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Dallas, Texas USA



# INSTALLATION INSTRUCTIONS EL196UHE

ELITE® SERIES GAS FURNACE  
UPFLOW / HORIZONTAL AIR DISCHARGE

507764-05  
04/2020  
Supersedes 507764-04



**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, 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.

## **!** 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.

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**Unit Dimensions - inches (mm)**

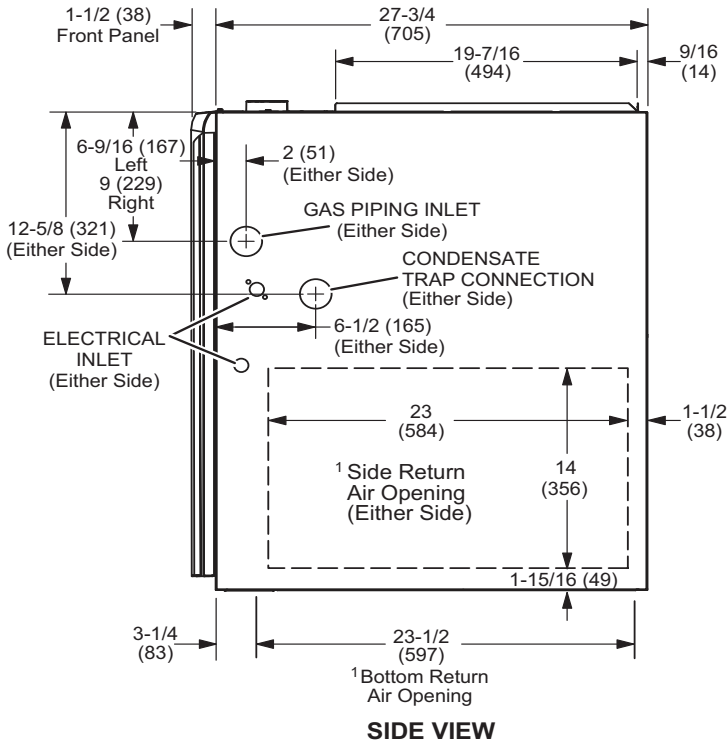
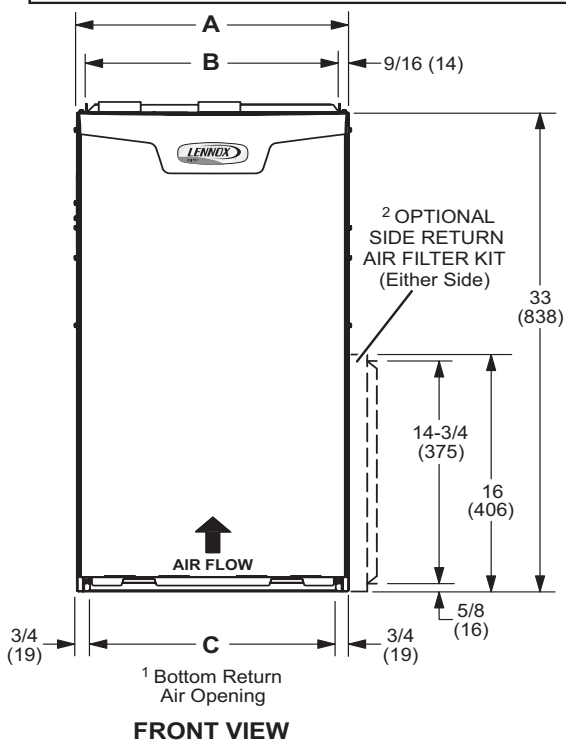
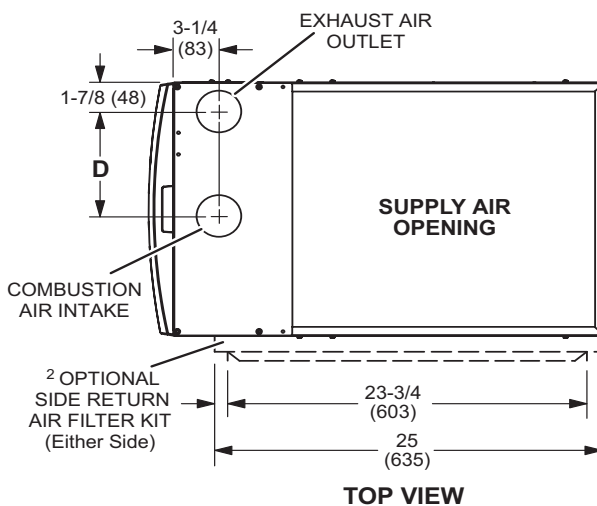
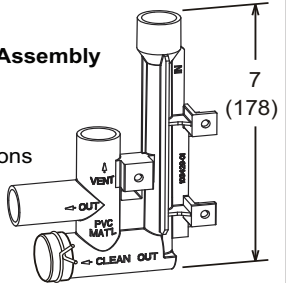
<sup>1</sup> NOTE - 60C and 60D size units that require air volumes over 1800 cfm must have one of the following:

1. Single side return air and Optional Return Air Base with transition that must accommodate required 20 x 25 x 1 inch (508 x 635 x 25 mm) air filter to maintain proper 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> Optional Side Return Air Filter Kit is not for use with the Optional Return Air Base.

**Flue Condensate Trap Assembly**

Furnished for external field installation on either side of unit. (See installation instructions for additional information.)



Model No.	A in - mm	B in - mm	C in - mm	D in - mm
EL196UH030XE36B EL196UH045XE36B EL196UH070XE36B	17-1/2 - 446	16-3/8 - 416	16 - 406	7-5/8 - 194
EL196UH090XE48C EL196UH110XE60C	21 - 533	19-7/8 - 505	19-1/2 - 495	9-3/8 - 238

## EL196UHE Gas Furnace

The EL196UHE Category IV gas furnace is shipped ready for installation in the upflow or horizontal position. The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in horizontal panel or upflow applications with bottom return air.

**The EL196UHE can be installed as either a Direct Vent or a Non-Direct Vent gas central furnace.**

The furnace is equipped for installation in natural gas applications. A conversion kit (ordered separately) is required for use in propane/LP gas applications.

**NOTE** - In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors. In Non-Direct Vent installations, combustion air is taken from indoors or ventilated attic or crawlspace and flue gases are discharged outdoors. See Figure 1 and Figure 2 for applications involving roof termination.

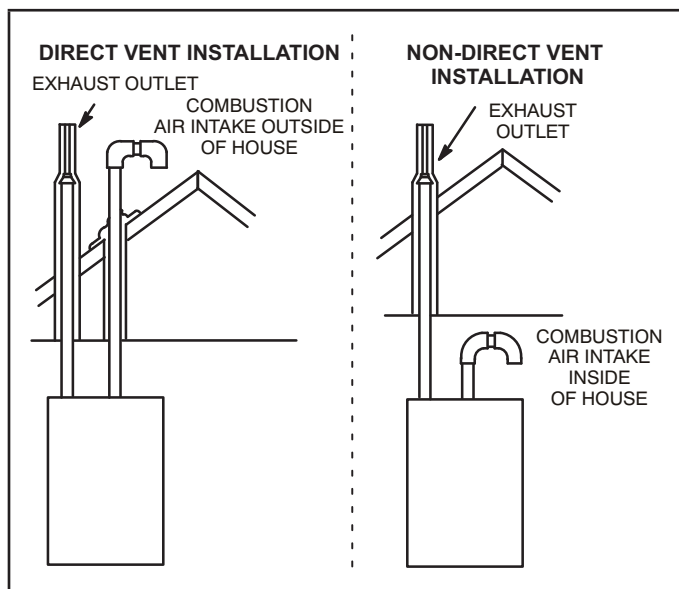


Figure 1

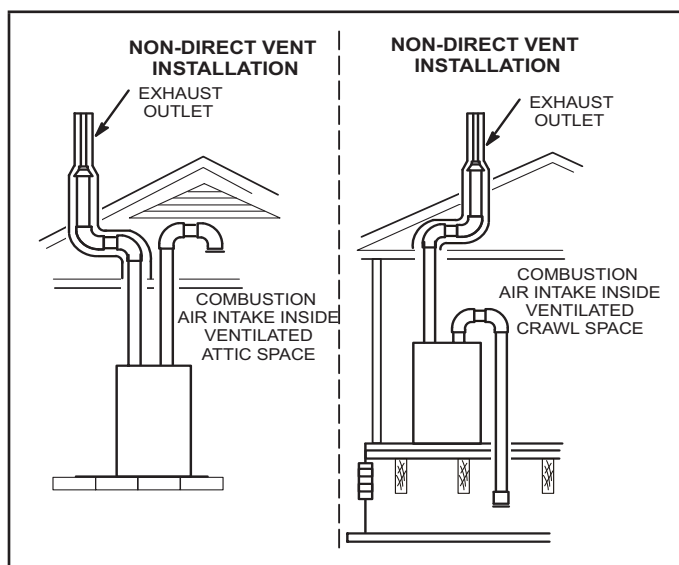


Figure 2

## Shipping and Packing List

### Package 1 of 1 contains

- 1 - Assembled EL196UHE unit
  - 1 - Bag assembly containing the following:
    - 1 - Snap bushing
    - 1 - 1/2" diameter threaded street elbow
    - 1 - Snap plug
    - 1 - Wire tie
    - 1 - Condensate trap
    - 1 - Condensate trap cap
    - 1 - Condensate trap clamp
    - 1 - 2" diameter debris screen
    - 1 - 3/4" Threaded street elbow

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

The following items may also be ordered separately:

- 1 - Thermostat
- 1 - LP/Propane changeover kit
- 1 - Return air base kit
- 1 - Horizontal suspension kit
- 1 - High altitude pressure switch

## Safety Information

### ⚠ 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.

### ⚠ CAUTION

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

### ⚠ 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.

Use only the type of gas approved for use with this furnace. Refer to unit nameplate.

EL196UHE units are CSA International certified to ANSI Z21.47 and CSA 2.3 standards.

### Building Codes

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/NFPA 54). The National Fuel Gas Code is available from the following address:

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

In Canada, installation must conform with current National Standard of Canada CSA-B149 Natural Gas and Propane Installation Codes, local plumbing or waste water codes and other applicable local codes.

In order to ensure proper unit operation in non-direct vent applications, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code or CSA-B149 standard.

### Installation Locations

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the table in figure 12. 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.**

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 or CSA B149 standards.

**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 premature heat exchanger failure.**

This EL196UHE 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 coils (Figure 3), it shall be installed in parallel with, or on the upstream side of, cooling coils 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. 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

In Canada, all electrical wiring and grounding for the unit must be installed according to the current regulations of the Canadian Electrical Code Part I (CSA Standard C22.1) and/or local codes.

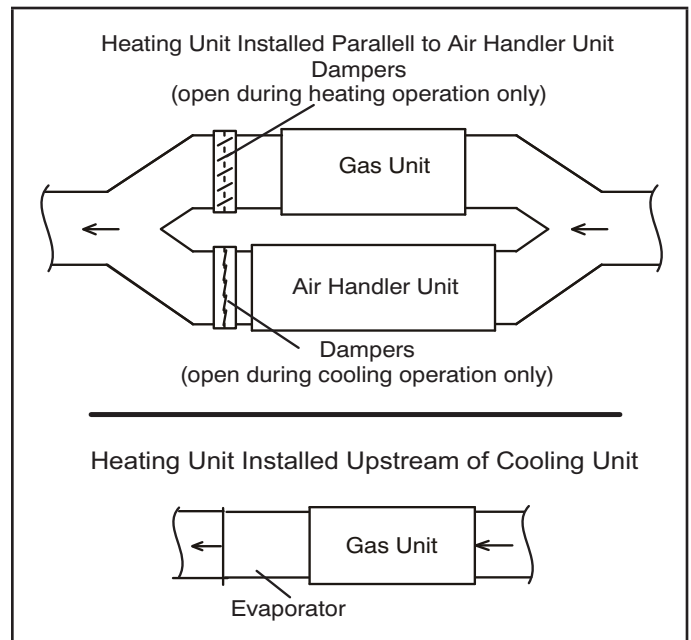


Figure 3

**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 EL196UHE 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 certified for installation in mobile homes, recreational vehicles, or outdoors.

### Use of Furnace as Construction Heater

Units may be used for heating of buildings or structures under construction, if the following conditions are met to ensure proper operation:

**DO NOT USE THE UNIT FOR CONSTRUCTION HEAT UNLESS ALL OF THE FOLLOWING CRITERIA ARE MET:**

- Furnace must be in its final location. The vent system must be permanently installed per these installation instructions.
- Furnace must be installed as a two pipe system and one hundred percent (100%) outdoor air must be provided for combustion air requirements during construction.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is prohibited.
- The input rate and temperature rise must be set per the furnace rating plate.
- Supply and Return air ducts must be provided and sealed to the furnace. Return air must be terminated outside of the space where furnace is installed.

- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- MERV 11 or greater air filters must be installed in the system and must be regularly inspected and maintained (e.g., regular static checks and replaced at end of life) during construction.
- Blower and vestibule access panels must be in place on the furnace at all times.
- The furnace heat exchanger, components, duct system, and evaporator coils must be thoroughly cleaned following final construction clean-up.
- Air filters must be replaced upon construction completion.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified in accordance with these installation instructions.

**EQUIPMENT MAY EXPERIENCE PREMATURE COMPONENT FAILURE AS A RESULT OF FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS. FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS VOIDS THE MANUFACTURER'S EQUIPMENT LIMITED WARRANTY. LENNOX DISCLAIMS ALL LIABILITY IN CONNECTION WITH INSTALLER'S FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS.**

**NOTWITHSTANDING THE FOREGOING, INSTALLER IS RESPONSIBLE FOR CONFIRMING THAT THE USE OF CONSTRUCTION HEAT IS CONSISTENT WITH THE POLICIES AND CODES OF ALL REGULATING ENTITIES. ALL SUCH POLICIES AND CODES MUST BE ADHERED TO.**

**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 EL196UHE 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 vent termination point.
- When the furnace is installed in non-direct vent applications, do not install the furnace where drafts might blow directly into it. This could cause improper combustion and unsafe operation.
- When the furnace is installed in non-direct vent applications, do not block the furnace combustion air opening 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.
- When the furnace is installed in an unconditioned space, consider provisions required to prevent freezing of condensate drain system.
- Please consult the manufacturer of your evaporator coil for their recommendations on distance required between the heat exchanger and their drain pan. Adequate space must be provided between the drain pan and the furnace heat exchanger.

**⚠ CAUTION**

EL196UHE unit should not be installed in areas normally subject to freezing temperatures.

**⚠ WARNING**

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

**Combustion, Dilution & Ventilation Air**

**If the EL196UHE is installed as a Non-Direct Vent Furnace, follow the guidelines in this section.**

**NOTE** - In Non-Direct Vent installations, combustion air is taken from indoors or ventilated attic or crawlspace and flue gases are discharged out-doors.

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 EL196UHE furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents and gas piping. A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI Z223.1/ NFPA 54). 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.

In Canada, refer to the CSA B149 installation codes.

## **⚠ 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.

All gas-fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliance 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 required 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 Outside section.

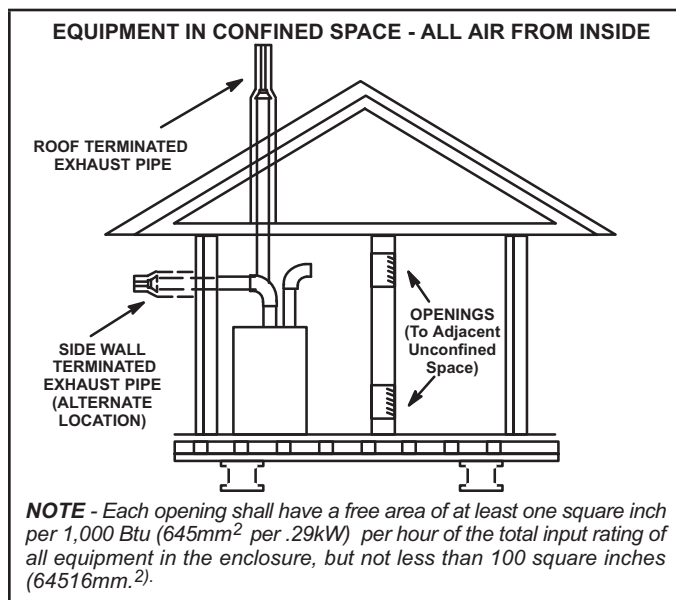
### **Confined Space**

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.

### **Air from Inside**

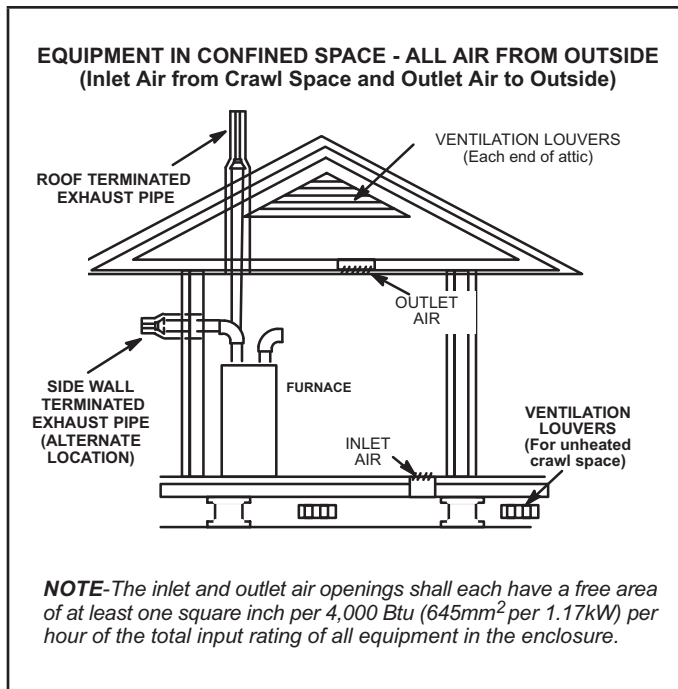
If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm<sup>2</sup>) per 1,000 Btu (.29 kW) per hour of total input rating 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 4.



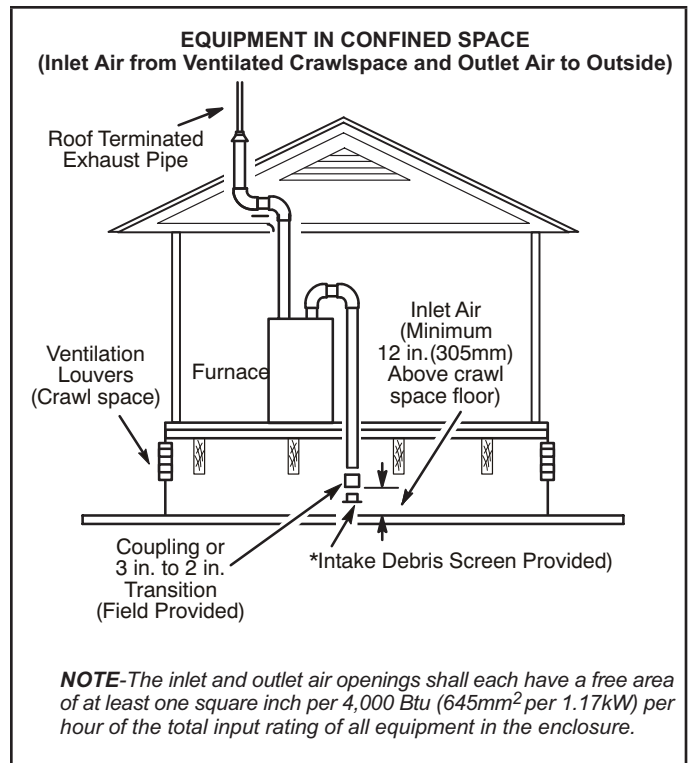
**Figure 4**

### **Air from Outside**

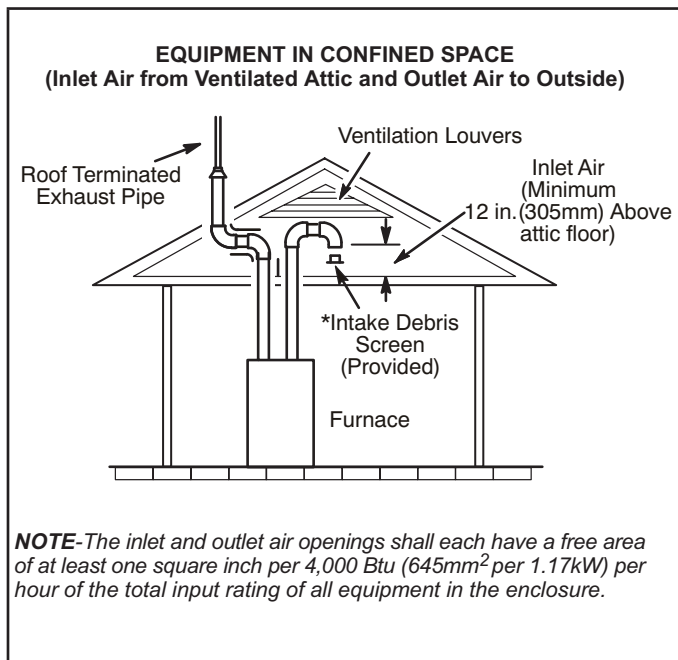
If air from outside is brought in for combustion and ventilation, the confined space shall be provided with two permanent openings. One opening shall be within 12" (305mm) of the top of the enclosure and one within 12" (305mm) of the bottom. These openings must communicate directly or by ducts with the 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 per 4,000 Btu (645mm<sup>2</sup> per 1.17kW) per hour of total input rating of all equipment in the enclosure. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch per 2,000 Btu (645mm<sup>2</sup> per .59kW) per total input rating of all equipment in the enclosure (See Figure 5). It is also permissible to bring in air for combustion from a ventilated attic (Figure 6) or ventilated crawl space (Figure 7).



**Figure 5**



**Figure 7**



**Figure 6**

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 5 and Figure 8. 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 9.

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.

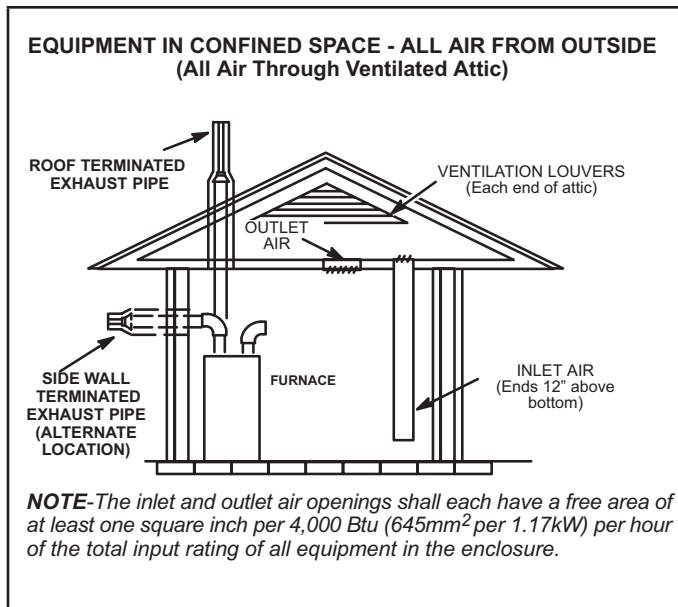


Figure 8

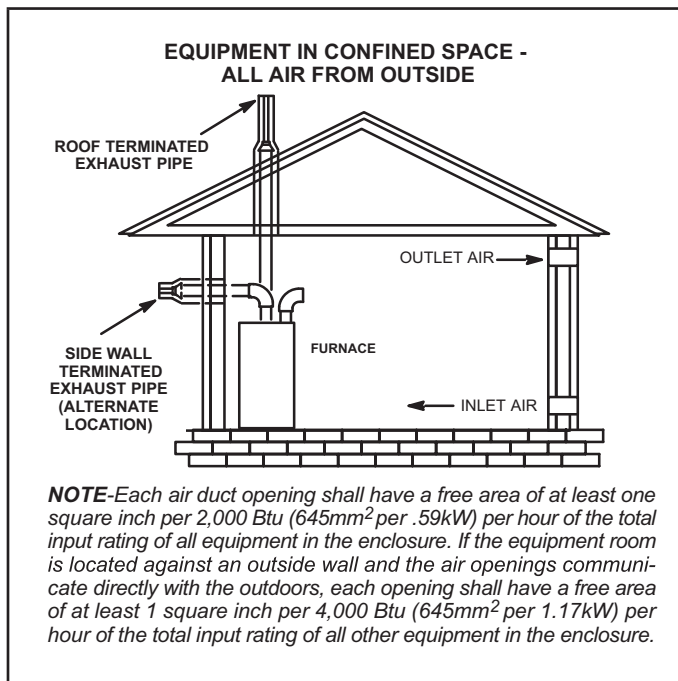


Figure 9

**Shipping Bolt Removal**

Units with 1/2 and 3/4 hp blower motor are equipped with three flexible legs and one rigid leg. 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). See Figure 10. 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.

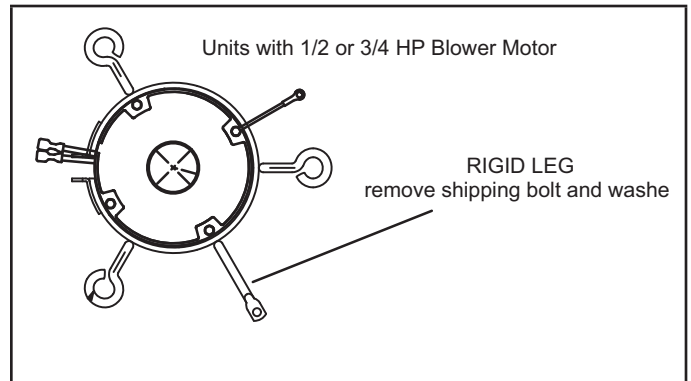


Figure 10

**Installation - Setting Equipment**

**⚠ WARNING**

Do not connect the return air duct 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.

**⚠ WARNING**

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

**Upflow Applications**

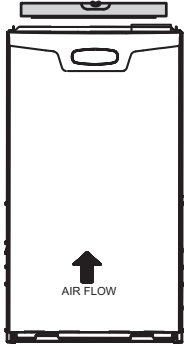
The EL196UHE gas furnace can be installed as shipped in the upflow position. Refer to Figure 12 for clearances. Select a location that allows for the required clearances that are listed on the unit nameplate. Also consider gas supply connections, electrical supply, vent connection, condensate trap and drain connections, and installation and service clearances [24 inches (610 mm) at unit front]. **The unit must be level from side to side. The unit may be positioned from level to 1/2" toward the front. See Figure 11.** Allow for clearances to combustible materials as indicated on the unit nameplate.



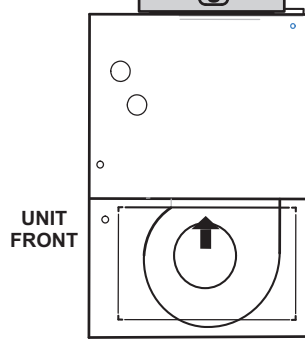
### SETTING EQUIPMENT

Unit must be level side-to-side. Unit may be positioned from level to 1/2" toward the front to aid in draining.

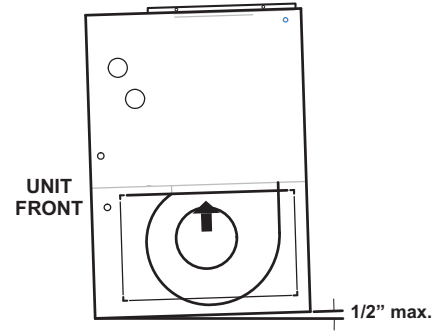
#### UPFLOW APPLICATION



FRONT VIEW

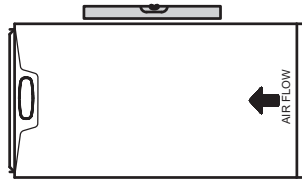


SIDE VIEW

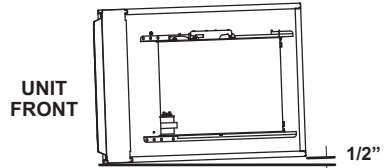


SIDE VIEW

#### HORIZONTAL APPLICATION



FRONT VIEW



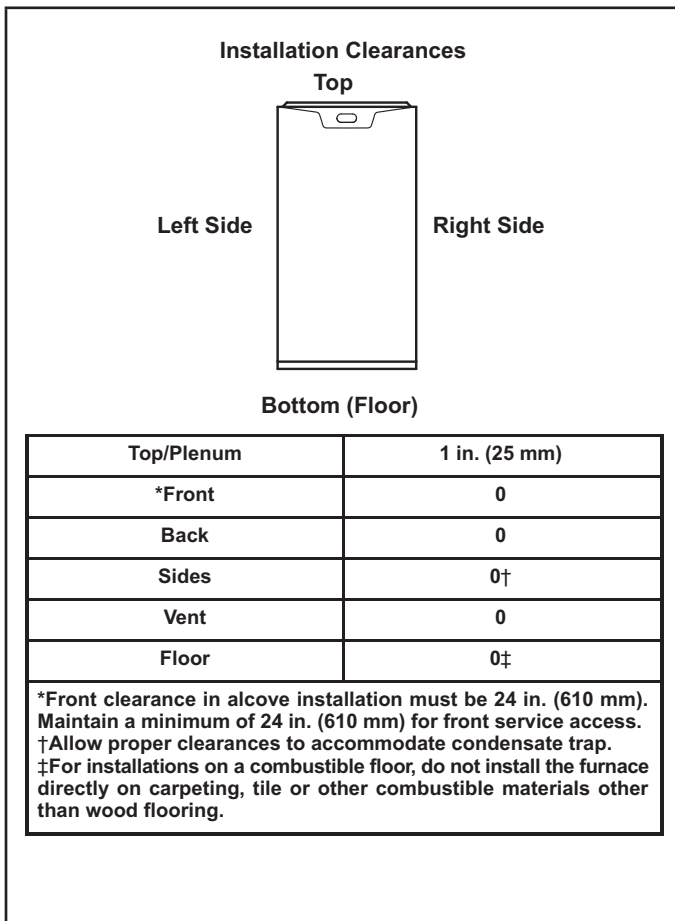
END VIEW

Figure 11

## ⚠ 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 air in the living space. Use sheet metal screws and joint tape to seal return air system to furnace. In platform installations with furnace return, 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. For no reason should return and supply air duct systems ever 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.



**Figure 12**

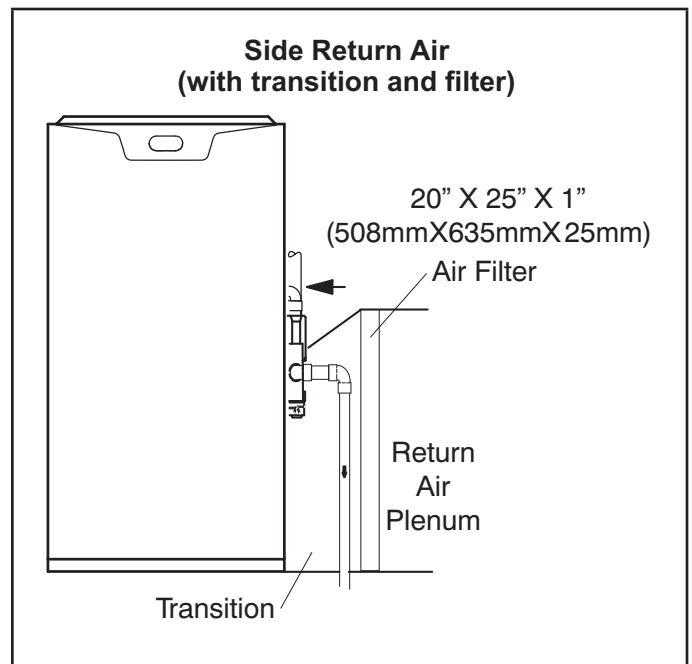
### Return Air Guidelines

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.

