



© 2025 Lennox Industries Inc.  
Dallas, Texas USA



## ⚠ WARNING

This furnace is equipped with an ignition control factory enabled for use with Lennox A2L refrigerant systems. Disabling the refrigerant detection functionality on A2L system is prohibited by safety codes. Refer to furnace installation instructions for non-A2L and non-Lennox refrigerant system setup.

### Contents

|                                               |    |
|-----------------------------------------------|----|
| Unit Dimensions - inches (mm) .....           | 2  |
| ML180UHE(K) Gas Furnace .....                 | 3  |
| Shipping and Packing List .....               | 3  |
| Safety .....                                  | 3  |
| Use of Furnace as a Construction Heater ..... | 4  |
| General .....                                 | 4  |
| Combustion, Dilution, Ventilation Air .....   | 5  |
| Setting Equipment .....                       | 8  |
| Filters .....                                 | 11 |
| Duct System .....                             | 12 |
| Venting .....                                 | 13 |
| Gas Piping .....                              | 20 |

# INSTALLATION INSTRUCTIONS ML180UHE(K)

MERIT® SERIES GAS FURNACE  
UPFLOW / HORIZONTAL AIR DISCHARGE

508541-01  
10/2025

**THIS MANUAL MUST BE LEFT WITH THE  
HOMEOWNER FOR FUTURE REFERENCE**

**⚠** This is a safety alert symbol and should never be ignored. When you see this symbol on labels or in manuals, be alert to the potential for personal injury or death.

## ⚠ 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.

## ⚠ IMPORTANT

**DO NOT** use the heat exchanger bracket to lift, drag or pull the furnace to its installation location. Doing so will loosen the bracket causing noise and or unsafe operation.

Bracket



## Unit Dimensions - inches (mm)

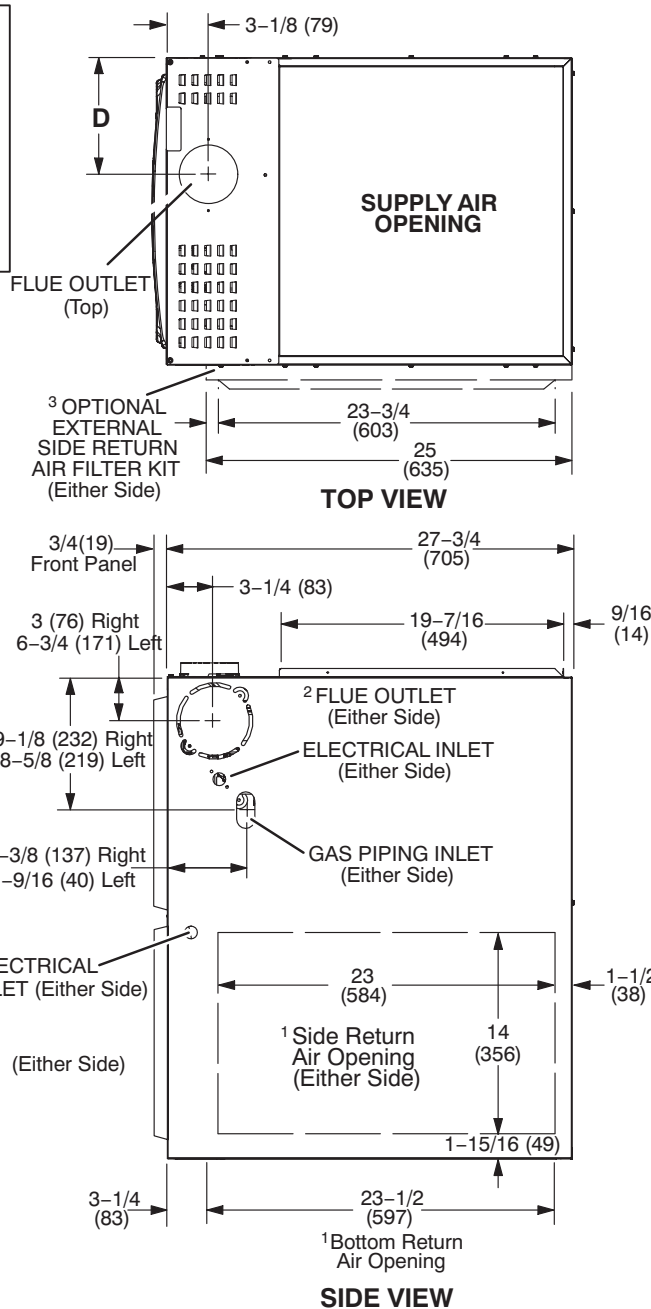
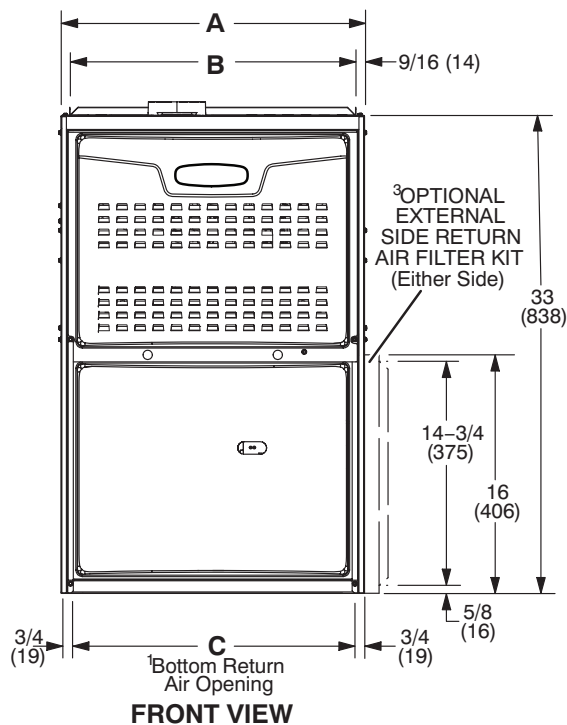
<sup>1</sup>NOTE - 60C and 60D units that require air volumes over 1800 cfm must have one of the following:

1. Single side return air and Optional Return Air Base with transition that must accommodate required 20 x 25 x 1 in. (508 x 635 x 25 mm) air filter to maintain proper air velocity.)
2. Bottom return air.
3. Return air from both sides.
4. Bottom and one side return air.

See Blower Performance Tables for additional information.

<sup>2</sup>Flue outlet may be horizontal but furnace must be vented vertically

<sup>3</sup>Optional external side return air filter kit cannot be used with the optional RAB Return Air Base.



| ML180UHE(K)<br>Model       | A      |     | B      |     | C      |     | D     |     |
|----------------------------|--------|-----|--------|-----|--------|-----|-------|-----|
|                            | in     | mm  | in     | mm  | in     | mm  | in    | mm  |
| 045(X)E36AK<br>070(X)E36AK | 14-1/2 | 368 | 13-3/8 | 340 | 13     | 330 | 4-3/4 | 121 |
| 070(X)E36BK<br>090(X)E48BK | 17-1/2 | 446 | 16-3/8 | 416 | 16     | 406 | 6-1/4 | 159 |
| 090E60CK<br>110(X)E60CK    | 21     | 533 | 19-7/8 | 504 | 19-1/2 | 495 | 8     | 203 |
| 135E60DK                   | 24-1/2 | 622 | 23-3/8 | 546 | 23     | 584 | 9-3/4 | 248 |

## ML180UHE(K) Gas Furnace

The ML180UHE(K) unit is shipped ready for installation in the upflow or horizontal right position (for horizontal left position the combustion air pressure switch must be moved) fueled by natural gas. A conversion kit (ordered separately) is required for use in LP/Propane gas applications. The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in a horizontal application. The panel may also be removed in upflow applications.

## Shipping and Packing List

### Package 1 of 1 contains

- 1 - Assembled ML180UHE(K) unit
- 1 - Bag assembly containing the following:
  - 2 - Screws
  - 1 - Snap bushing
  - 1 - Snap plug
  - 1 - Wire tie
  - 1 -Vent warning label
  - 1 - Owner's manual and warranty card

The following items may be ordered separately:

- 1 - Thermostat
- 1 - Suspension kit (for horizontal installations)
- 1 - LP/Propane changeover kit
- 1 - Return air base
- 1 - High altitude kit
- 1 - Side filter kit
- 1 - Sensor Kit (field installed)

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

## Safety Information

### DANGER

Danger of explosion.

There are circumstances in which odorant used with LP/propane gas can lose its scent. In case of a leak, LP/propane gas will settle close to the floor and may be difficult to smell. An LP/propane leak detector should be installed in all LP applications.

### WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

## Certifications

ML180UHE(K) units are CSA International certified to ANSI Z21.47.

In the USA, installation of gas furnaces must conform with local building codes. In the absence of local codes, units must be installed according to the current National Fuel Gas Code (ANSI-Z223.1). The National Fuel Gas Code is available from the following address:

American National Standards Institute, Inc.  
11 West 42nd Street  
New York, NY 10036

## Clearances

Adequate clearance must be made around the air openings into the vestibule area. In order to ensure proper unit operation, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code.

Vent installations must be consistent with the National Fuel Gas Code venting tables (in this instruction) and applicable provisions of local building codes.

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the tables in figures 7 and 11. Accessibility and service clearances must take precedence over fire protection clearances.

**NOTE** - For installation on combustible floors, the furnace shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.

## Installed Locations

For installation in a residential garage, the furnace must be installed so that the burner(s) and the ignition source are located no less than 18 inches (457 mm) above the floor. The furnace must be located or protected to avoid physical damage by vehicles. When a furnace is installed in a public garage, hangar, or other building that has a hazardous atmosphere, the furnace must be installed according to recommended good practice requirements and current National Fuel Gas Code.

## Temperature Rise

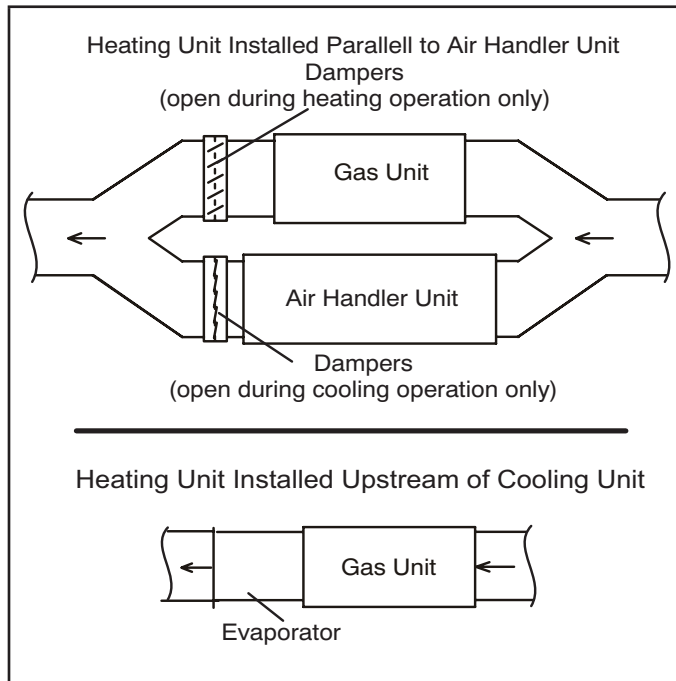
**NOTE** - Furnace must be adjusted to obtain a temperature rise within the range specified on the unit nameplate. Failure to do so may cause erratic limit operation and may result in premature heat exchanger failure.

This ML180UHE(K) furnace must be installed so that its electrical components are protected from water.

## Installed in Combination with a Cooling Coil

When this furnace is used with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating compartment. See FIGURE 1.

With a parallel flow arrangement, a damper (or other means to control the flow of air) must adequately prevent chilled air from entering the furnace. If the damper is manually operated, it must be equipped to prevent operation of either the heating or the cooling unit, unless it is in the full HEAT or COOL setting.



**FIGURE 1**

When installed, this furnace must be electrically grounded according to local codes. In addition, in the United States, installation must conform with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from the following address:

National Fire Protection Association  
1 Battery March Park  
Quincy, MA 02269

**NOTE** - This furnace is designed for a minimum continuous return air temperature of 60°F (16°C) or an intermittent operation down to 55°F (13°C) dry bulb for cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C) dry bulb.

The ML180UHE(K) furnace may be installed in alcoves, closets, attics, basements, garages, crawl spaces and utility rooms in the upflow or horizontal position.

**This furnace design has not been CSA International certified for installation in mobile homes, recreational vehicles, or outdoors.**

#### Use of Furnace as Construction Heater

Lennox does not recommend the use of ML180UHE(K) units as a construction heater during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

ML180UHE(K) units may be used for heating of buildings or structures under construction, if the following conditions are met:

- The vent system must be permanently installed per these installation instructions.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is not allowed.
- The return air duct must be provided and sealed to the furnace.
- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- Air filters must be installed in the system and must be maintained during construction.
- Air filters must be replaced upon construction completion.
- The input rate and temperature rise must be set per the furnace rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during construction. Temporary ducting may supply outdoor air to the furnace. Do not connect duct directly to the furnace. Size the temporary duct following these instructions in section for Combustion, Dilution and Ventilation Air in a confined space with air from outside.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils must be thoroughly cleaned following final construction clean-up.
- The refrigerant leak detection sensor must be inspected for dust/debris deposits. Please refer to the evaporator coil and/or refrigerant detection sensor kit instructions for additional information.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

#### General

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation. In addition to the requirements outlined previously, the following general recommendations must be considered when installing a ML180UHE(K) furnace:

- Place the furnace as close to the center of the air distribution system as possible. The furnace should also be located close to the chimney or vent termination point.

- Do not install the furnace where drafts might blow directly into it. This could cause improper combustion and unsafe operation.
- Do not block the furnace combustion air openings with clothing, boxes, doors, etc. Air is needed for proper combustion and safe unit operation.
- When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

**NOTE - The Commonwealth of Massachusetts stipulates these additional requirements:**

- **Gas furnaces shall be installed by a licensed plumber or fitter only.**
- **The gas cock must be "T handle" type.**
- **When a furnace is installed in an attic, the passageway to and service area surrounding the equipment shall be floored.**

#### Combustion, Dilution & Ventilation Air

In the past, there was no problem in bringing in sufficient outdoor air for combustion. Infiltration provided all the air that was needed. In today's homes, tight construction practices make it necessary to bring in air from outside for combustion. Take into account that exhaust fans, appliance vents, chimneys, and fireplaces force additional air that could be used for combustion out of the house. Unless outside air is brought into the house for combustion, negative pressure (outside pressure is greater than inside pressure) will build to the point that a downdraft can occur in the furnace vent pipe or chimney. As a result, combustion gases enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install ML180UHE(K) furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents. A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI-Z223.1). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

### CAUTION

Do not install the furnace in a corrosive or contaminated atmosphere. Meet all combustion and ventilation air requirements, as well as all local codes.

### CAUTION

Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. It will also cause excess water in the heat exchanger resulting in rusting and premature heat exchanger failure. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:

Permanent wave solutions  
Chlorinated waxes and cleaners  
Chlorine base swimming pool chemicals  
Water softening chemicals  
De-icing salts or chemicals  
Carbon tetrachloride  
Halogen type refrigerants  
Cleaning solvents (such as perchloroethylene)  
Printing inks, paint removers, varnishes, etc.  
Hydrochloric acid  
Cements and glues  
Antistatic fabric softeners for clothes dryers  
Masonry acid washing materials

All gas-fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliances will operate inefficiently and unsafely. Enough air must be provided to meet the needs of all fuel-burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is necessary to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

In addition to providing combustion air, fresh outdoor air dilutes contaminants in the indoor air. These contaminants may include bleaches, adhesives, detergents, solvents and other contaminants which can corrode furnace components.

The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or a confined space.

#### Unconfined Space

An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m<sup>3</sup>) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space.

This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air for combustion if the structure does not provide enough air by infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from out.

## Confined Space

A confined space is an area with a volume less than 50 cubic feet (1.42 m<sup>3</sup>) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This definition includes furnace closets or small equipment rooms.

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air must be handled by ducts which are sealed to the furnace casing and which terminate outside the space containing the furnace. This is especially important when the furnace is mounted on a platform in a confined space such as a closet or small equipment room.

Even a small leak around the base of the unit at the platform or at the return air duct connection can cause a potentially dangerous negative pressure condition. Air for combustion and ventilation can be brought into the confined space either from inside the building or from outside.

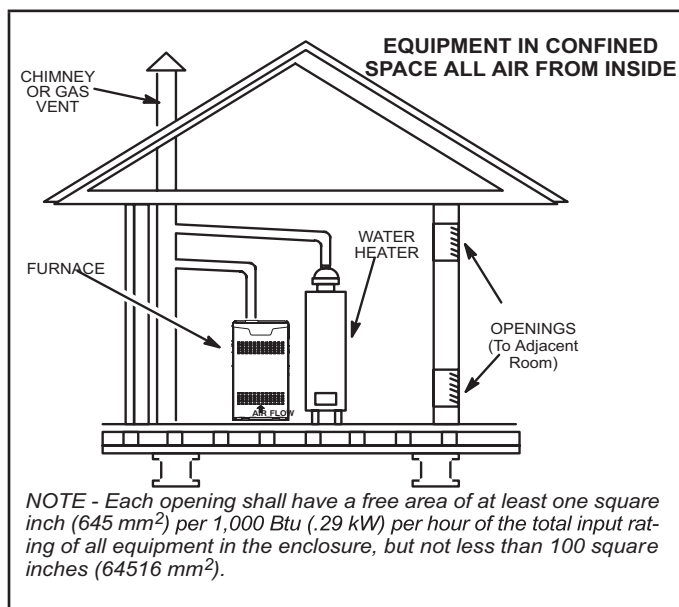


FIGURE 2

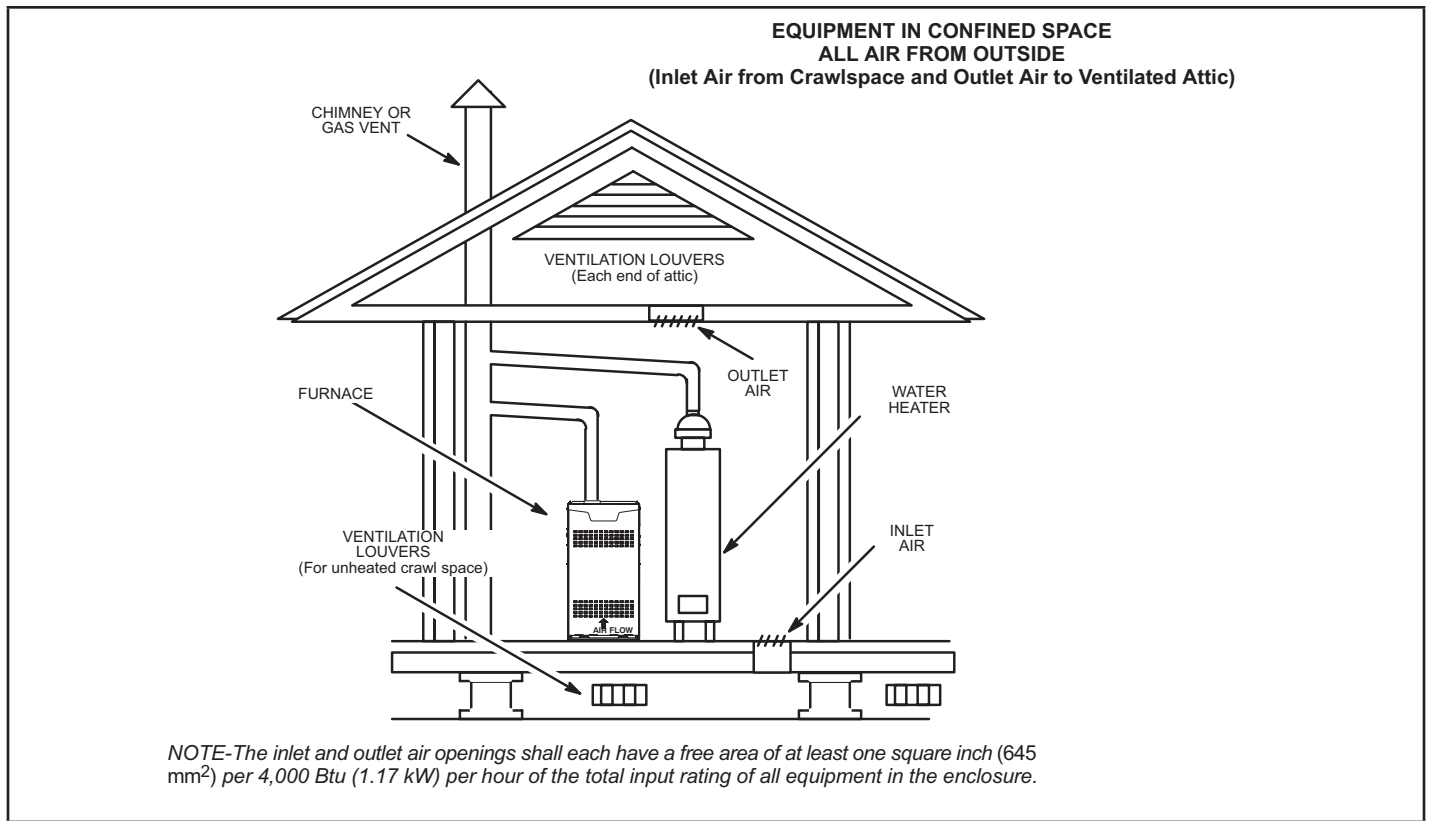
## Air from Inside

If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm<sup>2</sup>) per 1,000 Btu (.29 kW) per hour of total input rating of all gas-fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm<sup>2</sup>). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See FIGURE 2.

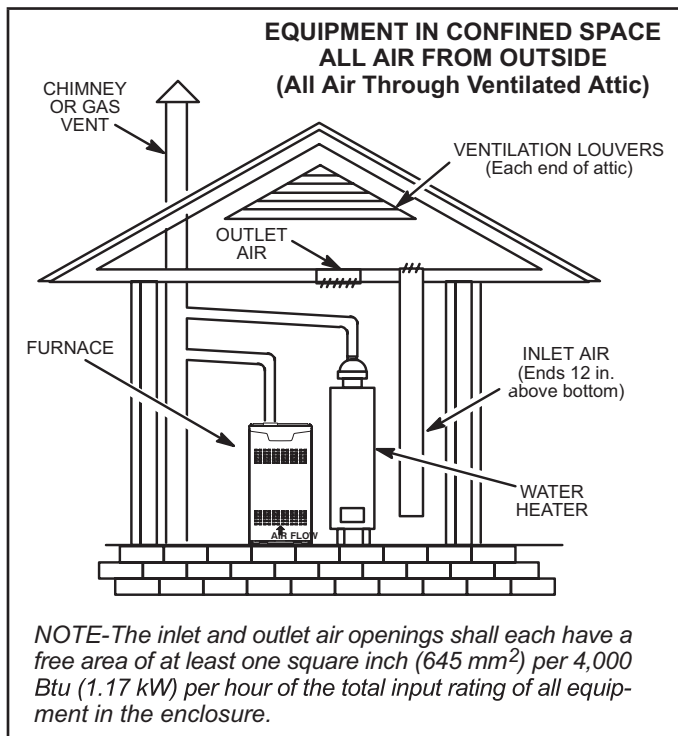
## Air from Outside

If air from outside is brought in for combustion and ventilation, the confined space must have two permanent openings. One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. These openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors or indirectly through vertical ducts. Each opening shall have a minimum free area of 1 square inch (645 mm<sup>2</sup>) per 4,000 Btu (1.17 kW) per hour of total input rating of all equipment in the enclosure. See FIGURE 3 and FIGURE 4. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch (645 mm<sup>2</sup>) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See FIGURE 5.

