



INSTALLATION INSTRUCTIONS ML180UHT

MERIT® SERIES GAS FURNACE
UPFLOW / HORIZONTAL AIR DISCHARGE

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TP Technical
Publications

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



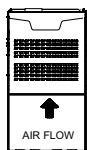
This is a safety alert symbol and should never be ignored.
When you see this symbol on labels or in manuals, be alert
to the potential for personal injury or death.

!WARNING

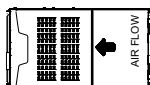
**Improper installation, adjustment, alteration, service
or maintenance can cause property damage, person-
al injury or loss of life. Installation and service must
be performed by a licensed professional installer (or
equivalent), service agency or the gas supplier.**

!CAUTION

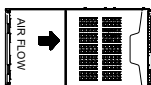
**As with any mechanical equipment, personal injury
can result from contact with sharp sheet metal
edges. Be careful when you handle this equipment.**



UPFLOW



HORIZONTAL LEFT



HORIZONTAL RIGHT



**Los calefactores están
aprobados por el Instituto
del Gas Argentino (IGA)
para funcionar con gas
natural y no se pueden
convertir para funcionar
con gas licuado.**

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Unit Dimensions - mm

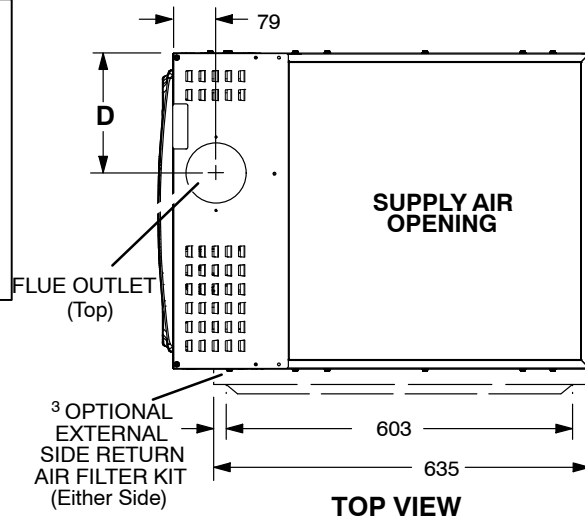
¹NOTE - 60C and 60D units that require air volumes over 1800 cfm (850 L/s) must have one of the following:

1. Single side return air with transition to accommodate 508 x 635 x 25 mm cleanable air filter. (Required to maintain proper air velocity.)
2. Single side return with optional return air base.
3. Bottom return air.
4. Return air from both sides.
5. Bottom and one side return air.

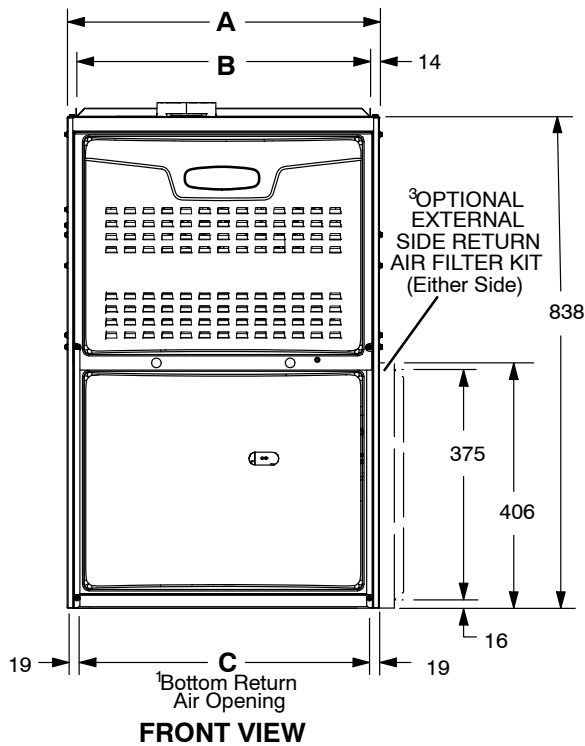
See Blower Performance Tables for additional information.

²Flue outlet may be horizontal but furnace must be vented vertically

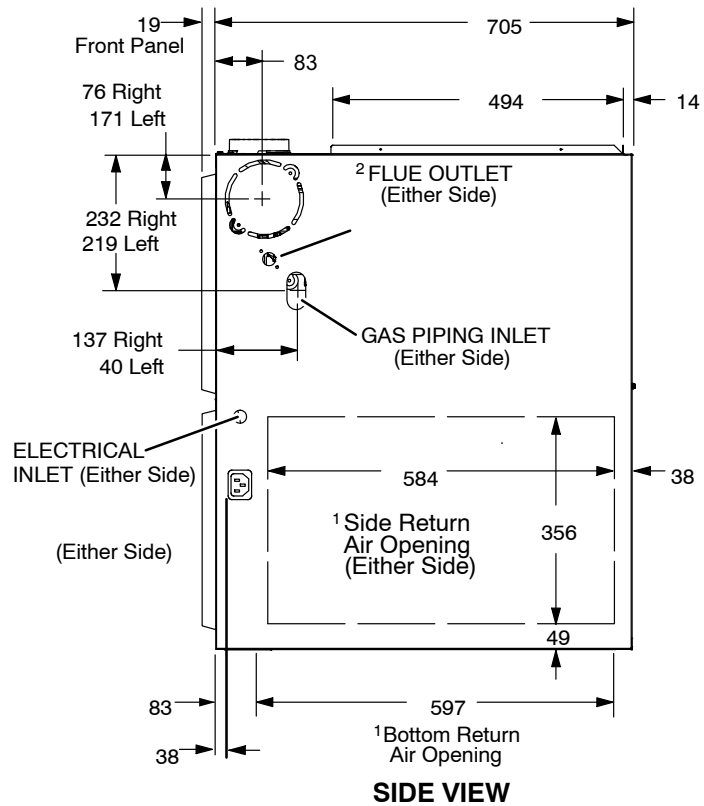
³Optional external side return air filter kit cannot be used with the optional RAB Return Air Base.



TOP VIEW



FRONT VIEW



SIDE VIEW

ML180UHT Model No.	A	B	C	D
	mm	mm	mm	mm
070TP36A	368	340	330	121
090TP48B	446	416	406	159
110TP36C 110TP60C	533	504	495	203
135TP60D	622	546	584	248

ML180UHT Gas Furnace

The ML180UHT 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). 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 with bottom return air.

Shipping and Packing List

Package 1 of 1 contains

- 1 - Assembled ML180UHT 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

The following items may be ordered separately:

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

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

Requirements

The ML180UHT furnace is approved for installation for inside of building only, with clearances as listed in figure 6. (Accessibility and service clearances must take precedence over fire protection clearances). Installation of Lennox forced air central furnaces must be in accordance with these instructions, local gas fitting regulations, municipal building codes and electrical wiring regulations

The acceptable natural gas Wobbe number values for use with Lennox furnaces are shown in Table 1.

TABLE 1

Wobbe Number*	Min	Normal	Max
	46.95 mj / m ³ (1260 Btu / ft ³)	50.15 mj / m ³ (1346 Btu / ft ³)	53.28 mj / m ³ (1430 Btu / ft ³)
Gas Properties 101.3 kPa, 15° C Dry bulb (14.73 psia, 60° F Dry Bulb)			

* Wobbe number = heating value ÷ square root of specific gravity

If you need to know whether a gas is acceptable, request the Wobbe number from your gas supplier and compare to the chart. If the number is within the ranges listed for Natural gas, the gas is acceptable to use. If the Wobbe number is outside the acceptable ranges, the gas is not acceptable to use.

As LP (Propane) is a regulated/manufactured gas, a Wobbe number is not required to determine acceptability. For propane installations, the acceptable heating value range is 93.2 mj / m³ (2500 btu/ft³) +/- 5%.

NOTE - Lennox does not recommend using unrefined or "well head" gas on Lennox gas-fired furnaces. The quality of gas is not controlled and may have contaminants which may lead to corrosion, premature heat exchanger failure or may void the equipment warranty. The information provided above is intended for evaluating fuel gases available commercially through gas utilities or LP (propane) suppliers.

Adequate clearance must be made around the air openings into the vestibule area. Provisions shall be made for proper operation and for combustion air and ventilation air supply according to local codes or these instructions.

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

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 457 mm (18 in) 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 local codes.

Unit must be adjusted to obtain a temperature rise within the range specified on appliance rating plate.

This ML180UHT furnace must be installed so that its electrical components are protected from water.

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. 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.

When installed, this furnace must be electrically grounded according to local codes.

All field wiring must comply with local codes or what is listed in these instructions.

When furnace is installed so that supply ducts carry air circulated by furnace to areas outside of space containing furnace, return air shall be handled by a duct(s) sealed to a furnace casing and terminating outside space containing furnace.

NOTE - ML180UHT series units must not be used as a "construction heater" during any phase of construction. Very low temperatures, harmful vapors and misplacement of the filters will damage the unit and its efficiency.

The ML180UHT furnace may be installed in alcoves, closets, attics, basements, garages, crawl spaces and utility rooms in any of its approved installation positions.

This furnace design has not been approved for installation in mobile homes, recreational vehicles, or outdoors.

⚠ 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.

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 ML180UHT 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.

⚠ WARNING

The State of California has determined that this product may contain or produce a chemical or chemicals, in very low doses, which may cause serious illness or death. It may also cause cancer, birth defects or reproductive harm.

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.

⚠ 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 1.42 m³ (50 cubic feet) per .29 kW (1,000 Btu) 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 outside section.

Confined Space

A confined space is an area with a volume less than 1.42 m³ (50 cubic feet) per .29 kW (1,000 Btu) 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.