*Refer to Engineering Handbook for additional information.*

**EL196UHE applications which include side return air and a condensate trap installed on the same side of the cabinet (trap can be installed remotely within 5 ft.) require either a return air base or field-fabricated transition to accommodate an optional IAQ accessory taller than 14.5". See Figure 13.**



**Figure 13**

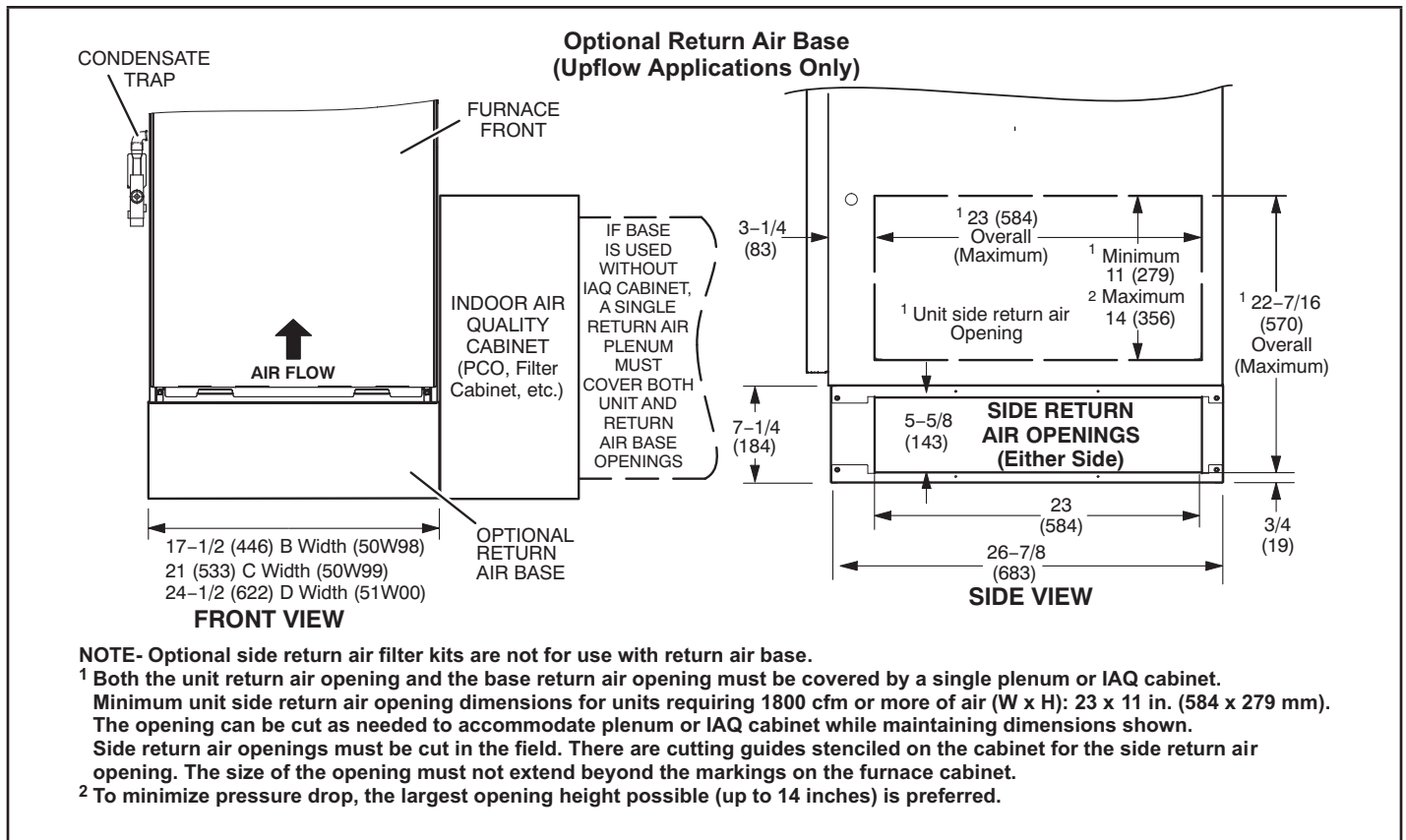


Figure 14

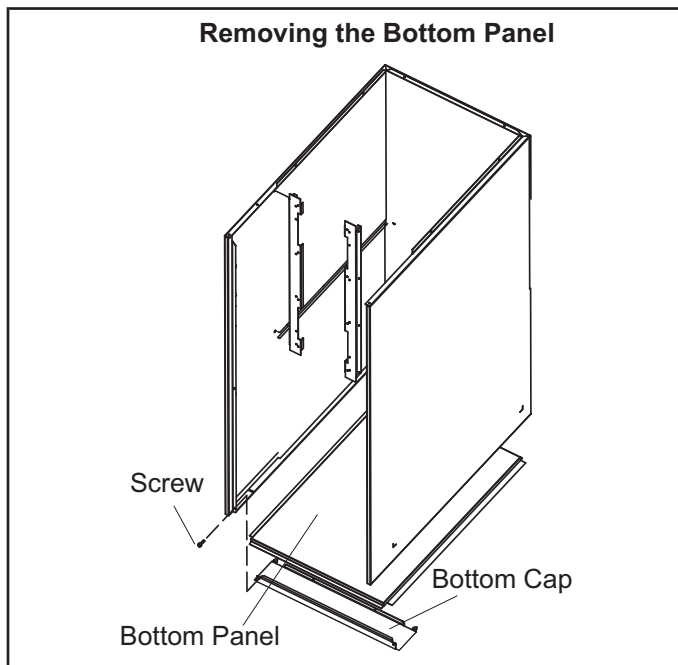


Figure 15

**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 15.

**Horizontal Applications**

**⚠ WARNING**

Do not install the furnace on its front or back. See Figure 16.

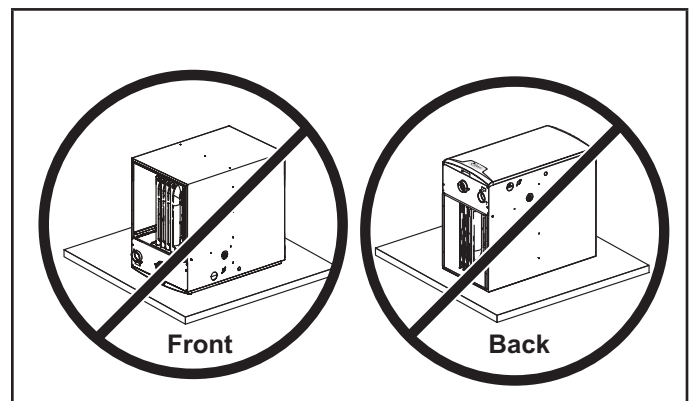


Figure 16

The EL196UHE furnace can be installed in horizontal applications with either right- or left-hand air discharge. Refer to Figure 17 for clearances in horizontal applications.

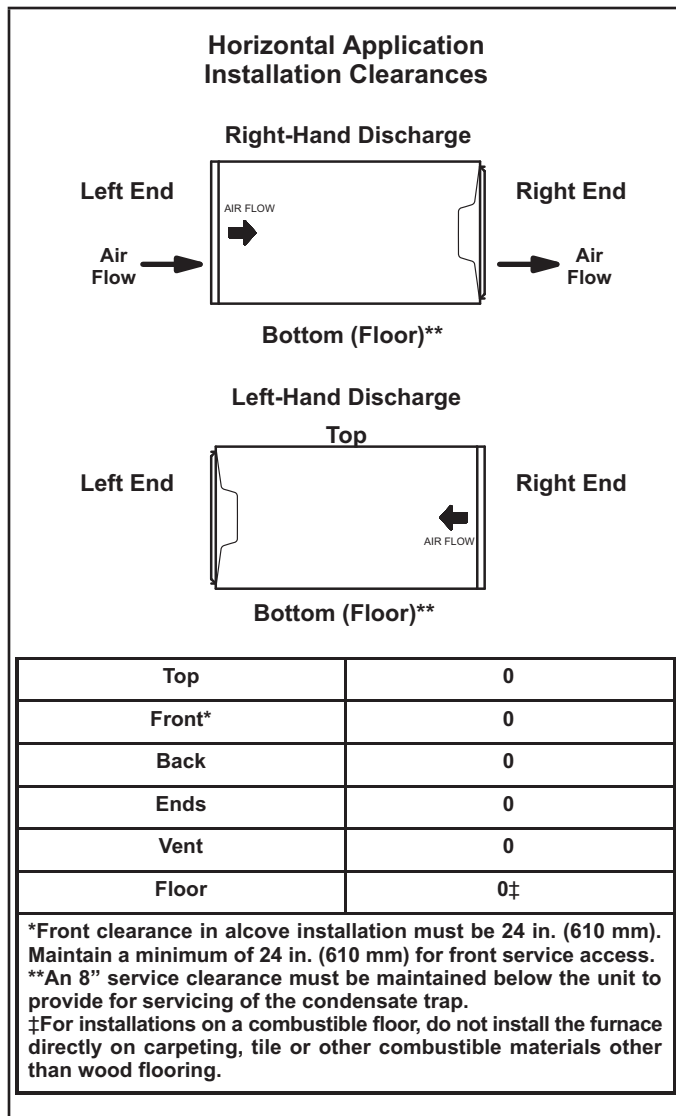


Figure 17

### Suspended Installation of Horizontal Unit

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 18, or install the furnace on a platform, as shown in Figure 19. A horizontal suspension kit (51W10) may be ordered from Lennox or use equivalent.

**NOTE - Heavy-gauge 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.**

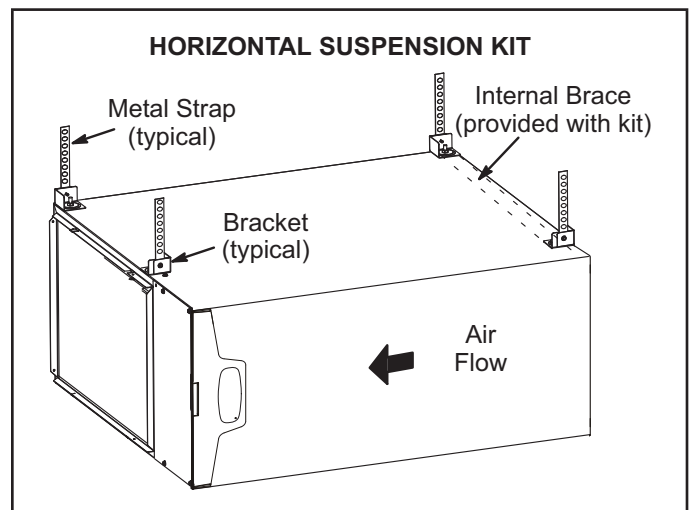


Figure 18

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

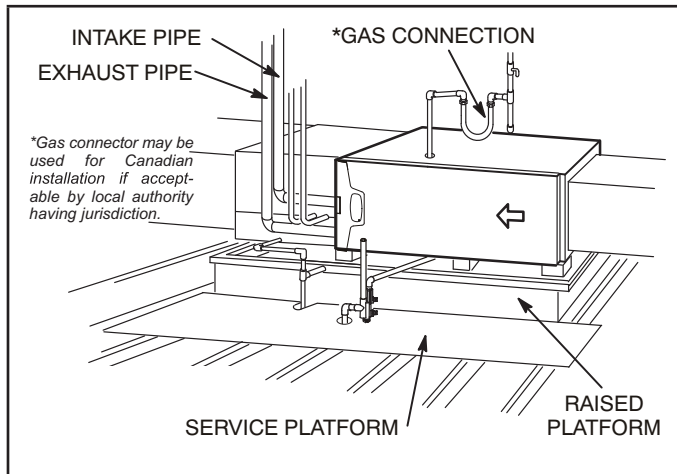
### Platform Installation of Horizontal Unit

- 1 - Select location for unit keeping in mind service and other necessary clearances. See Figure 17.
- 2 - Construct a raised wooden frame and cover frame with a plywood sheet. If unit is installed above finished space, fabricate an auxiliary drain pan to be installed under unit. Set unit in drain pan as shown in Figure 19. Leave 8 inches for service clearance below unit for condensate trap.
- 3 - Provide a service platform in front of unit. When installing the unit in a crawl space, a proper support platform may be created using cement blocks.
- 4 - Route auxiliary drain line so that water draining from this outlet will be easily noticed by the homeowner.

- 5 - If necessary, run the condensate line into a condensate pump to meet drain line slope requirements. The pump must be rated for use with condensing furnaces. Protect the condensate discharge line from the pump to the outside to avoid freezing.
- 6 - Continue with exhaust, condensate and intake piping installation according to instructions.

**TABLE 1**

Furnace Cabinet Width	Filter Size	
	Side Return	Bottom Return
17-1/2"	16 X 25 X 1 (1)	16 X 25 X 1 (1)
21"	16 X 25 X 1 (1)	20 X 25 X 1 (1)



**Figure 19**

**Return Air -- Horizontal Applications**

Return air may be brought in only through the end of a furnace installed in the horizontal position. The furnace is equipped with a removable bottom panel to facilitate installation. See Figure 15.

**Filters**

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

**⚠ WARNING**

If a highefficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. Highefficiency filters have a higher static pressure drop than standardefficiency 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 to size and install the supply and return air duct system. Figure 20 shows the correct supply and return duct installation. Refer to ACCA Manual D. This will result in a quiet and low-static system that has uniform air distribution.

**NOTE -** This furnace is not certified for operation in heating mode (indoor blower operating at selected heating speed) with an external static pressure which exceeds 0.5 inches w.c. Operation at these conditions may result in improper limit operation.

**Supply Air Plenum**

If the furnace is installed without a cooling coil, a removable access panel should be installed in the supply air duct. The access panel should be large enough to permit inspection of the heat exchanger. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks. 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 raw gas or toxic fumes might then be distributed throughout the house by the furnace duct system.

Return air can be brought in through the bottom or either side of the furnace (return air brought into either side of furnace allowed in upflow applications only). 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.

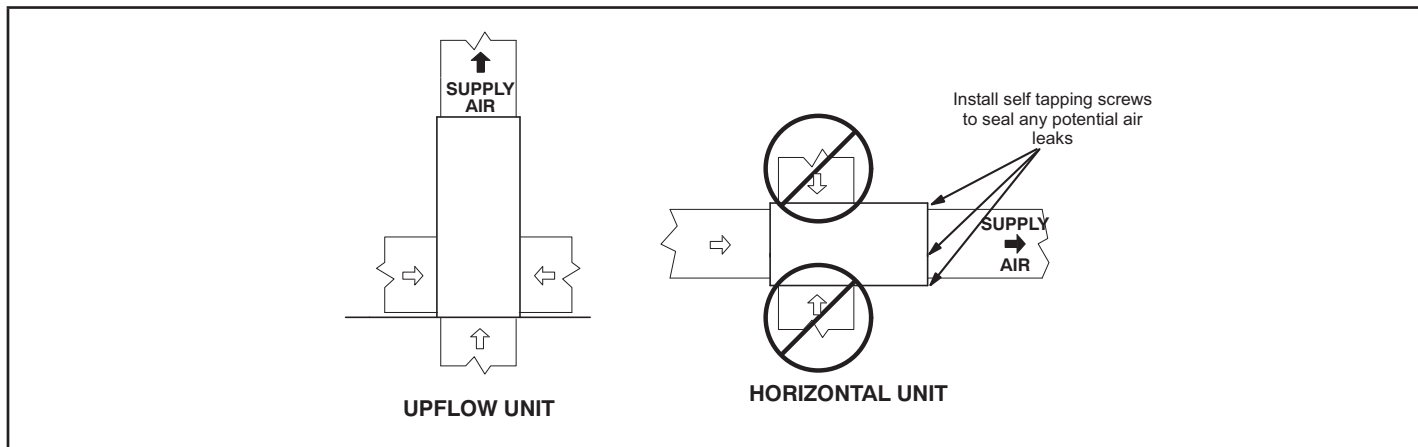


Figure 20

### Pipe & Fittings Specifications

All pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. The solvent shall be free flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring. Refer to the TABLE 2 for approved piping and fitting materials.

### ⚠ CAUTION

Solvent cements for plastic pipe are flammable liquids and should be kept away from all sources of ignition. Do not use excessive amounts of solvent cement when making joints. Good ventilation should be maintained to reduce fire hazard and to minimize breathing of solvent vapors. Avoid contact of cement with skin and eyes.

### ⚠ IMPORTANT

EL196UHE exhaust and intake connections are made of PVC. Use PVC primer and solvent cement when using PVC vent pipe. When using ABS vent pipe, use transitional solvent cement to make connections to the PVC fittings in the unit.

TABLE 2  
PIPING AND FITTINGS SPECIFICATIONS

Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
Schedule 40 CPVC (Pipe)	F441
Schedule 40 CPVC (Fittings)	F438
SDR-21 PVC or SDR-26 PVC (Pipe)	D2241
SDR-21 CPVC or SDR-26 CPVC (Pipe)	F442
Schedule 40 ABS Cellular Core DWV (Pipe)	F628
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) Pipe & Fittings)	D2665
<b>PRIMER &amp; SOLVENT CEMENT</b>	<b>ASTM SPECIFICATION</b>
PVC & CPVC Primer	F656
PVC Solvent Cement	D2564
CPVC Solvent Cement	F493
ABS Solvent Cement	D2235
PVC/CPVC/ABS All Purpose Cement For Fittings & Pipe of the same material	D2564, D2235, F493
ABS to PVC or CPVC Transition Solvent Cement	D3188
<b>CANADA PIPE &amp; FITTING &amp; SOLVENT CEMENT</b>	<b>MARKING</b>
PVC & CPVC Pipe and Fittings	ULCS636
PVC & CPVC Solvent Cement	
ABS to PVC or CPVC Transition Cement	
<b>POLYPROPYLENE VENTING SYSTEM</b>	
PolyPro® by Duravent	
InnoFlue® by Centrotherm	

Use PVC primer and solvent cement or ABS solvent cement meeting ASTM specifications, refer to TABLE 2. As an alternate, use all purpose cement, to bond ABS, PVC, or CPVC pipe when using fittings and pipe made of the same materials. Use transition solvent cement when bonding ABS to either PVC or CPVC.

Low temperature solvent cement is recommended during cooler weather. Metal or plastic strapping may be used for vent pipe hangers. Uniformly apply a liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean

inside socket surface of fitting and male end of pipe to depth of fitting socket.

**Canadian Applications Only** - Pipe, fittings, primer and solvent cement used to vent (exhaust) this appliance must be certified to ULC S636 and supplied by a single manufacturer as part of an approved vent (exhaust) system. In addition, the first three feet of vent pipe from the furnace flue collar must be accessible for inspection.

**TABLE 3**

OUTDOOR TERMINATION USAGE*									
Input Size	Vent Pipe Dia. in.	STANDARD					CONCENTRIC		
		Flush Mount Kit	Wall Kit		Wall Ring Kit	Field Fabricated	1-1.2 inch	2 inch	3 inch
			2 inch	3 inch	2 inch		71M80 (US) 44W92 (CA)	69M29 (US) 44W92 (CA)	60L46 (US) 44W93 (CA)
030, 045	<sup>6</sup> 1-1.2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	2-1/2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	3	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
070	<sup>6</sup> 1-1/2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	2-1/2	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
	3	<sup>3</sup> YES	YES	<sup>1</sup> YES	<sup>1</sup> YES	<sup>5</sup> YES	<sup>2</sup> YES		
090	2	<sup>3</sup> YES		YES	YES	<sup>5</sup> YES		YES	YES
	2-1/2	<sup>3</sup> YES		YES	YES	<sup>5</sup> YES		YES	YES
	3	<sup>3</sup> YES		YES	YES	<sup>5</sup> YES		YES	YES
110	2	YES		YES	YES	<sup>5</sup> YES		YES	YES
	2-1/2	YES		YES		<sup>5</sup> YES		YES	YES
	3	YES		YES		<sup>5</sup> YES		YES	YES

NOTE - Standard Terminations do not include any vent pipe or elbows external to the structure. Any vent pipe or elbows external to the structure must be included in total vent length calculations. See vent length tables.

\* Kits must be properly installed according to kit instructions.

<sup>1</sup>Requires field-provided outdoor 1-1/2" exhaust accelerator.

<sup>2</sup>Concentric kits 71M80 and 44W92 include 1-1/2" outdoor accelerator, when uses with 030, 045 and 070 input models. When using 1-1/2 inch vent pipe, transition to 2" pipe before installing concentric kit.

<sup>3</sup> Flush mount kits 51W11 and 51W12 includes 1-1/2 in. outdoor exhaust accelerator, required when used with 030, 045, 070 and 090 input models. When using 1-1/2" vent pipe, transition to 2" pipe before installing flushmount kit.

<sup>4</sup> Termination kits 30G28, 44W92, 4493 and 81J20 are certified to ULC S636 for use in Canada only.

<sup>5</sup> See table 8 for vent accelerator requirements.

<sup>6</sup> Requires field provided 2" to 1-1/2" reducer.

## Joint Cementing Procedure

All cementing of joints should be done according to the specifications outlined in ASTM D 2855.

# ⚠ DANGER

## DANGER OF EXPLOSION!

Fumes from PVC glue may ignite during system check. Allow fumes to dissipate for at least 5 minutes before placing unit into operation..

- 1 - Measure and cut vent pipe to desired length.
- 2 - Deburr and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.

**NOTE** - Check the inside of vent pipe thoroughly for any obstruction that may alter furnace operation.

- 3 - Clean and dry surfaces to be joined.
- 4 - Test fit joint and mark depth of fitting on outside of pipe.
- 5 - Uniformly apply a liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean inside socket surface of fitting and male end of pipe to depth of fitting socket.

**NOTE** - Time is critical at this stage. Do not allow primer to dry before applying cement.

- 6 - Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.
- 7 - Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn PVC pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly. DO NOT turn ABS or cellular core pipe.

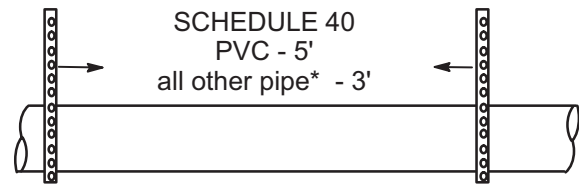
**NOTE** - Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.

- 8 - After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate an improper assembly due to insufficient solvent.

- 9 - Handle joints carefully until completely set.

## Venting Practices

### Piping Suspension Guidelines



\* See Piping and Fittings Specifications table

**NOTE** - Isolate piping at the point where it exits the outside wall or roof in order to prevent transmission of vibration to the structure.

### Wall Thickness Guidelines

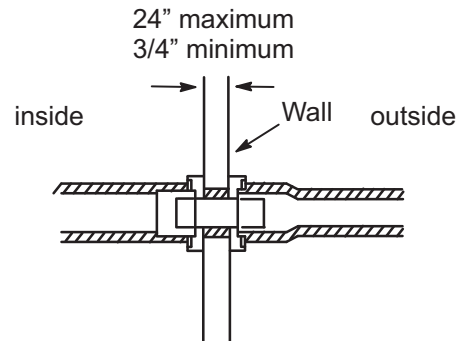
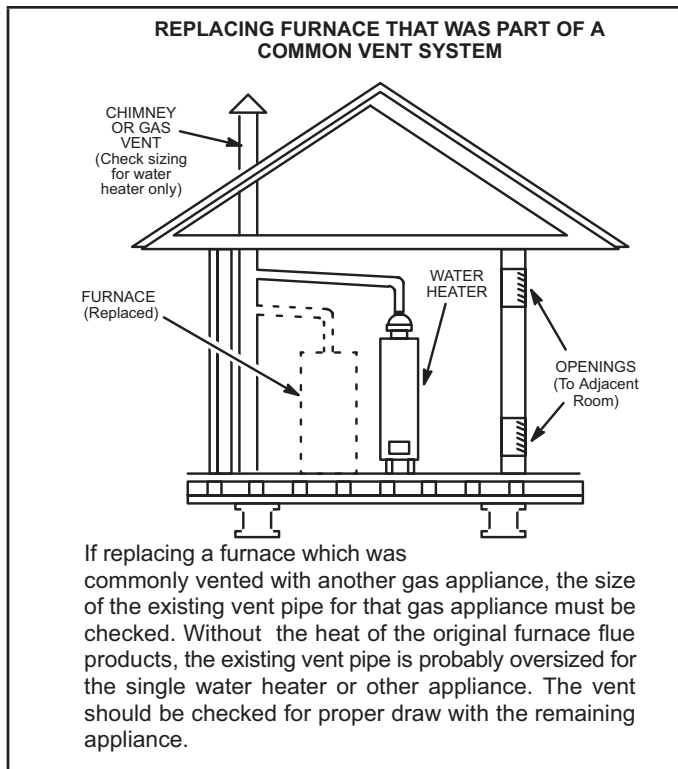


Figure 21

- 1 - In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using a hanger.
- 2 - When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining condensate collection trap and lines.





**Figure 22**

**Exhaust Piping (Figure 25 and Figure 26)**

Route piping to outside of structure. Continue with installation following instructions given in piping termination section.

**⚠ CAUTION**

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is even with the top or outlet end of the metal stack.

**⚠ CAUTION**

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

**Vent Piping Guidelines**

**NOTE** - Lennox has approved the use of DuraVent® and Centrotherm manufactured vent pipe and terminations as an option to PVC. When using the PolyPro® by DuraVent or InnoFlue® by Centrotherm venting system the vent pipe requirements stated in the unit installation instruction – minimum & maximum vent lengths, termination clearances, etc. – apply and must be followed. Follow the instructions provided with PolyPro by DuraVent and InnoFlue by Centrotherm venting system for assembly or if requirements are more restrictive. The PolyPro by DuraVent and InnoFlue by Centrotherm venting system must also follow the uninsulated and unconditioned space criteria listed in TABLE 7.

The EL196UHE can be installed as either a Non-Direct Vent or a Direct Vent gas central furnace.

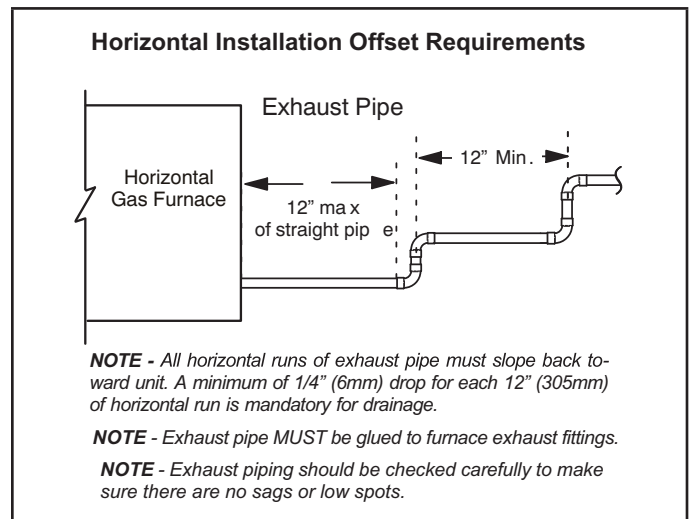
**NOTE** - In Non-Direct Vent installations, combustion air is taken from indoors and flue gases are discharged outdoors. In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.

Intake and exhaust pipe sizing -- Size pipe according to TABLE 4, TABLE 5 and TABLE 6. Count all elbows inside and outside the home.

Regardless of the diameter of pipe used, the standard roof and wall terminations described in section Exhaust Piping Terminations should be used. Exhaust vent termination pipe is sized to optimize the velocity of the exhaust gas as it exits the termination. Refer to TABLE 8.

In some applications which permit the use of several different sizes of vent pipe, a combination vent pipe may be used. Contact Lennox' Application Department for assistance in sizing vent pipe in these applications.

**NOTE** - The exhaust collar on all models is sized to accommodate 2" Schedule 40 vent pipe. In horizontal applications, any transition to exhaust pipe larger than 2" must be made in vertical runs of the pipe. Therefore a 2" elbow must be added before the pipe is transitioned to any size larger than 2". This elbow must be added to the elbow count used to determine acceptable vent lengths. Contact the Application Department for more information concerning sizing of vent systems which include multiple pipe sizes.



**Figure 23**

**TABLE 4**

**MINIMUM VENT PIPE LENGTHS**

EL196UHE Model	MIN. VENT LENGTH*
030, 045, -070, -090, 110	15 ft. or 5 ft. plus 2 elbows or 10 ft. plus 1 elbow

\*Any approved termination may be added to the minimum length listed. Two 45 degree elbows are the equivalent to one 90 degree elbow.

Use the following steps to correctly size vent pipe diameter.

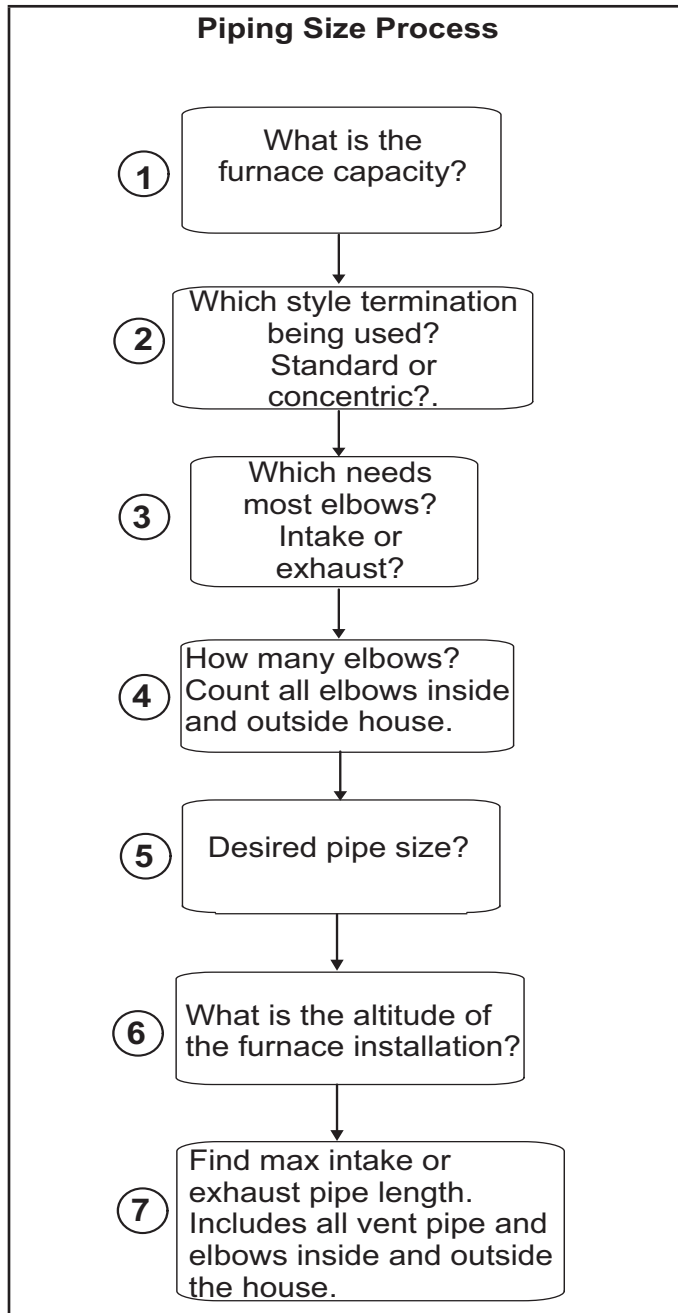


Figure 24

## **! IMPORTANT**

Do not use screens or perforated metal in exhaust or intake terminations. Doing so will cause freeze-ups and may block the terminations.