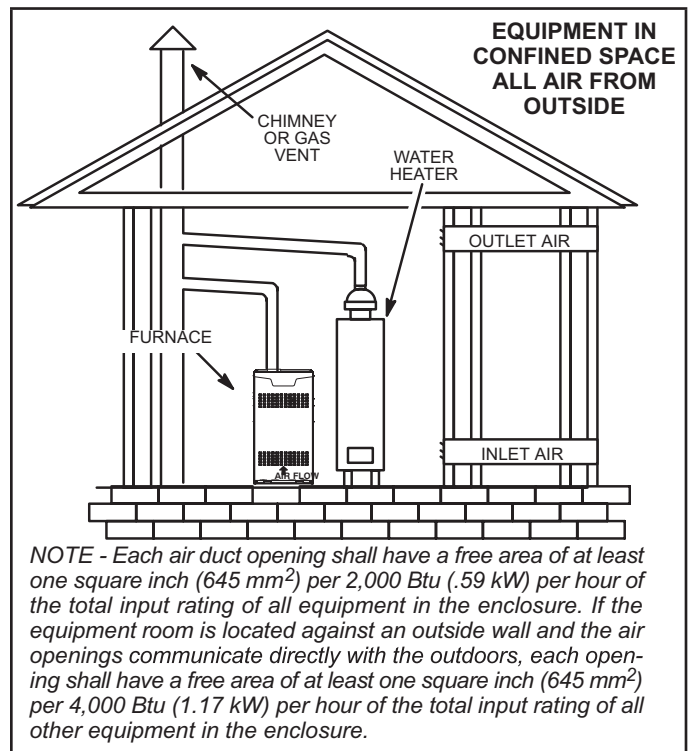
When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. If the design and free area of protective covering is not known for calculating the size opening required, it may be assumed that wood louvers will have 20 to 25 percent free area and metal louvers and grilles will have 60 to 75 percent free area. Louvers and grilles must be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.



**FIGURE 3**



**FIGURE 4**



**FIGURE 5**

## Setting Equipment

### WARNING

Do not install the furnace on its front or its back. Do not connect the return air ducts to the back of the furnace. Doing so will adversely affect the operation of the safety control devices, which could result in personal injury or death.

The ML180UHE(K) gas furnace can be installed as shipped in either the upflow position or the horizontal position. Select a location that allows for the required clearances that are listed on the unit nameplate. Also consider gas supply connections, electrical supply, vent connection, and installation and service clearances [24 inches (610 mm) at unit front]. The unit must be level.

**NOTE** - Units with 1/2 or 3/4 hp blower motors are equipped with three flexible legs and one rigid leg. See FIGURE 6. The rigid leg is equipped with a shipping bolt and a flat white plastic washer (rather than the rubber mounting grommet used with a flexible mounting leg). **The bolt and washer must be removed before the furnace is placed into operation.** After the bolt and washer have been removed, the rigid leg will not touch the blower housing.

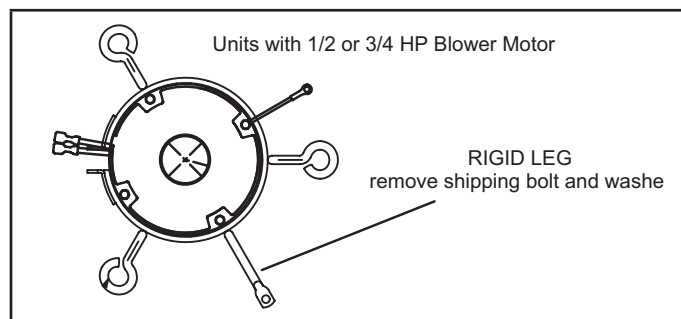


FIGURE 6

## Upflow Applications

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in FIGURE 7.

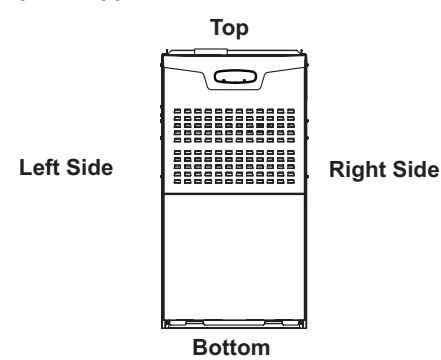
| Upflow Application Installation Clearances                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |                   |
| Type of Vent Connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Type C              | Type B1           |
| Top                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 in. (25 mm)       | 1 in. (25 mm)     |
| *Front                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2-1/4 in. (57 mm)** | 2-1/4 in. (57 mm) |
| Back                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0                   | 0                 |
| Sides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0†                  | 0                 |
| Vent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6 in. (152 mm)      | 1 in. (25 mm)     |
| Floor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0‡                  | 0‡                |
| <p>*Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.<br/> ** 4-1/2 in. if single wall vent pipe is used.<br/> ‡For installation on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.<br/> †Left side requires 3 inches if a single wall vent is used on 14-1/2 in. cabinets, or 2 inches if a single wall vent pipe is used on 17-1/2 in. cabinets.</p> |                     |                   |

FIGURE 7

## Return Air -- Upflow Applications

Return air can be brought in through the bottom or either side of the furnace installed in an upflow application. If the furnace is installed on a platform with bottom return, make an airtight seal between the bottom of the furnace and the platform to ensure that the furnace operates properly and safely. The furnace is equipped with a removable bottom panel to facilitate installation.

Markings are provided on both sides of the furnace cabinet for installations that require side return air. Cut the furnace cabinet at the maximum dimensions shown on page 2.

NOTE - 60C and 60D units that require air volumes over 1800 cfm (850 L/s) must have one of the following:

- 1 - Single side return air with optional return air base with transition that must accommodate required 20 x 25 x 1 in. (508 x 635 x 25 mm) air filter to maintain proper air velocity.) See FIGURE 8.
- 2 - Bottom return air.
- 3 - Return air from both sides.
- 4 - Bottom and one side return air.

Refer to Product Specifications for additional information

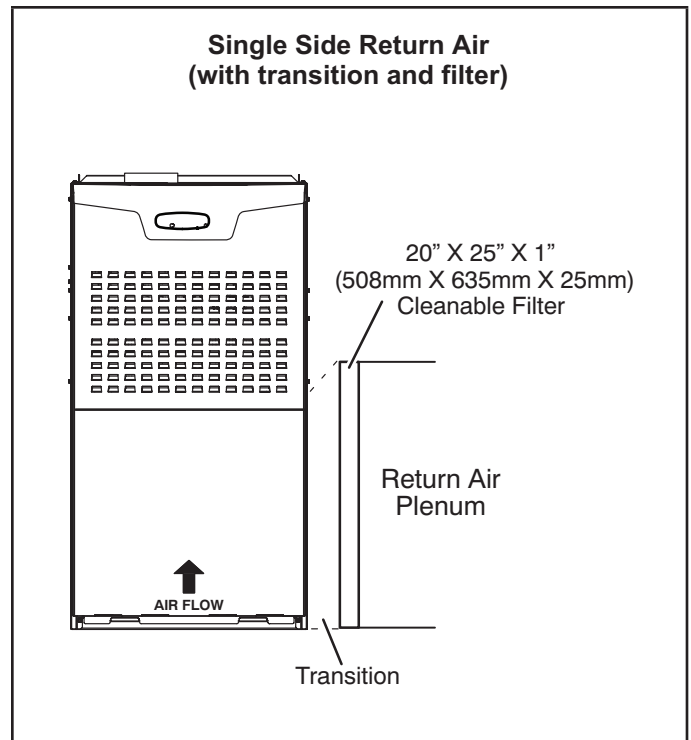


FIGURE 8

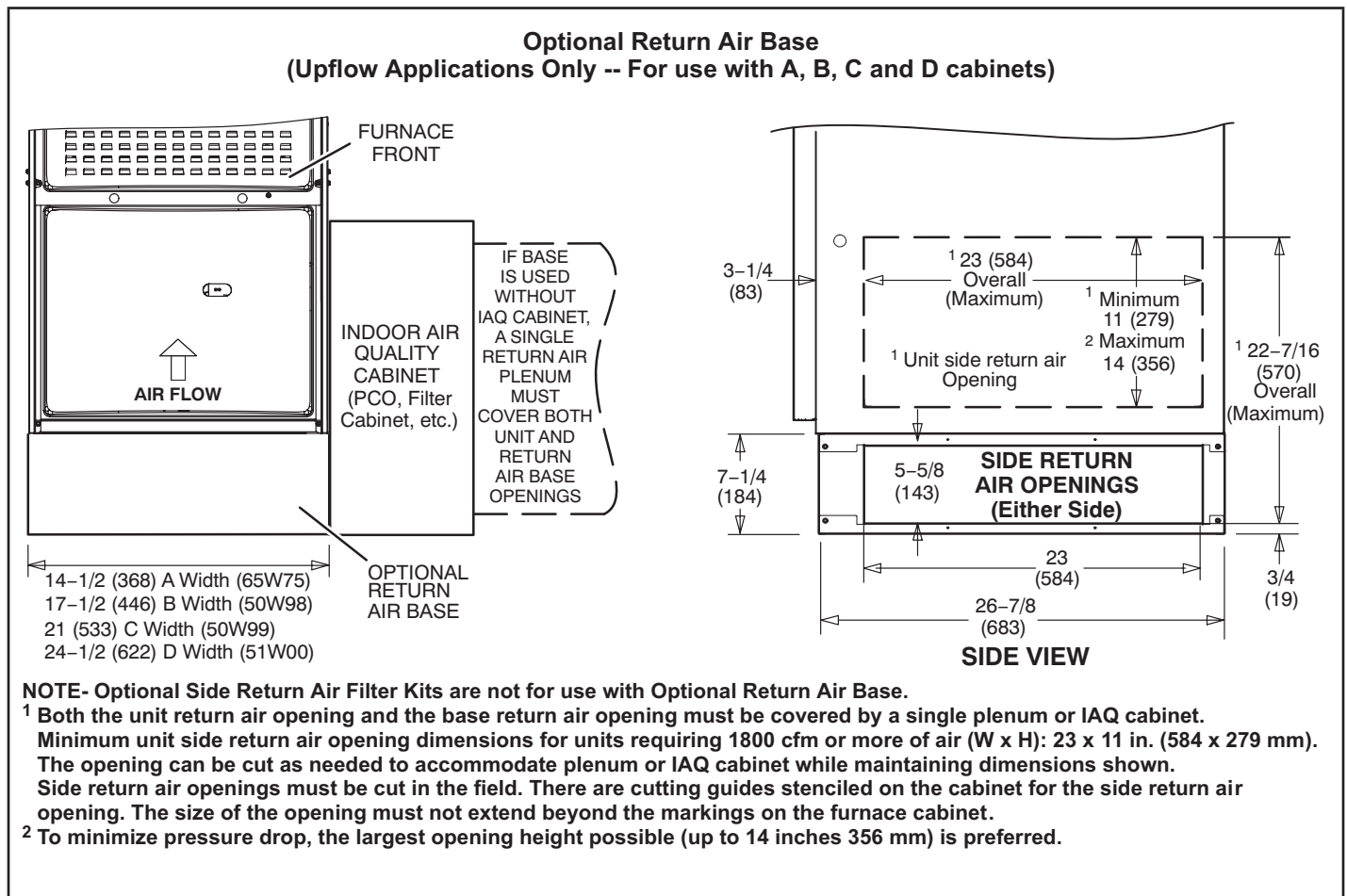


FIGURE 9

## Removing the Bottom Panel

Remove the two screws that secure the bottom cap to the furnace. Pivot the bottom cap down to release the bottom panel. Once the bottom panel has been removed, reinstall the bottom cap. See FIGURE 10.

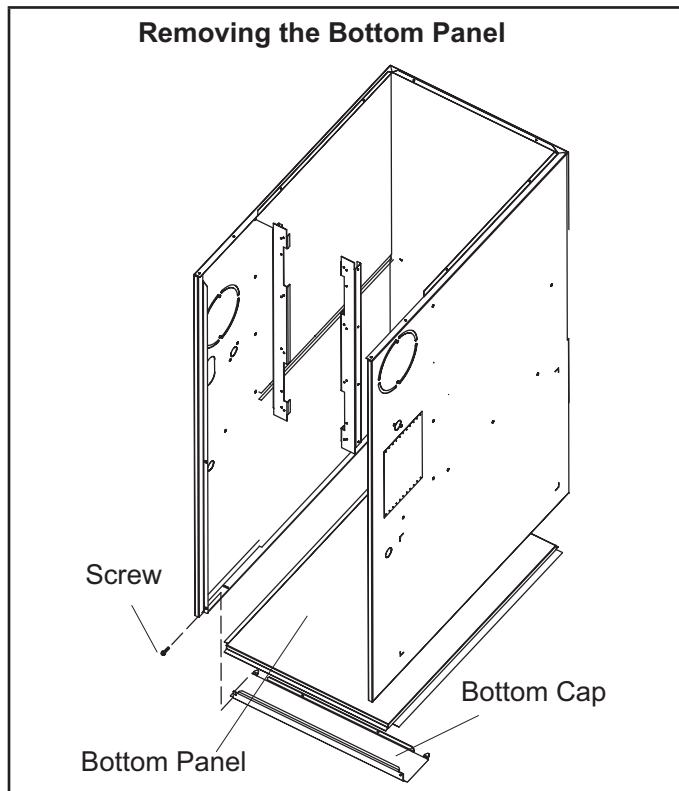


FIGURE 10

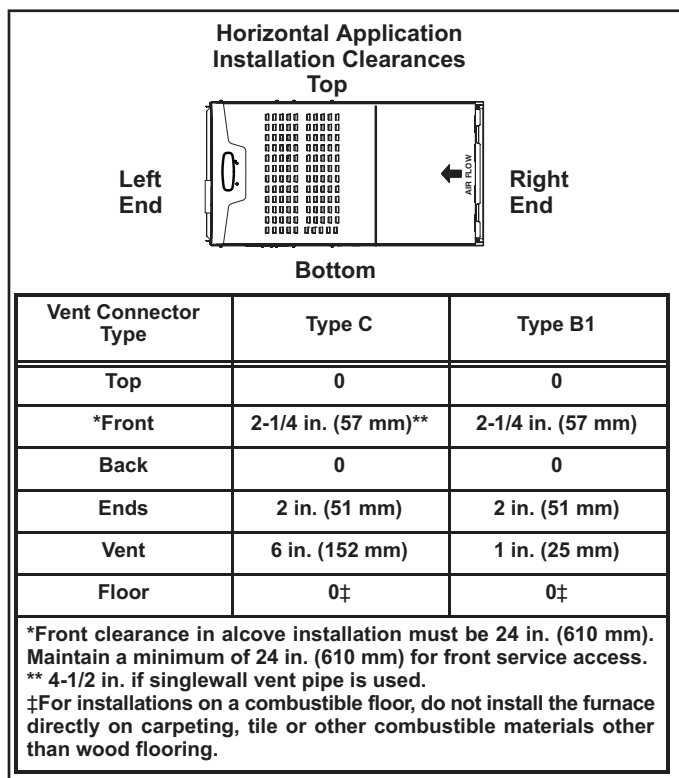


FIGURE 11

## Horizontal Applications

The ML180UHE(K) furnace can be installed in horizontal applications. Order horizontal suspension kit (51W10) from Lennox, or use equivalent suspension method.

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in FIGURE 11.

This furnace may be installed in either an attic or a crawlspace. Either suspend the furnace from roof rafters or floor joists, as shown in FIGURE 12, or install the furnace on a platform, as shown in FIGURE 13.

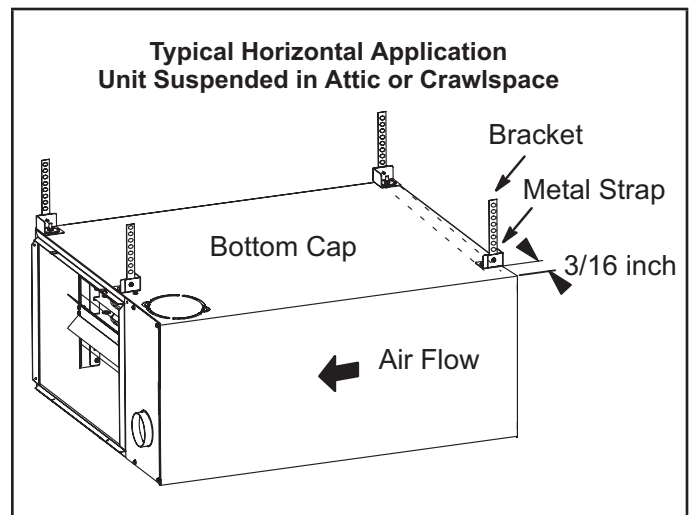


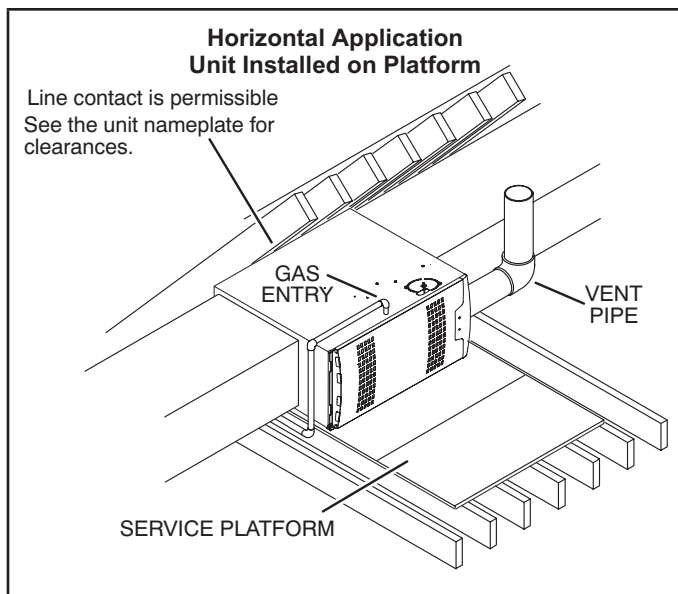
FIGURE 12

**NOTE** - Heavy-gauge perforated sheet metal straps may be used to suspend the unit from roof rafters or ceiling joists. When straps are used to suspend the unit in this way, support must be provided for both the ends. The straps must not interfere with the plenum or exhaust piping installation. **Cooling coils and supply and return air plenums must be supported separately.**

**NOTE** - When the furnace is installed on a platform in a crawlspace, it must be elevated enough to avoid water damage and to allow the evaporator coil to drain.

## Return Air -- Horizontal Applications

Return air must be brought in through the end of a furnace installed in a horizontal application. The furnace is equipped with a removable bottom panel to facilitate installation. See FIGURE 10.



**FIGURE 13**

## **⚠ CAUTION**

If this unit is being installed in a space serviced by an exhaust fan, power exhaust fan, or other device which may create a negative pressure in the space, take care when sizing the inlet air opening. The inlet air opening must be sized to accommodate the maximum volume of exhausted air as well as the maximum volume of combustion air required for all gas appliances serviced by this space.

## **⚠ WARNING**

Improper installation of the furnace can result in personal injury or death. Combustion and flue products must never be allowed to enter the return air system or the living space. Use screws and joint tape to seal the return air system to the furnace. In platform installations with bottom return air, the furnace should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the furnace. Allow absolutely no sagging, cracks, gaps, etc. The return and supply air duct systems must never be connected to or from other heating devices such as a fireplace or stove, etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

## **⚠ WARNING**

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

### **Filters**

This unit is not equipped with a filter or rack. A field-provided high-velocity filter is required for the unit to operate properly. TABLE 1 lists recommended filter sizes. A filter must be in place any time the unit is operating.

**TABLE 1**

| Furnace Cabinet Width | Filter Size     |                 |
|-----------------------|-----------------|-----------------|
|                       | Side Return     | Bottom Return   |
| A - 14-1/2"           | 16 X 25 X 1 (1) | 14 X 25 X 1 (1) |
| B - 17-1/2"           | 16 X 25 X 1 (1) | 16 X 25 X 1 (1) |
| C - 21"               | 16 X 25 X 1 (1) | 20 x 25 x 1 (1) |
| D - 24-1/2"           | 16 X 25 X 1 (2) | 24 x 25 x 1 (1) |

## **⚠ IMPORTANT**

If a high efficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. High efficiency filters have a higher static pressure drop than standard efficiency glass/foam filters. If the pressure drop is too great, system capacity and performance may be reduced. The pressure drop may also cause the limit to trip more frequently during the winter and the indoor coil to freeze in the summer, resulting in an increase in the number of service calls.

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate Lennox Product Specifications bulletin. Additional information is provided in Service and Application Note ACC002 (August 2000).

## Duct System

Use industry-approved standards (such as those published by Air Conditioning Contractors of America or American Society of Heating, Refrigerating and Air Conditioning Engineers) to size and install the supply and return air duct system. See FIGURE 14 for proper duct system installation. This will result in a quiet and low-static system that has uniform air distribution.

**NOTE** - Do not operate the furnace in the heating mode with an external static pressure that exceeds 0.5 inches w.c. Higher external static pressures may cause erratic limit operation.

### Supply Air Plenum

If the furnace is installed without a cooling coil, a removable access panel must be installed in the supply air duct. The access panel should be large enough to permit inspection (either by smoke or reflected light) of the heat exchanger for leaks after the furnace is installed. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks into the supply air duct system. For horizontal units, install self tapping screws in the three evaporator coil screw holes made for horizontal applications to seal the top cap to the vestibule panel.

### Return Air Plenum

**NOTE** - Return air must not be drawn from a room where this furnace, or any other gas-fueled appliance (i.e., water heater), or carbon monoxide producing device (i.e., wood fireplace) is installed.

When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

In upflow applications, the return air can be brought in through the bottom or either side of the furnace. If a furnace with bottom return air is installed on a platform, make an airtight seal between the bottom of the furnace and the platform to ensure that the unit operates properly and safely. Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the furnace cabinet to ensure a tight seal. If a filter is installed, size the return air duct to fit the filter frame.