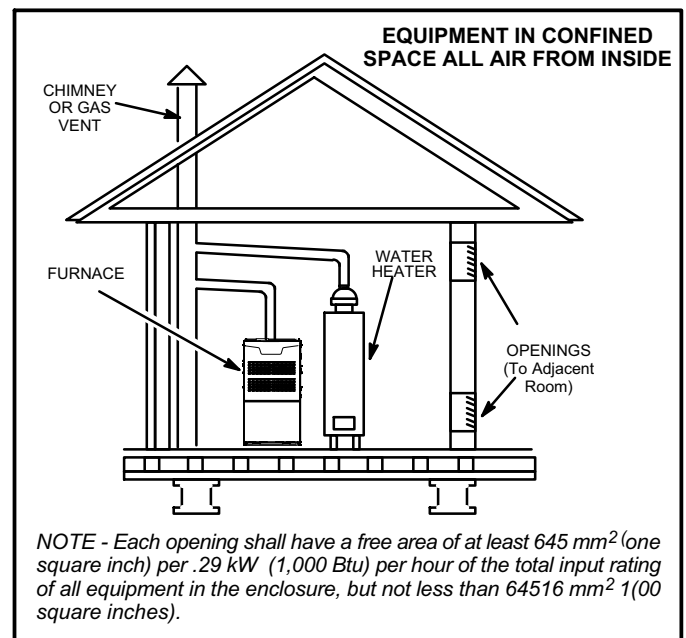


FIGURE 1

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 645 mm² (1 square inch) per .29 kW (1,000 Btu) per hour of total input rating of all gas-fired equipment in the confined space. Each opening must be at least 64516 mm² (100 square inches). One opening shall be within 305 mm (12 inches) of the top of the enclosure and one opening within 305 mm (12 inches) of the bottom. See figure 1.

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 305 mm (12 inches) of the

top of the enclosure and one opening within 305 mm (12 inches) 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 645 mm² (1 square inch) per 1.17 kW (4,000 Btu) per hour of total input rating of all equipment in the enclosure. See figures 2 and 3. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 645 mm² (1 square inch) per .56 kW (2,000 Btu) per total input rating of all equipment in the enclosure. See figure 4.

When ducts are used, they shall be of the same cross-section

as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 75 mm (3 inches). 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.

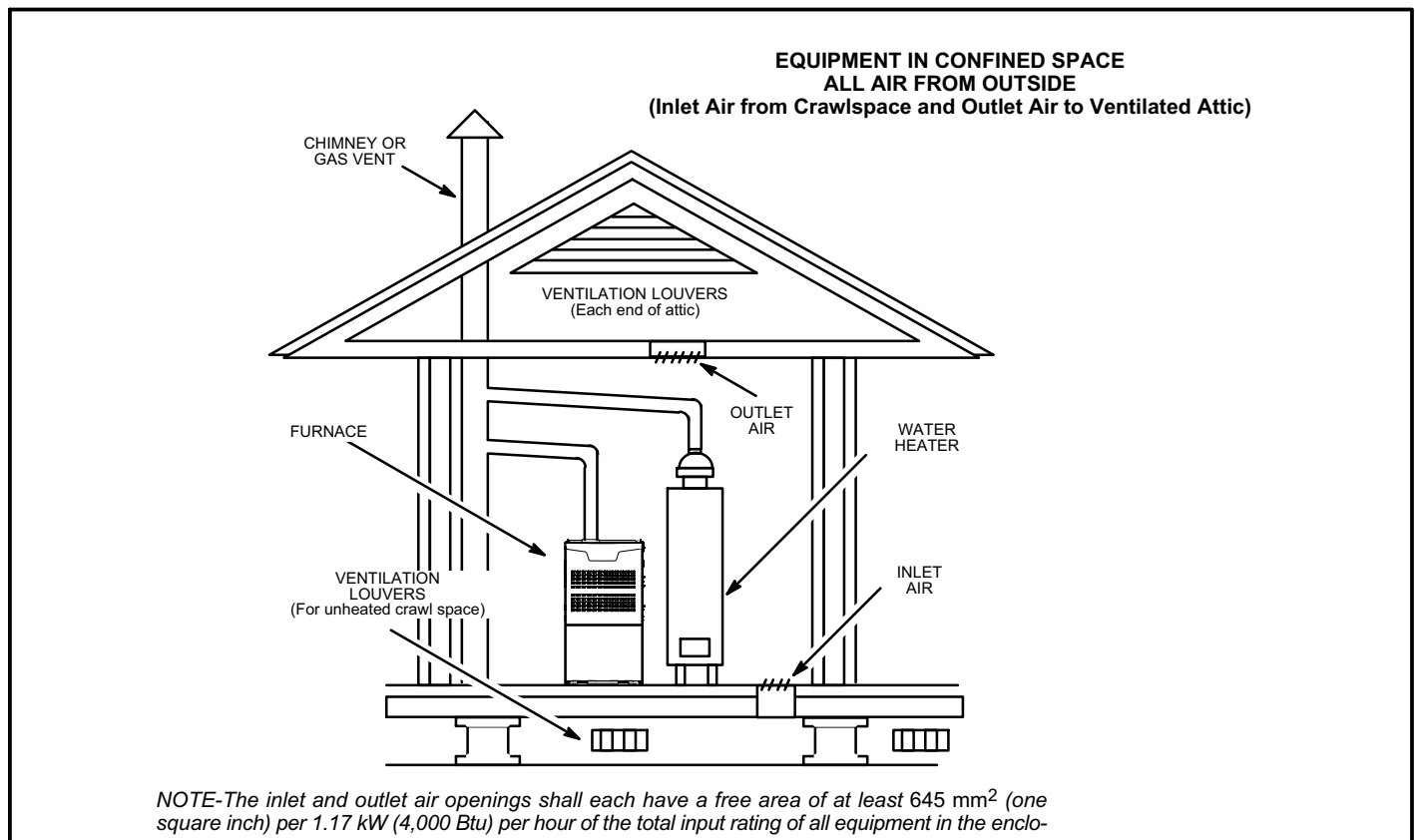


FIGURE 2

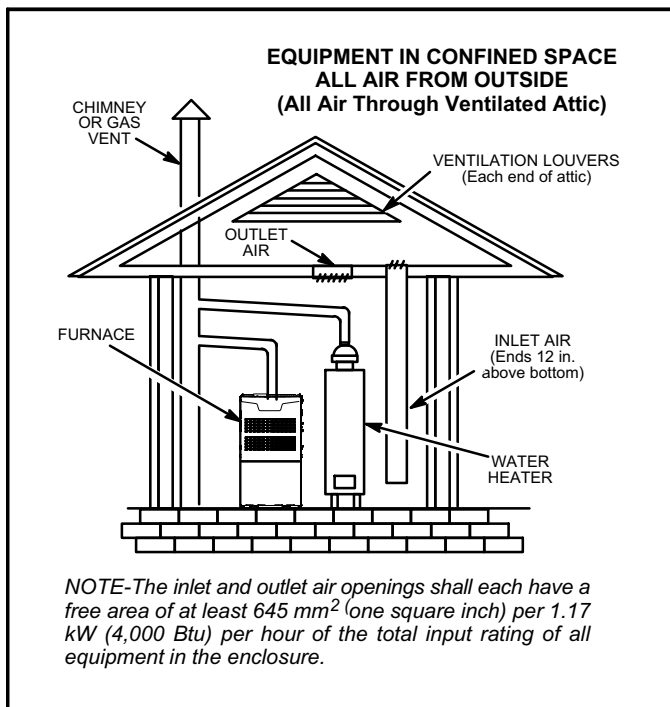


FIGURE 3

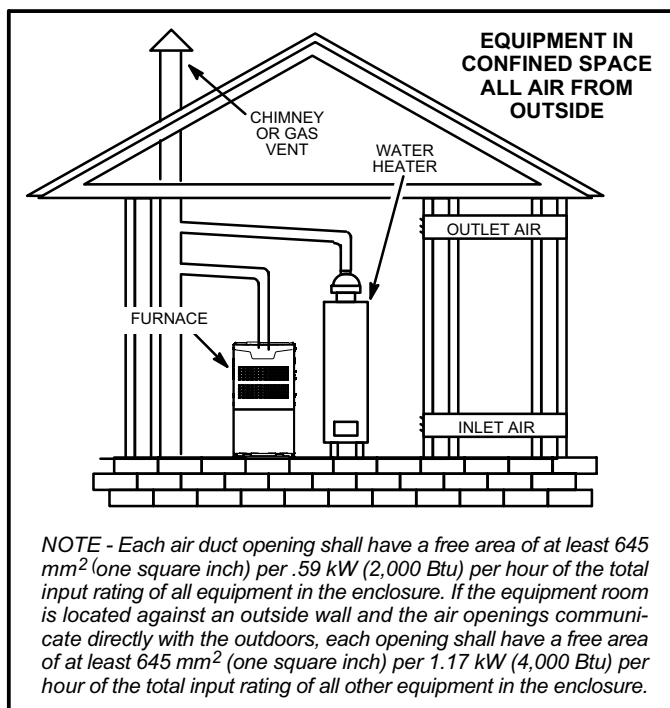


FIGURE 4

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.

NOTE - As an option, rubberlike pads defined as having an elastic texture resembling rubber in flexibility or toughness, may be placed under each corner of the furnace as appropriate to the application.

The ML180UHT 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 [610 mm (24 inches)] at unit front. *The unit must be level.*

NOTE - Units with 1/2 hp blower motors (ML180UH110TP36C and ML180UH090TP48B) are equipped with three flexible legs and one rigid leg. See figure 5. 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.