**NOTE** - Lennox offers a glueless vent adapter kit 17H92 as an option for exhaust exiting at the furnace top cap coupling.

**TABLE 5**

**Maximum Allowable Intake or Exhaust Vent Length in Feet**

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

<b>Standard Termination at Elevation 0 - 4500 ft</b>																		
No. Of 90° Elbows	<b>1-1/2" Pipe</b>					<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>				
	<b>Model</b>					<b>Model</b>				<b>Model</b>				<b>Model</b>				
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030/045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030/045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030/045</b>	<b>070</b>	<b>090</b>	<b>110</b>	
1	25	20	15	n/a	n/a	81	66	44	24	115	115	93	58	138	137	118	118	
2	20	15	10			76	61	39	19	110	110	88	53	133	132	113	113	113
3	15	10	n/a			71	56	34	14	105	105	83	48	128	127	108	108	108
4	10	n/a				66	51	29	n/a	100	100	78	43	123	122	103	103	103
5	n/a					61	46	24		95	95	73	38	118	117	98	98	98
6						56	41	19		90	90	68	33	113	112	93	93	
7						51	36	14		85	85	63	28	108	107	88	88	
8						46	31	n/a		80	80	58	23	103	102	83	83	
9						41	26			75	75	53	18	98	97	78	78	
10						36	21	70		70	48	13	93	92	73	73		
<b>Standard Termination Elevation 4500 - 10,000 ft</b>																		
No. Of 90° Elbows		<b>1-1/2" Pipe</b>					<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>			
	<b>Model</b>					<b>Model</b>				<b>Model</b>				<b>Model</b>				
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030,045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030,045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030,045</b>	<b>070</b>	<b>090</b>	<b>110</b>	
1	25	20	15	n/a	n/a	81	66	44	n/a	115	115	93	58	138	137	118	118	
2	20	15	10			76	61	39		110	110	88	53	133	132	113	113	113
3	15	10	n/a			71	56	34		105	105	83	48	128	127	108	108	108
4	10	n/a				66	51	29		100	100	78	43	123	122	103	103	
5	n/a					61	46	24		95	95	73	38	118	117	98	98	
6						56	41	19		90	90	68	33	113	112	93	93	
7						51	36	14		85	85	63	28	108	107	88	88	
8						46	31	n/a		80	80	58	23	103	102	83	83	
9						41	26			75	75	53	18	98	97	78	78	
10						36	21	70		70	48	13	93	92	73	73		

**TABLE 5 Continued**

**Maximum Allowable Intake or Exhaust Vent Length in Feet**

*NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.*

*NOTE - additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.*

<b>Concentric Termination at Elevation 0 - 4500 ft</b>																									
No. Of 90° Elbows	<b>1-1/2" Pipe</b>					<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>											
	<b>Model</b>					<b>Model</b>				<b>Model</b>				<b>Model</b>											
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>								
1	20	15	10	n/a	n/a	73	58	42	22	105	105	89	54	121	121	114	114								
2	15	10	n/a			n/a	68	53	37	17	100	100	84	49	116	116	109	109							
3	10	n/a					n/a	n/a	63	48	32	12	95	95	79	44	111	111	104	104					
4	n/a								n/a	n/a	n/a	58	43	27	n/a	90	90	74	39	106	106	99	99		
5												53	38	22		85	85	69	34	101	101	94	94		
6												48	33	17		80	80	64	29	96	96	89	89		
7												43	28	12		75	75	59	24	91	91	84	84		
8												38	23	n/a		70	70	54	19	86	86	79	79		
9												33	18			65	65	49	14	81	81	74	74		
10												28	13			60	60	44	n/a	76	76	69	69		
<b>Concentric Termination Elevation 4500 - 10,000 ft</b>																									
No. Of 90° Elbows			<b>1-1/2" Pipe</b>									<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>					
		<b>Model</b>					<b>Model</b>					<b>Model</b>				<b>Model</b>									
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>								
1	20	15	10	n/a	n/a	73	58	42	n/a	105	105	89	54	121	121	114	114								
2	15	10	n/a			n/a	68	53		37	100	100	84	49	116	116	109	109							
3	10	n/a					n/a	n/a		63	48	32	95	95	79	44	111	111	104	104					
4	n/a									n/a	n/a	n/a	58	43	27	90	90	74	39	106	106	99	99		
5													53	38	22	85	85	69	34	101	101	94	94		
6													48	33	17	80	80	64	29	96	96	89	89		
7													43	28	12	75	75	59	24	91	91	84	84		
8													38	23	n/a	70	70	54	19	86	86	79	79		
9													33	18		65	65	49	14	81	81	74	74		
10													28	13		60	60	44	n/a	76	76	69	69		

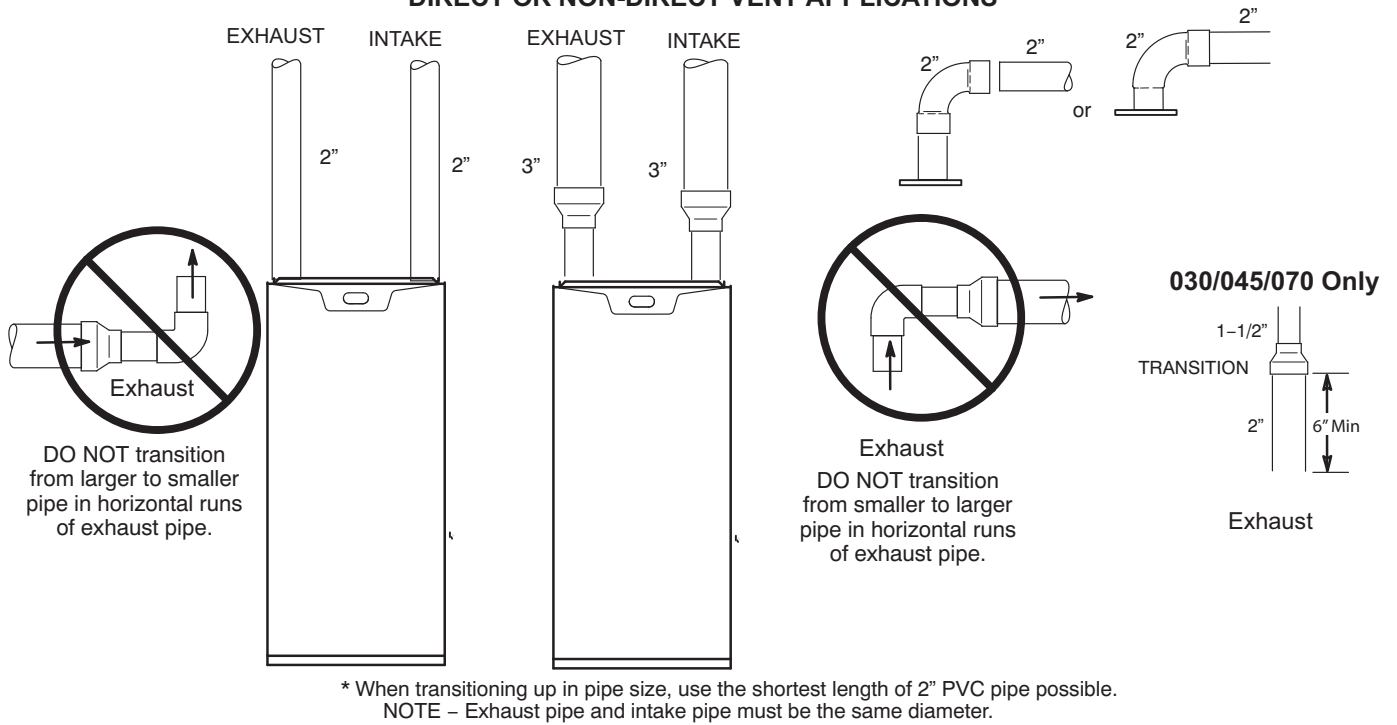
**TABLE 6**

**Maximum Allowable Exhaust Vent Lengths With Furnace Installed in a Closet or Basement Using Ventilated Attic or Crawl Space For Intake Air in Feet**

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

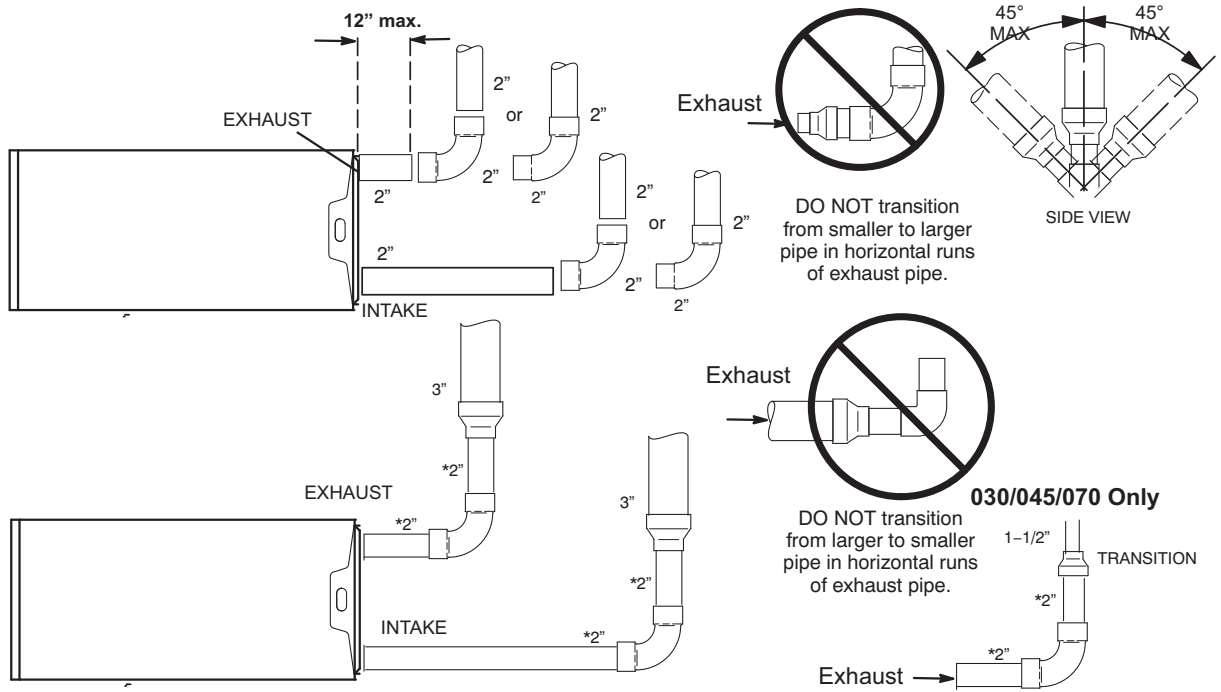
<b>Standard Termination at Elevation 0 - 4500 ft</b>																									
No Of 90° Elbows	<b>1-1/2" Pipe</b>					<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>											
	<b>Model</b>					<b>Model</b>				<b>Model</b>				<b>Model</b>											
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>								
1	20	15	10	n/a	n/a	71	56	34	14	100	100	78	43	118	117	98	98								
2	15	10	n/a			n/a	66	51	29	9	95	95	73	38	113	112	93	93							
3	10	n/a					n/a	n/a	61	46	24	4	90	90	68	33	108	107	88	88					
4	n/a								n/a	n/a	n/a	56	41	19	n/a	85	85	63	28	103	102	83	83		
5												51	36	14		80	80	58	23	98	97	78	78		
6												46	31	9		75	75	53	18	93	92	73	73		
7												41	26	4		70	70	48	13	88	87	68	68		
8												36	21	n/a		65	65	43	8	83	82	63	63		
9												31	16			60	60	38	3	78	77	58	58		
10												26	11			55	55	33	n/a	73	72	53	53		
<b>Standard Termination Elevation 4500 - 10,000 ft</b>																									
No Of 90° Elbows			<b>1-1/2"</b>									<b>2" Pipe</b>				<b>2-1/2" Pipe</b>				<b>3" Pipe</b>					
		<b>Model</b>					<b>Model</b>					<b>Model</b>				<b>Model</b>									
	<b>030</b>	<b>045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>	<b>030 045</b>	<b>070</b>	<b>090</b>	<b>110</b>								
1	20	15	10	n/a	n/a	71	56	34	n/a	100	100	78	43	118	117	98	98								
2	15	10	n/a			n/a	66	51		29	95	95	73	38	113	112	93	93							
3	10	n/a					n/a	n/a		61	46	24	90	90	68	33	108	107	88	88					
4	n/a									n/a	n/a	n/a	56	41	19	85	85	63	28	103	102	83	83		
5													51	36	14	80	80	58	23	98	97	78	78		
6													46	31	9	75	75	53	18	93	92	73	73		
7													41	26	4	70	70	48	13	88	87	68	68		
8													36	21	n/a	65	65	43	8	83	82	63	63		
9													31	16		60	60	38	3	78	77	58	58		
10													26	11		55	55	33	n/a	73	72	53	53		

**TYPICAL EXHAUST AND INTAKE PIPE CONNECTIONS IN UPFLOW  
DIRECT OR NON-DIRECT VENT APPLICATIONS**



**Figure 25**

**TYPICAL EXHAUST AND INTAKE PIPE CONNECTIONS IN HORIZONTAL DIRECT OR  
NON-DIRECT VENT APPLICATIONS (RIGHT HAND DISCHARGE SHOWN)**



**Figure 26**

## Intake Piping

The EL196UHE furnace may be installed in either direct vent or non-direct vent applications. In non-direct vent applications, when intake air will be drawn into the furnace from the surrounding space, the indoor air quality must be considered and guidelines listed in Combustion, Dilution and Ventilation Air section must be followed.

Follow the next two steps when installing the unit in Direct Vent applications, where combustion air is taken from outdoors and flue gases are discharged outdoors. The provided air intake screen must not be used in direct vent applications (outdoors).

- 1 - Use transition solvent cement or a sheet metal screw to secure the intake pipe to the inlet air connector.
- 2 - Route piping to outside of structure. Continue with installation following instructions given in general guidelines for piping terminations and intake and exhaust piping terminations for direct vent sections. Refer to TABLE 5 for pipe sizes.

Follow the next two steps when installing the unit in **Non-Direct Vent applications** where combustion air is taken from indoors and flue gases are discharged outdoors.

- 1 - Use field-provided materials and the factory-provided air intake screen to route the intake piping as shown in Figure 27 or Figure 28. Maintain a minimum clearance of 3" (76mm) around the air intake opening. The air intake opening (with the protective screen) should always be directed forward or to either side in the upflow position, and either straight out or downward in the horizontal position. **The air intake piping must not terminate too close to the flooring or a platform. Ensure that the intake air inlet will not be obstructed by loose insulation or other items that may clog the debris screen.**
- 2 - If intake air is drawn from a ventilated attic (Figure 29) or ventilated crawlspace (Figure 30) the exhaust vent length must not exceed those listed in TABLE 6. If 3" diameter pipe is used, reduce to 2" diameter pipe at the termination point to accommodate the debris screen.
- 3 - Use a sheet metal screw to secure the intake pipe to the connector, if desired.

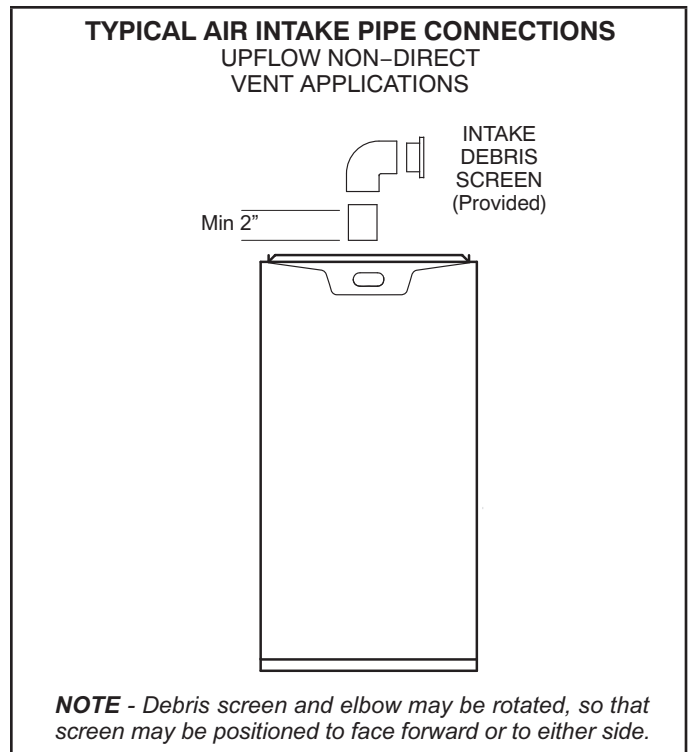


Figure 27

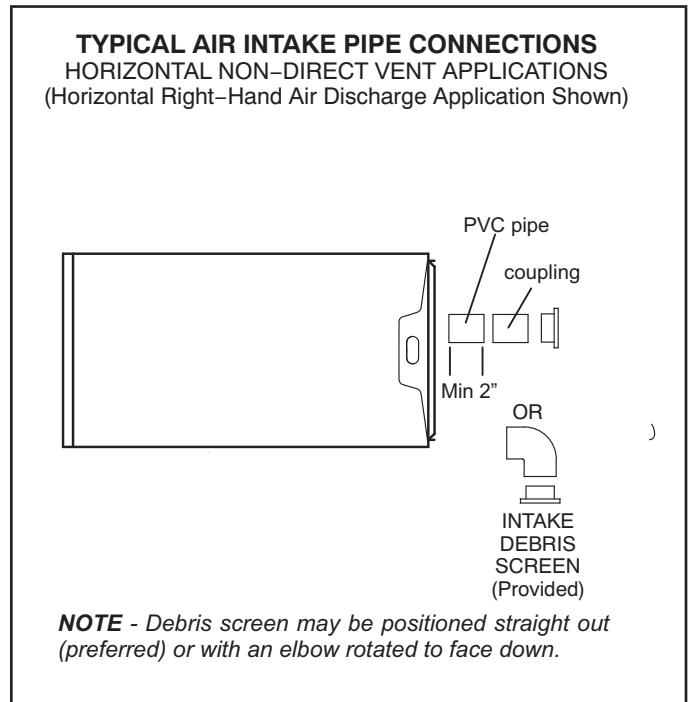
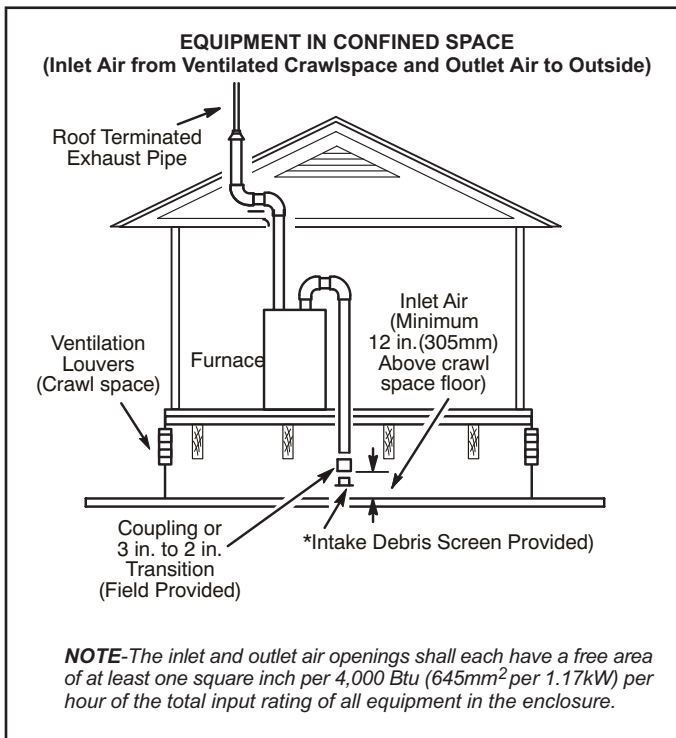
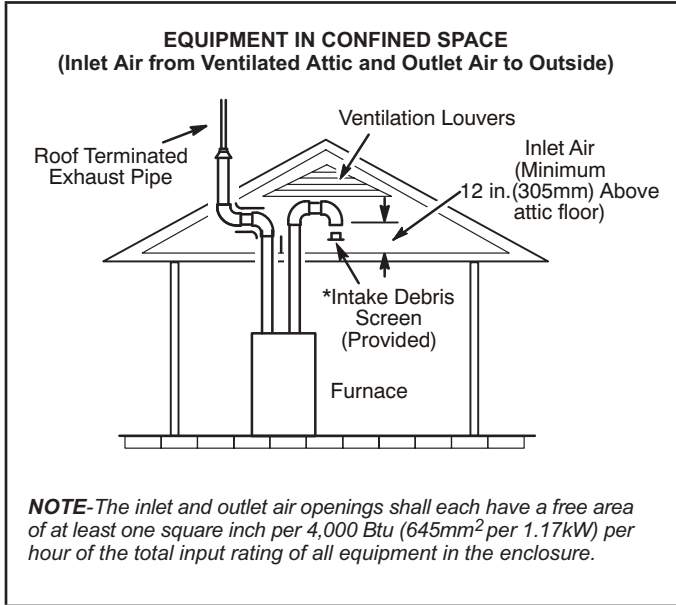


Figure 28

## ⚠ CAUTION

If this unit is being installed in an application with combustion air coming in from 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.



## General Guidelines for Vent Terminations

In Non-Direct Vent applications, combustion air is taken from indoors and the flue gases are discharged to the outdoors. The EL196UHE is then classified as a non-direct vent, Category IV gas furnace.

In Direct Vent applications, combustion air is taken from outdoors and the flue gases are discharged to the outdoors. The EL196UHE is then classified as a direct vent, Category IV gas furnace.

In Non-Direct Vent and Direct Vent applications, the vent termination is limited by local building codes. In the absence of local codes, refer to the current National Fuel Gas Code ANSI Z223-1/NFPA 54 in U.S.A., and current CSA-B149 Natural Gas and Propane Installation Codes in Canada for details.

Position termination according to location given in Figure 32 or Figure 33. In addition, position termination so it is free from any obstructions and 12" above the average snow accumulation.

At vent termination, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8m) of an outdoor AC unit because the condensate can damage the painted coating.

**NOTE** - See TABLE 7 for maximum allowed exhaust pipe length without insulation in unconditioned space during winter design temperatures below 32°F (0°C). If required exhaust pipe should be insulated with 1/2" (13mm) Armaflex or equivalent. In extreme cold climate areas, 3/4" (19mm) Armaflex or equivalent may be necessary. Insulation must be protected from deterioration. Armaflex with UV protection is permissible. Basements or other enclosed areas that are not exposed to the outdoor ambient temperature and are above 32 degrees F (0°C) are to be considered conditioned spaces.

## ⚠ IMPORTANT

Do not use screens or perforated metal in exhaust terminations. Doing so will cause freeze-ups and may block the terminations.

## ⚠ IMPORTANT

For Canadian Installations Only:

In accordance to CSA International B149 installation codes, the minimum allowed distance between the combustion air intake inlet and the exhaust outlet of other appliances shall not be less than 12 inches (305mm).



**TABLE 7**

Maximum Allowable Exhaust Vent Pipe Length (in ft.)<sup>3</sup> Without Insulation In Unconditioned Space For Winter Design Temperatures Single - Stage High Efficiency Furnace

Winter Design Temp <sup>1</sup> °F (°C)	Vent Pipe Diam	Unit Input Size											
		030		045		070		090		110			
		PVC	<sup>2</sup> PP	PVC	<sup>2</sup> PP	PVC	<sup>2</sup> PP	PVC	<sup>2</sup> PP	PVC	<sup>2</sup> PP		
32 to 21 (0 to -6)	1-1/2 in	N/A	N/A	25	N/A	20	N/A	N/A	N/A	N/A	N/A		
	2 in			18	16	31	28	50	48	30	30		
	2-1/2 in			13	N/A	24	N/A	42	N/A	56	N/A		
	3 in			9	9	18	18	35	35	47	47		
20 to 1 (-7 to -17)	1-1/2 IN					15	N/A	20	N/A	N/A	N/A	N/A	N/A
	2 in					9	8	18	16	32	29	30	30
	2-1/2 in					5	N/A	13	N/A	24	N/A	34	N/A
	3 in					1	1	8	8	19	19	26	26
0 to -20 (-18 to -29)	1-1/2 in					10	N/A	15	N/A	N/A	N/A	N/A	N/A
	2 in					5	3	12	10	22	19	30	27
	2-1/2 in					1	N/A	7	N/A	15	N/A	22	N/A
	3 in					N/A	N/A	2	2	10	10	16	16

<sup>1</sup>Refer to 99% Minimum Design Temperature table provided in the current edition of the ASHRAE Fundamentals Handbook.

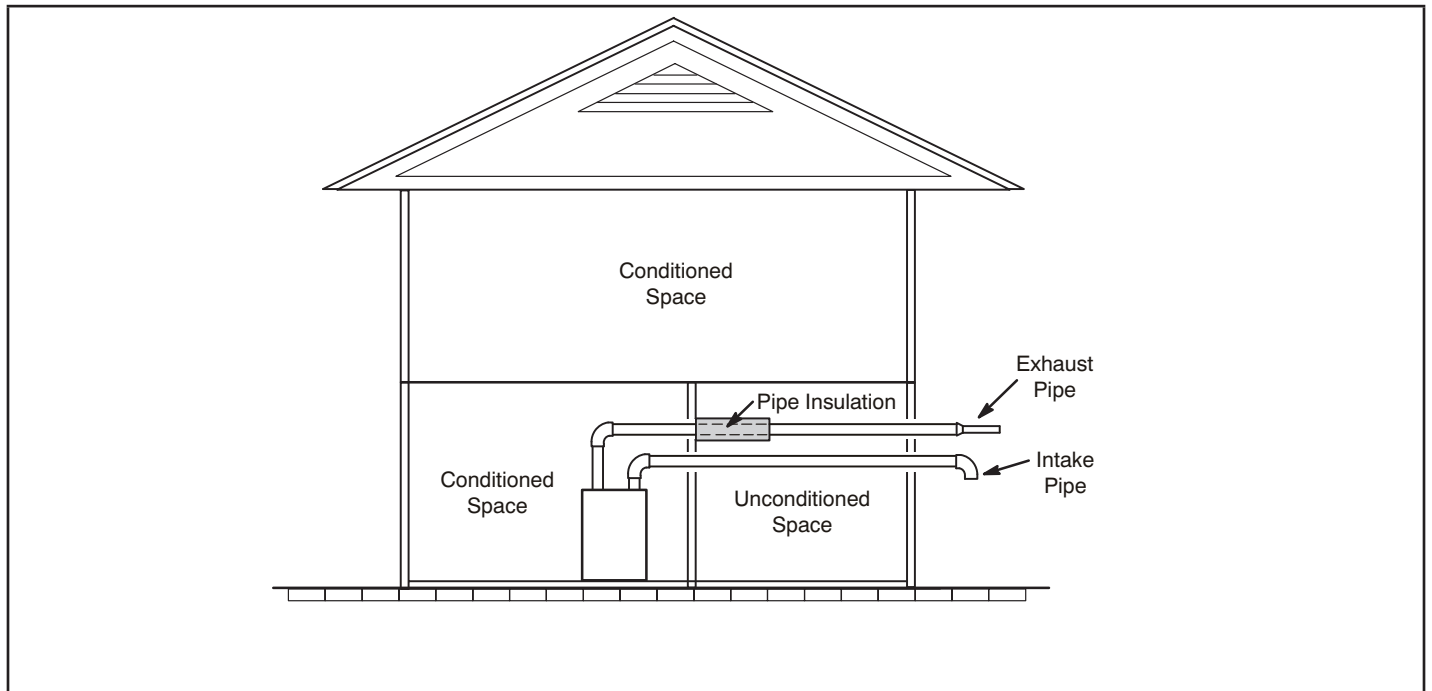
<sup>2</sup> Poly-Propylene vent pipe (PP) by Duravent and Centrotherm.

NOTE - Concentric terminations are the equivalent of 5' and should be considered when measuring pipe length.

NOTE - Maximum uninsulated vent lengths listed may include the termination(vent pipe exterior to the structure) and cannot exceed 5 linear feet or the maximum allowable intake or exhaust vent length listed in table 5 or 6 which ever is less.

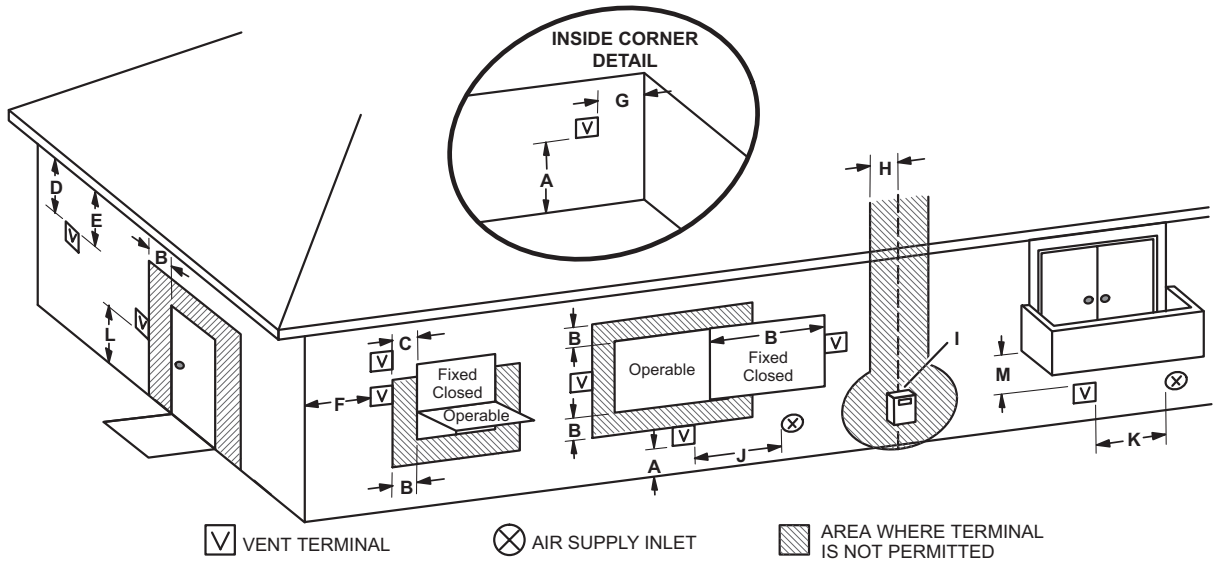
NOTE - If insulation is required in an unconditioned space, it must be located on the pipe closest to the furnace. See Figure 31.