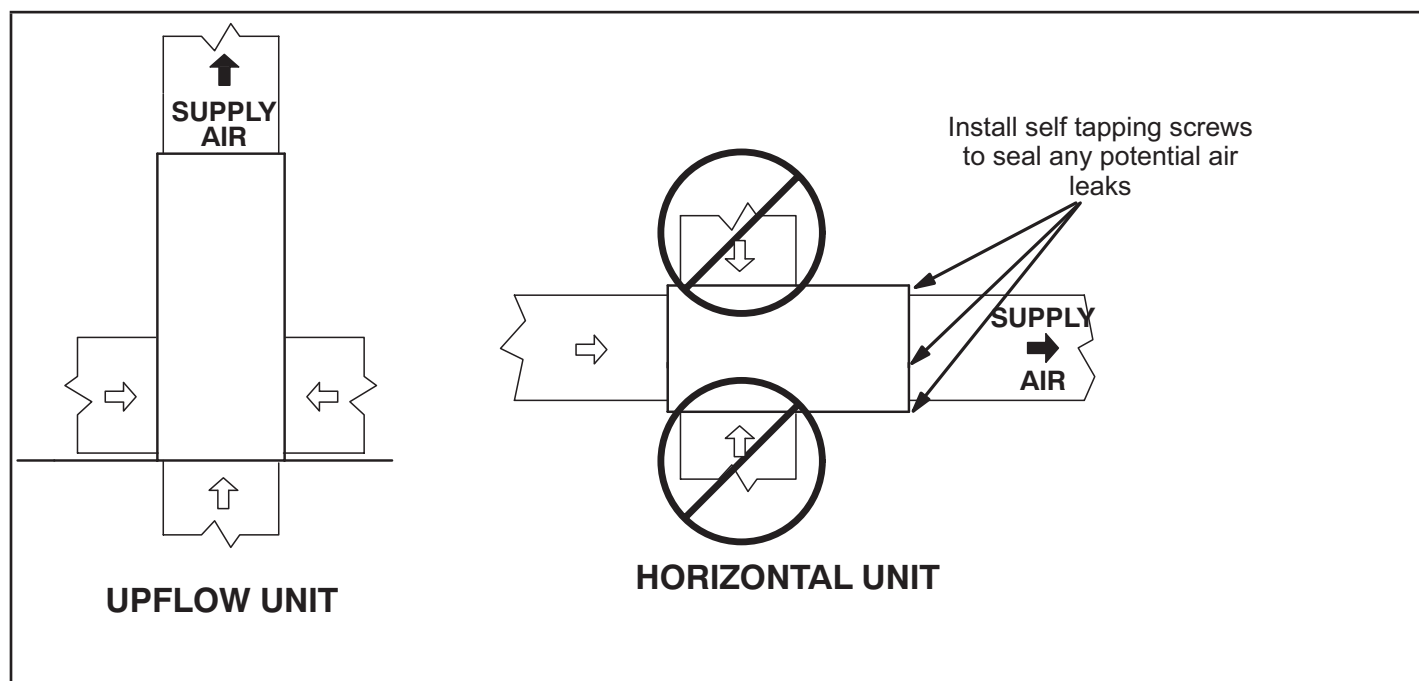


FIGURE 14

## Venting

A 4-inch diameter flue transition is factory-installed on the combustion air inducer outlet of all models. FIGURE 16 shows the combustion air inducer as shipped from the factory.

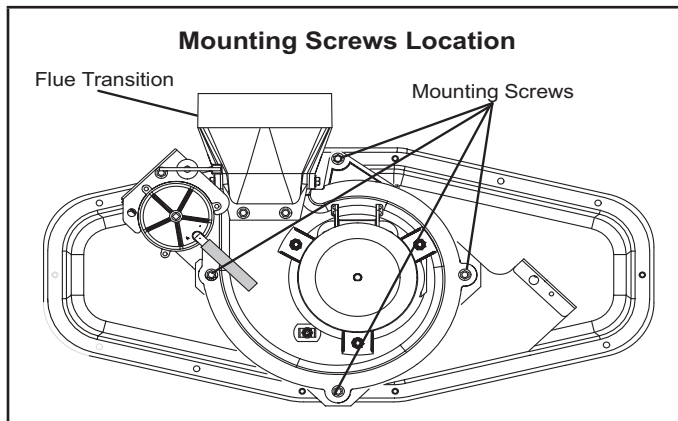


FIGURE 15

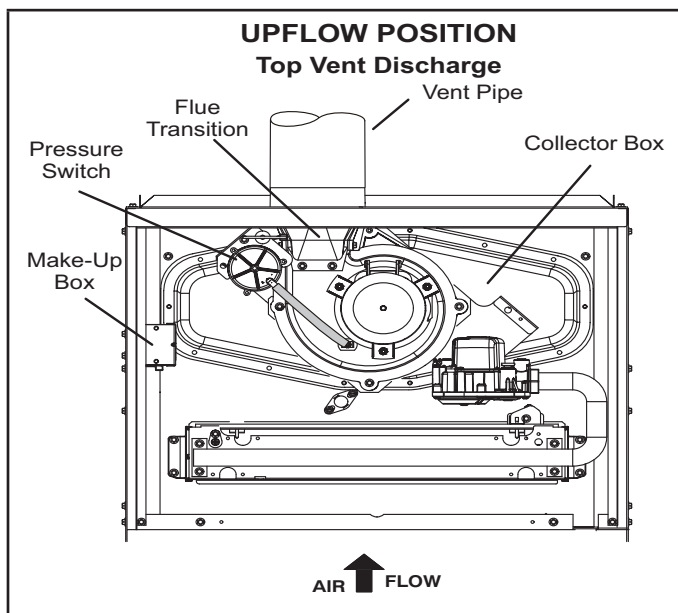


FIGURE 16

## ⚠ IMPORTANT

The unit will not vent properly with the flue transition pointed down in the 6 o'clock position. The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for top or side vent discharge in all applications. When the unit is installed, the flue transition must be in the 9 o'clock, 12 o'clock or 3 o'clock position.

If necessary, reposition the combustion air inducer, pressure switch and/or make-up box as needed per the following steps. See FIGURE 17 through FIGURE 21.

1 - Remove the four mounting screws (FIGURE 15) which secure the combustion air inducer / pressure switch assembly to the orifice plate. Lift the assembly and rotate it 90 degrees clockwise or counterclockwise to either the 3 o'clock position or to 9 o'clock position. Resecure with four screws. Gasket should be left in place.

2 - Use tin snips to cut preferred opening on the cabinet for repositioning the flue outlet. Use the cut-out piece as a cover plate to patch unused opening on cabinet

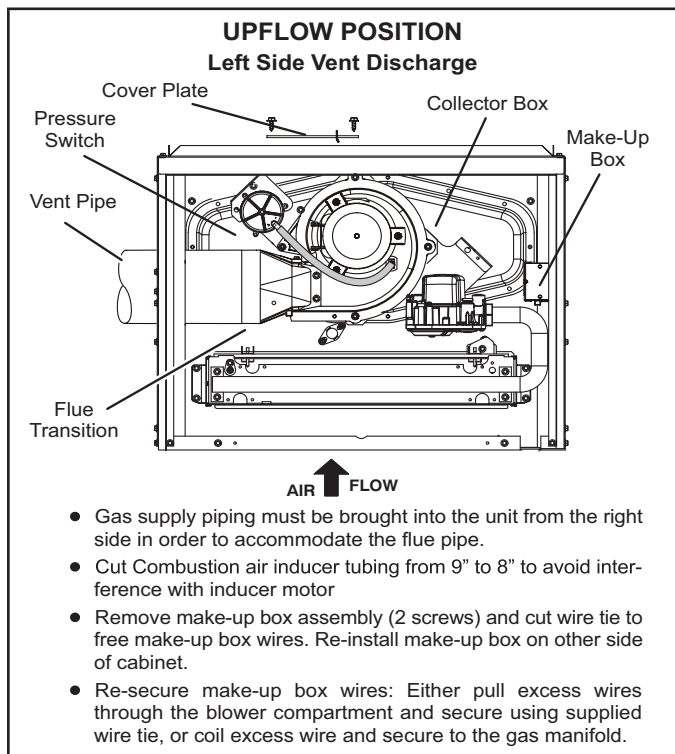


FIGURE 17

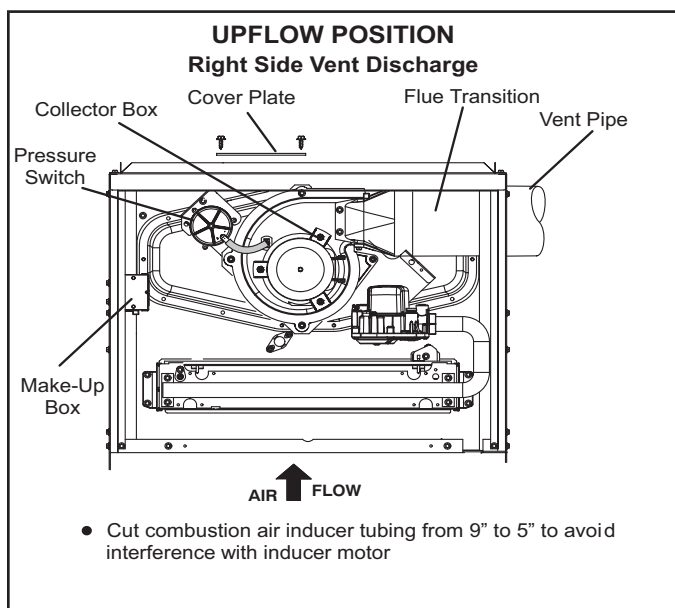
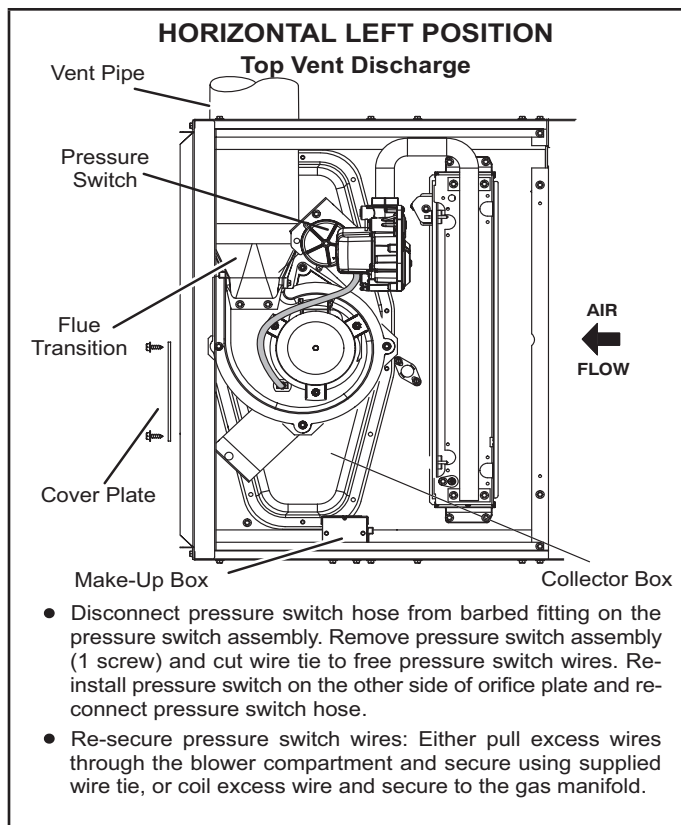
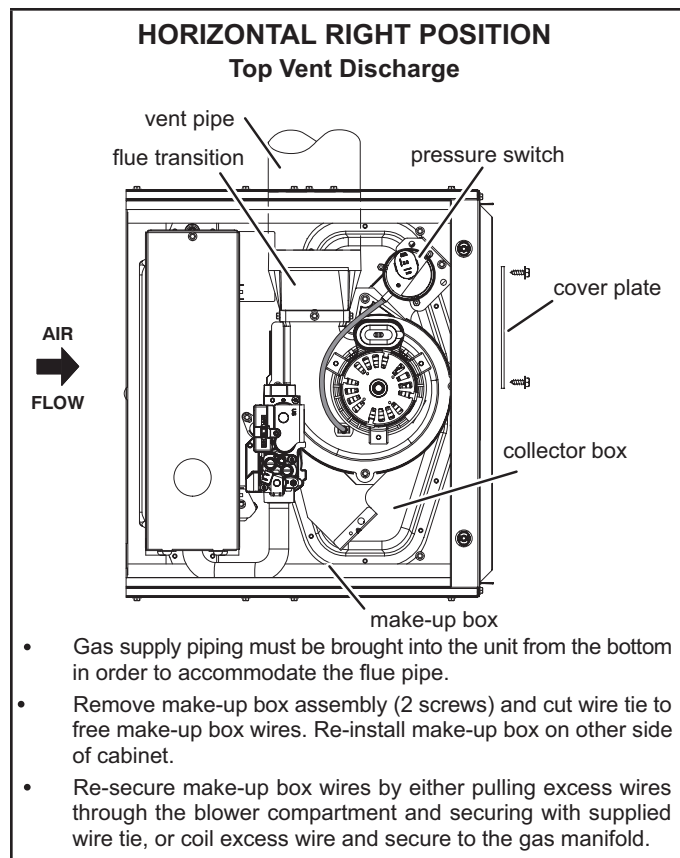


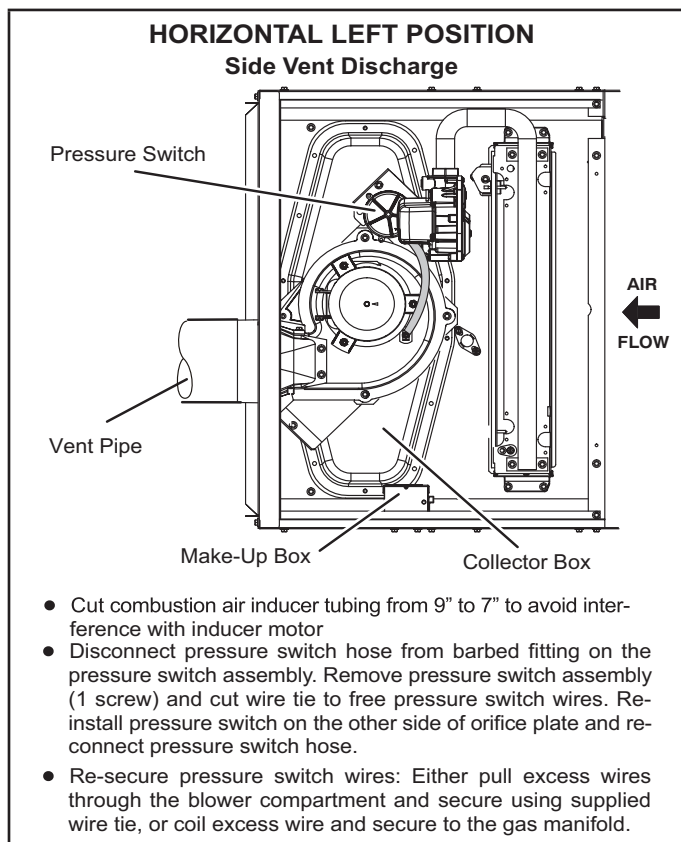
FIGURE 18



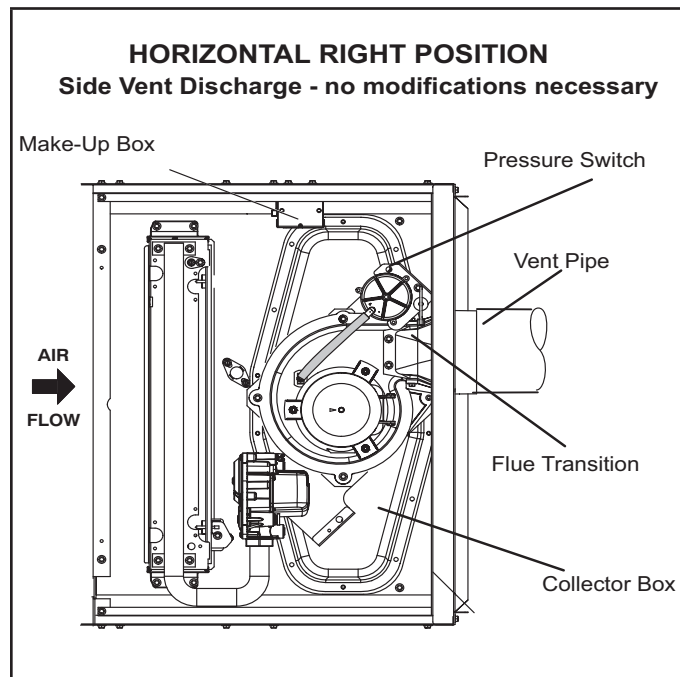
**FIGURE 19**



**FIGURE 21**



**FIGURE 20**



**FIGURE 22**

The ML180UHE(K) series units are classified as fan-assisted Category I furnaces when vertically vented according to the latest edition of National Fuel Gas Code (NFPA 54 / ANSI Z223.1) in the USA. A fan-assisted Category I furnace is an appliance equipped with an integral mechanical means to either draw or force combustion products through the combustion chamber and/or heat exchanger. The ML180UHE(K) is not approved for use with horizontal venting.

**NOTE** - Use these instructions as a guide. They do not supersede local codes. This furnace must be vented according to all local codes these installation instructions, and the provided venting tables in these instructions

The venting tables in this manual were extracted from the National Fuel Gas Code (NFPA 54 / ANSI Z223.1) and are provided as a guide for proper vent installation. Proper application, termination, construction and location of vents must conform to local codes having jurisdiction. In the absence of local codes, the NFPA serves as the defining document.

Use self-drilling sheet metal screws or a mechanical fastener to firmly secure the vent pipe to the round collar of the flue transition. If self-drilling screws are used to attach the vent pipe, it is recommended that three be used. Drive one self-drilling screw through the front and one through each side of the vent pipe and collar. See FIGURE 23.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet. See FIGURE 23.

#### Venting Using a Masonry Chimney

The following additional requirements apply when a lined masonry chimney is used to vent this furnace. Masonry chimneys used to vent Category I central furnaces must be either tile-lined or lined with a listed metal

lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See FIGURE 24 and FIGURE 25 for common venting.

A chimney with one or more sides exposed to the outside of the structure is considered to be an exterior chimney.

An exterior masonry chimney that is not tile-lined must be lined with B1 vent or a listed insulated flexible metal vent. An exterior tile-lined chimney that is sealed and capped may be lined with a listed uninsulated flexible metal vent. If the existing chimney will not accommodate a listed metal liner, either the chimney must be rebuilt to accommodate one of these liners or an alternate approved venting method must be found.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See FIGURE 24. Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

### ! IMPORTANT

Once the venting system is installed, attach the "Disconnected Vent" warning sticker to a visible area of the plenum near the vent pipe. See FIGURE 23. The warning sticker is provided in the bag assembly. Order Kit 66W04 for additional stickers.

### ! WARNING

Asphyxiation hazard. The exhaust vent for this furnace must be securely connected to the furnace flue transition at all times..

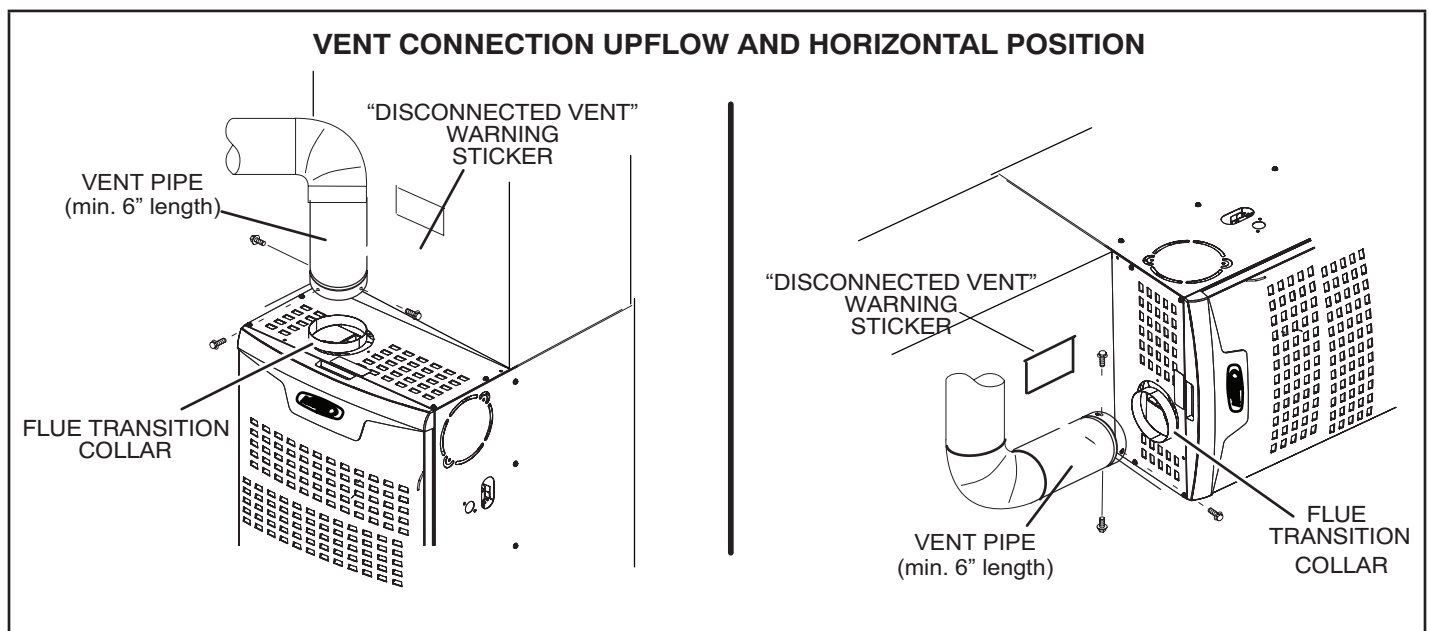
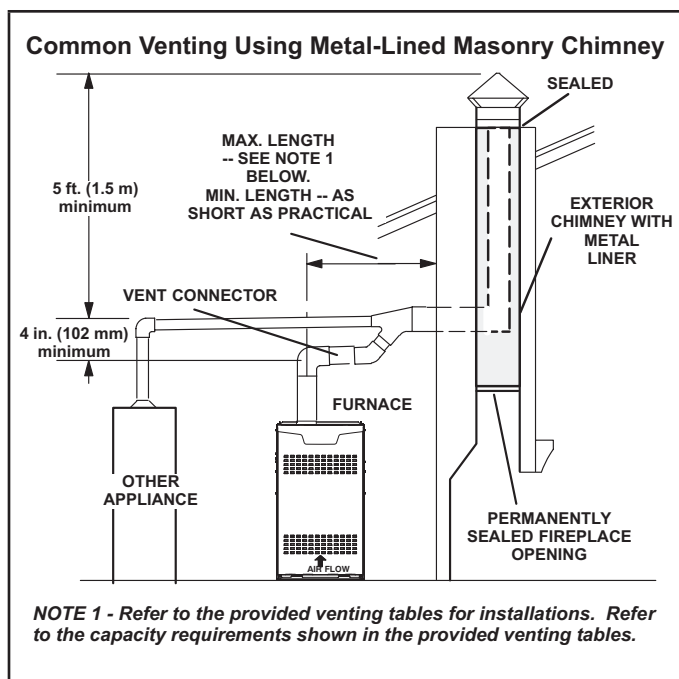


FIGURE 23



**FIGURE 24**

**DO NOT** insulate the space between the liner and the chimney wall with puffed mica or any other loose granular insulating material.

## **⚠ IMPORTANT**

**SINGLE** appliance venting of a fan-assisted furnace into a tile-lined masonry chimney (interior or outside wall) is **PROHIBITED**. The chimney must first be lined with either type B1 vent or an insulated single wall flexible vent lining system which has been sized according to the provided venting tables and the vent pipe manufacturer's instructions.

A fan-assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

- The chimney is currently serving at least one draft-hooded appliance;
- The vent connectors and chimney are sized according to the provided venting tables.

If type B1 double-wall vent is used inside a chimney, no other appliance can be vented into the chimney. The outer wall of type B1 vent pipe must not be exposed to flue products. A type B1 vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly according to the terms of their respective listings and the vent manufacturer's instructions.

