML195, 80AF1, 92AF1 & 95AF1 Units**

1 - Connect test gauge to manifold pressure tap (figure 5) on gas valve.

2 - Start unit and allow 5 minutes for unit to reach steady state operation.

3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in table 2.

4 - If necessary, make adjustments. Figure 5 shows location of adjustment screw.

**SL280 Units With Two-Stage Gas Valve**

***NOTE -*** *Pressure test adapter kit (10L34) is available from Lennox to facilitate manifold pressure measurement.*

1 - Connect test gauge to manifold pressure tap (figure 6) on gas valve.

2 - Start unit on high fire and let run for 5 minutes to allow for steady state operation.

3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in table 3.

4 - If necessary, make adjustments. Figure 6 shows location of high fire adjustment screw.

5 - If an adjustment is made on high fire, re-check manifold pressure on low fire. Do not adjust low fire manifold pressure. If low fire manifold pressure is more than 1/2" above or below value specified in table 3, replace valve.

**EL280, SL280, ML296, EL296 & 95AF2 With White Rodgers Two-Stage Gas Valve**

A manifold pressure post located on the gas valve provides access to the manifold pressure. See figure 7. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure manifold pressure.

To correctly measure manifold pressure on the ML296, EL296 and 95AF2, the differential pressure between the positive gas manifold and the negative burner box must be considered.

1 - Connect the test gauge positive side "+" to manifold pressure tap on gas valve as noted above.

2 - Tee into the gas valve regulator vent hose and connect to test gauge negative "-" (ML296, EL296 and 95AF2 only)

3 - Ignite unit on low fire and let run for 5 minutes to allow for steady state conditions.

4 - After allowing unit to stabilize for 5 minutes, record low fire manifold pressure and compare to value given in table 3. If necessary, make adjustment. Figure 7 shows location of low fire adjustment screw.

5 - Repeat on high fire and compare to value given in table 3. If necessary, make adjustment. Figure 7 shows location of high fire adjustment screw.

**EL195UH/DF**

When testing manifold gas pressure, use the 1/8" N.P.T. plugged tap (manifold pressure outlet) located on the gas valve to facilitate test measuring device. See figure 8.

1 - Remove the threaded manifold pressure outlet plug from the gas valve and install the barbed fitting.

2 - Take a length of square tubing and connect one end to the barbed fitting and the other to the positive "+" side of the measuring device.

3 - Take another length of tubing and "tee" into the gas valve regulator vent hose. Connect to the measuring device negative "-" side.

4 - Start unit and allow 5 minutes for unit to reach steady state operation.

5 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in table 2.

6 - If necessary make adjustment. Turn off unit and remove the tubing from the negative (-) barbed fitting on the gas valve.

7 - Remove the negative barbed fitting as shown in figure 8 and using a screw driver make adjustment to increase or decrease manifold pressure.

8 - Repeat steps 1 through 7 until manifold pressure is correct.

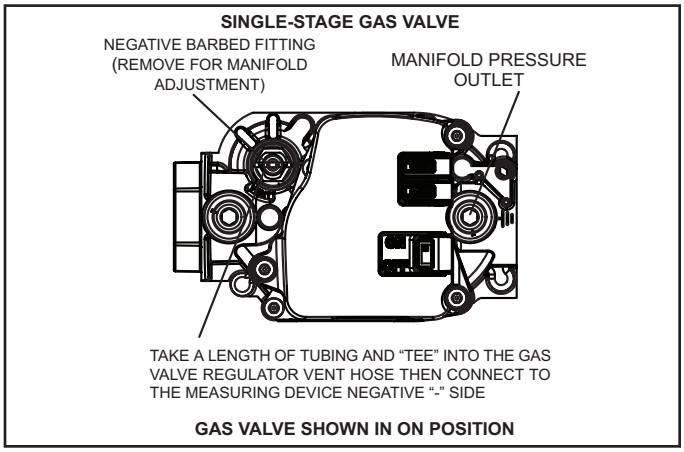


**FIGURE 8**

**TABLE 2**

| Unit | Manifold Pressure in wc | Line Pressure in wc |
|---|---|---|
| ML180, 80AF1, EL180 | 3.5 | 4.5 - 13.0 |
| ML193, ML195, EL195, 92AF1 & 95AF1 | 3.5 | 3.5 - 13.0 |

**D - Proper Combustion**

Furnace should operate a minimum of 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to the tables 4, 5 and 6.

**TABLE 3**

| Unit | Manifold Pressure in wc | | Line Pressure in wc | |
|---|---|---|---|---|
| | Low Fire | High Fire | Min | Max |
| EL280, SL280, ML296, EL296, 95AF2 | 1.7 | 3.5 | 4.5 | 13.0 |

**TABLE 4**

| Unit | $CO_2$% | |
|---|---|---|
| ML180UH, 80AF1UH, EL180UH | 7.2 - 7.8 | |
| ML180DF, 80AF1DF, EL180DF | 6.8 - 7.4 | |
| ALL ML193, ML195, EL195, 92AF1 & 95AF1 | 7.2 - 8.2 | |
| EL280UH, SL280UH | High Fire | |
| | Low Fire | |
| SL280DF | High Fire | |
| | Low Fire | |
| The carbon monoxide reading should not exceed 100 ppm. | | |

**TABLE 5**

| ML296UH, EL296UH, 95AF2UH | $CO_2$% For Nat | |
|---|---|---|
| | Low Fire | High Fire |
| 045 | 5.4 - 6.4 | 7.5 - 8.5 |
| 070 | 5.3 - 6.3 | 7.4 - 8.4 |
| 090 | 5.8 - 6.8 | 7.6 - 8.6 |
| 110 | 6.1 - 7.1 | 8.0 - 9.0 |
| 135 | 6.1 - 7.1 | 7.8 - 8.8 |
| The carbon monoxide reading should not exceed 100 ppm. | | |

**TABLE 6**

| ML296DF, EL296DF, 95AF2DF | $CO_2$% For Nat | |
|---|---|---|
| | Low Fire | High Fire |
| 045 | 5.6 - 6.6 | 7.8 - 8.8 |
| 070 | 5.5 - 6.5 | 7.3 - 8.3 |
| 090 | 5.9 - 6.9 | 7.8 - 8.8 |
| 110 | 6.3 - 7.1 | 8.2 - 9.2 |
| The carbon monoxide reading should not exceed 100 ppm. | | |

***NOTE -*** *Shut unit off and remove manometer as soon as supply line, manifold pressure and combustion sample has been obtained. Take care to remove barbed fitting, replace threaded plug and tighten port fittings.*