<sup>3</sup> Vent length in the table is equivalent length. Each elbow is equivalent to 5ft of straight pipe and should be included when measuring total length.



**Figure 31**

## VENT TERMINATION CLEARANCES FOR NON-DIRECT VENT INSTALLATIONS IN THE US AND CANADA



	US Installations <sup>1</sup>	Canadian Installations <sup>2</sup>	
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 in. (305mm) above average snow accumulation.	12 inches (305mm) or 12 in. (305mm) above average snow accumulation.
B =	Clearance to window or door that may be opened	4 feet (1.2 m) below or to side of opening; 1 foot (30cm) above opening	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
C =	Clearance to permanently closed window	* 12"	* 12"
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (610 mm) from the center line of the terminal	* Equal to or greater than soffit depth.	* Equal to or greater than soffit depth.
E =	Clearance to unventilated soffit	* Equal to or greater than soffit depth.	* Equal to or greater than soffit depth.
F =	Clearance to outside corner	* No minimum to outside corner	* No minimum to outside corner
G =	Clearance to inside corner	*	*
H =	Clearance to each side of center line extended above meter / regulator assembly	* 3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly
I =	Clearance to service regulator vent outlet	* 3 feet (.9m)	3 feet (.9m)
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
K =	Clearance to mechanical air supply inlet	3 feet (.9m) above if within 10 feet (3m) horizontally	6 feet (1.8m)
L =	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.1m)†	7 feet (2.1m)†
M =	Clearance under veranda, porch, deck or balcony	*12 inches (305mm)‡	12 inches (305mm)‡

<sup>1</sup> In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code

<sup>2</sup> In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

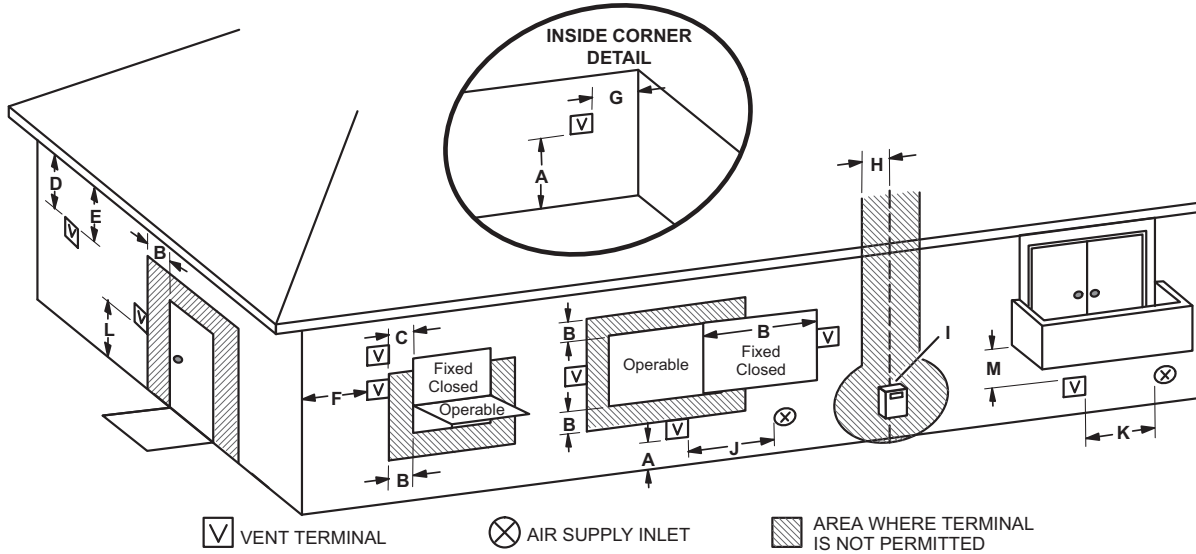
† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Lennox recommends avoiding this location if possible.

\*For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions."

**Figure 32**

## VENT TERMINATION CLEARANCES FOR DIRECT VENT INSTALLATIONS IN THE US AND CANADA



	US Installations <sup>1</sup>	Canadian Installations <sup>2</sup>	
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 in. (305mm) above average snow accumulation.	12 inches (305mm) or 12 in. (305mm) above average snow accumulation.
B =	Clearance to window or door that may be opened	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (228mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
C =	Clearance to permanently closed window	* 12"	* 12"
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (610mm) from the center line of the terminal	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
E =	Clearance to unventilated soffit	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
F =	Clearance to outside corner	* No minimum to outside corner	* No minimum to outside corner
G =	Clearance to inside corner	*	*
H =	Clearance to each side of center line extended above meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly
I =	Clearance to service regulator vent outlet	* 3 feet (.9m)	3 feet (.9m)
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (228mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
K =	Clearance to mechanical air supply inlet	3 feet (.9m) above if within 10 feet (3m) horizontally	6 feet (1.8m)
L =	Clearance above paved sidewalk or paved driveway located on public property	* 7 feet (2.1m)	7 feet (2.1m)†
M =	Clearance under veranda, porch, deck or balcony	*12 inches (305mm)‡	12 inches (305mm)‡

<sup>1</sup> In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code

<sup>2</sup> In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Lennox recommends avoiding this location if possible.

\*For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions."

**Figure 33**

## Details of Intake and Exhaust Piping Terminations for Direct Vent Installations

**NOTE** - In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged to outdoors.

**NOTE** - Flue gas may be slightly acidic and may adversely affect some building materials. If any vent termination is used and the flue gasses may impinge on the building material, corrosion-resistant shield (minimum 24 inches square) should be used to protect the wall surface. If the optional tee is used, the protective shield is recommended. The shield should be constructed using wood, plastic, sheet metal or other suitable material. All seams, joints, cracks, etc. in the affected area should be sealed using an appropriate sealant. See Figure 42.

Intake and exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figure 34 through Figure 41 show typical terminations.

1 - Intake and exhaust terminations are not required to be in the same pressure zone. You may exit the intake on one side of the structure and the exhaust on another side (Figure 35). You may exit the exhaust out the roof and the intake out the side of the structure (Figure 36).

2 - Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Maximum separation is 3" (76mm) on roof terminations and 6" (152mm) on side wall terminations.

**NOTE** - When venting in different pressure zones, the maximum separation requirement of intake and exhaust pipe DOES NOT apply.

3 - On roof terminations, the intake piping should terminate straight down using two 90° elbows (See Figure 34).

4 - Exhaust piping must terminate straight out or up as shown. A reducer may be required on the exhaust piping at the point where it exits the structure to improve the velocity of exhaust away from the intake piping. See TABLE 8.

**NOTE** - Care must be taken to avoid recirculation of exhaust back into intake pipe.

5 - On field-supplied terminations for side wall exit, exhaust piping may extend a maximum of 12 inches (305mm) for 2" PVC and 20 inches (508mm) for 3" (76mm) PVC beyond the outside wall. Intake piping should be as short as possible. See Figure 42.

6 - On field-supplied terminations, a minimum distance between the end of the exhaust pipe and the end of the intake pipe without a termination elbow is 8" and a minimum distance of 6" with a termination elbow. See Figure 42.

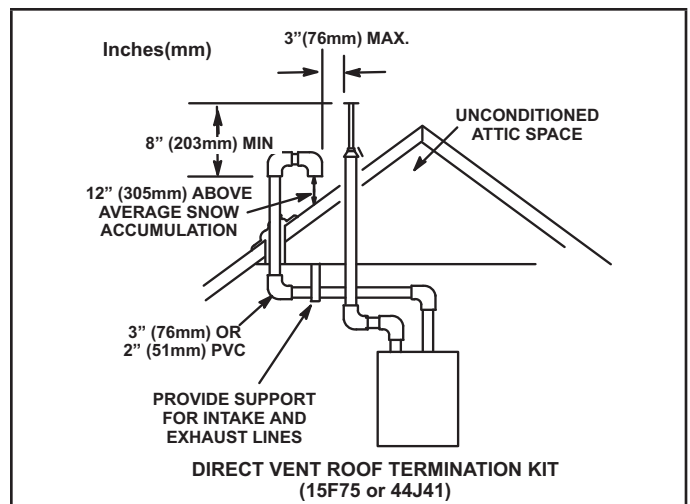


Figure 34

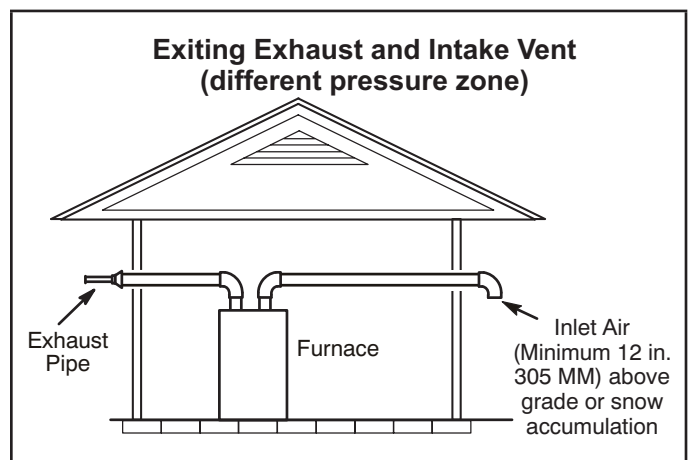


Figure 35

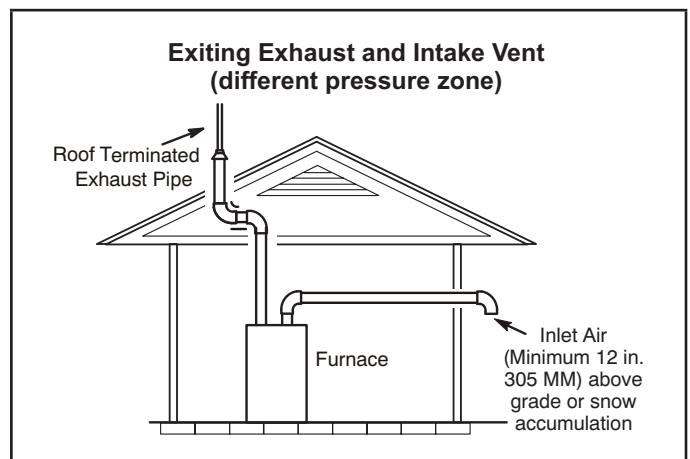


Figure 36

TABLE 8

Exhaust Pipe Termination Size Reduction

EL196UHE Model	Termination Pipe Size
*030, *045, *070	1-1/2" (38mm)
*090	2" (51mm)
110	

\*Use the provided 1-1/2" accelerator if matched with the flushmount termination.

- 7 - If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported. At least one bracket must be used within 6" from the top of the elbow and then every 24" (610mm) as shown in Figure 42, to prevent any movement in any direction. When exhaust and intake piping must be run up an outside wall, the exhaust piping must be terminated with pipe sized per TABLE 8. The intake piping may be equipped with a 90° elbow turndown. Using turndown will add 5 feet (1.5m) to the equivalent length of the pipe.
- 8 - A multiple furnace installation may use a group of up to four terminations assembled together horizontally, as shown in Figure 40.

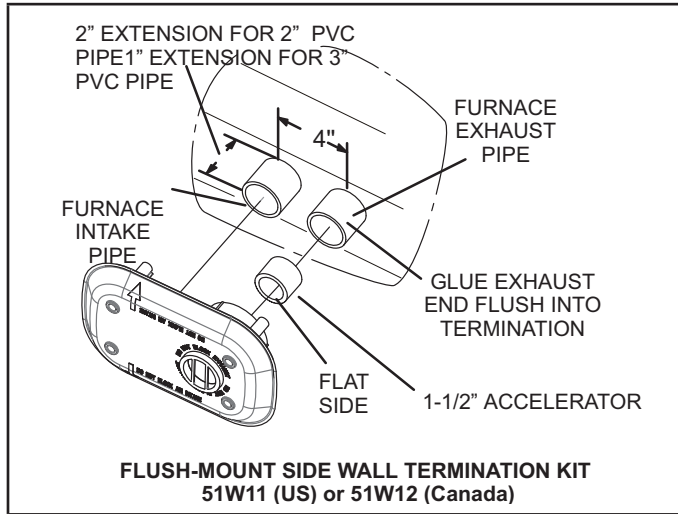


Figure 37

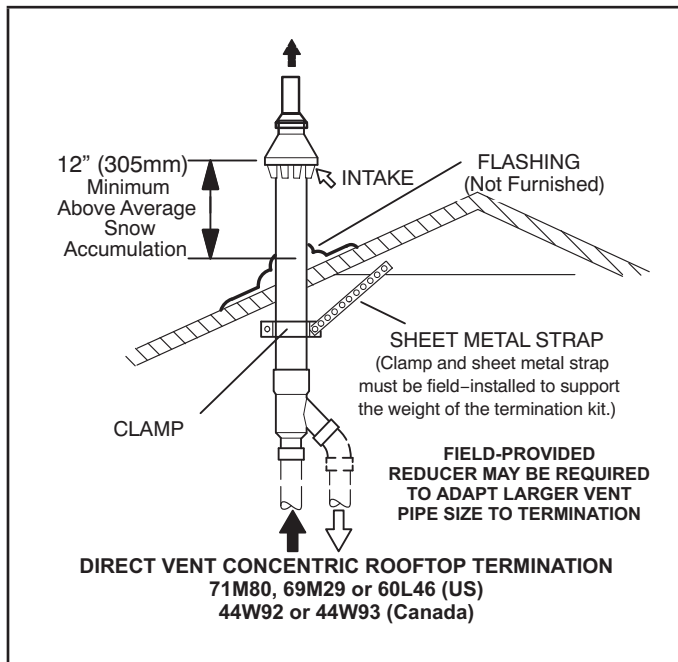


Figure 38

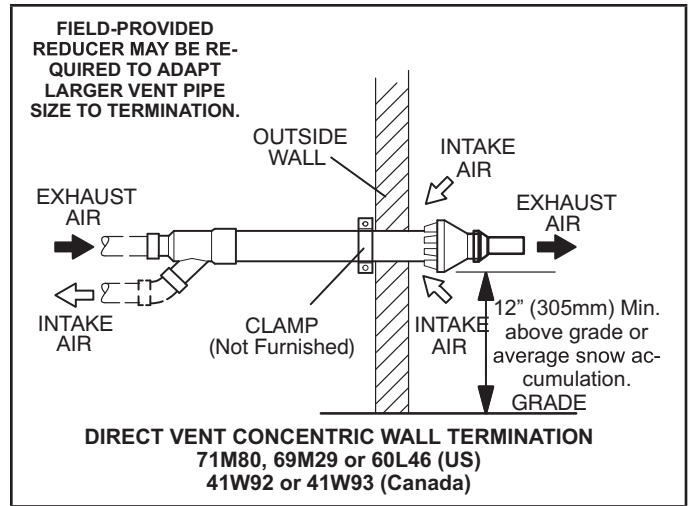


Figure 39

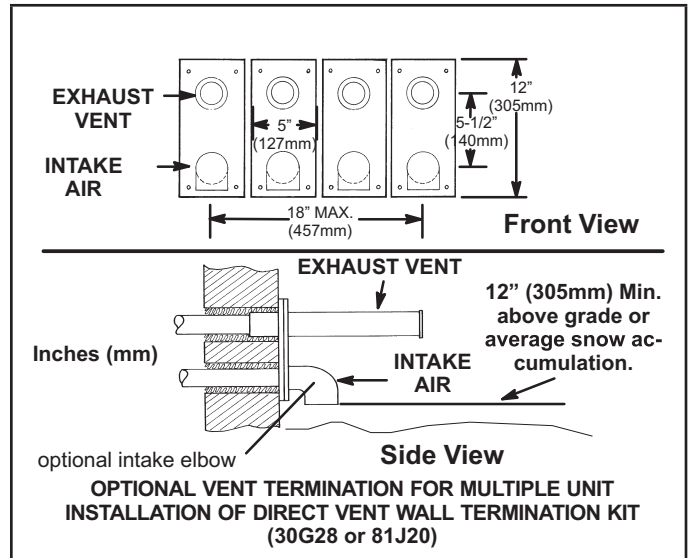


Figure 40

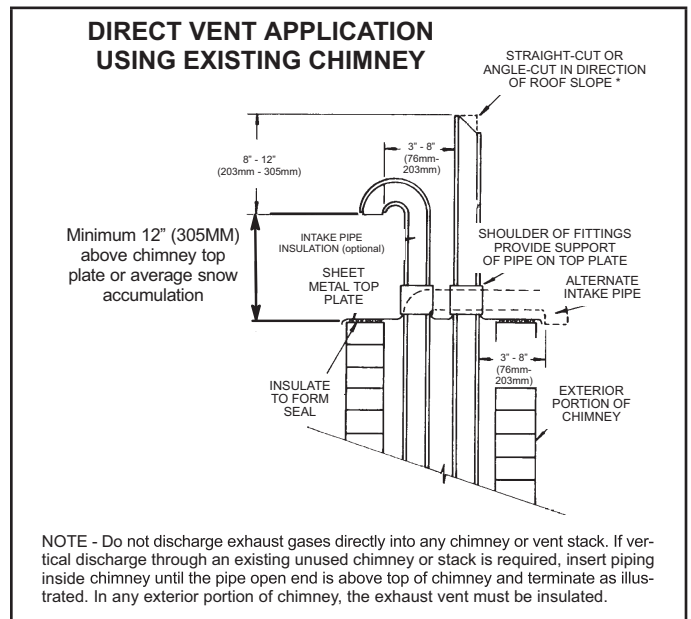
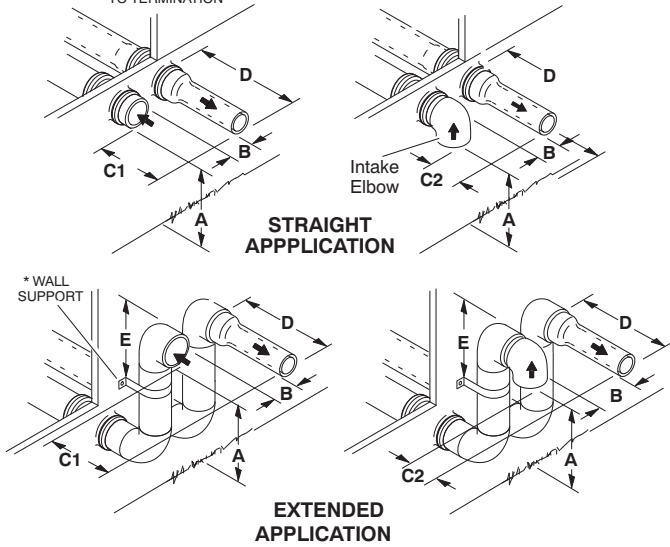


Figure 41

### FIELD FABRICATED WALL TERMINATION

NOTE - FIELD-PROVIDED REDUCER MAY BE REQUIRED TO ADAPT LARGER VENT PIPE SIZE TO TERMINATION



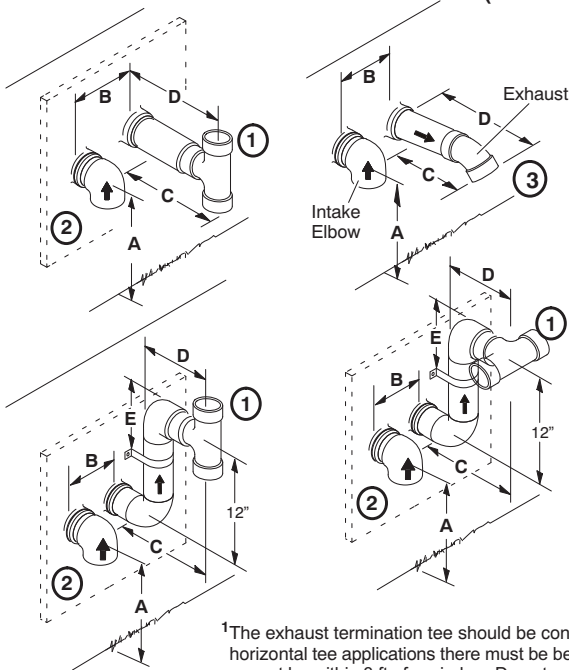
	2" (51mm) Vent Pipe	3" (76mm) Vent Pipe
A- Minimum clearance above grade or average snow accumulation	12" (305 mm)	12" (305 mm)
B- Maximum horizontal separation between intake and exhaust	6" (152 mm)	6" (152 mm)
C1 -Minimum from end of exhaust to inlet of intake	8" (203 mm)	8" (203 mm)
C2 -Minimum from end of exhaust to inlet of intake	6" (152 mm)	6" (152 mm)
D- Maximum exhaust pipe length	12" (305 mm)	20" (508 mm)
E- Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152 mm)	6" (152 mm)

See maximum allowable venting tables for venting lengths with this arrangement.

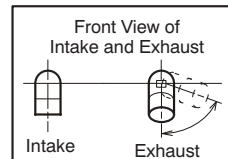
\* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm).

NOTE - One wall support must be within 6" (152 mm) from top of each pipe (intake and exhaust) to prevent movement in any direction.

### ALTERNATE TERMINATIONS (TEE & FORTY-FIVE DEGREE ELBOWS ONLY)



	2" (51MM) Vent Pipe	3" (76MM) Vent Pipe
A- Clearance above grade or average snow accumulation	12" (305 mm) Min.	12" (305 mm) Min.
B- Horizontal separation between intake and exhaust	6" (152 mm) Min. 24" (610 mm) Max.	6" (152 mm) Min. 24" (610 mm) Max.
C- Minimum from end of exhaust to inlet of intake	9" (227 mm) Min.	9" (227 mm) Min.
D- Exhaust pipe length	12" (305 mm) Min. 16" (405 mm) Max.	12" (305 mm) Min. 20" (508 mm) Max.
E- Wall support distance from top of each pipe (intake/exhaust)	6" (152 mm) Max.	6" (152 mm) Max.



<sup>1</sup>The exhaust termination tee should be connected to the 2" or 3" PVC flue pipe as shown in the illustration. In horizontal tee applications there must be a minimum of 3 ft away from covered patios or any living areas and cannot be within 3 ft of a window. Do not use an accelerator in applications that include an exhaust termination tee. The accelerator is not required.

<sup>2</sup> As required. Flue gas may be acidic and may adversely affect some building materials. If a side wall vent termination is used and flue gases will impinge on the building materials, a corrosion-resistant shield (24 inches square) should be used to protect the wall surface. If optional tee is used, the protective shield is recommended. The shield should be constructed using wood, sheet metal or other suitable material. All seams, joints, cracks, etc. in affected area, should be sealed using an appropriate sealant.

<sup>3</sup> Exhaust pipe 45° elbow can be rotated to the side away from the combustion air inlet to direct exhaust away from adjacent property. The exhaust must never be directed toward the combustion air inlet.

Figure 42

## Details of Exhaust Piping Terminations for Non-Direct Vent Applications

Exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figure 43 and Figure 44 show typical terminations.

- 1 - Exhaust piping must terminate straight out or up as shown. The termination pipe must be sized as listed in TABLE 8. The specified pipe size ensures proper velocity required to move the exhaust gases away from the building.
- 2 - On field supplied terminations for side wall exit, exhaust piping may extend a maximum of 12 inches (305mm) for 2" PVC and 20 inches (508mm) for 3" (76mm) PVC beyond the outside wall.
- 3 - If exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported every 24 inches (610mm). When exhaust piping must be run up an outside wall, any reduction in exhaust pipe size must be done after the final elbow.
- 4 - Distance between exhaust pipe terminations on multiple furnaces must meet local codes.

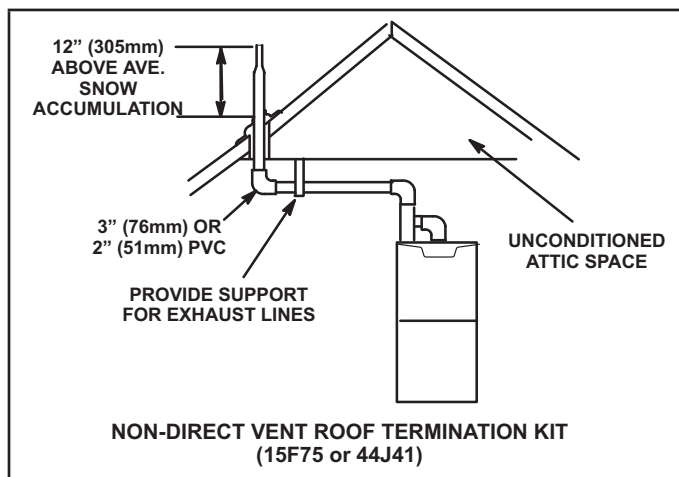


Figure 43

### Crawl Space and Extended Horizontal Venting

Lennox provides kit 51W18 (USA) kit 15Z70 (Canada) to install 2" or 3" PVC exhaust piping through the floor joists and into the the crawl space. See Figure 45. This kit can also be used as a supplemental drain for installations with condensate run back in the vent pipe (ie. long horizontal runs, unconditioned spaces, etc.).

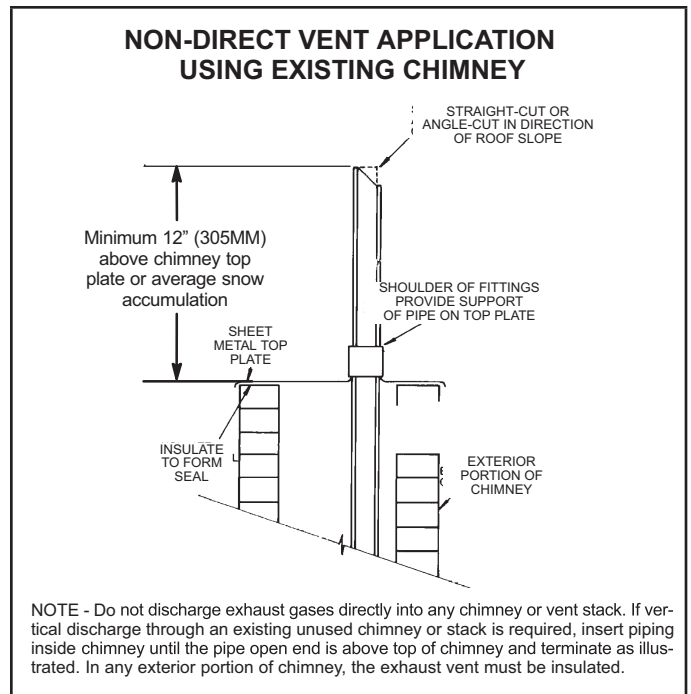


Figure 44

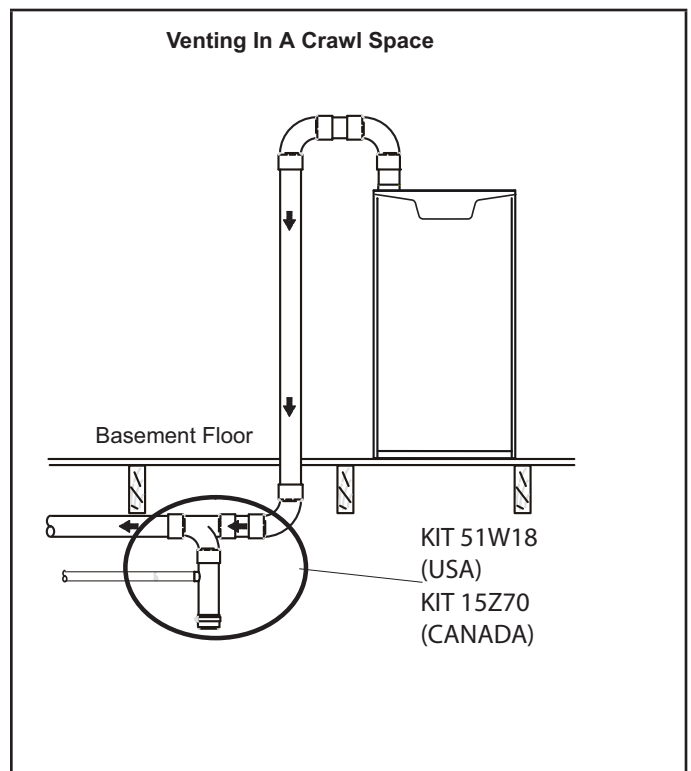


Figure 45

### Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping in upflow applications. In horizontal applications, the condensate trap must extend below the unit. An 8" service clearance is required for the condensate trap.

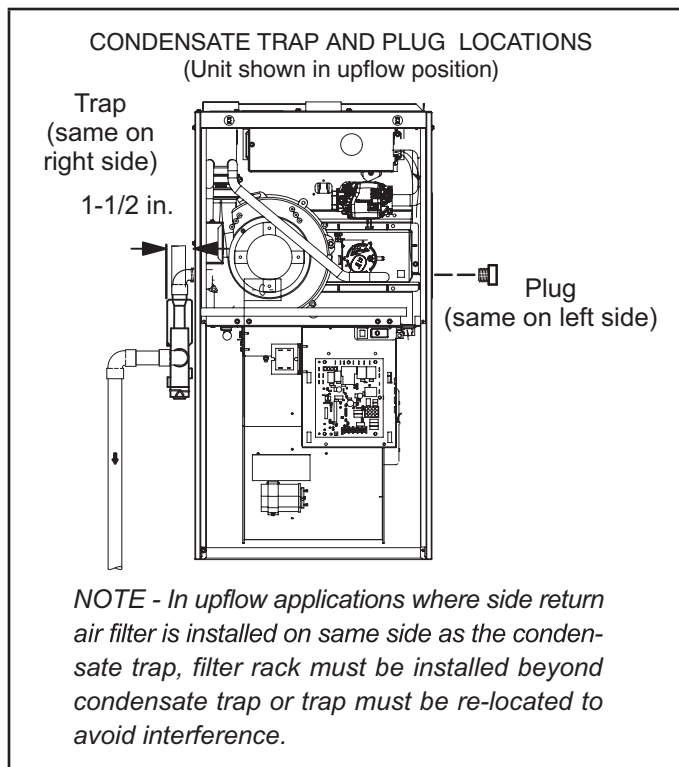
Refer to Figure 46 and Figure 48 for condensate trap locations. Figure 54 shows trap assembly using 1/2" PVC or 3/4" PVC.

**NOTE** - If necessary the condensate trap may be installed up to 5' away from the furnace. Use PVC pipe to connect trap to furnace condensate outlet. Piping from furnace must slope down a minimum of 1/4" per ft. toward trap.

- 1 - Determine which side condensate piping will exit the unit, location of trap, field-provided fittings and length of PVC pipe required to reach available drain.
- 2 - Use a large flat head screw driver or a 1/2" drive socket extension and remove plug (figure 46) from the cold end header box at the appropriate location on the side of the unit. Install provided 3/4 NPT street elbow fitting into cold end header box. Use Teflon tape or appropriate pipe dope.

**NOTE** - Cold end header box drain plugs are factory installed. Check the unused plug for tightness to prevent leakage.

- 3 - Install the cap over the clean out opening at the base of the trap. Secure with clamp. See figure 54.