When inspection reveals that an existing chimney is not safe for the intended purpose, it shall be rebuilt to conform to nationally recognized standards, lined or relined with suitable materials, or replaced with a gas vent or chimney suitable for venting ML180UHE(K) series units. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

Do not install a manual damper, barometric draft regulator, or flue restrictor between the furnace and the chimney.

Never connect a Category I appliance to a chimney that is servicing a solid-fuel appliance. If a fireplace chimney flue is used to vent this appliance, the fireplace opening must be permanently sealed.

A type B or listed chimney lining system that passes through an unused masonry chimney flue is not considered to be exposed to the outdoors.

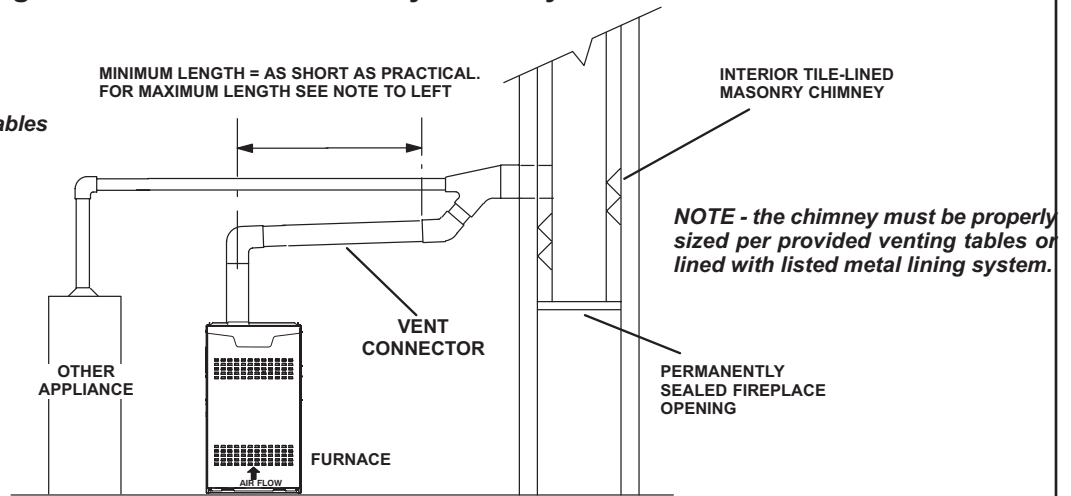
### **General Venting Requirements**

Vent all ML180UHE(K) furnaces according to these instructions:

- 1 - Vent diameter recommendations and maximum allowable piping runs are found in the provided venting tables.
- 2 - In no case should the vent or vent connector diameter be less than the diameter specified in the provided venting tables.
- 3 - The minimum vent capacity determined by the sizing tables must be less than the low fire input rating and the maximum vent capacity must be greater than the high fire input rating.
- 4 - Single appliance vents - If the vertical vent or tile-lined chimney has a larger diameter or flow area than the vent connector, use the vertical vent diameter to determine the minimum vent capacity and the vent connector diameter to determine the maximum vent capacity. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.
- 5 - Multiple appliance vents - The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.
- 6 - The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.

## Common Venting Using Tile-Lined Interior Masonry Chimney and Combined Vent Connector

**NOTE-** Refer to provided venting tables for installations.



**FIGURE 25**

- 7 - Single appliance venting configurations with zero lateral lengths (TABLE 3) are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10% (0.90 x maximum listed capacity).
- 8 - The common venting (TABLE 5) were generated using a maximum horizontal vent connector length of 1-1/2 feet (.46 m) for each inch (25 mm) of connector diameter as follows:

**TABLE 2**

| Connector Diameter<br>inches (mm) | Maximum Horizontal<br>Connector Length feet (m) |
|-----------------------------------|-------------------------------------------------|
| 3 (76)                            | 4-1/2 (1.37)                                    |
| 4 (102)                           | 6 (1.83)                                        |
| 5 (127)                           | 7-1/2 (2.29)                                    |
| 6 (152)                           | 9 (2.74)                                        |
| 7 (178)                           | 10-1/2 (3.20)                                   |

- 9 - If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.

**NOTE -** For any Low GWP refrigerant systems with exposed line set joints installed in the same space, each non-direct vent furnace system must have a refrigerant detection sensor installed below the level of the burners (See Secondary Sensor Requirements Page 30). Any direct vent furnace system is not subject to this requirement.

- 10 - The vent pipe should be as short as possible with the least number of elbows and angles required to complete the job. Route the vent connector to the vent using the shortest possible route.
- 11 - A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance.
- 12 - Vent connectors shall be firmly attached to the furnace flue collar by self-drilling screws or other approved means, except vent connectors of listed type B vent material which shall be assembled according to the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.
- 13 - When the vent connector used for Category I appliances must be located in or pass through a crawlspace, attic or other areas which may be cold, that portion of the vent connector shall be constructed of listed double-wall type B vent material or material having equivalent insulation qualities.
- 14 - All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFPA 223.1).
- 15 - No portion of the venting system can extend into, or pass through any circulation air duct or plenum.
- 16 - Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV venting systems.

- 17 - If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10%, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).
- 18 - The common vent diameter must always be at least as large as the largest vent connector diameter.
- 19 - In no case, shall the vent connector be sized more than two consecutive table size diameters over the size of the draft hood outlet or flue collar outlet.

- 20 - Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.
- 21 - When connecting this appliance to an existing dedicated or common venting system, you must inspect the venting system's general condition and look for signs of corrosion. The existing vent pipe size must conform to these instructions and the provided venting tables. If the existing venting system does not meet these requirements, it must be resized.

**TABLE 3**

Capacity of Type B Double-Wall Vents with Type B Double-Wall Connectors  
Serving a Single Category I Appliance

| Height<br>H<br>(feet) | Lateral<br>L<br>(feet) | Vent and Connector Diameter - D (inches)            |     |        |     |        |     |        |     |
|-----------------------|------------------------|-----------------------------------------------------|-----|--------|-----|--------|-----|--------|-----|
|                       |                        | 3 inch                                              |     | 4 inch |     | 5 inch |     | 6 inch |     |
|                       |                        | Appliance Input Rating in Thousands of Btu Per Hour |     |        |     |        |     |        |     |
|                       |                        | Min                                                 | Max | Min    | Max | Min    | Max | Min    | Max |
| 6                     | 0                      | 0                                                   | 78  | 0      | 152 | 0      | 251 | 0      | 375 |
|                       | 2                      | 13                                                  | 51  | 18     | 97  | 27     | 157 | 32     | 232 |
|                       | 4                      | 21                                                  | 49  | 30     | 94  | 39     | 153 | 50     | 227 |
|                       | 6                      | 25                                                  | 46  | 36     | 91  | 47     | 149 | 59     | 223 |
| 8                     | 0                      | 0                                                   | 84  | 0      | 165 | 0      | 276 | 0      | 415 |
|                       | 2                      | 12                                                  | 57  | 16     | 109 | 25     | 178 | 28     | 263 |
|                       | 5                      | 23                                                  | 53  | 32     | 103 | 42     | 171 | 53     | 255 |
|                       | 8                      | 28                                                  | 49  | 39     | 98  | 51     | 164 | 64     | 247 |
| 10                    | 0                      | 0                                                   | 88  | 0      | 175 | 0      | 295 | 0      | 447 |
|                       | 2                      | 12                                                  | 61  | 17     | 118 | 23     | 194 | 26     | 289 |
|                       | 5                      | 23                                                  | 57  | 32     | 113 | 41     | 187 | 52     | 280 |
|                       | 10                     | 30                                                  | 51  | 41     | 104 | 54     | 176 | 67     | 267 |
| 15                    | 0                      | 0                                                   | 94  | 0      | 191 | 0      | 327 | 0      | 502 |
|                       | 2                      | 11                                                  | 69  | 15     | 136 | 20     | 226 | 22     | 339 |
|                       | 5                      | 22                                                  | 65  | 30     | 130 | 39     | 219 | 49     | 330 |
|                       | 10                     | 29                                                  | 59  | 40     | 121 | 51     | 206 | 64     | 315 |
|                       | 15                     | 35                                                  | 53  | 48     | 112 | 61     | 195 | 76     | 301 |
| 20                    | 0                      | 0                                                   | 97  | 0      | 202 | 0      | 349 | 0      | 540 |
|                       | 2                      | 10                                                  | 75  | 14     | 149 | 18     | 250 | 20     | 377 |
|                       | 5                      | 21                                                  | 71  | 29     | 143 | 38     | 242 | 47     | 367 |
|                       | 10                     | 28                                                  | 64  | 38     | 133 | 50     | 229 | 62     | 351 |
|                       | 15                     | 34                                                  | 58  | 46     | 124 | 59     | 217 | 73     | 337 |
|                       | 20                     | 48                                                  | 52  | 55     | 116 | 69     | 206 | 84     | 322 |
| 30                    | 0                      | 0                                                   | 100 | 0      | 213 | 0      | 374 | 0      | 587 |
|                       | 2                      | 9                                                   | 81  | 13     | 166 | 14     | 283 | 18     | 432 |
|                       | 5                      | 21                                                  | 77  | 28     | 160 | 36     | 275 | 45     | 421 |
|                       | 10                     | 27                                                  | 70  | 37     | 150 | 48     | 262 | 59     | 405 |
|                       | 15                     | 33                                                  | 64  | 44     | 141 | 57     | 249 | 70     | 389 |
|                       | 20                     | 56                                                  | 58  | 53     | 132 | 66     | 237 | 80     | 374 |
|                       | 30                     | NA                                                  | NA  | 73     | 113 | 88     | 214 | 104    | 346 |

NOTE - Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

**TABLE 4**

## Vent Connector Capacity

Type B Double-Wall Vents with Type B Double-Wall Connectors

Serving Two or More Category I Appliances

| Height<br>H<br>(feet) | Lateral<br>L<br>(feet) | Vent and Connector Diameter - D (inches)            |     |        |     |        |     |        |     |
|-----------------------|------------------------|-----------------------------------------------------|-----|--------|-----|--------|-----|--------|-----|
|                       |                        | 3 inch                                              |     | 4 inch |     | 5 inch |     | 6 inch |     |
|                       |                        | Appliance Input Rating in Thousands of Btu Per Hour |     |        |     |        |     |        |     |
|                       |                        | Min                                                 | Max | Min    | Max | Min    | Max | Min    | Max |
| 6                     | 1                      | 22                                                  | 37  | 35     | 66  | 46     | 106 | 58     | 164 |
|                       | 2                      | 23                                                  | 41  | 37     | 75  | 48     | 121 | 60     | 183 |
|                       | 3                      | 24                                                  | 44  | 38     | 81  | 49     | 132 | 62     | 199 |
| 8                     | 1                      | 22                                                  | 40  | 35     | 72  | 49     | 114 | 64     | 176 |
|                       | 2                      | 23                                                  | 44  | 36     | 80  | 51     | 128 | 66     | 195 |
|                       | 3                      | 24                                                  | 47  | 37     | 87  | 53     | 139 | 67     | 210 |
| 10                    | 1                      | 22                                                  | 43  | 34     | 78  | 49     | 123 | 65     | 189 |
|                       | 2                      | 23                                                  | 47  | 36     | 86  | 51     | 136 | 67     | 206 |
|                       | 3                      | 24                                                  | 50  | 37     | 92  | 52     | 146 | 69     | 220 |
| 15                    | 1                      | 21                                                  | 50  | 33     | 89  | 47     | 142 | 64     | 220 |
|                       | 2                      | 22                                                  | 53  | 35     | 96  | 49     | 153 | 66     | 235 |
|                       | 3                      | 24                                                  | 55  | 36     | 102 | 51     | 163 | 68     | 248 |
| 20                    | 1                      | 21                                                  | 54  | 33     | 99  | 46     | 157 | 62     | 246 |
|                       | 2                      | 2                                                   | 57  | 34     | 105 | 48     | 167 | 64     | 259 |
|                       | 3                      | 23                                                  | 60  | 35     | 110 | 50     | 176 | 66     | 271 |
| 30                    | 1                      | 20                                                  | 62  | 31     | 113 | 45     | 181 | 60     | 288 |
|                       | 2                      | 21                                                  | 64  | 33     | 118 | 47     | 190 | 62     | 299 |
|                       | 3                      | 22                                                  | 66  | 34     | 123 | 48     | 198 | 64     | 309 |

**TABLE 5**

## Common Vent Capacity

Type B Double-Wall Vents with Type B Double-Wall Connectors

Serving Two or More Category I Appliances

| Vent<br>Height<br>H<br>(feet) | Vent and Connector Diameter - D (inches)            |           |           |           |           |           |           |           |
|-------------------------------|-----------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                               | 4 inch                                              |           | 5 inch    |           | 7 inch    |           | 7 inch    |           |
|                               | Appliance Input Rating in Thousands of Btu Per Hour |           |           |           |           |           |           |           |
|                               | FAN + FAN                                           | FAN + NAT | FAN + FAN | FAN + NAT | FAN + FAN | FAN + NAT | FAN + FAN | FAN + NAT |
| 6                             | 92                                                  | 81        | 140       | 116       | 204       | 161       | 309       | 248       |
| 8                             | 101                                                 | 90        | 155       | 129       | 224       | 178       | 339       | 275       |
| 10                            | 110                                                 | 97        | 169       | 141       | 243       | 194       | 367       | 299       |
| 15                            | 125                                                 | 112       | 195       | 164       | 283       | 228       | 427       | 352       |
| 20                            | 136                                                 | 123       | 215       | 183       | 314       | 255       | 475       | 394       |
| 30                            | 152                                                 | 138       | 244       | 210       | 361       | 297       | 547       | 459       |

## Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances. Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you must correct the system as indicated in the general venting requirements section.

### **IMPORTANT**

#### **CARBON MONOXIDE POISONING HAZARD**

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death. The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

- 1 - Seal any unused openings in the common venting system.
- 2 - Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- 3 - Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- 4 - Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
- 5 - After the burner have operated for 5 minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle.
- 6 - After determining that each appliance connected to the common venting system is venting properly, (step 3) return all doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliances to their previous mode of operation.
- 7 - If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem. Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards of the National Fuel Gas Code ANSI Z223.1.

## Gas Piping

Gas supply piping should not allow more than 0.5"W.C. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

### **WARNING**

Do not over torque (800 in-lbs) or under torque (350 in-lbs) when attaching the gas piping to the gas valve.

### **CAUTION**

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet. The flexible connector can then be added between the black iron pipe and the gas supply line.

## Gas Supply

- 1 - This unit is shipped standard for left or right side installation of gas piping (or top entry in horizontal applications). Connect the gas supply piping into the gas valve. The maximum torque is 800 in lbs and minimum torque is 350 in lbs when attaching the gas piping to the gas valve.
- 2 - When connecting the gas supply piping, consider factors such as length of run, number of fittings, and furnace rating to avoid excessive pressure drop. TABLE 6 lists recommended pipe sizes for typical applications.
- 3 - The gas piping must not run in or through air ducts, clothes chutes, gas vents or chimneys, dumb waiters, or elevator shafts.
- 4 - The piping should be sloped 1/4 inch (6.4 mm) per 15 feet (4.57 m) upward toward the meter from the furnace. The piping must be supported at proper intervals [every 8 to 10 feet (2.44 to 3.01 m)] with suitable hangers or straps. Install a drip leg in vertical pipe runs to the unit.
- 5 - A 1/8" N.P.T. plugged tap or pressure post is located on the gas valve to facilitate test gauge connection. See FIGURE 37 and FIGURE 38.
- 6 - In some localities, codes may require the installation of a manual main shut-off valve and union (furnished by the installer) external to the unit. The union must be of the ground joint type.

### **IMPORTANT**

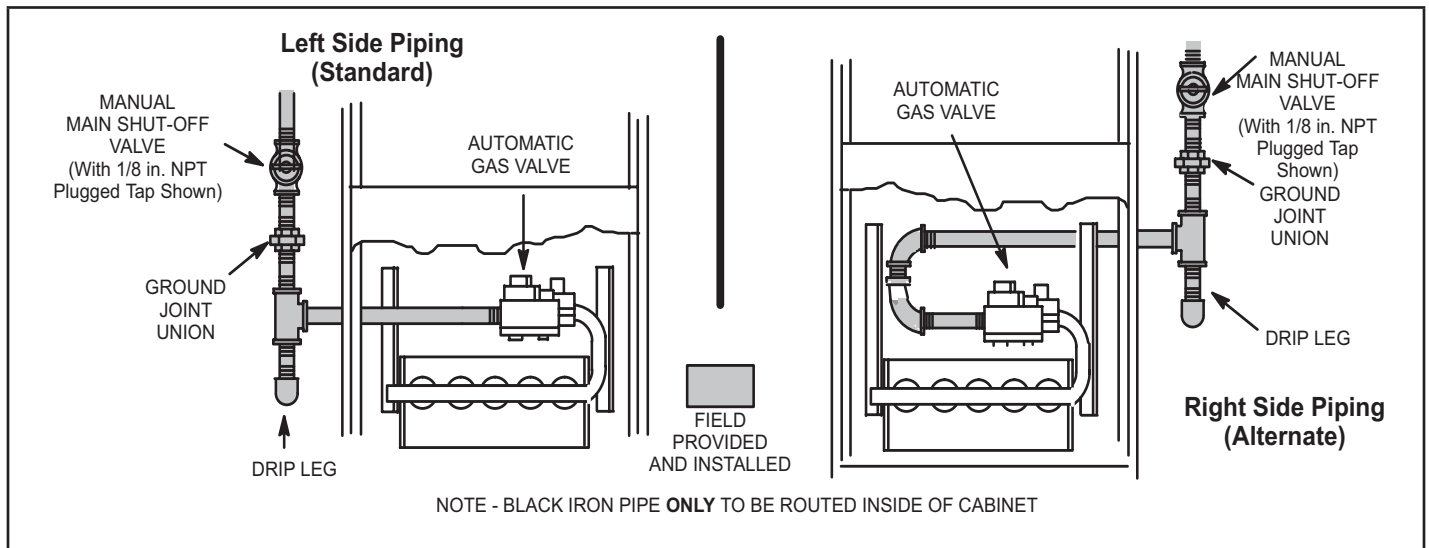
Compounds used on threaded joints of gas piping must be resistant to the actions of liquified petroleum gases.

**NOTE** - If emergency shutoff is necessary, shut off the main manual gas valve and disconnect main power to the furnace. The installer should properly label these devices

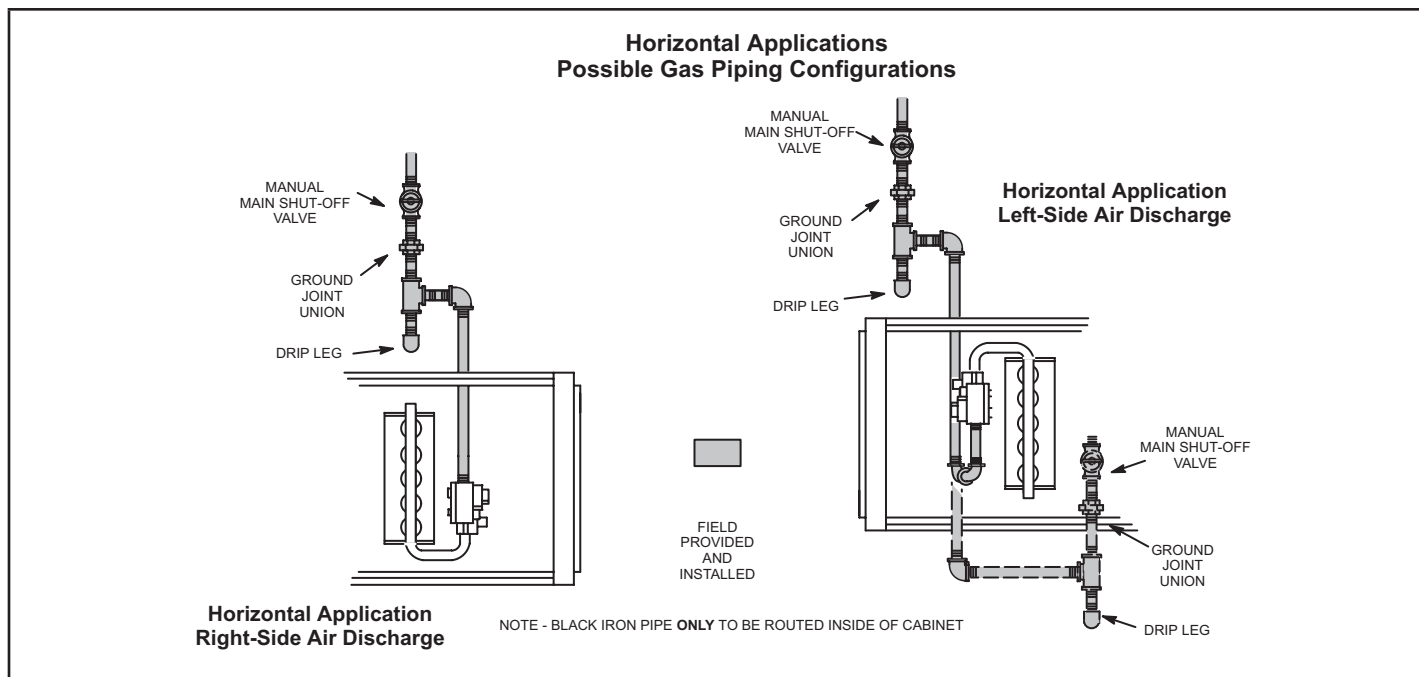
**TABLE 6**  
**Gas Pipe Capacity - ft<sup>3</sup>/hr (m<sup>3</sup>/hr)**

| Nominal<br>Iron Pipe<br>Size Inches<br>(mm) | Internal<br>Diameter<br>inches<br>(mm) | Length of Pipe - feet (m) |                  |                  |                  |                  |                  |                  |                  |                 |                  |
|---------------------------------------------|----------------------------------------|---------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|
|                                             |                                        | 10<br>(3.048)             | 20<br>(6.096)    | 30<br>(9.144)    | 40<br>(12.192)   | 50<br>(15.240)   | 60<br>(18.288)   | 70<br>(21.336)   | 80<br>(24.384)   | 90<br>(27.432)  | 100<br>(30.480)  |
| 1/2<br>(12.7)                               | .622<br>(17.799)                       | 172<br>(4.87)             | 118<br>(3.34)    | 95<br>(2.69)     | 81<br>(2.29)     | 72<br>(2.03)     | 65<br>(1.84)     | 60<br>(1.69)     | 56<br>(1.58)     | 52<br>(1.47)    | 50<br>(1.42)     |
| 3/4<br>(19.05)                              | .824<br>(20.930)                       | 360<br>(10.19)            | 247<br>(7.000)   | 199<br>(5.63)    | 170<br>(4.81)    | 151<br>(4.23)    | 137<br>(3.87)    | 126<br>(3.56)    | 117<br>(3.31)    | 110<br>(3.11)   | 104<br>(2.94)    |
| 1<br>(25.4)                                 | 1.049<br>(26.645)                      | 678<br>(19.19)            | 466<br>(13.19)   | 374<br>(10.59)   | 320<br>(9.06)    | 284<br>(8.04)    | 257<br>(7.27)    | 237<br>(6.71)    | 220<br>(6.23)    | 207<br>(5.86)   | 195<br>(5.52)    |
| 1-1/4<br>(31.75)                            | 1.380<br>(35.052)                      | 1350<br>(38.22)           | 957<br>(27.09)   | 768<br>(22.25)   | 657<br>(18.60)   | 583<br>(16.50)   | 528<br>(14.95)   | 486<br>(13.76)   | 452<br>(12.79)   | 424<br>(12.00)  | 400<br>(11.33)   |
| 1-1/2<br>(38.1)                             | 1.610<br>(40.894)                      | 2090<br>(59.18)           | 1430<br>(40.49)  | 1150<br>(32.56)  | 985<br>(27.89)   | 873<br>(24.72)   | 791<br>(22.39)   | 728<br>(20.61)   | 677<br>(19.17)   | 635<br>(17.98)  | 600<br>(17.00)   |
| 2<br>(50.8)                                 | 2.067<br>(52.502)                      | 4020<br>(113.83)          | 2760<br>(78.15)  | 2220<br>(62.86)  | 1900<br>(53.80)  | 1680<br>(47.57)  | 1520<br>(43.04)  | 1400<br>(39.64)  | 1300<br>(36.81)  | 1220<br>(34.55) | 1160<br>(32.844) |
| 2-1/2<br>(63.5)                             | 2.469<br>(67.713)                      | 6400<br>(181.22)          | 4400<br>(124.59) | 3530<br>(99.95)  | 3020<br>(85.51)  | 2680<br>(75.88)  | 2480<br>(70.22)  | 2230<br>(63.14)  | 2080<br>(58.89)  | 1950<br>(55.22) | 1840<br>(52.10)  |
| 3<br>(76.2)                                 | 3.068<br>(77.927)                      | 11300<br>(319.98)         | 7780<br>(220.30) | 6250<br>(176.98) | 5350<br>(151.49) | 4740<br>(134.22) | 4290<br>(121.47) | 3950<br>(111.85) | 3670<br>(103.92) | 3450<br>(97.69) | 3260<br>(92.31)  |

**NOTE** - Capacity given in cubic feet (m<sup>3</sup>) of gas per hour and based on 0.60 specific gravity gas.



**FIGURE 26**



**FIGURE 27**

### Leak Check

After gas piping is completed, carefully check all field-installed piping connections for gas leaks. Use a commercially available leak detecting solution specifically manufactured for leak detection. Never use an open flame to test for gas leaks.

