GAS SUPPLY APPLICATION GUIDE

Modulating, Condensing,
Hot Water Boiler Models:

- MLX-303
- MLX-454
- MLX-606
- MLX-757
- MLX-909
- MLX-1060

Other manuals for this product include:

- GF-115-C MLX E8 Controller/ BCM Manual
- GF-115-P-H MLX Piping Guide
- GF-115-V MLX Venting Guide
- GF-115-E MLX Electrical Power Guide

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1 GENERAL INTRODUCTION

AERCO Modulex gas fired boilers are modulating input devices that require an adequate volume and pressure of natural gas for proper operation. The gas requirements specified herein must be satisfied to ensure efficient combustion. Designers and installers must adhere to the specifications of AERCO and of the local authorities having jurisdiction. A thorough understanding and knowledge of these guidelines is required for the successful design and installation of Modulex boilers.

2 GAS TRAIN COMPONENTS

The Modulex is a cast aluminum body boiler consisting of mutually connected combustion chambers, each having its own gas train (gas valve, pre-combustion chamber, and burner), blower, air pressure switch, ignitor, and flame detector. Each group of these components is referred to as a module. The gas train components have been designed to operate at high combustion and seasonal efficiencies by closely controlling both the volume and air/fuel mixture to the burner. Below are descriptions of each of the gas train components for each module.

- GAS VALVE – An electronic, modulating gas valve with 100% tight shutoff. It controls the amount of gas delivered to the burner. This valve is wired to the low gas pressure switch located on the gas manifold inside the Modulex boiler. The gas pressure switch monitors the manifold pressure for minimum supply condition.

- PRE-COMBUSTION CHAMBER – A cast aluminum chamber where combustion air and gas mixes prior to entering the burner providing controlled combustion. It is equipped with a check valve to prevent any backflow of combustion gases.

- LOW NOx BURNER – Fabricated from metal fiber mesh covering a stainless steel burner head. The burner operation is stable throughout the entire input range of the boiler.

3 GAS PRESSURE REQUIREMENTS

AERCO Modulex boilers require a stable gas input pressure. The inlet supply to the unit must be at least 4.0" W.C. when firing at maximum input. A Minimum supply gas pressure switch prevents the boiler from operating without sufficient pressure. Maximum allowable gas pressure is 14" W.C. Static gas pressure (when the unit is not firing) may vary, however actual gas pressure should be measured when the unit is in operation (firing). Measure the gas pressure with a manometer at the 1/8” NPT port provided in the inlet manifold. In a multiple boiler installation, gas pressure should initially be set for a single boiler in operation and then remaining boilers should be staged on at full fire to ensure that gas pressures never fall below the minimum allowable pressure of 4.0" W.C.

An external gas pressure regulator is mandatory for the State of Massachusetts, regardless of supply pressure; for all other jurisdictions, a lock-up style regulator is required when supply pressure is greater than 14" W.C. (see Fig. 1). The regulator must be installed with at least 2 feet of pipe between the regulator and the unit gas inlet. The regulator discharge range must able to maintain 4.0” W.C. Gas

NOTE
The optimum gas pressure for the Modulex boiler is 7.0” W.C. However, it should be noted that the Modulex boiler can be safely operated at gas pressures ranging from a minimum of 4.0” W.C. to a maximum 14.0” W.C.
regulators are self-contained with tapped diaphragm vent ports allowing the diaphragm to change its position. These vents typically require piping to the outside.

Every Modulex boiler is shipped with a 1-1/2" NPT manual shutoff valve. CSA requires that no other components can be installed between the boiler and this shutoff valve except for pipe fittings such as pipe union. If an external regulator is used, an additional isolation/service valve must be installed upstream of the regulator (see Figure 1). Gas piping should contain ground unions for removal of the gas piping to the unit for maintenance or service as required. Gas piping should never obstruct removal of the unit side panels and should not be supported from the unit itself. Gas piping should be supported properly from the floor or overhead as the installation allows.