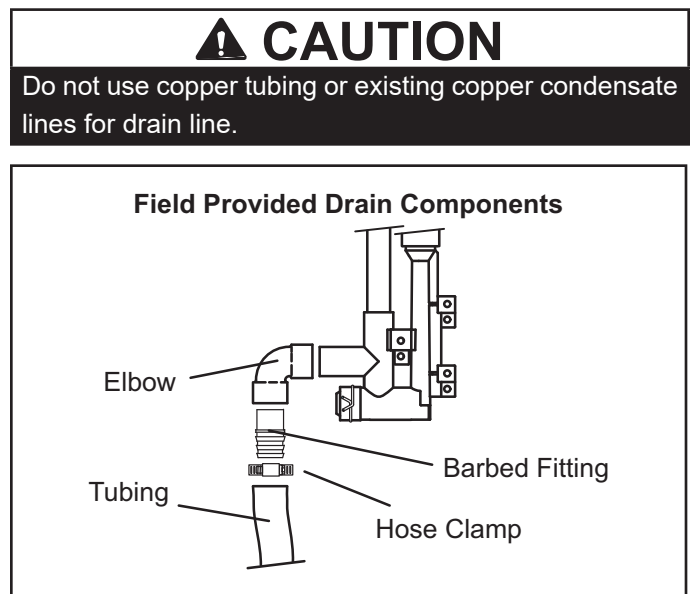
**Figure 46**

- 4 - Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in Figure 54. Route the condensate line to an open drain. Condensate line must maintain a 1/4" downward slope from the furnace to the drain.

- 5 - Figure 49 and Figure 51 shows the furnace and evaporator coil using a separate drain. If necessary the condensate line from the furnace and evaporator coil can drain together. See Figure 50, Figure 52 and Figure 53. Upflow furnace (Figure 52) - In upflow furnace applications the field provided vent must be a minimum 1" to a maximum 2" length above the condensate drain outlet connection. Any length above 2" may result in a flooded heat exchanger if the combined primary drain line were to become restricted. Horizontal furnace (Figure 53) - In horizontal furnace applications the field provided vent must be a minimum 4" to a maximum 5" length above the condensate drain outlet connection. Any length above 5" may result in a flooded heat exchanger if the combined primary drain line were to become restricted.

**NOTE** - In horizontal applications it is recommended to install a secondary drain pan underneath the unit and trap assembly.

**NOTE** - Appropriately sized tubing and barbed fitting may be used for condensate drain. Attach to the drain on the trap using a hose clamp. See Figure 47.



**Figure 47**

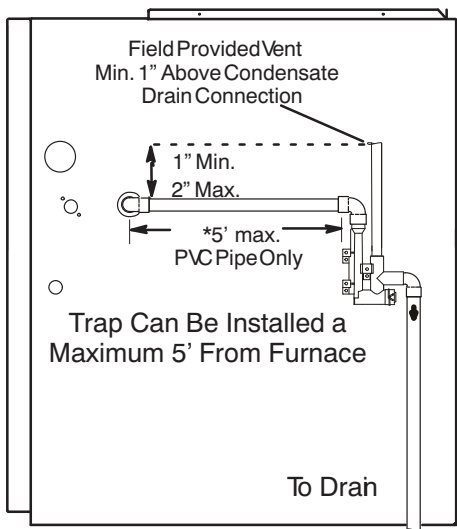
- 6 - If unit will be started immediately upon completion of installation, prime trap per procedure outlined in Unit Start-Up section.

Condensate line must slope downward away from the trap to drain. If drain level is above condensate trap, condensate pump must be used. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate trap and line. Heating cable kit is available from Lennox in various lengths; 6 ft. (1.8m) - kit no. 26K68 and 24 ft. (7.3m) - kit no. 26K69.



### CONDENSATE TRAP LOCATIONS

(Unit shown in upflow position with remote trap)



\*Piping from furnace must slope down a minimum 1/4" per ft. toward trap

Figure 48

### Condensate Trap With Optional Overflow Switch

From Evaporator Coil

Field-Provided Vent  
(Upflow/Furnace 1" Min. to 2" Max.  
Horizontal Furnace 4" Min. to 5" Max. above  
condensate drain connection)

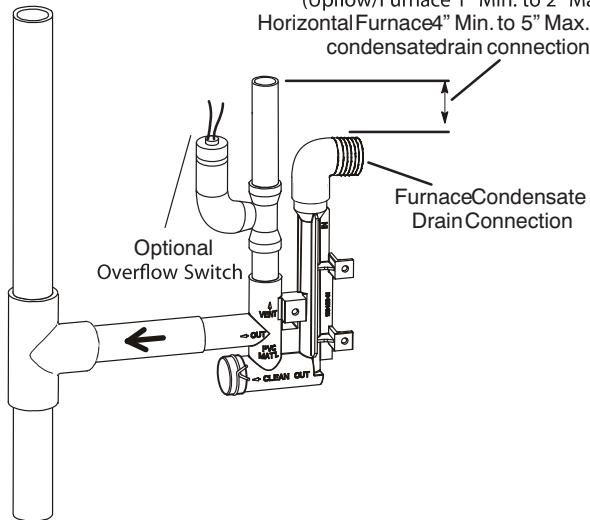


Figure 50

### Furnace With Evaporator Coil Using A Separate Drain

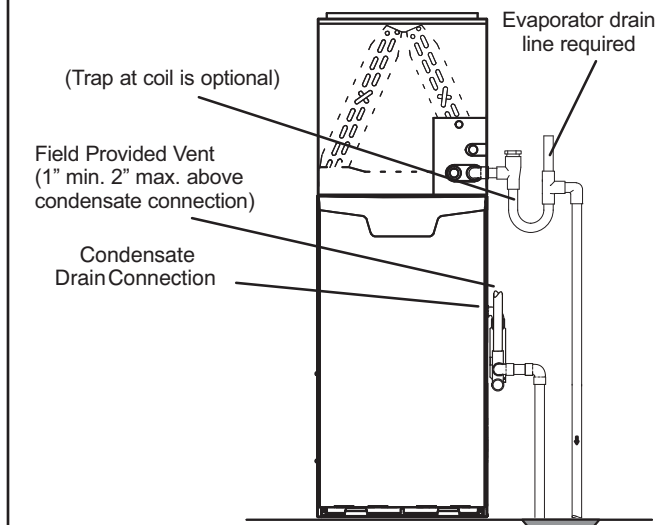
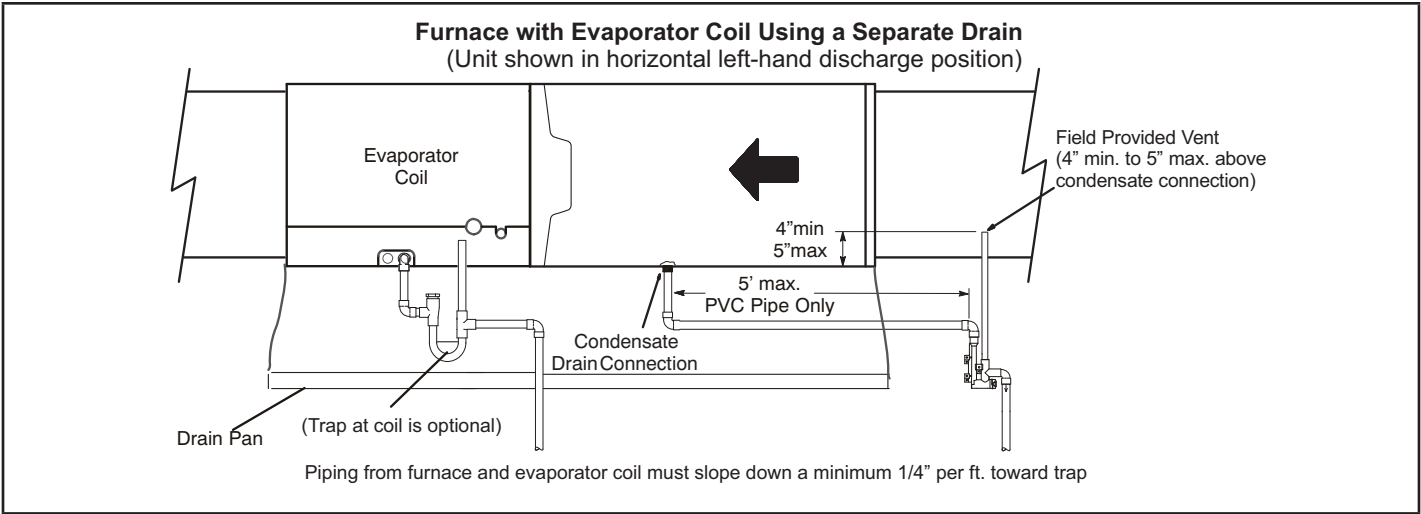
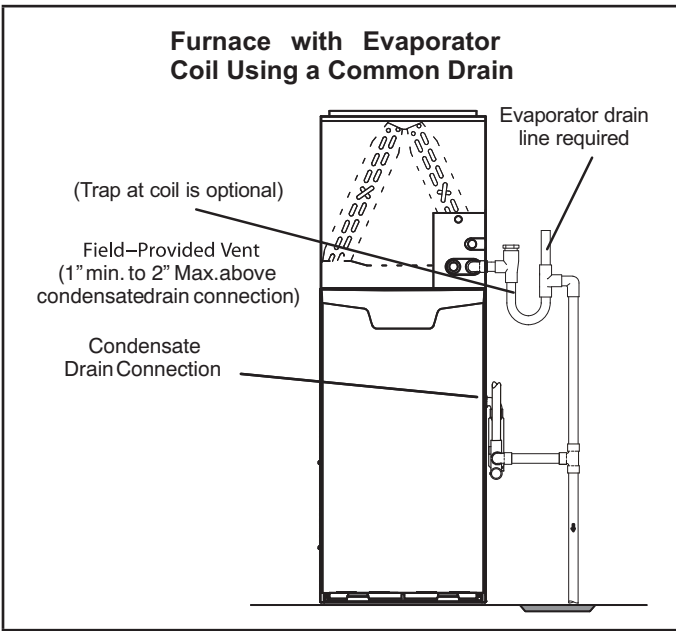


Figure 49



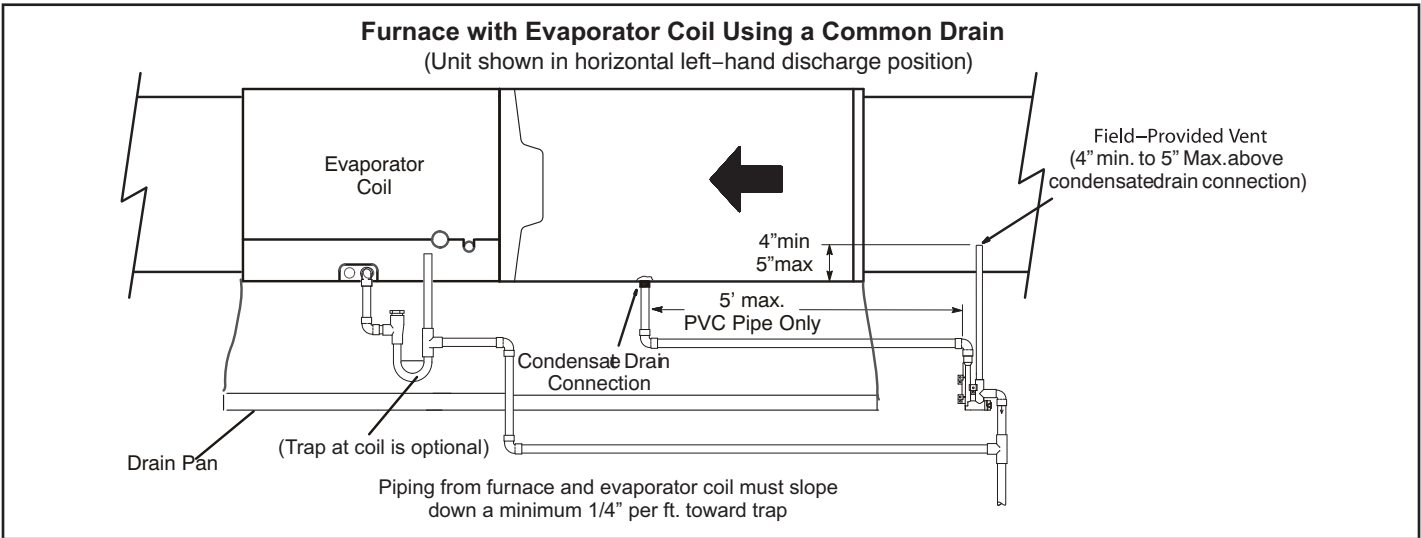
**Figure 51**



**Figure 52**

**⚠ IMPORTANT**

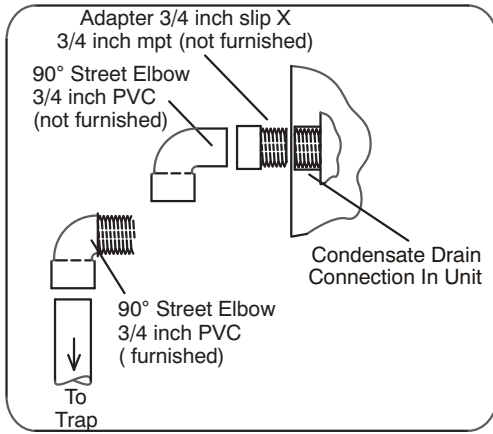
When combining the furnace and evaporator coil drains together, the A/C condensate drain outlet must be vented to relieve pressure in order for the furnace pressure switch to operate properly.



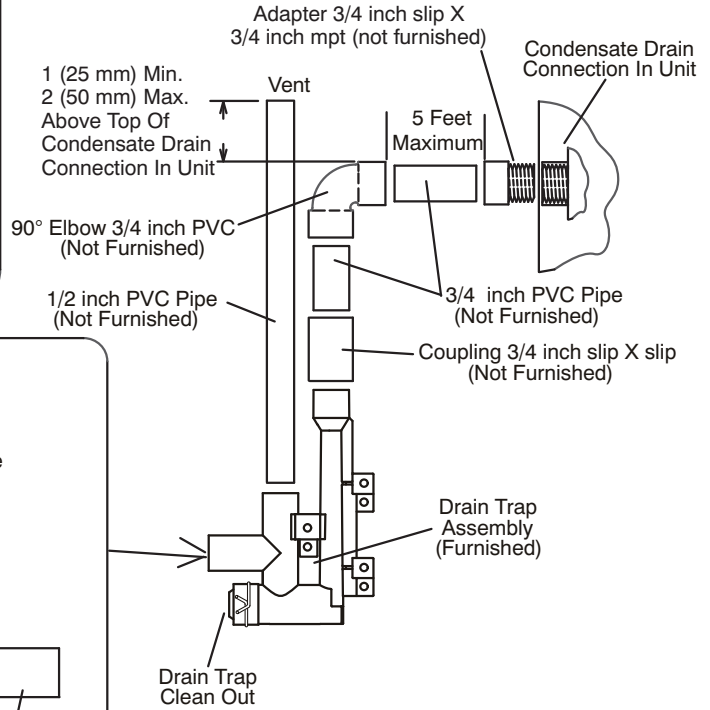
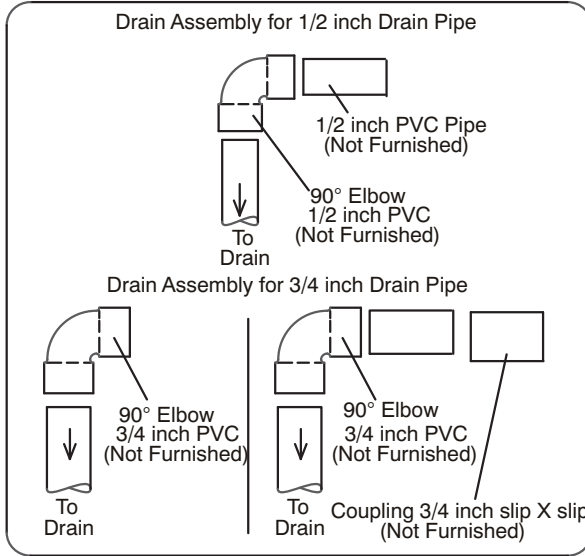
**Figure 53**

**TRAP / DRAIN ASSEMBLY USING 1/2" PVC OR 3/4" PVC**

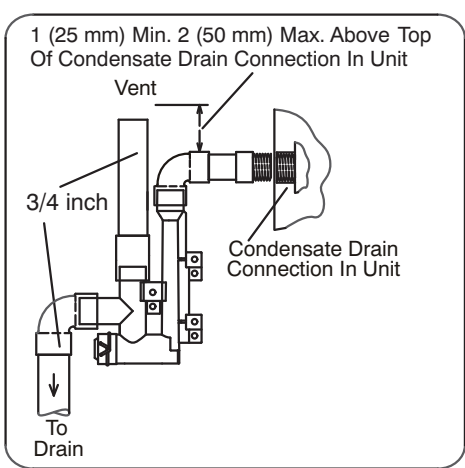
Optional Condensate Drain Connection



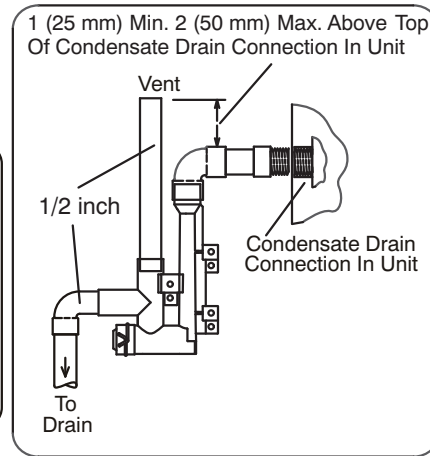
Optional Drain Piping From Trap



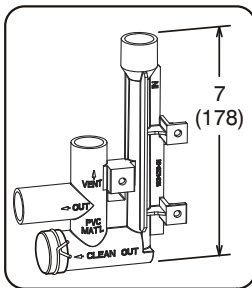
Drain Trap Assembly with 3/4 inch Piping



Drain Trap Assembly with 1/2 inch Piping



Drain Trap Assembly (Furnished)



**Figure 54**

## 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.

### ⚠ 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.

### ⚠ WARNING

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

1 - Gas piping may be routed into the unit through either the left- or right-hand side. Supply piping enters into the gas valve from the side of the valve as shown in Figure 56. 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 gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. TABLE 9 lists recommended pipe sizes for typical applications.

**NOTE** - Use two wrenches when connecting gas piping to avoid transferring torque to the manifold.

3 - Gas piping must not run in or through air ducts, clothes chutes, chimneys or gas vents, dumb waiters or elevator shafts. Center gas line through piping hole. Gas line should not touch side of unit. See Figure 56 and Figure 57.

4 - Piping should be sloped 1/4 inch per 15 feet (6mm per 5.6m) upward toward the gas meter from the furnace. The piping must be supported at proper intervals, every 8 to 10 feet (2.44 to 3.05m), using suitable hangers or straps. Install a drip leg in vertical pipe runs to serve as a trap for sediment or condensate.

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 61.

6 - In some localities, codes may require installation of a manual main shut-off valve and union (furnished by installer) external to the unit. 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.

#### 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.

Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection.

*The furnace must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at pressures greater than or equal to 1/2 psig (3.48 kPa, 14 inches w.c.).*

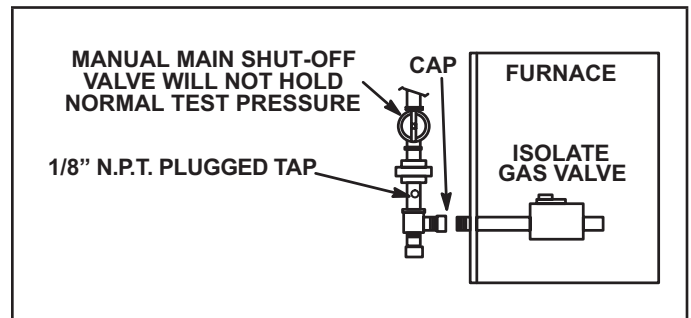


Figure 55

### ⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See Figure 55. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa).

### ⚠ WARNING

#### FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection. Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed.

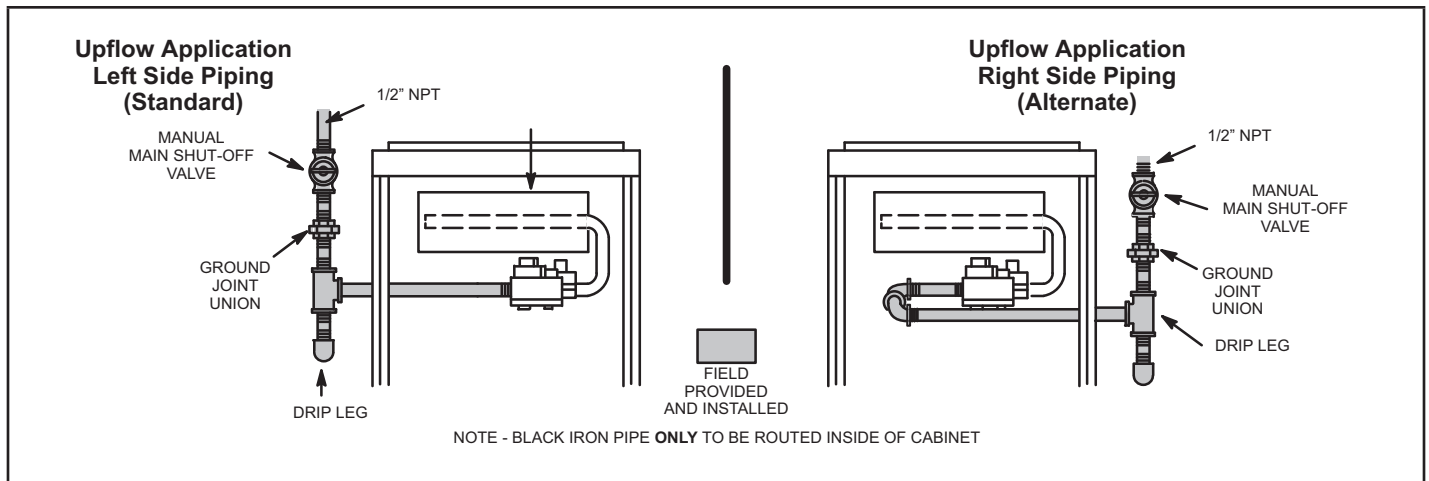


Figure 56

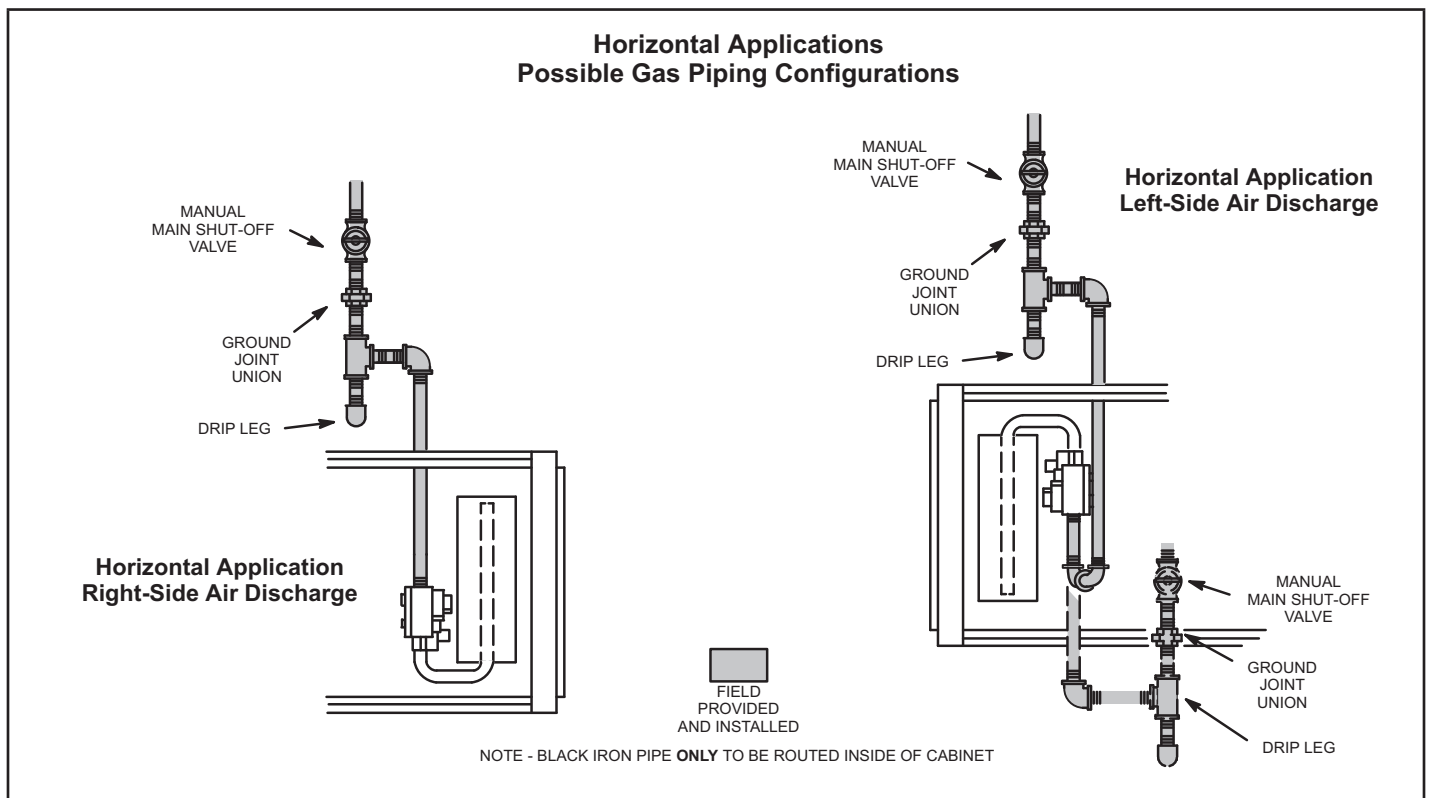


Figure 57

**TABLE 9**  
**Gas Pipe Capacity - ft<sup>3</sup>/hr (m<sup>3</sup>/hr)**

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

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

### 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 main burner has 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.

## 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.

#### ⚠ WARNING



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

#### ⚠ 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.

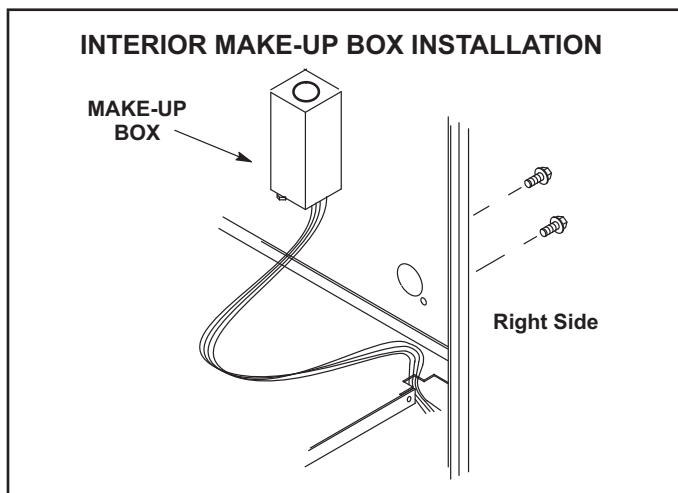


Figure 58

The unit is equipped with a field make-up box. The make-up box may be moved to the right side of the furnace to facilitate installation. Secure the excess wire to the existing harness to protect it from damage.

Refer to Figure 59 for field wiring, schematic wiring diagram and troubleshooting.

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.

#### ⚠ 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.

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 unit wiring diagram shown in Figure 59. Use 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.

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) for the USA and current Canadian Electric Code part 1 (CSA standard C22.1) for Canada. A green ground wire is provided in the field make-up box.

**NOTE** - The EL196UHE furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

#### Accessory Terminals

One line voltage "EAC" 1/4" spade terminal is provided on the furnace integrated control. See Figure 60 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 "120 HUM" 1/4" spade terminal is provided on the furnace integrated control. See Figure 60 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 relay.

One 24V "H" 1/4" spade terminal is provided on the furnace integrated control. See Figure 60 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. Install the room thermostat according to the instructions provided with the thermostat. See Figure 59 for thermostat designations. If the furnace is being matched with a heat pump, refer to the thermostat installation instruction for set up.

### Indoor Blower Speeds

- 1 - When the thermostat is set to "FAN ON," the indoor blower will run continuously on the fan speed (FAN) when there is no cooling or heating demand. See TABLE 18 on page 54 for allowable circulation speeds.

- 2 - When the EL196UHE is running in the heating mode, the indoor blower will run on the heating speed (HEAT). See TABLE 17 on page 54 for allowable heating speeds.

- 3 - When there is a cooling demand, the indoor blower will run on the cooling speed (COOL).

### 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% THD (total harmonic distortion).

**TABLE 10**  
**IGNITION CONTROL**

RED LED Flash Code <sup>2</sup>	Diagnostic Codes / Status of Furnace
Off	No power to control or board fault detected
Heartbeat <sup>1</sup>	Normal Operation - Idle, Continuous Fan, Cool
Continuous Rapid Flash	Call For Heat / Burner Operation
1	Reverse Line Voltage Polarity
2	Improper Earth Ground
3	Burner failed to light, or lost flame during heat demand
4	Low Flame Signal - check flame sensor
5	Watchguard - burner failed to light, exceeded maximum number of retries or recycles.
6	Not Used
7	Primary or Secondary Limit Open or Watchguard Mode - Limit Switch Open longer than 3 minutes
8	Rollout Switch Open
9	Pressure Switch failed to close or opened during heat demand
10	Watchguard - Pressure Switch opened 5 times during one heat demand
11	Pressure Switch stuck closed prior to activation of combustion air inducer
12	Flame Sensed without gas valve energized
13	Low Line Voltage
Notes	
Note - 1	A "Heartbeat" is indicated by a "Slow Flash" - 1 sec on 1 sec off, repeating
Note - 2	Error codes are indicated by a "rapid flash" - the LED flashes X times at 1/2 second on 1/2 second off, remains off for 3 seconds then repeats.
Note - 3	Last 10 error codes are stored in memory including when power is shut off to the unit. - To recall, press and release button, most recent will be displayed first, LED off for 3 sec, then next error code is displayed, etc. To clear error codes, depress and hold button longer than 5 seconds.