**NOTE** - If emergency shutoff is necessary, shut off the main manual gas valve and disconnect the main power to the furnace. The installer should properly label these devices.

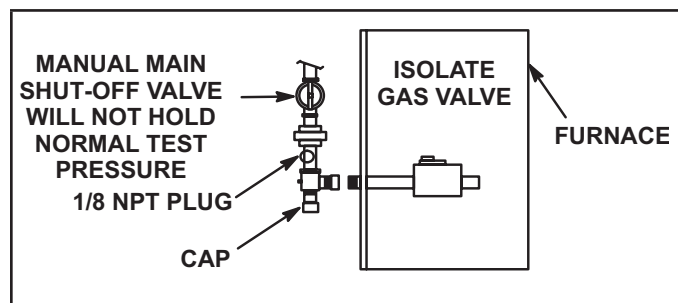
### ⚠ CAUTION

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.

The furnace must be isolated from the gas supply system by closing the individual manual shut-off valve during any gas supply system at pressures greater than or equal to 1/2 psig. (3.48 kPa, 14 inches w.c.). This furnace and its components are designed, manufactured and independently certified to comply with all applicable ANSI/CSA standards. A leak check of the furnace and its components is not required.

### ⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See FIGURE 28. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).



**FIGURE 28**

## Electrical

### ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

#### ⚠ CAUTION



Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

#### ⚠ IMPORTANT

When matching this gas furnace with zoning, dual fuel or other 24V accessories, It is recommended to replace the factory installed transformer with kit 27J32.

Kit 27J32 contains a 75VA transformer, so you do not overload the original 40VA transformer.

#### ⚠ WARNING

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

#### ⚠ CAUTION

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

The unit is equipped with a field make-up box on the left hand side of the cabinet. The make-up box may be moved to the right side of the furnace to facilitate installation. If the make-up box is moved to the right side, clip the wire ties that bundle the wires together. The excess wire must be pulled into the blower compartment. Secure the excess wire to the existing harness to protect it from damage.

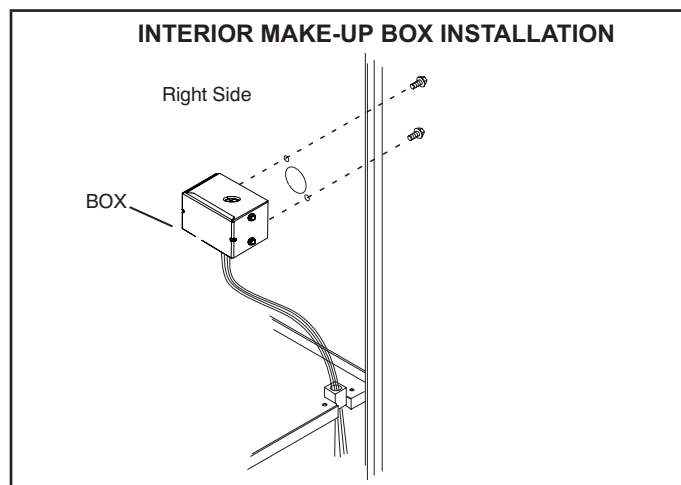


FIGURE 29

Refer to FIGURE 30 for schematic wiring diagram, field wiring and trouble shooting.

The power supply wiring must meet Class I restrictions.

Protected by either a fuse or circuit breaker, select circuit protection and wire size according to unit nameplate.

**NOTE** - Unit nameplate states maximum current draw. Maximum over-current protection allowed is 15 AMP.

Holes are on both sides of the furnace cabinet to facilitate wiring.

Install a separate (properly sized) disconnect switch near the furnace so that power can be turned off for servicing. Before connecting the thermostat, check to make sure the wires will be long enough for servicing at a later date. Make sure that thermostat wire is long enough to facilitate future removal of blower for service.

Complete the wiring connections to the equipment. Use the provided unit wiring and field wiring diagram shown in FIGURE 30. Use 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.

#### ⚠ WARNING



Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70). A green ground wire is provided in the field make-up box.

**NOTE** - The ML180UHE(K) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

#### Generator Use - Voltage Requirements

The following requirements must be kept in mind when specifying a generator for use with this equipment:

- The furnace requires 120 volts + 10% (Range: 108 volts to 132 volts).
- The furnace operates at 60 Hz + 5% (Range: 57 Hz to 63 Hz).
- The furnace integrated control requires both polarity and proper ground. Both polarity and proper grounding should be checked before attempting to operate the furnace on either permanent or temporary power.
- Generator should have a wave form distortion of less than 5% total harmonic distortion.

#### Thermostat

Install the room thermostat according to the instructions provided with the thermostat. See FIGURE 33 for thermostat designations. If the furnace is being matched with a heat pump, refer to the thermostat installation instructions for set up.

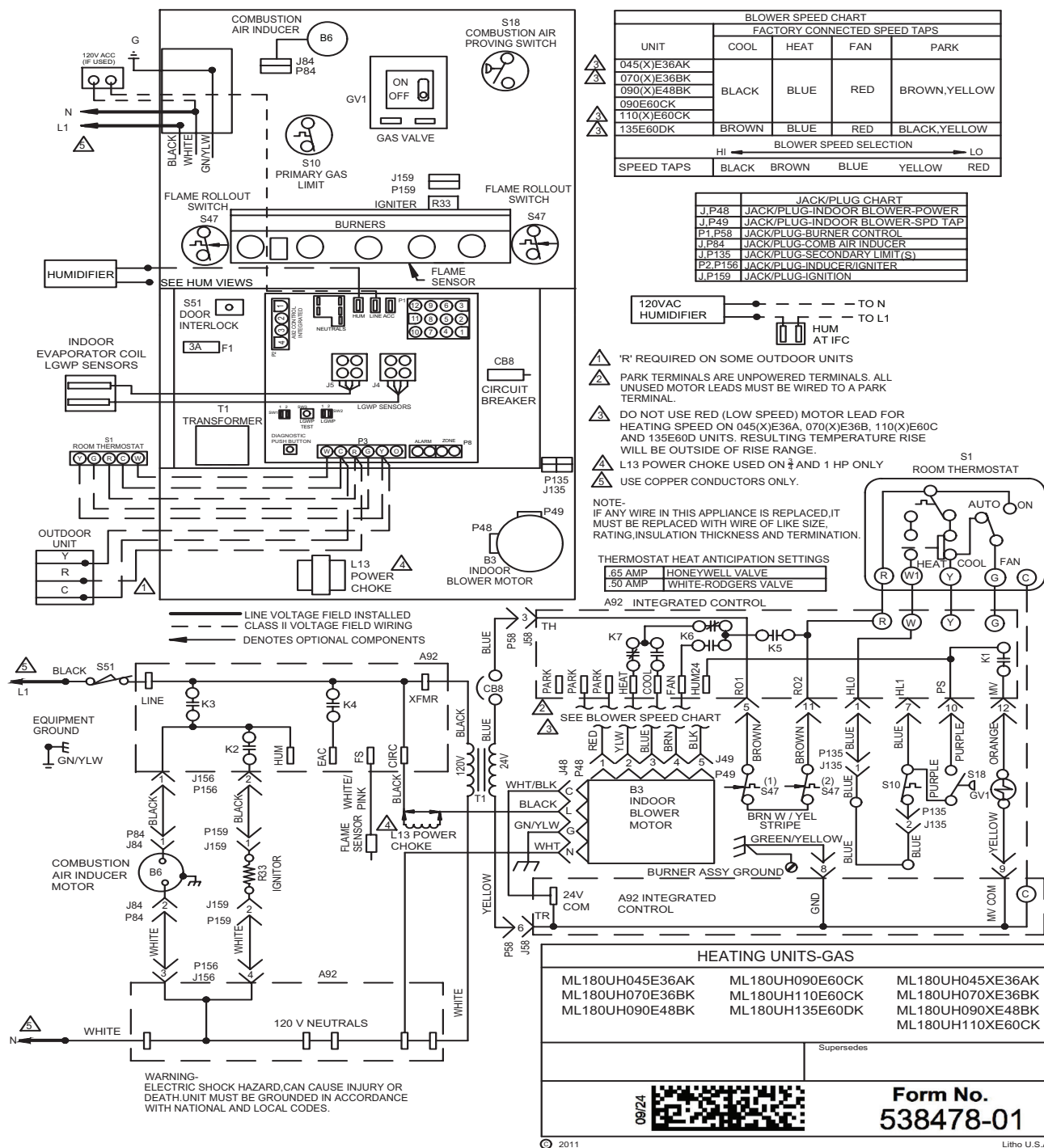


FIGURE 30

## Integrated Control DIP Switch Settings

ML180UHEK units are equipped with a single-stage integrated control. This control manages ignition timing, heating mode fan off delays and indoor blower speeds based on selections made using the control dip switches and jumpers. The control includes an internal watchdog feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the watchdog will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

### Accessory Terminals

One line voltage "ACC" 1/4" spade terminal is provided on the furnace integrated control. See FIGURE 33 for integrated control configuration. This terminal is energized when the indoor blower is operating. Any accessory rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If an accessory rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One line voltage "HUM" 1/4" spade terminal is provided on the furnace integrated control. See FIGURE 33 for integrated control configuration. This terminal is energized in the heating mode when the combustion air inducer is operating. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If a humidifier rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One 24V "H" 1/4" spade terminal is provided on the furnace integrated control. See FIGURE 33 for integrated control configuration. The terminal is energized in the heating mode when the combustion air inducer is operating and the pressure switch is closed. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit connected to ground or the "C" terminal.

## Indoor Blower Operation DIP Switch Settings

The heat fan-on time of 30 seconds is not adjustable. The heat fan-off delay (amount of time that the blower operates after the heat demand has been satisfied) may be adjusted by changing the two position dip switch on the integrated control, to one of four selections. Blower off delay is factory set at 120 seconds. For other blower off delay settings, please refer to the following chart:

| Blower Delay Select    |       |       |
|------------------------|-------|-------|
|                        | SW1-1 | SW1-2 |
| 90                     | OFF   | ON    |
| 120                    | OFF   | OFF   |
| 180                    | ON    | OFF   |
| 210                    | ON    | ON    |
| Factory Setting is 120 |       |       |

## ON BOARD LINKS AND DIAGNOSTIC PUSH BUTTON

See FIGURE 31 and FIGURE 32

### IMPORTANT

Carefully review all configuration information provided. Failure to properly set DIP switches, jumpers and on-board links can result in improper operation!

### On-Board Link W951 Heat Pump (R to O)

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal "O" will remain energized eliminating the HEAT MODE in the heat pump.

### Diagnostic Push Button

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall "E" mode and the Flame Signal "F" mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

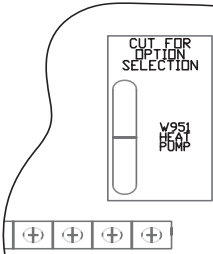
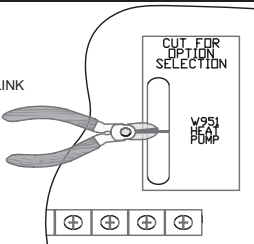
| Thermostat  | On Board Links Must NOT Be Cut To Select AC ON System Options                                                          | Wiring Connections                                                                                                                                       |
|-------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heat / Cool | <p>DO NOT CUT ANY ON-BOARD LINKS</p>  | <p>S1 T'STAT      FURNACE TERM. STRIP      OUTDOOR UNIT</p> <p>W --- W</p> <p>R --- R --- R</p> <p>G --- G</p> <p>C --- C --- C</p> <p>Y --- Y --- Y</p> |

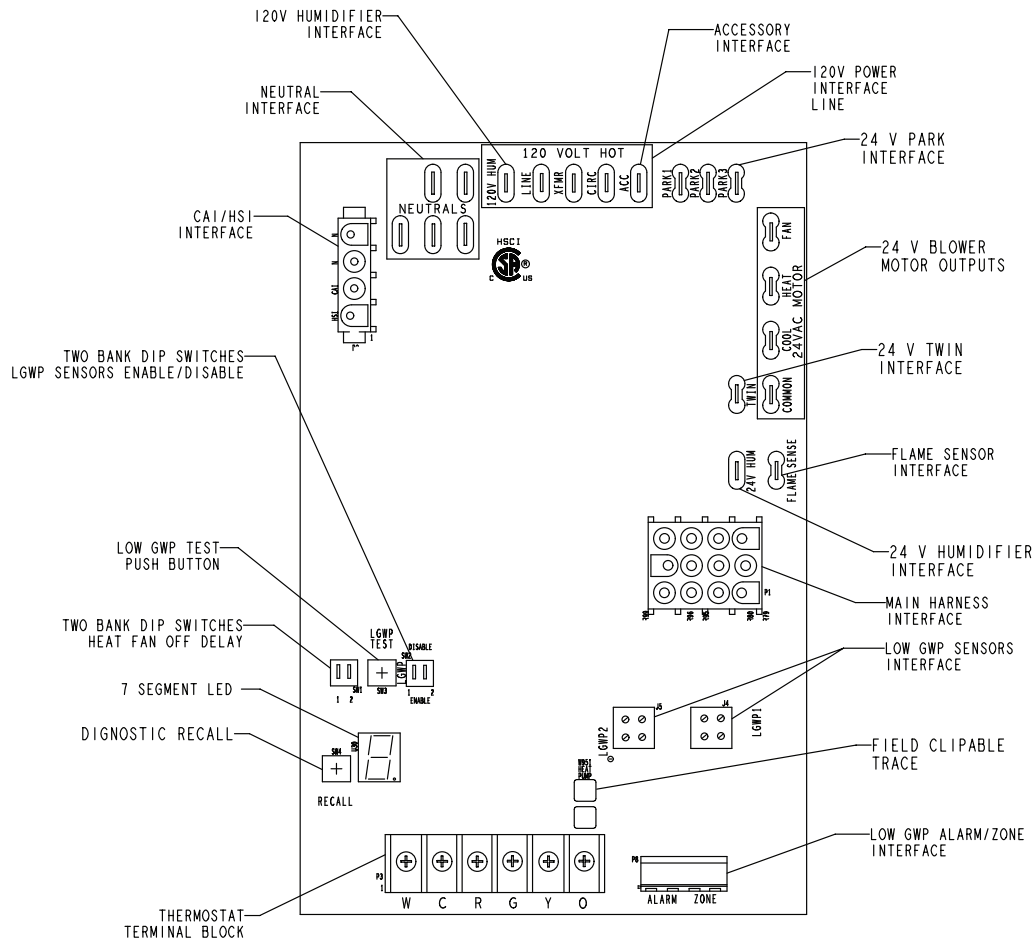
FIGURE 31

| Thermostat                                                                                       | On Board Links Must Be Cut To Select Heat Pump Options                                                                    | Wiring Connections                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Dual Fuel Single Stage Heat Pump</p> <p>ComfortSense thermostat w/ dual fuel capabilities</p> | <p>CUT ON-BOARD LINK W951 HEAT PUMP</p>  | <p>T'STAT      FURNACE TERM. STRIP      HEAT PUMP</p> <p>R --- R --- R</p> <p>W --- W ← 67M41* → W</p> <p>O --- O --- O</p> <p>Y --- Y --- Y</p> <p>G --- G</p> <p>C --- C --- C</p> |

\*Connect W to W ONLY if using defrost tempering kit 67M41

FIGURE 32

# **Single Stage, Constant Torque, Non-Communicating** **107792-01**



**FIGURE 33**

**TABLE 7**

| <b>1/4" QUICK CONNECT TERMINALS</b>  |                                                            |
|--------------------------------------|------------------------------------------------------------|
| 120V HUM                             | POWER FOR HUMIDIFIER (120 VAC)                             |
| LINE                                 | INCOMING POWER LINE (120 VAC)                              |
| XFMR                                 | TRANSFORMER PRIMARY (120 VAC)                              |
| CIRC                                 | INDOOR BLOWER MOTOR (120 VAC)                              |
| ACC                                  | ACCESSORY(120 VAC)                                         |
| 24V HUM                              | HUMIDIFIER (24 VAC)                                        |
| NEUTRALS                             | NEUTRAL (5)                                                |
| <b>3/16" QUICK CONNECT TERMINALS</b> |                                                            |
| COOL                                 | COOL SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC)           |
| HEAT                                 | HEAT SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC)           |
| FAN                                  | CONTINUOUS FAN SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC) |
| FLAME SENSE                          | FLAME SENSOR ELECTRODE (120 VAC)                           |
| COMMON                               | COMMON (24 VAC)                                            |
| TWIN                                 | 24V TWINNING COMMUNICATION                                 |
| PARK                                 | 3 TERMINALS TO PARK UNUSED MOTOR SPEED TAPS                |

**TABLE 8**

| <b>THERMOSTAT INPUT TERMINALS</b> |                                        |
|-----------------------------------|----------------------------------------|
| W                                 | HEAT                                   |
| C                                 | COMMON GROUND                          |
| R                                 | 24V AC                                 |
| G                                 | FAN                                    |
| Y                                 | COOL                                   |
| O                                 | REVERSING VALVE (when W951 is clipped) |

**TABLE 9**

| <b>LOW GWP INTERFACE</b> |                                                       |
|--------------------------|-------------------------------------------------------|
| LGWP1                    | LOW GWP SENSOR #1 INTERFACE                           |
| LGWP2                    | LOW GWP SENSOR # 2 INTERFACE                          |
| ALARM                    | INTERFACE TO LOW GWP LEAK AUDIBLE ALARM (DRY CONTACT) |
| ZONE                     | INTERFACE TO ZONING CONTROL (DRY CONTACT)             |
| LGWP TEST                | PUSH BUTTON TO TEST LOW GWP FUNCTIONALITY             |

## Diagnostic LED (FIGURE 33)

The seven-segment diagnostic LED displays operating status, target airflow, error codes and other information.

## Diagnostic Push Button (FIGURE 33)

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall "E" mode and the Flame Signal "F" mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

### Error Code Recall Mode

Select "E" from the menu to access the most recent 10 error codes. Select "c" from the Error Code Recall menu to clear all error codes. Button must be pressed a second time while "c" is flashing to confirm command to delete codes. Press the button until a solid "≡" is displayed to exit the Error Code Recall mode.

### Flame Signal Mode

Select "F" from the menu to access the flame signal mode. The integrated control will display the flame current on 7 segment LED in micro amps (uA).

- Flame signal mode is exited after the following:
- Power is reset
- Pressing and holding push button until 3 horizontal
- lines "≡" are displayed
- 10 minutes of entering the flame sense mode.