Drip legs are typically required at the gas supply of each unit to prevent any dirt, weld slag, or debris from entering the boiler gas train inlet pipe. When multiple units are installed, some utilities and local codes require a full size drip leg on the main gas supply line in addition to the drip leg at each unit. The bottom of the gas drip leg(s) should be removable without disassembling any gas piping. The weight of the gas pipe should not be supported from the bottom of the drip leg. The drip leg(s) should not be used to support any or part of the gas piping.

The AERCO Modulex boilers must be isolated from the system when leak testing.

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Figure 1: Single Boiler Gas Pipe Connections
4 GAS PIPING

All gas piping and components must comply with NFPA local codes, and utility requirements minimum. Only gas approved fittings, valves, or pipe should be utilized.

Standard industry practice for gas piping is Schedule 40 iron pipe and fittings. All high and low gas pressure piping systems must comply with local utility and building codes.

Assembled piping should be clean of all debris, pipe chips, or foreign material to prevent any from entering the Modulex boiler gas trains. Piping should be tested as prescribed in NFPA 54. Equipment should be isolated before testing any piping system over the allowable pressure. **DO NOT EXCEED 14” W. C.** on the inlet side of the Modulex boiler at any time.

5 GAS SUPPLY MAIN SIZING

Gas pipe sizing, for either a single or multiple unit installation, shall be sized to provide no more than a 0.3” W.C. pressure drop, from the source to the final unit location. The fuel supplier, or utility, should be consulted to confirm that sufficient volume and normal pressure is provided to the building at the discharge side of the gas meter or supply pipe. For existing installations with gas equipment, gas pressure should be measured with a manometer to ensure sufficient pressure is available. Before sizing gas piping, a survey of all connected gas devices should be made. Gas piping supplying more than one gas device must be able to handle the total connected input within the allowable gas pressure drop. The allowable minimum and maximum gas pressure for each device should be considered. Whenever the minimum and maximum gas pressures vary between devices, gas pressure regulators at each unit should be installed to allow regulation at any individual unit. Gas pressure must never exceed the maximum allowable rating of any connected device.

The total length of gas piping as well as fitting pressure drop must be considered when sizing the gas piping. Total equivalent length should be calculated from the meter or source location to the last unit connected. Gas piping Table 1, containing data extracted from NFPA 54, should be used as a minimum guideline. Gas pipe size should be selected on the total equivalent length from the table. The gas volume for cfh flow will be the input divided by the calorific value of the fuel to be supplied.

**Table 1: Gas Supply Main Piping Minimum Size Requirements**

<table>
<thead>
<tr>
<th>Nominal Iron Pipe Size</th>
<th>Maximum Capacity of Pipe in Cubic Feet of Gas / Hour (Gas pressure = 0.5 psig or less, pressure drop = 0.5 inches of w. c.) (Natural Gas with Specific Gravity of 0.60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length of pipe in feet</td>
</tr>
<tr>
<td></td>
<td>10’</td>
</tr>
<tr>
<td>1.1/4”</td>
<td>1,390</td>
</tr>
<tr>
<td>1.1/2”</td>
<td>2,090</td>
</tr>
<tr>
<td>2”</td>
<td>4,020</td>
</tr>
<tr>
<td>2.1/2”</td>
<td>6,400</td>
</tr>
<tr>
<td>3”</td>
<td>11,300</td>
</tr>
</tbody>
</table>

**NOTE**

For further information refer to the latest edition of the National Fuel Gas Code Handbook, ANSI Z223.1
6 GAS HEADER SIZING

Main supply gas pipe sizing should be developed for the total plant. Boiler gas manifold piping should be sized based on the volume requirements and lengths between boilers and the fuel main. Header sizes can be either full size or stepped in size as units are connected. A typical gas piping header diagram for two AERCO Modulex boilers is illustrated in Figure 2. Header should be located above or behind boiler. Gas piping should not be installed directly over top or front of any part of boiler. Clearances for maintenance are required.

Figure 2: Typical Multiple Boiler Gas Manifold Construction