# TYPICAL EL196UHE WIRING DIAGRAM

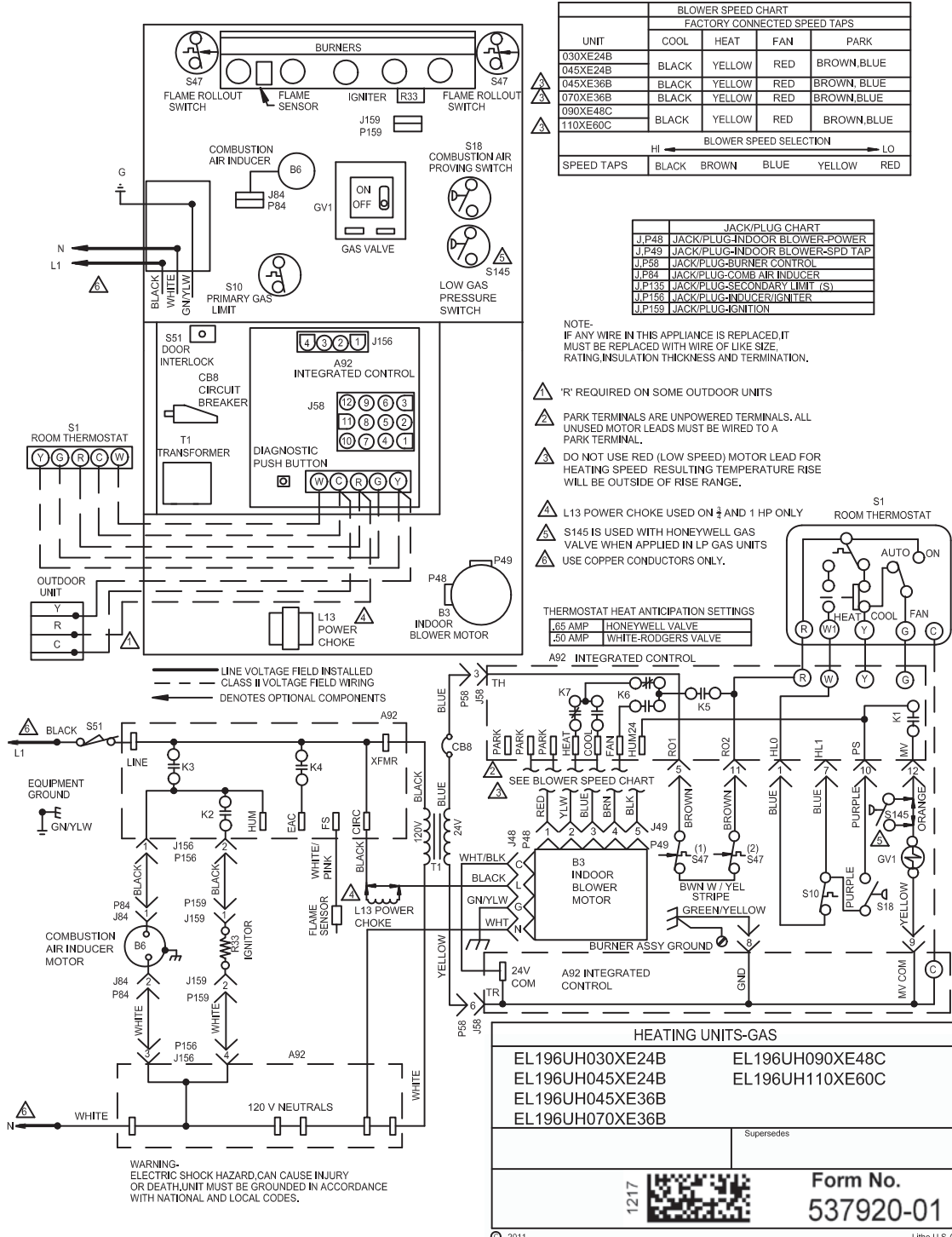
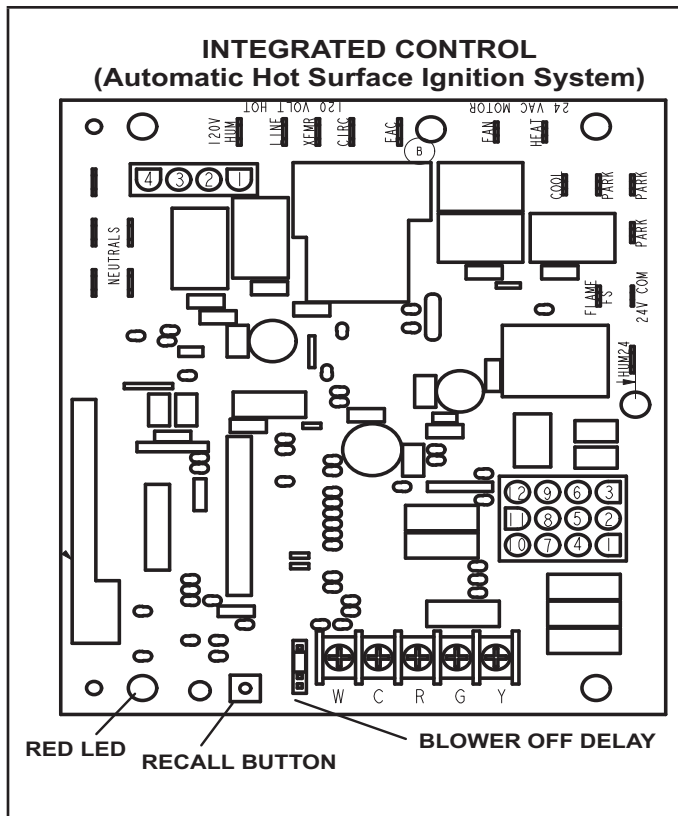


Figure 59



**Figure 60**

**TABLE 11**

1/4" QUICK CONNECT TERMINALS	
120HUM	Humidifier 120VAC
LINE	120VAC
XFMR	Transformer 120VAC
CIRC	Indoor blower 120VAC
EAC	Indoor air quality accessory 120VAC
NEUTRAL	Common 120VAC
HUM24	Humidifier 24VAC
3/16" QUICK CONNECT TERMINALS	
COOL	Cooling tap 24VAC
HEAT	Heating tap 24VAC
FAN	Continuous blower 24 VAC
PARK (no power)	Park terminal for speed taps
FLAME / FS	Flame Sense
24 COM	Common 24VAC

**Unit Start-Up**

FOR YOUR SAFETY READ BEFORE OPERATING

**⚠ 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**



Danger of explosion. Can cause injury or product or property damage. 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** the unit, smell all around the furnace 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 EL196UHE is equipped with a gas control switch (lever). Use only your hand to move switch. Never use tools. If the the switch will not move by hand, do not try to repair it. Force or attempted repair may result in a fire or explosion.

**Placing the furnace into operation:**

EL196UHE units are equipped with an automatic hot surface ignition system. Do not attempt to manually light burners on this furnace. 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 these units.

## Priming Condensate Trap

The condensate trap should be primed with water prior to start-up to ensure proper condensate drainage. Either pour 10 fl. oz. (300 ml) of water into the trap, or follow these steps to prime the trap:

- 1 - Follow the lighting instructions to place the unit into operation.
- 2 - Set the thermostat to initiate a heating demand.
- 3 - Allow the burners to fire for approximately 3 minutes.
- 4 - Adjust the thermostat to deactivate the heating demand.
- 5 - Wait for the combustion air inducer to stop. Set the thermostat to initiate a heating demand and again allow the burners to fire for approximately 3 minutes.
- 6 - Adjust the thermostat to deactivate the heating demand and wait for the combustion air inducer to stop. At this point, the trap should be primed with sufficient water to ensure proper condensate drain operation.

## 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 61)

- 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 access panel.
- 6 - Move gas valve switch to OFF. See Figure 61.
- 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.
- 8 - Move gas valve switch to ON. See Figure 61.

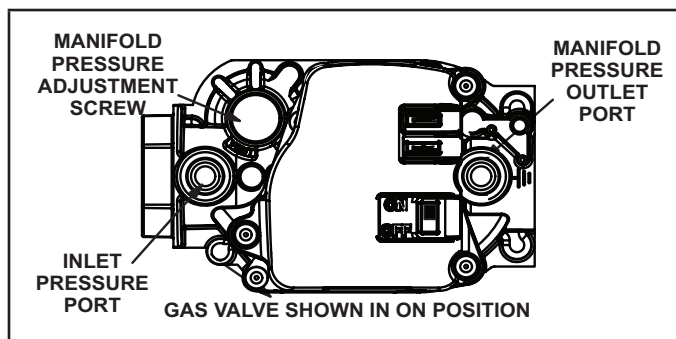


Figure 61

- 9 - Replace the 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 access panel.
- 4 - Move gas valve switch to OFF.
- 5 - Replace the 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 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 lockout? If the unit locks out again, inspect the unit for blockages.

## Heating Sequence Of Operation

- 1 - When thermostat calls for heat, combustion air inducer 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. To interrupt the 60-minute "WATCHGUARD" period, move thermostat from "Heat" to "OFF" then back to "Heat". Heating sequence then restarts at step 1.

## Unit Start-Up

### Gas Flow (Approximate)

**TABLE 12**

GAS METER CLOCKING CHART				
EL196UHE Unit	Seconds For One Revolution			
	Natural		LP/Propane	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-030	120	240	300	600
-045	80	160	200	400
-070	55	110	136	272
-090	41	82	102	204
-110	33	66	82	164
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 12. If manifold pressure matches TABLE 13 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

When testing supply gas pressure, use the 1/8" N.P.T. plugged tap or pressure post located on the gas valve to facilitate test gauge connection. See figure 61. Check gas line pressure with unit firing at maximum rate. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire.

On multiple unit installations, each unit should be checked separately, with and without units operating. Supply pressure must fall within range listed in TABLE 13.

#### Check Manifold Pressure

After supply pressure has been checked and adjusted, check manifold pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold pressure are made as verification of proper regulator adjustment.

## IMPORTANT

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

Follow the steps below. Gas manifold Kit 10L34 provides additional components if needed.

- 1 - Connect the test gauge positive side "+" to manifold pressure tap on gas valve.
- 2 - Tee into the gas valve regulator vent hose and connect to test gauge negative "-".
- 3 - Start unit and let run for 5 minutes to allow for steady state conditions.
- 4 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in TABLE 13.
- 5 - Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.
- 6 - Start unit and perform leak check. Seal leaks if found.

**TABLE 13**

#### Supply Line and Manifold Pressure (inches w.c.)

Unit	Fuel	Manifold Pressure	Line Pressure
All	Nat	3.5	4.5 - 10.5
All	LP/Propane	10.0	11.0 - 13.0

#### Proper Combustion

Furnace should operate 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 14**

EL196 Unit	CO2% Nat	CO2% LP
-030	7.5- 8.5	8.2 - 9.5
-045		
-070		
-090		
-110		

#### High Altitude Information

**NOTE** - In Canada, certification for installations at elevations over 4500 feet (1372 m) is the jurisdiction of local authorities.

Units may be installed at altitudes up to 10,000 ft. above sea level. See table 16 for de-rate manifold values. Units installed at altitude of 7501 - 10,000 feet require an orifice change. Units installed at altitude of 4501 - 10,000 feet require a pressure switch change which can be ordered separately. TABLE 16 lists conversion kit and pressure switch requirements at varying altitudes.

The combustion air pressure switch is factory-set and requires no adjustment.

**TABLE 15**  
**Manifold and Supply Line Pressure 0-10,000ft.**

EL196 Unit	Gas	Manifold Pressure in. wg.					Supply Line Pressure in. w.g. 0 - 10000 ft.	
		0 - 4500 ft	4501 - 5500 ft	5501 - 6500 ft	6501 - 7500 ft	7501 - 10,000 ft		
All Models	Natural	3.5	3.3	3.2	3.1	3.5	4.5	13.0
	L.P. Propane	10.0	9.4	9.1	8.9	10.0	11.0	13.0

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.

**TABLE 16**  
**Conversion Kit and Pressure Switch Requirements at Varying Altitudes**

EL196 Model	Natural to LP/Propane	High Altitude Natural Burner Orifice Kit	High Altitude LP/Propane Burner Orifice Kit	High Altitude Pressure Switch	
	0 - 7500 ft (0 - 2286m)	7501 - 10,000 ft (2286 - 3038m)	7501 - 10,000 ft (2286 - 3038m)	4501 - 7500 ft (1373 - 2286m)	7501 - 10,000 ft (2286 - 3048m)
-030	17H63	14C90	17H66	<sup>1</sup> 17H63	11U65
-045	*11K49	73W37	*11K44	No Change	11U65
-070				11U71	11U67
-090				11U70	11U64
-110				11U71	11U64

\* Conversion requires installation of a gas valve manifold spring which is provided with the gas conversion kit. Pressure switch is factory set. No adjustment necessary. All models use the factory-installed pressure switch from 0-4500 feet (0-1370 m).

<sup>1</sup> Use the pressure switch provided in kit 17H63

## Testing for Proper Venting and Sufficient Combustion Air for Non-Direct Vent Applications

### **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.

After the EL196UHE gas furnace has been started, the following test should be conducted to ensure proper venting and sufficient combustion air has been provided to the EL196UHE as well as to other gas-fired appliances which are separately vented.

If a EL196UHE furnace replaces a Category I furnace which was commonly vented with another gas appliance, the size of the existing vent pipe for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe is probably oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

The test should be conducted while all appliances (both in operation and those not in operation) are connected to the venting system being tested. If the venting system has been installed improperly, or if provisions have not been made for sufficient amounts of combustion air, corrections must be made as outlined in the previous section.

- 1 - Seal any unused openings in the venting system.
- 2 - Visually inspect the venting system for proper size and horizontal pitch. Determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- 3 - To the extent that it is practical, close all building doors and windows and all doors between the space in which the appliances connected to the venting system are located and other spaces of the building.
- 4 - Close fireplace dampers.
- 5 - Turn on clothes dryers and any appliances not connected to the 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.
- 6 - Follow the lighting instruction to place the appliance being inspected into operation. Adjust thermostat so appliance will operate continuously.
- 7 - Use the flame of match or candle to test for spillage of flue gases at the draft hood relief opening after 5 minutes of main burner operation.

8 - If improper venting is observed during any of the above tests, the venting system must be corrected or sufficient combustion/make-up air must be provided. The venting system should be re-sized to approach the minimum size as determined by using the appropriate tables in appendix G in the current standards of the National Fuel Gas Code ANSI-Z223.1/NPFA 54 in the U.S.A., and the appropriate Natural Gas and Propane appliances venting sizing tables in the current standard of the CSA-B149 Natural Gas and Propane Installation Codes in Canada.

9 - After determining that each appliance remaining connected to the common venting system properly vents when tested as indicated in step 3, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

## Other Unit Adjustments

### **Primary Limit.**

The primary limit is located on the heating compartment vestibule panel. This limit is factory set and requires no adjustment.

### **Flame Rollout Switches (Two)**

These manually reset switches are located in the burner box.

### **Pressure Switch**

The pressure switch is located in the heating compartment on the cold end header box. This switch checks for proper combustion air inducer operation before allowing ignition trial. The switch is factory-set and must not be adjusted.

### **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 17 on page 54 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.

### **Fan Control**

#### **Fan On Delay**

The heat fan on time of 30 seconds is not adjustable. The cool fan on delay is 2 seconds and not adjustable.

#### **Fan Off Delay**

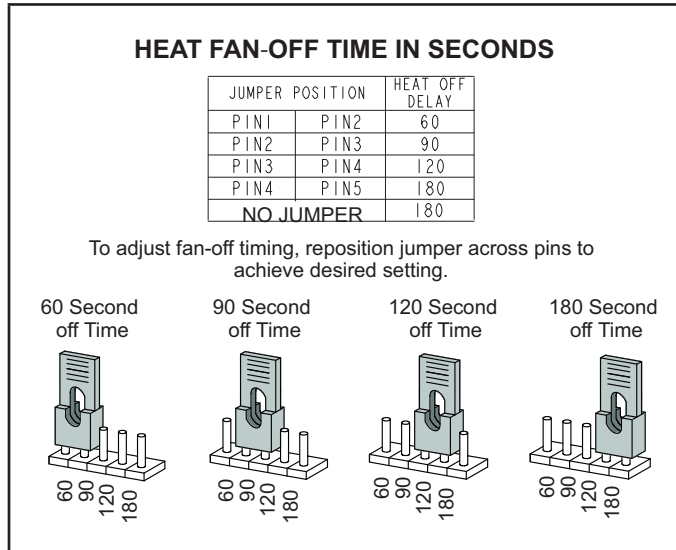
The heat fan off delay (amount of time that the blower operates after the heat demand has been satisfied) may be adjusted by changing the jumper position across the five pins on the integrated control. The unit is shipped with a factory fan off setting of 90 seconds. The fan off delay affects comfort and is adjustable to satisfy individual applications. Adjust the fan off delay to achieve a supply air temperature between 90° and 110°F 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 62. The cool fan off delay (amount of time that the blower operates after the cool demand has been satisfied) is 45 seconds and not adjustable.

## 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 TABLE 17 on page 54 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 break and remake thermostat demand to the furnace and automatically reset the integrated control to begin the ignition sequence.

## Exhaust and Air Intake Pipe

- 1 - Check exhaust and air intake connections for tightness and to make sure there is no blockage.
- 2 - Is pressure switch closed? Obstructed exhaust pipe will cause unit to shut off at pressure switch. Check termination for blockages.
- 3 - Obstructed pipe or termination may cause rollout switches to open. Reset manual flame rollout switches on burner box assembly if necessary.

## 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.

### **⚠ 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.

## Annual Furnace Maintenance

At the beginning of each heating season, and to comply with the Lennox Limited Warranty, your system should be checked 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 - Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary.
- 7 - Inspect the condensate drain and trap for leaks and cracks. The drain and trap must also be cleaned and the trap must be primed with water. Inspect the rubber hoses connected to the pressure switches for cracks or loose connections, replace as necessary. Remove the rubber hoses from the cold end header box and inspect for any blockage, clean as needed. If strainers are installed in the hoses remember to remove and clean before reinstalling the hoses.
- 8 - 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)
- 9 - 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.

- 10- Inspect the furnace intake and exhaust pipes to make sure they are in place, structurally sound, without holes, blockage or leakage and the exhaust pipe is sloped toward the furnace. Inspect terminations to ensure they are free of obstructions and are structurally sound. 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.
- 11- 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.
- 12- Check the condition of the furnace cabinet insulation and repair if necessary.
- 13- Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.
- 14- 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. 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.

#### **Winterizing and Condensate Trap Care**

- 1 - Turn off power to the furnace.
- 2 - Have a shallow pan ready to empty condensate water.
- 3 - Remove the clean out cap from the condensate trap and empty water. Inspect the trap then reinstall the clean out cap.

#### **Cleaning the Burner Assembly**

If cleaning the burners becomes necessary, follow the steps below:

- 1 - Turn off electrical and gas power supplies to furnace. Remove upper and lower furnace access panels.
- 2 - Disconnect the wires from the gas valve.
- 3 - Remove the burner box cover (if equipped).
- 4 - Disconnect the gas supply line from the gas valve. Remove gas valve/manifold assembly.
- 5 - Mark and disconnect sensor wire from the sensor. Disconnect wires from flame rollout switches.
- 6 - Disconnect combustion air intake pipe. It may be necessary to cut the existing pipe to remove burner box assembly.
- 7 - Remove four screws which secure burner box assembly to vent panel. Remove burner box from the unit.
- 8 - Use the soft brush attachment on a vacuum cleaner to gently clean the face of the burners. Visually inspect the inside of the burners and crossovers for any blockage caused by foreign matter. Remove any blockage.
- 9 - Reinstall the burner box assembly using the existing four screws. Make sure that the burners line up in the center of the burner ports.
- 10 - Reconnect the sensor wire and reconnect the 2-pin plug to the ignitor wiring harness. Reconnect wires to flame rollout switches.
- 11 - Reinstall the gas valve manifold assembly. Reconnect the gas supply line to the gas valve. Reinstall the burner box cover.
- 12 - Reconnect wires to gas valve.
- 13 - Replace the blower compartment access panel.
- 14 - Refer to instruction on verifying gas and electrical connections when re-establishing supplies.
- 15 - Follow lighting instructions to light and operate furnace for 5 minutes to ensure that heat exchanger is clean and dry and that furnace is operating properly.
- 16 - Replace heating compartment access panel.



## Repair Parts List

The following repair parts are available through Lennox dealers. When ordering parts, include the complete furnace model number listed on the CSA nameplate -- Example: EL196UH045XE36B-01. **All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.**

### Cabinet Parts

- Outer access panel
- Blower access panel
- Top Cap

### Control Panel Parts

- Transformer
- Integrated control board
- Door interlock switch

### Blower Parts

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

### Heating Parts

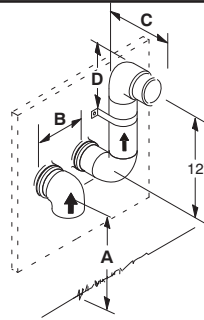
- Flame Sensor
- Heat exchanger assembly
- Gas manifold
- Combustion air inducer
- Gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Ignitor
- Primary limit control
- Flame rollout switches

## THE PROVINCE OF ONTARIO, HORIZONTAL SIDEWALL VENT APPLICATIONS ONLY

For exterior horizontal venting applications, the 2" X 1.5" reducer for 2" venting at the point where the exhaust pipe exits the structure is not required in direct or nondirect vent applications in the Province of Ontario. In these applications, the vent should be oriented such that the exhaust plume is unobjectionable. If the installation requires more separation between the flue gases and the building structure, a reducer may be installed on the exhaust pipe to increase the flue gas velocity.

## ADDENDUM FOR THE PROVINCE OF SASKATCHEWAN AND MANITOBA

See below for venting in the province of Saskatchewan and Manitoba. Lennox approves the following termination for use in Saskatchewan Canada.



	2" (51MM) Vent Pipe	3" (76MM) Vent Pipe
A - Clearance above grade or average snow accumulation	12" (305 mm) Min.	12" (305 mm) Min.
B - Horizontal separation between intake and exhaust	6" (152 mm) Min. 24" (610 mm) Max.	6" (152 mm) Min. 24" (610 mm) Max.
C - Exhaust pipe length	Per: Saskatchewan Code of Practice	
D - Wall support distance from top of each pipe (intake/exhaust)	6" (152 mm) Max.	6" (152 mm) Max.

**NOTE** - Flue gas may be acidic and may adversely affect some building materials. If flue gases impinge on the building materials, a corrosion-resistant shield should be used to protect the wall surface. The shield should be constructed using wood, sheet metal or other suitable material. All seams, joints, cracks, etc. in affected area, should be sealed using an appropriate sealant.

**Modifications to NFPA-54, Chapter 10**

**Revise NFPA-54 section 10.8.3 to add the following requirements:**

For all side wall, horizontally vented, gas-fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above the finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1 - **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall, horizontally vented, gas-fueled equipment, the installing plumber or gasfitter shall observe that a hard-wired carbon monoxide detector with an alarm and battery backup is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery-operated or hard-wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall, horizontally vented, gas-fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard-wired carbon monoxide detectors.

- a. In the event that the side wall, horizontally vented, gas-fueled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery backup may be installed on the next adjacent floor level.
- b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery-operated carbon monoxide detector with an alarm shall be installed.

2 - **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3 - **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented, gas-fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS."

4 - **INSPECTION.** The state or local gas inspector of the side wall, horizontally vented, gas-fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

**EXEMPTIONS: The following equipment is exempt from 24 CMR 5.08(2)(a) 1 through 4:**

- 1 - The equipment listed in Chapter 10 entitled "Equipment Not Required to Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
- 2 - Product Approved side wall, horizontally vented, gasfueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

**MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED.**

When the manufacturer of Product Approved side wall, horizontally vented, gas-fueled equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

- 1 - Detailed instructions for the installation of the venting system design or the venting system components; and
- 2 - A complete parts list for the venting system design or venting system.

**MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.**

When the manufacturer of Product Approved side wall, horizontally vented, gas-fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems," the following requirements shall be satisfied by the manufacturer:

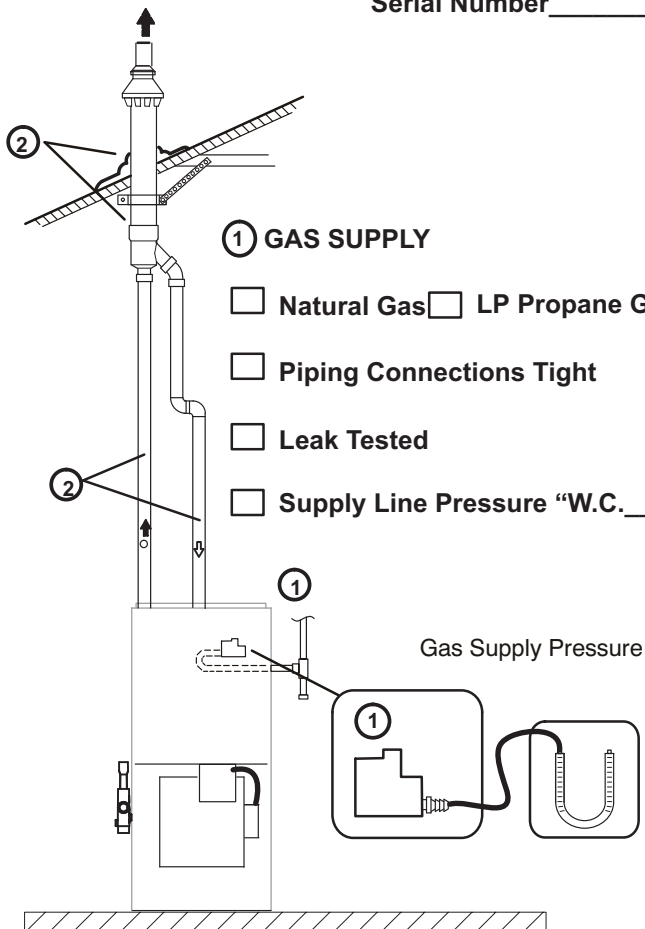
- 1 - The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
- 2 - The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

**A copy of all installation instructions for all Product Approved side wall, horizontally vented, gas-fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.**

**UNIT SET UP**

Furnace:  
Model Number \_\_\_\_\_

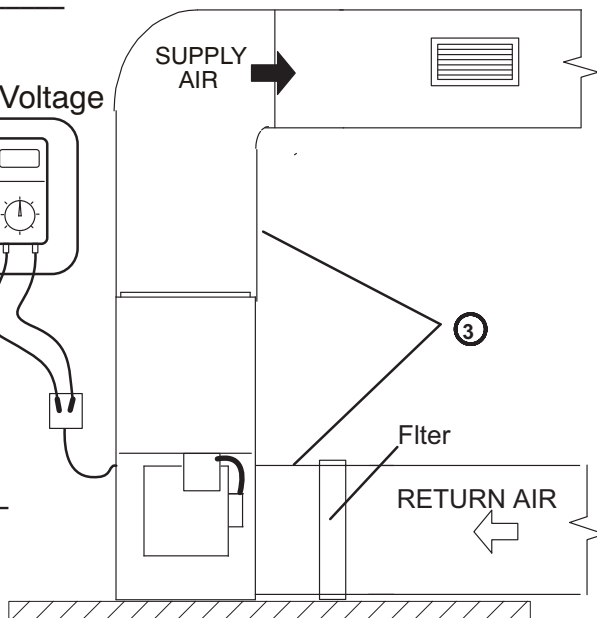
Serial Number \_\_\_\_\_



**① GAS SUPPLY**

- Natural Gas  LP Propane Gas
- Piping Connections Tight
- Leak Tested
- Supply Line Pressure "W.C." \_\_\_\_\_

Line Voltage



**③ DUCT SYSTEM**

**SUPPLY AIR DUCT**

- Sealed
- Insulated (if necessary)

**RETURN DUCT**

- Sealed
- Filter Installed and Clean
- Grilles Unobstructed

**④ VOLTAGE CHECK**

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

- Electrical Connections Tight

**② INTAKE / EXHAUST PIPE**

- All Joints Primed and Glued
- Terminations Installed Properly
- Horizontal Pipes Sloped (if applicable)
- Condensate Trap Primed / Line Sloped
- Pipes Supported
- Heat Cable Installed and Operable (if applicable)

## UNIT OPERATION

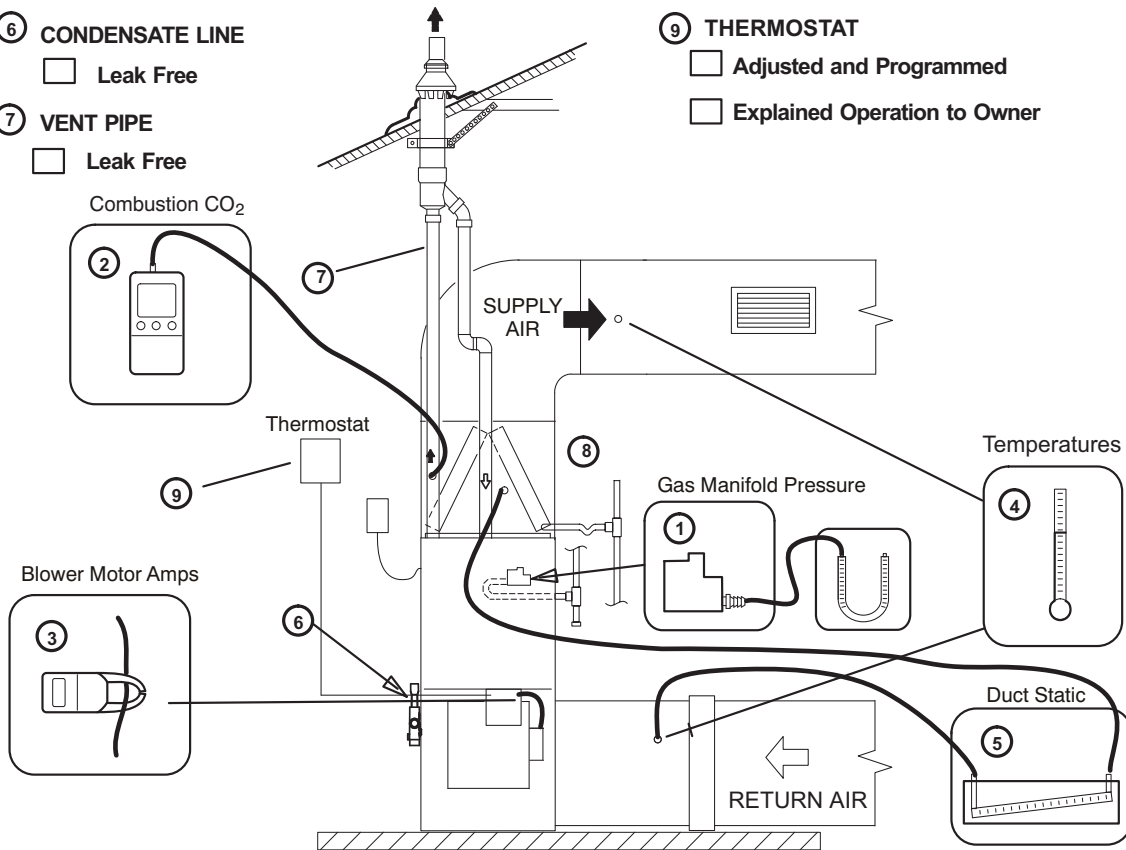
### HEATING MODE

- 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  
Supply External Static \_\_\_\_\_  
Return External Static + \_\_\_\_\_  
Total External Static = \_\_\_\_\_

### COOLING MODE

- 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 = \_\_\_\_\_
- ⑧ DRAIN LINE  
 Leak Free
- ⑨ THERMOSTAT  
 Adjusted and Programmed  
 Explained Operation to Owner

- ⑥ CONDENSATE LINE  
 Leak Free
- ⑦ VENT PIPE  
 Leak Free



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

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

**Blower Data**

## EL196UH030XE24B AND EL196UH045XE24B PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High		Medium-High		Medium		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1125	160	1015	125	935	105	830	65	905	70
0.10	1070	165	980	130	885	110	775	70	700	60
0.20	1035	175	950	140	845	115	715	75	560	50
0.30	1000	185	915	150	810	125	670	85	495	55
0.40	965	195	875	160	770	135	625	95	435	60
0.50	925	205	835	170	730	140	580	100	365	65
0.60	890	215	800	180	685	150	530	105	325	70
0.70	855	225	770	190	635	155	485	110	270	75
0.80	820	230	720	195	600	165	430	115	230	80