## Integrated Diagnostic Codes/Status of Equipment

| Code | Diagnostic Codes/Status of Equipment                                                                            |
|------|-----------------------------------------------------------------------------------------------------------------|
| A    | Indoor Blower Operation:<br>Continuous Fan only mode                                                            |
| dF   | Defrost mode                                                                                                    |
| .    | Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).                                         |
| C    | Cooling stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes.                            |
| d    | Dehumidification mode (1 second ON, 1 second OFF) / Pause / Repeat Codes).                                      |
| H    | Gas Heat Stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes. Blinking during ignition. |
| h    | Heat pump stage.                                                                                                |

\* No change implies the display will continue to show whatever is currently being displayed for normal operation (blinking decimal, active error code, heat state, etc.)

| Code | Diagnostic Codes/Status of Equipment                  | Action Required to Clear and Recover                                                                                                                                                                                                                                |
|------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E000 | No error in memory                                    | No active fault exists, or all faults have been cleared                                                                                                                                                                                                             |
| E106 | Twin Communication Fault                              | This may indicate:<br>1) The power is removed from one furnace and not the other or/and<br>2) The 24 VAC supply to the twins are not in phase                                                                                                                       |
| E110 | Low line voltage.                                     | Line Voltage Low (Voltage lower than nameplate rating). Check power line voltage and correct. Alarm clears 5 seconds after fault recovered.                                                                                                                         |
| E111 | Line voltage polarity reversed.                       | Reverse line power voltage wiring. System resumes normal operation 5 seconds after fault recovered.                                                                                                                                                                 |
| E112 | Ground not detected.                                  | System shuts down. Provide proper earth ground. System resumes normal operation 5 seconds after fault recovered.                                                                                                                                                    |
| E113 | High line voltage.                                    | Line Voltage High (Voltage higher than nameplate rating). Provide power voltage within proper range. System resumes normal operation 5 seconds after fault recovered.                                                                                               |
| E114 | Line voltage frequency out-of-range.                  | No 60 Hertz Power. Check voltage and line power frequency. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.                                                                                                 |
| E115 | Low 24V - Control will restart if the error recovers. | 24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. May require installation of larger VA transformer to be installed in furnace / air handler. Clears after fault recovered. |
| E117 | Poor ground detected (Warning only).                  | Provide proper grounding for unit. Check for proper earth ground to the system. Warning only will clear 30 seconds after fault recovered.                                                                                                                           |

| Code | Diagnostic Codes/Status of Equipment                                                                                                                                                                     | Action Required to Clear and Recover                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E125 | Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.). | Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Critical alert. Cleared 300 seconds after fault recovered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| E150 | Refrigerant Leak detected                                                                                                                                                                                | This may indicate the presence of a leak at or in the indoor unit coil of the equipment, that will need to be repaired for proper and safe system operation. Additionally, it may indicate that proper refrigerant charge will need to be verified. This fault cannot be cleared while the refrigerant detection system sensor is reporting the presence of a leak                                                                                                                                                                                                                                                                                                    |
| E151 | Refrigerant Leak Detector Sensor #1 fault                                                                                                                                                                | The refrigerant detection sensor #1 in the unit is reporting an issue that prevents it from functioning properly, and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition.                                                                                                                                                                                                                                                                                                                                                                                                              |
| E152 | Refrigerant Leak Detector Sensor #2 fault                                                                                                                                                                | The refrigerant detection sensor #2 in the unit is reporting an issue that prevents it from functioning properly, and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition.                                                                                                                                                                                                                                                                                                                                                                                                              |
| E154 | Refrigerant Leak Detector Sensor #1<br>Communication lost or invalid sensor dip switch configuration (ON/OFF)                                                                                            | There may be an issue with the wiring harness connecting the sensor #1 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and the connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum of 5 minutes. Retest of the presence of fault can be effected by pressing the Low GWP test button on the furnace unit control board.<br><br>This may also indicate incorrect Low GWP dip switch settings. Please refer to installation instructions. |
| E155 | Refrigerant Leak Detector Sensor #2<br>Communication lost                                                                                                                                                | There may be an issue with the wiring harness connecting the sensor #2 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and the connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum of 5 minutes. Retest of the presence of fault can be effected by pressing the Low GWP test button on the furnace unit control board                                                                                                                  |
| E160 | Refrigerant Leak Detector Sensor #1 type incorrect                                                                                                                                                       | The sensor #1 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the Low GWP test button on the furnace unit control board.                                                                                                                                                                                                                                                   |
| E161 | Refrigerant Leak Detector Sensor #2 type incorrect                                                                                                                                                       | The sensor #2 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the Low GWP test button on the furnace unit control board.                                                                                                                                                                                                                                                   |
| E163 | Furnace Control Board Failure                                                                                                                                                                            | There is an issue with the furnace control board, preventing the furnace from operating properly. This may require the replacement of the indoor unit control board. This fault clears when the furnace controller operates normally.                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Code | Diagnostic Codes/Status of Equipment                                                                                                                   | Action Required to Clear and Recover                                                                                                                                                                                                                                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E164 | Low GWP Test                                                                                                                                           | Low GWP Test mode activates by manually engaging Low GWP test button. Normal operations resumes and code clears automatically after 1-minute                                                                                                                                                                                  |
| E200 | Hard lockout - Rollout circuit open or previously open.                                                                                                | Correct cause of rollout trip, or replace flame rollout switch. Test furnace operation. Cleared after fault recovered.                                                                                                                                                                                                        |
| E204 | Gas valve mis-wired.                                                                                                                                   | Check gas valve operation and wiring. Clears when repaired.                                                                                                                                                                                                                                                                   |
| E223 | Pressure switch failed open.                                                                                                                           | Check pressure (inches w.c.) of pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.                                                                               |
| E224 | Pressure switch failed closed.                                                                                                                         | Check pressure (inches w.c.) of pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.                                                                               |
| E227 | Pressure switch open during trial for ignition or run mode.                                                                                            | Check pressure (inches w.c.) of pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.                                                                               |
| E240 | Low flame current - Run mode.                                                                                                                          | Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Alert clears after current heat call has been completed.                                                                                     |
| E241 | Flame sensed out of sequence - Flame still present.                                                                                                    | Shut off gas. Check for gas valve leak. Replace, if necessary. Alert clears when fault is recovered.                                                                                                                                                                                                                          |
| E250 | Limit switch circuit open.                                                                                                                             | Check for proper firing rate on furnace. Ensure there is no blockage in heater. Check for proper air flow. If limit not closed within 3 minutes, unit will go into 1-hour soft lockout. Resumes normal operation after fault is cleared.                                                                                      |
| E270 | Soft lockout - Exceeded maximum number of retries. No flame current sensed.                                                                            | Check for proper gas flow. Ensure that ignitor is lighting burner. Check flame sensor current. Clears when heat call finishes successfully.                                                                                                                                                                                   |
| E271 | Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.                                               | Check pressure (inches w.c.) of pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.                                                                                   |
| E272 | Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.                                                   | Check operation of low pressure switch to see if it is stuck closed on heat call. Check pressure (inches w.c.) of pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully. |
| E273 | Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.                                                                 | Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Clears when heat call finishes successfully.                                                                                                 |
| E274 | Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes. | Shut down system. 1-hour soft lockout. Check firing rate and air flow. Check for blockage. Clears when heat call finishes successfully.                                                                                                                                                                                       |
| E275 | Soft lockout - Flame sensed out of sequence. Flame signal is gone.                                                                                     | Shut off gas. Check for gas valve leak. 1-hour soft lockout. Clears when flame has been proven stable.                                                                                                                                                                                                                        |
| E290 | Ignitor circuit fault - Failed ignitor or triggering circuitry.                                                                                        | Measure resistance of hot surface ignitor. Replace if open or not within specifications. 1-hour soft lockout. Clears when flame has been proven stable.                                                                                                                                                                       |
| E390 | Low GWP Relay Stuck                                                                                                                                    | This indicates an issue with the Low GWP relay in the furnace control. This may require the replacement of the indoor unit control board. This fault clears when the relay operates normally.                                                                                                                                 |

### Indoor Blower Speeds

- 1 - When the thermostat is set to "FAN ON," the indoor blower will run continuously on the fan speed when there is no cooling or heating demand. See TABLE 11 for allowable circulation speeds.
- 2 - When the ML180UHE(K) is running in the heating mode, the indoor blower will run on the heating speed. See TABLE 10 for allowable heating speeds.
- 3 - When there is a cooling demand, the indoor blower will run on the cooling speed.

**TABLE 10**

| Allowable Heating Speeds |             |         |                 |            |             |
|--------------------------|-------------|---------|-----------------|------------|-------------|
| Model Number             | Red         | Yellow  | Blue            | Brown      | Black       |
| ML180UH045E36AK          | Not Allowed | Allowed | Factory Setting | Allowed    | Not Allowed |
| ML180UH070E36BK          | Not Allowed |         |                 |            |             |
| ML180UH090E48BK          | Allowed     |         |                 |            |             |
| ML180UH090E60CK          |             |         |                 |            |             |
| ML180UH110E60CK          | Not Allowed |         |                 |            |             |
| ML180UH135E60DK          | Not Allowed |         |                 | No Allowed |             |

**TABLE 11**

| Allowable Circulation Speeds |                 |             |             |             |             |
|------------------------------|-----------------|-------------|-------------|-------------|-------------|
| Model Number                 | Red             | Yellow      | Blue        | Brown       | Black       |
| All Models                   | Factory Setting | Not Allowed | Not Allowed | Not Allowed | Not Allowed |

## Twinning Two ML180UHEK Furnaces

The control board in this furnace is equipped with a provision to "twin" (interconnect) two(2) adjacent furnaces with a common plenum such that they operate as one (1) large unit.

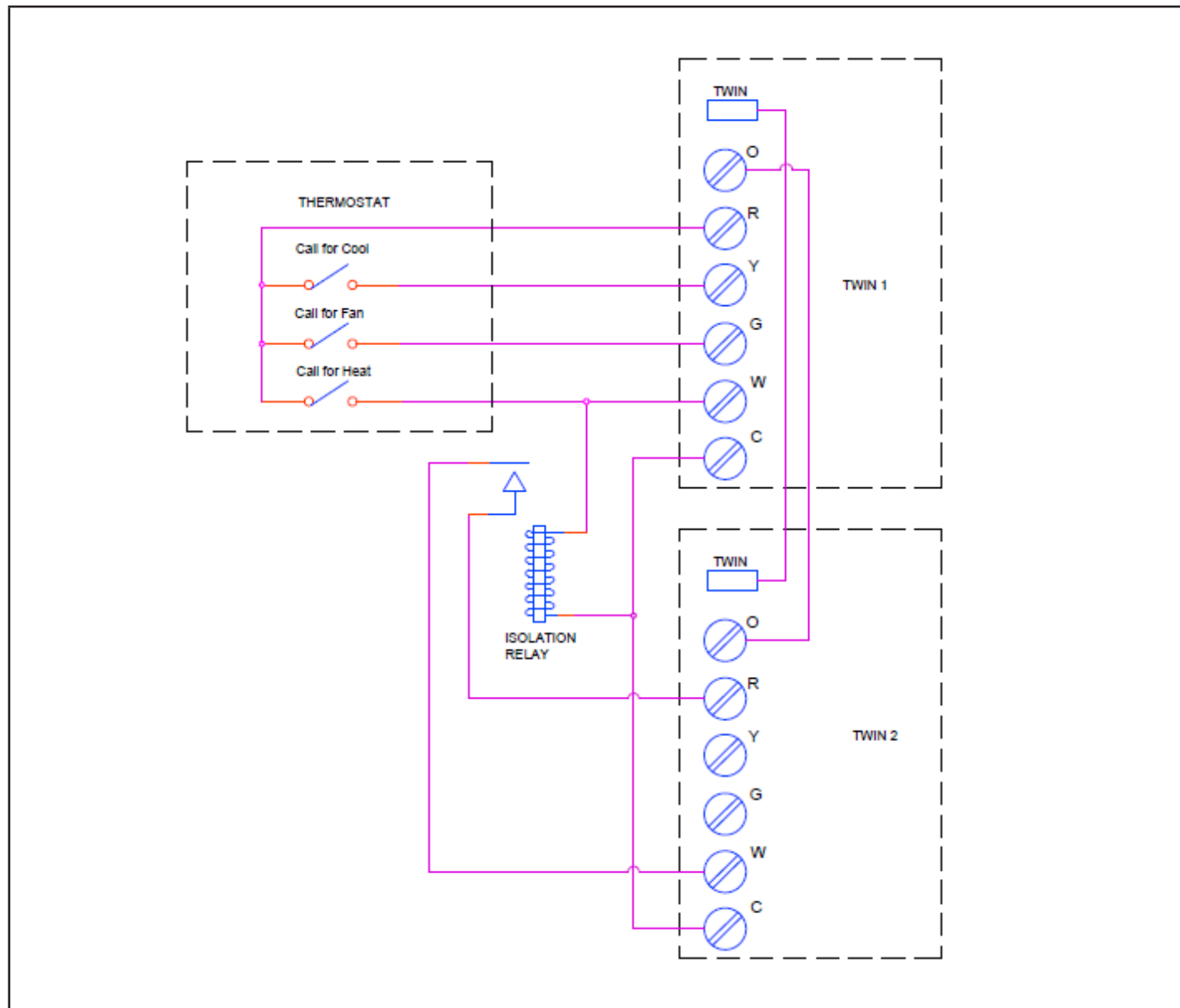
When twinned, the circulating blower speeds are synchronized between the furnaces. If either furnace has a need to run the blower, both furnaces will run the blower on the same speed. The cooling speed has highest priority, followed by heating speed and fan speed.

Field installation of twinning consists of connecting wires between the "C", "O" and "Twin" terminals of the two controls.

The 24 VAC secondary of the two systems must be in phase. All thermostat connections are made to one control only. See diagram below.

The twinned furnace without thermostat connections is to have the call for heat supplied by an external 24VAC isolation relay\* to prevent its rollout switch from being bypassed by the other twinned furnace. The coil of the isolation relay connects from the thermostat "W" to 24 VAC common. The contacts of the relay connect "R" to "W" on the non-thermostat twin.

\*Wiring and quick connects will be field provided



## Low GWP Application

### **⚠ WARNING**

For use with Lennox approved evaporator coil and LGWP sensors only. Use original manufacturer recommended LGWP sensors if using non Lennox approved evaporator coil.

## CONNECTING THE FURNACE CONTROL BOARD SENSOR.

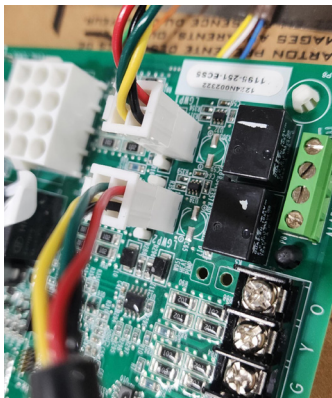
See **FIGURE 36** and follow steps below:

- 1 - Route sensor wire #1 through provided grommet. Form a drip loop below the control board on upflow installations to prevent condensate dripping on the control board.
- 2 - Avoid sharp edges when routing sensor wire during installation.
- 3 - Sensor wire must not block view of 7 segment LED .

Ensure the cable is properly seated into the SENSOR 1 plug (LGWP1). The Molex plug clip should lock into the Molex connection point for a secured connection, as shown below in **FIGURE 34**. Verify the connection is free of dust, debris, and moisture.

**NOTE** - In confined space applications, connect the second sensor to the SENSOR 2 plug (LGWP2). Refer to evaporator coil installation instructions for more detail.

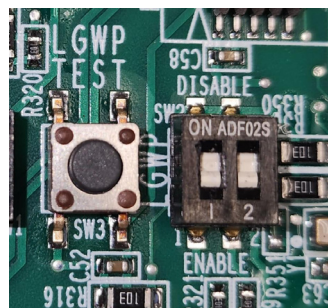
### Single Stage Constant Torque Control



**FIGURE 34**

## LOW GWP DIP SWITCH SETTINGS

Adjust the DIP switch settings to the sensor configuration. Failure to do so will cause faults on power-up. See **FIGURE 35** and **TABLE 12**



**FIGURE 35**

**TABLE 12**

DIP Switch Settings

| Configuration                                                 | Switch 1      | Switch 2      |
|---------------------------------------------------------------|---------------|---------------|
| One (1) sensor, connected to SENSOR 1 plug                    | OFF (enable)  | ON (disable)  |
| Two (2) sensors, connected to SENSOR 1 plug and SENSOR 2 plug | OFF (enable)  | OFF (enable)  |
| No sensor R410A or heat only applications                     | ON (Disabled) | ON (Disabled) |

In single sensor configurations, the sensor must be connected to the SENSOR 1 plug (LGWP1). Configurations other than the ones shown in **TABLE 12** will cause a servicing fault.

Each DIP switch corresponds to a sensor position (i.e., DIP switch 1 to sensor 1; DIP switch 2 to sensor 2). The default factory switch positions are set to OFF (ENABLED)

The furnace control board software reads the OFF position as an active sensor. A sensor should be present for the corresponding sensor connector. Setting the DIP switch to ON disables the sensor position.

## SECONDARY SENSOR REQUIREMENTS

### Additional Line Sets

If additional refrigerant line joints are present outside of the line set sleeve and a secondary refrigerant detection sensor is required, its installation must comply with the requirements listed in Refrigerant Detection Sensor Kit (27V53). See **FIGURE 36** for routing the secondary sensor cable through the furnace cabinet.

## Non-Low GWP Applications

### **⚠ WARNING**

For Furnace only applications or Furnace replacement in a Non-Low GWP applications, the LOW GWP sensors should be disabled, otherwise the blower will operate continuously. To do this, the Low GWP Dip switches setting for both – Sensor 1 and the Sensor 2 must be moved to the ON position.

## FURNACE CONTROL BOARD LOW GWP MODES OF OPERATION

The modes of operation for the furnace control board are Initializing, Normal, Leak Detected, and Fault.

### Initializing

The furnace control board is establishing connection with the refrigerant detection sensor and is completing an initial five-minute purge sequence.

### Normal

The HVAC system is functioning normally. The furnace control board has not detected a refrigerant leak.

### Leak Detected

When the furnace control board detects a refrigerant leak:

1. The furnace control board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

2. The furnace control board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.
3. After the furnace control board determines the refrigerant levels are below the safety threshold, the blower will continue to operate for the remainder of the seven (7) -minute cycle.
4. After the blower sequence is complete, the HVAC system resumes normal operation.

**NOTE -** The HVAC system may not maintain a cooling or heating setpoint if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.

### Fault

When a Low GWP fault is detected by the furnace control board, the indoor unit blower engages and remains engaged at a constant air flow output until the fault is cleared.

**NOTE -** See **IGNITION CONTROL DIAGNOSTIC CODES** on page 28 for Low GWP diagnostic error codes.

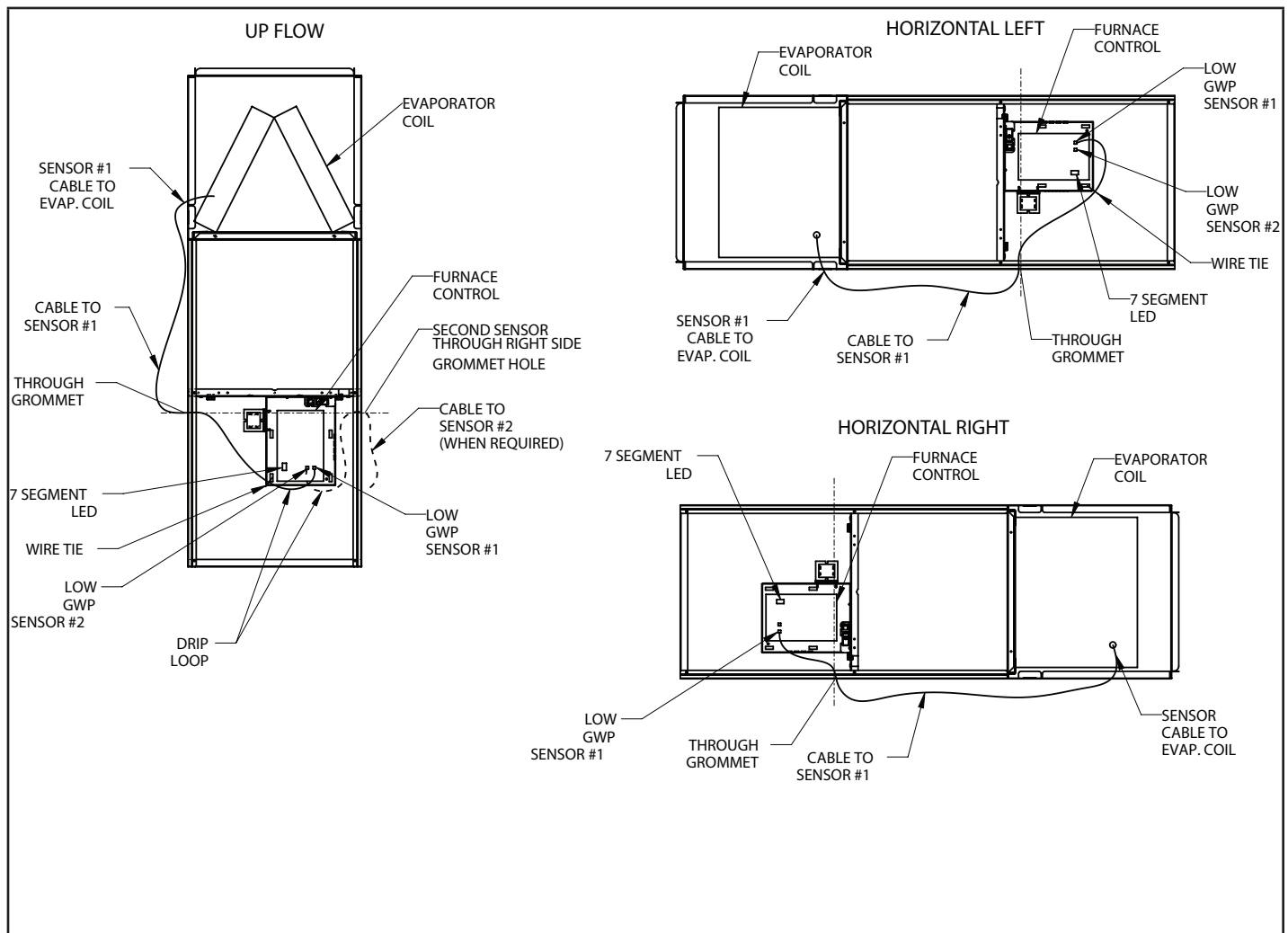


FIGURE 36

## LGWP TEST BUTTON FUNCTIONALITY

The furnace control board is equipped with a Test/Reset push button. The Test button can be used to perform several functions, depending on the mode of operation of the furnace control board.

TABLE 13 lists the functions of the Test button during each mode of operation.

**TABLE 13**  
**LGWP Test Button Function**

| Mode of Operation | Press the Test Button to:                                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normal            | Trigger a leak detection response.<br>Verify all equipment is wired correctly into the furnace blower control board (after installation).                                       |
| Leak Detected     | Reset the furnace control board to a normal mode of operation after a previous leak has been detected and purged from the HVAC system                                           |
| Fault             | Reset the furnace control board after troubleshooting and resolving a fault condition. If the fault is not resolved, the furnace control board will enter the Fault mode again. |

### LGWP Test Button - Additional Functions

TABLE 14 lists the additional functions of the Test Button while the furnace control board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault.

**TABLE 14**  
**Additional Button Functions**

| State        | Press | Action                                                                                   |
|--------------|-------|------------------------------------------------------------------------------------------|
| Initializing | Short | Skips remaining pre-purge after sensors are recognized by the furnace control board      |
| Initializing | Long  | Reset control                                                                            |
| Monitoring   | Short | Clear purge-counter if prior mitigation has occurred; Test mitigation                    |
| Monitoring   | Long  | Reset control                                                                            |
| Mitigating   | Short | If testing mitigation, end test                                                          |
| Servicing    | Short | Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator |
| Servicing    | Long  | Reset control                                                                            |
| Fault        | Short | Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator |
| Fault        | Long  | Reset control                                                                            |

## External Alarm

(For applications with external alarms wired directly to the furnace control board)

The furnace control board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the furnace control board provides a dry relay contact that is rated 3A at 30 VAC/DC.

## THERMOSTAT COMPATIBILITY

Thermostats that preserve memory settings are compatible with the furnace control board. Examples include:

- Battery-powered thermostats
- Analog Thermostat
- Late-model programmable thermostats

**NOTE** - Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

## START UP PROCEDURE

The furnace control board is equipped with a LGWP Test/Reset button, see Test Button Functionality. After the furnace control board has been mounted and wired, restore power to the HVAC system. The system will then run through a purge sequence for five minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

### Cooling Demand

1. Prompt a cooling demand at the thermostat.
2. Press the LGWP Test button on the furnace control board.  
The system then executes a leak detection response.
3. Observe the following sequence:
  - a. The LED indicator for leak detection. See IGNITION CONTROL DIAGNOSTIC CODES on page 28.
  - b. The blower powers up.
  - c. The outdoor compressor powers down.
4. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion

### Heating Demand

1. Prompt a heating demand at the thermostat.
2. Observe the following sequence:
  - a. The LED indicator for leak detection. See IGNITION CONTROL DIAGNOSTIC CODES on page 28.
  - b. The blower powers up.
  - c. The gas burners power down.
  - d. The outdoor compressor powers down.
3. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion.

The installation of the furnace control board is complete after both sequences are successfully completed.

## Unit Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

### **⚠ WARNING**

Do not use this furnace if any part has been underwater. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. Immediately call a qualified service technician to inspect the furnace and to replace all gas controls, control system parts, and electrical parts that have been wet or to replace the furnace, if deemed necessary.

### **⚠ WARNING**

If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply..

### **⚠ CAUTION**

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch..