NOTE - ML180UH090TP48B, & ML180UH110TP36C are also equipped with a shipping pad under the blower housing. Remove the shipping pad prior to operation.

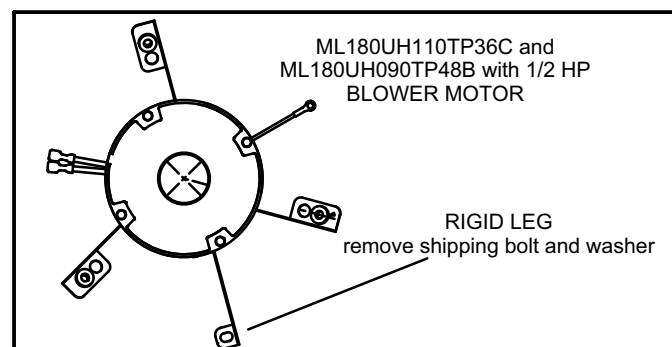


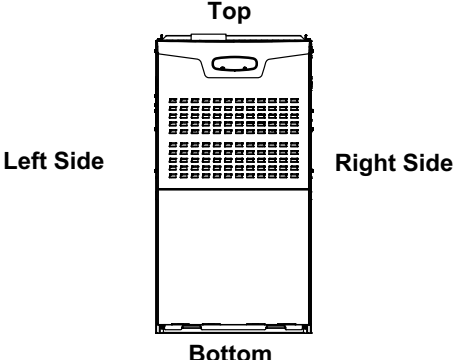
FIGURE 5

⚠ 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.

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 6.

Upflow Application Installation Clearances		
		
Type of Vent Connector	Type C	Type B1
Top	25 mm (in.)	25 mm (1 in.)
*Front	57 mm (2-1/4 in)**	57 mm (2-1/4 in.)
Back	0	0
Sides	0†	0
Vent	152 mm (6 in.)	25 mm (1 in.)
Floor	0‡	0‡

*Front clearance in alcove installation must be 610 mm (24 in.). Maintain a minimum of 610 (24 in.) mm for front service access.
 ** 114 mm (4-1/2 in.) if single wall vent pipe is used.
 †For installation on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.
 ‡Left side requires 76 mm (3 in.) if a single wall vent is used on 368 mm (14-1/2 in.) cabinets, or 51 mm (2 in.) if a single wall vent pipe is used on 445 mm (17-1/2 in.) cabinets.

FIGURE 6

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 850 L/s (1800cfm) must have one of the following:

- 1 - Single side return air with transition to accommodate 508 x 635 x 25 mm (20 x 25 x 1 in.) cleanable air filter. (Required to maintain proper air velocity.) See figure 7.
- 2 - Single side return air with optional return airbase. See figure 8.
- 3 - Bottom return air.
- 4 - Return air from both sides.
- 5 - Bottom and one side return air.

Refer to Product Specifications bulletin for additional information.

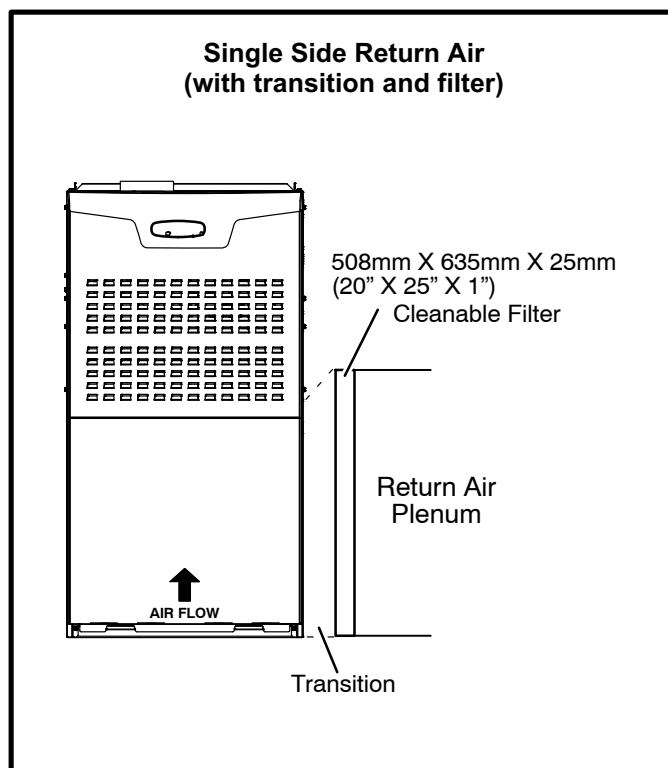
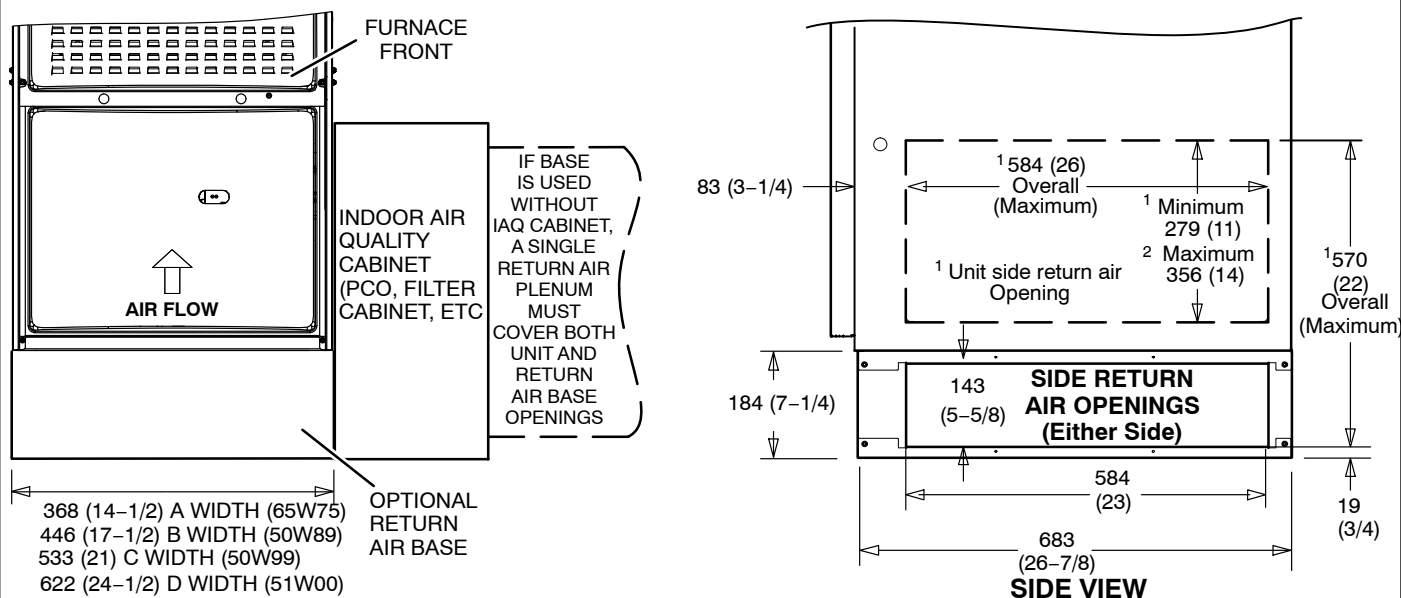


FIGURE 7

**Optional Return Air Base
(Upflow Applications Only -- For use with A, B, C and D cabinets)**



NOTE- Optional Side Return Air Filter Kits are not for use with Optional Return Air Base.

¹ Both the unit return air opening and the base return air opening must be covered by a single plenum or IAQ cabinet.

Minimum unit side return air opening dimensions for units requiring 850 L/s (1800 cfm) or more of air (W x H): 584 x 279 mm. (23 X 11 in.)

The opening can be cut as needed to accommodate plenum or IAQ cabinet while maintaining dimensions shown.

Side return air openings must be cut in the field. There are cutting guides stenciled on the cabinet for the side return air opening. The size of the opening must not extend beyond the markings on the furnace cabinet.

² To minimize pressure drop, the largest opening height possible [up to 356 mm (14 in.)] is preferred.

FIGURE 8

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 9.

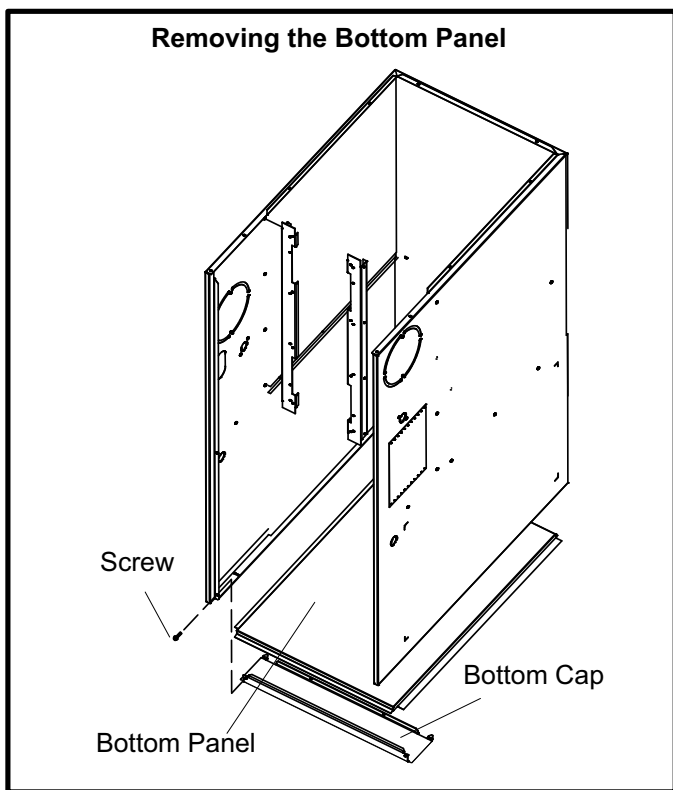
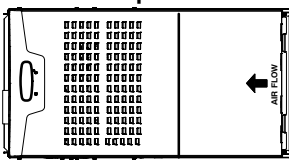


FIGURE 9

Horizontal Application Installation Clearances Top		
Left End		Right End
Bottom		
Vent Connector Type	Type C	Type B1
Top	0	0
*Front	57 mm (2-1/4 in.)**	57 mm (2-1/4 in.)
Back	0	0
Ends	51 mm (2 in.)	51 mm (2 in.)
Vent	152 mm (6 in.)	25 mm (1 in.)
Floor	0‡	0‡

*Front clearance in alcove installation must be 610 mm (24 in) Maintain a minimum of 610 mm (24 in.) for front service access.
 ** 114 mm (4-1/2 in.) if singlewall vent pipe is used.
 ‡For installations on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

FIGURE 10

Horizontal Applications

The ML180UHT 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 10.