## EL196UH045XE36B PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High		Medium-High		Medium		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1460	335	1285	235	1190	170	910	85	870	75
0.10	1430	350	1260	245	1155	185	885	95	830	85
0.20	1405	365	1235	255	1125	200	860	105	800	90
0.30	1375	370	1205	265	1090	210	825	115	755	95
0.40	1350	380	1175	275	1055	215	780	125	710	105
0.50	1315	385	1145	285	1020	230	735	130	665	115
0.60	1245	375	1110	295	980	240	685	140	620	125
0.70	N/A	N/A	1070	305	940	250	640	145	575	135
0.80	N/A	N/A	1020	310	905	260	600	155	530	140

## EL196UH070XE36B PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High		Medium-High		Medium		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1445	315	1315	215	1215	165	930	85	925	75
0.10	1445	335	1275	230	1170	180	905	94	860	80
0.20	1415	345	1240	240	1125	190	870	101	800	85
0.30	1380	355	1205	250	1090	200	830	109	760	95
0.40	1345	370	1175	265	1055	210	790	117	710	105
0.50	1315	385	1150	280	1020	220	735	129	665	115
0.60	1275	390	1110	290	985	230	685	137	625	125
0.70	1210	395	1075	300	950	240	640	146	565	130
0.80	N/A	N/A	1030	305	915	250	595	148	535	135

**Blower Data**

**EL196UH070XE36B PERFORMANCE (Less Filter)**

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High		Medium-High		Medium		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1445	315	1315	215	1215	165	930	85	925	75
0.10	1445	335	1275	230	1170	180	905	94	860	80
0.20	1415	345	1240	240	1125	190	870	101	800	85
0.30	1380	355	1205	250	1090	200	830	109	760	95
0.40	1345	370	1175	265	1055	210	790	117	710	105
0.50	1315	385	1150	280	1020	220	735	129	665	115
0.60	1275	390	1110	290	985	230	685	137	625	125
0.70	1210	395	1075	300	950	240	640	146	565	130
0.80	N/A	N/A	1030	305	915	250	595	148	535	135

**EL196UH090XE48C PERFORMANCE (Less Filter)**

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High		Medium-High		Medium		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1765	375	1535	250	1410	180	1315	155	1155	115
0.10	1735	390	1500	260	1365	200	1270	165	1130	125
0.20	1700	405	1465	275	1330	215	1230	175	1095	135
0.30	1660	425	1435	290	1295	225	1195	190	1055	145
0.40	1640	435	1400	300	1265	235	1165	200	1010	155
0.50	1615	450	1370	315	1230	250	1125	215	965	165
0.60	1575	465	1340	325	1190	265	1080	230	925	180
0.70	1530	470	1305	340	1150	280	1045	235	885	190
0.80	N/A	N/A	1260	345	1115	285	1000	245	845	195

**EL196UH110XE60C 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.										<b>Single Side Return Air</b> – Air volumes in <b>bold</b> 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		Med-High		Medium		Med-Low		Low		High		Med-High		Medium		Med-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	2220	655	1975	440	1800	325	1665	390	1050	180	2180	685	1910	460	1750	345	1660	285	1430	195
0.10	2185	680	1925	460	1750	345	1625	285	1440	200	2155	705	1885	480	1720	360	1610	295	1415	205
0.20	2150	705	1880	480	1710	365	1590	300	1390	220	2130	725	1855	495	1685	380	1565	305	1380	220
0.30	2110	720	1850	495	1680	380	1560	320	1350	230	2085	745	1825	510	1655	390	1535	325	1335	230
0.40	2080	735	1810	520	1650	405	1515	330	1310	245	2060	760	1795	530	1625	405	1495	340	1295	245
0.50	2045	755	1785	530	1610	415	1470	350	1265	255	2030	775	1765	545	1585	425	1450	355	1255	265
0.60	2010	775	1740	545	1575	430	1440	370	1220	270	1995	785	1725	565	1550	435	1420	370	1205	275
0.70	1980	790	1705	565	1525	450	1400	375	1170	280	1960	795	1690	575	1505	455	1385	385	1165	290
0.80	1950	795	1670	580	1485	460	1360	390	1140	293	1895	790	1650	590	1465	470	1335	395	1120	295

**TABLE 17**

Allowable Heating Speeds					
Model Number	Red	Yellow	Blue	Brown	Black
All Models	Allowed	Factory Setting	Allowed	Allowed	Not Allowed

**TABLE 18**

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



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# USER'S INFORMATION MANUAL

## EL196UHE SERIES

### GAS FURNACE



#### **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.



#### **WARNING**

#### **FIRE OR EXPLOSION HAZARD.**

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



Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

#### WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

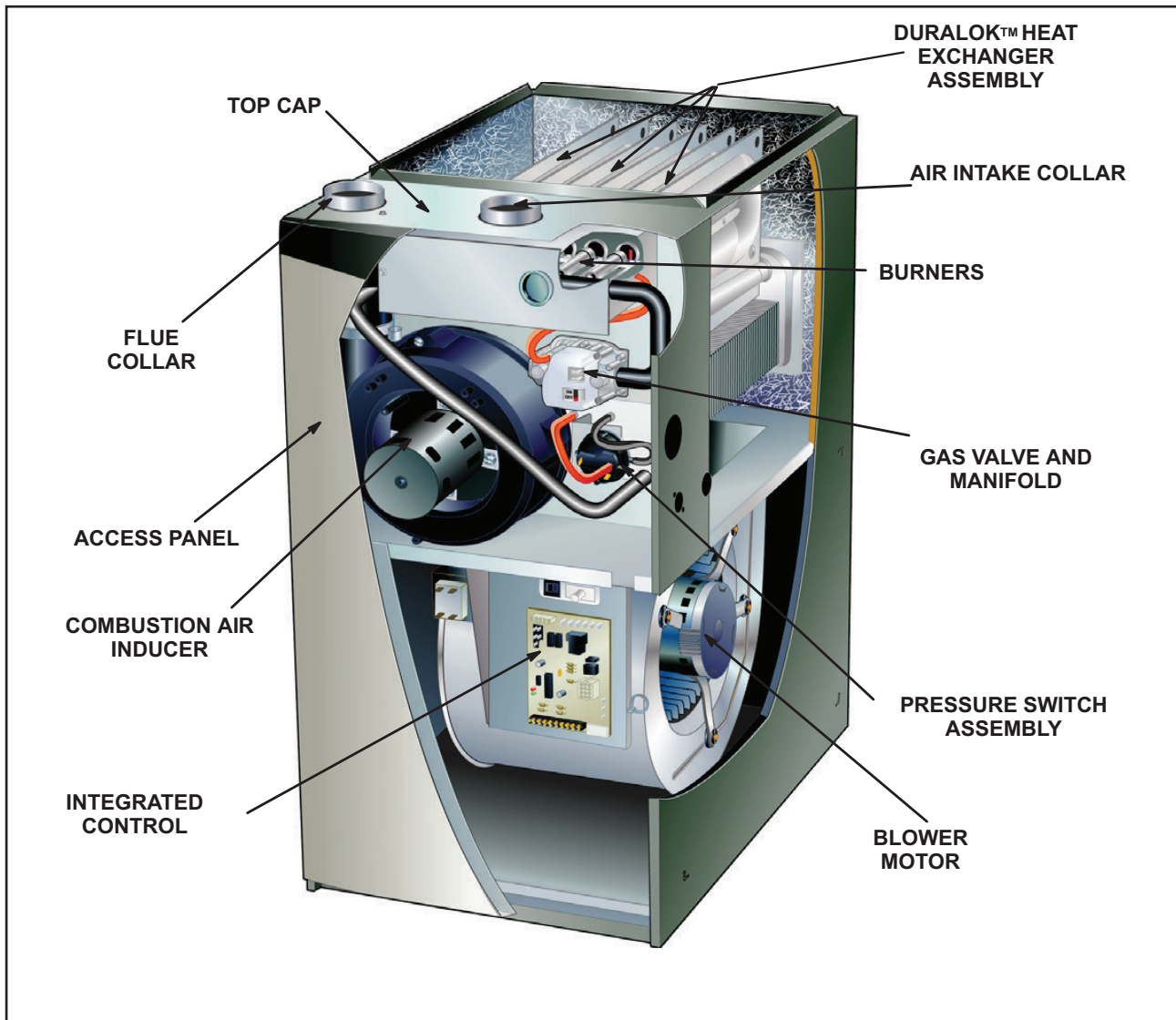


FIGURE 1

*NOTE - This manual is the property of the homeowner and must be left with the equipment user.*

**Notice to Homeowner**

This furnace is equipped with safety devices that protect you and your property. If one or more of these devices is activated, furnace operation will stop. If your home is left unattended for an extended period of time, equipment operation must be checked periodically.

If this is not possible, the water supply to the house should be shut off and the pipes should be drained. This will prevent problems associated with a NO HEAT condition (frozen pipes, etc.)

**⚠ CAUTION**

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



## **WARNING**

Do not set thermostat below 60°F (16°C) in heating mode. Setting thermostat below 60°F (16°C) reduces the number of heating cycles. Damage to the unit may occur that is not covered by the warranty.

## **WARNING**

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

## **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 licensed professional service technician (or equivalent) 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.

## **NOTICE**

Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a licensed professional installer (or equivalent) using factory-specified and approved parts.

## **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 installer (or equivalent), a service agency, or the gas supplier.

## **WARNING**

### **CARBON MONOXIDE POISONING HAZARD**

Failure to follow instruction could result in severe personal injury or death due to carbon monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building. Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

## **Safety Instructions**

- 1 - Keep the furnace area clear and free of combustible material, gasoline, and other flammable vapors and liquids. If it is installed in an insulated area, the furnace must be kept free of insulating material. Insulating material may be combustible.
- 2 - After any heavy snow, ice or frozen fog event, the furnace vent pipes may become restricted. Always check the vent system and remove any snow or ice that may be obstructing the plastic intake or exhaust pipes.
- 3 - **DO NOT** obstruct air flow to unit. Unit must receive an unobstructed flow of combustion and ventilating air. **DO NOT** block or obstruct air openings on the furnace or air openings to the area in which the furnace is installed. Take care to maintain established clearances surrounding the furnace.
- 4 - **DO NOT** store chlorine or fluorine products near unit or introduce these products into the combustion air. These products can cause furnace corrosion.
- 5 - **DO NOT** draw return air from a room where this furnace, or any other gas appliance (ie., a water heater), 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.

## **WARNING**

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

## **WARNING**

Sharp edges.

Be careful when handling unit to avoid sharp edges which may result in personal injury.

**Your furnace is a gas appliance.** It is critical that the gas supplied to the unit be completely burned to avoid the production of carbon monoxide gas. Complete combustion of the gas requires, but is not limited to, correct gas pressure and gas flow rate, adequate combustion, air, and proper venting.

## **⚠ WARNING**

**Carbon monoxide gas is invisible, odorless and toxic.**

Exposure to carbon monoxide gas can cause personal injury and even death to all occupants, including pets. Any item that is powered by or gives off heat from a combustion process (including lawn mowers, automobiles, and fireplaces) has the potential to produce carbon monoxide gas. Because of this, **Lennox recommends the use of a carbon monoxide detector in your home, even if you do not own gas appliances.** Reliable detectors are available at reasonable retail prices. Contact your Lennox dealer for more details about this investment in your safety.

Your furnace is designed to meet standards set by national agencies, and to operate safely when properly installed and maintained. However, the unit's performance can be greatly impacted by the individual installation and the operating environment. It is your responsibility to ensure that this appliance is maintained. Proper maintenance is critical for your safety and the satisfactory operation of the product. **Lennox strongly recommends annual inspection and maintenance of this appliance.** Contact your Lennox dealer for an inspection by a licensed professional service technician (or equivalent).

## **⚠ 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. Do not attempt to bleed the gas lines of air. Call your local gas provider.

### **Start-Up & Operation Information**

## **⚠ WARNING**



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

**BEFORE PLACING THE UNIT INTO OPERATION,** 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 EL196UHE will be equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the switch will not move by hand, do not try to repair it. Call a licensed professional service technician (or equivalent). Force or attempted repair may result in a fire or explosion.

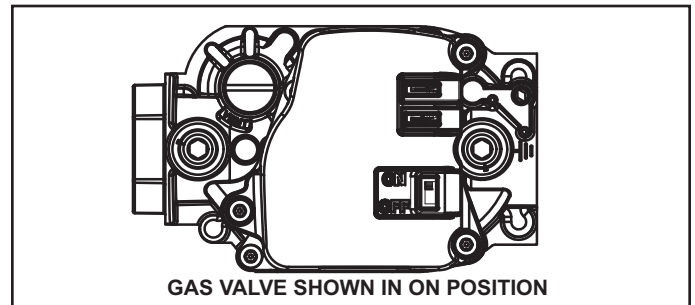
### **Placing the EL196UHE furnace into operation:**

EL196UHE units are equipped with an ignition system. Do not attempt to manually light burners on this furnace.

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 this ignition system.

### **Operating the Gas Valve (Figure 2)**

- 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. See figure 2.
- 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.
- 8 - Move switch on gas valve to ON. See figure 2.



**FIGURE 2**

- 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 section "Turning Off Gas to the Unit" and call your licensed professional service technician (or equivalent).

### **Turning Off Gas to the Unit**

- 1 - Set the thermostat to the lowest setting.
- 2 - Turn off all electrical power to the unit if service is to be performed.
- 3 - Remove the upper access panel.
- 4 - Move switch on gas valve OFF.
- 5 - Replace the upper access panel.

## Filters

All EL196UHE filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filter(s) when necessary to ensure proper furnace operation. A filter must be in place when the unit is operating. See table 1 for recommended filter sizes.

**NOTE** - Use replacement filters that are similar in size and efficiency ratings to those originally provided by the installing contractor. Use of replacement filters with higher filtration ratings may restrict air flow to the furnace. This may result in reduced unit efficiency, as well as premature blower motor failure.

TABLE 1

Furnace Cabinet Width	Filter Size	
	Side Return	Bottom Return
17-1/2"	16 X 25 X 1 (1)	16 X 25 X 1 (1)
21"	16 X 25 X 1 (1)	20 X 25 X 1 (1)

## Maintenance

A licensed professional service technician (or equivalent) should inspect the complete system each season (heating and cooling). The following maintenance procedures should only be conducted by a licensed professional service technician (or equivalent). **Do not attempt to service the unit in any way.**

### 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.

## Venting System

### WARNING

#### Asphyxiation Hazard

The exhaust vent for this furnace must be leak-free and must be securely connected to the furnace flue collar at all times.

For your safety and to fulfill the terms of the limited warranty, a licensed professional service technician (or equivalent) must annually inspect this furnace and its vent system.

Annually (before heating season) inspect furnace venting system, vent cap, heat exchanger, and burners for corrosion, deterioration, or deposits of debris. Remove any obstructions.

Inspect the furnace for obvious signs of deterioration.

Inspect the furnace venting system to make sure it is in place, physically sound, and without holes, corrosion, or blockage.

Vent pipe must be clear and free of obstructions and must slope upward away from the furnace.

Inspect the furnace return air duct connection to ensure duct is sealed to the furnace and terminates outside the space containing the furnace.

Inspect the physical support of the furnace to guarantee that it is sound without sagging, cracks or gaps around base and it maintains seal between base and support.

Inspect the condensate drain and trap for leaks and cracks. The drain and trap must also be cleaned and the trap must be filled with water.

During a seasonal check the service technician will conduct a combustion analysis. The technician will also inspect the indoor blower, burner flames, electrical connections and the venting system.

### 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.

### Burner Flame

### CAUTION

To ensure proper operation, a licensed professional service technician (or equivalent) should check the burner flame and conduct a combustion analysis annually.

### Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check for the correct voltage at the furnace (furnace operating).
- 3 - Check amp-draw on the blower motor  
Motor Nameplate \_\_\_\_\_ Actual \_\_\_\_\_

## Service Reminder

Call your Lennox service technician if the unit will not operate. Before calling, always check the following to be sure service is required:

- 1 - Check that electrical disconnect switches are **ON**.
- 2 - Check room thermostat for proper setting.
- 3 - Replace any blown fuses or reset circuit breakers.
- 4 - Gas valve should be **ON**.
- 5 - Air filter should not be plugged, which will limit air flow.
- 6 - Is gas turned on at meter?
- 7 - Is manual main shut-off valve open?

Record the model and serial number of the furnace. These numbers are on the unit nameplate, which is located on the blower deck below the combustion air inducer.

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

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

## Safety Precautions

**If you discover any of the following, shut down your unit, and contact a Lennox dealer for an inspection by a licensed professional service technician (or equivalent).**

- If you repeatedly hear any new or unfamiliar sounds while your unit is operating, there may be a problem. For example, poorly performing burners can produce unfamiliar noises.
- If you smell any unusual odors, your unit may be operating improperly. For example, units can give off unfamiliar odors if components are required to operate in abnormal conditions.
- Look for visible signs of a malfunctioning unit. Examples include unusual amounts of condensate on windows inside your house, visibly burnt components or unusual dirt or rust accumulations on the vent pipe or in the unit.
- If you experience headache, nausea, fatigue, or dizziness, the cause could be exposure to carbon monoxide gas. This is often misdiagnosed as the flu because symptoms are similar. If you suffer from flu-like symptoms that are exaggerated at home, but seem to subside while you are away from the house, exposure to carbon monoxide could be the cause.

Your vigilance may pay off in early detection of a problem before either personal injury or property damage occurs. Do not hesitate to contact a qualified service technician as an investment in your well being.

## Planned Service

### Annual Furnace Maintenance

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

- 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 - Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary.
- 7 - Inspect the condensate drain and trap for leaks and cracks. The drain and trap must also be cleaned and the trap must be primed with water. Inspect the rubber hoses connected to the pressure switches for cracks or loose connections, replace as necessary. Remove the rubber hoses from the cold end header box and inspect for any blockage, clean as needed. If strainers are installed in the hoses remember to remove and clean before reinstalling the hoses.
- 8 - 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)
- 9 - 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.
- 10 - Inspect the furnace intake and exhaust pipes to make sure they are in place, structurally sound, without holes, blockage or leakage and the exhaust pipe is sloped toward the furnace. Inspect terminations to ensure they are free of obstructions and are structurally sound. 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.

**NOTE** - After any heavy snow, ice or frozen fog event the furnace vent pipes may become restricted. Always check the vent system and remove any snow or ice that may be obstructing the plastic intake or exhaust pipes.

- 11 - 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.
- 12 - Check the condition of the furnace cabinet insulation and repair if necessary.
- 13 - Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.
- 14 - 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 for each stage of operation. Check the supply pressure and the manifold pressure on both low fire and high 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.

## Repair Parts List

The following repair parts are available through Lennox dealers. When ordering parts, include the complete furnace model number listed on the CSA International nameplate -- Example: EL196UH45XE36B. **All service must be done by a licensed professional installer (or equivalent), a service agency, or the gas supplier.**

### Cabinet Parts

- Upper access panel
- Blower access panel
- Top Cap

### Control Panel Parts

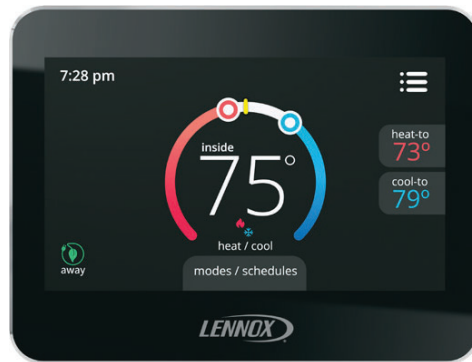
- Transformer
- Integrated control
- Door interlock switch

### Blower Parts

- Blower wheel
- Motor
- Motor mounting frame
- 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 switches



# ComfortSense® 5500 Thermostat

## User Guide

507500-02  
6/2018  
Supersedes 5/2017

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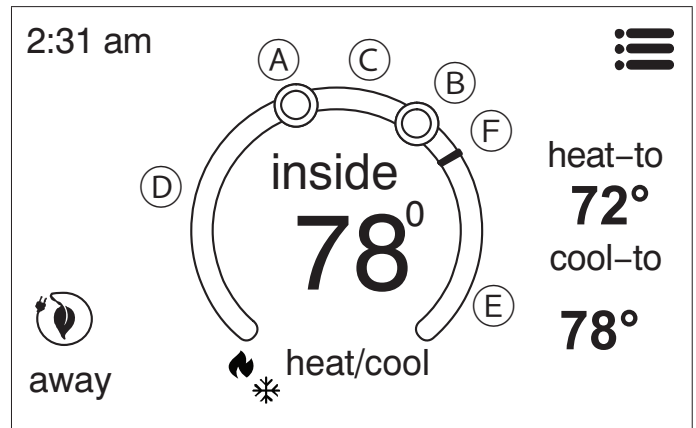
### Features

The ComfortSense® 5500 Series thermostat is an electronic 7-day, single-stage, programmable, touchscreen thermostat. Features are:

- Large, clear color display that shows the current and set temperatures and time.
- Ergonomic design.
- Smooth Setback Recovery starts system early to achieve setpoint at start of program period.
- Compressor short-cycle protection (5 minutes).
- Real-time clock keeps time during power failures and automatically adjusts for daylight savings time and leap year.

- Program hold options allow user to override the program schedule as desired by time and date.
- Select individual days or groups of days to set programming.
- Programmable fan offers increased performance when combined with whole home indoor air quality products.

### Home Screen Temperature Indicator



**Figure 1. Temperature Dial Feature**

- This is the heat set point position indicator on the dial. This object will be red in color.
- This is the cool set point position indicator on the Dial. This object will be blue in color.
- This is the location area where no system demand is active. In figure 1, the example would be any temperature between 73°F and 77°F.

- D. When there is an active call for heating, this area of the dial will fade back and forth from white to red.
- E. When there is an active call for cooling, this area of the dial will fade back and forth from white to blue.
- F. The yellow line indicates the actual room temperature on the temperature dial indicator.

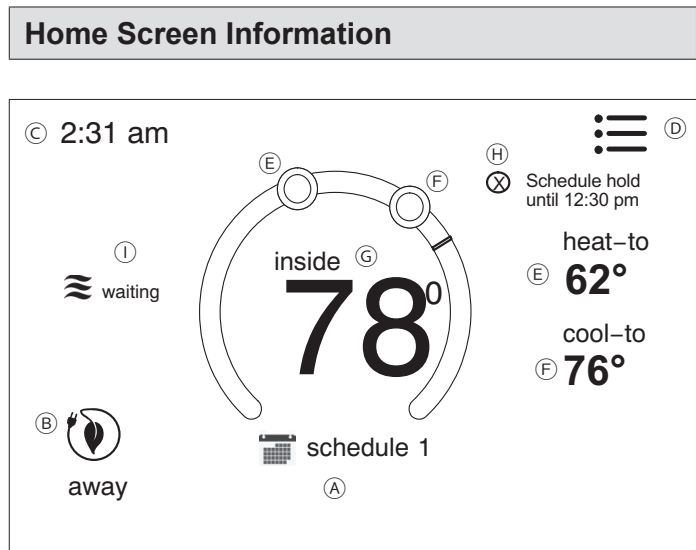
- B. **AWAY** - Selecting AWAY will allow the user to set the heating and/or cooling mode temperatures when away from home. Touch **cancel** to exit this screen and return to the home screen and normal system operations.

- C. Displays current time.
- D. **Menu** - This will allow access to notifications, performance report, schedules and settings.
- E. This allows you to set the heat-to (if enabled) temperature. Selecting the heat-to or temperature dial position indicator will take you to the temperature setting detail screen. The temperature dial will change from white to red when heating is active.

- F. This allows you to set the cool-to (if enabled) temperature. Selecting the cool-to or temperature dial position indicator will take you to the temperature setting detail screen. The dial will change from white to blue when cooling is active.

- G. Displays the current indoor temperature.
- H. Indicates the schedule is on hold until the next time period or permanent.

- Place the schedule on hold by touching on either the heat-to or cool-to location on the screen. If an adjustment is required for the temperature setting, this can be done now.
- After approximately three seconds the screen will display the override setting options.
- From the override setting screen, the options are 1 hour, 2 hour or next scheduled period. Make selection and then touch set.
- For the 1 or 2 hour setting the home





**Figure 2. Home Screen**

Touch the screen to turn on the back-light if it is off.

- A. **OPERATING MODE** - touch to access the screen that will list available modes. Selectable modes are heat/cool, heat only, cool only, off, emergency heat and schedule 1. In addition fan operation can be set to on, auto or circulate.







screen will indicate schedule hold until time indicated (i.e., 11:57 pm). To exit schedule hold, touch 

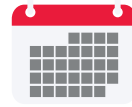
- When until next period is selected, the set point will be kept until the next program schedule period. To exit until next period, touch .

I. **System Status Icons** - Equipment operation information appears along the left side of the home screen. The displayed icons will indicate cooling or heating demand, cooling compressor delay, or cooling demand.

**Table 1. System Status Icons**

Icon	Description
	Red flames indicates the system is heating.
	Blue flames indicates the system is cooling.
	Snowflake indicates the next mode of operation will be cooling. Waiting indicates there is a compressor delay which is by default five minutes.
	Red flame indicates the next mode of operation will be heating.

**Table 1. System Status Icons**

Icon	Description
	Transitioning to next schedule temperature setting. This icon will only appear if smooth setback recovery is enabled under the installer setup. When enabled, it will begin recovery up to two hours before the programmed time so that the programmed temperature is reached at the corresponding programmed event time. Assume 12°F per hour for gas/electric heating and 6°F per hour for first stage compressor based cooling. When smooth set back recovery is disabled, the control will start recovery at the programmed time set in the schedule.

## Operating Mode Selection

Touch anywhere in the area indicated below to select how the system will operate.

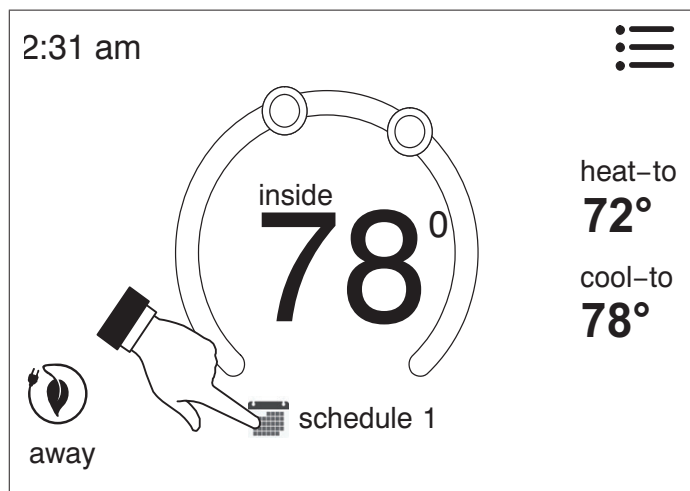


Figure 3. Operating Mode Selection

### Select Modes

1. **OFF**
2. **COOL ONLY** allows only cooling demand.
3. **HEAT ONLY** allows only heating demand.
4. **HEAT/COOL** allows the thermostat to switch between heating and cooling automatically.
5. **SCHEDULE (1, 2 and 3)** (see Edit Schedules on page 13 for customizing schedules).
6. **ON, AUTO** and **CIRCULATE** - Select by touching the desired fan operation ON, AUTO

and CIRCULATE. When selected a green check mark will be indicate selection.

When in the CIRCULATE mode, the fan will follow the setting configured under **menu > settings > fan > select fan mode**. Under circulate the circulate off time can be set from 1 to 30 minutes.

### FAN OPERATION

The desired fan mode can be selected in addition to selected mode of operation.

Table 2. Fan Operation

Icon	Mode	Description
	ON	Fan is NOT following the schedule and runs continuously until it is changed from the select mode.
	AUTO	Fan will follow the fan setting in the selected schedule.
	CIRCULATE	Fan is following schedule and cycles during periods of equipment inactivity. Circulate off time is set by the user.

**NOTES:** When system operating mode is set to OFF, both ON or CIRCULATE fan modes are disabled.

## User Menu Screen

Touch the three lines in the upper right-hand corner of the screen to access the menu. Selectable options under menu are notifications, performance report, edit schedules and settings.

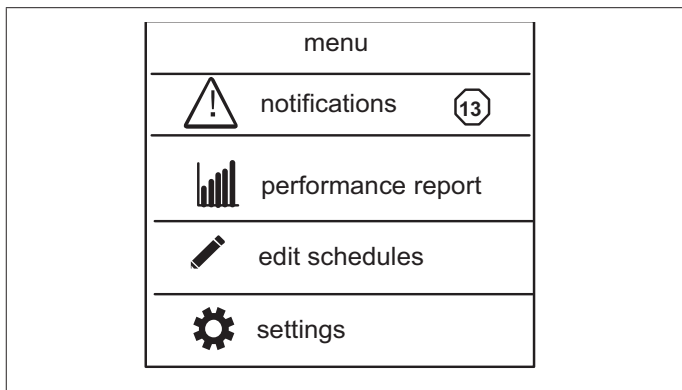


Figure 4. User Menu Screen

### NOTIFICATIONS

When a system error or reminder occurs, a pop-up screen will appear indicating the condition.

- Error code notification pop-up can be dismissed by touching the back button. Contact the dealer to resolve the issue.
- For notification, touch either clear or set a future reminder.

- Any active history for notifications (critical errors or reminders) will be listed under settings > notification.
- If critical errors occur, they will also be displayed under notifications as illustrated in figure 6.
- Touch the contractor info option for assistance.

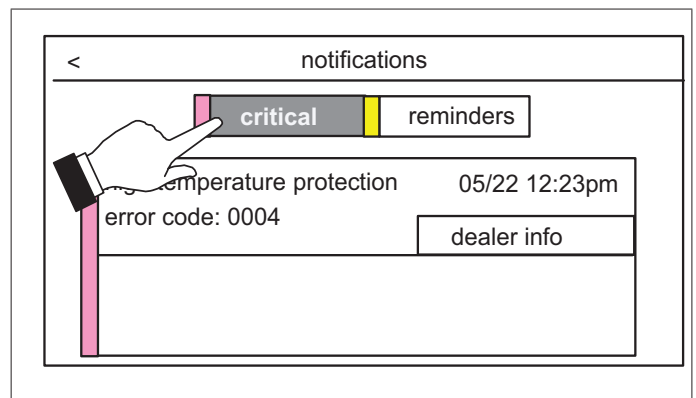
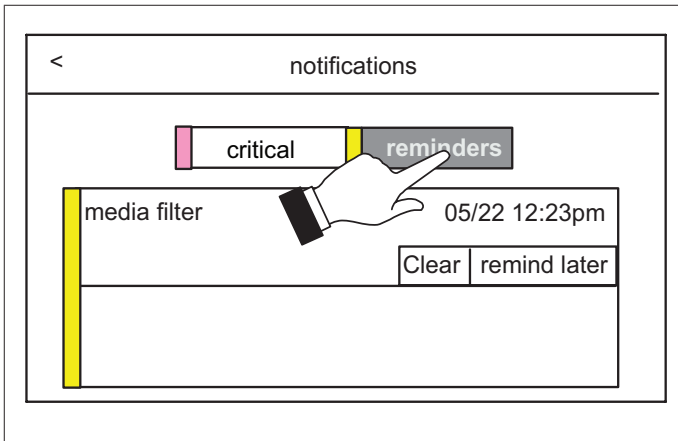


Figure 5. Critical Notifications

### REMINDERS

When reminders occur, they will also be displayed under notifications as illustrated in figure 7. Touch the clear or remind later to redisplay active reminder for 1 day, 1 week, 1 month, 3 months or a custom date.