**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.

The gas valve on the ML180UHE(K) unit is equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the switch will not turn or if the control switch will not move by hand, do not try to repair it.

#### **Placing the furnace into operation:**

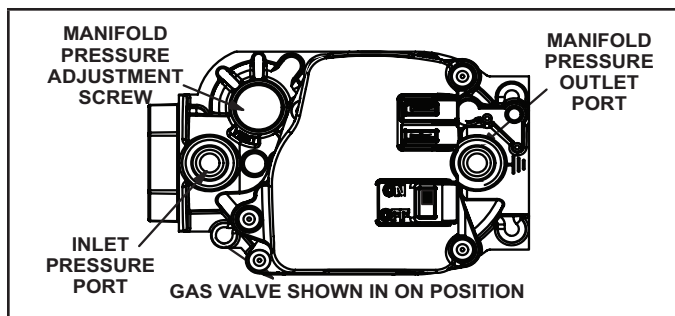
ML180UHE(K) units are equipped with an automatic ignition system. Do not attempt to manually light burners on these furnaces. Each time the thermostat calls for heat, the burners will automatically light. The ignitor does not get hot when there is no call for heat on units with an automatic ignition system.

### **⚠ WARNING**

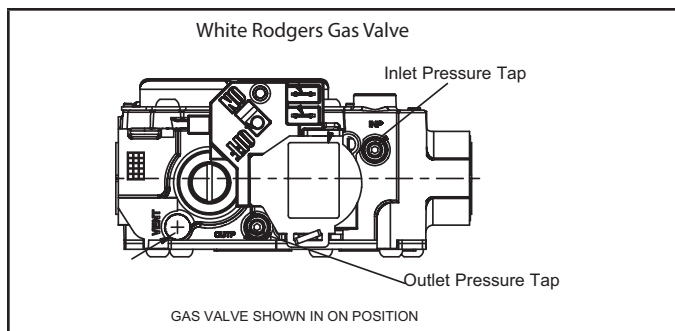
If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or death..

#### **Gas Valve Operation (FIGURE 37 and FIGURE 38)**

- 1 - **STOP!** Read the safety information at the beginning of this section.
- 2 - Set the thermostat to the lowest setting.
- 3 - Turn off all electrical power to the unit.
- 4 - This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
- 5 - Remove the upper access panel.
- 6 - Move switch on gas valve to **OFF**. Do not force. See FIGURE 37 and FIGURE 38.
- 7 - Wait five minutes to clear out any gas. 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 next step.



**FIGURE 37**



**FIGURE 38**

8 - Move switch on gas valve to ON. Do not force. See FIGURE 37 and FIGURE 38.

9 - Replace the upper access panel.

10- Turn on all electrical power to the unit.

11- Set the thermostat to desired setting.

**NOTE** - When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.

12- If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

#### **Turning Off Gas to 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 upper access panel.
- 4 - Move switch on gas valve to OFF. Do not force.
- 5 - Replace the upper access panel.

#### **Failure To Operate**

If the unit fails to operate, check the following:

- 1 - Is the thermostat calling for heat?
- 2 - Are access panels securely in place?
- 3 - Is the main disconnect switch closed?
- 4 - Is there a blown fuse or tripped circuit breaker?
- 5 - Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.
- 6 - Is gas turned on at the meter?
- 7 - Is the manual main shut-off valve open?
- 8 - Is the internal manual shut-off valve open?
- 9 - Is the unit ignition system in lock out? If the unit locks out again, call the service technician to inspect the unit for blockages.
- 10 - Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages

- 11 - Are flame rollout switches tripped? If flame rollout switches are tripped, call the service technician for inspection.

#### Heating Sequence Of Operation (follow steps below)

- 1 - When thermostat calls for heat, combustion air blower starts.
- 2 - Combustion air pressure switch proves blower operation. Switch is factory-set and requires no adjustment.
- 3 - After a 15-second prepurge, the hot surface ignitor energizes.
- 4 - After a 20-second ignitor warm-up period, the gas valve solenoid opens. A 4-second trial for ignition period begins.
- 5 - Gas is ignited, flame sensor proves the flame, and the combustion process continues.
- 6 - If flame is not detected after first ignition trial, the ignition control will repeat steps 3 and 4 four more times before locking out the gas valve ("WATCHGUARD" flame failure mode). The ignition control will then automatically repeat steps 1 through 6 after 60 minutes.
- 7 - To interrupt the 60-minute "WATCHGUARD" period, move thermostat from "Heat" to "OFF" then back to "Heat." Heating sequence then restarts at step 1.

#### Gas Pressure Adjustment

#### Gas Flow (Approximate)

TABLE 15

| GAS METER CLOCKING CHART |                            |                 |                 |                 |
|--------------------------|----------------------------|-----------------|-----------------|-----------------|
| ML180UHE(K)<br>Unit      | Seconds For One Revolution |                 |                 |                 |
|                          | Natural                    |                 | LP/Propane      |                 |
|                          | 1 cu ft<br>Dial            | 2 cu ft<br>Dial | 1 cu ft<br>Dial | 2 cu ft<br>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             |

Natural-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 15. If manifold pressure matches TABLE 17 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.

#### Supply Pressure Measurement

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap. Remove the threaded plug, install a field-provided barbed fitting and connect a manometer to measure supply pressure. See TABLE 17 for proper line pressure. Replace the threaded plug after measurements have been taken.

#### Manifold Pressure Measurement

- 1 - Remove the threaded plug from the outlet side of the gas valve and install a field-provided barbed fitting. Connect to a manometer to measure manifold pressure.
- 2 - Start unit and allow 5 minutes for unit to reach steady state.
- 3 - While waiting for the unit to stabilize, observe the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue.
- 4 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in TABLE 17.

**NOTE** - Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to remove barbed fitting and replace threaded plug.

#### Proper Combustion

Furnace should operate a minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to the table below. **The maximum carbon monoxide reading should not exceed 100 ppm.**

TABLE 16

| ML180UHE(K)<br>Unit | CO <sub>2</sub> % Nat | CO <sub>2</sub> % LP |
|---------------------|-----------------------|----------------------|
| -045                | 7.2 - 7.8             | 7.5 - 9.0            |
| -070                |                       |                      |
| -090                |                       |                      |
| -110                |                       |                      |
| -135                |                       |                      |

#### High Altitude

The manifold pressure may require adjustment and combustion air pressure switch may need replacing to ensure proper combustion at higher altitudes. Refer to TABLE 17 for manifold pressure and TABLE 18 for pressure switch change and gas conversion kits.

### IMPORTANT

For safety, shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

**TABLE 17**

Manifold Pressure Settings at all Altitudes

| Model Input Size | Gas        | 0 - 2000 ft. | 2001 -4500 ft . | 4501 - 7500 ft. | 7501 - 10,000 ft | Line Pressure in. wg. |      |
|------------------|------------|--------------|-----------------|-----------------|------------------|-----------------------|------|
|                  |            |              |                 |                 |                  | Min                   | Max  |
| 045              | Nat        | 3.5          | 3.2             | 3.0             | 3.5              | 4.5                   | 13.0 |
|                  | LP/Propane | 10.0         | 10.0            | 10.0            | 10.0             | 11.0                  | 13.0 |
| 070              | Nat        | 3.5          | 3.2             | 2.8             | 3.5              | 4.5                   | 13.0 |
|                  | LP/Propane | 10.0         | 10.0            | 10.0            | 10.0             | 11.0                  | 13.0 |
| 090              | Nat        | 3.5          | 3.2             | 2.7             | 3.5              | 4.5                   | 13.0 |
|                  | LP/Propane | 10.0         | 10.0            | 9.6             | 10.0             | 11.0                  | 13.0 |
| 110              | Nat        | 3.5          | 3.5             | 3.0             | 3.5              | 4.5                   | 13.0 |
|                  | LP/Propane | 10.0         | 10.0            | 9.6             | 10.0             | 11.0                  | 13.0 |
| 135              | Nat        | 3.5          | 3.5             | 2.9             | 3.5              | 4.5                   | 13.0 |
|                  | LP/Propane | 10.0         | 10.0            | 9.6             | 10.0             | 11.0                  | 13.0 |

**TABLE 18**

Pressure Switch and Gas Conversion Kits at all Altitudes

| Model Input Size | High Altitude Pressure Switch Kit |              |                | High Altitude Natural Gas Orifice Kit | LP/Propane Orifice Kit |                | Natural Gas Orifice Kit |
|------------------|-----------------------------------|--------------|----------------|---------------------------------------|------------------------|----------------|-------------------------|
| 045              | 0-4500 ft                         | 4501-7500 ft | 7501-10,000 ft | 7501-10,000 ft                        | 0-7500 ft              | 7501-10,000 ft | 0-7500 ft               |
| 070              | No Change                         | 80W52        | 80W51          | 73W37                                 | 11K49                  | 11K44          | 73W81                   |
| 110              |                                   | 80W52        | 80W51          |                                       |                        |                |                         |
| 090              |                                   | 80W52        | 80W51          |                                       |                        |                |                         |
| 110              |                                   | 80W57        | 80W52          |                                       |                        |                |                         |
| 135              |                                   | 80W52        | 80W51          |                                       |                        |                |                         |

**NOTE** - A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

### Other Unit Adjustments

#### Primary and Secondary Limits

The primary limit is located on the heating compartment vestibule panel. The secondary limits (if equipped) are located in the blower compartment, attached to the back side of the blower. These auto reset limits are factory-set and require no adjustment.

#### Flame Rollout Switches

These manually reset switches are located on the burner box.

#### Pressure Switch

The pressure switch is located in the heating compartment adjacent to the combustion air inducer. The switch checks for proper combustion air inducer operation before allowing ignition trial. The switch is factory-set and requires no adjustment.

#### Temperature Rise

After the furnace has been started, and supply and return air temperatures have been allowed to stabilize, check the temperature rise. If necessary, adjust the blower speed to maintain the temperature rise within the range shown on the unit nameplate. See TABLE 10 for allowable heating speeds.

Increase the blower speed to decrease the temperature. Decrease the blower speed to increase the temperature rise. Failure to adjust the temperature rise may cause erratic limit operation.

## Constant Torque Motor

ML180UHE(K) units are equipped with a constant torque ECM motor. It has a DC motor coupled to an electronic control module both contained in the same motor housing. The motor is programmed to provide constant torque at each of the five selectable speeds. The motor has five speed taps. Each tap requires 24 volts to energize.

### Input Voltage Requirements

The circuit is designed to be operated with AC voltage. A voltage of 12 to 33VAC is required to energize the motor. Expected current draw will be less than 20mA.

### Blower Speeds

Follow the steps below to change the blower speeds.

- 1 - Turn off electrical power to furnace.
- 2 - Remove blower access panel.
- 3 - Disconnect existing speed tap at integrated control speed terminal.  
**NOTE** - Termination of any unused motor leads must be insulated.
- 4 - Place unused blower speed tap on integrated control "PARK" terminal or insulate.
- 5 - Refer to blower speed selection chart on unit wiring diagram for desired heating or cooling speed. See Product Specifications manual for blower performance data. See TABLE 10 for allowable heating speeds.
- 6 - Connect selected speed tap at integrated control speed terminal.
- 7 - Resecure blower access panel.
- 8 - Turn on electrical power to furnace.
- 9 - Recheck temperature rise.

### Electronic Ignition

The integrated control has an added feature of an internal Watchguard control. The feature serves as an automatic reset device for integrated control lockout caused by ignition failure. This type of lockout is usually due to low gas line pressure. After one hour of continuous thermostat demand for heat, the Watchguard will re-set and remake thermostat demand to the furnace and automatically reset the integrated control to begin the ignition sequence.

## Service

### WARNING

ELECTRICAL SHOCK, FIRE,  
OR EXPLOSION HAZARD.



Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

Improper servicing could result in dangerous operation, serious injury, death, or property damage. Before servicing, disconnect all electrical power to furnace.

When servicing controls, label all wires prior to disconnecting.

Take care to reconnect wires correctly.

Verify proper operation after servicing.

### Annual Furnace Maintenance

At the beginning of each heating season, and to comply with the **Lennox Limited Warranty**, your system should be checked by a licensed professional technician (or equivalent) as follows:

- 1 - Check wiring for loose connections, voltage at indoor unit and amperage of indoor motor.
- 2 - Check the condition of the belt and shaft bearings if applicable.
- 3 - Inspect all gas pipe and connections for leaks.
- 4 - Check the cleanliness of filters and change if necessary (monthly).
- 5 - Check the condition and cleanliness of burners and heat exchanger and clean if necessary.
- 6 - Inspect the Low GWP sensor / sensors and rubber sleeve.

- 7- Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.
- 8- Inspect the combustion air inducer and clean if necessary.
- 9- Evaluate the heat exchanger integrity by inspecting the heat exchanger per the AHRI heat exchanger inspection procedure. This procedure can be viewed at [www.ahrinet.org](http://www.ahrinet.org)
- 10- Ensure sufficient combustion air is available to the furnace. Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) must be properly sized, open and unobstructed to provide combustion air.
- 11- Inspect the furnace venting system to make sure it is in place, structurally sound, and without holes, corrosion, or blockage. Vent system must be free and clear of obstructions and must slope upward away from the furnace. Vent system should be installed per the National Fuel Gas Code
- 12- Inspect the furnace return air duct connection to ensure the duct is sealed to the furnace. Check for air leaks on supply and return ducts and seal where necessary.
- 13- Check the condition of the furnace cabinet insulation and repair if necessary.
- 14- Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.
- 15- Verify operation of CO detectors and replace batteries as required.

Perform a general system test. Turn on the furnace to check operating functions such as the start-up and shut-off operation.

- 1 - Check the operation of the ignition system, inspect and clean flame sensor. Check microamps before and after. Check controls and safety devices (gas valve, flame sensor, temperature limits). Consult Service Manual for proper operating range. Thermal Limits should be checked by restricting airflow and not disconnecting the indoor blower. For additional details, please see Service and Application Note H049.
- 2 - Verify that system total static pressure and airflow settings are within specific operating parameters.

- 3 - Clock gas meter to ensure that the unit is operating at the specified firing rate. Check the supply pressure and the manifold pressure. On two-stage gas furnaces check the manifold pressure on high fire and low fire. If manifold pressure adjustment is necessary, consult the Service Literature for unit specific information on adjusting gas pressure. Not all gas valves are adjustable. Verify correct temperature rise.

### Blower

Check the blower wheel for debris and clean if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.

## WARNING

The blower door must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into the living space resulting in personal injury or death.

### Cleaning the Burners

**NOTE** - Use papers or protective covering in front of the furnace during cleaning.

- 1 - Turn off both electrical and gas power supplies to furnace.
- 2 - Label the wires from gas valve, rollout switches, primary limit switch and make-up box then disconnect them.
- 3 - Disconnect gas supply piping. Remove the screw securing the burner box cover and remove cover. Remove the four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.
- 4 - To clean burners, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage. FIGURE 39 shows burner detail.
- 5 - Reinstall burner box, manifold assembly and burner box cover.
- 6 - Re-install gas supply and turn on electrical power to furnace.

## BURNER ASSEMBLY & REMOVAL

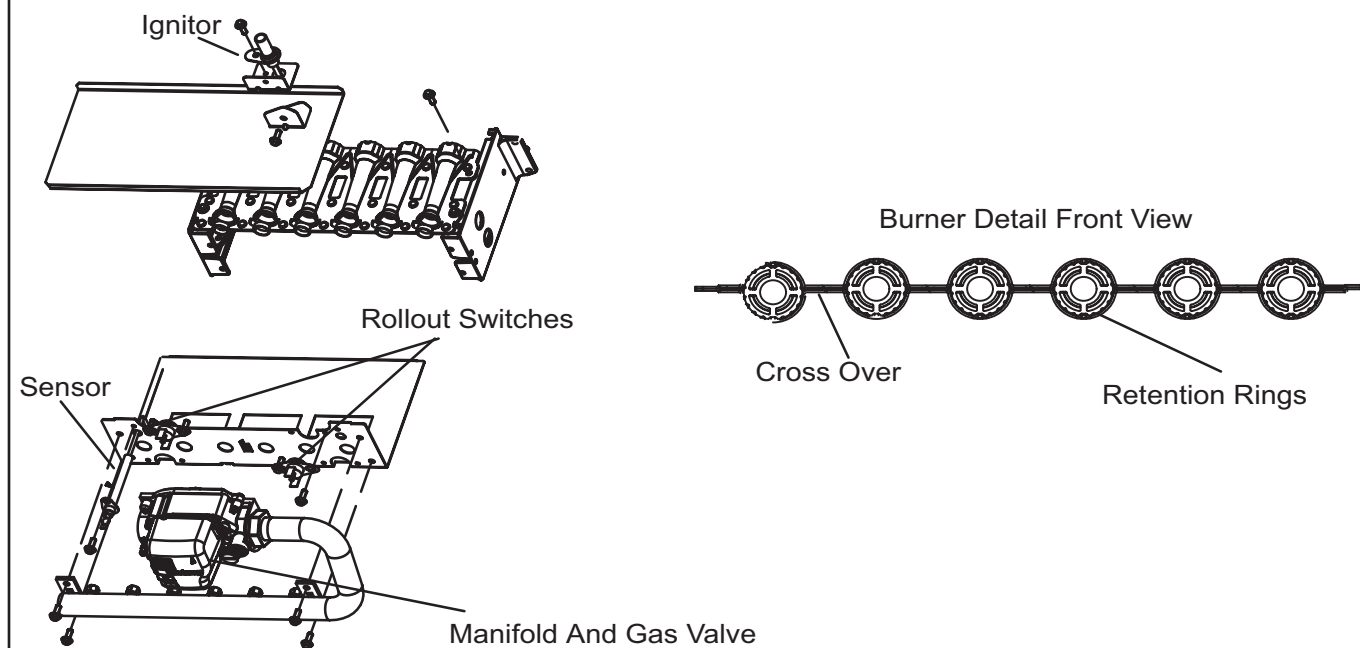


FIGURE 39

### Repair Parts List

The following repair parts are available through independent Lennox dealers. When ordering parts, include the complete furnace model number listed on the CSA International nameplate -- Example: ML180UH045E36AK-01. **All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.**

#### Cabinet Parts

- Upper access panel
- Blower panel
- Top cap

#### Control Panel Parts

- Transformer
- Integrated control
- Door interlock switch
- Circuit breaker

#### Blower Parts

- Blower wheel
- Blower housing
- Motor
- Motor mounting frame
- Motor power choke
- Blower housing cutoff plate

#### Heating Parts

- Flame sensor
- Heat exchanger assembly
- Gas manifold
- Combustion air inducer
- Gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Ignitor
- Primary limit control
- Flame rollout switch (s)
- Secondary limit

#### Refrigerant Detection System Parts

- Refrigerant Detection Sensor
- Refrigerant Line Set Sleeve

**UNIT SET UP**  
(typical)

Unit Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

The diagram illustrates the typical setup for a furnace unit. On the left, the furnace unit is shown with a gas supply line (1) connected to a gas pressure gauge. A vent/exhaust pipe (2) is connected to the top of the unit. To the right, a line voltage meter (5) is connected to the unit's electrical terminals. The duct system (3) is shown with supply air (upward arrow) and return air (downward arrow) paths. A filter is installed in the return air path. The unit is labeled 'upflow furnace shown'. The integrated control (4) is also shown connected to the unit.

**Gas Supply Pressure**

**Line Voltage**

**SUPPLY AIR**

**upflow furnace shown**

**Filter**

**RETURN AIR**

**① GAS SUPPLY**

☐ Natural Gas   ☐ LP/Propane Gas

☐ Piping Connections Tight

☐ Leak Tested

☐ Supply Line Pressure " W.C. \_\_\_\_\_

**② VENT / EXHAUST PIPE**

☐ Secure to Unit

☐ Elbows Secured to Pipe

☐ Roof Flashing (water tight)

☐ Vent Pipe Supported

**③ DUCT SYSTEM**

**SUPPLY AIR DUCT**

☐ Sealed

☐ Insulated (if necessary)

☐ Registers Open and Unobstructed

**RETURN DUCT**

☐ Sealed

☐ Filter Installed and Clean

☐ Grilles Unobstructed

**④ INTEGRATED CONTROL**

☐ DIP Switches Set (if applicable)

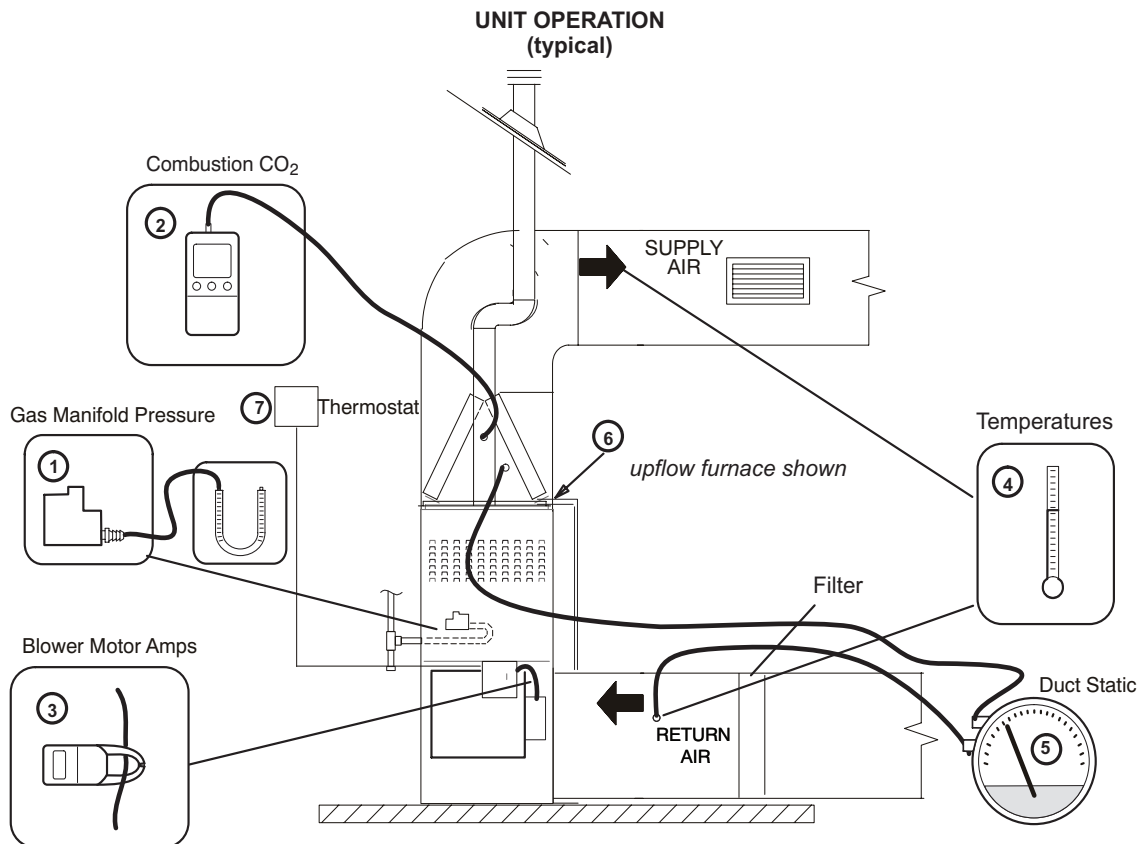
☐ Appropriate Links in Place (if applicable)