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 11, or install the furnace on a platform, as shown in figure 12.

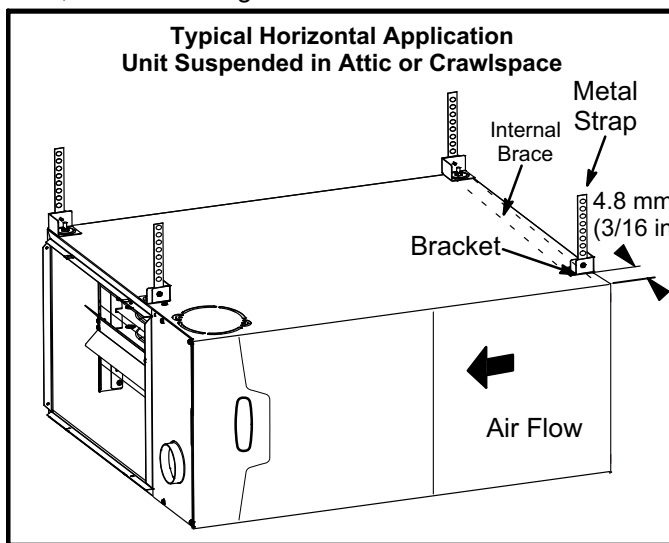


FIGURE 11

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 9.

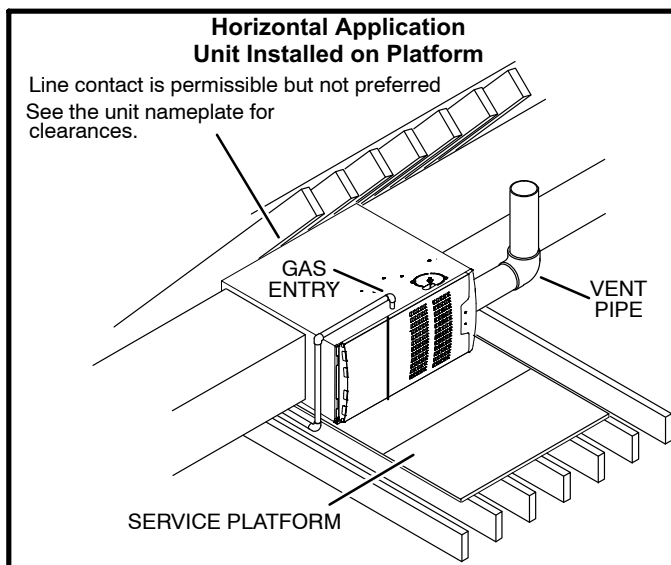


FIGURE 12

⚠ 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 2 lists recommended filter sizes.

A filter must be in place any time the unit is operating.

TABLE 2

Furnace Cabinet Width	Filter Size mm (in) and Quantity	
	Side Return	Bottom Return
A - 338 (14-1/2")	406 X 635 X 25 1 (16 X 25 X 1)	356 X 635 X 25 1 (14 X 25 X 1)
B - 446 (17-1/2")	406 X 635 X 25 1 (16 X 25 X 1)	406 X 635 X 25 1 (16 X 25 X 1)
C - 533 (21")	405 X 635 X 25 1 (16 X 25 X 1)	508 X 635 X 25 1 (20 X 25 X 1)
D - 622 (24-1/2")	405 X 635 X 25 2 (16 X 25 X 1)	610 X 635 X 25 1 (24 X 25 X 1)

Duct System

Use industry-approved standards to size and install the supply and return air duct system. 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.

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.

Venting

The ML180UHT is a fan assisted furnace equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber and/or heat exchanger. When installed in the vertical position and vented vertically, the furnace operates with a non-positive vent stack pressure. When installed in the horizontal position and vented vertically, the furnace operates with a positive stack pressure.

⚠ IMPORTANT

The ML180UHT is certified for horizontal installation but **DO NOT** vent flue horizontally. The ML180UHT furnace is not certified for horizontal venting. See figure 21.

General Venting Requirements

A 102 mm (4 in.) diameter flue transition is factory-installed on the combustion air inducer outlet of all models. **Figure 14 shows the combustion air inducer as shipped from the factory.**

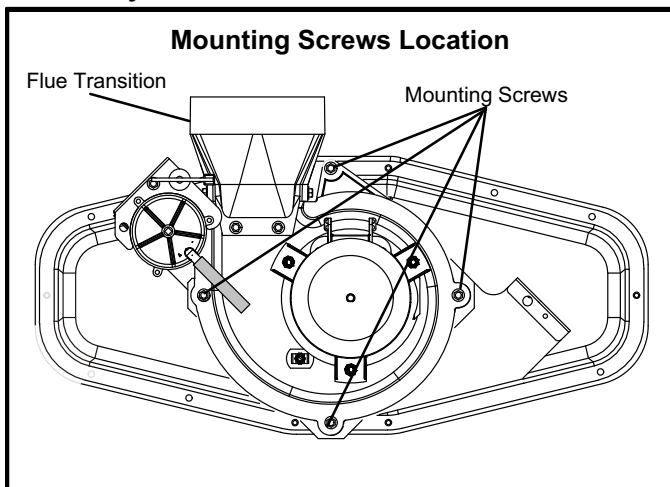


FIGURE 13

If necessary, reposition the combustion air inducer, pressure switch and/or make-up box as needed per the following steps. See figures 14 through 20.

- 1 - Remove the four mounting screws (figure 13) which secure the combustion air inducer / pressure switch assembly to the orifice plate. Lift the inducer assembly and rotate it 90 degrees clockwise or counterclockwise to either the 3 o'clock position or to 9 o'clock position. Re-secure 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.

Upflow Position

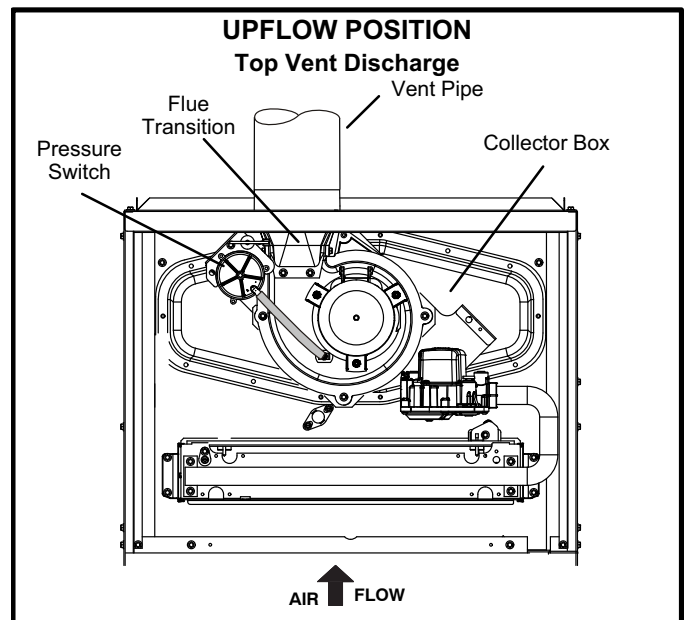


FIGURE 14

⚠ 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.