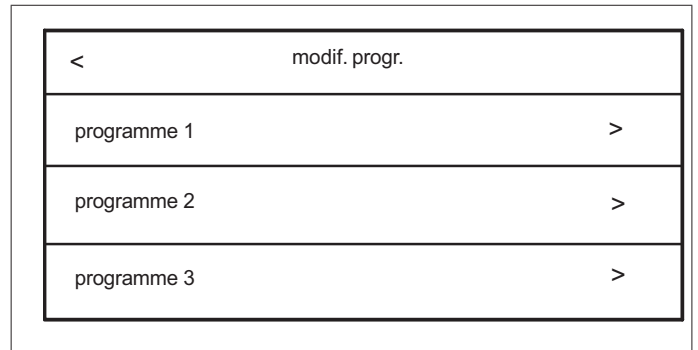
**Figure 6. Reminder Notifications**

**PERFORMANCE REPORT**

This will display the total number of hours each month that the system has been running. Example would be for mar (March) 23H or 23 hours. To return to the menu screen, touch the house icon in the upper left-hand corner of the screen. Red bar indicates heating and blue indicates cooling hours ran.

**EDIT SCHEDULES**

Any schedule can be edited by touching the right arrow next to the desired schedule.



**Figure 7. Edit Schedules Screen**

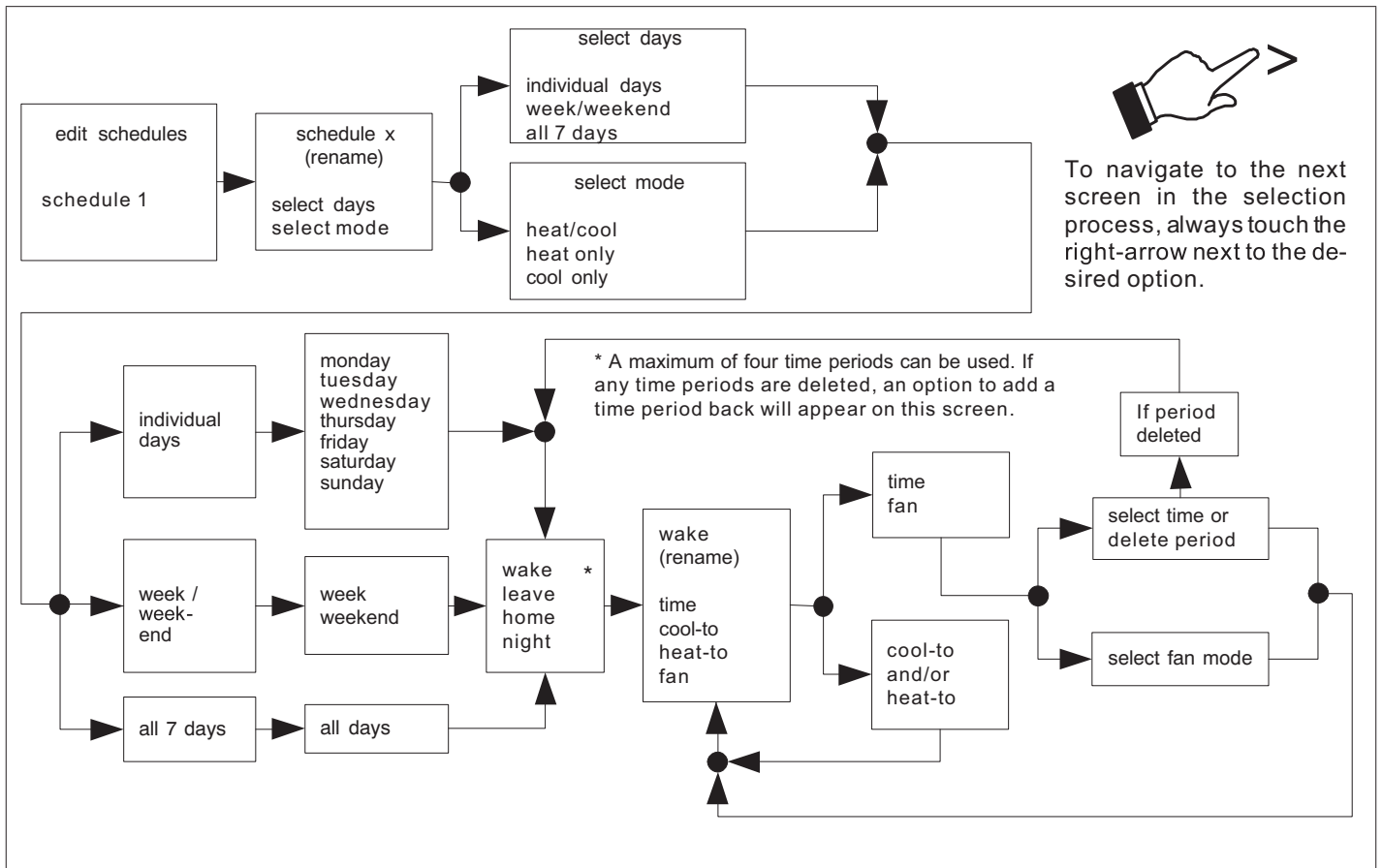
**NOTES:** See “Operating Mode Selection” on page 5 to run a specific schedule.

From the HOME screen touch the MENU and touch edit schedules option.

The edit schedules screen will allow section of up too three separate schedules. On the edit schedules screen, each schedule can be renamed and edited. See “Figure 8. Renaming and Editing Schedules” on page 8 for editing schedules.

**NOTES:** The fan mode that is selected under the edit schedules screen will always override the fan mode selected under the **select mode screen** or **menu > user settings > fan mode** if different

For example, if the select mode fan setting or **user settings > fan** is configured for Auto, and the schedule fan mode is set to circulate, then the system will follow the fan mode selected in the active schedule.



**Figure 8. Renaming and Editing Schedules**

## User Settings Menu

**Table 3. User Settings (General)**

Setting Selection	Function	Description
fan		See "Fan Operation" on page 5.
heat / cool (gas or electric heating is selected)	normal	Heats home to desired temperature setting. Options are on or off.
	setpoint range	Heating limit with a default of 0°F. Range is 45°F to 90°F Cooling limit with a default of 45°F. Range is 45°F to 99°F
cool only (option only appears if no heating equipment is available or configured)	set point range	Cooling limit with a default of 45°F. Range is 45°F to 99°F
reminders		<p>Select reminders. The reminder setting screen will appear and a list all of the predefined reminders plus the two custom reminders at the end of the list.</p> <p><b>NOTE:</b> <i>Your installer will need to change the name of the two available custom reminders.</i></p> <p>Select the desired reminder to set a date. By default all reminders are set to disabled. Touch disable for a specific reminder to choose from 3mon, 6mon, 12mon, 24mon or custom date.</p> <p>When finished, touch &lt; to return to previous menu.</p>

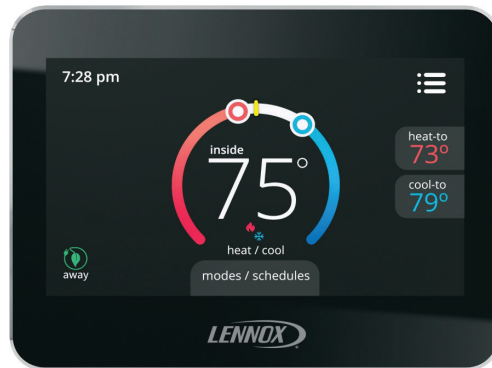
**Table 3. User Settings (General)**

Setting Selection	Function	Description
general - provides information about the thermostat and settings for screen lock, date & time and language.	about	Displays information concerning thermostat model number, serial number, hardware and software revisions.
	screen lock	Setting options are unlocked, partially, and locked.  To set partially lock, create a three digit code. Partially lock restricts access to the menu.  To set locked, create a three digit code. Lock restricts access to anything on the screen.  <b>NOTE:</b> <i>Partially Lock and Locked is set for one instance only. Either would need to be set each time it is desired to partially locked or locked the screen. Master code is 864 in case user forget their custom code.</i>
	date & time	Settings for 24-hour clock (military), daylight savings, set time and date.
	language	Languages available are English, Spanish, Portuguese and French.
display - Allows the user to control some information that is displayed on the home screen.	screen saver	Options are enable and disable. Default is enabled. When enabled only the time and inside temperature is displayed on the screen. Touching the screen will restore all other details.  The back light setting is also on the same screen. Options are continuous on or energy save. Default is continuous on.
	screen brightness	A horizontal adjustment bar is provided to move from minimum to maximum brightness.
	temperature scale	°F for Fahrenheit or C° for Celsius.
	clean screen	This will disable the touchscreen for 30 seconds.









# ComfortSense<sup>®</sup> 5500

## Installation and Setup Guide

507501-02  
6/2018  
Supersedes 5/2017

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## Shipping and Packing List

- 1 - ComfortSense® 5500 touchscreen, 7-day programmable thermostat with back plate
- 1 - Wall plate
- 2 - Mounting screws (M3.5x25mm self-tapping screws)
- 2 - Wall anchors
- 1 - Warranty certificate
- 1 each - Homeowner and Installer Guides

*NOTE - This thermostat is equipped with automatic compressor protection to prevent potential damage due to short cycling or extended power outages. The short cycle protection provides a 5-minute delay between heating or cooling cycles to prevent the compressor from being damaged.*



### IMPORTANT

Read this manual before programming the thermostat.  
Use this thermostat only as described in this manual.

## Description

The ComfortSense® 5500 thermostat (Catalog No. 13H13) is an electronic 7-day single-stage programmable touch screen thermostat. It also offers enhanced capabilities which include:

- worry-free memory storage feature

- menu-driven touch-screen display
- equipment maintenance reminders

This thermostat supports single-stage non-heat pump units.

**Dimensions (H x W x D)**


Case dimensions: 3-5/16 x 4-5/16 x 7/8 in. (84 x 110 x 22mm)


**Wall Plate Dimensions (H x W)**


Plate dimensions: 4-1/2" x 5-3/4" (114 x 146mm)

**Compressor Short Cycle Protection**

A 5-minute compressor short cycle protection timer begins when a compressor output is de-energized. Also, if a power loss occurs, the system will go into compressor protection mode and will display a snowflake icon and the word "waiting" next to it if there is a cooling compressor call.

 <b>WARNING</b>
<p>Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.</p> <p>Installation and service must be performed by a licensed professional HVAC installer (or equivalent) or service agency.</p>

 <b>CAUTION</b>
<p>This is a 24VAC low-voltage thermostat. Do not install on voltages higher than 30VAC.</p> <p>Do not short (jumper) across terminals on the gas valve or at the system control to test installation. This will damage the thermostat and void the warranty.</p>

 <b>IMPORTANT</b>
<p>In all applications, the ComfortSense® Model 5500 thermostat can only be used with all residential units and approved commercial split-system matches, and those which meet the following installation criteria:</p> <ul style="list-style-type: none"> <li>• installation uses 18 GAUGE thermostat wire or larger,</li> <li>• thermostat wire run length DOES NOT EXCEED 300' (91m),</li> <li>• load from any thermostat connection is 1 AMP or LESS.</li> </ul>



## WARNING

Always turn off power at the main power source by switching the circuit breaker to the OFF position before installing or removing this thermostat. All wiring must conform to local and national building and electrical codes and ordinances.

## Installation

Before beginning installation, note the type of equipment, number of stages, and any accessories being installed. This thermostat is a 24VAC low-voltage thermostat and requires a common wire to the thermostat to operate.

## DO

- Shut off all power to system before installing.
- Read this entire document, noting which instructions pertain to your equipment and system requirements.
- Make sure that all wiring conforms to local and national building and electrical codes and ordinances.
- Ensure load from any thermostat connection is less than 1 AMP.

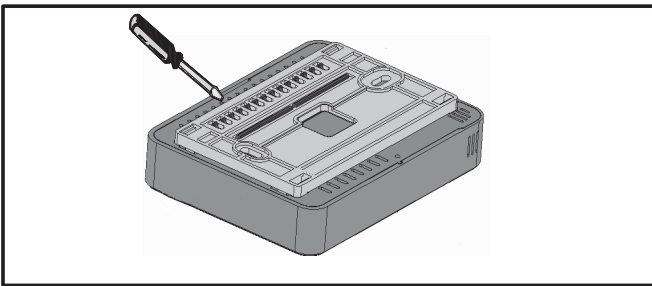
## DO NOT

- Install on voltages higher than 30VAC.
- Short (jumper) across terminals on the gas valve or at the system control to test installation. This will damage the thermostat and void the warranty.
- Install on outside walls or in direct sunlight.
- Exceed thermostat wire run length greater than 300 feet (91m).

### Installation Setup

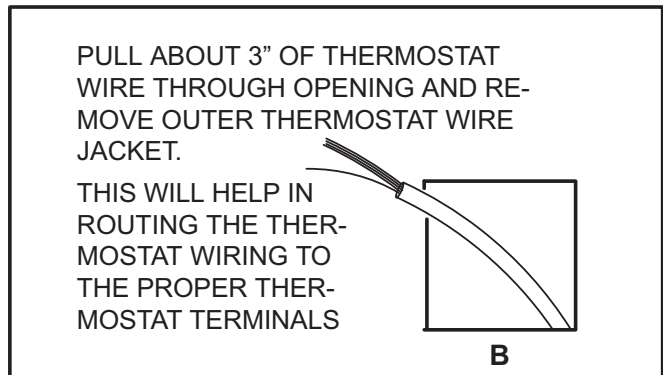
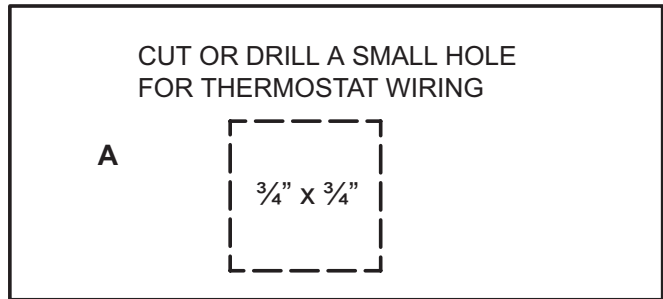
1. Unpacked the thermostat and open the case with a thin-blade screwdriver. Place between wall base and unit and twist to separate unit from base.
2. Select a location for the thermostat about 5 feet (1.5m) above the floor in an area with good air circulation at average temperature.
3. Do not install the thermostat where it can be affected by:
  - Drafts or dead spots behind doors and in corners.
  - Not close to entrance or automatic doors.
  - Not close to heat generating equipment such as kitchen equipment.
  - Not in an enclosed environment unless a remote indoor sensor is used.
  - Hot or cold air from ducts.

- Radiant heat from sun or appliances.
- Concealed pipes and chimneys.
- Unheated (uncooled) areas such as an outside wall behind the thermostat.

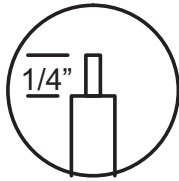


**Figure 1. Removing Back Plate**

4. Use steps **A** through **J** (step **J** applicable when using provided wall plate) to install the thermostat.

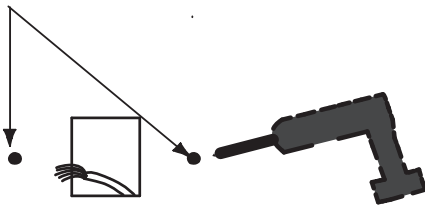


**C** TRIM 1/4" INSULATION FROM  
END OF EACH WIRE



DRILL 3/16" HOLES AT MARKED LOCATIONS  
ON WALL FOR ANCHORS

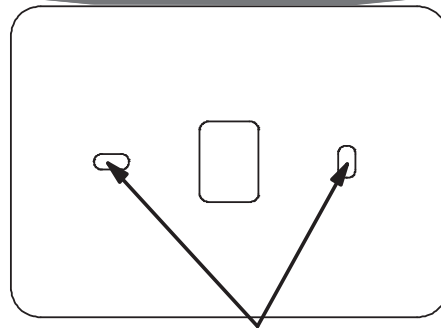
**E**



(USE A LEVEL) ALIGN WALL PLATE



**D**



USE UNIT WALL PLATE AS TEMPLATE TO MARK  
DESIRED MOUNTING HOLE LOCATIONS ON WALL.

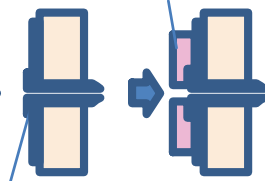
NOTE: INSTALLATION OF WALL PLATE IS  
OPTIONAL.

### Thermostat Installation with Wall Plate

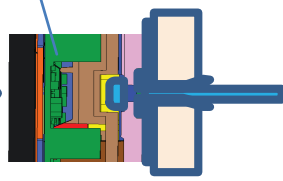
**F** - Place wall plate over holes in wall.



**H** - Attach back plate to wall plate.



**J** - Attach thermostat to back plate.

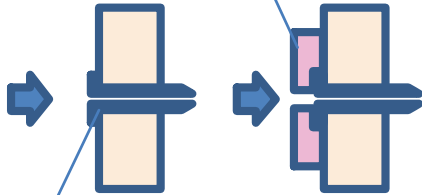


**G** - Insert wall anchors through wall plate into wall.

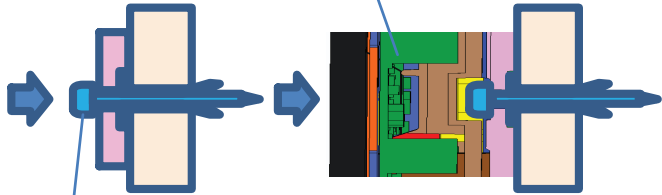
**I** - Insert provided screws through back and wall plates into wall anchors.

### Thermostat Installation without Wall Plate

**G** - Place back plate over wall anchors in wall.



**I** - Attach thermostat to back plate.



**F** - Insert wall anchors through wall plate into wall.

**H** - Insert provided screws through back plate into wall anchors.

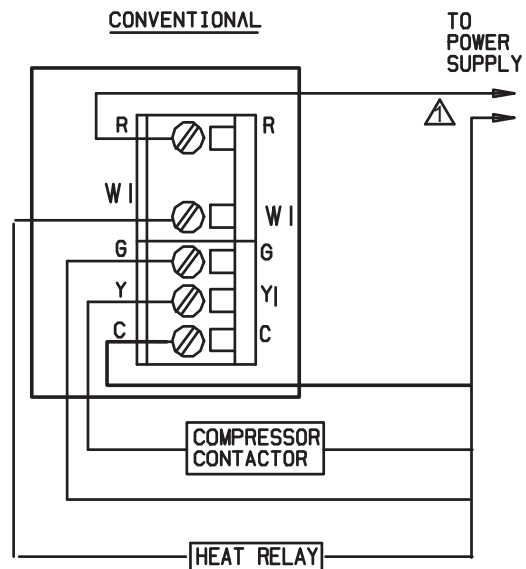
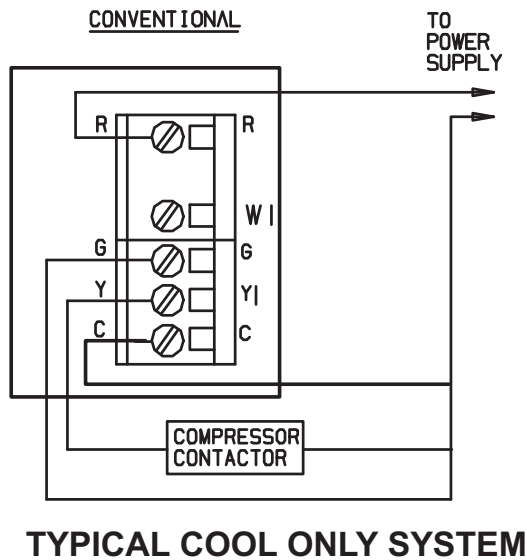


**Wiring thermostat**

1. Connect wiring between thermostat, indoor unit, and outdoor unit as shown in the appropriate wiring diagram.
2. Seal the hole in the wall with a suitable material to prevent drafts from entering the thermostat case.
3. Configure thermostat and equipment for system type (gas or electric heat), program the thermostat, and test system.

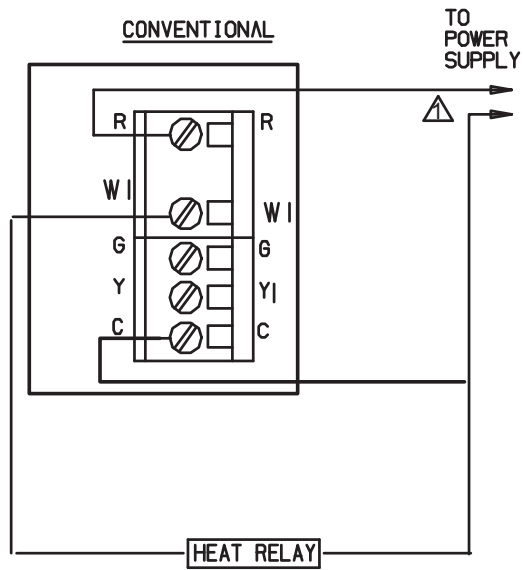
**TERMINAL DESIGNATIONS**

- C - Common 24 VAC
- G - Fan relay
- W1 - 1st stage heating (electric or gas heat)
- Y1 - 1st stage cooling
- R - 24VAC power



⚠ POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED

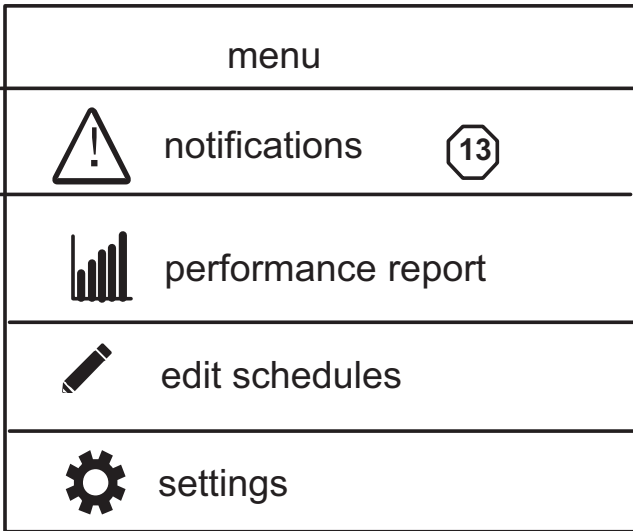
**TYPICAL CONVENTIONAL SINGLE-STAGE HEAT / COOL SYSTEM**



**TYPICAL HEAT ONLY SYSTEM**

△ POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED

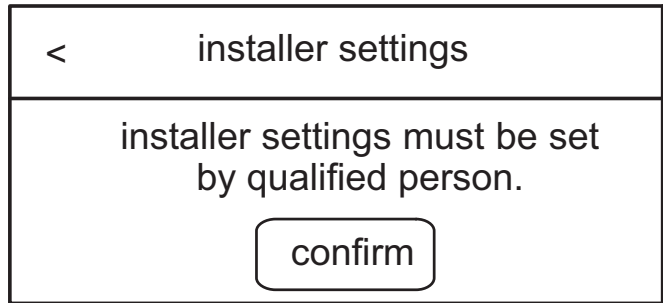
**Installer Settings**



**Figure 2. Installer Menu Screen**

**Menu**

1. Touch **menu** option from the home screen.
2. Touch and hold the **settings** option on the menu. This will display the **installer settings** notice and then menu.



**Figure 3. Installer Menu Screen Confirmation**

3. Available options are as follows:

< installer settings	
system setup	>
residual cool	>
dead band	>
smooth set recovery	>
contact information	>
stage 1 diff	>
temperature offset	>
compressor protect	>
custom reminder	>
reset setting	>
energy saving default	>
system test mode	>

## **System Setup**

Sets the thermostat heat options.

<	system settings
indoor unit settings	
No heat	
gas/oil	✓
electric	

**Figure 4. System Setup**

### **Residual Cool**

Default is 0 seconds. This is the time, in seconds, that the fan runs after a call for cooling is satisfied in order to deliver any residual cooling ability from the coil and ductwork into the conditioned space. Options are 0, 30, 60, 90 and 120 minutes. Touch < to return to previous menu.

### **Deadband**

Default is 3°F (2°C). The deadband setting is the minimum difference between the cooling and heating set points. This setting is used in cool/heat mode to ensure smooth equipment operation. The deadband is adjustable from 3 to 8°F. Use the + or - option

to select desired deadband. Touch < to return to previous menu.

### **Smooth Set Recovery (SSR)**

Options are enable or disable. Default is Disabled. When enabled, smooth set back begins recovery up to two hours before the programmed time so that the programmed temperature is reached at the corresponding programmed event time. Assume 12°F per hour for gas/electric heating and 6°F per hour for first stage compressor based cooling. With Smooth Set Back disabled, the control will start a recovery at the programmed time.

### **Dealer Information**

This allows the installer to add dealer name, address, phone, email, website and number.

Touch < to return to previous menu.

### **Stage 1 Diff**

The default is 1.0°F but can be programmed between 0.5° and 8.0°F in 0.5°F increments. Touch < to return to previous menu.

### **Temperature Offset**

Default is 0°F. This setting can be used to offset the displayed space temperature by up to +/- 5°F. This offset also applies to the control temperature. Touch < to return to previous menu.

### **Compressor Protect**

Default is ON and it can be turned OFF, however only for one compressor cycle and then it will revert back to ON.

If the system is running in compressor protection, the home screen displays “WAIT” only if there is cooling call for the compressor (Y1).

If compressor protection is running and there is a demand for electric heating, the system waits for the compressor protection timer to expire.

**Custom Reminders**

Two custom reminders may be rename on this screen to the desired name (name is limited to 19 characters). After entering the new name, touch the done key to return to the customer reminder screen.


To set a reminder go to the User Settings screen and select **reminders**. The reminder setting screen will appear and a list all of the predefined reminders plus the two custom reminders will appear at the end of the list.

Scroll to CUSTOM REMINDER 1 or 2 (or renamed titles). Touch the title to select the reminder. By default all reminders are set to disabled. Touch disable to choose from 3mon, 6mon, 12mon, 24mon or custom date.

When finished, touch < to return to previous menu.

**Reset Settings**

To reset the thermostat to factory defaults, scroll to RESET SETTINGS and touch to select. Read the message and to continue touch **CONFIRM**.

	<b>IMPORTANT</b>
<b>RESET SETTINGS</b> erases all programming and returns the thermostat to the factory conditions, including the installer settings. Use this only as a last resort.	

**Energy saving Default**

Energy saving recommended set points for heating and cooling can help save energy. The time and temperatures reference in table 1 are pre-programmed into the thermostat to achieve energy savings.

Scroll to ENERGY SAVING DEFAULT and touch to select. Read the message on the screen and to continue, touch **CONFIRM**.

**Table 1. Energy Saving Set Points**

<b>Time</b>	<b>Heating</b>	<b>Cooling</b>
Wake	70°F (21°C)	78°F (25°C)
Leave	62°F (17°C)	85°F (29°C)
Return	70°F (21C)	78°F (25°C)
Sleep	62°F (17°C)	82°F (28°C)




**System Test Modes**

After the thermostat has been installed and set-up, the installer may run a system test function (ac-

cessed through the installer settings menu). Test include cooling, heating and fan outputs.

Select system test mode. A pop-up will be displayed indicating all equipment will be stopped. Touch **confirm** to continue.

Touching the **OFF** button next to the desired option will change the status to **ON** and will enable the relay for that terminal. Touching again will turn **OFF** the relay. Touch the left arrow (<) to exit the system test mode.

system test mode	
Y1	
W1	
G	

All HVAC components can be tested to confirm the signals between thermostat and unit are being sent and were received.

*NOTES: After 5 minutes without a test being initiated, the test modes is disabled and system goes back to the normal mode (i.e. HOME screen).*

*When in SYSTEM TEST MODE, the compressor minimum off timer is bypassed.*

### Unit Part (Catalog) & Serial Numbers

A label on the back of the thermostat is visible through an opening in the back of base plate. This identifies the Lennox Catalog Number, Part Number and Serial Number. Separate the base plate from the thermostat to see additional manufacturing information.

### Memory Protection

The thermostat stores all the information concerning its programming (state, mode, program information, last temperature measured) in a nonvolatile memory.

This function avoids the loss of the state of the thermostat when a power-down occurs. The only thing that might be lost is the clock and date information, however, a lithium battery will remember clock / date information for as long as it has a charge (approximately 24 hours). When power down occurs (due to a power outage) the thermostat is able to switch off all relays. When power is restored the thermostat will be in heat /cool mode so either mode can run to re-satisfy the temperature setting in the home. Day and time (schedules) may be off due to battery power loss.

## Diagnostic Information

Error Code	Screen Text	Priority 0:high 1:middle 2:low	Message Type	Condition	System Action	Action to Clear / Recovery Condition
4	high temperature protection	0	critical	High temperature protection when outdoor ambient temperature exceeds 96°F (35.6°C).	All stages of heat are turned off by safety relay. This error is displayed on notification screen.	Once temperature drops below 96°F (35.6°C), the system resume operation.
5	temperature sensor error	0	critical	Local temperature sensor is out of range -40°F to 158°F. There is a finite difference between main thermostat and sub-thermistor which is greater than 5°F.	Indoor temp is displayed as "--" on the home screen. This will STOP all temperature related operation. All stages of heat are turned off by safety relay. This error is displayed on notification screen.	Either thermostat will have to be replace or if the sensor returns to normal operating range, the error message will automatically clear and the system will resume operation.
7	memory error	0	critical	EEPROM error (Power ON)	System will restore using to Energy Star defaults and resume operations. This error is displayed on notification screen.	Thermostat will need to be replaced.
8	memory error	0	critical	EEPROM error (Operating)	System will operate in normal mode operation until power off. This error is displayed in notification screen.	

## Reminder Information

Error Code	Screen Text	Message Type	Action to Clear / Recovery Condition
12	replace media filter	reminder	Touch either <b>done</b> to clear the reminder or <b>remind later</b> button.
13	replace UV lamp		
14	replace humidity pad		
15	routine system check-up		
16	replace metal insert for pure air		
17	user editable		
18	user editable		

## Supported Configurations

This thermostat supports air conditioner systems only with single speed compressors.

	Backup/ Indoor Heat	Comp. stages	Indoor Heat Stages	Heat Stages	1st Heat Stage	Cool Stages	1st Cool Stage
Non HP	GAS/OIL OR ELEC.	1	1	1	W1	1	Y1
Non HP	NONE	1	0			1	Y1



## Installation Checklist

Item Number	Item	Yes	No
1	Is the thermostat level where mounted on the wall?		
2	Is the thermostat installed away from direct sunlight or discharge air vents?		
3	Has the thermostat been wired correctly based on the type of equipment installed (air handler, outdoor unit and accessories)?		
4	Is the thermostat wiring secured tightly to the terminals?		
5	Is the common wire (terminal C) connected?		
6	Has the System Test Mode located under the installer settings been used to verify proper operation?		