**⑤ VOLTAGE CHECK**

Supply Voltage \_\_\_\_\_

☐ Electrical Connections Tight

FIGURE 40



① GAS MANIFOLD PRESSURE "W.C." \_\_\_\_\_

② COMBUSTION SAMPLE CO<sub>2</sub>% \_\_\_\_\_ CO PPM \_\_\_\_\_

③ INDOOR BLOWER AMPS \_\_\_\_\_

④ TEMPERATURE RISE  
 Supply Duct Temperature \_\_\_\_\_  
 Return Duct Temperature - \_\_\_\_\_  
 Temperature Rise = \_\_\_\_\_

⑤ TOTAL EXTERNAL STATIC (dry coil)  
 Supply External Static \_\_\_\_\_  
 Return External Static + \_\_\_\_\_  
 Total External Static = \_\_\_\_\_

③ INDOOR BLOWER AMPS \_\_\_\_\_

④ TEMPERATURE DROP  
 Return Duct Temperature \_\_\_\_\_  
 Supply Duct Temperature - \_\_\_\_\_  
 Temperature Drop = \_\_\_\_\_

⑤ TOTAL EXTERNAL STATIC (dry coil)  
 Supply External Static \_\_\_\_\_  
 Return External Static + \_\_\_\_\_  
 Total External Static = \_\_\_\_\_

⑥ DRAIN LINE  
☐ Leak Free

⑦ THERMOSTAT  
☐ Adjusted and Programmed  
☐ Operation Explained to Owner

Contractor's: Name \_\_\_\_\_ Telephone \_\_\_\_\_ Checklist Completed \_\_\_\_\_

Job Address \_\_\_\_\_ Technician's Name \_\_\_\_\_

**FIGURE 41**

## BLOWER DATA

### ML180UH045E36AK PERFORMANCE (Less Filter)

| External Static Pressure<br>in. w.g. | Air Volume / Watts at Various Blower Speeds |       |                        |       |                  |       |                        |       |              |       |
|--------------------------------------|---------------------------------------------|-------|------------------------|-------|------------------|-------|------------------------|-------|--------------|-------|
|                                      | High<br>(Black)                             |       | Medium-High<br>(Brown) |       | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       |
|                                      | cfm                                         | Watts | cfm                    | Watts | cfm              | Watts | cfm                    | Watts | cfm          | Watts |
| 0.10                                 | 1383                                        | 239   | 1179                   | 156   | 991              | 106   | 970                    | 102   | 959          | 98    |
| 0.20                                 | 1346                                        | 251   | 1132                   | 165   | 943              | 114   | 854                    | 92    | 764          | 78    |
| 0.30                                 | 1308                                        | 263   | 1083                   | 174   | 896              | 122   | 797                    | 99    | 668          | 78    |
| 0.40                                 | 1268                                        | 272   | 1057                   | 185   | 864              | 130   | 748                    | 106   | 612          | 85    |
| 0.50                                 | 1257                                        | 286   | 1013                   | 193   | 818              | 139   | 697                    | 114   | 562          | 92    |
| 0.60                                 | 1211                                        | 297   | 985                    | 203   | 775              | 147   | 651                    | 121   | 508          | 98    |
| 0.70                                 | 1185                                        | 307   | 937                    | 212   | 728              | 155   | 605                    | 129   | 456          | 104   |
| 0.80                                 | 1140                                        | 318   | 902                    | 221   | 688              | 163   | 554                    | 136   | 385          | 111   |
| 0.90                                 | 1115                                        | 328   | 866                    | 231   | 641              | 171   | 512                    | 143   | ---          | ---   |
| 1.00                                 | 1074                                        | 335   | 823                    | 241   | 598              | 178   | 446                    | 151   | ---          | ---   |

### ML180UH070E36AK PERFORMANCE (Less Filter)

| External Static Pressure<br>in. w.g. | Air Volume / Watts at Various Blower Speeds |       |                        |       |                  |       |                        |       |              |       |
|--------------------------------------|---------------------------------------------|-------|------------------------|-------|------------------|-------|------------------------|-------|--------------|-------|
|                                      | High<br>(Black)                             |       | Medium-High<br>(Brown) |       | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       |
|                                      | cfm                                         | Watts | cfm                    | Watts | cfm              | Watts | cfm                    | Watts | cfm          | Watts |
| 0.10                                 | 1372                                        | 296   | 1160                   | 188   | 1073             | 154   | 1040                   | 144   | 880          | 96    |
| 0.20                                 | 1340                                        | 305   | 1125                   | 197   | 1035             | 162   | 1002                   | 151   | 836          | 103   |
| 0.30                                 | 1309                                        | 315   | 1092                   | 205   | 999              | 170   | 965                    | 159   | 794          | 110   |
| 0.40                                 | 1281                                        | 325   | 1059                   | 213   | 964              | 178   | 929                    | 166   | 752          | 116   |
| 0.50                                 | 1253                                        | 335   | 1026                   | 221   | 927              | 185   | 891                    | 173   | 709          | 122   |
| 0.60                                 | 1225                                        | 344   | 992                    | 229   | 891              | 192   | 855                    | 180   | 666          | 128   |
| 0.70                                 | 1196                                        | 353   | 958                    | 237   | 854              | 199   | 818                    | 187   | 622          | 134   |
| 0.80                                 | 1158                                        | 357   | 924                    | 245   | 817              | 206   | 780                    | 194   | 582          | 139   |
| 0.90                                 | 1122                                        | 363   | 890                    | 252   | 781              | 213   | 742                    | 200   | 544          | 144   |
| 1.00                                 | 1090                                        | 370   | 849                    | 257   | 746              | 219   | 707                    | 207   | 504          | 149   |

### ML180UH070E36BK PERFORMANCE (Less Filter)

| External Static Pressure<br>in. w.g. | Air Volume / Watts at Various Blower Speeds |       |                        |       |                  |       |                        |       |              |       |
|--------------------------------------|---------------------------------------------|-------|------------------------|-------|------------------|-------|------------------------|-------|--------------|-------|
|                                      | High<br>(Black)                             |       | Medium-High<br>(Brown) |       | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       |
|                                      | cfm                                         | Watts | cfm                    | Watts | cfm              | Watts | cfm                    | Watts | cfm          | Watts |
| 0.10                                 | 1493                                        | 267   | 1256                   | 173   | 1166             | 145   | 1139                   | 132   | 978          | 96    |
| 0.20                                 | 1433                                        | 277   | 1221                   | 184   | 1116             | 155   | 1078                   | 139   | 903          | 98    |
| 0.30                                 | 1395                                        | 288   | 1151                   | 193   | 1067             | 163   | 1027                   | 148   | 849          | 107   |
| 0.40                                 | 1353                                        | 296   | 1094                   | 199   | 1008             | 171   | 975                    | 155   | 786          | 113   |
| 0.50                                 | 1312                                        | 308   | 1047                   | 209   | 951              | 179   | 923                    | 164   | 726          | 120   |
| 0.60                                 | 1270                                        | 318   | 995                    | 219   | 901              | 187   | 875                    | 172   | 667          | 127   |
| 0.70                                 | 1232                                        | 328   | 943                    | 228   | 856              | 194   | 824                    | 181   | 604          | 134   |
| 0.80                                 | 1187                                        | 338   | 895                    | 236   | 804              | 202   | 774                    | 188   | 543          | 142   |
| 0.90                                 | 1144                                        | 348   | 858                    | 244   | 754              | 209   | 720                    | 196   | 492          | 147   |
| 1.00                                 | 1067                                        | 339   | 809                    | 252   | 703              | 217   | 669                    | 204   | 447          | 152   |

## BLOWER DATA

### ML180UH090E48BK PERFORMANCE (Less Filter)

| External Static Pressure<br>in. w.g. | Air Volume / Watts at Various Blower Speeds |       |                        |       |                  |       |                        |       |              |       |
|--------------------------------------|---------------------------------------------|-------|------------------------|-------|------------------|-------|------------------------|-------|--------------|-------|
|                                      | High<br>(Black)                             |       | Medium-High<br>(Brown) |       | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       |
|                                      | cfm                                         | Watts | cfm                    | Watts | cfm              | Watts | cfm                    | Watts | cfm          | Watts |
| 0.10                                 | 1740                                        | 329   | 1528                   | 233   | 1404             | 193   | 1348                   | 173   | 1205         | 130   |
| 0.20                                 | 1697                                        | 344   | 1479                   | 245   | 1360             | 203   | 1302                   | 185   | 1147         | 140   |
| 0.30                                 | 1655                                        | 355   | 1437                   | 260   | 1329             | 219   | 1262                   | 194   | 1097         | 151   |
| 0.40                                 | 1624                                        | 373   | 1405                   | 274   | 1268             | 225   | 1215                   | 204   | 1043         | 161   |
| 0.50                                 | 1581                                        | 382   | 1376                   | 287   | 1234             | 238   | 1175                   | 216   | 996          | 171   |
| 0.60                                 | 1545                                        | 400   | 1319                   | 299   | 1197             | 249   | 1119                   | 227   | 944          | 182   |
| 0.70                                 | 1513                                        | 414   | 1277                   | 308   | 1150             | 260   | 1069                   | 238   | 889          | 190   |
| 0.80                                 | 1472                                        | 426   | 1246                   | 321   | 1097             | 270   | 1025                   | 251   | 845          | 199   |
| 0.90                                 | 1421                                        | 431   | 1197                   | 333   | 1051             | 283   | 983                    | 261   | 781          | 211   |
| 1.00                                 | 1296                                        | 404   | 1153                   | 344   | 1010             | 292   | 935                    | 270   | 723          | 221   |

### ML180UH090E60CK PERFORMANCE (Less Filter)

| External Static Pressure<br>in. w.g. | Air Volume / Watts at Different Blower Speeds                                              |       |                        |       |                  |       |                        |       |              |       |                                                                                                                                                                                                                          |            |                        |            |                  |       |                        |       |              |       |
|--------------------------------------|--------------------------------------------------------------------------------------------|-------|------------------------|-------|------------------|-------|------------------------|-------|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|------------|------------------|-------|------------------------|-------|--------------|-------|
|                                      | Bottom Return Air, Side Return Air from Both Sides or Return Air from Bottom and One Side. |       |                        |       |                  |       |                        |       |              |       | Single Side Return Air – Air volumes in <b>bold</b> (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity. |            |                        |            |                  |       |                        |       |              |       |
|                                      | High<br>(Black)                                                                            |       | Medium-High<br>(Brown) |       | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       | High<br>(Black)                                                                                                                                                                                                          |            | Medium-High<br>(Brown) |            | Medium<br>(Blue) |       | Medium-Low<br>(Yellow) |       | Low<br>(Red) |       |
|                                      | cfm                                                                                        | Watts | cfm                    | Watts | cfm              | Watts | cfm                    | Watts | cfm          | Watts | cfm                                                                                                                                                                                                                      | Watts      | cfm                    | Watts      | cfm              | Watts | cfm                    | Watts | cfm          | Watts |
| 0.10                                 | 2179                                                                                       | 623   | 1917                   | 435   | 1725             | 326   | 1565                   | 256   | 1422         | 201   | <b>2148</b>                                                                                                                                                                                                              | <b>593</b> | <b>1889</b>            | <b>403</b> | 1707             | 305   | 1553                   | 234   | 1404         | 185   |
| 0.20                                 | 2141                                                                                       | 640   | 1874                   | 450   | 1679             | 340   | 1515                   | 268   | 1370         | 214   | <b>2123</b>                                                                                                                                                                                                              | <b>606</b> | <b>1823</b>            | <b>406</b> | 1679             | 317   | 1503                   | 244   | 1377         | 196   |
| 0.30                                 | 2102                                                                                       | 658   | 1831                   | 464   | 1636             | 355   | 1468                   | 282   | 1321         | 225   | <b>2069</b>                                                                                                                                                                                                              | <b>613</b> | <b>1814</b>            | <b>422</b> | 1638             | 327   | 1464                   | 255   | 1328         | 207   |
| 0.40                                 | 2065                                                                                       | 675   | 1790                   | 480   | 1591             | 368   | 1420                   | 294   | 1265         | 237   | <b>2065</b>                                                                                                                                                                                                              | <b>634</b> | 1791                   | 435        | 1593             | 337   | 1414                   | 264   | 1268         | 216   |
| 0.50                                 | 2029                                                                                       | 693   | 1749                   | 495   | 1546             | 381   | 1371                   | 306   | 1208         | 248   | <b>2030</b>                                                                                                                                                                                                              | <b>645</b> | 1734                   | 445        | 1548             | 348   | 1366                   | 276   | 1224         | 228   |
| 0.60                                 | 1991                                                                                       | 709   | 1708                   | 510   | 1500             | 394   | 1320                   | 317   | 1158         | 259   | <b>2000</b>                                                                                                                                                                                                              | <b>663</b> | 1705                   | 461        | 1503             | 360   | 1329                   | 291   | 1156         | 235   |
| 0.70                                 | 1952                                                                                       | 726   | 1667                   | 524   | 1455             | 406   | 1271                   | 328   | 1107         | 269   | <b>1954</b>                                                                                                                                                                                                              | <b>681</b> | 1663                   | 474        | 1461             | 374   | 1278                   | 303   | 1106         | 245   |
| 0.80                                 | 1912                                                                                       | 743   | 1623                   | 538   | 1408             | 418   | 1224                   | 341   | 1052         | 280   | <b>1928</b>                                                                                                                                                                                                              | <b>694</b> | 1624                   | 488        | 1411             | 385   | 1227                   | 313   | 1045         | 257   |
| 0.90                                 | 1876                                                                                       | 758   | 1582                   | 552   | 1366             | 432   | 1176                   | 353   | 1003         | 291   | <b>1890</b>                                                                                                                                                                                                              | <b>712</b> | 1576                   | 502        | 1361             | 397   | 1175                   | 324   | 989          | 268   |
| 1.00                                 | 1842                                                                                       | 779   | 1543                   | 567   | 1320             | 443   | 1128                   | 365   | 947          | 302   | <b>1853</b>                                                                                                                                                                                                              | <b>728</b> | 1541                   | 517        | 1315             | 412   | 1122                   | 335   | 912          | 282   |

## BLOWER DATA

### ML180UH110E60CK PERFORMANCE (Less Filter)

| External Static Pressure in. w.g. | Air Volume / Watts at Different Blower Speeds                                                              |       |                     |       |               |       |                     |       |           |       |                                                                                                                                                                                                                          |            |                     |            |               |       |                     |       |           |       |
|-----------------------------------|------------------------------------------------------------------------------------------------------------|-------|---------------------|-------|---------------|-------|---------------------|-------|-----------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|------------|---------------|-------|---------------------|-------|-----------|-------|
|                                   | Bottom Return Air, Side Return Air with Return Air from Both Sides or Return Air from Bottom and One Side. |       |                     |       |               |       |                     |       |           |       | Single Side Return Air – Air volumes in <b>bold</b> (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity. |            |                     |            |               |       |                     |       |           |       |
|                                   | High (Black)                                                                                               |       | Medium-High (Brown) |       | Medium (Blue) |       | Medium-Low (Yellow) |       | Low (Red) |       | High (Black)                                                                                                                                                                                                             |            | Medium-High (Brown) |            | Medium (Blue) |       | Medium-Low (Yellow) |       | Low (Red) |       |
|                                   | cfm                                                                                                        | Watts | cfm                 | Watts | cfm           | Watts | cfm                 | Watts | cfm       | Watts | cfm                                                                                                                                                                                                                      | Watts      | cfm                 | Watts      | cfm           | Watts | cfm                 | Watts | cfm       | Watts |
| 0.10                              | 2147                                                                                                       | 601   | 1917                | 421   | 1697          | 300   | 1550                | 240   | 1367      | 175   | <b>2160</b>                                                                                                                                                                                                              | <b>623</b> | <b>1902</b>         | <b>427</b> | 1679          | 303   | 1538                | 244   | 1354      | 179   |
| 0.20                              | 2129                                                                                                       | 622   | 1857                | 427   | 1632          | 308   | 1501                | 249   | 1309      | 184   | <b>2117</b>                                                                                                                                                                                                              | <b>642</b> | <b>1854</b>         | <b>440</b> | 1626          | 318   | 1486                | 252   | 1309      | 189   |
| 0.30                              | 2087                                                                                                       | 632   | 1822                | 441   | 1594          | 320   | 1436                | 256   | 1263      | 193   | <b>2066</b>                                                                                                                                                                                                              | <b>653</b> | <b>1805</b>         | <b>453</b> | 1579          | 326   | 1445                | 265   | 1265      | 198   |
| 0.40                              | 2065                                                                                                       | 652   | 1787                | 454   | 1542          | 329   | 1401                | 270   | 1203      | 203   | <b>2038</b>                                                                                                                                                                                                              | <b>670</b> | 1764                | 467        | 1541          | 336   | 1400                | 276   | 1210      | 208   |
| 0.50                              | 2013                                                                                                       | 661   | 1743                | 464   | 1498          | 339   | 1343                | 278   | 1150      | 214   | <b>2004</b>                                                                                                                                                                                                              | <b>686</b> | 1740                | 481        | 1493          | 347   | 1360                | 290   | 1155      | 219   |
| 0.60                              | 1995                                                                                                       | 683   | 1701                | 477   | 1452          | 356   | 1294                | 291   | 1088      | 224   | <b>1965</b>                                                                                                                                                                                                              | <b>698</b> | 1697                | 494        | 1450          | 360   | 1307                | 299   | 1097      | 228   |
| 0.70                              | 1942                                                                                                       | 691   | 1651                | 492   | 1409          | 369   | 1243                | 305   | 1039      | 235   | <b>1936</b>                                                                                                                                                                                                              | <b>717</b> | 1648                | 505        | 1409          | 369   | 1260                | 310   | 1038      | 235   |
| 0.80                              | 1913                                                                                                       | 710   | 1617                | 507   | 1358          | 380   | 1193                | 313   | 974       | 245   | <b>1906</b>                                                                                                                                                                                                              | <b>731</b> | 1605                | 518        | 1353          | 381   | 1206                | 315   | 986       | 246   |
| 0.90                              | 1877                                                                                                       | 726   | 1570                | 521   | 1304          | 392   | 1158                | 328   | ---       | ---   | <b>1842</b>                                                                                                                                                                                                              | <b>724</b> | 1566                | 534        | 1324          | 395   | 1160                | 328   | 929       | 256   |
| 1.00                              | 1797                                                                                                       | 719   | 1545                | 539   | 1263          | 403   | 1090                | 339   | ---       | ---   | 1742                                                                                                                                                                                                                     | 696        | 1529                | 546        | 1264          | 403   | 1112                | 339   | 873       | 267   |

### ML180UH135E60DK PERFORMANCE (Less Filter)

| External Static Pressure in. w.g. | Air Volume / Watts at Different Blower Speeds                                                              |       |                     |       |               |       |                     |       |           |       |                                                                                                                                                                                                                          |            |                     |            |               |            |                     |       |           |       |
|-----------------------------------|------------------------------------------------------------------------------------------------------------|-------|---------------------|-------|---------------|-------|---------------------|-------|-----------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|------------|---------------|------------|---------------------|-------|-----------|-------|
|                                   | Bottom Return Air, Side Return Air with Return Air from Both Sides or Return Air from Bottom and One Side. |       |                     |       |               |       |                     |       |           |       | Single Side Return Air – Air volumes in <b>bold</b> (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity. |            |                     |            |               |            |                     |       |           |       |
|                                   | High (Black)                                                                                               |       | Medium-High (Brown) |       | Medium (Blue) |       | Medium-Low (Yellow) |       | Low (Red) |       | High (Black)                                                                                                                                                                                                             |            | Medium-High (Brown) |            | Medium (Blue) |            | Medium-Low (Yellow) |       | Low (Red) |       |
|                                   | cfm                                                                                                        | Watts | cfm                 | Watts | cfm           | Watts | cfm                 | Watts | cfm       | Watts | cfm                                                                                                                                                                                                                      | Watts      | cfm                 | Watts      | cfm           | Watts      | cfm                 | Watts | cfm       | Watts |
| 0.10                              | 2441                                                                                                       | 700   | 2249                | 547   | 2036          | 403   | 1826                | 305   | 1647      | 231   | <b>2388</b>                                                                                                                                                                                                              | <b>698</b> | <b>2205</b>         | <b>546</b> | <b>2005</b>   | <b>411</b> | 1808                | 309   | 1604      | 231   |
| 0.20                              | 2384                                                                                                       | 726   | 2200                | 576   | 1978          | 428   | 1739                | 319   | 1569      | 249   | <b>2309</b>                                                                                                                                                                                                              | <b>722</b> | <b>2145</b>         | <b>565</b> | <b>1939</b>   | <b>429</b> | 1738                | 327   | 1535      | 248   |
| 0.30                              | 2336                                                                                                       | 760   | 2137                | 595   | 1895          | 442   | 1662                | 340   | 1507      | 265   | <b>2275</b>                                                                                                                                                                                                              | <b>749</b> | <b>2091</b>         | <b>594</b> | <b>1866</b>   | <b>447</b> | 1675                | 344   | 1461      | 263   |
| 0.40                              | 2269                                                                                                       | 784   | 2069                | 621   | 1837          | 472   | 1585                | 360   | 1430      | 281   | <b>2208</b>                                                                                                                                                                                                              | <b>773</b> | <b>2049</b>         | <b>619</b> | <b>1812</b>   | <b>469</b> | 1606                | 363   | 1396      | 281   |
| 0.50                              | 2211                                                                                                       | 799   | 2021                | 651   | 1771          | 487   | 1517                | 376   | 1346      | 294   | <b>2193</b>                                                                                                                                                                                                              | <b>802</b> | <b>1987</b>         | <b>640</b> | 1745          | 487        | 1534                | 381   | 1324      | 297   |
| 0.60                              | 2186                                                                                                       | 836   | 1966                | 671   | 1710          | 508   | 1437                | 391   | 1271      | 311   | <b>2138</b>                                                                                                                                                                                                              | <b>827</b> | <b>1945</b>         | <b>669</b> | 1676          | 507        | 1481                | 400   | 1262      | 314   |
| 0.70                              | 2107                                                                                                       | 835   | 1881                | 682   | 1633          | 525   | 1429                | 415   | 1201      | 328   | <b>2071</b>                                                                                                                                                                                                              | <b>833</b> | <b>1884</b>         | <b>687</b> | 1630          | 529        | 1411                | 417   | 1192      | 329   |
| 0.80                              | 1979                                                                                                       | 802   | 1826                | 706   | 1598          | 550   | 1355                | 432   | 1091      | 348   | <b>1948</b>                                                                                                                                                                                                              | <b>798</b> | <b>1835</b>         | <b>710</b> | 1604          | 560        | 1344                | 433   | 1117      | 345   |
| 0.90                              | 1817                                                                                                       | 742   | 1735                | 700   | 1512          | 567   | 1224                | 448   | 1000      | 361   | 1775                                                                                                                                                                                                                     | 740        | 1709                | 689        | 1519          | 569        | 1282                | 451   | 876       | 361   |
| 1.00                              | 1576                                                                                                       | 644   | 1525                | 634   | 1401          | 569   | 1124                | 467   | 927       | 376   | 1535                                                                                                                                                                                                                     | 639        | 1514                | 619        | 1426          | 574        | 1220                | 469   | 786       | 377   |