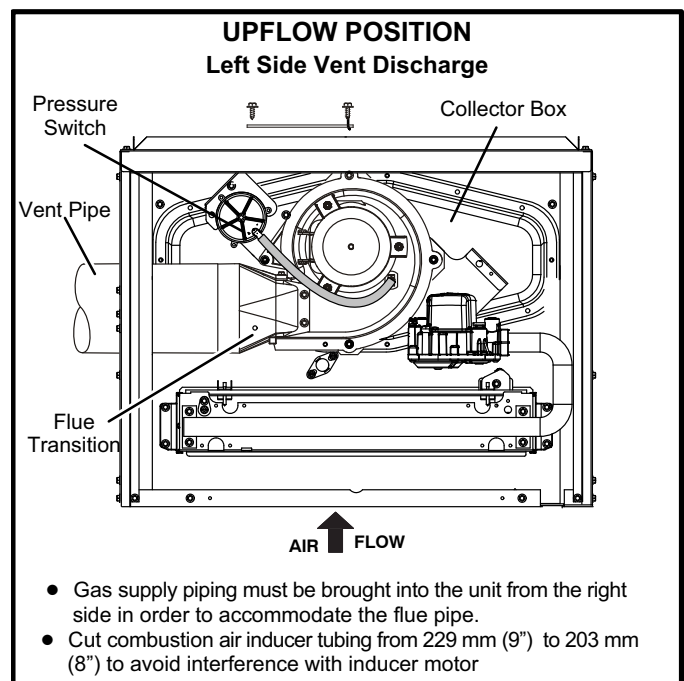


FIGURE 15

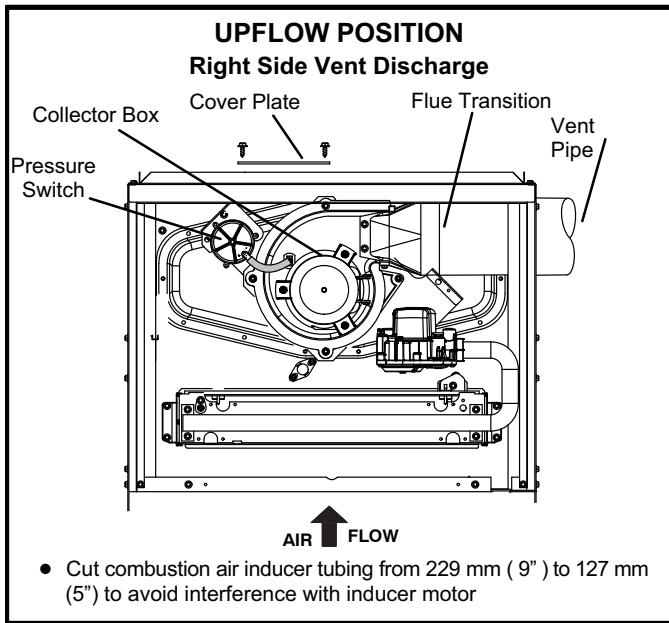


FIGURE 16

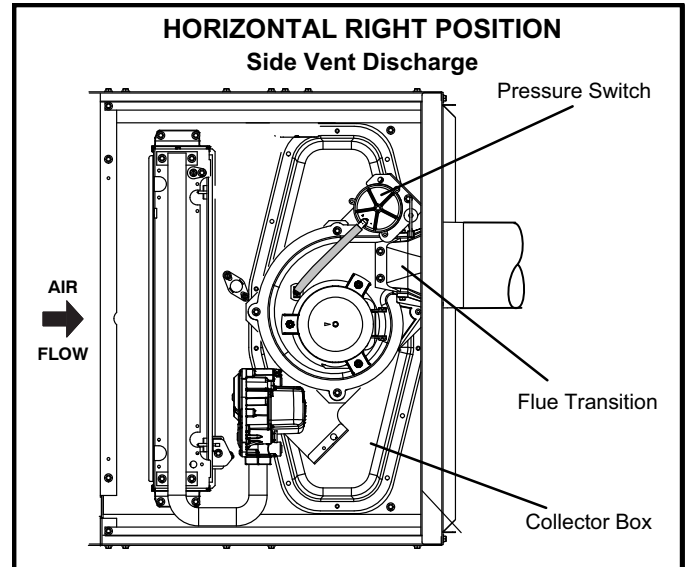


FIGURE 18

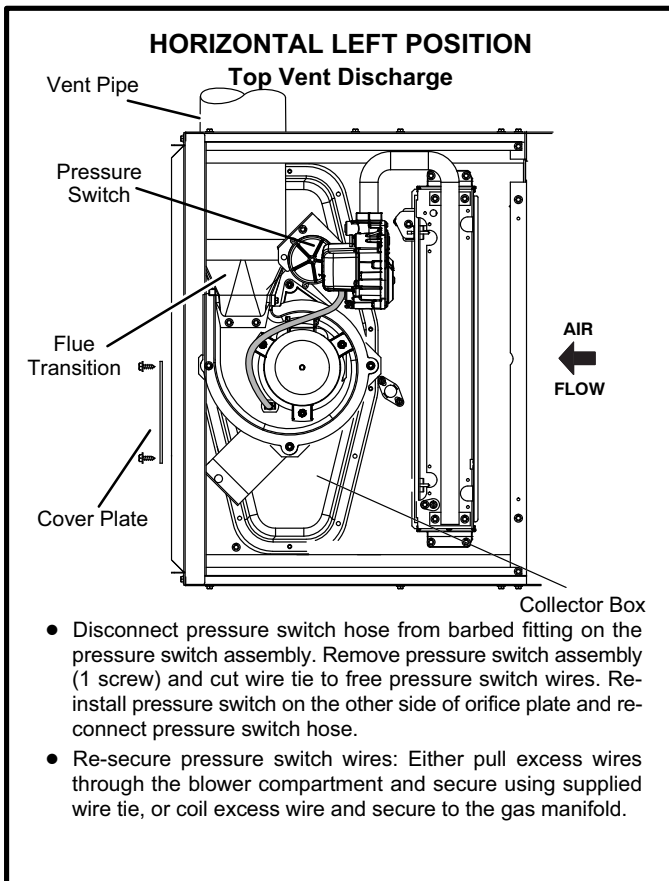


FIGURE 17

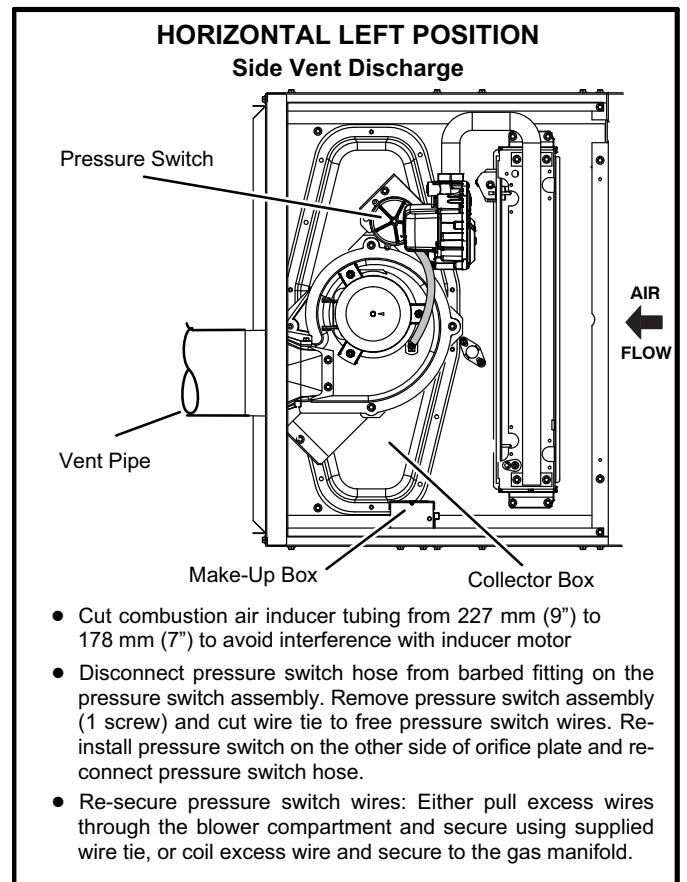


FIGURE 19

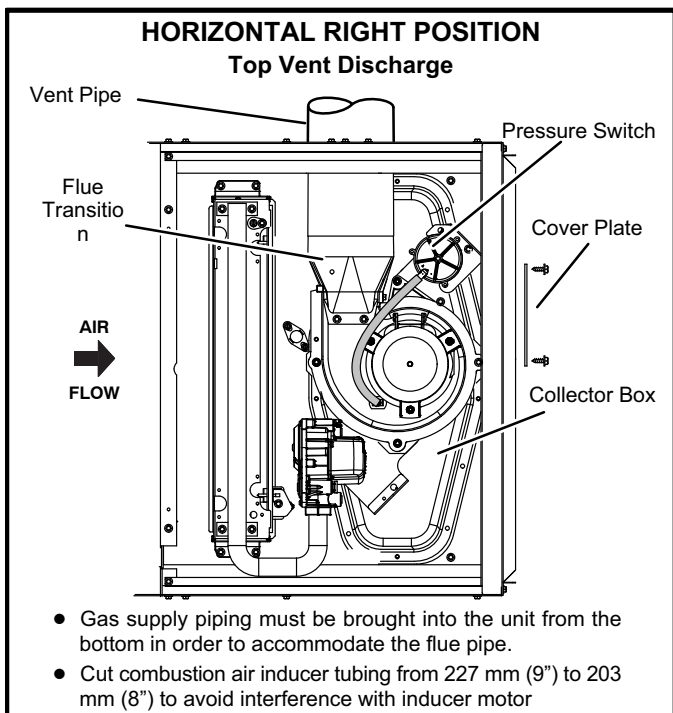


FIGURE 20

The ML180UHT 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 ML180UHT 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 NFGC serves as the defining document.

Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

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 21.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet. See figure 21.

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 figures 22 and 23 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 22.

⚠ 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 21. 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.

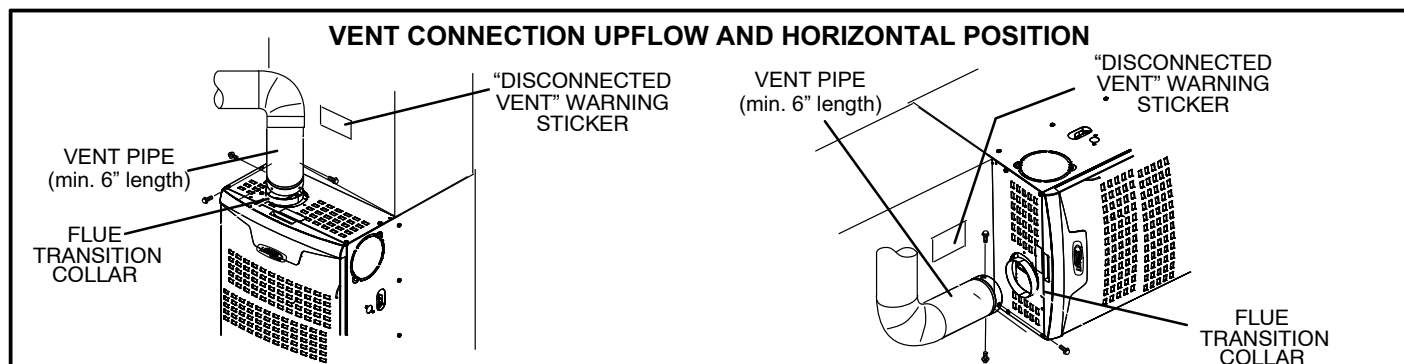


FIGURE 21

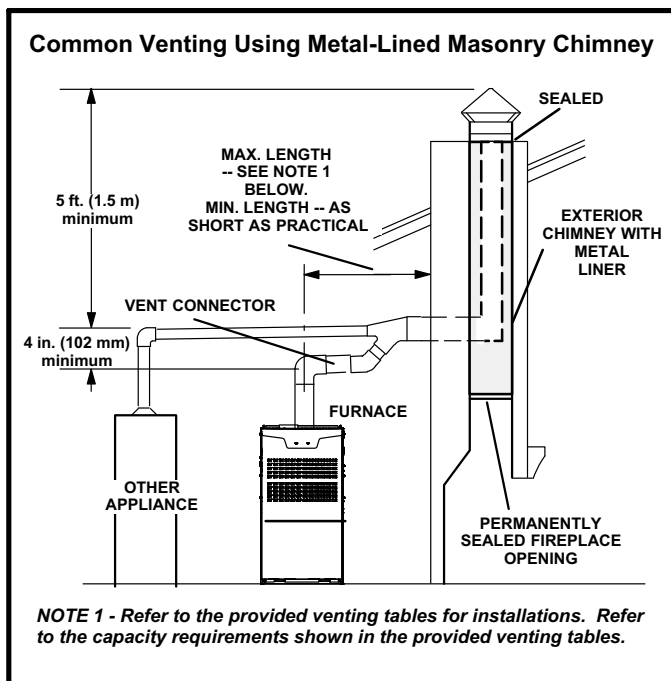


FIGURE 22

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-hood-equipped 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 ML180UHT 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 ML180UHT 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, draft-hood 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, draft-hood outlet area or flue collar area unless designed according to approved engineering methods.

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

NOTE- Refer to provided venting tables for installations.

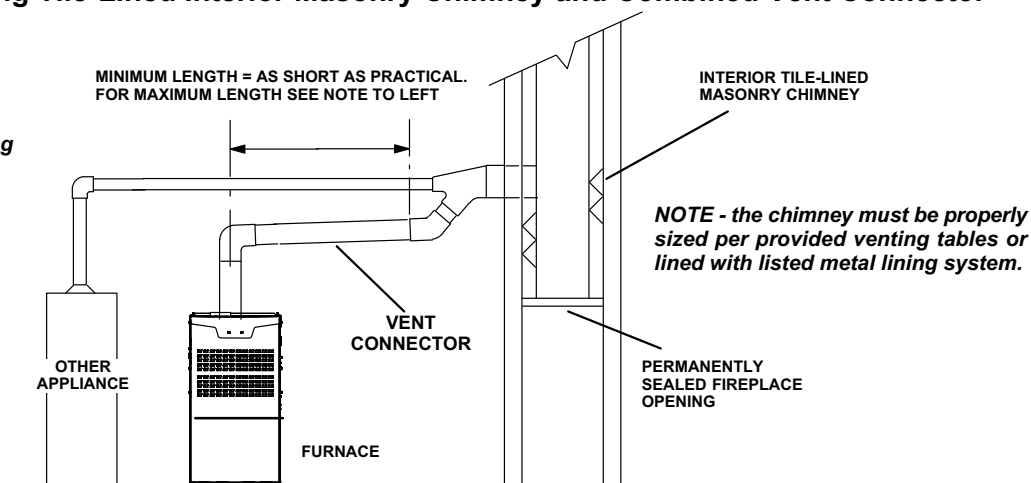


FIGURE 23

- 6 - The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.
- 7 - Single appliance venting configurations with zero lateral lengths (table 4) 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 tables (5 and 6) 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:

Connector Diameter inches (mm)	Maximum Horizontal 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.
- 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 crawl-space, 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 (Z223.1).
- 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 4
Capacity of Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving a Single Category I Appliance

Height H (feet)	Lateral L (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 5
Vent Connector Capacity
Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Connector Rise R (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	22	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 6
Common Vent Capacity
Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 Inch		5 Inch		6 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.

WARNING

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.

Using local codes, resize the common venting system to the minimum vent pipe size.

Gas Piping

See local codes for gas piping requirements and gas pipe sizing tables.

Gas supply piping should not allow more than 125 Pa (0.5"W.C.) drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

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 to the piping assembly.
- 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.
- 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 6.4 mm (1/4 in) per 4.57 m (15 ft.) upward toward the meter from the furnace. The piping must be supported at proper intervals every 2.44 to 3.01 m (8 to 10 ft) with suitable hangers or straps. Install a drip leg in vertical pipe runs to the unit.
- 5 - A 3 mm (1/8") N.P.T. plugged tap or pressure post is located on the gas valve to facilitate test gauge connection. See figure 29.
- 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.

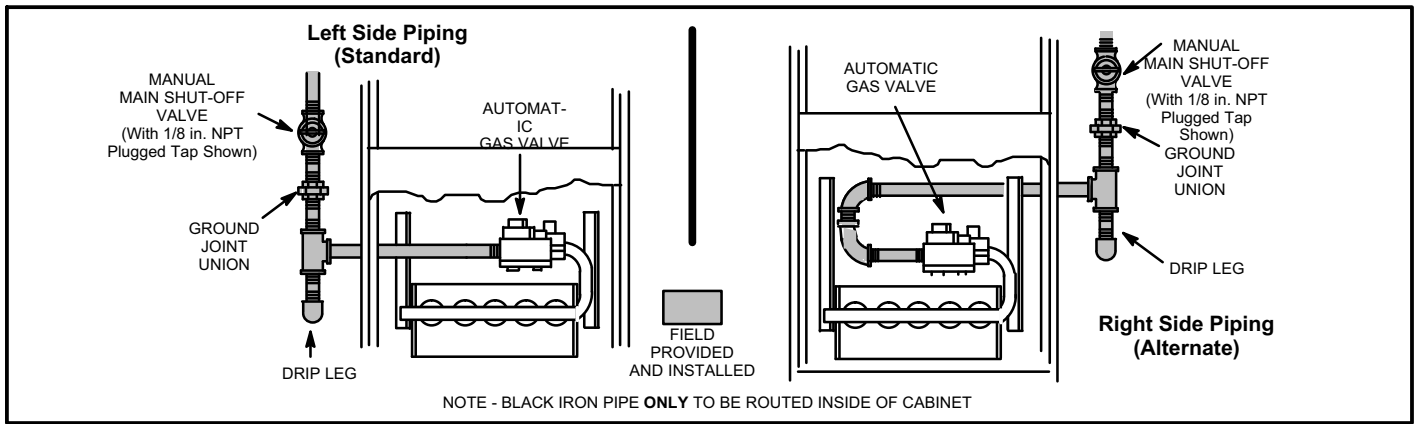


FIGURE 24

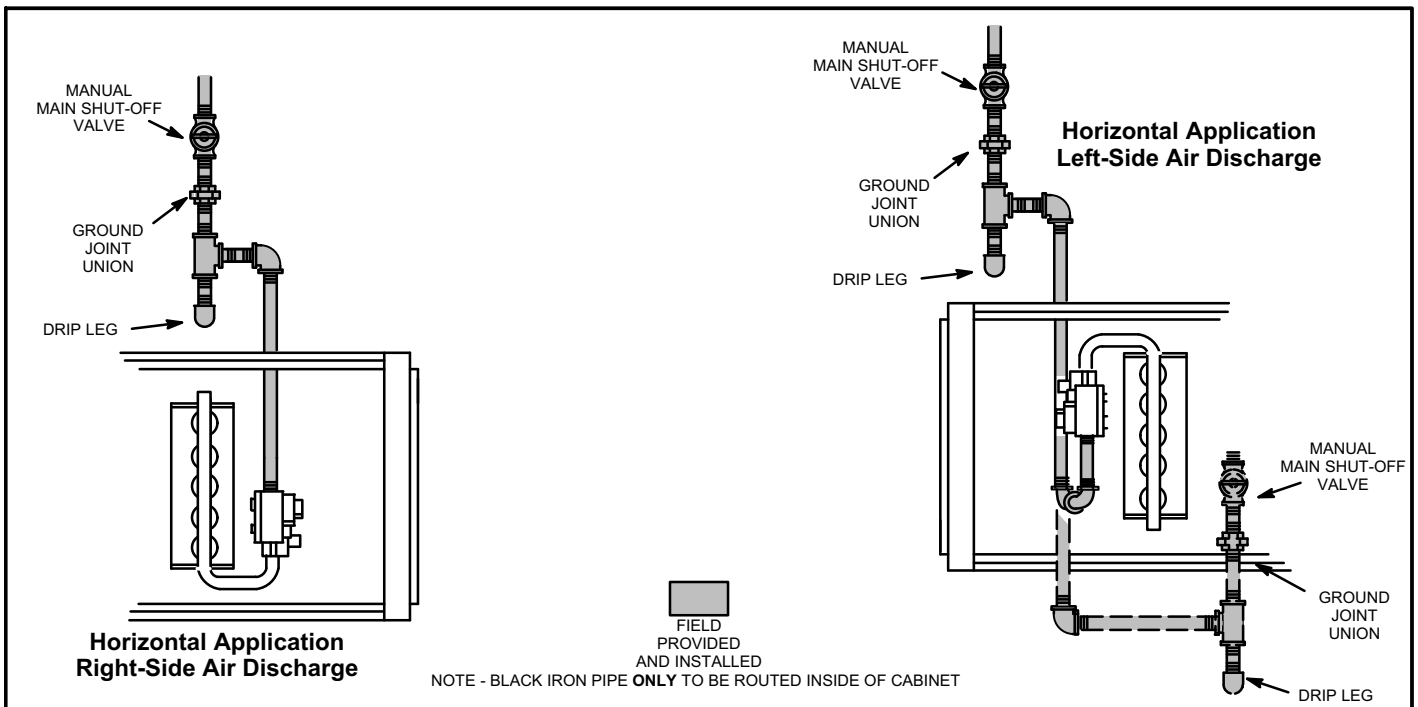


FIGURE 25

Leak Check

After gas piping is completed, carefully check all piping connections (factory- and field-installed) for gas leaks. Use a leak detecting solution or other preferred means.

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 by closing its individual manual shut-off valve and disconnecting from the gas supply system during any pressure testing of the gas supply system at pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See figure 26. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

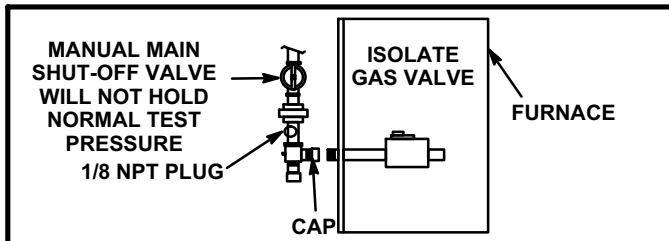


FIGURE 26

Electrical

⚠ 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.

Refer to figure 28 schematic wiring diagram.

- 1 - Ensure that power connection point is located with 2m of furnace.
- 2 - Holes are on both sides of the furnace cabinet to facilitate thermostat wiring.

- 3 - Before connecting the thermostat wiring, check to make sure the wires will be long enough for servicing at a later date. Remove the blower access panel to check the length of the wire.
- 4 - Complete the wiring connections to the equipment. Use the provided unit wiring diagram shown in figure 28. 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.
- 5 - Electrically ground the unit according to local codes.
NOTE - The ML180UHT furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.
- 6 - One line voltage "EAC" spade terminal is provided on the furnace control board. Any electronic air cleaner 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. See figure 27 for control board configuration. This terminal is energized when the indoor blower is operating.
- 7 - One line voltage "HUM" spade terminal is provided on the furnace control board. 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. See figure 27 for control board configuration. This terminal is energized in the heating mode when the combustion air inducer is operating.
- 8 - Install the room thermostat according to the instructions provided with the thermostat. See figure 28 for thermostat designations. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

Indoor Blower Speeds

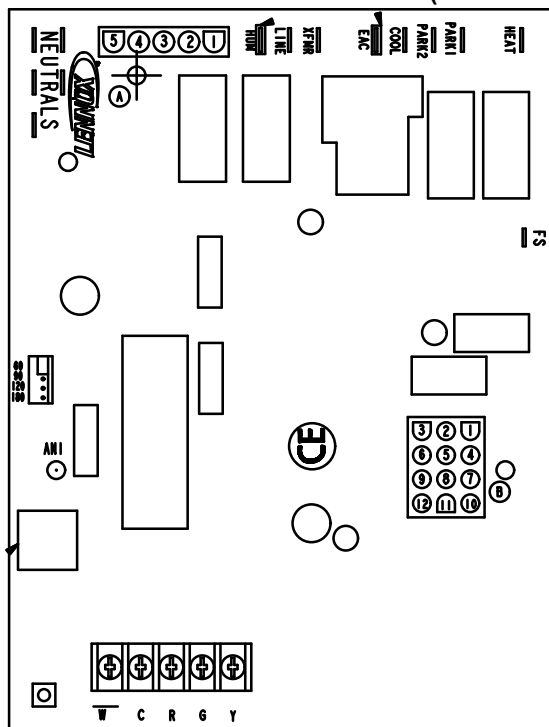
- 1 - When the thermostat is set to "FAN ON," the indoor blower will run continuously on the heating speed when there is no cooling or heating demand.
- 2 - When the ML180UHT is running in the heating mode, the indoor blower will run on the heating speed.
- 3 - When there is a cooling demand, the indoor blower will run on the cooling speed.

Generator Use - Voltage Requirements

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

- The furnace requires 230 volts \pm 10%.
- The furnace operates at 50 Hz \pm 5% .
- 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% THD (total harmonic distortion)

INTEGRATED CONTROL
(Automatic Hot Surface Ignition System)



TERMINAL DESIGNATIONS

HUM - Humidifier 240VAC
 LINE - Input 240VAC
 XFMR - Transformer 240VAC
 EAC - Electronic Air Cleaner 240VAC
 COOL - Cool Speed 240VAC
 PARK1, PARK2 - Dead terminals for alternate speed taps
 NEUTRALS - Neutral terminals 240VAC
 HEAT - Heating Speed 240VAC
 FS - Flame Sense

FIGURE 27

ML180UHT Schematic Wiring Diagram

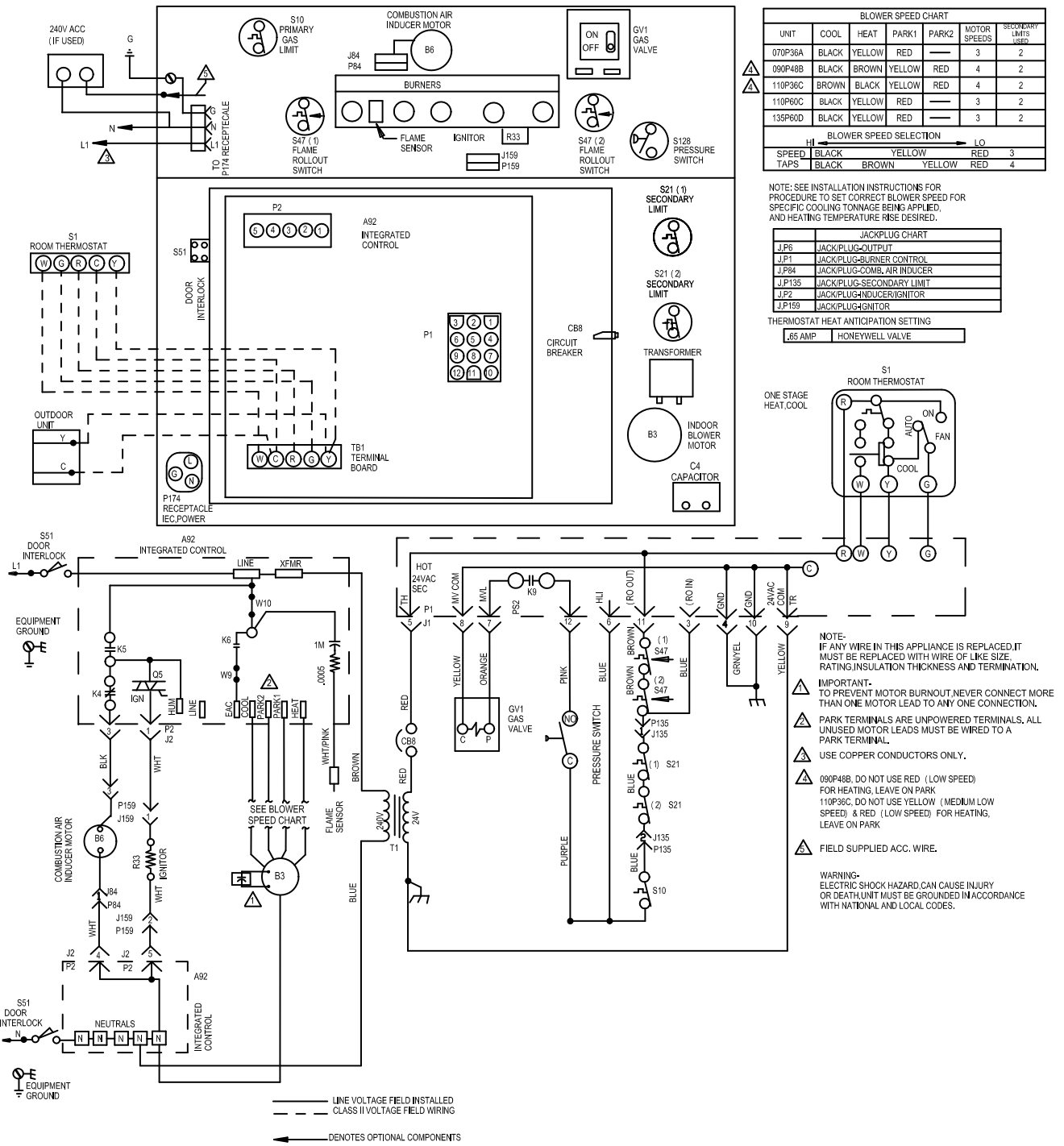


FIGURE 28

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 ML180UHT unit will be 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:

ML180UHT 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

- 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 lever on gas valve to **OFF**. See figure 29.
- 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.

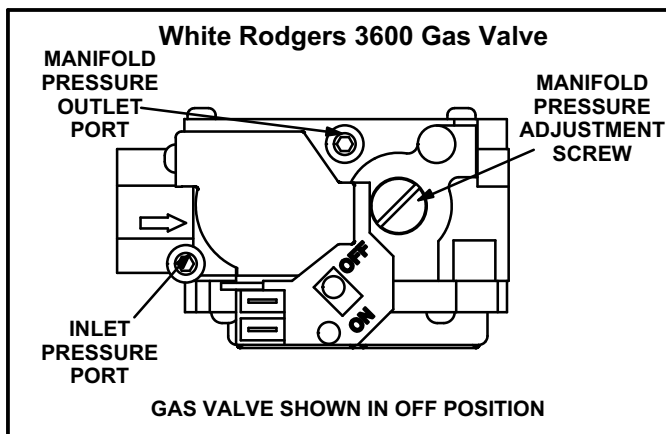


FIGURE 29

- 8 - Move lever on gas valve to **ON**. See figure 29.
- 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 lever on gas valve to **OFF**. See figure 29.
- 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 or see Figure 28 for more detail)

- 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

To check for proper flow to combustion chamber, determine Btu input from appliance rating plate. Divide this input rating by the Btu per cubic foot of available gas. Result is the required number of cubic ft. per hour. Determine the flow of gas through the gas meter for two minutes and multiply by 30 to get the hourly flow of gas.

! IMPORTANT

The White Rodgers 36G24 gas valve (figure 29) is equipped with pressure posts for measuring supply and manifold pressures. The posts provide built-in 7.9mm (5/16") hose connections and have an integral 2.4mm (3/32") Allen-head screw. Rotate the screw counterclockwise one full turn to permit pressure measurement. Reseat the screw (rotate one full turn clockwise) after measurements have been taken to prevent gas leakage.

Use pressure measurement kit 69M1701 to connect 7.9mm (5/16") pressure post on gas valve to 6.4mm (1/4") hose off the manometer.

Line Pressure Measurement

- 1 - Check the gas line pressure with the unit firing at maximum rate. See table 8 for maximum and minimum line pressures.

After the line pressure has been checked and adjusted, check the manifold pressure per table 8. See figure 29 for the location of the manifold pressure adjustment screw.

Manifold Pressure Measurement

- 1 - Connect the outlet side of the gas 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 8.

NOTE - Shut unit off and remove manometer as soon as an accurate reading has been obtained.

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 tables below. **The maximum carbon monoxide reading should not exceed 100 ppm.**

TABLE 7

Unit	CO ₂ % For Nat	CO ₂ % For L.P.
-070	6.3 - 7.8	7.0 - 9.0
-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 8 for manifold pressure and table 9 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 8
Manifold Pressure Settings at all Altitudes

Model Input Size	Gas	0-610 m* (0-2000 ft)	611-914 m* (2001-3000 ft.)	915-1219 m* (3001-4000 ft)	1220-1524 m* (4001-5000 ft.)	1525-1981 m* (5001-6500 ft)	Line Pressure kPa	
							Min	Max
All Models	Nat	0.87	0.72	0.67	0.62	0.87	1.12	3.20
	LP/propane	2.49	2.27	2.19	2.12	2.49	2.74	3.20

* See table 9 for proper high altitude gas conversion kit.

TABLE 9
Pressure Switch and Gas Conversion Kits at all Altitudes

Model Input Size	High Altitude Pressure Switch Kit			High Altitude Natural Gas Burner Orifice Kit	Natural Gas to LP/Propane Gas Change over Kit		LP/Propane to Natural Gas Change over Kit
	0-610 m (0-2000 ft)	611-1219 m (2001-4000 ft)	1220-1981 m (4001-6500 ft)	1525-1981 m (5001-6500 ft)	0-1524 m (0-5000 ft)	1525-1981 m (5001-6500 ft)	1-1524 m (1 5000 ft)
070	No Change	80W51	80W56	73W37	11K15	97W04	96W95
090		80W51	80W56				
110		80W51	80W56				
135		No Change	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

This manually reset switches are located on the top of 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. 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.

Fan Control

The 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 jumper position across the five pins on the integrated control. The unit is shipped with a factory fan-off delay setting of 60 seconds. The fan-off delay affects comfort and is adjustable to satisfy individual applications. Adjust the fan-off delay to achieve a supply air temperature between 32°C and 43°C at the moment that the blower is de-energized. Longer off delay settings provide lower return air temperatures; shorter settings provide higher return air temperatures. See figure 30.

HEAT FAN-OFF TIME IN SECONDS

JUMPER POSITION		HEAT OFF DELAY
PIN1	PIN2	60
PIN2	PIN3	90
PIN3	PIN4	120
PIN4	PIN5	180
NO JUMPER		180

To adjust fan-off timing, reposition jumper across pins to achieve desired setting.

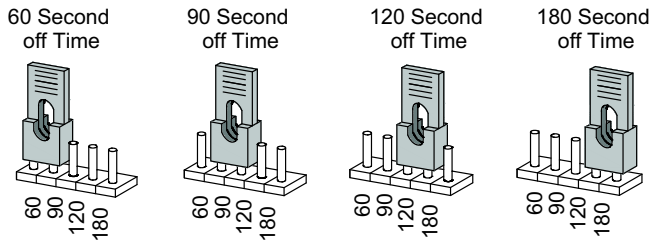


FIGURE 30

NOTE - Do not secure the electrical conduit directly to the air ducts or structure.

Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check for the correct voltage at the furnace (furnace operating). Correct voltage is 230VAC \pm 10%.
- 3 - Check amp-draw on the blower motor with inner blower panel in place.

Unit Nameplate _____ Actual _____

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.

See unit *Product Specifications bulletin* for indoor blower data.

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 Blower performance data beginning on the next page.
- 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 break 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.

At the beginning of each heating season, a qualified technician should check the system as follows:

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 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

All ML180UHT filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure that the furnace operates properly. Replacement filters must be rated for high velocity airflow. Table 2 lists recommended filter sizes.

Flue And Chimney

- 1 - Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage.
- 2 - Check unit for proper draft.

Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check for the correct voltage at the furnace (furnace operating). Correct voltage is 230VAC \pm 10%.
- 3 - Check amp-draw on the blower motor with inner blower panel in place.

Unit Nameplate _____ Actual _____

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 block-

age caused by foreign matter. Remove any blockage. Figure 31 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.

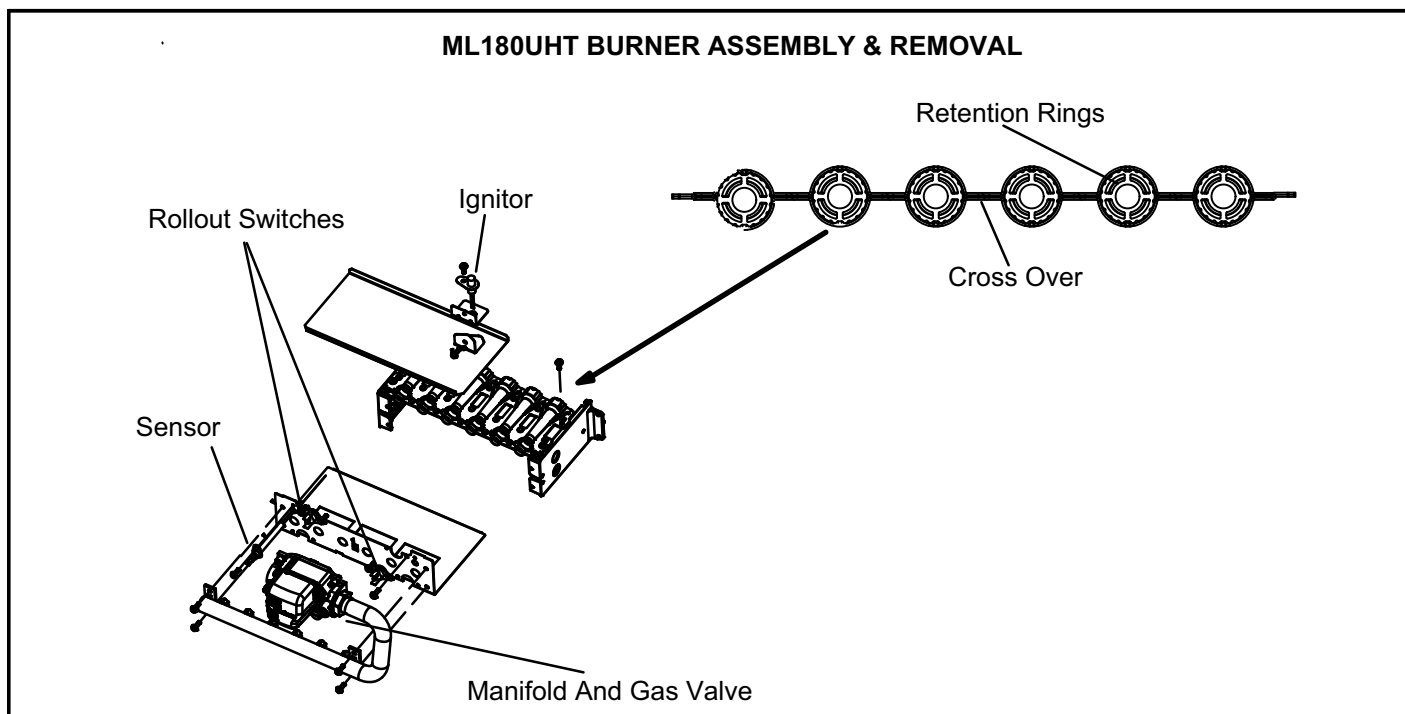


FIGURE 31

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: ML180UH070TP36A-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 capacitor
- 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